



MITIGATION PLAN

FINAL

December 9, 2020

CARPENTER BOTTOM MITIGATION SITE

Gaston County, NC
NCDEQ Contract No. 7731
DMS ID No. 100090

Catawba River Basin
HUC 03050102
(03050103 Expanded Service Area)

USACE Action ID No. SAW-2018-02062
NC DWR Project No. 2019-0049
RFQ #: 09132018

PREPARED FOR:



**NC Department of Environmental Quality
Division of Mitigation Services**

1652 Mail Service Center
Raleigh, NC 27699-1652

DRAFT MITIGATION PLAN

CARPENTER BOTTOM MITIGATION SITE

Gaston County, NC
NCDEQ Contract No. 7731
DMS ID No. 100090
Catawba River Basin
HUC 0305102
(03050103 Expanded Service Area)
USACE Action ID No. SAW-2018-02062

PREPARED FOR:



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

PREPARED BY:



Wildlands Engineering, Inc.
167-B Haywood Rd
Asheville, NC 28806
Phone: (828) 774-5547

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 DMS operations and procedures for the delivery of compensatory mitigation.

Contributing Staff:

Eric Neuhaus, PE, *Project Manager*
Shawn Wilkerson, *Principal in Charge*
Kristi Suggs, *Wetland Delineations*
Jordan Hessler, *Mitigation Plan Development*

Haley Brinkley, *Mitigation Plan Development*
Scott Gregory, *Mitigation Plan Development*
Josh Short, *EI Stream and Wetland Design*
Christine Blackwelder, *Lead Quality Assurance*



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

December 1, 2020

Regulatory Division

Re: NCIRT Review and USACE Approval of the NCDMS Carpenter Bottom Mitigation Site /
Buncombe Co./ SAW-2018-02062/ NCDMS Project # 100090

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

Dear Mr. Baumgartner:

The purpose of this letter is to provide the North Carolina Division of Mitigation Services (NCDMS) with all comments generated by the North Carolina Interagency Review Team (NCIRT) during the 30-day comment period for the Carpenter Bottom Draft Mitigation Plan, which closed on October 25, 2020. These comments are attached for your review.

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

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

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

Sincerely,

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

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List

Matthew Reid, Paul Wiesner—NCDMS

Eric Neuhaus, Shawn Wilkerson—WEI



REPLY TO
ATTENTION OF:

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

CESAW-RG/Browning

November 13, 2020

MEMORANDUM FOR RECORD

SUBJECT: Carpenter Bottom Mitigation Project - NCIRT Comments during 30-day Mitigation Plan Review

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

NCDMS Project Name: Carpenter Bottom Mitigation Site, Buncombe County, NC

USACE AID#: SAW-2018-02062

NCDMS #: 100090

30-Day Comment Deadline: October 25, 2020

USACE Comments, Kim Browning:

1. The ratio for the preservation area would be more appropriate as a low-level enhancement area since it is proposed for cattle exclusion and invasive treatment. The lack of a wider buffer also warrants a lower ratio. Wider buffers, measuring at least 100 feet in width, are generally required. An enhancement III ratio of 8:1 would be more appropriate for this area.
 - a. Do the buffers meet the minimum width on reach 2? They appear to be narrow in one section, especially on the eastern boundary.
2. Livestock exclusion is mentioned as a way to gain functional uplift throughout the plan but it's unclear how this will be accomplished without fencing, especially given the fact that multiple landowners are involved. Will existing fence on adjacent properties be the main way to exclude cattle? This seems risky for future encroachments.
3. Please include a veg plot in the wetland rehabilitation area near GWG 5 (wetland N).
4. It would be helpful to show the existing farm roads on Figure 3 since these areas will be a concern due to compaction. Please put at least one mobile veg plot in one of these areas.
5. Page 3: Please correct "30530.230" cool stream credits.
6. There is concern that wetlands may extend beyond the conservation easement, into adjacent farmland. A potential risk is that the adjacent landowner may ditch or tile the wetland adjacent to the CE.
7. It would be helpful to include the NCSAM/WAM results in Tables 5 and 6.
8. Tables 9 and 17 state that livestock fence will be installed as needed. This is inconsistent with other sections that state that fence will not be necessary because cattle will be removed.
9. Section 8.0: The IRT does not support terminating monitoring after 5 years. 7 years is required.
10. Section 8.1.1: The ER for C type streams should be no less than 2.2.

11. Section 8.2: Please remove the section that discusses inundation and a decreased vigor standard. If tree height is a concern during monitoring this can be addressed in an adaptive management plan. Additionally, please correct Table 17.
12. Section 8.5: The Corps supports benthic and water quality monitoring on this site.
13. Appendix 14: I'm a little confused why you ran the buffer tool and actually lost credits. It looks like the only place where you have less than 50 ft is at the end of the Carpenter Branch R2, and this appears to be less than 5% of the total length. Please confirm. By using the buffer tool you get penalized for the crossing as well.

WRC Comments, Travis Wilson:

1. The vegetation portion of the mitigation plan identified a target community but did not include a comprehensive list of species representative of that community. A target community species list should be included in the mitigation plan and the planting plan should reflect that list of species.
2. The Draft mitigation plan did not include details for the design of the culvert crossing. This information should be provided prior to the final mitigation plan in order to review adequate size, configuration, and structure type.
3. The target community identified should not have vast areas of inundation that would affect vigor. There may be a mosaic of depressional areas that would have longer periods of inundation potentially affecting some species vigor and that can be described in the mit plan, but I don't agree with adjusting the success criteria.

EPA Comments, Todd Bowers:

1. General:

- I would like to commend the site sponsor and landowner for protecting the headwater wetlands and streams by livestock exclusion without the need for fencing. Limiting livestock access to site streams or drainages is crucial in protecting stream stability and minimizing harm to water quality downstream.
- Recommend expanding the conservation easement to include upland buffers for the restored wetlands at the headwaters of Carpenter Branch where feasible. Some of the wetlands may extend well beyond the currently proposed conservation easement boundaries and without additional protection these wetlands may experience degradation if the adjacent aquatic resource is not protected.
- I found it very helpful to name the main tributary of the site as Carpenter Branch and not just another UT.
- I am confused on the presence/absence of fencing across the site. Correspondence and some of the mitigation plan states that fencing is not needed as all cattle will be removed by the landowners. Other parts of the document clearly state that fencing will be a site objective to meet the livestock exclusion goal. The entire document needs to be edited to provide consistency one way or another, however total cattle exclusion without the need for fencing is the preferred approach.

2. Section 4.1/Page 10:

- Recommend adding livestock exclusion as a method to provide potential functional uplift of the site wetlands.

3. Section 4.5/Page 11:

- Recommend adding livestock exclusion as a method to provide potential uplift to stream channel geomorphology.

4. Section 5.3/Page 13:

- Fencing is mentioned as method of improving the wetland function via removing livestock and will be denoted in final plans. This is adding to confusion of the presence/absence of fencing on-site.

5. Table 9/Page 15:

- Livestock fencing is listed as an objective for livestock exclusion goal. Recommend clarifying/correcting this inconsistency.
6. Section 7.1/Page 16:
 - Recommend adding “decommissioning farm roads” as part of the design approach. The detailed plan sheets show these roads to be removed in detail.
 - Cattle exclusion is mentioned but the method is not addressed.
 7. Section 7.4/Page 20:
 - Relatively low design discharge (14 cfs) justification for Carpenter Branch Reach 1 was noted.
 8. Section 7.6 /Pages 23-24:
 - Livestock exclusion along entire reach of Carpenter Branch, UTs and headwater wetlands is mentioned but the method remains unknown.
 9. Section 7.7.3/Page 25:
 - EPA appreciates the breadth and timing of the six groundwater gauges installed as well as the data included to confirm presence/absence of potential wetland hydrology in the locations proposed for wetland restoration. This is excellent baseline data that clearly demonstrates the potential of this site to provide quality wetland function.
 10. Section 7.8/Page 28:
 - Recommend moving the last date for planting to be no later than April 15. This gives a two-week buffer period to properly conduct a vegetation survey that should be completed by November 1 of MY1. Giving a six-week extension to the planting season also unnecessarily increases the risk of mortality for first year bare-root seedlings and saplings so I highly recommend that Wildlands avoid going beyond March 15 as little as possible.
 11. Section 8.2/Page 30:
 - Recommend adding November 1 as last date for vegetation sampling.
 - Recommend adding the estimated number of vegetation plots in total and in the three planing zones to be monitored for performance. Please update the monitoring figure to include all planting zones (wetland re-habilitation zone does not appear to be monitored in Figure 10).
 12. Section 8.5/Page 31:
 - Wildlands has stated in correspondence that are not seeking the bonus credit from water quality monitoring but this is an excellent site to demonstrate uplift since much of the headwaters are encompassed and there is a high quality area (CB preservation) that is a good source for benthic macroinvertebrates to move upstream/migrate from. An extra 2-4% of stream credits may offset those lost to less than 50-foot width riparian buffers.
 13. Table 17/Page 30:
 - Inconsistent approach to cattle exclusion (fencing) is listed as an objective here.
 14. Section 10/Page 35:
 - No livestock, fencing or crossings are proposed for the project. Clarify if necessary but I believe this is the preferred approach according to correspondence from Wildlands.
 15. Section 12/Page 36:
 - Add language to address the potential for water quality sampling and the additional potential credits that may be generated by such action if pursued.
 16. Planting Plans:
 - Add the wetland indicator status for each species proposed for planting in the wetland zones.
 - Recommend adding alternative species that may be considered if the primary chosen species are not available at the time of planting in either the riparian or wetland zone.

DWR Comments, Erin Davis:

1. Page 5, Section 3.2 – DWR appreciates that Gaston County planning documents were reviewed for this plan.
1. Page 7, Section 3.4 – Please reference NCSAM ratings and include the assessment and scoring sheets in the appropriate appendix.

2. Page 15, Table 9 (also Page 32, Table 17) – Based on the response to DMS comments, fence installation is not proposed for this project. Please update objective descriptions in both tables.
3. Page 24, Section 7.7 – Please confirm whether a total of 8.8 acres or 10.2 acres (page 3) of historically altered wetlands are proposed to be restored.
4. Page 25, Section 7.7.2 – The soil investigation notes the depth to hydric indicators is less than 10 inches onsite. Is grading proposed within wetland credit areas? If so, will any of these areas be graded beyond than 12 inches?
5. Page 26, Section 7.7.3 – Section 8.3 lists the performance standard hydroperiod based on the IRT 2016 guidance. However, based on the pre-construction baseline site data and reference wetland data, what is the designed target hydroperiod (range) for the proposed wetland community?
6. Page 28, Section 7.8 –
 - a. This section only mentions planting early successional species. DWR would like to see a mix of early successional native species and appropriate climax species based on the designated target community.
 - b. It is noted that ripping may be performed in haul road and stockpile areas, but of specific compaction concern to this project is the decommissioning of farm roads that crisscross the easement both in wetland and stream buffer areas.
7. Page 28, Section 7.9 – If cattle will be removed fully from the properties by the property owners as mentioned in the response to DMS comments, then please identify the primary use for the proposed culvert crossing. Will it still function as an agriculture crossing?
8. Page 30, Section 30 – DWR does not support the requested reduced vigor standard due to inundation without additional information. Based on your modeling and reference wetland data, what is the expected inundation period? If the inundation period is expected to be long enough to stunt vegetation growth, shouldn't this also be reflected in the target hydroperiod duration performance criteria? A request for a reduced vigor standard may be a more appropriate discussion during adaptive management planning, unless the proposed wetland restoration is designed to have prolonged inundation based on the wetland target and reference community(s).
9. Page 31, Section 8.5 – DWR supports benthic and water quality monitoring at this site.
10. Page 33, Table 17 – See DWR comment #8 regarding vigor. Also, please provide more information about the shaded plantings. Is supplemental understory/shrub planting proposed? If so, please distinguish supplemental planting areas from full planting areas on a figure or design sheet.
11. Page 34, Table 18 – Please add a stream gauge on UT2, as mentioned in Section 8.1.3.
12. Page 35, Section 10 – In an effort to reduce the risk of encroachment, signage spacing and visibility will be important given all bends/corners along the proposed CE and multiple property owners.
13. Figure 10 –
 - a. DWR requests the flow gauges on UT 3 and Carpenter Branch be shifted upstream near the proposed photo points (approximately two-thirds the way upstream of the confluence).
 - b. Please shift a permanent veg plot from the wetland re-establishment area to the wetland rehabilitation area.
 - c. DWR requires a minimum of one additional groundwater gage. Please place the additional gage near the wetland re-establishment/rehabilitation line east of UT2. DWR requests an additional groundwater gage near the right bank photo point along Carpenter Branch. It appears that of the originally proposed nine gages, six are located approximately 50 feet from the easement boundary. DWR requests that at least half of the total gages be placed within 50 feet of the easement boundary, since this is the area DWR is most concerned with meeting the minimum hydroperiod performance standard.
 - d. Please include a photo point at the proposed crossing.

- e. Please add a note regarding the four random veg plots to be monitored.
 - f. Please show or note that photo points will be taken at cross sections, veg plots and gauge locations.
14. Sheet 2.1.1 – It would help our review to see the existing channel areas proposed to be filled as a shaded feature on the plan view sheets, or for callouts be added. If ditch/channel plugs area proposed, please identify the approximate locations. Also, please provide detail(s) for ditch/channel filling and plugs.
15. Sheet 2.1.5 – Please call out culvert removals and show proposed culvert and easement break lines on profiles.
16. Sheet 2.4.1 –
- a. Will the pipe above the proposed BMP be removed?
 - b. What is the adjacent 50-ft existing easement line for?
17. Sheet 3.0 – Please confirm that the structure entering CE from west will be removed; please add a callout identifying what it is.
18. Sheet 4.0 –
- a. DWR understands that quantity substitutions may be necessary based on the nursery's species available. However, we request that no species (excluding live stakes) account for more than 20 percentage of a specified planting zone in order to promote diversity within the designated community type.
 - b. It would be helpful for our review to have the wetland indicator status included in the tables.
19. Sheet 6.1 – Rock sill – DWR does not support seeding banks with pearl millet or fescue.
20. Sheet 6.7 – Based on the material size it appears that the “rock toe” will be a riprap toe. Please explain why this stabilization treatment is proposed rather than a stone/boulder toe for the four stream bank areas called out.
21. Sheet 6.2 – DWR likes the level of detail provided for the vernal pool typical, including the LWD callout.
- a. Please consider a max. depth of 14 inches if a pool isn't expected to seasonally dry at 18 inches.
 - b. Were options evaluated to create a stable connection between pool and stream without adding riffle material? Please callout riffle material size.
 - c. No vernal pools were called out on plan view sheets, if the proposed locations are to be determined during construction please make sure to include callouts on the redline record drawings.
22. Appendix 7 – In future project plans, DWR would request at least 1-2 additional representative boring logs be provided based on the wetland credit area proposed and landscape features.
23. Appendix 13 – The IRT meeting minutes mentioned the possibility of extending the CE width along a section of Carpenter Branch. What happened to this discussion?

Kim Browning
Mitigation Project Manager
Regulatory Division



December 9, 2020

ATTN: CESAW-RG/Browning
Ms. Kim Browning
US Army Corps of Engineers – Wilmington District
69 Darlington Avenue
Wilmington, NC 28403-1343

RE: Carpenter Bottom Mitigation Site
Gaston County, NC
Response to NCIRT Comments during 30-day Mitigation Plan Review
USACE Action ID No: SAW-2018-02062
DWR Project ID: 7731
NCDMS Project No: 100090

Dear Ms. Browning:

Wildlands Engineering, Inc. (Wildlands) has reviewed DWR's, NCWRC's, USACE's, and US EPA's comments from the Carpenter Bottom Mitigation Plan package. Wildlands responses to DWR's, NCWRC's, USACE's, and USEPA's comments are outlined below.

USACE Comments, Kim Browning comments received November 13, 2020:

- 1. The ratio for the preservation area would be more appropriate as a low-level enhancement area since it is proposed for cattle exclusion and invasive treatment. The lack of a wider buffer also warrants a lower ratio. Wider buffers, measuring at least 100 feet in width, are generally required. An enhancement III ratio of 8:1 would be more appropriate for this area.*

Wildlands Response: Wildlands updated the proposed approach and associated credits for Carpenter Branch Reach 2 to Enhancement III at an 8:1 mitigation ratio. Affected sections of the mitigation plan including Section 12 and Table 20 were updated to reflect the change in approach and crediting.

- a. Do the buffers meet the minimum width on reach 2? They appear to be narrow in one section, especially on the eastern boundary.*

Wildlands Response: The riparian buffers along Carpenter Branch Reach 2 meet the required 50-foot minimum outside the portion of the reach between station 126+53 to 127+77. This length of the reach does not have the required 50-foot buffer along the left bank based on property limitations. Wildlands updated the mitigation plan and associated materials to show this portion of Carpenter Branch Reach 2 as not for credit. This portion of Carpenter Reach 2 will be within the conservation easement and treated as part of the project however, based on the limited buffer, no credit is proposed.



2. *Livestock exclusion is mentioned as a way to gain functional uplift throughout the plan but it's unclear how this will be accomplished without fencing, especially given the fact that multiple landowners are involved. Will existing fence on adjacent properties be the main way to exclude cattle? This seems risky for future encroachments.*

Wildlands Response: The project parcels, while owned by multiple family members, were previously leased to a single tenant farmer for cattle. The property owners plan to terminate the lease and require livestock to be removed prior to project construction. Therefore, cattle exclusion will be achieved via removal of livestock which will provide ecological uplift to project streams and wetlands. All property owner option agreements include language which clearly states that livestock must be removed, or fencing must be installed to exclude livestock. The property owners have chosen to remove the livestock. As noted in Section 10.0 and Table 19 of the mitigation plan "If land use changes in the future and fencing is required to protect the easement, the landowner is responsible for installing appropriate approved fencing."

3. *Please include a veg plot in the wetland rehabilitation area near GWG 5 (wetland N).*

Wildlands Response: A permanent Vegetation plot was added to wetland rehabilitation areas within wetlands I & N. A mobile plot will be located in wetland M during monitoring. These changes can be seen on the revised Figure 10.

4. *It would be helpful to show the existing farm roads on Figure 3 since these areas will be a concern due to compaction. Please put at least one mobile veg plot in one of these areas.*

Wildlands Response: The existing farm roads are dirt trails which are currently used primarily for ATV and foot traffic. They will be decommissioned during construction by ripping as deemed necessary in the field to reduce soil compaction. The existing farm roads have been added to Figure 3. A mobile vegetation plot was added to Figure 10 in the location of one of the existing farm roads.

5. *Page 3: Please correct "30530.230" cool stream credits.*

Wildlands Response: The total stream credit was revised to 3,067.849 credits to correct the error in the comment above and update the project crediting based on revisions documented within this comment response letter.

6. *There is concern that wetlands may extend beyond the conservation easement, into adjacent farmland. A potential risk that the adjacent landowner may ditch or tile the wetland adjacent to the CE.*

Wildlands Response: Wildlands acknowledges that portions of the jurisdictional wetland features extend outside of the conservation easement, however, real estate and farm infrastructure limitations prevent these areas from being included within the conservation easement. Wildlands captured as much jurisdictional wetland as possible within the conservation easement and no crediting is proposed for areas outside of the conservation easement.

7. *It would be helpful to include the NCSAM/WAM results in Tables 5 and 6.*

Wildlands Response: The NCSAM/WAM rating were added to Tables 5 and 6.

8. *Tables 9 and 17 state that livestock fence will be installed as needed. This is inconsistent with other sections that state that fence will not be necessary because cattle will be removed.*

Wildlands Response: See response to USACE comment #2 regarding livestock exclusion. Tables 9 and 17 were reviewed and proposed fencing references were removed. Livestock exclusion discussion was left within the tables, as livestock exclusion is still a method of uplift being performed in project streams and wetlands.

9. *Section 8.0: The IRT does not support terminating monitoring after 5 years. 7 years is required.*

Wildlands Response: The language in section 8.0 was updated to reflect a 7-year monitoring period.

10. *Section 8.1.1: The ER for C type streams should be no less than 2.2.*

Wildlands Response: The statement in section 8.1.1 was corrected to say “entrenchment ratios must be no less than 2.2 at any measured riffle cross section”.

11. *Section 8.2: Please remove the section that discusses inundation and a decreased vigor standard. If tree height is a concern during monitoring this can be addressed in an adaptive management plan. Additionally, please correct Table 17.*

Wildlands Response: The discussion within Section 8.2 and Table 17 regarding decreased vigor standard has been removed. Text within Section 8.2 was updated to read:

“Given inundation periods anticipated for areas proposed for wetland restoration, woody vegetation growth may be hindered resulting in stunted tree heights. If monitored vegetation data does not meet the required vigor outlined above, tree height and vigor will be evaluated and discussed within monitoring reports and adaptive management plans, as necessary.”

12. *Section 8.5: The Corps supports benthic and water quality monitoring on this site.*

Wildlands Response: Wildlands recognizes that ACOE supports further water quality monitoring for the proposed crediting bonus of 2% to 4%, however, given project timelines, a narrow construction window, and the additional steps that would be required to implement the water quality monitoring (additional DMS and IRT reviews) it was determined that pursuing the additional credit bonus could not be achieved within the existing project schedule.

While the credit bonus will not be pursued, Wildlands does plan to include the Carpenter Bottom Mitigation Site in our current development of data for research of water quality. Pre-construction sampling will be performed, as well as 2, 5, and 7-year sampling post construction. For this independent research, NC Qual 4 sampling methodology from the NC Standard Operating Procedures for the Collection and Analysis of Benthic Macroinvertebrates (February 2016) is followed. Water quality data including DO, pH, temperature, and conductivity is also collected and the NC Benthic Habitat Assessment Form is completed. Wildlands can provide this data to NCDMS and the NCIRT for information, despite the credit bonus not being pursued.

13. *Appendix 14: I'm a little confused why you ran the buffer tool and actually lost credits. It looks like the only place where you have less than 50 ft is at the end of the Carpenter Branch R2, and this appears to be less than 5% of the total length. Please confirm. By using the buffer tool you get penalized for the crossing as well.*

Wildlands Response: Wildlands updated the mitigation plan and proposed crediting, removing credit along Carpenter Branch Reach 2 between stations 126+53 to 127+77 due to limited buffer along the left bank. By reducing proposed crediting along this portion of Carpenter Branch Reach 2, the proposed credited stream length with less than the required 50-foot buffer is below the 5% benchmark, eliminating the need to run the Wilmington District Stream Buffer Credit Calculator. As such, language around the Wilmington District Stream Buffer Credit Calculator and Appendix 14 showing the calculation results were removed from the mitigation plan.

WRC comments, Travis Wilson comments received November 13, 2020:

1. *The vegetation portion of the mitigation plan identified a target community but did not include a comprehensive list of species representative of that community. A target community species list should be included in the mitigation plan and the planting plan should reflect that list of species.*

Wildlands Response: Wildlands made significant changes to the species planting list and supplemental planting areas. Planting edits were made due to comments received from the IRT, changes in the stream profile outlined below, and previous communication with the IRT regarding implementing more site-specific planting plans. In Section 7.7 there are three target communities and specific canopy and subcanopy plant species found within these plant communities. Canopy and subcanopy species were selected based on these plant communities, observation of occurrence of species in riparian buffers adjacent to the site, availability of nursery stock, and best professional judgement.

2. *The DRAFT mitigation plan did not include details for the design of the culvert crossing. This information should be provided prior to the final mitigation plan in order to review adequate size, configuration, and structure type.*

Wildlands Response: As noted in the NCDMS comments and responses, detailed culvert information is not typically included with Mitigation Plan submittals. This level of design is typically implemented after IRT Mitigation Plan approval as the project moves toward construction. The proposed culvert crossing is currently anticipated as a 49" x 33" arched CMP pipe which will pass a little over three times the estimated bankfull discharge. The proposed arched CMP will be imbedded below stream bed grade a minimum of 6" to facilitate aquatic organism passage at the Site.

3. *The target community identified should not have vast areas of inundation that would affect vigor. There may be a mosaic of depressional area that would have longer periods of inundation potentially affecting some species vigor and that can be described in the mit plan, but I don't agree with adjusting the success criteria.*

Wildlands Response: See response to ACOE Comment #11 regarding the alteration of the standard vigor success criteria being removed from the plan.

EPA comments, Todd Bowers comments received November 16, 2020:

1. *General:*

- *I would like to commend the site sponsor and landowner for protecting the headwater wetlands and streams by livestock exclusion without the need for fencing. Limiting livestock access to site streams or drainages is crucial in protecting stream stability and minimizing harm to water quality downstream*

Wildlands Response: The headwater wetland complex at the Carpenter Bottom Mitigation Site is a unique ecological resource and Wildlands is excited for the opportunity to protect the asset in perpetuity.

- *Recommend expanding the conservation easement to include upland buffers for the restored wetlands at the headwaters of Carpenter Branch where feasible. Some of the wetlands may extend well beyond the currently proposed conservation easement boundaries and without additional protection these wetlands may experience degradation if the adjacent aquatic resource is not protected.*

Wildlands Response: Wildlands negotiated the maximum possible conservation easement with the property owners and is providing the minimum required buffers as outlined in the Wilmington District Mitigation Guidance.

- *I found it very helpful to name the main tributary of the site as Carpenter Branch and not just another UT.*

Wildlands Response: Wildlands will consider continuing this project naming methodology on future submittals if it facilitates project communication.

- *I am confused on the presence/absence of fencing across the site. Correspondence and some of the other mitigation plan states that fencing is not needed as all cattle will be removed by the landowners. Other parts of the document clearly stat that fencing will be a site objective to meet the livestock exclusion goal. The entire document needs to be edited to provide consistency one way or another, however total cattle exclusion without the need for fencing is the preferred approach.*

Wildlands Response: See response to USACE comment #2 regarding livestock exclusion. The document has been reviewed to remove confusion around livestock exclusion and fencing. Total cattle exclusion without the need for fencing is the approach proposed within the mitigation plan.

2. *Section 4.1/Page 10: Recommend adding livestock exclusion as a method to provide potentially functional uplift of the site wetlands.*

Wildlands Response: Text was added to Section 4.1 identifying cattle exclusion as a method of functional uplift.

3. *Section 4.5/Page 11: Recommend adding livestock exclusion as a method to provide potential uplift to stream channel geomorphology.*

Wildlands Response: Text was added to Section 4.5 identifying cattle exclusion as a method of functional uplift.

4. *Section 5.3/Page 13: Fencing is mentioned as method of improving the wetland function via removing livestock and will be denoted in final plans. This is adding to confusion of the presence/absence of fencing on-site.*

Wildlands Response: Text within Section 5.3 was updated to read:
“Generally, existing wetlands will be improved by planting native vegetation and excluding livestock via removal.”

5. *Table 9/Page 15: Livestock fencing is listed as an objective for livestock exclusion goal. Recommend clarifying/correcting this inconsistency.*

Wildlands Response: Table 9 was updated to reflect cattle removal from the Site as the objective for livestock exclusion.

6. *Section 7.1/Page 16:*

- *Recommend adding “decommissioning farm roads” as part of the design approach. The detailed plan sheets show these roads to be removed in detail.*

Wildlands Response: The existing farm roads are relic dirt ATV trails and farm paths that will be decommissioned during construction by ripping to reduce soil compaction as deemed necessary based on field conditions. Wildlands doesn’t consider the roughening and planting of these farms paths as a major component of the design approach; therefore, Section 7.1 was not updated.

- *Cattle exclusion is mentioned but the method is not addressed.*

Wildlands Response: Text was edited within Section 7.1 to read:
“Cattle will be excluded from the entire project area via removal, eliminating wallow areas within the headwater streams and wetlands.”

7. *Section 7.4/Page 20: Relatively low design discharge (14 cfs) justification for Carpenter Branch Reach 1 was noted.*

Wildlands Response: No response required.

8. *Section 7.6/Pages 23-24: Livestock exclusion along entire reach of Carpenter Branch, UTs, and headwater wetlands is mentioned but the method remains unknown.*

Wildlands Response: See response to USACE comment #2 regarding livestock exclusion methods. Livestock exclusion and anticipated methods have been added to multiple locations throughout the report (Sections 4.1, 5.3, 6.0 and 7.1). Cattle exclusion is noted throughout

Section 7.6 as a method of project implementation, exclusion method is not relevant to the project uplift.

9. *Section 7.7.3/Page 25: EPA appreciates the breadth and timing of six groundwater gauges installed as well as the data included to confirm presence/absence of potential wetland hydrology in the locations proposed for wetland restoration. This is excellent baseline data that clearly demonstrates the potential of this site to provide quality wetland function.*

Wildlands Response: No response required.

10. *Section 7.8/Page 28: Recommend moving the last date for planting to be no later than April 15. This gives a two-week buffer period to properly conduct a vegetation survey that should be completed by November 1 of MY1. Giving a six-week extension to the planting season also unnecessarily increases the risk of mortality for first year bare-root seedlings and saplings so I highly recommend that Wildlands avoid going beyond March 15 as little as possible.*

Wildlands Response: The last date for planting listed in Section 7.8 was updated to April 15th. Planting will only be performed beyond March 15th in extenuating circumstances and plantings will be monitored for survivability.

11. *Section 8.2/Page 30:*

- *Recommend adding November 1 as last date for vegetation sampling.*

Wildlands Response: Wildlands added November 1st as the last date for vegetation sampling in Section 8.2.

- *Recommend adding the estimated number of vegetation plots in total and in the three planting zones to be monitored for performance. Please update the monitoring figure to include all planting zones (wetland re-habilitation zone does not appear to be monitored in Figure 10).*

Wildlands Response: Wildlands updated the monitoring figure to include vegetation plots in the wetland rehabilitation zone. Section 8.2 was updated to reflect the number of vegetation monitoring plots in each planting zone.

12. *Section 8.5/Page 31: Wildlands has stated in correspondence that are not seeking the conus credit from water quality monitoring but this is an excellent site to demonstrate uplift since much of the headwaters are encompassed and there is a high quality area (CB preservation) that is a good source for benthic macroinvertebrates to move upstream/migrate from. An extra 2-4% of stream credits may offset those lost to less than 50-foot width riparian buffers.*

Wildlands Response: See response to USACE comment #12 regarding additional benthic and water quality monitoring at the Site.

13. *Table 17/Page 30: Inconsistent approach to cattle exclusion (fencing) is listed as an objective here.*

Wildlands Response: Table 17 was updated to remove the inconsistency regarding fencing. See response to USACE comment #2 for details on livestock exclusion.

14. *Section 10/Page 35: No livestock, fencing or crossings are proposed for the project. Clarify if necessary but I believe this is the preferred approach according to correspondence from Wildlands.*

Wildlands Response: No livestock fencing is proposed, see response to USACE comment #2 for details on livestock exclusion. One existing culvert crossing required for property owner access will be replaced as part of the project.

15. *Section 12/Page 36: Add language to address the potential for water quality sampling and the additional potential credits that may be generated by such action if pursued.*

Wildlands Response: See response to USACE comment #12 regarding additional benthic and water quality monitoring at the Site.

16. *Planting Plans:*

- *Add the wetland indicator status for each species proposed for planting in the wetland zones.*

Wildlands Response: Wildlands added the wetland indicator statuses for all plant species.

- *Recommend adding alternative species that may be considered if the primary chosen species are not available at the time of planting in either the riparian or wetland zone.*

Wildlands Response: Alternate species have been added to the proposed planted species list on design sheet 4.0.

DWR comments, Erin David comments received November 13, 2020:

1. *Page 5, Section 3.2 – DWR appreciates that Gaston County planning documents were reviewed for this plan.*

Wildlands Response: Wildlands attempts to locate all available planning documents that may be relevant to the existing and future project conditions.

1. *Page 7, Section 3.4 – Please reference NCSAM ratings and include the assessment and scoring sheet in the appropriate appendix.*

Wildlands Response: The NCSAM ratings are now included in Appendix 4. The language in Section 3.4 was updated to reference NCSAM ratings sheets in Appendix 4.

2. *Page 15, Table 9 (also Page 32, Table 17) – Based on the response to DMS comments, fence installation is not proposed for this project. Please update objective descriptions in both tables.*

Wildlands Response: Inconsistencies in cattle exclusion approach within Table 9 and Table 17 have been clarified within the report based on comments from ACOE (comment #2) and EPA (comments #5 and #13).

3. *Page 24, Section 7.7 – Please confirm whether a total of 8.8 acres or 10.2 acres (page 3) of historically altered wetlands are proposed to be restored.*

Wildlands Response: The site proposes to restore 9.661 acres of historically altered wetlands. This was updated throughout the report.

4. *Page 25, Section 7.7.2 – The soil investigation notes the depth to hydric indicators is less than 10 inches onsite. Is grading proposed within wetland credit areas? If so, will any of these areas be graded beyond 12 inches?*

Wildlands Response: No grading is proposed within the wetland restoration areas beyond what is required to fill existing ditches and built headwaters of site streams. No areas of proposed grading are deeper than 12 inches.

5. *Page 26, Section 7.7.3 – Section 8.3 lists the performance standard hydroperiod based on the IRT 2016 guidance. However, based on the pre-construction baseline site data and reference wetland data, what is the designed target hydroperiod (range) for the proposed wetland community?*

Wildlands Response: The designed minimum target hydroperiod for the wetland restoration areas is 16% of the identified growing season. Maximum anticipated inundation periods are not estimated as part of wetland restoration design. Baseline and reference wetland data are used as resources but are also heavily influenced by weather patterns and cannot be considered as representative of all potential years of wetland hydrology.

6. *Page 28, Section 7.8 –*

- a. *This section only mentions planting early successional species. DWR would like to see a mix of early successional native species and appropriate climax species based on the designated target community.*

Wildlands Response: Language referencing early successional species was removed from Section 7.8. Plants are selected based on designated target communities. More in depth descriptions of these plant communities can be found in section 7.8. Please see response to WRC comments #1 for further details.

- b. *It is noted that ripping may be performed in haul road and stockpile areas, but of specific compaction concern to this project is the decommissioning of farms roads that crisscross the easement both in wetland and stream buffer areas.*

Wildlands Response: See response to EPA comment #6 regarding existing farm paths.

7. *Page 28, Section 7.9 – If cattle will be removed fully from the properties by the property owners as mentioned in the response to DMS comments, then please identify the primary use for the proposed culvert crossing. Will it still function as an agricultural crossing?*

Wildlands Response: See response to USACE comment #2 regarding livestock exclusion. The primary use for the proposed culvert crossing will be to access the west section of the parcel

that has been divided by the conservation easement. This proposed culvert crossing is the only access point to this section of parcel.

8. *Page 30, Section 30 – DWR does not support the requested reduced vigor standard due to inundation without additional information. Based on your modeling and reference wetland data, what is the expected inundation period? If the inundation period is expected to be long enough to stunt vegetation growth, shouldn't this also be reflected in the target hydroperiod duration performance criteria? A request for a reduced vigor standard may be a more appropriate discussion during adaptive management planning, unless the proposed wetland restoration is designed to have prolonged inundation based on the wetland target and reference community(s).*

Wildlands Response: See response to ACOE Comment #11 regarding the alteration of the standard vigor success criteria being removed from the plan.

9. *Page 31, Section 8.5 – DWR supports benthic and water quality monitoring at this site.*

Wildlands Response: See response to USACE comment #12 regarding additional benthic and water quality monitoring at the Site.

10. *Page 33, Table 17 – See DWR comment #8 regarding vigor. Also, please provide more information about the shaded plantings. Is supplemental understory/shrub planting proposed? If so, please distinguish supplemental planting area from full planting areas on figure or design sheet.*

Wildlands Response: Wildlands updated the planting plan to include a species list for supplemental planting areas. The proposed supplemental planting areas are shown on the revised Figure 11 and within the revised Preliminary Design Plans included in Appendix 8 (Sheets 4.0-4.4).

11. *Page 34, Table 18 – Please add a stream gauge on UT2, as mentioned in Section 8.1.3.*

Wildlands Response: A stream gauge was added to UT2. Table 18 and Figure 10 were updated accordingly.

12. *Page 35, Section 10 – In an effort to reduce the risk of encroachment, signage spacing and visibility will be important given all bends/corners along the proposed CE and multiple property owners.*

Wildlands Response: The conservation easement will be marked according to the latest guidance and with intention to provide a clear boundary for the property owners. Wildlands Land Stewardship Team will maintain signage and will visit the Site several times throughout the year to confirm markings.

13. *Figure 10 –*

- a. *DWR requests the flow gauges on UT3 and Carpenter Branch be shifted upstream near the proposed photo points (approximately two-thirds the way upstream of the confluence).*

Wildlands Response: Flow gauges on UT3 and Carpenter Branch were shifted upstream. See new placement on the revised Figure 10.

- b. *Please shift a permanent veg plot from the wetland re-establishment area to the wetland rehabilitation area.*

Wildlands Response: See response to USACE comment #3 regarding vegetation plots.

- c. *DWR requires a minimum of one additional groundwater gage. Please place the additional gage near the wetland re-establishment/rehabilitation line east of UT2. DWR requests an additional groundwater gage near the right bank photo point along Carpenter Branch. It appears that of the originally proposed nine gages, six are located approximately 50 feet from the easement boundary. DWR requests that at least half of the total gages be placed within 50 feet of the easement boundary, since this is the area DWR is most concerned with meeting the minimum hydroperiod performance standard.*

Wildlands Response: Two additional groundwater monitoring gages were added to Figure 10 and Table 18 (11 groundwater gages for less than 10 acres of proposed wetland). The sites wetland hydrology will be represented by eleven wetland gages with six of them placed approximately 50 feet from the easement boundary for post construction monitoring.

- d. *Please include a photo point at the proposed crossing.*

Wildlands Response: A photo point was added at the proposed crossing. Figure 10 and Table 18 were revised accordingly.

- e. *Please add a note regarding the four random veg plots to be monitored.*

Wildlands Response: The four random vegetation plots were added to Figure 10.

- f. *Please show or note that photo points will be taken at cross sections, veg plots and gauge locations.*

Wildlands Response: A note added to Figure 10 indicating that photo points will be taken at cross sections, veg plots and gauge locations.

14. *Sheet 2.1.1 – It would help our review to see the existing channel areas proposed to be filled as a shaded feature on the plan view sheets, or for callouts to be added. If ditch/channel plugs area proposed, please identify the approximate locations. Also, please provide detail(s) for ditch/channel filling and plugs.*

Wildlands Response: The Preliminary Design Plans were updated to include a hatch for existing drainage features which will be filled (Sheets 2.1.1 - 3.0). Proposed ditch plugs locations and an associated detail were added to the Preliminary Design Plans (Sheets 3.0 and Sheet 6.1).

15. *Sheet 2.1.5 – Please call out culvert removals and show proposed culvert and easement break lines on profiles.*

Wildlands Response: Callouts are now shown on the profiles where existing culverts are to be removed. Proposed culverts are now shown on the profiles.

16. *Sheet 2.4.1 –*

a. *Will the pipe above the proposed BMP be removed?*

Wildlands Response: Wildlands plans to decommission the existing farm trail and remove the existing culvert above the proposed BMP. The resulting swale will be stabilized to drain to the BMP. A callout has been added to the plan sheets.

b. *What is the adjacent 50-ft existing easement line for?*

Wildlands Response: The easement outside the project area shown on Sheet 2.4.1 is an access easement outside the conservation easement which is required based on the parcel locations (setback from existing street frontage) and associated access requirements.

17. *Sheet 3.0 – Please confirm that the structure entering CE from west will be removed; please add a callout identifying what it is.*

Wildlands Response: A callout was added to Sheet 3.0 to remove the existing rip rap outlet within the conservation easement.

18. *Sheet 4.0 –*

a. *DWR understands that quantity substitutions may be necessary based on the nursery's species available. However, we request that no species (excluding live stakes) account for more than 20 percentage of a specified planting zone in order to promote diversity within the designated community type.*

Wildlands Response: Wildlands will do our best to ensure that no species account for more than 20 percent of a specified planting zone. However, as noted above, plantings greatly depend on quantity and availability of bare root species. While availability does depend on the nursery, seasonal effects including weather can heavily contribute to plant availability, even when sourcing from multiple nurseries.

b. *It would be helpful for our review to have the wetland indicator status included in the tables.*

Wildlands Response: Wildlands added the wetland indicator status for all proposed plant species in wetland zones on Sheet 4.0.

19. *Sheet 6.1 – Rock sill – DWR does not support seeding banks with pearl millet or fescue.*

Wildlands Response: Language within Detail 3 on Sheet 6.1 was updated to: "Banks shall be raked, seeded with temporary and riparian seed mixes shown on Sheet 4.0, amended with fertilized as needed, and then matted over with 700G erosion control matting."

20. *Sheet 6.7 – Based on the material size it appears that the “rock toe” will be a riprap toe. Please explain why this stabilization treatment is proposed rather than a stone/boulder toe for the four stream bank areas called out.*

Wildlands Response: Wildlands considered boulder toe as an alternative to rock toe, but ultimately decided to propose rock toe due to stream dimensions, design discharge, and structure intent. Riprap proposed for the rock toe is large material consisting of an equal part mix of Class 1 (8” midrange) and Class B (10” midrange) riprap. It is Wildlands experience that the smaller material is better suited for installation on streams with smaller dimensions and will allow for better vegetation of banks in the future when compared to large boulders.

21. *Sheet 6.2 – DWR likes the level of detail provided for the vernal pool typical, including the LWD callout.*

a. *Please consider a max. depth of 14 inches if a pool isn’t expected to seasonally dry at 18 inches.*

Wildlands Response: Wildlands has decided to change the terminology of “Vernal Pools” to “Floodplain Pools” to better represent the hydrologic conditions on-site. Wildlands reduced the maximum depth of floodplain pools shown in Detail 1, on Sheet 6.2 to 14 inches.

b. *Were options evaluated to create a stable connection between pool and stream without adding riffle material? Please callout riffle material size.*

Wildlands Response: Wildlands will consider alternative options for outlet stabilization during construction based on field conditions.

c. *No vernal pools were called out on plan view sheets, if the proposed locations are to be determined during construction please make sure to include callouts on the redline record drawings.*

Wildlands Response: Floodplain pool locations will be determined during construction and will be surveyed during the as-built. Locations of floodplain pools will be included with the Record Drawings.

22. *Appendix 7 – In future project plans, DWR would request at least 1-2 additional representative boring logs be provided based on the wetland credit area proposed and landscape features.*

Wildlands Response: The number of representative boring logs is based on observed soil types at the site by the Licensed Soil Scientist (LSS). The LSS determines the number of soil types and bases the number of boring logs on these observed soils. More boring logs can be provided, but given that the boring logs are representative, but they may contain duplicate information.

23. *Appendix 13 – The IRT meeting minutes mentioned the possibility of extending the CE width along a section of Carpenter Branch. What happened to this discussion?*

Wildlands Response: Wildlands pursued the additional conservation easement area west of the proposed conservation easement along the right floodplain of Carpenter Branch as indicated in the meeting minutes. Unfortunately, the property owners declined including this area within the conservation easement.

In addition to the revisions performed based on the above comments. Between NCDMS approval and NCIRT comment receipt, Wildlands was able to obtain signed permissions from the adjacent property owner upstream of UT4 to allow for backwater to occur within the existing channel top of banks off the project property. Receiving the signed permissions allowed Wildlands to raise the bankfull profile of Carpenter Branch Reach 1 by 1.0 to 1.5 feet between approximate proposed stations 106+50 and 118+00. Based on the bankfull revision, this portion of Carpenter Branch previously proposed for a priority 2 restoration approach will be built more like a priority 1 stream restoration which will allow for better floodplain connection and better potential vegetation conditions. Updates to the proposed profile can be seen in Sheets 2.1.2 thru 2.1.5 of the revised preliminary design plans included in Appendix 8. Additionally, Sections 4.9 and 5.2 of the mitigation plan which discuss potential hydrologic trespass and site constraints were updated to reflect this change. Wildlands considers this profile revision an improvement in site design and believes the priority 1 restoration approach will provide better stability and vegetation conditions at the site long term.

Hard copies of the Final Mitigation Plan package can be provided upon request. Please contact me at (865) 207-8835 if you have any questions.

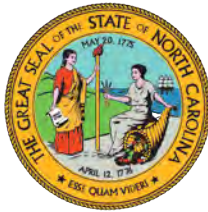
Sincerely,



Eric Neuhaus, PE

Project Manager

eneuhaus@wildlandseng.com



NORTH CAROLINA
Environmental Quality

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

TIM BAUMGARTNER
Director

August 31, 2020

Mr. Eric Neuhaus, PE
Wildlands Engineering, Inc.
167-B Haywood Road
Asheville, N.C. 28806

Subject: Draft Mitigation Plan for the
Carpenter Bottom Mitigation Site
Catawba River Basin – CU# 03050102
Gaston County
DMS Project ID No. 100090
Contract # 7731

Dear Mr. Neuhaus:

On July 28, 2020, the Division of Mitigation Services (DMS) received the draft mitigation plan for the Carpenter Bottom Mitigation Site from Wildlands Engineering, Inc. (WEI).

The report establishes the proposed mitigation activities on the project site. Anticipated mitigation on the site includes 3,051 Stream Mitigation Units and 8.345 Wetland Mitigation Units. The following are our comments on the draft mitigation plan report and preliminary plan set:

Title Page:

- Please include the 401 permit number if available.

Introduction:

- Stream credits and wetland credits do not match Table 20. Please update for final to match revised asset table.

Table 1:

- Suggest reporting location in decimal degrees.

3.2 Land Use/Land Cover:

- Please indicate the approximate acreage of forest cleared between 2012 and 2016.



3.3 Existing Vegetation:

- The Land Use/Land Cover section describes the site as being maintained as active cattle and hay pasture. The Existing Vegetation sections makes no reference to grasses or other vegetation typically found in these areas. Please update.

3.4 Existing Project Resources:

- Please add a statement regarding the completed PJD submittal also included in Appendix 3 in this section.

Table 5:

- Add a row for the Existing Length of Reach (LF) to the first table. The second table showing UT2, UT3 and UT4 has this parameter listed.

5.2 FEMA Floodplain Compliance and Hydrologic Trespass:

- Do the proposed site modifications increase the risk of hydrologic trespass to any areas outside of the conservation easement? The discussion needs to address any concerns onsite or offsite that could be impacted.

5.3 401/404:

- Please remember to update final plans with safety fencing location around wetlands outside of the proposed limits of disturbance.

Table 13:

- Please provide an explanation for why the design discharge changes between existing and design.

7.4 Design Discharge Analysis and Table 14:

- “This decrease in discharge can be attributed to the attenuation of water in the wetland upstream of Carpenter Branch. Wetland restoration efforts will furthermore increase the attenuation of water, and therefore a relatively low bankfull discharge was determined for Carpenter Branch.” The design Q of 14 is significantly lower than the other methodologies. Can this rationale from the cited section of 7.4 be defended given that the wetlands are currently ditched? The gauge data also indicate that the ditching may not be that influential.

7.4.2 Wildlands Regional USGS Rural Piedmont Calculator:

- Section indicates that the Wildlands regional flood frequency analysis 1.2 year predictions are plotted on Figure 8. This analysis is not currently plotted on Figure 8. Please update.

7.6 Project Implementation:

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

Page 21, First Paragraph, Last Sentence:

- Please revise sentence structure. Words accidently left out.



7.6.5 UT4:

- Based on the profile shown on the plan sheet there is concern of adverse impact to the existing culvert upstream of the site. Will raising UT4 through a Priority 1 restoration impound the culvert upstream of the site or cause sediment deposition in the pipe?

7.7.3 Hydrologic Monitoring and Evaluation:

- Will the filling of the agricultural ditches and swales create a drainage concern up gradient and outside of the conservation easement?
- Please provide rationale for a hydrologic success criterion of 12% with 3 gauges ranging from 16-30% in the existing conditions.
- Recommend putting reference gauge hydroperiod in Table 16.

7.8 Vegetation and Planting Plan:

- The October 2016 IRT Mitigation Monitoring Guidance states that planting shall occur between November 15 and March 15. Please update section to reflect this time frame.
- Does WEI plan on treating fescue and other undesirable pasture grasses prior to or during construction? The IRT has recommended early treatment in the past based on observations of fescue impeding planted vegetation establishment and vigor.

7.9 Project Risk and Uncertainties:

- Detailed culver information was not included in the plan sheet details for the draft submittal. Please verify that the new culvert will be appropriately sized and installed correctly to allow aquatic organism passage.

8.2 Vegetation:

- Please identify the target community types and reference the sheet number of the species list for each zone in the design plans.
- WEI expects stunted vegetation growth in proposed wetland restoration areas due to inundation periods. What average height does WEI expect to see in these areas? WEI may want to reiterate this expectation in Table 17.

8.5 Benthic Macroinvertebrates and Water Quality Monitoring:

- If WEI wants to pursue the potential 2% to 4% credit bonus associated with additional monitoring, then a plan must be outlined in the Mitigation Plan and not after the fact. Please include a monitoring plan and discussion including water quality and benthic macroinvertebrate sampling techniques that will be employed to accomplish this task. Please update the mitigation plan accordingly. If WEI decides to pursue the additional monitoring, please allow DMS to review the protocols before submitting final draft.

9.0 Monitoring Plan, Table 17, Table 18, Plansheets:

- The number of monitoring stations does not comply with the USACE 2016 Guidance Document requirements for streams. At the design bankfull width for Carpenter Creek, 18 cross sections are prescribed, 5 have been proposed. Additional gauges may also be requested to meet the requirement to gauge the center and edges of wetlands. Please update accordingly.



Table 18:

- Please provide rationale for baseline pebble counts at riffles and then conducting reach wide counts only during monitoring.

Table 20:

- DMS is currently updating the Required Tables Spreadsheet based on IRT and Provider feedback. Please add a column at the end for “Credits”.
- For accounting purposes, please extend the credit calculations out to the third decimal place for streams and wetlands.
- Credit calculations used in the Wilmington District Stream Buffer Credit Calculator are slightly off when compared to Table 20. For example, Restoration Creditable Stream Length is shown as 3021.3 in the calculator, but summing Table 20 yields 3021. Preservation in the calculator shows 477.5, but Table 20 is 477. Total Baseline Credit in the calculator is shown as 3116.80, but Table 20 indicates 3116. Please revise once Table 20 has been finalized.
- The Asset Table tab in the Required Tables file shows UT4 as Restoration at a 2:1 ratio, and Table 20 in the report shows it as 1:1. Please update.
- Please populate the Stream Restoration Level columns with their respective lengths.

Figure 9 and Figure 10:

- Please add location of proposed fencing.

Proposed Riparian Vegetation Plantings:

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

Preliminary Design Plans:

- Please add fencing and detail.
- Update plans with wetland safety fence locations for final.
 - There are currently 3 details for safety fence in the draft plans.

Digital Deliverables:

- The following asset features had feature lengths/areas that differed from the reported values. Please provide updated features for these assets that accurately represent the values reported in Table 20.
 - UT4: 34 ft vs. 45 ft
 - Wetland Re-Establishment: 5.714 ac vs. 5.897 ac
- Please provide vegetation plot features as polygons rather than points.
- Please add ID attributes to all monitoring features.
- In Fig 3, there are 9 existing cross-sections, but only 3 existing conditions cross-sections were included in Appendix 6.
- Data for 6 of the 9 existing conditions cross sections were provided in the required DMS Mit Plan Tables Spreadsheet. Please include the data for the remaining 3 cross-sections.
- Please provide Excel versions of cross-section, substrate and gauge data instead of PDFs.



At your earliest convenience, please provide a written response letter addressing the DMS comments provided and a revised/updated electronic copy of the draft mitigation plan. The comment response letter should be included in the revised draft mitigation plan after the report cover. If you have any questions, please contact me at any time at (828) 231-7912 or email me at matthew.reid@ncdenr.gov.

Sincerely,

Matthew Reid

Matthew Reid
Project Manager – Western Region
NCDEQ – Division of Mitigation Services
5 Ravenscroft Dr., Suite 102
Asheville, NC 28801
(828) 231-7912 Mobile





MEMORANDUM

TO: Matthew Reid, NC DMS

FROM: Eric Neuhaus, PE

DATE: September 4, 2020

RE: Carpenter Bottom Mitigation Site
Catawba River Basin 03050102
(03050103 Expanded Service Area)
Gaston County, NC
DMS ID No. 100090
DEQ Contract Number 7731
RFQ Number 09132018
SAW-2018-02062
Response to NCDMS Mitigation Plan Comments

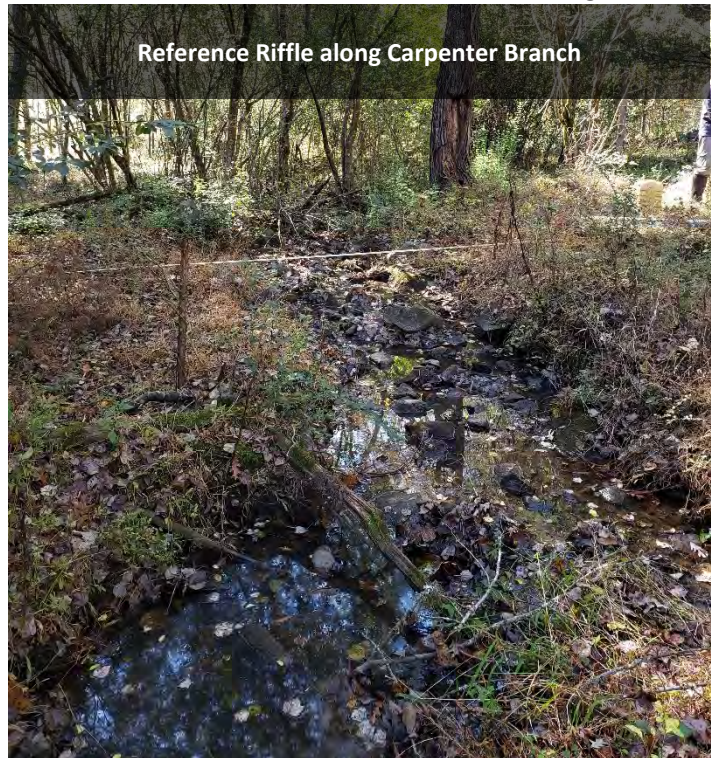
This memo documents NCDMS's initial Draft Mitigation Plan review comments (*in italics*) received from Matthew Reid's letter dated 08/31/2020, the project team's responses, and where the revisions have been included in the final Mitigation Plan.

Mitigation Plan Comments:

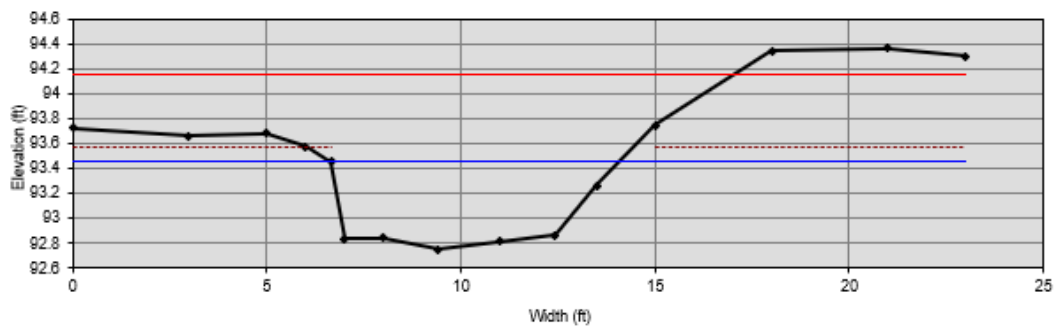
- **Title Page:** *Please include the 401 permit number if available.*
 - The 401-permit number is not available. Per NCDMS, the 401-permit application cannot be submitted without the completion of Task 2.
- **Introduction:** *Stream credits and wetland credits do not match Table 20. Please update for final to match revised asset table.*
 - Stream and wetland mitigation credits were updated in the introduction to match Table 20.
- **Table 1:** *Suggest reporting location in decimal degrees.*
 - Project Coordinates were updated to decimal degrees in Table 1.
- **3.2:** *Please indicate the approximate acreage of forest cleared between 2012 and 2016.*
 - Based on aerial photography, approximately 2.4 acres of forest within the proposed conservation easement was cleared sometime in 2014. This information was added to Section 3.2.
- **3.3 Existing Vegetation:** *The Land Use/Land Cover section describes the site as being maintained as active cattle and hay pasture. The Existing Vegetation sections makes no reference to grasses or other vegetation typically found in these areas. Please update.*

- Text was added to Section 3.3 referring to grass and weed species found within managed cattle hay pasture.
- **3.4 Existing Project Resources:** *Please add a statement regarding the completed PJD submittal also included in Appendix 3 in this section.*
 - The following text was added to Section 3.4: “An approved preliminary jurisdictional determination including wetland and non-wetland waters is included in Appendix 3.”
- **Table 5:** *Add a row for the Existing Length of Reach (LF) to the first table. The second table showing UT2, UT3 and UT4 has this parameter listed.*
 - Existing Length of Reach (LF) was added to Table 5 for Carpenter Branch and UT1 and lengths were reconciled with the digital submittal information.
- **5.2 FEMA Floodplain Compliance and Hydrologic Trespass:** *Do the proposed site modifications increase the risk of hydrologic trespass to any areas outside of the conservation easement? The discussion needs to address any concerns onsite or offsite that could be impacted.*
 - The potential for hydrologic trespass was heavily considered as part of the design and Wildlands believes the current design mitigates much of the risk. Text was added to Section 5.2 identifying potential risk and how this is being addressed as part of the design.
- **5.3 401/404:** *Please remember to update final plans with safety fencing locations around wetlands outside of the proposed limits of disturbance.*
 - Wetlands listed as no impact on the PCN but inside the limits of disturbance (LOD) will have safety fence for protection. Wetland areas outside of the LOD will not be safety fenced as no disturbance will be permitted outside the LOD.
- **Table 13:** *Please provide an explanation for why the design discharge changes between existing and design.*
 - Design discharge values for existing conditions are calculated based on bankfull calls made in the field and during existing conditions data processing. Design discharge values for proposed conditions are estimated using the methodology outlined in the Section 7.4 of the report. These values vary based on the differing methods of estimation. The existing conditions estimates are not always straightforward based on the impaired conditions of the channel and design discharge estimates consider potential changes to site hydrology. As such, it is not uncommon for the values to vary by 3 to 5 cubic feet per second (CFS).
- **7.4 Design Discharge Analysis and Table 14:** *“This decrease in discharge can be attributed to the attenuation of water in the wetland upstream of Carpenter Branch. Wetland restoration efforts will furthermore increase the attenuation of water, and therefore a relatively low bankfull discharge was determined for Carpenter Branch.” The design Q of 14 is significantly lower than the other methodologies. Can this rationale from the cited section of 7.4 be defended given that the wetlands are currently ditched? The gauge data also indicate that the ditching may not be that influential.*

- There is a short section of stable channel along Carpenter's Branch where the bed has held grade based on a relic abandoned farm crossing and/or small dam feature. Wildlands surveyed this cross section (XS4) as it provided a good, stable, on-site riffle dimension reference. Based on the influence of the data (shown below and included in the digital files), Wildlands lowered the design discharge of Carpenter's Branch. While this reference dimension influenced the design of the channel, the discharge was not lowered to match the exact discharge of this dimension based on other reference information (site specific reference reach curve, NC Rural Piedmont Regional Curve, etc.). Wildlands felt the selected discharge of 14 CFS was a reasonable conciliation of the evaluated on-site data and traditional discharge estimate methodologies given the selected discharge falls within the 95% lower confidence interval of the Regional Curve.



Carpenter Bottom - On-Site Reference



Bankfull Dimensions	
4.1	x-section area (ft.sq.)
7.4	width (ft)
0.5	mean depth (ft)
0.7	max depth (ft)
7.9	wetted perimeter (ft)
0.5	hydraulic radius (ft)
13.6	width-depth ratio

Flood Dimensions	
---	w flood prone area (ft)
---	entrenchment ratio
0.8	low bank height (ft)
1.2	low bank height ratio

Materials	
6.1	D50 Riffle (mm)
10	D84 Riffle (mm)
6	threshold grain size (mm)

Rosgen Stream Type	
---	Missing: , Sinuosity, D50, slope

Bankfull Flow	
2.6	velocity (ft/s)
10.4	discharge rate (cfs)
0.63	Froude number

Flow Resistance	
0.024	Manning's roughness
0.08	Darcy-Weisbach fric.
10.0	resistance factor ulu*
16.7	relative roughness

Forces & Power	
0.4	channel slope (%)
0.13	shear stress (lb/sq.ft.)
0.26	shear velocity (ft/s)
0.35	unit strm power (lb/ft/s)

- **7.4.2 Wildlands Regional USGS Rural Piedmont Calculator:** Section indicates that the Wildlands regional flood frequency analysis 1.2-year predictions are plotted on Figure 8. This analysis is not currently plotted on Figure 8. Please update.
 - Wildlands regional flood frequency analysis 1.2-year predictions are now plotted on Figure 8.
- **7.6 Project Implementation:** Please describe how WEI will construct the Priority 2 sections. Will topsoil be stockpiled? Minimum bench and side slopes? Since establishment of vegetative cover and vigor can be a challenge on Priority 2 banks and benches, please include a discussion on how the soil restoration will be addressed during construction and reference potential adaptive management.
 - The following text was added to Section 7.8 of the report:

“Mechanical site soil preparation will be implemented where necessary, including but not limited to wetland areas, priority 2 benches, and areas of cut greater than one foot. Site preparations will be performed to create soil physical properties favorable for tree growth. In the pasture areas, the planted area will be ripped in a grid-like pattern with a maximum rip shank spacing of six feet. Ripping will be performed during the driest conditions feasible to maximize shatter of the plow pan. Ripping may be implemented to reduce soil compaction resulting from haul roads, stockpile areas, etc. Where required based on site conditions, topsoil will be stockpiled and reapplied. Soil amendments may be incorporated to augment survival and growth of planted vegetation as determined necessary by soil testing.”
 - Wildlands will strip and stockpile topsoil before grading and reapply the material after finished grading but prior to roughening to help establish vegetation in wetland grading areas and on priority 2 benches, as necessary. Topsoil and subsoils within proposed grading areas will be tested for typical soil parameters and amendments will be considered based upon the results. If vegetative cover struggles to establish in planted areas of the project. Wildlands will resample the affected area and implement soil amendments based on the results of a soil test during the monitoring period.
 - Typical cross sections found on sheets 1.1, 1.2, and 1.3 in the design plans indicate bench slope tie ins to be 3:1 and bench slopes to be 10:1. Bench widths will vary to balance earthwork and based on site conditions. As shown in the design plans, they are all currently greater than 1.5 bankfull width. Wildlands anticipates bench widths greater than 1.5 bankfull widths as a consistent minimum for proposed priority two benches during construction.
- **Page 21, First Paragraph, Last Sentence:** Please revise sentence structure. Words accidentally left out.
 - The last sentence of the paragraph was revised to: “Livestock will be excluded along the entire length of the reach.”
- **7.6.5 UT4:** Based on the profile shown on the plan sheet there is concern of adverse impact to the existing culvert upstream of the site. Will raising UT4 through a Priority 1 restoration impound the culvert upstream of the site or cause sediment deposition in the pipe?
 - There is not an existing culvert upstream of UT4. The existing culvert along UT4 is being removed as part of the project. If NCDMS is referring to UT1 and the associated upstream

culvert, Wildlands will evaluate the condition of the culvert before final design and determine if it makes logistical sense to replace this small culvert as part of the project, but based on the current design, Wildlands is not concerned about damage to the existing pipe based on the installation of the downstream BMP and associated stream restoration.

- **7.7.3 Hydrologic Monitoring and Evaluation:**

- *Will the filling of the agricultural ditches and swales create a drainage concern up gradient and outside of the conservation easement?*
 - Wildlands has evaluated areas outside the proposed conservation easement and believes that we have addressed future drainage concerns. Upgradient of delineated wetland M outside of the proposed conservation easement, positive drainage will be maintained via an existing drainage ditch. Between the two forks of the proposed wetland the topography increases by at least 1-foot quickly, which will help this area maintain upland hydrology. Drainage effects at the very upstream extent of delineated wetland N are minor when compared to the interior of the wetland restoration areas. Areas beyond the proposed wetland boundary and stream floodplain quickly increase in elevations, helping to avoid increased inundation. Text was added in Section 5.2 addressing potential hydrologic trespass to clarify these evaluations within the mitigation plan.
- *Please provide rationale for a hydrologic success criterion of 12% with 3 gauges ranging from 16-30% in the existing conditions.*
 - As outlined in the report, 12% represents the upper limit of wetland saturation thresholds provided in the Notification of Issuance of *Guidance for Compensatory Stream and Wetland Mitigation Conducted for the Wilmington District* (October 24, 2016) for the site soils (Worsham) which were determined by an outside License Soil Scientist (LSS). Additionally, when looking at rainfall patterns for 2019, February, April, June, and August of the growing season were either at or exceeded the 70% rainfall exceedance threshold based on historic data established by the Gaston County WETS table. As noted in the report groundwater gages with higher inundation periods (1,3, and 5) are within the interior area proposed for wetland restoration and as shown by data from gages 2 and 4 are not necessarily representative of the entire proposed wetland restoration area. Based on these observations, Wildlands believes a saturation threshold of 12% represents monitoring criteria on the wetter end of regulatory guidance as a minimum success criterion, which is consistent with Site goals. Wildlands added the 2019 rainfall evaluation to Appendix 7 and updated headings in Table 16 for clarification.
- *Recommend putting reference gauge hydroperiod in Table 16.*
 - Average consecutive days of inundation and corresponding percent of growing season for four years of monitored groundwater data was added to Table 16. It should be noted that reference wetland information including soil types, vegetation, landscape information, and hummock depth/formation are all information gleaned from reference wetland areas. Hydrology is only one of many factors used to identify a useful reference wetland.

- **7.8 Vegetation and Planting Plan:**

- *The October 2016 IRT Mitigation Guidance states that planting shall occur between November 15 and March 15. Please update section to reflect this time frame.*

Section 7.8 was updated with the following text: "Per the 2016 NCIRT Mitigation Guidance plantings are preferred to occur between November 15 and March 15, however, in some cases the March 15 deadline cannot be met but planting must occur no later than April 30 for acceptance as a full season of monitoring. Per IRT Guidance, vegetation monitoring also cannot be started within 180 days of the completion of planting."

- *Does WEI plan on treating fescue and other undesirable pasture grasses prior to or during construction? The IRT has recommended early treatment in the past based on observations of fescue impeding planted vegetation establishment and vigor.*
 - Wildlands primary treatment method for fescue will be mechanical removal based on roughening of the wetland area and overall extent of site grading. If areas of fescue are not proposed for grading or roughening, Wildlands will employ chemical applications via tree rings to offset any impeding bareroot growth post construction.

- **7.9 Project Risk and Uncertainties:**

- *Detailed culver information was not included in the plan sheet details for the draft submittal. Please verify that the new culvert will be appropriately sized and installed correctly to allow aquatic organism passage.*
 - Detailed culvert information is not typically included with Mitigation Plan submittals. This level of design is implemented after IRT Mitigation Plan approval. The proposed culvert crossing will be sized to pass a minimum 10-year storm event and will be imbedded below stream bed grade between 8-inches and 12-inches depending on the determined pipe size.

- **8.2 Vegetation:**

- *Please identify the target community types and reference the sheet number of the species list for each zone in the design plans.*
 - The following text was added to Section 8.2: "The Site will be planted with species to achieve a target community of a Southern Piedmont Small Floodplain and Riparian Forest. Species designated for planting were selected based on compatibility of silvics with expected site conditions within a given planting zone, observation of reference communities, and best professional judgement. Species lists for each planting zone are listed on Sheet 4.0 of the preliminary design plans included in the Appendix. Additionally, proposed planting zones are shown in Figure 11."
- *WEI expects stunted vegetation growth in proposed wetland restoration areas due to inundation periods. What average height does WEI expect to see in these areas? WEI may want to reiterate this expectation in Table 17.*
 - Wildlands added the following text to Section 8.2 and Table 17: "However, given inundation periods anticipated for areas proposed for wetland restoration, woody

vegetation growth may be hindered in these areas resulting in stunted heights. Taking this into consideration, monitoring criteria for woody vegetation within wetland restorations zones should average 3.5 feet in height in each plot at the end of the fifth monitoring year (MY5) and 5 feet in height in each plot at the end of the seventh year (MY7) of monitoring year.”

- **8.5 Benthic Macroinvertebrates and Water Quality Monitoring:**

- *If WEI wants to pursue the potential 2% to 4% credit bonus associated with additional monitoring, then a plan must be outlined in the Mitigation Plan and not after the fact. Please include a monitoring plan and discussion including water quality and benthic macroinvertebrate sampling techniques that will be employed to accomplish this task. Please update the mitigation plan accordingly. If WEI decides to pursue the additional monitoring, please allow DMS to review the protocols before submitting final draft.*

- Wildlands has evaluated this option and does not plan to pursue the potential 2% to 4% credit bonus.

- **9.0 Monitoring Plan, Table 17, Table 18, Plansheets:**

- *The number of monitoring stations does not comply with the USACE 2016 Guidance Document requirements for streams. At the design bankfull width for Carpenter Creek, 18 cross sections are prescribed, 5 have been proposed. Additional gauges may also be requested to meet the requirement to gauge the center and edges of wetlands. Please update accordingly.*

- Wildlands original proposed number of 5 cross sections was based on Carpenter Branch classifying as a narrow stream with a proposed bankfull width of 7.5 feet and 2 cross sections per 1,000 LF of channel based on the guidance. Alternatively, if Carpenter Branch Reach 1 is classified as a large stream with a proposed linear footage of restoration of 2,250 LF. The guidance would require 15 cross sections based on the guidance for large streams of 1 monitoring cross-section per 20 bankfull widths ($2,250 / (7.5 * 20)$). However given that a 7.5-foot bankfull width is on the smaller end of what is considered a large stream (not definitive in the guidance), along with previous project experience and associated standard monitoring practice considerations, Wildlands proposes 12 Cross Sections (6 riffle, 6 pool) for Carpenter Branch. Table 18 and Figure 10 have been updated accordingly.

- Wildlands previous experience with wetland gaging post construction within wetland restoration areas has been approximately one groundwater gage per acre depending on Site conditions. Based on existing gaging of the Site, Wildlands believes 9 groundwater gages should be sufficient to map overall groundwater trends throughout the wetland area.

- **Table 18:** *Please provide rationale for baseline pebble counts at riffle and then conducting reach wide counts only during monitoring.*

- Wildlands performs Riffle 100-count substrate sampling during baseline monitoring only to characterize pavement within the riffles in the as-built conditions. Reach-wide pebble counts are performed on restoration reaches in monitoring years one, two, three, five, and seven for classification purposes of Rosgen channel types.

- **Table 20**
 - *DMS is currently updating the Required Tables Spreadsheet based on IRT and Provider feedback. Please add a column at the end for “Credits”.*
 - A column was added for Mitigation Credits in the Required DMS Mit Plan Tables digital submittal as well as Table 20:Project Asset Table within the report.
 - *For accounting purposes, please extend the credit calculations out the third decimal place for streams and wetlands.*
 - Stream and wetland credits are listed to 3 decimal places in the Required DMS Mit Plan Tables digital submittal as well as Table 20: Project Asset Table within the report.
 - *Credit calculations used in the Wilmington District Stream Buffer Credit Calculator are slightly off when compared to Table 20. For example, Restoration Creditable Stream Length is shown as 3021.3 in the calculator, but summing Table 20 yields 3021. Preservation in the calculator shows 477.5, but Table 20 is 477. Total Baseline Credit in the calculator is shown as 3116.80, but Table 20 indicates 3116. Please revise once Table 20 has been finalized.*
 - Lengths and crediting were finalized and are now identical within the Wilmington District Buffer Credit Calculator and Table 20.
 - *The Asset Table tab in the Required Tables file shows UT4 as Restoration at a 2:1 ratio, and Table 20 in the report shows it as 1:1. Please update.*
 - UT4 Restoration was revised to 1:1 in the Required DMS Mit Plan Tables digital submittal.
 - *Please populate the Stream Restoration Level columns with their respective lengths.*
 - Stream Restoration Level columns were populated in the Required DMS Mit Plan Tables digital submittal as well as Table 20: Project Asset Table within the report.
- **Figure 9 and Figure 10:** *Please add location of proposed fencing.*
 - Cattle are being removed from the property by the property owners as the method of cattle exclusion. No fencing is proposed for the project.
- **Proposed Riparian Vegetation Plantings:** *The IRT has requested recently that a figure noting the different planting zones to be included in the mitigation plan. Please consider adding this figure in the Figures section and referencing in the report.*
 - Figure 11 (Proposed Planting Zone Map) was included and referenced in Section 8.2.
- **Preliminary Design Plans:**
 - *Please add fencing and detail.*
 - Cattle are being removed from the property by the property owners as the method of cattle exclusion. No fencing is proposed for the project.
 - *Update plans with wetland safety fence locations for final.*

- Wildlands updated the plans to show safety fence where wetlands abut disturbed areas within the LOD. Wildlands will refine these locations as we develop final construction plans.
- *There are currently 3 details for safety fence in the draft plans*
 - Extra safety fence details were removed from design plans
- **Digital Deliverables:**
 - *The following asset features had feature lengths/areas that differed from the reported values. Please provide updated features for these assets that accurately represent the values reported in Table 20.*
 - *UT4: 34 ft vs 45 ft*
 - Proposed length was updated and changed to 36.364 ft in Table 20 for UT4 to reflect the proposed length of UT4 restoration per the design plans. The attribute length for UT4 was updated in the feature class to reflect 36.349 ft.
 - *Wetland Re-Establishment: 5.714 ac vs 5.897 ac*
 - The attribute area for Wetland Re-Establishment was updated in the feature class to reflect 5.714 ac
 - *Please provide vegetation plot features as polygons rather than points.*
 - A polygon feature class has been created for the vegetation plots and is included in the proposed condition geodatabase; the point feature class of the veg plots has been deleted from the geodatabase.
 - *Please add ID attributes to all monitoring features.*
 - All monitoring feature attribute tables have been updated with populated ID fields. These ID fields are subject to change at the As-Built and Baseline Monitoring stage of the project based on field conditions during initial monitoring appurtenance establishment.
 - *In Fig 3, there are 9 existing conditions cross sections, but only 3 existing conditions cross-sections were included in Appendix 6.*
 - Appendix 6 as well as the associated digital files were updated to include all 9 cross sections.
 - *Data for 6 of the 9 existing conditions cross sections were provided in the required DMS Mit Plan Tables Spreadsheet. Please include data for the remaining 3 cross-sections.*
 - Data for the remaining three cross sections are now provided in the required DMS Mitigation Plan Tables Spreadsheet.
 - *Please provide Excel versions of cross-section, substrate and gauge data instead of PDFs.*
 - Excel data was added to the existing conditions folder of the digital submittal. This data is also provided in the Required DMS Mitigation Plan Tables Spreadsheet sheet for cross-sections, substrate, and gage data.

TABLE OF CONTENTS

1.0 Introduction 4

2.0 Watershed Approach and Site Selection 4

3.0 Baseline and Existing Conditions 5

 3.1 Landscape Characteristics 5

 3.2 Land Use/Land Cover 6

 3.3 Existing Vegetation 7

 3.4 Existing Project Resources 8

4.0 Functional Uplift Potential 12

 4.1 Wetland Functional Uplift Potential 12

 4.2 Stream Functional Uplift Potential 12

 4.3 Hydrology 12

 4.4 Hydraulics 12

 4.5 Channel Geomorphology 13

 4.6 Physicochemical 13

 4.7 Biology 13

 4.8 Overall Functional Uplift Potential 13

 4.9 Site Constraints to Functional Uplift 14

5.0 Regulatory Considerations 14

 5.1 Biological and Cultural Resources 14

 5.2 FEMA Floodplain Compliance and Hydrologic Trespass 14

 5.3 401/404 15

6.0 Mitigation Site Goals and Objectives 16

7.0 Design Approach and Mitigation Work Plan 17

 7.1 Design Approach Overview 17

 7.2 Reference Streams 18

 7.3 Design Channel Morphological Parameters 20

 7.4 Design Discharge Analysis 21

 7.5 Sediment Transport Analysis 23

 7.6 Project Implementation 24

 7.7 Proposed Wetland Design Overview 26

 7.8 Vegetation and Planting Plan 29

 7.9 Project Risk and Uncertainties 30

8.0 Performance Standards 30

 8.1 Streams 31

 8.2 Vegetation 32

 8.3 Wetland 32

 8.4 Visual Assessments 33

 8.5 Benthic Macroinvertebrates and Water Quality Monitoring 33

9.0 Monitoring Plan 33

 9.1 Monitoring Components 33

10.0 Long-Term Management Plan 36

11.0 Adaptive Management Plan 36

12.0 Determination of Credits 37

13.0 References 39



TABLES

Table 1: Project Attribute Table Part 1 4
Table 2: Project Attribute Table Part 2 5
Table 3: Project Soil Types 5
Table 4: Drainage Areas and Associated Land Use 7
Table 5: Project Streams Attribute Table 9
Table 6: Existing Wetland Summary 10
Table 7: Project Attribute Table Part 4 14
Table 8: Estimated Impacts to Project Wetlands 15
Table 9: Mitigation Goals and Objectives 16
Table 10: Stream and Wetland Stressors and Restoration Approach 18
Table 11: Stream Reference Data Used in Development of Design Parameters 18
Table 12: Summary of Morphological Parameters 20
Table 13: Summary of Morphological Parameters 21
Table 14: Summary of East Side Design Discharge Analysis 22
Table 15: Results of Competence Analysis 23
Table 16: Existing Groundwater Monitoring Gage Data and Analysis Results 28
Table 17: Monitoring Plan 34
Table 18: Monitoring Components 35
Table 19: Long-term Management Plan 36
Table 20: Project Asset Table 37

FIGURES

- Figure 1** Vicinity Map
- Figure 2** Service Area Map
- Figure 3** Site Map
- Figure 4** Watershed Map
- Figure 5** USGS Topographic Map
- Figure 6** Soils Map
- Figure 7** Reference Reach Vicinity Map
- Figure 8** Discharge Analysis
- Figure 9** Concept Map
- Figure 10** Monitoring Components Map
- Figure 11** Proposed Planting Zone Map

APPENDICES

- Appendix 1** Site Protection Instrument
- Appendix 2** Historic Aerial Photos
- Appendix 3** Jurisdictional Determination and Wetland Assessment Forms
- Appendix 4** Stream Identification Forms
- Appendix 5** Categorical Exclusion Documentation and Agency Correspondence
- Appendix 6** Data, Analysis, and Supplementary Design Information
- Appendix 7** Wetland Design Documents and Data
- Appendix 8** Preliminary Design Plans
- Appendix 9** Invasive Vegetation Treatment Plan
- Appendix 10** Maintenance Plan
- Appendix 11** Credit Release Schedule
- Appendix 12** Financial Assurance
- Appendix 13** NCIRT Meeting Minutes

1.0 Introduction

The Carpenter Bottom Mitigation Site (Site) is located in Gaston County, NC approximately 4.1 miles south of the City of Lincolnton and just south of the Gaston County/Lincoln County border (Figure 1). The project includes wetland rehabilitation and wetland re-establishment as well as the restoration and enhancement of five unnamed headwater tributaries to Beaverdam Creek which have been given names for this project (Carpenter Branch, UT1, UT2, UT3, UT4). The project is located within the Catawba River Basin Hydrologic Unit Code (HUC) 03050102050020 and NC Division of Water Resources (DWR) Subbasin 03-08-35 and was selected by DMS to provide stream credits and wetland credits for the [Catawba River Basin HUC 03050103 within the expanded service area] (Figure 2). The Site is located within the South Fork Catawba River (High Shoals) WS-IV water supply watershed and is located just outside the Indian Creek Targeted Local Watershed (TLW). The project proposes to restore and preserve stream channels and restore 9.661-acres of historically altered wetlands. Restoration and enhancement of the project streams and wetlands will provide 3,067.849 cool stream credits and 8.345 wetland credits and will be protected in perpetuity by an 18-acre conservation easement. The Site Protection Instrument detailing the conservation easement is included in Appendix 1. General project information is included below in Table 1.

Table 1: Project Attribute Table Part 1 – Carpenter Bottom Mitigation Site

Project Information	
Project Name	Carpenter Bottom Mitigation Site
County	Gaston
Project Area (acres)	18.0
Project Coordinates (latitude and longitude)	35.410725 N, 81.260717 W
Planted Acreage (acres of woody stems planted)	16.2

2.0 Watershed Approach and Site Selection

The Site was selected based on its potential to support the goals and objectives of current conservation and watershed planning documents which are outlined below.

- The July 2007 (amended in 2013) Catawba River Basin Restoration Priorities (RBRP) identifies sediment impairments on waterways within the basin as a current basin stressor.
- Beaverdam Creek is listed as fully supporting of benthic and fish communities within the 2010 Catawba River Basinwide Water Quality Plan (WQP). However, the WQP notes that signs of sedimentation impacting stream health are becoming evident and protection of its headwaters is a top priority to continue supporting the currently high biological quality of the creek.
- The Catawba River basin is also discussed in the 2015 North Carolina Wildlife Resource Commission's (NCWRC) Wildlife Action Plan (WAP). The report notes that streams within the basin are degraded or threatened by sedimentation, loss of riparian woody vegetation, channelization and/or stream relocation, and nutrient loading. Poorly managed agricultural activities and alterations to stream channels, including loss of riparian vegetation are cited as contributing to sedimentation and habitat degradation via bank erosion.

Restoration of the Site will directly and indirectly address stressors identified in the RBRP, the DWR Basinwide WQP, and the NCWRC WAP by reducing sediment loads through cattle exclusion within headwater tributaries of Beaverdam Creek, creating stable stream banks, and restoring a native forested riparian buffer. Additionally, the proposed project will reduce nutrient and sediment contributions to



receiving waters in a water supply watershed by restoring a natural headwater wetland which will increase nutrient and sediment uptake at the Site.

3.0 Baseline and Existing Conditions

The Site watershed (Table 2 and Figure 4) is in the central portion of the Catawba 02. It is situated in the residential countryside in Gaston County just south of the City of Lincolnton and near the Gaston County/Lincoln County border. The following sections describe the existing conditions of the Site and its watershed.

Table 2: Project Attribute Table Part 2 – Carpenter Bottom Mitigation Site

Project Watershed Summary Information	
Physiographic Province	Piedmont
Ecoregion	Southern Outer Piedmont
River Basin	Catawba River
USGS HUC (8 digit, 14 digit)	03050102, 03050102050020
NCDWR Sub-basin	03-08-35
Project Drainage Area (acres)	180
Project Drainage Area Percentage of Impervious Area	0.65%
2011 NLCD Land Use Classification	43% forest, 43% agricultural row crops and hay, 8% grassland/herbaceous, <1% shrubland, 5% urban, <1% impervious

3.1 Landscape Characteristics

3.1.1 Physiography and Topography

The Site is in the Southern Outer Piedmont Belt of the Piedmont physiographic province. The Piedmont is characterized by gently rolling, well-rounded hills with long low ridges, with elevations ranging anywhere from 300 to 1500 feet above sea level. The Site topography and relief are typical for the region, as illustrated in Figure 5. Site topography is moderate to flat within the headwater wetland area that drains to the ephemeral ditches. Stream and valley slopes increase as Carpenter Branch becomes perennial and flows toward Beaverdam Creek. The downstream end of the project steps down over natural bedrock features as the stream approaches the floodplain of Beaverdam Creek

3.1.2 Geology and Soils

The Site is located on the Cat Square terrane of the Piedmont physiographic province. The Cat square terrane is composed of metamorphic sedimentary and volcanic rocks that have been intruded by younger granitic rocks. The underlying geology of the Site is mapped as Late Proterozoic (500 to 900 million years in age) metamorphic rock mica schist (CZms). Multiple bedrock outcroppings can be seen on site and within the channel bed.

The proposed project is mapped by the Gaston County Soil Survey. Project area soils are described below in Table 3. Figure 6 provides a soils map of the Site.

Table 3: Project Soil Types – Carpenter Bottom Mitigation Site

Soil Name	Description
Worsham Loam	Worsham soils are found in depressions and at the toe of slopes on flats in the Piedmont. Slopes are typically between 1 and 4 percent. They are poorly-drained alluvial soils with a very low permeability. Worsham Loam is listed on the NC hydric soils list for Gaston County.

Soil Name	Description
Chewacla Loam	Chewacla Loam soils are predominantly found in Piedmont river valleys. They are somewhat poorly-drained alluvial soils with a seasonal high-water table of 6-24 inches. This soil unit is frequently flooded or ponded. Chewacla Loam is listed on the NC hydric soils list for Gaston County.
Pacolet Sandy Clay Loam	Pacolet series soils consists of very deep, well drained, moderately permeable soils that are typically found in Piedmont uplands. Slopes are commonly steep (between 15 and 25 percent) but can range anywhere from 2 to 60 percent. Most areas of Pacolet series soils are in forests of pines and mixed hardwoods; however, many areas have been cleared and are used for agriculture including hay and pasture.
Winnsboro Loam	The Winnsboro series consists of deep, well drained, slowly permeable fine soil that formed in material mostly weathered from dark colored basic rocks of the Piedmont. Winnsboro Loam is typically found on gently to moderately sloping Piedmont uplands.
Helena Sandy Loam	Helena soils are very deep and moderately well drained soils with slow permeability and moderate to rapid surface runoff. They are typically found on slopes from 0 to 15 percent and have a high shrink/swell potential. Helena Sandy Loam is listed on the NC hydric soils list for Gaston County.
Cecil Sandy Clay Loam	Cecil soils are very deep, well drained moderately permeable soils on ridges and side slopes of the Piedmont uplands. They are typically found on slopes between 2 and 15 percent and have developed in weathered felsic igneous and high-grade metamorphic rocks.

Source: *Soil Survey of Gaston County, North Carolina, USDA-NRCS, <http://www.nrcs.usda.gov>*

To confirm the online mapping, a licensed soil scientist (LSS) performed a soil evaluation of the Site along with Wildlands personnel on April 16, 2018. Details regarding this soils investigation and how it relates to the wetland restoration design are detailed in Section 7.7 – Proposed Wetland Design Overview. The soils investigation confirmed the NRCS web soil survey mapping of the Worsham soil series.

3.2 Land Use/Land Cover

The project watershed totals 0.28 square miles and the primary land uses are agricultural and forest which each comprise 43% of the watershed area. The next largest category of land use is grassland/herbaceous which covers 8% of the watershed area. Urban land comprises 5% of the watershed, and impervious and shrub each comprise less than 1% of the project watershed. The watershed areas and current land uses for each of the project reaches are summarized in Table 4, below.

Historical aerial photographs from 1950 to 2016 (Appendix 2) were reviewed for changes in land use and land cover. The Site has been ditched and maintained as an active cattle and hay pasture as far back as 1950. Based on aerial photography, a small forested area within the proposed wetland restoration was allowed to reforest starting around 1973. However, in 2014 approximately 2.4 acres was deforested to provide additional pasture. A watershed reconnaissance survey was performed on November 10, 2016 to identify on the ground potential site stressors. The future land use potential was examined by reviewing the Gaston County zoning boundaries and the Gaston County 2035 Comprehensive Land Use Plan (Gaston County Planning & Development Services, 2016). Based on this review, potential future site stressors include deforestation for residential development and agriculture. Risks are limited as the majority of the project watershed is already in agriculture and increased hydrology from potential clearing would be attenuated by the proposed restored forested headwater wetland complex.



Table 4: Drainage Areas and Associated Land Use

Reach Name	NCDWR Stream Identification Form Scores	Intermittent/ Perennial	Watershed Area (acres)	Watershed Area (sq. mi.)	Land Use
Carpenter Branch	20.50 38.25	Intermittent ¹ Perennial	180	0.28	43% forest, 43% agricultural row crops and hay, 8% grassland/herbaceous, <1% shrubland, 5% urban
UT1	28.50	Intermittent	20	0.03	39% forest, 23% agricultural row crops and hay, 30% grassland/herbaceous, 8% urban
UT2	32.25	Perennial	39	0.06	9% forest, 73% agricultural and hay, 4% grassland/herbaceous, 3% shrubland, 11% urban
UT3	20.75	Intermittent	17	0.03	51% forest, 38% agricultural row crops and hay, 5% grassland/herbaceous, 6% urban
UT4	35.00	Perennial	23	0.04	27% forest, 73% agricultural row crops

¹NCDWR stream ID score of 20.50 and classification of intermittent was based on evaluation performed upstream of UT2 drainage (Figure 4.)

3.3 Existing Vegetation

Throughout the wetland re-establishment areas, vegetation within the drainage ditches is typical of ephemeral drainages and/or linear wetland features and includes common rush (*Juncus effuses*) and flat sedge (*Cyperus odoratus*). Outside of the drainage ditches, vegetation within wetland re-establishment areas is currently managed in pasture grasses including tall fescue (*Festuca arundinacea*) and foxtail millet (*Setaria italica*). Some invasive herbaceous species exist within the pasture including Carolina horsenettle (*Solanum carolinense*), common ragweed (*Ambrosia artemisiifolia*) and dogfennel (*Eupatorium capillifolium*). The area upstream of Ditch 2 proposed for wetland rehabilitation was cleared sometime in 2014 as noted in Section 3.2 of this report. Since vegetation has not been regularly maintained within the wetland rehabilitation area, native woody and herbaceous species have started to establish including but not limited to common rush, flat sedge, jewel weed (*Impatiens capensis*), buttonbush (*Cephalanthus occidentalis*), tulip poplar (*Liriodendron tulipifera*), willow (*Salix*), riverbirch (*Betula nigra*), sycamore (*Platanus occidentalis*), red maple (*Acer rubrum*), and sweet gum (*Liquidambar styraciflua*). Along with native species, invasive herbaceous and woody species have established themselves within this area including but not limited to Chinese privet (*Ligustrum spp*), wild tomato (*Solanum carolinense*), honey suckle (*Lonicera*), Japanese stiltgrass (*Microstegium vimineum*), Asian spiderwort (*Murdannia keisak*), and hardy orange (*Poncirus trifoliata*).

Vegetation along the Carpenter Bottom streams consists of native and invasive species within a narrow riparian corridor varying in width from 15 to 20 feet. Native canopy species within the riparian corridor include tulip poplar, red maple (*Acer rubrum*), sycamore, sweet gum, and pawpaw (*Asimina triloba*). Native shrub and herbaceous species along the reach include American holly (*Ilex opaca*), jewel weed, Christmas fern (*Polystichum acrostichoides*), and wool grass (*Scirpus cyperinus*). Invasive species along the reach include Chinese privet, wild tomato, honey suckle, Japanese stiltgrass, Asian spiderwort, hardy orange, and poison ivy (*Toxicodendron radicans*). Outsied the narrow-forested corridor the floodplain is managed in pasture and consists of common pasture species including tall fescue, foxtail millet, Carolina

horsenettle, common ragweed, dogfennel, bull thistle (*Cirsium vulgare*), and broomsedge bluestem (*Andropogon virginicus*).

3.4 Existing Project Resources

Wildlands investigated on-site jurisdictional waters of the United States (US) within the proposed project area. Potential jurisdictional areas were delineated using the US Army Corps of Engineers (USACE) Routine On-Site Determination Method. This method is defined by the 1987 USACE Wetlands Delineation Manual and the subsequent Eastern Mountain and Piedmont Regional Supplement. Streams were classified using North Carolina Department of Water Resources (NCDWR) Classification Forms. Jurisdictional waters of the US were surveyed for inclusion on plans and figures. Wetland determination forms representative of on-site jurisdictional areas as well as non-jurisdictional upland areas are included in Appendix 3. There are five (5) jurisdictional stream channels and 14 jurisdictional wetlands on-site. An approved preliminary jurisdictional determination including wetland and non-wetland waters is included in Appendix 3. Table 5 provide a summary of stream resources within the project limits. Existing conditions are also illustrated in Figure 3. Reach specific cross sections and geomorphic summaries are provided in Appendix 6. NCSAM forms for each stream resource are included in appendix 4.

3.4.1 Jurisdictional Wetlands

A total of 14 jurisdictional wetland features (Wetlands A-N) were documented within the assessment area (Figure 3). Table 6 provides a summary of wetland resources within the project limits. On-site wetland features exhibit prolonged saturation within the upper 12 inches of the soil profile, hydrophytic vegetation, and a depleted matrix or darkened surface horizons. Wetlands N, M, H, and I are drained by ephemeral ditches and are currently in active cattle pasture (Figure 3).

Existing wetlands were evaluated using the North Carolina Wetland Assessment Method (NCWAM). The rapid assessment method evaluates field conditions relative to reference condition to generate function ratings for specific wetland types. Using the NCWAM dichotomous key and best professional judgement, existing wetlands were classified based on their reference wetland type if the area was not disturbed. Onsite wetlands were all classified as headwater forests. All delineated wetlands on-site had an overall wetland rating of low. NCWAM field assessment forms are included in Appendix 3.

3.4.2 Carpenter Branch Reach 1 and Reach 2

Carpenter Branch originates as an intermittent stream from an agricultural ditch that drains from wetland N. Carpenter Branch Reach 1 remains an intermittent stream until the confluence of UT2 where it becomes perennial. Carpenter Branch Reach 1 flows through an unconfined alluvial valley with moderate slope in an incised condition ($BHR > 3.0$). The stream exhibits evidence of active soil headcuts, bank erosion, and cattle activity including wallows and entry/exit runs. Bedform diversity is moderate, with some sections of riffle-pool sequences. However, much of the bedform is actively impacted by



cattle trampling. A relic road crossing maintains channel grade for a short section upstream of the confluence with UT1. The stream has one existing undersized culvert crossing. In Reach 2, the channel incision reduces and channel bedform improves. The valley slope increases and a stable step-pool channel begins to form. Cattle have access to the downstream extents, but impacts appear to be limited by established vegetation which limits cattle activity. The riparian corridor is narrow and heavily

invested with invasives species, particularly chinese privet and hardy orange.

3.4.3 UT1

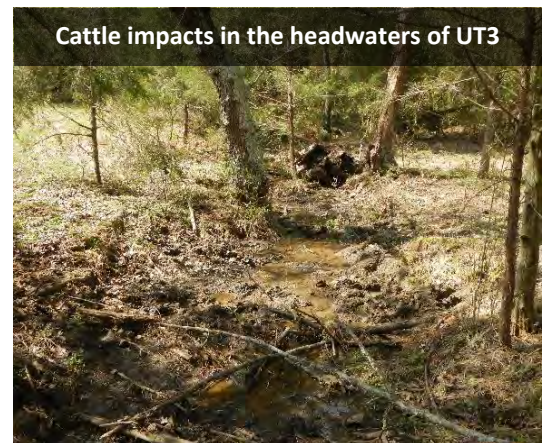
UT1 originates on-site as an ephemeral channel as it flows from a small existing culvert within a forested buffer. The stream becomes intermittent approximately 70 LF downstream of the existing culvert. The reach is deeply incised for its entirety and exhibits active erosion on both banks. Bedform is embedded by bank sediments from active erosion.

3.4.4 UT2

UT2 originates as a perennial stream flowing from agricultural ditches which currently drain Wetlands H and M. The reach flows through a wooded unconfined valley with a low slope to its confluence with Carpenter Branch. The bed material consists of fine sediments from adjacent agricultural fields, eroding banks, and cattle wallows. Bedform diversity and riffle-pool habitat is lacking throughout the reach. The stream appears to have been channelized at some point, likely to drain upstream wetland areas and/or connect it to the existing agricultural ditch network.

3.4.5 UT3

UT3 is an intermittent stream that originates within the project limits. The reach is confined against the right valley wall for approximately 180 LF before opening to an unconfined valley. The upstream extents of the reach are extensively impacted by cattle trampling and wallowing. The riparian corridor along the reach consists of sparse mature woody vegetation, with the understory grazed by cattle. The stream exhibits weak to moderate riffle-pool sequence and substrate dominated by fines from upstream cattle impacts.



3.4.6 UT4

UT4 is a perennial stream that originates off-site. The reach flows into the project area through a smooth walled plastic pipe culvert. Downstream of the existing culvert, the channel is daylighted for approximately 20 LF before converging with Carpenter Branch. Channel habitat, bedform, and geomorphology is currently not functioning due to the existing culvert.

Table 5: Project Streams Attribute Table

Parameter	Carpenter Branch (Intermittent)	Carpenter Branch (R1, R2: Perennial)	UT1
Existing Length of Reach (LF)	376	2189	123
Valley Confinement (confined, moderately confined, unconfined)	Moderately confined	Confined to moderately confined	Confined
Existing Drainage Area (acres)	48	180	20
Perennial, Intermittent, Ephemeral	I	P	I
NCDWR Water Quality Classification	WS-IV		
Existing Stream Classification ¹	G4	G4/B4	G4
Evolutionary Trend (Simon) ¹	III	III/IV/V	III
FEMA Classification	None		
NCSAM Rating	Low	Low/High	Low

Parameter	UT2	UT3	UT4
Existing Length of Reach (LF)	245	387	50
Valley Confinement (confined, moderately confined, unconfined)	Moderately confined	Moderately confined	Confined
Existing Drainage Area (acres)	39	17	23
Perennial, Intermittent, Ephemeral	P	I	P
NCDWR Water Quality Classification	WS-IV		
Existing Stream Classification ¹	G	Straightened C	G
Evolutionary Trend (Simon) ¹	III	III	I
FEMA Classification	None		
NCSAM Rating	Low	Low	Low

¹The Rosgen classification system (Rosgen, 1994) and Simon Channel Evolution Model (Simon, 1989) are for natural streams. These channels have been heavily manipulated by man and therefore may not fit the classification category or channel evolution as described by these models. Results of the classification and model are provided for illustrative purposes only.

Table 6: Existing Wetland Summary

Wetland Summary Information				
Parameter	Wetland A	Wetland B	Wetland C	Wetland D
Size of Wetland (acres)	0.07	0.01	0.01	0.01
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian Riverine			
Mapped Soil Series	Pacolet	Worsham	Pacolet	Pacolet
Drainage Class	Well drained	Poorly drained	Well drained	Well drained
Soil Hydric Status (field/mapping)	Yes	Yes	No	No
Source of Hydrology	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater
NCWAM Rating	Low	Low	Low	Low
Restoration or enhancement method (hydrologic, vegetative, etc.)	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

Parameter	Wetland E	Wetland F	Wetland G	Wetland H
Size of Wetland (acres)	<0.01	0.07	<0.01	0.39
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian Riverine			
Mapped Soil Series	Worsham	Worsham	Worsham	Worsham
Drainage Class	Poorly drained	Poorly drained	Poorly drained	Poorly drained
Soil Hydric Status (field/mapping)	Yes	Yes	Yes	Yes

Parameter	Wetland E	Wetland F	Wetland G	Wetland H
Source of Hydrology	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater
NCWAM Rating	Low	Low	Low	Low
Restoration or enhancement method (hydrologic, vegetative, etc.)	N/A	N/A	N/A	Hydrologic, Vegetative

Parameter	Wetland I	Wetland J	Wetland K	Wetland L
Size of Wetland (acres)	0.36	0.01	<0.01	0.02
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian Riverine			
Mapped Soil Series	Worsham/ Winnsboro	Worsham/ Winnsboro	Winnsboro	Winnsboro
Drainage Class	Poorly drained/Well drained	Well drained	Well drained	Well drained
Soil Hydric Status (field/mapping)	Yes/No	Yes/No	No	No
Source of Hydrology	Groundwater	Groundwater & overbank flooding	Groundwater & overbank flooding	Groundwater
NCWAM Rating	Low	Low	Low	Low
Restoration or enhancement method (hydrologic, vegetative, etc.)	Hydrologic, Vegetative	N/A	N/A	N/A

Parameter	Wetland M	Wetland N
Size of Wetland (acres)	1.02	2.35
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian Riverine	
Mapped Soil Series	Worsham	Worsham
Drainage Class	Poorly drained	Poorly drained
Soil Hydric Status (field/mapping)	Yes	Yes
Source of Hydrology	Groundwater	Groundwater
	Low	Low
Restoration or enhancement method (hydrologic, vegetative, etc.)	Hydrologic, Vegetative	Hydrologic, Vegetative

4.0 Functional Uplift Potential

4.1 Wetland Functional Uplift Potential

Areas proposed for wetland re-establishment currently do not provide functions associated with wetlands due to hydrologic manipulation, agricultural activity including cattle, and maintenance of vegetation. Wetland rehabilitation areas currently provide some functions however one of the physical, chemical, or biological functions observed in jurisdictional wetlands have been impacted. Functional uplift to existing wetland areas is expected because of the proposed activities on site. Removal of the existing ditch networks will raise the water table and increase inundations periods, restoring hydrology to the proposed forested headwater wetland area. Wetland restoration areas will also be planted with native riparian wetland vegetation and areas of heavy invasive species will be treated. Cattle will be excluded from all proposed wetland and riparian areas, reducing fecal and nutrient inputs into the system. Projected activities will result in uplift of various wetland functions including increased water storage and groundwater recharge, water quality treatment, and increased aquatic and terrestrial habitat.

4.2 Stream Functional Uplift Potential

The potential for functional uplift is qualitatively described in this section using terminology from the Stream Functions Pyramid (Harman, 2012). The Stream Functions Pyramid describes a hierarchy of five stream functions, each of which supports the functions above it on the pyramid (and sometimes reinforces those below it). The five functions in order from bottom to top are hydrology, hydraulics, geomorphology, physicochemical, and biology. Worksheets were not used to determine ratings of function shown below. Alternatively, Site observations and information from existing conditions analysis was used to assume a general rate of function for project resources. Neither the Stream Functions Pyramid nor the Quantification Tool are proposed to determine success of the mitigation site.

4.3 Hydrology

Site hydrology has been altered by the management of the watershed for livestock and agricultural practices. These alterations in land cover typically result in reductions in rainfall interception and evapotranspiration which lead to increases in runoff and water yield (Dunne and Leopold, 1978), resulting in an increase in both peak flows and base flows. The watershed has adjusted to its landcover changes and the hydrologic regime has stabilized. Based on observations and the Gaston County 2035 Comprehensive Land Use Plan, it is suggested that landcover will continue to be dominated by agriculture and population growth in the rural area will continue to be low.

A stream restoration project performed at a specific site does not often result in uplift to watershed hydrology (Harman, 2012). The restoration of the headwater wetland should reduce peak flows through increased inundation times for areas within the project boundary but, the rainfall-runoff relationship will not significantly improve within the overall project watershed.

4.4 Hydraulics

Site streams, particularly Carpenter Branch and UT1, are hydraulically impaired due to their lack of consistent floodplain connection (BHR = 3.4 to 6.1) with a typical entrenchment ratio of 1.4. Reconnecting or establishing a floodplain using Priority 1 and Priority 2 restoration will provide the in-stream relief needed to improve the hydraulic function of the Site streams. High flow velocities, along with bankfull channel shear stresses, will be reduced. The channels will be designed to experience out of bank events at a recurrence interval typical of a naturally functioning stream system. All restoration reaches will be constructed with a bank height ratio of 1.0 to 1.1. The overall water table is expected to rise to meet the restored elevation of the stream channel. Changes in the stream dimension and improvement of floodplain connectivity will raise the hydraulic function of the Site streams.



4.5 Channel Geomorphology

Watershed impacts for agricultural and cattle have degraded the streams on Site. Apart from Carpenter Branch Reach 2, the bedform and habitat along the stream lack diversity. Upstream sedimentation from active cattle wallows limit pool formation and embed riffles with fine sediments.

There is opportunity to improve the geomorphology function on Site. Channel dimension will be stabilized on restoration reaches and the incision and bank erosion will be corrected. LWD will be added to the system through construction of in-stream structures and bank revetments, a riparian buffer will be planted, and cattle will be excluded from the stream and riparian buffer, resulting in the long-term geomorphic function of Site streams.

4.6 Physicochemical

No water quality sampling has been conducted on the Site and there are no water quality monitoring stations within the project watershed. The 2007 Catawba River Basin Restoration Priorities (RBRP) identifies sediment impairments on waterways within the basin as a current basin stressor.

Upon completion of the project, the exclusion of cattle within the Site provides a great potential to improve the physicochemical functioning of the streams. The establishment of a riparian buffer and headwater wetland system within the conservation easement will reduce runoff and erosion of nutrient-rich agricultural sediments and eventually provide stream shading, reducing water temperatures. Water will flow over in-stream structures providing reaeration. However, the potential improvements to physicochemical functioning on Site streams will not happen immediately and some aspects will not occur until a mature canopy is established. Therefore, physicochemical improvements will not be explicitly monitored for success, although visual observations should show that the improvements are in place and functioning.

4.7 Biology

Currently, no data on the existing biological communities are available. Current habitat conditions vary on the Site from poor in areas that are actively incising and altered by cattle to excellent in the proposed enhancement III reach.

There is opportunity to improve the instream and riparian habitat on Site streams and wetlands. Instream structures with a variety of rock and woody materials, pools of varying depths, and woody bank revetments will be added to the streams to increase instream habitat diversity. A wide, consistent riparian buffer that will shade the stream and improve terrestrial habitat will be planted. Wetland development will diversify the available habitats for both terrestrial and aquatic species. Despite these immediate improvements, the biological response may be slow. The ultimate level of improvement in biology may not occur until after the completion of the seven-year monitoring period. Although the biological response of the project will be difficult to quantify based on a lack of existing conditions data, improvements in biologic activity of the Site will likely be noted during visual assessments and appropriate monitoring of the project.

4.8 Overall Functional Uplift Potential

Overall, the Site has functional uplift potential, from the improvement in watershed hydrology with wetland re-establishment and riparian buffer establishment to the improvements in stream hydraulics that will be seen throughout the Site with stream restoration. Improvements in geomorphology will come with restoring streams that are suited to the valley types throughout the Site. Physicochemical and biological improvements are a likely result of the project. However, there is no existing basis for classifying the existing condition of these functions and the likely improvements will occur gradually after construction.



4.9 Site Constraints to Functional Uplift

Due to the project reach length and proximity to non-project parcel boundaries, UT4 was a constraint on the design approach of Carpenter Branch Reach 1 and UT1. Wildlands was able to obtain signed permissions from the adjacent property owner upstream of UT4 to allow for minor hydrologic trespass to reduce the constraints on the project streams. There are no other known Site constraints that will affect the functional uplift of the project. The valley width on the Site will allow for the development of pattern and dimensions to restore stable, functioning streams and wetlands. The degree to which the physicochemical and biology functions can improve on the Site is limited by the watershed conditions beyond the project limits and the presence of source communities downstream of the Site.

5.0 Regulatory Considerations

Table 7, below, is a summary of regulatory considerations for the Site. These considerations are expanded upon in Sections 5.1-5.3.

Table 7: Project Attribute Table Part 4 – Carpenter Bottom Mitigation Site

Regulatory Considerations			
Parameters	Applicable?	Resolved?	Supporting Docs?
Water of the United States - Section 404	Yes	No	PCN ¹
Water of the United States - Section 401	Yes	No	PCN ¹
Endangered Species Act	Yes	Yes	Appendix 5
Historic Preservation Act	Yes	Yes	Appendix 5
Coastal Zone Management Act	No	No	N/A
FEMA Floodplain Compliance	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

1. PCN to be provided to IRT with Final Mitigation Plan.

5.1 Biological and Cultural Resources

A Categorical Exclusion for the Carpenter Bottom Mitigation Site was approved on June 12, 2019. This document included investigation into the presence of threatened and endangered species on Site protected under The Endangered Species Act of 1973, as well as any historical resources protected under The National Historic Preservation Act of 1966. The biological conclusion for the Site, per the Categorical Exclusion research and response by US Fish and Wildlife Service, is that “any resulting incidental take that may results from the associated activities [from the project] is exempt under the 4(d) rule.” All correspondence with USFWS and a list of Threatened and Endangered Species in Gaston County, NC is included in Appendix 5. The conclusion for cultural resources per the Categorical Exclusion research and response by the State Historic Preservation Office is that there are no historic resources that would be affected by this project. For additional information and regulatory communications please refer to the Categorical Exclusion document in Appendix 5.

5.2 FEMA Floodplain Compliance and Hydrologic Trespass

The Site is represented on the Gaston County Flood Insurance Rate Map Panels 3620 and 3621, with an Effective date of 9/28/2007. The Site is located outside of the Zone AE Special Flood Hazard Area (SFHA) regulatory floodplain associated with Beaverdam Creek. None of the project streams are mapped under the regulatory authority of FEMA.

Since most of the streams originate on-site, the potential for hydrologic trespass is limited. Areas with the most risk for hydrologic trespass are where UT4 enters the project and the area upstream of



jurisdictionally delineated wetland M. To address these potential issues, Wildlands obtained signed permissions from the adjacent property owner upstream of UT4 to allow for backwater to occur within the existing channel top of banks off the project property. Upstream of Wetland M, positive drainage within the existing ditch that flows through the adjacent field outside of the project area will remain and flow will be directed into the proposed wetland restoration area. Generally, outside of the proposed wetland restoration areas and the stream floodplain, the topography at the site increases quickly and there is little risk for increased inundation.

5.3 401/404

Impacts to existing wetlands will be minimized or avoided as much as possible. The majority of these wetlands are in areas of cattle pasture. Generally, existing wetlands will be improved by planting native vegetation and excluding livestock via removal. Project streams and wetlands will be protected in perpetuity under the conservation easement placed on the properties. During construction safety fence will be installed to prevent unintended impacts of on-site wetlands that are located outside of the proposed limits of disturbance. This fencing will be denoted in the final plans.

Table 8 estimates the anticipated impacts to wetland areas on this project. The Pre-Construction Notification, including this data, will be submitted to the IRT with the Final Mitigation Plan.

Table 8: Estimated Impacts to Project Wetlands – Carpenter Bottom Mitigation Site

Jurisdictional Feature	Classification	Acreage	Permanent (P) Impact		Temporary (T) Impact	
			Type of Activity	Impact Area (acres)	Type of Activity	Impact Area (acres)
Wetland A	Headwater Forest	0.07	-	-	Road Naturalization	0.007
Wetland B		0.01	-	-	Floodplain Grading	0.012
Wetland C		0.01	Conversion to Stream Resource	0.001	Floodplain Grading	0.012
Wetland D		0.01	-	-	Floodplain Grading	0.011
Wetland E		0.001	Fill, Floodplain Grading	0.001	-	-
Wetland F		0.07	-	-	Road Naturalization/ Floodplain Grading	0.009
Wetland H		0.39	Fill	0.012	Construction Access/Floodplain grading	0.150
Wetland I		0.36	Conversion to Stream Resource	0.031	Construction Access/Floodplain Grading	0.332



Jurisdictional Feature	Classification	Acreage	Permanent (P) Impact		Temporary (T) Impact	
			Type of Activity	Impact Area (acres)	Type of Activity	Impact Area (acres)
Wetland J	Headwater Forest	0.01	Fill/Floodplain Grading	0.011	-	-
Wetland K		0.01	-	-	Construction Access	0.007
Wetland L		0.02	Conversion to Stream Resource	0.004	Floodplain Grading	0.015
Wetland M		1.02	Fill Ditch	0.237	Road Naturalization /Construction Access	0.139
Wetland N		2.35	Fill Ditch	0.224	Construction Access, Minor Grading	1.990

6.0 Mitigation Site Goals and Objectives

The project aims to improve stream and wetland functions at a Site level as described in Section 4 through stream restoration, cattle exclusion, buffer re-vegetation, rehabilitation of existing wetlands, and the re-establishment of relic wetland areas. Project goals are desired project outcomes and are verifiable through measurement and/or visual assessment. Objectives are activities that will result in the accomplishment of goals. The project will be monitored after construction to evaluate performance as described in Section 8 of this report. The project goals and related objectives are described in Table 9.

Table 9: Mitigation Goals and Objectives – Carpenter Bottom Mitigation Site

Goal	Objective	Expected Outcomes	Function Supported
Exclude livestock from stream channels and wetlands.	Decommission pastures on Site and exclude livestock via removal from stream channels, wetlands, and riparian areas.	Reduce direct fecal coliform and nutrient inputs to the Site streams. Reduce sediment inputs from bank erosion. Reduce shear stress on channel boundary. Eliminate cattle trampling of wetlands.	Geomorphology, Physicochemical, Biology
Improve the stability of stream channels.	Reconstruct stream channels with stable dimension, pattern, and profile. Reconnect streams to existing floodplain. Add bank revetments and in-stream structures to protect restored streams.	Reduce sediment inputs from bank erosion. Reduce shear stress on channel boundary. Increase floodplain engagement.	Hydrology, Hydraulics, Geomorphology, Biology

Goal	Objective	Expected Outcomes	Function Supported
Improve instream habitat.	Install habitat features such as constructed steps, constructed riffles, and brush toe on restored reaches. Add woody materials to channel beds. Construct pools of varying depth.	Increase and diversify available habitats for macroinvertebrates, fish, and amphibians. Promote aquatic species migration and recolonization and increase in biodiversity over time. Add complexity including LWD to the streams	Geomorphology, Physicochemical, Biology
Restore wetland function and hydrology.	Restore wetlands through re-establishment of hydrology. Remove the drainage effects of agricultural ditching and maintenance.	Raise water table and hydrate riparian wetlands.	Hydrology, Physicochemical, Biology
Restore and enhance native floodplain and wetland vegetation.	Plant native tree, shrub, and understory species in riparian and proposed wetland restoration zones.	Reduce sediment inputs from bank erosion and runoff. Increase nutrient cycling and storage in floodplain. Provide riparian and wetland habitat. Add a source of LWD and organic material to Site streams. Support all stream functions	Hydrology, Hydraulic, Geomorphology, Physicochemical, Biology
Permanently protect the project site from harmful uses.	Establish conservation easements on the Site.	Protect Site from encroachment on the riparian corridor and direct impact to streams and wetlands. Support all stream functions	Hydraulic, Geomorphic, Physicochemical, Biology

7.0 Design Approach and Mitigation Work Plan

7.1 Design Approach Overview

The design approach for this Site was developed to meet the goals and objectives described in Section 6 which were formulated based on the potential for uplift described in Section 4. The design is also intended to provide the expected outcomes in Section 6, though these are not tied to performance criteria. Carpenter Branch and its associated tributaries will be reconnected with their active floodplains and reconstructed with stable dimension, pattern, and profile. The headwater wetland system will be restored (either re-established or rehabilitated) by plugging and filling the agricultural drainage swales. The floodplains and wetlands will be planted with native tree species and invasive species will be treated where necessary. Instream structures will be constructed in the channels to help maintain stable channel morphology, improve aquatic habitat, and enhance channel bedform. Cattle will be excluded from the entire project area via removal, eliminating wallow areas within the headwater streams and wetlands. The entire project area will be protected in perpetuity by a conservation easement. Table 10 summarizes the stressors of each project reach and the mitigation activities expected to address those stressors.

The design approach for this Site utilized a combination of analog and analytical approaches for stream restoration, and also relies on empirical data and prior experience and observations. Reference reaches and reference wetlands were identified to serve as a portion of basis for design. Channels were sized based on design discharge analysis which uses a combination of empirical and analytical data as

described within this report. Wetland potential and hydrology was assessed with existing groundwater gage data, reference wetland data, and soils analysis. These design approaches have been used on many successful Piedmont restoration projects and are appropriate for the goals and objectives for this Site.

Table 10: Stream and Wetland Stressors and Restoration Approach

Project Reach	Primary Stressors/Impairments	Approach	Mitigation Activities
Carpenter Branch Reach 1	Poor Buffer, bank erosion, cattle impacts, stream incision, lacking bedform (pool habitat)	R	Restoring appropriate dimension, adding bedform with instream structures, planting buffers, excluding cattle, protecting with conservation easement.
Carpenter Branch Reach 2	Minor cattle impacts	EIII	Excluding cattle and protecting with conservation easement.
UT1	Poor Buffer, bank erosion, cattle impacts, stream incision, lacking bedform.	R	Restoring appropriate dimension, adding bedform with instream structures, planting buffers, excluding cattle, protecting with conservation easement.
UT2	Poor Buffer, bank erosion, cattle impacts, stream incision, invasive species in riparian buffer.	R	Restoring appropriate dimension, planting buffers, excluding cattle, protecting with conservation easement, treating invasive species.
UT3	Poor Buffer, bank erosion, cattle impacts, stream incision.	R	Restoring dimension, pattern, and profile, planting buffers, protecting with conservation easement
UT4	Encapsulated in existing culvert	R	Daylighting stream and restoring natural channel features including dimension and bedform.
Wetland Re-establishment	Maintained vegetation for agriculture, decreased hydrology due to drainage features, cattle impacts.	R	Plugging/filling drainage features, planting native wetland community, treating invasive species, excluding cattle.
Wetland Rehabilitation	Existing drainage features, maintained vegetation, invasive species, cattle impacts (wallowing and trampling).	R	Plugging/filling drainage features, planting native wetland community, treating invasive species, excluding cattle.

7.2 Reference Streams

Reference streams provide geomorphic parameters of a stable system, which can be used to inform pieces of design of for stable channels of similar stream types in similar landscapes and watersheds. Six reference reaches were identified for this Site and used to support the design of the project streams (Figure 7). These reference reaches were chosen because based on their similarities to the Site streams including drainage area, valley slope, morphology, and bed material. Reference geomorphic parameters for these reaches are summarized in Appendix 4. The references to be used for the specific streams are shown in below in Table 11. A description of each reference reach is included below.

Table 11: Stream Reference Data Used in Development of Design Parameters: Carpenter Bottom Mitigation Site

Design Stream		Carpenter Branch	UT1	UT2	UT3	UT4
Reach		1				
Reference Stream	Stream Type					
Reedy Creek Nature Preserve	B4c		X			

Design Stream		Carpenter Branch	UT1	UT2	UT3	UT4
Reach		1				
Reference Stream	Stream Type					
UT to Lyle Creek	C5			X	X	
Foust Upstream	C4	X				
UT to S. Fork Catawba	E5	X				
UT to Sandy Run	E4		X		X	X
UT to South Crowders	E4		X	X		X

7.2.1 Reedy Creek Nature Preserve – South Fork

The Reedy Creek Nature Preserve – South Fork reference reach is located in northeast Mecklenburg County, NC on the publicly-owned Reedy Creek Nature Preserve and Park. The stream receives drainage from a 0.2 square mile watershed. The stream’s width-to-depth ratio ranges from 6.0 to 11.7 and the overall channel slope is 0.67%. Habitat features include meander pools, pools formed around logs and debris, rock riffles, root mats, and woody debris in the stream. The reach classifies as a B4c stream.

7.2.2 Foust Upstream

Foust Creek is located within the Carolina Slate Belt region of the Piedmont, approximately 12 miles south of Burlington, NC, in Alamance County. The stream receives drainage from a 1.4 square mile watershed. Wildlands collected riffle cross-sections, pool cross-sections, and a longitudinal profile representative of the reference reach. The stream’s width-to-depth ratio ranges from 14.3 to 15.7. The Foust Creek reference site classified as a C4 channel.

7.2.3 UT to Sandy Run

UT to Sandy Run is located in Cleveland County, 45 miles west of Charlotte, NC. This site is classified as an E4 stream type and has a drainage area of 0.15 square miles. The valley slope is 2.0% and the channel slope is 1.5%. The bed material d_{50} for the reach is 19 mm. While the stream formally classifies as an E-type channel, the stream and valley slope are steeper than typical E channels, and reference conditions observed in the field appeared analogous to B channels on-site.

7.2.4 UT to South Crowders

UT to South Crowders is a perennial stream located in Crowder Mountain State Park that receives 0.22 square miles of drainage from the forested mountain side. The stream is quite sinuous given the 2.57% valley, with a sinuosity of 2.2. UT to South Crowders is an example of a classic, small E4 stream within a higher sloped setting, with a width to depth ratio ranges from 5.7 to 8.2 and a high entrenchment ratio ranging from 3.7 to 4.2. The stream is fully connected to its alluvial floodplain, and supports varied habitats including root mats, deep meander pools, rock riffles, and woody debris in the channel.

7.2.5 UT to South Fork Catawba – Vile Preserve

UT to South Fork Catawba River - Vile Preserve is a perennial stream located in the floodplain of the South Fork Catawba River. The stream flows through a broad, flat, wetland floodplain complex, which receives runoff from adjacent agricultural uplands. The stream is completely connected to the floodplain wetlands with a bank height ratio of 1.0 and an entrenchment ratio over 30. The reach has a low slope with a sandy substrate and classifies as a Rosgen E5 stream type. The channel dimension, interaction with the floodplain wetland, and similar stream substrate make it an applicable reference reach for design of the streams within the wetlands on the West side of the project.

7.2.6 UT to Lyle Creek

UT to Lyle Creek is a perennial stream flowing through the broad, flat floodplain of Lyle Creek. UT to Lyle’s watershed is wooded, and the stream is fully connected to the floodplain with a bank height ratio



of 1.0 and an entrenchment ratio of over 2.5. The width-to-depth ratio ranges from approximately 15 to 18, and the overall valley slope is approximately 0.8%. UT to Lyle Creek has a sinuosity of 1.1 and classifies as a straight, C5 stream channel. In-stream habitat features within this reach include shallow pools, woody debris, and small sections of tree roots.

7.3 Design Channel Morphological Parameters

Reference reaches were a primary source of information to develop the pattern and profile design parameters for the streams. Ranges of pattern parameters were developed within the reference reach parameter ranges with some exceptions based on best professional judgement and knowledge from previous projects. For example, for meandering C designs, radius of curvature ratio is kept above 1.8 on all reaches and meander width ratio is kept above a 2.4. Meandering designs have pool widths to be 1.2 to 1.5 times the width of riffles to provide adequate point bars and riffle pool transition zones. Wildlands has found these minimum ratios to support stable geometry. Designer experience was used for pool design as well. Pool depths were designed to be a minimum of 3 times deeper than riffles to provide habitat variation. Cross-section parameters such as area, depth, and width were designed based on the design discharge and stable bank slopes. Key morphological parameters for the Site are listed in Table 12 and Table 13. Complete morphological tables for existing, reference, and proposed conditions are in Appendix 6.

Table 12: Summary of Morphological Parameters– Carpenter Bottom Mitigation Site

Parameter	Carpenter Branch Reach 1			UT1		
	Existing	Reference: UT to S. Fork Catawba	Proposed	Existing	Reference: UT to South Crowders	Proposed
Valley Width (ft)	14	N/A	17 - 26	4 - 8	N/A	11 - 18
Contributing Drainage Area (acres)	180	602	180	20	141	20
Channel/Reach Classification	G4	E5	C4	G4/5	E4	C4
Design Discharge Width (ft)	10.2	6.1 - 6.2	7.5	3.1	6.1 – 8.4	5.0
Design Discharge Depth (ft)	0.7	0.7 - 0.8	0.6	0.6	1.0 – 1.1	0.4
Design Discharge Area (ft ²)	7.0	4.5 - 5.3	4.4	1.8	6.4 – 8.7	1.9
Design Discharge Velocity (ft/s)	2.0	11.0	3.2	3.8	2.9	3.3
Design Discharge (cfs)	14	54	14	7	22	6
Water Surface Slope (ft/ft)	0.0130	0.0068	0.0120	0.0258	0.0091	0.0200
Sinuosity	1.1	1.0	1.2	1.1	2.2	1.3
Width/Depth Ratio	15	7 – 8	12.5	5	6 – 8	12.5
Bank Height Ratio	3.4	1.0	1.0 – 1.1	6.1	1.4 – 2.1	1.0 – 1.1
Entrenchment Ratio	1.4	3.0+	2.2 – 3.5	1.4	3.7 – 4.3	2.2 – 3.5



Table 13: Summary of Morphological Parameters– Carpenter Bottom Mitigation Site

Parameter	UT2			UT3		
	Existing	Reference: UT to Lyle Creek	Proposed	Existing	Reference: UT to Sandy Run	Proposed
Valley Width (ft)	N/A	N/A	13 - 21	N/A	N/A	13 - 21
Contributing Drainage Area (acres)	39	160	39	17	96	17
Channel/Reach Classification	G4/5	C5	C4	G4/5	E4	C4b
Design Discharge Width (ft)	4.2	7.0 – 8.6	6.0	9.5	7.3 – 7.8	6.0
Design Discharge Depth (ft)	0.8	0.5	0.5	0.3	0.7 – 0.8	0.5
Design Discharge Area (ft ²)	3.4	3.5 – 4.1	2.9	2.8	5.7 – 6.2	2.9
Design Discharge Velocity (ft/s)	3.5	4.7	3.0	2.2	3.4	3.8
Design Discharge (cfs)	12	18	8	6	20	8
Water Surface Slope (ft/ft)	0.0116	0.0057	0.008	0.026	0.0150	0.023
Sinuosity	1.0	1.1	1.2	1.0	1.6	1.2
Width/Depth Ratio	5	15 – 18	12	32	7 – 10	13
Bank Height Ratio	1.6	1.0	1.0 – 1.1	1.3	1.7	1.0 – 1.1
Entrenchment Ratio	N/A	5.7 – 6.4	2.2 – 3.5	N/A	1.6 – 2.1	2.2 – 3.5

Existing geomorphic parameters are not provided for UT4 because the entirety of the existing reach is within an existing culvert. Proposed geomorphic design ratios for UT4 are included in Appendix 6.

7.4 Design Discharge Analysis

Multiple methods were used to develop bankfull discharge estimates for each of the project restoration reaches: the NC Rural Piedmont regional curve (Harman et al., 1999), NC Piedmont/Mountain regional curve (Walker, unpublished), a Wildlands regional USGS flood frequency analysis, a site-specific reference reach curve, existing bankfull indicators using Manning’s equation, and data from previous successful design projects. The resulting values were compared, and best professional judgment was used to determine the specific design discharge for each restoration reach. Each data source is plotted on Figure 8 to show the relationship of the data to the design discharge selections.

Determining the bankfull discharge for Carpenter Branch relied heavily on existing bankfull indicators and onsite reference riffle cross-sections. Existing cross-sections along Carpenter Branch suggest a channel forming discharge significantly less than the values estimated when using the other listed methods. This decrease in discharge can be attributed to the attenuation of water in the wetland upstream of Carpenter Branch. Wetland restoration efforts will furthermore increase the attenuation of water, and therefore a relatively low bankfull discharge was determined for Carpenter Branch.

7.4.1 Regional Curve Data

Discharge was estimated using the published NC Rural Piedmont Curve (Rural Data on Figure 8) as well as the updated curve for rural Piedmont and Mountain streams, shown as the Alan Walker Curve on Figure 8.

7.4.2 Wildlands Regional USGS Rural Piedmont Calculator

Wildlands developed a regional flood frequency analysis tool that tailored the USGS 2009 publication *Magnitude and Frequency of Rural Floods in the Southeastern United States, through 2006* to the Piedmont of North Carolina. Of the 103 stations referenced in the publication, 23 were used in the development of the tool. To fill gaps in data, five additional stations were added by Wildlands to

represent streams with drainage areas less than one square mile. The Hosking and Wallis homogeneity test was performed in R© to identify the most appropriate gages based on homogeneity (Hosking and Wallis, 1993). The gages used were:

- USGS 02096740 – Gun Branch near Alamance, NC (DA = 4.06 mi²)
- USGS 02096846 – Cane Creek near Yadkin Grove, NC (DA = 7.54 mi²)
- USGS 02097010 – Robeson Creek near Pittsboro, NC (DA = 1.71 mi²)
- USGS 02101030 – Falls Creek near Bennett, NC (DA = 3.43 mi²)
- USGS 0210166029 – Rocky River at SR1300 near Crutchfield Crossroads, NC (DA = 7.42 mi²)

The data from these 28 gage stations were used to develop flood frequency curves for the 1.2-year and 1.5-year recurrence interval discharges. These relationships can be used to estimate discharge of those recurrence intervals for ungaged streams in the same hydrologic region, and were solved for each project reach’s discharge with the drainage area as the input. The discharge estimates are shown on Figure 8 as the USGS Rural Piedmont Calculator 1.2-yr Predictions.

7.4.3 Site Specific Reference Reach Curve

Six reference reaches were identified for this project. Each reference reach was surveyed to develop information for analyzing drainage area-discharge relationships as well as development of design parameters. Stable cross-sectional dimensions and channel slopes were used to compute a bankfull discharge with the Manning’s equation for each reference reach. The resulting discharge values were plotted with drainage area on Figure 8 (Reference Reach Curve) and compared the other discharge estimation methods.

7.4.4 Existing Bankfull Indicators (Manning’s Equation)

A riffle cross-section was surveyed on each design reach on the Site, with the exception of UT4, totaling 4 cross-sections. Bankfull indicators were identified in the field during this survey. Manning’s equation was used to calculate a corresponding discharge using the survey data for channel slope. It can be difficult to identify bankfull features on disturbed reaches which can lead to uncertainty in the results. For this reason, the results from this method were considered but were not weighted heavily when determining the bankfull discharge.

7.4.5 Design Discharge Analysis Summary

The design discharges for each restoration project reach were developed so that the reconstructed channels will flood with the desired frequency. Results from each of the methods described above were evaluated and compared to the other methods. For this analysis, the most emphasis was placed on the results from the regional flood frequency (1.2-year event) and the piedmont regional curve in selecting a design discharge for UT1, UT2, UT3, and UT4, while existing cross-sections were analyzed to select a design discharge for Carpenter Branch. Table 14 gives a summary of the discharge analysis.

Table 14: Summary of East Side Design Discharge Analysis – Carpenter Bottom Mitigation Site

		Carpenter Branch Reach 1	UT1	UT2	UT3	UT4
DA (acres)		180	20	39	17	23
DA (sq. mi.)		0.28	0.03	0.06	0.03	0.04
NC Rural Piedmont Regional Curve (cfs)		35	7	10	10	7
Alan Walker Curve (cfs)		20	4	5	5	4
Wildlands Regional USGS Flood Frequency Analysis (cfs)	1.2-year event	30	6	9	9	6
	1.5-year event	44	9	13	13	9

	Carpenter Branch Reach 1	UT1	UT2	UT3	UT4
Site Specific Reference Reach Curve	27	6	8	8	6
Max Q from Manning's Eq. from XS survey (cfs)	237	285	21	14	N/A
Final Design Q (cfs)	14	6	8	8	6

7.5 Sediment Transport Analysis

The watershed was assessed via aerial photography and field reconnaissance to characterize the current land cover and potential sediment sources. As discussed in Section 3.2, the majority of the project watershed is dominated by pasture, agriculture fields, and forest. Primary potential sediment sources include overland runoff from agricultural fields and active streambank erosion.

Project streams were visually assessed to obtain qualitative data on aggradation and degradation within the channels. The presence of fine sediment throughout the project streams indicate that the current agricultural practices and unstable stream conditions are overloading the carrying capacity of the project streams and their ability to move fine sediment. Observations of incised channels, actively eroding stream banks, and cattle wallowing within headwater streams indicate that actively degrading channels are a major source of fine sediment to the stream. Restoring the project streams and valley will address the major local sediment sources by protecting stream banks, removing unconsolidated alluvial deposits, reducing shear stress, and eliminating sediment from livestock trampling. The revegetated headwater wetland system will capture agricultural sediments further reducing local sediment loads. Buffers will be converted from active cattle pasture to undisturbed native woody vegetation, stabilizing potential floodplain sediment sources. By addressing local sediment sources, capacity issues currently observed on-site should be dramatically improved post construction. The focus of sediment transport analysis for design was to verify that the designed channels will have the competence to pass the sediment that continues to be delivered by the watershed while still maintaining channel stability after local sediment issues have been addressed at the Site.

7.5.1 Competence Analysis

Competence analysis was performed for Carpenter Branch Reach 1, comparing existing and proposed shear stress, mean depth, and slope. The evaluation was performed to determine parameter requirements to move the maximum particle of the existing bed material sampled at the Site. Carpenter Branch Reach 1 is representative of site conditions and contains the majority of Site assets. As such, sediment transport analysis was not performed on the associated unnamed tributaries. Additionally, the data was used to evaluate whether channel shear stress exceeds required maximum values and could potentially cause channel degradation of the existing bed material without further supplementing coarser material within the channel. The analysis utilized standard equations based on a methodology using the Shields (1936) curve and Andrews (1984) equation described by Rosgen (2001). The results of the analysis are shown in Table 15.

Table 15: Results of Competence Analysis – Carpenter Bottom Mitigation Site

	Carpenter Branch Reach 1	
	Existing	Proposed
Dbkf (ft)	0.7	0.6
Schan (ft/ft)	0.0130	0.0120
Bankfull Shear Stress, τ (lb/sq ft)	0.49	0.42
Dmax Bar/Subpavement (mm)	30	30

	Carpenter Branch Reach 1	
	Existing	Proposed
Movable particle size (mm) Shields/Rosgen	37/90	32/81
Predicted Shear Stress to move D _{max} Shields/Rosgen	0.40/0.11	0.40/0.11

While the proposed design reduces shear stress of the bankfull channel, both the Shield’s and Rosgen’s results indicate that the proposed stream design exceeds the required shear stress to initiate movement of the existing bed particles. While the channel should have adequate boundary shear stress to move most particles in the subpavement layer and theoretically pass the largest particle supplied by the watershed, if bed substrate material is not supplemented there would be potential for downcutting and erosion to occur within the stream. The results were used to inform further design of the reach.

The excess shear estimated within the Site stream requires larger material ($D_{max} > 3.5$ -inches) be incorporated within constructed riffles proposed for the Site. The proposed D_{50} and D_{100} for the constructed riffles on all stream reaches will be sized accordingly to prevent channel degradation. Additionally, to increase stabilization, structures such as rock/log sills, steps, J-hooks, and vanes will be installed within the channel to provide grade control. Brush toes will also be installed to increase roughness within the channel and reduce boundary shear stress along outside meanders. These measures will ensure a stable pavement layer that also allows for bed load material to be active during isolated events. It should also be noted that the analysis on the existing channel was only performed up to a bankfull event, and that the highest shear stresses the existing channel is experiencing occurs during flow events beyond bankfull in which channel incision limits floodplain connection and exposes stream banks and beds to extreme stress. The reconstruction of appropriate channel dimension will eliminate these extreme shear stress events through the reconnection of an active floodplain.

7.6 Project Implementation

7.6.1 Overview

The mitigation approaches proposed for the streams and wetlands on Site have been developed to achieve the potential for functional uplift relative to the existing conditions on the Site (described in Section 4). The site includes elements of stream restoration, stream enhancement, wetland re-establishment, and wetland rehabilitation as described below. Figure 9 shows the approaches proposed for the project reaches.

Restoration reaches will be constructed as Priority 1 and Priority 2. Restoration reaches have been designed to create stable, functional stream channels based on reference parameters, design discharge analysis, and sediment transport analysis. Dimension, pattern and profile have been designed for all restoration reaches to provide a cross-sectional area sized for frequent overbank flows, a stable bed with variable bedforms, well-vegetated bank slopes, and improvements to aquatic habitat. Improved vertical and lateral stability will reduce stream channel erosion. Diverse bedforms will be established using in-stream structures appropriate for the geomorphic setting. These structures will provide grade control to prevent incision and serve as habitat features. Pools will have varied depths to increase habitat diversity.

In-stream structures for restoration reaches will include riffles, boulders sills, log sills, log j-hooks, and brush toe. Constructed riffles will be built from excavated on-site rock if it meets specifications and is available. Quarry stone may be used if on-site materials are not sufficient. Riffle material will also incorporate woody material and logs, which will provide pore spaces within the riffles, benefiting in-stream habitat and the hyporheic exchange process. Using a diverse range of constructed material and types will provide grade control, habitat diversity and will create varied flow vectors. Log j-hooks will



direct the flow away from the banks, while providing grade control and habitat variability. Log and boulder sills will be used to allow for small grade drops across pools. Brush toe will be used in select meander bends to help reduce erosion, encourage pool maintenance, and provide varied pool habitat.

The Site includes riparian riverine headwater seep, pocket, and floodplain wetlands that will be re-established and rehabilitated. Existing agricultural drainage ditches/swales will be filled to provide hydrologic uplift, appropriate forested wetland vegetation will be established, and invasive species will be treated.

7.6.2 Carpenter Branch Reach 1 and 2

Carpenter Branch Reach 1 will be restored through a combination of Priority 1 and Priority 2 restoration. Due to profile and earthwork constraints, a Priority 1 approach cannot be used along the entire reach and a Priority 2 approach is required at transitions as well as at the confluences of some tributaries. The channel will be raised and a floodplain bench will be established with minimum bank height ratios of 1.0-1.1 and minimum entrenchment ratios of 2.2. The channel is designed as a Rosgen C-type stream with moderate sinuosity. In-stream structures will be added for stream stability, grade control and habitat variability. A native vegetation riparian buffer will be established, and invasive vegetation will be treated. Livestock will be excluded along the entire length of the reach.

Carpenter Branch Reach 2 is slated for an enhancement III approach. The reach is currently stable and exhibits mature vegetation, stable dimension, and variable bedrock bedform. Desirable aquatic habitat is present throughout the reach. Invasive vegetation will be spot treated as needed along the reach.

7.6.3 UT1

UT1 will be restored through a combination of Priority 1 and Priority 2 restoration. The channel will be raised and reconnected to a constructed floodplain bench or relic floodplain where possible. In-stream structures will be installed to provide bedform, a riparian buffer will be established for enhanced stability, and livestock will be excluded to eliminate this water quality stressor. At the upstream extent, a portion of ephemeral channel within the conservation easement will be converted to a step-pool stormwater conveyance system to address potential storm drainage flowing from an existing culvert. No maintenance is expected to be required for the step-pool stormwater conveyance system based on the minimal drainage that it will receive.

7.6.4 UT2 and UT3

UT2 and UT3 are headwater streams which begin within the proposed conservation easement. Both streams originate at the downstream end of the headwater wetland. The upstream extent of the streams will be transitioned from small, shallow swales to a dimension indicative of Rosgen C-type channels. The channels will be restored through Priority 1 restoration and will be raised to reconnect them to their relic floodplains as they meander towards Carpenter Branch with moderate slope and sinuosity through unconfined valleys. In-stream structures will be used to promote stability, a native riparian buffer will be established, livestock will be excluded, and invasive species will be treated along both reaches. These headwater perennial and intermittent streams provide a key role in overall stream health and restoration of these streams will help protect larger channels restored downstream.

7.6.5 UT4

UT4 will be daylighted and removed from an existing culvert within the limits of the conservation easement. The channel will be restored using a Priority 1 restoration approach. A stable pattern and profile will be established, and in-stream structures will be added to promote a diverse bedform. A native riparian buffer will be planted, and invasive species will be treated along the reach.



7.6.6 Wetland Re-establishment

Relic wetland areas will be re-established on the Site through hydrologic uplift, establishment of forested wetland plant communities, cattle exclusion, and roughening to promote increased retention times. Hydrology within proposed wetland re-establishment areas has been altered through agricultural ditching and increased drainage effects of channels at the downstream extent. Restoration of these headwater channels will promote increased hydrology appropriate for a Piedmont forested wetland system. Vegetation within wetland re-establishment areas has been maintained in pasture and hay has been grazed by cattle for multiple seasons. Increased roughness from vegetation will reduce surface drainage effects within the wetland and allow for development of facultative herbaceous and woody species.

7.6.7 Wetland Rehabilitation

Jurisdictionally delineated areas including wetlands H, I, M and N are slated for rehabilitation. Existing hydrology within these areas will be improved by filling the existing network of drainage ditches and roughening the surface of these areas to promote increased retention times. The restoration of existing incised streams which connect the network of ditches will raise overall water table elevations within the existing wetland areas which will also improve hydrologic function. Rehabilitation areas which are dominated by herbaceous vegetation and grasses will be planted with appropriate woody species to establish a forested wetland system. In previous cutover areas (primarily Wetland N) invasive and upland species, including hardy orange and longleaf pine (*Pinus palustris*) will be treated. Cattle will also be excluded from all existing wetland areas, eliminating wallow areas which are currently acting as nutrient and sediment sources for the project receiving waters.

7.7 Proposed Wetland Design Overview

The proposed design includes the restoration of 9.661 acres of historically altered wetlands which will be re-established and rehabilitated at the headwaters of Carpenter Branch. Wildlands performed a multilevel analysis of the proposed wetland area to holistically understand the ditching and anthropogenic effects, current and proposed hydrologic conditions, and current and potential hydric soil development.

7.7.1 Jurisdictional Investigation

As outlined in Section 3.4.1 and Table 6 of this report, Wildlands investigated potential waters of the United States within the project area. These areas were delineated using the USACE routine On-Site Determination method presented in the 1987 Corps of Engineers delineation manual, the subsequent Regional Supplement for the Eastern Mountains and Piedmont Region, groundwater hydrology data, and the evaluator's best professional judgement. All jurisdictional Waters of the U.S. were located by sub-meter GPS. The Preliminary Jurisdictional Determination (PJD) package was submitted on March 24, 2020. The approved PJD was issued to Wildlands on May 20, 2020 and is included in Appendix 3.

7.7.2 Hydric Soils Investigation

To ensure adequate potential for the development of hydric soils within the proposed wetland restoration areas, an initial evaluation of Site soils was performed using Natural Resources and Conservation Service (NRCS) web soil survey mapping. Soils within the proposed wetland restoration areas are mapped as Worsham Loam (Figure 6). The Worsham soil series is a poorly drained soils series with very slow permeability. Worsham soils are listed on the North Carolina hydric soils list for Gaston County in low sloped and depressional areas meeting hydric criteria 2.

To confirm the online mapping, a licensed soil scientist (LSS) performed a preliminary soil evaluation of the Site along with Wildlands personnel on April 16, 2018 and also follow up investigation to further confirm the presence and existence of hydric soils on April 24, 2020. Hand auger borings were advanced



on the property to approximate the location and extent of hydric soils. Borings were evaluated to assess the presence or absence of hydric soil indicators utilizing the NRCS Field Indicators of Hydric Soils in the United States – A Guide for Identifying and Delineating Hydric Soils (version 7.0, 2010). Based on the preliminary and follow up site visits, reports and figures included in Appendix 7 were prepared outlining the potential for wetland restoration on Site. The soils investigation confirmed the NRCS web soil survey mapping of the Worsham soil series. Soil borings performed within the study area were identified as hydric soils meeting the F3 – depleted matrix hydric soils indicator. Depth to hydric soil indicators were less than 10-inches sitewide and in most cases were less than 2” below the land surface. Due to the on-site ditching, many areas exhibiting hydric soil indicators did not exhibit primary or secondary wetland hydrology indicators.

7.7.3 Hydrologic Monitoring and Evaluation

Six groundwater gages were installed to evaluate the existing hydrologic conditions of the Site (Figure 3). As much as possible, groundwater gages were placed in transects to allow evaluation of the water table across the proposed wetland areas. Groundwater gages one through four were placed within the area proposed for wetland re-establishment, groundwater gage 5 was placed within the main portion of the project proposed for wetland rehabilitation, and groundwater gage 6 was placed just outside the proposed wetland restoration boundary.

Groundwater gages collected data at the Site between March 1, 2019 and October 3, 2019. The defined growing season based on the Gaston County, North Carolina WETS table for 50% probability of soil temperatures greater than 28 degrees Fahrenheit is March 15th to November 14th representing a 250-day growing season. Table 1 listing wetland saturation thresholds provided in the Notification of Issuance of *Guidance for Compensatory Stream and Wetland Mitigation Conducted for the Wilmington District* (October 24, 2016) defines a wetland saturation threshold for Worsham soils between 10% and 12%. Based on the defined growing season outlined above, wetland saturation thresholds for the project should range between 25 and 30 consecutive days of inundation within the defined growing season at the Site to provide minimum hydrology for adequate wetland processes to occur. Given that Wildlands had nearly an entire growing season of groundwater gage data across the Site, an evaluation of existing water table elevations was performed based on the installed gages.

An evaluation of the data from the installed existing groundwater gages is shown below in Table 16 and plots of the existing groundwater data are provided in Appendix 7. Based on the evaluated data, groundwater gages 1, 3, and 5 saw consecutive inundation periods of 48-days, 48-days, and 73-days, respectively. For these gages, this represents 19.6%, 19.6%, and 29.8% of the growing season for the three gages. Groundwater gages 2 and 4, both show consecutive inundation periods of 22-days, representing 9% of the growing season. Groundwater gage 6 recorded 13 days of consecutive inundation within the growing season representing 5.3%. Gage data collected within areas proposed for wetland rehabilitation and re-establishment show that the Site is very close if not currently getting adequate hydrology to begin to allow wetland processes to occur. The identification of shallow hydric soils, and the amount of delineated wetland features further supports that the Site is either currently meeting a wetland hydrologic regime or is just outside the hydrologic regime required for wetland processes to occur. Based on Wildlands observations, major limiting factors for wetland processes at this point, are cattle access, agricultural ditching, a lack of roughness due to vegetative maintenance, and drainage effects from incised headwater streams at the downstream extent. The proposed mitigation approach of filling the agricultural swales and ditches and shallowing the headwater channels at the downstream extent of the wetland system will raise hydrology within the currently ditched areas. Additionally, roughening of the Site and increased roughness from woody vegetation will slow surface drainage from the proposed wetland areas and increase retention times at the wetland surface.



Wildlands generated the proposed wetland rehabilitation and re-establishment boundaries based on field indicators and hydrology data that supports that proposed areas will meet minimum saturation thresholds. Locations of proposed groundwater gages for post construction monitoring were chosen so that data can be compared between existing and proposed groundwater gages and confirm general hydrologic uplift at the Site. The existing gage data, along with the jurisdictional delineation, and LSS investigation provides support that if drainage effects on Site are reduced, proposed wetland areas will meet minimum required hydrology standards.

Table 16: Existing Groundwater Monitoring Gage Data and Analysis Results

Gage	Consecutive Days in Growing Season Wells Met Groundwater Depth Criterion Under 2019 Rainfall Conditions (Days)	Consecutive Percent Growing Season Wells Groundwater Depth Criterion Under 2019 Rainfall Conditions (%)	Evaluated Dates	Wetland Approach
1	48	19.6%	3/1/19 to 10/3/19	Re-establishment ¹
2	22	9.0%	3/1/19 to 10/3/19	Re-establishment
3	48	19.6%	3/1/19 to 10/3/19	Re-establishment
4	22	9.0%	3/1/19 to 10/3/19	Re-establishment
5	73	29.8%	3/1/19 to 10/3/19	Rehabilitation
6	13	5.3%	3/1/19 to 10/3/19	Outside Proposed Wetland Restoration Area
Ref ²	151	65%	2016 to 2019 Growing Seasons	Reference

¹Groundwater gage 1 is located near the boundary of the wetland re-establishment and rehabilitation.

²Data in the table represents the average consecutive days and percent of growing season over 4 analyzed growing seasons of reference well data.

7.7.4 Reference Wetland

To further evaluate the Site hydrologic regime, a reference wetland was identified approximately 6.7 miles from the Site. This reference wetland area is a mature Piedmont Bottomland Forest that is located within the floodplain of Howards Creek in Lincoln County. Historical aeriels reveal no recent disturbances to the reference property and no disturbances were observed in the field. The existing vegetation communities are typical of a Bottomland Hardwood Forest and include mature canopy tree species, moderate subcanopy and shrub species, as well as an herbaceous layer. Dominant canopy species include river birch, green ash, sycamore, box elder, and red maple. Understory species include ironwood and spicebush. The herbaceous layer within the reference wetland included arrow arum, jewelweed, lizard’s tail, and microstegium.

The hydrology of this system is intermittently, temporarily, or seasonally flooded, but unlike the project site, the reference area has not been disturbed by clearing or ditching. As a result, mature vegetation has been established and the natural flooding regime has been preserved. This reference wetland has been used by Wildlands for previous mitigation sites and groundwater data has been collected for the last four growing season, providing a good baseline of hydrologic data for comparison during

monitoring. The proximity of the reference area to the project site provides quality hydrologic information to use in rehabilitating and re-establishing wetlands at the proposed site.

Groundwater monitoring data from the reference well for the 2019 growing season is included in Appendix 7 and is also shown on the existing groundwater gage plots installed at the Site for hydrologic comparison. During the recorded period, general trends of reference Site hydrology (peak and drawdown periods) are very similar in duration and magnitude to gages installed at the Site within the proposed wetland areas. This data supports that the reference site sees similar climatic conditions as the proposed mitigation site. It can also be observed that drawdown periods (receding limbs of the groundwater hydrographs) for the proposed mitigation site are steeper than those at the reference site, indicating that a lack of surface roughness from vegetation and increased drainage effects from agricultural ditching are influencing Site hydrology. Groundwater gage 5 located within the previous cutover area which currently contains more established vegetation most nearly matches the reference well data, supporting that establishing herbaceous and woody vegetation will slow drainage effects. While currently meeting wetland hydrologic criteria, groundwater gage 5 is still seeing some drainage effects from existing agricultural swales, and is anticipated that the groundwater levels will increase further once these drainage features are filled during construction, increasing groundwater levels even closer to those observed at the reference wetland site. These hydrology data support that the reference site has the appropriate hydrologic regime to serve as a reference condition for the project site. The reference gage will continue to record water table depth throughout the post-construction monitoring period. In the event of unusual weather during the post-construction monitoring period, the reference well performance will be used as a check for the mitigation site performance.

7.8 Vegetation and Planting Plan

The objective of the planting plan is to establish, over time, a 50-foot thriving riparian buffer composed of native tree species. This restored buffer will improve riparian and wetland habitat, help the restored streams stay stable, shade the streams, and provide a source for LWD and organic material to the streams. The specific species composition to be planted was selected based on the target community type, observation of occurrence of species in riparian buffers adjacent to the site, availability of nursery stock, and best professional judgment. Species chosen for the planting plan are listed on sheet 4.0 of the preliminary plans located in Appendix 12. Wildlands used the following community types as targets for species selection for the site:

- Piedmont/Low Mountain Alluvial Forest

Canopy trees include but not limited to *Betula nigra*, *Platanus occidentalis*, *Liquidambar styraciflua*, *Liriodendron tulipifera*, *Ulmus americana*, *Celtis laevigata*, *Juglans nigra*, *Fraxinus pennsylvanica*, *Carya cordiformis*, *Carya ovata*, *Quercus imbricaria*, and *Acer rubrum*. Subcanopy trees typically found in mesic mixed hardwood forest include *Acer negundo*, *Acer floridanum*, *Acer rubrum*, *Asimina triloba*, *Ilex opaca*, and *Carpinus caroliniana*.

- Mesic Mixed Hardwood Forest

Canopy trees include but not limited to *Fagus grandifolia*, *Quercus rubra*, *Liriodendron tulipifera*, *Acer rubrum*, *Acer saccharum*, *Tsuga canadensis*. Subcanopy trees in mixed hardwood forest include *Cornus florida*, *Ostrya virginiana*, *Evonymus americana*, *Kalmia latifolia*.

- Piedmont Bottomland Forest

Canopy trees include but not limited to *Liriodendron tulipifera*, *Liquidambar styraciflua*, *Quercus pagoda*, *Quercus michauxii*, *Ulmus americana*, *Celtis laevigata*, *Fraxinus pennsylvanica*, *Pinus taeda*, *Carya Ovata*, and *Carya cordiformis*. Subcanopy trees typically found in bottomland



forest include *Carpinus carolinianan*, *Acer floridanum*, *Acer rubrum*, *Cornus florida*, *Ilex opaca*, and *Asimina triloba*.

Non-forested areas within the conservation easement will be planted with bare root tree species and permanent riparian seed mix. Riparian buffers will be seeded and planted with native vegetation chosen to develop species diversity and are listed on Sheet 4.0 of the preliminary design plans located in Appendix 8. The specific species composition to be planted was selected based on the community type, observation of occurrence of species in riparian buffers adjacent to the Site, and best professional judgement on species establishment and anticipated Site conditions in the early years following project implementation. In addition, the stream banks will be planted with live stakes and the channel toe will be planted with herbaceous plugs. Permanent herbaceous seed will be spread on streambanks, floodplain areas, and disturbed areas within the project easement. Per the 2016 NCIRT Mitigation Guidance plantings are preferred to occur between November 15 and March 15, however, in some cases the March 15 deadline cannot be met but planting must occur no later than April 15 for acceptance as a full season of monitoring. Per IRT Guidance, vegetation monitoring also cannot be started within 180 days of the completion of planting.

Mechanical site soil preparation will be implemented where necessary, including but not limited to wetland areas, priority 2 benches, and areas of cut greater than one foot. Site preparations will be performed to create soil physical properties favorable for tree growth. In the pasture areas, the planted area will be ripped in a grid-like pattern with a maximum rip shank spacing of six feet. Ripping will be performed during the driest conditions feasible to maximize shatter of the plow pan. Ripping may be implemented to reduce soil compaction resulting from existing farm paths, haul roads, stockpile areas, etc. Where required based on site conditions, topsoil will be stockpiled and reapplied. Soil amendments may be incorporated to augment survival and growth of planted vegetation as determined necessary by soil testing.

Invasive species within the riparian buffers of restoration reaches will be treated at the time of construction. The extent of invasive species coverage will be monitored, mapped, and controlled as necessary throughout the required monitoring period. Please refer to Appendix 9 for the invasive species treatment plan.

7.9 Project Risk and Uncertainties

In general, this project has low risk. Due to the rural nature of the watershed and the Site's location in the upper reaches of the watershed, there is very little risk that changes in land use upstream in the project watershed would alter the hydrology or sediment supply enough to damage the project streams after construction.

One easement crossing will be part of the Site: a new internal culvert crossing on Carpenter Branch Reach 1. Stone will be placed along the entrance and exit of the Carpenter Branch culvert to dissipate energy and provide stability.

8.0 Performance Standards

The performance criteria for the Site will follow approved performance criteria presented in the DMS Stream and Wetland Mitigation Plan Template and Guidance (June 2017), and the October 2016 IRT Mitigation Monitoring Guidance. Annual monitoring and semi-annual site visits will be conducted to assess the condition of the completed project. The stream restoration sections of the project will be assigned specific performance criteria components for stream morphology, hydrology, vegetation, and wetland hydrology. Performance criteria will be evaluated throughout the seven years of post-construction monitoring period.



8.1 Streams

8.1.1 Dimension

Riffle cross sections on the restoration reaches should be stable and should show little change in bankfull area, and width-to-depth ratio. Per NC IRT guidance, bank height ratios shall not exceed 1.2 and entrenchment ratios must be no less than 2.2 at any measured riffle cross section. Riffle cross sections should fall within the parameters defined for channels of the appropriate stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include a vertically incising thalweg or eroding channel banks. Changes in the channel that indicate a movement toward stability or enhanced habitat include a decrease in the width-to-depth ratio in meandering channels or an increase in pool depth. Remedial action would not be taken if channel changes indicate a movement toward stability.

8.1.2 Pattern and Profile

Visual assessments and photo documentation should indicate that streams are remaining stable and do not indicate a trend toward vertical or lateral instability. Signs of instability may include bank scour, bank migration, and bed incision.

8.1.3 Hydrology

Four bankfull flow events, occurring in separate years, must be documented on the restoration reaches within the seven-year monitoring period.

Bankfull events will be documented using photographs and either a crest gage or a pressure transducer, as appropriate for Site conditions. The selected measurement device will be installed within a surveyed riffle cross section. The device will be checked at each site visit to determine if a bankfull event has occurred. Photographs will also be used to document the occurrence of debris lines and sediment deposition. A pressure transducer will be installed in the channel to document baseflow within streams channels. The pressure transducer data will be plotted and included in the annual monitoring reports. Per the NCIRT request via meeting minutes included in the appendix, stream gages are proposed along UT1, UT2, and UT3 to document continuity of flow along these reaches.

8.1.4 Photo Documentation

Photographs should illustrate the Site's vegetation and morphological stability on an annual basis. Cross section photos should demonstrate no excessive erosion or degradation of the banks. Longitudinal photos should indicate the absence of persistent bars within the channel or vertical incision. Grade control structures should remain stable. Deposition of sediment on the bank side of vane arms is preferable. Maintenance of scour pools on the channel side of vane arms is expected.

Photographs will be taken once a year to visually document stability for seven years following construction. Permanent markers will be established and located with GPS equipment so that the same locations and view directions on the Site are photographed each year. Photos will be used to monitor restoration and enhancement areas as well as vegetation plots.

Longitudinal reference photos will be established along the channel by taking a photo looking upstream and downstream. Cross sectional photos will be taken of each permanent cross section looking upstream and downstream. Reference photos will also be taken for each of the vegetation plots. Representative digital photos of each permanent photo point, cross section, and vegetation plot will be taken on the same day the stream and vegetation assessments are conducted. The photographer will make every effort to consistently maintain the same area in each photo over time.



8.2 Vegetation

Vegetative performance for riparian buffers associated with the stream restoration component of the project (buffer widths 0 – 50ft) will be in accordance with the Stream Mitigation Guidelines issued October 2016 by the USACE and NCIRT. The success criteria is an interim survival rate of 320 planted stems per acre at the end of monitoring year three (MY3), 260 stems per acre at the end of monitoring year 5 (MY5) and a final vegetation survival rate of 210 stems per acre at the end of monitoring year 7 (MY7). Planted vegetation must average 7 feet in height in each plot at the end of the fifth monitoring year (MY5) and 10 feet in height in each plot at the end of the seventh year (MY7) of monitoring. Given inundation periods anticipated for areas proposed for wetland restoration, woody vegetation growth may be hindered resulting in stunted tree heights. If monitored vegetation data does not meet the required vigor outlined above, tree height and vigor will be evaluated and discussed within monitoring reports and adaptive management plans, as necessary. Vegetation monitoring will be conducted between July 1st and the end of the of the growing season and no later than November 1st. The extent of invasive species coverage will be monitored and controlled as necessary throughout the required monitoring period (MY7).

A combination of permanent and random vegetation plots will be used to demonstrate vegetation coverage. Both fixed and mobile plots will be chosen randomly and will include a mix of the planted vegetation communities. All woody stems, including exotic invasive species, are to be counted within each plot. The vegetation plots permanent and mobile will be distributed through each planted area as follows: four plots in wetland re-establishment areas, three plots in wetland rehabilitation zones, and six plots in riparian planting areas.

Permanent vegetation plots will be established after construction during the as-built baseline (MY0). Permanent plots will be visually marked in the field and planted woody stems within these plots will be marked annually as needed and given a coordinate, based off a known origin, so that they can be found in subsequent monitoring years. Individual plot data will include height, density, vigor, damage (if any), planted species versus volunteer species, and survival. Mortality will be determined from the difference between the previous year's living planted stems and the current year's living planted stems.

Mobile vegetation plots will not make up more than 50% of the total required plots. Locations (GPS coordinates and orientation) of the random plots will be identified and included in the corresponding monitoring year's report. Plots will be physically marked in the field so that they may be evaluated during the monitoring year. Random plot data collected will include species and height.

8.3 Wetland

Groundwater monitoring gages will be established throughout the proposed wetland area as shown in Figure 10. Generally, the gages will be installed at appropriate locations so that the data collected will provide an indication of groundwater levels throughout the wetland project area. As outlined above in Section 7.7.3, Table 1 listing wetland saturation thresholds provided in the Notification of Issuance of *Guidance for Compensatory Stream and Wetland Mitigation Conducted for the Wilmington District* (October 24, 2016) defines a wetland saturation threshold for Worhsam soils between 10% and 12% and the defined growing season based on the Gaston County, North Carolina WETS table for 50% probability of soil temperatures greater than 28 degrees Fahrenheit is March 15th to November 14th representing a 250-day growing season. Based on the information above, along with the existing hydrologic Site investigation and reference wetland data, Wildlands proposes a saturation criterion of 12% of the 250-day growing season, representing 30 consecutive days of inundation.

Growing season dates for the project area will be confirmed using soil temperature probes installed on-site and soil temperature data will be collected for each individual monitoring year. Per USACE guidance, soil temperature probes will be located at a depth of 12 inches. The growing season will be defined as



that portion of the year where soil temperature remains above 40 degrees Fahrenheit and can be corroborated with vegetative indicators, including bud burst and leaf drop. The growing season may not begin before March 1 of each year when calculating hydroperiods. If a wetland zone does not meet the performance standard for a given monitoring year, rainfall patterns will be analyzed, and the hydrograph will be compared to that of the reference wetland to assess whether atypical weather conditions occurred during the monitoring period. Soil profile descriptions will be recorded at each boring where a gage is installed before and after construction. The profile descriptions will present a record of the soil horizons, color, texture, and redoximorphic features.

8.4 Visual Assessments

Visual assessments should support the specific performance standards for each metric as described above. Visual assessments will be performed along stream reaches on a semi-annual basis during the seven-year monitoring period. Problem areas will be noted such as channel instability (e.g. lateral and/or vertical instability, instream structure failure/instability and/or piping, headcuts), vegetation health (e.g. low stem density, vegetation mortality, invasive species, or encroachment), beaver activity, or livestock access. Areas of concern will be mapped and photographed and will be accompanied by a written description in the annual report. Problem areas will be re-evaluated during each subsequent visual assessment. Should remedial actions be required, a plan of action will be provided in the annual monitoring report.

8.5 Benthic Macroinvertebrates and Water Quality Monitoring

Based on the issued and approved NCIRT meeting minutes from January 16, 2019 included in Appendix 13, the Site is a good candidate for benthic and water quality monitoring with a potential associated 2% to 4% credit bonus associated with this monitoring. If based on review of the draft mitigation plan, NCDMS and the NCIRT are still in support of this monitoring and associated credit bonus, Wildlands will draft a technical memorandum outlining water quality and benthic macroinvertebrate sampling techniques which will be included with the comment response letter submitted with the Final Mitigation Plan and associated crediting bonuses will be based on quantities presented in Table 20.

9.0 Monitoring Plan

The Site monitoring plan has been developed to ensure that the required performance standards are met and project goals and objectives are achieved. Annual monitoring data will be reported using the DMS Baseline Monitoring Report Template (April 2017). The monitoring report shall provide project data chronology that will facilitate an understanding of project status and trends, ease population of DMS databases for analysis and research purposes and assist in close-out decision making.

Using the DMS Baseline Monitoring Report Template (June 2017), a baseline monitoring document and as-built record drawings of the project will be developed for the constructed Site. Complete monitoring reports will be prepared in the fall of monitoring year one, two, three, five, and seven and submitted to DMS. In monitoring years four, and six, a summary of the site conditions along with photos, current condition plan view (CCPV) map, and applicable hydrology data will be prepared and submitted to DMS. Annual monitoring reports will be based on the DMS Annual Monitoring Report Template (June 2017). The monitoring period will extend seven years beyond completion of construction or until performance criteria have been met. Table 17, below, describes how the monitoring plan is set up to verify that project goals and objectives have been achieved.

9.1 Monitoring Components

Project monitoring components are listed in more detail in Table 18. Approximate locations of the proposed vegetation plots and groundwater gage monitoring components are illustrated in Figure 10.



Table 17: Monitoring Plan – Carpenter Bottom Mitigation Site

Goal	Objective	Performance Standards	Monitoring Metric
Exclude livestock from stream channels and wetlands.	Decommission livestock pastures from parcels and remove livestock from stream channels, wetlands, and riparian areas.	Prevent easement encroachment	Visual assessment for signs of livestock encroachment.
Improve stability of stream channels.	Reconstruct stream channels with stable dimension, pattern, and profile. Reconnect streams to existing floodplain. Add bank revetments and in-stream structures to protect restored streams.	Bank height ratios stay below 1.2. Visual assessments showing progression towards stability.	Cross-section monitoring and Visual assessment.
Improve instream habitat.	Install habitat features such as constructed steps, constructed riffles, and brush toe on restored reaches. Add woody materials to channel beds. Construct pools of varying depth.	There is no required performance standard for this metric.	Visual assessment
Restore wetland function and hydrology.	Restore wetlands through re-establishment of hydrology. Remove the drainage effects of agricultural ditching and maintenance.	Free groundwater surface within 12 inches of the ground surface for a minimum of 12% (30 consecutive days) of the growing season for Gaston County.	Groundwater gages will be placed in wetland restoration areas and monitored annually.
Restore and enhance native floodplain and wetland vegetation.	Plant native tree, shrub and understory species in riparian and proposed wetland restoration zones.	In open areas planted; Survival of 210 planted stems per acre at MY7. Interim survival of at least 320 planted stems at MY3 and at least 260 planted stems per acre at MY5. No success criteria are associated with shaded area planting. Planted vegetation must average 7 feet in height in each plot at the end of MY5 and 10 feet in height in each plot at the end of MY7.	Permanent and mobile 100 square meter vegetation plots within planted open areas. Shaded areas planted will be visual assessed.
Permanently protect the project site from harmful uses.	Establish a conservation easement on the Site.	Record and close conservation easement prior to implementation.	Visual assessment



Table 18: Monitoring Components – Carpenter Bottom Mitigation Site

Parameter	Monitoring Feature	Quantity/Length by Reach						Frequency	Notes
		Carpenter Branch Reach 1	Carpenter Branch Reach 2	UT1	UT2	UT3	UT4		
Dimension	Riffle Cross-sections	6	N/A	1	N/A	1	N/A	Year 1, 2, 3, 5, and 7	1
	Pool Cross-sections	6	N/A	N/A	N/A	N/A	N/A		
Pattern	Pattern	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2
Profile	Longitudinal Profile	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Substrate	Reach wide (RW) Pebble Count	1	N/A	1	1	1	1	Year 1, 2, 3, 5, and 7	3
Hydrology	Crest Gage (CG) and/or Transducer (SG)	1 SG	N/A	1 SG	1 SG	1 SG		Semi-Annual	4
Vegetation	CVS Level 2/Mobile Plots	13 (9 permanent, 4 mobile)						Year 1, 2, 3, 5, and 7	5
Wetland	Groundwater Gage	11						Semi-Annual	
Visual Assessment		Y	Y	Y	Y	Y	Y	Semi-Annual	
Exotic and nuisance vegetation								Semi-Annual	6
Project Boundary								Semi-Annual	7
Reference Photos	Photographs	5	3	1	1	1	1	Annual	

1. Cross-sections will be permanently marked with rebar to establish location. Surveys will include points measured at all breaks in slope, including top of bank, bankfull, edge of water, and thalweg.
2. Pattern and profile will be assessed visually during semi-annual site visits. Longitudinal profile will be collected during as-built baseline monitoring survey only, unless observations indicate widespread lack of vertical stability (greater than 10% of reach is affected) and profile survey is warranted in additional years to monitor adjustments or survey repair work.
3. Riffle 100-count substrate sampling will be collected during the baseline monitoring only. Substrate assessments in subsequent monitoring years will consist of reachwide substrate monitoring.
4. Crest gages and/or transducers will be inspected quarterly or semi-annually, evidence of bankfull events will be documented with a photo when possible. Transducers, if used, will be set to record stage once every 2 hours. The transducer will be inspected and downloaded semi-annually. A transducer will be installed on the intermittent portion of Carpenter Branch Reach 1, UT1, and UT3 to document 30 days of continuous flow.
5. Both mobile and permanent vegetation plots will be utilized to evaluate the vegetation performance for the open areas planted. 2% of the open planted acreage will be monitored with permanent plots and mobile plots. Permanent vegetation monitoring plot assessments will follow CVS Level 2 protocols. Mobile vegetation monitoring plot assessments will document number of planted stems and species using a circular or 100 m² square/rectangular plot. Planted shaded areas will be visually assessed. Number indicates total number of plots for the entire site.
6. Locations of exotic and nuisance vegetation will be mapped.
7. Locations of vegetation damage and boundary encroachments will be mapped.

10.0 Long-Term Management Plan

The Site will be transferred to the North Carolina Department of Environmental Quality (NCDEQ) Stewardship Program. 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. The NCDEQ Stewardship Program is developing an endowment system within the non-reverting, interest-bearing Conservation Lands Conservation Fund Account. The use of funds from the Endowment Account will be governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used for 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. No livestock or fencing are currently present or planned for the project area. Any future livestock or associated fencing or permanent crossings will be the responsibility the owner of the underlying fee to maintain.

The Site Protection Instrument can be found in Appendix 1.

Table 19: Long-term Management Plan – Carpenter Bottom Mitigation Site

Long-Term Management Activity	Long-Term Manager Responsibility	Landowner Responsibility
Signage will be installed and maintained along the Site boundary to denote the area protected by the recorded conservation easement.	The long-term steward will be responsible for inspecting the Site boundary and for maintaining or replacing signage to ensure that the conservation easement area is clearly marked.	The landowner shall report damaged or missing signs to the long-term manager, as well as contact the long-term manager if a boundary needs to be marked, or clarification is needed regarding a boundary location. If land use changes in the future and fencing is required to protect the easement, the landowner is responsible for installing appropriate approved fencing.
The Site will be protected in its entirety and managed under the terms outlined in the recorded conservation easement.	The long-term manager will be responsible for conducting annual inspections and for undertaking actions that are reasonably calculated to swiftly correct the conditions constituting a breach. The USACE, and their authorized agents, shall have the right to enter and inspect the Site and to take actions necessary to verify compliance with the conservation easement.	The landowner shall contact the long-term manager if clarification is needed regarding the restrictions associated with the recorded conservation easement.

11.0 Adaptive Management Plan

Upon completion of Site construction, Wildlands will implement the post-construction monitoring defined in Sections 8 and 9. Project maintenance will be performed during the monitoring years to address minor issues as necessary (Appendix 10). If, during the course of annual monitoring it is determined the Site’s ability to achieve Site performance standards are jeopardized, Wildlands will

notify the DMS of the need to develop a Plan of Corrective Action. Once the Plan of Corrective Action is prepared and finalized Wildlands will:

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

12.0 Determination of Credits

The final stream credits associated with the Site are listed in Table 20. Stream restoration is proposed at a credit ratio of 1:1 and stream enhancement III is proposed at a credit ratio of 8:1 based on cattle exclusion, establishment of a conservation easement, and removal of invasive species. Wetland re-establishment and rehabilitation are proposed at a ratio of 1:1 and 1.5:1, respectively. Crediting ratios are based on discussions with the IRT as included within post contract meeting minutes included in Appendix 13 along with current mitigation standards. The credit release schedule is located in Appendix 11.

The riparian buffers along Carpenter Branch Reach 2 between station 126+53 to 127+77 do not meet the required 50 foot minimum based on property limitations along the left bank. This portion of Carpenter Reach 2 will be within the conservation easement and treated as part of the project however, based on the limited buffer, no credit is proposed for this portion of the reach. Given that greater than 95% of the proposed credited stream length does have the required 50-foot minimum buffer, no credit reduction was performed.

Table 20: Project Asset Table – Carpenter Bottom Mitigation Site

Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)	Mitigation Credits
Carpenter Branch Reach 1	2,564	2,249.689	Cool	R	P1, P2	1.0	2249.689
Carpenter Branch Reach 2		353.080 ^a	Cool	EIII		8.0	44.135
UT1	123	174.819	Cool	R	P1, P2	1.0	174.819
UT2	245	178.196	Cool	R	P1	1.0	178.196
UT3	387	384.661	Cool	R	P1	1.0	384.661
UT4	50	36.349	Cool	R	P1	1.0	36.349
Wetland Re-Establishment							
Wetland Re-Establishment	0.000	5.714	RR	RE		1.00000	5.714
Wetland Rehabilitation							
Wetland Rehabilitation	4.130	3.947	RR	RH		1.50000	2.631

Restoration Level	Stream			Riparian Wetland		Non-Rip Wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Non-Riv		
Restoration		3023.714					
Re-establishment				5.714			
Rehabilitation				2.631			
Enhancement							
Enhancement I							
Enhancement II							
Enhancement III		44.135					
Creation							
Preservation							
Total Crediting		3,067.849		8.345			

13.0 References

- Dunne, T. and L. B. Leopold. 1978. *Water in Environmental Planning*. W.H. Freeman and Company. New York.
- Gaston County Planning & Development Services. 2016. *Gaston County 2035 Comprehensive Land Use Plan*. Gaston County, NC
- Giese, G.I and Robert R. Mason Jr. 1993. Low-Flow Characteristics of Streams in North Carolina. U.S. Geological Survey Water Supply Paper 2403.
- Harman, W.A. and C.J. Jones. 2016. Functional Lift Quantification Tool for Stream Restoration Projects in North Carolina: Spreadsheet User Manual Version 2. Environmental Defense Fund, Raleigh, NC.
- Harman, W. R. Starr, M. Carter, K. Tweedy, M. Clemmons, K. Suggs, C. Miller. 2012. *A Function Based Framework for Stream Assessment and Restoration Projects*. US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC EPA 843-K-12-006.
- Harman et al. 1999. Bankfull Hydraulic Geometry Relationships for North Carolina Streams. AWRA Wildland Hydrology Symposium Proceedings. Edited by: D. S. Olsen and J.P. Potyondy. AWRA Summer Symposium. Bozeman, MT.
- Hosking, J. R. M., and J. R. Wallis. 1993. Some statistics useful in regional frequency analysis, *Water Resour. Res.*, 29(2), 271–281, doi:[10.1029/92WR01980](https://doi.org/10.1029/92WR01980).
- Montgomery County Department of Environmental Protection Division of Water Resources Management. 1996. *Rapid Stream Assessment Technique (RSAT) Field Methods*. Montgomery County, Maryland.
- Natural Resources Conservation Service (NRCS). Web Soil Survey of Gaston County. <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>
- North Carolina Division of Mitigation Services. 2007. Catawba River Basin Restoration Priorities
- North Carolina Division of Water Quality (NCDWQ), 2011. Surface Water Classifications. <http://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/classifications>
- North Carolina Geological Survey (NCGS), 1985, Geologic Map of North Carolina: Raleigh, North Carolina Department of Natural Resources and Community Development, Geological Survey Section, scale 1:500,00, in color.
- NCGS, 2017. NCGS Publications. <https://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/interactive-geologic-maps>
- NCGS, 2013. Mineral Resources. <http://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/mineral-resources>
- North Carolina Natural Heritage Program (NHP), 2009. Natural Heritage Element Occurrence Database, Gaston County, NC.
- Rosgen, D. L. 1994. A classification of natural rivers. *Catena* 22:169-199.
- Rosgen, D.L. 2001. A stream channel stability assessment methodology. Proceedings of the Federal Interagency Sediment Conference, Reno, NV, March 2001.
- Schafale, M.P. 2012. Classification of the Natural Communities of North Carolina, Fourth Approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina.
- Schafale, M.P., Weakley, A.S. 1990. Classification of The Natural Communities of North Carolina, Third Approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina.



- Simon, A. 1989. A model of channel response in disturbed alluvial channels. *Earth Surface Processes and Landforms* 14(1):11-26.
- Shields, D. F., Copeland, R. R, Klingman, P. C., Doyle, M. W., and Simon, A. 2003. Design for Stream Restoration. *Journal of Hydraulic Engineering* 129(8): 575-582.
- United States Army Corps of Engineers (USACE). 2016. Federal Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District. October 24, 2016.
- United States Fish and Wildlife Service (USFWS), 2014. Endangered Species, Threatened Species, Federal Species of Concern and Candidate Species, Gaston County, NC.
<http://www.fws.gov/raleigh/species/cntylist/Gaston.html>
- Walker, Alan, unpublished. NC Rural Mountain and Piedmont Regional Curve.



FIGURES

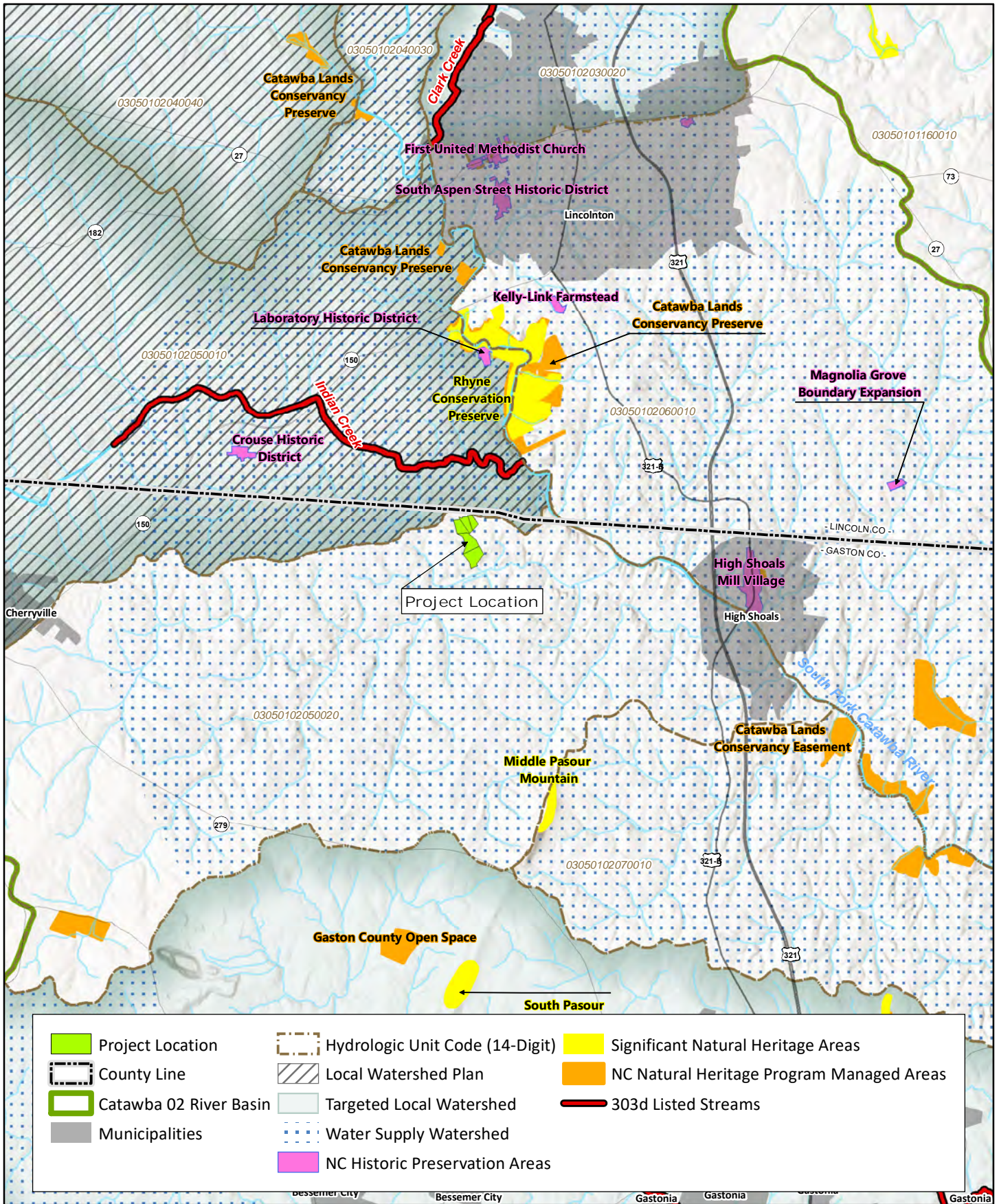


Figure 1 Vicinity Map
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102
 (03050103 Expanded Service Area)
 Gaston County, NC



WILDLANDS
ENGINEERING

0 0.75 1.5 Miles



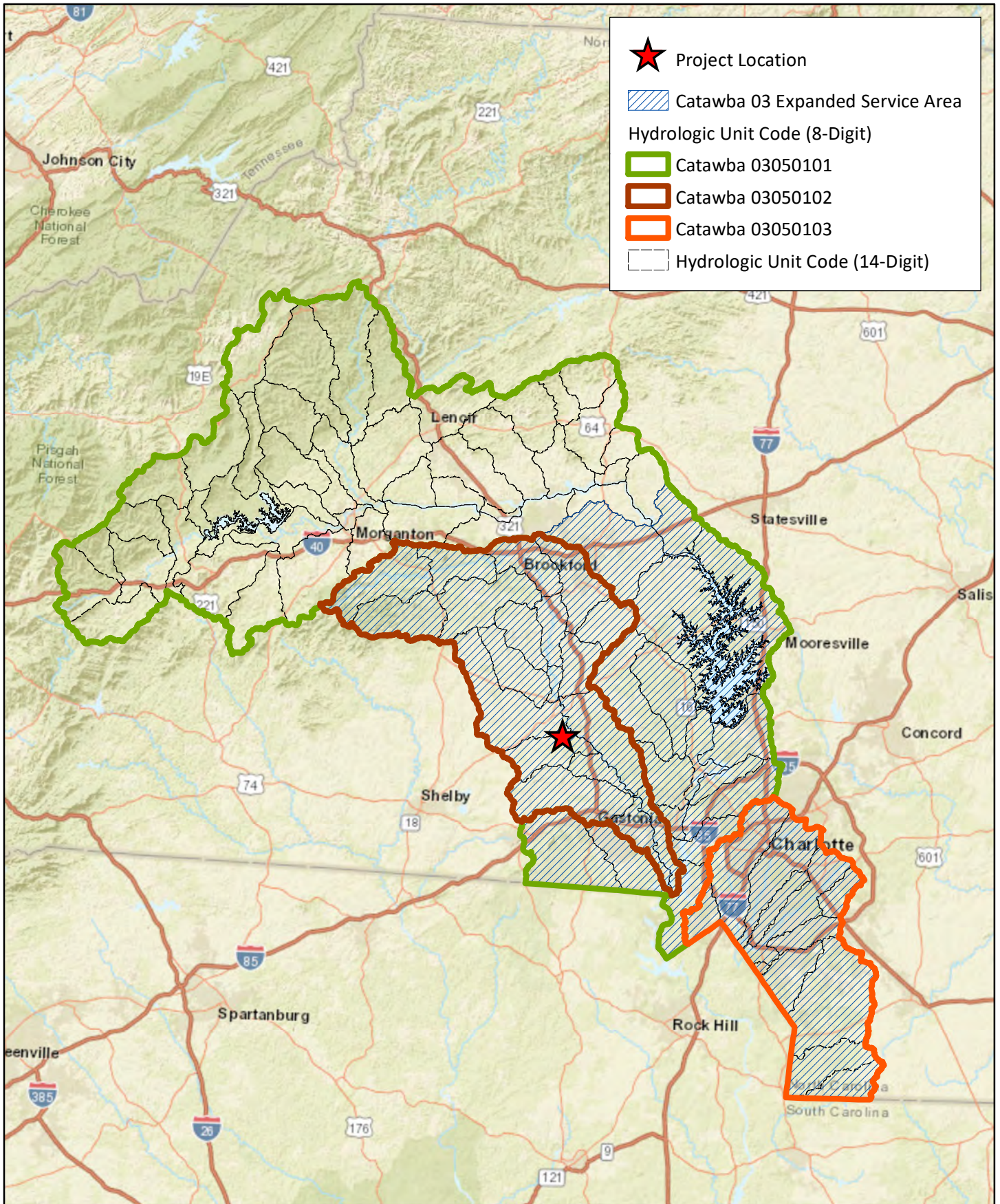
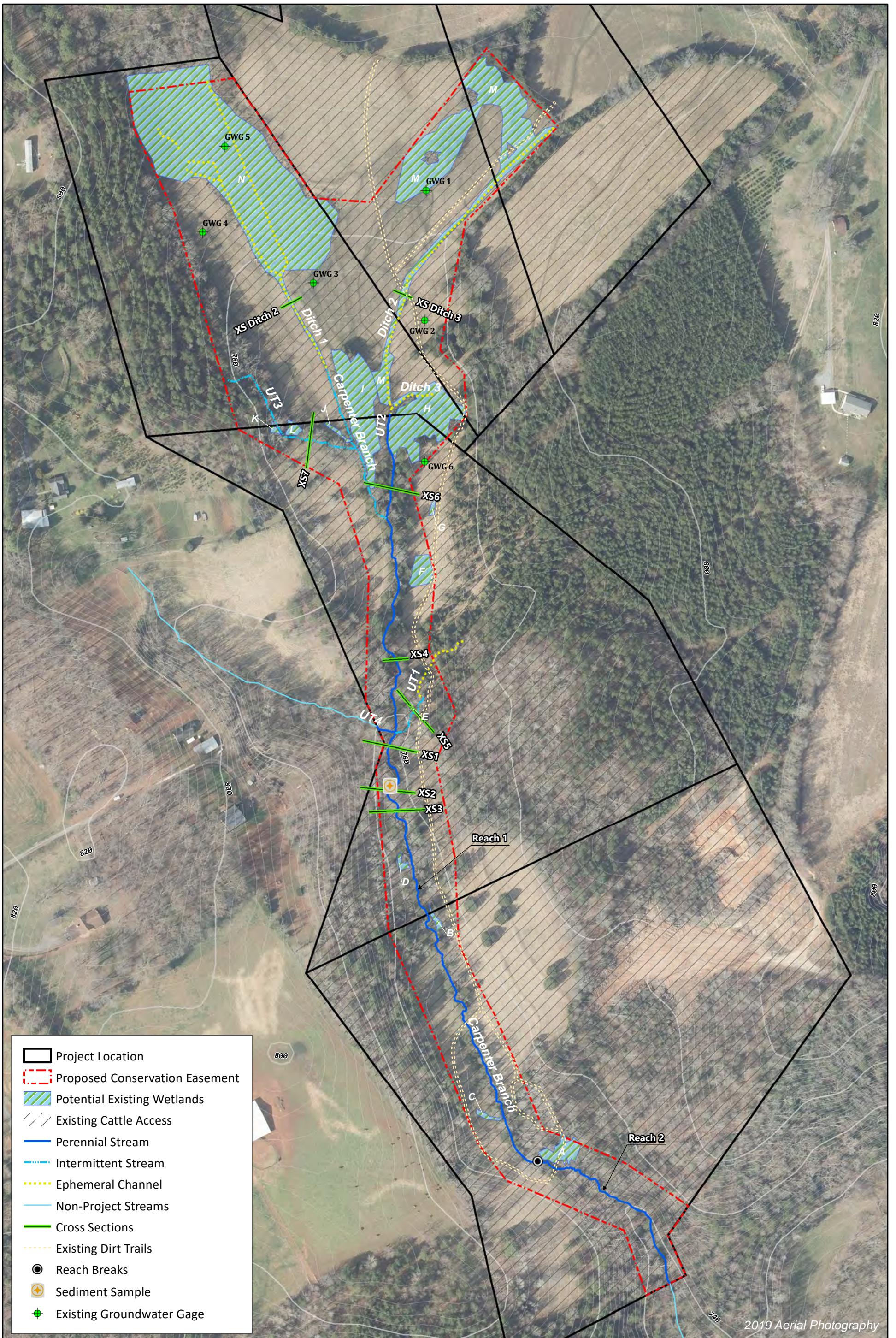


Figure 2 Project Service Area
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102
 (03050103 Expanded Service Area)

Gaston County, NC





- Project Location
- Proposed Conservation Easement
- Potential Existing Wetlands
- Existing Cattle Access
- Perennial Stream
- Intermittent Stream
- Ephemeral Channel
- Non-Project Streams
- Cross Sections
- Existing Dirt Trails
- Reach Breaks
- + Sediment Sample
- + Existing Groundwater Gage

2019 Aerial Photography

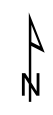
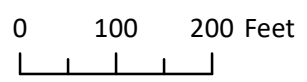


Figure 3 Site Map
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102
 (03050103 Expanded Service Area)
 Gaston County, NC

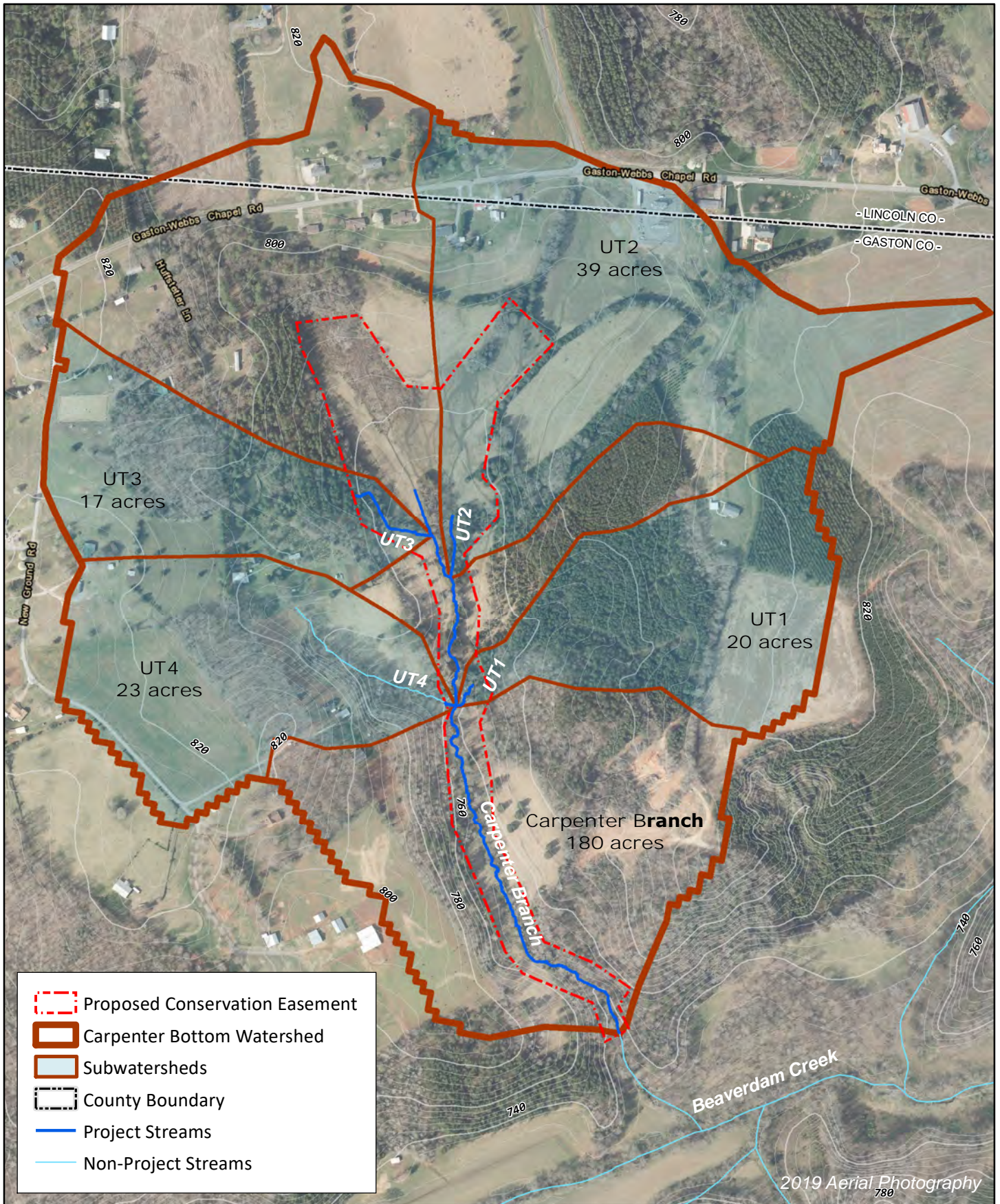


Figure 4: Watershed Map
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102
 (03050103 Expanded Service Area)
 Gaston County, NC



0 250 500 Feet



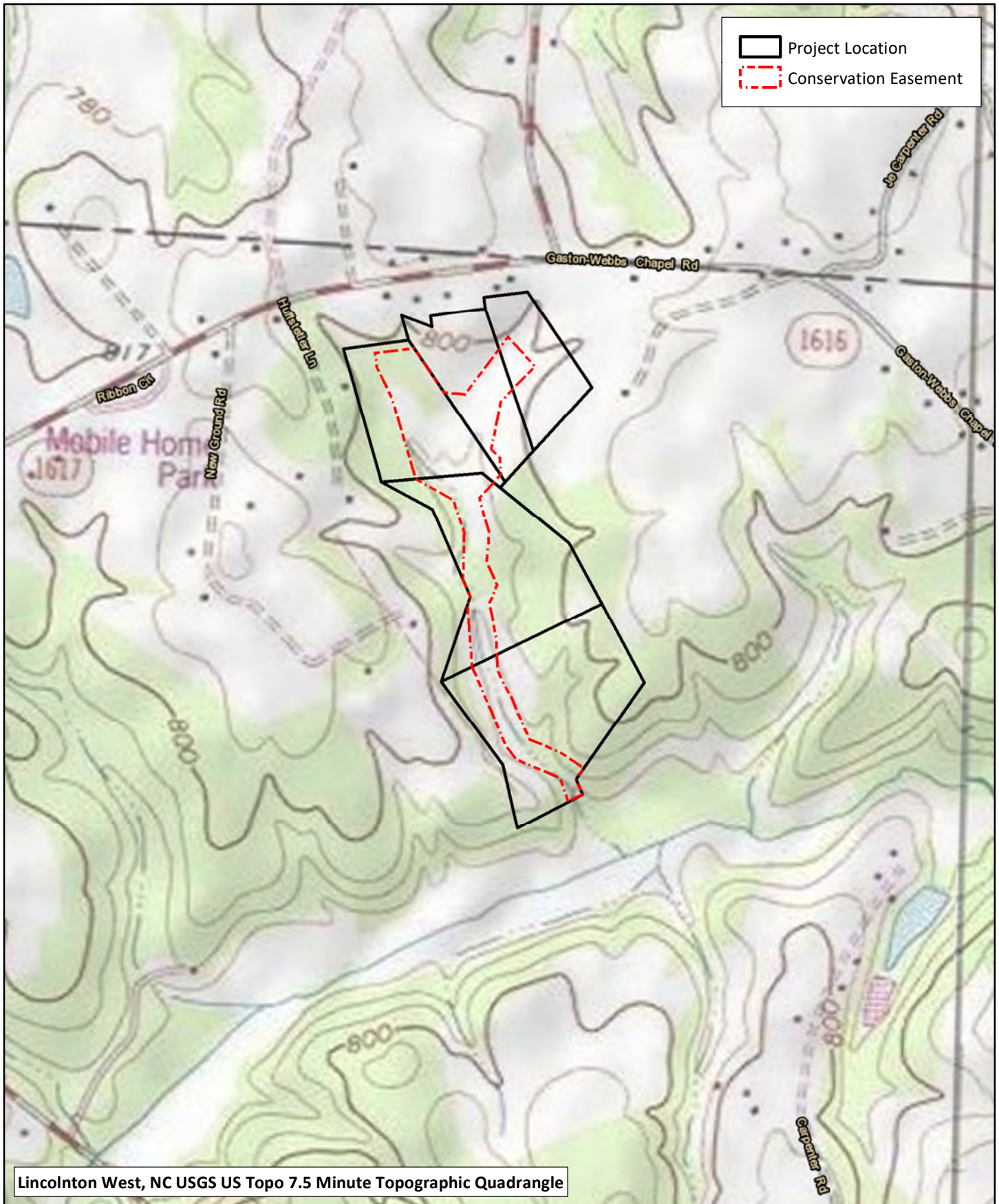
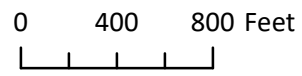
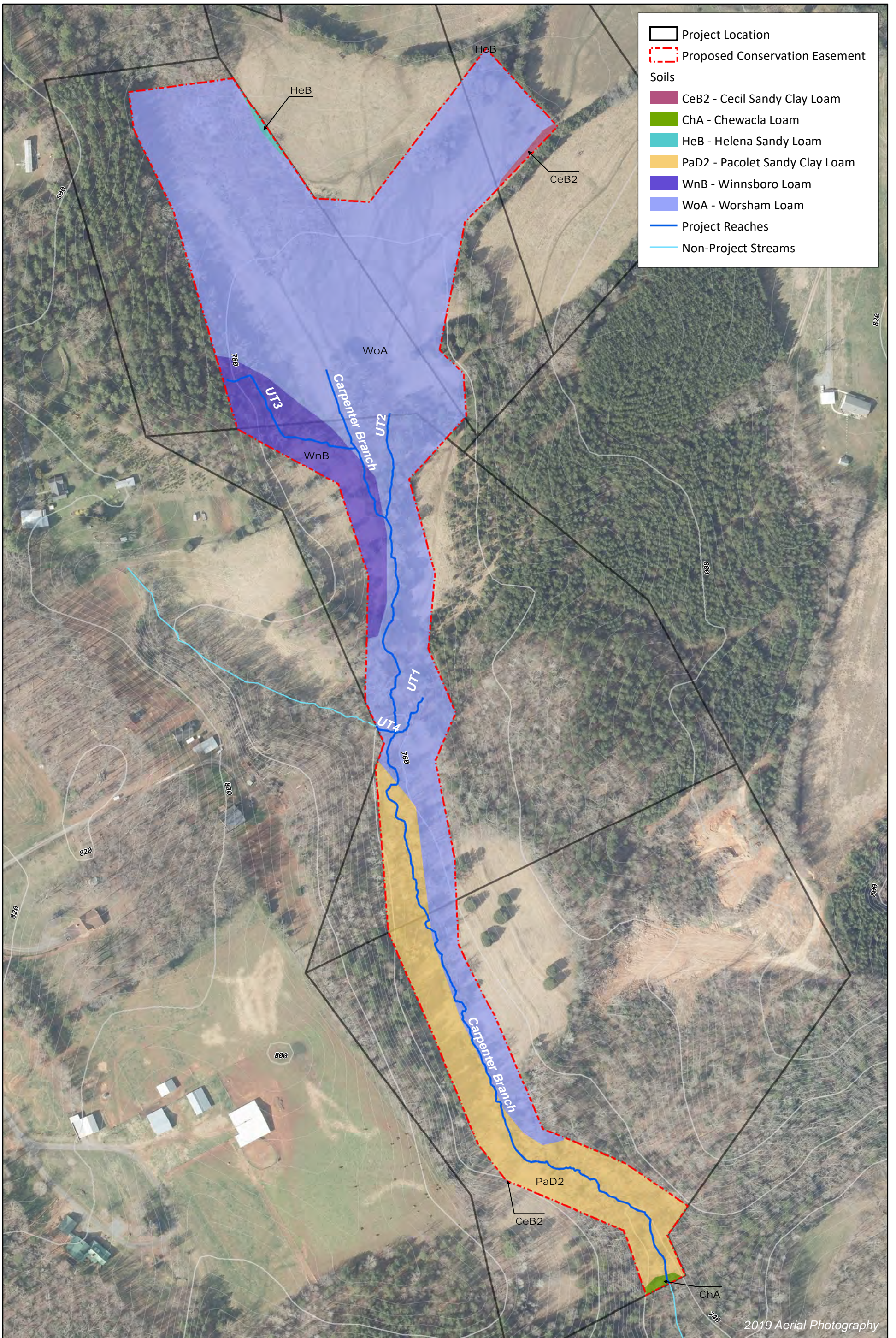


Figure 5 USGS Topographic Map
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102
 (03050103 Expanded Service Area)

Gaston County, NC





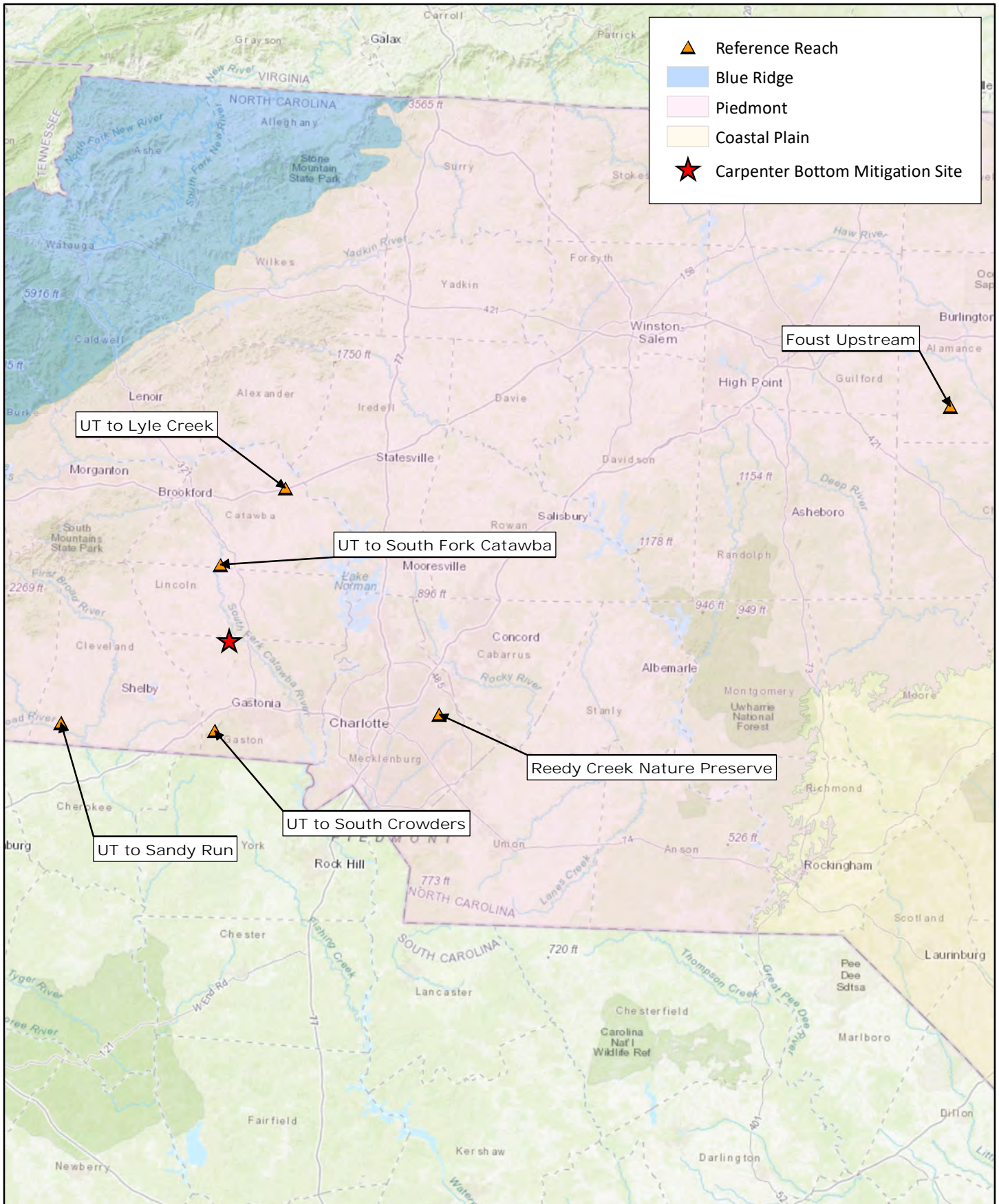


Figure 7 Reference Reach Vicinity Map
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102
 (03050103 Expanded Service Area)



NC Rural Piedmont and Alan Walker (Rural Piedmont/Mountain) Regional Curves: Bankfull Discharge Plot

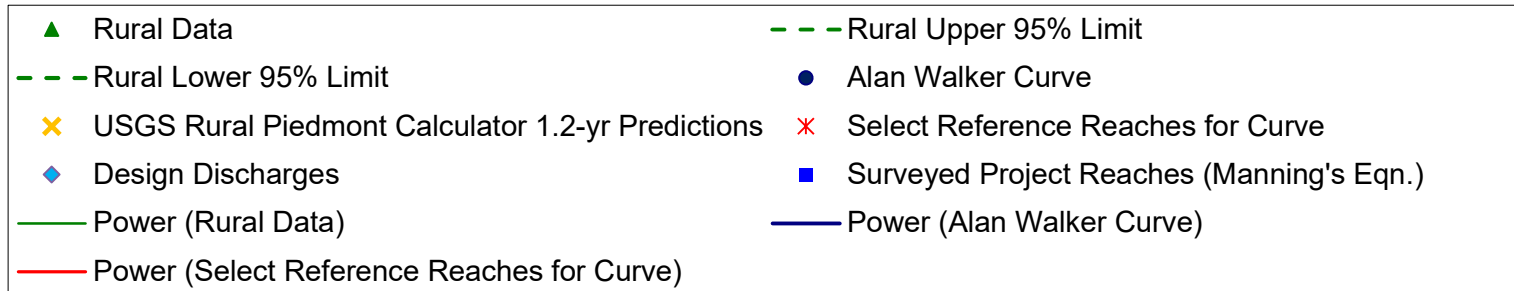
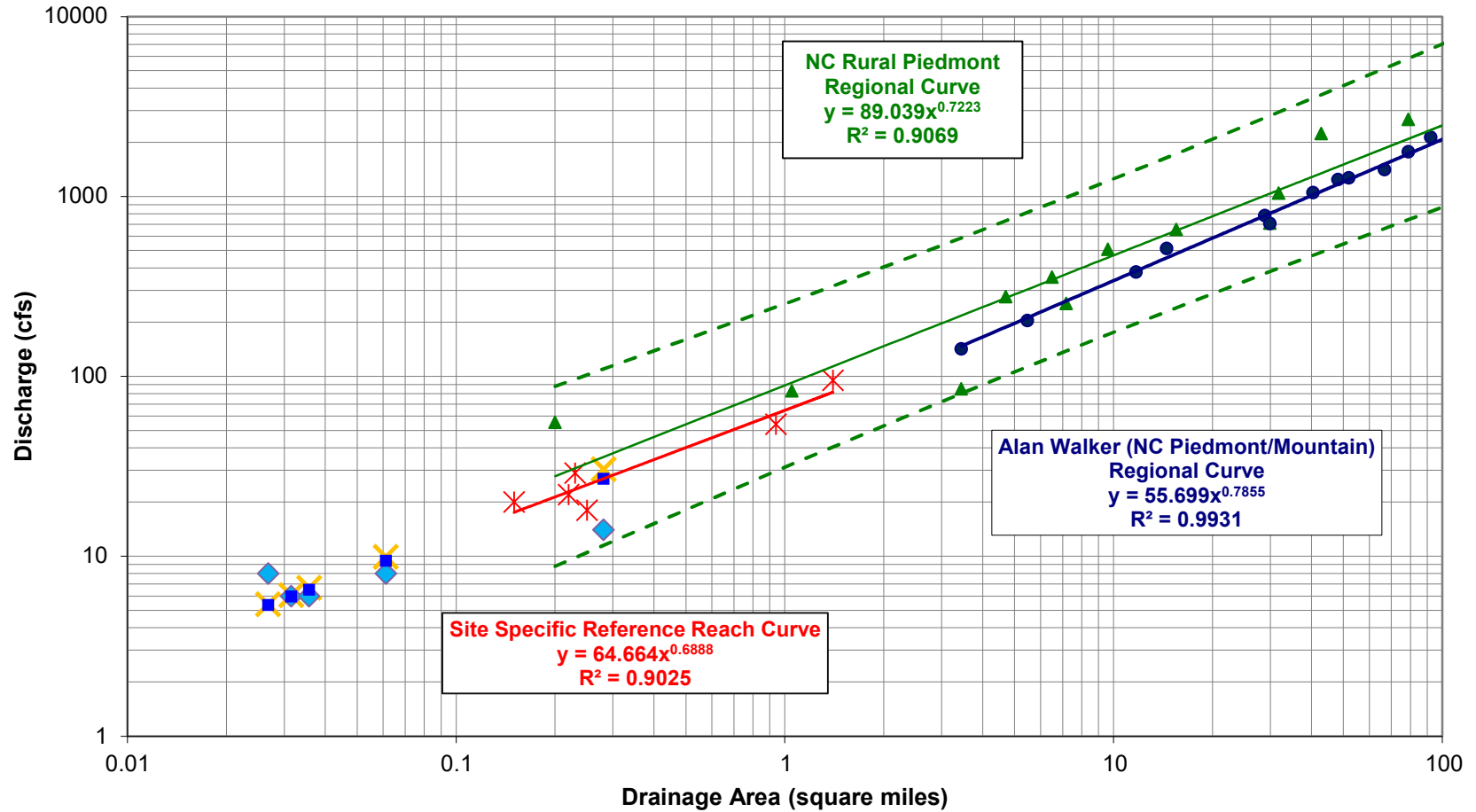
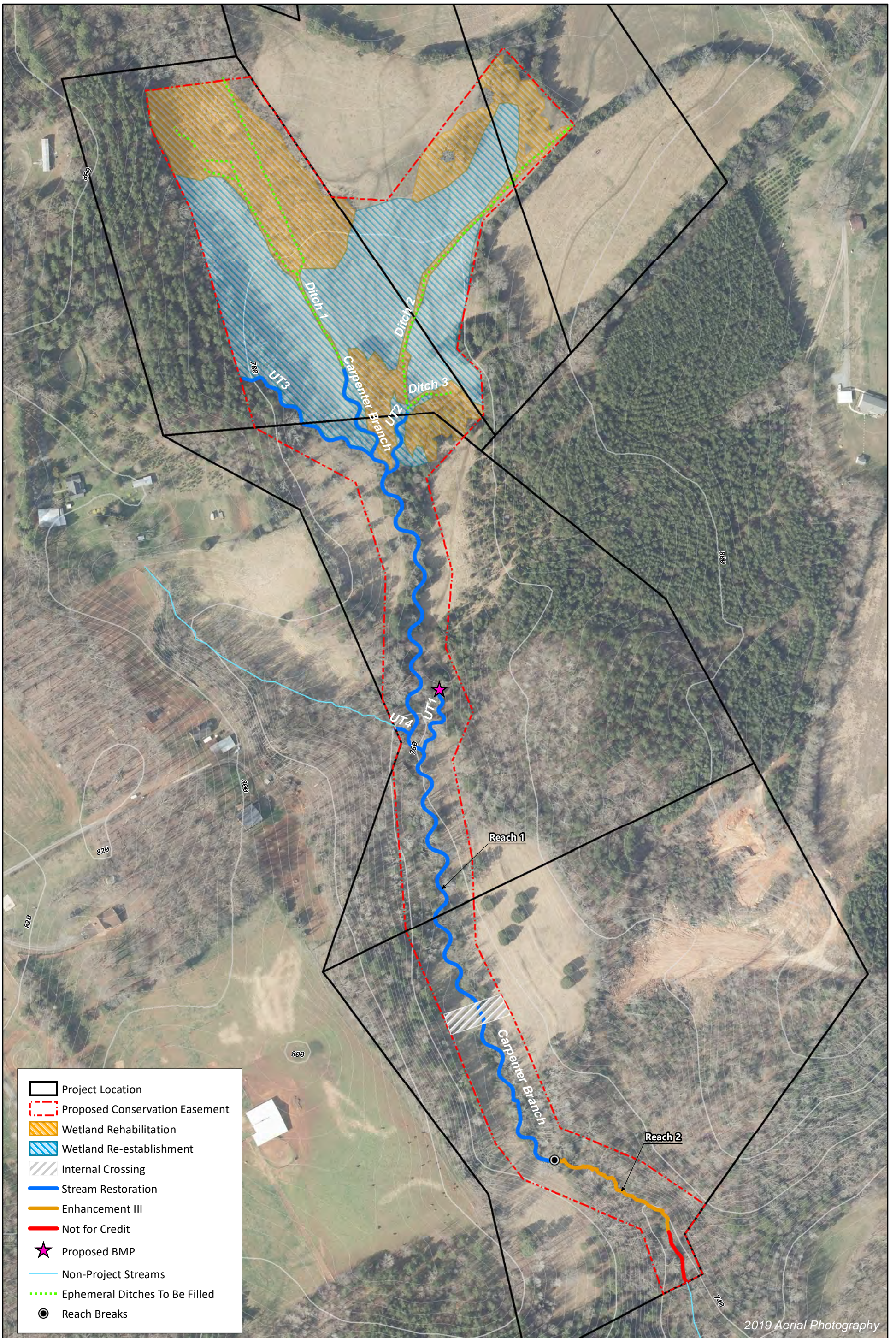


Figure 8 Discharge Analysis
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102
 (03050103 Expanded Service Area)





2019 Aerial Photography

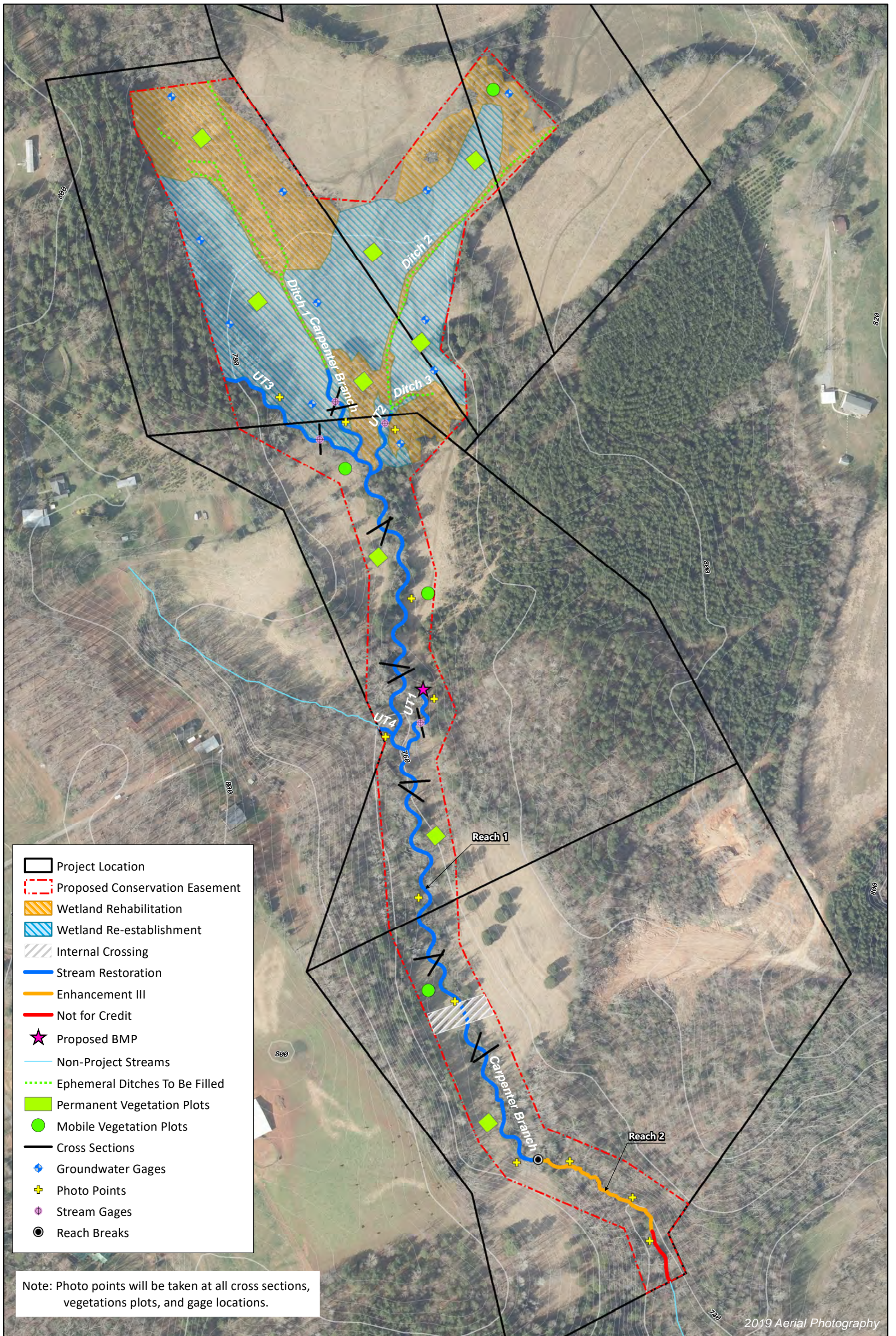


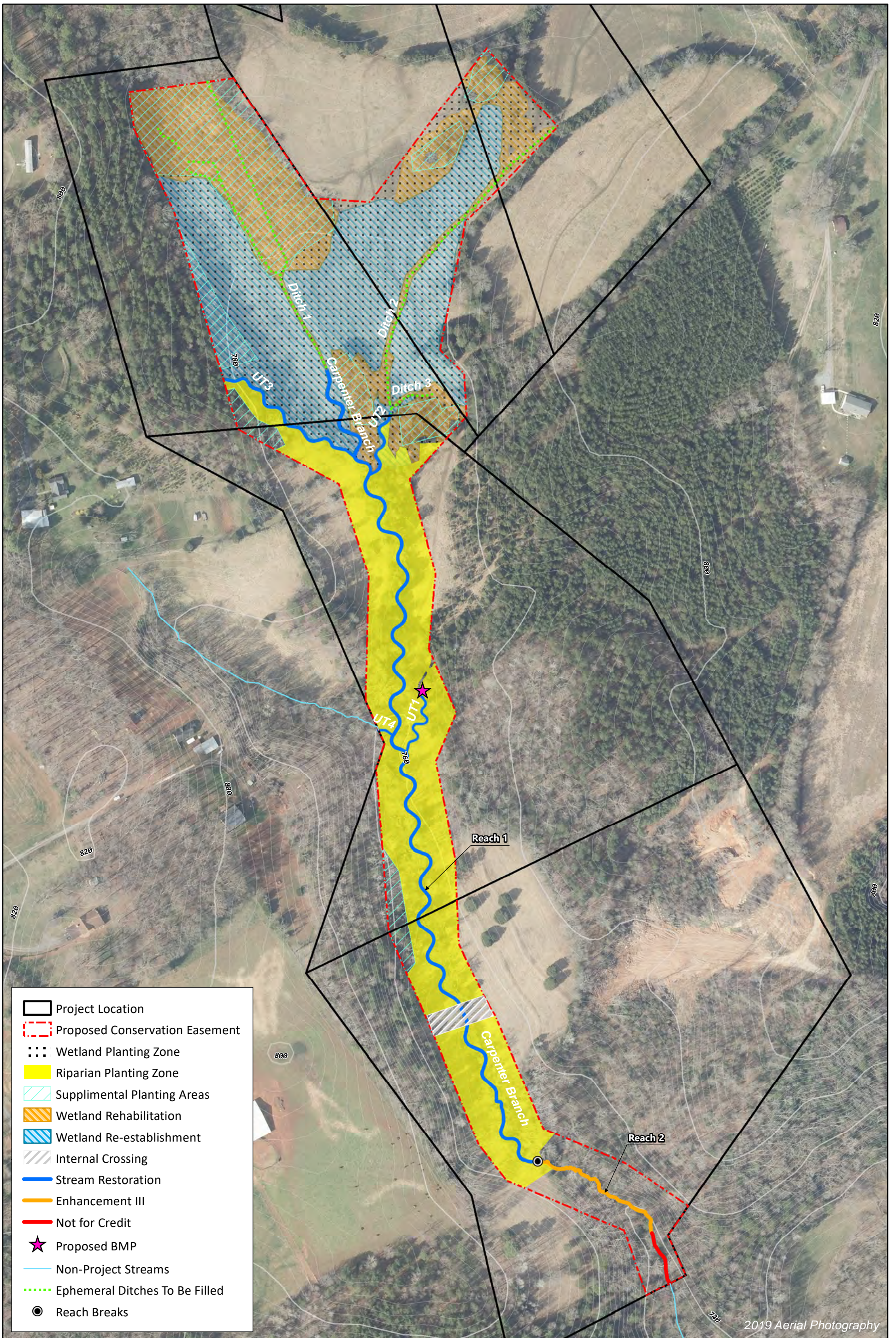
0 100 200 Feet



Figure 9 Concept Map
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102
 (03050103 Expanded Service Area)

Gaston County, NC





APPENDIX 1
Site Protection Instrument

Appendix 1 Site Protection Instrument

The land required for construction, management, and stewardship of this mitigation project includes portions of the parcels listed in Table 1. Parcels are optioned for easement purchase by Wildlands Engineering, Inc. (Wildlands). Upon transfer of lands to Wildlands, a conservation easement will be recorded on the parcels and includes streams and wetlands being restored and preserved along with their corresponding riparian buffers.

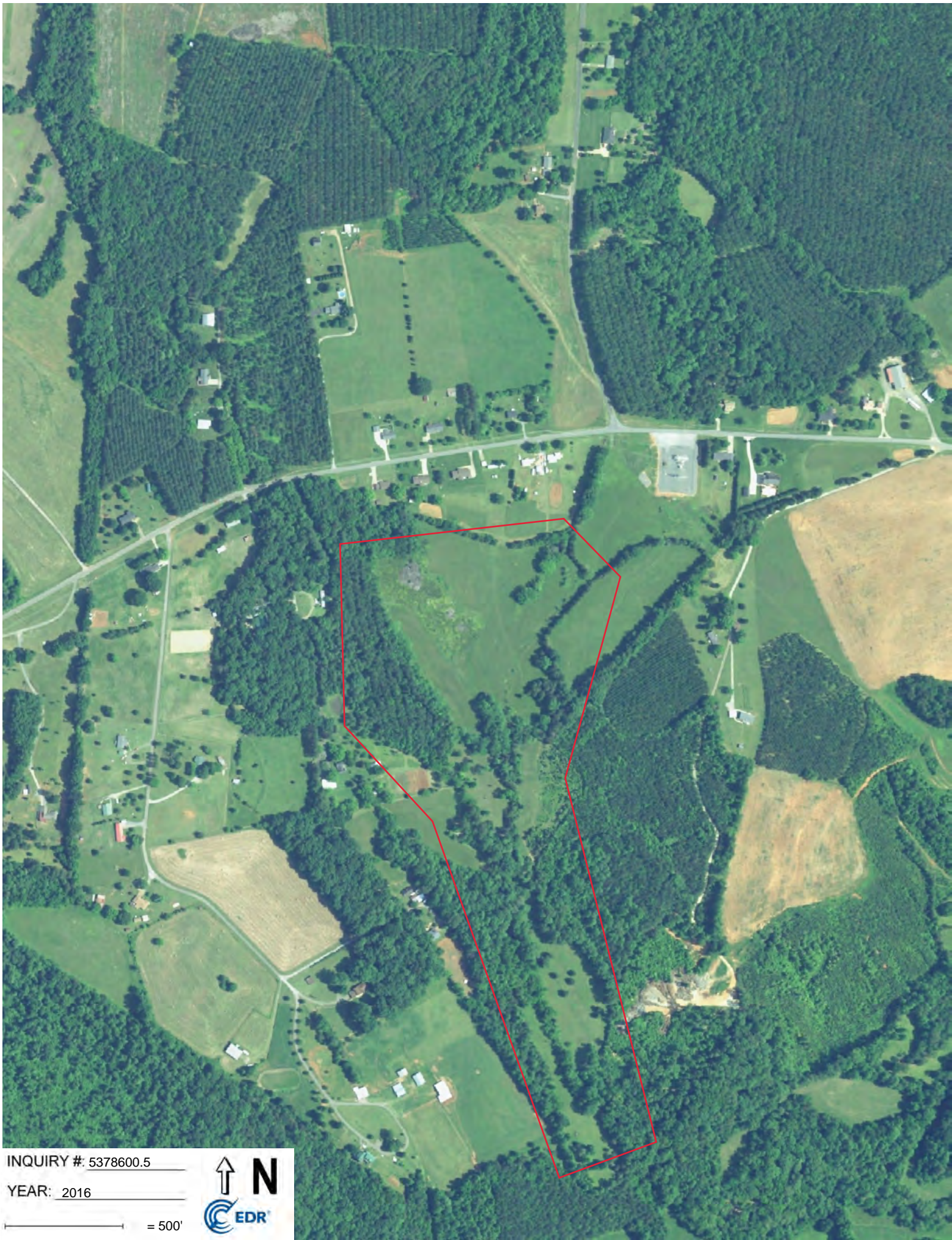
Table 1: Site Protection Instrument – Carpenter Bottom Mitigation Site

Current Landowner	PIN	County	Under Option to Purchase by Wildlands?	Memorandum of Option Conservation Easement Deed Book (DB) and Page Number (PG)	Acreage to be Protected
Lucille Mauney	3621611613962	Gaston	Yes	BK 4986 PG 2333 to 2336	6.75
Brian O'Neill Bumgarner	3621627101	Gaston	Yes	BK 4986 PG 2329 to 2332	2.60
Joyce Mccraw	3621720283	Gaston	Yes	BK 4986 PG 2325 to 2328	0.76
Annette Poole & Wilber Poole	3621618181	Gaston	Yes	BK 4986 PG 2341 to 2344	4.57
Diane Carpenter & Wade Carpenter Jr.	3621701221	Gaston	Yes	BK 4986 PG 2337 to 2340	3.34

The conservation easement template that will be used for recordation is included in this appendix. All site protection instruments require 60-day advance notification to the USACE and or DMS prior to any action to void, amend, or modify the document. No such action shall take place unless approved by the State.



APPENDIX 2
Historic Aerial Photos

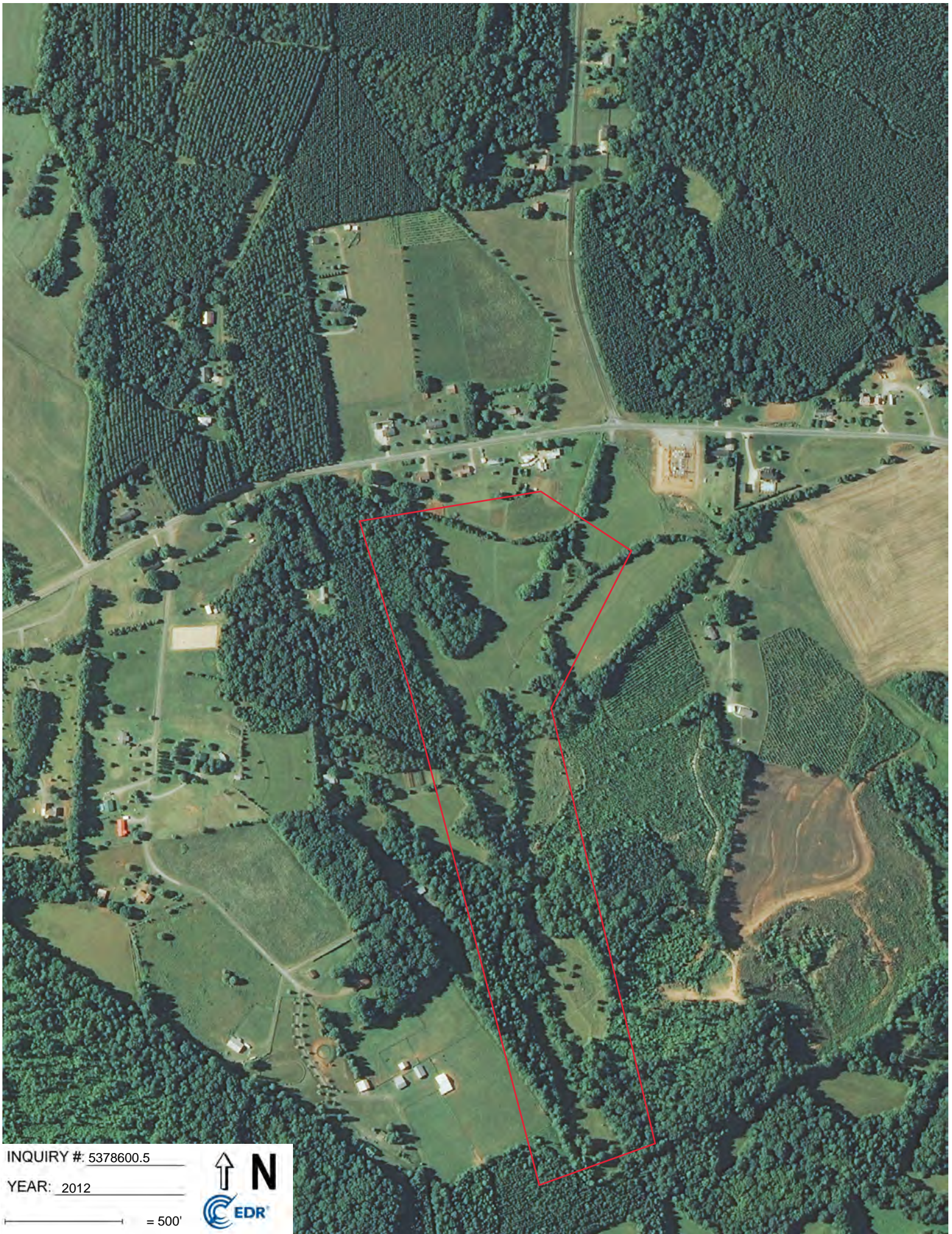


INQUIRY #: 5378600.5

YEAR: 2016

— = 500'





INQUIRY # 5378600.5

YEAR: 2012

— = 500'



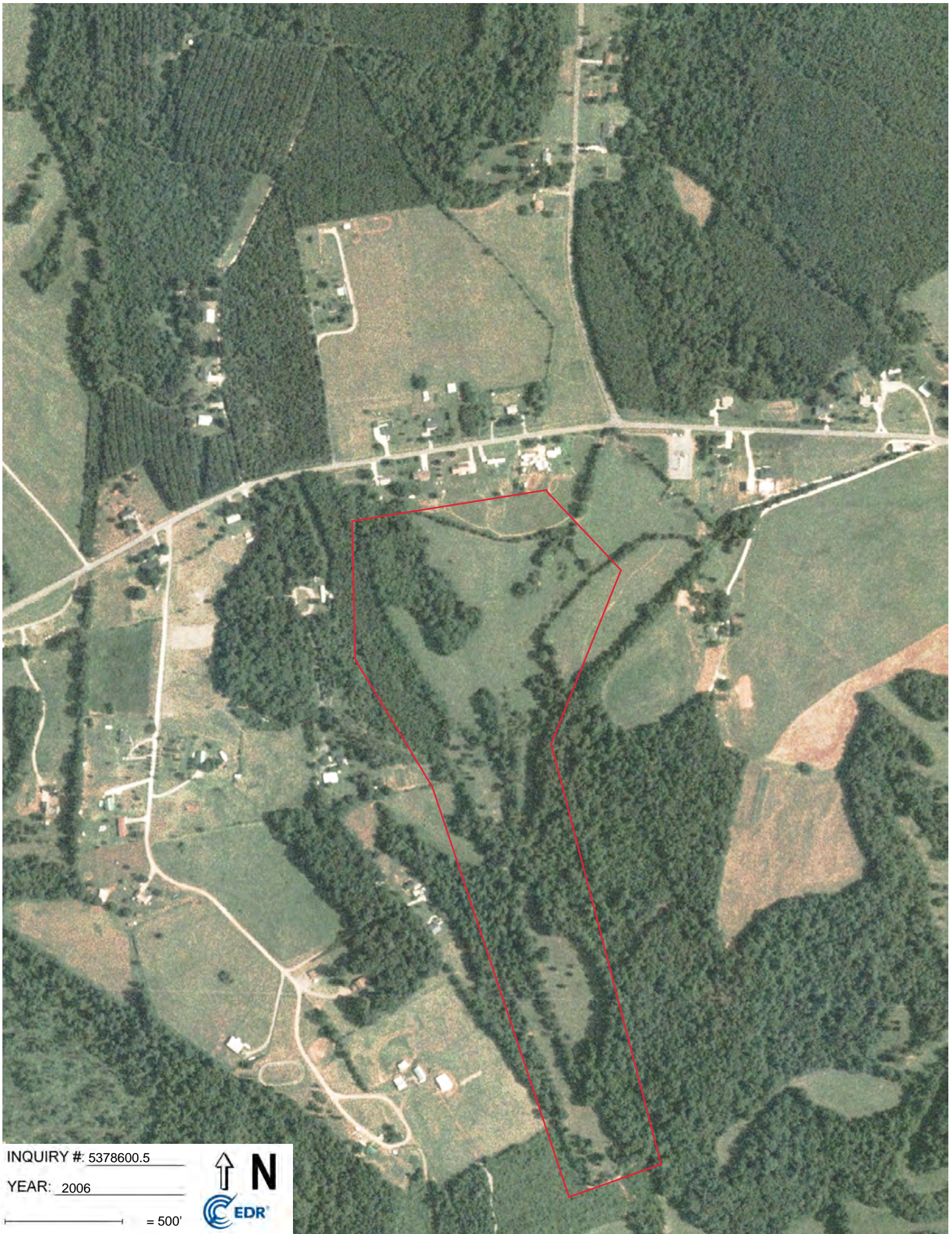


INQUIRY # 5378600.5

YEAR: 2009

— = 500'





INQUIRY #: 5378600.5

YEAR: 2006

— = 500'



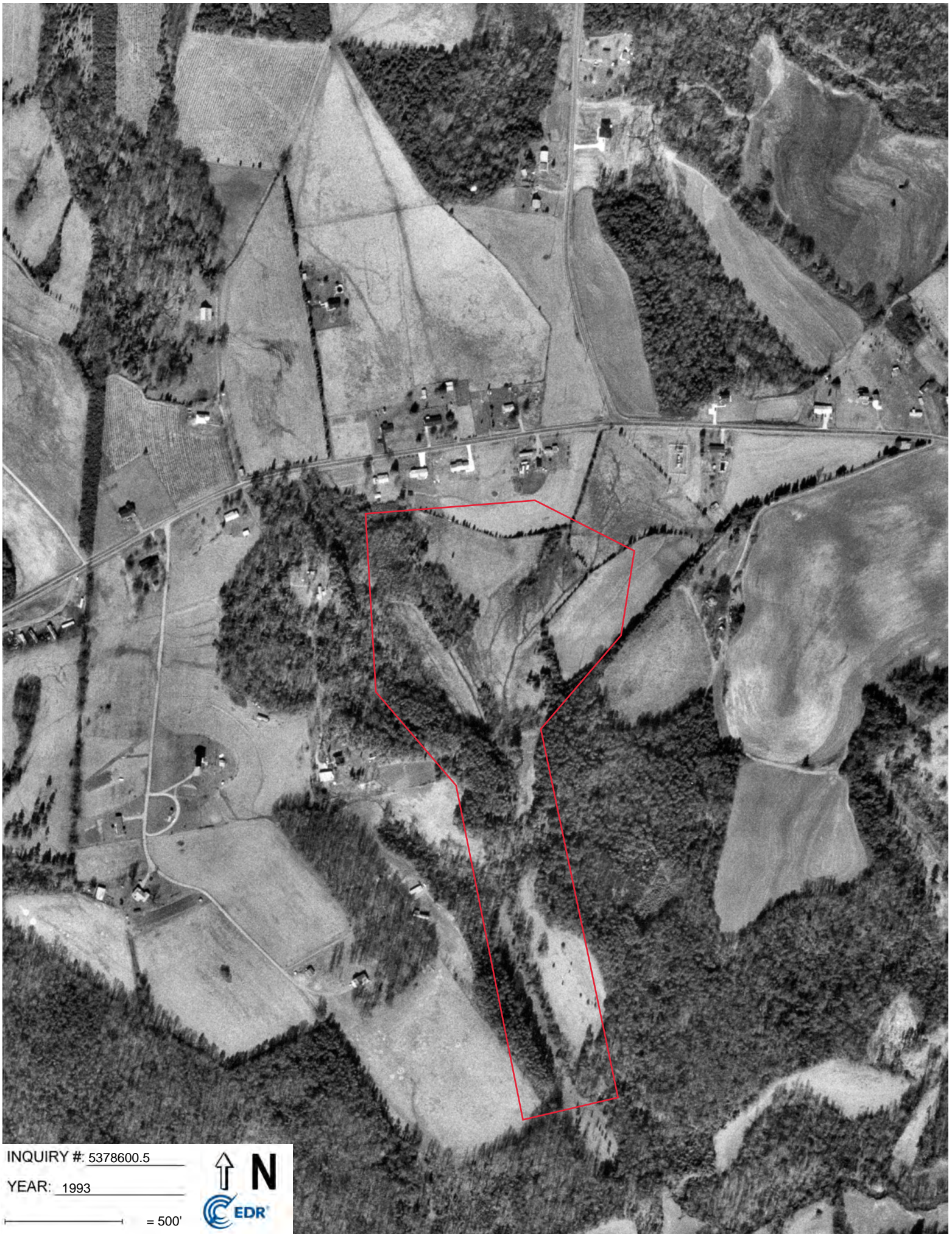


INQUIRY #: 5378600.5

YEAR: 1998

— = 500'





INQUIRY #: 5378600.5

YEAR: 1993

— = 500'





INQUIRY #: 5378600.5

YEAR: 1984

— = 500'



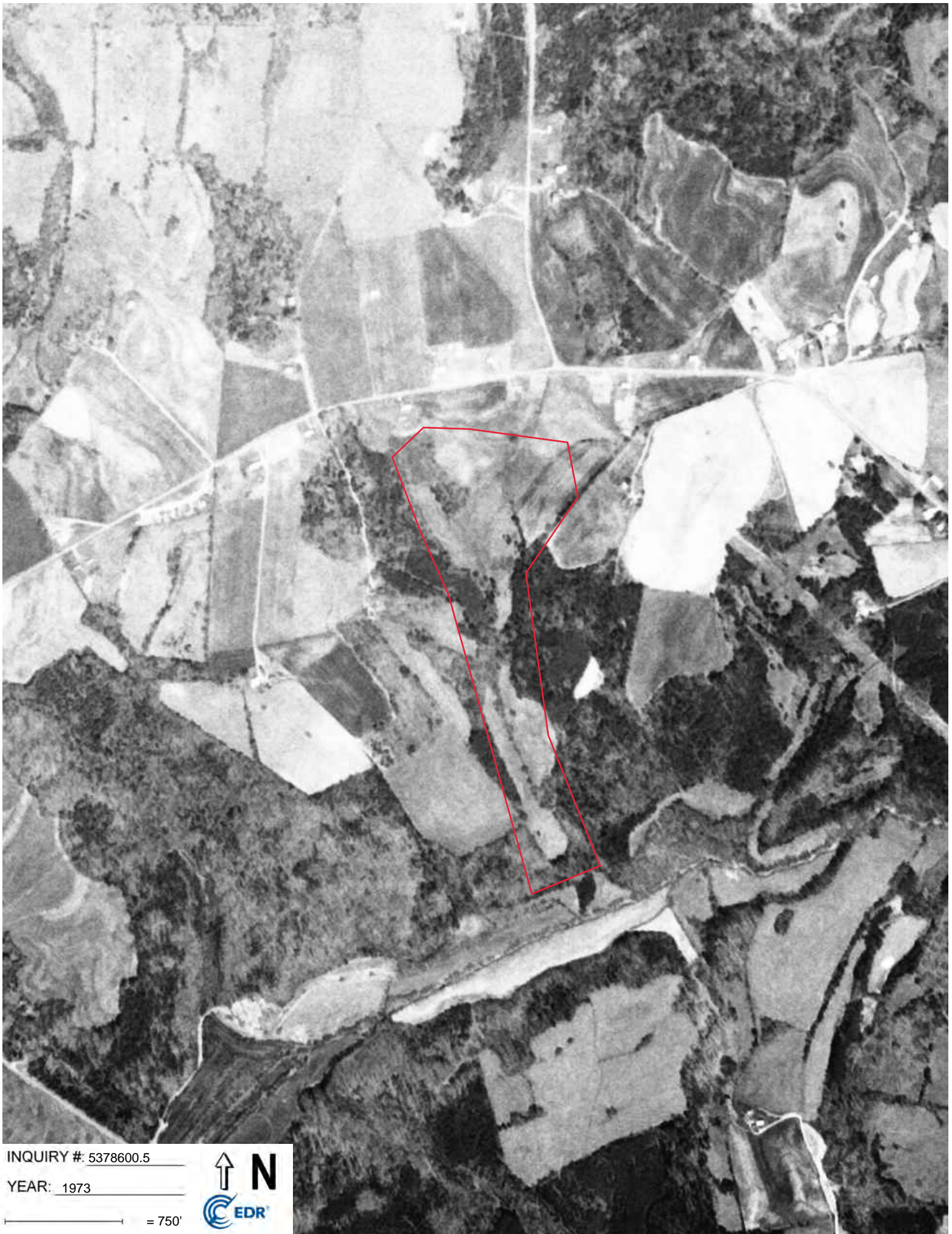


INQUIRY #: 5378600.5

YEAR: 1976

— = 500'



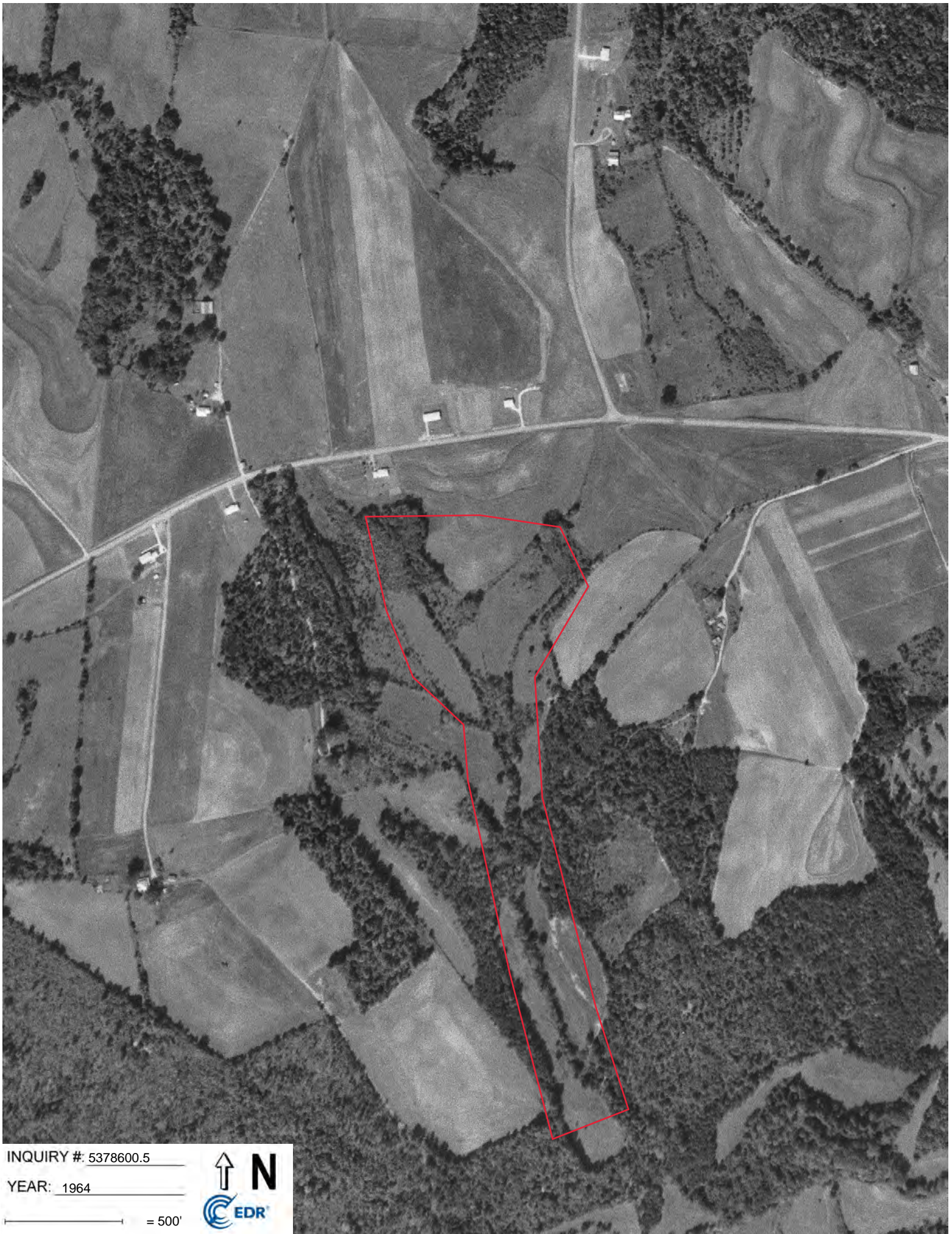


INQUIRY #: 5378600.5

YEAR: 1973

— = 750'





INQUIRY #: 5378600.5

YEAR: 1964

— = 500'



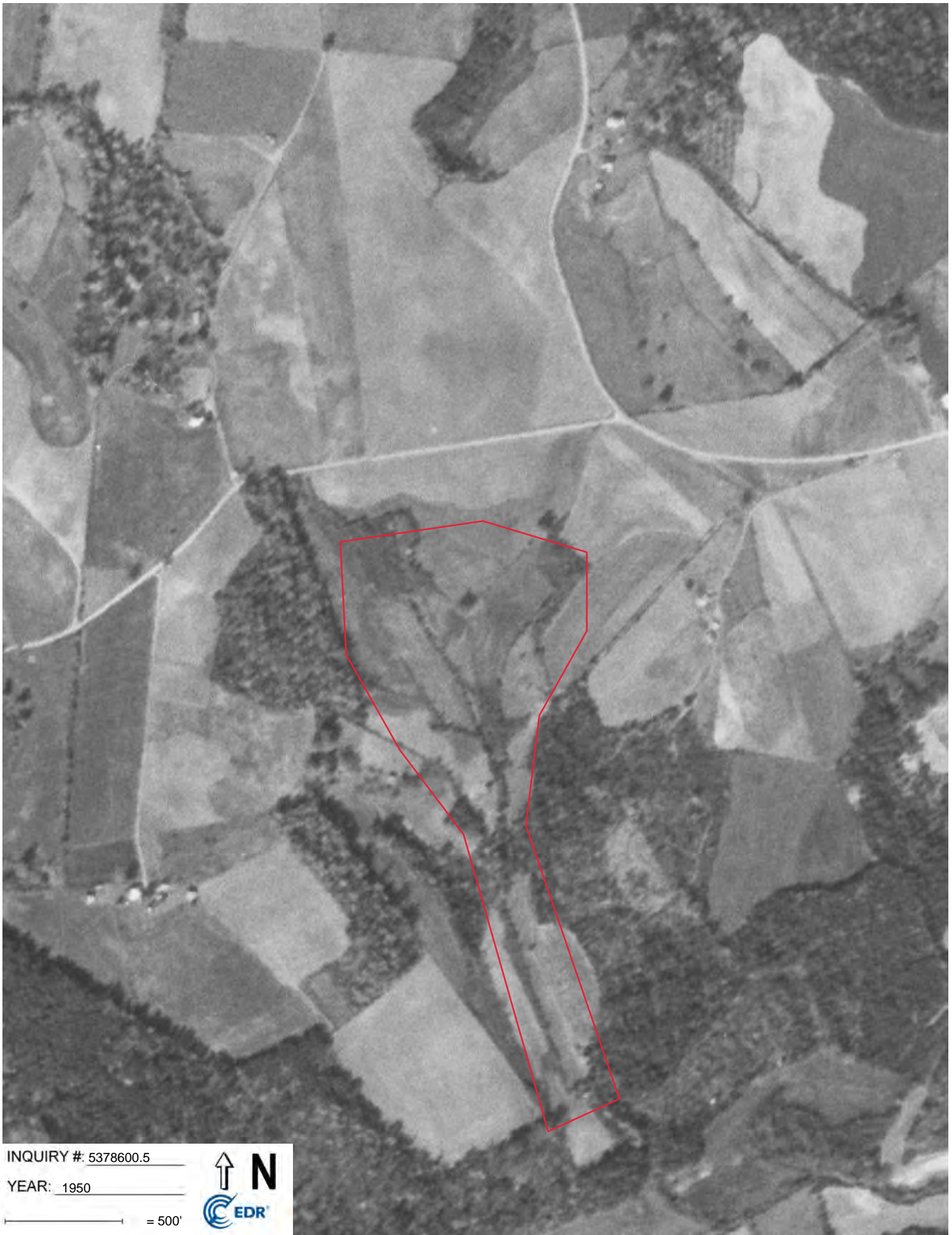


INQUIRY #: 5378600.5

YEAR: 1956

— = 500'





INQUIRY #: 5378600.5

YEAR: 1950

— = 500'



APPENDIX 3
Jurisdictional Determination and Wetland Assessment Forms

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. SAW-2018-02062 County: Gaston U.S.G.S. Quad: NC- Lincolnton West

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Requestor: Kristi Suggs
Address: 1430 S. Mint Street #104
Charlotte, NC 28203
Telephone Number: 704-332-7754 ext 110
E-mail: ksuggs@wildlandseng.com

Size (acres)	<u>20</u>	Nearest Town	<u>Lincolnton</u>
Nearest Waterway	<u>Beaverdam Creek</u>	River Basin	<u>Santee</u>
USGS HUC	<u>03050102</u>	Coordinates	Latitude: <u>35.410705</u> Longitude: <u>-81.260321</u>

Location description: The review area is located 0.211 miles Gaston-Webbs Chapel Road and Huffstetler Lane in Gaston County. PIN(s): 3621-62-8677, 3621-72-0270, 3621724534, 3621-70-1117, 3621-62-6176, & 3621-61-2994..

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 3/12/2020. 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.

SAW-2020-02062

- The **waters, including wetlands** on your project area/property have been delineated and the delineation has been verified by the Corps. The approximate boundaries of these waters are shown on the enclosed delineation map dated **DATE**. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.
- The **waters, including wetlands** have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on **DATE**. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are no waters of the U.S., to include wetlands, present on the above described project area/property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in **Morehead City, NC, at (252) 808-2808** to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Catherine M. Janiczak at 704-510-1438 or Catherine.M.Janiczak@usace.army.mil.**

C. Basis For Determination: Basis For Determination: See the preliminary jurisdictional determination form dated 05/20/2020.

D. Remarks: None.

E. Attention USDA Program Participants

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

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

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

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

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **Not applicable**.

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

Corps Regulatory Official: Catherine M. Janiczak

Date of JD: **05/20/2020** Expiration Date of JD: **Not applicable**

SAW-2020-02062

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 the Customer Satisfaction Survey located at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0

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

Applicant: Kristi Suggs		File Number: SAW-2018-02062	Date: 05/20/2020
Attached is:		See Section below	
<input type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A	
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of permission)	B	
<input type="checkbox"/>	PERMIT DENIAL	C	
<input type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D	
<input checked="" type="checkbox"/>	PRELIMINARY JURISDICTIONAL DETERMINATION	E	

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx> or the Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the district engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:
District Engineer, Wilmington Regulatory Division
Attn: Catherine M. Janiczak
Charlotte Regulatory Office
U.S Army Corps of Engineers
8430 University Executive Park Drive, Suite 615
Charlotte, North Carolina 28262

If you only have questions regarding the appeal process you may also contact:
Mr. Phillip Shannin, Administrative Appeal Review Officer
CESAD-PDO
U.S. Army Corps of Engineers, South Atlantic Division
60 Forsyth Street, Room 10M15
Atlanta, Georgia 30303-8801
Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

<hr/> Signature of appellant or agent.	Date:	Telephone number:
---	-------	-------------------

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, Attn: Catherine M. Janiczak, 69 Darlington Avenue, Wilmington, North Carolina 28403

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

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

PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD: 05/20/2020

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Kristi Suggs, 1430 S. Mint Street
#104, Charlotte, NC 28203

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: Wilmington District, Carpenter Bottom PJD,
SAW-2018-02062

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: The review area is located 0.211 miles Gaston-Webbs Chapel Road and Huffstetler Lane in Gaston County. PIN(s): 3621-62-8677, 3621-72-0270, 3621724534, 3621-70-1117, 3621-62-6176, & 3621-61-2994..

(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: NC County: Gaston City: Lincolnton
Center coordinates of site (lat/long in degree decimal format): Latitude: 35.410705 Longitude: -81.260321

Universal Transverse Mercator:

Name of nearest waterbody: Beaverdam Creek

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

- Office (Desk) Determination. Date:
 Field Determination. Date(s): 05/20/2020

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)
1.) Carpenter Branch (Perennial)	35.408603	-81.259961	2,176 LF	Non-wetland waters	Section 404
2.) Carpenter Branch (Intermittent)	35.409587	-81.260431	376 LF	Non-wetland waters	Section 404
3.) UT1	35.407605	-81.259788	123 LF	Non-wetland waters	Section 404
4.) UT2	35.409336	-81.260015	245 LF	Non-wetland waters	Section 404
5.) UT3	35.409270	-81.260510	387 LF	Non-Wetland Waters	Section 404
6.) UT4	35.407494	-81.260019	61 LF	Non-Wetland Waters	Section 404
9.) Wetland A	35.404910	-81.258531	0.07	Wetland waters	Section 404
10.) Wetland B	35.406346	-81.259584	0.01	Wetland waters	Section 404
11.) Wetland C	35.405102	-81.259098	0.01	Wetland waters	Section 404

12.) Wetland D	35.406650	-81.259826	0.01	wetland waters	Section 404
13.) Wetland E	35.407647	-81.259794	0.001	Wetland waters	Section 404

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)
14.) Wetland F	35.435084	-81.259752	0.07	Wetland waters	Section 404
15.) Wetland G	35.408871	-81.259671	0.01	Wetland waters	Section 404
16.) Wetland H	35.409599	-81.259679	0.39	Wetland waters	Section 404
17.) Wetland I	35.409577	-81.260181	0.36	Wetland waters	Section 404
18.) Wetland J	35.409340	-81.260397	0.01	Wetland waters	Section 404
19.) Wetland K	35.409333	-81.260885	0.01	Wetland waters	Section 404
20.) Wetland L	35.409334	-81.260740	0.02	Wetland waters	Section 404
21.) Wetland M	35.411225	-81.259599	1.02	Wetland waters	Section 404
22.) Wetland N	35.410976	-81.261605	2.35	Wetland waters	Section 404

- 1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.
- 2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such

jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there *"may be"* waters of the U.S. and/or that there *"may be"* navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

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

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

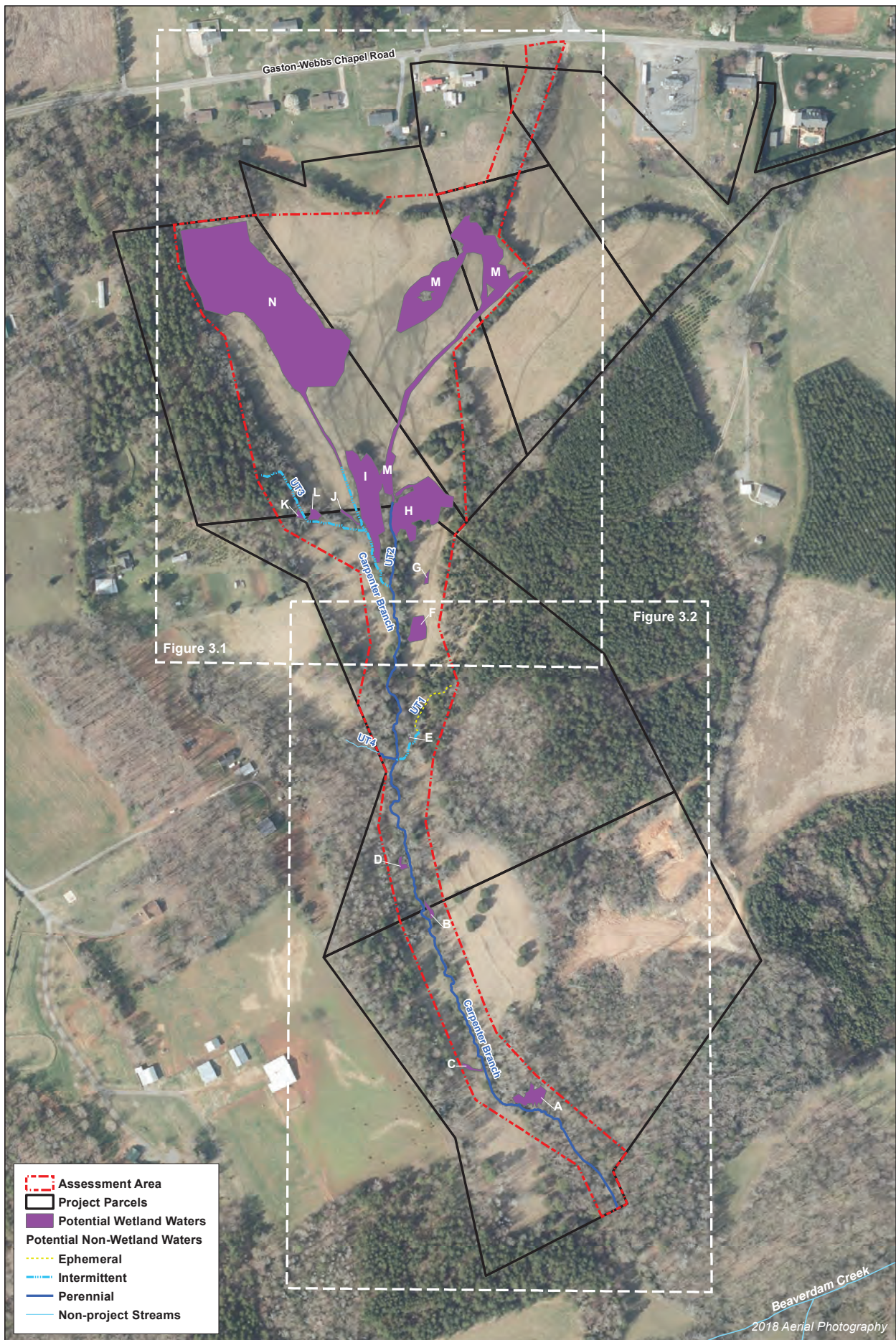
- Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
Map: Figure 3 (Dated 03/12/2020)___
- Data sheets prepared/submitted by or on behalf of the PJD requestor.
 - Office concurs with data sheets/delineation report.
 - Office does not concur with data sheets/delineation report. Rationale: _____
- Data sheets prepared by the Corps: _____
- Corps navigable waters' study: _____
- 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: 1:24000 Scale Lincoln W quadrangle _____
- Natural Resources Conservation Service Soil Survey. Citation: NRCS Web Soil Survey Website_
- National wetlands inventory map(s). Cite name: USFWS National Wetlands Inventory .
- State/local wetland inventory map(s): _____
- FEMA/FIRM maps: _____
- 100-year Floodplain Elevation is: _____ (National Geodetic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date): Figure 3 (Dated 03/12/2020) _____
or Other (Name & Date): _____
- Previous determination(s). File no. and date of response letter: _____
- Other information (please specify): _____

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

Catherine M. Janiczak
Signature and date of Regulatory
staff member completing PJD
05/20/2020

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.



- Assessment Area
- Project Parcels
- Potential Wetland Waters
- Potential Non-Wetland Waters
- Ephemeral
- Intermittent
- Perennial
- Non-project Streams



0 250 500 Feet



Figure 3 Delineation Overview Map
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102
 Gaston County, NC
 03/12/20

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Carpenter Bottom Mitigation Site	Date of Evaluation	4/1/2020
Applicant/Owner Name	Wildlands Engineering Inc. (WEI)	Wetland Site Name	Wetland A
Wetland Type	Headwater Forest	Assessor Name/Organization	Jordan Hessler/ WEI
Level III Ecoregion	Piedmont	Nearest Named Water Body	Beaverdam Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	03050102
County	Gaston	NCDWR Region	Mooresville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.40491/-81.258531

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

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

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

Is the assessment area intensively managed? Yes No

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

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

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

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

Is the assessment area on a coastal island? Yes No

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

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

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

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

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

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

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

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

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

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input checked="" type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

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

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

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

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

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

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

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

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input checked="" type="checkbox"/> J | <input checked="" type="checkbox"/> J | <input checked="" type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 100 to < 500 acres |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

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

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

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

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

- A 0
- B 1 to 4
- C 5 to 8

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

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

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

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

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

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

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

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herb layer sparse or absent

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

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

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

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

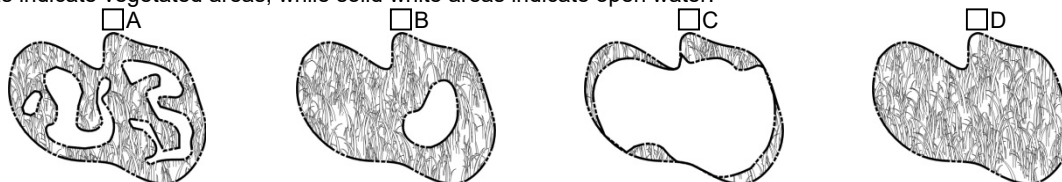
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

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

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



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland A Date of Assessment 4/1/20
 Wetland Type Headwater Forest Assessor Name/Organization Jordan Hessler/WEI

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Carpenter Bottom Mitigation Site	Date of Evaluation	4/1/2020
Applicant/Owner Name	Wildlands Engineering Inc. (WEI)	Wetland Site Name	Wetland B, D, & E
Wetland Type	Headwater Forest	Assessor Name/Organization	Jordan Hessler/ WEI
Level III Ecoregion	Piedmont	Nearest Named Water Body	Beaverdam Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	03050102
County	Gaston	NCDWR Region	Mooresville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.406346/-81.259584

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

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

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

Is the assessment area intensively managed? Yes No

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

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

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

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

Is the assessment area on a coastal island? Yes No

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

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

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

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

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

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

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

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

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

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

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

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

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

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

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

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

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

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

- | | | |
|----------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 100 to < 500 acres |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

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

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

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

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

- A 0
- B 1 to 4
- C 5 to 8

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

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

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

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

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

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

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

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

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

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

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

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

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

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

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

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



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetlands abut streams in floodplain areas.

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland B, D, & E Date of Assessment 4/1/20
 Wetland Type Headwater Forest Assessor Name/Organization Jordan Hessler/WEI

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Carpenter Bottom Mitigation Site	Date of Evaluation	4/1/2020
Applicant/Owner Name	Wildlands Engineering Inc. (WEI)	Wetland Site Name	Wetland C
Wetland Type	Seep	Assessor Name/Organization	Jordan Hessler/ WEI
Level III Ecoregion	Piedmont	Nearest Named Water Body	Beaverdam Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	03050102
County	Gaston	NCDWR Region	Mooresville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.405102/-81.259098

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

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

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

Is the assessment area intensively managed? Yes No

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

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

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

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

Is the assessment area on a coastal island? Yes No

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

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

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

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

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

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

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

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

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

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

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

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

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

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

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

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

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

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

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

- | | | |
|----------------------------|----------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 100 acres |
| <input checked="" type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

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

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

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

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

- A 0
- B 1 to 4
- C 5 to 8

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

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

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

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

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

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

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

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

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

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

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

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

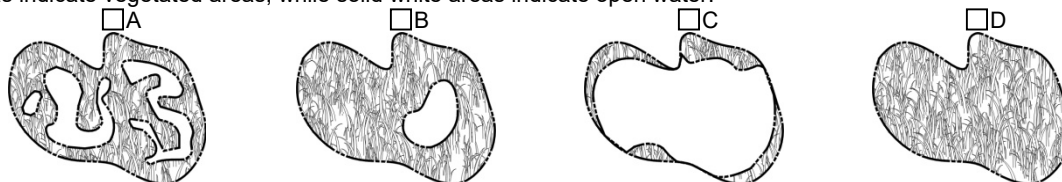
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

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

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



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland is located in an agricultural field primarily used for hay production.

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland C Date of Assessment 4/1/20
 Wetland Type Seep Assessor Name/Organization Jordan Hessler/WEI

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

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention	Condition	NA	
		Sub-surface Storage and Retention	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	Condition	NA
			Condition/Opportunity	NA
			Opportunity Presence (Y/N)	NA
		Physical Change	Condition	NA
			Condition/Opportunity	NA
			Opportunity Presence (Y/N)	NA
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	LOW	
	Landscape Patch Structure	Condition	LOW	
	Vegetation Composition	Condition	LOW	

Function Rating Summary

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

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Carpenter Bottom Mitigation Site	Date of Evaluation	4/1/2020
Applicant/Owner Name	Wildlands Engineering Inc. (WEI)	Wetland Site Name	Wetland F
Wetland Type	Headwater Forest	Assessor Name/Organization	Jordan Hessler/ WEI
Level III Ecoregion	Piedmont	Nearest Named Water Body	Beaverdam Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	03050102
County	Gaston	NCDWR Region	Mooresville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.408492/-81.259752

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

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

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

Is the assessment area intensively managed? Yes No

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

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

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

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

Is the assessment area on a coastal island? Yes No

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

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

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

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

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

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

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

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

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

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

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

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

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

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

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

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

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

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

- | | | |
|----------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input checked="" type="checkbox"/> K	<input checked="" type="checkbox"/> K	<input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 500 acres
<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input checked="" type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

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

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

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

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

- A 0
- B 1 to 4
- C 5 to 8

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

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

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

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

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

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

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

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

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

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

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

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

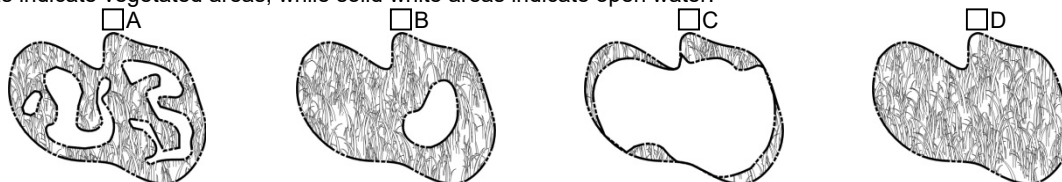
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

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

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



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland area is located in an agricultural field primarily used for hay production.

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland F Date of Assessment 4/1/20
 Wetland Type Headwater Forest Assessor Name/Organization Jordan Hessler/WEI

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Carpenter Bottom Mitigation Site	Date of Evaluation	4/1/2020
Applicant/Owner Name	Wildlands Engineering Inc. (WEI)	Wetland Site Name	Wetland G
Wetland Type	Headwater Forest	Assessor Name/Organization	Jordan Hessler/ WEI
Level III Ecoregion	Piedmont	Nearest Named Water Body	Beaverdam Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	03050102
County	Gaston	NCDWR Region	Mooresville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.408871/-81.259752

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

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

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

Is the assessment area intensively managed? Yes No

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

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

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

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

Is the assessment area on a coastal island? Yes No

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

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

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

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

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

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

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

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

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

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input checked="" type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

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

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

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

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

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

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

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

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

- | | | |
|----------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input checked="" type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

- | Well | Loosely |
|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats |

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

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

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

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

- A 0
- B 1 to 4
- C 5 to 8

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

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

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

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

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

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

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

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

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

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

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

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

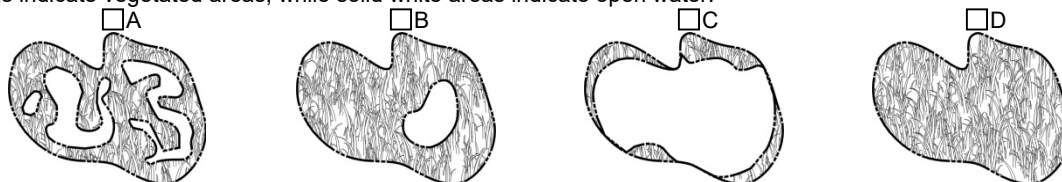
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

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

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



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland area is located in an agricultural field primarily used for hay production.

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland G Date of Assessment 4/1/20
 Wetland Type Headwater Forest Assessor Name/Organization Jordan Hessler/WEI

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Carpenter Bottom Mitigation Site	Date of Evaluation	4/1/2020
Applicant/Owner Name	Wildlands Engineering Inc. (WEI)	Wetland Site Name	Wetland H
Wetland Type	Headwater Forest	Assessor Name/Organization	Jordan Hessler/ WEI
Level III Ecoregion	Piedmont	Nearest Named Water Body	Beaverdam Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	03050102
County	Gaston	NCDWR Region	Mooresville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.409599/-81.259679

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

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

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

Is the assessment area intensively managed? Yes No

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

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

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

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

Is the assessment area on a coastal island? Yes No

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

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

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

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

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

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

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

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

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

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input checked="" type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

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

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

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

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

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

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

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

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

- | | | |
|----------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 100 to < 500 acres |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

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

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

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

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

- A 0
- B 1 to 4
- C 5 to 8

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

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

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

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

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

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

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

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

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

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

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

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

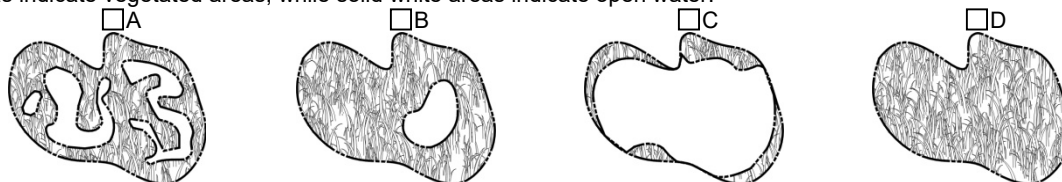
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

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

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



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Livestock have full access to wetland area and have created areas of heavy trampling

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland H Date of Assessment 4/1/20
 Wetland Type Headwater Forest Assessor Name/Organization Jordan Hessler/WEI

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Carpenter Bottom Mitigation Site	Date of Evaluation	4/1/2020
Applicant/Owner Name	Wildlands Engineering Inc. (WEI)	Wetland Site Name	Wetland I
Wetland Type	Headwater Forest	Assessor Name/Organization	Jordan Hessler/ WEI
Level III Ecoregion	Piedmont	Nearest Named Water Body	Beaverdam Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	03050102
County	Gaston	NCDWR Region	Mooresville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.409577/-81.260181

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

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

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

Is the assessment area intensively managed? Yes No

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

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

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

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

Is the assessment area on a coastal island? Yes No

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

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

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

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

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

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

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

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

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

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

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

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

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

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

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

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

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

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

- | | | |
|----------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input checked="" type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input checked="" type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input checked="" type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

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

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

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

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

- A 0
- B 1 to 4
- C 5 to 8

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

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

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

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

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

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

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

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

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

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

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

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

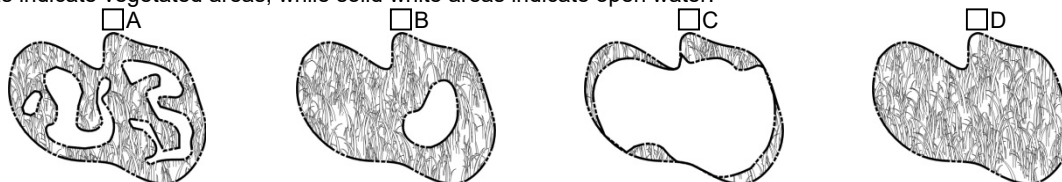
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

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

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



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland area exhibits highly trampled and wallow area from cattle. It also exhibits evidence manual manipulation likely from ditching.

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland I Date of Assessment 4/1/20
 Wetland Type Headwater Forest Assessor Name/Organization Jordan Hessler/WEI

Notes on Field Assessment Form (Y/N) YES
 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 Sub-surface Storage and Retention	Condition	LOW	
		Condition	HIGH	
Water Quality	Pathogen Change	Condition	LOW	
		Condition/Opportunity	LOW	
		Opportunity Presence (Y/N)	NO	
	Particulate Change	Condition	LOW	
		Condition/Opportunity	NA	
		Opportunity Presence (Y/N)	NA	
	Soluble Change	Condition	Condition	LOW
			Condition/Opportunity	LOW
			Opportunity Presence (Y/N)	NO
		Physical Change	Condition	LOW
			Condition/Opportunity	LOW
			Opportunity Presence (Y/N)	NO
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	LOW	
	Landscape Patch Structure	Condition	LOW	
	Vegetation Composition	Condition	LOW	

Function Rating Summary

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

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Carpenter Bottom Mitigation Site	Date of Evaluation	4/1/2020
Applicant/Owner Name	Wildlands Engineering Inc. (WEI)	Wetland Site Name	Wetland J, K, & L
Wetland Type	Headwater Forest	Assessor Name/Organization	Jordan Hessler/ WEI
Level III Ecoregion	Piedmont	Nearest Named Water Body	Beaverdam Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	03050102
County	Gaston	NCDWR Region	Mooresville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.409333/-81.260885

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

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

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

Is the assessment area intensively managed? Yes No

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

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

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

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

Is the assessment area on a coastal island? Yes No

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

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

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

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

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

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

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

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

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

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

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

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

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

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

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

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

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

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

- | | | |
|----------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input checked="" type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input checked="" type="checkbox"/> J | <input checked="" type="checkbox"/> J | <input checked="" type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

- | Well | Loosely |
|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input checked="" type="checkbox"/> C From 50 to < 100 acres |
| <input checked="" type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E < 10 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats |

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

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

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

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

- A 0
- B 1 to 4
- C 5 to 8

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

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

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

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

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

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

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

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

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

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

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

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

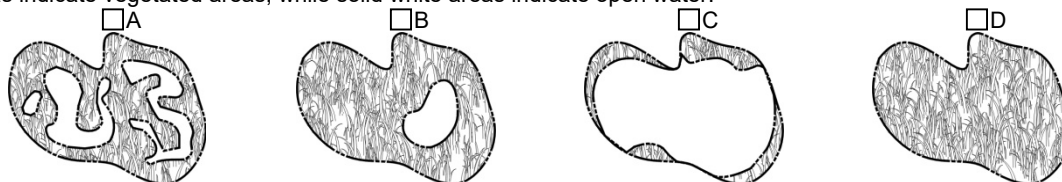
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

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

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



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland J, K, & L Date of Assessment 4/1/20
 Wetland Type Headwater Forest Assessor Name/Organization Jordan Hessler/WEI

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 Sub-surface Storage and Retention	Condition	LOW	
		Condition	HIGH	
Water Quality	Pathogen Change	Condition	MEDIUM	
		Condition/Opportunity	MEDIUM	
		Opportunity Presence (Y/N)	NO	
	Particulate Change	Condition	MEDIUM	
		Condition/Opportunity	NA	
		Opportunity Presence (Y/N)	NA	
	Soluble Change	Condition	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	MEDIUM	
	Landscape Patch Structure	Condition	LOW	
	Vegetation Composition	Condition	LOW	

Function Rating Summary

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

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Carpenter Bottom Mitigation Site	Date of Evaluation	4/1/2020
Applicant/Owner Name	Wildlands Engineering Inc. (WEI)	Wetland Site Name	Wetland M & N
Wetland Type	Headwater Forest	Assessor Name/Organization	Jordan Hessler/ WEI
Level III Ecoregion	Piedmont	Nearest Named Water Body	Beaverdam Creek
River Basin	Catawba	USGS 8-Digit Catalogue Unit	03050102
County	Gaston	NCDWR Region	Mooresville
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.410976/-81.261605

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

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

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

Is the assessment area intensively managed? Yes No

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

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

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

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

Is the assessment area on a coastal island? Yes No

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

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

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

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

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

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

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

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

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

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

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

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

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

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

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

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

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

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

- | | | |
|----------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input checked="" type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input checked="" type="checkbox"/> G | <input checked="" type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 100 acres |
| <input checked="" type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

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

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

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

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

- A 0
- B 1 to 4
- C 5 to 8

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

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

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

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

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

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

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

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

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

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

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

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

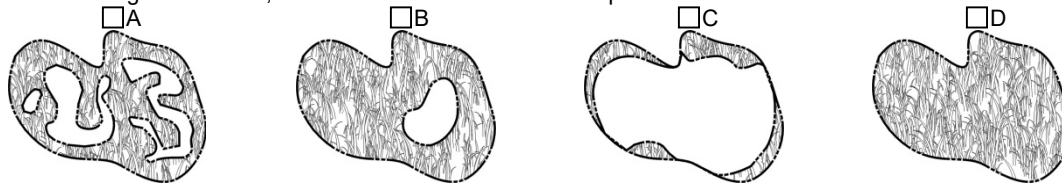
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

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

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



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes
 These areas are located in the headwaters of the drainage area where cattle have full access. Wetland areas have been trampled and there is evidence of ditching throughout these areas to drain them for pasture use.

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland M & N Date of Assessment 4/1/20
 Wetland Type Headwater Forest Assessor Name/Organization Jordan Hessler/WEI

Notes on Field Assessment Form (Y/N) YES
 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 Sub-surface Storage and Retention	Condition	LOW	
		Condition	HIGH	
Water Quality	Pathogen Change	Condition	MEDIUM	
		Condition/Opportunity	MEDIUM	
		Opportunity Presence (Y/N)	NO	
	Particulate Change	Condition	LOW	
		Condition/Opportunity	NA	
		Opportunity Presence (Y/N)	NA	
	Soluble Change	Condition	Condition	LOW
			Condition/Opportunity	LOW
			Opportunity Presence (Y/N)	NO
		Physical Change	Condition	LOW
			Condition/Opportunity	LOW
			Opportunity Presence (Y/N)	NO
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	LOW	
	Landscape Patch Structure	Condition	LOW	
	Vegetation Composition	Condition	LOW	

Function Rating Summary

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

Overall Wetland Rating LOW

Project/Site: Carpernter Bottom Mitigation Site City/County: Gaston Sampling Date: 7/12/19
 Applicant/Owner: Wildlands Engineering Inc. State: NC Sampling Point: DP1
 Investigator(s): Kristi Suggs & Ian Eckardt Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.40491 Long: -81.25853 Datum: NAD 83
 Soil Map Unit Name: Pacolet Sandy clay loam (PaD2) NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u> Hydric Soil Present? Yes <u>X</u> No <u> </u> Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Remarks: DP1 is representative for Wetland A.	

HYDROLOGY

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

Field Observations: Surface Water Present? Yes <u>X</u> No <u> </u> Depth (inches): <u>12</u> Water Table Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> Saturation Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No <u> </u>
--	---

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

Remarks:
 Surface water was present in the wetland; however, it was not present in the auger hole.

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

Sampling Point: DP1

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

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

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Murdannia keisak</u>	<u>80</u>	<u>Yes</u>	<u>OBL</u>
2. <u>Microstegium vimineum</u>	<u>15</u>	<u>No</u>	<u>FAC</u>
3. <u>Persicaria lapathifolia</u>	<u>5</u>	<u>No</u>	<u>FACW</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
=Total Cover			
50% of total cover: <u>50</u>		20% of total cover: <u>20</u>	

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 1 (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 <u>80</u>	x 1 = <u>80</u>
FACW species <u>5</u>	x 2 = <u>10</u>
FAC species <u>15</u>	x 3 = <u>45</u>
FACU species <u>0</u>	x 4 = <u>0</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>100</u> (A)	<u>135</u> (B)
Prevalence Index = B/A = <u>1.35</u>	

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

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

SOIL

Sampling Point: DP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 3/2	90	7.5YR 4/6	10	C	M	Loamy/Clayey	Prominent redox concentrations
4-14								Refusal due to bedrock

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

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (**LRR N**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- Thin Dark Surface (S9) (**MLRA 147, 148**)
- Loamy Mucky Mineral (F1) (**MLRA 136**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- Umbric Surface (F13) (**MLRA 122, 136**)
- Piedmont Floodplain Soils (F19) (**MLRA 148**)
- Red Parent Material (F21) (**MLRA 127, 147, 148**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**MLRA 147**)
- Coast Prairie Redox (A16) (**MLRA 147, 148**)
- Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- Red Parent Material (F21) (**outside MLRA 127, 147, 148**)
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____ Bedrock
 Depth (inches): _____ 10

Hydric Soil Present? Yes No

Remarks:

Project/Site: Carpenter Bottom Mitigation Site City/County: Gaston Sampling Date: 7/12/19
 Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: DP2
 Investigator(s): Kristi Suggs & Ian Eckardt Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.40635 Long: -81.25958 Datum: NAD 83
 Soil Map Unit Name: Worsham loam (WoA) NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No X (If no, explain in Remarks.)
 Are Vegetation X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u> Hydric Soil Present? Yes <u> </u> No <u>X</u> Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Remarks: Sampling upland point it representative for Wetlands A, B, C, D, & E. Sampling point is located in an agricultural field primarily used for hay production.	

HYDROLOGY

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

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

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

Remarks:
 No hydrologic indicators present.

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

Sampling Point: DP2

Tree Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer rubrum</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Liquidambar styraciflua</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>
3. <u>Juniperus virginiana</u>	<u>5</u>	<u>Yes</u>	<u>FACU</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
<u>25</u> =Total Cover			
50% of total cover: <u>13</u> 20% of total cover: <u>5</u>			

Sapling/Shrub Stratum (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Cephalanthus occidentalis</u>	<u>5</u>	<u>Yes</u>	<u>OBL</u>
2. <u>Liquidambar styraciflua</u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
<u>10</u> =Total Cover			
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>			

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Schedonorus arundinaceus</u>	<u>90</u>	<u>Yes</u>	<u>FACU</u>
2. <u>Ambrosia artemisiifolia</u>	<u>5</u>	<u>No</u>	<u>FACU</u>
3. <u>Dichanthelium clandestinum</u>	<u>5</u>	<u>No</u>	<u>FAC</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
<u>100</u> =Total Cover			
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>			

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

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>5</u>	x 1 = <u>5</u>
FACW species <u>0</u>	x 2 = <u>0</u>
FAC species <u>30</u>	x 3 = <u>90</u>
FACU species <u>100</u>	x 4 = <u>400</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>135</u> (A)	<u>495</u> (B)
Prevalence Index = B/A = <u>3.67</u>	

Hydrophytic Vegetation Indicators:

 1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

 3 - Prevalence Index is ≤3.0¹

 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)
 Sampling location is in an agricultural field primarily used for hay production.

SOIL

Sampling Point: DP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-14	5YR 4/6	100					Loamy/Clayey	

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

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (**LRR N**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- Thin Dark Surface (S9) (**MLRA 147, 148**)
- Loamy Mucky Mineral (F1) (**MLRA 136**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- Umbric Surface (F13) (**MLRA 122, 136**)
- Piedmont Floodplain Soils (F19) (**MLRA 148**)
- Red Parent Material (F21) (**MLRA 127, 147, 148**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**MLRA 147**)
- Coast Prairie Redox (A16) (**MLRA 147, 148**)
- Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- Red Parent Material (F21) (**outside MLRA 127, 147, 148**)
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:
 No hydric soil indicators present.

Project/Site: Carpenter Bottom Mitigation Site City/County: Gaston Sampling Date: 7/12/19
 Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: DP3
 Investigator(s): Kristi Suggs & Ian Eckardt Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.40645 Long: -81.25957 Datum: NAD 83
 Soil Map Unit Name: Worsham loam (WoA) NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u> Hydric Soil Present? Yes <u>X</u> No <u> </u> Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Remarks: Data point is representative for Wetlands B, D, & E. Wetlands abut streams in floodplain areas.	

HYDROLOGY

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

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

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

Remarks:

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

Sampling Point: DP3

Tree Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer rubrum</u>	<u>50</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Juglans nigra</u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>
3. <u>Ilex opaca</u>	<u>10</u>	<u>No</u>	<u>FACU</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
<u>85</u> =Total Cover			
50% of total cover: <u>43</u> 20% of total cover: <u>17</u>			

Sapling/Shrub Stratum (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Ligustrum sinense</u>	<u>5</u>	<u>No</u>	<u>FACU</u>
2. <u>Ilex opaca</u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>
3. <u>Liriodendron tulipifera</u>	<u>1</u>	<u>No</u>	<u>FACU</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
<u>31</u> =Total Cover			
50% of total cover: <u>16</u> 20% of total cover: <u>7</u>			

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Sanicula marilandica</u>	<u>5</u>	<u>No</u>	<u>FACU</u>
2. <u>Impatiens capensis</u>	<u>20</u>	<u>Yes</u>	<u>FACW</u>
3. <u>Boehmeria cylindrica</u>	<u>20</u>	<u>Yes</u>	<u>FACW</u>
4. <u>Microstegium vimineum</u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>
5. <u>Parthenocissus quinquefolia</u>	<u>15</u>	<u>No</u>	<u>FACU</u>
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
<u>90</u> =Total Cover			
50% of total cover: <u>45</u> 20% of total cover: <u>18</u>			

Woody Vine Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Poncirus trifoliata</u>	<u>10</u>	<u>Yes</u>	<u>UPL</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
<u>10</u> =Total Cover			
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 57.1% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>40</u>	x 2 = <u>80</u>
FAC species <u>80</u>	x 3 = <u>240</u>
FACU species <u>86</u>	x 4 = <u>344</u>
UPL species <u>10</u>	x 5 = <u>50</u>
Column Totals: <u>216</u> (A)	<u>714</u> (B)
Prevalence Index = B/A = <u>3.31</u>	

Hydrophytic Vegetation Indicators:

 1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

 3 - Prevalence Index is ≤3.0¹

 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

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

SOIL

Sampling Point: DP3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-7	7.5YR 4/4	100					Loamy/Clayey	
7-14	2.5Y 4/1	80	5YR 3/4	20	C	M	Loamy/Clayey	Prominent redox concentrations

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

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (**LRR N**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- Thin Dark Surface (S9) (**MLRA 147, 148**)
- Loamy Mucky Mineral (F1) (**MLRA 136**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- Umbric Surface (F13) (**MLRA 122, 136**)
- Piedmont Floodplain Soils (F19) (**MLRA 148**)
- Red Parent Material (F21) (**MLRA 127, 147, 148**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**MLRA 147**)
- Coast Prairie Redox (A16) (**MLRA 147, 148**)
- Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- Red Parent Material (F21) (**outside MLRA 127, 147, 148**)
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Project/Site: Carpenter Bottom Mitigation Site City/County: Gaston Sampling Date: 7/12/19
 Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: DP4
 Investigator(s): Kristi Suggs & Ian Eckardt Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): 0%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.40833 Long: -81.25974 Datum: NAD 83
 Soil Map Unit Name: Worsham loam (WoA) NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u> Hydric Soil Present? Yes <u>X</u> No <u> </u> Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Remarks: Sampling point DP4 is representative for Wetland C. Wetland is located in an agricultural field primarily used for hay production.	

HYDROLOGY

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

Field Observations: Surface Water Present? Yes <u>X</u> No <u> </u> Depth (inches): <u>1</u> Water Table Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> Saturation Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No <u> </u>
---	---

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

Remarks:
 Surface water is from a floodplain seep.

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

Sampling Point: DP4

Tree Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Liquidambar styraciflua</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	<u>10</u> =Total Cover		
	50% of total cover: <u>5</u>	20% of total cover: <u>2</u>	

Sapling/Shrub Stratum (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Cephalanthus occidentalis</u>	<u>15</u>	<u>Yes</u>	<u>OBL</u>
2. <u>Fraxinus pennsylvanica</u>	<u>15</u>	<u>Yes</u>	<u>FACW</u>
3. <u>Juglans nigra</u>	<u>5</u>	<u>No</u>	<u>FACU</u>
4. <u>Liquidambar styraciflua</u>	<u>5</u>	<u>No</u>	<u>FAC</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
	<u>40</u> =Total Cover		
	50% of total cover: <u>20</u>	20% of total cover: <u>8</u>	

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Juncus effusus</u>	<u>15</u>	<u>No</u>	<u>FACW</u>
2. <u>Microstegium vimineum</u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>
3. <u>Persicaria lapathifolia</u>	<u>5</u>	<u>No</u>	<u>FACW</u>
4. <u>Dichanthelium clandestinum</u>	<u>15</u>	<u>No</u>	<u>FAC</u>
5. <u>Eupatorium capillifolium</u>	<u>2</u>	<u>No</u>	<u>FACU</u>
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
	<u>97</u> =Total Cover		
	50% of total cover: <u>49</u>	20% of total cover: <u>20</u>	

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

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (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 <u>15</u>	x 1 = <u>15</u>
FACW species <u>35</u>	x 2 = <u>70</u>
FAC species <u>90</u>	x 3 = <u>270</u>
FACU species <u>7</u>	x 4 = <u>28</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>147</u> (A)	<u>383</u> (B)
Prevalence Index = B/A = <u>2.61</u>	

Hydrophytic Vegetation Indicators:

 1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)
Wetland is located in an agricultural field primarily used for hay production.

SOIL

Sampling Point: DP4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10YR 3/2	90	5YR 4/6	10	C	M	Loamy/Clayey	Prominent redox concentrations
6-14	10YR 4/3	75	5YR 4/6	25	C	M	Loamy/Clayey	Prominent redox concentrations

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

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (**LRR N**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- Thin Dark Surface (S9) (**MLRA 147, 148**)
- Loamy Mucky Mineral (F1) (**MLRA 136**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- Umbric Surface (F13) (**MLRA 122, 136**)
- Piedmont Floodplain Soils (F19) (**MLRA 148**)
- Red Parent Material (F21) (**MLRA 127, 147, 148**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**MLRA 147**)
- Coast Prairie Redox (A16) (**MLRA 147, 148**)
- Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- Red Parent Material (F21) (**outside MLRA 127, 147, 148**)
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Project/Site: Carpenter Bottom Mitigation Site City/County: Gaston Sampling Date: 7/12/19
 Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: D5
 Investigator(s): Kristi Suggs Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.40849 Long: -81.25975 Datum: NAD 83
 Soil Map Unit Name: Worsham loam (WoA) NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u> Hydric Soil Present? Yes <u>X</u> No <u> </u> Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Remarks: Sampling point is representative of Wetland F. Wetland area is located in an agricultural field primarily used for hay production.	

HYDROLOGY

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

Field Observations: Surface Water Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> Water Table Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> Saturation Present? Yes <u>X</u> No <u> </u> Depth (inches): <u>14</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No <u> </u>
--	---

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

Remarks:
 Soil saturation present within the auger hole from 0 - 14 inches below ground surface.

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

Sampling Point: D5

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

Sapling/Shrub Stratum (Plot size: <u> 15 </u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Acer rubrum</i></u>	<u> 5 </u>	<u> Yes </u>	<u> FAC </u>
2. <u><i>Fraxinus pennsylvanica</i></u>	<u> 5 </u>	<u> Yes </u>	<u> FACW </u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
	<u> 10 </u> =Total Cover		
50% of total cover: <u> 5 </u>	20% of total cover: <u> 2 </u>		

Herb Stratum (Plot size: <u> 5 </u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Eupatorium perfoliatum</i></u>	<u> 15 </u>	<u> Yes </u>	<u> FACW </u>
2. <u><i>Juncus effusus</i></u>	<u> 40 </u>	<u> Yes </u>	<u> FACW </u>
3. <u><i>Dichanthelium clandestinum</i></u>	<u> 15 </u>	<u> Yes </u>	<u> FAC </u>
4. <u><i>Persicaria lapathifolia</i></u>	<u> 5 </u>	<u> No </u>	<u> FACW </u>
5. <u><i>Helenium flexuosum</i></u>	<u> 2 </u>	<u> No </u>	<u> FAC </u>
6. <u><i>Cyperus strigosus</i></u>	<u> 10 </u>	<u> No </u>	<u> FACW </u>
7. <u><i>Juncus articulatus</i></u>	<u> 5 </u>	<u> No </u>	<u> OBL </u>
8. <u><i>Ageratina altissima</i></u>	<u> 5 </u>	<u> No </u>	<u> FACU </u>
9. <u><i>Carex lurida</i></u>	<u> 2 </u>	<u> No </u>	<u> OBL </u>
10. _____	_____	_____	_____
11. _____	_____	_____	_____
	<u> 99 </u> =Total Cover		
50% of total cover: <u> 50 </u>	20% of total cover: <u> 20 </u>		

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 5 (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 <u> 7 </u>	x 1 = <u> 7 </u>
FACW species <u> 75 </u>	x 2 = <u> 150 </u>
FAC species <u> 22 </u>	x 3 = <u> 66 </u>
FACU species <u> 5 </u>	x 4 = <u> 20 </u>
UPL species <u> 0 </u>	x 5 = <u> 0 </u>
Column Totals: <u> 109 </u> (A)	<u> 243 </u> (B)
Prevalence Index = B/A = <u> 2.23 </u>	

Hydrophytic Vegetation Indicators:

 1 - Rapid Test for Hydrophytic Vegetation

 X 2 - Dominance Test is >50%

 X 3 - Prevalence Index is ≤3.0¹

 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No

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

SOIL

Sampling Point: D5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	5Y 4/1	85	5YR 4/6	15	C	M	Loamy/Clayey	Prominent redox concentrations
4-14	10GY 4/1	90	7.5YR 5/8	10	C	M	Loamy/Clayey	Prominent redox concentrations

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

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (**LRR N**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- Thin Dark Surface (S9) (**MLRA 147, 148**)
- Loamy Mucky Mineral (F1) (**MLRA 136**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- Umbric Surface (F13) (**MLRA 122, 136**)
- Piedmont Floodplain Soils (F19) (**MLRA 148**)
- Red Parent Material (F21) (**MLRA 127, 147, 148**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**MLRA 147**)
- Coast Prairie Redox (A16) (**MLRA 147, 148**)
- Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- Red Parent Material (F21) (**outside MLRA 127, 147, 148**)
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Project/Site: Carpenter Bottom Mitigation Site City/County: Gaston Sampling Date: 7/12/19
 Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: D6
 Investigator(s): Kristi Suggs & Ian Eckardt Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.40947 Long: -81.25977 Datum: NAD 83
 Soil Map Unit Name: Worsham loam (WoA) NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u> Hydric Soil Present? Yes <u> </u> No <u>X</u> Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Remarks: Upland site associated with Wetlands F & G. Sampling point located in an agricultural field primarily used for hay production.	

HYDROLOGY

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

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

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

Remarks:
 Located in floodplain adjacent to Wetland F.

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

Sampling Point: D6

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

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

Herb Stratum (Plot size: <u> 5 </u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Schedonorus arundinaceus</u>	80	Yes	FACU
2. <u>Eupatorium capillifolium</u>	3	No	FACU
3. <u>Juncus effusus</u>	7	No	FACW
4. <u>Dichantheium clandestinum</u>	10	No	FAC
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
100 = Total Cover			
50% of total cover: <u> 50 </u> 20% of total cover: <u> 20 </u>			

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

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u> 0 </u>	x 1 = <u> 0 </u>
FACW species <u> 7 </u>	x 2 = <u> 14 </u>
FAC species <u> 10 </u>	x 3 = <u> 30 </u>
FACU species <u> 83 </u>	x 4 = <u> 332 </u>
UPL species <u> 0 </u>	x 5 = <u> 0 </u>
Column Totals: <u> 100 </u> (A)	<u> 376 </u> (B)
Prevalence Index = B/A = <u> 3.76 </u>	

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)
 Sampling point is located in an agricultural field primarily used for hay production.

SOIL

Sampling Point: D6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	7.5YR 4/4	100					Loamy/Clayey	
3-14	5YR 4/6	100					Loamy/Clayey	

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

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (MLRA 136)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (F21)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> (outside MLRA 127, 147, 148)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Very Shallow Dark Surface (F22)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N,	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> MLRA 136)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 122, 136)		
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147, 148)		

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

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes _____ No <u> X </u>
---	---

Remarks:
 No hydric soil indicators present.

Project/Site: Carpenter Bottom Mitigation Site City/County: Gaston Sampling Date: 7/12/19
 Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: D7
 Investigator(s): Kristi Suggs & Ian Eckardt Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.4097 Long: -81.25977 Datum: NAD 83
 Soil Map Unit Name: Worsham loam (WoA) NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u> Hydric Soil Present? Yes <u>X</u> No <u> </u> Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Remarks: Data point is representative of Wetland G. Located in an agricultural floodplain primarily used for hay production.	

HYDROLOGY

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

Field Observations: Surface Water Present? Yes <u>X</u> No <u> </u> Depth (inches): <u>12</u> Water Table Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> Saturation Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No <u> </u>
--	---

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

Remarks:
 Standing water present in wetland; however, no surface water, water table, or soil saturation present in auger hole.

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

Sampling Point: D7

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

Sapling/Shrub Stratum (Plot size: <u> 15 </u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u> Fraxinus pennsylvanica </u>	<u> 5 </u>	<u> Yes </u>	<u> FACW </u>
2. <u> Acer rubrum </u>	<u> 1 </u>	<u> No </u>	<u> FAC </u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
	<u> 6 </u> =Total Cover		
50% of total cover: <u> 3 </u>	20% of total cover: <u> 2 </u>		

Herb Stratum (Plot size: <u> 5 </u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u> Carex lurida </u>	<u> 10 </u>	<u> No </u>	<u> OBL </u>
2. <u> Juncus effusus </u>	<u> 35 </u>	<u> Yes </u>	<u> FACW </u>
3. <u> Helenium flexuosum </u>	<u> 6 </u>	<u> No </u>	<u> FAC </u>
4. <u> Dichanthelium clandestinum </u>	<u> 35 </u>	<u> Yes </u>	<u> FAC </u>
5. <u> Xanthium strumarium </u>	<u> 1 </u>	<u> No </u>	<u> FAC </u>
6. <u> Eupatorium pilosum </u>	<u> 3 </u>	<u> No </u>	<u> FACW </u>
7. <u> Eupatorium capillifolium </u>	<u> 2 </u>	<u> No </u>	<u> FACU </u>
8. <u> Persicaria lapathifolia </u>	<u> 2 </u>	<u> No </u>	<u> FACW </u>
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
	<u> 94 </u> =Total Cover		
50% of total cover: <u> 47 </u>	20% of total cover: <u> 19 </u>		

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 3 (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 <u> 10 </u>	x 1 = <u> 10 </u>
FACW species <u> 45 </u>	x 2 = <u> 90 </u>
FAC species <u> 43 </u>	x 3 = <u> 129 </u>
FACU species <u> 2 </u>	x 4 = <u> 8 </u>
UPL species <u> 0 </u>	x 5 = <u> 0 </u>
Column Totals: <u> 100 </u> (A)	<u> 237 </u> (B)
Prevalence Index = B/A = <u> 2.37 </u>	

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation¹ (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)
 Located in an agricultural floodplain primarily used for hay production.

SOIL

Sampling Point: D7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	2.5YR 3/2	95	7.5YR 4/6	5	C	PL	Loamy/Clayey	Prominent redox concentrations
6-10	2.5YR 3/2	50	7.5YR 4/6	50	C	PL/M	Loamy/Clayey	Prominent redox concentrations
10-14	2.5YR 3/2	30	7.5YR 4/6	70	C	M	Loamy/Clayey	Prominent redox concentrations

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

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (**LRR N**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- Thin Dark Surface (S9) (**MLRA 147, 148**)
- Loamy Mucky Mineral (F1) (**MLRA 136**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- Umbric Surface (F13) (**MLRA 122, 136**)
- Piedmont Floodplain Soils (F19) (**MLRA 148**)
- Red Parent Material (F21) (**MLRA 127, 147, 148**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**MLRA 147**)
- Coast Prairie Redox (A16) (**MLRA 147, 148**)
- Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- Red Parent Material (F21) (**outside MLRA 127, 147, 148**)
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Project/Site: Carpenter Bottom Mitigation Site City/County: Gaston Sampling Date: 7/15/19
 Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: DP8
 Investigator(s): Kristi Suggs & Ian Eckardt Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Flat Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.41098 Long: -81.2616 Datum: NAD 83
 Soil Map Unit Name: Worsham loam (WoA) NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation X, Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No X
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u> Hydric Soil Present? Yes <u>X</u> No <u> </u> Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Remarks: Data point is representative for Wetland H. Livestock have full access to wetland area and have created areas of heavy trampling.	

HYDROLOGY

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

Field Observations: Surface Water Present? Yes <u>X</u> No <u> </u> Depth (inches): <u>9</u> Water Table Present? Yes <u>X</u> No <u> </u> Depth (inches): <u>9</u> Saturation Present? Yes <u>X</u> No <u> </u> Depth (inches): <u>14</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No <u> </u>
--	---

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

Remarks:
 Backswimmer was located in surface water.

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

Sampling Point: DP8

Tree Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer rubrum</u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Pinus taeda</u>	<u>10</u>	<u>No</u>	<u>FAC</u>
3. <u>Morus rubra</u>	<u>5</u>	<u>No</u>	<u>FACU</u>
4. <u>Fraxinus pennsylvanica</u>	<u>10</u>	<u>No</u>	<u>FACW</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	<u>85</u> =Total Cover		
	50% of total cover: <u>43</u>	20% of total cover: <u>17</u>	

Sapling/Shrub Stratum (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Pinus taeda</u>	<u>5</u>	<u>No</u>	<u>FAC</u>
2. <u>Viburnum dentatum</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>
3. <u>Juniperus virginiana</u>	<u>10</u>	<u>Yes</u>	<u>FACU</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
	<u>35</u> =Total Cover		
	50% of total cover: <u>18</u>	20% of total cover: <u>7</u>	

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Microstegium vimineum</u>	<u>70</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Saururus cernuus</u>	<u>2</u>	<u>No</u>	<u>OBL</u>
3. <u>Symphotrichum puniceum</u>	<u>27</u>	<u>Yes</u>	<u>OBL</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
	<u>99</u> =Total Cover		
	50% of total cover: <u>50</u>	20% of total cover: <u>20</u>	

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

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 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 <u>29</u>	x 1 = <u>29</u>
FACW species <u>10</u>	x 2 = <u>20</u>
FAC species <u>165</u>	x 3 = <u>495</u>
FACU species <u>15</u>	x 4 = <u>60</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>219</u> (A)	<u>604</u> (B)
Prevalence Index = B/A = <u>2.76</u>	

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

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

SOIL

Sampling Point: DP8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-8	5Y 3/1	90	5YR 4/6	10	C	M	Loamy/Clayey	Prominent redox concentrations
8-14	5Y 3/1	80	5YR 4/6	20	C	M	Loamy/Clayey	Prominent redox concentrations

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

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (**LRR N**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- Thin Dark Surface (S9) (**MLRA 147, 148**)
- Loamy Mucky Mineral (F1) (**MLRA 136**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- Umbric Surface (F13) (**MLRA 122, 136**)
- Piedmont Floodplain Soils (F19) (**MLRA 148**)
- Red Parent Material (F21) (**MLRA 127, 147, 148**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**MLRA 147**)
- Coast Prairie Redox (A16) (**MLRA 147, 148**)
- Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- Red Parent Material (F21) (**outside MLRA 127, 147, 148**)
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Project/Site: Carpenter Bottom Mitigation Site City/County: Gaston Sampling Date: 7/12/19
 Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: DP9
 Investigator(s): Kristi Suggs & Ian Eckardt Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): Hummock Local relief (concave, convex, none): Convex Slope (%): -
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.41079 Long: -81.26156 Datum: NAD 83
 Soil Map Unit Name: Worsham loam (WoA) NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u> Hydric Soil Present? Yes <u> </u> No <u>X</u> Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Remarks: Upland data point representative for Wetland H. An upland hummock surrounded by Wetland H.	

HYDROLOGY

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

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

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

Remarks:
 No hydrologic indicators present.

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

Sampling Point: DP9

Tree Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Juglans nigra</u>	<u>40</u>	<u>Yes</u>	<u>FACU</u>
2. <u>Pinus taeda</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	<u>60</u> =Total Cover		
	50% of total cover: <u>30</u>	20% of total cover: <u>12</u>	

Sapling/Shrub Stratum (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Fraxinus pennsylvanica</u>	<u>5</u>	<u>Yes</u>	<u>FACW</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
	<u>5</u> =Total Cover		
	50% of total cover: <u>3</u>	20% of total cover: <u>1</u>	

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Schedonorus arundinaceus</u>	<u>80</u>	<u>Yes</u>	<u>FACU</u>
2. <u>Juncus effusus</u>	<u>10</u>	<u>No</u>	<u>FACW</u>
3. <u>Eupatorium capillifolium</u>	<u>5</u>	<u>No</u>	<u>FACU</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
	<u>95</u> =Total Cover		
	50% of total cover: <u>48</u>	20% of total cover: <u>19</u>	

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 4 (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 <u>0</u>	x 1 = <u>0</u>
FACW species <u>15</u>	x 2 = <u>30</u>
FAC species <u>20</u>	x 3 = <u>60</u>
FACU species <u>125</u>	x 4 = <u>500</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>160</u> (A)	<u>590</u> (B)
Prevalence Index = B/A = <u>3.69</u>	

Hydrophytic Vegetation Indicators:

 1 - Rapid Test for Hydrophytic Vegetation

 2 - Dominance Test is >50%

 3 - Prevalence Index is ≤3.0¹

 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No X

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

SOIL

Sampling Point: DP9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-8	7.5YR 4/6	100					Loamy/Clayey	
8-14	7.5YR 4/4	100					Loamy/Clayey	

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

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (**LRR N**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- Thin Dark Surface (S9) (**MLRA 147, 148**)
- Loamy Mucky Mineral (F1) (**MLRA 136**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- Umbric Surface (F13) (**MLRA 122, 136**)
- Piedmont Floodplain Soils (F19) (**MLRA 148**)
- Red Parent Material (F21) (**MLRA 127, 147, 148**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**MLRA 147**)
- Coast Prairie Redox (A16) (**MLRA 147, 148**)
- Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- Red Parent Material (F21) (**outside MLRA 127, 147, 148**)
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

APPENDIX 4
Stream Identification Forms

NC DWQ Stream Identification Form Version 4.11

Date: 7-11-19	Project/Site: Carpenter Bottom	Latitude:
Evaluator: IE/KS	County: Gaston	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30 20.5	Stream Determination (circle one) Ephemera <u>Intermittent</u> Perennial	Other Carpenter Branch e.g. Quad Name: Reach 1 - above UT3

A. Geomorphology (Subtotal = 9.25)

	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 <i>Few pools - little to no riffles/step</i>	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

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

B. Hydrology (Subtotal = 5.5)

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 = 5.75)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed <i>few spots cordgrass</i>	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed <i>Juncus</i>	FACW = 0.75, OBL = 1.5, Other = 0			

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

Notes:

Sketch:

SCP2

NC DWQ Stream Identification Form Version 4.11

Manstun - Carpenter's Branch

Date: 8/1/2018	Project/Site: Carpenter's Bot	Latitude: 35° 24' 35.5N
Evaluator: ERN	County: Gaston	Longitude: 81° 15' 38"W
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 38.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 24)

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

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

B. Hydrology (Subtotal = 9)

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

C. Biology (Subtotal = 5.75)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 7-11-19	Project/Site: Carpenter Bottom	Latitude:
Evaluator: IE/KS	County: Gaston	Longitude:
Total Points: 28.5 <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral (Intermittent) Perennial	Other UT 1 e.g. Quad Name:

A. Geomorphology (Subtotal = 11)

	Absent	Weak	Moderate	Strong
1 ³ 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	1.5	3
5. Active/relict floodplain	0	1	1.5	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	

³ artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.5)

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

C. Biology (Subtotal = 9)

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

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

Notes:

Sketch: Particle size: U/S is mainly fines (silt/sand)
D/S end has some boulders/cobbles

- 4 dragonflies
- 3 diving beetles
- 3 sediment beetles
- 1 frog
- 1 crayfish

NC DWQ Stream Identification Form Version 4.11

Date: 7-11-19	Project/Site: Carpenter Bottom	Latitude:
Evaluator: IE/KS	County: Gaston	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30 32.25	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other UTA U/S End e.g. Quad Name: above confluence w/ CB

A. Geomorphology (Subtotal = 12.5)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	1.5	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: Few small boulders/bedrock	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

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

B. Hydrology (Subtotal = 9.5)

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

C. Biology (Subtotal = 10.25)

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

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

Notes:

Sketch: Dragonfly 1
Bottom? water spider III
Salamander III

NC DWQ Stream Identification Form Version 4.11

Date: 7-11-19	Project/Site: Carpenter	Latitude:
Evaluator: IE/KS	County: Gaston	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30 20.75	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other UT3 e.g. Quad Name:

A. Geomorphology (Subtotal = 9.5)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	1.5	3
4. Particle size of stream substrate	0	1	1.5	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: several large tree roots	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

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

B. Hydrology (Subtotal = 5.5)

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 = 6.75)

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 7-11-19	Project/Site: Carpenter Bottom	Latitude:
Evaluator: IE/KS	County: Gaston	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ 35	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other UTA e.g. Quad Name:

A. Geomorphology (Subtotal = 15)

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

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

B. Hydrology (Subtotal = 9.5)

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

C. Biology (Subtotal = 10.5)



18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	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: Evaluated last 30' of channel between fence line & confluence w/ CB
Observed: 1 hellgrammite, 6 crayfish, 2 stoneflies, 4 caddisflies & 2 caddisflies

Sketch:

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/15/2019</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>Wildlands</u></td> <td>4. Assessor name/organization: <u>M. Caddell</u></td> </tr> <tr> <td>5. County: <u>Gaston</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u></td> </tr> <tr> <td>7. River basin: <u>Catawba</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40929, -81.26030</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <p style="text-align: center;">Carpenter Reach</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>1 (above UT3)</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>130</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>2</u></td> </tr> <tr> <td colspan="2">13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)</p> <p>17. Watershed size: (skip for Tidal Marsh Stream) <input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation: <u>7/15/2019</u>	3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>	5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>	7. River basin: <u>Catawba</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40929, -81.26030</u>		9. Site number (show on attached map): <u>1 (above UT3)</u>	10. Length of assessment reach evaluated (feet): <u>130</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1</u> <input type="checkbox"/> Unable to assess channel depth.		12. Channel width at top of bank (feet): <u>2</u>		13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No		14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)
1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation: <u>7/15/2019</u>																																
3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>																																
5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>																																
7. River basin: <u>Catawba</u>																																	
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40929, -81.26030</u>																																	
9. Site number (show on attached map): <u>1 (above UT3)</u>	10. Length of assessment reach evaluated (feet): <u>130</u>																																
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>1</u> <input type="checkbox"/> Unable to assess channel depth.																																	
12. Channel width at top of bank (feet): <u>2</u>																																	
13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No																																	
14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream																																	
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)																															
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters																															
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters																															
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)																															

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

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

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

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[X]A [X]A Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
[C] [C] Extensive evidence of conditions that adversely affect reference interaction

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

Check all that apply.

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

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

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

9. Large or Dangerous Stream – assessment reach metric

[]Yes [X]No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

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

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

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[X]E Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

Check for Tidal Marsh Streams Only

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

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

11a. []Yes [X]No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

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

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

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

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

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

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

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.
- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

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

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

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

- Consider aspect. Consider "leaf-on" condition.**
- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
 - B Degraded (example: scattered trees)
 - C Stream shading is gone or largely absent

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

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

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

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

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

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

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

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	Pasture (active livestock use)

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

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

LB	RB	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

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

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

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:







**Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1**

Stream Site Name	Carpenter Bottom Mitigation Site	Date of Assessment	7/15/2019
Stream Category	Pa1	Assessor Name/Organization	M. Caddell

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

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	MEDIUM	MEDIUM
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	MEDIUM	MEDIUM
(3) Streamside Area Attenuation	MEDIUM	MEDIUM
(4) Floodplain Access	HIGH	HIGH
(4) Wooded Riparian Buffer	LOW	LOW
(4) Microtopography	LOW	LOW
(3) Stream Stability	MEDIUM	MEDIUM
(4) Channel Stability	HIGH	HIGH
(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	OMITTED	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	HIGH	HIGH
(3) In-stream Habitat	LOW	LOW
(2) Stream-side Habitat	LOW	LOW
(3) Stream-side Habitat	LOW	LOW
(3) Thermoregulation	LOW	LOW
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	LOW	LOW

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																							
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/15/2019</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>Wildlands</u></td> <td>4. Assessor name/organization: <u>M. Caddell</u></td> </tr> <tr> <td>5. County: <u>Gaston</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u></td> </tr> <tr> <td>7. River basin: <u>Catawba</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40476, 81.25860</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <p align="center">Carpenter Reach 1 (between UT1 and Reach 2)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): _____</td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>1200</u></td> </tr> <tr> <td>11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>5-7</u></td> <td><input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td>12. Channel width at top of bank (feet): <u>10-15</u></td> <td>13. Is assessment reach a swamp stream? <input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%; text-align: center;"> <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) </td> <td style="width:50%; text-align: center;"> <input type="checkbox"/> B  (less sinuous stream, steeper valley slope) </td> </tr> </table> <p>17. Watershed size: (skip for Tidal Marsh Stream)</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Size 1 (< 0.1 mi²)</td> <td><input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi²)</td> <td><input type="checkbox"/> Size 3 (0.5 to < 5 mi²)</td> <td><input type="checkbox"/> Size 4 (≥ 5 mi²)</td> </tr> </table> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> <tr> <td colspan="3"><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.</td> </tr> </table> <p>List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation: <u>7/15/2019</u>	3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>	5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>	7. River basin: <u>Catawba</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40476, 81.25860</u>		9. Site number (show on attached map): _____	10. Length of assessment reach evaluated (feet): <u>1200</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>5-7</u>	<input type="checkbox"/> Unable to assess channel depth.	12. Channel width at top of bank (feet): <u>10-15</u>	13. Is assessment reach a swamp stream? <input type="checkbox"/> Yes <input type="checkbox"/> No	14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope)	<input type="checkbox"/> B  (less sinuous stream, steeper valley slope)	<input type="checkbox"/> Size 1 (< 0.1 mi ²)	<input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²)	<input type="checkbox"/> Size 3 (0.5 to < 5 mi ²)	<input type="checkbox"/> Size 4 (≥ 5 mi ²)	<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.		
1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation: <u>7/15/2019</u>																																							
3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>																																							
5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>																																							
7. River basin: <u>Catawba</u>																																								
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40476, 81.25860</u>																																								
9. Site number (show on attached map): _____	10. Length of assessment reach evaluated (feet): <u>1200</u>																																							
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>5-7</u>	<input type="checkbox"/> Unable to assess channel depth.																																							
12. Channel width at top of bank (feet): <u>10-15</u>	13. Is assessment reach a swamp stream? <input type="checkbox"/> Yes <input type="checkbox"/> No																																							
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream																																								
<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope)	<input type="checkbox"/> B  (less sinuous stream, steeper valley slope)																																							
<input type="checkbox"/> Size 1 (< 0.1 mi ²)	<input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²)	<input type="checkbox"/> Size 3 (0.5 to < 5 mi ²)	<input type="checkbox"/> Size 4 (≥ 5 mi ²)																																					
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)																																						
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters																																						
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters																																						
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)																																						
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.																																								

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

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

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

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

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

Check all that apply.

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

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

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

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

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

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

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

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

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

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

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

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

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

Table with 5 columns (NP, R, C, A, P) and 7 rows of substrate types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

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

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

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

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

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

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

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

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

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input checked="" type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

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

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

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

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

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

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

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

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

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

LB	RB	
<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

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

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

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Carpenter Bottom Mitigation Site	Date of Assessment	7/15/2019
Stream Category	Pa2	Assessor Name/Organization	M. Caddell

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

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

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																	
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>Carpenter Bottom</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/15/2019</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>Wildlands</u></td> <td>4. Assessor name/organization: <u>M. Caddell</u></td> </tr> <tr> <td>5. County: <u>Gaston</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u></td> </tr> <tr> <td>7. River basin: <u>Catawba</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40764, -81.25987</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <p style="text-align: center;">Carpenter Reach 1 (between UT2 & UT1)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>UT1</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>450</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>6</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>15</u> 13. Is assessment reach a swamp stream? <input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)</p> <p>17. Watershed size: (skip for Tidal Marsh Stream) <input type="checkbox"/> Size 1 (< 0.1 mi²) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> <tr> <td colspan="3"><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.</td> </tr> </table> <p>List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>Carpenter Bottom</u>	2. Date of evaluation: <u>7/15/2019</u>	3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>	5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>	7. River basin: <u>Catawba</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40764, -81.25987</u>		9. Site number (show on attached map): <u>UT1</u>	10. Length of assessment reach evaluated (feet): <u>450</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>6</u> <input type="checkbox"/> Unable to assess channel depth.		12. Channel width at top of bank (feet): <u>15</u> 13. Is assessment reach a swamp stream? <input type="checkbox"/> Yes <input type="checkbox"/> No		14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.		
1. Project name (if any): <u>Carpenter Bottom</u>	2. Date of evaluation: <u>7/15/2019</u>																																	
3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>																																	
5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>																																	
7. River basin: <u>Catawba</u>																																		
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40764, -81.25987</u>																																		
9. Site number (show on attached map): <u>UT1</u>	10. Length of assessment reach evaluated (feet): <u>450</u>																																	
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>6</u> <input type="checkbox"/> Unable to assess channel depth.																																		
12. Channel width at top of bank (feet): <u>15</u> 13. Is assessment reach a swamp stream? <input type="checkbox"/> Yes <input type="checkbox"/> No																																		
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream																																		
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)																																
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters																																
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters																																
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)																																
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.																																		

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

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

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

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

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

Check all that apply.

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

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

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

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

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

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

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

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

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

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

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

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

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

Table with 5 columns (NP, R, C, A, P) and 7 rows of substrate types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

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

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

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

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

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

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

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

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

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

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

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

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

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

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

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

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	Pasture (active livestock use)

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

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

LB	RB	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

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

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

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name Carpenter Bottom Date of Assessment 7/15/2019
 Stream Category Pa2 Assessor Name/Organization M. Caddell

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

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

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																	
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/15/2019</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>Wildlands</u></td> <td>4. Assessor name/organization: <u>M. Caddell</u></td> </tr> <tr> <td>5. County: <u>Gaston</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u></td> </tr> <tr> <td>7. River basin: <u>Catawba</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40876, -81.26006</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <p style="text-align: center;">Carpenter Reach 1 (between UT3 & UT2)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>UT2</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>200</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3-4</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>5-10</u> 13. Is assessment reach a swamp stream? <input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)</p> <p>17. Watershed size: (skip for Tidal Marsh Stream) <input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> <tr> <td colspan="3"><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.</td> </tr> </table> <p>List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation: <u>7/15/2019</u>	3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>	5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>	7. River basin: <u>Catawba</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40876, -81.26006</u>		9. Site number (show on attached map): <u>UT2</u>	10. Length of assessment reach evaluated (feet): <u>200</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3-4</u> <input type="checkbox"/> Unable to assess channel depth.		12. Channel width at top of bank (feet): <u>5-10</u> 13. Is assessment reach a swamp stream? <input type="checkbox"/> Yes <input type="checkbox"/> No		14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.		
1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation: <u>7/15/2019</u>																																	
3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>																																	
5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>																																	
7. River basin: <u>Catawba</u>																																		
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40876, -81.26006</u>																																		
9. Site number (show on attached map): <u>UT2</u>	10. Length of assessment reach evaluated (feet): <u>200</u>																																	
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3-4</u> <input type="checkbox"/> Unable to assess channel depth.																																		
12. Channel width at top of bank (feet): <u>5-10</u> 13. Is assessment reach a swamp stream? <input type="checkbox"/> Yes <input type="checkbox"/> No																																		
14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream																																		
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)																																
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters																																
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters																																
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)																																
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.																																		

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

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

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

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

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

Check all that apply.

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

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

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

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

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

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

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

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

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

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

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

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

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

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

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

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

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.
- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Consider storage capacity with regard to both overbank flow and upland runoff.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.**
- | | | |
|----------------------------|----------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

- Consider for the Left Bank (LB) and the Right Bank (RB).** Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

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

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

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

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

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

- Consider aspect. Consider "leaf-on" condition.
- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
 - B Degraded (example: scattered trees)
 - C Stream shading is gone or largely absent

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

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

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

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

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

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

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

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	Pasture (active livestock use)

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

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

LB	RB	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

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

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

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

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

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

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

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

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

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

Notes/Sketch:



**Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1**

Stream Site Name	Carpenter Bottom Mitigation Site	Date of Assessment	7/15/2019
Stream Category	Pa1	Assessor Name/Organization	M. Caddell

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

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

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																																
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/15/2019</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>Wildlands</u></td> <td>4. Assessor name/organization: <u>M. Caddell</u></td> </tr> <tr> <td>5. County: <u>Gaston</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u></td> </tr> <tr> <td>7. River basin: <u>Catawba</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40411, -81.25776</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <p style="text-align: center;">Carpenter Reach</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>2</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>~350</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3-5</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>20</u></td> </tr> <tr> <td colspan="2">13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input checked="" type="checkbox"/> B  (less sinuous stream, steeper valley slope)</p> <p>17. Watershed size: (skip for Tidal Marsh Stream) <input type="checkbox"/> Size 1 (< 0.1 mi²) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation: <u>7/15/2019</u>	3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>	5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>	7. River basin: <u>Catawba</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40411, -81.25776</u>		9. Site number (show on attached map): <u>2</u>	10. Length of assessment reach evaluated (feet): <u>~350</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3-5</u> <input type="checkbox"/> Unable to assess channel depth.		12. Channel width at top of bank (feet): <u>20</u>		13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No		14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)
1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation: <u>7/15/2019</u>																																
3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>																																
5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>																																
7. River basin: <u>Catawba</u>																																	
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40411, -81.25776</u>																																	
9. Site number (show on attached map): <u>2</u>	10. Length of assessment reach evaluated (feet): <u>~350</u>																																
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>3-5</u> <input type="checkbox"/> Unable to assess channel depth.																																	
12. Channel width at top of bank (feet): <u>20</u>																																	
13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No																																	
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream																																	
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)																															
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters																															
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters																															
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)																															

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

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

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

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

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

Check all that apply.

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

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

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

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

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

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

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

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

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

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns (NP, R, C, A, P) and 7 rows of substrate types: Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.
- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

- Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

- Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.
- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

- Check all contributors within the assessment reach or within view of and draining to the assessment reach.
- A Streams and/or springs (jurisdictional discharges)
 - B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
 - C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
 - D Evidence of bank seepage or sweating (iron in water indicates seepage)
 - E Stream bed or bank soil reduced (dig through deposited sediment if present)
 - F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

- Check all that apply.
- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
 - B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
 - C Urban stream (≥ 24% impervious surface for watershed)
 - D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
 - E Assessment reach relocated to valley edge
 - F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

- Consider aspect. Consider "leaf-on" condition.
- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
 - B Degraded (example: scattered trees)
 - C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Carpenter Bottom Mitigation Site	Date of Assessment	7/15/2019
Stream Category	Pb2	Assessor Name/Organization	M. Caddell

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	NO
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	NA	
(3) Stream Stability	HIGH	
(4) Channel Stability	HIGH	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	HIGH	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	HIGH	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	HIGH	
(3) Baseflow	HIGH	
(3) Substrate	HIGH	
(3) Stream Stability	HIGH	
(3) In-stream Habitat	HIGH	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	HIGH	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:		
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p>			
1. Project name (if any):	<u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation:	<u>7/15/2019</u>
3. Applicant/owner name:	<u>Wildlands</u>	4. Assessor name/organization:	<u>M. Caddell</u>
5. County:	<u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad:	<u>Beaverdam Creek</u>
7. River basin:	<u>Catawba</u>	8. Site coordinates (decimal degrees, at lower end of assessment reach):	<u>35.40762, -81.25980</u>
<p>STREAM INFORMATION: (depth and width can be approximations)</p>			
9. Site number (show on attached map):	<u>UT1</u>	10. Length of assessment reach evaluated (feet):	<u>120</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	<u>2-5</u>	<input type="checkbox"/> Unable to assess channel depth.	
12. Channel width at top of bank (feet):	<u>3-6</u>	13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No	
14. Feature type: <input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream			
<p>STREAM CATEGORY INFORMATION:</p>			
15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)			
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> A 	<input type="checkbox"/> B 	
	(more sinuous stream, flatter valley slope)	(less sinuous stream, steeper valley slope)	
17. Watershed size: (skip for Tidal Marsh Stream)	<input checked="" type="checkbox"/> Size 1 (< 0.1 mi ²)	<input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²)	<input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)
<p>ADDITIONAL INFORMATION:</p>			
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.			
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters	
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.			
List species: _____			
<input type="checkbox"/> Designated Critical Habitat (list species) _____			
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
 B No flow, water in pools only.
 C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
 B 10 to 25% of channel unstable
 C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | | | |
|---------------------------------------|---------------------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: _____ (explain in “Notes/Sketch” section)
- J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- | | | |
|---|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

- | | | | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------------------|
| NP | R | C | A | P | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Cobble (64 – 256 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Sand (.062 – 2 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Artificial (rip-rap, concrete, etc.) |

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Carpenter Bottom Mitigation Site	Date of Assessment	7/15/2019
Stream Category	Pa1	Assessor Name/Organization	M. Caddell

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	NO
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	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	LOW	LOW
(3) Stream Stability	MEDIUM	MEDIUM
(4) Channel Stability	MEDIUM	MEDIUM
(4) Sediment Transport	MEDIUM	MEDIUM
(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	MEDIUM
(2) In-stream Habitat	LOW	MEDIUM
(3) Baseflow	MEDIUM	MEDIUM
(3) Substrate	MEDIUM	MEDIUM
(3) Stream Stability	MEDIUM	MEDIUM
(3) In-stream Habitat	LOW	MEDIUM
(2) Stream-side Habitat	MEDIUM	MEDIUM
(3) Stream-side Habitat	MEDIUM	MEDIUM
(3) Thermoregulation	MEDIUM	MEDIUM
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	LOW	LOW

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:		
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p>			
1. Project name (if any):	<u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation:	<u>7/15/2019</u>
3. Applicant/owner name:	<u>Wildlands</u>	4. Assessor name/organization:	<u>M. Caddell</u>
5. County:	<u>Gaston</u>	6. Nearest named water body	<u>Beaverdam Creek</u>
7. River basin:	<u>Catawba</u>	on USGS 7.5-minute quad:	<u>Beaverdam Creek</u>
8. Site coordinates (decimal degrees, at lower end of assessment reach):	<u>35.40877, -81.25996</u>		
STREAM INFORMATION: (depth and width can be approximations)			
9. Site number (show on attached map):	<u>UT2</u>	10. Length of assessment reach evaluated (feet):	<u>250</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	<u>3-4</u>	<input type="checkbox"/> Unable to assess channel depth.	
12. Channel width at top of bank (feet):	<u>3-10</u>	13. Is assessment reach a swamp steam?	<input type="checkbox"/> Yes <input type="checkbox"/> No
14. Feature type:	<input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		
STREAM CATEGORY INFORMATION:			
15. NC SAM Zone:	<input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)		
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope)	<input type="checkbox"/> B  (less sinuous stream, steeper valley slope)	
17. Watershed size: (skip for Tidal Marsh Stream)	<input checked="" type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)		
ADDITIONAL INFORMATION:			
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.			
<input type="checkbox"/> Section 10 water		<input type="checkbox"/> Classified Trout Waters	
<input type="checkbox"/> Essential Fish Habitat		<input type="checkbox"/> Primary Nursery Area	
<input type="checkbox"/> Publicly owned property		<input type="checkbox"/> NCDWR Riparian buffer rule in effect	
<input type="checkbox"/> Anadromous fish		<input type="checkbox"/> 303(d) List	
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.		<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	
<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters		<input type="checkbox"/> Nutrient Sensitive Waters	
<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)			
List species: _____			
<input type="checkbox"/> Designated Critical Habitat (list species) _____			
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.

2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A

3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A

4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A

5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
A A Little or no evidence of conditions that adversely affect reference interaction
B B Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
C C Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
B Excessive sedimentation (burying of stream features or intertidal zone)
C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
D Odor (not including natural sulfide odors)
E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
F Livestock with access to stream or intertidal zone
G Excessive algae in stream or intertidal zone
H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
I Other: (explain in "Notes/Sketch" section)
J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | LB | RB | |
|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Carpenter Bottom Mitigation Site	Date of Assessment	7/15/2019
Stream Category	Pa1	Assessor Name/Organization	M. Caddell

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	NO
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	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	MEDIUM	
(4) Channel Stability	LOW	
(4) Sediment Transport	HIGH	
(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	HIGH	
(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	NA	
Overall	LOW	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:														
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p>															
1. Project name (if any):	<u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation:	<u>7/15/2019</u>												
3. Applicant/owner name:	<u>Wildlands</u>	4. Assessor name/organization:	<u>M. Caddell</u>												
5. County:	<u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad:	<u>Beaverdam Creek</u>												
7. River basin:	<u>Catawba</u>	8. Site coordinates (decimal degrees, at lower end of assessment reach):	<u>35.40927, -81.26031</u>												
<p>STREAM INFORMATION: (depth and width can be approximations)</p>															
9. Site number (show on attached map):	<u>UT3</u>	10. Length of assessment reach evaluated (feet):	<u>110</u>												
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	<u>1-2</u>	<input type="checkbox"/> Unable to assess channel depth.													
12. Channel width at top of bank (feet):	<u>2-3</u>	13. Is assessment reach a swamp steam?	<input type="checkbox"/> Yes <input type="checkbox"/> No												
14. Feature type:	<input type="checkbox"/> Perennial flow <input checked="" type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream														
<p>STREAM CATEGORY INFORMATION:</p>															
15. NC SAM Zone:	<input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)														
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope)	<input type="checkbox"/> B  (less sinuous stream, steeper valley slope)													
17. Watershed size: (skip for Tidal Marsh Stream)	<input checked="" type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)														
<p>ADDITIONAL INFORMATION:</p>															
<p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border:none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p>				<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)													
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters													
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters													
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)													
<p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>															

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

- Consider only current instability, not past events from which the stream has currently recovered.** Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
- A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[X]A [X]A Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction
[C] [C] Extensive evidence of conditions that adversely affect reference interaction

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
[I] Other: (explain in "Notes/Sketch" section)
[J] Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[X]C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[]Yes [X]No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. []Yes []No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[X]E Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

Check for Tidal Marsh Streams Only

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. []Yes [X]No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [A] Riffle-run section (evaluate 11c)
[B] Pool-glide section (evaluate 11d)
[X]C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. []Yes []No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|----------------------------|----------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input checked="" type="checkbox"/> E	<input checked="" type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:



**Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1**

Stream Site Name	Carpenter Bottom Mitigation Site	Date of Assessment	7/15/2019
Stream Category	Pa1	Assessor Name/Organization	M. Caddell

Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	NO
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Intermittent

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	HIGH
(2) Baseflow	MEDIUM	MEDIUM
(2) Flood Flow	HIGH	HIGH
(3) Streamside Area Attenuation	MEDIUM	MEDIUM
(4) Floodplain Access	HIGH	HIGH
(4) Wooded Riparian Buffer	LOW	LOW
(4) Microtopography	LOW	LOW
(3) Stream Stability	HIGH	HIGH
(4) Channel Stability	HIGH	HIGH
(4) Sediment Transport	LOW	LOW
(4) Stream Geomorphology	HIGH	HIGH
(2) Stream/Intertidal Zone Interaction	NA	NA
(2) Longitudinal Tidal Flow	NA	NA
(2) Tidal Marsh Stream Stability	NA	NA
(3) Tidal Marsh Channel Stability	NA	NA
(3) Tidal Marsh Stream Geomorphology	NA	NA
(1) Water Quality	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	OMITTED	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	HIGH	HIGH
(3) In-stream Habitat	LOW	LOW
(2) Stream-side Habitat	LOW	LOW
(3) Stream-side Habitat	LOW	LOW
(3) Thermoregulation	LOW	LOW
(2) Tidal Marsh In-stream Habitat	NA	NA
(3) Flow Restriction	NA	NA
(3) Tidal Marsh Stream Stability	NA	NA
(4) Tidal Marsh Channel Stability	NA	NA
(4) Tidal Marsh Stream Geomorphology	NA	NA
(3) Tidal Marsh In-stream Habitat	NA	NA
(2) Intertidal Zone	NA	NA
Overall	LOW	LOW

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:																														
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u></td> <td style="width:50%;">2. Date of evaluation: <u>7/15/2019</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>Wildlands</u></td> <td>4. Assessor name/organization: <u>M. Caddell</u></td> </tr> <tr> <td>5. County: <u>Gaston</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u></td> </tr> <tr> <td>7. River basin: <u>Catawba</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40745, -81.25984</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>UT4</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>40</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>12</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)</p> <p>17. Watershed size: (skip for Tidal Marsh Stream) <input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: _____</p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation: <u>7/15/2019</u>	3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>	5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>	7. River basin: <u>Catawba</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40745, -81.25984</u>		9. Site number (show on attached map): <u>UT4</u>	10. Length of assessment reach evaluated (feet): <u>40</u>	11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4</u> <input type="checkbox"/> Unable to assess channel depth.		12. Channel width at top of bank (feet): <u>12</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No		14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)	<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters	<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)
1. Project name (if any): <u>Carpenter Bottom Mitigation Site</u>	2. Date of evaluation: <u>7/15/2019</u>																														
3. Applicant/owner name: <u>Wildlands</u>	4. Assessor name/organization: <u>M. Caddell</u>																														
5. County: <u>Gaston</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Beaverdam Creek</u>																														
7. River basin: <u>Catawba</u>																															
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>35.40745, -81.25984</u>																															
9. Site number (show on attached map): <u>UT4</u>	10. Length of assessment reach evaluated (feet): <u>40</u>																														
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4</u> <input type="checkbox"/> Unable to assess channel depth.																															
12. Channel width at top of bank (feet): <u>12</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input type="checkbox"/> No																															
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream																															
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters	<input checked="" type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V)																													
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters																													
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR Riparian buffer rule in effect	<input type="checkbox"/> Nutrient Sensitive Waters																													
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)																													

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- A Water throughout assessment reach.
- B No flow, water in pools only.
- C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
- B Not A

3. Feature Pattern – assessment reach metric

- A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
- B Not A

4. Feature Longitudinal Profile – assessment reach metric

- A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
- B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- A < 10% of channel unstable
- B 10 to 25% of channel unstable
- C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | | | |
|---------------------------------------|---------------------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in “Notes/Sketch” section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
- I Other: _____ (explain in “Notes/Sketch” section)
- J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- | | | |
|---|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams Only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input checked="" type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

- | | | | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------------------|
| NP | R | C | A | P | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Bedrock/saprolite |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Boulder (256 – 4096 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Cobble (64 – 256 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Gravel (2 – 64 mm) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sand (.062 – 2 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Silt/clay (< 0.062 mm) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Detritus |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Artificial (rip-rap, concrete, etc.) |

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="checkbox"/> N | <input checked="" type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input checked="" type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Medium to high stem density
<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Carpenter Bottom Mitigation Site	Date of Assessment	7/15/2019
Stream Category	Pa1	Assessor Name/Organization	M. Caddell




Notes of Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Additional stream information/supplementary measurements included (Y/N)	NO
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	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	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	MEDIUM	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	MEDIUM	
(2) In-stream Habitat	MEDIUM	
(3) Baseflow	MEDIUM	
(3) Substrate	HIGH	
(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	NA	
Overall	LOW	

APPENDIX 5
Categorical Exclusion Documentation and Agency Correspondence

Categorical Exclusion Form for Ecosystem Enhancement Program Projects Version 2

Note: Only Appendix A should be submitted (along with any supporting documentation) as the environmental document.

Part 1: General Project Information	
Project Name:	Carpenter Bottom Mitigation Site
County Name:	Gaston County
DMS Number:	100090
Project Sponsor:	Wildlands Engineering, Inc.
Project Contact Name:	Andrea Eckardt
Project Contact Address:	1430 S. Mint Street, Suite 104, Charlotte, NC 28203
Project Contact E-mail:	aeckardt@wildlandseng.com
DMS Project Manager:	Matthew Reid
Project Description	
<p>The Carpenter Bottom Mitigation Site is located in Gaston County, NC approximately 4.1 miles south of the City of Lincolnton and just south of the Gaston County/Lincoln County border. The project includes wetland restoration along with the restoration and preservation of Carpenter's Branch and several unnamed tributaries. Proposed mitigation areas are currently active cattle and hay pasture with limited forested canopy. The project will provide 3,229 stream credits and 8.2 riparian wetland credits to the Division of Mitigation Services in the Catawba River Basin (03050103 expanded service area).</p>	
For Official Use Only	
Reviewed By: <div style="text-align: center; margin-top: 10px;">  <hr style="width: 100%;"/> </div>	<div style="text-align: center; margin-top: 10px;">  <hr style="width: 100%;"/> DMS Project Manager </div>
Date <div style="text-align: center; margin-top: 10px;"> <i>6/12/2019</i> <hr style="width: 100%;"/> </div>	Conditional Approved By: <div style="text-align: center; margin-top: 10px;"> <hr style="width: 100%;"/> </div>
Date <div style="text-align: center; margin-top: 10px;"> <hr style="width: 100%;"/> </div>	<div style="text-align: center; margin-top: 10px;"> <hr style="width: 100%;"/> For Division Administrator FHWA </div>
<input type="checkbox"/> Check this box if there are outstanding issues	
Final Approval By: <div style="text-align: center; margin-top: 10px;">  <hr style="width: 100%;"/> </div>	<div style="text-align: center; margin-top: 10px;"> <i>6-12-19</i> <hr style="width: 100%;"/> For Division Administrator FHWA </div>
Date	Date

Part 2: All Projects	
Regulation/Question	Response
<u>Coastal Zone Management Act (CZMA)</u>	
1. Is the project located in a CAMA county?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Has a CAMA permit been secured?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. Has NCDPCM agreed that the project is consistent with the NC Coastal Management Program?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
<u>Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)</u>	
1. Is this a "full-delivery" project?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
6. Is there an approved hazardous mitigation plan?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
<u>National Historic Preservation Act (Section 106)</u>	
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Does the project affect such properties and does the SHPO/THPO concur?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. If the effects are adverse, have they been resolved?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
<u>Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)</u>	
1. Is this a "full-delivery" project?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Does the project require the acquisition of real estate?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Was the property acquisition completed prior to the intent to use federal funds?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

Part 3: Ground-Disturbing Activities	
Regulation/Question	Response
American Indian Religious Freedom Act (AIRFA)	
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Is the site of religious importance to American Indians?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. Have the effects of the project on this site been considered?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Antiquities Act (AA)	
1. Is the project located on Federal lands?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. Has a permit been obtained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Archaeological Resources Protection Act (ARPA)	
1. Is the project located on federal or Indian lands (reservation)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Will there be a loss or destruction of archaeological resources?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. Has a permit been obtained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Endangered Species Act (ESA)	
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Is Designated Critical Habitat or suitable habitat present for listed species?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. Is the project "likely to adversely affect" the species and/or "likely to adversely modify" Designated Critical Habitat?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

Executive Order 13007 (Indian Sacred Sites)	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Farmland Protection Policy Act (FPPA)	
1. Will real estate be acquired?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Have the USFWS and the NCWRC been consulted?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Land and Water Conservation Fund Act (Section 6(f))	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Has the NPS approved of the conversion?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Is suitable habitat present for EFH-protected species?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
4. Will the project adversely affect EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
5. Has consultation with NOAA-Fisheries occurred?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Have the USFWS recommendations been incorporated?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Wilderness Act	
1. Is the project in a Wilderness area?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A



ᏍᏍᏍᏍ ᏃᏆᏆ
CHEROKEE NATION[®]
P.O. Box 948 • Tahlequah, OK 74465-0948 • 918-453-5000 • cherokee.org

Office of the Chief

Bill John Baker
Principal Chief
ᏍᏆ ᏍᏍᏍᏍᏍᏍᏍᏍᏍ
ᏍᏍᏍᏍᏍᏍᏍ

S. Joe Crittenden
Deputy Principal Chief
ᏍᏆ ᏍᏍᏍᏍᏍᏍᏍᏍᏍ
ᏍᏍᏍᏍ ᏃᏍᏍᏍᏍᏍᏍ ᏍᏍᏍᏍᏍᏍᏍ

January 29, 2019

Kimberly Browning
United States Army Corps of Engineers
3331 Heritage Trade Drive, Suite 105
Wake Forest, NC 27587

Re: SAW-2018-02062, Carpenter Bottom Site

Ms. Kimberly Browning:

The Cherokee Nation (Nation) is in receipt of your correspondence about **SAW-2018-02062, Carpenter Bottom Site**, and appreciates the opportunity to provide comment upon this project. Please allow this letter to serve as the Nation's interest in acting as a consulting party to this proposed project.

The Nation maintains databases and records of cultural, historic, and pre-historic resources in this area. Our Historic Preservation Office reviewed this project, cross referenced the project's legal description against our information, and found no instances where this project intersects or adjoins such resources. Thus, the Nation does not foresee this project imparting impacts to Cherokee cultural resources at this time.

However, the Nation requests that the United States Army Corps of Engineers (USACE) halt all project activities immediately and re-contact our Offices for further consultation if items of cultural significance are discovered during the course of this project.

Additionally, the Nation requests that USACE conduct appropriate inquiries with other pertinent Historic Preservation Offices regarding historic and prehistoric resources not included in the Nation's databases or records.

If you require additional information or have any questions, please contact me at your convenience. Thank you for your time and attention to this matter.

Wado,

Elizabeth Toombs, Tribal Historic Preservation Officer
Cherokee Nation Tribal Historic Preservation Office
elizabeth-toombs@cherokee.org
918.453.5389



NORTH CAROLINA
Environmental Quality

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

TIM BAUMGARTNER
Director

Stephen Yerka & Russell Townsend
Historic Preservation Specialists
Tribal Historic Preservation Office
Eastern Band of the Cherokee Indians
[\(828\) 359-6852](tel:(828)359-6852)
syerka@nc-choerokee.com rustown@nc-choerokee.com

5/1/2019

Dear Mr. Yerka and Mr. Townsend,

The North Carolina Department of Environmental Quality (NCDEQ) – Division of Mitigation Services (DMS) requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with the proposed Carpenter Bottom mitigation site. The Federal Highway Administration (FHWA) is the lead federal agency for this proposed mitigation project.

The U.S. Army Corps of Engineers (USACE) issued a public notice (SAW-2018-02062) on 1/11/19 for this stream and wetland mitigation project. The USACE public notice closed on 2/27/19 and no response was received from the Eastern Band of the Cherokee Indians. Responses from the Cherokee Nation and NC SHPO are included for your review.

A USGS Topographic Map and a proposed project conceptual map showing the project area are enclosed. The topographic figure was prepared from the Lincolnton West, 7.5-Minute USGS Topographic Quadrangle. The project location (Latitude and Longitude) is as follows: 35°24'31"N, 81°15'35"W.

The Carpenter Bottom Mitigation Site (Site) is located in Gaston County, NC approximately 4.1 miles south of the City of Lincolnton and just south of the Gaston County/Lincoln County border.

The site is being affected by heavy sedimentation, channelization, and nutrient loading. Poorly managed agricultural activities and alterations to stream channels, including loss of riparian vegetation are cited as contributing to sedimentation and habitat degradation via bank erosion. The site is currently accessible to cattle, but they will be excluded with the start of the project. It is planned to place approximately 15.2 acres under a permanent conservation easement. The project will yield 3,229 SMUs from restoration and preservation, and 8.2



WMUs, which consist of 6.8 acres of wetland re-establishment, and 2.1 acres of wetland rehabilitation.

We ask that you review this site based on the attached information to determine the presence of any known historic properties. We respectfully request a response within 30 days of receipt of this email in an effort to implement this necessary stream restoration/mitigation project. Please feel free to contact us with any questions that you may have concerning this project.

Respectfully,

Paul Wiesner

Paul Wiesner

Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-273-1673 Mobile
paul.wiesner@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Drive
Suite 102
Asheville, N.C. 28801

Attachments:

Figure 1: USGS Topographic Map

Figure 2: Proposed Project Conceptual Map

Cherokee Nation Response to USACE Public Notice (SAW-2018-02062)

NC SHPO Response to USACE Public Notice (SAW-2018-02062)

cc: Donnie Brew, FHWA





NORTH CAROLINA
Environmental Quality

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

TIM BAUMGARTNER
Director

5/1/2019

Erin Thompson & Sheila Bird
Tribal Historic Preservation Office
United Keetoowah Band of Cherokee
18263 W. Keetoowah Circle
Tahlequah, OK 74464
918-871-2838 / 918-871-2852
ethompson@ukb-nsn.gov / sbird@ukb-nsn.gov

Dear Ms. Thompson and Ms. Bird,

The North Carolina Department of Environmental Quality (NCDEQ) – Division of Mitigation Services (DMS) requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with the proposed Carpenter Bottom mitigation site. The Federal Highway Administration (FHWA) is the lead federal agency for this proposed mitigation project.

The U.S. Army Corps of Engineers (USACE) issued a public notice (SAW-2018-02062) on 1/11/19 for this stream and wetland mitigation project. The USACE public notice closed on 2/27/19 and no response was received from the United Keetoowah Band of Cherokee. Responses from the Cherokee Nation and NC SHPO are included for your review.

A USGS Topographic Map and a proposed project conceptual map showing the project area are enclosed. The topographic figure was prepared from the Lincolnton West, 7.5-Minute USGS Topographic Quadrangle. The project location (Latitude and Longitude) is as follows: 35°24'31"N, 81°15'35"W.

The Carpenter Bottom Mitigation Site (Site) is located in Gaston County, NC approximately 4.1 miles south of the City of Lincolnton and just south of the Gaston County/Lincoln County border.

The site is being affected by heavy sedimentation, channelization, and nutrient loading. Poorly managed agricultural activities and alterations to stream channels, including loss of riparian vegetation are cited as contributing to sedimentation and habitat degradation via bank erosion. The site is currently accessible to cattle, but they will be excluded with the start of the project. It is planned to place approximately 15.2 acres under a permanent conservation easement. The project will yield 3,229 SMUs from restoration and preservation, and 8.2 WMUs, which consist of 6.8 acres of wetland re-establishment, and 2.1 acres of wetland rehabilitation.



We ask that you review this site based on the attached information to determine the presence of any known historic properties. We respectfully request a response within 30 days of receipt of this letter in an effort to implement this necessary stream restoration/ mitigation project. Please feel free to contact us with any questions that you may have concerning this project.

Respectfully,

Paul Wiesner

Paul Wiesner

Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-273-1673 Mobile
paul.wiesner@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Drive
Suite 102
Asheville, N.C. 28801

Attachments:

Figure 1: USGS Topographic Map

Figure 2: Proposed Project Conceptual Map

Cherokee Nation Response to USACE Public Notice (SAW-2018-02062)

NC SHPO Response to USACE Public Notice (SAW-2018-02062)

cc: Donnie Brew, FHWA





April 29, 2019

Claire Ellwanger
US Fish and Wildlife Service
Asheville Field Office
160 Zillicoa Street
Asheville, NC 28801

Subject: Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Dear Ms. Ellwanger,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to endangered species, migratory birds, or other trust resources associated with the proposed Carpenter Bottom Mitigation Site, a stream and wetland mitigation site located in Gaston County, NC. A USGS Topographic Map and a Project Conceptual Map showing the approximate project area are enclosed. The topographic figure was prepared from the Lincolnton West, 7.5-Minute USGS Topographic Quadrangle and the site is located at latitude 35.4089600, longitude -81.2604790.

The Carpenter Bottom Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel and riparian wetland impacts. This project will include wetland restoration along with stream restoration and preservation of Carpenter's Branch and its unnamed tributaries, which all flow to Beaverdam Creek. Several sections of channel have been identified as significantly degraded. The site has been disturbed due to agricultural use, including cattle that have full access to the stream.

According to your website (<https://www.fws.gov/raleigh/species/cntylist/gaston.html>) the threatened or endangered species for Gaston County are the Northern long-eared bat (*Myotis septentrionalis*), the bog turtle (*Glyptemys muhlenbergii*) the Dwarf-flowered heartleaf (*Hexastylis naniflora*), and the Schweinitz's Sunflower (*Helianthus schweinitzii*). If we have not heard from you in 30 days, we will assume that you do not have any comments regarding associated laws and that you do not have any information relevant to this project at the current time.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning this project.

Sincerely,

A handwritten signature in cursive script that reads "Andrea S. Eckardt".

Andrea Eckardt
Senior Environmental Scientist

Attachment:

Figure 1 USGS Topographic Map

Figure 2 Project Conceptual Map

Andrea Eckardt

From: Brew, Donnie (FHWA) <Donnie.Brew@dot.gov>
Sent: Wednesday, May 29, 2019 9:02 AM
To: Ellwanger, Claire
Cc: Wiesner, Paul; Andrea Eckardt; matthew.reid@ncdenr.gov
Subject: NLEB 4(d) rule consultation - Carpenter Bottom mitigation site, Gaston County
Attachments: Carpenter Bottom site- NLEB Consultation Form_5-29-19.docx; Figure 1 Carpenter Bottom site USGS map.pdf; Figure 2 Carpenter Bottom site map.pdf

Good morning Claire,

The purpose of this message is to notify your office that FHWA will use the streamlined consultation framework for the Carpenter Bottom Mitigation Site in Gaston County, NC.

Attached is a completed NLEB 4(d) Rule Streamlined Consultation form along with site maps/figures.

Thank you,

Donnie

Notifying the Service Under the Framework

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies (or designated non-federal representatives) should use the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation form to notify the Service of their project and meet the requirements of the framework.

[Northern Long-Eared Bat 4\(d\) Rule Streamlined Consultation Form](#) (Word document)

Information requested in the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form serves to

- (1) notify the field office that an action agency will use the streamlined framework;
- (2) describe the project with sufficient detail to support the required determination; and
- (3) enable the USFWS to track effects and determine if reinitiation of consultation for the 4(d) rule is required. This form requests the minimum amount of information required for the Service to be able to track this information.

Providing information in the Streamlined Consultation Form does not address section 7(a)(2) compliance for any other listed species.

Donnie Brew
Preconstruction & Environment Engineer
Federal Highway Administration

310 New Bern Ave, Suite 410
Raleigh, NC 27601
donnie.brew@dot.gov
919-747-7017

Please consider the environment before printing this email.

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies should use this form for the optional streamlined consultation framework for the northern long-eared bat (NLEB). This framework allows federal agencies to rely upon the U.S. Fish and Wildlife Service’s (USFWS) January 5, 2016, intra-Service Programmatic Biological Opinion (BO) on the final 4(d) rule for the NLEB for section 7(a)(2) compliance by: (1) notifying the USFWS that an action agency will use the streamlined framework; (2) describing the project with sufficient detail to support the required determination; and (3) enabling the USFWS to track effects and determine if reinitiation of consultation is required per 50 CFR 402.16.

This form is not necessary if an agency determines that a proposed action will have no effect to the NLEB or if the USFWS has concurred in writing with an agency's determination that a proposed action may affect, but is not likely to adversely affect the NLEB (i.e., the standard informal consultation process). Actions that may cause prohibited incidental take require separate formal consultation. Providing this information does not address section 7(a)(2) compliance for any other listed species.

Information to Determine 4(d) Rule Compliance:	YES	NO
1. Does the project occur wholly outside of the WNS Zone ¹ ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Have you contacted the appropriate agency ² to determine if your project is near known hibernacula or maternity roost trees?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Could the project alter the entrance or interior environment of a known hibernaculum?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the BO.

Agency and Applicant³ (Name, Email, Phone No.): FHWA, Donnie Brew, Donnie.brew@dot.gov, 919-747-7017

Project Name: Carpenter Bottom Mitigation Site

Project Location (include coordinates if known): 35.4089600"N 80.2604790"W

Basic Project Description (provide narrative below or attach additional information):

The Carpenter Bottom Mitigation Site is a stream and wetland mitigation project located in Gaston County, approximately 4.1 miles south of the City of Lincolnton and just south of the Gaston County/Lincoln County border. The project will include the restoration and enhancement of Carpenter’s Branch and several unnamed tributaries. Proposed mitigation areas are currently active cattle and hay pasture with limited forested canopy. The project will provide 3,229 stream mitigation units and 8.2 riparian wetland mitigation units to the Division of Mitigation Services in the Catawba River Basin (03050103 expanded service area). Construction of the stream restoration project will include some tree removal (>3”DBH) – approximately 2.5 acres.

¹ <http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf>

² See <http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html>

³ If applicable - only needed for federal actions with applicants (e.g., for a permit, etc.) who are party to the consultation.

General Project Information	YES	NO
Does the project occur within 0.25 miles of a known hibernaculum? (47 miles)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the project occur within 150 feet of a known maternity roost tree?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the project include forest conversion ⁴ ? (if yes, report acreage below)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Estimated total acres of forest conversion	2.5 ac	
If known, estimated acres ⁵ of forest conversion from April 1 to October 31		
If known, estimated acres of forest conversion from June 1 to July 31 ⁶		
Does the project include timber harvest? (if yes, report acreage below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Estimated wind capacity (MW)		

Agency Determination:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.



Signature: _____

Date Submitted: 5-29-19

⁴ Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the BO).

⁵ If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.

⁶ If the activity includes tree clearing in June and July, also include those acreage in April to October.

Andrea Eckardt

From: Andrea Eckardt
Sent: Friday, May 24, 2019 4:20 PM
To: Cortes, Milton - NRCS, Raleigh, NC
Subject: RE: AD1006 - Stream/Wetland Mitigation Project
Attachments: Carpenter AD 1006 Final.pdf

Milton-

Thank you so much. Attached is the fully completed AD1006 Form for Carpenter Bottom Mitigation Site for your files.

Andrea

Andrea S. Eckardt | *Senior Environmental Planner*
704.332.7754 x101

From: Cortes, Milton - NRCS, Raleigh, NC <milton.cortes@usda.gov>
Sent: Tuesday, May 21, 2019 5:16 PM
To: Andrea Eckardt <aeckardt@wildlandseng.com>
Subject: RE: AD1006 - Stream/Wetland Mitigation Project

Andrea:

Please find attached the Farmland Conversion Impact Rating evaluation on Carpenter Bottom Mitigation Site, Gaston Co. NC

If I can be of further assistance please let us know.

Thanks

Milton Cortes

State Soil Scientist

USDA NRCS

4407 Bland Rd., Suite 117

Raleigh, NC 27609

Desk: 919-873-2171

From: Andrea Eckardt <aeckardt@wildlandseng.com>
Sent: Thursday, May 9, 2019 3:17 PM
To: Cortes, Milton - NRCS, Raleigh, NC <milton.cortes@usda.gov>
Subject: FW: AD1006 - Stream/Wetland Mitigation Project

Hi Milton-

I was just following up on the email I sent April 29th regarding the Carpenter Bottom Stream and Wetland Mitigation Site.

Let me know if you need any additional information from me.

Andrea

Andrea S. Eckardt | *Senior Environmental Planner*
704.332.7754 x101

From: Andrea Eckardt
Sent: Monday, April 29, 2019 11:11 AM
To: Cortes, Milton - NRCS, Raleigh, NC <Milton.Cortes@nc.usda.gov>
Subject: AD1006 - Stream/Wetland Mitigation Project

Milton-

I have attached the partially completed AD1006 Form for the Carpenter Bottom Mitigation Site, located in Gaston County.

I have also included a USGS Topographic Map, a Concept Map, and a Soils Map associated with the proposed stream and wetland mitigation project.

The soils map includes a breakdown of acreage of each soil type with the project's conservation easement area.

Please let me know if you need anything else to complete Parts II and IV of the AD 1006 Farmland Conversion Form.

Thank you for your time,

Andrea

Andrea S. Eckardt | *Senior Environmental Planner*
704.332.7754 x101

[Wildlands Engineering, Inc.](#)

1430 S. Mint St, Suite 104
Charlotte, NC 28203

This electronic message contains information generated by the USDA solely for the intended recipients. Any unauthorized interception of this message or the use or disclosure of the information it contains may violate the law and subject the violator to civil or criminal penalties. If you believe you have received this message in error, please notify the sender and delete the email immediately.

FARMLAND CONVERSION IMPACT RATING

PART I <i>(To be completed by Federal Agency)</i>	Date Of Land Evaluation Request
Name Of Project	Federal Agency Involved
Proposed Land Use	County And State

PART II <i>(To be completed by NRCS)</i>		Date Request Received By NRCS	
Does the site contain prime, unique, statewide or local important farmland? <i>(If no, the FPPA does not apply -- do not complete additional parts of this form).</i>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount Of Farmland As Defined in FPPA Acres: %	
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By NRCS	

PART III <i>(To be completed by Federal Agency)</i>	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly				
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site				

PART IV <i>(To be completed by NRCS)</i> Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				

PART V <i>(To be completed by NRCS)</i> Land Evaluation Criterion Relative Value Of Farmland To Be Converted <i>(Scale of 0 to 100 Points)</i>				

PART VI <i>(To be completed by Federal Agency)</i> Site Assessment Criteria <i>(These criteria are explained in 7 CFR 658.5(b))</i>	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				

PART VII <i>(To be completed by Federal Agency)</i>					
Relative Value Of Farmland <i>(From Part V)</i>	100				
Total Site Assessment <i>(From Part VI above or a local site assessment)</i>	160				
TOTAL POINTS <i>(Total of above 2 lines)</i>	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes <input type="checkbox"/> No <input type="checkbox"/>
----------------	-------------------	---

Reason For Selection:



April 29, 2019

Shannon Deaton
North Carolina Wildlife Resource Commission
Division of Inland Fisheries
1721 Mail Service Center
Raleigh, NC 27699

Subject: Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Dear Ms. Deaton,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to fish and wildlife issues associated with the proposed Carpenter Bottom Mitigation Site, a stream and wetland mitigation site located in Gaston County, NC. A USGS Topographic Map and a Project Conceptual Map showing the approximate project area are enclosed. The topographic figure was prepared from the Lincolnton West, 7.5-Minute USGS Topographic Quadrangle and the site is located at latitude 35.4089600, longitude -81.2604790.

The Carpenter Bottom Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel and riparian wetland impacts. This project will include wetland restoration along with stream restoration and preservation of Carpenter's Branch and its unnamed tributaries, which all flow to Beaverdam Creek. Several sections of channel have been identified as significantly degraded. The site has been disturbed due to agricultural use, including cattle that have full access to the stream.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning this project.

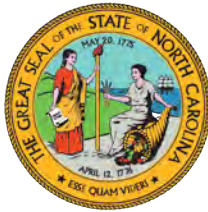
Sincerely,

A handwritten signature in black ink that reads "Andrea S. Eckardt".

Andrea Eckardt
Senior Environmental Scientist

Attachment:

Figure 1 USGS Topographic Map
Figure 2 Project Conceptual Map



NORTH CAROLINA
Environmental Quality

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

TIM BAUMGARTNER
Director

Stephen Yerka & Russell Townsend
Historic Preservation Specialists
Tribal Historic Preservation Office
Eastern Band of the Cherokee Indians
[\(828\) 359-6852](tel:(828)359-6852)
syerka@nc-choerokee.com rustown@nc-choerokee.com

5/1/2019

Dear Mr. Yerka and Mr. Townsend,

The North Carolina Department of Environmental Quality (NCDEQ) – Division of Mitigation Services (DMS) requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with the proposed Carpenter Bottom mitigation site. The Federal Highway Administration (FHWA) is the lead federal agency for this proposed mitigation project.

The U.S. Army Corps of Engineers (USACE) issued a public notice (SAW-2018-02062) on 1/11/19 for this stream and wetland mitigation project. The USACE public notice closed on 2/27/19 and no response was received from the Eastern Band of the Cherokee Indians. Responses from the Cherokee Nation and NC SHPO are included for your review.

A USGS Topographic Map and a proposed project conceptual map showing the project area are enclosed. The topographic figure was prepared from the Lincolnton West, 7.5-Minute USGS Topographic Quadrangle. The project location (Latitude and Longitude) is as follows: 35°24'31"N, 81°15'35"W.

The Carpenter Bottom Mitigation Site (Site) is located in Gaston County, NC approximately 4.1 miles south of the City of Lincolnton and just south of the Gaston County/Lincoln County border.

The site is being affected by heavy sedimentation, channelization, and nutrient loading. Poorly managed agricultural activities and alterations to stream channels, including loss of riparian vegetation are cited as contributing to sedimentation and habitat degradation via bank erosion. The site is currently accessible to cattle, but they will be excluded with the start of the project. It is planned to place approximately 15.2 acres under a permanent conservation easement. The project will yield 3,229 SMUs from restoration and preservation, and 8.2



WMUs, which consist of 6.8 acres of wetland re-establishment, and 2.1 acres of wetland rehabilitation.

We ask that you review this site based on the attached information to determine the presence of any known historic properties. We respectfully request a response within 30 days of receipt of this email in an effort to implement this necessary stream restoration/mitigation project. Please feel free to contact us with any questions that you may have concerning this project.

Respectfully,

Paul Wiesner

Paul Wiesner
Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-273-1673 Mobile
paul.wiesner@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Drive
Suite 102
Asheville, N.C. 28801

Attachments:

Figure 1: USGS Topographic Map
Figure 2: Proposed Project Conceptual Map
Cherokee Nation Response to USACE Public Notice (SAW-2018-02062)
NC SHPO Response to USACE Public Notice (SAW-2018-02062)

cc: Donnie Brew, FHWA





NORTH CAROLINA
Environmental Quality

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

TIM BAUMGARTNER
Director

5/1/2019

Erin Thompson & Sheila Bird
Tribal Historic Preservation Office
United Keetoowah Band of Cherokee
18263 W. Keetoowah Circle
Tahlequah, OK 74464
918-871-2838 / 918-871-2852
ethompson@ukb-nsn.gov / sbird@ukb-nsn.gov

Dear Ms. Thompson and Ms. Bird,

The North Carolina Department of Environmental Quality (NCDEQ) – Division of Mitigation Services (DMS) requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with the proposed Carpenter Bottom mitigation site. The Federal Highway Administration (FHWA) is the lead federal agency for this proposed mitigation project.

The U.S. Army Corps of Engineers (USACE) issued a public notice (SAW-2018-02062) on 1/11/19 for this stream and wetland mitigation project. The USACE public notice closed on 2/27/19 and no response was received from the United Keetoowah Band of Cherokee. Responses from the Cherokee Nation and NC SHPO are included for your review.

A USGS Topographic Map and a proposed project conceptual map showing the project area are enclosed. The topographic figure was prepared from the Lincolnton West, 7.5-Minute USGS Topographic Quadrangle. The project location (Latitude and Longitude) is as follows: 35°24'31"N, 81°15'35"W.

The Carpenter Bottom Mitigation Site (Site) is located in Gaston County, NC approximately 4.1 miles south of the City of Lincolnton and just south of the Gaston County/Lincoln County border.

The site is being affected by heavy sedimentation, channelization, and nutrient loading. Poorly managed agricultural activities and alterations to stream channels, including loss of riparian vegetation are cited as contributing to sedimentation and habitat degradation via bank erosion. The site is currently accessible to cattle, but they will be excluded with the start of the project. It is planned to place approximately 15.2 acres under a permanent conservation easement. The project will yield 3,229 SMUs from restoration and preservation, and 8.2 WMUs, which consist of 6.8 acres of wetland re-establishment, and 2.1 acres of wetland rehabilitation.



We ask that you review this site based on the attached information to determine the presence of any known historic properties. We respectfully request a response within 30 days of receipt of this letter in an effort to implement this necessary stream restoration/ mitigation project. Please feel free to contact us with any questions that you may have concerning this project.

Respectfully,

Paul Wiesner

Paul Wiesner

Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-273-1673 Mobile
paul.wiesner@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Drive
Suite 102
Asheville, N.C. 28801

Attachments:

Figure 1: USGS Topographic Map

Figure 2: Proposed Project Conceptual Map

Cherokee Nation Response to USACE Public Notice (SAW-2018-02062)

NC SHPO Response to USACE Public Notice (SAW-2018-02062)

cc: Donnie Brew, FHWA





April 29, 2019

Claire Ellwanger
US Fish and Wildlife Service
Asheville Field Office
160 Zillicoa Street
Asheville, NC 28801

Subject: Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Dear Ms. Ellwanger,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to endangered species, migratory birds, or other trust resources associated with the proposed Carpenter Bottom Mitigation Site, a stream and wetland mitigation site located in Gaston County, NC. A USGS Topographic Map and a Project Conceptual Map showing the approximate project area are enclosed. The topographic figure was prepared from the Lincolnton West, 7.5-Minute USGS Topographic Quadrangle and the site is located at latitude 35.4089600, longitude -81.2604790.

The Carpenter Bottom Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel and riparian wetland impacts. This project will include wetland restoration along with stream restoration and preservation of Carpenter's Branch and its unnamed tributaries, which all flow to Beaverdam Creek. Several sections of channel have been identified as significantly degraded. The site has been disturbed due to agricultural use, including cattle that have full access to the stream.

According to your website (<https://www.fws.gov/raleigh/species/cntylist/gaston.html>) the threatened or endangered species for Gaston County are the Northern long-eared bat (*Myotis septentrionalis*), the bog turtle (*Glyptemys muhlenbergii*), the Dwarf-flowered heartleaf (*Hexastylis naniflora*), and the Schweinitz's Sunflower (*Helianthus schweinitzii*). If we have not heard from you in 30 days, we will assume that you do not have any comments regarding associated laws and that you do not have any information relevant to this project at the current time.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning this project.

Sincerely,

A handwritten signature in black ink that reads "Andrea S. Eckardt".

Andrea Eckardt
Senior Environmental Scientist

Attachment:

Figure 1 USGS Topographic Map

Figure 2 Project Conceptual Map

Andrea Eckardt

From: Brew, Donnie (FHWA) <Donnie.Brew@dot.gov>
Sent: Wednesday, May 29, 2019 9:02 AM
To: Ellwanger, Claire
Cc: Wiesner, Paul; Andrea Eckardt; matthew.reid@ncdenr.gov
Subject: NLEB 4(d) rule consultation - Carpenter Bottom mitigation site, Gaston County
Attachments: Carpenter Bottom site- NLEB Consultation Form_5-29-19.docx; Figure 1 Carpenter Bottom site USGS map.pdf; Figure 2 Carpenter Bottom site map.pdf

Good morning Claire,

The purpose of this message is to notify your office that FHWA will use the streamlined consultation framework for the Carpenter Bottom Mitigation Site in Gaston County, NC.

Attached is a completed NLEB 4(d) Rule Streamlined Consultation form along with site maps/figures.

Thank you,

Donnie

Notifying the Service Under the Framework

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies (or designated non-federal representatives) should use the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation form to notify the Service of their project and meet the requirements of the framework.

[Northern Long-Eared Bat 4\(d\) Rule Streamlined Consultation Form](#) (Word document)

Information requested in the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form serves to

- (1) notify the field office that an action agency will use the streamlined framework;
- (2) describe the project with sufficient detail to support the required determination; and
- (3) enable the USFWS to track effects and determine if reinitiation of consultation for the 4(d) rule is required. This form requests the minimum amount of information required for the Service to be able to track this information.

Providing information in the Streamlined Consultation Form does not address section 7(a)(2) compliance for any other listed species.

Donnie Brew
Preconstruction & Environment Engineer
Federal Highway Administration

310 New Bern Ave, Suite 410
Raleigh, NC 27601
donnie.brew@dot.gov
919-747-7017

Please consider the environment before printing this email.

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies should use this form for the optional streamlined consultation framework for the northern long-eared bat (NLEB). This framework allows federal agencies to rely upon the U.S. Fish and Wildlife Service’s (USFWS) January 5, 2016, intra-Service Programmatic Biological Opinion (BO) on the final 4(d) rule for the NLEB for section 7(a)(2) compliance by: (1) notifying the USFWS that an action agency will use the streamlined framework; (2) describing the project with sufficient detail to support the required determination; and (3) enabling the USFWS to track effects and determine if reinitiation of consultation is required per 50 CFR 402.16.

This form is not necessary if an agency determines that a proposed action will have no effect to the NLEB or if the USFWS has concurred in writing with an agency's determination that a proposed action may affect, but is not likely to adversely affect the NLEB (i.e., the standard informal consultation process). Actions that may cause prohibited incidental take require separate formal consultation. Providing this information does not address section 7(a)(2) compliance for any other listed species.

Information to Determine 4(d) Rule Compliance:	YES	NO
1. Does the project occur wholly outside of the WNS Zone ¹ ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Have you contacted the appropriate agency ² to determine if your project is near known hibernacula or maternity roost trees?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Could the project alter the entrance or interior environment of a known hibernaculum?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the BO.

Agency and Applicant³ (Name, Email, Phone No.): FHWA, Donnie Brew, Donnie.brew@dot.gov, 919-747-7017

Project Name: Carpenter Bottom Mitigation Site

Project Location (include coordinates if known): 35.4089600"N 80.2604790"W

Basic Project Description (provide narrative below or attach additional information):

The Carpenter Bottom Mitigation Site is a stream and wetland mitigation project located in Gaston County, approximately 4.1 miles south of the City of Lincolnton and just south of the Gaston County/Lincoln County border. The project will include the restoration and enhancement of Carpenter’s Branch and several unnamed tributaries. Proposed mitigation areas are currently active cattle and hay pasture with limited forested canopy. The project will provide 3,229 stream mitigation units and 8.2 riparian wetland mitigation units to the Division of Mitigation Services in the Catawba River Basin (03050103 expanded service area). Construction of the stream restoration project will include some tree removal (>3”DBH) – approximately 2.5 acres.

¹ <http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf>

² See <http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html>

³ If applicable - only needed for federal actions with applicants (e.g., for a permit, etc.) who are party to the consultation.

General Project Information	YES	NO
Does the project occur within 0.25 miles of a known hibernaculum? (47 miles)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the project occur within 150 feet of a known maternity roost tree?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the project include forest conversion ⁴ ? (if yes, report acreage below)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Estimated total acres of forest conversion	2.5 ac	
If known, estimated acres ⁵ of forest conversion from April 1 to October 31		
If known, estimated acres of forest conversion from June 1 to July 31 ⁶		
Does the project include timber harvest? (if yes, report acreage below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Estimated wind capacity (MW)		

Agency Determination:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.



Signature: _____

Date Submitted: 5-29-19

⁴ Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the BO).

⁵ If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.

⁶ If the activity includes tree clearing in June and July, also include those acreage in April to October.

Andrea Eckardt

From: Andrea Eckardt
Sent: Friday, May 24, 2019 4:20 PM
To: Cortes, Milton - NRCS, Raleigh, NC
Subject: RE: AD1006 - Stream/Wetland Mitigation Project
Attachments: Carpenter AD 1006 Final.pdf

Milton-

Thank you so much. Attached is the fully completed AD1006 Form for Carpenter Bottom Mitigation Site for your files.

Andrea

Andrea S. Eckardt | *Senior Environmental Planner*
704.332.7754 x101

From: Cortes, Milton - NRCS, Raleigh, NC <milton.cortes@usda.gov>
Sent: Tuesday, May 21, 2019 5:16 PM
To: Andrea Eckardt <aeckardt@wildlandseng.com>
Subject: RE: AD1006 - Stream/Wetland Mitigation Project

Andrea:

Please find attached the Farmland Conversion Impact Rating evaluation on Carpenter Bottom Mitigation Site, Gaston Co. NC

If I can be of further assistance please let us know.

Thanks

Milton Cortes

State Soil Scientist

USDA NRCS

4407 Bland Rd., Suite 117

Raleigh, NC 27609

Desk: 919-873-2171

From: Andrea Eckardt <aeckardt@wildlandseng.com>
Sent: Thursday, May 9, 2019 3:17 PM
To: Cortes, Milton - NRCS, Raleigh, NC <milton.cortes@usda.gov>
Subject: FW: AD1006 - Stream/Wetland Mitigation Project

Hi Milton-

I was just following up on the email I sent April 29th regarding the Carpenter Bottom Stream and Wetland Mitigation Site.

Let me know if you need any additional information from me.

Andrea

Andrea S. Eckardt | *Senior Environmental Planner*
704.332.7754 x101

From: Andrea Eckardt
Sent: Monday, April 29, 2019 11:11 AM
To: Cortes, Milton - NRCS, Raleigh, NC <Milton.Cortes@nc.usda.gov>
Subject: AD1006 - Stream/Wetland Mitigation Project

Milton-

I have attached the partially completed AD1006 Form for the Carpenter Bottom Mitigation Site, located in Gaston County.

I have also included a USGS Topographic Map, a Concept Map, and a Soils Map associated with the proposed stream and wetland mitigation project.

The soils map includes a breakdown of acreage of each soil type with the project's conservation easement area.

Please let me know if you need anything else to complete Parts II and IV of the AD 1006 Farmland Conversion Form.

Thank you for your time,

Andrea

Andrea S. Eckardt | *Senior Environmental Planner*
704.332.7754 x101

[Wildlands Engineering, Inc.](#)

1430 S. Mint St, Suite 104
Charlotte, NC 28203

This electronic message contains information generated by the USDA solely for the intended recipients. Any unauthorized interception of this message or the use or disclosure of the information it contains may violate the law and subject the violator to civil or criminal penalties. If you believe you have received this message in error, please notify the sender and delete the email immediately.

FARMLAND CONVERSION IMPACT RATING

PART I <i>(To be completed by Federal Agency)</i>	Date Of Land Evaluation Request
Name Of Project	Federal Agency Involved
Proposed Land Use	County And State

PART II <i>(To be completed by NRCS)</i>		Date Request Received By NRCS	
Does the site contain prime, unique, statewide or local important farmland? <i>(If no, the FPPA does not apply -- do not complete additional parts of this form).</i>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount Of Farmland As Defined in FPPA Acres: %	
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By NRCS	

PART III <i>(To be completed by Federal Agency)</i>	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly				
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site				

PART IV <i>(To be completed by NRCS)</i> Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				

PART V <i>(To be completed by NRCS)</i> Land Evaluation Criterion Relative Value Of Farmland To Be Converted <i>(Scale of 0 to 100 Points)</i>				
--	--	--	--	--

PART VI <i>(To be completed by Federal Agency)</i> Site Assessment Criteria <i>(These criteria are explained in 7 CFR 658.5(b))</i>	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				

PART VII <i>(To be completed by Federal Agency)</i>					
Relative Value Of Farmland <i>(From Part V)</i>	100				
Total Site Assessment <i>(From Part VI above or a local site assessment)</i>	160				
TOTAL POINTS <i>(Total of above 2 lines)</i>	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes <input type="checkbox"/> No <input type="checkbox"/>
----------------	-------------------	---

Reason For Selection:



April 29, 2019

Shannon Deaton
North Carolina Wildlife Resource Commission
Division of Inland Fisheries
1721 Mail Service Center
Raleigh, NC 27699

Subject: Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Dear Ms. Deaton,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to fish and wildlife issues associated with the proposed Carpenter Bottom Mitigation Site, a stream and wetland mitigation site located in Gaston County, NC. A USGS Topographic Map and a Project Conceptual Map showing the approximate project area are enclosed. The topographic figure was prepared from the Lincolnton West, 7.5-Minute USGS Topographic Quadrangle and the site is located at latitude 35.4089600, longitude -81.2604790.

The Carpenter Bottom Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel and riparian wetland impacts. This project will include wetland restoration along with stream restoration and preservation of Carpenter's Branch and its unnamed tributaries, which all flow to Beaverdam Creek. Several sections of channel have been identified as significantly degraded. The site has been disturbed due to agricultural use, including cattle that have full access to the stream.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning this project.

Sincerely,

A handwritten signature in black ink that reads "Andrea S. Eckardt".

Andrea Eckardt
Senior Environmental Scientist

Attachment:

Figure 1 USGS Topographic Map
Figure 2 Project Conceptual Map

APPENDIX 6
Data, Analysis, and Supplementary Design Information

Existing Conditions Geomorphic Parameters						
Parameter	Notation	Units	Carpenter's Branch Reach 1	UT1	UT2	UT3
stream type			G4	G4/5	G4/5	G4/5
drainage area	DA	sq mi	0.28	0.03	0.06	0.03
bankfull cross-sectional area	A_{bkf}	SF	7.0	1.8	3.4	2.8
avg velocity during bankfull event	v_{bkf}	fps	2.0	3.8	3.5	2.2
width at bankfull	w_{bkf}	feet	10.2	3.1	4.2	9.5
maximum depth at bankfull	d_{max}	feet	1.2	0.8	1.2	0.7
mean depth at bankfull	d_{bkf}	feet	0.7	0.6	0.8	0.3
bankfull width to depth ratio	w_{bkf}/d_{bkf}		14.9	5.2	5.2	31.9
low bank height		feet	4.1	4.9	1.6	1.0
bank height ratio	BHR		3.4	6.1	1.3	1.3
floodprone area width	w_{fpa}	feet	14.2	4.2	N/A	N/A
entrenchment ratio	ER		1.4	1.4	N/A	N/A
max pool depth at bankfull	d_{pool}	feet	1.9	N/A	N/A	N/A
pool depth ratio	d_{pool}/d_{bkf}		2.7	N/A	N/A	N/A
pool width at bankfull	w_{pool}	feet	6.4	N/A	N/A	N/A
pool width ratio	w_{pool}/w_{bkf}		0.6	N/A	N/A	N/A
Bkf pool cross-sectional area	A_{pool}	SF	7.6	N/A	N/A	N/A
pool area ratio	A_{pool}/A_{bkf}		1.1	N/A	N/A	N/A
pool-pool spacing	p-p	feet	23.7	N/A	N/A	N/A
pool-pool spacing ratio	$p-p/w_{bkf}$		2.3	N/A	N/A	N/A
valley slope	S_{valley}	feet/foot	0.0140	0.0294	0.0118	0.0235
channel slope	$S_{channel}$	feet/foot	0.0130	0.0258	0.0116	0.0228
sinuosity	K		1.13	1.14	1.02	1.03
belt width	w_{bit}	feet	N/A	N/A	N/A	N/A
meander width ratio	w_{bit}/w_{bkf}		N/A	N/A	N/A	N/A
meander length	L_m	feet	N/A	N/A	N/A	N/A
meander length ratio	L_m/w_{bkf}		N/A	N/A	N/A	N/A
linear wavelength	LW		N/A	N/A	N/A	N/A
linear wavelength ratio	LW/w_{bkf}		N/A	N/A	N/A	N/A
radius of curvature	R_c	feet	N/A	N/A	N/A	N/A
radius of curvature ratio	R_c/w_{bkf}		N/A	N/A	N/A	N/A

N/A¹ - Pattern data not applicable

N/A² - Pool section not present in field

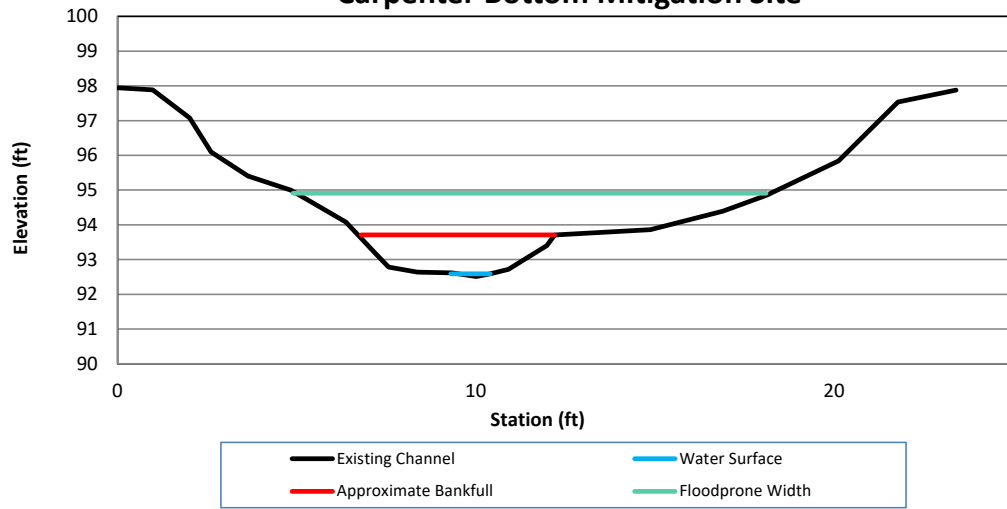
Proposed Geomorphic Parameters																	
	Notation	Units	Carpenter Reach 1			UT1			UT2			UT3			UT4		
			Typical Section Values	Min	Max	Typical Section Values	Min	Max	Typical Section Values	Min	Max	Typical Section Values	Min	Max	Typical Section Values	Min	Max
stream type			C4			C4			C4			C4b			C4		
drainage area	DA	sq mi	0.26			0.03			0.06			0.03			0.04		
design discharge	Q	cfs	14			6			8			8			6		
bankfull cross-sectional area	A _{bkf}	SF	4.4			1.9			2.9			2.9			1.9		
average velocity during bankfull event	V _{bkf}	fps	3.2			3.3			3.0			3.8			2.8		
Cross-Section																	
width at bankfull	w _{bkf}	feet	7.5			5.0			6.0			6.0			5.0		
maximum depth at bankfull	d _{max}	feet	0.7	0.7	0.9	0.5	0.5	0.6	0.7	0.6	0.8	0.7	0.6	0.8	0.5	0.5	0.6
mean depth at bankfull	d _{bkf}	feet	0.6			0.4			0.5			0.5			0.4		
bankfull width to depth ratio	w _{bkf} /d _{bkf}		12.5			12.5			12			12			12.5		
max depth ratio	d _{max} /d _{bkf}		1.2			1.25			1.4			1.4			1.25		
bank height ratio	BHR		1.0	1.0	1.1	1.0	1.0	1.1	1.0	1.0	1.1	1.0	1.0	1.1	1.0	1.0	1.1
floodprone area width	w _{fpa}	feet	26+	17	26	18+	11	18	21+	13	21	21+	13	21	18+	11	18
entrenchment ratio	ER		3.5+	2.2	3.5	3.5+	2.2	3.5	3.5+	2.2	3.5	3.5+	2.2	3.5	3.5+	2.2	3.5
Slope																	
valley slope	S _{valley}	feet/foot	0.0144			0.0220			0.0100			0.0270			0.0200		
channel slope	S _{chnl}	feet/foot	0.0120			0.0170			0.0080			0.0230			0.0100		
Profile																	
riffle slope	S _{riffle}	feet/foot	---	0.0144	0.0300	---	0.0204	0.0425	---	0.0096	0.0224	---	0.0276	0.0644	---	0.0120	0.0250
riffle slope ratio	S _{riffle} /S _{chnl}		---	1.2	2.5	---	1.2	2.5	---	1.2	2.8	---	1.2	2.8	---	1.2	2.5
pool slope	S _p	feet/foot	---	0.0000	0.0024	---	0.0000	0.0036	---	0.0000	0.0031	---	0.0000	0.0031	---	0.0000	0.0036
pool slope ratio	S _p /S _{chnl}		---	0.0	0.2	---	0.0	0.2	---	0.0	0.2	---	0.0	0.2	---	0.0	0.2
pool-to-pool spacing	L _{p-p}	feet	---	23	53	---	15	35	---	18	42	---	18	42	---	15	35
pool spacing ratio	L _{p-p} /w _{bkf}		---	3.0	7.0	---	3.0	7.0	---	3.0	7.0	---	3.0	7.0	---	3.0	7.0
pool cross-sectional area	A _{pool}	SF	---	5.3	11.1	---	2.3	4.7	---	3.4	7.1	---	3.4	7.1	---	2.3	4.7
pool area ratio	A _{pool} /A _{bkf}		---	1.2	2.5	---	1.2	2.5	---	1.2	2.5	---	1.2	2.5	---	1.2	2.5
maximum pool depth	d _{pool}	feet	---	0.9	2.1	---	0.6	1.3	---	0.7	1.7	---	0.7	1.7	---	0.6	1.3
pool depth ratio	d _{pool} /d _{bkf}		---	1.1	1.5	---	1.5	3.5	---	1.5	3.5	---	1.5	3.5	---	1.5	3.5
pool width at bankfull	w _{pool}	feet	10.2			6.8			8.1			8.1			6.8		
pool width ratio	w _{pool} /w _{bkf}		1.4			1.4			1.35			1.35			1.4		
Pattern																	
sinuosity	K		1.20			1.30			1.25			1.17			--- ¹		
belt width	w _{bit}	feet	---	26	60	---	10	40	---	12	48	---	12	48	--- ¹		
meander width ratio	w _{bit} /w _{bkf}		---	3.5	8	---	2	8	---	2	8	---	2	8	--- ¹		
linear wavelength (formerly meander length)	LW	feet	---	23	101	---	15	68	---	18	81	---	18	81	--- ¹		
linear wavelength ratio (formerly meander length ratio)	LW/w _{bkf}		---	3	13.5	---	3.0	13.5	---	3	13.5	---	3	13.5	--- ¹		
meander length	L _m	feet	---	49	105	---	33	70	---	39	84	---	39	84	--- ¹		
meander length ratio	L _m /w _{bkf}		---	6.5	14	---	6.5	14.0	---	6.5	14	---	6.5	14	--- ¹		
radius of curvature	R _c	feet	---	14	26	---	9.0	18.0	---	10.8	21	---	10.8	21	---	9.0	18.0
radius of curvature ratio	R _c /w _{bkf}		---	1.8	3.5	---	1.8	3.5	---	1.8	3.5	---	1.8	3.5	---	1.8	3.5

¹ Reach length less than 50'



BHR	4.2
Entrenchment Ratio	2.44
FP Width (feet)	13.2

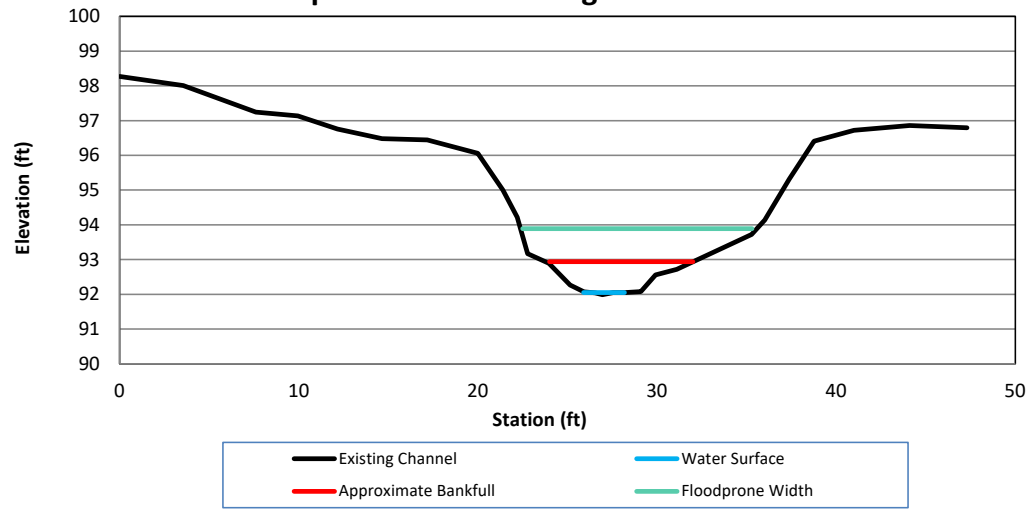
Carpenters Branch - XS1
Carpenter Bottom Mitigation Site





BHR	4.3
Entrenchment Ratio	1.60
FP Width (feet)	12.8

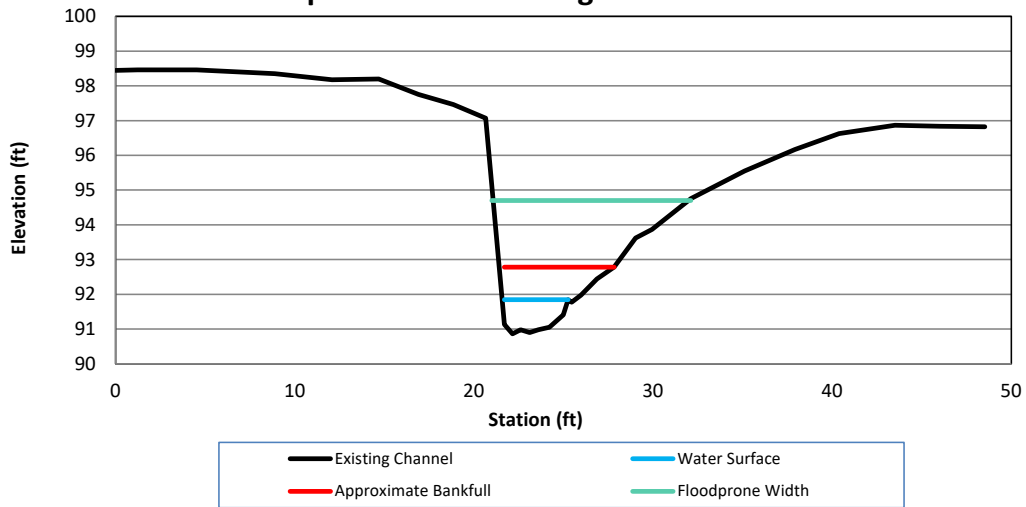
**Carpenters Branch - XS2
Carpenter Bottom Mitigation Site**





BHR	3.1
Entrenchment Ratio	1.81
FP Width (feet)	11.11

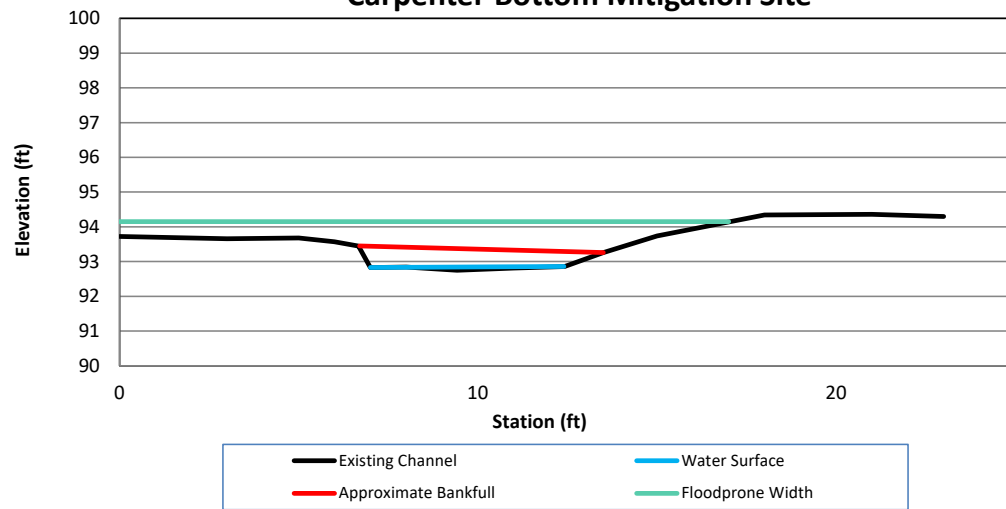
**Carpenters Branch - XS3
Carpenter Bottom Mitigation Site**





BHR	1.2
Entrenchment Ratio	2.50
FP Width (feet)	17

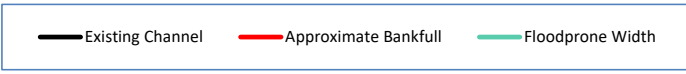
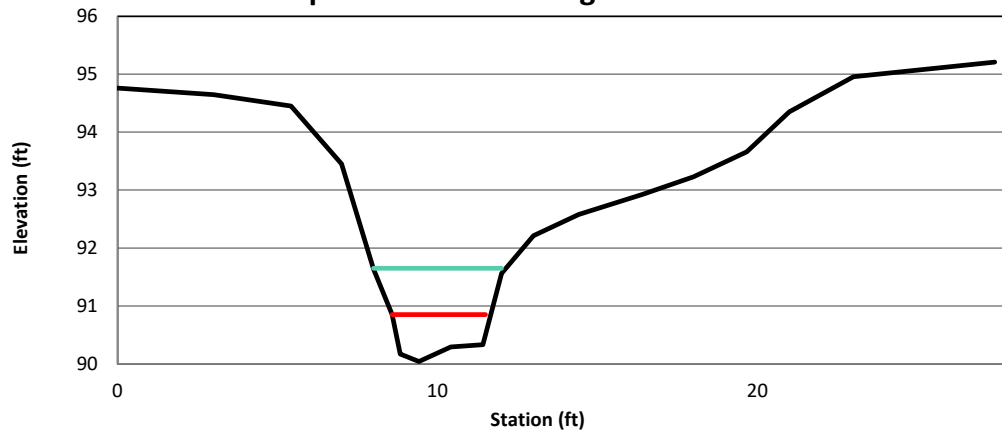
**Carpenters Branch - XS4 Reference
Carpenter Bottom Mitigation Site**





BHR	5.4
Entrenchment Ratio	1.37
FP Width (feet)	4

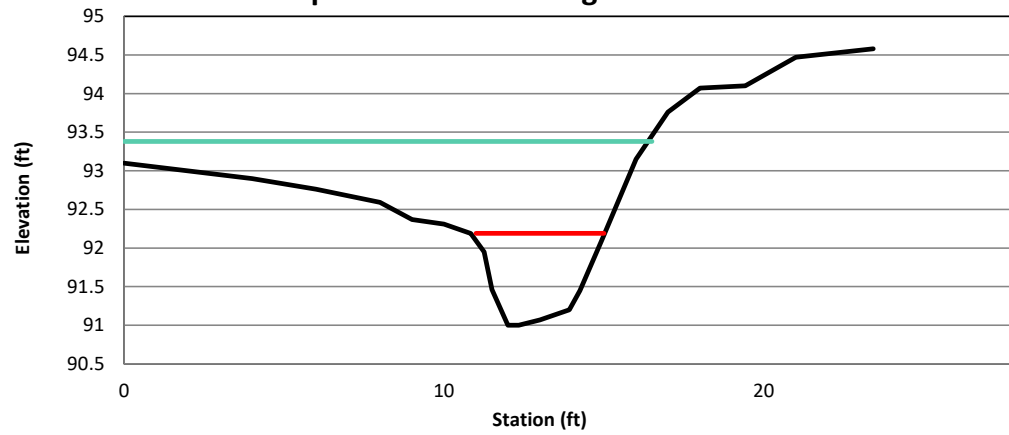
UT1 - XS 5
Carpenter Bottom Mitigation Site





BHR	1.8
Entrenchment Ratio	4.13
FP Width (feet)	16.5

UT2 - XS 6
Carpenter Bottom Mitigation Site

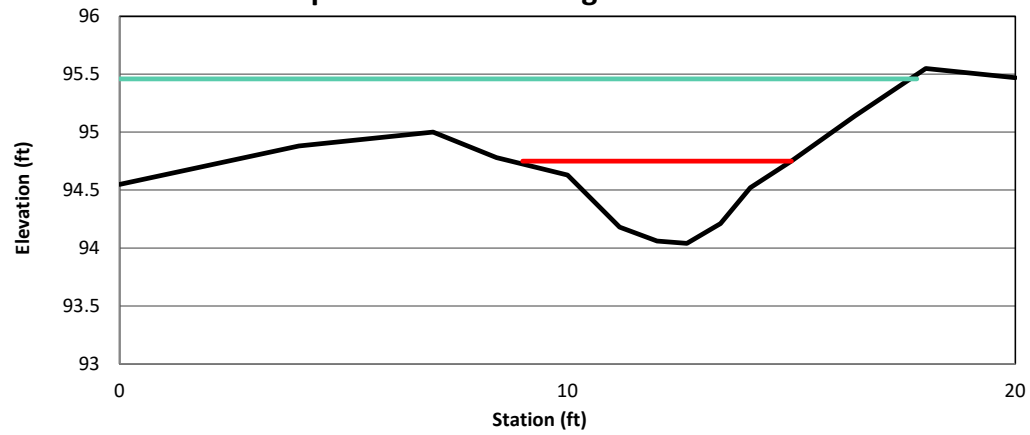





Existing Channel	Approximate Bankfull	Floodprone Width
------------------	----------------------	------------------



BHR	1.5
Entrenchment Ratio	2.97
FP Width (feet)	17.8

UT3 - XS 7
Carpenter Bottom Mitigation Site

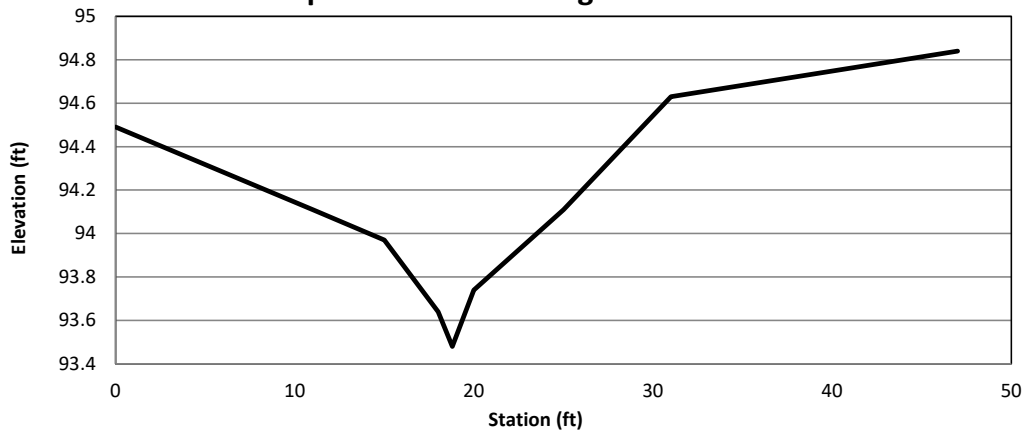


 Existing Channel	 Approximate Bankfull	 Floodprone Width
--	--	--



BHR	N/A
Entrenchment Ratio	N/A
FP Width (feet)	10

**XS Ditch 2
Carpenter Bottom Mitigation Site**

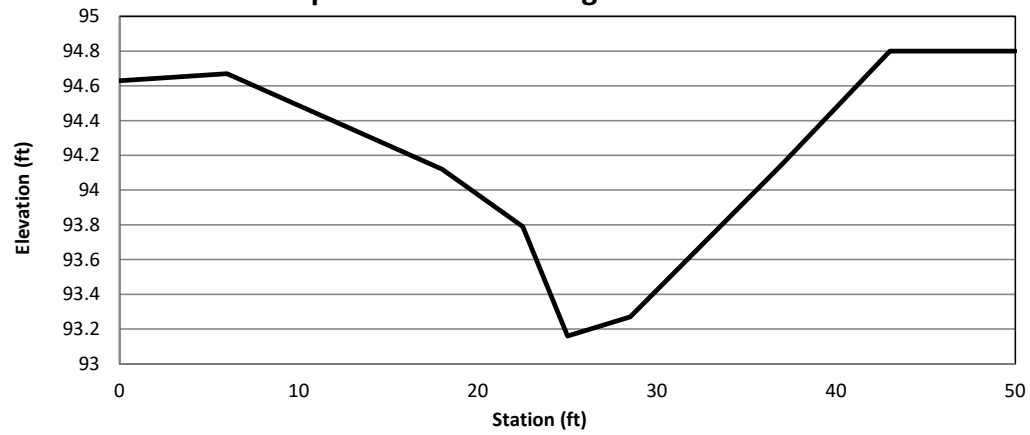


— Existing Ditch



BHR	N/A
Entrenchment Ratio	N/A
FP Width (feet)	19

**XS Ditch 2
Carpenter Bottom Mitigation Site**



— Existing Ditch

PEBBLE COUNT FIELD FORM

Project Name:	Carpenter Bottom	Data Collected By:	SD/HR
Location:		Data Collected On:	5/17/19
Job #:		Reach:	Existing Conditions Reach 1
Date:		Cross Section #:	

Particle Class	Diameter (mm)		Particle Count	
	min	max	Rifle	Pool
SILT/CLAY Silt/Clay	0.000	0.062		
SAND	Very fine	0.062	0.125	
	Fine	0.125	0.250	
	Medium	0.250	0.500	
	Coarse	0.5	1.0	
	Very Coarse	1.0	2.0	
GRAVEL	Very Fine	2.0	2.8	
	Very Fine	2.8	4.0	
	Fine	4.0	5.7	
	Fine	5.7	8.0	
	Medium	8.0	11.3	
	Medium	11.3	16.0	
	Coarse	16.0	22.6	
	Coarse	22.6	32	
	Very Coarse	32	45	
	Very Coarse	45	64	
COARSE SAND	Small	64	90	
	Small	90	128	
	Large	128	180	
	Large	180	256	
FINE SAND	Small	256	362	
	Small	362	512	
	Medium	512	1024	
	Large/Very Large	1024	2048	
BEDROCK Bedrock	2048	>2048		
Total:				

(R1) ||| ||| (P1) ||| |||
 (R2) ||| ||| (P2) ||| |||
 (R3) ||| ||| (P3) ||| |||
 (R4) ||| ||| (P4) ||| |||
 (R5) ||| ||| (P5) ||| |||

Largest Particle (mm): _____

PEBBLE COUNT FIELD FORM

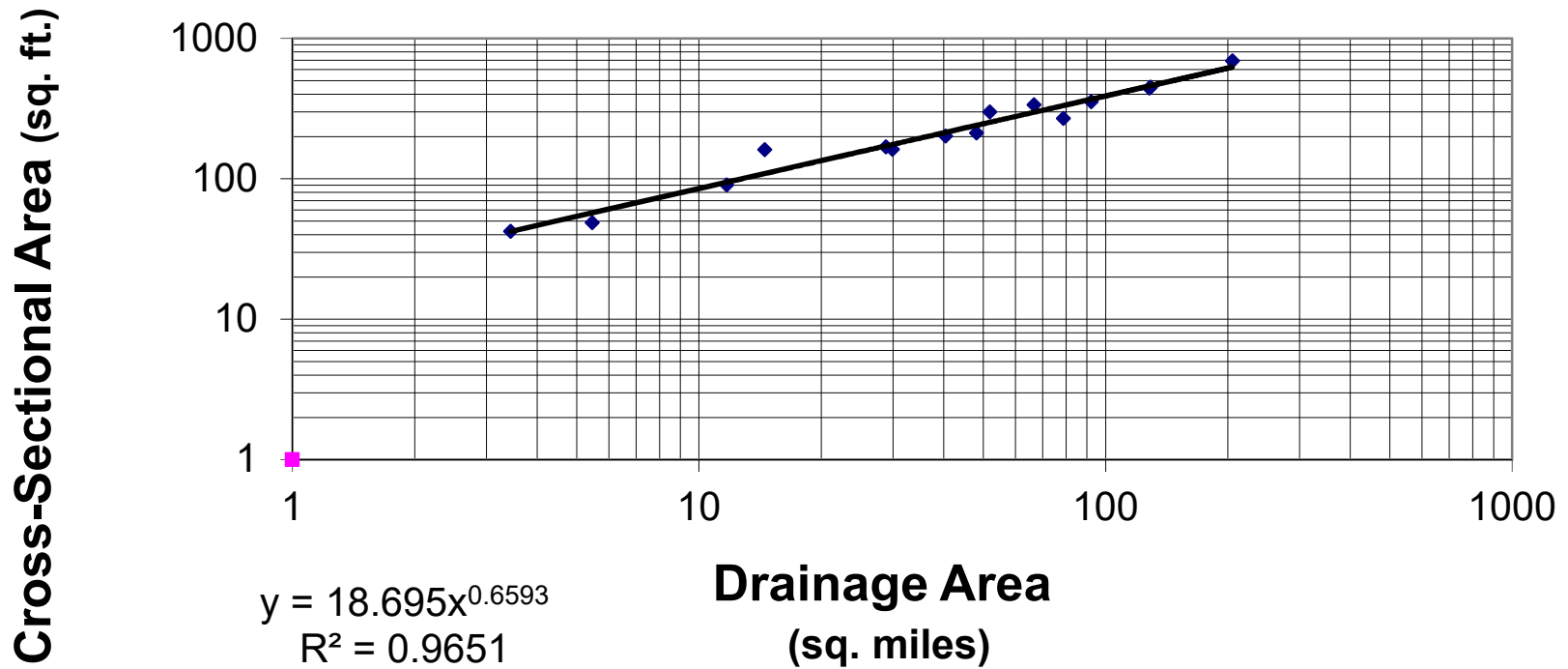
Project Name:	Carpenter Bottom	Data Collected By:	SD/HR
Location:		Data Collected On:	5/17/19
Job #:		Reach:	
Date:		Cross Section #:	EC XS1

Particle Class		Diameter (mm)		Particle Count
		min	max	Riffle
SILT/CLAY	Silt/Clay	0.000	0.062	
SAND	Very fine	0.062	0.125	
	Fine	0.125	0.250	
	Medium	0.250	0.500	
	Coarse	0.5	1.0	
	Very Coarse	1.0	2.0	
GRAVEL	Very Fine	2.0	2.8	
	Very Fine	2.8	4.0	
	Fine	4.0	5.7	
	Fine	5.7	8.0	
	Medium	8.0	11.3	
	Medium	11.3	16.0	
	Coarse	16.0	22.6	
	Coarse	22.6	32	
	Very Coarse	32	45	
	Very Coarse	45	64	
COBBLE	Small	64	90	
	Small	90	128	
	Large	128	180	
	Large	180	256	
BOULDER	Small	256	362	
	Small	362	512	
	Medium	512	1024	
	Large/Very Large	1024	2048	
BEDROCK	Bedrock	2048	>2048	
Total:				

1 ||| |||
 2 ||| |||
 3 ||| |||
 4 ||| |||
 5 ||| |||
 6 ||| |||
 7 ||| |||
 8 ||| |||
 9 ||| |||
 10 ||| |||

Largest Particle (mm): _____

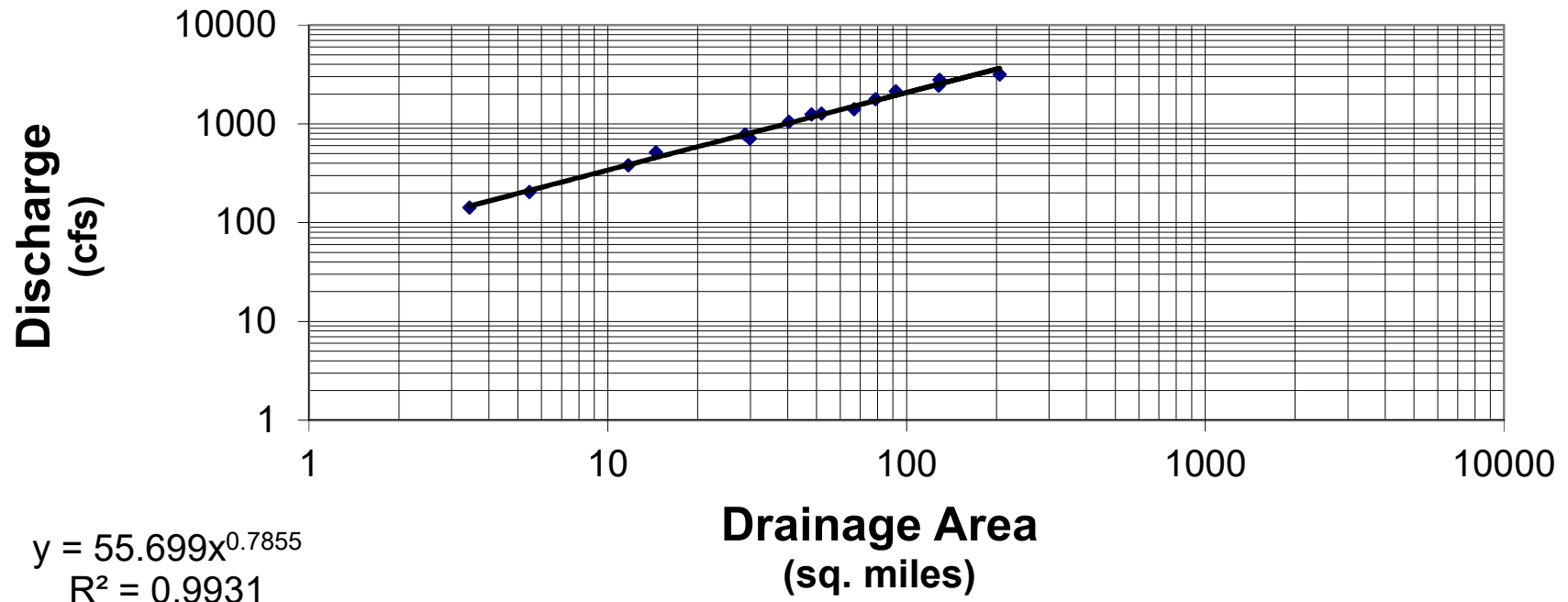
Rural NC Mtn & Piedmont Regional Curve (Stream Gage Sites)



		square miles	XS area - Alan Walker	XS area - Regional Curve
Carpenter Branch	Reach 1	0.27	7.89	8.13
Carpenter Branch	Reach 2	0.28	8.08	8.32
UT1		0.03	1.85	1.93
UT2		0.05	2.59	2.70
UT3		0.08	3.54	3.67
UT4		0.04	2.24	2.33

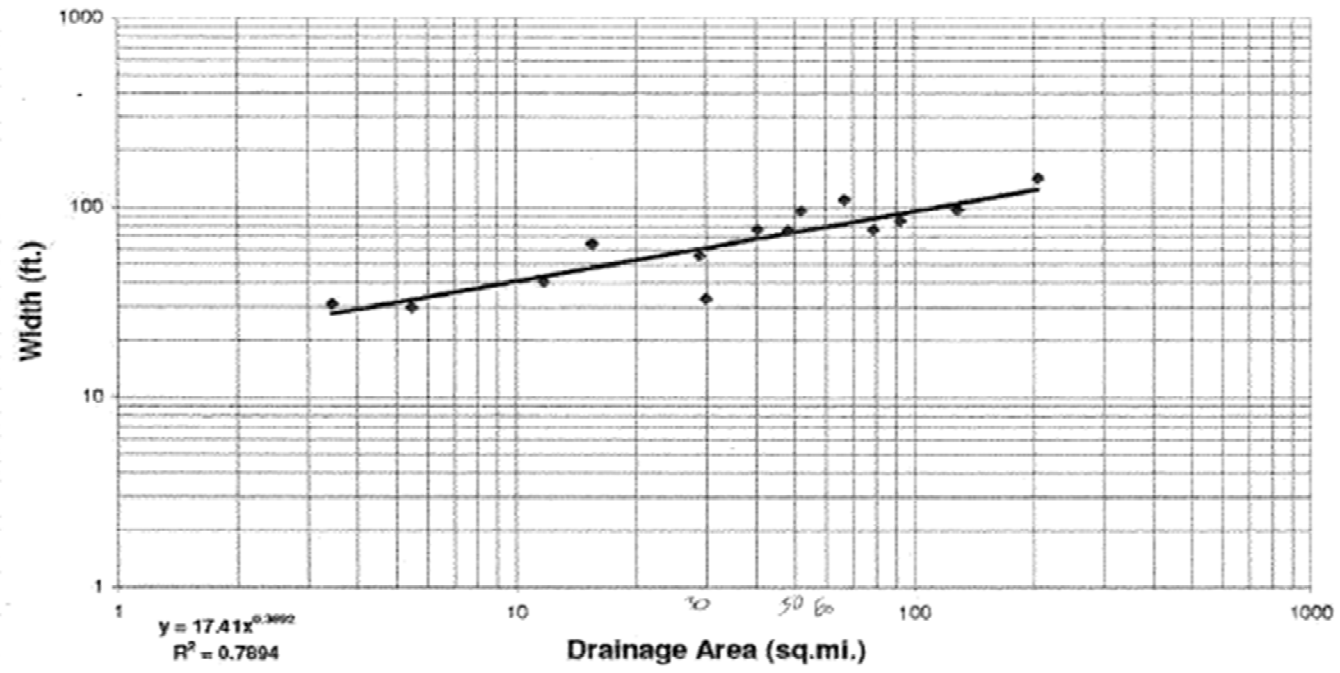
Rural NC Mtn & Piedmont Regional Curve

(Stream Gage Sites)

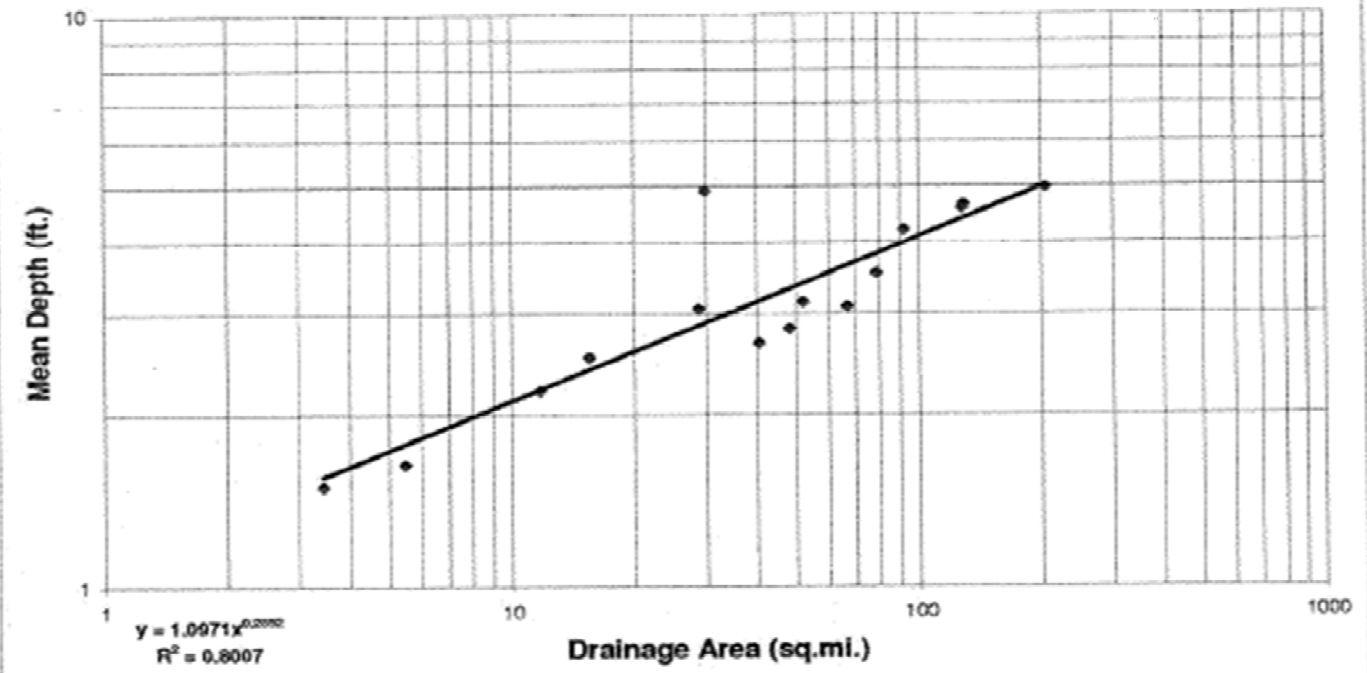


square miles			Discharge (cfs)	Discharge (cfs)
			Alan Walker	Regional Curve
Carpenter Branch	Reach 1	0.27	19.92	19.90
Carpenter Branch	Reach 2	0.28	20.49	20.48
UT1		0.03	3.55	3.58
UT2		0.05	5.30	5.33
UT3		0.08	7.66	7.70
UT4		0.04	4.44	4.48

NC Rural Mountain and Piedmont Regional Curve
(Stream Gage Sites)

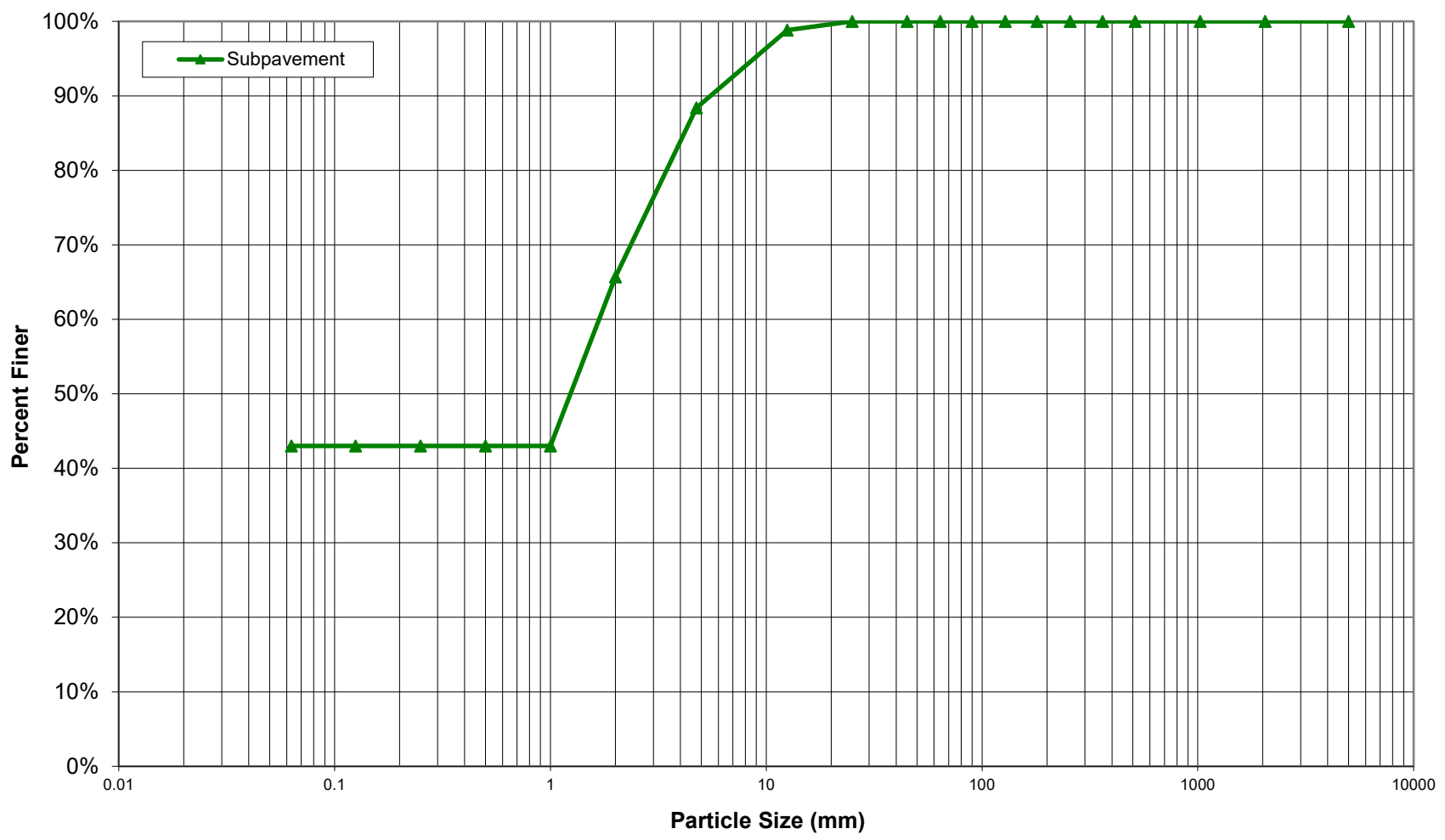


NC Rural Mountain and Piedmont Regional Curve
(Stream Gage Sites)

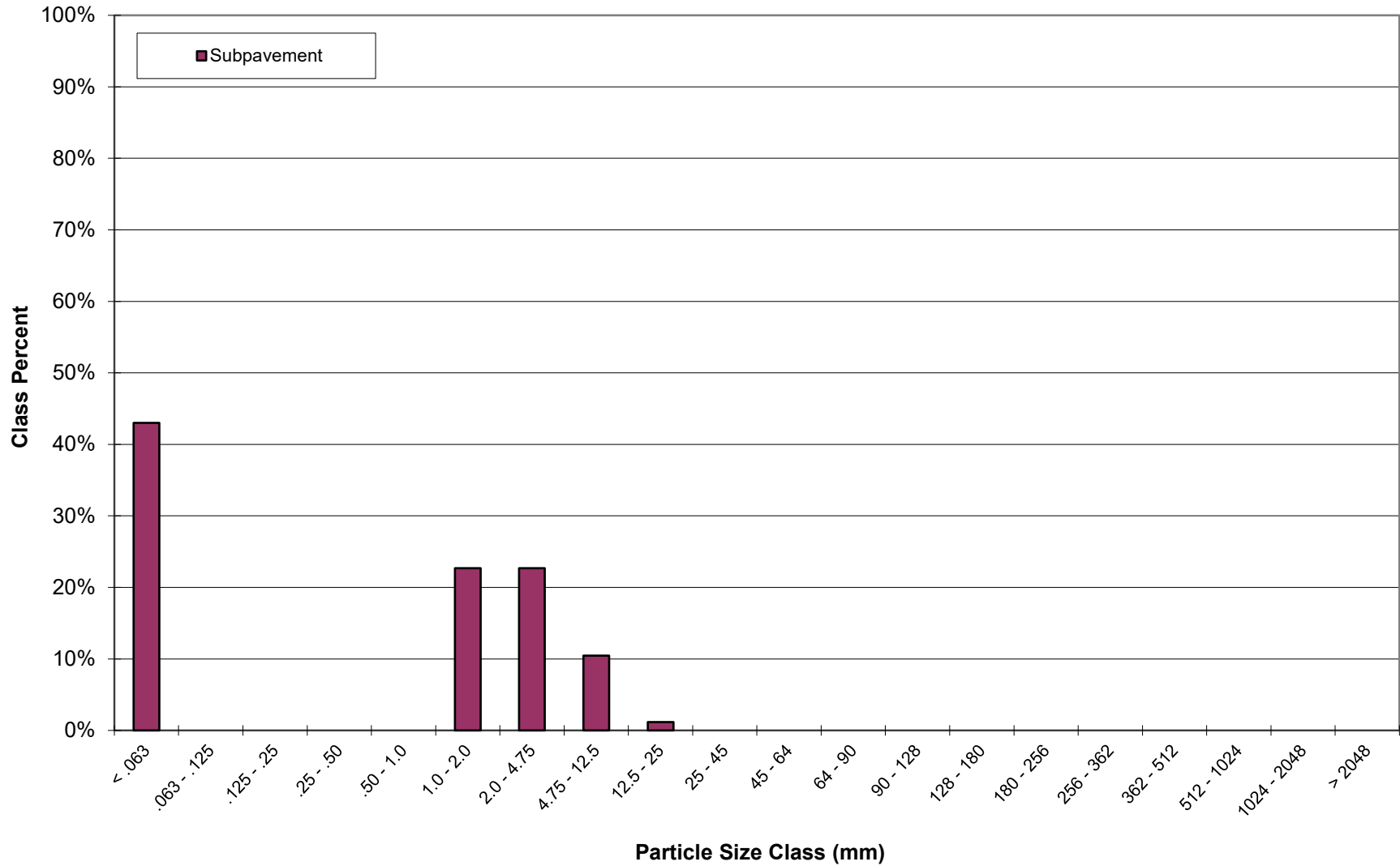


		square miles	BKF Width	Mean Depth
Carpenter Branch	Reach 1	0.27	10.74	0.76
Carpenter Branch	Reach 2	0.28	10.88	0.76
UT1		0.03	4.77	0.40
UT2		0.05	5.76	0.47
UT3		0.08	6.85	0.53
UT4		0.04	5.30	0.44

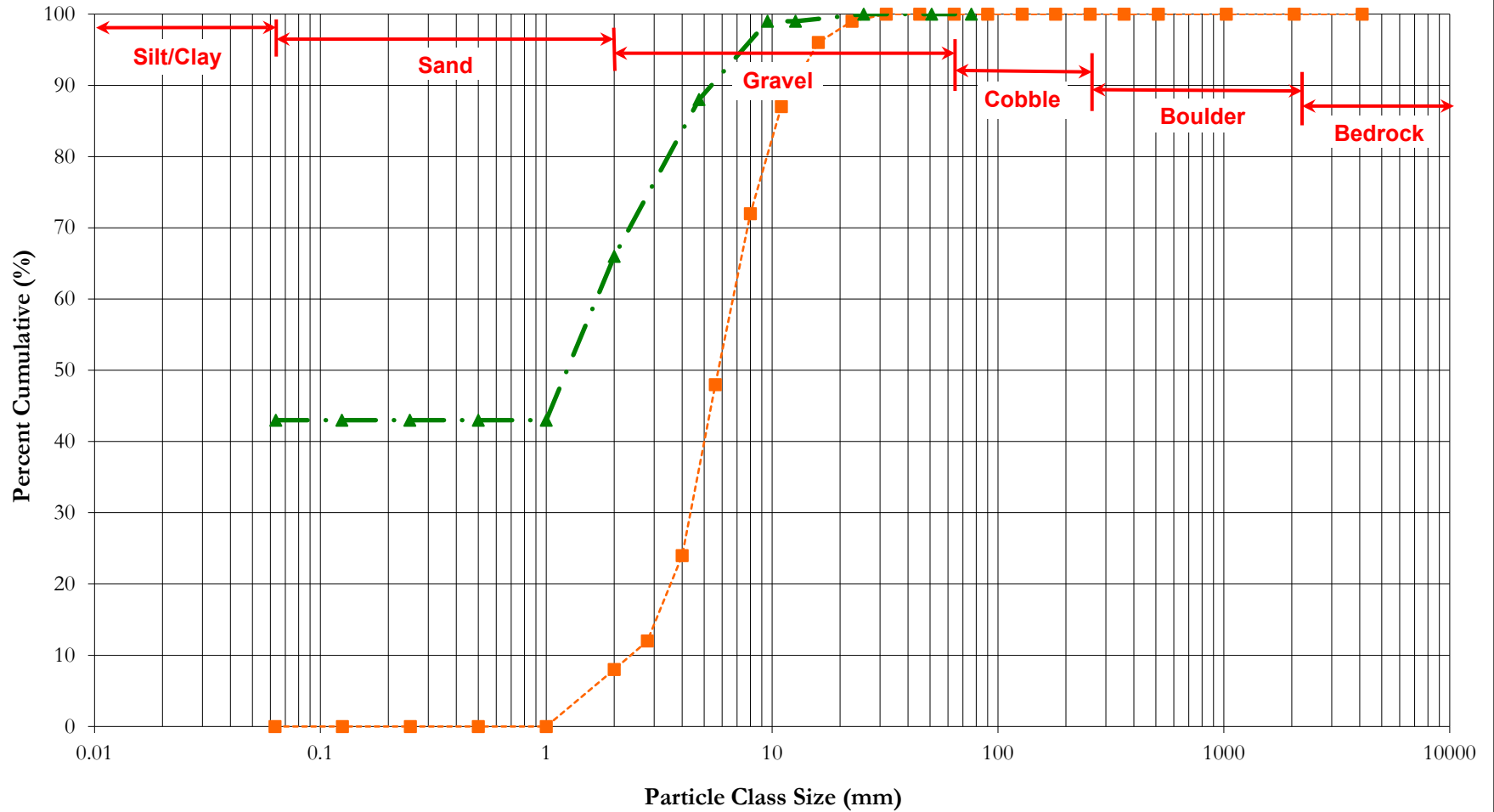
**Carpenter Bottom Mitigation Site
Carpenter Branch Reach 1
Subpavement Particle Size Distribution**



Carpenter Branch
Reach 1
Sieve Analysis Class Distribution



Carpenter Bottom Reach 1 - XS1 Pavement-Subpavement Particle Distribution



---■--- Pavement Summary -.-▲-.- Subpavement Summary

EXISTING CONDITIONS		
Carpenter Bottom Reach 1 - XS1		
Shear Stress Analysis	subpav	
Bankfull Xsec Area, Abkf (sq ft)	7.0	
Bankfull Width, Wbkf (ft)	10.2	
Bankfull Mean Depth, Dbkf (ft)	0.7	
Wetted Perimeter, WP=W+2D (ft)	11.6	
Hydraulic Radius, R (ft)	0.6	
Schan (ft/ft)	0.0130	
Boundary/Bankfull Shear Stress, t (lb/sq ft)	0.49	
d50 riffle 100 ct (mm)	5.8	
d50 (mm) - bar sample or subpavement	5.1	
ratio - d50pve/d50subpave (valid range 3-7)	1.13	
ratio - di/d50 pavement (valid range 1.3-3)	5.20	
tci-equation 1	0.0749	
tci-equation 2	0.0089	
D100 bar/subpavement or measured largest particle from lab sample (mm)	30.0	
d bar large (ft)	0.10	
Dcrit (ft) (equation 1)	0.9	
Dcrit (ft) (equation 2)	0.1	
Scrit (equation 1)	0.01737	
Scrit (equation 2)	0.00206	
Largest moveable particle (Shields/CO curves)		
Bankfull Velocity (fps)	2.0	
Unit Stream Power (watts/ sq meter)	14.3	
DIMENSIONAL SHEAR STRESS ANALYSIS T = Yds Movable particle size (mm) Predicted Shear Stress to move Dmax Predicted mean depth to move Dmax Predicted slope required to initiate movement of Dmax A for aggradational, D for degradational, according to the curves	SHIELDS CURVE	ROSGEN CURVE
	0.49	
	37.0	89.9
	0.40	0.11
	0.49	0.14
	0.0092	0.0025
	D	D

DESIGN CONDITIONS	
Carpenter Bottom Reach 1 - XS1	
subpav	
	4.4
	7.5
	0.60
	7.8
	0.6
	0.0120
	0.42
	5.8
	5.1
	1.14
	5.17
	0.0746
	0.0089
	30.0
	0.10
	1.0
	0.12
	0.02018
	0.00242
	3.2
	19.7
SHIELDS CURVE	ROSGEN CURVE
0.42	
31.8	80.7
0.40	0.11
0.53	0.15
0.0107	0.0029
D	D

APPENDIX 7
Wetland Design Documents and Data



Soil & Environmental Consultants, PA

11010 Raven Ridge Road • Raleigh, North Carolina 27614 • Phone: (919) 846-5900 • Fax: (919) 846-9467
www.SandEC.com

PRELIMINARY HYDRIC SOIL INVESTIGATION

Carpenter's Bottom Project Site

Piedmont

Catawba River Basin

Lincoln County, North Carolina

Prepared for:

Mr. Eric Neuhaus

Wildlands

312 West Millbrook Road, Suite 225

Raleigh, NC 27609



Kevin C. Martin



August 1st, 2018

INTRODUCTION

Soil & Environmental Consultants, PA (S&EC, PA) was retained to perform a preliminary evaluation to assess the presence and extent of hydric soils onsite. Most of the area evaluated is currently in pasture.

METHODOLOGY

On April 16th, 2018 Kevin Martin (LSS, PWS) of S&EC, PA performed a hydric soil evaluation at the site. Hand auger borings were advanced on the property at locations as appropriate to approximately estimate the location and extent of hydric soils within the project area (see attached Approximate Hydric Soil Locations Map). Each soil boring was evaluated to assess the presence or absence of hydric soil indicators. Hydric soil indicators were identified utilizing the NRCS Field Indicators of Hydric Soils in the United States - A Guide for Identifying and Delineating Hydric Soils (Version 8.1, 2017).

All areas evaluated are mapped as the Worsham soil series (Fine, mixed, active, thermic Typic Endoaquults) by NRCS. Most hydric soils observed onsite were in fact most like the Worsham soil series.

RESULTS

Numerous soil borings were performed within the study area. Soil characteristics were evaluated and all areas identified as containing hydric soils met the hydric soil criteria described below. An X" on the map indicates approximate soil boring locations. Depth to hydric soil indicators, were less than 10" and in most cases were less than 2" below land surface.

U- are non hydric soil areas

H- are hydric soils areas containing a depleted matrix.

Indicator F3: Depleted Matrix

Technical Description: A layer that has a depleted matrix with 60 percent or more chroma of 2 or less and that has a minimum thickness of either:

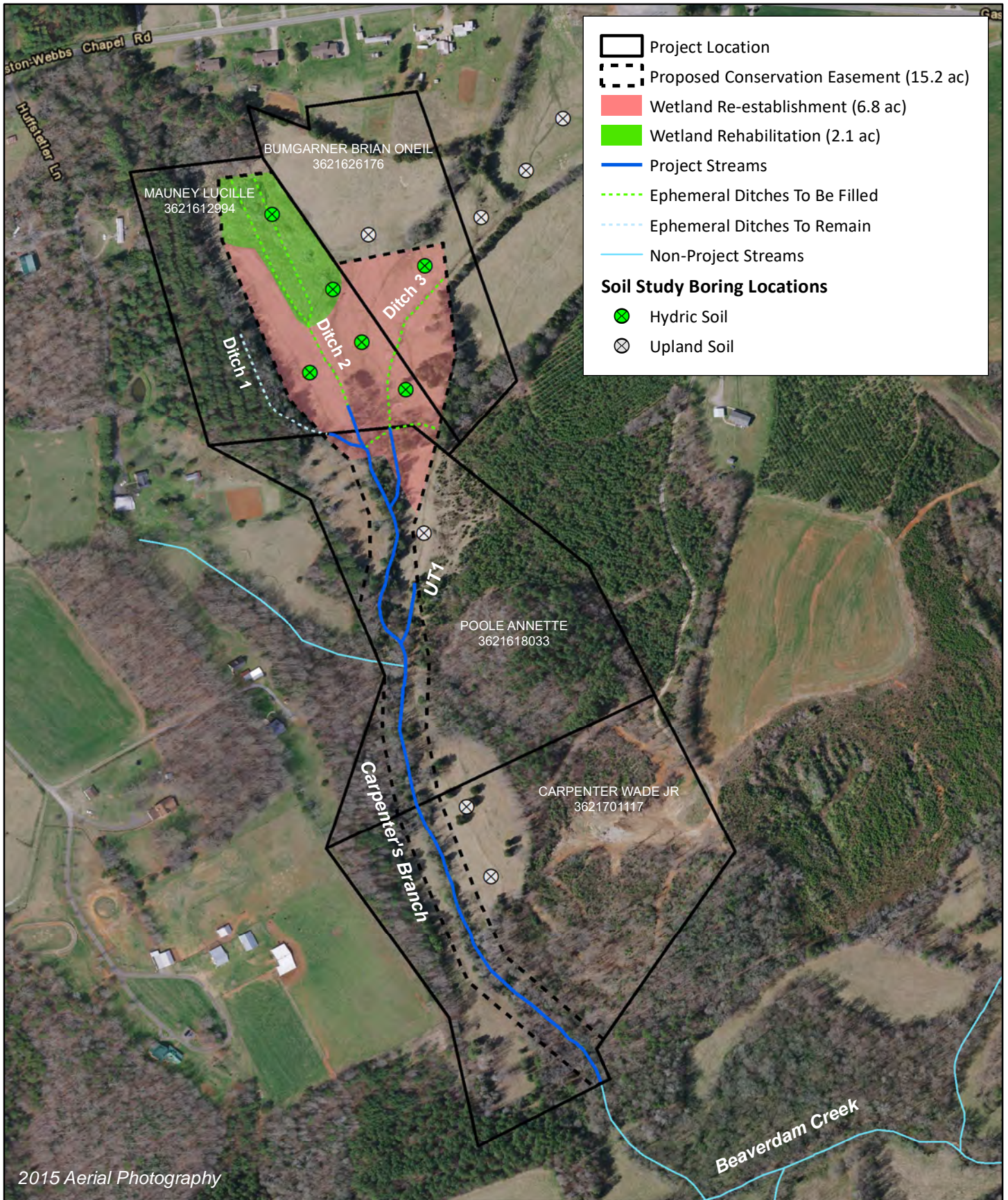
(a) 2 in. (5 cm) if the 2 in. (5 cm) is entirely within the upper 6 in. (15 cm)

of the soil, or

(b) 6 in. (15 cm) starting within 10 in. (25 cm) of the soil surface.

Wetland Hydrology Indicators:

While all of the borings performed within areas identified as hydric soils on the attached map exhibited hydric soil indicators, many areas containing hydric soils did not exhibit Primary Wetland Hydrology or Secondary Wetland Hydrology Indicators.

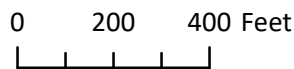


Legend

- Project Location
- Proposed Conservation Easement (15.2 ac)
- Wetland Re-establishment (6.8 ac)
- Wetland Rehabilitation (2.1 ac)
- Project Streams
- Ephemeral Ditches To Be Filled
- Ephemeral Ditches To Remain
- Non-Project Streams

Soil Study Boring Locations

- ⊗ Hydric Soil
- ⊗ Upland Soil



Approximate Hydric Soils Locations Map
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102

Gaston County, NC



Soil & Environmental Consultants, PA

11010 Raven Ridge Road • Raleigh, North Carolina 27614 • Phone: (919) 846-5900 • Fax: (919) 846-9467
www.SandEC.com

HYDRIC SOIL INVESTIGATION

Carpenter Bottom Project Site

Piedmont

Catawba River Basin

Gaston County, North Carolina

Prepared for:

Mr. Eric Neuhaus

Wildlands

312 West Millbrook Road, Suite 225

Raleigh, NC 27609



August 11th, 2018
Revised May 8th, 2020

INTRODUCTION

Soil & Environmental Consultants, PA (S&EC, PA) was retained to perform a preliminary evaluation to assess the presence and extent of hydric soils onsite. Most of the area evaluated is currently in pasture.

METHODOLOGY

On April 16th, 2018 and April 24th, 2020 Kevin Martin (LSS, PWS) of S&EC, PA performed hydric soil evaluations at the site. Hand auger borings were advanced on the property at locations as appropriate to approximately estimate the location and extent of hydric soils within the project area (see attached Hydric Soil Locations Map). Each soil boring was evaluated to assess the presence or absence of hydric soil indicators. Hydric soil indicators were identified utilizing the NRCS Field Indicators of Hydric Soils in the United States - A Guide for Identifying and Delineating Hydric Soils (Version 8.1, 2017) in 2018 and Field Indicators of Hydric Soils in the United States - A Guide for Identifying and Delineating Hydric Soils (Version 8.2, 2018) in 2020.

All areas evaluated are mapped as the Worsham soil series (Fine, mixed, active, thermic Typic Endoaquults) by NRCS. Most hydric soils observed onsite were in fact most like the Worsham soil series.

RESULTS

Twenty four soil borings were performed within the study area. Borings B1-A to B1-M are all from the 2018 soils evaluation. Borings B2-A to B2-K are from the 2020 soils evaluation. Soil characteristics were evaluated and all areas identified as containing hydric soils met the hydric soil criteria described below.

A circle with an "X" inside on the map indicates approximate soil boring locations. Green circles are at locations that contained hydric soils while the gray circles are at non-hydric soil locations. Depth to hydric soil indicators, were less than 10" and in most cases were less than 2" below land surface. Hydric soils areas contain a depleted matrix.

Indicator F3: Depleted Matrix

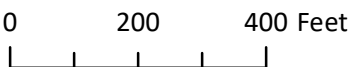
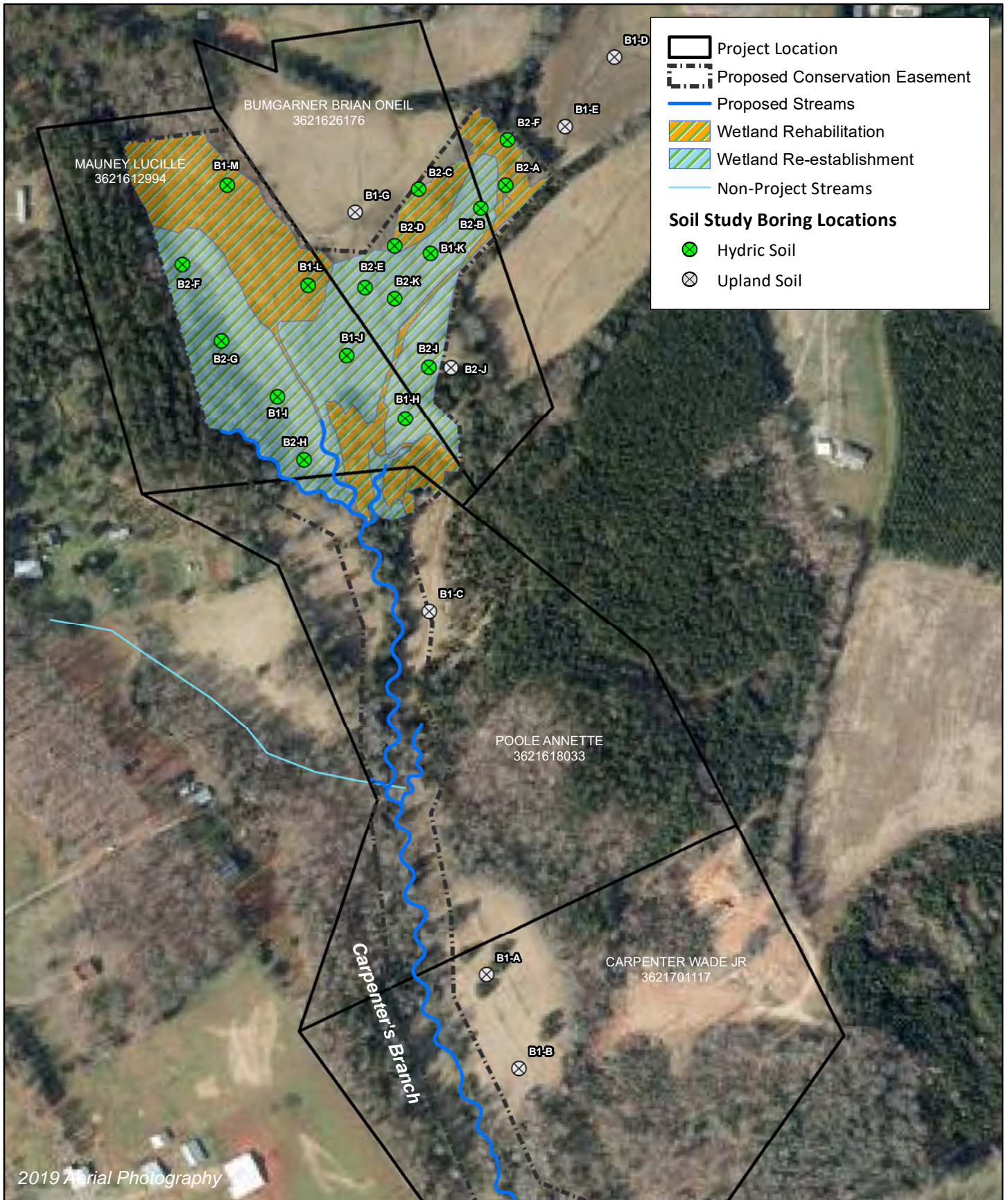
Technical Description: A layer that has a depleted matrix with 60 percent or more chroma of 2 or less and that has a minimum thickness of either:

(a) 2 in. (5 cm) if the 2 in. (5 cm) is entirely within the upper 6 in. (15 cm)

of the soil, or

(b) 6 in. (15 cm) starting within 10 in. (25 cm) of the soil surface.

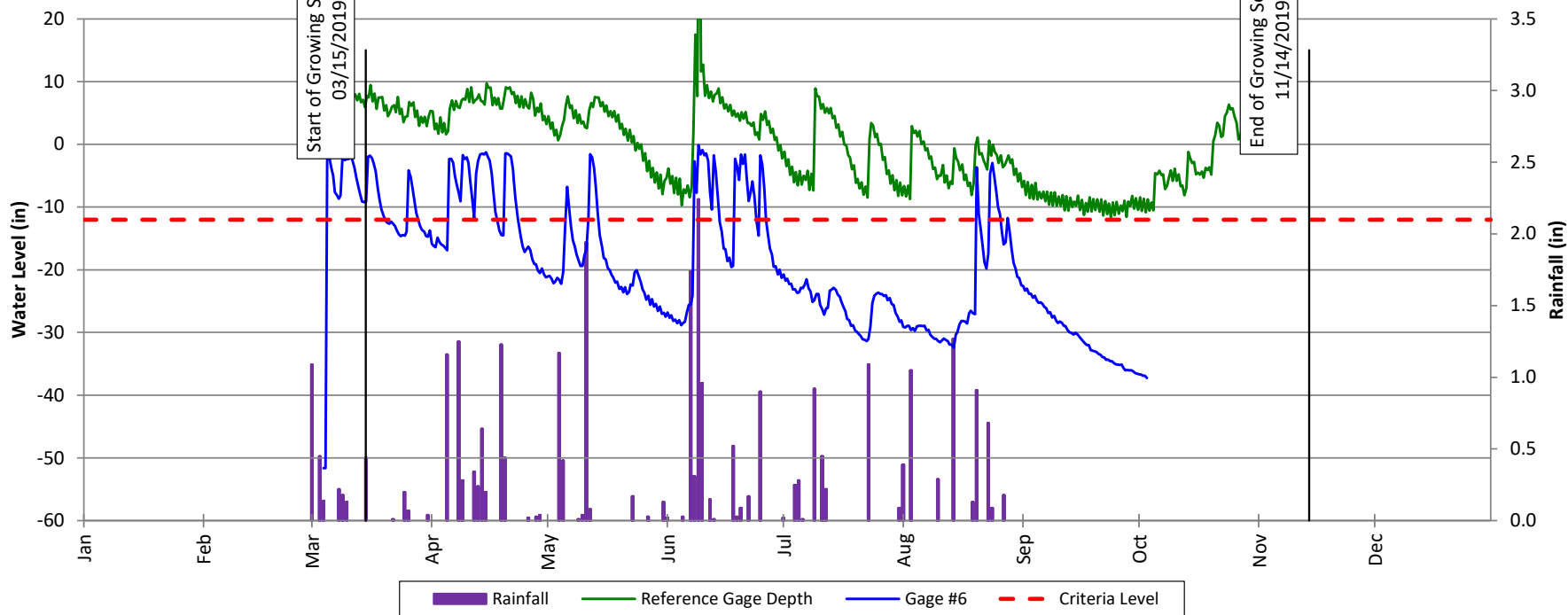
Two of the borings within the hydric soil area in 2020 contained the F3a indicator (B2-A and B2-F) while all of the other borings performed in 2018 and 2020 within hydric soil areas contained the F3b indicator. Typical soil profiles are attached for borings that were performed at B2-K and B2-F and are representative of the F3a and F3a hydric soil indicators respectively.



Hydic Soils Locations Map
 Revised Based on Updated Investigation
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102

Gaston County, NC

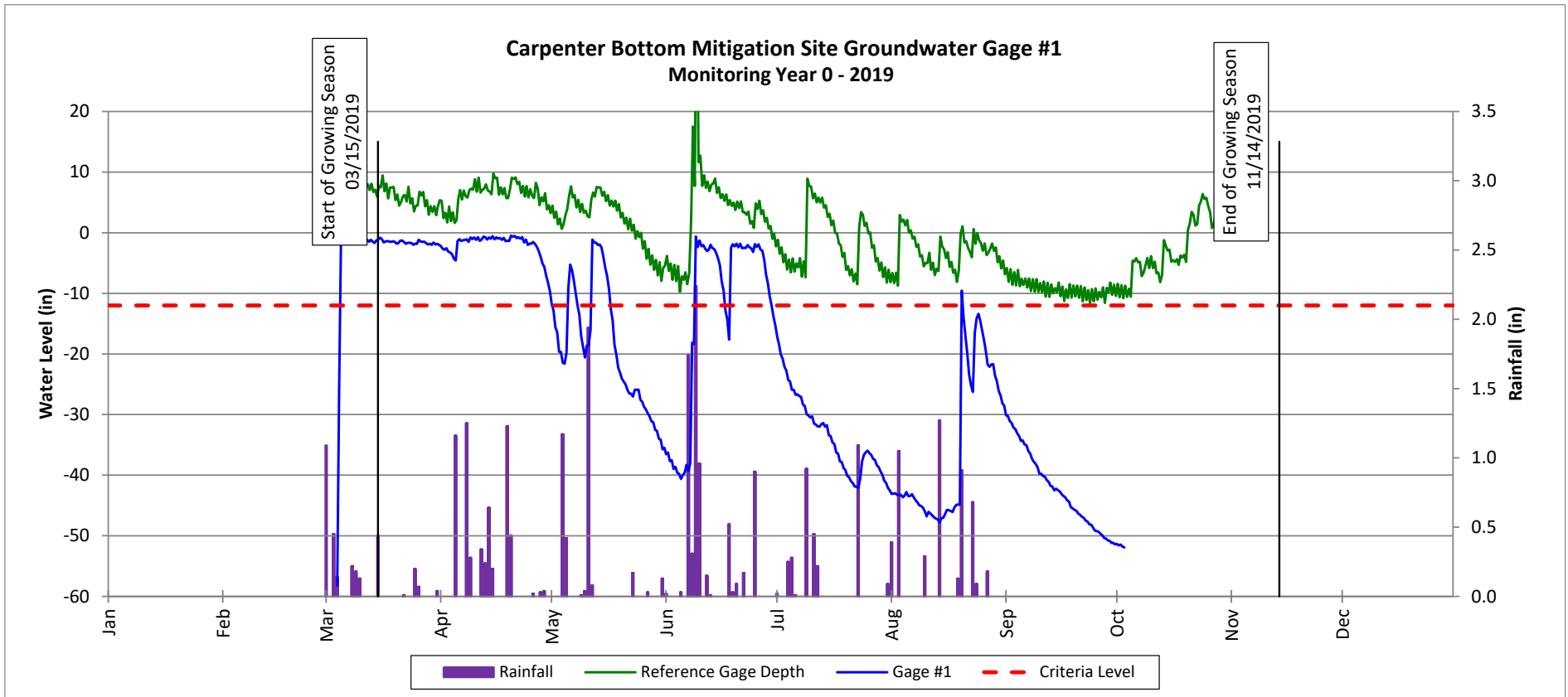
Carpenter Bottom Mitigation Site Groundwater Gage #6 Monitoring Year 0 - 2019



Groundwater Gage Plots

Carpenter Bottom Mitigation Site (DMS Project No. XXXXX)

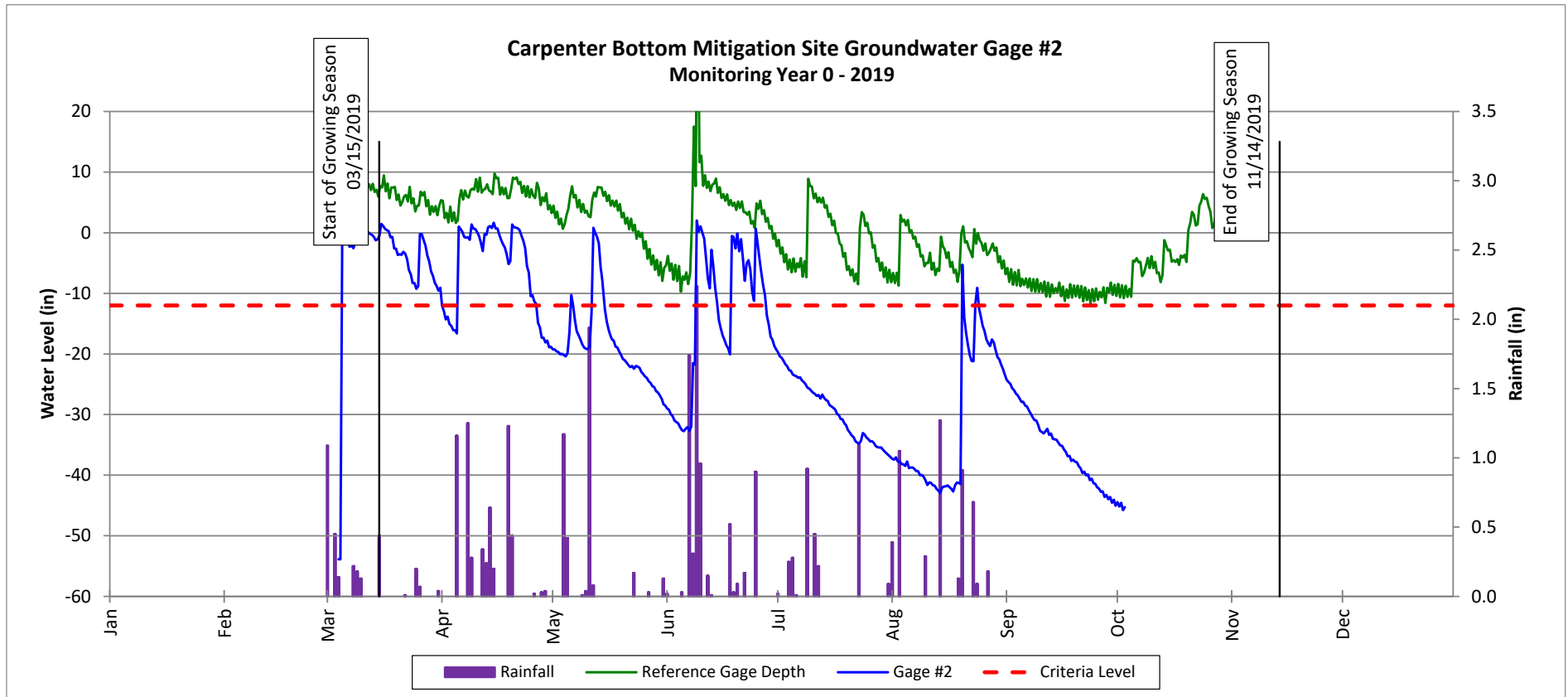
Monitoring Year 0 - 2019



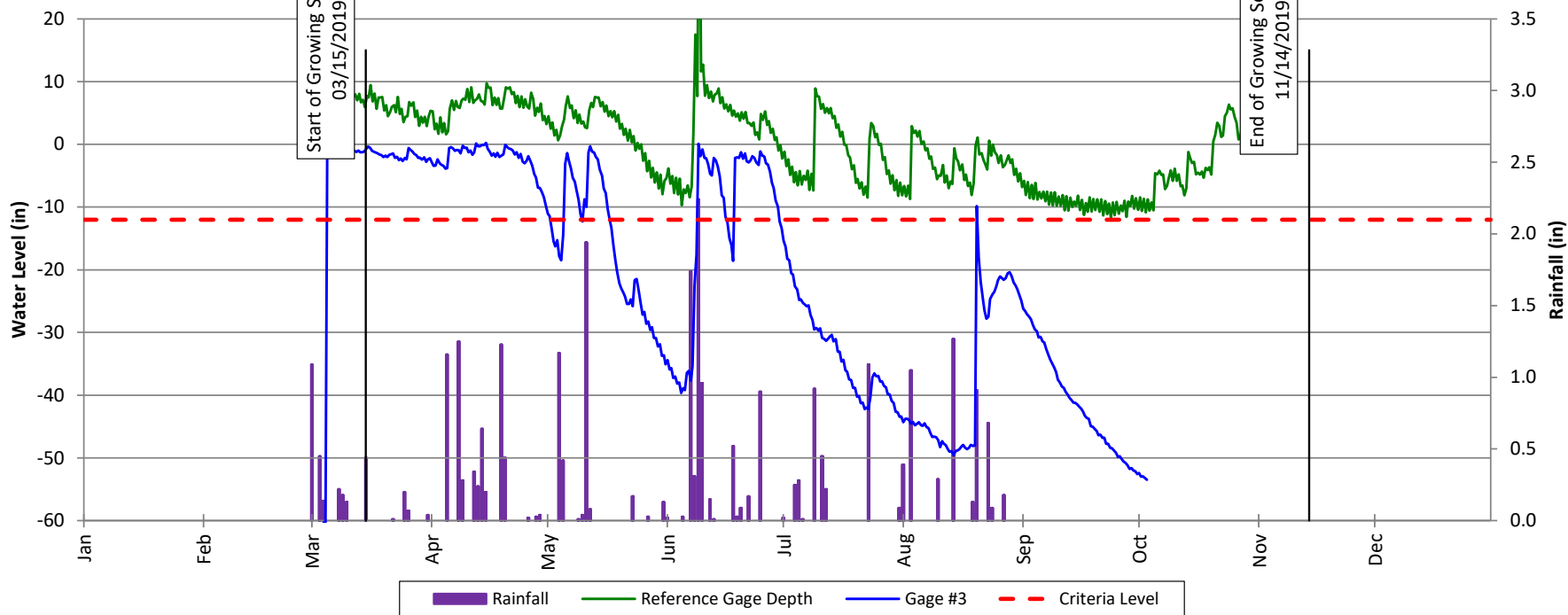
Groundwater Gage Plots

Carpenter Bottom Mitigation Site (DMS Project No. XXXXX)

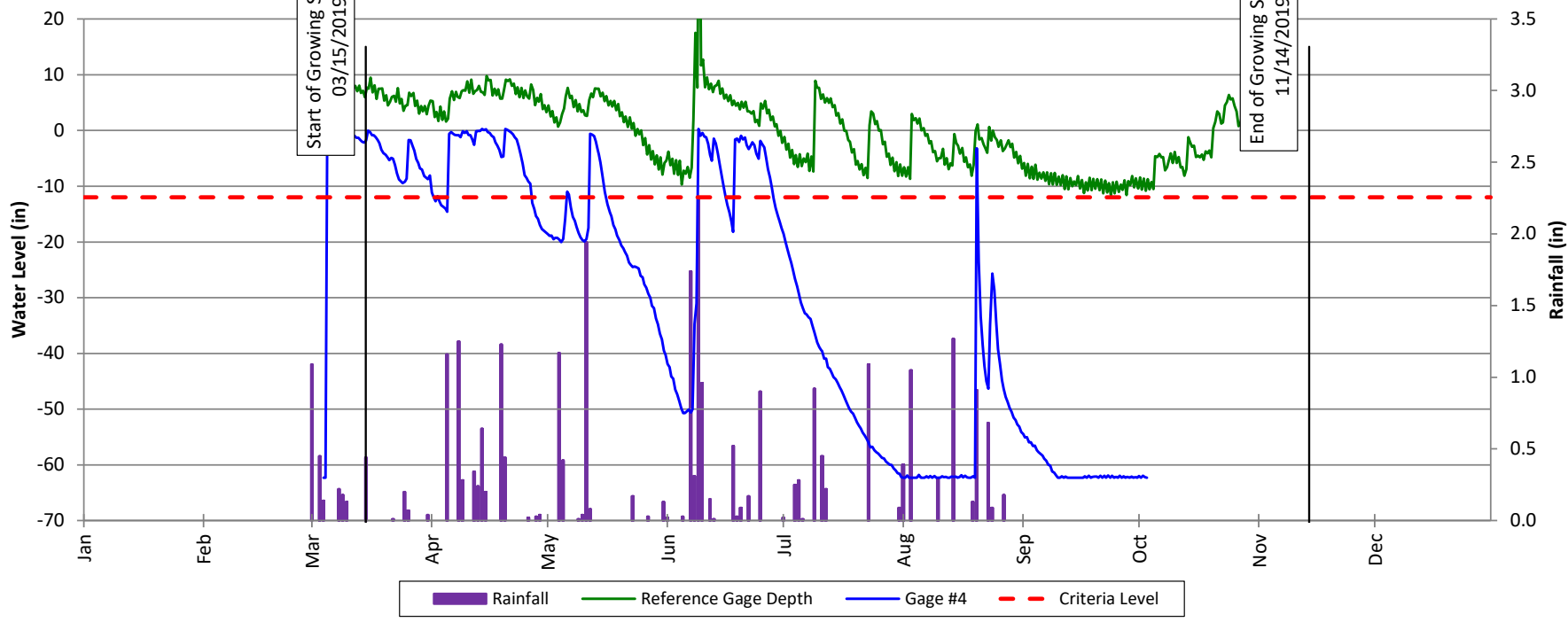
Monitoring Year 0 - 2019



Carpenter Bottom Mitigation Site Groundwater Gage #3 Monitoring Year 0 - 2019



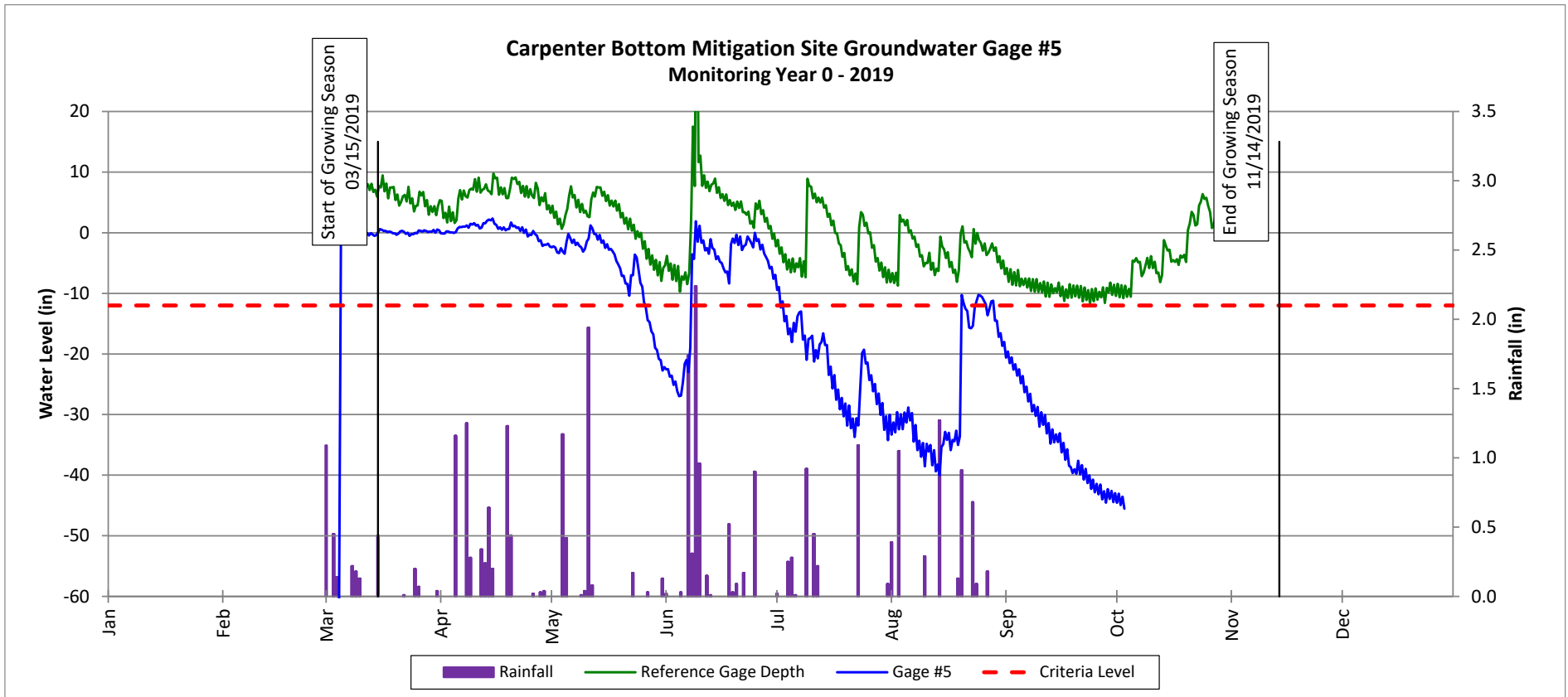
Carpenter Bottom Mitigation Site Groundwater Gage #4 Monitoring Year 0 - 2019



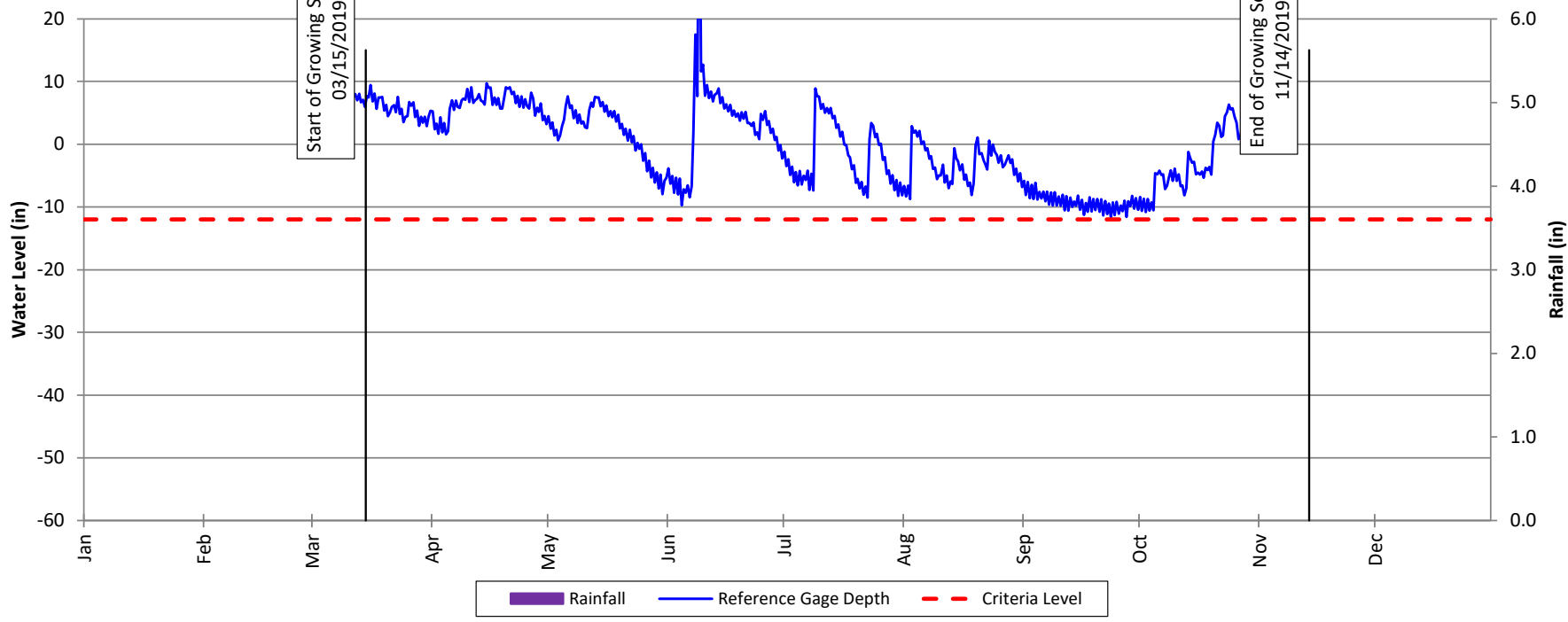
Groundwater Gage Plots

Carpenter Bottom Mitigation Site (DMS Project No. XXXXX)

Monitoring Year 0 - 2019



Carpenter Bottom Mitigation Site Reference Gage Monitoring Year 0 - 2019

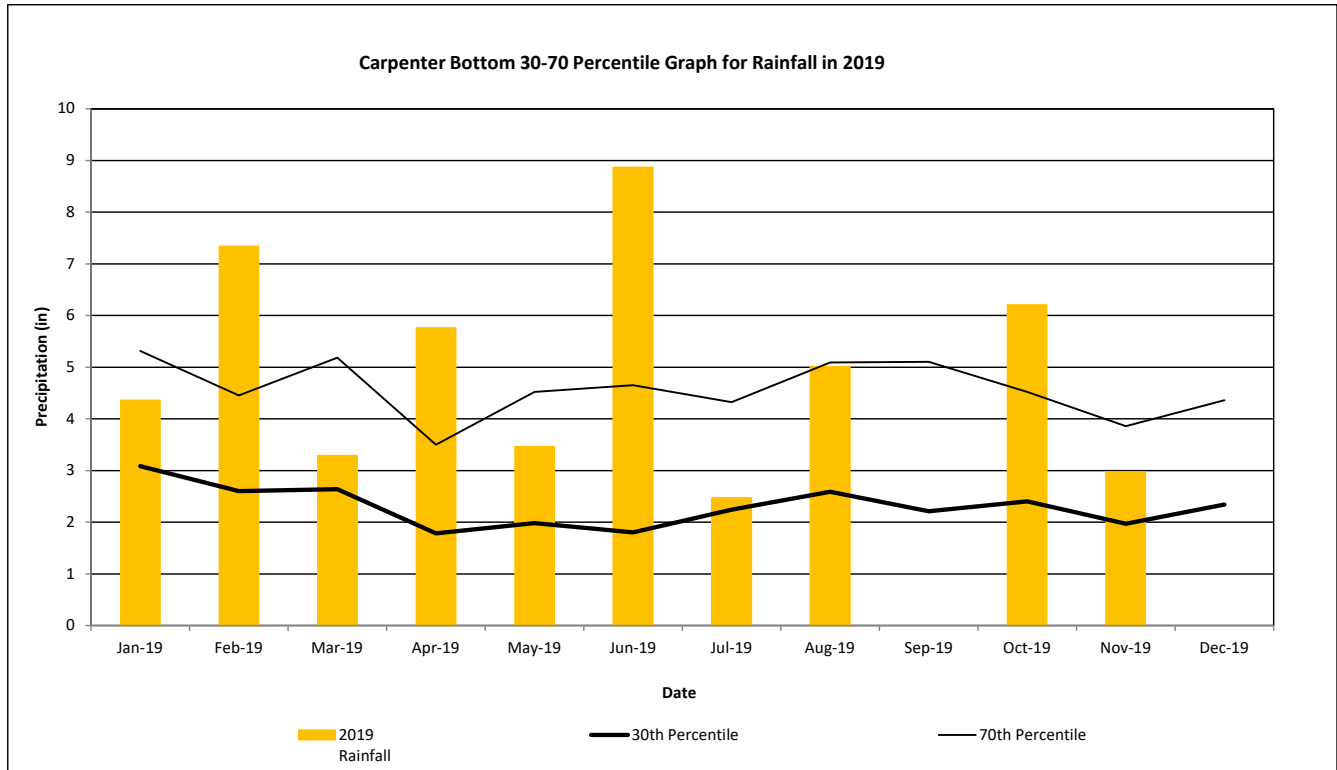


Monthly Rainfall Plot

Carpenter Bottom Mitigation Site

DMS Project No. 10090

Pre-Construction - 2019 Year



30th and 70th percentile rainfall data collected from Gaston County, NC WETS Table

	30% Rainfall	70% Rainfall	2019 Rainfall
Jan-19	3.08	5.31	4.36
Feb-19	2.60	4.45	7.34
Mar-19	2.64	5.18	3.29
Apr-19	1.78	3.50	5.76
May-19	1.98	4.52	3.46
Jun-19	1.80	4.65	8.87
Jul-19	2.24	4.32	2.47
Aug-19	2.59	5.09	5.01
Sep-19	2.21	5.10	0.00
Oct-19	2.40	4.52	6.2
Nov-19	1.97	3.86	2.97
Dec-19	2.34	4.36	5.57

2019 Rainfall Data from Lincolnton 2W USC00314997 NOAA Station

APPENDIX 8
Preliminary Design Plans

Carpenter Bottom Mitigation Site

Gaston County, North Carolina

for

NCDEQ

Division of Mitigation Services



Vicinity Map
Not to Scale



Sheet Index	
Title Sheet	0.1
Project Overview	0.2
General Notes and Symbols	0.3
Typical Sections	1.1-1.3
Stream Plan and Profile	
Carpenter Bottom	2.1.1-2.1.7
UT3	2.2.1
UT2	2.3.1
UT1	2.4.1
UT4	2.5.1
Wetland Overview	3.0
Planting Sheets	4.0-4.4
Erosion and Sediment Control	Placeholder
Details	6.0-6.9

Project Directory	
Engineering: Wildlands Engineering, Inc License No. F-0831 167-B Haywood Rd Asheville, NC 28806 Eric Neuhaus, Project Engineer 828-774-5547	Owner: NCDEQ Division of Mitigation Services 5 Ravenscroft Drive, Ste 102 Asheville, NC 28801 Paul Wiesner 828-273-1673
Surveying: Turner Land Surveying P.O. Box 148 Swannanoa, NC 28778 Elisabeth G. Turner, PLS 919-827-0745	DMS Project No. 100090 Catawba River Basin 03050102 USACE Action ID No. SAW-2018-02062 USACE PM Todd Tugwell 3331 Heritage Trade Drive, Suite 105 Raleigh, NC 27587



BEFORE YOU DIG!
CALL 1-800-632-4949
N.C. ONE-CALL CENTER
IT'S THE LAW!

PRELIMINARY PLANS FOR
FINAL IRT REVIEW
ISSUED DECEMBER 9, 2020

DRAFT

Carpenter Bottom Mitigation Site
Gaston County, North Carolina

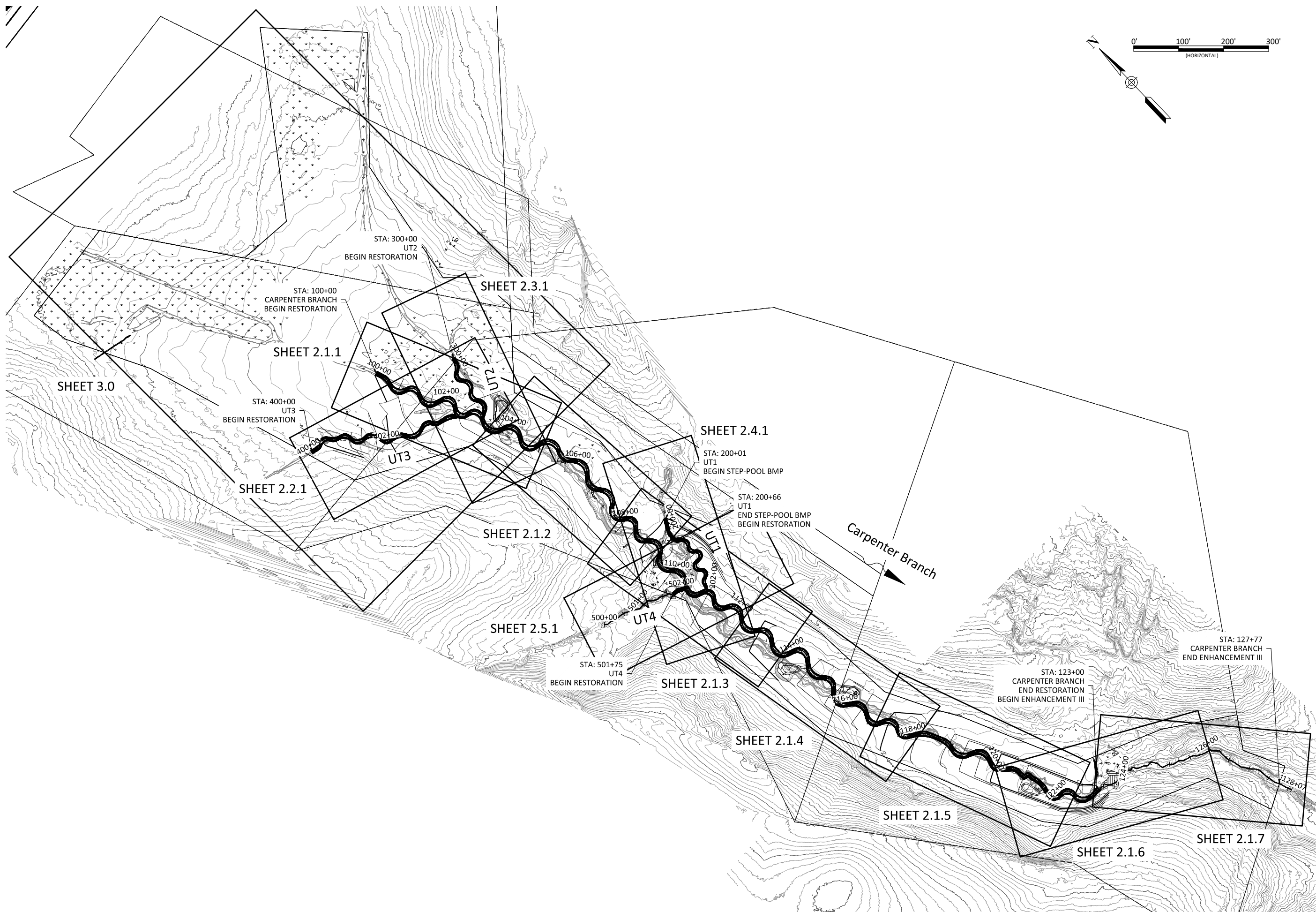
Title Sheet

Revisions:

Date: 12.09.2020
Job Number: 005-02179
Project Engineer: EFN
Drawn By: JMS
Checked By: EGR

0.1

Sheet



DRAFT

Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Project Overview

Revisions:

12.09.2020

Date:	12.09.2020
Job Number:	005-02179
Project Engineer:	EJN
Drawn By:	JMS
Checked By:	EGK

0.2



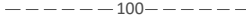


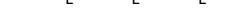



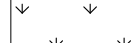
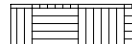

Construction Notes and Construction Sequence to be included with final plans.

DRAFT

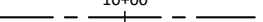
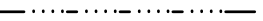



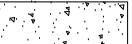

Carpenter Bottom Mitigation Site
Gaston County, North Carolina

General Notes and Symbols




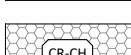


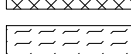
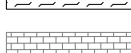





Existing Features

-  Existing Property Line
-  Existing Thalweg
-  Existing Major Contour
-  Existing Minor Contour
-  Existing Fence
-  Existing 50' Access Easement
-  Existing Farm Road
-  Existing Culvert
-  Debris
-  Existing Wetland
-  Existing Bedrock
-  Existing Tree










Proposed Features

-  Proposed Thalweg Alignment
-  Proposed Bankfull
-  Proposed Major Contour
-  Proposed Minor Contour
-  Proposed Culvert
-  Wetland Re-establishment
-  Wetland Rehabilitation

Proposed Structures

-  Proposed Constructed Riffle
See Sheet 6.0, Detail 1
-  Proposed Woody Riffle
See Sheet 6.0, Detail 2
-  Proposed Angled Log Riffle
See Sheet 6.0, Detail 3
-  Proposed Chunky Riffle
See Sheet 6.0, Detail 4
-  Proposed Brush Toe
See Detail 1 & 2, Sheet 6.3
-  Proposed Step-Pool BMP (UT1)
See Detail 2, Sheet 6.2
-  Proposed Floodplain Pool
See Detail 1, Sheet 6.2
-  Proposed Ditch Plug
See Detail 3, Sheet 6.2
-  Proposed Ditch/Channel Fill
-  Log Sill
See Detail 2, Sheet 6.1
-  Log J-Hook
See Detail 3, Sheet 6.1
-  Rock Sill
See Detail 1, Sheet 6.1
-  Rock Toe
See Detail 4, Sheet 6.7

Erosion and Sediment Control Features

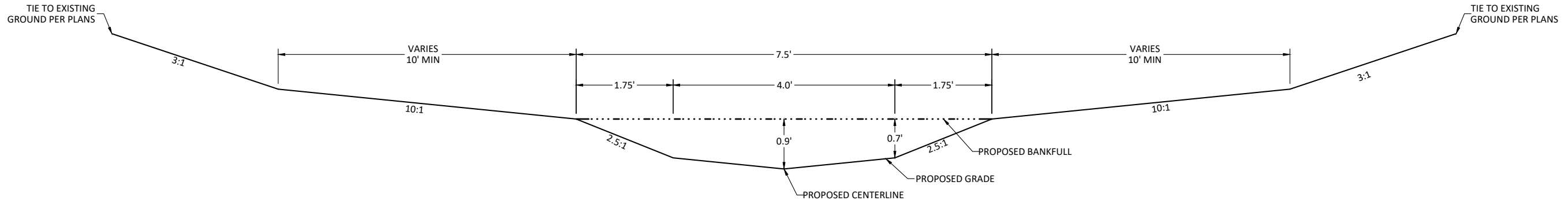
-  Proposed Limits of Disturbance
-  Proposed Safety Fence
See Detail 1, Sheet 6.7
-  Proposed Silt Fence
See Detail 4, Sheet 6.4
-  Proposed Silt Fence Gravel Outlet
See Detail 2, Sheet 6.4
-  Proposed Haul Road
-  Proposed Temporary Construction Entrance
See Detail 1, Sheet 6.5
-  Proposed Temporary Sediment Dam
See Detail 2, Sheet 6.6
-  Proposed Pump Around System
See Detail 2, Sheet 6.5
-  Proposed Temporary Crossing
See Detail 3, Sheet 6.4

Revisions:

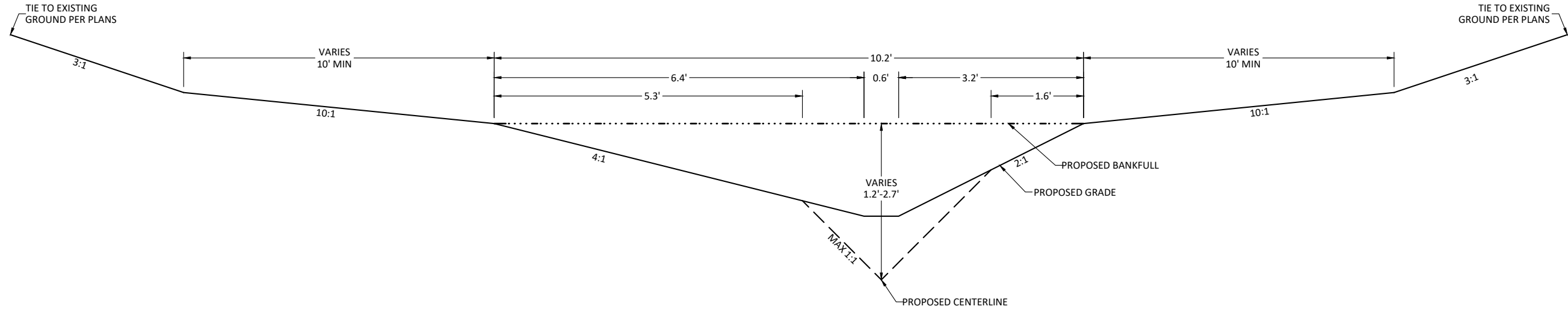
Date:	12.09.2021
Job Number:	005-02179
Project Engineer:	EJN
Drawn By:	JMS
Checked By:	EGK

0.3

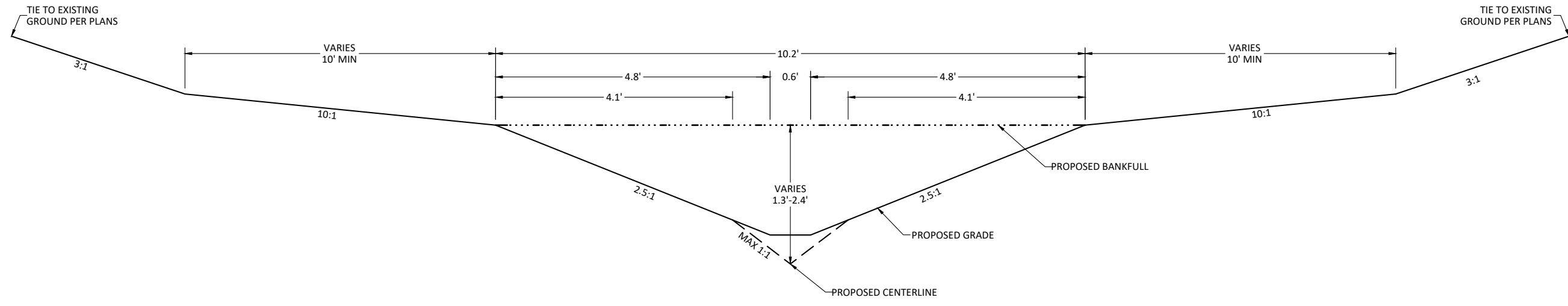
December 10, 2020
X:\Shared\Projects\005-02179-Carpenter Bottom Mitigation Site\CADD\Plans\02179_1 Typical.dwg



Carpenter Branch Reach 1 - Riffle
STA: 100+00 - 123+00



Carpenter Branch Reach 1 - Meander Pool
STA: 100+00 - 123+00



Carpenter Branch Reach 1 - In-Line Pool
STA: 100+00 - 123+00

DRAFT

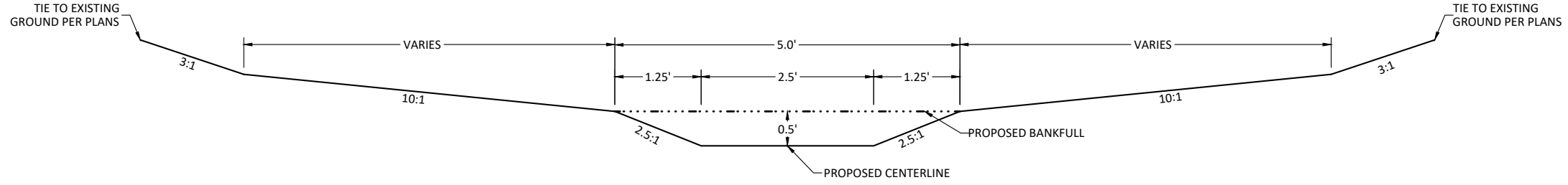
Carpenter Bottom Mitigation Site
Gaston County, North Carolina
Carpenter Branch Reach 1
Typical Sections

Revisions:

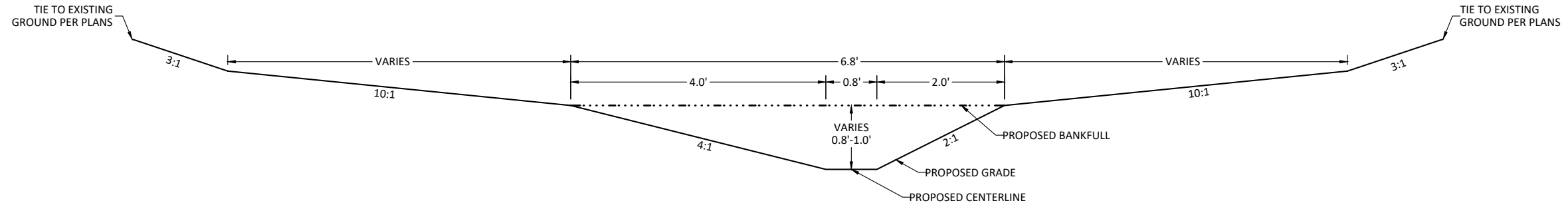
Date:	12.09.2020
Job Number:	005-02179
Project Engineer:	EPN
Drawn By:	JMS
Checked By:	EGR

1.1

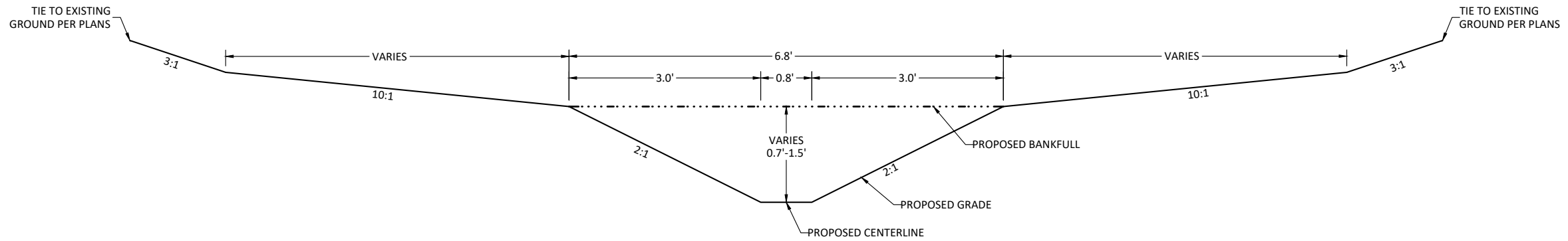
December 14, 2020
X:\Shared\Projects\005-02179-Carpenter Bottom Mitigation Site\Cadd\Plans\02179-1 Typical.dwg



UT1 - Riffle
STA: 200+66 - 202+41
UT4 - Riffle
STA: 500+53 - 500+90



UT1 - Meander Pool
STA: 200+66 - 202+41
UT4 - Meander Pool
STA: 500+53 - 500+90



UT1 - In-Line Pool
STA: 200+66 - 202+41
UT4 - In-Line Pool
STA: 500+53 - 500+90

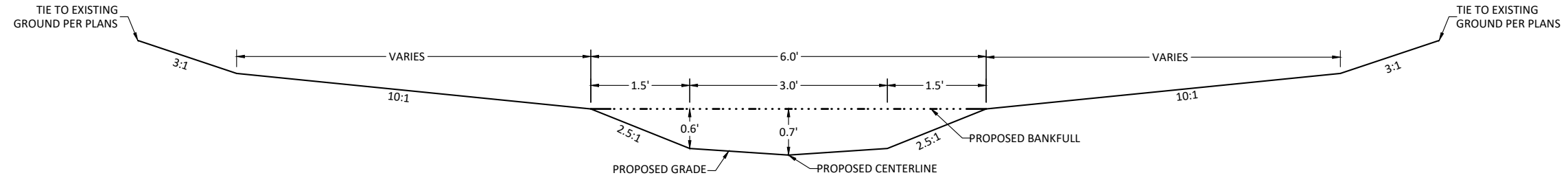
DRAFT

Carpenter Bottom Mitigation Site
Gaston County, North Carolina
UT1 and UT4
Typical Sections

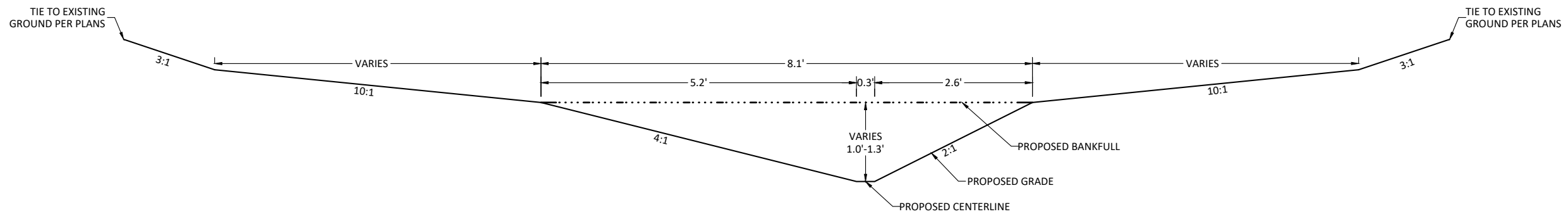
Revisions:

Date: 12.09.2020
Job Number: 005-02179
Project Engineer: EPN
Drawn By: JMS
Checked By: EGR

December 14, 2020
X:\Shared\Projects\005-02179-Carpenter Bottom Mitigation Site\Cadd\Plans\02179-1 Typical.dwg



UT2 - Riffle
STA: 300+00 - 301+78
UT3 - Riffle
STA: 400+00 - 403+84



UT2 - Meander Pool
STA: 300+00 - 301+78
UT3 - Meander Pool
STA: 400+00 - 403+84

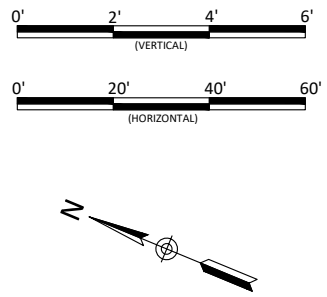
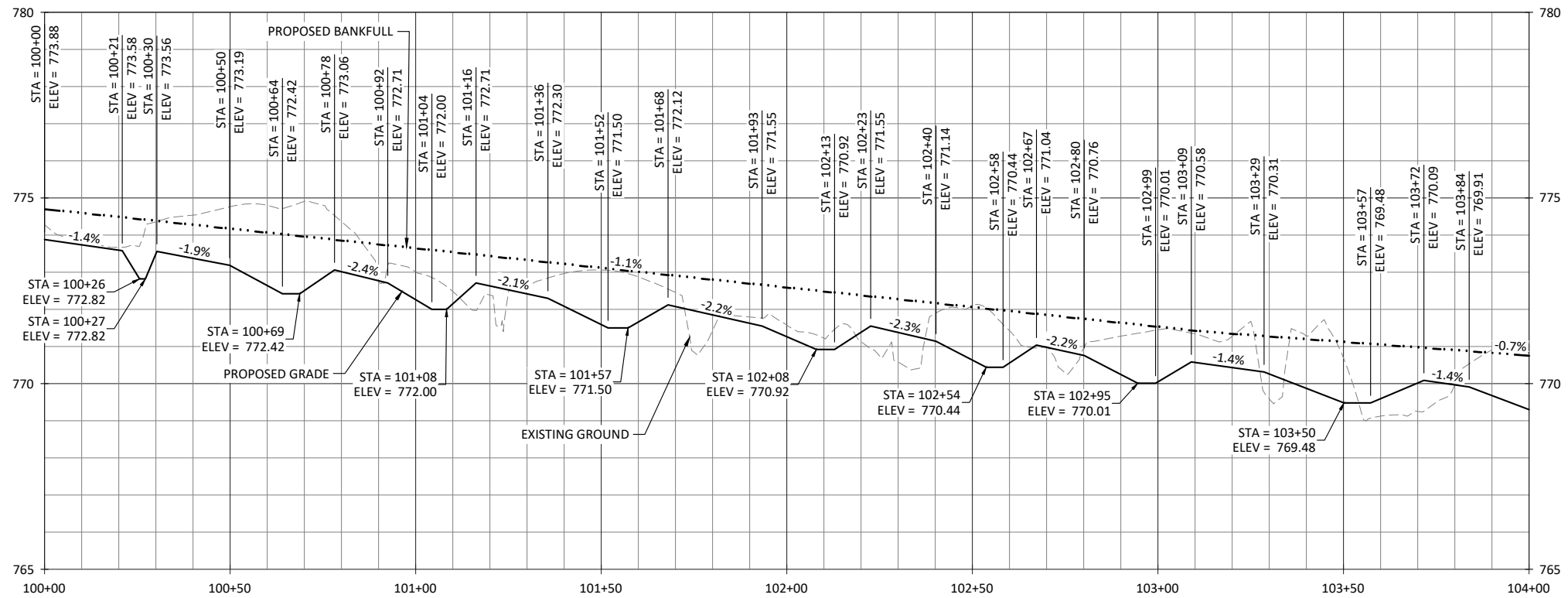
DRAFT

Carpenter Bottom Mitigation Site
Gaston County, North Carolina
UT2 and UT3
Typical Sections

Revisions:

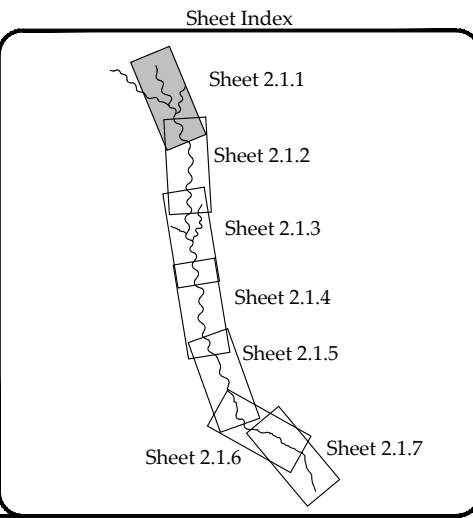
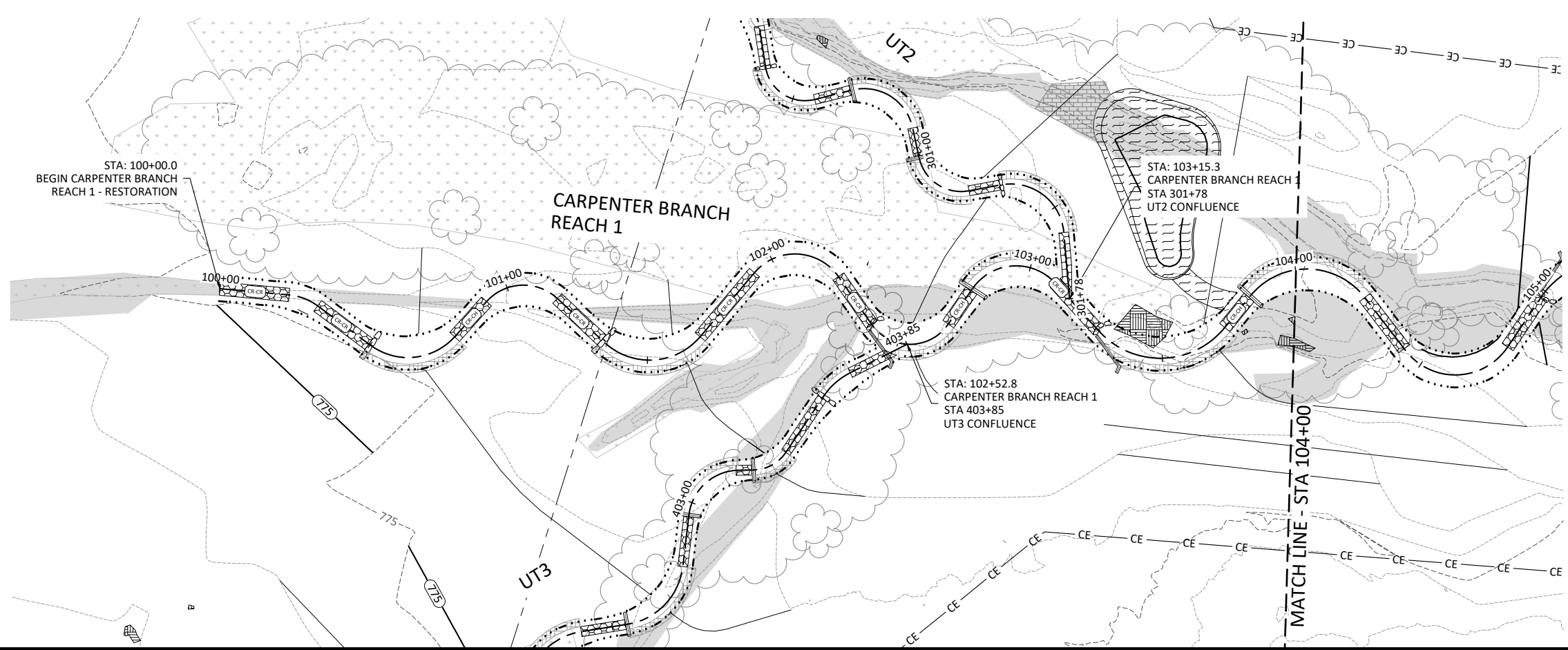
Date: 12-09-2020
Job Number: 005-02179
Project Engineer: EPN
Drawn By: JMS
Checked By: EGR

1.3



DRAFT

Carpenter Bottom Mitigation Site
Gaston County, North Carolina
Carpenter Branch
Stream Plan and Profile

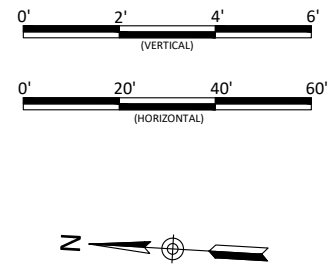
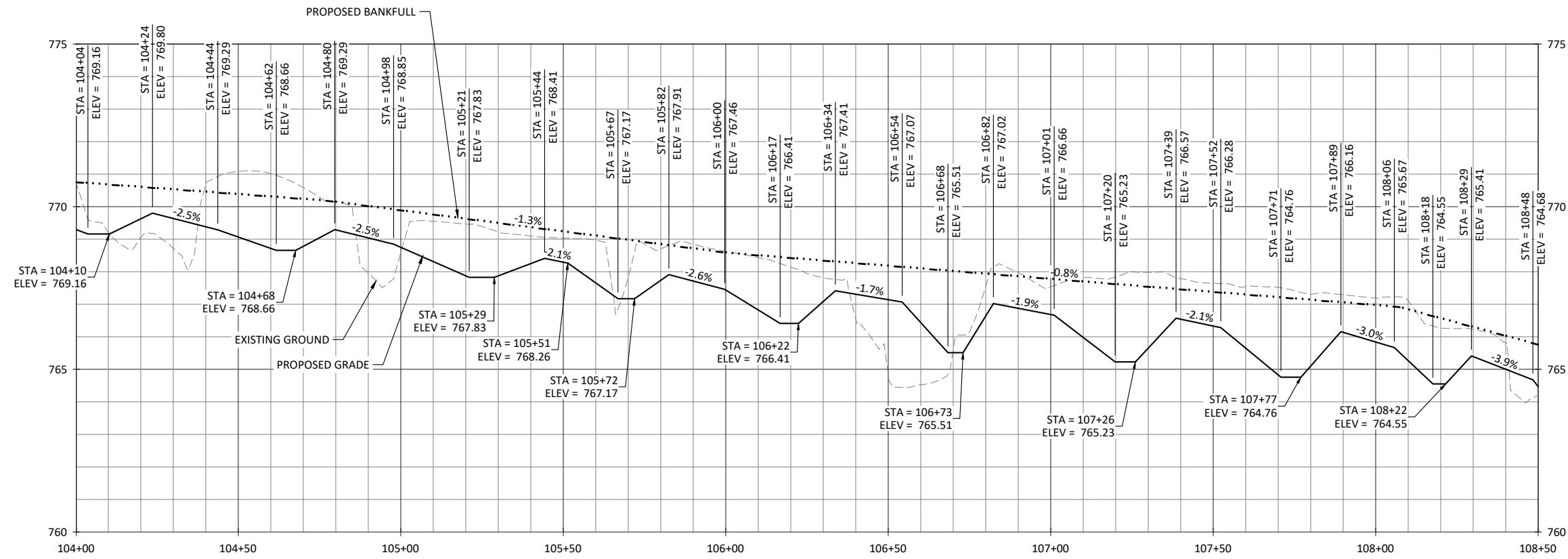


Revisions:	

Date:	12.09.2020
Job Number:	005-02179
Project Engineer:	EJN
Drawn By:	JMS
Checked By:	EGK

2.1.1

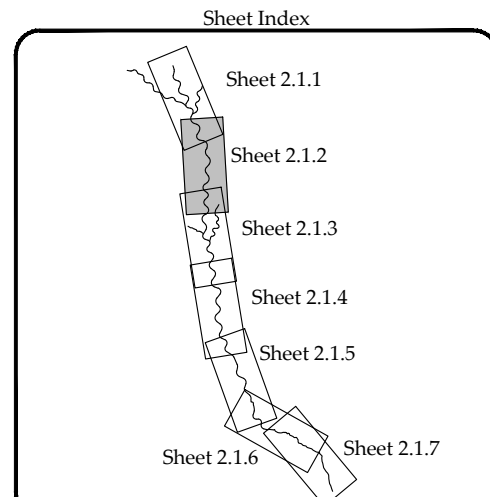
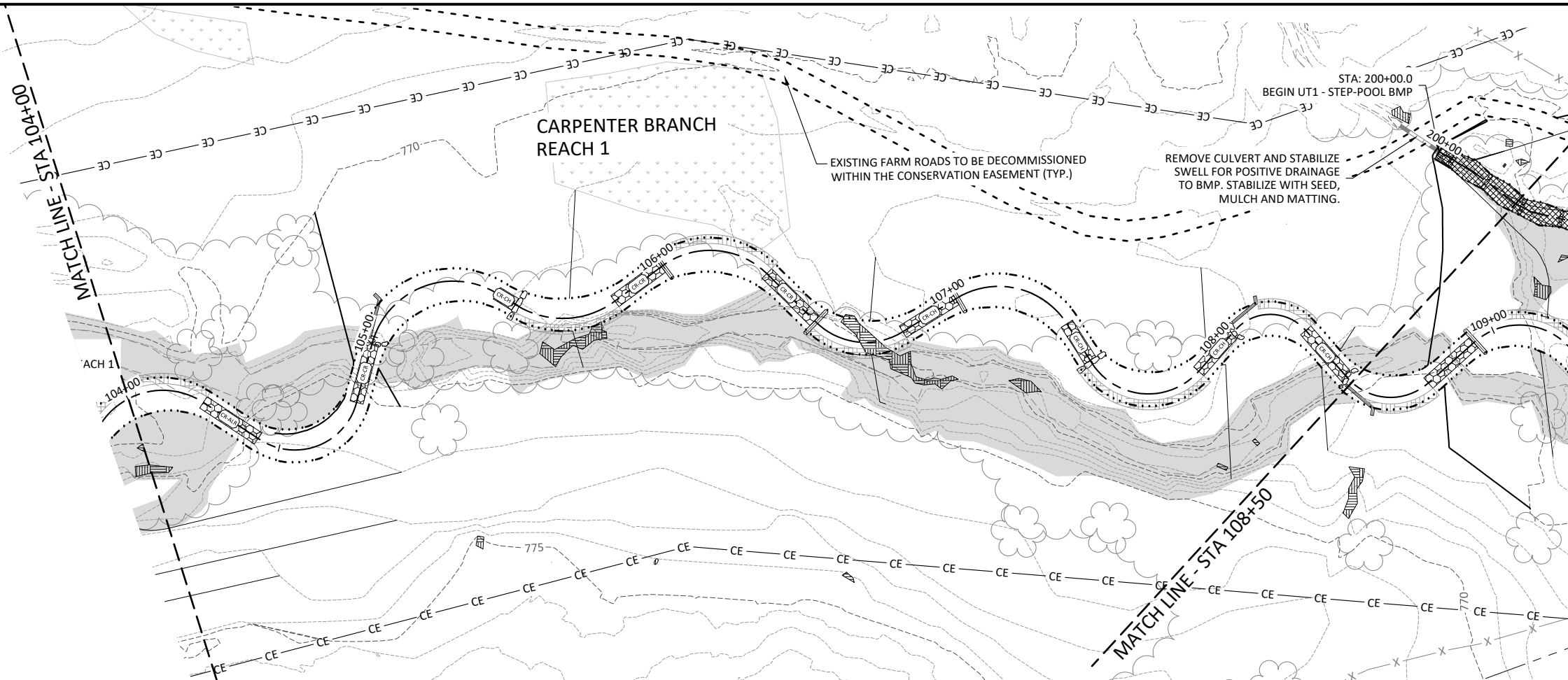
Sheet



DRAFT

Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Carpenter Branch
Stream Plan and Profile

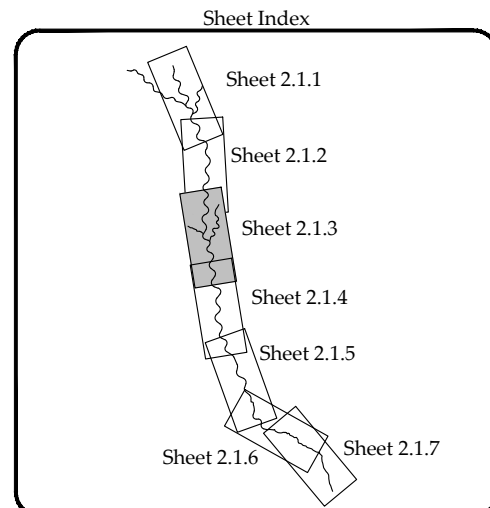
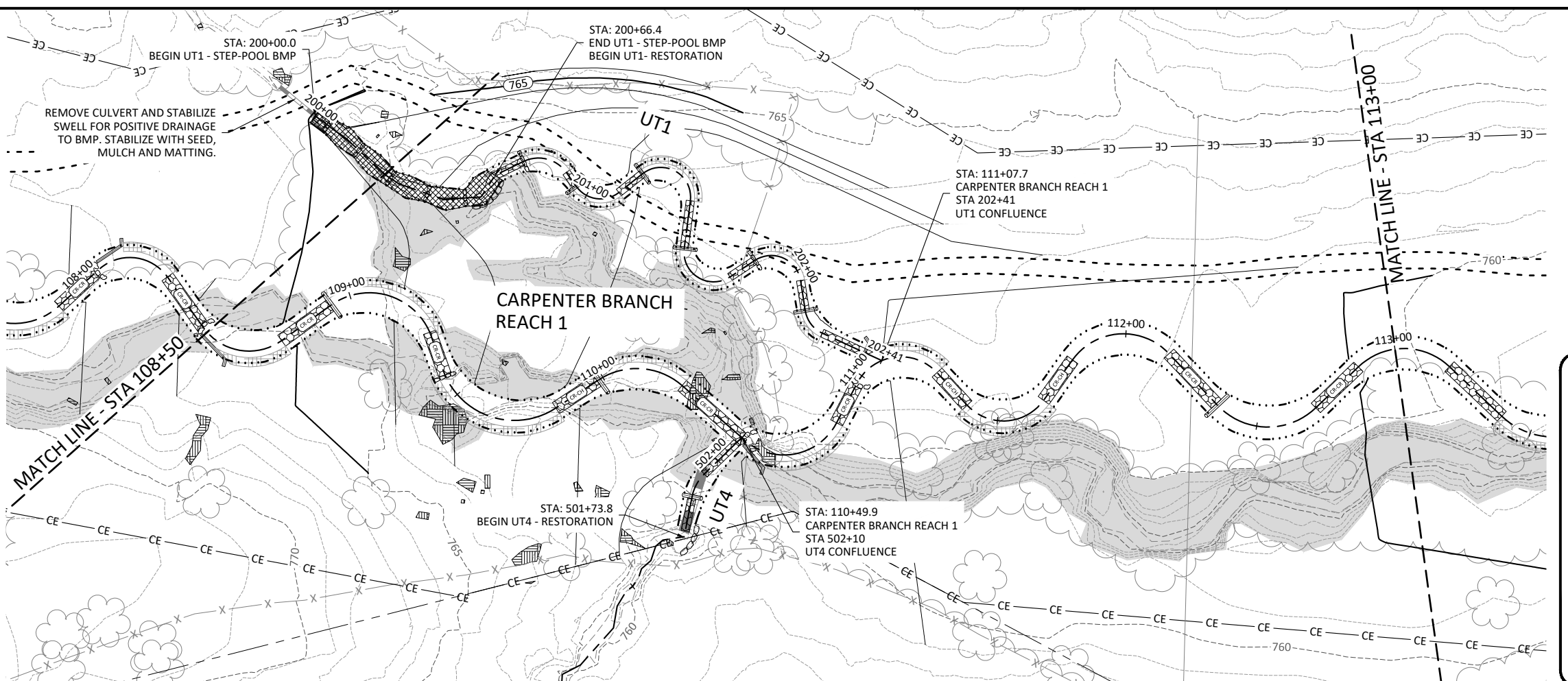
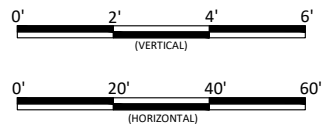
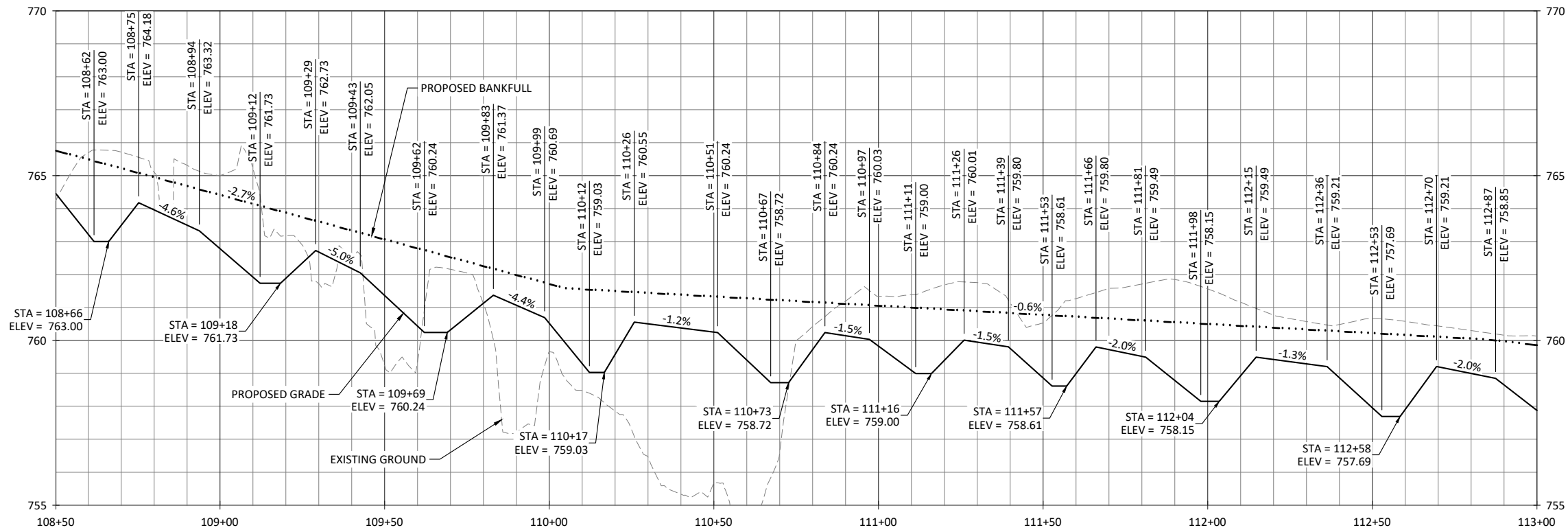


Revisions:

Date: 12.09.2020
Job Number: 005-02179
Project Engineer: EFN
Drawn By: JMS
Checked By: EGR

2.1.2

Sheet



Carpenter Bottom Mitigation Site
Gaston County, North Carolina
Carpenter Branch
Stream Plan and Profile

Revisions:

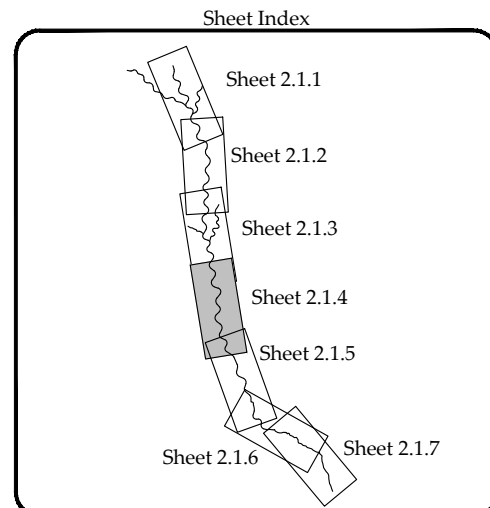
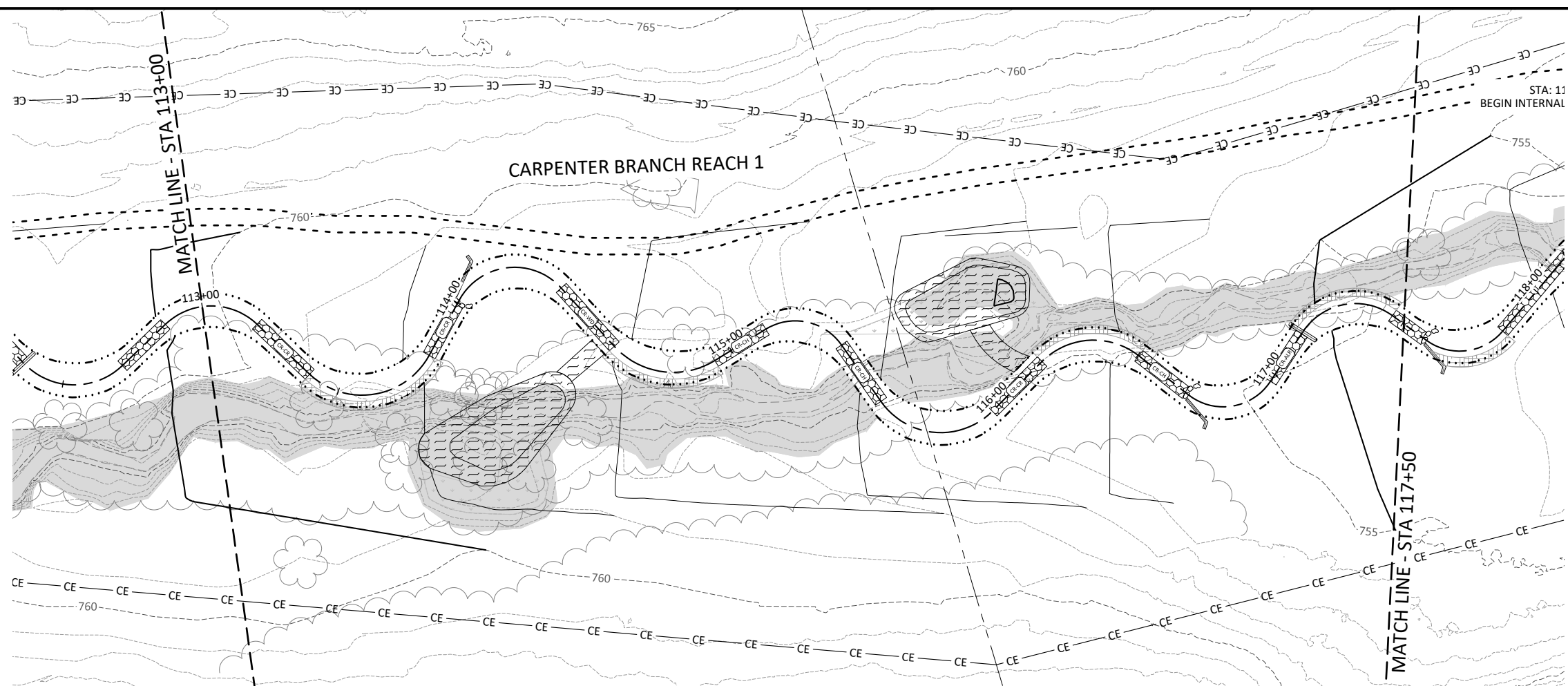
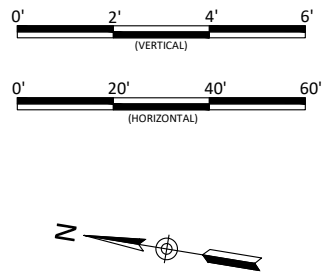
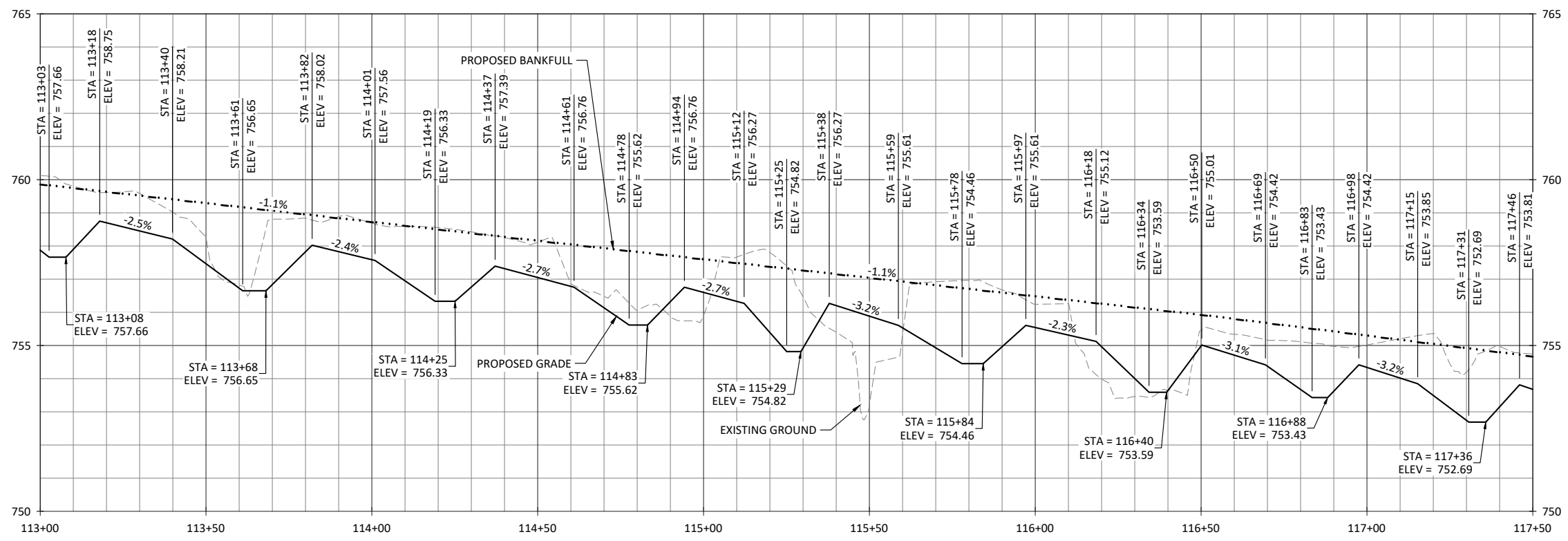
Date: 12.09.2020
Job Number: 005-02179
Project Engineer: EFN
Drawn By: JMS
Checked By: EGR

2.1.3
Sheet

DRAFT

December 9, 2021

X:\Shared\Projects\005-02179 Carpenter Bottom Mitigation Site\CAD\Plans\02179 - Plan and Profile.dwg



Carpenter Bottom Mitigation Site
Gaston County, North Carolina
Carpenter Branch
Stream Plan and Profile

Revisions:	Date:	By:	Check:

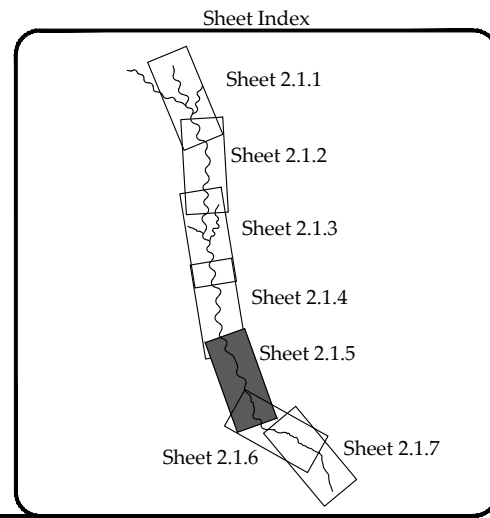
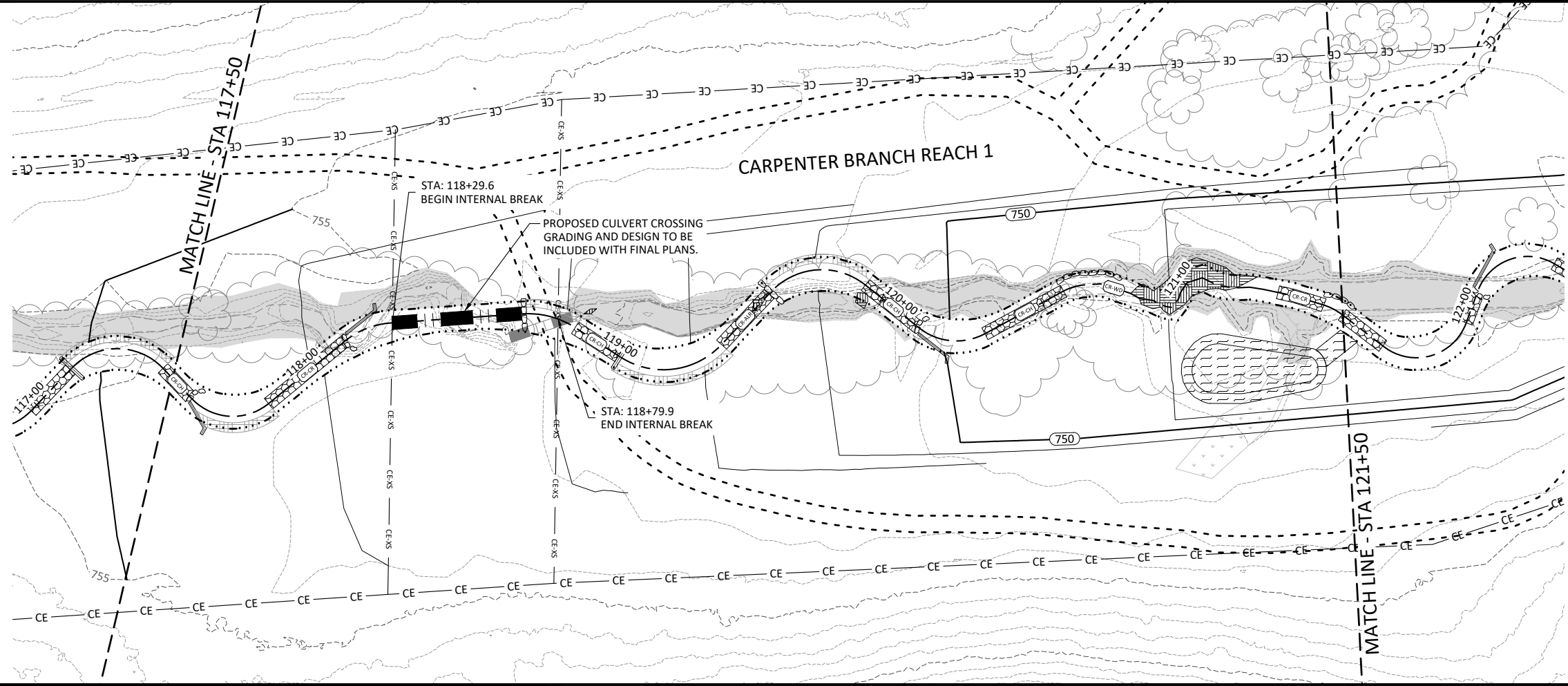
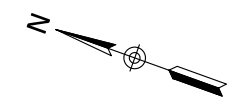
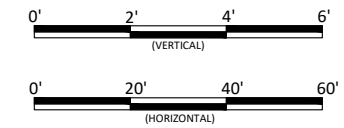
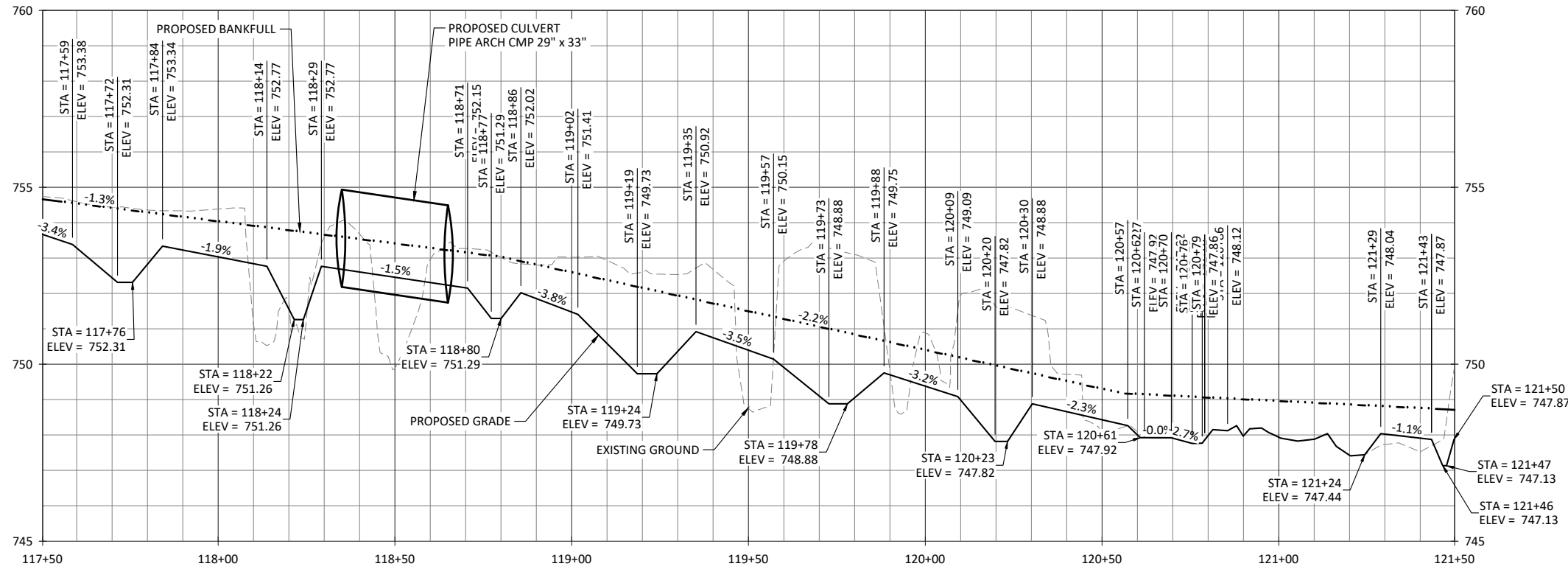
Date: 12.09.2021
Job Number: 005-02179
Project Engineer: EFN
Drawn By: JMS
Checked By: EGR

2.1.4

Sheet



DRAFT



Carpenter Bottom Mitigation Site
Gaston County, North Carolina
Carpenter Branch
Stream Plan and Profile

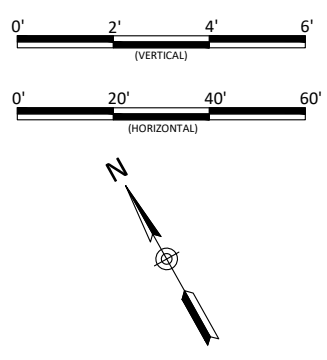
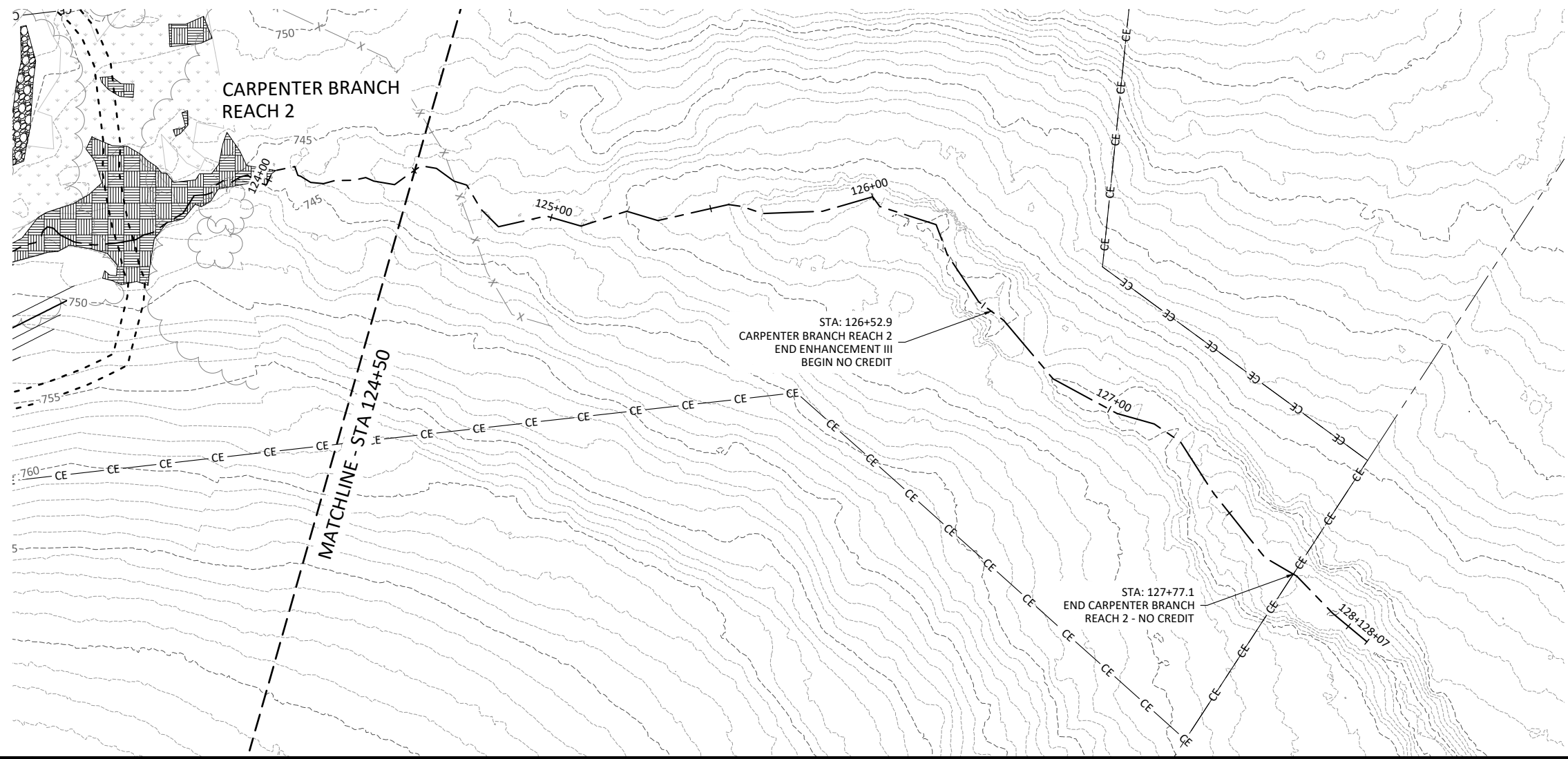
Revisions:

Date: 12-09-2020
Job Number: 005-02179
Project Engineer: EFN
Drawn By: JMS
Checked By: EGR

2.1.5

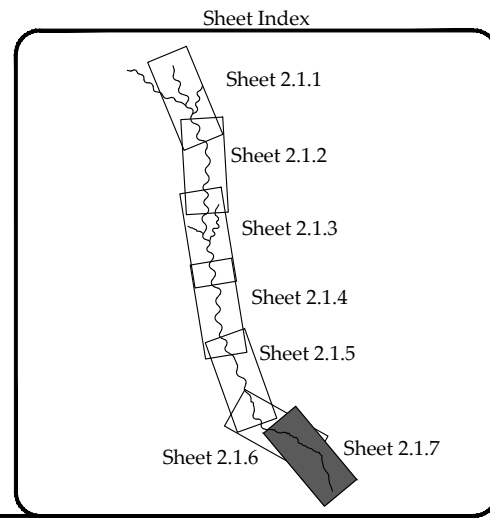
Sheet

DRAFT



DRAFT

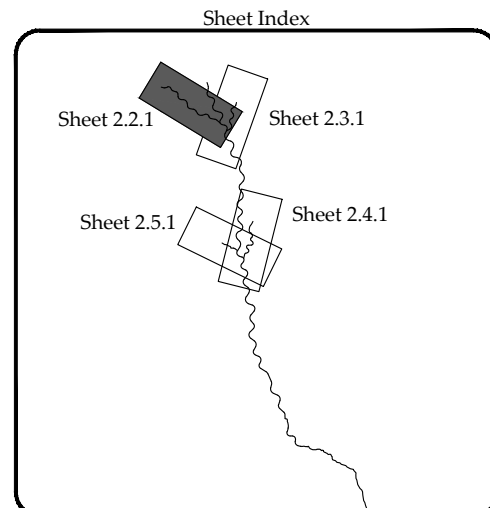
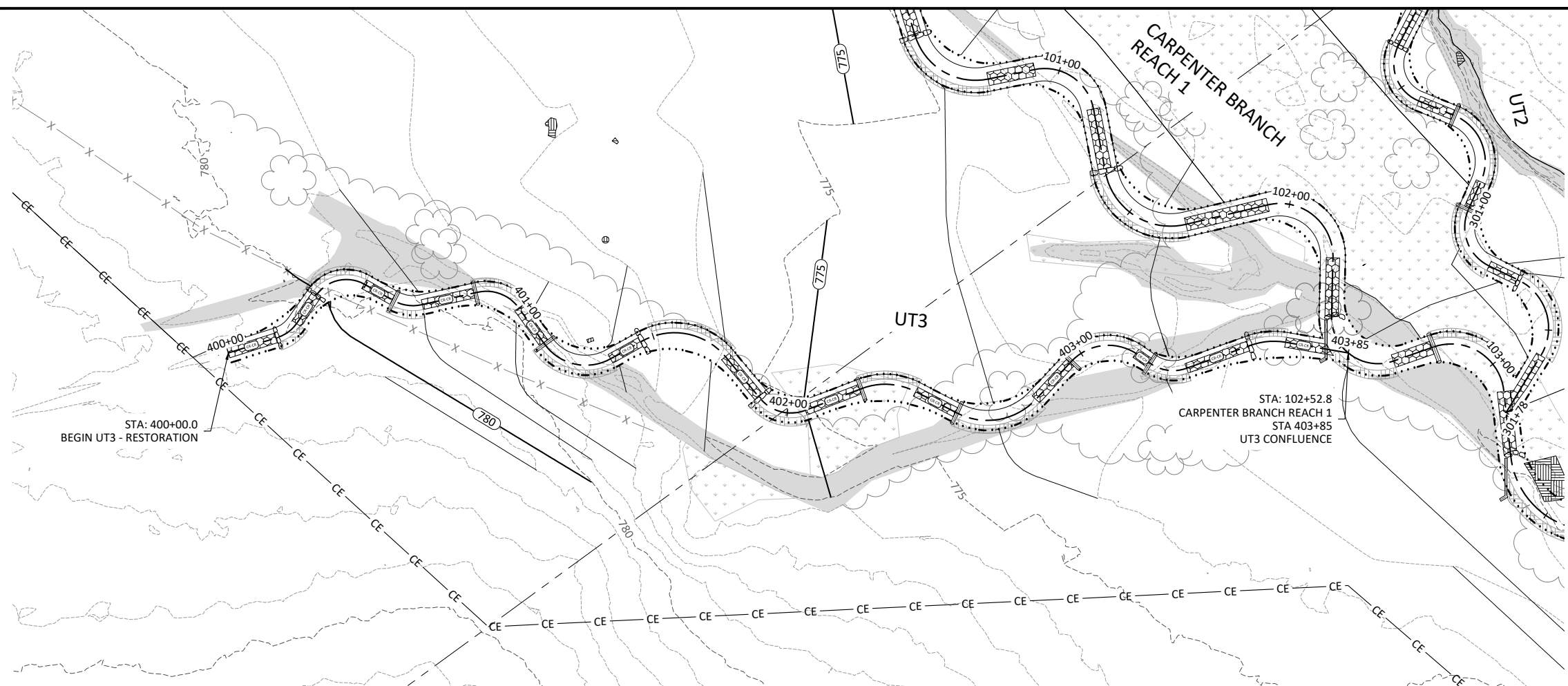
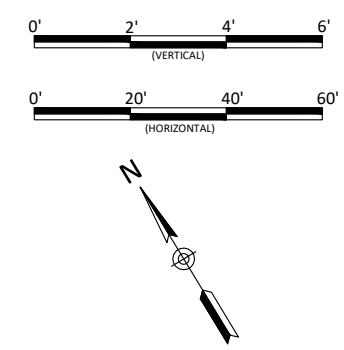
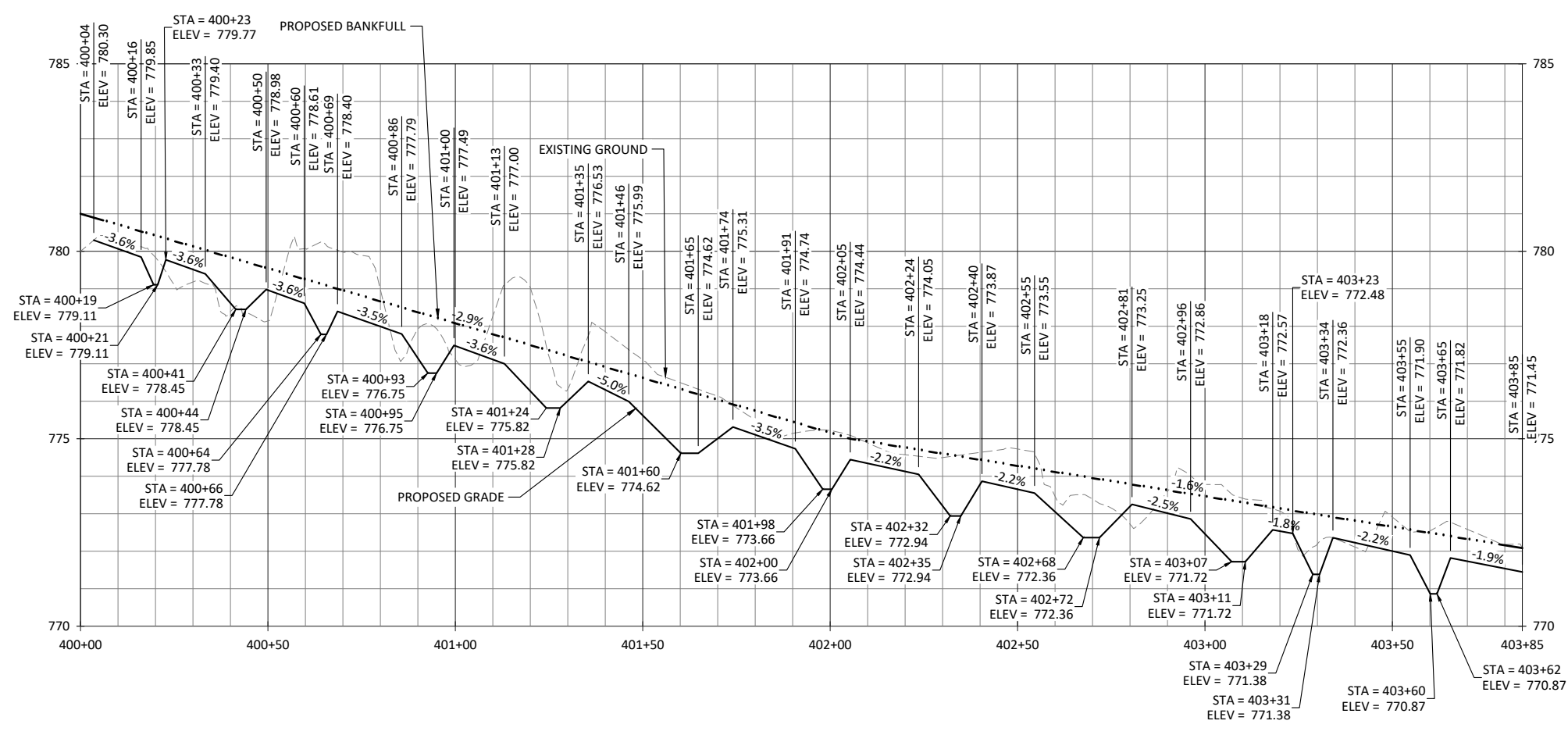
Carpenter Bottom Mitigation Site
Gaston County, North Carolina
Carpenter Branch
Stream Plan and Profile



Revisions:

Date:	12.09.2020
Job Number:	005-02179
Project Engineer:	EJN
Drawn By:	JMS
Checked By:	EGK

2.1.7



Carpenter Bottom Mitigation Site
Gaston County, North Carolina

UT3
Stream Plan and Profile

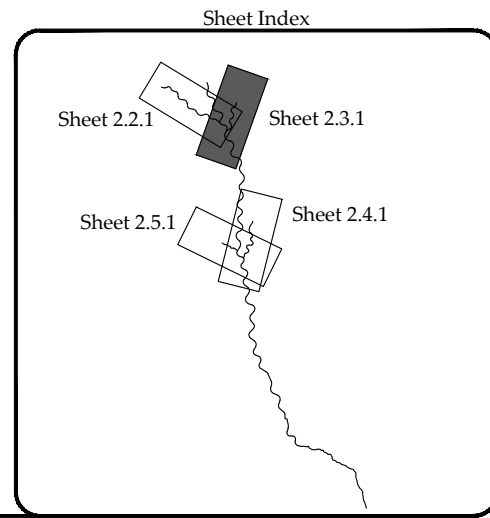
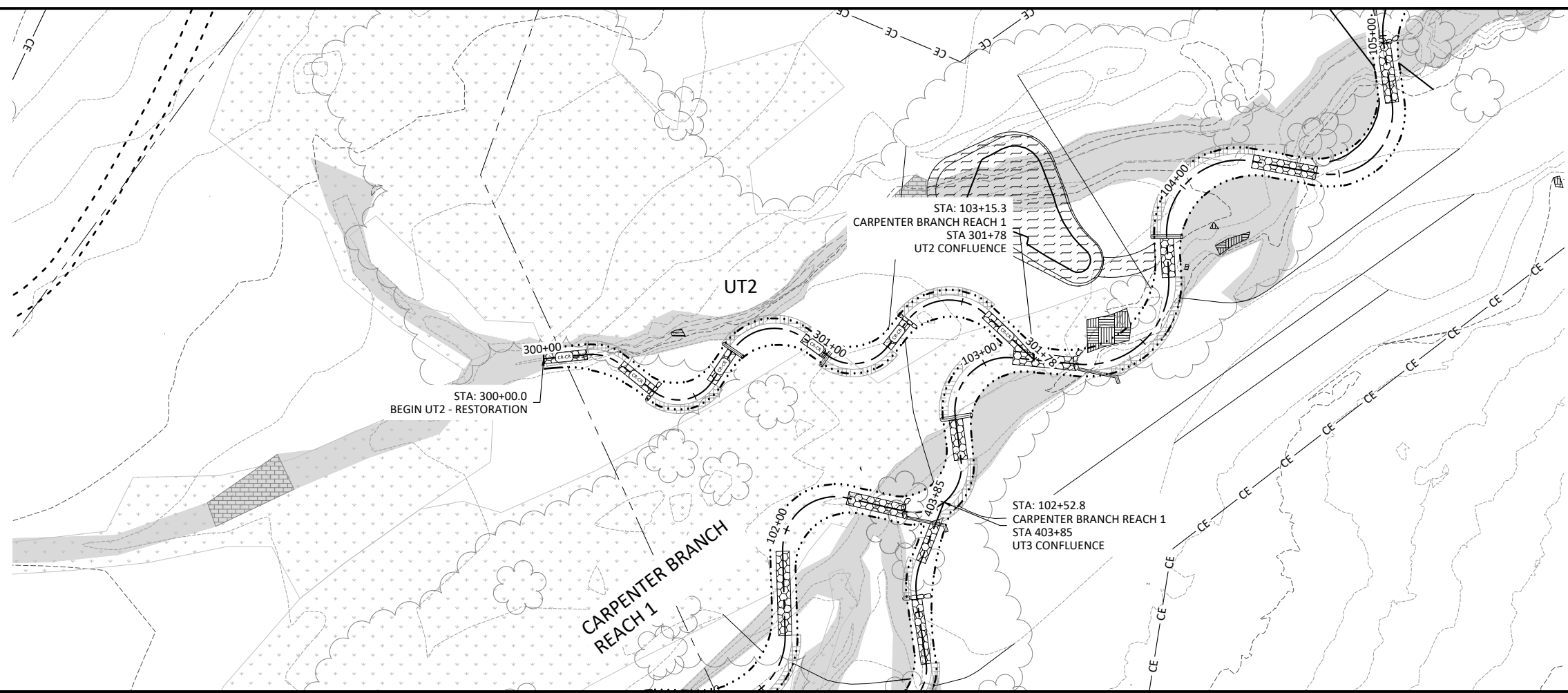
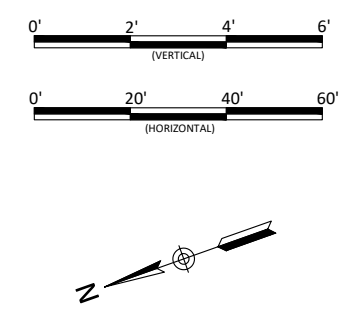
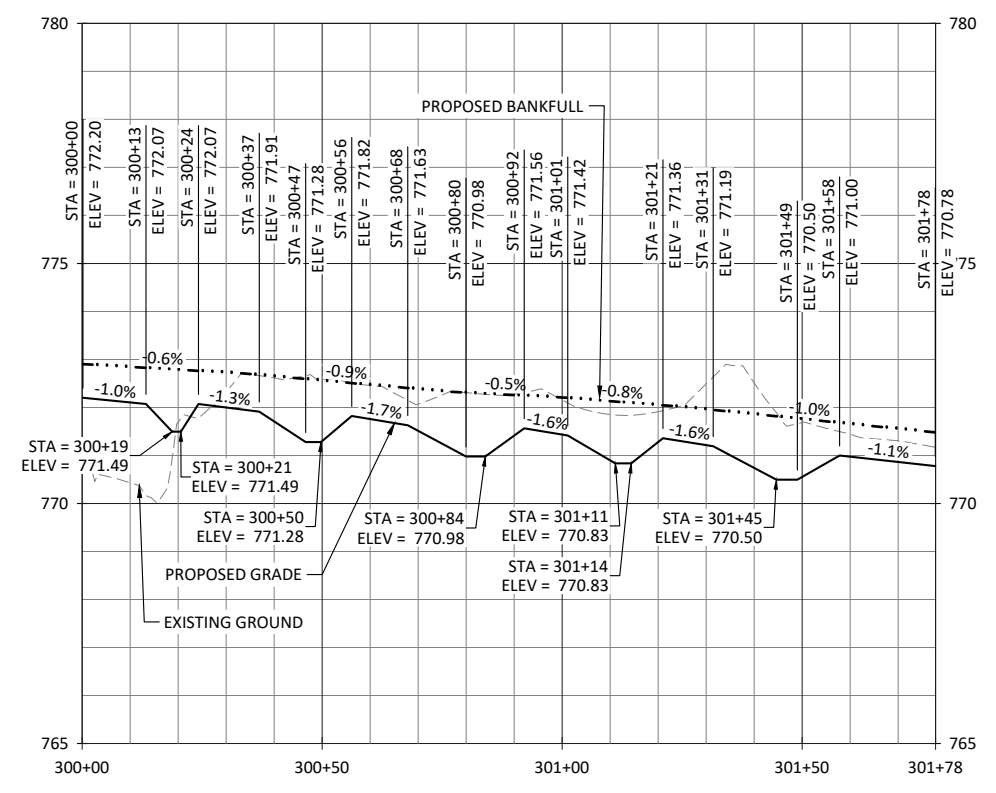
Revisions:

12.09.2020
Job Number: 005-02179
Project Engineer: EFN
Drawn By: JMS
Checked By: EGR

2.2.1

Sheet

DRAFT



Carpenter Bottom Mitigation Site
Gaston County, North Carolina



DRAFT

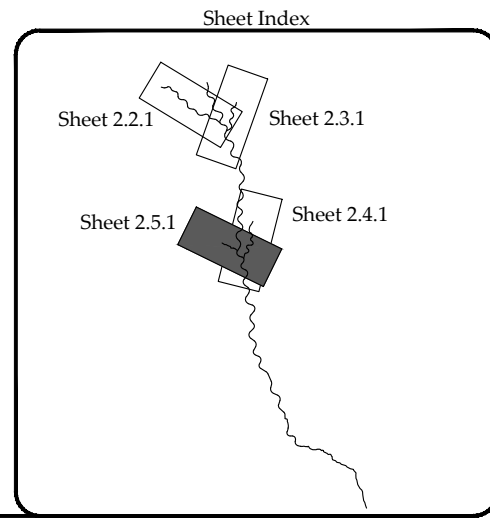
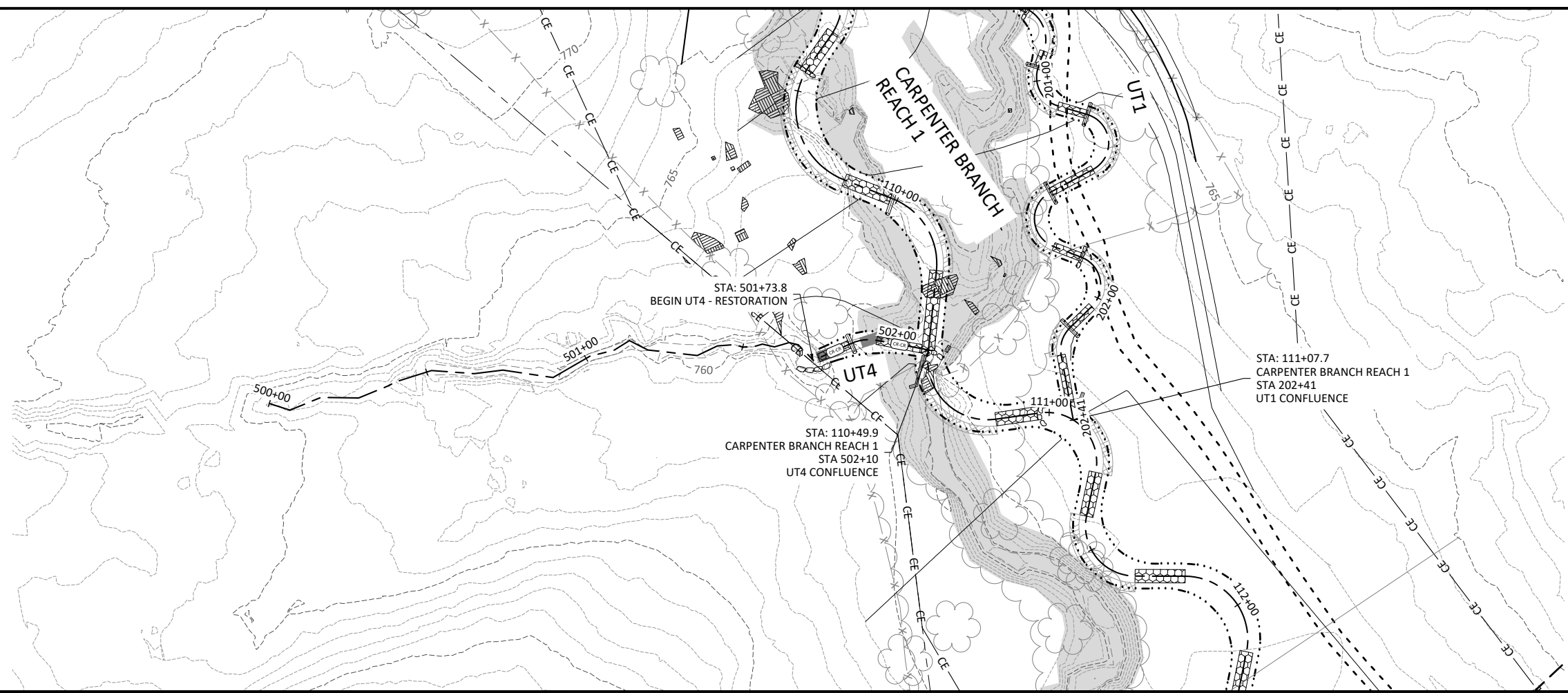
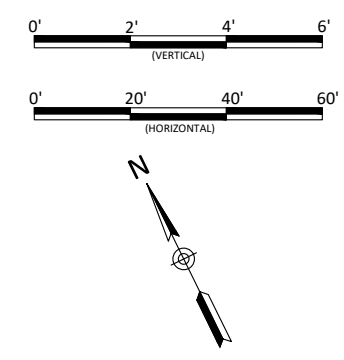
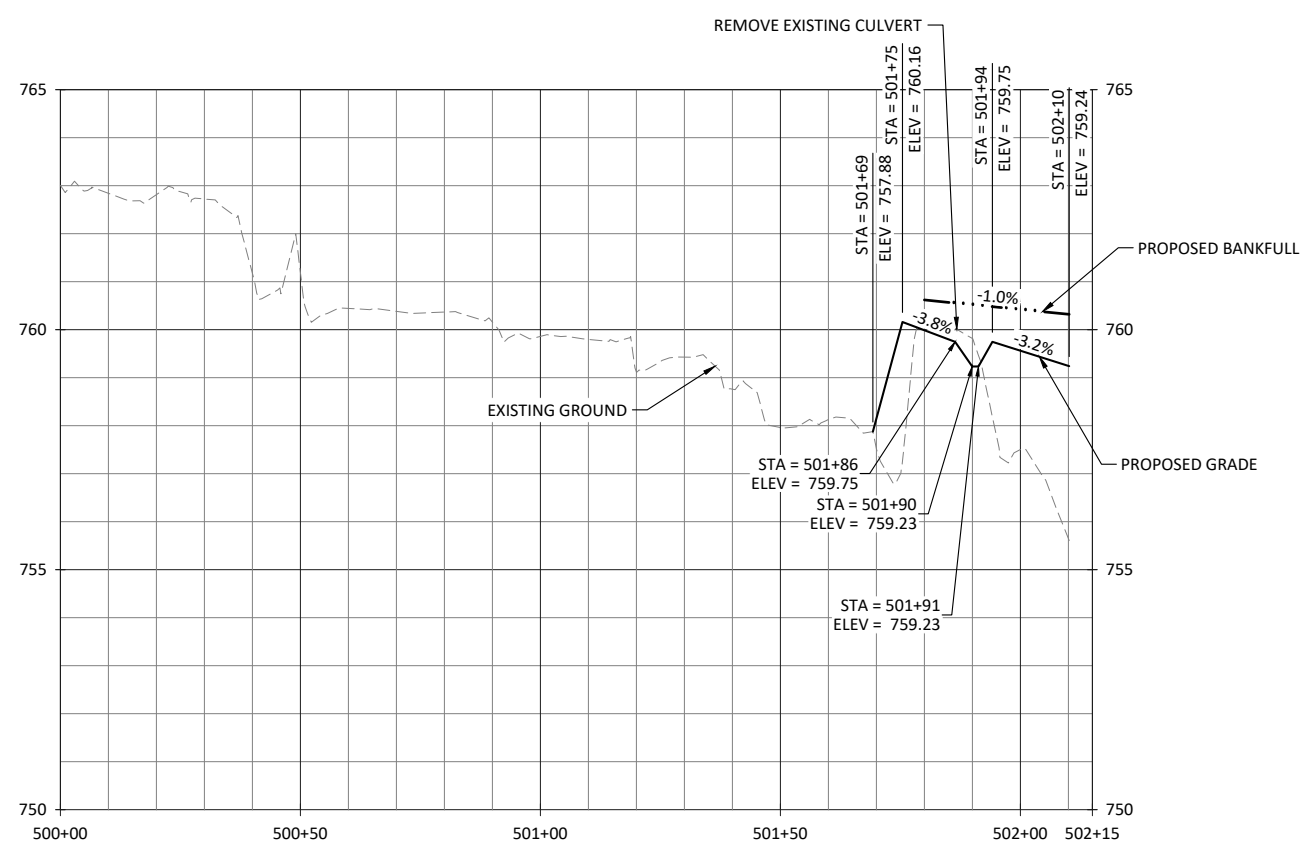
UT2
 Stream Plan and Profile

Revisions:

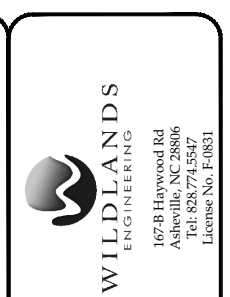
Date: 12.09.2020
 Job Number: 005-02179
 Project Engineer: EFN
 Drawn By: JMS
 Checked By: EGR

2.3.1

Sheet



Carpenter Bottom Mitigation Site
Gaston County, North Carolina



DRAFT

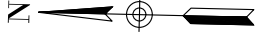
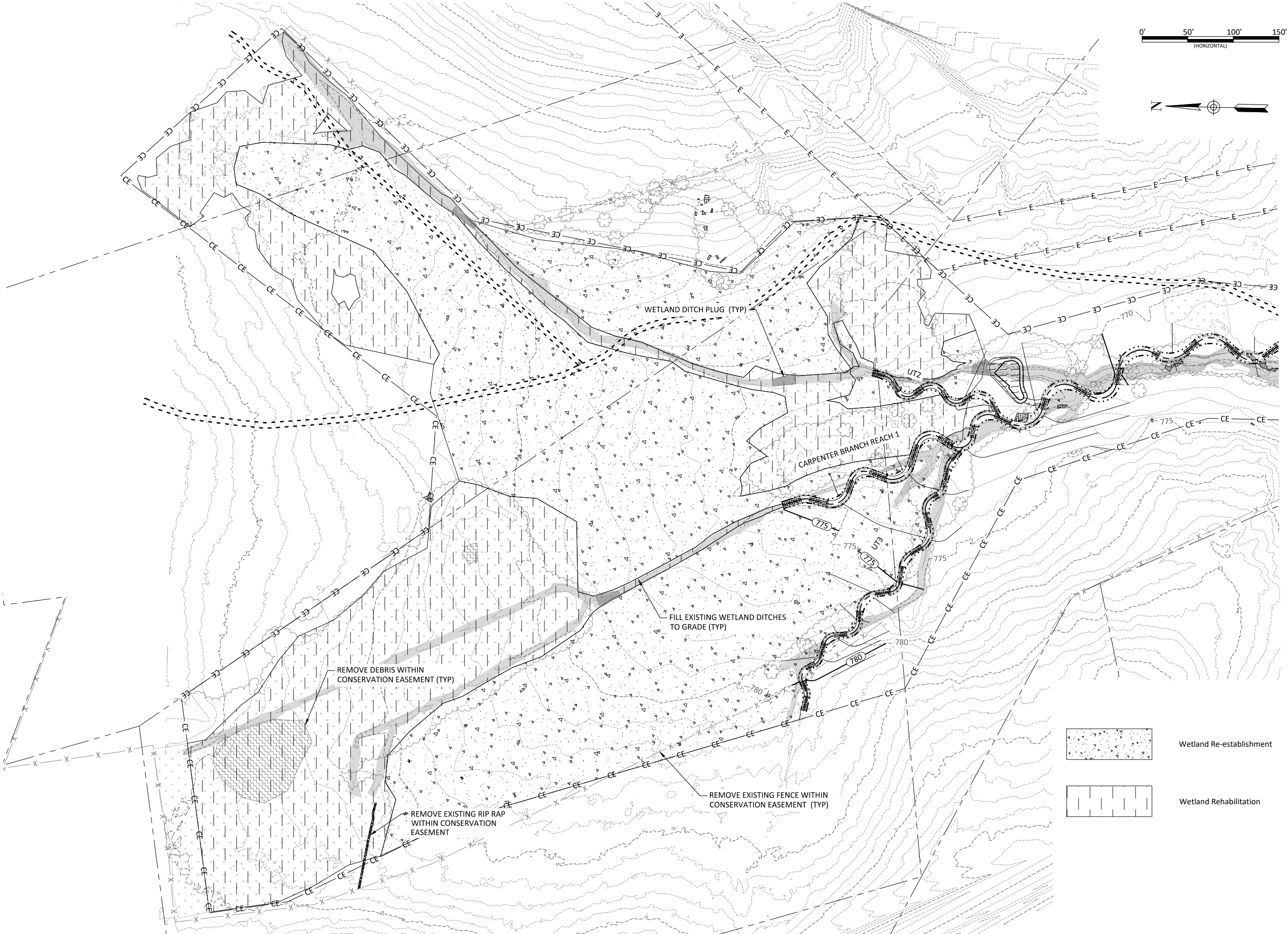
UT4
Stream Plan and Profile

Revisions:

Date: 12.09.2020
Job Number: 005-02179
Project Engineer: EFN
Drawn By: JMS
Checked By: EGR

2.5.1

Sheet



Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Wetland Overview

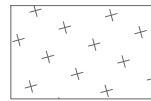
DRAFT

Revisions:

Date: 12.09.2020
 Job Number: 005-02179
 Project Engineer: EFN
 Drawn By: JMS
 Checked By: EGR

3.0

Open Area Buffer Planting



Open Buffer Planting Zone Trees							
Bare Root							
Species	Common Name	Max Spacing	Indiv. Spacing	Min. Caliper Size	Stratum	Wetland Indicator	# of Stems
<i>Acer negundo</i>	Boxelder	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	10%
<i>Platanus occidentalis</i>	Sycamore	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	15%
<i>Betula nigra</i>	River Birch	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	15%
<i>Liriodendron tulipifera</i>	Tulip Poplar	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACU	10%
<i>Quercus Phellos</i>	Willow Oak	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	10%
<i>Fagus grandifolia</i>	American Beech	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACU	10%
<i>Diospyros virginiana</i>	Persimmon	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	5%
<i>Populus deltoides</i>	Eastern Cottonwood	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	10%
Total							90%

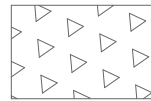
Alternates							
<i>Nyssa sylvatica</i>	Black Gum	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	0%
<i>Acer saccharinum</i>	Silver Maple	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	0%
<i>Ulmus rubra</i>	Slippery Elm	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	0%

Open Buffer Planting Zone Small Trees / Shrubs							
Bare Root							
Species	Common Name	Max Spacing	Indiv. Spacing	Min. Caliper Size	Stratum	Wetland Indicator	# of Stems
<i>Alnus serrulata</i>	Tag Alder	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	OBL	2%
<i>Hamamelis virginiana</i>	Witch Hazel	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	FACU	2%
<i>Cornus florida</i>	Flowering Dogwood	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	FACU	2%
<i>Lindera benzoin</i>	Spicebush	12 ft.	6-12 ft.	0.25"-1.0"	Shrub	FAC	2%
<i>Amelanchier arborea</i>	Serviceberry	12 ft.	6-12 ft.	0.25"-1.0"	Shrub	FAC	2%
Total							10%

Alternates							
<i>Asima triloba</i>	Pawpaw	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	FAC	0%
<i>Carpinus caroliniana</i>	American Hornbeam	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	FAC	0%

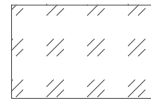
Notes:
Transplants from on-site to be used at Designer's discretion for streambank and floodplain planting. Percentages of each species may be varied at Designer's discretion but shall not exceed 20% per each species. Designer may substitute container plantings or other plantings for bare roots.

Partially Vegetated Buffer Area Planting



Partially Buffer Planting Zone Trees							
Bare Root							
Species	Common Name	Max Spacing	Indiv. Spacing	Min. Caliper Size	Stratum	Wetland Indicator	# of Stems
<i>Carpinus caroliniana</i>	American Hornbeam	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	FAC	10%
<i>Euonymus americana</i>	Strawberry Bush	12 ft.	6-12 ft.	0.25"-1.0"	Shrub	FAC	10%
<i>Lindera benzoin</i>	Spicebush	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	FAC	10%
<i>Fagus grandifolia</i>	American Beech	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACU	10%
<i>Ulmus rubra</i>	Slippery Elm	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	10%
<i>Hamamelis virginiana</i>	Witchhazel	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	FACU	10%
<i>Calycanthus floridus</i>	Sweetshrub	12 ft.	6-12 ft.	0.25"-1.0"	Shrub	FACU	10%
<i>Cornus florida</i>	Flowering Dogwood	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	FACU	10%
<i>Asima triloba</i>	Pawpaw	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	FAC	10%
<i>Quercus rubra</i>	Northern Red Oak	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACU	10%
Total							100%

Wetland Planting



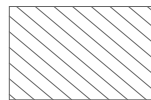
Wetland Planting Zone Trees							
Bare Root							
Species	Common Name	Max Spacing	Indiv. Spacing	Min. Caliper Size	Stratum	Wetland Indicator	# of Stems
<i>Platanus occidentalis</i>	Sycamore	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	15%
<i>Quercus pagoda</i>	Cherrybark Oak	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	15%
<i>Quercus phellos</i>	Willow Oak	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	10%
<i>Ulmus americana</i>	American Elm	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	10%
<i>Nyssa sylvatica</i>	Black Gum	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	5%
<i>Quercus michauxii</i>	Swamp Chestnut Oak	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	10%
<i>Acer negundo</i>	Boxelder	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	5%
<i>Celtis laevigata</i>	Sugarberry	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	5%
<i>Betula nigra</i>	River Birch	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	10%
Total							85%

Alternate							
<i>Acer saccharinum</i>	Silver Maple	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	0%

Wetland Planting Zone Small Trees/Shrubs							
Bare Root							
Species	Common Name	Max Spacing	Indiv. Spacing	Min. Caliper Size	Stratum	Wetland Indicator	# of Stems
<i>Alnus serrulata</i>	Tag Alder	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	OBL	5%
<i>Lindera benzoin</i>	Spicebush	12 ft.	6-12 ft.	0.25"-1.0"	Shrub	FAC	3%
<i>Cephalanthus occidentalis</i>	Buttonbush	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	OBL	5%
<i>Sambucus canadensis</i>	Elderberry	12 ft.	6-12 ft.	0.25"-1.0"	Shrub	FAC	2%
Total							15%

Alternate							
<i>Alnus serrulata</i>	Tag Alder	12 ft.	6-12 ft.	Tubing	Sub-Canopy	OBL	5%

Notes:
Transplants from on-site to be used at Designer's discretion for streambank and floodplain planting. Percentages of each species may be varied at Designer's discretion but shall not exceed 20% per each species. Designer may substitute container plantings or other plantings for bare roots.



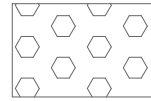
Partially Vegetated Wetland Planting

Partially Vegetated Wetland Planting Zone							
Bare Root							
Species	Common Name	Max Spacing	Indiv. Spacing	Min. Caliper Size	Stratum	Wetland Indicator	# of Stems
<i>Platanus occidentalis</i>	Sycamore	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	15%
<i>Nyssa sylvatica</i>	Black Gum	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	15%
<i>Alnus serrulata</i>	Tag Alder	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	OBL	15%
<i>Acer negundo</i>	Boxelder	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FAC	15%
<i>Celtis laevigata</i>	Sugarberry	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	15%
<i>Cephalanthus occidentalis</i>	Buttonbush	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	OBL	15%
<i>Quercus michauxii</i>	Swamp Chestnut Oak	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	FACW	10%

TEMPORARY SEEDING		
APPROVED DATE	TYPE	PLANTING RATE (lbs/acre)
Jan 1 – May 1	Rye Grain (<i>Secale Cereale</i>)	120
	Ladino clover (<i>Trifolium Repens</i>)	5
	Crimson Clover (<i>Trifolium incarnatum</i>)	5
May 1 – Aug 15	Straw Mulch	4,000
	German Millet (<i>Setaria italica</i>)	40
	Ladino clover (<i>Trifolium Repens</i>)	5
	Crimson Clover (<i>Trifolium incarnatum</i>)	5
Aug 15 – Dec 31	Straw Mulch	4,000
	Rye Grain (<i>Secale Cereale</i>)	120
	Ladino clover (<i>Trifolium Repens</i>)	5
	Crimson Clover (<i>Trifolium incarnatum</i>)	5

Notes:
Rates of fertilizer and lime if necessary can be found in the site preparation plan included in the specification documents.

Riparian Corridor Planting (Streambanks)



Streambank Planting Zone						
Live Stakes						
Species	Common Name	Max Spacing	Indiv. Spacing	Min. Size	Stratum	% of Stems
<i>Salix nigra</i>	Black Willow	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	25%
<i>Cornus amomum</i>	Silky Dogwood	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	20%
<i>Salix sericea</i>	Silky Willow	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	25%
<i>Cephalanthus occidentalis</i>	Buttonbush	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	15%
<i>Sambucus canadensis</i>	Elderberry	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	15%
Total						100%

Herbaceous Plugs						
<i>Juncus effusus</i>	Common Rush	5 ft.	3-5 ft.	1.0"-2.0" plug	Herb	40%
<i>Carex crinita</i>	Fringed Sedge	5 ft.	3-5 ft.	1.0"-2.0" plug	Herb	10%
<i>Carex lurida</i>	Lurid Sedge	5 ft.	3-5 ft.	1.0"-2.0" plug	Herb	20%
<i>Carex lupulina</i>	Hop Sedge	5 ft.	3-5 ft.	1.0"-2.0" plug	Herb	15%
<i>Scirpus cyperinus</i>	Woolgrass	5 ft.	3-5 ft.	1.0"-2.0" plug	Herb	15%
Total						100%

Note: See live staking and herbaceous plugs detail.

Permanent Seeding

Riparian Seeding - Open Canopy					
Pure Live Seed (20 lbs/ acre)					
Approved Date	Species Name	Common Name	Stratum	Wetland Indicator	Density (lbs/acre)
All Year	<i>Schizachyrium scoparium</i>	Little Bluestem	Herb	FACU	4.0
All Year	<i>Panicum virgatum</i>	Switchgrass	Herb	FAC	2.0
All Year	<i>Panicum rigidulum</i>	Redtop Panicgrass	Herb	FACW	1.0
All Year	<i>Rudbeckia hirta</i>	Blackeyed Susan	Herb	FACU	1.0
All Year	<i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis	Herb	FACU	1.0
All Year	<i>Carex vulpinoidea</i>	Fox Sedge	Herb	OBL	1.0
All Year	<i>Panicum clandestinum</i>	Deertongue	Herb	FAC	2.0
All Year	<i>Elymus virginicus</i>	Virginia Wild Rye	Herb	FACW	2.0
All Year	<i>Sorghastrum nutans</i>	Indiangrass	Herb	FACU	3.0
All Year	<i>Bidens aristosa</i>	Showy Tickseed Sunflower	Herb	FACW	1.0
All Year	<i>Helianthus angustifolia</i>	Narrowleaf Sunflower	Herb	FACW	1.0
All Year	<i>Coreopsis tinctoria</i>	Plains coreopsis	Herb	FAC	1.0

Wetland Seeding - Open Canopy					
Pure Live Seed (20 lbs/ acre)					
Approved Date	Species Name	Common Name	Stratum	Wetland Indicator	Density (lbs/acre)
All Year	<i>Coleataenia anceps</i>	Beaked Panicgrass	Herb	FAC	3.0
All Year	<i>Carex vulpinoidea</i>	Fox Sedge	Herb	OBL	2.0
All Year	<i>Elymus virginicus</i>	Virginia Wild Rye	Herb	FACW	4.0
All Year	<i>Bidens aristosa</i>	Showy Tickseed Sunflower	Herb	FACW	3.0
All Year	<i>Panicum cirgatum</i>	Switchgrass	Herb	FAC	3.0
All Year	<i>Polygonum pensylvanicum</i>	Smartweed	Herb	FACW	1.0
All Year	<i>Juncus effusus</i>	Common Rush	Herb	OBL	2.0
All Year	<i>Panicum dichotomiflorum</i>	Smooth Panicgrass	Herb	FACW	2.0

Notes:
Apply Permanent Riparian seeding in all disturbed areas within Conservation Easement. Apply Permanent seeding in all other disturbed areas per specification.

Stabilization Seeding

Stabilization Seeding		
Pure Live Seed (32 lbs/ac)		
Species Name	Common Name	lbs/acre
<i>Festuca arundinacea</i>	Fescue (KY 31)	20
<i>Dactylis glomerata</i>	Orchard Grass	12

Note:
1. "STABILIZATION SEEDING" is for areas of disturbance outside conservation easement.
2. ground stabilization shall be established within 7 days of grading completion for slopes steeper than 4:1 and within 14 days for slopes 4:1 or flatter. permanent ground cover shall be established for all disturbed areas within 15 working days or 90 calendar days (whichever is shorter) following completion of construction.

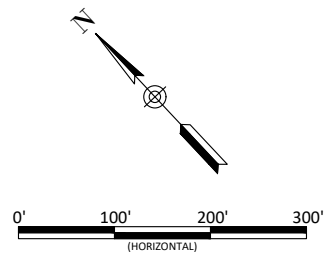
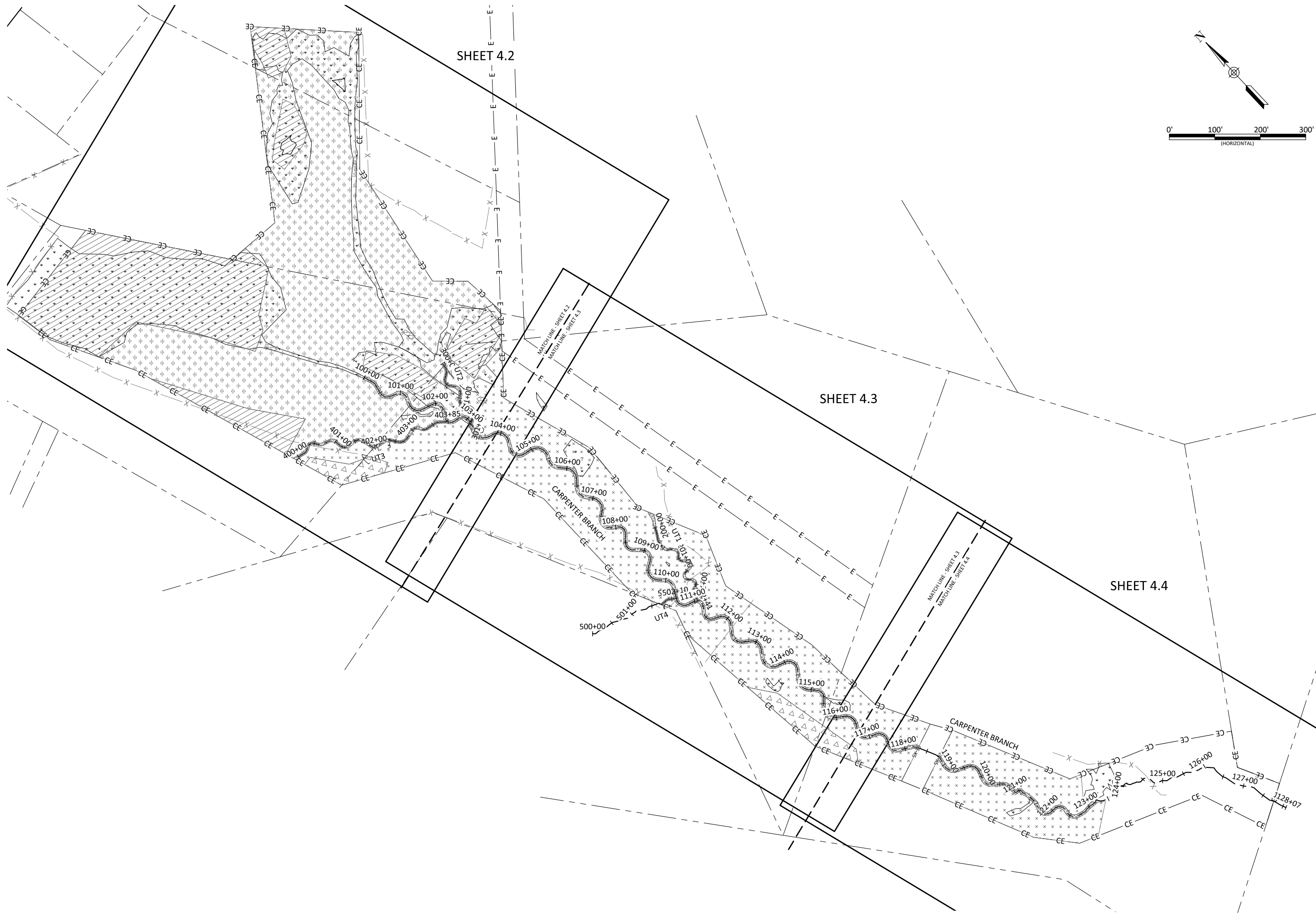
Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Planting Plan

Date: 12-09-2021
Job Number: 005-02179
Project Engineer: EFN
Drawn By: JMS
Checked By: ECR

4.0

DRAFT



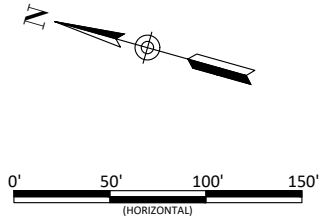
DRAFT

Carpenter Bottom Mitigation Site
Gaston County, North Carolina
 Planting Overview
 Planting Plan

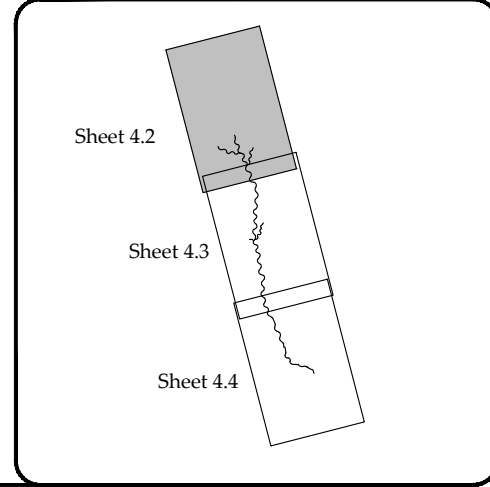
Revisions:

Date: 12.09.2020
 Job Number: 005-02179
 Project Engineer: EFN
 Drawn By: JMS
 Checked By: EGR

4.1



MATCH LINE - SHEET 4.3



Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Planting Plan

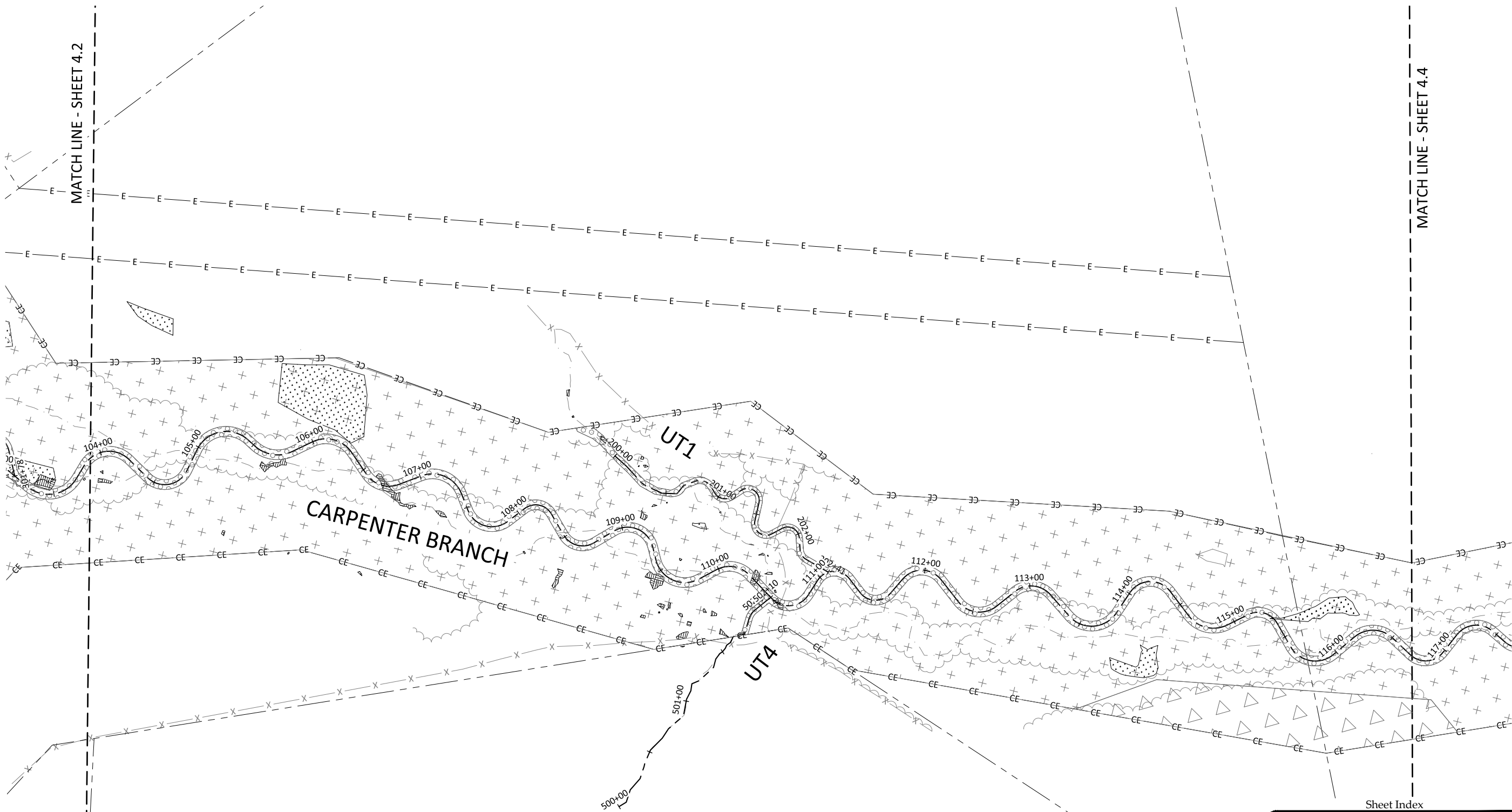
Revisions:

Date: 12.09.2021
 Job Number: 005-02179
 Project Engineer: EFN
 Drawn By: JMS
 Checked By: EGR

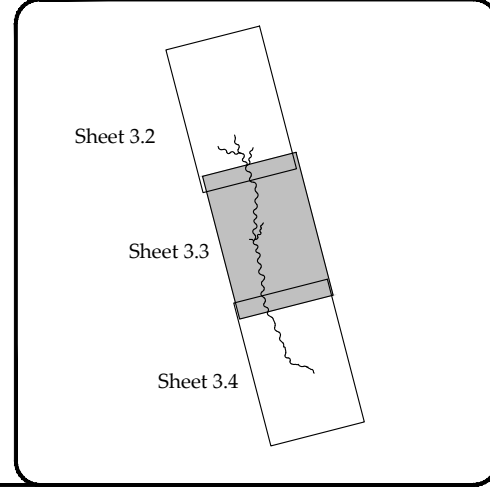
4.2

Sheet

DRAFT



Sheet Index



Carpenter Bottom Mitigation Site
 Gaston County, North Carolina

Planting Plan

Revisions:

Date: 12.09.2020
 Job Number: 005-02179
 Project Engineer: EFN
 Drawn By: JMS
 Checked By: EGR

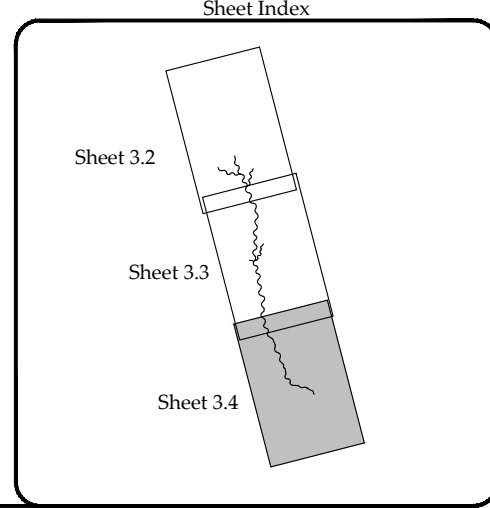
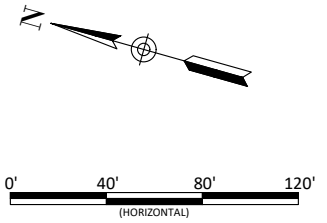
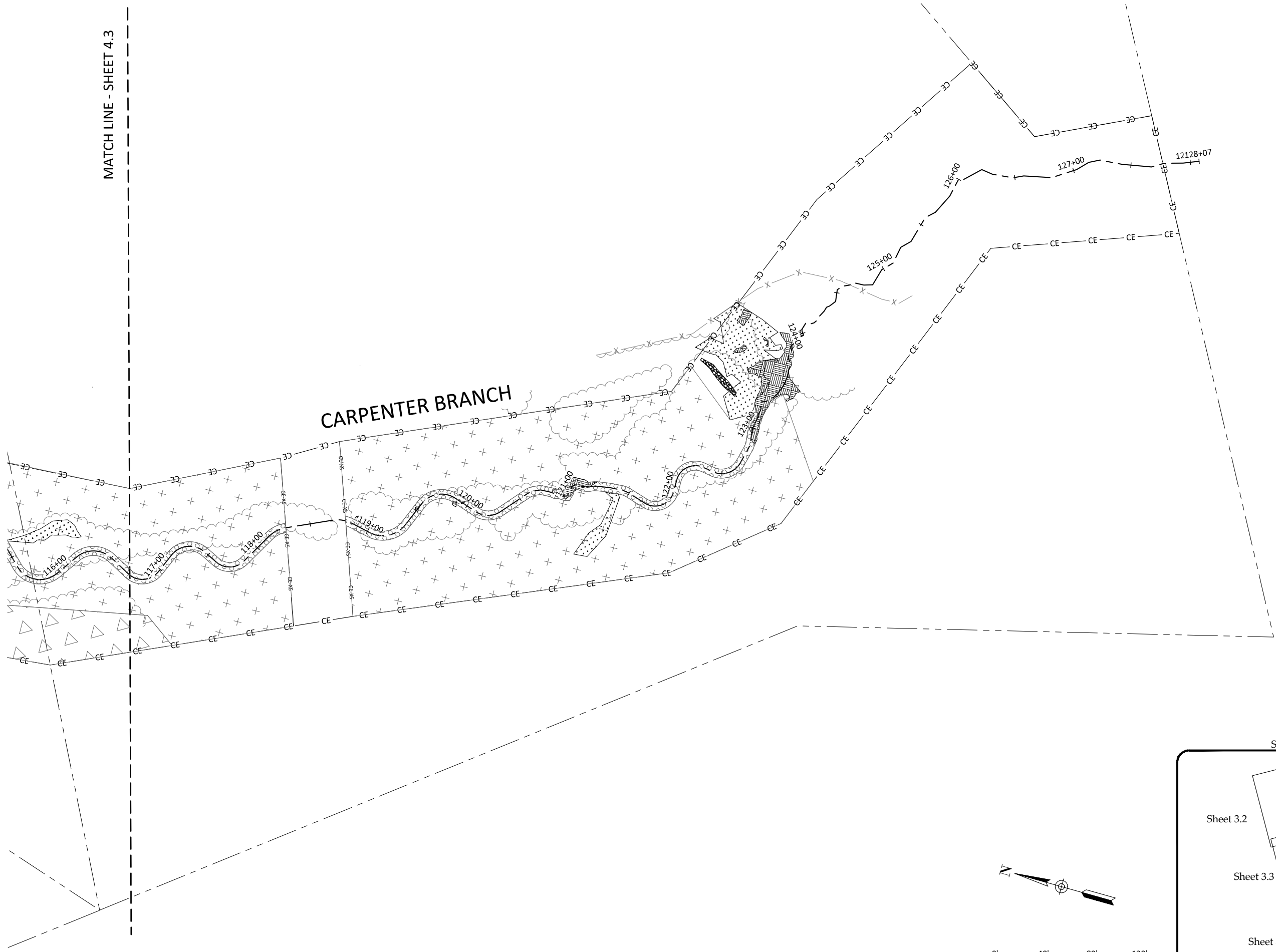
4.3

Sheet

DRAFT

MATCH LINE - SHEET 4.3

CARPENTER BRANCH



Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Planting Plan

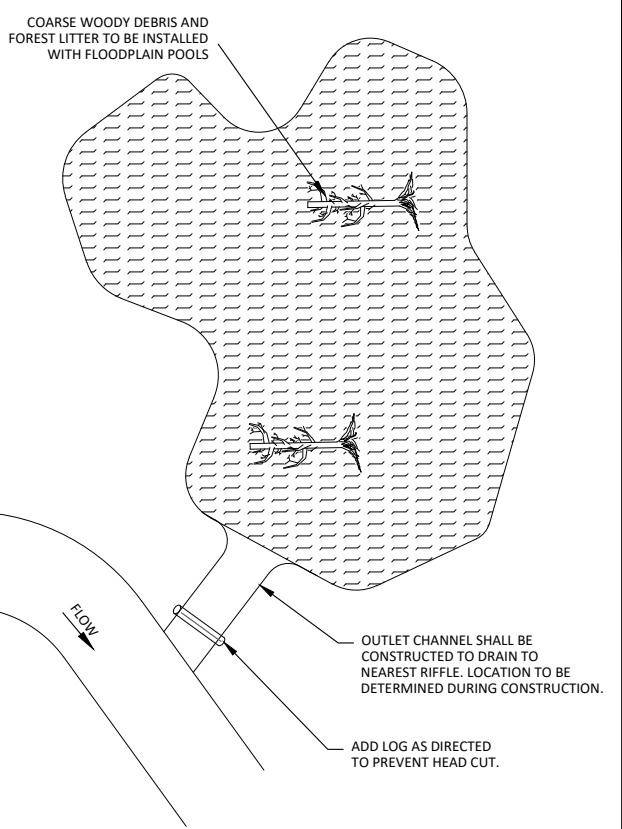
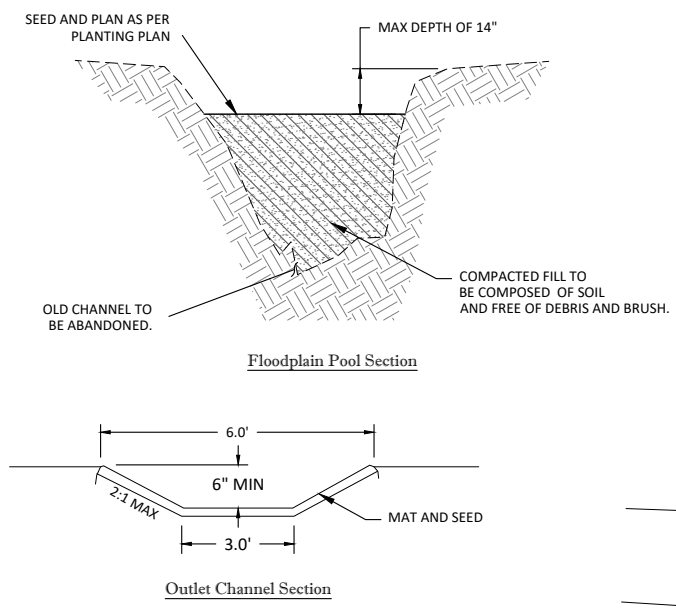
Revisions:

Date:	12.09.2020
Job Number:	005-02179
Project Engineer:	EJN
Drawn By:	JMS
Checked By:	EGR

4.4

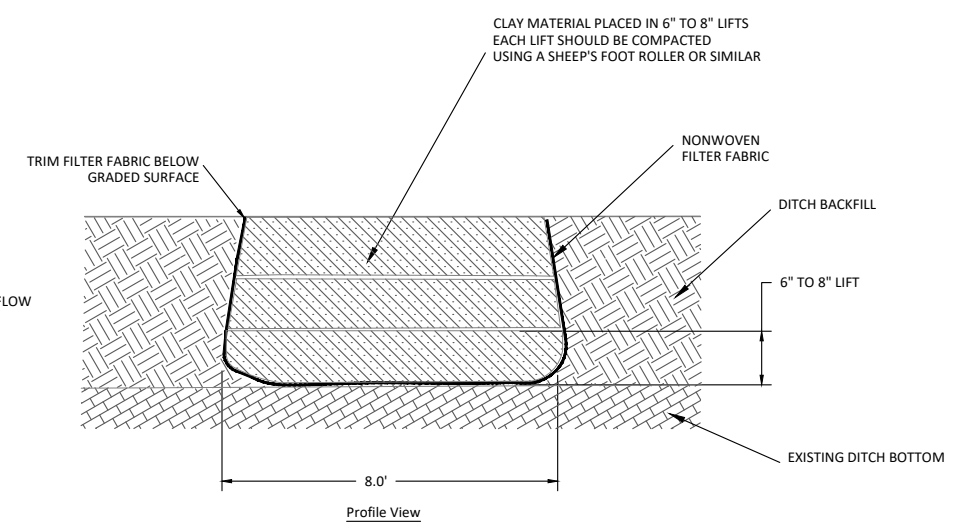
Sheet

DRAFT

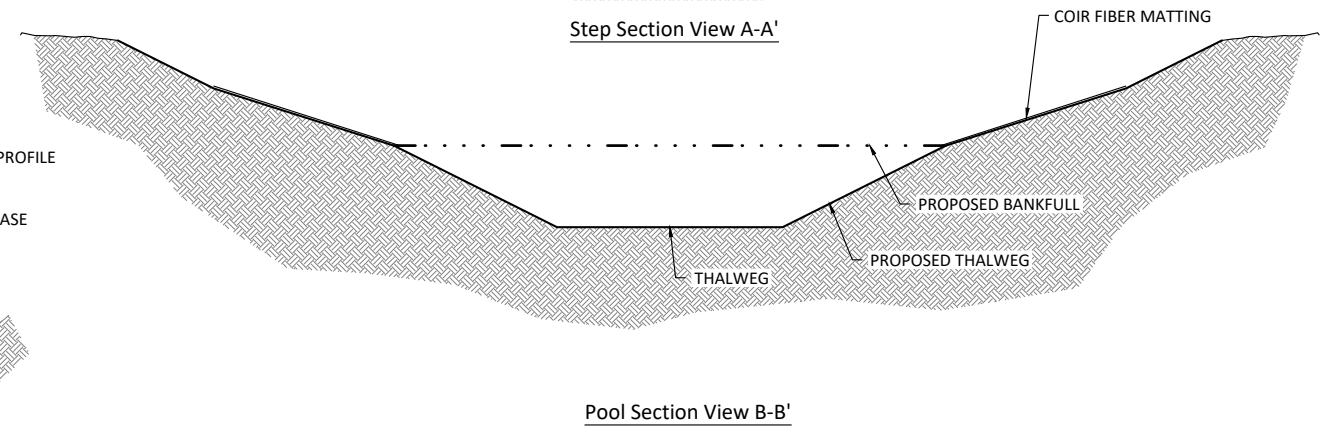
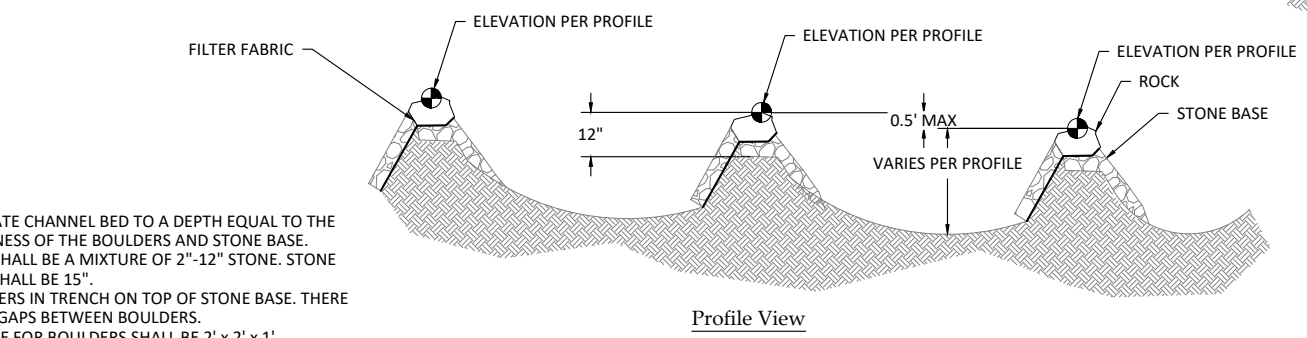
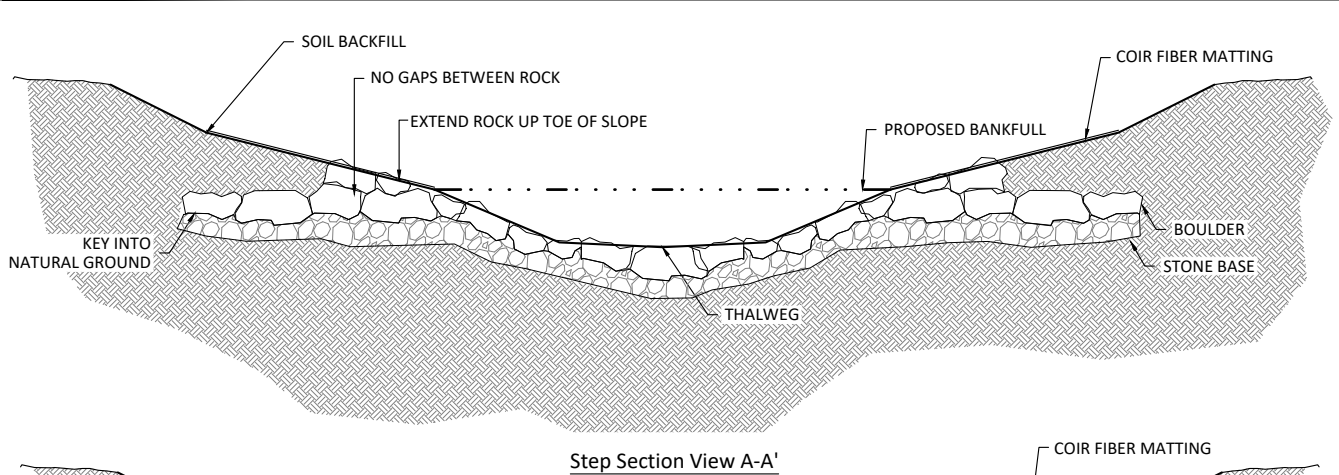
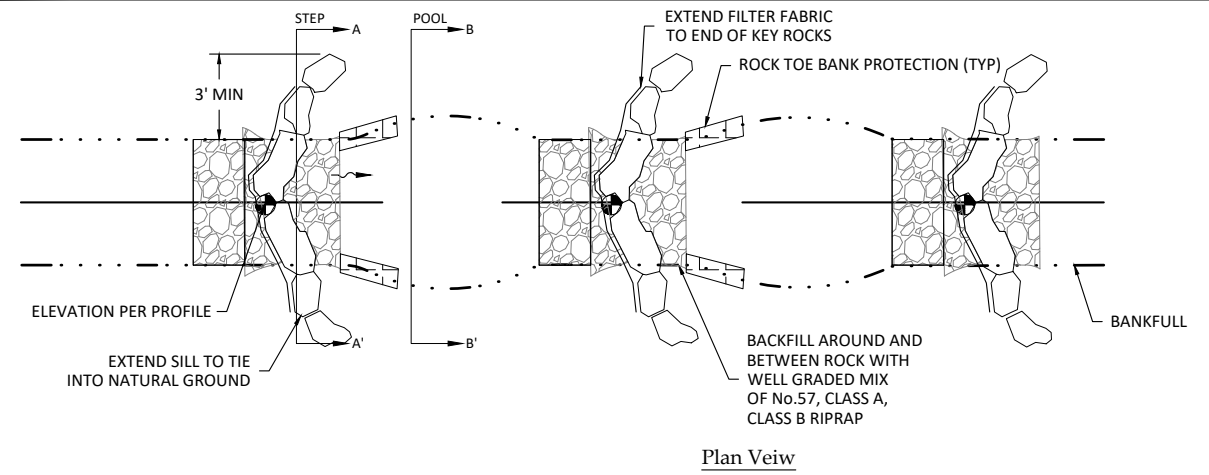


1
6.2 Floodplain Pool
Not to Scale

- NOTES:**
- CLAY MATERIAL TO BE APPROVED BY ENGINEER OR ON-SITE INSPECTOR.
 - ALL WOODY AND HERBACEOUS VEGETATION MUST BE REMOVED FROM AREA TO BE PLUGGED PRIOR TO INSTALLATION
 - PLUG SHOULD EXTEND FROM TOP OF DITCH TO TOP OF DITCH WITHIN THE DITCH CROSS SECTION
 - LOCATIONS MAY VARY FROM AREAS AS SHOWN ON PLANS WITH APPROVAL FROM ENGINEER.



3
6.2 Wetland Ditch Plug
Not to Scale



- NOTES:**
- OVER-EXCAVATE CHANNEL BED TO A DEPTH EQUAL TO THE TOTAL THICKNESS OF THE BOULDERS AND STONE BASE.
 - STONE BASE SHALL BE A MIXTURE OF 2"-12" STONE. STONE BASE DEPTH SHALL BE 15".
 - PLACE BOULDERS IN TRENCH ON TOP OF STONE BASE. THERE SHALL BE NO GAPS BETWEEN BOULDERS.
 - MINIMUM SIZE FOR BOULDERS SHALL BE 2' x 2' x 1'.
 - PLACE BACKFILL MATERIAL BEHIND THE ROCKS AND FILTER FABRIC.
 - FILTER FABRIC TO EXTEND 5'.
 - PLACE COARSE BACKFILL BEHIND ROCKS AND FILTER FABRIC ENSURING THAT ANY VOIDS BETWEEN THE ROCKS ARE FILLED.

2
6.2 Step-Pool BMP (UT1)
Not to Scale

DRAFT

Details

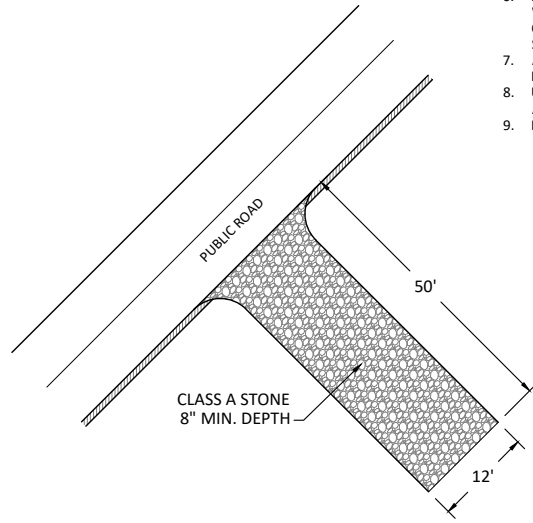
Revisions:

Date: 12.09.2010
Job Number: 005-02179
Project Engineer: EFN
Drawn By: JMS
Checked By: EGR

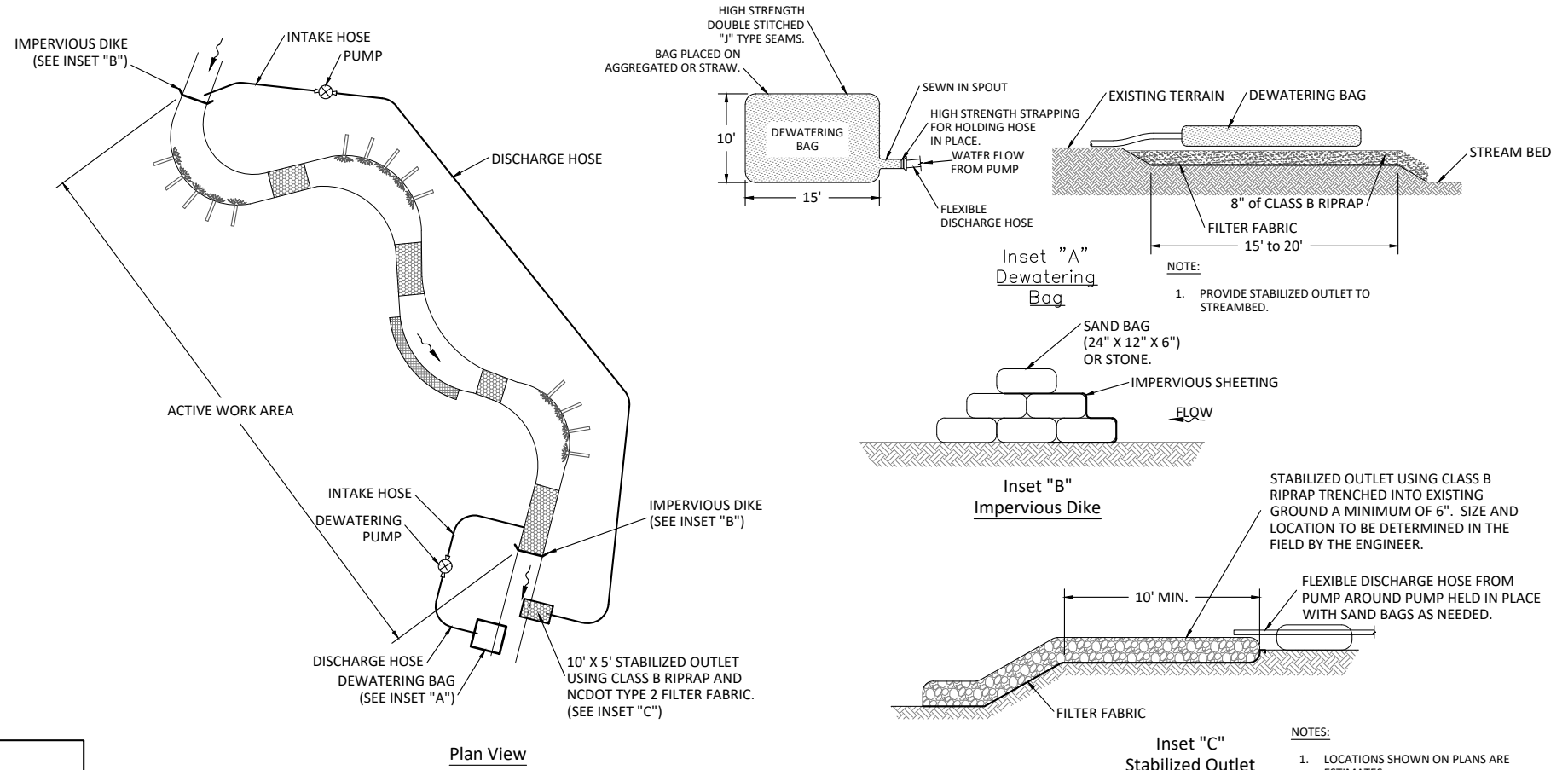
6.2

NOTES:

1. PROVIDE TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS.
5. LOCATE CONSTRUCTION ENTRANCE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. PROVIDE FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE.
6. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOP DRESSING WITH STONE WILL BE NECESSARY.
7. ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED IMMEDIATELY.
8. USE CLASS A STONE OR OTHER COARSE AGGREGATE APPROVED BY THE ENGINEER.
9. PLACE FILTER FABRIC BENEATH STONE.



1
6.5 Construction Entrance
Not to Scale



2
6.5 Pump Around System
Not to Scale

To be included with final plans

3
6.5 Permanent Culvert Crossing
Not to Scale

DRAFT

Carpenter Bottom Mitigation Site
Gaston County, North Carolina

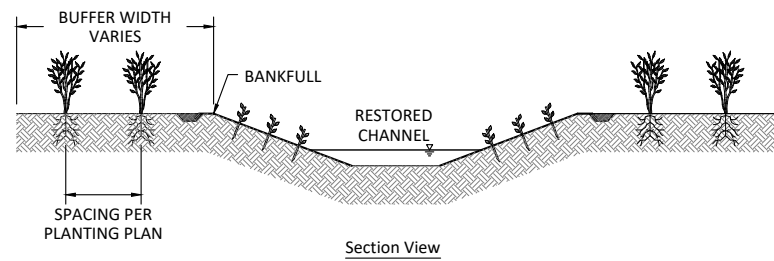
Details

Revisions:

Date:	12.09.2010
Job Number:	05-02179
Project Engineer:	EJN
Drawn By:	JMS
Checked By:	EGR

6.5

Sheet



DIBBLE BAR

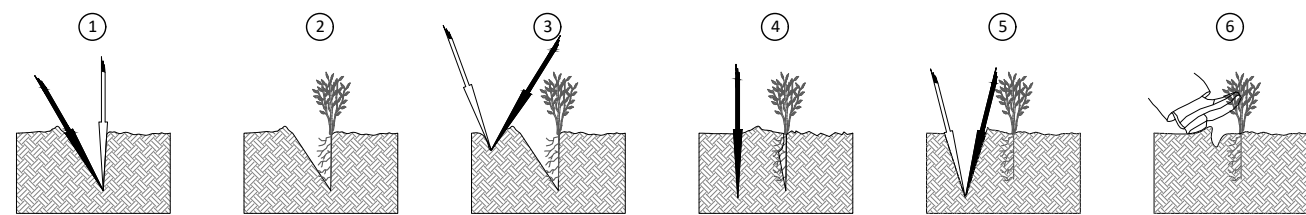
PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS-SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.

ROOTING PRUNING

ALL ROOTS SHALL BE PRUNED TO AN APPROPRIATE LENGTH TO PREVENT J-ROOTING.

NOTES:

1. ALL SOILS WITHIN THE BUFFER PLANTING AREA SHALL BE DISKED, AS REQUIRED, PRIOR TO PLANTING.
2. ALL PLANTS SHALL BE PROPERLY HANDLED PRIOR TO INSTALLATION TO INSURE SURVIVAL.



INSERT THE DIBBLE, OR SHOVEL, STRAIGHT DOWN INTO THE SOIL TO THE FULL DEPTH OF THE PLANTING HOLE. (DO NOT ROCK THE SHOVEL BACK AND FORTH AS THIS CAUSES SOIL IN THE PLANTING HOLE TO BE COMPACTED, INHIBITING ROOT GROWTH.)

REMOVE THE DIBBLE, OR SHOVEL, AND PUSH THE SEEDLING ROOTS DEEP INTO THE PLANTING HOLE. PULL THE SEEDLING BACK UP TO THE CORRECT PLANTING DEPTH (THE ROOT COLLAR SHOULD BE 1 TO 3 INCHES BELOW THE SOIL SURFACE). GENTLY SHAKE THE SEEDLING TO ALLOW THE ROOTS TO STRAIGHTEN OUT. DO NOT TWIST OR SPIN THE SEEDLING OR LEAVE THE ROOTS J-ROOTED.

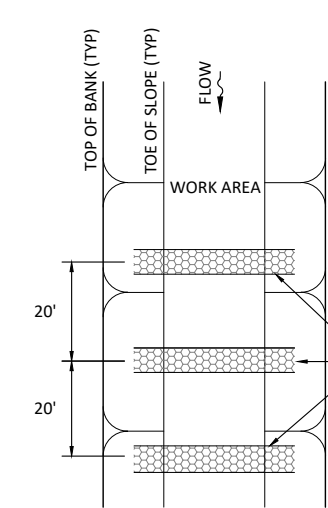
INSERT THE DIBBLE, OR SHOVEL, SEVERAL INCHES IN FRONT OF THE SEEDLING AND PUSH THE BLADE HALFWAY INTO THE SOIL. TWIST AND PUSH THE HANDLE FORWARD TO CLOSE THE TOP OF THE SLIT TO HOLD THE SEEDLING IN PLACE.

PUSH THE DIBBLE, OR SHOVEL, DOWN TO THE FULL DEPTH OF THE BLADE.

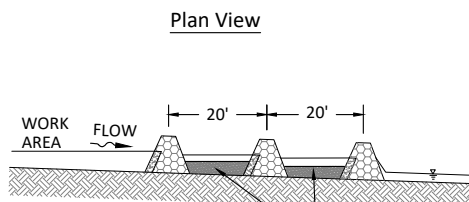
PULL BACK ON THE HANDLE TO CLOSE THE BOTTOM OF THE PLANTING HOLD. THEN PUSH FORWARD TO CLOSE THE TOP, ELIMINATING AIR POCKETS AROUND THE ROOT.

REMOVE THE DIBBLE, OR SHOVEL, AND CLOSE AND FIRM UP THE OPENING WITH YOUR HEEL. BE CAREFUL TO AVOID DAMAGING THE SEEDLING.

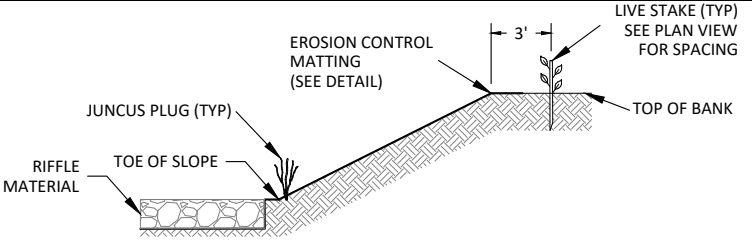
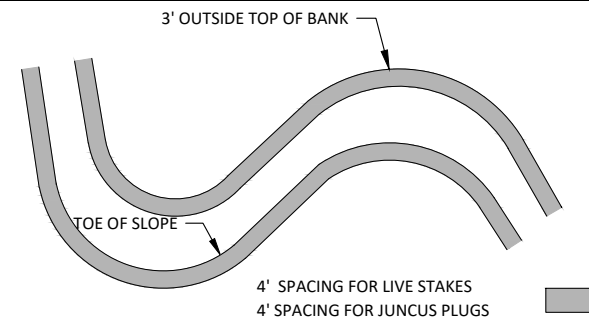
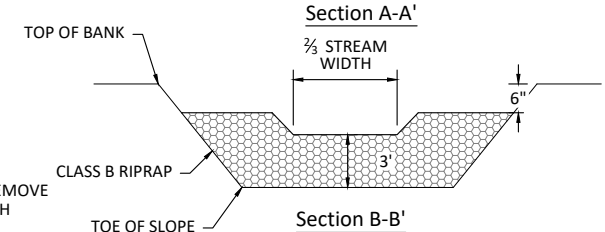
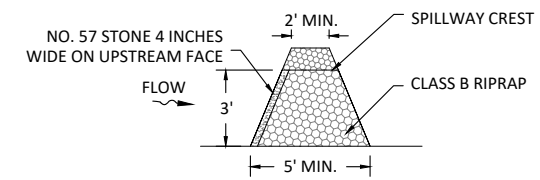
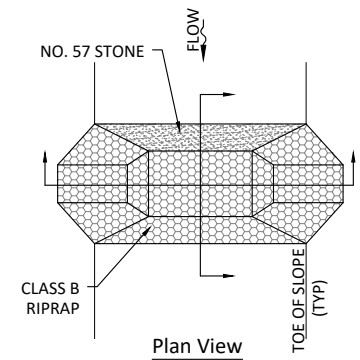
1 Bare Root Planting
6.6 Not to Scale



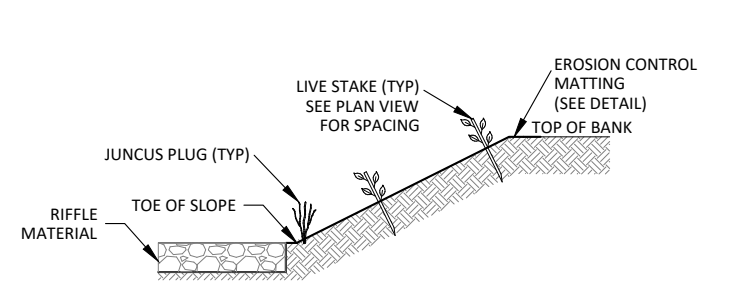
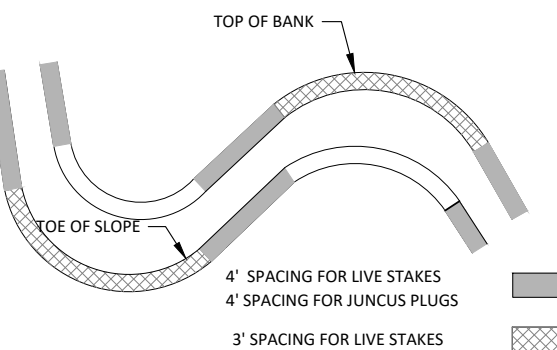
INSTALL AND MAINTAIN THREE CHECK DAMS LOCATED AT DOWNSTREAM LIMITS OF PROJECT.



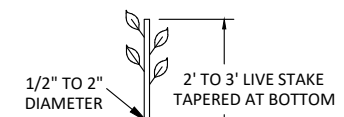
2 Temporary Rock Sediment Dam
6.6 Not to Scale



Section View - UT1, UT2, UT3, UT4



Section View - Carpenter Branch



3 Streambank Planting
6.6 Not to Scale

- NOTE:**
1. LIVE STAKES TO BE PLANTED IN AREAS AS SHOWN ON DETAIL AND DIRECTED BY THE ENGINEER.

DRAFT

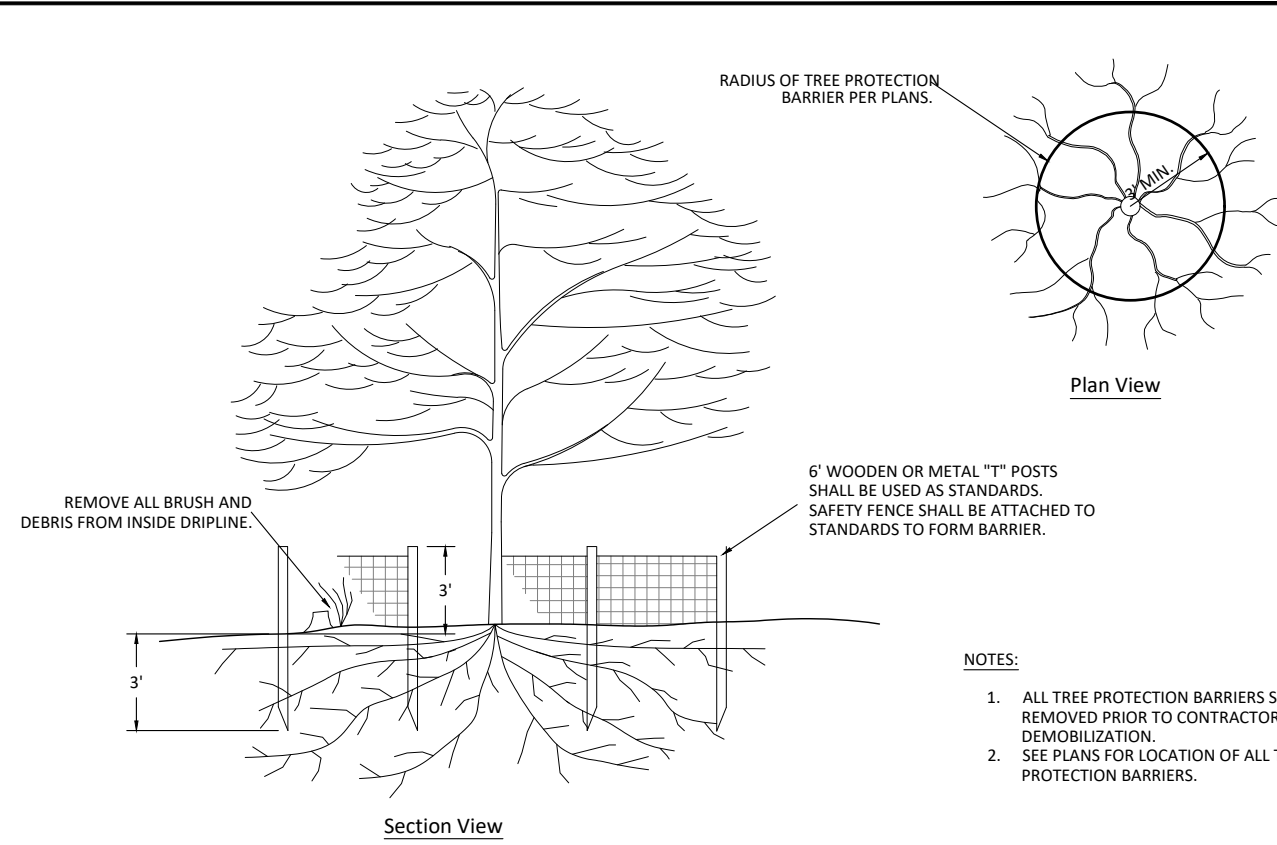
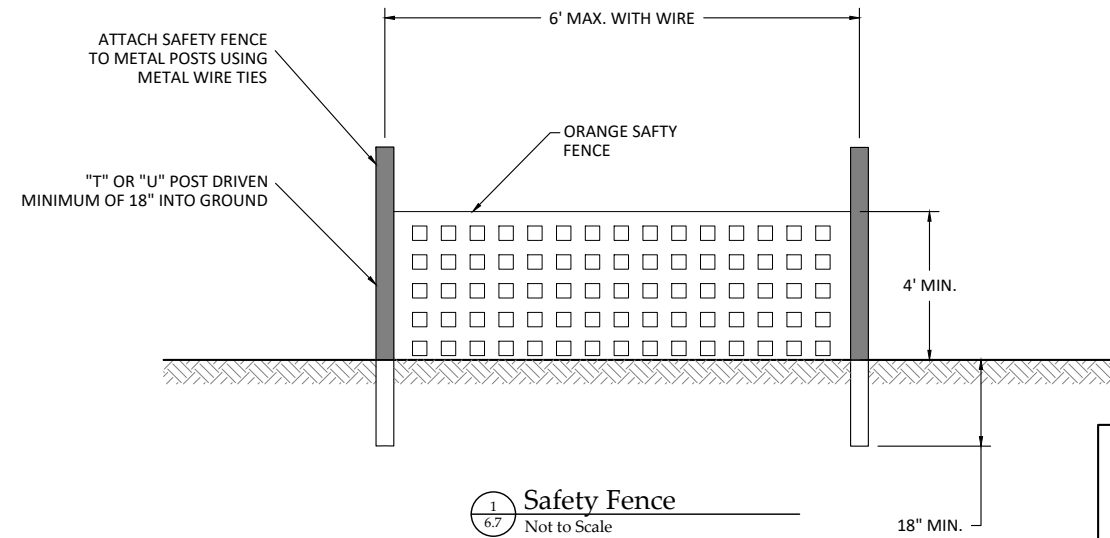
Details

Revisions:

Date: 12.09.2010
Job Number: 05-02179
Project Engineer: EFN
Drawn By: JMS
Checked By: EGR

6.6

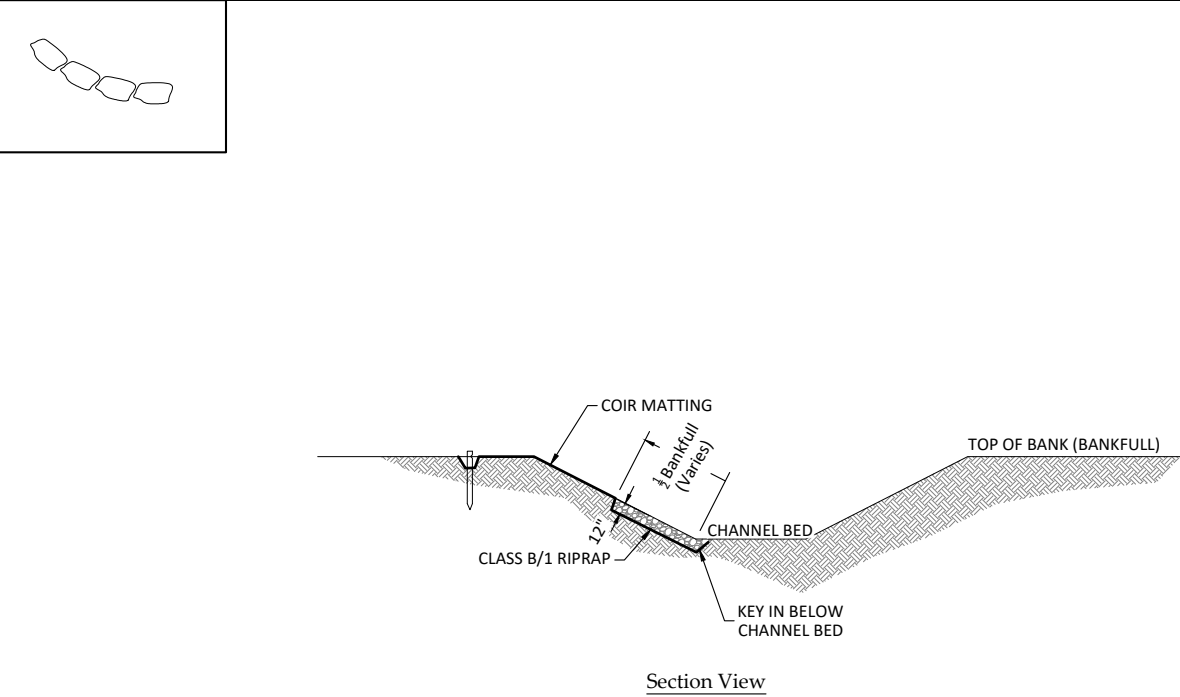
MATERIAL SPECIFICATIONS		
PHYSICAL PROPERTY	TESTS	REQUIREMENTS
MATERIAL	N/A	POLYETHYLENE
RECOMENDED COLOR	N/A	"INTERNATIONAL ORANGE"
TENSILE YIELD	ASTM D638	AVE. 2000 LBS. PER 4" WIDE
ULTIMATE TENSILE STRENGTH	ASTM D638	AVE. 2900 LBS. PER 4" WIDE
ELONGATION AT BREAK (%)	ASTM D638	GREATER THAN 1000%
CHEMICAL RESISTANCE	N/A	INERT TO MOST CHEMICALS AND ACIDS



- NOTES:
1. ALL TREE PROTECTION BARRIERS SHALL BE REMOVED PRIOR TO CONTRACTOR DEMOBILIZATION.
 2. SEE PLANS FOR LOCATION OF ALL TREE PROTECTION BARRIERS.

To be included with final plans

3 Structure Sizing
6.7



- NOTES:
1. VOID SPACES SHOULD BE HAND CHINKED.

4 Rock Toe
6.7 Not to Scale

DRAFT

Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Details

Revisions:

Date:	12.09.2010
Job Number:	05-02179
Project Engineer:	EJN
Drawn By:	JMS
Checked By:	EGR

6.7

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION A: SELF-INSPECTION

Self-inspections are required during normal business hours in accordance with the table below. When adverse weather or site conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection may be delayed until the next business day on which it is safe to perform the inspection. In addition, when a storm event of equal to or greater than 1.0 inch occurs outside of normal business hours, the self-inspection shall be performed upon the commencement of the next business day. Any time when inspections were delayed shall be noted in the Inspection Record.

Table with 3 columns: Inspect, Frequency (during normal business hours), and Inspection records must include:.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

The approved E&SC plan as well as any approved deviation shall be kept on the site. The approved E&SC plan must be kept up-to-date throughout the coverage under this permit. The following items pertaining to the E&SC plan shall be documented in the manner described:

Table with 2 columns: Item to Document and Documentation Requirements.

2. Additional Documentation

In addition to the E&SC Plan documents above, the following items shall be kept on the site and available for agency inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

- (a) This general permit as well as the certificate of coverage, after it is received.
(b) Records of inspections made during the previous 30 days.
(c) All data used to complete the Notice of Intent and older inspection records shall be maintained for a period of three years after project completion and made available upon request.

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that must be reported

Permittees shall report the following occurrences:

- (a) Visible sediment deposition in a stream or wetland.
(b) Oil spills if:
(c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act.
(d) Anticipated bypasses and unanticipated bypasses.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Division's Emergency Response personnel at (800) 662-7956, (800) 858-0368 or (919) 733-3300.

Table with 2 columns: Occurrence and Reporting Timeframes (After Discovery) and Other Requirements.

NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING

EFFECTIVE: 04/01/19

1 Self-inspection, Recordkeeping and Reporting

6.9 Not to Scale

DRAFT

Carpenter Bottom Mitigation Site
Gaston County, North Carolina

Details

Revisions table with columns for revision number and description.

Date: 12/09/2010, Job Number: 005-02179, Project Engineer: EFN, Drawn By: JMS, Checked By: EGR

6.9

APPENDIX 9
Invasive Vegetation Treatment Plan

Appendix 9 Invasive Vegetation Treatment 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. If, during the monitoring period, invasive species threaten the survivability of planted woody vegetation in an area that exceeds 1% of the planted easement acreage, the invasive species shall be treated. Smaller areas may be treated at the discretion of the project engineer and biologist, if deemed in the best interest of the Site. Generally, the treatment plan shall follow the below guidelines in Table 1 for common invasive species found in riparian areas; however, the treatment may be changed based on the professional judgement of the project engineer and biologist. For invasive species not listed in the below table that threaten the survivability of the planted woody vegetation, Wildlands shall notify DMS of the invasive species observed and the plan for treatment prior to treating the species. All invasive species treatment will be reported in the following year's monitoring plan.

Table 1. Invasive Species Treatment – Carpenter Bottom Mitigation Site

Invasive Species	Recommended Treatment Technique
<p>Japanese Honeysuckle (<i>Lonicera japonica</i>)</p>	<p>Small infestations of <i>L. japonica</i> can be pulled by hand. Monitor to remove any re-sprouts. Care should be taken to bag and remove the plants, including mature fruits to prevent re-establishment. Large infestations of <i>L. japonica</i> will usually require a combination of cut stump and foliar herbicide treatments. Where vines have grown into the tree canopy, cut stems as close to the ground as possible. Treat the freshly cut surface of the rooted stem with a 25 percent solution of glyphosate or triclopyr. Remove the twining vines to prevent them from girdling and killing desirable vegetation. Groundcovers of <i>L. japonica</i> can be treated with a foliar solution of 2 percent glyphosate or triclopyr plus a 0.5 percent non-ionic surfactant to thoroughly wet all the leaves.</p>
<p>Chinese Privet (<i>Ligustrum sinense</i>)</p>	<p>Thoroughly wet all leaves with one of the following herbicides in water with a surfactant: a glyphosate herbicide as a 3-percent solution (12 ounces per 3-gallon mix) in the late fall or early winter when safety to surrounding vegetation is desired, or elsewhere, Arsenal AC* as a 1-percent solution (4 ounces per 3-gallon mix). Backpack mist blowers can broadcast glyphosate as a 3-percent solution (12 ounces per 3-gallon mix) or Escort XP* at 1 ounce per acre (0.2 dry ounces per 3-gallon mix and 10 gallons per acre) during winter for safety to dormant hardwoods. Summer applications of glyphosate may not be as effective as other times and require a higher percent solution. The best time for Arsenal AC* and Escort XP* is summer to fall. For stems too tall for foliar sprays and when safety to surrounding vegetation is desired, apply a basal spray of Garlon 4 as a 20-percent solution (5 pints per 3-gallon mix) in a labeled basal oil product, vegetable oil or mineral oil with a penetrant, or fuel oil or diesel fuel (where permitted); or undiluted Pathfinder II. Elsewhere, apply Stalker* as a 6- to 9-percent solution (1.5 to 2 pints per 3-gallon mix) in a labeled basal oil product, vegetable oil or mineral oil with a penetrant to young bark as a basal spray making certain to treat all stems in a clump; or cut and immediately treat the stump tops with Arsenal AC* as a 5-percent solution (20 ounces per 3-gallon mix) or Velpar L* as a 10-percent solution in water (1 quart per 3-gallon mix) with a surfactant. When safety to surrounding vegetation is desired, immediately treat stump tops and sides with Garlon 3A or with a glyphosate herbicide as a 20-percent solution (5 pints per 3-gallon mix) in water with a surfactant. ORTHO Brush-B-Gon and Enforcer Brush Killer are effective undiluted for treating cut-stumps. For large stems, make stem injections using Arsenal AC* or when safety to surrounding vegetation is desired, Garlon 3A or a glyphosate herbicide using dilutions and cut-spacings specified on the herbicide label (anytime except March and April). An EZ-Ject tree injector can help to reach the lower part of the main stem; otherwise, every branching trunk can be hack-and-squirt injected.</p>



Invasive Species	Recommended Treatment Technique
Asian spiderwort (<i>Murdannia keisak</i>)	Foliar treatment of large populations requires 2% aquatic label glyphosate with non-ionic surfactant. Avoid not mechanically remove. Species can spread through fragmentation. Treat upon emergence in early summer into early fall before seed set.
Hardy orange (<i>Poncirus trifoliata</i>)	Foliar treatment of large populations requires 4% glyphosate solution or Garlon 3A (triclopyr) with non-ionic surfactant. Cut treatment with 25% aquatic label glyphosate or Garlon 3A (triclopyr). Saplings treatment require Garlon 4 (3A for aquatic) with 20% in oil with penetrant or Pathfinder II undiluted (non-aquatic). Treat year round, avoid spreading fruits in fall.
Multiflora rose (<i>Rosa multiflora</i>)	Foliar treatment of large populations with 4% glyphosate solution. Cut stump treatment is time consuming, though effective. Treat in spring/summer.



APPENDIX 10
Maintenance Plan

Appendix 10 Maintenance Plan

The site shall be visited semi-annually and a physical inspection of the site shall 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:

Table 1. Maintenance Plan – Carpenter Bottom Mitigation Site

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 – these shall be conducted where success criteria are threatened or at the discretion of the Designer. Areas where storm water and floodplain flows intercept the channel may also require maintenance to prevent bank failures and head-cutting. Beaver activity will be monitored and beaver dams on project streams will typically be removed, at the discretion of the Designer, during the monitoring period to allow for bank stabilization and stream development outside of this type of influence.
Wetlands	Routine wetland maintenance and repair activities may include supplemental installations of target vegetation within the wetland. Areas where storm water and floodplain flows intercept the wetland may also require maintenance to prevent scour that adversely and persistently threatens wetland habitat or function.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Invasive plant species requiring treatment per the Invasive Species Treatment Plan (Appendix 9) shall be treated in accordance with that plan and with NC Department of Agriculture (NCDA) rules and regulations.
Site boundary	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries may be identified by fence, marker, bollard, post, tree-blazing, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as-needed basis.



APPENDIX 11
Credit Release Schedule

Appendix 11 - Credit Release Schedule and Supporting Information

All credit releases will be based on the total credit generated as reported by the as-built survey of the mitigation site. Under no circumstances shall any mitigation project be debited until the necessary Department of the Army (DA) authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the Interagency Review Team (IRT), will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to restart or be extended, depending on the extent to which the site fails to meet the specified performance standard. The release of project credits will be subject to the criteria described as follows:

Table A: Credit Release Schedule – Stream Credits – Carpenter Bottom Mitigation Site

Credit Release Milestone	Monitoring Year	Credit Release Activity	Interim Release	Total Released
1	0	Site Establishment	0%	0%
2	0	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan – see requirements below	30%	30%
3	1	Year 1 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	40%
4	2	Year 2 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	50%
5	3	Year 3 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	60%
6	4*	Year 4 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	65% (75%**)
7	5	Year 5 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	75% (85%**)
8	6*	Year 6 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	80% (90%**)
9	7	Year 7 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	90% (100%**)

*Vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the NCIRT.

**10% reserve of credits to be held back until the bankfull event performance standard has been met

Table B: Credit Release Schedule – Wetland Credits – Carpenter Bottom Mitigation Site

Credit Release Milestone	Monitoring Year	Credit Release Activity	Interim Release	Total Released
1	0	Site Establishment	0%	0%
2	0	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan – see requirements below	30%	30%
3	1	Year 1 monitoring report demonstrates that interim performance standards have been met	10%	40%



Credit Release Milestone	Monitoring Year	Credit Release Activity	Interim Release	Total Released
4	2	Year 2 monitoring report demonstrates that interim performance standards have been met	10%	50%
5	3	Year 3 monitoring report demonstrates that interim performance standards have been met	15%	65%
6	4*	Year 4 monitoring report demonstrates that interim performance standards have been met	5%	70%
7	5	Year 5 monitoring report demonstrates that interim performance standards have been met	15%	85%
8	6*	Year 6 monitoring report demonstrates that interim performance standards have been met	5%	90%
9	7	Year 7 monitoring report demonstrates that interim performance standards have been met	10%	100%

*Vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the NCIRT.

1.1 Initial Allocation of Released Credits

For this NCDMS project, no initial release of credits is provided. To account for this, the 15% credit release typically associated with the site establishment is held until completion of all initial physical and biological improvements made pursuant to the Mitigation Plan. In order for NCDMS to receive the 30% release (shown in Tables A and B as Milestone 2), they must comply with the credit release requirements stated in Section IV(I)(3) of the approved NCDMS instrument.

1.2 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.

The following conditions apply to credit release schedules:

- a. A reserve of 10% of site's total stream credits will be release after four bankfull events have occurred, in separate years, provided the channel is stable and all other performance standards are met. In the event that less than four bankfull events occur during the monitoring period, release of these reserve credits is at the discretion of the NCIRT.
- b. After the second milestone, the credit releases are scheduled to occur on an annual basis, assuming that the annual monitoring report has been provided to the USACE in accordance with Section IV (General Monitoring Requirements) of this document, and that the monitoring report demonstrates that interim performance standards are being met and that no other concerns have been identified on-site during the visual monitoring. All credit releases require written approval from the USACE.
- c. The credits associated with the final credit release milestone will be released only upon a determination by the USACE, in consultation with the NCIRT, of functional success as defined in the Mitigation Plan.

As projects approach milestones associated with credit release, the 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 12
Financial Assurances

Appendix 12 - Financial Assurances

Pursuant to Section IV H and Appendix III of the Division of Mitigation Service's In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environment and Natural Resources has provided the US Army Corps of Engineers Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.



APPENDIX 13
Meeting Minutes



CREDITING UPDATE AND IRT MEETING MINUTES

MEETING: Post Contract IRT Site Visit
CARPENTER BOTTOM Mitigation Site
Catawba River Basin 03050103 (expanded service area); Gaston County, NC
NCDEQ Contract No. 7731
Wildlands Project No. 005-02179

DATE: Wednesday, January 16, 2019, 9:30 am

LOCATION: Gaston-Webbs Chapel Road
Lincolnton, NC 28092

Attendees

Todd Tugwell, USACE
Paul Wiesner, Division of Mitigation Services (NCDMS)
Matthew Reid, NCDMS
Melonie Allen, NCDMS
Kirsten Ullman, NCDMS
Mac Haupt, NC Department of Environmental Quality
Shawn Wilkerson, Wildlands Engineering
Eric Neuhaus, Wildlands Engineering

Materials

- Wildlands Engineering Technical Proposal 8/10/2018 in response to NCDMS RFQ 09132018

Meeting Notes

1. Wildlands gave a brief site overview before the walk which discussed stream and wetland approach and general site conditions.
 2. The group entered the proposed wetland re-establishment area from the northeast field adjacent to Ditch 3 as shown on the attached concept map. Wildlands was asked about plans for Ditch 3 and it was noted that the ditch would be filled within the proposed wetland re-establishment area. Upstream of the proposed wetland re-establishment area, drainage from Ditch 3 will be directed into the wetland to support hydrology.
 3. Soil borings were taken towards the eastern edge of the proposed wetland re-establishment area. The consensus from the group was that site soils were depleted with a low chroma, consistent with the Licensed Soil Scientist (LSS) investigation included with the proposal. Site soils were deemed suitable for the proposed wetland restoration at the surface.
 4. The walk continued into the proposed wetland rehabilitation area, where two headwater ditches were observed, and soils were double checked for consistency. A rehabilitation approach was discussed
-



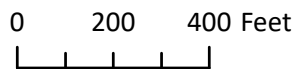
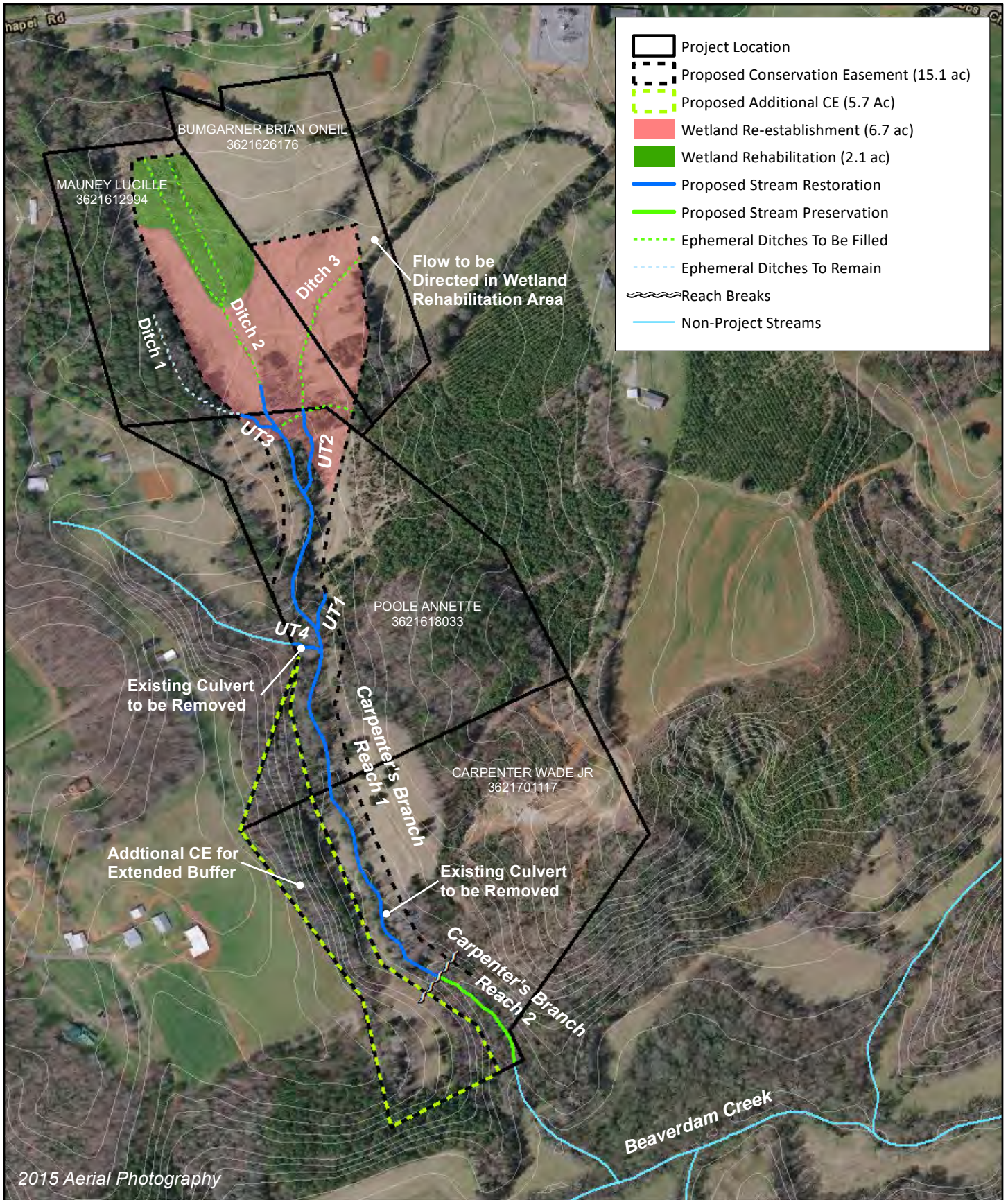
including plugging of the existing drainage ditches, treatment of invasive vegetation (including but not limited to hardy orange, Chinese privet, and white pine trees), wetland plantings, and cattle exclusion. IRT members noted that a jurisdictional delineation will need to be done to verify the wetland rehabilitation boundary, but overall, they agreed with the approach. Soils observed within the rehabilitation area were consistent with previous soil borings taken within the re-establishment area.

5. Fish and Wildlife noted that there is potential habitat for a stream specific crayfish and dwarf flowered heartleaf species on-site. Neither of these species was observed during the site walk but Wildlands noted that they would look for these specific species as part of the categorical exclusion and threatened and endangered species walks.
6. A soil boring was taken within the wetland re-establishment area west of Ditch 2 shown on the attached concept map. Soils were consistent with other observations on site and were deemed appropriate for wetland re-establishment at the surface.
7. Overall, IRT members agreed with the proposed wetland restoration approach and proposed ratios of 1:1 for areas of wetland re-establishment and 1.5:1 for areas of wetland rehabilitation.
8. Wildlands will prioritize getting the jurisdictional delineation completed within the proposed wetland rehabilitation area. Additionally, Wildlands will install groundwater gages throughout the wetland restoration area prior to the 2019 growing season.
9. The walk continued south toward the headwater tributaries of Carpenter's Branch. IRT and NCDMS representatives were shown the approximate location of intermittent and perennial stream calls based on field mapping. It was discussed that these calls would be further refined as the project moved forward, but generally intermittent and perennial calls presented in the proposal were agreed upon.
10. Ditch 1 shown on the attached concept map was discussed in detail. Wildlands current proposed approach was to install channel plugs at various locations upstream of the intermittent call to redirect drainage back into the adjacent proposed wetland area. It was noted that if the channel was deemed jurisdictional above the current field call, Wildlands would either restore or enhance the channel and include it within the proposed conservation easement.
11. The site walk continued to the headwaters and ultimately down the entire length of Carpenter's Branch. Wildlands originally proposed all streams on-site including headwater tributaries, the entire length of Carpenter's Branch, and UT1 for an enhancement II approach at a 2.5:1 credit ratio. After field observations and discussions with the IRT, it was determined that the streams on-site need to be fully restored using a priority I approach until an existing bedrock portion of the channel, which will be proposed for a preservation approach. The change in approach results in an increase in proposed stream credits from 1,224 in the proposal to 3,370. A re-issued concept map and detailed credit table is included with these meeting minutes.
12. It was noted that a current culvert crossing over an unnamed tributary from the right floodplain (now UT4 on the attached concept map) will be removed as part of the project. The portion of UT4 within the proposed conservation easement will be restored and tied to the proposed alignment of Carpenter's Branch as part of the project.
13. IRT members noted that a flow gage will need to be installed along UT1 to document continuity of flow for the project reach, regardless of stream approach.
14. In addition to restoring Carpenter's Branch with a Priority I restoration approach, Wildlands agreed that they would discuss putting the additional property (approximately 5.7 acres) on the right floodplain of Carpenter's Branch within the proposed conservation easement with the property owner. This would allow for an extended buffer along the right floodplain of Carpenter's Branch and allow Wildlands to eliminate the proposed 30' internal culvert crossing shown in the proposal.
15. The IRT noted that the site could be a prime candidate for benthic and water quality monitoring with a potential associated 2% to 4% credit bonus if property monitoring was carried out.

Stream Credits							
Reach	Management Objectives	Proposal Mitigation Approach	Revised Mitigation Approach	Length (feet)	Ratio	Mitigation Credits (No Expanded Buffer)	Mitigation Credits ¹ (With Expanded Buffer)
Carpenter's Branch Reach 1	Restore with Priority 1 restoration including appropriate dimension, pattern, and profile. Reconnect stream to its relic floodplain, increase bedform diversity through the installation of instream structures, and stabilize bed and banks. Exclude cattle, treat invasive vegetation, and plant a native riparian community. Eliminate an existing culvert crossing along the proposed reach.	Enhancement II	Restoration	2,400	1:1	2,400	2,506
Carpenter's Branch Reach 2	Exclude cattle, treat invasive vegetation, and plant a native riparian community.	Enhancement II	Preservation	431	5:1	86	96
UT1	Restore with Priority 1 restoration including appropriate dimension, pattern, and profile. Reconnect stream to its relic floodplain, increase bedform diversity through the installation of instream structures, and stabilize bed and banks. Exclude cattle, treat invasive vegetation, and plant a native riparian community.	Enhancement II	Restoration	120	1:1	120	120
UT2	Restore with Priority 1 restoration including appropriate dimension, pattern, and profile. Reconnect stream to its relic floodplain, increase bedform diversity through the installation of instream structures, and stabilize bed and banks. Exclude cattle, treat invasive vegetation, and plant a native riparian community.	Enhancement II	Restoration	372	1:1	372	372
UT3	Restore with Priority 1 restoration including appropriate dimension, pattern, and profile. Reconnect stream to its relic floodplain, increase bedform diversity through the installation of instream structures, and stabilize bed and banks. Exclude cattle, treat invasive vegetation, and plant a native riparian community.	Enhancement II	Restoration	216	1:1	216	216
UT4	Restore with Priority 1 restoration including appropriate dimension, pattern, and profile. Reconnect stream to its relic floodplain, increase bedform diversity through the installation of instream structures, and stabilize bed and banks. Exclude cattle, treat invasive vegetation, and plant a native riparian community. Eliminate an existing culvert crossing along the proposed reach.	Enhancement II	Restoration	60	1:1	60	60
			Total	3,599	---	3,254 Stream Credits (Cool)	3,370 Stream Credits (Cool)

¹Stream mitigation credit adjustments were for non-standard buffer widths were estimated based on 2016 Wilmington District Stream Mitigation Update.

Wetland Credits					
Reach	Management Objectives	Mitigation Approach	Acres	Ratio	Mitigation Credits
Wetland Re-establishment	Restore wetland hydrology by eliminating drainage ditches. Re-establish appropriate wetland community by planting native tree species. Increase ponding by eliminating vegetative maintenance and increasing surface roughness throughout the proposed wetland area. Reduce sediment and nutrient inputs via cattle exclusion.	Wetland Re-establishment	6.7	1:1	6.7
Wetland Rehabilitation	Restore wetland hydrology by eliminating drainage ditches. Further promote appropriate wetland community through supplemental planting of native tree species and through elimination of invasive species. Reduce sediment and nutrient inputs via cattle exclusion.	Wetland Rehabilitation	2.1	1.5:1	1.4
Total			8.8		8.1 Riparian Wetland Credits



Concept Map
 Post Contract IRT Site Walk
 Carpenter Bottom Mitigation Site
 Catawba River Basin 03050102



March 13, 2019

Ms. Kristie Corson
 NCDEQ-Division of Mitigation Services
 217 West Jones Street, Suite 3000A
 Raleigh, NC 27603

RE: Contract Amendment Request – Carpenter Bottom Mitigation Site
 Gaston County
 DEQ Contract Number 7731
 NCDMS Project Number 100090
 RFQ #09132018
 Located in Catawba 03050102 for mitigation credit in Catawba 03050103 (within the expanded service area)
 Federal Tax ID 56 0651376

Dear Ms. Corson:

Wildlands proposes to amend the existing contract for Stream and Wetland Credits on our Carpenter Bottom Mitigation Site (Site) based on the NC DMS and Interagency Review Team (IRT) walk on 1/16/2019. Included with this letter is a proposed concept map, revised credit table with current stream approach, the proposed amount to be added to the contract based on additional crediting, an updated Task/Project Milestone Table, and the post contract IRT meeting minutes. The below table details the existing and proposed contract assets and values.

Based on the change in stream crediting and previous contract pricing, Wildlands anticipates the Carpenter Bottom Mitigation Site contract will total \$1,758,875.00, of which \$15,000.00 has already been paid based on the Task A invoice submitted by Wildlands on 11/20/2018.

Carpenter Bottom Mitigation Site Existing and Proposed Contract Assets and Values			
	Original Contract	Current Contract	Proposed Contract
Stream Credits	1,224	1,224	3,229
Cost/Stream Credit	\$375	\$375	\$375
Wetland Credits	8.2	8.2	8.2
Cost/Wetland Credit	\$65,000	\$65,000	\$65,000
¹ Contract Amendment No 1	N/A	\$15,000	\$15,000
Total Contract Value	\$992,000	\$1,007,000	\$1,758,875
1. Amendment No. 1 increased the original contract by \$15,000 to cover payments for Task A: Technical Approach/Signed Option Agreement(s) Suitable Real Property Documentation			



The below table reflects the revised task/project milestone deliverable schedule.

Project Milestone	Proposed Completion Date (Original NTP issued on 7/25/2017)	Payment Contract Value	Proposed Contract Payment
Task A: Technical Approach/Signed Option Agreement(s)/Suitable Real Property Documentation	Invoiced – November 20, 2018	\$15,000	\$15,000
Task 1. Categorical Exclusion Document	June 1, 2019	5%	\$87,193.75
Task 2. Submit Recorded Conservation Easement on the Site	May 1, 2020	20%	\$348,775.00
Task 3. Mitigation Plan (Final Draft) and Financial Assurance	May 1, 2020	15%	\$261,581.25
Task 4. Mitigation Site Earthwork Completed	December 1, 2020	15%	\$261,581.25
Task 5. Mitigation Site Planting & Installation of Monitoring Devices	February 1, 2021	10%	\$174,387.50
Task 6. Baseline Monitoring Report (Including As-Built Drawings) Approved by DMS	April 1, 2021	10%	\$174,387.50
Task 7. Submit Monitoring Report #1 to DMS*	December 31, 2021	5%	\$87,193.75
Task 8. Submit Monitoring Report #2 to DMS*	December 31, 2022	2%	\$34,877.50
Task 9. Submit Monitoring Report #3 to DMS*	December 31, 2023	2%	\$34,877.50
Task 10. Submit Monitoring Report #4 to DMS*	December 31, 2024	2%	\$34,877.50
Task 11. Submit Monitoring Report #5 to DMS*	December 31, 2025	2%	\$34,877.50
Task 12. Submit Monitoring Report #6 to DMS*	December 31, 2026	2%	\$34,877.50
Task 13. Submit Monitoring Report #7 to DMS* and complete Close-Out Process	December 31, 2027	10%	\$174,387.50
		Total	\$1,758,875.00

*Meets success criteria (schedule progression and payment values have been developed assuming that the site credits meet success criteria each monitoring year)

If you have any questions or concerns regarding this correspondence, please contact me at (704) 332-7754 x 102.

Sincerely,

Shawn Wilkerson, Principal
swilkerson@wildlandseng.com, 704-332-7754 ext. 100

CC: Paul Wiesner, NCDEQ-DMS
 Enclosures: Concept Figure
 Post Contract IRT Meeting Minutes from 1/16/2019

Stream Credits						
Reach	Management Objectives	Proposal Mitigation Approach	Revised Mitigation Approach	Length (feet)	Ratio	Mitigation Credits (No Expanded Buffer)
Carpenter's Branch Reach 1	Restore with Priority 1 restoration including appropriate dimension, pattern, and profile. Reconnect stream to its relic floodplain, increase bedform diversity through the installation of instream structures, and stabilize bed and banks. Exclude cattle, treat invasive vegetation, and plant a native riparian community. Replace an existing culvert crossing along the proposed reach.	Enhancement II	Restoration	2,375	1:1	2,375
Carpenter's Branch Reach 2	Exclude cattle, treat invasive vegetation, and plant a native riparian community.	Enhancement II	Preservation	431	5:1	86
UT1	Restore with Priority 1 restoration including appropriate dimension, pattern, and profile. Reconnect stream to its relic floodplain, increase bedform diversity through the installation of instream structures, and stabilize bed and banks. Exclude cattle, treat invasive vegetation, and plant a native riparian community.	Enhancement II	Restoration	120	1:1	120
UT2	Restore with Priority 1 restoration including appropriate dimension, pattern, and profile. Reconnect stream to its relic floodplain, increase bedform diversity through the installation of instream structures, and stabilize bed and banks. Exclude cattle, treat invasive vegetation, and plant a native riparian community.	Enhancement II	Restoration	372	1:1	372
UT3	Restore with Priority 1 restoration including appropriate dimension, pattern, and profile. Reconnect stream to its relic floodplain, increase bedform diversity through the installation of instream structures, and stabilize bed and banks. Exclude cattle, treat invasive vegetation, and plant a native riparian community.	Enhancement II	Restoration	216	1:1	216
UT4	Restore with Priority 1 restoration including appropriate dimension, pattern, and profile. Reconnect stream to its relic floodplain, increase bedform diversity through the installation of instream structures, and stabilize bed and banks. Exclude cattle, treat invasive vegetation, and plant a native riparian community. Eliminate an existing culvert crossing along the proposed reach.	Enhancement II	Restoration	60	1:1	60
			Total	3,599	---	3,229 Stream Credits (Cool)