FINAL MITIGATION PLAN

February 9, 2021

Dynamite Creek Mitigation Site

Rockingham County, NC
NCDEQ Contract No. 7911
DMS ID No. 100125 DWR# 20190868

Roanoke River Basin
HUC 03010103

USACE Action ID No. 2019-00909
RFP #: 16-007727

PREPARED FOR:

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February 9, 2021

Kim Browning
Department of the Army
Wilmington District, Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403-1343

RE: Dynamite Creek Mitigation Project-NCIRT Comments during 30-day Mitigation Plan Review

USACE AID# SAW-2019-00909

Dear Ms. Browning,

Thank you for compiling and providing comments on the Dynamite Creek Mitigation Site Draft Mitigation Plan. We have reviewed the comments dated December 10, 2020 and have revised the Mitigation Plan accordingly. This letter includes provided comments with our responses in *italics*. The revised Mitigation Plan is being submitted with this letter.

USACE Comments, Kim Browning

1. Figure 2: Please call-out the area on Dynamite Creek where the relic dam was located as the potential for legacy sediment in this area is a concern.

   Figure 2 has been updated with a call-out for the relic dam.

2. Figure 10: Please include a fixed photo point at the utility crossing and the downstream end of the project culvert.

   Fixed photo points have been added to Figure 10 at the referenced locations.

3. Table 5: Thank you for including this table, this baseline data is helpful when demonstrating functional uplift during monitoring.

   You are welcome.

4. Page 12. Table 6: The first and last goal are redundant "Protect high quality stream resources and Protect the project site…"

   Table 6 has been simplified to remove redundancies.

5. Sections 3.5 and 4.0 discuss the reduction of bacterial loading downstream as one of the two main functional uplifts. This is a benefit that is presumed and will not be measured by monitoring. Unless you intend to demonstrate actual uplift in this area, I recommend that this section be reworded. The same is true for the project goal to exclude livestock from streams (Table 6), which state that its expected outcome is that inputs will be reduced: however, there is no proposal to actually measure or demonstrate this to be the case. Please reword these sections.

This section has been reworded to state that fencing livestock from the conservation easement will support the overall Local Watershed Plan goal of reducing bacterial loading on Town Creek, but it is not listed as an "expected outcome" as it will not be measured.

6. When comparing Tables 3 and 9, it is interesting to note that reaches 3 and 6 scored a High SAM score but are proposed for restoration. I do recall the condition of the channels form the IRT site visit and I don't question the proposed approach, I just want to point out that observation.

   Noted.

7. Table 4: It would be helpful to incorporate the NCWAM ratings.

   NCWAM ratings have been added to the table.

8. Section 6.7: Different target community planting zones should be specified, similar to the different planting zones described on Design Sheet 3, since reach 7 is appropriate for bottomland hardwoods and the majority of the other reaches are in uplands.

   The Mitigation Plan now states that the targeted upland community is Piedmont Alluvial Forest and a Piedmont Bottomland Forest is the targeted community for Reach 7 in the Dan River floodplain.

9. Section 6.8: Is there potential for utility line maintenance? I recall this area being very steep and eroded.

   The first paragraph of Section 6.8 addresses the potential for utility line maintenance. The discussion notes that the ford crossing approach slopes were designed with low slopes to support potential future utility maintenance. The eastern approach, which is the most eroded, will be repaired during construction.

10. Section 7.0: I don't recall a discussion regarding a wetland rehabilitation ratio of 1.3:1, in fact my notes indicate that the majority of the wetlands would be more appropriate for enhancement, I would agree to a 1.5:1 ratio for the rehabilitation area. Please adjust Table 16.

    Table 16 has been adjusted to use a ratio of 1.5:1.

11. Please confirm the depth of the vernal pool within the CE.

    Vernal pools are designed with an average depth of 12-18 inches compared to the surrounding floodplain. Plan Sheet 2.1 shows 2 feet of cut in a vernal pool, but this cut includes removal of a man-made berm. A description of this is now included in Section 6.6.9.

12. Please note that photos and cross-sections along Reach 7 will be looked at closely to ensure that this reach is maintaining a channel.

    Noted.

WILDLANDS
ENGINEERING

EPA Comments, Todd Bowers

Note: It is understood that site visits may have been made by IRT members and other project managers during the development of site feasibility to provide mitigation credit. In that regard, I feel it is necessary to mention that I have not been on-site during this process and that my comments may reflect a lack of on-site observation and evaluation.

The EPA Region 4 Ocean, Wetlands and Stream Protection Branch offers the following site-specific comments as they pertain to the Dynamite Creek Draft Mitigation Plan dated October 2020:

1. Section 3.5/ Page 10: Livestock exclusion is mentioned but the method is not well addressed in the document and proposed fencing is not shown in the design sheets. Recommend adding exclusion details (complete livestock removal or fencing or a combination and updates to the design sheets.

   The bulleted list in Section 3.5 now states that conservation easement fencing will be installed as needed to exclude livestock from adjacent pastures. A fencing plan has been included with the final plan set in the Appendix.

2. Section 6.6.7/ Page 22: Recommend expanding the discussion for grading between the conservation easement and the farm road culvert at the terminal end of the project of known. It should be known at this point if grading is needed or not to tie the project into the culvert which will not be removed or replaced.

   The text now states that while grading outside the conservation easement is not currently required, minor bank grading outside the easement may be necessary if banks become unstable prior to construction.

3. Section 6.6.9 /Page 22: Recommend adding the number of consecutive days needed to meet the 12 percent of the growing season success criteria. This comment applies to Tables 17 (Performance Standards) and 18 (Monitoring Plan) as well.

   Growing season dates and the number of consecutive days equating to 12% of the growing season are now included in Section 6.6.9. Since the growing season dates may be modified each year based on soil temperature data and observation of bud burst, this criterion is expressed only as a percentage in Tables 17 and 18.

4. Section 6.7.1/ Page 23: What are the plant community targets for the stream riparian zone, wetland reestablishment and wetland restoration areas? No reference forest or community type is noted in this section. Discuss the designated Zones (provide a narrative) for planting (Riparian Zone, Wetland Zone, streambank zones) as displayed in planting plan of Sheets 3.0 and 3.1.

   Section 6.7.1 now states that the targeted upland community is Piedmont Alluvial Forest and a Piedmont Bottomland Forest is the targeted community for Reach 7 in the Dan River floodplain. A description of streambank planting is included below the community type description.

5. Table 18/ Page 2: Provide a definitive answer to the objective of livestock exclusion if it is to be fencing, removal or a combination of both.

Table 18 now states that fencing will be installed along the easement where adjacent to active livestock pastures.

6. Table 19/ Page 28: In footnote 5, please reword the vegetation monitoring requirement. The statement should be "in years 4 and 6, vegetation will be only monitored visually". Current wording alludes that vegetation will not be monitored visually in other years.

   Footnote 5 has been updated as requested.

7. Appendix 1/ Figures 7 and 10: Excellent legend color scheme! The only color notably absent is orange, however there is no Enhancement II work, so this is expected.

   Thank you.

DWR Comments, Erin Davis:

1. Page 9, Section 3.4.3 – DWR appreciates the inclusion of baseline ground water gage data.

   Thank you.

2. Page 11, Section 3.6 – DWR appreciates that the number of crossings is limited, and that the landowner access crossing is proposed as a narrow, bridged internal crossing.

   Thank you.

3. Page 20, Section 6.6 – Exclusion of cattle is listed as the first project goal and as such a minimum level of detail regarding how this will be accomplished should be included in the approved mitigation plan. Please include a concept fencing plan showing existing and proposed fencing in the final mitigation plan. Please also show approximate locations of anticipated gates or note that adequate safe site access for regulatory staff will be addressed and shown on the MY0 submittal.

   Project Goals now state that conservation easement fencing will be installed as needed to exclude livestock from adjacent pastures. A fencing plan is included in the resubmitted plans. As fencing will only occur on the northern and western site boundaries, access will not be restricted to regulatory staff.

4. Page 22, Section 6.6.9 – On Sheet 2.1 the proposed pools are identified as "vernal", which is a habitat feature that seasonally dries. The elevation table lists a cut depth of up to 4 feet. Please confirm that these features will seasonally dry, if not, DWR recommends planting obligate herbaceous plugs and shrubs that can tolerate the designed inundation level. DWR does not support wetland rehabilitation credit for the two pools that are not located within a delineated drained hydric soil/appropriate wetland restoration area. DWR would support the one pool located within an appropriate wetland restoration area if it is vegetated.

   Vernal pools are designed to be an average of 12-18 inches deep compared to the surrounding floodplain. Sheet 2.1 of the Plans shows a cut depth of 2 feet because the location of the pools is on a pre-existing berm that will be removed. This description has been added to Section 6.6.9 with a description stating the pools are to be seasonally dry. All pools will be planted similarly to surrounding wetland areas.

5. Page 23, Section 6.7.1 –

    a. Planting Plan – Please identify and describe target community(s) or reference site community(s) (including location map). DWR would expect that the buffer target community along Reach 1 – 6 would differ from the wetland target community along Reach 7. Also, this section mentions planting only successional species. DWR would like to see a mix of successional native species and appropriate climax species based on the designated target community(s).

    The Mitigation Plan test has been updated to describe a Piedmont Alluvial Forest in the upland area and a Piedmont Bottomland Forest along Reach 7 in the Dan River floodplain. Section 6.7.1 now states that a combination of early and late successional native vegetation will be planted.

    b. Soil Restoration – Please call out soil restoration of priority II bench cuts.

    The Plans (Appendix 10) now shows the grading areas and includes the Priority II bench cut through the old dam (Sheet 1.4). Section 6.7.1 discusses this work. This is the only Priority II bench on site.

6. Page 24, Section 6.8 – Related to the frequent, large storm events, have you evaluated the risk of alluvial deposits from the Dan River re-burying hydric soil in wetland credit areas? Currently, wetland restoration credit areas extend to the stream top of the bank. Should there be offset?

    Over the past 5 years, Wildlands has observed minimal alluvial deposition in the floodplain despite numerous Dan River floods. Wildlands expects nominal alluvial deposition during the 7-year monitoring period. This discussion is expanded upon in Section 6.8.

    Wildlands believes the groundwater discharge and design stream dimensions will support wetland hydrology to the top of stream banks. Groundwater gage data and wetland hydrology indicators will be evaluated for all wetland credit areas to inform criterion attainment.

7. Page 24, Section 7.0 – Regarding the proposed alternate wetland rehabilitation ratio of 1.3:1, DWR supports the application of the standard rehabilitation ration of 1.5:1.

    The wetland rehabilitation ratio has been changed to 1.5:1.

8. Page 25, Table 17 – Please clarify that the wetland hydroperiod is an annual standard.

    Table 17 has been revised to indicate that wetland hydroperiod monitoring is an annual standard.

9. Page 27, Table 18 – Please confirm whether veg plots will be monitored annually.

    Table 18 has been updated to state that vegetation will be monitored annually. Footnote 5 on Table 19 states that years 4 and 6 vegetation monitoring will be visual only.

10. Page 29, Section 11 – Please include the NCIRT in the adaptive management planning process.

    Section 11 has been updated to include NCIRT in the planning process.

11. Figure 10 – DWR requires a minimum of one additional groundwater gage within the wetland rehabilitation credit area. Since wetland credit extends from easement boundary to stream

bank, DWR requests that a representative number of wells be located close to the easement boundary and stream bank edges, as these are the areas DWR is most concerned about meeting the minimum hydroperiod standard.

A groundwater gage has been added to the recommended area in Figure 10.

12. Appendix 6 – Depending on the area and volume of alluvial deposition to be removed, an adaptive management plan review by the IRT may be warranted.

    The above text has been added to the Maintenance Plan table in row 1: Stream/Wetlands.

13. Sheet 3.0 – Overall, DWR appreciates the level of detail (multiple planting zones) included on the planting plan. I would just ask to consider on or two more understory/shrub species for the wetland planting zone.

    An additional shrub species has been added to the riparian planting and wetland planting zones.

14. Design Sheets – Please show bench/floodplain grading extents, in particular for the priority II areas along Reach 2 and Reach 6 noted in Section 6.6. Also, if channel grading is proposed downstream of the conservation easement as part of this project construction, please show on design sheets and include in the ePCN project impacts table (possibly noted in Section 6.6.7).

    Grading has been added to the Design Sheets and includes areas of benching/floodplain grading. Grading is not anticipated beyond the conservation easement at the downstream end. All impacts are included in the ePCN table.

15. Details – Please include channel fill and plug details. Has available onsite material been calculated? Will offsite material need to be sourced? DWR shares WRC's concern noted during the site walk, that if the old channel is not fully filled and plugged streamflow may persist along the hillside toe path (upper reaches).

    Details for channel fill and for an earthen valley sill have bene included. The earthen valley sill is intended to break the flow path along the toe of slope where the channel is to be abandoned. Overfilling in these areas and planting livestakes is intended to offset any potential settling of fill material in the abandoned channel.

If you have any questions please contact me at aallen@wildlandseng.com, (919)851-9986 x 106.

Sincerely,

Angela Allen, P.E., *Project Manager*

October 1, 2020

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

RE: DMS Review comments for Mitigation Plan
Dynamite Creek Mitigation Site (DMS ID # 100125)
Roanoke River Basin 03010103, Rockingham County, NC
Contract No. 7911

Dear Mr. Dow,

Thank you for compiling and providing comments on the Dynamite Creek Mitigation Site draft Mitigation Plan. We have reviewed the comments dated September 14, 2020 and have revised the Mitigation Plan accordingly. This letter includes a response to each comment; comments have been reprinted with our response in *italics*. The revised Mitigation Plan is being submitted with this letter.

Mitigation Plan

1. Title Page – Please add DWR# 20190868

   The number above has been added to the title page.

2. The footer displayes 2019 instead of 2020.

   The footer has been updated to 2020.

3. Page 11, Table 6 – Under the objective of goal #2, the draft plan indicates repairing eroding stream banks with bank revetment. It seems that bank revetment generally means hardened structures holding banks in place. Suggest changing the wording.

   The wording has been changed to say "biogengineering methods".

4. Page 14, Section 6.2 – Please discuss why the geomorphic data for the discharge references are not included.

   This was not included in order to simplify data in the report. However, we have now added that data to the report.

5. Page 17, Table 13 – Please explain why the discharges change between existing and proposed. Should the proposed be described as the discharge at the new LTOB?

   The "existing discharge" is what is predicted discharge based on using mannings equation on the bankfull features from the cross-sections taken in the field. the proposed discharge is our chosen design discharge based on that information along with our other sources. A footnote has been added to the tables to describe this.

6. Page 18, Table 14 – The discharge discussion leaves it unclear what the basis was for the greater confidence given to the NCSU Rural Piedmont Curve and the Flood Frequency Analysis.

   This paragraph was re-written to better explain the weighting of different analysis methods and their relation to the on-site reference reach in choosing the design discharge.

7. Page 19, 2nd paragraph – It seems like Reach 7 does have a capacity issue. Even though the fine supplied from upstream will be reduced, how is Wildlands confident that the design for Reach 7 has the capacity to mobilize Dan River alluvium?

   Additional discussion of the potential flooding along the Dan River and its corresponding alluvial deposition have been added to Section 6.5.

8. Page 24, Table 16 – Please use the standard Wetland Rehabilitation credit ratio of 1.5:1 or please justify the 1.3:1 ratio proposed.

   Further justification for the 1.3:1 ratio has been added above Table 16.

9. Pages 27-28, Table 19 – Crest Gauge should be a continuous stage recorder. Footnote 4 – Just indicate stage will be measured via a pressure transducer at 15-30 minute intervals. Streams of this size are flashy enough to require a higher resolution of measurement.

   This note has been added to Table 19, footnote 4.

10. Appendix 1, Figure 10 – It is hard to see where "Wetland not for Credit/No Treatment" is. Please consider a different color.

    This figure has been updated to show "Wetland not for Credit/No Treatment" in purple.

11. Appendix 1, Existing conditions Table – The sinuosity for Dynamite Creek Reach 3 is listed as 1.0. Recollection of this reach is that it was fairly sinuous. Please verify.

    As the stream exits Reach 2 via the breach in the old dam, it Is straight. Then the valley curves along with a tight meander bend. The sinuosity of 1 is because the entire valley turns with that one bend.

12. Appendix 1 – Please include a legend on graphed cross-sections.

    The graphed cross-sections have been updated to include a legend.

13. Appendix 1, XS9 – Is this a representative cross-section of Dynamite Creek Reach 7? Section 3.3 classifies the reach as incised and disconnected from the floodplain (the photos support this). Please clarify.

    This has been updated with a more appropriate cross-section taken to represent the incision of the channel and presence of spoil piles along the reach.

14. Appendix 5 – Please include all correspondences with resources agencies, like USFWS, WRC, and others (EDR report can be reduced to summary page and maps).

    Appendix 5 has been expanded to include the maps and regulatory correspondence from the categorical exclusion.

Construction Plans (Appendix 10)

1. Please include project IDs (DMS, CES, and DWR) on the title sheet. Also include latitude, longitude, and total disturbed acreage on the title sheet.

   All project IDs and latitude and longitude have been added to the cover sheet. The total disturbed acreage is currently unknown, as the sediment and erosion control plan (SEC) has not been finalized at this time. The final mitigation plan will include an estimated disturbance of all wetland and streams on site based on the grading and sediment and erosion control plan. Disturbance due to grading is generally restricted to the valley floor in Reaches 1-6 and the grading areas shown on Sheet 2.1.

2. Please show the boundaries of limits of disturbance on plan sheets.

   See note above. The final LOD will be completed with the SEC plan.

3. Please make sure to label wetlands in the plan sheets according to the approved JD.

   Wetland labels have been added to the plan sheets.

Electornic Files

1. Please provide the monitoring features that were included in Figure 10 (e.g. veg plots, photo points, etc.)

   The monitoring features have been added to the geodatabase.

2. Please provide the data used to create groundwater gauge and precipitation gauge figures.

   The data used to create the figures has been added.

If you have any questions please contact me at aallen@wildlandseng.com, (919)851-9986 x 106.

Sincerely,

Angela Allen, P.E., *Project Manager*

DRAFT MITIGATION PLAN

Dynamite Creek Mitigation Site

Rockingham County, NC
Roanoke River Basin
HUC 03030103

USACE Action ID No. 2019-00909

DWR # 20190868

PREPARED BY:

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FIGURES

APPENDICES

1.0 Introduction

The Dynamite Creek Mitigation Sites (Site) is in a rural area of Rockingham County approximately three miles east of the City of Eden (Figure 1). The project is in the NC Division of Mitigation Services (DMS) targeted local watershed (TLW) 14-digit Hydrologic Unit code (HUC) 03010103230040 and the NC Division of Water Resources (DWR) Subbasin 03-02-03. The Site will provide stream and wetland mitigation credits for the Roanoke River Basin (HUC 03010103) through the restoration, enhancement, and preservation of two unnamed tributaries to Town Creek (referred to as Dynamite Creek and UT1 for this project) and riparian wetland reestablishment (Figure 2). This Site will provide 3,601.700 warm stream credits and 9.753 wetland credits and will be protected by a 22.9-acre conservation easement. The Site Protection Instrument detailing the easement is included in Appendix 8.

Table 1: Project Attribute Table Part 1

Project Information	
Project Name	Dynamite Creek Mitigation Site
County	Rockingham
Project Area (acres)	22.9
Project Coordinates (latitude and longitude)	36°29'3.32"N 79°42'39.31"W
Planted Acreage (acres of woody stems planted)	15.4

2.0 Basin Characterization and Site Selection

The Eden Area Local Watershed Plan (LWP) (Piedmont Triad Regional Council 2014) includes three 14-digit hydrologic units (HUs), including the Dan River-middle, 03010103230040, which contains the Dynamite Creek Mitigation Site. The LWP identifies sediment, fecal coliform bacteria, and nutrients as the main stressors to water quality and habitat. The LWP goes on to identify the Town Creek subwatershed, in which the project site is located, as a major contributor of fecal coliform and sediment due to streambank and hillside erosion. The Site is specifically identified in Restoration Watershed S-09 in the LWP as a significant source of bacteria loading from livestock. A TMDL for fecal coliform for the Dan River, including the segment (22-39) where Town Creek joins the Dan River, was approved by US EPA in July 2009 (NCDENR 2009). The Virginia TMDL targets a 95% reduction in *E. coli* from agricultural nonpoint sources to the Dan River. NC DWR also points to fecal coliform and elevated turbidity levels as the primary water quality stressors in this subbasin in Chapter 1 of the Roanoke River Basinwide Plan (NCDWR 2011).

The LWP lists priority remedial actions for Town Creek and its watershed as cattle exclusion, agricultural BMPs, and improved pasture management. The LWP recommends riparian planting, cattle exclusion, and wetland restoration specifically for the Site. This project will address recommendations from the LWP through the exclusion of livestock from stream reaches, the reduction in sediment loads through stream restoration and enhancement, the reestablishment of riparian wetlands, planting of riparian buffers, and protection of the site with a conservation easement.

3.0 Baseline and Existing Conditions

3.1 Watershed Conditions

The Dynamite Creek watershed (Table 2 and Figure 3) is a rural watershed that transitions from rolling hillsides typical of the North Carolina Piedmont (elevations ranging from 653-496 feet msl), to a broad flat floodplain located in the greater Dan River floodplain (Figure 4). Oral history from the current landowner indicates the upper reaches of Dynamite Creek were farmed prior to 1951 and were wooded

by the first available aerial photo in 1951. The 1951 aerial shows the upper reaches wooded and the dan river floodplain in agriculture. There was one logging event in 2007 during which trees were harvested from the hilltops of the watershed east of Dynamite Creek. Since that event nearly all the area has reforested (except for an area less than 1 acre). Historical aerials show land use and riparian buffer extents has remained essentially unchanged since at least 1951.

The headwaters of Dynamite Creek are 90% forested, with 10% managed or developed land. The proportion of forest in the watershed decreases in the downstream direction until by Reach 6 it is 82% forested and begins incorporating managed herbaceous agricultural fields. The Dynamite Creek Reach 7 watershed is 75% forested with the remainder being managed herbaceous, shrubland, and developed.

Major watershed stressors, as noted in Section 2.2 are sediment and bacteria loading. The relic farm dam at the downstream end of Dynamite Creek Reach 2 failed at some point in the past. The stream has downcut five to eight feet through the legacy sediment and been a source of sediment loading to the lower watershed. Eroded banks on Dynamite Creek Reaches 3, 5, and 6 are an additional source of sediment. A farm pond at the downstream end of Dynamite Creek Reach 6 acts as a sediment sink for Reaches 1-6. Water then exits the pond through a 15-inch pipe and enters Reach 7. Bank erosion, cattle trampling, and Dan River flood flows contribute more sediment to Dynamite Creek along Reach 7. Bacteria loading is a result of cattle grazing along Dynamite Creek Reaches 6 and 7.

Table 2: Project Attribute Table Part 2

Project Watershed Summary Information	
Physiographic Province	Piedmont
Ecoregion	Northern Inner Piedmont
River Basin	Roanoke
USGS HUC (8-digit, 14 digit)	03010103; 03010103230040
NCDWR Sub-basin	03-02-03
Project Drainage Area (acres)	119
Project Drainage Area Percentage of Impervious Area	0.5%
CGIA Land Use Classification	75% forested; 21.5% managed herbaceous cover/pasture; 2.5% shrubland; 1% developed

3.2 Landscape Characteristics

The Site is located in the Dan River Group-Pine Hall Formation of the Triassic Basin within the Piedmont physiographic province (NCGS 1985). The Dan River Group is a basin-margin conglomerate interfingering with basin-center sandstone and mudstone. The Pine Hall Formation (TRdp) consists of yellowish-orange to brown sandstone, mudstone, and conglomerate. The Site is located close to the margin of the Triassic Basin where coarser conglomerate and finer sandstone and mudstone are both present. The conglomerate is evident in the streambed of Dynamite Creek Reaches 1-6, while it is rather sparse in Dynamite Creek Reach 7. The drop in stream power as Dynamite Creek transitions from a confined colluvial valley (1-3% valley slope on Reaches 1-5) to the unconfined Dan River floodplain (0.5% valley slope on Reaches 6-7) likely reduces the streams ability to transport this larger bedload. The majority of this material appears to drop out in Reach 6 and is not transported to Reach 7. The conglomerate may also be covered in lower Dynamite creek due to prevalent bank erosion, which produces fine-grained sand and silt that may have aggraded to cover more deeply buried conglomerate and livestock which have trampled the streambed.

Soils in Dynamite Creek Reaches 1-5 consist of Rhodhiss sandy loam and Clover sandy loam, which have a shallow layer (<9 inches) of sandy loam underlain by sandy clay loam and clay respectively. Bedrock is

present on Dynamite Creek Reaches 1, 4, and 5. The bedrock has prevented incision of these reaches, providing natural grade control. Bedrock and soils on Reach 2 have been covered in legacy sediments from the historic dam at the downstream extent of the reach, however some bedrock is exposed where the stream has downcut fully through the sediment.

Dynamite Creek Reaches 6 and 7 are mapped by the National Resource Conservation Service (NRCS) as Hatboro silt loam, which is a very deep, poorly-drained soil with a shallow loam layer underlain by a sandy clay loam that developed from alluvium from the Dan River. Mapped Site soils are depicted in Figure 5. These soils support the existing wetlands in the floodplain of these reaches.

3.3 Existing Streams

Dynamite Creek Reach 1

Reach 1 of Dynamite Creek originates at a headcut at the upstream end of the project. It is in a confined colluvial valley and has stable streambanks as evidenced by moss and fern cover. Bedform diversity is appropriate for this step-pool channel type. The riparian buffer is a mature hardwood forest.


Dynamite Creek Reach 1

Dynamite Creek Reaches 2 and 3

Dynamite Creek Reach 2 begins where the valley widens and the channel incises. Fine sediment has eliminated bedform diversity and the channel is migrating and eroding into the left valley wall. Reach 2 crosses a powerline easement and has significant erosion on both sides at the easement location. The east side of the power easement has a road that is washing away in rills and gullies. City Creek flows from the west side of the power easement and has multiple headcuts and unstable banks. These features are contributing sediment to downstream reaches. Downstream from the powerline easement, Dynamite Creek has incised through legacy sediments that accumulated behind a relic farm dam. The dam has been breached and headcuts have migrated through it.


Dynamite Creek Reach 2

Dynamite Creek Reach 3 begins at the failed relic dam and is a transition area between the highly eroding and incised Reach 2, and the stable Reach 4. Bank erosion is present and there is a morphologically unstable meander bend that has eroded into the right valley wall.


Dynamite Creek Reach 3

The riparian buffer along both Reaches 2 and 3 is a hardwood forest. Trees in Reach 2 are not as mature as Reaches 1, 3, 4, and 5 due to the relic farm pond.

Dynamite Creek Reach 4

Dynamite Creek Reach 4 has stable geomorphology with low bank height ratios and a stable meander pattern. The riparian buffer is mature hardwood. Bed material is dominated by gravels. The bed material and presence of large woody debris provide bedform and habitat diversity along this reach.

Dynamite Creek Reach 5

Dynamite Creek Reach 5 is experiencing localized downvalley meander migration where riffles have formed in meander bends that are heavily eroded. Many of these meander bends have migrated to the edge of the valley and are beginning to cause toe failure and significant erosion of the steep valley walls. Large woody debris is preventing several headcuts from migrating up the channel. Fine sediment is filling the pools, but the riffles include gravel and cobbles. Bedform diversity is appropriate for this meandering stream type and large woody debris is generally abundant. The riparian buffer is a mature hardwood forest.

Dynamite Creek Reach 6

Reach 6 begins at the confluence of Cabin Creek and is situated along the right side of the floodplain. The downvalley meander migration pattern noted in Reach 5 continues through Reach 6 and is coupled with reachwide incision. While Reach 5 exhibits several localized areas of severe erosion, the incision and erosion in Reach 6 affect the majority of the channel length. Bedform diversity is mostly lacking in Reach 6, due to abundant accumulation of fine sediment. Large woody debris is generally abundant. High quality floodplain wetlands have drainage patterns that are beginning to headcut from the point where they flow into Reach 6. Livestock have access to lower Reach 6 of Dynamite Creek. The understory is relatively sparse, indicating livestock may browse in these areas.

Dynamite Creek Reach 7

Dynamite Creek Reach 7 begins at the online pond as the channel exits the forested valley and flows to the project terminus at a culverted farm road crossing. Dynamite Creek Reach 7 exists the pond in a channelized condition. The stream has been straightened and dredged, with spoil piles along the streambanks throughout the project reach. According to the landowner, his father used dynamite in the 1940s to connect two stream channels, likely near the lower end of the project area. This routed Dynamite Creek east to connect to Towns Creek before entering the Dan River, where Dynamite Creek may at one point have been connected directly to the Dan River. The farmer has dredged the channel

approximately every ten years since the 1950s, most recently in early 2015. Wildlands has discussed other sites with similar dredging practices with USACE staff in the past. Regular dredging for agricultural purposes is considered to be channel maintenance and not a violation of Clean Water Act rules since the channel was not relocated.


Dynamite Creek Reach 7

Both the pond dam and dredge spoil piles in the floodplain of Reach 7 exist as artificial barriers to stream-wetland hydrology connections. Dynamite Creek Reach 7 is incised and disconnected from the floodplain and streambank erosion is common. Much of the erosion is active scour, though mass wasting is also present. Bank erosion has been exacerbated by dredging activities that create vertical banks. Bedform diversity is very poor in that riffles and pools are barely apparent and only fine sediment is visible. Large woody debris is absent. The channel slope flattens considerably about two-thirds of the way between the pond and the downstream end of the project.

There are isolated trees in a single row along the channel, and the remaining riparian buffer area is dominated by pasture grasses. Algae is abundant in the channel along lower Dynamite Creek and is evidence of high nutrient loading.


UT1

UT1

UT1 enters Reach 4 of Dynamite Creek from the southeast. UT1 is perennial and exhibits reference-quality conditions. Bedform diversity is appropriate for this step-pool channel type and large woody debris is abundant. The riparian buffer is a mature hardwood forest.

Village Creek, City Creek, and Cabin Creek

Village Creek, City Creek, and Cabin Creek are all tributaries to Dynamite Creek. Village Creek and Cabin Creek are small, stable channels with a mature forested buffer. City Creek, however, is located within the powerline easement and has degraded due to lack of buffer, location on the hillslope, and the incision of Dynamite Creek at its confluence. These streams are not included in the project for credit.

Table 3: Summary of Stream Resources

Reach Summary Information								
Stream Reach	**Dynamite Creek R1**	**Dynamite Creek R2**	**Dynamite Creek R3**	**Dynamite Creek R4**	**Dynamite Creek R5**	**Dynamite Creek R6**	**Dynamite Creek R7**	**UT1**
Length of Reach(lf)	508	947	206	522	653	703	1,376	287
Valley Confinement (confined C, moderately confined M, unconfined U)	C	C	C	C	M	U	U	C
Drainage Area (acres)	13	35	36	49	68	75	119	7
Perennial, Intermittent, Ephemeral	I,P	P	P	P	P	P	P	P
NCDWR Water Quality Classification[1]	C							
Stream Classification (Existing and Proposed)[2]	B4	E4:B4/C4	C4:B4	E4	E4	E4:C4	C5:C4/E4	B4
FEMA Classification	X	X	AE	AE	AE	AE	AE/ Floodway	X
NCSAM Overall Score[3]	High	Medium	High	High	High	High	Low	High

1. Source: North Carolina Division of Water Resources 2016 water quality classifications for the Roanoke River.
2. Source: Rosgen, D. L. 1994. A classification of natural rivers. Catena 22:169-199.
3. NCSAM worksheets and scores can be found in Appendix 3

3.4 Existing Wetlands

3.4.1 Existing Jurisdictional Wetlands

On February 5, 19, 20, and 27, 2020, Wildlands investigated the extent of Waters of the United States within the project area. All jurisdictional resources were located by sub-meter GPS or conventional survey. USACE staff provided confirmation of extent of jurisdictional resources on June 15, 2020. Existing wetlands within the project area are summarized in the table below.

The 23 jurisdictional wetland features were classified and evaluated using the North Carolina Wetland Assessment Method (NCWAM). NCWAM forms can be found in Appendix 3. For discussion purposes, existing wetlands will be placed into two groups – wetlands in the Dan River floodplain managed for pasture (northern group) and wetlands south of where Dynamite Creek flows out of the wooded portion of the project area (southern group). Wetlands A-L, Q, and R are in the northern group and wetlands M-P and S-W are in the southern group. A figure of the wetlands can be found in the approved PJD in Appendix 2.

The southern group of wetlands consists of the headwater forest type with one floodplain pool type (Wetland T). Wetlands N, O, and S-V score medium or high using NCWAM and function appropriately (Appendix 3). The value of maintaining and further improving function of these wetlands is recognized,

and impacts will be avoided and minimized. Wetlands M, P, and W formed as a result of historical agricultural disturbance and accelerated erosion rates. Erosion in these areas continue. Stabilizing these erosional features may require impacting the three wetlands, however, it will provide the greatest overall ecological input for the system to reduce the sediment load. Wetlands in the southern group are not proposed for credit generation due to small size and difficulty in measuring functional uplift, although some functional uplift is expected as a result of stream restoration.

The northern group of wetlands consists primarily of the bottomland hardwood forest type. This group includes one riverine swamp forest wetland (Wetland Q) which classifies as such because it is a shallow impoundment of Dynamite Creek. Prior to disturbance, this wetland would have been a bottomland hardwood forest. All wetlands in the northern group are expected to be bottomland hardwood forest following restoration. Most existing wetlands in this group score low on the overall NCWAM wetland ratings and low on the individual function ratings for hydrology, water quality and habitat. These low ratings are a direct result of extensive manipulation and management for agricultural purposes.

The dredging of Dynamite Creek, floodplain drainage, and grade manipulation has hydrologically disconnected wetlands from the stream. On the north side of the stream, it appears that broad, elevated planting beds were once constructed, leaving a higher than natural floodplain elevation. South of Dynamite Creek, there are similar elevated beds as well as shallow drainage swales which provide a direct conduit for surface water to drain to the channelized stream. These drainage swales can be observed in historical photos back to 1951 with wet, linear signatures in the west-east direction throughout the floodplain. A few large, scattered trees are present within and in proximity to the northern group of wetlands, but appropriate bottomland hardwood forest vegetation is generally absent because the wetlands are managed for livestock forage. The 250 head of cattle that access the wetland areas intermittently (a total of six months annually) provide a substantial source of nutrients and bacteria to the area. Additional nutrients are added during annual top dress fertilization. The floodplain manipulation causes the northern group of wetlands to act as a source and expedited transport mechanism for nutrient delivery to the stream. Rainwater and floodwaters that come into contact with fecal coliform and other nutrients in the floodplain that would otherwise be absorbed by the floodplain instead runoff into drainage swales and are delivered into the stream. In reference condition, bottomland hardwood forest wetlands would be a net nutrient and bacteria sink. Existing wetlands in the northern group will be the focus of wetland rehabilitation practices.

Table 4: Summary of Wetland Resources

Wetland Summary Information						
Parameter	**Wetland A**	**Wetland B**	**Wetland C**	**Wetland D**	**Wetland E**	**Wetland F**
Size of Wetland (AC)	4.23	0.02	0.01	0.15	0.01	0.04
Wetland Type	Bottomland Hardwood Forest	Bottomland Hardwood Forest	Bottomland Hardwood Forest	Bottomland Hardwood Forest	Bottomland Hardwood Forest	Bottomland Hardwood Forest
NCWAM Rating	Low	Low	Low	Low	Low	Low
Mapped Soil Series	Hatboro	Hatboro	Dan River	Hatboro/Dan River	Dan River	Dan River
Drainage Class	Poorly Drained	Poorly Drained	Well Drained	Poorly Drained/Well Drained	Well Drained	Well Drained
Soil Hydric Status	Yes	Yes	Yes	Yes	Yes	Yes
Source of Hydrology	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater

Wetland Summary Information						
Parameter	**Wetland G**	**Wetland H**	**Wetland J**	**Wetland K**	**Wetland M**	**Wetland N**
Size of Wetland (AC)	0.94	0.05	0.01	0.02	<0.01	0.03
Wetland Type	Bottomland Hardwood Forest	Bottomland Hardwood Forest	Bottomland Hardwood Forest	Bottomland Hardwood Forest	Headwater Forest	Headwater Forest
NCWAM Rating	Low	Low	Low	Low	Medium	High
Mapped Soil Series	Dan River	Dan River	Dan River	Dan River	Clover	Hatboro
Drainage Class	Well Drained	Well Drained	Well Drained	Well Drained	Well Drained	Poorly Drained
Soil Hydric Status	Yes	Yes	Yes	Yes	No	Yes
Source of Hydrology	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater

Wetland Summary Information						
Parameter	**Wetland O**	**Wetland P**	**Wetland Q**	**Wetland S**	**Wetland T**	**Wetland U**
Size of Wetland (AC)	0.03	<0.01	0.09	0.02	<0.01	0.04
Wetland Type	Headwater Forest	Headwater Forest	Riverine Swamp Forest	Headwater Forest	Floodplain Pool	Headwater Forest
NCWAM Rating	High	Low	Low	Medium	High	High
Mapped Soil Series	Rhodhiss	Clover	Hatboro	Hatboro	Hatboro	Rhodhiss
Drainage Class	Well Drained	Well Drained	Poorly Drained	Poorly Drained	Poorly Drained	Well Drained
Soil Hydric Status	No	No	Yes	Yes	Yes	No
Source of Hydrology	Groundwater	Groundwater	Impoundment	Groundwater	Groundwater	Groundwater

Wetland Summary Information		
Parameter	**Wetland V**	**Wetland W**
Size of Wetland (AC)	0.03	0.01
Wetland Type	Headwater Forest	Headwater Forest
NCWAM Rating	High	Low
Mapped Soil Series	Hatboro	Rhodhiss
Drainage Class	Well Drained	Well Drained
Soil Hydric Status	No	No
Source of Hydrology	Groundwater	Groundwater

3.4.2 Relic Hydric Soils

A detailed investigation was conducted by a licensed soil scientist (LSS) on April 21, 2020 to determine the extent of hydric soils onsite. The results of this investigation were used to determine wetland re-establishment potential. Areas containing hydric soils or buried hydric soils but lacking a contemporary wetland hydrology regime were likely functional wetlands prior to agricultural conversion. The LSS report and hydric soil map are included in Appendix 1.

The investigation determined that soils in the Dan River Floodplain portion of the Site are most like the Hatboro or Holly series (Fine-loamy, mixed, active, nonacid, mesic, Fluvaquentic Endoaquepts). Areas that have been built up by discharge of fill material are technically most similar to the Codorus series (Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts), but would have been more similar to Hatboro or Holly prior to disturbance. It is expected that these areas will be most similar to a Hatboro following restoration and removal of fill.

3.4.3 Existing Hydrology

Groundwater gages (GW) were installed on site in November 2019 at locations shown on Figure 2. Wetland hydroperiod at each location observed was less than values typical for the Hatboro series. The longest consecutive duration of saturation within 12 inches of the soil surface during the growing season (March 24 – November 14) at GW 1, 2, 5, and 6 occurred on May 20th – May 30th, 2020 and was associated with nine inches of rain in one week and flooding of the Dan River. In a reference condition piedmont bottomland hardwood forest, groundwater is the primary source of hydrology and overbank flooding serves as a supplementary input. Recorded data suggests that areas surrounding GW 2, 3, 4, and 6 lack persistence in maintaining groundwater levels near the soil surface, even outside of the growing season. Precipitation inputs appear to be rapidly removed from the floodplain, likely due to the agricultural drainage practices. The area surrounding GW 4 shows strongest evidence of persistent groundwater recharge but has a network of beds and swales which remove excess water. The drainage rate of the area surrounding GW 1 is between drainage rates in proximity to GW4 and remaining areas. This is likely due to its location between the toe of slope, where persistent groundwater discharge is expected, and a very incised reach of Dynamite Creek, which provides drainage. The hydrology of all existing wetland and relic hydric soil areas observed exhibits clear departure from a reference condition piedmont bottomland hardwood forest. A summary of groundwater gage data is provided in Table 5 and plots for the entire observation period are in Appendix 1.

Table 5: Groundwater Gage Summary

Gage	Consecutive Days in Growing Season with Groundwater Table Above 12 in. Depth (Days)	Consecutive Percent of Growing Season with Groundwater Table Above 12 in. Depth (%)	Record Dates	Proposed Wetland Approach
1	11	4.7	11/13/2019-6/4/2020	Rehabilitation
2	10	4.2	11/13/2019-6/4/2020	Re-establishment
3[1]	N/A	N/A	11/19/2019-2/19/2020	N/A
4	16	6.8	11/13/2019-6/4/2020	Rehabilitation
5	14	5.9	11/13/2019-6/4/2020	Rehabilitation
6	10	4.2	2/20/2020-6/4/2020	Re-establishment

1. Groundwater gauge number three was not present during the 2020 growing season and its location was within the proposed stream alignment.

3.4.4 Existing Vegetation

The forested sections of Dynamite Creek Reaches 1-6 and UT1 are primarily composed of deciduous species. Mature hardwoods such as American beech (*Fagus grandifolia)*, American sycamore (*Platanus occidentalis)*, red maple (*Acer rubrum*), river birch (*Betula nigra*), tulip poplar (*Liriodendron tulipifera)*, and sweetgum (*Liquidambar styraciflua*) are present in the upper portion of the project area. The understory is populated by American hornbeam (*Carpinus caroliniana)*, painted buckeye (*Aesculus sylvatica*), pawpaw (*Asimina triloba*), spicebush (*Lindera benzoin*), and witch hazel (*Hamamelis virginiana*). In addition, umbrella magnolia (*Magnolia tripetala*) grows along Dynamite Creek Reach 6. The herbaceous vegetation includes Christmas fern (*Polystichum acrostichoides*), hog peanut (*Amphicarpaea bracteata*), jewelweed (*Impatiens capensis*), wood nettle (*Laportea canadensis*), and wild strawberry (*Fragaria virginiana*). Greenbrier (*Smilax spp*.) grows throughout. Invasive species include Chinese privet (*Ligustrum sinense*), Japanese spiraea (*Spiraea japonica*), Japanese stiltgrass (*Microstegium vimineum*), and multiflora rose (*Rosa multiflora*).

Pasture grasses, such as tall fescue (*Festuca arundinacea*) dominate the pasture areas of Dynamite Creek Reach 7 and the Dan River floodplain. Also present are buttercup (*Ranunculus spp.*), cardinal flower (*Lobelia cardinalis*), cinnamon fern (*Osmundastrum cinnamomeum*), clover (*Trilifolium spp*.), crimsoneyed rosemallow (*Hibiscus moscheutos*), ironweed (*Vernonia spp*.), knotweed (*Polygonym spp.*), and spikerush (*Eleocharis spp*.). Minimal invasive vegetation was observed; however, species present include Chinese privet (*Ligustrum sinense*) and multifora rose. Sparse trees are located along the channel and floodplain. These include American sycamore, black willow (*Salix nigra*), river birch, sugarberry (*Celtis laevigata*), and various oaks (*Quercus spp.*).

3.5 Overall Functional Uplift Potential

The primary stressors to streams on Site are incision of Dynamite Creek through unconsolidated material in an old pond bed on Reach 2, lateral instability on Reaches 3 and 5, livestock access on Reaches 6 and 7, historical channelization of Dynamite Creek on Reach 7, and lack of riparian buffers on portions of Reach 6 and all of Reach 7. Without intervention, the pond material in Reach 2 would continue to move downstream and livestock would continue to trample banks and wallow in the stream channel, contributing to the sediment and pollutant load downstream.

Wetland functionality within the Dan River floodplain has been compromised by agricultural conversion. Wetland restoration practices will increase groundwater storage and residence time, improve hydrologic interaction of the stream and floodplain wetlands, provide opportunity for water quality treatment, and establish diverse wildlife habitat.

The primary functional uplift on site will be the reduction of sediment loads through the stabilization of stream channels, and improvements to wetland functions through the following activities:

- Addressing varying degrees of geomorphic instability through channel restoration and enhancement.
- Stabilizing legacy sediments located on Reach 2.
- Removal of livestock from the project area through fencing along the conservation easement in areas adjacent to livestock pasture.
- Reconnecting stream channels to their floodplains and hydrologically reconnecting Reaches 6 and 7 to riparian wetlands.
- Establishing a riparian buffer on Reaches 6 and 7.
- Removing drainage swales from the Dynamite Creek Reach 7 floodplain.

Additional benefits to instream habitat will result from addressing channel instability on all project reaches and the establishment of instream habitat features where they were previously absent.

Removal of livestock from the Site will contribute to the LWP and RBRP goals of reducing bacterial inputs to the Town Creek watershed.

3.6 Site Constraints to Functional Uplift

Reduction in sediment and bacterial loading downstream will be limited by the influence area of the project. The watershed for Dynamite Creek extends slightly north into the adjacent field, which may continue to have livestock in the future and produce runoff from agricultural fields.

There are two crossings on the project. The first is a utility crossing on reach 2 that is external to the easement that will constitute a break in the project canopy, as vegetation in that reach will be periodically maintained. The second crossing, located on Reach 6, is an internal easement crossing for farm use. The primary purpose of the farm crossing is to convey a water supply pipe to water stations on pastures west of the project area. It is necessary to put the well on the hillslope above the project area because of the risk of flooding on the Dan River which could otherwise damage electrical equipment. The crossing will be fenced and gated with a cattle guard under the western gate.

4.0 Mitigation Site Goals and Objectives

The overall goal of the project is to reduce sediment and fecal coliform loading in the Dynamite Creek watershed and improve stream and wetland function through the restoration, enhancement, and preservation of streams, the reestablishment and rehabilitation of riparian wetlands, and the establishment and protection of riparian buffers. Goals have been set to achieve the functional uplift outlined in Section 3 and alleviate the watershed stressors discussed in Section 2. The project goals and related objectives are described in Table 6.

Table 6: Mitigation Goals and Objectives

Goal	Objective	Expected Outcomes and LWP/RBRP Objectives Supported
Exclude Livestock from Stream	Install fencing around the conservation easement adjacent to livestock pastures.	• *Support LWP/RBRP objective of reduction in sediment, nutrient, fecal coliform, and bacteria inputs through implementation of livestock exclusion.*
Improve the stability of stream channels.	Construct stream channels that will maintain stable cross-sections, patterns, and profiles over time. Repair eroding stream banks with bioengineering methods. Restore profile to remove dam breach headcut.	• Reduce shear stress on channel boundary. Reduce sediment inputs from bank erosion. • *Support LWP/RBRP objective of reducing turbidity inputs and stabilizing streambanks.*
Improve instream habitat.	Install habitat features such as constructed riffles, cover logs, and brush toes into restored/enhanced streams. Add woody materials to channel beds. Construct pools of varying depth.	• Increase and diversify available habitats for macroinvertebrates, fish, and amphibians leading to colonization and increase in biodiversity over time. Add complexity including LWD to the streams.

Goal	Objective	Expected Outcomes and LWP/RBRP Objectives Supported
Reconnect channels with floodplains.	Reconstruct stream channels with appropriate bankfull dimensions and depth relative to the existing floodplain.	• Allow more frequent flood flows to disperse on the floodplain. Support geomorphology and higher-level functions. Improve wetland hydrology on Dynamite Creek Reach 7. • *Support LWP/RBRP objective of reduction in sediment and turbidity inputs.*
Improve wetland hydrology.	Remove livestock to allow soil profiles to stabilize. Remove drain effect of channelized stream and floodplain berms and swales.	• Increased surface water residency time will provide contact treatment and groundwater recharge potential.
Restore and enhance native floodplain and streambank vegetation.	Plant native tree and understory species in riparian zones and plant native shrub and herbaceous species on streambanks. Treat invasive species within project area.	• Reduce sediment inputs from bank erosion and runoff. Increase nutrient cycling and storage in floodplain. Provide riparian habitat. Add a source of LWD and organic material to stream. Support all stream functions. • *Support LWP/RBRP objective of restoring riparian buffers.*
Permanently protect the project site from harmful uses.	Establish a conservation easement on the site. Preserve high quality stream reaches through the placement of a conservation easement on site.	• Protect Site from encroachment on the riparian corridor and direct impact to streams and wetlands. Support all stream functions. • *Support LWP/RBRP objective of contributing to the protection of Town Creek and the Dan River.*

5.0 Regulatory Considerations

Table 7, below, is a summary of regulatory considerations for the Site. These considerations are expanded upon in Sections 5.1-5.4.

Table 7: Project Attribute Table Part 4

Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	No	PCN, 404 Permit
Water of the United States - Section 401	Yes	No	PCN, 401 Permit
Endangered Species Act	Yes	Yes	Categorical Exclusion Documents
Historic Preservation Act	Yes	Yes	Categorical Exclusion Documents
Coastal Zone Management Act	No	No	N/A
FEMA Floodplain Compliance	Yes	No	No-Rise
Essential Fisheries Habitat	No	N/A	N/A

5.1 FEMA Floodplain Compliance and Hydrologic Trespass

Dynamite Creek is mapped in a Zone AE Special Flood Hazard Area (SFHA) on Rockingham County Flood Insurance Rate Map (FIRM) Panel 7999 (Figure 6). The mapped portion of Dynamite Creek (labeled Town Creek Tributary 1 on FIRM Panel 7999) is located on Reaches 3-7. For this portion of the reach, a limited detailed study has been performed with base flood elevations and non-encroachment widths defined. The remainder of the stream has no hydraulic modeling performed but is mapped within the floodway and flood fringe of the Dan River. Wildlands will model the stream in HEC-RAS as a No-Rise, coordinating the permitting through the City of Eden and Rockingham County and the state FEMA coordinator.

5.2 401/404

Design of the Site prioritized avoidance and minimization of impacts to wetlands that currently provide appropriate function. Functioning wetlands are within the southern group discussed in section 3.4.1. Some small impacts to wetlands O and S were unavoidable and necessary to maximize ecological uplift potential of the stream design. These impacts are due to conversion of wetland to stream resource and floodplain grading. Remaining wetland impacts occur to poorly functioning wetlands, and the impacts are direct results of practices intended to restore function of the wetlands and stream. A net gain of wetland area and function is expected. Wetlands within the limits of disturbance will be shown on construction plans, erosion and sediment control plan and detail sheets, and avoidance procedures described in project specifications. Wetland impacts are provided in Table 8 to the project as a whole. The Pre-Construction Notification will itemize impacts in greater detail and will be provided with the Final Mitigation Plan.

Table 8: Estimated Impacts to Project Wetlands

Jurisdictional Feature	Classification	Permanent (P) Impact		Temporary (T) Impact	
		Type of Activity	Impact Area (acres)	Type of Activity	Impact Area (acres)
Wetland O	Non-Tidal Wetland	Fill Area	0.001	-	-
Wetland T	Non-Tidal Wetland	Fill Area	0.003	Fill Area	0.001
Wetland S	Non-Tidal Wetland	Fill Area	0.013	Fill Area	0.009
Wetland A	Non-Tidal Wetland	Fill Area	0.008	-	-
Wetland Q	Non-Tidal Wetland	Fill Area	0.092	-	-
Wetland A	Non-Tidal Wetland	-	-	Fill Area	0.054
Wetland B	Non-Tidal Wetland	-	-	Fill Area	0.024
Wetland D	Non-Tidal Wetland	Fill Area	0.006	Fill Area	0.001
Wetland G	Non-Tidal Wetland	Fill Area	0.067	Fill Area	0.051
Wetland K	Non-Tidal Wetland	Fill Area	0.009	Fill Area	0.01
Wetland W	Non-Tidal Wetland	Fill Area	0.001	-	-

6.0 Design Approach and Mitigation Work Plan

6.1 Design Approach Overview

The design approach (Figure 7) for this site was developed to maximize functional uplift and meet the goals and objectives described in Section 4. The table below summarizes the primary impairments to each resource and the proposed restoration activity.

Table 9: Functional Impairments and Restoration Approach

Resource	Reach(es)	Primary Stressors/Impairments	Restoration Approach
Dynamite Creek	1	High quality	Preservation
Dynamite Creek	2	Incision through legacy sediments, erosion	Restoration
Dynamite Creek	3	Bank erosion	Restoration
Dynamite Creek	4	High quality	Preservation
Dynamite Creek	5	Bank Erosion, isolated areas of unstable planform	Enhancement 1
Dynamite Creek	6	Livestock access, incision, bank erosion, pond at downstream end	Restoration
Dynamite Creek	7	Livestock access, incision, scour, lack of riparian buffer.	Restoration
UT1	-	High Quality	Preservation
Relic hydric soils in floodplain	Dynamite Creek Reach 7	Floodplain drainage, channel incision, livestock access, lack of wooded vegetation	Reestablishment
Existing floodplain wetlands	Dynamite Creek Reach 7	Livestock access, lack of wooded vegetation	Rehabilitation

6.2 Reference Streams

Reference reaches were chosen to inform the design because of their similarities to the Site streams including drainage area, valley slope, morphology, and bed material. Proximity of the reference reaches to the project site and location within similar physiographic and geologic regions were also considered. In all, 9 reference reaches were used to develop and support the design of Dynamite Creek. Geomorphic parameters for these reference reaches are summarized in Appendix 1 (except for reference reaches only used for discharge analysis). A brief description of each reference reach is included in Table 10.

Table 10: Stream Reference Data Used in Development of Design Parameters

Reference Reach	Stream Type	Landscape Position	Chosen For	Used For	Used for Reaches
Magnolia Trib Reach 1	B4c	Forested area in the upper piedmont region of NC with a predominantly wooded and agricultural watershed with some low-density residential areas	Similar physiographic region as project site with similar valley slope	Discharge	Dynamite Creek Reaches 2-7
UT to Varnals Creek	B	Forested area in the central piedmont region of NC	Proximity to the project site and similar valley slope as the reach	Discharge, Dimension, Pattern, Profile	Dynamite Creek Reach 2 and 3
UT to Polecat	E4	Central piedmont region of NC in a mature forested area receiving runoff from agricultural, wooded, and low-density residential areas	Similar valley slope to the project reach and entrenchment ratio near what is anticipated for final reach design	Discharge, Dimension, Pattern, Profile	Dynamite Creek Reach 2, 3, 5, and 6
Sanders Creek	E4	Mature forested area in the piedmont region of VA	Similar valley slope as the project reach and similar physiographic region of the site	Discharge, Dimension, Pattern, Profile	Dynamite Creek Reach 2, 3, 5, and 6
Indian Creek	E4	Mature forested area in the foothills of NC. Located in Hanging Rock State Park	Similar landscape position and geologic region as the project site.	Discharge	Dynamite Creek Reaches 2-7
Dynamite Creek - On Site	C4/E4	Confined valley receiving runoff from a predominantly forested watershed	An on-site reference quality stream gives the best representation of the desired outcome of the restoration effort	Discharge	Dynamite Creek Reaches 2-7
Long Branch	C4/E4	Central piedmont region of NC receiving runoff primarily from wooded and agricultural areas, and some low-density residential areas	Proximity to the project site and similar valley slope	Discharge, Dimension, Pattern, Profile	Dynamite Creek Reach 7
Cedar Creek	E5	Coastal plain region of NC in wooded floodplain paralleling the Cape Fear River	Wide and flat valley similar to the project reach with low slope	Pattern, Profile	Dynamite Creek Reach 7
UT to Lyle Creek	C5	Foothills region of NC in wooded floodplain of Lyle Creek	Similar physiographic region as the project site with similar valley slope	Discharge, Dimension, Pattern, Profile	Dynamite Creek Reach 7

6.3 Design Channel Morphological Parameters -

A combination of reference reach data and designer experience was used to develop design parameters for streams on site. Reach 2 and 3 of Dynamite Creek has sections of both B-type and C-type channel, depending on width and slope of the valley. References for both these channel types are included in Table 11, below. Pattern metrics for references only apply to C-type channel portions of the reach. Key morphological parameters are summarized in tables below and extended parameter tables can be found in Appendix 1.

Table 11: Summary of Morphological Parameters for Dynamite Creek Reaches 2 and 3

Parameter	Dynamite Creek Existing Parameters	Reference Parameters			Dynamite Creek Proposed Parameters
	Reaches 2 and 3	UT to Varnals Creek	UT to Polecat	Sanders Creek	Reaches 2 and 3
Valley Width (ft)	90	-	-	-	90
Contributing Drainage Area (acres)	35	262	262	224	35
Channel/ Reach Classification	E4	B	E4	C4	B4/C4
Bankfull Width (ft)	4.2	9.9	8.1	6.9	6.1
Bankfull Depth (ft)	0.7	1.1	1.0	0.7	0.5
Bankfull Area (sq ft)	3.1	11.3	8.9	5.2	3
Bankfull Discharge Velocity (ft/s)	3.3	4.8	2.9	3	3
Bankfull Discharge (cfs)	10.3	54	20.3	15	8.8
Water Surface Slope (%)	1.55	1.7	1.2	0.8	1.77
Sinuosity	1.3	1.2	1.4	1.8	1.1
Width/ Depth Ratio	6.0	8.7	7.4	9.4	12.6
Bank Height Ratio	5.3	1	1	1.6	1.0
Entrenchment Ratio	1.6	7.9	5.8	>2.2	>2.2

1. Existing discharge represents the discharge calculated using Mannings equation on the surveyed existing cross-section. The proposed discharge is the design discharge used to size the proposed channels as found in Table 14 and described in Section 6.4.

Table 12: Summary of Morphological Parameters for Dynamite Creek Reach 6

Parameter	Dynamite Creek Existing Parameters	Reference Parameters		Dynamite Creek Proposed Parameters
	Reach 6	UT to Polecat	Sanders Creek	Reach 6
Valley Width (ft)	120	-	-	120
Contributing Drainage Area (acres)	75	262	224	75
Channel/ Reach Classification	E4	E4	C4	C4
Bankfull Width (ft)	8.3	8.1	6.9	8.5
Bankfull Depth (ft)	0.9	1.0	0.7	0.7
Bankfull Area (sq ft)	7.2	8.9	5.2	5.7
Bankfull Discharge Velocity (ft/s)	3.1	2.9	3	2.7
Bankfull Discharge (cfs)	22.2	20.3	15	15.4
Water Surface Slope (%)	0.93	1.2	0.8	0.94
Sinuosity	1.3	1.4	1.8	1.3
Width/ Depth Ratio	9.2	7.4	9.4	12.6
Bank Height Ratio	2.9	1	1.6	1.0
Entrenchment Ratio	1.4	5.8	>2.2	>2.2

2. Existing discharge represents the discharge calculated using Mannings equation on the surveyed existing cross-section. The proposed discharge is the design discharge used to size the proposed channels as found in Table 14 and described in Section 6.4.

Table 13: Summary of Morphological Parameters for Dynamite Creek Reach 7

Parameter	Dynamite Creek Existing Parameters	Reference Parameters			Dynamite Creek Proposed Parameters
	Reach 7	Long Branch	Cedar Creek	UT to Lyle Creek	Reach 7
Valley Width (ft)	>500	-	-	-	>500
Contributing Drainage Area (acres)	119	954	2605	160	119
Channel/ Reach Classification	C5	C4/E4	E5	C5	E4
Bankfull Width (ft)	9.9	14.8-18.6	11.1-12.0	7	10.9
Bankfull Depth (ft)	1.3	1.3-2.1	1.8	0.5	0.9
Bankfull Area (sq ft)	12.8	25.0-34.6	18.9-22.2	3.5-4.1	9.4
Bankfull Discharge Velocity (ft/s)	2.6	3.6-4.0	3.0-3.1	4.7	2.6
Bankfull Discharge (cfs)[1]	33.3	101-124	57-68	18	24.1
Water Surface Slope (%)	0.303	0.4	0.3	0.4	0.47
Sinuosity	1	1.3	1.2	1.1	1.1
Width/ Depth Ratio	7.6	7.9-13.8	6.5-6.6	14.9-18.3	12.7
Bank Height Ratio	1.0	1.2-1.5	1.1-1.3	0.6-0.9	1
Entrenchment Ratio	>2.2	>3.4	>2.2	5.7-6.4	>2.2

3. Existing discharge represents the discharge calculated using Mannings equation and a potential bankfull feature on the surveyed existing cross-section. The proposed discharge is the design discharge used to size the proposed channels as found in Table 14 and described in Section 6.4.

6.4 Design Bankfull Discharge Analysis

The primary design goal for restoration reaches on site is to reduce sediment delivery down stream via erosion through the construction of stable streams, hydraulically connected to their floodplains. Selection of an appropriate bankfull discharge is key to appropriately sizing a channel so it may flood the adjacent floodplain with intended frequency. Multiple methods were used to develop design discharges for restoration reaches, including published regional curve data (Doll et al. 2003), reference reach data, and existing bankfull indicators. Additionally, Wildlands performed a regional flood frequency analysis using U.S. Geological Survey (USGS) gage sites. Results are shown in Table 14 and illustrated in Figure 9.

Table 14: Summary of Design Discharge Analysis

		Dynamite Creek Reach 2	Dynamite Creek Reach 3	Dynamite Creek Reach 5	Dynamite Creek Reach 6	Dynamite Creek Reach 7
DA (acres)		35	36	68	75	119
DA (sq. mi.)		0.05	0.06	0.11	0.12	0.19
NCSU Rural Piedmont Regional Curve (cfs)		11	11	18	19	26
NRCS Piedmont/Mountian Regional Curve (cfs)		5.7	5.8	9.6	10.3	14.9
Wildlands Regional Flood Frequency Analysis (cfs)	**1.2-year event**	9.1	9.2	14.9	15.9	22.5
	1.5-year event	13	14	22	23	33
Site Specific Reference Reach Curve (cfs)		6	6	11	12	19
Design Q		**8.8**	**9**	**14.4**	**15.5**	**24**

The results of the discharge analysis show the site-specific reference reach curve and the NRCS Piedmont/mountain regional curve at the lower end of the flow estimations, with the NCSU Rural piedmont curve being higher. An analysis was run equally weighting the four methods (once with the 1.2-year event and another with the 1.5 year- event from the Wildlands Regional Flood Frequency Analysis). The predicted values for design discharge were then compared to the on-site reference in the preservation section of Dynamite Creek Reach 4. It was found that the on-site reference on Reach 4 (estimated discharge between 10.2 and 10.4) supported a discharge between the weighted averages of methods, and closest to the Wildlands Regional Flood Frequency 1.2-year event. The design discharge was chosen based on these results.

6.5 Sediment Transport Analysis

The overall watershed was evaluated for potential off-site sources of sediment into the system that may affect existing conditions and design. The entire upstream watershed is forested, and that are no major sources of sediment input aside from the potential for logging (Figure 3). As discussed in Section 3.1, the last logging event was in 2007. Periodic logging of a small pine tree stand located on the project property may serve as temporary source of sediment.

The primary on-site source of fine sediment to the system is the legacy sediments of an old pond located along Reach 2. Additional sources of sediment are valley head cuts located upstream of the jurisdictional limits on Dynamite Creek, UT1, and Village Creek and streambank erosion along Dynamite Creek and City Creek. The heterogenous riffle material present along Reaches 3, 4, 5, and 6, downstream of the old pond, indicates the existing channel has adequate power to move the fine sediments delivered to the stream.

Dynamite Creek Reach 7 functions differently than the upstream reaches. Reach 7 is a low-slope section of channel in the floodplain of the Dan River with a predominantly sand bed and some intermixed

gravel. An in-line pond at the upstream end of the reach prevents delivery of gravel bedload from upstream reaches to Reach 7. Fine material delivered from upstream erosion and floodplain runoff, livestock access, and the lack of gravel being delivered to this reach, have created a sand bed system on Reach 7. The periodic dredging of this reach has also likely removed any natural channel gravels. Reach 7 and its floodplain have flooded several times during the assessment period due to flooding on the Dan River. Despite this flooding and the influx of fine sediment from upstream erosion, there are no signs of aggradation on the reach. Frequent flooding of this system may deliver fines back to the floodplain or push them downstream.

The design approach will address the major sediment sources (i.e. incision, erosion, and valley erosion) within the project area by stabilizing valley head cuts, stabilizing incision through the old pond on Reach 2, and stabilizing streambank erosion. Restoration reaches will be designed to appropriate geomorphic dimensions that will reduce shear stress within the channel and reconnect the stream to its floodplain. Since sediment loads will be reduced and there are currently no capacity issues based on a visual assessment of aggradation, the focus of this analysis is on competence. A competence analysis was performed using shear stress as calculated by the Shields (1936) and Andrews (1984) equation described by Rosgen (2001). The analysis was done to evaluate the current conditions of site streams and to aid in the design of threshold channels.

Table 15: Results of Competence Analysis

	Dynamite Creek Reach 2	Dynamite Creek Reach 3	Dynamite Creek Reach 6	Dynamite Creek Reach 7
Design Abkf (sq ft)	3.0	3.0	5.7	9.4
Design Wbkf (ft)	6.1	6.4	8.5	10.9
Design Dbkf (ft)	0.5	0.5	0.7	0.9
Design Schan (ft/ft)	0.018	0.019	0.009	0.005
Design Bankfull Velocity (fps)	3.0	3.0	2.7	2.6
Bankfull Shear Stress, t (lb/sq ft)	0.52	0.54	0.38	0.24
Movable particle size (mm)	67	70	51	18
D_{50} particle from sediment sample (mm)	45	45	45	8
Largest particle from sediment sample (mm)	76	76	76	16

Dynamite Creek Reaches 1-6 are a colluvial system, where the source of bed material is the underlying geology of the site, and material is input to the system from the surrounding steep valley walls. This is evidenced by the blocky structure of the large gravel and cobble material in riffles. Bedrock interspersed throughout the stream reaches provide periodic grade control. Competence analysis on Reaches 2 and 6 shows that the stream design is capable of moving the D_{50} particle size from the bar sample, but not the D_{100}. This indicates the streams will be stable and able to pass normal bedload while not flushing out an entire riffle due to excess shear stress. The design of bed material for the reaches 2- 6 is intended to mimic the size class currently available to the streams, while providing large enough material to ensure the entirety of the riffle is not mobile, and it will provide enough roughness to reduce shear stresses on the system. Median aggregate size will be slightly larger than the calculated movable particle size in the above table. Reaches 2 and 3 both demonstrate locally steep sections, with riffle grades greater than 2.5 times the average slope of the reach. Steep riffles along this reach are also to have large cobble

incorporated in the matrix to provide obstruction to flow and reduce shear stress (i.e. chunky riffles). Riffle material size classes are located in the Plans.

There was concern noted by the IRT in the initial site visit (meeting minutes Appendix 4), that the slope on Reach 7 was so low that it would not have the competence to move the sand bedload entering the system. For this reason, the reach was designed with a lower sinuosity than may be found in such a low slope system. The results of the competence analysis for Reach 7 indicate a slight excess of shear based on the existing bedload to the system. The native material riffles on Reach 7 will be designed with a D_{50} larger than the movable particle size to reduce shear stress within the system, but not enough to reduce overall competence to a point in which aggradation would occur. Riffles on Reach 7 are designed to have a lower portion of active bedload within the riffle material, as alluvium from Reaches 1-6 are unlikely to continually replace bed material. Competence numbers indicate that Reach 7 cannot move the size material located in Reaches 1-6 due to the low slope of Reach 7 in the Dan River floodplain. Wildlands cannot be certain that Dynamite Creek Reach 7 will be able to move sediment through the system for a large flooding event on the Dan River. Anecdotal evidence from the farmer and the past few years of assessment indicate the stream is capable of passing Dan River alluvium, but that may not be the case depending on the severity of a storm and the amount of bedload being carried by the Dan River. There is the potential need for maintenance in the Dan River floodplain following such an event. This is described further in Section 6.8 and Appendix 6.

6.6 Project Implementation

Below are descriptions of the proposed designs for each project reach. Fencing will be installed as determined necessary by the engineer to maintain livestock exclusion from the conservation easement. Planting density throughout the project area will vary based existing vegetation density following construction.

6.6.1 Dynamite Creek Reach 1 - Preservation

An existing headcut in the valley upstream of Reach 1 will be stabilized by grading the valley bottom in the area and matting and seeding the disturbed ground. Reach 1 is proposed as a preservation reach.

6.6.2 Dynamite Creek Reach 2 - Restoration

Dynamite Creek Reach 2 is proposed as a restoration reach. The designed channel type will vary between a B-type and C-type channel within the reach due to varying valley widths and profile grade requirements. Reach 2 will begin on-line and quickly abandon the existing stream alignment, meandering through the confined floodplain for approximately 150 feet as a B-type channel. As the valley widens moving downstream the designed channel transitions to a C-type stream with a meandering pattern and wider belt width. Reach 2 is bisected by a 30-foot-wide utility right-of-way. A ford crossing is proposed for the section of stream passing through the utility right-of-way. This length of stream will have a broad top-width and side slopes no steeper than 8(H):1(V) to allow for or passage of utility maintenance vehicles. The side slopes of the channel through this section will be rocked to increase stability and minimize potential damage to the streambanks caused by vehicular traffic. Downstream of the utility right-of-way Reach 2 continues as a C-type channel as it enters the alluvial soils of an old farm pond. Although The existing channel is highly incised and unstable where is passes through legacy sediments once retained by the downstream dam, a semi-mature forest has established on the floodplain throughout the historic footprint of the pond. The designed channel will utilize a priority 1 approach through the upper extents of the old pond bed to minimize impacts to the surrounding semi-mature forest while providing greater stability to the channel by appropriately reconnecting it with its floodplain. In the downstream section of the pond bed, Reach 2 transitions to a B-type channel, using a priority 2 approach, as the designed channel cuts down through the pond bed to tie back into the existing channel downstream of the old dam. Through this section of grade transition, a

new floodplain will be established along the designed channel to provide hydraulic relief during high flow events. The small section of the earthen dam on the right side of the existing channel will remain to maintain stability of the valley wall in this section.

Two intermittent tributaries flow into Reach 2. Village creek flows into Reach 2 from the right floodplain approximately 100 feet upstream of the utility right-of-way. A linear wetland feature exists up-valley of the point of jurisdiction of Village Creek. A series of three valley sills will be placed in the linear wetland to slow the flow of water from the steep valley, protecting both the wetland and the stream channel. A large knickpoint located in the valley bottom above the linear wetland will be stabilized by grading and planting/seeding the valley in the immediate and adjacent areas during construction. Stabilization of the valley will minimize sediment load to the system. City Creek flows through the utility right-of-way and into Reach 2 from the left floodplain. Bank grading and installation of two grade control structures is proposed for City Creek to enhance channel stability and allow for passage of utility maintenance vehicles within the right-of-way. Downstream sections and the confluences of both Village Creek and City Creek will be protected by the conservation easement; however, neither tributary is proposed for credit.

6.6.3 Dynamite Creek Reach 3 – Restoration

Dynamite creek Reach 3 begins in the existing channel approximately 20 feet downstream of the old dam. Reach 3 will continue along the existing channel for approximately 75 feet before meandering off-line at a sharp bend in the existing channel that is pushed against a steep valley wall, creating an opportunity for undercutting and mass wasting from the hill side. In this existing bend, the left valley wall will be graded back to increase floodplain capacity and the design channel will be moved to a more central alignment within the valley. The existing channel will be left as a disconnected oxbow to catch sediment from future hillside erosion, preventing excess sediment from entering the stream system. The reach ends approximately 30 feet downstream of the realigned meander where the design channel re-converges with the existing channel. Reach 3 is proposed for Restoration credit.

6.6.4 Dynamite Creek Reach 4 - Preservation

Dynamite Creek Reach 4 is proposed for Preservation credit and no manipulation of the channel is planned. During construction, special consideration of staging, site access, and material harvesting will be used to minimize impact on this reach. UT1 flows into Reach 4 approximately 150 feet upstream from the end of the reach.

6.6.5 Dynamite Creek Reach 5 – Enhancement I

Dynamite Creek Reach 5 is proposed for Enhancement I credit based on the level of intervention and the potential for ecological uplift on that reach, as agreed upon at the IRT site visit (meeting minutes Appendix 4). Most enhancement of the existing channel through this reach occurs in the meander bends. Bank revetments and other structures are proposed throughout the reach to provide protection to the outer streambank through these meanders. Two sections of the existing channel along the reach are proposed for realignment. One meander with a very low radius of curvature will be realigned through the existing point bar to better protect the streambank on the outside of the meander and prevent future erosion. Another section of existing stream flowing perpendicular to the valley will be realigned to reduce shear stress and potential for erosion.

6.6.6 Dynamite Creek Reach 6 - Restoration

Dynamite Creek Reach 6 is proposed for Restoration. The reach will begin as a priority II restoration as an existing bench feature at the end of Reach 5 will be carried downstream through part of Reach 6. This bench feature is incorporated to provide adequate hydraulic relief within the design channel during high flow events. The reach will transition to a priority I restoration as a the bankfull profile decreases in elevation in relation to the thalweg profile to achieve a bank height ratio near 1.0. A 20-foot-wide

internal easement crossing is proposed at the end of the reach. A bridge suitable for light vehicular and foot traffic is proposed within the crossing. Special precautions and considerations will be used during construction of this reach to ensure impacts to the mature trees and wetlands along the reach are minimized.

A small tributary, Cabin Creek, flows into Reach 6 approximately 75 feet downstream from the start of the reach. A portion of Cabin Creek and its confluence with Dynamite Creek will be protected by the conservation easement but is not proposed for credit.

6.6.7 Dynamite Creek Reach 7 - Restoration

Dynamite Creek Reach 7 begins downstream of the internal easement crossing where the stream enters the floodplain of the Dan River. Reach 7 is a very low slope channel (0.1% - 0.2%) and is proposed for Restoration. To prevent sedimentation within the channel from upstream sources and flooding of the Dan River, Reach 7 was designed to have low sinuosity, increasing the reach-wide slope and capacity of the channel. The variability in flow velocity will create variety of habitat niches within stream and promote a diverse and more-complete aquatic ecosystem. Reach 7 extends to eastern boundary of the conservation easement. Grading is not anticipated beyond the conservation easement at the downstream end of the easement, prior to the culvert and farm road. However, if streambank conditions worsen prior to construction, minor bank stabilization may occur in the form of grading back, matting, and vegetating banks.

6.6.8 UT1

UT1 is proposed for Preservation credit. No manipulation of the channel is proposed.

6.6.9 Wetlands

Areas proposed for wetland rehabilitation are existing jurisdictional wetlands which exhibit substantial impairments to hydrology, water quality, and habitat functions. 5.475 acres are proposed for rehabilitation. Wetland Re-establishment is proposed on 5.551 acres that contain hydric soil or buried hydric soil (Appendix 1) but lack a contemporary wetland hydrology regime.

Rehabilitation and re-establishment of wetland hydrology will be accomplished be elevating the Dynamite Creek Streambed, removing agricultural drainage swales, and creating surface roughness. Elevating the streambed will eliminate the drainage effect currently provided by the dredged channel and increase frequency of interaction of the stream with floodplain wetlands. Artificially elevated beds and dredged furrows will be removed leaving a generally flat landscape with surface roughness. The Plan Sheets in Appendix 10 provide an overview of the limited grading in wetland re-establishment areas with corresponding depths. The majority of area graded is less than 0.25 feet. Wetland re-establishment areas that are cut over a foot make up 0.7% of the re-establishment area. Removal of the large spoil piles immediately adjacent to the existing channel make up 5% of the wetland re-establishment area. These practices will increase infiltration, eliminate surface drainage conduits, and increase groundwater storage. Wetland rehabilitation areas will not involve any surface grading, however the area may be disked to create surface roughness and reduce the compaction created by livestock access. This will also improve the ability to establish native vegetation.

Water quality treatment potential and wildlife habitat will be addressed in rehabilitation and re-establishment areas through the exclusion of livestock and planting of a native, hydrophytic vegetation community. Three shallow floodplain pools are proposed in the wetland restoration area (Appendix 10, Plan Sheet 2.1). The pools will be 12-18 inches deep and are intended to be seasonally dry. Appendix 10, sheet 2.1 shows a grading cut depth of greater than 2 feet due to an artificially raised bed in the location of the vernal pools. These pools are designed to provide short-term retention of overland flow on the floodplain, providing a longer wetting period for the surrounding wetlands and variability in habitat. Two

pools are in an area with soils that do not support wetland rehabilitation or re-establishment. The pools are located outside of the 50 ft required buffer for piedmont streams and will be vegetated.

Wetland credit areas will be restored to a bottomland hardwood forest. Hatboro soils are capable of supporting this wetland type and a 12% hydroperiod is proposed. Based on WETS data available from 1990-2019 in Reidsville NC, growing season dates are from March 24 through November 14. Using these dates, 12% of the growing season is 29 days. Per IRT guidance, growing season dates may be modified during the monitoring period using soil temperature data and observation of bud burst. Modification of growing season dates would result in a different number of consecutive days required to achieve success, but the hydroperiod criterion will remain fixed at 12% of the growing season. This duration hydroperiod is sufficient to drive redoximorphic reactions, support a hydrophytic plan community, and is within the range provided in the mitigation guidance.

6.7 Vegetation, Planting Plan, and Land Management

6.7.1 Vegetation and Planting Plan

The objective of the planting plan is to establish, over time, a thriving riparian buffer composed of native tree species. This restored buffer will improve riparian habitat, help the streams stay stable, shade the streams, and provide a source for large woody debris (LWD) and organic material to the streams. The Site will be planted, as necessary, to the extents of the conservation easement. Non-forested areas and construction haul roads will be planted with early and late successional native vegetation. The specific species composition to be planted was selected based on the community type, occurrence of species in riparian buffers adjacent to the Site, best professional judgement on species establishment, and anticipated Site conditions in the early years following project implementation. Species chosen for planting are listed on Sheet 3.0 of the Draft Plans located in Appendix 10.

Wildlands used the following community types as targets for species selection for the site:

- Piedmont Alluvial Forest: This is the target community of the upland area along Reaches 1-6 of Dynamite creek. Canopy trees in a Piedmont Alluvial Forest include but are not limited to River Birch, American Sycamore, Tulip Poplar and Sugarberry. Subcanopy is typified by spicebush.
- Piedmont Bottomland Forest: This is the target community of the Dan River floodplain wetlands and riparian area along Dynamite Creek Reach 7. Canopy Trees in a Piedmont Bottomland Forest include but are not limited to Overcup Oak (*Quercus lyrate*), Swamp Chesnut oak (*Quercus Machauxii*), American elm (*Ulnus americana*), and Cherry Bark oak (*Quercus pagoda*). Common herbaceous understory include Juncus spp. and Carex spp.

The riparian areas will be planted with bare root seedlings. Species planted as bare roots will be planted at 12-foot by 6-foot spacing (targeted densities after monitoring year 3 are 320 stems per acre). In addition, streambanks will be planted with live stakes. Herbaceous plugs will be planted throughout the site in combination with instream structures to add toe-of-slope protection for the streambanks. The draft Plans located in Appendix 10 provide the location and spacing of streambank planting.

Site soil preparations, including adding amendments, will be implemented to create soil physical properties favorable to tree growth. This may include, but is not limited to wetland areas, Priority II bench cuts (see sheet 1.4 in Appendix 10), and any areas of cut greater than one foot (removal of stockpiles in wetland restoration area). Construction haul roads and areas of soil compaction will be ripped to a depth of 18 inches. Soil tests will be performed in areas of cut and appropriate amendments will be applied based on the results. Topsoil will be harvested during the grading process and reapplied where necessary before permanent seeding and planting activities take place.

Pasture grasses are located along Reach 7 including fescue. Wildlands will treat the existing fescue within the conservation easement to prevent any effects on tree growth. The treatment will be a part of the site management plan and will include spraying the fescue throughout the easement with a boom sprayer and/or ring sprays around planted trees.

Additional monitoring and maintenance issues regarding vegetation can be found in Sections 9 and 10 and Appendix 6.

6.7.2 Land Management/Stewardship

Few existing land management concerns should persist on the site after construction is complete. Apart from the main issues associated with the altered hydrology, grazing pressure, and reduced vegetated buffer, the Site's main existing land management concern is a few populations of exotic invasive plants. Small, scattered populations of multiflora rose, Chinese privet, and Japanese spiraea (*Spiraea japonica*) are present on the site and will be removed either before or during construction. Japanese stiltgrass is also present across the site but will not be targeted for treatment due to its persistent seed bank which makes effective control extremely difficult. Wildlands will continue to monitor the site for additional populations of exotic invasive plants throughout the monitoring period and perform treatments as necessary. Wildlands will also monitor the site for future land management issues, such as floodplain erosion, bare areas, and boundary encroachments that arise during the monitoring period.

6.8 Project Risk and Uncertainties

There is one utility crossing on site, located at an internal easement break. This area has been designed with flatter sideslopes and larger riffle material to support potential crossing with maintenance vehicles without disruption or impact to the integrity of the stream. This crossing will be visually inspected during each site visit to assess any impacts from utility maintenance vehicular access. The bridge between Reach 6 and 7 will be monitored for debris blockage and cleared as necessary. Streams have been designed with appropriately sized bed material and shear stress to limit degradation on streambanks and the streambed and additional grade control structures have been placed to prevent erosion and headcuts within the stream channel and through the alluvial soils on Reach 2. They will also promote movement of sediment through the system from any unforeseen inputs due to changes in land use.

Potential risks to the project include flooding of the Dan River, beaver activity, encroachment on the easement, and the spreading of invasive species. The Dan River periodically floods the entirety of Dynamite Creek Reach 7 and portions of Reach 6. This occurred more than once during preparation of the project design. It is likely that large woody debris and sediment from the Dan River may periodically deposit within these reaches and their floodplains during large storm events. This site has been observed by Wildlands since 2016, and despite several flooding events on the Dan River, sediment accumulation on the floodplain has not been noted. However, large woody debris has passed through the site. The site will be visually inspected quarterly to ensure any large debris endangering project resources is removed. It may be necessary to remove Dan River alluvium from the site if flood conditions are severe enough that accumulation is noted.

The streams have been designed not to induce hydrologic trespass on neighboring properties. The existing culvert will remain at the downstream end of the project and hydraulics of the culvert will remain the same post-construction. There has not been any beaver activity on site during the project planning phase. Streams will be monitored for future beaver activity according to the monitoring and maintenance plans. Invasive species management and encroachment are described above in Section 6.8.2. Potential maintenance activities that address these risks and uncertainties are located in Appendix 6 – Maintenance Plan, and Section 10 – Long Term Management Plan.

7.0 Determination of Credits

The final stream credits associated with the Site are listed in Table 16. Stream Restoration is proposed at a ratio of 1:1. All riparian buffers are the required minimum of 50 feet. Wetland reestablishment is proposed at a ratio of 1:1, and wetland rehabilitation is proposed at a ratio of 1.5:1. The ratio for wetland rehabilitation was chosen according to the level of impact to the wetlands from livestock and a lack of an appropriate vegetative community and the potential for ecological uplift. There are currently 270 head of cattle rotated through the riparian wetlands. The hoof shear loosens soil, which increases runoff of sediment into Dynamite Creek. The livestock also prevent the growth of natural wetland vegetation and input nutrients and bacteria to the existing wetland areas. Removing the livestock and replanting the vegetation will reduce the nutrients, fecal bacteria, and sediment flowing to Dynamite Creek. The vegetation will serve to improve the wetland habitat, water quality, and reduce shear from stormflows across the Dan River/ Dynamite Creek floodplain.

Table 16: Project Stream Assets and Credits

Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)
Dynamite Creek Reach 1	498	498	Warm	P	--	10
Dynamite Creek Reach 2	905	720	Warm	R	1	1
Dynamite Creek Reach 3	206	155	Warm	R	1	1
Dynamite Creek Reach 4	522	522	Warm	P	--	10
Dynamite Creek Reach 5	653	555	Warm	E1	1	1.5
Dynamite Creek Reach 6	683	656	Warm	R	1	1
Dynamite Creek Reach 7	1,338	1,570	Warm	R	1	1
UT1	287	287	Warm	P	--	10
Wetland Rehabilitation	5.586	5.475	Riverine		--	1.5
Wetland Reestablishment	N/A	5.541	Riverine	R	--	1

Restoration Level	Stream			Riparian Wetland		Non-Rip	Coastal
	Warm	Cool	Cold	Riverine	Non-Riv	Wetland	Marsh
Restoration	3,101.000						
Re-establishment				5.541			
Rehabilitation				3.650			
Enhancement							
Enhancement I	370.000						
Enhancement II							
Creation							
Preservation	130.700						
Additional Credit from Extended Buffers							
TOTAL	**3,601.700**	-	-	**9.191**	-	-	-

8.0 Performance Standards

The stream and wetland performance standards for the project will follow approved standards presented in the Wilmington District Stream and Wetland Compensatory Mitigation Update issued October 2016 by the USACE and NCIRT. Annual monitoring and routine site visits will be conducted by a qualified scientist to assess the condition of the finished project. Specific performance standards that apply to this project are those described in the 2016 Compensatory Mitigation Update including Vegetation (Section V, B, Items 1 through 3) and Stream Channel Stability and Stream Hydrology Performance Standards (Section VI, B, Items 1 through 7). Wetland performance criteria has been developed in accordance with Section IX Wetland Hydrology Monitoring. Table 17 summarizes performance standards.

Table 17: Summary of Performance Standards

Parameter	Monitoring Feature	Performance Standard
Dimension	Cross-Section Survey	BHR <1.2; ER >2.2 for C/E channels or >1.4 for B channels.
Pattern and Profile	Visual Assessment	Should indicate stream stability.
Substrate	Pebble Counts	Coarser material in riffles; finer particles in pools.
Photo Documentation	• Cross-Section Photos • Photo Points	No excessive erosion or degradation of banks. No mid-channel bars, Stable grade control.
Stream Hydrology	Crest Gauge Transducer	Four bankfull events during the 7-year period; in separate years.
Wetland Hydrology	Groundwater Well Transducer	Free groundwater table within 12 inches of the ground surface for 12% of the growing season annually.
Vegetation	Vegetation Plots	MY3 success criteria: 320 planted stems per acre, MY5 success criteria: 260 planted stems per acre, average of 7 feet in height in each plot. MY7 success criteria: 210 planted stems per acre, average of 10 feet in height in each plot.
Visual Assessment	CCPV	Signs of encroachment, stream instability, invasive species.

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.

Invasive vegetation will be mapped, photographed, and visually assessed annually. Invasive species will be treated by mechanical and/or chemical methods so that invasive species do not exceed 5% of the easement acreage. All herbicide applications will be performed in accordance with the NC Department of Agriculture rules and regulations.

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 Annual Monitoring Reporting Template (June 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 As-Built Baseline Monitoring Report Template (June 2017), a baseline monitoring document and as-built record drawings of the project will be developed within 60 days of the planting completion and monitoring installation on the restored Site. Monitoring reports will be prepared in the fall of each monitoring year and submitted to DMS by November 30. These reports will be based on the

DMS Annual Monitoring Template (June 2017) and Closeout Report Template (January 2016). Full monitoring reports will be submitted to DMS in monitoring years 1, 2, 3, 5, and 7. Abbreviated reports will be submitted in monitoring years 4 and 6. Closeout monitoring period will be seven years beyond completion of construction or until performance standards have been met.

Table 18, below, describes how the monitoring plan is set up in order to verify project goals and objectives have been achieved.

Table 18: Monitoring Plan

Goal	Objective	Performance Standards	Monitoring Metric
Exclude cattle from streams.	Install fencing around conservation easement adjacent to cattle pastures.	Prevent encroachment by livestock.	Visually inspect the perimeter of the Site to ensure no livestock access is occurring.
Improve the stability of stream channels.	Construct stream channels that will maintain stable cross-sections, patterns, and profiles over time. Repair eroding stream banks with bank revetments. Restore profile to remove dam breach headcut.	Entrenchment ratio over 2.2 for C/E or 1.4 for B restoration reaches and bank height ratio below 1.2 with visual assessments showing progression towards stability.	Cross-section monitoring and visual inspections.
Improve instream habitat.	Install habitat features such as constructed riffles, cover logs, and brush toes into restored/enhanced streams. Add woody materials to channel beds. Construct pools of varying depth.	There is no required performance standard for this metric.	N/A
Reconnect channels with floodplains.	Reconstruct stream channels with appropriate bankfull dimensions and depth relative to the existing floodplain.	Four bankfull events in separate years within monitoring period.	Crest gauges and/or pressure transducers recording flow elevations.
Improve wetland hydrology.	Remove livestock to allow soil profiles to stabilize. Remove drain effect of channelized stream.	Free groundwater table within 12 inches of the ground surface for 12% of the growing season.	Groundwater gages will be placed in wetland areas and monitored annually.
Restore and enhance native floodplain and streambank vegetation.	Plant native tree and understory species in riparian zones and plant native shrub and herbaceous species on streambanks. Treat invasive species within project area.	210 planted stems per acre at MY7. Interim survival rate of 320 planted stems per acre at MY3 and 260 at MY5. Trees in each plot must average 7 ft at MY5 and 10 ft at MY7.	One hundred square meter vegetation plots will be placed on 2% of the planted area of the project and monitored annually.
Permanently protect the project site from harmful uses.	Establish a conservation easement on the site.	Prevent easement encroachment.	Visually inspect the perimeter of the Site to ensure no easement encroachment is occurring.

9.1 Monitoring Components

Project monitoring components are listed in more detail in Table 19. Approximate locations of the proposed monitoring components are illustrated in Figure 10.

Table 19: Monitoring Components

Parameter	Monitoring Feature	Quantity/ Length by Reach								Frequency	Notes
		Dynamite Creek							UT1		
		R1	R2	R3	R4	R5	R6	R7			
Dimension	Riffle Cross-sections	N/A	1	1	N/A	1	1	2	N/A	Year 1, 2, 3, 5, and 7	1
	Pool Cross-sections	N/A	1	0	N/A	0	1	1	N/A		
Pattern	Pattern	N/A								N/A	2
Profile	Longitudinal Profile	N/A								N/A	
Substrate	Reach wide (RW), Riffle (RF) 100 pebble count	N/A	RW	RW	N/A	RW	RW	RW	N/A	Year 1, 2, 3, 5, and 7	3
Stream Hydrology	Crest Gauge	1							N/A	Quarterly	4
Vegetation	Vegetation Plots	11 Fixed Plots, 2 Random Plots							N/A	Annual	5
Wetlands	Groundwater Wells	10							N/A	Quarterly	6
Visual Assessment	Photographs and Notes									Semi-Annual	
Exotic and nuisance vegetation	Photographs and Mapping									Semi-Annual	7
Project Boundary	Photographs and Mapping									Semi-Annual	8
Reference Photos	Photographs	1	2	1	1	2	2	5	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 lack of stability and profile survey is warranted in additional years.
3. Riffle 100 pebble counts at cross-sections will be conducted during as-built baseline monitoring only unless observations indicate a trend toward finer substrate and a comparison is needed.
4. Crest gauges will be monitored using automated pressure transducers at 15-30 minute intervals. Transducers will set to record bankfull events at least twice a day and will be inspected quarterly.
5. Vegetation monitoring will follow CVS protocols. In years 4 and 6, vegetation will be only monitored visually.
6. Groundwater well data will be collected using automated pressure transducers. Transducers will be set to record at least twice a day and will be inspected quarterly.
7. Locations of exotic and nuisance vegetation will be mapped.
8. Locations of vegetation damage, boundary encroachments, etc. 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 Statue GS 113A-232(d)(3). Interest gained by the endowment fund may be used for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable. The Site Protection Instrument can be found in Appendix 7 and financial assurances are in Appendix 8.

11.0 Adaptive Management Plan

Upon completion of site construction DMS will implement the post-construction monitoring protocols previously defined in this document. Project maintenance will be performed as described Appendix 9. If, during the course of annual monitoring, it is determined the site's ability to achieve site performance standards are jeopardized, DMS will notify the USACE and the NCIRT of the need to develop a Plan of Corrective Action. The Plan of Corrective Action may be prepared using in-house technical staff or may require engineering and consulting services. Once the Corrective Action Plan is prepared and finalized DMS will:

- Notify the USACE sand NCIRT 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 and NCIRT.
- Obtain other permits as necessary.
- Implement the Corrective Action Plan.
- Provide the USACE and NCIRT a Record Drawing of Corrective Actions. This document shall depict the extent and nature of the work performed.

12.0 References

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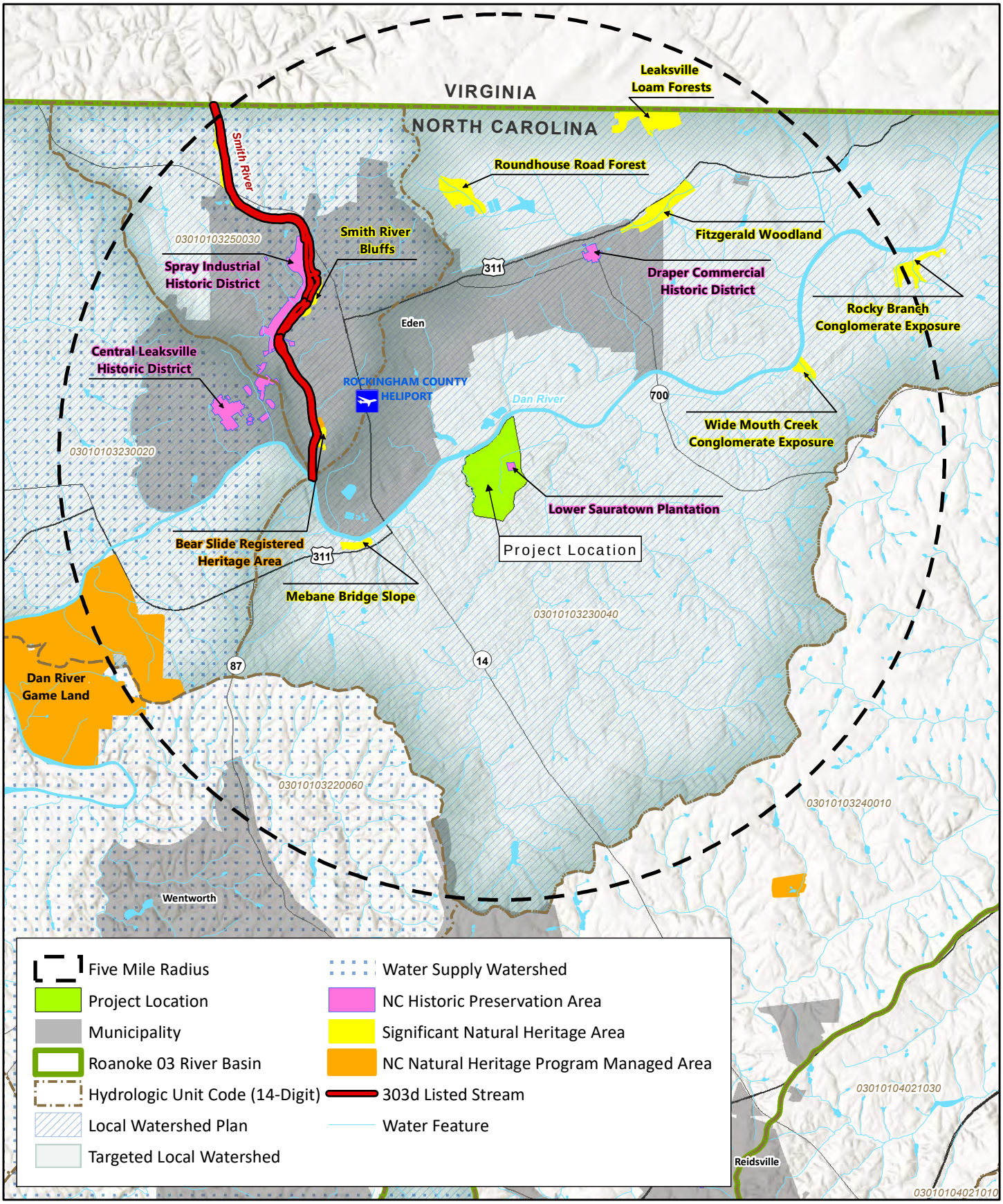
United States Army Corps of Engineers Routine On-Site Determination Method presented in the 1987 Corps of Engineers Delineation Manual, the subsequent Atlantic and Gulf Coastal Plain guidance

Appendix 1

Figures, Data, Analysis, Supplementary Information



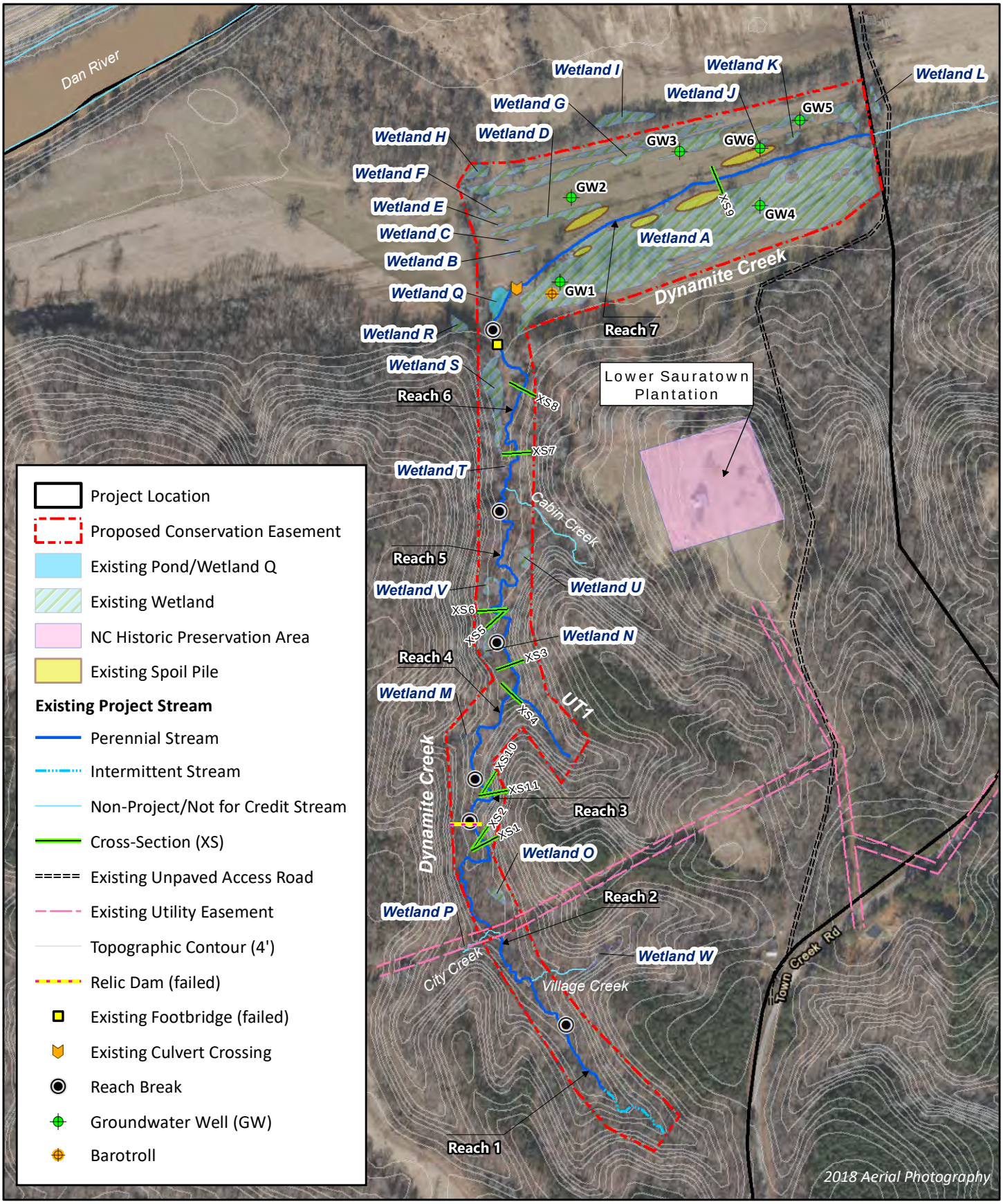
WILDLANDS ENGINEERING

0 0.75 1.5 Miles

N

Figure 1. Vicinity Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103

Rockingham County, NC

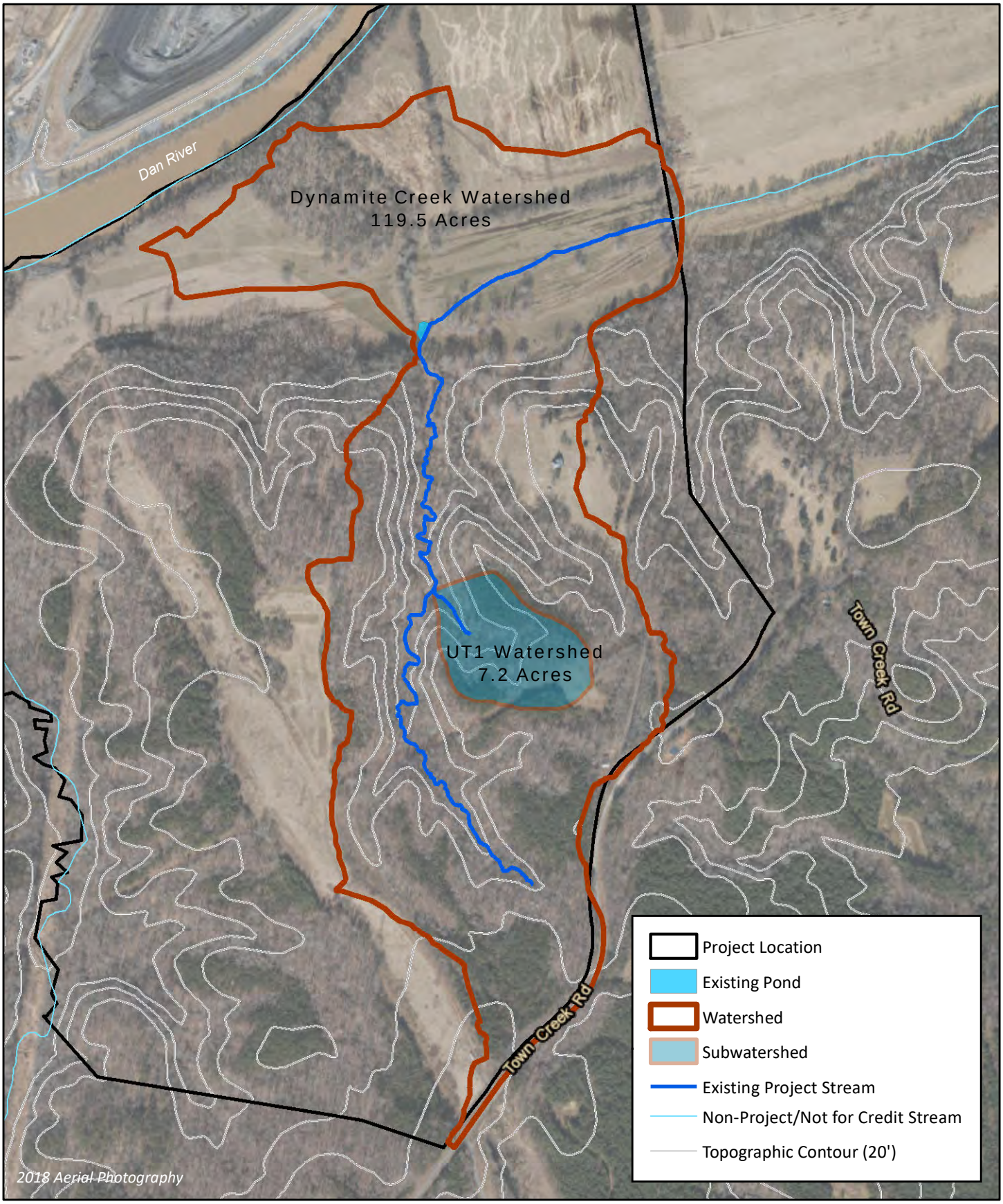


WILDLANDS ENGINEERING

0 200 400 Feet

N

Figure 2. Existing Conditions Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103
Rockingham County, NC

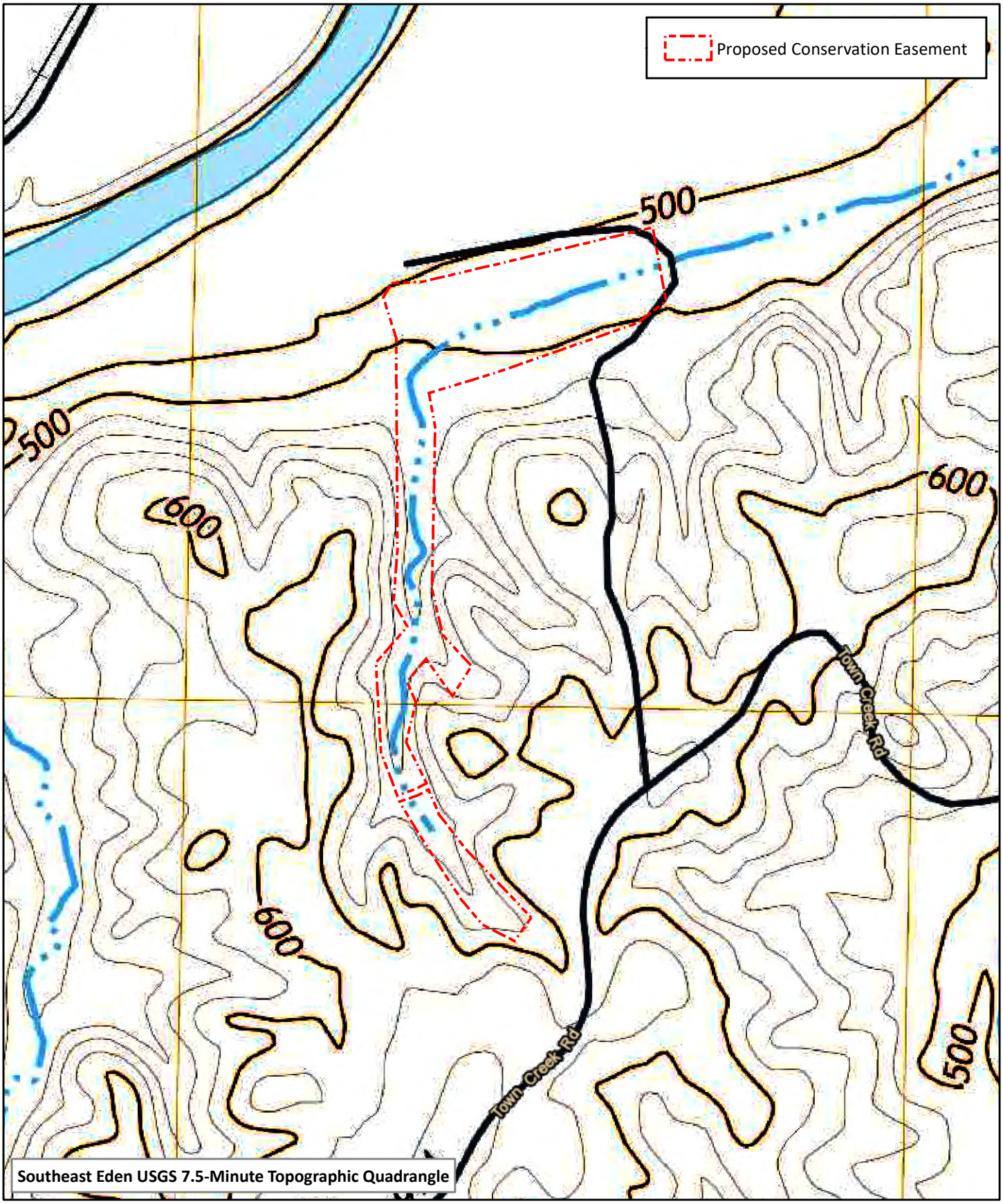


WILDLANDS ENGINEERING

0 300 600 Feet

N

Figure 3. Watershed Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103
Rockingham County, NC

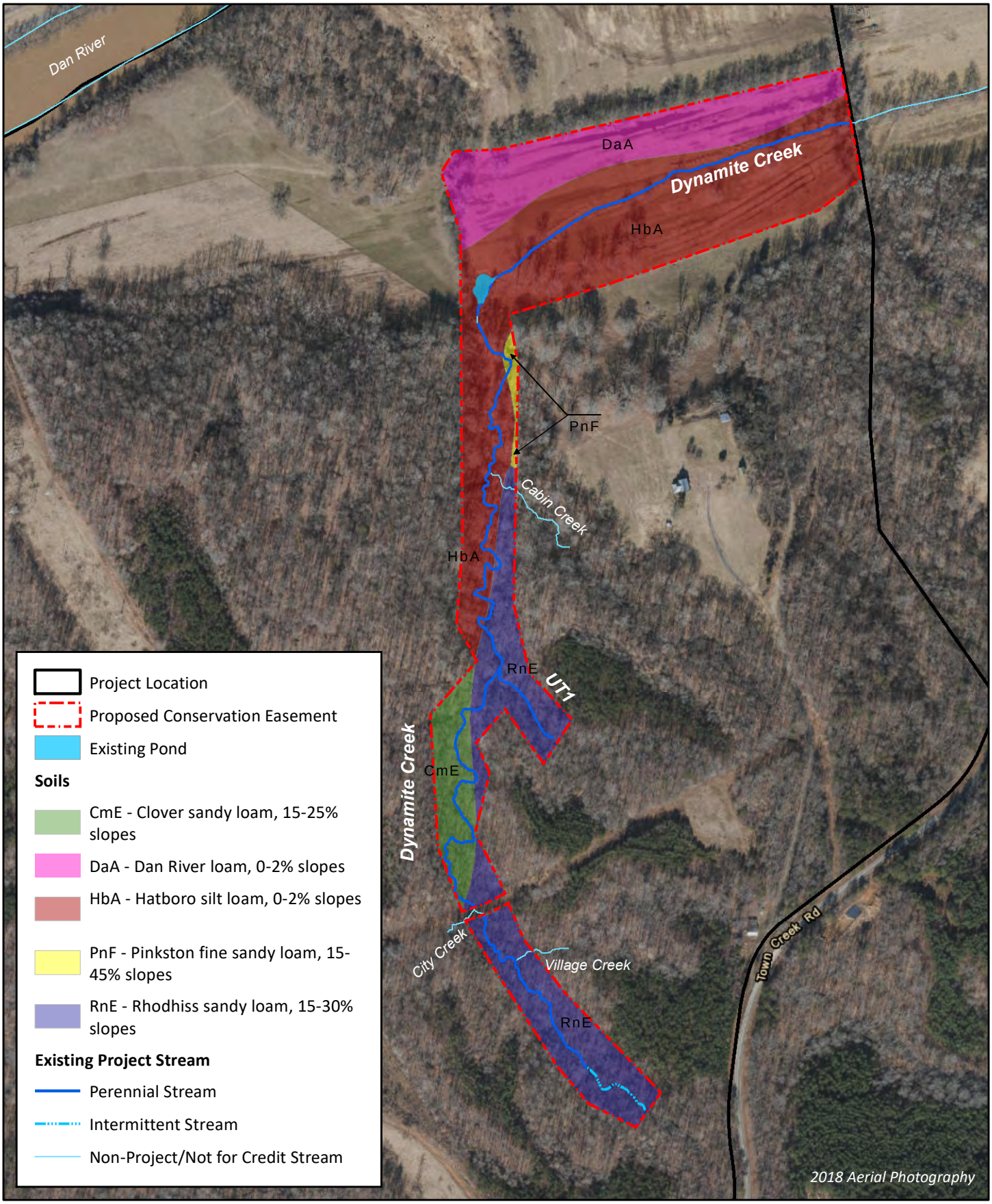


WILDLANDS ENGINEERING

0 300 600 Feet

N

Figure 4. USGS Topographic Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103
Rockingham County, NC



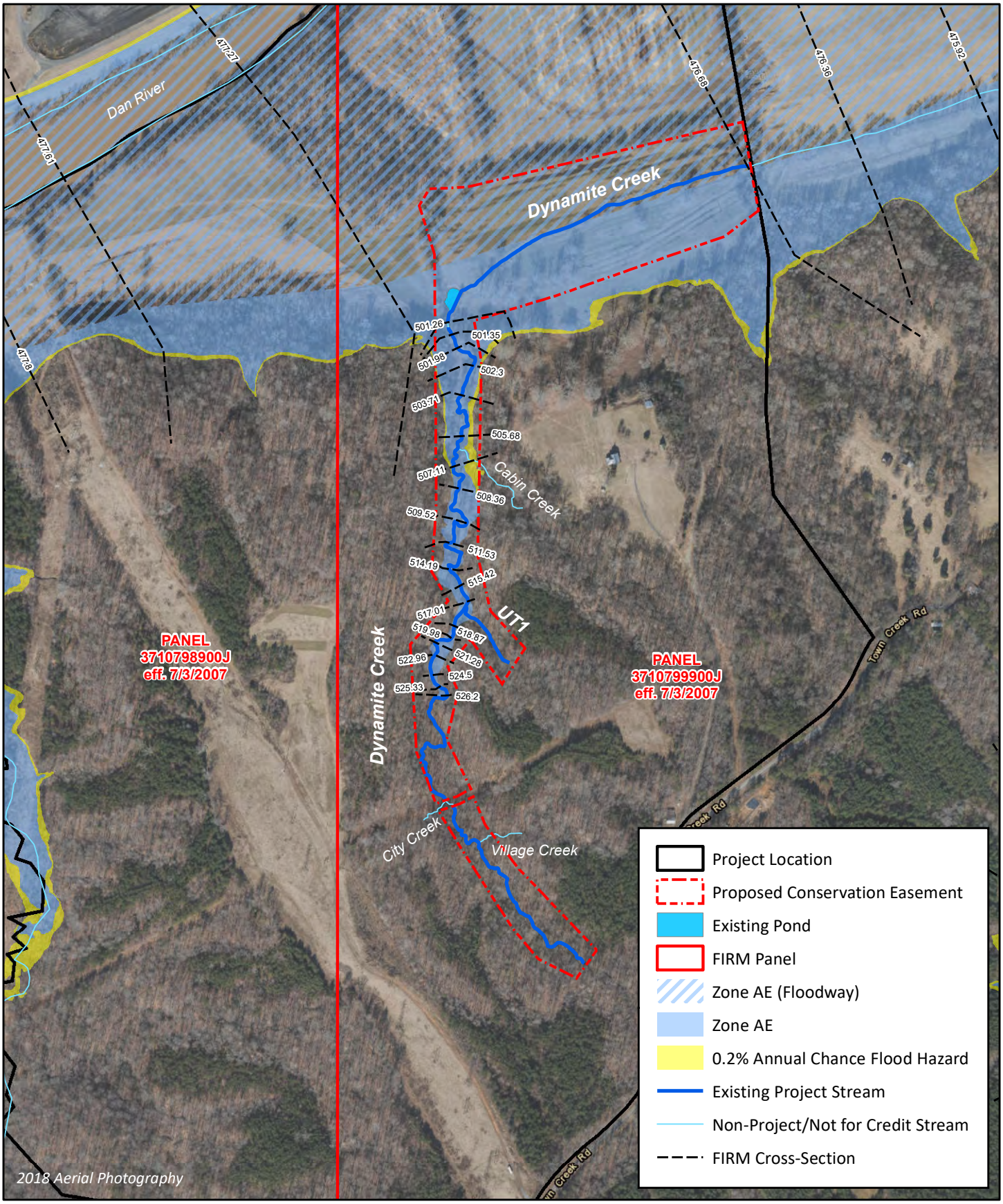
WILDLANDS ENGINEERING

0 200 400 Feet

N

Figure 5. Soils Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103

Rockingham County, NC

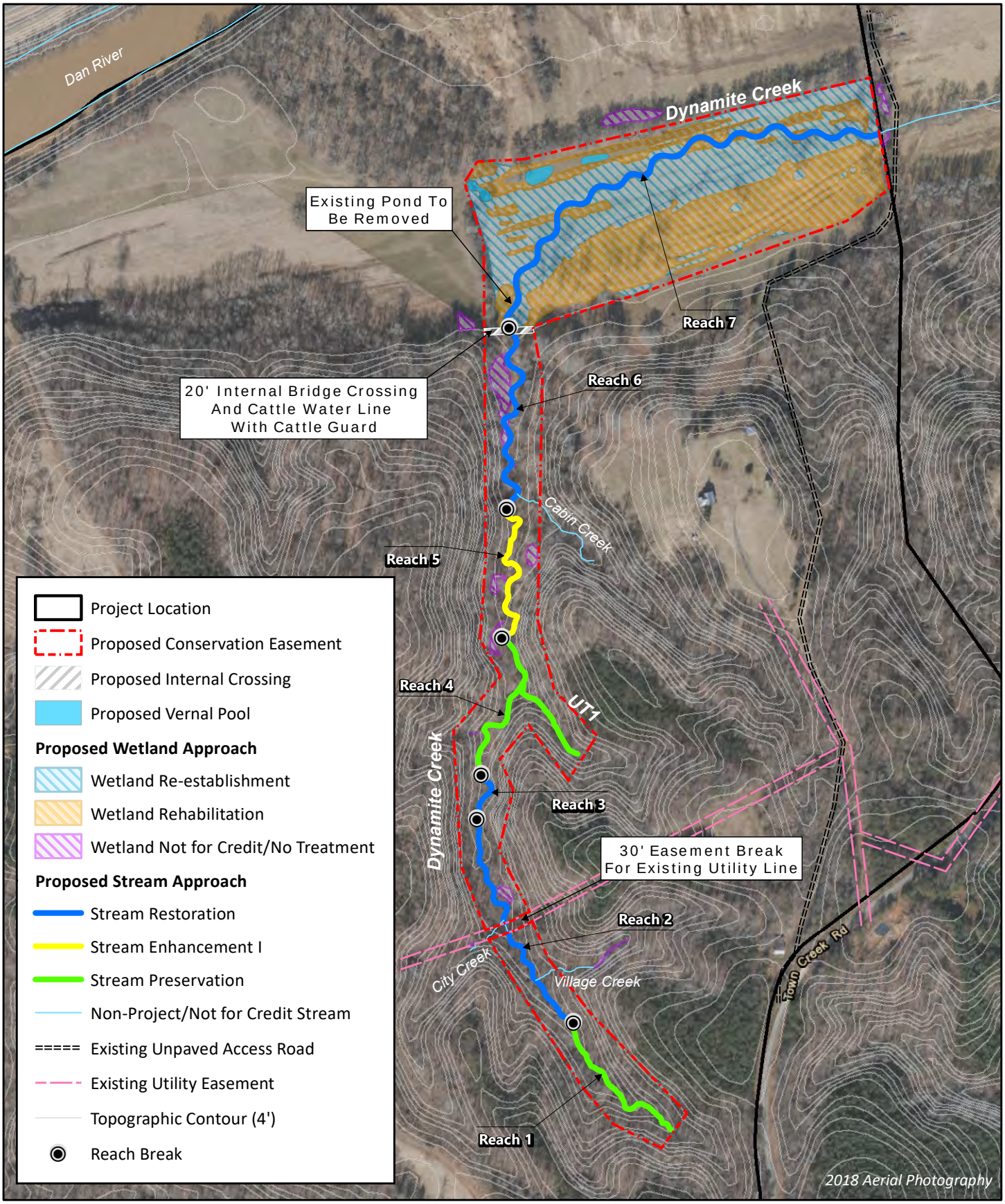


WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 6. FEMA Flood Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103
Rockingham County, NC

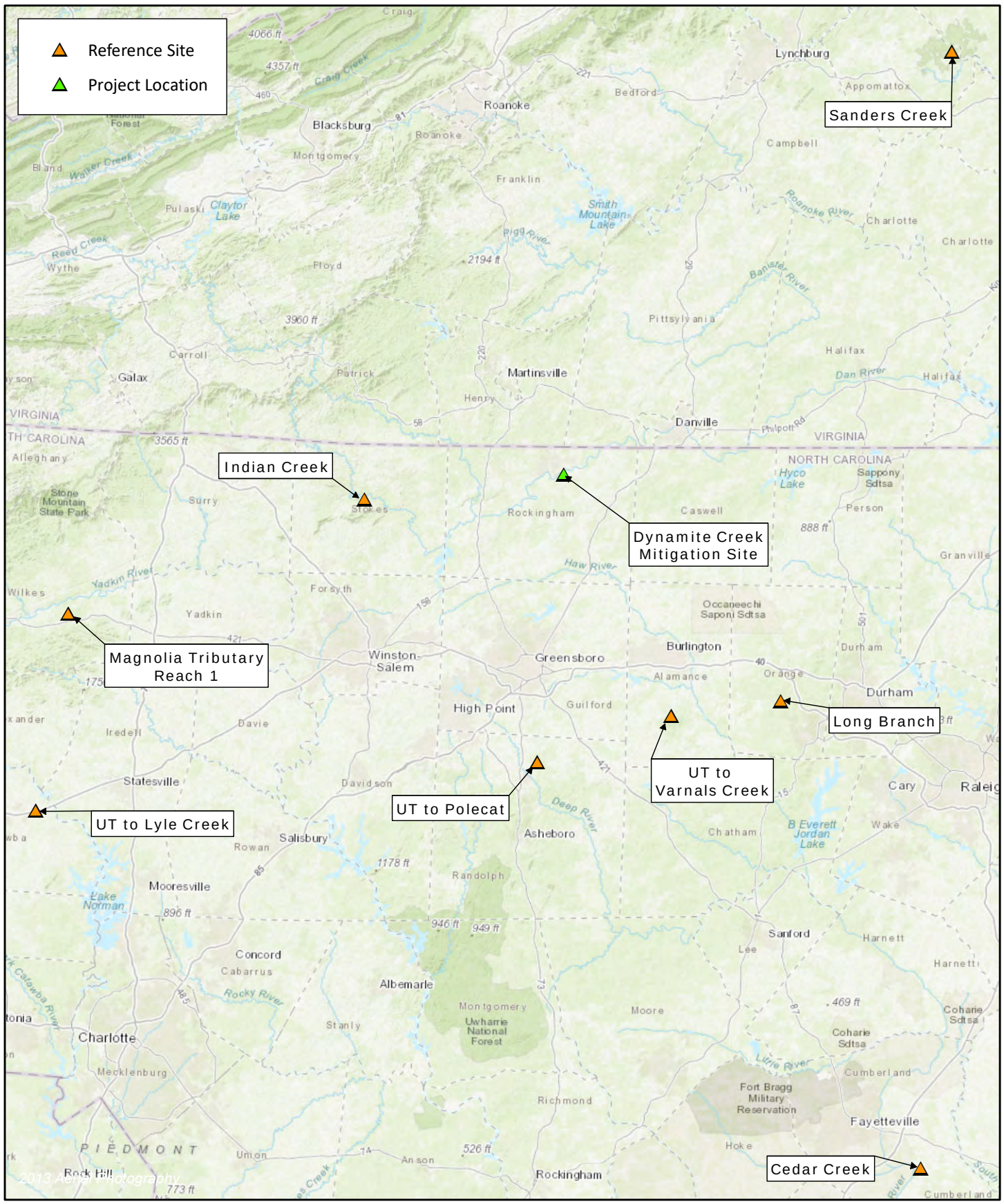


WILDLANDS ENGINEERING

0 200 400 Feet

N

Figure 7. Concept Design Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103
Rockingham County, NC

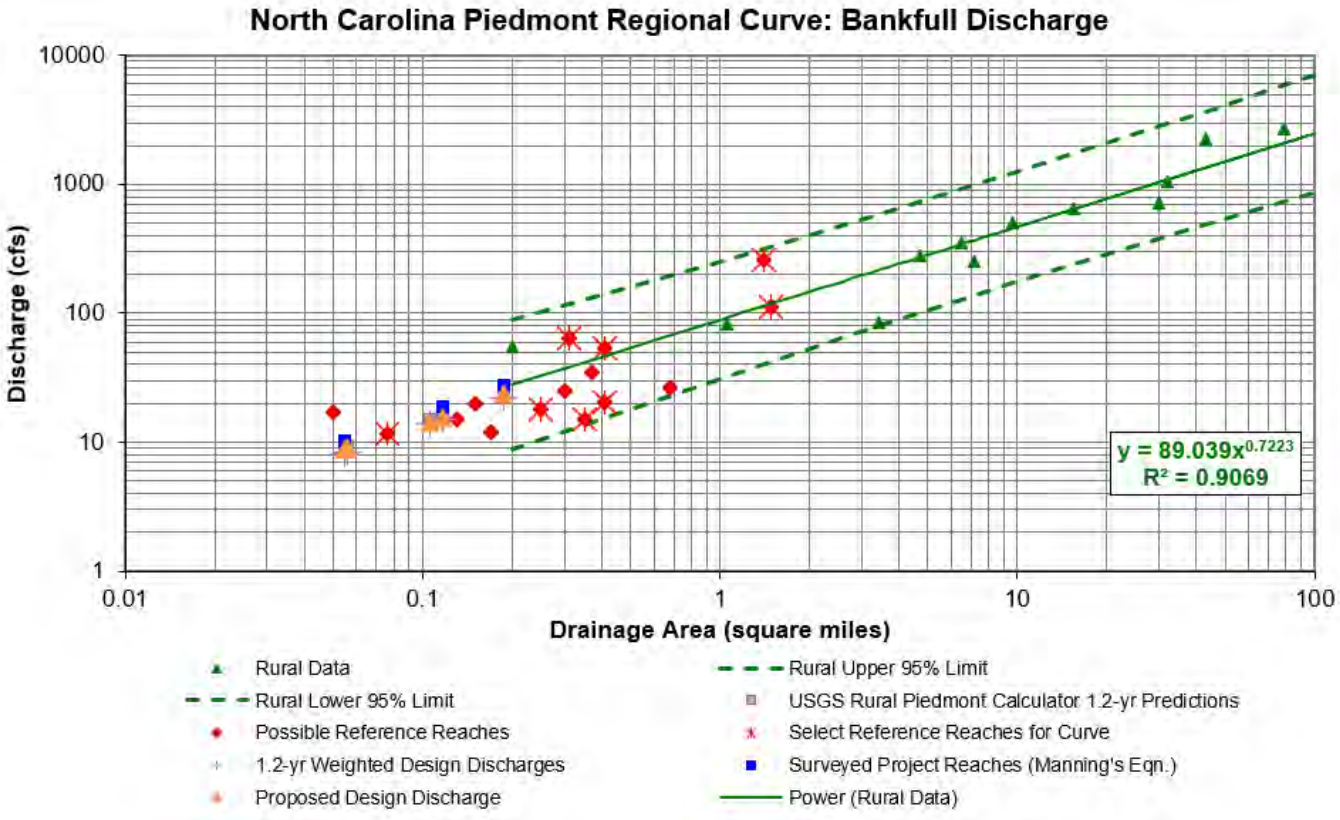


WILDLANDS ENGINEERING

0 10 20 Miles

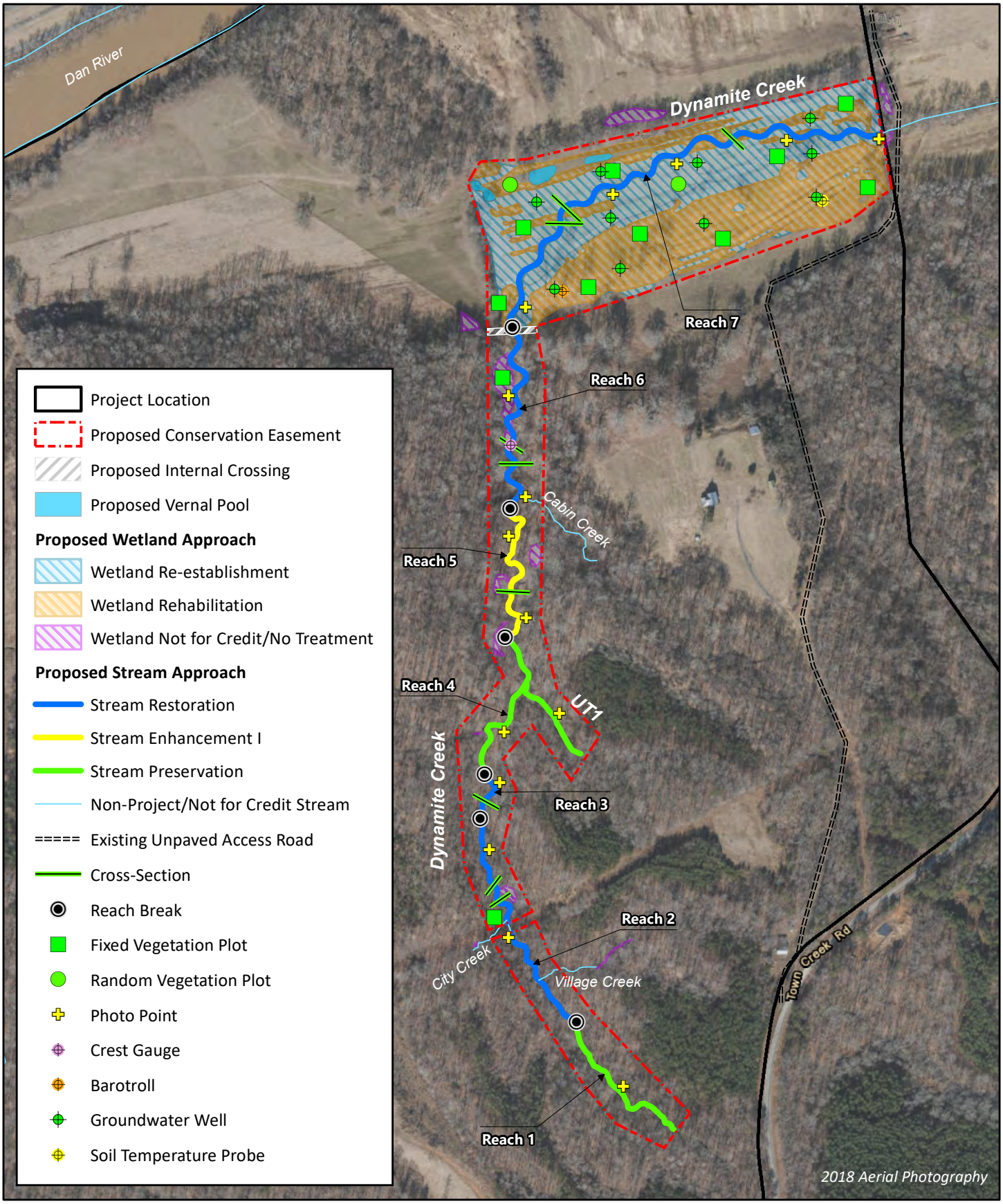
N

Figure 8. Reference Reach Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103
Rockingham County, NC



WILDLANDS ENGINEERING

Figure 9. Discharge Analysis
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103
Rockingham County, NC



WILDLANDS ENGINEERING

0 200 400 Feet

N

Figure 10. Monitoring Components Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103
Rockingham County, NC

Year: 1951
Dynamite Creek Mitigation Site


Year: 1966
Dynamite Creek Mitigation Site


Year: 1981
Dynamite Creek Mitigation Site
10
1
4
1
1
8
600F
600C
600C
307B
11E
324E
31B
3
3
E
307B
Photo Mat
AJX-2HH-
by RMB


INQUIRY #: 5778238.5
YEAR: 1993
= 500'
N
EDR


INQUIRY #: 5778238.5
YEAR: 2009
= 500'
N
EDR


INQUIRY #: 5778238.5
YEAR: 2016
= 500'
N
EDR

Dynamite Creek Reach 2 – looking upstream

Dynamite Creek Reach 2 – utility crossing

Dynamite Creek Reach 4 – preservation XS

Dynamite Creek Reach 5 – facing left bank

Dynamite Creek Reach 6 – pond looking downstream

Dynamite Creek Reach 7 - looking upstream

Dynamite Creek Reach 7 – spoil piles

Old Dam

Wetland D

Wetland G

Wetland I

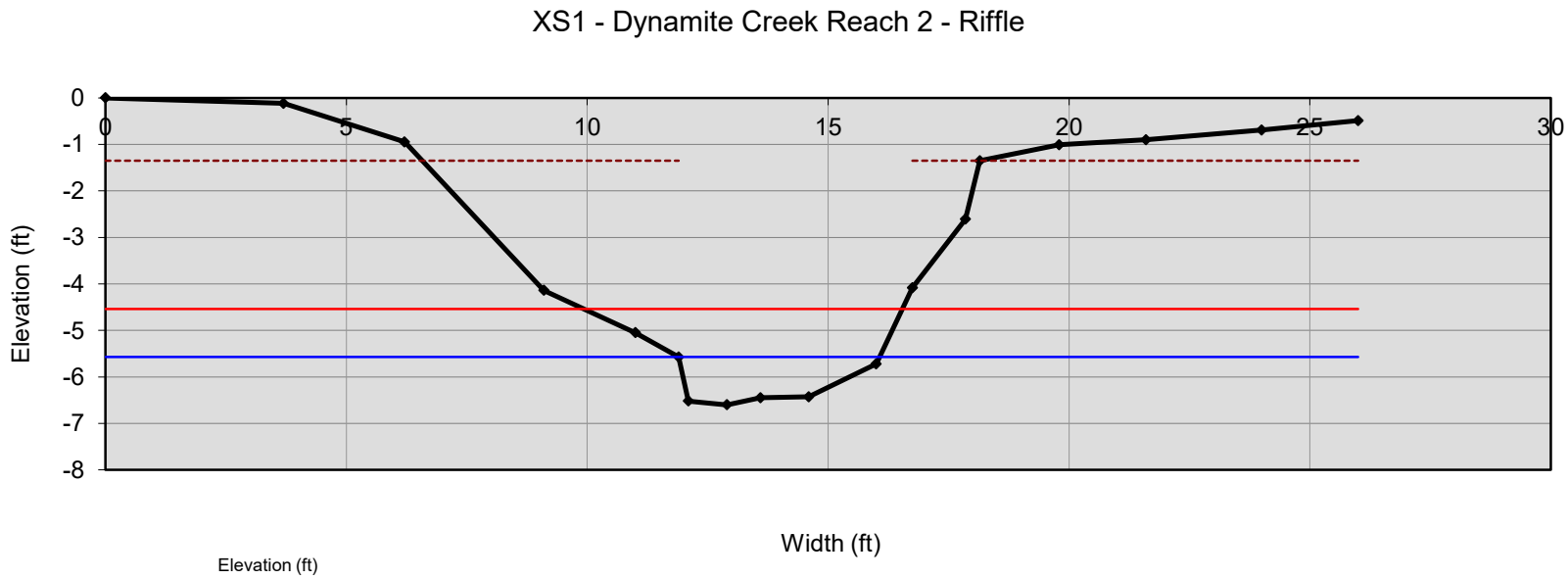
Cabin Creek - looking downstream

	
City Creek – looking downstream	**Village Creek -** looking upsteam

Existing Conditions Geomorphic Parameters								
Parameter			**Dynamite Creek Reach 2**		**Dynamite Creek Reach 3**		**Dynamite Creek Reach 5**	
			min	**max**	**min**	**max**	**min**	**max**
stream type			E4		C4		E4	
drainage area	DA	sq mi	0.055		0.056		0.106	
bankfull cross-sectional area	A_{bkf}	SF	3.1		3.1		5.3	
avg velocity during bankfull event	v_{bkf}	fps	3.3		3.4		3.0	
width at bankfull	w_{bkf}	feet	4.2		7.8		8.7	
maximum depth at bankfull	d_{max}	feet	1.0		0.50		0.80	
mean depth at bankfull	d_{bkf}	feet	0.70		0.40		0.60	
bankfull width to depth ratio	w_{bkf}/d_{bkf}		6.0		19.5		14.5	
low bank height		feet	5.3		5.2		2.1	
bank height ratio	BHR		5.3		5.6		2.6	
floodprone area width	w_{fpa}	feet	6.6		9.2		11	
entrenchment ratio	ER		1.6		1.2		1.3	
max pool depth at bankfull	d_{pool}	feet	1.7		0.9		1.3	
pool depth ratio	d_{pool}/d_{bkf}		2.1		2.3		2.2	
pool width at bankfull	w_{pool}	feet	5.1		6		8.9	
pool width ratio	w_{pool}/w_{bkf}		1.2		0.8		1.0	
Bkf pool cross-sectional area	A_{pool}	SF	7.1		3.5		5.4	
pool area ratio	A_{pool}/A_{bkf}		2.7		1.1		1.0	
pool-pool spacing	p-p	feet	12	88	25	65	11	58
pool-pool spacing ratio	$p\text{-}p/W_{bkf}$		2.9	21.0	3	8	1.3	7
valley slope	S_{valley}	feet/ foot	0.022		0.015		0.018	
channel slope	$S_{channel}$	feet/ foot	0.010	0.076	0.012	0.030	0.009	0.014
sinuosity	K		1.3		1.0		1.7	
belt width	w_{blt}	feet	15	31	31	68	33	71
meander width ratio	w_{blt}/w_{bkf}		3.6	7.4	4.0	8.7	3.8	8.2
meander length	L_m	feet	32	101	88	168	113	198
meander length ratio	L_m/w_{bkf}		7.6	24.0	11.3	21.5	13.0	22.8
Linear Wavelength	LW		25	87	66	87	58	143
Linear Wavelength Ratio	LW/w_{bkf}		6.0	20.7	8.5	11.2	6.7	16.4
radius of curvature	R_c	feet	8	38	9	22	9	25
radius of curvature ratio	R_c/ w_{bkf}		1.9	9.0	1.2	2.8	1.0	2.9

Existing Conditions Geomorphic Parameters						
Parameter			**Dynamite Creek Reach 6**		**Dynamite Creek Reach 7**	
			min	**max**	**min**	**max**
stream type			E4		C5	
drainage area	DA	sq mi	0.117		0.186	
bankfull cross-sectional area	A_{bkf}	SF	7.2		12.8	
avg velocity during bankfull event	v_{bkf}	fps	3.1		2.6	
width at bankfull	w_{bkf}	feet	8.3		9.9	
maximum depth at bankfull	d_{max}	feet	1.1		2.0	
mean depth at bankfull	d_{bkf}	feet	0.9		1.3	
bankfull width to depth ratio	w_{bkf}/d_{bkf}		9.2		7.6	
low bank height		feet	3.2		2.0	
bank height ratio	BHR		2.9		1.0	
floodprone area width	w_{fpa}	feet	11.4		--	
entrenchment ratio	ER		1.4		>2.2	
max pool depth at bankfull	d_{pool}	feet	0.8		---	
pool depth ratio	d_{pool}/d_{bkf}		0.9		---	
pool width at bankfull	w_{pool}	feet	9.6		---	
pool width ratio	w_{pool}/w_{bkf}		1.2		---	
Bkf pool cross-sectional area	A_{pool}	SF	5.7		---	
pool area ratio	A_{pool}/A_{bkf}		0.8		---	
pool-pool spacing	p-p	feet	32	181	---	
pool-pool spacing ratio	$p\text{-}p/W_{bkf}$		3.9	21.8	---	
valley slope	S_{valley}	feet/ foot	0.012		0.005	
channel slope	$S_{channel}$	feet/ foot	0.010	0.001	0.001	0.006
sinuosity	K		1.3		1.0	
belt width	w_{blt}	feet	15	31	---	
meander width ratio	w_{blt}/w_{bkf}		1.8	3.7	---	
meander length	L_m	feet	45	67	---	
meander length ratio	L_m/w_{bkf}		5.4	8.1	---	
Linear Wavelength	LW		23	50	---	
Linear Wavelength Ratio	LW/w_{bkf}		2.8	6.0	---	
radius of curvature	R_c	feet	10	20	---	
radius of curvature ratio	R_c/ w_{bkf}		1.2	2.4	---	

Cross Section 1



Elevation (ft)

Bankfull Dimensions

3.1	x-section area (ft.sq.)
4.2	width (ft)
0.7	mean depth (ft)
1.0	max depth (ft)
5.2	wetted perimeter (ft)
0.6	hydraulic radius (ft)
6.0	width-depth ratio

Flood Dimensions

6.6	W flood prone area (ft)
1.6	entrenchment ratio
5.3	low bank height (ft)
5.3	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
29	threshold grain size (mm):

Rosgen Stream Type

---	Missing: , , Sinuosity, ,

Bankfull Flow

3.3	velocity (ft/s)
10.3	discharge rate (cfs)
0.75	Froude number

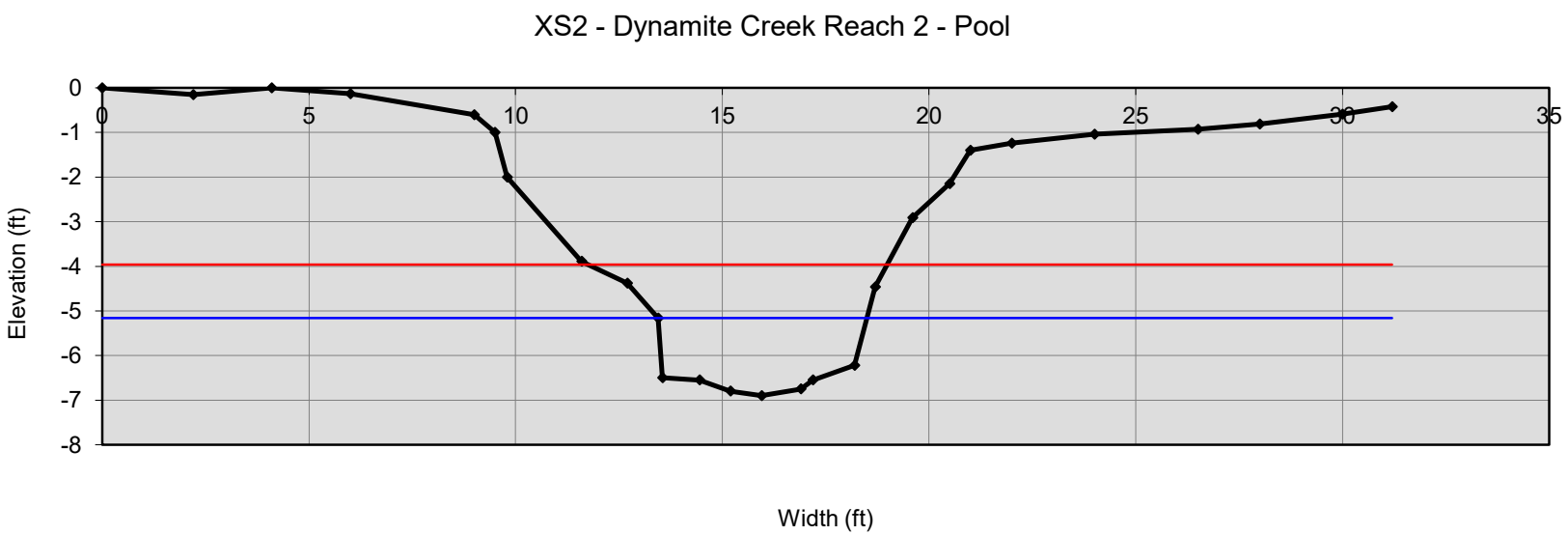
Flow Resistance

0.040	Manning's roughness
0.22	Darcy-Weisbach fric.
5.8	resistance factor u/u*
3.3	relative roughness

Forces & Power

1.55	channel slope (%)
0.58	shear stress (lb/sq.ft.)
0.55	shear velocity (ft/s)
2.4	unit strm power (lb/ft/s)

Cross Section 2



Bankfull Dimensions

7.1	x-section area (ft.sq.)
5.1	width (ft)
1.4	mean depth (ft)
1.7	max depth (ft)
7.3	wetted perimeter (ft)
1.0	hydraulic radius (ft)
3.6	width-depth ratio

Flood Dimensions

7.2	W flood prone area (ft)
1.4	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
---	threshold grain size (mm):

Rosgen Stream Type

Bankfull Flow

---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

Flow Resistance

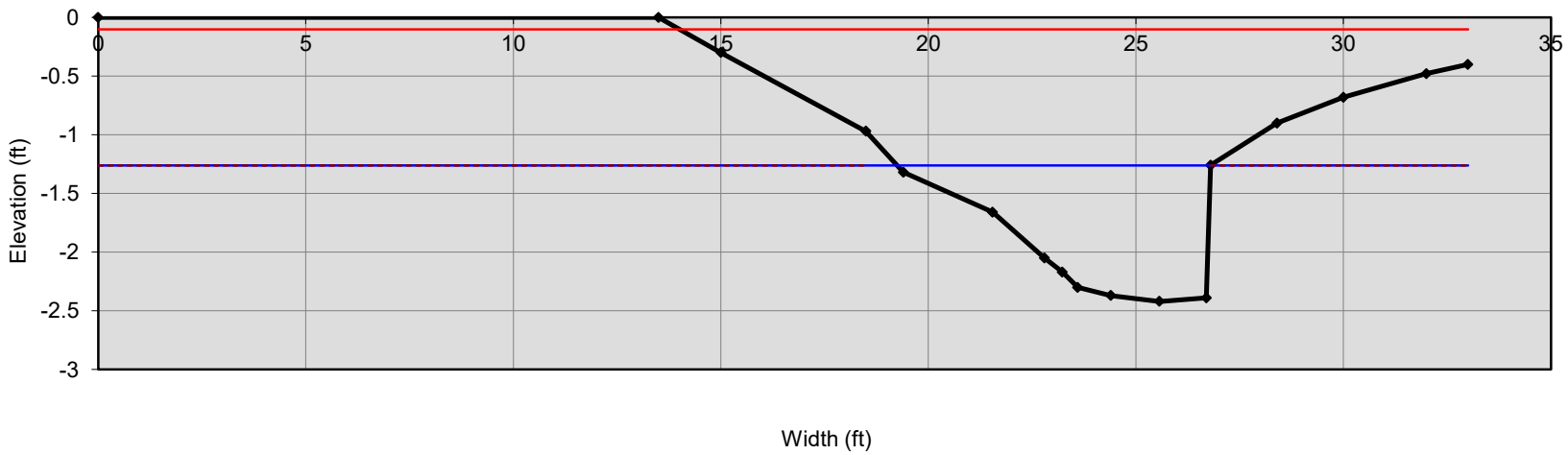
0.037	Manning's roughness
0.16	Darcy-Weisbach fric.
7.0	resistance factor u/u*
6.2	relative roughness

Forces & Power

---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

Cross Section 3

XS3 - Dynamite Creek Reach 4 - Riffle



Bankfull Dimensions

5.5	x-section area (ft.sq.)
7.6	width (ft)
0.7	mean depth (ft)
1.2	max depth (ft)
8.7	wetted perimeter (ft)
0.6	hydraulic radius (ft)
10.9	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
1.2	low bank height (ft)
1.0	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
12	threshold grain size (mm):

Rosgen Stream Type

---	Missing: , , Sinuosity, D50,

Bankfull Flow

2.1	velocity (ft/s)
11.7	discharge rate (cfs)
0.47	Froude number

Flow Resistance

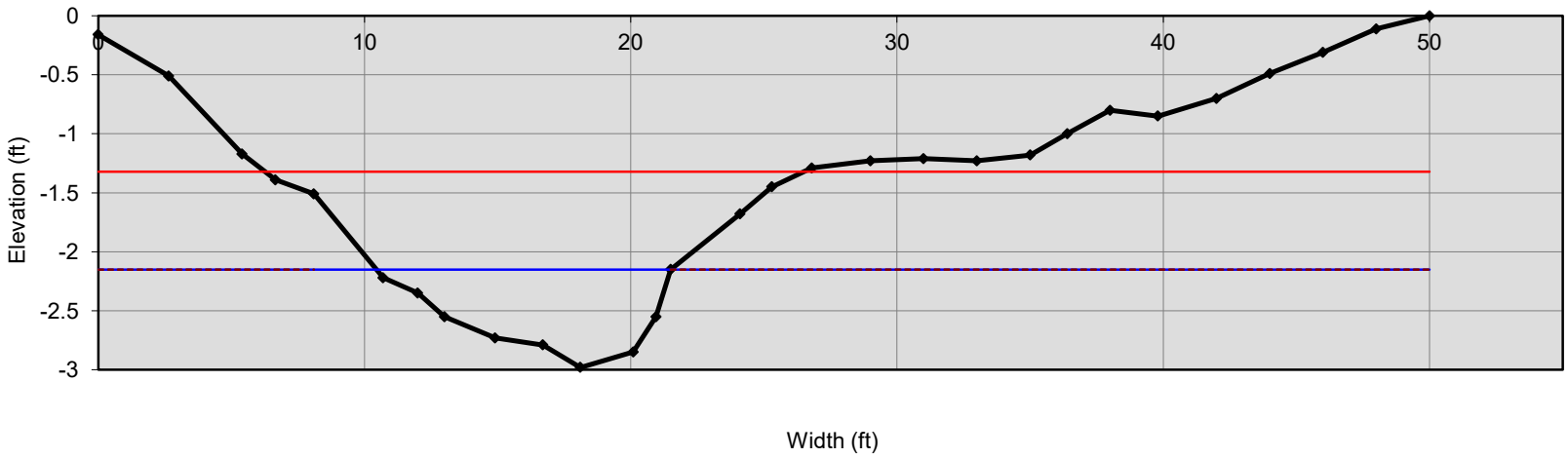
0.040	Manning's roughness
0.22	Darcy-Weisbach fric.
6.0	resistance factor u/u*
3.2	relative roughness

Forces & Power

0.6	channel slope (%)
0.24	shear stress (lb/sq.ft.)
0.35	shear velocity (ft/s)
0.58	unit strm power (lb/ft/s)

Cross Section 4

XS4 - Dynamite Creek Reach 4 - Riffle



Bankfull Dimensions

5.6	x-section area (ft.sq.)
11.1	width (ft)
0.5	mean depth (ft)
0.8	max depth (ft)
11.3	wetted perimeter (ft)
0.5	hydraulic radius (ft)
22.2	width-depth ratio

Flood Dimensions

20.3	W flood prone area (ft)
1.8	entrenchment ratio
0.8	low bank height (ft)
1.0	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
9	threshold grain size (mm):

Rosgen Stream Type

c	Missing: , , Sinuosity, D50,

Bankfull Flow

1.8	velocity (ft/s)
10.2	discharge rate (cfs)
0.45	Froude number

Flow Resistance

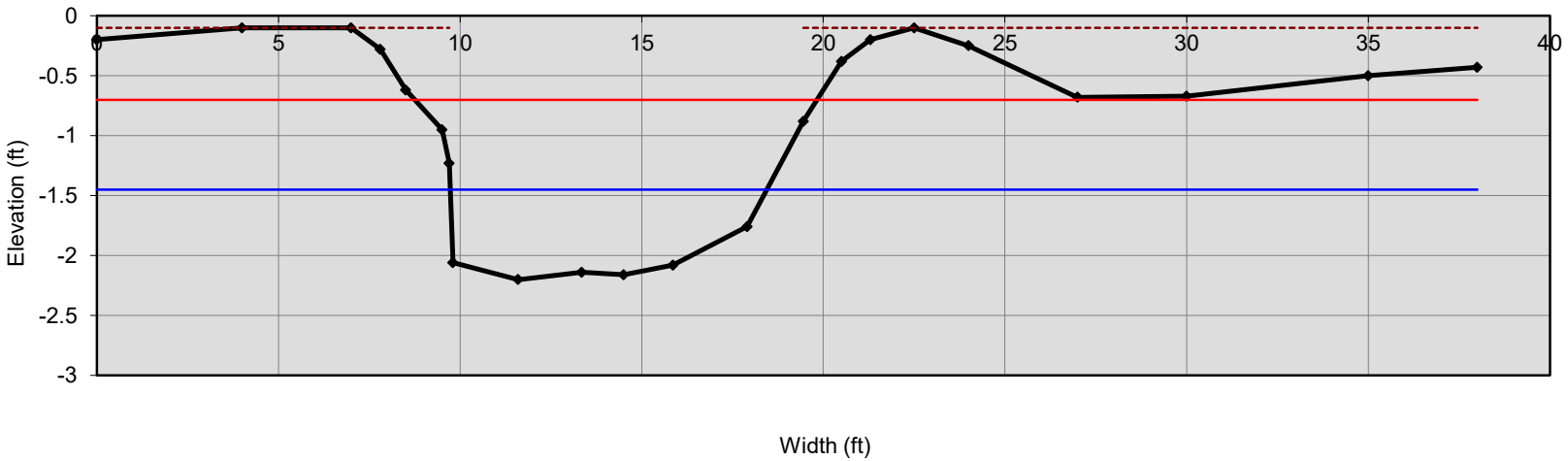
0.040	Manning's roughness
0.23	Darcy-Weisbach fric.
5.3	resistance factor u/u*
2.3	relative roughness

Forces & Power

0.6	channel slope (%)
0.19	shear stress (lb/sq.ft.)
0.31	shear velocity (ft/s)
0.35	unit strm power (lb/ft/s)

Cross Section 5

XS5 - Dynamite Creek Reach 5 - Riffle



Bankfull Dimensions

5.3	x-section area (ft.sq.)
8.7	width (ft)
0.6	mean depth (ft)
0.8	max depth (ft)
9.4	wetted perimeter (ft)
0.6	hydraulic radius (ft)
14.5	width-depth ratio

Flood Dimensions

11.1	W flood prone area (ft)
1.3	entrenchment ratio
2.1	low bank height (ft)
2.6	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
25	threshold grain size (mm):

Rosgen Stream Type

---	Missing: , , Sinuosity, D50,

Bankfull Flow

3.0	velocity (ft/s)
16.0	discharge rate (cfs)
0.71	Froude number

Flow Resistance

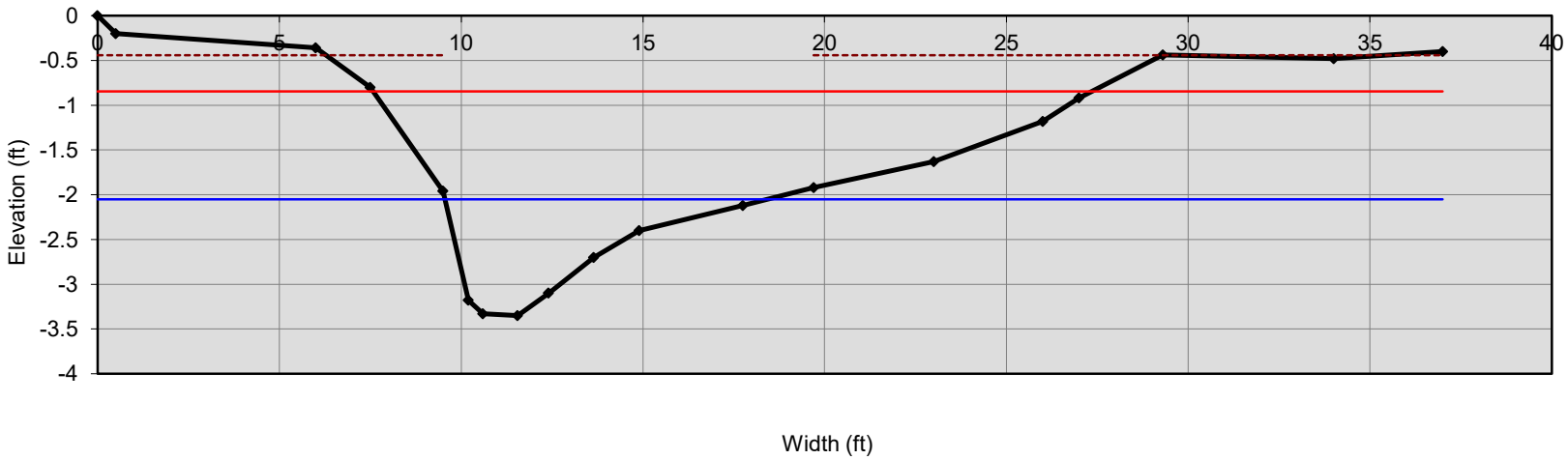
0.040	Manning's roughness
0.22	Darcy-Weisbach fric.
5.4	resistance factor u/u*
2.7	relative roughness

Forces & Power

1.43	channel slope (%)
0.50	shear stress (lb/sq.ft.)
0.51	shear velocity (ft/s)
1.64	unit strm power (lb/ft/s)

Cross Section 6

XS6 - Dynamite Creek Reach 6 - Pool



Bankfull Dimensions

5.4	x-section area (ft.sq.)
8.9	width (ft)
0.6	mean depth (ft)
1.3	max depth (ft)
9.7	wetted perimeter (ft)
0.6	hydraulic radius (ft)
14.8	width-depth ratio

Flood Dimensions

19.8	W flood prone area (ft)
2.2	entrenchment ratio
2.9	low bank height (ft)
2.2	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
24	threshold grain size (mm):

Rosgen Stream Type

Bankfull Flow

3.0	velocity (ft/s)
16.2	discharge rate (cfs)
0.71	Froude number

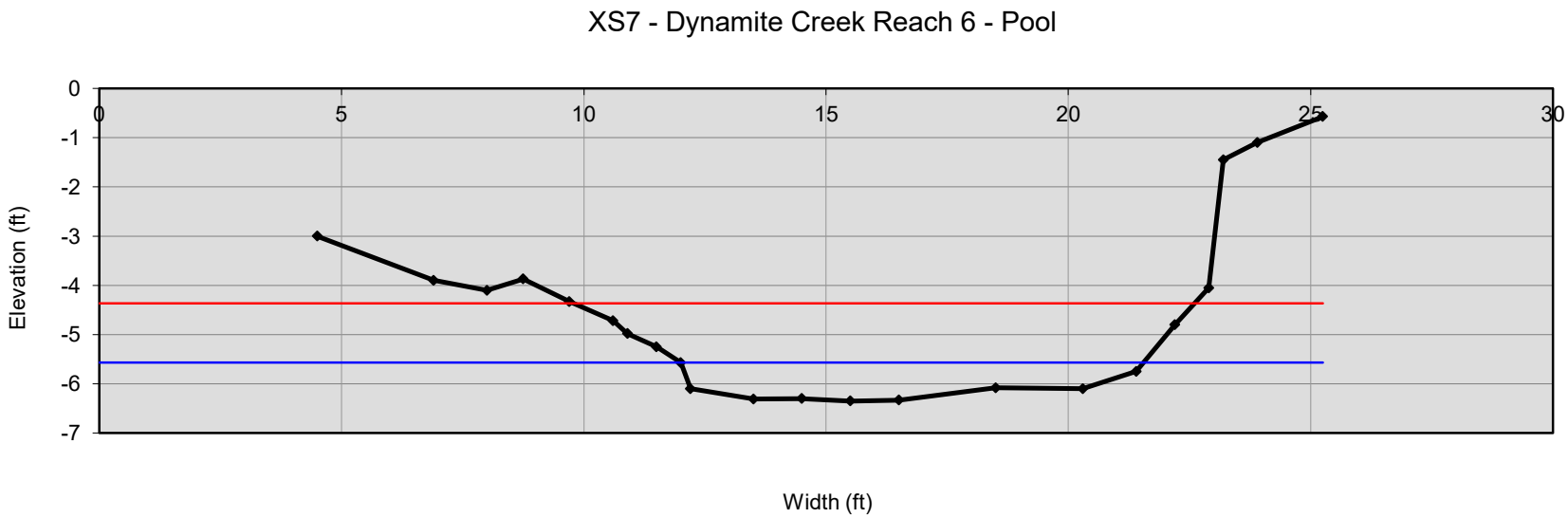
Flow Resistance

0.040	Manning's roughness
0.23	Darcy-Weisbach fric.
5.8	resistance factor u/u*
2.7	relative roughness

Forces & Power

1.43	channel slope (%)
0.49	shear stress (lb/sq.ft.)
0.51	shear velocity (ft/s)
1.63	unit strm power (lb/ft/s)

Cross Section 7



Bankfull Dimensions

5.7	x-section area (ft.sq.)
9.6	width (ft)
0.6	mean depth (ft)
0.8	max depth (ft)
10.1	wetted perimeter (ft)
0.6	hydraulic radius (ft)
16.0	width-depth ratio

Flood Dimensions

12.8	W flood prone area (ft)
1.3	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
17	threshold grain size (mm):

Rosgen Stream Type

Bankfull Flow

2.5	velocity (ft/s)
14.4	discharge rate (cfs)
0.59	Froude number

Flow Resistance

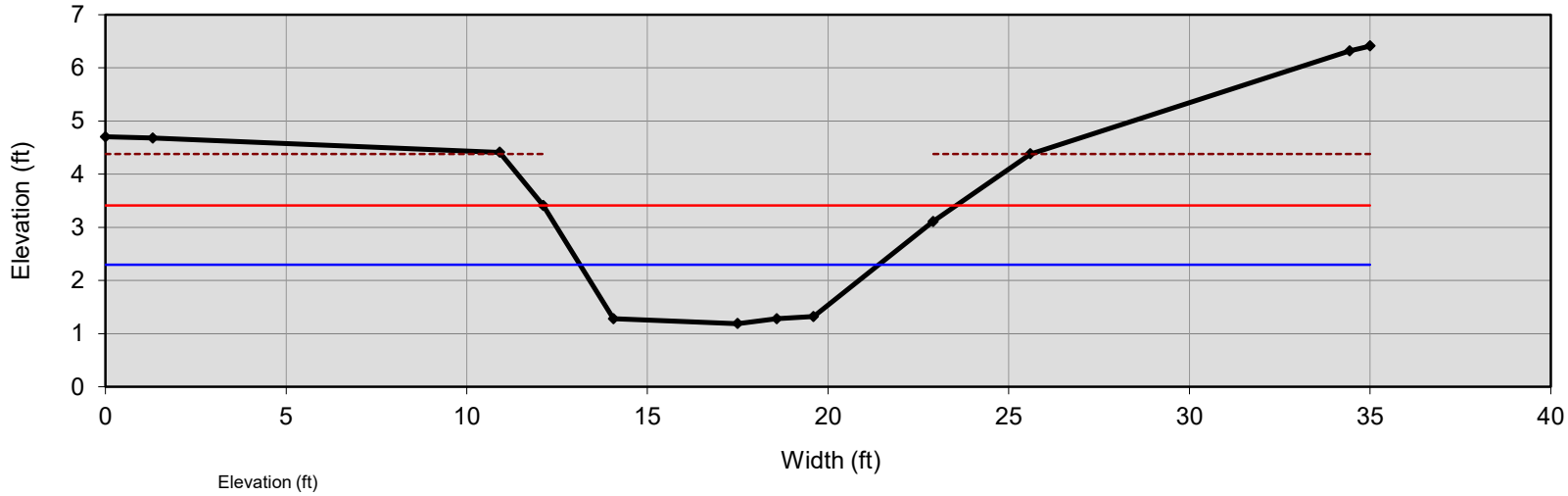
0.040	Manning's roughness
0.22	Darcy-Weisbach fric.
5.5	resistance factor u/u*
2.7	relative roughness

Forces & Power

0.97	channel slope (%)
0.34	shear stress (lb/sq.ft.)
0.42	shear velocity (ft/s)
0.91	unit strm power (lb/ft/s)

Cross Section 8

XS8 - Dynamite Creek Reach 6 - Riffle



Elevation (ft)

Bankfull Dimensions

7.2	x-section area (ft.sq.)
8.3	width (ft)
0.9	mean depth (ft)
1.1	max depth (ft)
9.0	wetted perimeter (ft)
0.8	hydraulic radius (ft)
9.2	width-depth ratio

Flood Dimensions

11.4	W flood prone area (ft)
1.4	entrenchment ratio
3.2	low bank height (ft)
2.9	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
23	threshold grain size (mm):

Rosgen Stream Type

---	Missing: , , Sinuosity, ,

Bankfull Flow

3.1	velocity (ft/s)
22.2	discharge rate (cfs)
0.61	Froude number

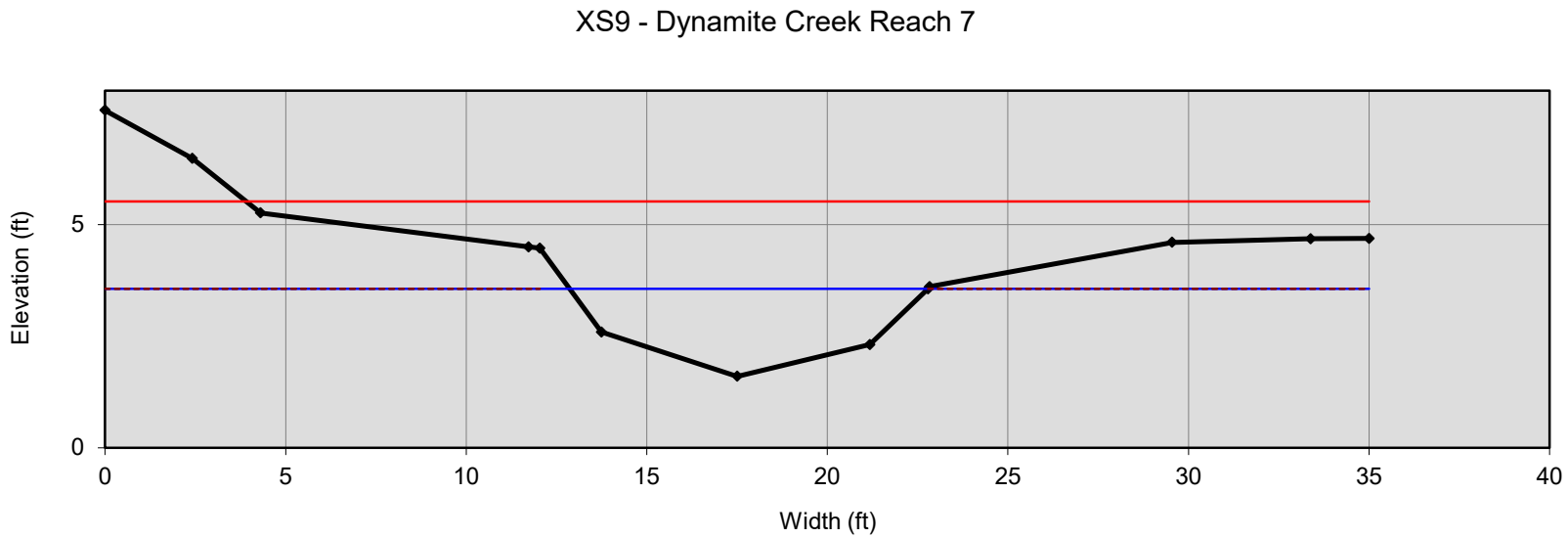
Flow Resistance

0.040	Manning's roughness
0.20	Darcy-Weisbach fric.
6.3	resistance factor u/u*
3.9	relative roughness

Forces & Power

0.926	channel slope (%)
0.46	shear stress (lb/sq.ft.)
0.49	shear velocity (ft/s)
1.55	unit strm power (lb/ft/s)

Cross Section 9



Bankfull Dimensions

12.8	x-section area (ft.sq.)
9.9	width (ft)
1.3	mean depth (ft)
2.0	max depth (ft)
11.0	wetted perimeter (ft)
1.2	hydraulic radius (ft)
7.6	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
2.0	low bank height (ft)
1.0	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
11	threshold grain size (mm):

Rosgen Stream Type

---	Missing: , , Sinuosity, D50,

Bankfull Flow

2.6	velocity (ft/s)
33.3	discharge rate (cfs)
0.42	Froude number

Flow Resistance

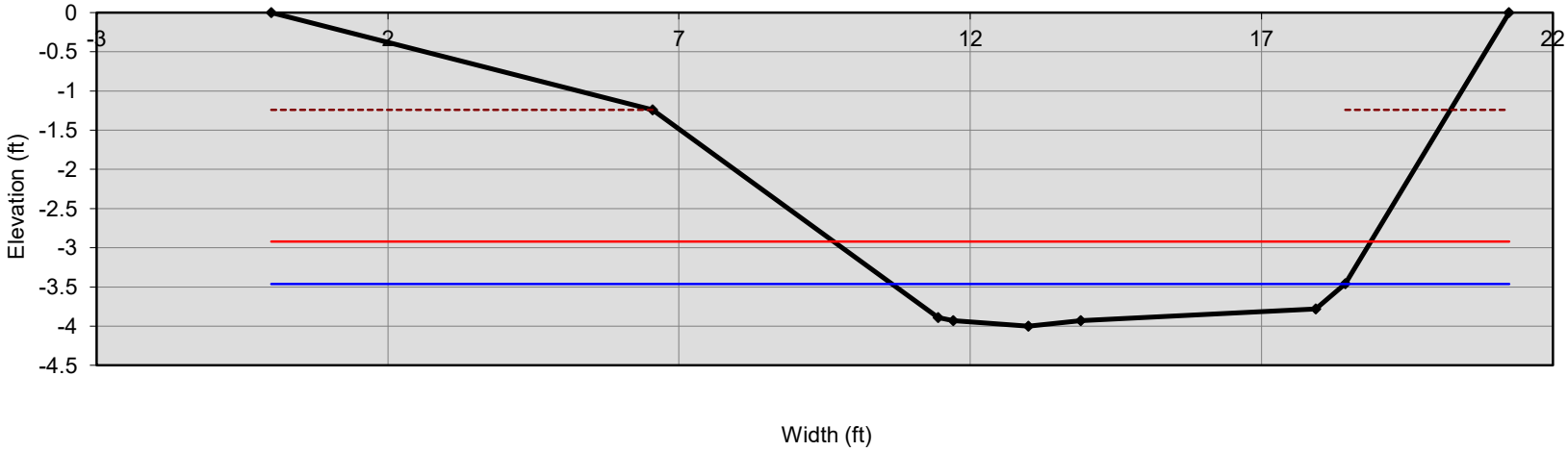
0.035	Manning's roughness
0.14	Darcy-Weisbach fric.
7.4	resistance factor u/u*
5.8	relative roughness

Forces & Power

0.303	channel slope (%)
0.22	shear stress (lb/sq.ft.)
0.34	shear velocity (ft/s)
0.63	unit strm power (lb/ft/s)

Cross Section 10

XS10 - Dynamite Creek Reach 3 - Riffle



Bankfull Dimensions

3.1	x-section area (ft.sq.)
7.8	width (ft)
0.4	mean depth (ft)
0.5	max depth (ft)
8.0	wetted perimeter (ft)
0.4	hydraulic radius (ft)
19.5	width-depth ratio

Flood Dimensions

9.2	W flood prone area (ft)
1.2	entrenchment ratio
2.8	low bank height (ft)
5.6	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
35	threshold grain size (mm):

Rosgen Stream Type

b	Missing: , , Sinuosity, D50,

Bankfull Flow

3.4	velocity (ft/s)
10.5	discharge rate (cfs)
0.97	Froude number

Flow Resistance

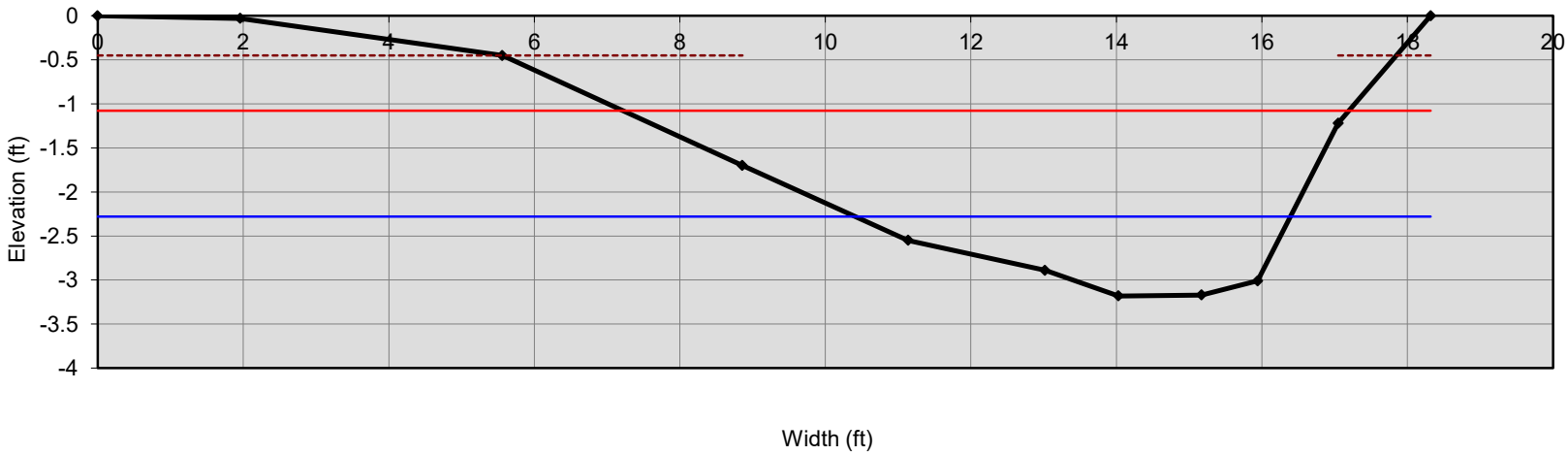
0.040	Manning's roughness
0.25	Darcy-Weisbach fric.
4.5	resistance factor u/u*
1.8	relative roughness

Forces & Power

3	channel slope (%)
0.72	shear stress (lb/sq.ft.)
0.61	shear velocity (ft/s)
2.5	unit strm power (lb/ft/s)

Cross Section 11

XS11 - Dynamite Creek Reach 3 - Pool



Bankfull Dimensions

3.5	x-section area (ft.sq.)
6.0	width (ft)
0.6	mean depth (ft)
0.9	max depth (ft)
6.5	wetted perimeter (ft)
0.5	hydraulic radius (ft)
10.0	width-depth ratio

Flood Dimensions

10.0	W flood prone area (ft)
1.7	entrenchment ratio
2.7	low bank height (ft)
3.0	low bank height ratio

Materials

27	D50 Riffle (mm)
68	D84 Riffle (mm)
25	threshold grain size (mm):

Rosgen Stream Type

Bankfull Flow

3.0	velocity (ft/s)
10.6	discharge rate (cfs)
0.73	Froude number

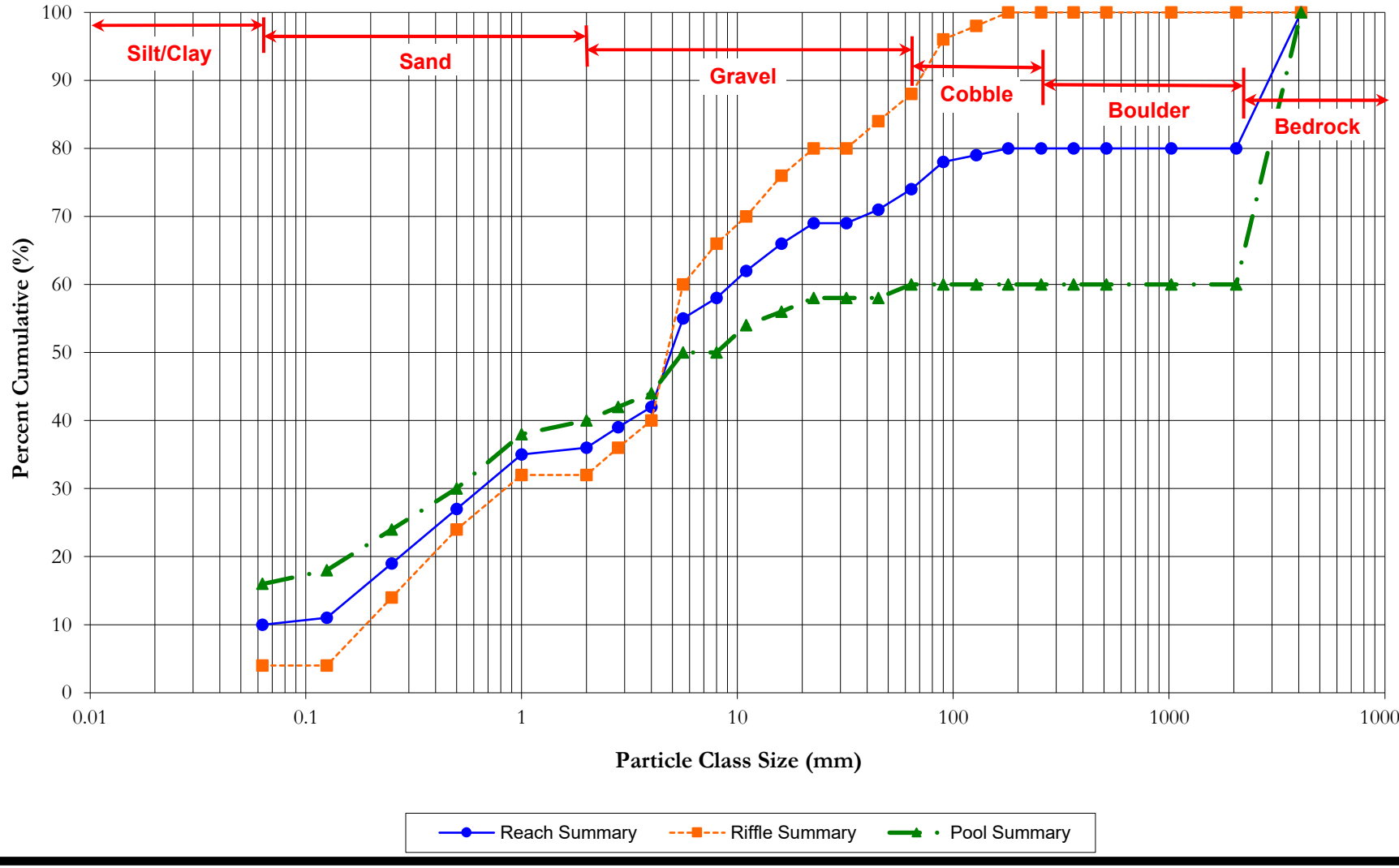
Flow Resistance

0.040	Manning's roughness
0.23	Darcy-Weisbach fric.
5.5	resistance factor u/u*
2.6	relative roughness

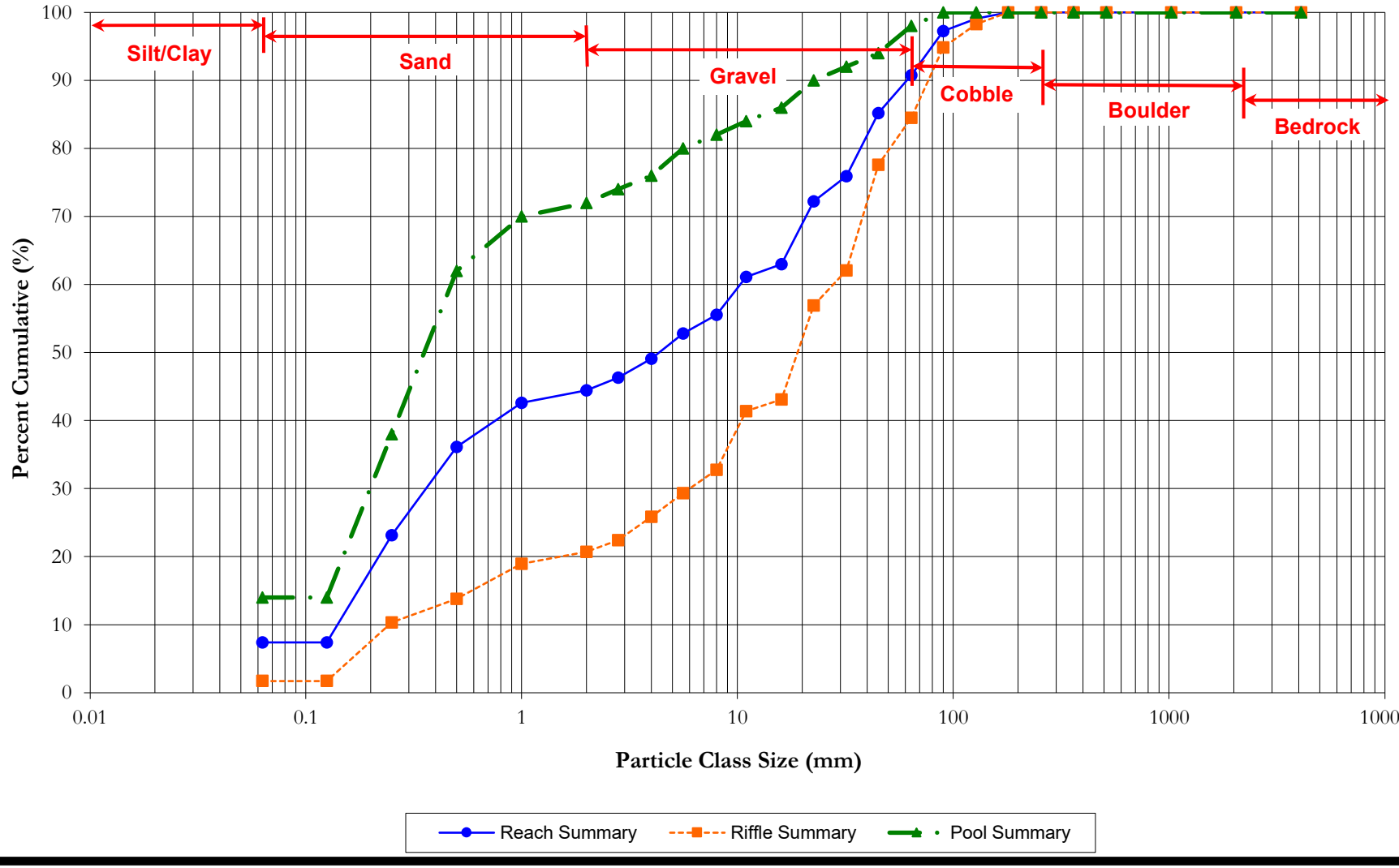
Forces & Power

1.51	channel slope (%)
0.51	shear stress (lb/sq.ft.)
0.51	shear velocity (ft/s)
1.67	unit strm power (lb/ft/s)

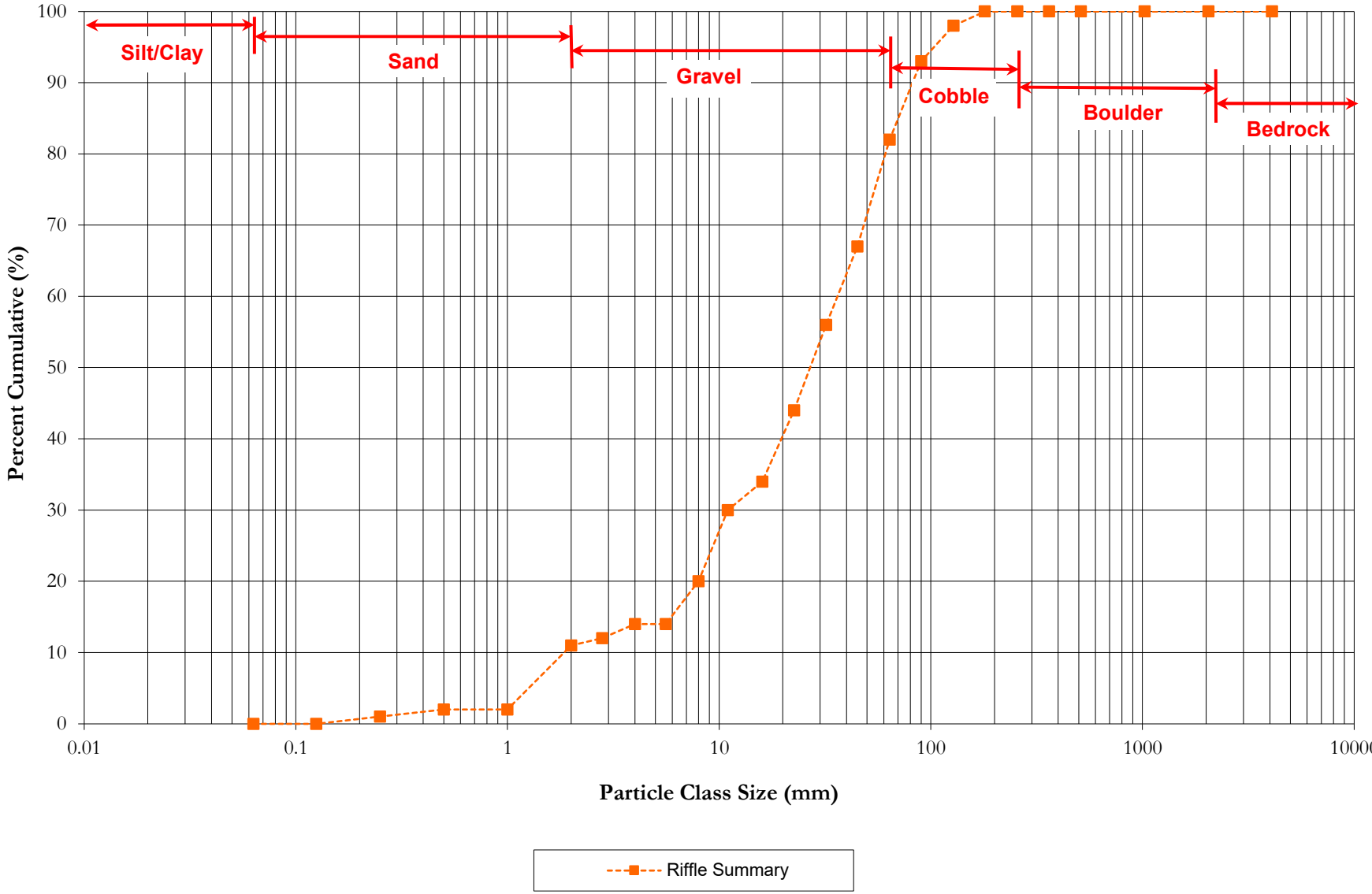
Dynamite Creek Reach 2
Reachwide Particle Distribution



Dynamite Creek Reach 6
Reachwide Particle Distribution



Dynamite Creek Reach 6 XS8
Pebble Count Particle Distribution



Proposed Geomorphic Parameters												
	Notation	**Units**	**Dynamite Creek Reach 2**			**Dynamite Creek Reach 6**			**Dynamite Creek Reach 7**			
			Typical Section Values	**Min**	**Max**	**Typical Section Values**	**Min**	**Max**	**Typical Section Values**	**Min**	**Max**	
stream type			B4/C4			C4			C4/E4			
drainage area	DA	*sq mi*	0.055			0.117			0.186			
design discharge	Q	*cfs*	8.8	-		15.5	-		24.0	-		
bankfull cross-sectional area	A_{bkf}	*SF*	3.0	-		5.7	-		9.4	-		
average velocity during bankfull event	v_{bkf}	*fps*	3.0	-		2.7	-		2.6	-		
Cross Section												
width at bankfull	w_{bkf}	*feet*	6.1	-		8.5	-		10.9	-		
maximum depth at bankfull	d_{max}	*feet*	0.8	-		1.1	-		1.4	-		
mean depth at bankfull	d_{bkf}	*feet*	0.5	-		0.7	-		0.9	-		
bankfull width to depth ratio	w_{bkf}/d_{bkf}		13	-		13	-		13	-		
max depth ratio	d_{max}/d_{bkf}	*feet*	1.6	-		1.6	-		1.6	-		
bank height ratio	BHR	-	-	1.0		-	1.0		-	1.0		
floodprone area width	w_{fpa}	*feet*	-	13	61	-	19	-	-	24	-	
entrenchment ratio	ER	-	-	2.2	10.0	-	2.2	-	-	2.2	-	
Slope												
valley slope	S_{valley}	*feet/ foot*	0.022			0.012			0.005			
channel slope	S_{chnl}	*feet/ foot*	-	0.018	0.019	-	0.0095	0.0103	-	0.0047	0.0051	
Profile												
riffle slope	S_{riffle}	*feet/ foot*	-	0.019	0.077	-	0.011	0.041	-	0.006	0.031	
riffle slope ratio	S_{riffle}/S_{chnl}	-	-	1.1	4.0	-	1.2	4.0	-	1.2	6.0	
pool slope	S_p	*feet/ foot*	-	0.000	0.008	-	0.000	0.002	-	0.000	0.001	
pool slope ratio	S_p/S_{chnl}	-	-	0.0	0.4	-	0.0	0.2	-	0.0	0.2	
pool-to-pool spacing	L_{p-p}	*feet*	-	9	37	-	26	51	-	22	76	
pool spacing ratio	L_{p-p}/w_{bkf}	-	-	1.5	6.0	-	3.0	6.0	-	2.0	7.0	
pool cross-sectional area	A_{pool}	*SF*	-	5.9	8.9	-	13.2	17.2	-	21.6	28.1	
pool area ratio	A_{pool}/A_{bkf}	-	-	2.0	3.0	-	2.3	3.0	-	2.3	3.0	
maximum pool depth	d_{pool}	*feet*	-	1.0	1.9	-	2.0	2.7	-	2.6	3.4	
pool depth ratio	d_{pool}/d_{bkf}	-	-	2.0	4.0	-	3.0	4.0	-	3.0	4.0	
pool width at bankfull	w_{pool}	*feet*	-	7.3	9.2	-	10.2	12.8	-	13.1	16.4	
pool width ratio	w_{pool}/w_{bkf}	-	-	1.2	1.5	-	1.2	1.5	-	1..2	1.5	
Pattern												
sinuosity	K	-	-	1.2		-	1.2		-	1.1		
belt width	w_{blt}	*feet*	-	12.0	49	-	26.0	68	-	16.0	55	
meander width ratio	w_{blt}/w_{bkf}	-	-	2.0	8.0	-	3.0	8.0	-	1.5	5.0	
linear wavelength (formerly meander length)	LW	*feet*	-	31	73	-	51	119	-	76	153	
linear wavelength ratio (formerly meander length ratio)	LW/w_{bkf}	-	-	5.0	12.0	-	6.0	14.0	-	7.0	14.0	
meander length	L_m	*feet*	-	37	88	-	61	143	-	84	168	
meander length ratio	L_m/W_{bkf}	-	-	6.0	14.4	-	7.2	16.8	-	7.7	15.4	
radius of curvature	R_c	*feet*	-	12	24	-	17	43	-	22	49	
radius of curvature ratio	R_c/ w_{bkf}	-	-	2.0	4.0	-	2.0	5.0	-	2.0	4.5	

Proposed Geomorphology

Reference Reach Geomorphic Parameters			Dynamite Creek Reach 2, 3, 5, and 6							
	Notation	*Units*	Magnolia Tributary 1		UT to Varnals Creek		UT Polecat		Sanders Creek	
			min	max	min	max	min	max	min	max
stream type			B4c		B		E4		C4	
drainage area	DA	*sq mi*	0.31		0.41		0.41		0.35	
design discharge	Q	*cfs*	64		54		20.3		14.3	15.7
bankfull cross-sectional area	A_{bkf}	*SF*	16.0		10.3	12.3	5.4	12.4	5.0	5.3
average velocity during bankfull event	v_{bkf}	*fps*	4.0		4.4	5.2	2.2	3.5	2.7	3.2
Cross-Section										
width at bankfull	w_{bkf}	*feet*	15.6		9.3	10.5	5.3	10.9	5.4	8.3
maximum depth at bankfull	d_{max}	*feet*	1.6		1.5	1.7	1.4	1.7	0.9	1.3
mean depth at bankfull	d_{bkf}	*feet*	1.0		1.1	1.2	1.0	1.1	0.6	0.9
bankfull width to depth ratio	w_{bkf}/d_{bkf}		15.2		8.1	9.3	5.2	9.6	5.8	13.0
depth ratio	d_{max}/d_{bkf}	*feet*	1.6		1.4	1.4	1.4	1.7	1.4	1.5
bank height ratio	BHR		1.6		1	1	1	1.1	1.4	1.9
floodprone area width	w_{fpa}	*feet*	30		60	100	25	65	26.0	43.4
entrenchment ratio	ER		1.9		5.7	10	3.2	8.3	>2.2	
Slope										
valley slope	S_{valley}	*feet/ foot*	0.017		0.020		0.017		0.011	
channel slope	S_{chnl}	*feet/ foot*	0.016		0.017		0.012		0.008	
Profile										
riffle slope	S_{riffle}	*feet/ foot*	0.012	0.14	0.024	0.057	0.004	0.047	0.017	0.042
riffle slope ratio	S_{riffle}/S_{chnl}		0.7	8.6	1.4	3.4	0.3	4	2.1	5.2
pool slope	S_p	*feet/ foot*	0	0.047	0	0.015	0.017		0.000	0.000
pool slope ratio	S_p/S_{chnl}		0.0	2.9	0.0	0.9	1.4		0.0	0.0
pool-to-pool spacing	$L_{p\text{-}p}$	*feet*	6	65	7.8	82.2	34	52	13.90	49.8
pool spacing ratio	$L_{p\text{-}p}/w_{bkf}$		0.4	4.2	0.5	5.6	0.3	3.2	2.6	6.0
pool cross-sectional area	A_{pool}	*SF*			22	22.7	9.3		8.9	
pool area ratio	A_{pool}/A_{bkf}				1.8	1.9	0.8	1.7	1.7	1.8
maximum pool depth	d_{pool}	*feet*			2.5	2.6	1.8		2.2	
pool depth ratio	d_{pool}/d_{bkf}				3	3.1	1.6	1.8	2.4	3.7
pool width at bankfull	w_{pool}	*feet*			15.1	18.6	8.0		8.3	
pool width ratio	w_{pool}/w_{bkf}				1.0	1.3	0.7	1.5	1.0	1.5
Pattern										
sinuosity	K		1.3		1.2		1.4		1.8	
belt width	w_{blt}	feet			14.6	44.5	28	50	43	58
meander width ratio	w_{blt}/w_{bkf}				1	3	3	5	5.2	10.7
linear wavelength (formerly meander length)	L_m	feet			16.4	46.6	56	85	54	76
linear wavelength ratio (formerly meander length ratio)	L_m/w_{bkf}				1.1	3.2	6	9	6.5	14.1
meander length		feet			--	--	---	---	119	135
meander length ratio					--	--	---	---	14.4	24.9
radius of curvature	R_c	feet			8.3	47.3	19	50	8	16
radius of curvature ratio	R_c/ w_{bkf}				0.6	3.2	2.0	5.3	0.7	3.0
Particle Size Distribution from Reach-wide Pebble Count										
d50 Description										
	d_{16}	mm	0.2		2.9				4.3	
	d_{35}	mm	4.5		9.2				9.0	
	d_{50}	mm	28.0		15.0				12.8	
	d_{84}	mm	120.0		56.0				33.2	
	d_{95}	mm	2500.0		88.0				55.3	
	d_{100}	mm	4096.0		256.0					

Reference Reach Geomorphology

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www.SandEC.com

HYDRIC SOIL INVESTIGATION

Dynamite Creek Mitigation Site
Town Creek Rd., Eden, NC
Foothills
Dan River Basin
Rockingham County, North Carolina

Prepared for:
Mr. Charlie Neaves
Wildlands Engineering, Inc.
312 West Millbrook Road, Suite 225
Raleigh, NC 27609

June 4th, 2020

INTRODUCTION

Soil & Environmental Consultants, PA (S&EC, PA) was retained to perform an evaluation to assess the presence and extent of hydric soils within the project area. The area evaluated is within a maintained pasture. The study area is bisected by a channelized stream that has been dredged for many years with the spoil material sidecast or stockpiled along the banks (See Photo 1). Dredged material is present adjacent to the stream channel and can be documented by observing the eroded stream banks. Linear depressions are present on both the north and south side of the stream that, according to the farmer, were created by "plowing and terracing" the areas so that it would not be so wet back when corn and soy beans were grown. These linear depressions are evident on aerial photos at least since 1946 and are obvious in the field (See Photo 2).

METHODOLOGY

On April 21st, 2020 S&EC, PA staff performed a hydric soil evaluation at the site. Hand auger borings were advanced on the property at locations appropriate to approximately estimate the location and extent of hydric soils within the project area (see attached Figure 1. - Hydric Soils 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 8.2, 2018). Spoil piles were also examined to assess characteristics of the dredge material.

The evaluated area is mapped as the poorly drained Hatboro soil series. Most hydric soils observed onsite within the project area were in fact most like the Hatboro or Holly soil series (Fine-loamy, mixed, active, nonacid, mesic Fluvaquentic Endoaquepts). Areas believed to contain buried hydric soils would technically be most like the Codorus series (Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts) since they do not contain redox concentrations within 10" of the current soil surface.

RESULTS

Approximately 48 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.

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.

The two non-hydric borings on the south side of the stream and one boring in the northwest corner of the study area were not hydric soils and did not contain a buried A horizon or evidence that dredge spoil material had been deposited upon them.

Soil borings were performed within the area approximately indicated on the attached Figure 1. - Hydric Soils Map. Hydric soil areas north of the stream had a depleted matrix (F3 indicator) within 8" of the current land surface. All hydric soil areas south of the stream had a depleted matrix (F3 indicator) at 0" except one which contained the F3 indicator at 2" below the current land surface.

The hydric soil areas south of the stream and in the northeast corner of the study area do not appear to have had dredged spoil or other material deposited upon it. Instead, based on soil characteristics observed, it appears that the existing soils were manipulated to create the higher elevation “bed” areas with material removed from where the current linear depressions exist. Soil profile description 4 is typical of this area.

Spoil piles contained grayish brown clay loam material similar to that found in the hydric soil areas. Spoil piles also contained light olive brown sandy clay loam material similar to the non-hydric material overlying suspected buried hydric soils. An area in the northwestern part of the study area appears to have been manipulated in a similar way as the area south of the stream but it also appears that some dredged or spoil material was utilized in creating the higher “bedded” areas resulting in a buried hydric soil. Prior to construction of the “beds”, this area would have met the F3 (depleted matrix) hydric soil indicator. Soil profile description 2 is representative of this area. Soil profile description 6 also appeared to be a buried hydric soil. This is apparently an isolated unit that is too small to map separately but is not surprising given the inherent variability of floodplain soils that are heavily manipulated. The areas with the yellow flowers in Photo 3 generally represent the “higher” bedded areas north of the stream. Soils observed at soil profile description 3 also appeared to have a layer of dredged or spoil material on the surface but that layer was thin enough that the F3 hydric soil indicator was still met. Soil profile description 1 may have been within the original stream bed location because a loamy sand layer was observed in the profile that contained gravel sized pebbles.

PHOTO 1

PHOTO 2

PHOTO 3

Description 1
Hydric Soil Indicator F3
Series and Taxonomic Class: Hatboro or Holly soil series (Fine-loamy, mixed, active, nonacid, mesic Fluvaquentic Endoaquepts)

Horizon Depth (inches)	Horizon	Matrix Color (moist)	%	Redox Features				Texture	Notes
				Color (moist)	%	Type	Location		
0-14	A	2.5Y 4/2	80	5YR 4/6	20	Conc.	PL, masses	CL	
14-28	Bg	2.5Y 6/2	60	7.5YR 4/6 10YR 3/4	20 20	Conc.	Masses	SCL	
28-34	IICg	2.5Y 6/2	70	7.5YR 4/6	30	Conc.	Masses	LS	Some gravel size material
34-39+	Cg1	2.5Y 5/2	65	7.5YR 4/6 7.5YR 5/6	20 15	Conc.	PL, few masses	C	

Description 2
Hydric Soil Indicator: None (Possible buried F3) Close to meeting F19 but prominent or distinct redox concentrations are only 10% not the required 20%
Series and Taxonomic Class: Codorus - Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts (Possibly buried Hatboro)

Horizon Depth (inches)	Horizon	Matrix Color (moist)	%	Redox Features				Texture	Notes
				Color (moist)	%	Type	Location		
0-4	A	10YR 4/3	100					CL	sidecast
4-14	Bw	2.5Y 5/3	60	2.5Y 5/4 7.5YR 3/4	30 10	Conc.	Masses	SCL	sidecast
14-24	Ab	2.5Y 5/2	70	7.5YR 3/4 7.5YR 4/6	20 10	Conc.	Masses	CL	
24-30+	Bg	2.5Y 5/1	80	7.5YR 4/4	20	Conc.	PL, Masses	C	

Description 3
Hydric Soil Indicator F3
Series and Taxonomic Class: Hatboro or Holly soil series (Fine-loamy, mixed, active, nonacid, mesic Fluvaquentic Endoaquepts)

Horizon Depth (inches)	Horizon	Matrix Color (moist)	%	Redox Features				Texture	Notes
				Color (moist)	%	Type	Location		
0-6	A	10YR 3/3	100					CL	Sidecast
6-12	Ab	2.5Y 4/2	85	7.5YR 5/6	15	Conc.	Masses, few PL	CL	
12-20+	Bg	10YR 4/1	60	10YR 5/3 10YR 4/4	25 15	Conc.	Masses	CL	

Description 4
Hydric Soil Indicator F3
Series and Taxonomic Class: Hatboro or Holly soil series (Fine-loamy, mixed, active, nonacid, mesic Fluvaquentic Endoaquepts)

Horizon Depth (inches)	Horizon	Matrix Color (moist)	%	Redox Features				Texture	Notes
				Color (moist)	%	Type	Location		
0-6	A	2.5Y 4/2	80	7.5YR 3/4	20	Conc.	PL, masses, OR	CL	
6-14	Bg	2.5Y 5/2	70	7.5YR 4/6	30	Conc.	PL and masses	C	

Description 5
Hydric Soil Indicator F3
Series and Taxonomic Class: Hatboro or Holly soil series (Fine-loamy, mixed, active, nonacid, mesic Fluvaquentic Endoaquepts)

Horizon Depth (inches)	Horizon	Matrix Color (moist)	%	Redox Features				Texture	Notes
				Color (moist)	%	Type	Location		
0-9	A	10YR 4/3	100					L	Sidecast
9-18	Ab	10YR 4/2	95	7.5YR 4/6	5	Conc.	Masses	L	
18+	C	10YR 5/3	90	10YR 4/6	10	Conc.	Masses	SL	

Description 6
Hydric Soil Indicator: None (close to meeting F3 but 2 chroma horizon within 10” of surface is only 4” thick rather than the required 6”)
Series and Taxonomic Class: Codorus - Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts (Possibly buried Hatboro)

Horizon Depth (inches)	Horizon	Matrix Color (moist)	%	Redox Features				Texture	Notes
				Color (moist)	%	Type	Location		
0-6	A	10YR 4/3	100					L	Sidecast
6-10	A2	10YR 4/2	95	7.5YR 4/6	5	Conc.	Masses	L	
10-24	C	7.5YR 4/6	80	10YR 4/2	20	Depl.	Matrix	SL	
24-33	IIAb	10YR 3/1	95	7.5YR 4/6	5	Conc.	PL	CL	
33+	IIBw	2.5Y 5/2	90	10YR 5/6	10	Conc.	PL, Masses	CL	

Description 7
Hydric Soil Indicator F3
Series and Taxonomic Class: Hatboro or Holly soil series (Fine-loamy, mixed, active, nonacid, mesic Fluvaquentic Endoaquepts)

Horizon Depth (inches)	Horizon	Matrix Color (moist)	%	Redox Features				Texture	Notes
				Color (moist)	%	Type	Location		
0-12	A	10YR 5/1	80	7.5YR 5/6	20	Conc.	PL, masses	CL	
12-22	Bg	10YR 5/1	80	7.5YR 5/6	20	Conc.	PL, masses	SCL	
22-26	Bg2	2.5Y 4/1	90	7.5YR 4/6	10	Conc.	PL	CL	
26-34	Cg	2.5Y 6/2	100					SL	
34+	Cg2	2.5Y 6/1	70	7.5YR 5/6	30	Conc.	Masses	C	

Description 8
Hydric Soil Indicator: F3
Series and Taxonomic Class: Codorus - Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts (Possibly buried Hatboro)

Horizon Depth (inches)	Horizon	Matrix Color (moist)	%	Redox Features				Texture	Notes
				Color (moist)	%	Type	Location		
0-6	A	2.5Y 4/1	100					SiL	
6-15	A2	10YR 6/6	60	10YR 4/1 7.5YR 4/6	35 5	Depl. Conc.	Matrix Masses	L	
15-20	Bg	2.5Y 4/1	90	7.5YR 4/6	10	Conc.	PL	CL	
20-42+	IIC	10YR 4/4	100					S	Coarse sand and rounded gravel. Looks like old river bed or delta

Description 9
Hydric Soil Indicator: F3
Series and Taxonomic Class: Codorus - Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts (Possibly buried Hatboro)

Horizon Depth (inches)	Horizon	Matrix Color (moist)	%	Redox Features				Texture	Notes
				Color (moist)	%	Type	Location		
0-8	A	2.5Y 4/1	95	7.5YR 4/6	5	Conc.	PL	L	
8-16	Bw	10YR 6/4	60	10YR 5/2 7.5YR 4/6	20 20	Depl. Conc.	Matrix Masses	L	
16-26	IIC	Red, brown, grey individual sand grains	100					S	Old delta?
33+	Cg	2.5Y 6/1	60	7.5YR 5/8	40	Conc.	Masses, PL	C	

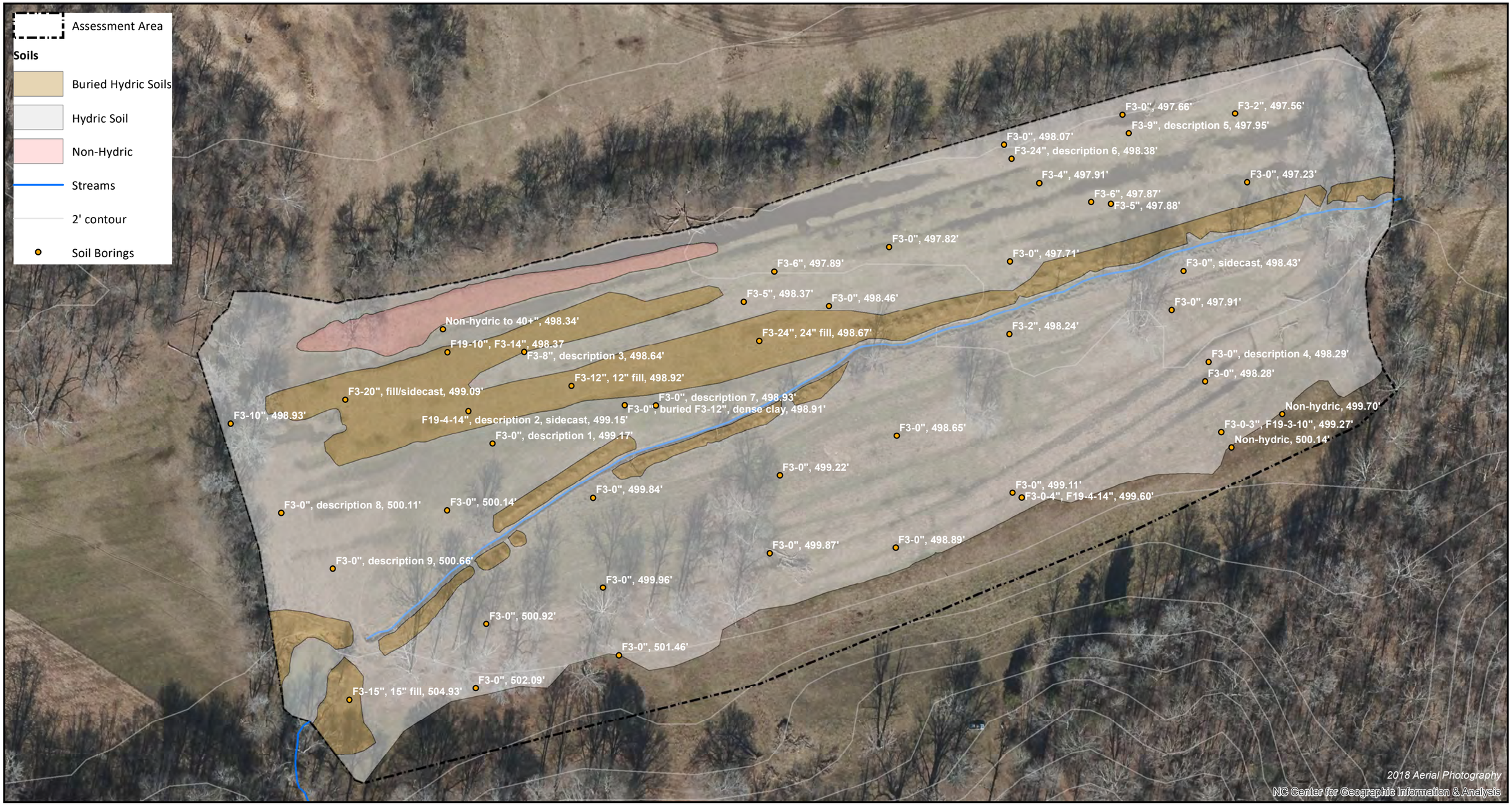


Figure 1. Hydric Soils Map
Dynamite Creek Mitigation Site
Roanoke 03010103

0 50 100 Feet

N

Rockingham County, NC

Reference Reach Geomorphic Parameters			Dynamite Creek Reach 7					
	Notation	*Units*	Long Branch		Cedar Creek		UT to Lyle Creek	
			min	max	min	max	min	max
stream type			C/E4		E5		C5	
drainage area	DA	*sq mi*	1.49		4.07		0.25	
design discharge	Q	*cfs*	101	124	57	68	18	
bankfull cross-sectional area	A_{bkf}	*SF*	25.0	34.6	18.9	22.2	3.5	4.1
average velocity during bankfull event	v_{bkf}	*fps*	3.6	4.0	3.0	3.1	4.7	
Cross-Section								
width at bankfull	w_{bkf}	*feet*	14.8	18.6	11.1	12.0	7.0	
maximum depth at bankfull	d_{max}	*feet*	1.9	2.9	2.5	2.6	1	1.1
mean depth at bankfull	d_{bkf}	*feet*	1.3	2.1	1.8		0.47	
bankfull width to depth ratio	w_{bkf}/d_{bkf}		7.9	13.8	6.5	6.6	14.9	18.3
depth ratio	d_{max}/d_{bkf}	*feet*	1.4	1.5	1.4		2.1	2.3
bank height ratio	BHR		1.2	1.5	1.1	1.3	0.6	0.9
floodprone area width	w_{fpa}	*feet*	>50		>150		45	49
entrenchment ratio	ER		>3.4		>2.2		5.7	6.4
Slope								
valley slope	S_{valley}	*feet/ foot*	0.006		0.007		0.009	
channel slope	S_{chnl}	*feet/ foot*	0.004		0.003		0.004	
Profile								
riffle slope	S_{riffle}	*feet/ foot*	0.013	0.012	0.006	0.024	0.006	0.060
riffle slope ratio	S_{riffle}/S_{chnl}		3.3	3	2.0	8.0	1.4	14.9
pool slope	S_p	*feet/ foot*	0.0003	0.003	0.000	0.009	0.000	0.001
pool slope ratio	S_p/S_{chnl}		0.1	0.8	0.0	3.0	0.0	0.3
pool-to-pool spacing	$L_{p\text{-}p}$	*feet*	50	105	27.0	84.2	15	28
pool spacing ratio	$L_{p\text{-}p}/w_{bkf}$		3.4	7.1	2.4	7.0	1.9	3.6
pool cross-sectional area	A_{pool}	*SF*	25.5	33.4	16.7	28.8	4	
pool area ratio	A_{pool}/A_{bkf}		1.0	1.3	1.5	2.4	1	1.1
maximum pool depth	d_{pool}	*feet*	2.2		2.9	3.3	1.3	
pool depth ratio	d_{pool}/d_{bkf}		0.8	1.2	0.26	0.28	2.9	
pool width at bankfull	w_{pool}	*feet*	16.2	18.8	11.2	12.9	6.1	
pool width ratio	w_{pool}/w_{bkf}		0.9	1.3	1.0	1.1	0.8	
Pattern								
sinuosity	K		1.3		1.2		1.1	
belt width	w_{blt}	feet	60		10	82	21	
meander width ratio	w_{blt}/w_{bkf}		3.2	4.1	0.9	6.83	2.4	3
linear wavelength (formerly meander length)	L_m	feet	66	191	53	117	39	44
linear wavelength ratio (formerly meander length ratio)	L_m/w_{bkf}		4.5	10.3	4.8	9.8	5.1	7
meander length		feet	---	---	82	129	---	---
meander length ratio			---	---	7.4	10.8	---	---
radius of curvature	R_c	feet	16	87	7.0	30.0	19	32
radius of curvature ratio	R_c/ w_{bkf}		1.1	4.7	0.6	2.5	2.7	3.7
Particle Size Distribution from Reach-wide Pebble Count								
d50 Description							Very Coarse Sand	
	d_{16}	mm	8.1				-	
	d_{35}	mm	26.6				0.1	
	d_{50}	mm	41.6				0.2	
	d_{84}	mm	124.8				0.5	
	d_{95}	mm	225.5				4.0	
	d_{100}	mm					8.0	

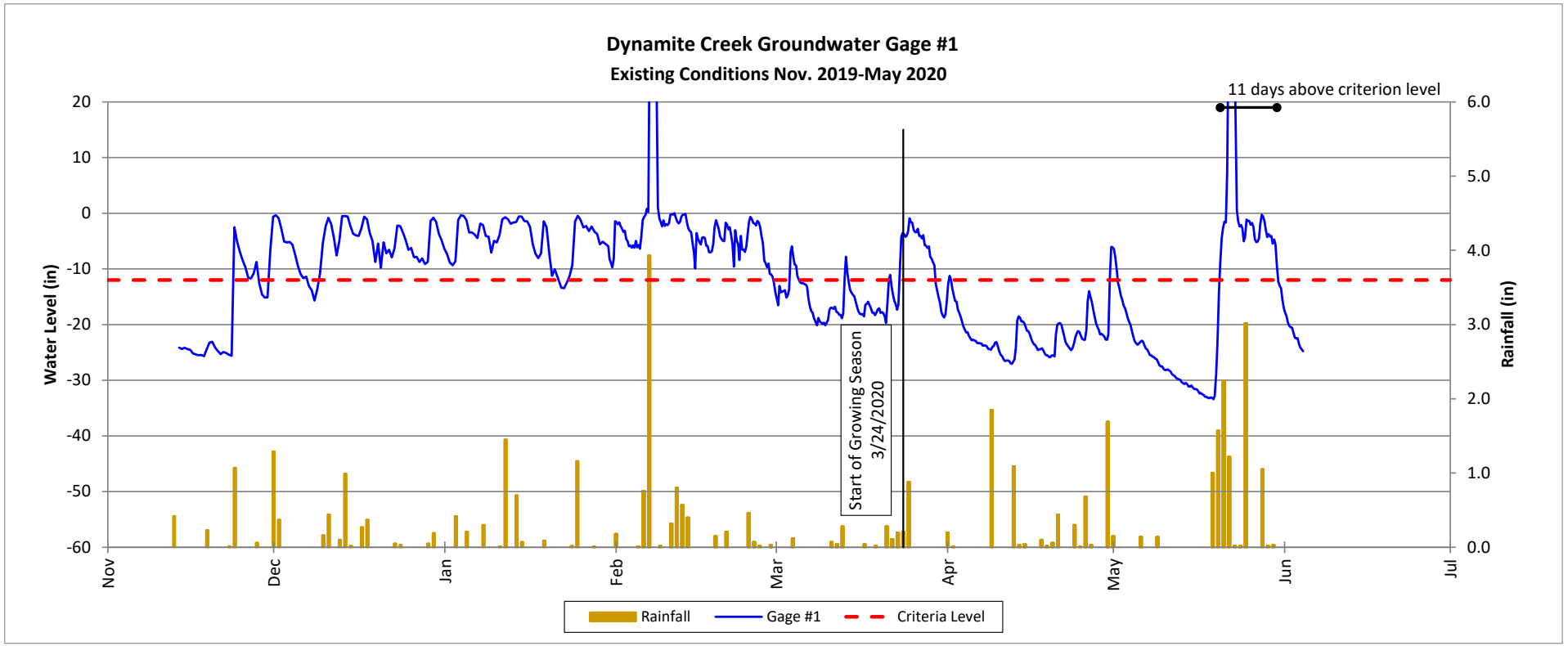
Reference Reach Geomorphology

Groundwater Gage Plots

Dynamite Creek Mitigation Site

DMS Project No. 100125

Existing Conditions Nov. 2019-May 2020

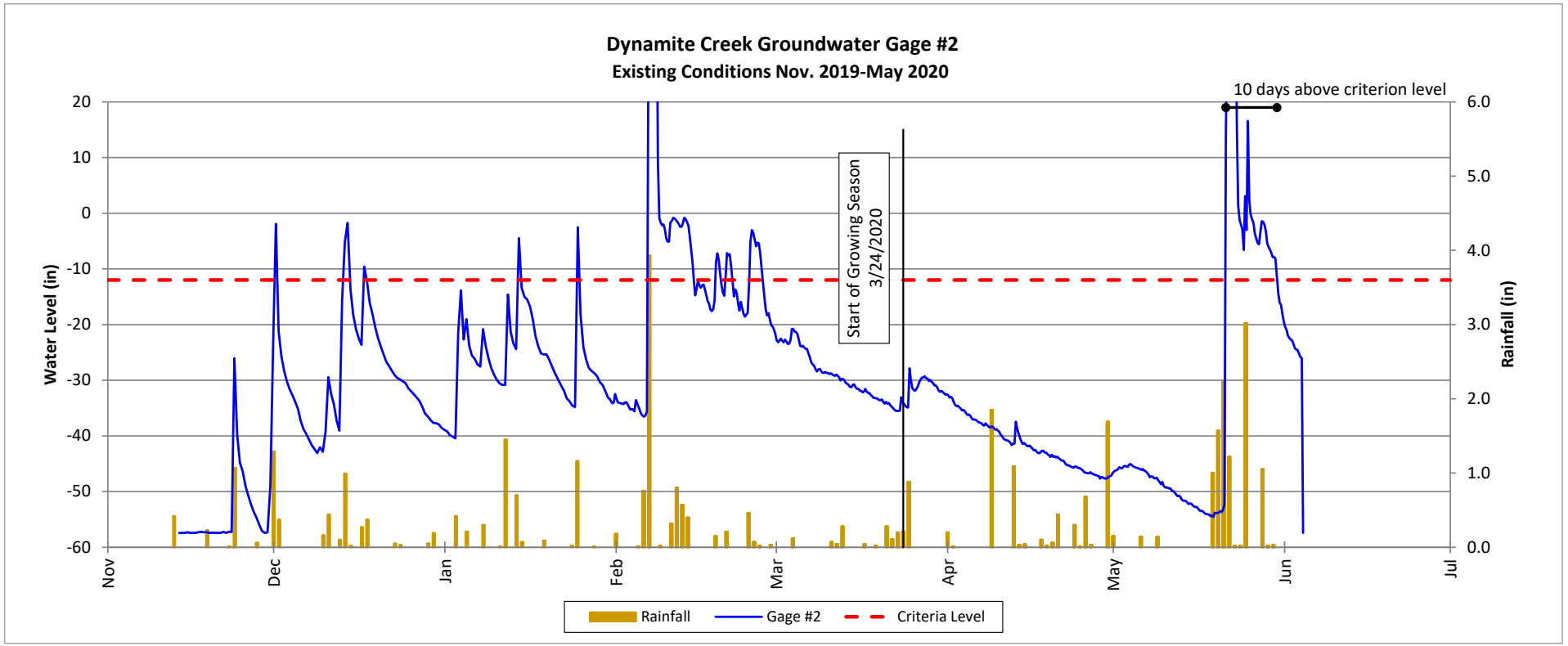


Groundwater Gage Plots

Dynamite Creek Mitigation Site

DMS Project No. 100125

Existing Conditions Nov. 2019-May 2020

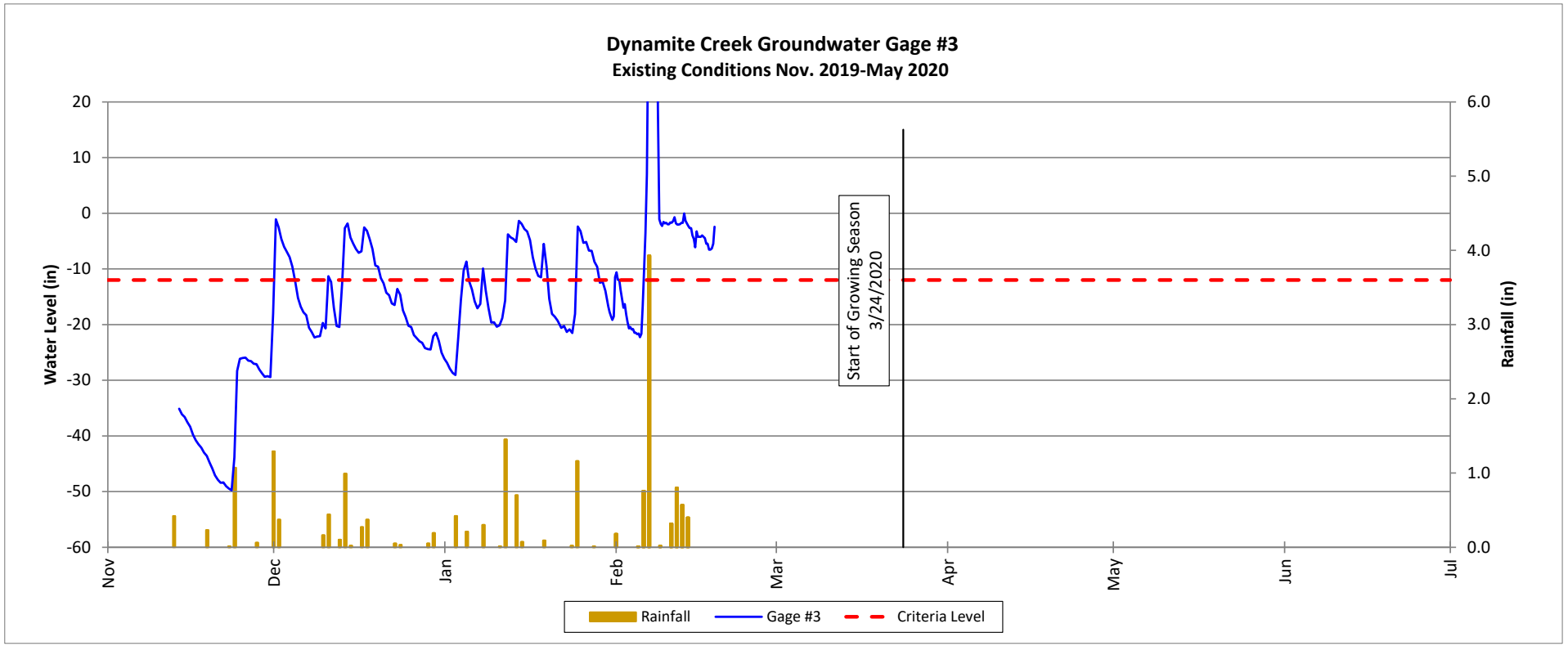


Groundwater Gage Plots

Dynamite Creek Mitigation Site

DMS Project No. 100125

Existing Conditions Nov. 2019-May 2020

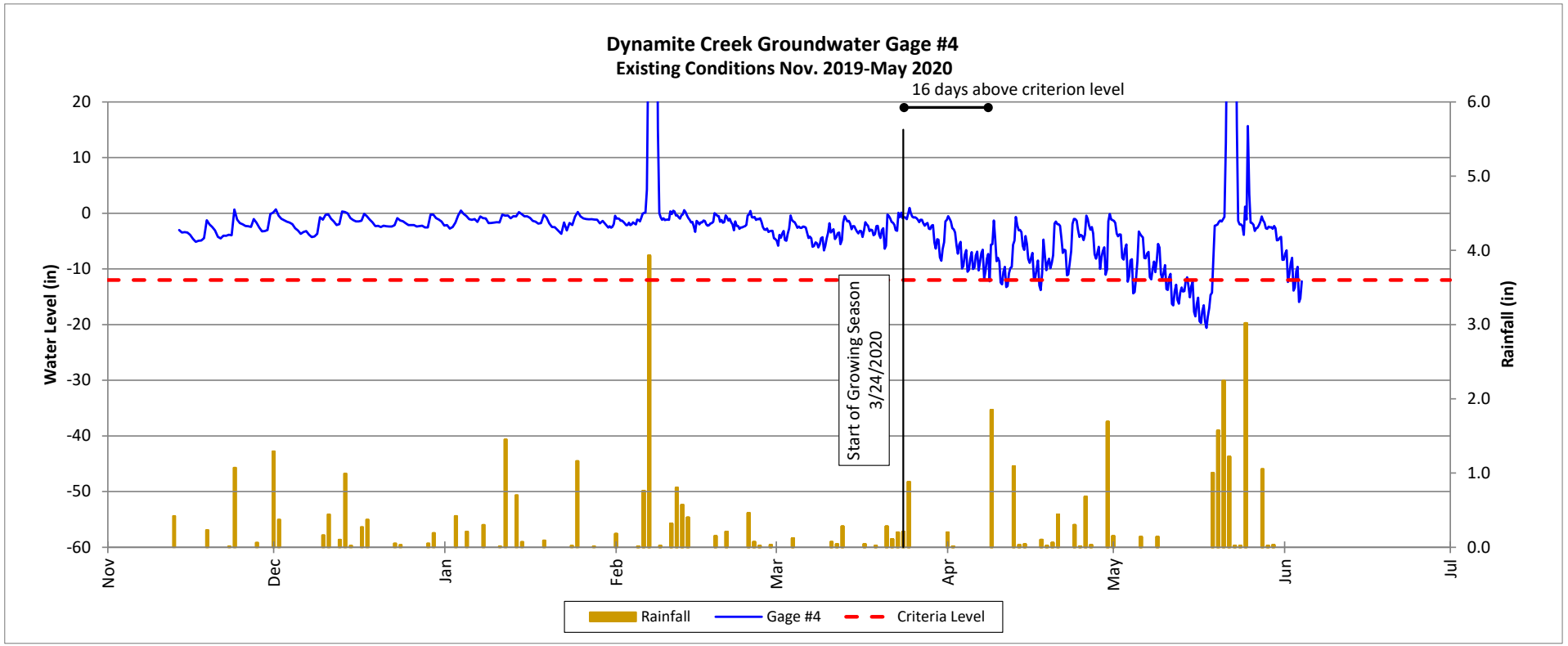


Groundwater Gage Plots

Dynamite Creek Mitigation Site

DMS Project No. 100125

Existing Conditions Nov. 2019-May 2020

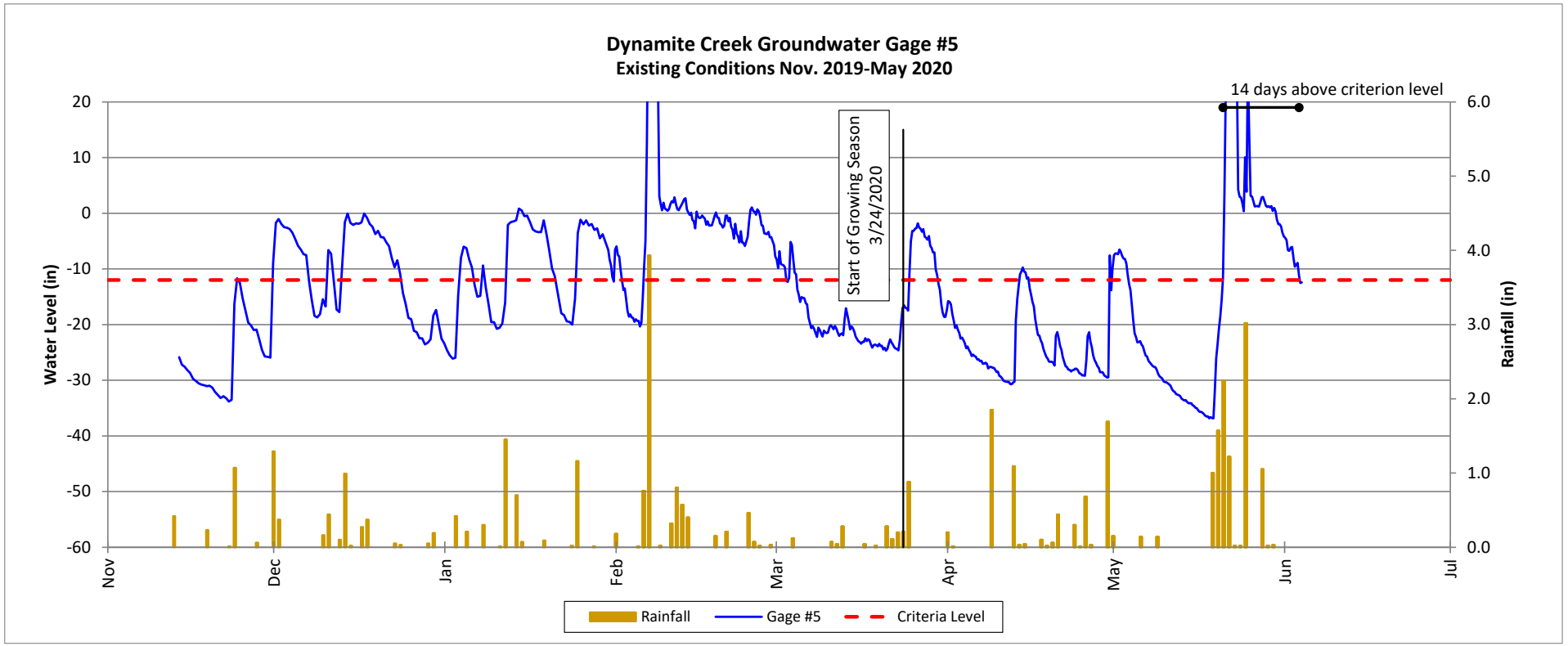


Groundwater Gage Plots

Dynamite Creek Mitigation Site

DMS Project No. 100125

Existing Conditions Nov. 2019-May 2020

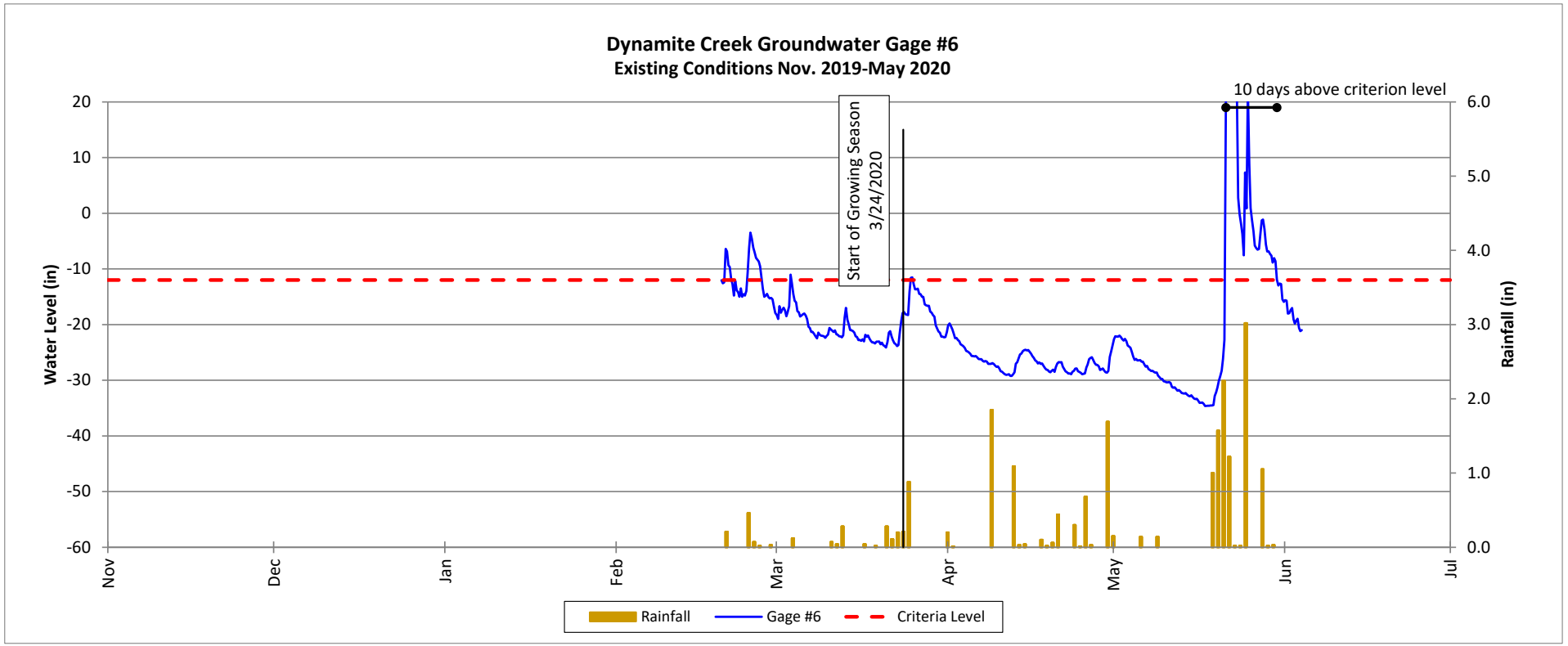


Groundwater Gage Plots

Dynamite Creek Mitigation Site

DMS Project No. 100125

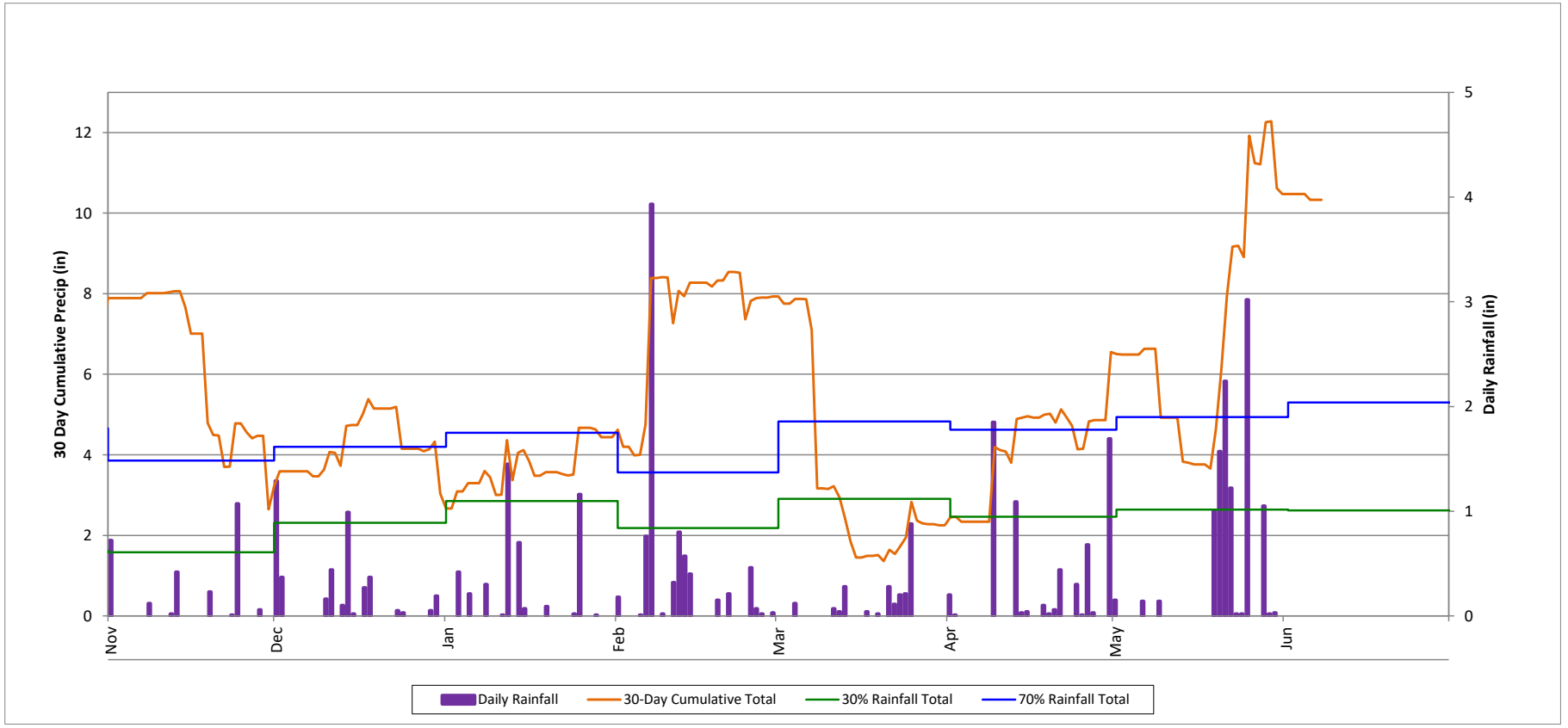
Existing Conditions Nov. 2019-May 2020



Normal Precipitation Analysis

Dynamite Creek Mitigation Site

Existing Conditions Nov. 2019-May 2020



[1] 2019-2020 monthly rainfall collected from Eden, NC station (312631).

[2] 30th and 70th percentile rainfall data collected from Eden, NC (312631).

Appendix 2

Preliminary JD and Supporting USACE Forms

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2019-00909** County: **Rockingham** U.S.G.S. Quad: **NC- Southeast Eden**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Requestor: **Wildlands Engineering, Inc.**
Attn: Charlie Neaves
Address: **312 W. Millbrook Road, Suite 225**
Raleigh, NC 27609

Size (acres) **~35** Nearest Town **Eden**
Nearest Waterway **UT to Dan River** River Basin **Roanoke**
USGS HUC **03010103** Coordinates **36.483800, -79.712743**
Location description: **The project area is located on the north side of Town Creek Road, approximately 0.45 mile east of its intersection with Glenrobin Drive, at 850 Town Creek Road, in Eden, Rockingham county, North Carolina. The project area is shown as the red-outlined "Assessment Area" on the attached sketches entitled "Figure 3a Site Map Overview", "Figure 3b Site Map", and "Figure 3c Site Map."**

Indicate Which of the Following Apply:

A. Preliminary Determination

☒ **There appear to be waters 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 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. 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 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 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 at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the waters 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 waterson 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 on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

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

☐ There are no waters of the U.S., to include wetlands, present on the above described project area/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 **David E. Bailey at (919) 554-4884 X 30 or David.E.Bailey2@usace.army.mil**.

C. Basis for Determination: See the Preliminary Jurisdictional Determination form dated 06/15/2020.

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:  Date: 2020.06.15 07:21:45 -04'00'

Date of JD: **06/15/2020** Expiration Date of JD: **Not applicable**

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.

Copy furnished:
Sue Homewood, NCDEQ-DWR, 450 W. Hanes Mill Rd, Suite 300, Winston-Salem, NC 27105

Assessment Area
Potential Waters of the US
Potential Non-Wetland Waters of the US
Culvert
2 ft Contours

Dynamite Creek

Figure 3b

Cabin Creek

UT1

City Creek

Village Creek

Dynamite Creek

Figure 3c

2018 Aerial Photography
NC Center for Geographic Information & Analysis

WILDLANDS ENGINEERING

0 125 250 Feet

N

Figure 3a Site Map Overview
Dynamite Creek Mitigation Site
Roanoke 03010103

Rockingham County, NC

Assessment Area
Potential Waters of the US
Potential Non-Wetland Waters of the US
Culvert
2 ft Contours
Data Points

Wetland I
Wetland L
DP 3
Wetland K
Wetland H
Wetland J
9' Culvert (w/in Assessment Area)
Wetland G
DP 2
DP 1
Wetland F
Wetland E
Wetland D
Wetland C
Wetland B
Dynamite Creek
Wetland A
Wetland Q
15' Culvert
Wetland R
DP 8
Wetland S
DP 9

2018 Aerial Photography
NC Center for Geographic Information & Analysis

WILDLANDS ENGINEERING

0 75 150 Feet

N

Figure 3b Site Map
Dynamite Creek Mitigation Site
Roanoke 03010103

Rockingham County, NC

WILDLANDS ENGINEERING

0 100 200 Feet

N

Figure 3c Site Map
Dynamite Creek Mitigation Site
Roanoke 03010103

Rockingham County, NC

SAW-2019-00909

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Wildlands Engineering, Inc. Attn: Charlie Neaves)**	File Number: **SAW-2019-00909**	Date: **06/15/2020**

Attached is:		See Section below
☐	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
☐	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
☐	PERMIT DENIAL	C
☐	APPROVED JURISDICTIONAL DETERMINATION	D
☒	PRELIMINARY JURISDICTIONAL DETERMINATION	E

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

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

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

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

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

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

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

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

SAW-2019-00909

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

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

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

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

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
District Engineer, Wilmington Regulatory Division **Attn: David E. Bailey** **Raleigh Regulatory Office** **U.S Army Corps of Engineers** **3331 Heritage Trade Drive, Suite 105** **Wake Forest, North Carolina 27587**	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.

_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, **Attn: David E. Bailey, 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

Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD: 6/15/2020

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Charlie Neaves, 312 W. Millbrook Rd, Suite 225, Raleigh, NC 27609

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: SAW-2019-00909 (NCDMS ILF - Dynamite Creek)

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: NC County/parish/borough: Rockingham City: Eden

Center coordinates of site (lat/long in degree decimal format):

Lat.: 36.485133 Long.: -79.711148

Universal Transverse Mercator:

Name of nearest waterbody: Dan River

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

[X] Office (Desk) Determination. Date: 4/21/2020

[ ] Field Determination. Date(s):

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
see attached					

Waters_Name	Latitude	Longitude	Waters Size	Type Of Aquatic Resource	Geographic Authority
Cabin Creek	36.4825	-79.71207	360 FEET	Non-Wetland	404
City Creek	36.47915	-79.71295	121 FEET	Non-Wetland	404
Dynamite Creek	36.47804	-79.71175	4793 FEET	Non-Wetland	404
UT1	36.48101	-79.71233	287 FEET	Non-Wetland	404
Village Creek	36.47888	-79.7121	139 FEET	Non-Wetland	404
Wetland 0	36.47952	-79.71272	.034 ACRES	Wetland	404
Wetland A	36.48508	-79.71097	4.237 ACRES	Wetland	404
Wetland B	36.48485	-79.71261	.024 ACRES	Wetland	404
Wetland C	36.48494	-79.71269	.012 ACRES	Wetland	404
Wetland D	36.48513	-79.71231	.151 ACRES	Wetland	404
Wetland E	36.48507	-79.71282	.006 ACRES	Wetland	404
Wetland F	36.48517	-79.71283	.045 ACRES	Wetland	404
Wetland G	36.48581	-79.71069	.937 ACRES	Wetland	404
Wetland H	36.48551	-79.71303	.055 ACRES	Wetland	404
Wetland I	36.48596	-79.71158	.13 ACRES	Wetland	404
Wetland J	36.48576	-79.71015	.012 ACRES	Wetland	404
Wetland K	36.48581	-79.7098	.023 ACRES	Wetland	404
Wetland L	36.48609	-79.70895	.03 ACRES	Wetland	404
Wetland M	36.48085	-79.71309	.001 ACRES	Wetland	404
Wetland N	36.48156	-79.71291	.027 ACRES	Wetland	404
Wetland P	36.4791	-79.7131	.002 ACRES	Wetland	404
Wetland Q	36.48442	-79.71281	.092 ACRES	Wetland	404
Wetland R	36.48423	-79.71321	.042 ACRES	Wetland	404
Wetland S	36.48371	-79.71284	.208 ACRES	Wetland	404
Wetland T	36.48307	-79.71274	.003 ACRES	Wetland	404
Wetland U	36.48232	-79.71252	.042 ACRES	Wetland	404
Wetland V	36.48206	-79.71291	.029 ACRES	Wetland	404
Wetland W	36.47903	-79.71173	.009 ACRES	Wetland	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: Aerial, soils, and topo maps (Wildlands).
- [■] Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - [X] 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: Southeast Eden Quad 1:24,000.
- [■] Natural Resources Conservation Service Soil Survey. Citation: web soil survey.
- [ ] National wetlands inventory map(s). Cite name: _____.
- [ ] State/local wetland inventory map(s): _____.
- [ ] FEMA/FIRM maps: _____.
- [ ] 100-year Floodplain Elevation is: _____.(National Geodetic Vertical Datum of 1929)
- [■] Photographs: [■] Aerial (Name & Date): NC Onemap 2018.
  or [■] Other (Name & Date): Site Photos February 2020.
- [ ] Previous determination(s). File no. and date of response letter: _____.
- [X] Other information (please specify): QL2 LiDAR (NC Floodmaps).

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.

Date: 2020.06.15 07:01:03 -04'00'

Signature and date of Regulatory staff member completing PJD

Charlie Neaves 4/13/2020

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

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

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Dynamite Creek Mitigation Site | City/County: Rockingham | Sampling Date: 2/19/20
Applicant/Owner: Wildlands Engineering, Inc. | State: NC | Sampling Point: DP1-A
Investigator(s): C. Neaves | Section, Township, Range:
Landform (hillside, terrace, etc.): Floodplain | Local relief (concave, convex, none): None | Slope (%): 0
Subregion (LRR or MLRA): LRR P, MLRA 136 | Lat: 36.485076 | Long: -79.710965 | Datum: NAD 83
Soil Map Unit Name: Hatboro silt loam | NWI classification:
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 X, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:
Above Normal Precipitation.

HYDROLOGY

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

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

Field Observations:
Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes X No ___ Depth (inches): 10
Saturation Present? Yes X No ___ Depth (inches): 0
(includes capillary fringe)
Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:
Weak reaction to alpha alpha dipyridil.

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

Sampling Point: DP1-A

Tree Stratum (Plot size: 30')	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: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover: ___	20% of total cover: ___		
Herb Stratum (Plot size: 5')			
1. *Ranunculus bulbosus*	60	Yes	FAC
2. Unknown grass	20	Yes	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	80 =Total Cover		
50% of total cover: 40	20% of total cover: 16		
Woody Vine Stratum (Plot size: 30')			
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: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 0	x 1 = 0
FACW species 0	x 2 = 0
FAC species 60	x 3 = 180
FACU species 0	x 4 = 0
UPL species 0	x 5 = 0
Column Totals: 60 (A)	180 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of 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.)
Unknown grass lacks parts necessary for identification.

SOIL

Sampling Point: DP1-A

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 5/1	90	7.5YR 4/6	10	C	PL	Loamy/Clayey	Prominent redox concentrations
4-12	10YR 5/2	75	7.5YR 4/6	25	C	PL	Loamy/Clayey	Prominent redox concentrations

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

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

Indicators for Problematic Hydric Soils[3]:
___ 2 cm Muck (A10) **(MLRA 147)**
___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
X 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)

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

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___
Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Dynamite Creek Mitigation Site | City/County: Rockingham | Sampling Date: 2/19/20
Applicant/Owner: Wildlands Engineering, Inc. | State: NC | Sampling Point: DP2-Upland
Investigator(s): C. Neaves | Section, Township, Range:
Landform (hillside, terrace, etc.): Floodplain | Local relief (concave, convex, none): Concave | Slope (%): 0
Subregion (LRR or MLRA): LRR P, MLRA 136 | Lat: 36.485238 | Long: -79.711612 | Datum: NAD 83
Soil Map Unit Name: Hatboro silt loam | NWI classification:
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 X, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:
Above Normal Precipitation.

HYDROLOGY

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

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

Field Observations:
Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? Yes ___ No X Depth (inches): ___
(includes capillary fringe)
Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks:
No reaction with alpha alpha dipyridil.

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

Sampling Point: DP2-Upland

Tree Stratum (Plot size: 30')	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: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5')			
1. *Ranunculus bulbosus*	50	Yes	FAC
2. Unknown grass	20	Yes	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70 =Total Cover		
50% of total cover: 35	20% of total cover: 14		
Woody Vine Stratum (Plot size: 30')			
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: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	50	x 3 = 150
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	50 (A)	150 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of 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.)
Unknown grass lacks parts necessary for identification.

SOIL

Sampling Point: DP2-Upland

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/2	92	5YR 4/6	8	C	PL/M	Loamy/Clayey	Prominent redox concentrations
6-12	10YR 5/1	85	5YR 4/6	15	C	PL/M	Loamy/Clayey	Prominent redox concentrations

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

Hydric Soil Indicators:

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5)
__ 2 cm Muck (A10) **(LRR N)**
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ 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)
X Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
X 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 Soils[3]:

__ 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)

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

Restrictive Layer (if observed):

Type:
Depth (inches):

Hydric Soil Present? Yes X No __

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Dynamite Creek Mitigation Site City/County: Rockingham Sampling Date: 2/20/20
Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: DP3-B-L
Investigator(s): C. Neaves Section, Township, Range:
Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): 0
Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 36.48581 Long: -79.71069 Datum: NAD 83
Soil Map Unit Name: Hatboro silt loam NWI classification:
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 X, or Hydrology X 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 X No __
Hydric Soil Present? Yes X No __
Wetland Hydrology Present? Yes X No __

Is the Sampled Area within a Wetland? Yes X No __

Remarks:
Above Normal Precipitation. Manmade swale in floodplain.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes X No __ Depth (inches): 0
Water Table Present? Yes X No __ Depth (inches): 0
Saturation Present? Yes X No __ Depth (inches): 0
(includes capillary fringe)

Wetland Hydrology Present? Yes X No __

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

Remarks:
No reaction with alpha alpha dipyridil

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

Sampling Point: DP3-B-L

Tree Stratum (Plot size: 30')	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: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5')			
1. *Ranunculus bulbosus*	60	Yes	FAC
2. Unknown grass	10	No	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70 =Total Cover		
50% of total cover: 35	20% of total cover: 14		
Woody Vine Stratum (Plot size: 30')			
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	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	60	x 3 = 180
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	60 (A)	180 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of 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.)
Unknown grass lacks part necessary for identificaiton

SOIL

Sampling Point: DP3-B-L

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 5/2	96	7.5YR 4/6	4	C	PL	Loamy/Clayey	Prominent redox concentrations
4-12	7.5YR 5/2	90	7.5YR 4/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 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)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X 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 Soils[3]:

- ___ 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)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes X No ___

Remarks:

U.S. Army Corps of Engineers

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Dynamite Creek Mitigation Site City/County: Rockingham Sampling Date: 2/20/20

Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: DP4-M, W

Investigator(s): C. Neaves Section, Township, Range: ___

Landform (hillside, terrace, etc.): hollow Local relief (concave, convex, none): concave Slope (%): 2

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 36.480851 Long: -79.713087 Datum: NAD 83

Soil Map Unit Name: Clover sandy loam NWI classification: ___

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No X (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 ___ No ___

Hydric Soil Present? Yes X No ___

Wetland Hydrology Present? Yes X No ___

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks:

Above normal rainfall. Vegetation absent.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 0

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? Yes X No ___ Depth (inches): 0

(includes capillary fringe)

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

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

Sampling Point: DP4-M, W

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size: 30')			
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: ___ (A)

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of 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.)

There is no vegetation rooted in Wetland M.

SOIL

Sampling Point: DP4-M, W

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1	100					Loamy/Clayey	
3-12	10YR 5/1	95	10YR 5/6	5	C	M	Loamy/Clayey	Prominent redox concentrations

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Dynamite Creek Mitigation Site | City/County: Rockingham | Sampling Date: 2/20/2020
Applicant/Owner: Wildlands Engineering, Inc. | State: NC | Sampling Point: DP5-Upland
Investigator(s): C. Neaves | Section, Township, Range:
Landform (hillside, terrace, etc.): Floodplain | Local relief (concave, convex, none): concave | Slope (%): 2
Subregion (LRR or MLRA): LRR P, MLRA 136 | Lat: 36.480833 | Long: -79.712856 | Datum: NAD 83
Soil Map Unit Name: Rhodhiss sandy loam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No X (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 ___ No X
Hydric Soil Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X
Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks:
Above normal rainfall.

HYDROLOGY

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

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

Field Observations:
Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___
Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP5-Upland

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fagus grandifolia*	50	Yes	FACU
2. *Liriodendron tulipifera*	20	Yes	FACU
3. *Quercus alba*	15	No	FACU
4.			
5.			
6.			
7.			
	85	=Total Cover	
50% of total cover: 43	20% of total cover: 17		

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
		=Total Cover	
50% of total cover:	20% of total cover:		

Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		=Total Cover	
50% of total cover:	20% of total cover:		

Woody Vine Stratum (Plot size: 30')			
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: 2 (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 0	x 1 = 0
FACW species 0	x 2 = 0
FAC species 0	x 3 = 0
FACU species 85	x 4 = 340
UPL species 0	x 5 = 0
Column Totals: 85 (A)	340 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of 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: DP5-Upland

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/4	100					Loamy/Clayey	
6-12	10YR 4/6	100					Loamy/Clayey	

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

Hydric Soil Indicators:
___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10) **(LRR N)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 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 Soils[3]:
___ 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)

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

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___
Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Dynamite Creek Mitigation Site | City/County: Rockingham | Sampling Date: 2/27/2020
Applicant/Owner: Wildlands Engineering, Inc. | State: NC | Sampling Point: DP6-O-P
Investigator(s): C. Neaves | Section, Township, Range:
Landform (hillside, terrace, etc.): Floodplain | Local relief (concave, convex, none): concave | Slope (%): 0
Subregion (LRR or MLRA): LRR P, MLRA 136 | Lat: 36.479515 | Long: -79.712723 | Datum: NAD 83
Soil Map Unit Name: Rhodhiss sandy loam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No X (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 X No ___
Hydric Soil Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___
Is the Sampled Area within a Wetland? **Yes** X **No** ___

Remarks:
Above normal rainfall.

HYDROLOGY

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

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

Field Observations:
Surface Water Present? Yes X No ___ Depth (inches): 0
Water Table Present? Yes X No ___ Depth (inches): 0
Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0
Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

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

Sampling Point: DP6-O-P

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	15	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	15 =Total Cover		
50% of total cover: 8	20% of total cover: 3		
Sapling/Shrub Stratum (Plot size: 15')			
1. *Carpinus caroliniana*	30	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	30 =Total Cover		
50% of total cover: 15	20% of total cover: 6		
Herb Stratum (Plot size: 5')			
1. *Smilax rotundifolia*	2	No	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	2 =Total Cover		
50% of total cover: 1	20% of total cover: 1		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 0	x 1 = 0
FACW species 0	x 2 = 0
FAC species 47	x 3 = 141
FACU species 0	x 4 = 0
UPL species 0	x 5 = 0
Column Totals: 47 (A)	141 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of 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: DP6-O-P

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 6/2	90	10YR 5/6	10	C	PL	Loamy/Clayey	Prominent redox concentrations
6-12	2.5Y 6/2	80	10YR 5/6	20	C	PL	Loamy/Clayey	Prominent redox concentrations

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

__ 2 cm Muck (A10) **(MLRA 147)**
__ Coast Prairie Redox (A16) **(MLRA 147, 148)**
__ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
__ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
__ Very Shallow Dark Surface (F22)
__ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? Yes X No __

Remarks:

U.S. Army Corps of Engineers

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Dynamite Creek Mitigation Site City/County: Rockingham Sampling Date: 2/27/2020

Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: DP7-Upland

Investigator(s): C. Neaves Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 36.479464 Long: -79.712792 Datum: NAD 83

Soil Map Unit Name: Rhodhiss sandy loam NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes __ No X (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 X No __

Hydric Soil Present? Yes __ No X

Wetland Hydrology Present? Yes __ No X

Is the Sampled Area within a Wetland? Yes __ No X

Remarks:
Above normal rainfall.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes __ No X Depth (inches): __

Water Table Present? Yes __ No X Depth (inches): __

Saturation Present? Yes __ No X Depth (inches): __
(includes capillary fringe)

Wetland Hydrology Present? Yes __ No X

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

Remarks:

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

Sampling Point: DP7-Upland

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Liquidambar styraciflua*	50	Yes	FAC
2. *Liriodendron tulipifera*	20	Yes	FACU
3. *Platanus occidentalis*	15	No	FACW
4. *Fraxinus pennsylvanica*	15	No	FACW
5.			
6.			
7.			
	100 =Total Cover		
50% of total cover: 50	20% of total cover: 20		
Sapling/Shrub Stratum (Plot size: 15')			
1. *Carpinus caroliniana*	20	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	20 =Total Cover		
50% of total cover: 10	20% of total cover: 4		
Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 0	x 1 = 0
FACW species 30	x 2 = 60
FAC species 70	x 3 = 210
FACU species 20	x 4 = 80
UPL species 0	x 5 = 0
Column Totals: 120 (A)	350 (B)

Prevalence Index = B/A = 2.92

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

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

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of 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: DP7-Upland

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3	100					Loamy/Clayey	
4-10	10YR 5/6	100					Loamy/Clayey	
10-12	10YR 6/6	100					Loamy/Clayey	

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Soils[3]:

- ___ 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)

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

Restrictive Layer (if observed):

Type:

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

U.S. Army Corps of Engineers

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Dynamite Creek Mitigation Site City/County: Rockingham Sampling Date: 2/5/2020

Applicant/Owner: Wildlands Engineering, Inc. State: NC Sampling Point: DP 8 - Upland

Investigator(s): C. Walker Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): convex Slope (%): 1

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 36.483761 Long: -79.712674 Datum: NAD 83

Soil Map Unit Name: Hatboro silt loam NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No X (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 X No ___

Hydric Soil Present? Yes ___ No X

Wetland Hydrology Present? Yes ___ No X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks:

Above normal rainfall

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes X No ___ Depth (inches): 22

Saturation Present? Yes X No ___ Depth (inches): 20

(includes capillary fringe)

Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks:

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

Sampling Point: DP 8 - Upland

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Carpinus caroliniana*	2	No	FAC
2. *Liquidambar styraciflua*	2	No	FAC
3.			
4.			
5.			
6.			
7.			
	4	=Total Cover	
50% of total cover: 2	20% of total cover: 1		
Sapling/Shrub Stratum (Plot size: 15')			
1. *Liquidambar styraciflua*	10	Yes	FAC
2. *Carpinus caroliniana*	10	Yes	FAC
3. *Fraxinus pennsylvanica*	7	Yes	FACW
4. *Juglans nigra*	5	No	FACU
5.			
6.			
7.			
8.			
9.			
	32	=Total Cover	
50% of total cover: 16	20% of total cover: 7		
Herb Stratum (Plot size: 5')			
1. *Fagus grandifolia*	10	Yes	FACU
2. *Acer negundo*	10	Yes	FAC
3. *Betula nigra*	5	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	25	=Total Cover	
50% of total cover: 13	20% of total cover: 5		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.3% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:
OBL species	0	x 1 = 0
FACW species	12	x 2 = 24
FAC species	34	x 3 = 102
FACU species	15	x 4 = 60
UPL species	0	x 5 = 0
Column Totals:	61 (A)	186 (B)

Prevalence Index = B/A = 3.05

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of 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: DP 8 - Upland

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3	100					Loamy/Clayey	
4-9	2.5Y 6/4	95	7.5YR 6/8	5	C	M	Loamy/Clayey	Prominent redox concentrations
9-14	7.5YR 5/8	95	2.5Y 6/4	5	D	M	Loamy/Clayey	
14-21	2.5Y 5/1	85	5YR 5/3	15	C	M	Loamy/Clayey	Prominent redox concentrations

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Soils[3]:

- ___ 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)

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

Restrictive Layer (if observed):

Type:

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Dynamite Creek Mitigation Site | City/County: Rockingham | Sampling Date: 2/5/2020
Applicant/Owner: Wildlands Engineering, Inc. | State: NC | Sampling Point: DP 9-N, Q-V
Investigator(s): C. Walker | Section, Township, Range:
Landform (hillside, terrace, etc.): Floodplain | Local relief (concave, convex, none): concave | Slope (%): 0
Subregion (LRR or MLRA): LRR P, MLRA 136 | Lat: 36.483704 | Long: -79.712809 | Datum: NAD 83
Soil Map Unit Name: Hatboro silt loam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No X (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 X No ___
Hydric Soil Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___
Is the Sampled Area within a Wetland? **Yes** X **No** ___

Remarks:
Above normal rainfall

HYDROLOGY

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

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

Field Observations:
Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes X No ___ Depth (inches): 10
Saturation Present? Yes X No ___ Depth (inches): 8
(includes capillary fringe)
Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 9-N, Q-V

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Platanus occidentalis*	30	Yes	FACW
2. *Carpinus caroliniana*	25	Yes	FAC
3. *Liquidambar styraciflua*	10	No	FAC
4. *Fraxinus pennsylvanica*	5	No	FACW
5.			
6.			
7.			
	70 =Total Cover		
50% of total cover: 35	20% of total cover: 14		

Sapling/Shrub Stratum (Plot size: 15')			
1. *Acer negundo*	10	Yes	FAC
2. *Fraxinus pennsylvanica*	5	Yes	FACW
3. *Betula nigra*	5	Yes	FACW
4. *Carpinus caroliniana*	5	Yes	FAC
5.			
6.			
7.			
8.			
9.			
	25 =Total Cover		
50% of total cover: 13	20% of total cover: 5		

Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Woody Vine Stratum (Plot size: 30')			
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: 6 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species 0	x 1 =	0
FACW species 45	x 2 =	90
FAC species 50	x 3 =	150
FACU species 0	x 4 =	0
UPL species 0	x 5 =	0
Column Totals: 95 (A)		240 (B)

Prevalence Index = B/A = 2.53

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of 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: DP 9-N, Q-V

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/1	85	7.5YR 5/8	15	C	PL	Loamy/Clayey	Prominent redox concentrations
6-11	10YR 5/3	80	7.5YR 5/8	20	C	PL/M	Loamy/Clayey	Prominent redox concentrations
11-14	2.5Y 6/4	75	7.5YR 5/6	25	C	M	Loamy/Clayey	Prominent redox concentrations

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

Hydric Soil Indicators:
___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10) **(LRR N)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 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)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
X 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 Soils[3]:
___ 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)

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

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___
Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: Dynamite Creek Mitigation Site | City/County: Rockingham | Sampling Date: 2/5/2020
Applicant/Owner: Wildlands Engineering, Inc. | State: NC | Sampling Point: DP 10- Upland
Investigator(s): C. Walker | Section, Township, Range:
Landform (hillside, terrace, etc.): Floodplain | Local relief (concave, convex, none): convex | Slope (%): 1
Subregion (LRR or MLRA): LRR P, MLRA 136 | Lat: 36.482609 | Long: -79.712373 | Datum: NAD 83
Soil Map Unit Name: Rhodhiss sandy loam | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No X (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 X No ___
Hydric Soil Present? Yes ___ No X
Wetland Hydrology Present? Yes X No ___
Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks:
Above normal rainfall

HYDROLOGY

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

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

Field Observations:
Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes X No ___ Depth (inches): 10
Saturation Present? Yes X No ___ Depth (inches): 4
(includes capillary fringe)
Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:
High water table and saturation likely due to recent above average rainfall

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

Sampling Point: DP 10- Upland

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30')			
1. *Liquidambar styraciflua*	15	Yes	FAC
2. *Platanus occidentalis*	10	Yes	FACW
3. *Acer negundo*	5	No	FAC
4.			
5.			
6.			
7.			
	30	=Total Cover	
50% of total cover: 15	20% of total cover: 6		
Sapling/Shrub Stratum (Plot size: 15')			
1. *Fagus grandifolia*	10	Yes	FACU
2. *Aesculus pavia*	5	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	15	=Total Cover	
50% of total cover: 8	20% of total cover: 3		
Herb Stratum (Plot size: 5')			
1. *Fagus grandifolia*	10	Yes	FACU
2. *Fraxinus pennsylvanica*	5	Yes	FACW
3. *Platanus occidentalis*	5	Yes	FACW
4. *Betula nigra*	5	Yes	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	25	=Total Cover	
50% of total cover: 13	20% of total cover: 5		
Woody Vine Stratum (Plot size: 5)			
1. *Toxicodendron radicans*	5	Yes	FAC
2.			
3.			
4.			
5.			
	5	=Total Cover	
50% of total cover: 3	20% of total cover: 1		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 77.8% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 0	x 1 = 0
FACW species 25	x 2 = 50
FAC species 30	x 3 = 90
FACU species 20	x 4 = 80
UPL species 0	x 5 = 0
Column Totals: 75 (A)	220 (B)

Prevalence Index = B/A = 2.93

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

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

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of 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: DP 10- Upland

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3	100					Loamy/Clayey	
4-6	2.5Y 5/3	85	7.5YR 4/6	15	C	PL	Loamy/Clayey	Prominent redox concentrations
6-12	2.5Y 6/3	80	7.5YR 5/8	20	C	M	Sandy	increase in sand

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

Hydric Soil Indicators:

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5)
__ 2 cm Muck (A10) **(LRR N)**
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ 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 Soils[3]:

__ 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)

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

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? **Yes** __ **No** X

Remarks:

Appendix 3

DWR Stream ID Forms, NCWAM, NCSAM

1.0 DWR Stream Classification

The results of the DWR Stream Classification Forms are listed in the table below. DWR forms can be found in this appendix and in the digital submission to DMS. DWR forms were completed by Wildlands for all on-site streams.

Table 1: DWR Form Summary

Stream	Geomorphology Score	Hydrology Score	Biology Score	Total Score
Dynamite Creek	23.5	8	10	41.5
UT1	18	6.5	6	30.5
Cabin Creek	12.5	5	7	24.5
City Creek	18.5	9.5	4.5	32.5
Village Creek	12.5	6.5	4	23

NC DWQ Stream Identification Form Version 4.11 Dynamik R2

Date: 2/21/19	**Project/Site:** Dynamik	**Latitude:**
Evaluator: JH	**County:** Rockingham	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 41.5	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 23.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	1	2	(3)
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	2	(3)
5. Active/relict floodplain	0	1	2	(3)
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	0	1	2	(3)
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	(No = 0)		Yes = 3	

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

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

C. Biology (Subtotal = 10)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	0	(0.5)	1	1.5
23. Crayfish	0	0.5	(1)	1.5
24. Amphibians	0	0.5	(1)	1.5
25. Algae	0	(0.5)	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11 UT 1

Date: 12/21/19	**Project/Site:** Dynamite	**Latitude:**
Evaluator: JH	**County:** Rockingham	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 20.5	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 16)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	1	2	(3)
9. Grade control	0	0.5	1	(1.5)
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 6.5)				
12. Presence of Baseflow	0	(1)	2	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	1	(0.5)	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

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

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 2/20/20	**Project/Site:** Dynamite / Cabin Creek	**Latitude:**
Evaluator: C. Neaves	**County:** Rockingham	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 24.5	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name:*

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)	2	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	(1)	2	3
9. Grade control	(0)	0.5	1	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 5)				
12. Presence of Baseflow	0	(1)	2	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	1	(0.5)	0
15. Sediment on plants or debris	(0)	0.5	1	1.5
16. Organic debris lines or piles	0	(0.5)	1	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

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

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

Notes:

Sketch: Caddis fly case + Snails

photo 249

Lower UT

NC DWQ Stream Identification Form Version 4.11

Date: 2/26/20	**Project/Site:** Dynamite Cr. Mit site City Creek	**Latitude:**
Evaluator: CN	**County:** Rockingham	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 32.5	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 18.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	(1)	2	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	1	2	(3)
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	(No = 0)		Yes = 3	

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

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

C. Biology (Subtotal = 4.5)				
18. Fibrous roots in streambed	3	(2)	1	0
19. Rooted upland plants in streambed	3	(2)	1	0
20. Macrobenthos (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	0	(0.5)	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 (Other = 0)			

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

Notes:

Sketch: Suspect channel Dries out in Summer months. Disturbance has promoted evosion leading to high geomorphology score. Just upstream of PL easement, geomorph score would be much lower, but still JD intermittent.

Turbine P/L esmt.

NC DWQ Stream Identification Form Version 4.11

Date: 2/27/20	**Project/Site:** Dynamite Fr. Village Creek	**Latitude:**
Evaluator: CN	**County:** Rockingham	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 23	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** *e.g. Quad Name:*

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)	2	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	(0)	1	2	3
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 6.5)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	1	(0.5)	0
15. Sediment on plants or debris	(0)	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 4)				
18. Fibrous roots in streambed	3	2	(1)	0
19. Rooted upland plants in streambed	3	(2)	1	0
20. Macrobenthos (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 (Other = 0)			

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

Notes:

Sketch: photo 295 - 300

trib 2 - SW trib

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

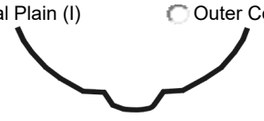
USACE AID #: 2019-00909 NCDWR #:

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

PROJECT / SITE INFORMATION:
1. Project name (if any): Dynamite Creek Mitigation Site - DC R1
2. Date of evaluation: 06/04/2020
3. Applicant/owner name:
4. Assessor name/organization: Wildlands Engineering
5. County: Rockingham
6. Nearest named water body on USGS 7.5-minute quad: Dan River
7. River Basin: Roanoke
8. Site coordinates (decimal degrees, at lower end of assessment reach): Lat 36.47848 Long -79.712076

STREAM INFORMATION: (depth and width can be approximations)
9. Site number (show on attached map): Dynamite Creek R1
10. Length of assessment reach evaluated (feet): approx 500 ft
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4-5 feet ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 3-4 feet
13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ○ Perennial flow ◉ Intermittent flow ○ Tidal Marsh Stream

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

16. Estimated geomorphic valley shape **(skip for Tidal Marsh Stream):**
○ a  (more sinuous stream, flatter valley slope)
◉ b  (less sinuous stream, steeper valley slope)

17. Watershed size: **(skip for Tidal Marsh Stream)** ◉ Size 1 (< 0.1 mi²) ○ Size 2 (0.1 to < 0.5 mi²) ○ Size 3 (0.5 to < 5 mi²) ○ Size 4 (≥ 5 mi²)

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

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

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

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

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

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

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

LB	RB	
◉ A	◉ A	Little or no evidence of conditions that adversely affect reference interaction
○ B	○ B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
○ C	○ C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision,

disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams only

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

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

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

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

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

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

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

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

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
12a. (•) Yes ( ) No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ( ) No Water ( ) Other: ______________________

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

1	>1	Numbers over columns refer to “individuals” for size 1 and 2 streams and “taxa” for size 3 and 4 streams.
[ ]	[ ]	Adult frogs
[ ]	[ ]	Aquatic reptiles
[ ]	[ ]	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[ ]	[x]	Beetles (including water pennies)
[ ]	[ ]	Caddisfly larvae (Trichoptera [T])

- ☐ ☐ Asian clam (*Corbicula*)
- ☑ ☐ Crustacean (isopod/amphipod/crayfish/shrimp)
- ☐ ☐ Damselfly and dragonfly larvae
- ☐ ☐ Dipterans (true flies)
- ☐ ☐ Mayfly larvae (Ephemeroptera [E])
- ☐ ☐ Megaloptera (alderfly, fishfly, dobsonfly larvae)
- ☐ ☐ Midges/mosquito larvae
- ☐ ☐ Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
- ☐ ☐ Mussels/Clams (not *Corbicula*)
- ☐ ☐ Other fish
- ☐ ☑ Salamanders/tadpoles
- ☐ ☐ Snails
- ☐ ☐ Stonefly larvae (Plecoptera [P])
- ☐ ☐ Tipulid larvae
- ☐ ☐ Worms/leeches

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

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

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

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

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

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

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

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

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

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

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

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

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

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

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
◉ A	◉ A	Mature forest
○ B	○ B	Non-mature woody vegetation or modified vegetation structure
○ C	○ C	Herbaceous vegetation with or without a strip of trees < 10 feet wide

LB	RB	
○ D	○ D	Maintained shrubs
○ E	○ E	Little or no vegetation

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

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

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

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

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

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

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

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

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

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

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

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

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

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

25a. ○ Yes ◉ No Was a conductivity measurement recorded?

If No, select one of the following reasons. ○ No Water ○ Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

○ A <46 ○ B 46 to < 67 ○ C 67 to < 79 ○ D 79 to < 230 ○ E ≥ 230

Notes/Sketch:

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Dynamite Creek Mitigation Site - DC R1
Date of Evaluation: 06/04/2020
Stream Category: Pb1
Assessor Name/Organization: Wildlands Engineering

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

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

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: 2019-00909 NCDWR #:

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

PROJECT / SITE INFORMATION:

1. Project name (if any): Dynamite Creek Mitigation Site - DC R2
2. Date of evaluation: 06/04/2020
3. Applicant/owner name:
4. Assessor name/organization: Wildlands Engineering
5. County: Rockingham
6. Nearest named water body on USGS 7.5-minute quad: Dan River
7. River Basin: Roanoke
8. Site coordinates (decimal degrees, at lower end of assessment reach): Lat 36.47996 Long -79.712913

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Dynamite Creek R2
10. Length of assessment reach evaluated (feet): approx 650 ft
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 4-8 feet ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 9-10 feet
13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ◉ Perennial flow ○ Intermittent flow ○ Tidal Marsh Stream

STREAM RATING INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

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

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

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

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

LB	RB	
○ A	○ A	Little or no evidence of conditions that adversely affect reference interaction
○ B	○ B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
◉ C	◉ C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision,

disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams only

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

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

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

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

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

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

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

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

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
12a. ◉ Yes ○ No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ○ No Water ○ Other: _____

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

1	>1	Numbers over columns refer to “individuals” for size 1 and 2 streams and “taxa” for size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles (including water pennies)
☐	☑	Caddisfly larvae (Trichoptera [T])

- [ ] [ ] Asian clam (*Corbicula*)
- [x] [ ] Crustacean (isopod/amphipod/crayfish/shrimp)
- [ ] [ ] Damselfly and dragonfly larvae
- [ ] [ ] Dipterans (true flies)
- [ ] [ ] Mayfly larvae (Ephemeroptera [E])
- [ ] [ ] Megaloptera (alderfly, fishfly, dobsonfly larvae)
- [ ] [ ] Midges/mosquito larvae
- [ ] [ ] Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
- [ ] [ ] Mussels/Clams (not *Corbicula*)
- [ ] [ ] Other fish
- [ ] [x] Salamanders/tadpoles
- [x] [ ] Snails
- [ ] [x] Stonefly larvae (Plecoptera [P])
- [ ] [ ] Tipulid larvae
- [ ] [ ] Worms/leeches

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

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

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

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

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

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

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

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

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

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

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

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

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

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

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
(•) A	(•) A	Mature forest
( ) B	( ) B	Non-mature woody vegetation or modified vegetation structure
( ) C	( ) C	Herbaceous vegetation with or without a strip of trees < 10 feet wide

○ D	○ D	Maintained shrubs
○ E	○ E	Little or no vegetation

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

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

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

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

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

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

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

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

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

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

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

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

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

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

25a. ○ Yes ◉ No Was a conductivity measurement recorded?

If No, select one of the following reasons. ○ No Water ○ Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

○ A <46 ○ B 46 to < 67 ○ C 67 to < 79 ○ D 79 to < 230 ○ E ≥ 230

Notes/Sketch:

See existing conditions cross sections 1 and 2 for cross sectional area, entrenchment ratio, etc.

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Dynamite Creek Mitigation Site - DC R2
Date of Evaluation: 06/04/2020
Stream Category: Pb1
Assessor Name/Organization: Wildlands Engineering

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

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

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: 2019-00909 NCDWR #:

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

PROJECT / SITE INFORMATION:

1. Project name (if any): Dynamite Creek Mitigation Site - DC R3
2. Date of evaluation: 06/04/2020
3. Applicant/owner name:
4. Assessor name/organization: Wildlands Engineering
5. County: Rockingham
6. Nearest named water body on USGS 7.5-minute quad: Dan River
7. River Basin: Roanoke
8. Site coordinates (decimal degrees, at lower end of assessment reach): Lat 36.48047 Long -79.713013

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Dynamite Creek R3
10. Length of assessment reach evaluated (feet): approx 280 ft
11. Channel depth from bed (in riffle, if present) to top of bank (feet): ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet):
13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ◉ Perennial flow ○ Intermittent flow ○ Tidal Marsh Stream

STREAM RATING INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

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

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

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

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

LB	RB	
○ A	○ A	Little or no evidence of conditions that adversely affect reference interaction
◉ B	◉ B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
○ C	○ C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision,

disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams only

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

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

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

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

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

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

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

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

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
12a. ◉ Yes ○ No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ○ No Water ○ Other: _____

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

1	>1	Numbers over columns refer to “individuals” for size 1 and 2 streams and “taxa” for size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles (including water pennies)
☐	☑	Caddisfly larvae (Trichoptera [T])

- [ ] Asian clam (*Corbicula*)
- [x] Crustacean (isopod/amphipod/crayfish/shrimp)
- [ ] Damselfly and dragonfly larvae
- [ ] Dipterans (true flies)
- [ ] Mayfly larvae (Ephemeroptera [E])
- [ ] Megaloptera (alderfly, fishfly, dobsonfly larvae)
- [ ] Midges/mosquito larvae
- [ ] Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
- [ ] Mussels/Clams (not *Corbicula*)
- [ ] Other fish
- [x] Salamanders/tadpoles
- [ ] Snails
- [x] Stonefly larvae (Plecoptera [P])
- [ ] Tipulid larvae
- [ ] Worms/leeches

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

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

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

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

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

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

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

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

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

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

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

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

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

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

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
(•) A	(•) A	Mature forest
( ) B	( ) B	Non-mature woody vegetation or modified vegetation structure
( ) C	( ) C	Herbaceous vegetation with or without a strip of trees < 10 feet wide

○ D	○ D	Maintained shrubs
○ E	○ E	Little or no vegetation

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

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

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

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

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

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

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

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

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

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

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

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

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

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

25a. ○ Yes ◉ No Was a conductivity measurement recorded?

If No, select one of the following reasons. ○ No Water ○ Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

○ A <46 ○ B 46 to < 67 ○ C 67 to < 79 ○ D 79 to < 230 ○ E ≥ 230

Notes/Sketch:

See existing conditions cross sections 10 and 11 for cross sectional area, entrenchment ratio, etc.

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Dynamite Creek Mitigation Site - DC R3
Date of Evaluation: 06/04/2020
Stream Category: Pb1
Assessor Name/Organization: Wildlands Engineering

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

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

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: 2019-00909 NCDWR #:

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

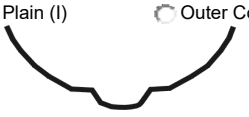
PROJECT / SITE INFORMATION:

1. Project name (if any): Dynamite Creek Mitigation Site - DC R4
2. Date of evaluation: 06/04/2020
3. Applicant/owner name:
4. Assessor name/organization: Wildlands Engineering
5. County: Rockingham
6. Nearest named water body on USGS 7.5-minute quad: Dan River
7. River Basin: Roanoke
8. Site coordinates (decimal degrees, at lower end of assessment reach): Lat 36.481612 Long -79.712794

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Dynamite Creek R4
10. Length of assessment reach evaluated (feet): approx 515 ft
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 1-3 feet ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 8-10 feet
13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ◉ Perennial flow ○ Intermittent flow ○ Tidal Marsh Stream

STREAM RATING INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

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

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

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

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

LB	RB	
◉ A	◉ A	Little or no evidence of conditions that adversely affect reference interaction
○ B	○ B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
○ C	○ C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision,

disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams only

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

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

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

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

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

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

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

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

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
12a. ◉ Yes ○ No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ○ No Water ○ Other: _____

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

1	>1	Numbers over columns refer to “individuals” for size 1 and 2 streams and “taxa” for size 3 and 4 streams.
☐	☐	Adult frogs
☑	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☑	Beetles (including water pennies)
☐	☑	Caddisfly larvae (Trichoptera [T])

- [ ] Asian clam (*Corbicula*)
- [ ] Crustacean (isopod/amphipod/crayfish/shrimp)
- [x] Damselfly and dragonfly larvae
- [ ] Dipterans (true flies)
- [ ] Mayfly larvae (Ephemeroptera [E])
- [ ] Megaloptera (alderfly, fishfly, dobsonfly larvae)
- [ ] Midges/mosquito larvae
- [ ] Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
- [ ] Mussels/Clams (not *Corbicula*)
- [ ] Other fish
- [x] Salamanders/tadpoles
- [ ] Snails
- [x] Stonefly larvae (Plecoptera [P])
- [ ] Tipulid larvae
- [x] Worms/leeches

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

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

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

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

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

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

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

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

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

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

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

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

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

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

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
(•) A	(•) A	Mature forest
( ) B	( ) B	Non-mature woody vegetation or modified vegetation structure
( ) C	( ) C	Herbaceous vegetation with or without a strip of trees < 10 feet wide

○ D	○ D	Maintained shrubs
○ E	○ E	Little or no vegetation

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

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

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

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

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

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

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

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

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

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

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

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

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

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

25a. ○ Yes ◉ No Was a conductivity measurement recorded?

If No, select one of the following reasons. ○ No Water ○ Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

○ A <46 ○ B 46 to < 67 ○ C 67 to < 79 ○ D 79 to < 230 ○ E ≥ 230

Notes/Sketch:

See existing conditions cross sections 3 and 4 for cross sectional area, entrenchment ratio, etc.

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Dynamite Creek Mitigation Site - DC R4
Date of Evaluation: 06/04/2020
Stream Category: Pb1
Assessor Name/Organization: Wildlands Engineering

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

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**HIGH**	
(2) Baseflow	**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	**MEDIUM**	
(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	**MEDIUM**	
(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 Habitat	NA	
Overall	**HIGH**	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: 2019-00909 NCDWR #:

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

PROJECT / SITE INFORMATION:

1. Project name (if any): Dynamite Creek Mitigation Site - DC R5
2. Date of evaluation: 06/04/2020
3. Applicant/owner name:
4. Assessor name/organization: Wildlands Engineering
5. County: Rockingham
6. Nearest named water body on USGS 7.5-minute quad: Dan River
7. River Basin: Roanoke
8. Site coordinates (decimal degrees, at lower end of assessment reach): Lat 36.482764 Long -79.71278

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Dynamite Creek R5
10. Length of assessment reach evaluated (feet): approx 615 ft
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2-3 feet ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 8-10 feet
13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ◉ Perennial flow ○ Intermittent flow ○ Tidal Marsh Stream

STREAM RATING INFORMATION:

15. NC SAM Zone: ○ Mountains (M) ◉ Piedmont (P) ○ Inner Coastal Plain (I) ○ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape **(skip for Tidal Marsh Stream):**

○ a (more sinuous stream, flatter valley slope)

◉ b (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream)** ○ Size 1 (< 0.1 mi²) ◉ Size 2 (0.1 to < 0.5 mi²) ○ Size 3 (0.5 to < 5 mi²) ○ Size 4 (≥ 5 mi²)

ADDITIONAL INFORMATION:

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

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

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

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

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

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

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

LB	RB	
○ A	○ A	Little or no evidence of conditions that adversely affect reference interaction
◉ B	◉ B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
○ C	○ C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision,

disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams only

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

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

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

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

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

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

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

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

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
12a. ◉ Yes ○ No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ○ No Water ○ Other: _____

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

1	>1	Numbers over columns refer to “individuals” for size 1 and 2 streams and “taxa” for size 3 and 4 streams.
☑	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles (including water pennies)
☐	☑	Caddisfly larvae (Trichoptera [T])

- ☐ Asian clam (*Corbicula*)
- ☐ Crustacean (isopod/amphipod/crayfish/shrimp)
- ☑ Damselfly and dragonfly larvae
- ☐ Dipterans (true flies)
- ☐ Mayfly larvae (Ephemeroptera [E])
- ☐ Megaloptera (alderfly, fishfly, dobsonfly larvae)
- ☐ Midges/mosquito larvae
- ☐ Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
- ☐ Mussels/Clams (not *Corbicula*)
- ☑ Other fish
- ☑ Salamanders/tadpoles
- ☐ Snails
- ☑ Stonefly larvae (Plecoptera [P])
- ☐ Tipulid larvae
- ☐ Worms/leeches

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

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

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

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

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

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

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

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

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

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

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

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

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

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

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
◉ A	◉ A	Mature forest
○ B	○ B	Non-mature woody vegetation or modified vegetation structure
○ C	○ C	Herbaceous vegetation with or without a strip of trees < 10 feet wide

LB	RB	
○ D	○ D	Maintained shrubs
○ E	○ E	Little or no vegetation

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

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

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

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

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

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

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

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

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

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

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

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

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

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

25a. ○ Yes ◉ No Was a conductivity measurement recorded?

If No, select one of the following reasons. ○ No Water ○ Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

○ A <46 ○ B 46 to < 67 ○ C 67 to < 79 ○ D 79 to < 230 ○ E ≥ 230

Notes/Sketch:

See existing conditions cross sections 5 and 6 for cross sectional area, entrenchment ratio, etc.

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Dynamite Creek Mitigation Site - DC R5
Date of Evaluation: 06/04/2020
Stream Category: Pb2
Assessor Name/Organization: Wildlands Engineering

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

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**MEDIUM**	
(2) Baseflow	**HIGH**	
(2) Flood Flow	**MEDIUM**	
(3) Streamside Area Attenuation	**MEDIUM**	
(4) Floodplain Access	**MEDIUM**	
(4) Wooded Riparian Buffer	**HIGH**	
(4) Microtopography	NA	
(3) Stream Stability	**MEDIUM**	
(4) Channel Stability	**MEDIUM**	
(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	**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	**MEDIUM**	
(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 Habitat	NA	
Overall	**HIGH**	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: 2019-00909 NCDWR #:

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

PROJECT / SITE INFORMATION:

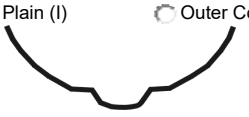
1. Project name (if any): Dynamite Creek Mitigation Site - DC R6
2. Date of evaluation: 06/04/2020
3. Applicant/owner name:
4. Assessor name/organization: Wildlands Engineering
5. County: Rockingham
6. Nearest named water body on USGS 7.5-minute quad: Dan River
7. River Basin: Roanoke
8. Site coordinates (decimal degrees, at lower end of assessment reach): Lat 36.484136 Long -79.712783

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Dynamite Creek R6
10. Length of assessment reach evaluated (feet): approx 530 ft
11. Channel depth from bed (in riffle, if present) to top of bank (feet): ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet):
13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ◉ Perennial flow ○ Intermittent flow ○ Tidal Marsh Stream

STREAM RATING INFORMATION:

15. NC SAM Zone: ○ Mountains (M) ◉ Piedmont (P) ○ Inner Coastal Plain (I) ○ Outer Coastal Plain (O)
16. Estimated geomorphic valley shape **(skip for Tidal Marsh Stream):**

○ a (more sinuous stream, flatter valley slope)

◉ b (less sinuous stream, steeper valley slope)
17. Watershed size: **(skip for Tidal Marsh Stream)** ○ Size 1 (< 0.1 mi^2) ◉ Size 2 (0.1 to < 0.5 mi^2) ○ Size 3 (0.5 to < 5 mi^2) ○ Size 4 (≥ 5 mi^2)

ADDITIONAL INFORMATION:

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

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

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

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

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

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

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

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

LB	RB	
◉ A	◉ A	Little or no evidence of conditions that adversely affect reference interaction
○ B	○ B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
○ C	○ C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision,

disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams only

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

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

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

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

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

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

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

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

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
12a. ◉ Yes ○ No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ○ No Water ○ Other: _____

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

1	>1	Numbers over columns refer to “individuals” for size 1 and 2 streams and “taxa” for size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☐	Beetles (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])

- [ ] Asian clam (*Corbicula*)
- [x] Crustacean (isopod/amphipod/crayfish/shrimp)
- [x] Damselfly and dragonfly larvae
- [ ] Dipterans (true flies)
- [ ] Mayfly larvae (Ephemeroptera [E])
- [ ] Megaloptera (alderfly, fishfly, dobsonfly larvae)
- [ ] Midges/mosquito larvae
- [ ] Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
- [ ] Mussels/Clams (not *Corbicula*)
- [x] Other fish
- [x] Salamanders/tadpoles
- [ ] Snails
- [x] Stonefly larvae (Plecoptera [P])
- [ ] Tipulid larvae
- [ ] Worms/leeches

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

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

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

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

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

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

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

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

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

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

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

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

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

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

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
(•) A	(•) A	Mature forest
( ) B	( ) B	Non-mature woody vegetation or modified vegetation structure
( ) C	( ) C	Herbaceous vegetation with or without a strip of trees < 10 feet wide

LB	RB	
○ D	○ D	Maintained shrubs
○ E	○ E	Little or no vegetation

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

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

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

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

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

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

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

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

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

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

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

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

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

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

25a. ○ Yes ◉ No Was a conductivity measurement recorded?

If No, select one of the following reasons. ○ No Water ○ Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

○ A <46 ○ B 46 to < 67 ○ C 67 to < 79 ○ D 79 to < 230 ○ E ≥ 230

Notes/Sketch:

See existing conditions cross sections 7 and 8 for cross sectional area, entrenchment ratio, etc

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Dynamite Creek Mitigation Site - DC R6
Date of Evaluation: 06/04/2020
Stream Category: Pb2
Assessor Name/Organization: Wildlands Engineering

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

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**HIGH**	
(2) Baseflow	**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	**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	**MEDIUM**	
(2) Baseflow	**HIGH**	
(2) Streamside Area Vegetation	**HIGH**	
(3) Upland Pollutant Filtration	**HIGH**	
(3) Thermoregulation	**HIGH**	
(2) Indicators of Stressors	**YES**	
(2) Aquatic Life Tolerance	**MEDIUM**	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	**HIGH**	
(2) In-stream Habitat	**HIGH**	
(3) Baseflow	**HIGH**	
(3) Substrate	**HIGH**	
(3) Stream Stability	**LOW**	
(3) In-stream Habitat	**HIGH**	
(2) Stream-side Habitat	**HIGH**	
(3) Stream-side Habitat	**HIGH**	
(3) Thermoregulation	**HIGH**	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
Overall	**HIGH**	

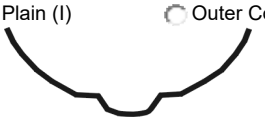
NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: 2019-00909 NCDWR #:

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

PROJECT / SITE INFORMATION:
1. Project name (if any): Dynamite Creek Mitigation Site - DC R7
2. Date of evaluation: 06/04/2020
3. Applicant/owner name:
4. Assessor name/organization: Wildlands Engineering
5. County: Rockingham
6. Nearest named water body on USGS 7.5-minute quad: Dan River
7. River Basin: Roanoke
8. Site coordinates (decimal degrees, at lower end of assessment reach): Lat 36.485809 Long -79.70903

STREAM INFORMATION: (depth and width can be approximations)
9. Site number (show on attached map): Dynamite Creek R7
10. Length of assessment reach evaluated (feet): approx. 1515 ft
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 3-5 feet ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 8-15 feet
13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ◉ Perennial flow ○ Intermittent flow ○ Tidal Marsh Stream

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams only

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

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

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

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

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

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

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

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

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
12a. ◉ Yes ○ No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ○ No Water ○ Other: _____

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

1	>1	Numbers over columns refer to “individuals” for size 1 and 2 streams and “taxa” for size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☑	Beetles (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])
☐	☐	Asian clam (*Corbicula*)
☐	☐	Crustacean (isopod/amphipod/crayfish/shrimp)
☐	☐	Damselfly and dragonfly larvae
☐	☐	Dipterans (true flies)
☐	☑	Mayfly larvae (Ephemeroptera [E])
☐	☐	Megaloptera (alderfly, fishfly, dobsonfly larvae)

- ☐ ☐ Midges/mosquito larvae
- ☐ ☐ Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
- ☐ ☐ Mussels/Clams (not *Corbicula*)
- ☐ ☐ Other fish
- ☐ ☑ Salamanders/tadpoles
- ☐ ☑ Snails
- ☐ ☐ Stonefly larvae (Plecoptera [P])
- ☐ ☑ Tipulid larvae
- ☐ ☑ Worms/leeches

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

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

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

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

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

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

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

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

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

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

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

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

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

Vegetated		Wooded		
LB	RB	LB	RB	
◉ A	◉ A	○ A	○ A	≥ 100-feet wide <u>or</u> extends to the edge of the watershed
○ B	○ B	○ B	○ B	From 50 to < 100-feet wide
○ C	○ C	○ C	○ C	From 30 to < 50-feet wide
○ D	○ D	○ D	○ D	From 10 to < 30-feet wide
○ E	○ E	◉ E	◉ E	< 10-feet wide <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	
○ A	○ A	Mature forest
○ B	○ B	Non-mature woody vegetation <u>or</u> modified vegetation structure
◉ C	◉ C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
○ D	○ D	Maintained shrubs
○ E	○ E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).
If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet	
LB	RB	LB	RB	LB	RB

○ A	○ A	○ A	○ A	○ A	○ A	Row crops
○ B	○ B	○ B	○ B	○ B	○ B	Maintained turf
○ C	○ C	○ C	○ C	○ C	○ C	Pasture (no livestock)/commercial horticulture
◉ D	◉ D	◉ D	◉ D	◉ D	◉ D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

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

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)
Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

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

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)
Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

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

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

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

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

Notes/Sketch:
See existing conditions cross section 9 for cross sectional area, entrenchment ratio, etc.

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Dynamite Creek Mitigation Site - DC R7
Date of Evaluation: 06/04/2020
Stream Category: Pa2
Assessor Name/Organization: Wildlands Engineering

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

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

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: 2019-00909 NCDWR #:

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

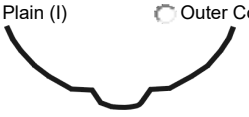
PROJECT / SITE INFORMATION:

1. Project name (if any): Dynamite Creek Mitigation Site - UT1
2. Date of evaluation: 06/04/2020
3. Applicant/owner name:
4. Assessor name/organization: Wildlands Engineering
5. County: Rockingham
6. Nearest named water body on USGS 7.5-minute quad: Dan River
7. River Basin: Roanoke
8. Site coordinates (decimal degrees, at lower end of assessment reach): Lat 36.481226 Long -79.712604

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): UT1
10. Length of assessment reach evaluated (feet): approx 305 ft
11. Channel depth from bed (in riffle, if present) to top of bank (feet): 2.5-3.5 feet ☐ Unable to assess channel depth.
12. Channel width at top of bank (feet): 8-10 feet
13. Is assessment reach a swamp stream? ○ Yes ○ No
14. Feature type: ◉ Perennial flow ○ Intermittent flow ○ Tidal Marsh Stream

STREAM RATING INFORMATION:

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

ADDITIONAL INFORMATION:

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

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

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

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

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

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

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

LB	RB	
◉ A	◉ A	Little or no evidence of conditions that adversely affect reference interaction
○ B	○ B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
○ C	○ C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision,

disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

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

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

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

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

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

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

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

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

Check for Tidal Marsh Streams only

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

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

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

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

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

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

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

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

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)
12a. ◉ Yes ○ No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. ○ No Water ○ Other: _____

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

1	>1	Numbers over columns refer to “individuals” for size 1 and 2 streams and “taxa” for size 3 and 4 streams.
☐	☐	Adult frogs
☐	☐	Aquatic reptiles
☐	☐	Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
☐	☑	Beetles (including water pennies)
☐	☐	Caddisfly larvae (Trichoptera [T])

- [ ] Asian clam (*Corbicula*)
- [x] Crustacean (isopod/amphipod/crayfish/shrimp)
- [ ] Damselfly and dragonfly larvae
- [ ] Dipterans (true flies)
- [ ] Mayfly larvae (Ephemeroptera [E])
- [ ] Megaloptera (alderfly, fishfly, dobsonfly larvae)
- [ ] Midges/mosquito larvae
- [ ] Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea)*
- [ ] Mussels/Clams (not *Corbicula*)
- [ ] Other fish
- [x] Salamanders/tadpoles
- [ ] Snails
- [ ] Stonefly larvae (Plecoptera [P])
- [ ] Tipulid larvae
- [ ] Worms/leeches

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

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

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

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

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

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

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

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

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

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

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

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

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

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

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

LB	RB	
(•) A	(•) A	Mature forest
( ) B	( ) B	Non-mature woody vegetation or modified vegetation structure
( ) C	( ) C	Herbaceous vegetation with or without a strip of trees < 10 feet wide

LB	RB	
○ D	○ D	Maintained shrubs
○ E	○ E	Little or no vegetation

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

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

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

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

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

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

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

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

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

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

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

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

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

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

25a. ○ Yes ◉ No Was a conductivity measurement recorded?

If No, select one of the following reasons. ○ No Water ○ Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

○ A <46 ○ B 46 to < 67 ○ C 67 to < 79 ○ D 79 to < 230 ○ E ≥ 230

Notes/Sketch:

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name: Dynamite Creek Mitigation Site - UT1
Date of Evaluation: 06/04/2020
Stream Category: Pb1
Assessor Name/Organization: Wildlands Engineering

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

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**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	**MEDIUM**	
(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 Habitat	NA	
Overall	**HIGH**	

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland A
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.485076, -79.710965

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

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

Is the assessment area intensively managed? ☒ Yes ☐ No

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5. Discharge into Wetland – opportunity metric

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

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

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

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

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

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

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

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

☐A 0
☐B 1 to 4
☒C 5 to 8

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

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

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

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

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

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

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

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

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

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

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

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

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

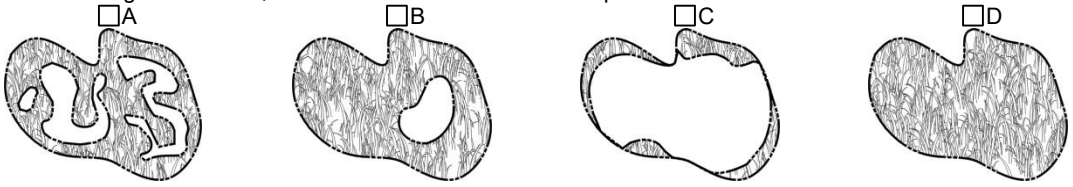
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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

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

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

☐A ☐B ☐C ☐D



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

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

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland A	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

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

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland B
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.484851, -79.712612

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

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

Is the assessment area intensively managed? ☒ Yes ☐ No

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5. Discharge into Wetland – opportunity metric

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

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

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

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

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

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

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

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

☐A 0
☐B 1 to 4
☒C 5 to 8

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

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

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

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

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

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

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

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

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

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

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

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

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

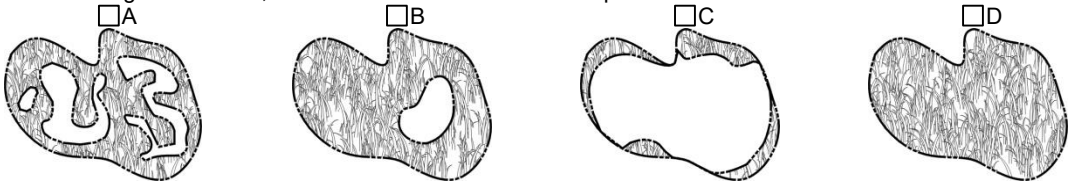
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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

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

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

☐A ☐B ☐C ☐D



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

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

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland B	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
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	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland C
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.484940, -79.712694

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

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

Is the assessment area intensively managed? ☒ Yes ☐ No

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5. Discharge into Wetland – opportunity metric

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

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

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

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

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

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

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

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

☐A 0
☐B 1 to 4
☒C 5 to 8

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

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

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

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

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

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

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

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

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

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

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

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

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

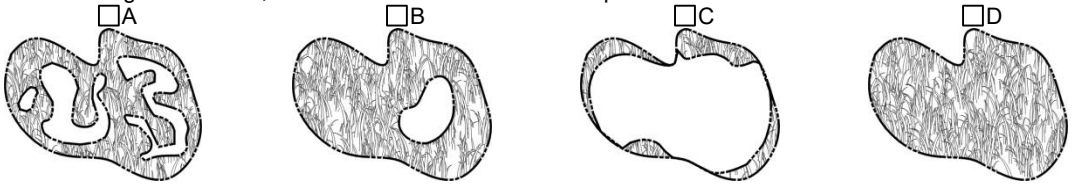
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

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

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

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

☐A ☐B ☐C ☐D



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

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

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland C	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
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	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland D
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.485133, -79.712306

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

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

Is the assessment area intensively managed? ☒ Yes ☐ No

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☒C	☒C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☒E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☒F	☒F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☒A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☒I	☒I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☒F	☒F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

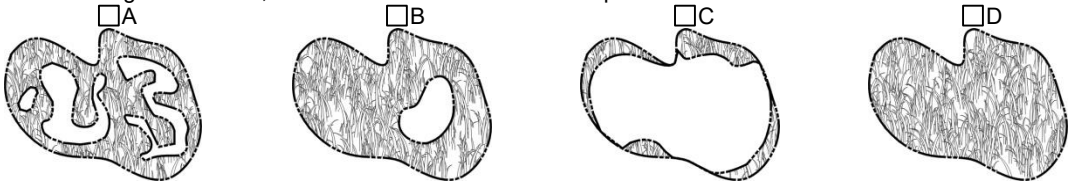
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland D	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	YES
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	YES
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland E
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.485065, -79.712822

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☒ Yes ☐ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☒C	☒C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☐Yes ☒No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☐≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☐No

7e. Is stream or other open water sheltered or exposed?
- ☐Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☒G	☒G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☒A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☒K	☒K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☒F	☒F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

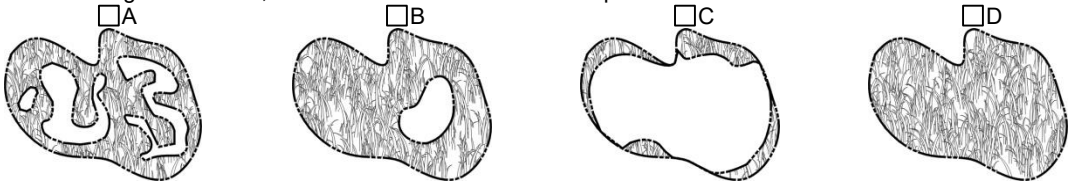
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland E	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
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	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**LOW**
	Condition/Opportunity	**LOW**
	Opportunity Presence (Y/N)	**NO**
Habitat	Condition	

Overall Wetland Rating _____

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland F
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.485171, -79.712832

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☒ Yes ☐ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☒C	☒C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☐Yes ☒No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☐≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☐No

7e. Is stream or other open water sheltered or exposed?
- ☐Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☒F	☒F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☒A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☒F	☒F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

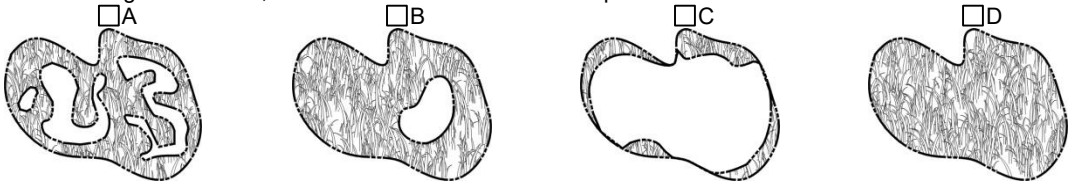
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland F	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
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	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland G
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.485810, -79.710690

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☒C	☒C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☐Yes ☒No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☐≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☐No

7e. Is stream or other open water sheltered or exposed?
- ☐Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☒E	☒E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☒C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☒H	☒H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☒F	☒F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☐Yes ☒No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

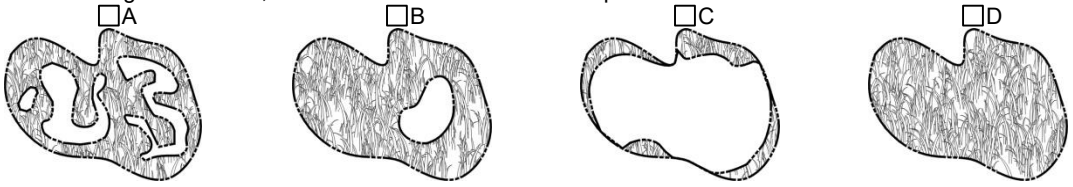
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland G	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
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	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland H
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.485508, -79.710690

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☒ Yes ☐ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☒C	☒C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☐Yes ☒No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☐≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☐No

7e. Is stream or other open water sheltered or exposed?
- ☐Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☒E	☒E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☒C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☒E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☐Yes ☒No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

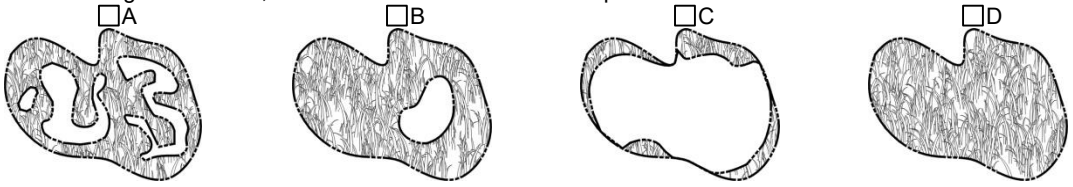
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland H	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
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	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland I
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.485958, -79.711580

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☒ Yes ☐ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☒A Soil ribbon < 1 inch
- ☐B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☒C	☒C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☐Yes ☒No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☐≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☐No

7e. Is stream or other open water sheltered or exposed?
- ☐Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☒E	☒E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☒C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☒I	☒I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☒F	☒F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☐Yes ☒No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

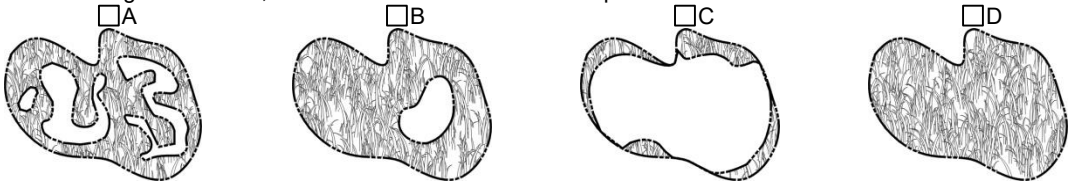
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland I	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
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	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**MEDIUM**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland J
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.485764, -79.710147

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☒ Yes ☐ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☒C	☒C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☐Yes ☒No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☐≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☐No

7e. Is stream or other open water sheltered or exposed?
- ☐Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☒G	☒G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☒A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☒F	☒F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

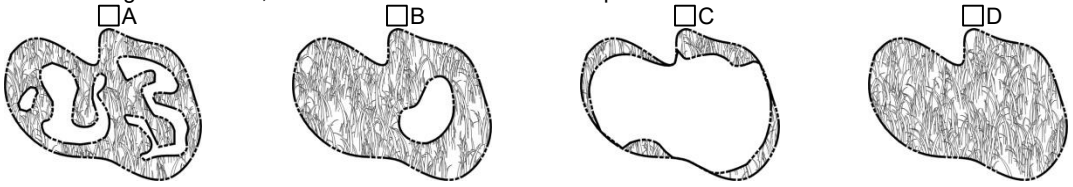
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland J	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
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	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland K
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.485814, -79.709797

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☒ Yes ☐ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☒C	☒C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☒C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☒F	☒F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☒A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☒F	☒F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

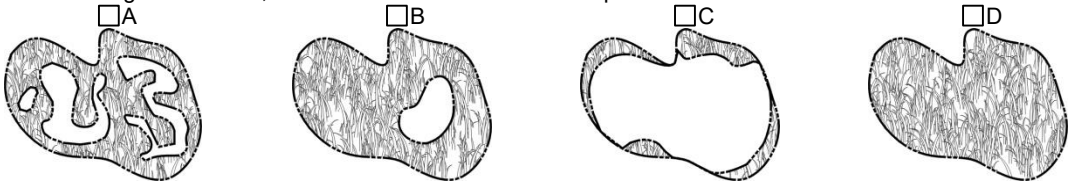
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland K	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	YES
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	YES
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland L
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.486093, -79.708950

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☒ Yes ☐ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☒C	☒C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☒D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☒F	☒F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☒C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☒F	☒F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☒B	☒B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☒C	☒C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

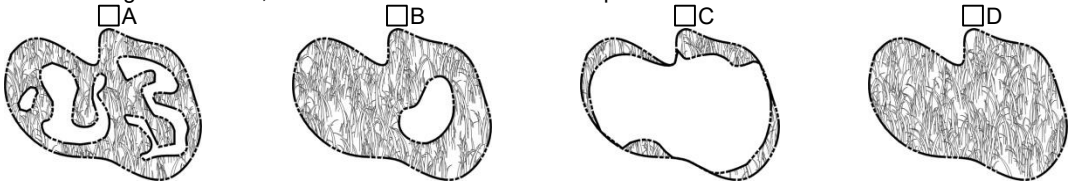
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland L	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	YES
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	YES
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland M
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.480851, -79.713087

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☒E	☒E	☒E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☒D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☒G	☒G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☒K	☒K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☒A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☒A 0
☐B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☒A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☒A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☐B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☒B	☒B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☒B	☒B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☒B	☒B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☒C	☒C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

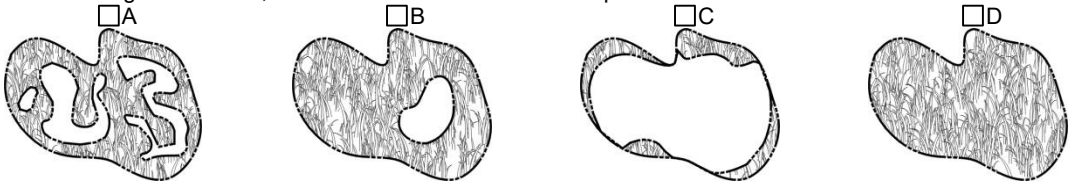
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☒A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland M	Date of Assessment	2/27/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	NO
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**HIGH**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**HIGH**
	Vegetation Composition	Condition	**HIGH**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**YES**
Habitat	Condition	**MEDIUM**

Overall Wetland Rating **MEDIUM**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland N
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.481564, -79.712914

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☒A	Not severely altered
☐B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☒E	☒E	☒E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☒D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☒Yes ☐No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☒G	☒G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☒J	From 0.01 to < 0.1 acre
☐K	☐K	☐K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☒A	☒A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☒A 0
☐B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☒A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☒A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☐B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☒A	☒A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☒B	☒B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☒B	☒B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☒C	☒C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☒A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☐C Majority of canopy trees are < 6 inches DBH or no trees.

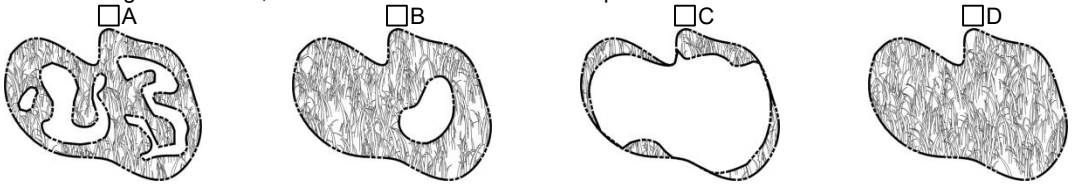
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☒A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland N	Date of Assessment	2/27/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	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	**HIGH**
	Sub-surface Storage and Retention	Condition	**MEDIUM**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**HIGH**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**MEDIUM**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**HIGH**
	Landscape Patch Structure	Condition	**HIGH**
	Vegetation Composition	Condition	**HIGH**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**HIGH**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**YES**
Habitat	Condition	**HIGH**

Overall Wetland Rating **HIGH**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland O
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.479515, -79.712723

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☒A	Not severely altered
☐B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☒G	☒G	☒G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☒E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☒E	☒E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☒J	From 0.01 to < 0.1 acre
☐K	☐K	☐K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☒A	☒A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☒A 0
☐B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☒A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☒A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☐B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☒A	☒A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☒B	☒B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☒B	☒B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☒C	☒C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

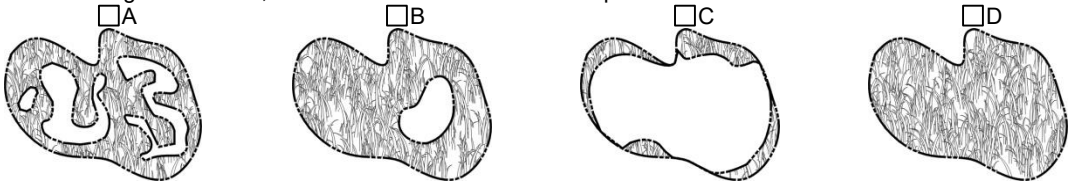
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☒A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland O	Date of Assessment	2/27/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	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	**HIGH**
	Sub-surface Storage and Retention	Condition	**MEDIUM**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**HIGH**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		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	**HIGH**
	Vegetation Composition	Condition	**HIGH**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**HIGH**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**NO**
Habitat	Condition	**MEDIUM**

Overall Wetland Rating **HIGH**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland P
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.479103, -79.713102

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☒G	☒G	☒G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☒D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☒G	☒G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☒K	☒K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☒A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☒C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☒B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☒C	☒C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

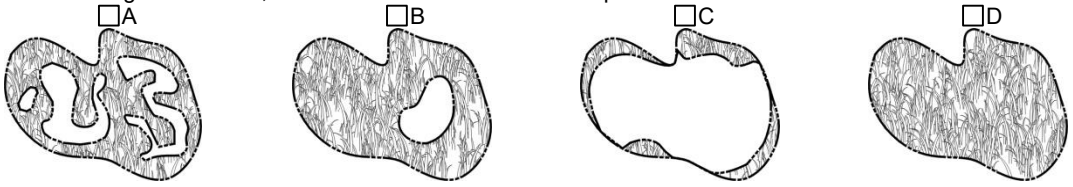
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland P	Date of Assessment	2/27/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	NO
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**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	**LOW**
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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland Q
Wetland Type	Riverine Swamp Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.484417, -79.712812

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☒ Yes ☐ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☐A	Not severely altered
☒B	☒B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☒B	☒B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☒B Evidence that maximum depth of inundation is between 1 and 2 feet
☐C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☒A Sandy soil
- ☐B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☒A Soil ribbon < 1 inch
- ☐B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☒D	☒D	☒D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☒B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☒E	☒E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☒C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☐A Sediment deposition is not excessive, but at approximately natural levels.
☒B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☐A	☒A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☐B 1 to 4
☒C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☐Yes ☒No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

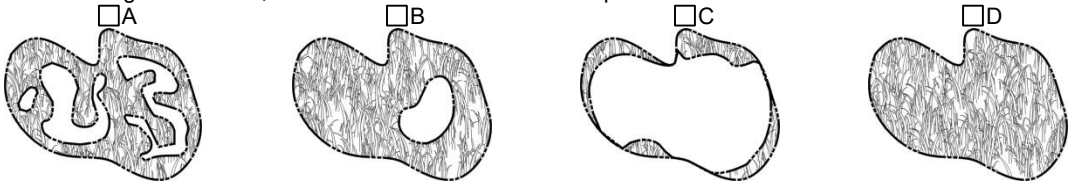
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland Q	Date of Assessment	2/27/2020
Wetland Type	Riverine Swamp Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	YES
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	YES
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**HIGH**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**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 #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland R
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.484231, -79.713209

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☒ Yes ☐ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☒A	Not severely altered
☐B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☐A No peat or muck presence
- ☒B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☒C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☒C	☒C	☒C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☐Yes ☒No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☐≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☐No

7e. Is stream or other open water sheltered or exposed?
- ☐Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
- ☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☒D	☒D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☒A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☒A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☐A 0
☒B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☒B	☒B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

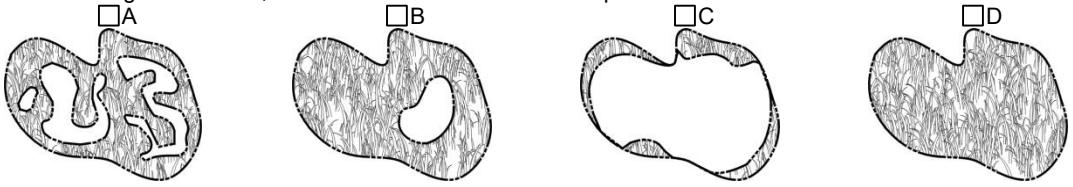
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☒A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland R	Date of Assessment	2/27/2020
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
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	Condition	**MEDIUM**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Particulate Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**YES**
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**YES**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**MEDIUM**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**YES**
Habitat	Condition	**LOW**

Overall Wetland Rating **MEDIUM**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland S
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.483706, -79.712841

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☒A	Not severely altered
☐B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☐A	Water storage capacity and duration are not altered.
☐B	☒B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☒E	☒E	☒E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☒B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☒Yes ☐No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☒E	☒E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☒A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☒I	☒I	☒I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☐K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☒A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☒A 0
☐B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☒A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☒A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☐B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☒A	☒A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☒A	☒A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☒B	☒B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☒A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☐B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☒B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☐C Majority of canopy trees are < 6 inches DBH or no trees.

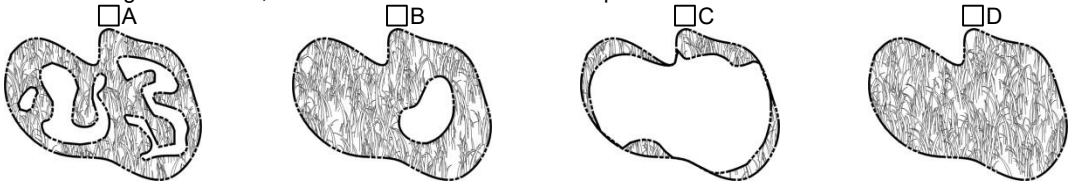
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☒A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☐B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☒B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland S	Date of Assessment	2/27/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	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	**MEDIUM**
	Sub-surface Storage and Retention	Condition	**MEDIUM**
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	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		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	**HIGH**
	Landscape Patch Structure	Condition	**HIGH**
	Vegetation Composition	Condition	**HIGH**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**MEDIUM**
Water Quality	Condition	**MEDIUM**
	Condition/Opportunity	**MEDIUM**
	Opportunity Presence (Y/N)	**NO**
Habitat	Condition	**HIGH**

Overall Wetland Rating **MEDIUM**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland T
Wetland Type	Floodplain Pool	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.483072, -79.712738

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☒ Yes ☐ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☒A	Not severely altered
☐B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☒B	☒B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☒B Evidence that maximum depth of inundation is between 1 and 2 feet
☐C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☐B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☒C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☒E	☒E	☒E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☒D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☒G	☒G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☒C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☒K	☒K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☒A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☒A 0
☐B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☒A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☒A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☐B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☐Yes ☒No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

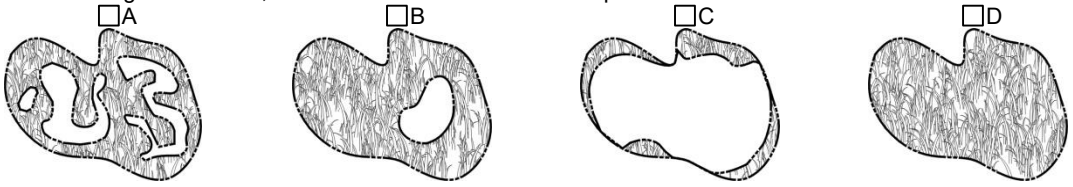
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☒A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland T	Date of Assessment	2/27/2020
Wetland Type	Floodplain Pool	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	YES
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**HIGH**
	Sub-surface Storage and Retention	Condition	NA
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**HIGH**
	Landscape Patch Structure	Condition	**MEDIUM**
	Vegetation Composition	Condition	**HIGH**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**HIGH**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**NO**
Habitat	Condition	**HIGH**

Overall Wetland Rating **HIGH**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland U
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.482320, -79.712517

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☒A	Not severely altered
☐B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☒E	☒E	☒E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☒E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☒E	☒E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☒A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☒A 0
☐B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☒A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☒A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☐B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☒A	☒A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☒A	☒A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☒B	☒B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☒B	☒B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☒B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☐C Majority of canopy trees are < 6 inches DBH or no trees.

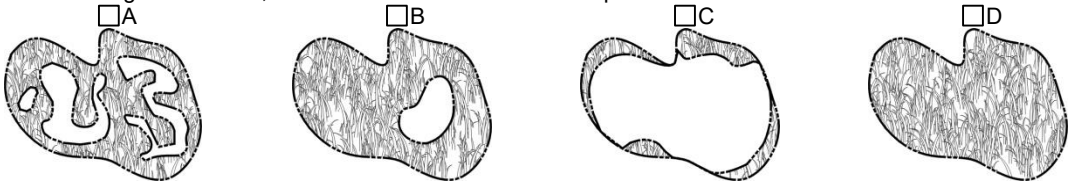
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☒A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland U	Date of Assessment	2/27/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	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	**HIGH**
	Sub-surface Storage and Retention	Condition	**MEDIUM**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**HIGH**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**HIGH**
	Landscape Patch Structure	Condition	**HIGH**
	Vegetation Composition	Condition	**HIGH**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**HIGH**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**YES**
Habitat	Condition	**HIGH**

Overall Wetland Rating **HIGH**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland V
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.482061. -79.712910

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☒A	☒A	Not severely altered
☐B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☒A	☒A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☒E	☒E	☒E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☐G	☐G	☐G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☒C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☒F	☒F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☒A Evidence of short-duration inundation (< 7 consecutive days)
☐B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☒A Sediment deposition is not excessive, but at approximately natural levels.
☐B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☒J	☒J	☒J	From 0.01 to < 0.1 acre
☐K	☐K	☐K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☒A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☒A 0
☐B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☒A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☐C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☒A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☐B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☒A	☒A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☒B	☒B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☒B	☒B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☒C	☒C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☒B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☐C Majority of canopy trees are < 6 inches DBH or no trees.

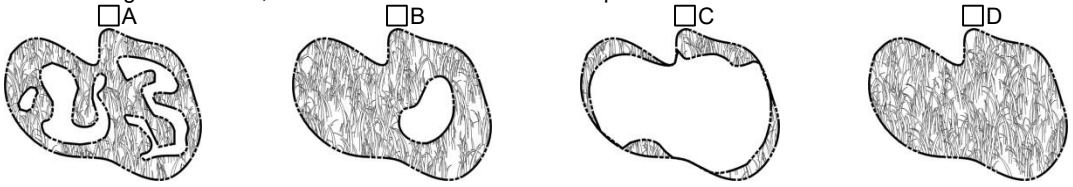
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☒A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland V	Date of Assessment	2/27/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	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	**HIGH**
	Sub-surface Storage and Retention	Condition	**MEDIUM**
Water Quality	Pathogen Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**HIGH**
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	**HIGH**
		Condition/Opportunity	**HIGH**
		Opportunity Presence (Y/N)	**NO**
	Physical Change	Condition	**MEDIUM**
		Condition/Opportunity	**MEDIUM**
		Opportunity Presence (Y/N)	**YES**
	Pollution Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Habitat	Physical Structure	Condition	**MEDIUM**
	Landscape Patch Structure	Condition	**HIGH**
	Vegetation Composition	Condition	**HIGH**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**HIGH**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**YES**
Habitat	Condition	**HIGH**

Overall Wetland Rating **HIGH**

NC WAM FIELD ASSESSMENT FORM
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USACE AID #	SAW-2019-00909	NCDWR#	
Project Name	Dynamite Creek Mitigaiton Site	Date of Evaluation	2/27/2020
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland W
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Dan River
River Basin	Roanoke	USGS 8-Digit Catalogue Unit	Roanoke 03010103
County	Rockingham	NCDWR Region	Winston-Salem
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	36.479034, -79.711729

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? ☐ Yes ☒ No

Regulatory Considerations - Were regulatory considerations evaluated? ☒Yes ☐No If Yes, check all that apply to the assessment area.

☐ Anadromous fish
☒ Federally protected species or State endangered or threatened species
☐ NCDWR riparian buffer rule in effect
☐ Abuts a Primary Nursery Area (PNA)
☐ Publicly owned property
☐ N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
☐ Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
☐ Designated NCNHP reference community
☐ Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

☐ Blackwater
☒ Brownwater
☐ Tidal (if tidal, check one of the following boxes) ☐ Lunar ☐ Wind ☐ Both

Is the assessment area on a coastal island? ☐ Yes ☒ No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? ☐ Yes ☒ No

Does the assessment area experience overbank flooding during normal rainfall conditions? ☐ Yes ☒ No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

GS	VS	
☐A	☒A	Not severely altered
☒B	☐B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☐B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☒C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☐C	☐C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☒D	☒D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☐A Soil ribbon < 1 inch
- ☒B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

WS	5M	2M	
☐A	☐A	☐A	≥ 10% impervious surfaces
☐B	☐B	☐B	Confined animal operations (or other local, concentrated source of pollutants
☐C	☐C	☐C	≥ 20% coverage of pasture
☐D	☐D	☐D	≥ 20% coverage of agricultural land (regularly plowed land)
☐E	☐E	☐E	≥ 20% coverage of maintained grass/herb
☐F	☐F	☐F	≥ 20% coverage of clear-cut land
☒G	☒G	☒G	Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed or hydrologic alterations that prevent drainage and/or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☐A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☒C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☐Yes ☒No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

WT	WC	
☐A	☐A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☒H	☒H	< 5 feet

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

☐A Evidence of short-duration inundation (< 7 consecutive days)
☒B Evidence of saturation, without evidence of inundation
☐C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

☐A Sediment deposition is not excessive, but at approximately natural levels.
☒B Sediment deposition is excessive, but not overwhelming the wetland.
☐C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☒K	☒K	☒K	< 0.01 acre or assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

☐A Pocosin is the full extent (≥ 90%) of its natural landscape size.
☐B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
☒A	☐A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only**.

☐Yes ☐No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

☒A 0
☐B 1 to 4
☐C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

☐A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
☐B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
☒C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

☐A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
☒B Vegetation diversity is low or has > 10% to 50% cover of exotics.
☐C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?
☐Yes ☒No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

☐A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
☒B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

☐A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
☐B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
☒C Majority of canopy trees are < 6 inches DBH or no trees.

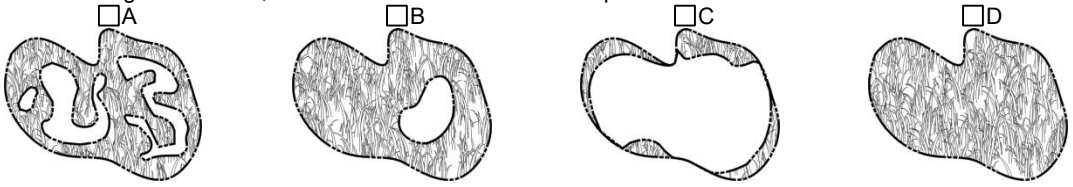
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.

☐A ☐B ☐C ☐D



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Wetland W	Date of Assessment	2/27/2020
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N)	NO
Presence of regulatory considerations (Y/N)	YES
Wetland is intensively managed (Y/N)	NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	YES
Assessment area is substantially altered by beaver (Y/N)	NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	NO
Assessment area is on a coastal island (Y/N)	NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	**LOW**
	Sub-surface Storage and Retention	Condition	**LOW**
Water Quality	Pathogen Change	Condition	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	Particulate Change	Condition	**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	**HIGH**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**LOW**
Water Quality	Condition	**LOW**
	Condition/Opportunity	**LOW**
	Opportunity Presence (Y/N)	**NO**
Habitat	Condition	**LOW**

Overall Wetland Rating **LOW**

Appendix 4

Regulatory Correspondence

IRT Field Meeting Notes – Dynamite Creek **July 16, 2019**

Meeting Attendees
Todd Tugwell/USACE
Kim Browning/USACE
Mac Haupt/NCDWR
Erin Davis/NCDWR
Travis Wilson/NCWRC
Lindsay Crocker/NCDMS
Jamie Blackwell/NCDMS
Jeremiah Dow/NCDMS
Tim Baumgartner/NCDMS
John Hutton/Wildlands
Chris Roessler/Wildlands

John Hutton and Chris Roessler of Wildlands Engineering, Inc. (Wildlands) led the group on a tour of the Dynamite Creek mitigation site in Eden, NC. The purpose of the tour was to present the site to a group of IRT members and to get input on the management/mitigation options proposed for the site. During the tour, the group openly discussed the condition of the stream channels on the site and the design options and crediting scenarios they felt would be most appropriate to restore and enhance the channels. The accompanying map identifies the stream reach names.

The tour began on the downstream end of Dynamite Creek, on the Dan River floodplain then moved upstream into the wooded headwaters. Comments provided during the site visit are listed below by reach.

Lower Dynamite Creek

Lower Dynamite Creek is a straightened and dredged channel that flows through part of the Dan River floodplain. The project wetlands surround the channel.

The IRT was concerned that the combination of low slope and high sediment load in this reach could result in a situation where sediment transport capacity was inadequate and the channel would aggrade. John said Wildlands would focus on reducing the sediment load significantly through the proposed work upstream and designing a low sinuosity E-channel to improve sediment transport capacity. The IRT agreed that low sinuosity was appropriate. Todd recommended a strategy for adaptive management in case the channel fills with sediment or becomes choked with vegetation.

The IRT asked whether there was any evidence that Dynamite Creek historically flowed directly to the Dan River. The group inspected the linear wooded corridor in between the project area and the river. The IRT agreed with Wildlands that while it was possible the stream historically flowed that direction, the amount of grading required to bring the stream into this corridor and the difficulty of tying this small stream down to the river made this solution impractical.

Mac reviewed the soils throughout area proposed for wetland re-establishment. He agreed with Wildlands assessment that the soils appear hydric in more of the easement area than was indicated on

the Licensed Soil Scientist report. Additionally, all parties agreed that some of the area proposed for re-establishment credit would probably be considered jurisdictional wetland now. Wildlands noted that this would be fine to adjust some of the re-establishment to rehabilitation as the extent of wetland reestablishment should be greater than what was proposed. A final wetland plan will be based on a jurisdictional determination and more detailed hydric soils analysis.

Upper Dynamite Creek

The group continued upstream into the wooded part of the stream corridor. Wildlands proposed a restoration approach to move the channel away from the right valley wall. The IRT noted that one section of this reach appeared stable but agreed with the overall approach as the stream was unstable above and below that section.

In the next reach, John presented a figure that detailed specific Enhancement 2 measures and locations. Additionally, John explained how Wildlands would minimize disturbance and tree mortality by limiting ingress and egress. All materials will be harvested at individual treatment locations. The IRT appreciated this approach and the figure with specific treatments. However, Todd suggested that since the lower end had more intensive treatments followed immediately upstream by a long stretch of no treatment that Wildlands consider the lower end E1 and the section above preservation, at 10:1. At the upper end of the previously proposed E2 reach is a steep, eroding hillslope that the channel touches. The IRT recommended realigning the channel here and leaving a disconnected oxbow at the foot of the eroding hillslope. For this section, Todd recommended an E1 approach. Wildlands will consider this upper section between the relic dam and the oxbow BMP during the design and mitigation plan-development phase. This area has the potential to be E1 or R, depending on the design changes to dimension, pattern, and profile. A figure showing these changes is provided at the end of the minutes.

Moving upstream, behind a failed dam are deep legacy sediments with mature trees. Dynamite Creek has incised through this section to create 5-8' vertical and eroding streambanks. John explained that Wildlands proposed to continue Priority 1 restoration from upstream of the power line crossing through this area. Toward the downstream end of the legacy sediment Wildlands will use a Priority 2 restoration with a B step pool channel to connect with the existing stream channel below the breached dam. Wildlands will seal structures to prevent erosion of legacy sediments. Travis commented that the old channels should be filled nearly completely and include compacted plugs to prevent the streamflow from resuming this path.

Wildlands will harvest all material for instream structures on the property. Trees that have to be removed for construction will be used in log sills, vanes, cover logs, and brush toe. Rock will be harvested at the immediate work site in the Enhancement 2 section and where possible in the restoration sections. A supplemental on-site rock harvest location will be used to provide rock where it cannot be obtained in the immediate vicinity. Wildlands light-footprint approach is more focused on the lowest Enhancement section. In the area of the relic dam and legacy sediments, buffer impacts will occur though these will be mitigated where Priority 1 restoration is implemented.

Summary and Conclusion

The IRT generally agreed with the approaches and credit ratios proposed by Wildlands for the Site, but recommended several changes as specified above and in the attached map.

Contacts

Jeremiah Dow will serve as the Project Manager for NCDMS and the main point of contact. Chris Roessler will be the Wildlands Project Manager and coordinate/submit project deliverables directly to Jeremiah for distribution to all NCIRT team members.

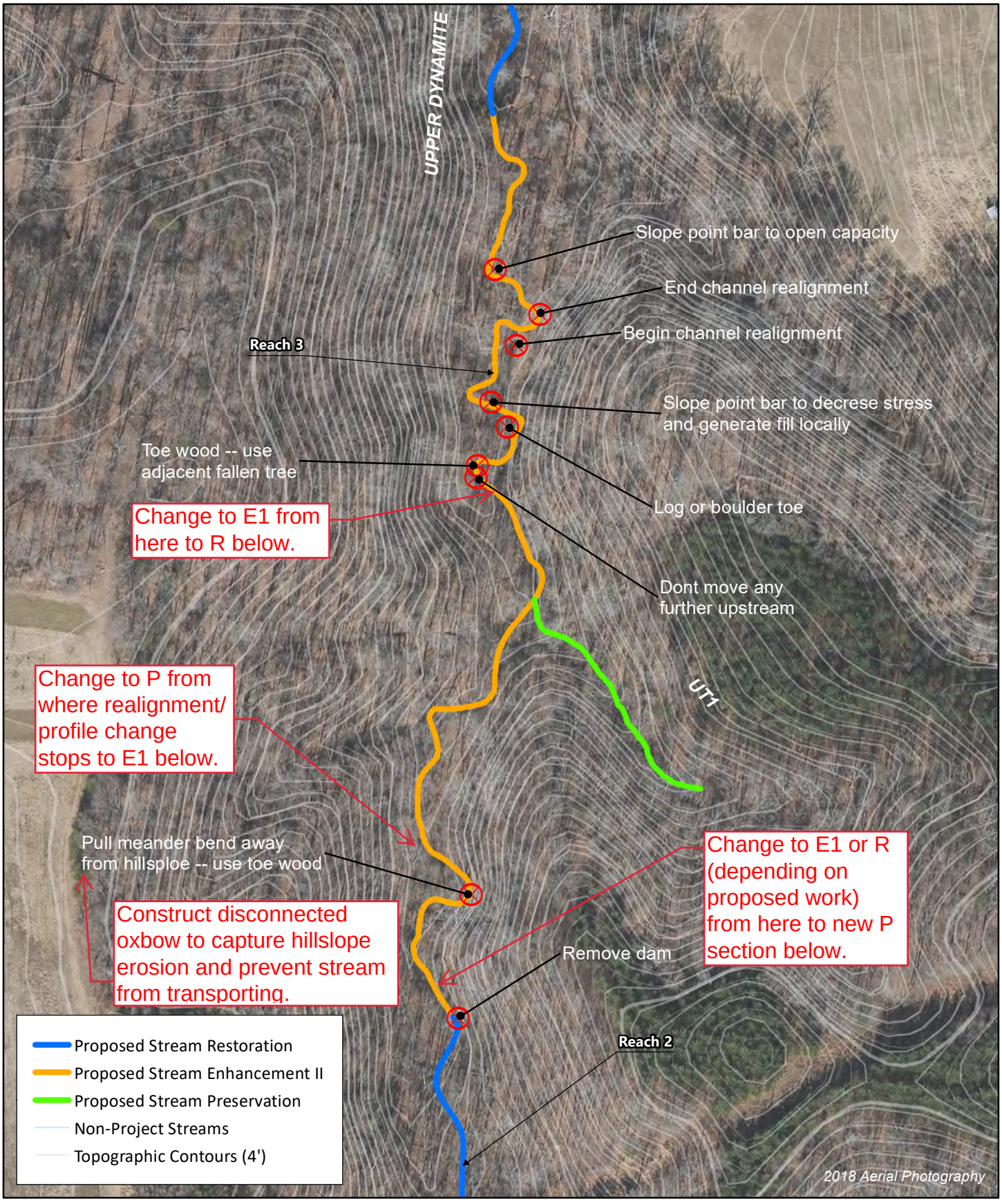
Action Items and Next Steps

- Project Schedule – Wildlands is ready to proceed immediately with the Task 1 deliverable (Categorical Exclusion) and does not anticipate project delays.
- After the jurisdictional determination has been conducted, any wetland areas that will be impacted by the proposed work (filled or drained) will need to be identified and functional replacement for those losses should be proposed and discussed in the draft mitigation plan.
- USACE requires Jurisdictional (JD) stream/wetland calls for the project. Wildlands will coordinate with David Bailey (or assigned) for on-site JD verification prior to mitigation plan submittal.
- Signage will be needed on all conservation easement areas.

This represents Wildlands' interpretation of the meeting discussions. If any meeting attendees should find any information contained in these meeting minutes to be in error and/or incomplete based on individual comments or conversations, please notify Chris Roessler with corrections/additions as soon as possible.

Sincerely,

Chris Roessler
croessler@wildlandseng.com
919.624.0905



WILDLANDS ENGINEERING

0 150 Feet

N

E2 Comments
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103

Rockingham County, NC

Appendix 5

Approved Categorical Exclusion

Categorical Exclusion Form for Ecosystem Enhancement Program Projects
Version 2

Note: Only Appendix A should to be submitted (along with any supporting documentation) as the environmental document.

Part 1: General Project Information	
Project Name:	Dynamite Creek Mitigation Site
County Name:	Rockingham County
DMS Number:	100125
Project Sponsor:	Wildlands Engineering, Inc.
Project Contact Name:	Kirsten Gimbert
Project Contact Address:	1430 S. Mint Street, Suite 104, Charlotte, NC 28203
Project Contact E-mail:	kgimbert@wildlandseng.com
DMS Project Manager:	Jeremiah Dow

Project Description

This project includes stream restoration, enhancement, and preservation, and wetland re-establishment. The area surrounding the site is currently cattle pasture. The major goals are to provide ecological and water quality enhancements to the Roanoke River Basin while creating a functional riparian corridor at the site level. This will be accomplished by removing cattle access to streams, creating stable stream banks, reconnecting incised streams to floodplains, restoring wetland function, restoring a riparian buffer from heavily grazed pasture, and protecting and preserving existing forested buffers.

For Official Use Only

Reviewed By:

11/7/19
Date

Jeremiah Dow
DMS Project Manager

Conditional Approved By:

Date

For Division Administrator FHWA

☐ **Check this box if there are outstanding issues**

Final Approval By:

Donald W. Brew
Date

11-6-19
For Division Administrator FHWA

Part 2: All Projects Regulation/Question	Response
Coastal Zone Management Act (CZMA)	
1. Is the project located in a CAMA county?	☐ Yes ☑ No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?	☐ Yes ☐ No ☑ N/A
3. Has a CAMA permit been secured?	☐ Yes ☐ No ☑ N/A
4. Has NCDCM agreed that the project is consistent with the NC Coastal Management Program?	☐ Yes ☐ No ☑ N/A
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	
1. Is this a "full-delivery" project?	☑ Yes ☐ No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?	☑ Yes ☑ No ☐ N/A
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☑ No ☐ N/A
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☐ No ☑ N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?	☐ Yes ☐ No ☑ N/A
6. Is there an approved hazardous mitigation plan?	☐ Yes ☐ No ☑ N/A
National Historic Preservation Act (Section 106)	
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?	☑ Yes ☐ No
2. Does the project affect such properties and does the SHPO/THPO concur?	☐ Yes ☑ No ☐ N/A
3. If the effects are adverse, have they been resolved?	☐ Yes ☐ No ☑ N/A
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)	
1. Is this a "full-delivery" project?	☑ Yes ☐ No
2. Does the project require the acquisition of real estate?	☑ Yes ☐ No ☐ N/A
3. Was the property acquisition completed prior to the intent to use federal funds?	☐ Yes ☑ No ☐ N/A
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?	☑ Yes ☐ No ☐ N/A

Part 3: Ground-Disturbing Activities Regulation/Question	Response
American Indian Religious Freedom Act (AIRFA)	
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?	☐ Yes ☑ No
2. Is the site of religious importance to American Indians?	☐ Yes ☐ No ☑ N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?	☐ Yes ☐ No ☑ N/A
4. Have the effects of the project on this site been considered?	☐ Yes ☐ No ☑ N/A
Antiquities Act (AA)	
1. Is the project located on Federal lands?	☐ Yes ☑ No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Archaeological Resources Protection Act (ARPA)	
1. Is the project located on federal or Indian lands (reservation)?	☐ Yes ☑ No
2. Will there be a loss or destruction of archaeological resources?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Endangered Species Act (ESA)	
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	☑ Yes ☐ No
2. Is Designated Critical Habitat or suitable habitat present for listed species?	☑ Yes ☐ No ☐ N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?	☐ Yes ☑ No ☐ N/A
4. Is the project "likely to adversely affect" the species and/or "likely to adversely modify" Designated Critical Habitat?	☐ Yes ☐ No ☑ N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?	☐ Yes ☐ No ☑ N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	☐ Yes ☐ No ☑ N/A

Executive Order 13007 (Indian Sacred Sites)	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	☐ Yes ☑ No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	☐ Yes ☐ No ☑ N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	☐ Yes ☐ No ☑ N/A
Farmland Protection Policy Act (FPPA)	
1. Will real estate be acquired?	☑ Yes ☐ No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	☑ Yes ☐ No ☐ N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	☑ Yes ☐ No ☐ N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	☑ Yes ☐ No
2. Have the USFWS and the NCWRC been consulted?	☑ Yes ☐ No ☐ N/A
Land and Water Conservation Fund Act (Section 6(f))	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	☐ Yes ☑ No
2. Has the NPS approved of the conversion?	☐ Yes ☐ No ☑ N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	☐ Yes ☑ No
2. Is suitable habitat present for EFH-protected species?	☐ Yes ☐ No ☑ N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	☐ Yes ☐ No ☑ N/A
4. Will the project adversely affect EFH?	☐ Yes ☐ No ☑ N/A
5. Has consultation with NOAA-Fisheries occurred?	☐ Yes ☐ No ☑ N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	☐ Yes ☑ No
2. Have the USFWS recommendations been incorporated?	☐ Yes ☐ No ☑ N/A
Wilderness Act	
1. Is the project in a Wilderness area?	☐ Yes ☑ No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	☐ Yes ☐ No ☑ N/A

Dynamite Creek Mitigation Site
Categorical Exclusion

SUMMARY

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) provides a Federal "Superfund" to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment.

As the Dynamite Creek Mitigation Site is a full-delivery project; an EDR Radius Map Report with Geocheck was ordered for the site through Environmental Data Resources, Inc on September 5, 2019. Neither the target property nor the adjacent properties were listed in any of the Federal, State, or Tribal environmental databases searched by the EDR. While two federally listed sites were identified in the EDR Radius Map Report, these sites are located almost 0.5 miles from the target property on the opposite side of the Dan River. Overall, the assessment revealed no evidence of any "recognized environmental conditions" in connection with the target property or adjacent properties.

The Executive Summary of the EDR report is included in the Appendix. The full report is available if needed.

National Historic Preservation Act (Section 106)

The National Historic Preservation Act declares a national policy of historic preservation to protect, rehabilitate, restore, and reuse districts, sites, buildings, structures, and objects significant in American architecture, history, archaeology, and culture, and Section 106 mandates that federal agencies take into account the effect of an undertaking on a property that is included in, or is eligible for inclusion in, the National Register of Historic Places.

The State Historic Preservation Office (SHPO) responded to a scoping letter requesting comment on the Dynamite Creek Mitigation Site on October 1, 2019. SHPO stated they were aware of "no historic resources which would be affected by the project" and would have no further comment. All correspondence related to Section 106 is included in the Appendix.

Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)

These acts, collectively known as the Uniform Act, provide for uniform and equitable treatment of persons displaced from their homes, businesses, non-profit associations, or farms by federal and federally-assisted programs, and establish uniform and equitable land acquisition policies.

Dynamite Creek Mitigation Site is a full-delivery project that includes land acquisition. Notification of the fair market value of the project property and the lack of condemnation authority by Wildlands was included in the signed Option Agreements for the project properties. A copy of the relevant section of each of the Option Agreements are included in the Appendix.

Endangered Species Act (ESA)

Section 7 of the ESA requires federal agencies, in consultation with and with the assistance of the Secretary of the Interior or of Commerce, as appropriate, to ensure that actions they authorize, fund or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species.

The United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation database (IPaC) list of endangered species for the site includes the Roanoke Logperch (*Percina rex*), the Atlantic Pigtoe (*Fusconaia masoni*), the James Spinymussel (*Pleurobema collina*), and the Smooth Coneflower (*Echinacea laevigata*). The USFWS does not currently list any Critical Habitat Designations for the

Federally listed species within Rockingham County nor are there any current known occurrences of the above listed species within a 2-mile radius of the project site.

Results of a pedestrian survey conducted on August 27, 2019, indicated that the project area provides areas of suitable habitat for only the smooth coneflower. Wildlands conclusions and determinations are noted below and included in the Appendix.

Smooth Coneflower

Wildlands identified open and disturbed areas existed on site, however, no populations resembling the species were found during the pedestrian survey. The survey was performed outside of the blooming season (May-July), however, the cones often persist and the fruiting season is June to October. Wildlands determined the project will have "no effect" on the smooth coneflower.

To meet regulatory requirements, a self-certification letter was submitted through the USFWS IPaC requesting comment from USFWS dated September 6, 2019. No response from the USFWS was received within the 45-day response period. Therefore, Wildlands assumes USFWS has no comments regarding associated laws and do not have any information relevant to the project at the current time.

Farmland Protection Policy Act (FPPA)

The FPPA requires that, before taking or approving any federal action that would result in conversion of farmland, the agency must examine the effects of the action using the criteria set forth in the FPPA, and, if there are adverse effects, must consider alternatives to lessen them.

Dynamite Creek Mitigation Site includes the conversion of prime farmland. As such, Form AD-1006 has been completed and submitted to the Natural Resources Conservation Service (NRCS). The completed form and correspondence documenting its submittal is included in the Appendix.

Fish and Wildlife Coordination Act (FWCA)

The FWCA requires consultation with the USFWS and the appropriate state wildlife agency on projects that alter or modify a water body. Reports and recommendations prepared by these agencies document project effects on wildlife and identify measures that may be adopted to prevent loss or damage to wildlife resources.

The Dynamite Creek Mitigation Site includes stream restoration, enhancement, and preservation, and wetland re-establishment. Wildlands requested comment on the project from both the USFWS and the North Carolina Wildlife Resources Commission (NCWRC) on September 6, 2019 and August 21, 2019, respectively. No response from the USFWS was received within the 45-day response period. Therefore, Wildlands assumes USFWS has no comments regarding associated laws and do not have any information relevant to the project at the current time. NCWRC responded to the scoping letter on August 29, 2019. They reported they have known records in the Dan River of federal and state endangered near the site. However, they have no known records of any state or federally-listed rare, threatened, or endangered species within or near the project area.

In addition, NCWRC also provided recommendations to minimize impacts to aquatic and terrestrial wildlife. Wildlands has reviewed these requests and will incorporate their recommendations as follows (Wildlands response to NCWRC comments below in *italics*).

1. If not already pursued, we suggest mitigation of Dynamite Creek downstream of the proposed site to the Dan River to further increase hydrologic and ecological function in the watershed.

   Wildlands has extended the proposed project boundary as far downstream as possible. The adjacent landowner will not accept the project on their property.

2. We recommend leaving snags and mature trees or if necessary, remove tees outside the maternity roosting season for bats (May 15 – August 15). We also recommend planting a wide variety of tree species, including those suitable for bats such as white oak and hickories.

   Yes, Wildlands will plan to leave snags and mature trees where possible, especially for the enhancement area in the upstream, wooded portion of the project.

3. We recommend that riparian buffers are as wide as possible, given site constraints and landowner needs. NCWRC generally recommends a woody buffer of 100 feet on perennial streams to maximize the benefits of buffers, including bank stability, stream shading, treatment of overland runoff, and wildlife habitat.

   All project streams will have adequate riparian buffers.

4. Since federal-listed species are known to occur in the Dan River, erosion and sediment control measures should conform to the High Quality Water Zones standards stipulated in the NC Department of Environmental Quality Erosion and Sediment Control Plan (https://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permitguidance/erosion-sediment-control-planning-design-manual). The use of biodegradable and wildlife-friendly sediment and erosion control devices is strongly recommended. Silt fencing, fiber rolls and/or other products should have loose-weave netting that is made of natural fiber materials with movable joints between the vertical and horizontal twines. Silt fencing that has been reinforced with plastic or metal mesh should be avoided as it impedes the movement of terrestrial wildlife species. Excessive silt and sediment loads can have detrimental effects on aquatic resources including destruction of spawning habitat, suffocation of eggs, and clogging of gills.

   Wildlands will receive all necessary erosion and sediment control permits prior to constructing the project.

All correspondence with the two agencies is included in the appendix.

Migratory Bird Treaty Act (MBTA)

The MBTA makes it unlawful for anyone to kill, capture, collect, possess, buy, sell, trade, ship, import, or export any migratory bird. The indirect killing of birds by destroying their nests and eggs is covered by the MBTA, so construction in nesting areas during nesting seasons can constitute a taking.

Wildlands requested comment on the Dynamite Creek Mitigation Site from the USFWS in regard to migratory birds on September 6, 2019. The USFWS has not responded at this time. All correspondence with USFWS is included in the Appendix.

Dynamite Creek Mitigation Site
Categorical Exclusion

APPENDIX

OVERVIEW MAP - 5778238.2S

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Hazardous Substance Disposal Sites

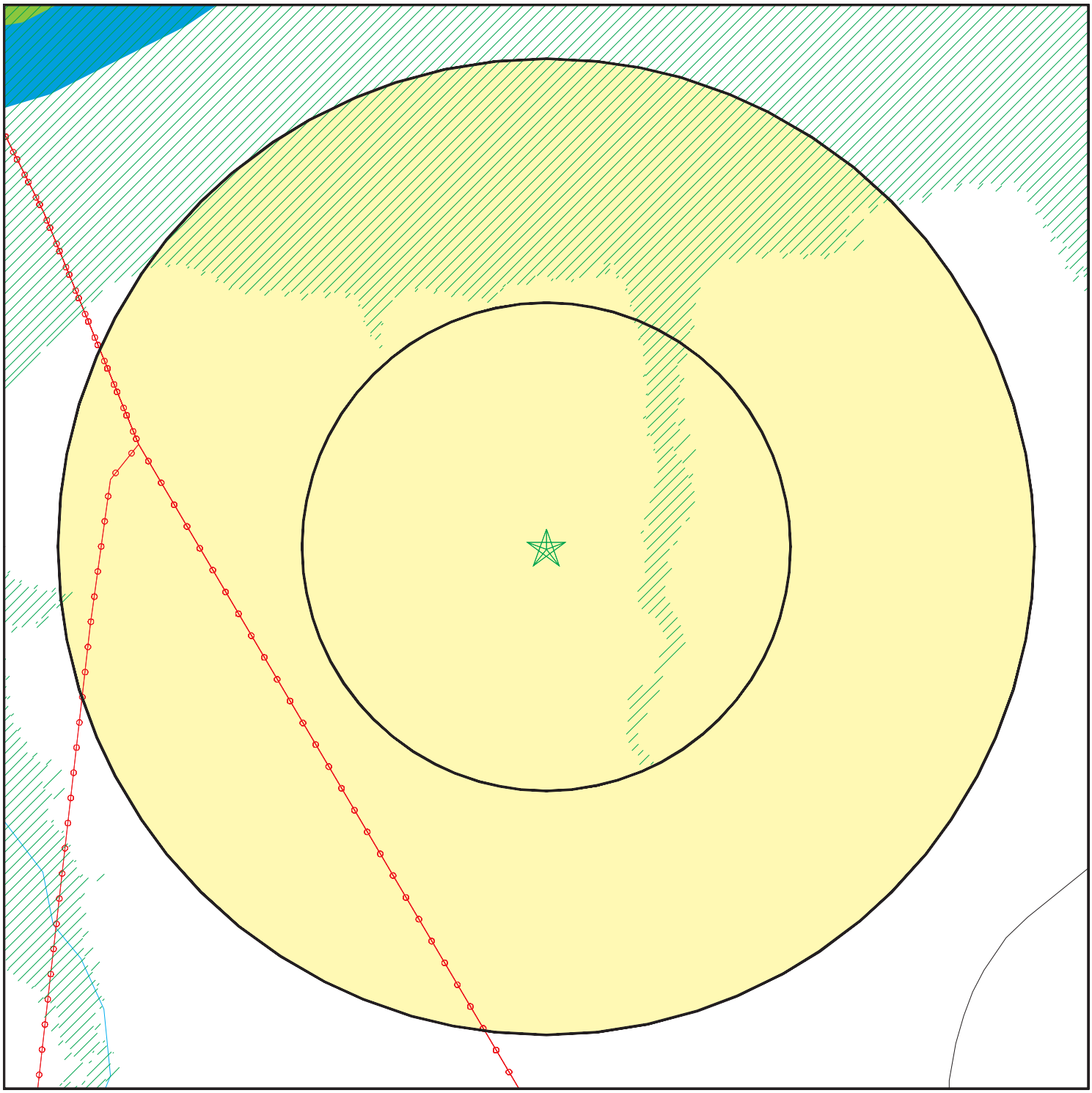
0 1/4 1/2 1 Miles

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Dynamite Creek Mitigation Site	CLIENT:	Wildlands Eng, Inc.
ADDRESS:	880 TOWN CREEK RD EDEN NC 27288	CONTACT:	Kirsten Gimbert
LAT/LONG:	36.481958 / 79.713802	INQUIRY #:	5778238.2s
		DATE:	September 05, 2019 12:29 pm

DETAIL MAP - 5778238.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Hazardous Substance Disposal Sites

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Dynamite Creek Mitigation Site	CLIENT:	Wildlands Eng, Inc.
ADDRESS:	880 TOWN CREEK RD EDEN NC 27288	CONTACT:	Kirsten Gimbert
LAT/LONG:	36.481958 / 79.713802	INQUIRY #:	5778238.2s
		DATE:	September 05, 2019 12:32 pm

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

October 1, 2019

Kirsten Gimbert
Wildlands Engineering
1430 South Mint Street, Suite 104
Charlotte, NC 28203

Re: Dynamite Creek Mitigation Site, Rockingham County, ER 19-2656

Dear Ms. Gimbert:

Thank you for your letter of August 21, 2019, concerning the above project.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona Bartos, Deputy
State Historic Preservation Officer

August 21, 2019

Renee Gledhill-Earley
State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

Subject: Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Dear Ms. Gledhill-Earley,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with a potential stream and wetland restoration project on the Dynamite Creek Mitigation Site located in Rockingham County, NC. A USGS Topographic Map and an Overview Site Map showing the approximate project area are enclosed. The topographic figure was prepared from the Ronda 7.5-Minute USGS Topographic Quadrangle, and the site is located at latitude 36.482 longitude -79.713.

The Dynamite Creek Mitigation Site is being developed to provide stream and wetland mitigation in the Roanoke River basin. The project includes stream restoration, enhancement, and preservation on Dynamite Creek and one unnamed tributary, and wetland re-establishment. All project streams flow into Town Creek, which in turn, flow into the Dan River. The major goals of the stream and wetland mitigation project are to provide ecological and water quality enhancements to the Roanoke River Basin while creating a functional riparian corridor at the site level. This will be accomplished by removing cattle access to onsite stream channels, creating stable stream banks, reconnecting incised streams to floodplains, restoring wetland function, restoring a riparian buffer from heavily grazed pasture, and protecting and preserving existing forested buffers. These actions will reduce fecal coliform, nutrient, and sediment inputs to Dynamite Creek, and ultimately to Town Creek and the Dan River. The area surrounding the streams and channels proposed for stream and wetland mitigation is currently cattle pasture.

The project parcel includes two remnant buildings from the Lower Sauratown Plantation, which is listed on the National Register with the State Historic Preservation Office. They are located outside the project easement area and the limits of land disturbing activities and will not be impacted by the project. No other architectural structures or archaeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes. We ask that you review the site based on the attached information to determine the presence of any historic properties.

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 the extent of site disturbance associated with this project.

Sincerely,

Kirsten J. Gimbert

Kirsten Gimbert, *Senior Environmental Scientist*

kgimbert@wildlandseng.com

704.941.9093

Attachment:
Figure 1 Site Map
Figure 2 USGS Topographic Map

TO OPTIONOR: 329 Partners LLC
Joseph B. C. Kluttz
2900 St. Andrews Lane
Charlotte, NC 28905
jbckluttz@gmail.com

Notice of change of address shall be given by written notice in the manner described in this paragraph.

3.4 **Assignment.** Optionee shall not have the right to assign this Agreement without the consent of Optionor, provided, however, that in the event the proposed assignee has capabilities, financial condition and reputation substantially similar to that of Optionee, such consent shall not be unreasonably withheld. No such assignment shall be effective unless the assignee has delivered to Optionor a written assumption of Optionee's obligations under this Agreement. Optionor hereby releases Optionee from any obligations under this Agreement arising after the effective date of any assignment of this Agreement by Optionee in accordance with this paragraph.

3.5 **Value of Conservation Easement; No Power of Eminent Domain.** In accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Optionee hereby notifies Optionor that: (i) Optionee believes that the fair market value of the Conservation Easement is an amount equal to the Purchase Price; and (ii) Optionee does not have the power of eminent domain.

3.6 **Entire Agreement; Modification; Waiver.** This Agreement constitutes the entire agreement of the parties with respect to its subject matter. No amendment of this Agreement will be effective unless it is in writing and signed by the parties. No waiver of satisfaction of a condition or failure to comply with an obligation under this Agreement will be effective unless it is in writing and signed by the party granting the waiver, and no such waiver will constitute a waiver of satisfaction of any other condition or failure to comply with any other obligation.

3.8 **Memorandum of Option Agreement.** Concurrently with the signing of this Agreement, Optionee and Optionor agree to sign a Memorandum of Option which Optionee will cause to be recorded, at its expense, in the Register of Deeds of Rockingham County North Carolina.

3.9 **Tax Deferred Exchange**. If Optionor desires to effect a tax-deferred exchange (the "**Exchange**") in connection with Optionee's purchase of the Conservation Easement, the parties agree to cooperate in effecting the Exchange. Optionor is responsible for all additional costs associated with the Exchange and Optionee shall not have any additional liability with respect to the Exchange. The parties will execute any additional documents required for the Exchange at no cost to Optionee.

3.10 **Brokers**. Shawn D. Wilkerson and Robert W. Bugg are North Carolina Real Estate Brokers. Neither Optionee nor Optionor has incurred, and Optionor shall in no event have, any liability for any brokerage fee, commission or finder's fee in connection with this Agreement or the transactions contemplated by this Agreement.

3.11 **Entire Agreement.** Each party acknowledges they are not relying on any statements made by the other party, other than in this Agreement, regarding the subject matter of this Agreement. Neither party will have a basis for bringing any claim for fraud in connection with any such statements.

Optionor RHK
Optionee

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636-3726

Date: 9/6/2019

Self-Certification Letter

Project Name Dynamite Creek Mitigation Site

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Raleigh Ecological Services online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the project named above in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. Based on your analysis, mark all the determinations that apply:

- [x] "no effect" determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- [ ] "may affect, not likely to adversely affect" determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- [ ] "may affect, likely to adversely affect" determination for the Northern long-eared bat (Myotis septentrionalis) and relying on the findings of the January 5, 2016, Programmatic Biological Opinion for the Final 4(d) Rule on the Northern long-eared bat;
- [x] "no Eagle Act permit required" determinations for eagles.

We certify that use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the “no effect” or “not likely to adversely affect” determinations for proposed and listed species and proposed and designated critical habitat; the “may affect” determination for Northern long-eared bat; and/or the “no Eagle Act permit required” determinations for eagles. Additional coordination with this office is not needed. Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species. Should project plans change or if additional information on the distribution of proposed or listed species, proposed or designated critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for 1 year. Information about the online project review process including instructions, species information, and other information regarding project reviews within North Carolina is available at our website http://www.fws.gov/raleigh/pp.html. If you have any questions, you can write to us at Raleigh@fws.gov or please contact Leigh Mann of this office at 919-856-4520, ext. 10.

Sincerely,

/s/Pete Benjamin

Pete Benjamin
Field Supervisor
Raleigh Ecological Services

Enclosures - project review package

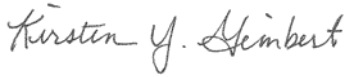
Species Conclusions Table

Project Name: Dynamite Creek

Date: 09/6/2019

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Roanoke Logperch (Percina rex)	No Suitable Habitat Present	No Effect	Field Survey conducted on August 27, 2019 determined no individual species or suitable habitat were found to exist. No critical habitat has been designated by USFWS for this species. Per NCNHP data explorer, no known element occurrences exist within the proposed project area.
Atlantic Pigtoe (*Fusconaia masoni*)	No Suitable Habitat Present, No Critical Habitat Present	No Effect	Field Survey conducted on August 27, 2019 determined no individual species or suitable habitat were found to exist. There is proposed critical habitat for this species (published in the Federal Register on October 11, 2018). Project location is outside the proposed critical habitat. Per NCNHP data explorer, no known element occurrences exist within the proposed project area.
James Spinymussel (*Pleurobema collina*)	No Suitable Habitat Present	No Effect	Field Survey conducted on August 27, 2019 determined no individual species or suitable habitat were found to exist. No critical habitat has been designated by USFWS for this species. Per NCNHP data explorer, no known element occurrences exist within the proposed project area.
Smooth Coneflower (*Echinacea laevigata*)	Suitable Habitat Present	No Effect	Field Survey conducted on August 27, 2019 found the presence of suitable habitat but no individual species were found to exist. No critical habitat has been designated by USFWS for this species. Per NCNHP data explorer, no known element occurrences exist within the proposed project area.
Bald Eagle	Unlikely to disturb nesting bald eagles	No Eagle Act Permit Required	Field Survey conducted on August 27, 2019 found the presence of suitable habitat but no individual species or nests were found to exist. Per NCNHP data explorer, no known element occurrences exist within the proposed project area.
Critical Habitat	No critical habitat present		

Acknowledgement: I agree that the above information about my proposed project is true. I used all of the provided resources to make an informed decision about impacts in the immediate and surrounding areas.



Senior Environmental Scientist — 09/06/2019

Signature /Title — Date

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
Phone: (919) 856-4520 Fax: (919) 856-4556

In Reply Refer To:
Consultation Code: 04EN2000-2019-SLI-1413
Event Code: 04EN2000-2019-E-03210
Project Name: Dynamite Creek

August 07, 2019

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The species list generated pursuant to the information you provided identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Section 7 of the Act requires that all federal agencies (or their designated non-federal representative), in consultation with the Service, insure that any action federally authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species. A biological assessment or evaluation may be prepared to fulfill that requirement and in determining whether additional consultation with the Service is necessary. In addition to the federally-protected species list, information on the species' life histories and habitats and information on completing a biological assessment or

evaluation and can be found on our web page at http://www.fws.gov/raleigh. Please check the web site often for updated information or changes

If your project contains suitable habitat for any of the federally-listed species known to be present within the county where your project occurs, the proposed action has the potential to adversely affect those species. As such, we recommend that surveys be conducted to determine the species' presence or absence within the project area. The use of North Carolina Natural Heritage program data should not be substituted for actual field surveys.

If you determine that the proposed action may affect (i.e., likely to adversely affect or not likely to adversely affect) a federally-protected species, you should notify this office with your determination, the results of your surveys, survey methodologies, and an analysis of the effects of the action on listed species, including consideration of direct, indirect, and cumulative effects, before conducting any activities that might affect the species. If you determine that the proposed action will have no effect (i.e., no beneficial or adverse, direct or indirect effect) on federally listed species, then you are not required to contact our office for concurrence (unless an Environmental Impact Statement is prepared). However, you should maintain a complete record of the assessment, including steps leading to your determination of effect, the qualified personnel conducting the assessment, habitat conditions, site photographs, and any other related articles.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

Not all Threatened and Endangered Species that occur in North Carolina are subject to section 7 consultation with the U.S Fish and Wildlife Service. Atlantic and shortnose sturgeon, sea turtles,when in the water, and certain marine mammals are under purview of the National Marine Fisheries Service. If your project occurs in marine, estuarine, or coastal river systems you should also contact the National Marine Fisheries Service, http://www.nmfs.noaa.gov/

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office. If you have any questions or comments, please contact John Ellis of this office at john_ellis@fws.gov.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
(919) 856-4520

Project Summary

Consultation Code: 04EN2000-2019-SLI-1413

Event Code: 04EN2000-2019-E-03210

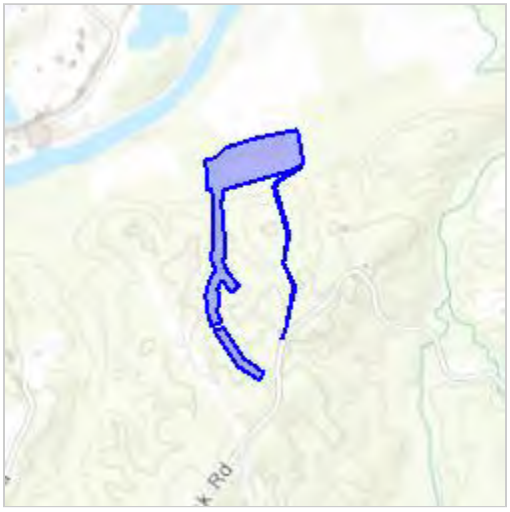
Project Name: Dynamite Creek

Project Type: LAND - RESTORATION / ENHANCEMENT

Project Description: Dynamite Creek is a stream and wetland mitigation project located in Rockingham County, NC that proposes to provide 3523 SMUs and 8.0 WMUs to offset unavoidable impacts within the basin.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/36.48256431494546N79.71271311436743W



Counties: Rockingham, NC

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Fishes

NAME	STATUS
Roanoke Logperch *Percina rex* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1134	Endangered

Clams

NAME	STATUS
Atlantic Pigtoe *Fusconaia masoni* There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5164	Proposed Threatened
James Spinymussel *Pleurobema collina* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2212	Endangered

Flowering Plants

NAME	STATUS
Smooth Coneflower *Echinacea laevigata* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3473	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Dynamite Creek - Final AD1006 FPPA form

Kirsten Gimbert

Tue 10/15/2019 8:34 AM

To: milton.cortes@nc.usda.gov <milton.cortes@nc.usda.gov>

1 attachments (43 KB)

FPPA_AD1006 Dynamite_FINAL.pdf;

Milton,

Please find attached to the email the completed FPPA AD1006 Form for the Dynamite Creek Mitigation Site.

Thank You,

Kirsten Gimbert | *Senior Environmental Scientist*
M: 704.941.9093

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 8/27/19
Name Of Project Dynamite Creek Mitigation Site	Federal Agency Involved FHWA
Proposed Land Use Stream & Wetland Restoration	County And State Rockingham County, NC
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 8/27/19

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).* Yes ☑ No ☐		Acres Irrigated -none-	Average Farm Size 124 acres
Major Crop(s) CORN	Farmable Land In Govt. Jurisdiction Acres: 260,767 acres % 71	Amount Of Farmland As Defined in FPPA Acres: 249,142 acres % 68	
Name Of Land Evaluation System Used Rockingham County, NC LESA	Name Of Local Site Assessment System N/A	Date Land Evaluation Returned By NRCS October 09, 2019 by eMAil	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	23.6			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	23.6	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	5.13			
B. Total Acres Statewide And Local Important Farmland	0.0			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0.0021			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	71.2			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	57	0	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use	15	15			
2. Perimeter In Nonurban Use	10	10			
3. Percent Of Site Being Farmed	20	12			
4. Protection Provided By State And Local Government	20	20			
5. Distance From Urban Builtup Area	15	5			
6. Distance To Urban Support Services	15	0			
7. Size Of Present Farm Unit Compared To Average	10	1			
8. Creation Of Nonfarmable Farmland	10	0			
9. Availability Of Farm Support Services	5	5			
10. On-Farm Investments	20	0			
11. Effects Of Conversion On Farm Support Services	10	0			
12. Compatibility With Existing Agricultural Use	10	0			
TOTAL SITE ASSESSMENT POINTS	160	68	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	57	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	68	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	125	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side)

This form was electronically produced by National Production Services Staff

Clear Form

Form AD-1006 (10-83)

North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

29 August 2019

Ms. Kirstin Gimbert
Wildlands Engineering
1430 South Mint Street, Suite 104
Charlotte, North Carolina 28203

Subject: Request for Project Review and Comments
Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Dear Ms. Gimbert,

Biologists with the North Carolina Wildlife Resource Commission (NCWRC) received your request to review and comment on any possible concerns regarding the Dynamite Creek Mitigation Site. Biologists with NCWRC have reviewed the provided documents. Comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e) and North Carolina General Statutes (G.S. 113-131 et seq.).

The Dynamite Creek Mitigation Site is located south of the Dan River and northwest of Town Creek Road near the City of Eden in Rockingham County, North Carolina. The site occurs within existing cattle pasture. The proposed project will remove cattle access to onsite stream channels, restore the riparian buffer, and protect and preserve the existing riparian buffer along upper Dynamite Creek and its unnamed tributary in the Roanoke River basin. As a result, the proposed project is expected to reduce fecal coliform, nutrients, and sediment inputs to Dynamite Creek, which flows into Town Creek and eventually the Dan River.

In the Dan River, we have known records of federal and state endangered James spinymussel (*Pleurobema collina*) and Roanoke logperch (*Percina rex*); state endangered green floater (*Lasmigona subviridis*) and yellow lampmussel (*Lampsilis cariosa*); state threatened bigeye jumprock (*Moxostoma ariommum*); and state significantly rare Roanoke bass (*Ambloplites cavifrons*) and quillback (*Carpiodes cyprinus*). We also have known records for the state threatened Jacob's ladder (*Polemonium reptans* var. *reptans*) and Virginia spiderwort (*Tradescantia virginiana*); and state significantly rare cliff stonecrop (*Sedum glaucophyllum*) and glade wild quinine (*Parthenium auriculatum*) near the site. The lack of records from the site does not imply or confirm the absence of federal or state-listed species. An on-site survey is the only means to determine if the proposed project may impact federal or state rare, threatened, or endangered species.

Mailing Address: Habitat Conservation • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

29 August 2019
Dynamite Creek Mitigation Site
Rockingham County

We offer the following recommendations to minimize impacts to aquatic and terrestrial wildlife resources:

1. If not already pursued, we suggest mitigation of Dynamite Creek downstream of the proposed site to the Dan River to further increase hydrologic and ecological function in the watershed.
2. We recommend leaving snags and mature trees or if necessary, remove tees outside the maternity roosting season for bats (May 15 – August 15). We also recommend planting a wide variety of tree species, including those suitable for bats such as white oak and hickories.
3. We recommend that riparian buffers are as wide as possible, given site constraints and landowner needs. NCWRC generally recommends a woody buffer of 100 feet on perennial streams to maximize the benefits of buffers, including bank stability, stream shading, treatment of overland runoff, and wildlife habitat.
4. Since federal-listed species are known to occur in the Dan River, erosion and sediment control measures should conform to the High Quality Water Zones standards stipulated in the NC Department of Environmental Quality Erosion and Sediment Control Plan (https://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permit-guidance/erosion-sediment-control-planning-design-manual). The use of **biodegradable and wildlife-friendly sediment and erosion control devices** is strongly recommended. Silt fencing, fiber rolls and/or other products should have loose-weave netting that is made of natural fiber materials with movable joints between the vertical and horizontal twines. Silt fencing that has been reinforced with plastic or metal mesh should be avoided as it impedes the movement of terrestrial wildlife species. Excessive silt and sediment loads can have detrimental effects on aquatic resources including destruction of spawning habitat, suffocation of eggs, and clogging of gills.

Provided measures are taken to minimize erosion and sedimentation from construction/restoration activities, we do not anticipate the project to result in significant adverse impacts to aquatic and terrestrial wildlife resources. Establishing native, forested buffers in riparian areas will help protect water quality, improve aquatic and terrestrial habitats, and provide a travel corridor for wildlife species.

Thank you for the opportunity to provide comments. If I can be of additional assistance, please call (919) 707-0364 or email olivia.munzer@ncwildlife.org.

Sincerely,

Olivia Munzer
Western Piedmont Habitat Conservation Coordinator
Habitat Conservation Program

Ec: John Ellis, USFWS
W. Thomas Russ, NCWRC

August 21, 2019

Olivia Munzer
North Carolina Wildlife Resource Commission
Western Piedmont Habitat Conservation Coordinator
Rogers Depot, 1718 NC Hwy 56 West
Creedmoor, NC 27522

Subject: Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Dear Ms. Munzer,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to fish and wildlife issues associated with a potential stream and wetland restoration project on the Dynamite Creek Mitigation Site located in Rockingham County, NC. A USGS Topographic Map and an Overview Site Map showing the approximate project area are enclosed. The topographic figure was prepared from the Ronda 7.5-Minute USGS Topographic Quadrangle, and the site is located at latitude 36.482 longitude -79.713.

The Dynamite Creek Mitigation Site is being developed to provide stream and wetland mitigation in the Roanoke River basin. The project includes stream restoration, enhancement, and preservation on Dynamite Creek and one unnamed tributary, and wetland re-establishment. All project streams flow into Town Creek, which in turn, flow into the Dan River. The major goals of the stream and wetland mitigation project are to provide ecological and water quality enhancements to the Roanoke River Basin while creating a functional riparian corridor at the site level. This will be accomplished by removing cattle access to onsite stream channels, creating stable stream banks, reconnecting incised streams to floodplains, restoring wetland function, restoring a riparian buffer from heavily grazed pasture, and protecting and preserving existing forested buffers. These actions will reduce fecal coliform, nutrient, and sediment inputs to Dynamite Creek, and ultimately to Town Creek and the Dan River. The area surrounding the streams and channels proposed for stream and wetland mitigation is currently cattle pasture.

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 the extent of site disturbance associated with this project.

Sincerely,

Kirsten G. Gimbert

Kirsten Gimbert, *Senior Environmental Scientist*

kgimbert@wildlandseng.com

704.941.9093

Attachment:
Figure 1 Site Map
Figure 2 USGS Topographic Map

Dynamite Creek Mitigation Site
Categorical Exclusion

FIGURES

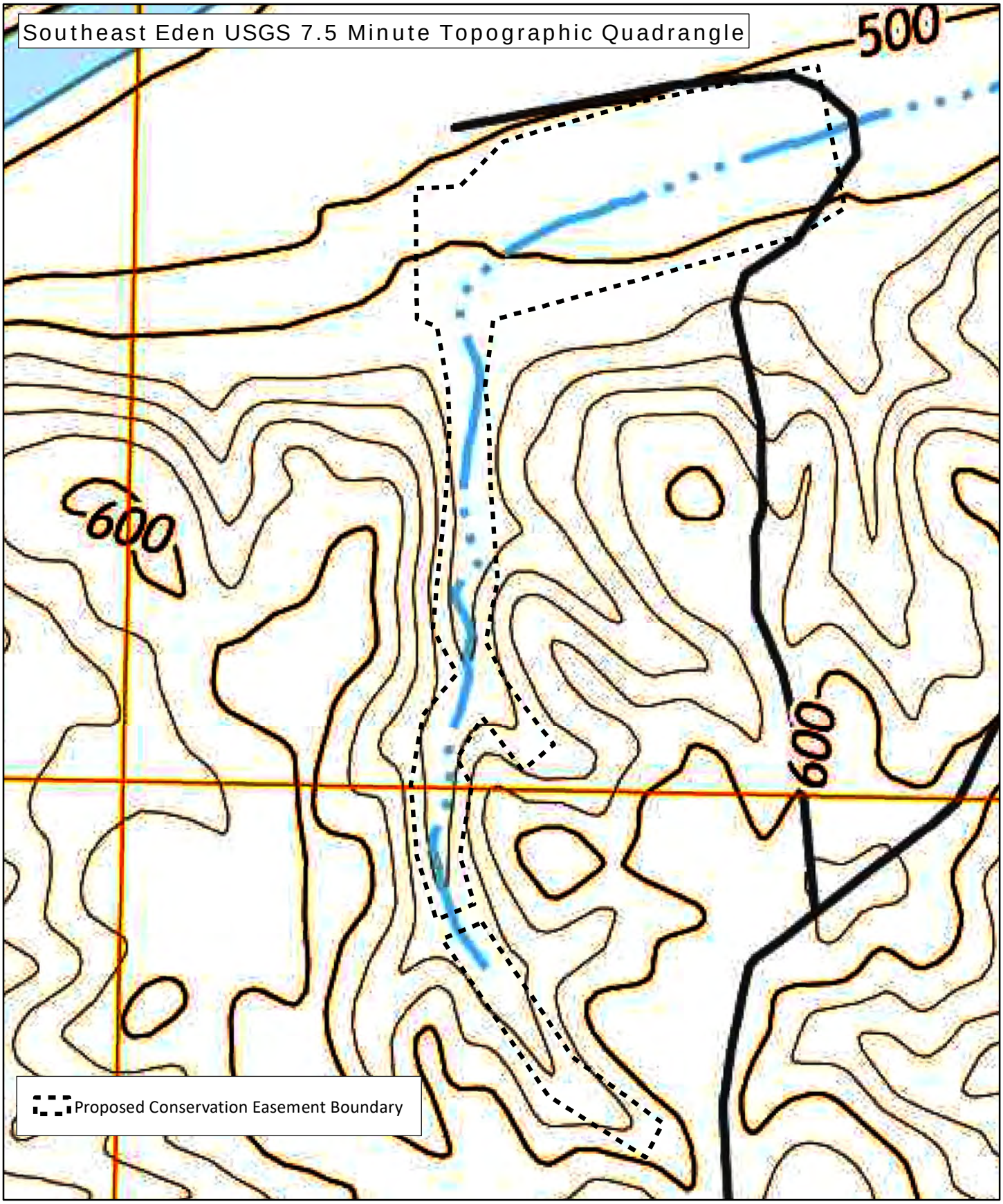
WILDLANDS ENGINEERING

0 400 Feet

N

Figure 1 Site Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103

Rockingham County, NC



WILDLANDS ENGINEERING

0 400 Feet

N

Figure 2 USGS Topographic Map
Dynamite Creek Mitigation Site
Roanoke River Basin 03010103

Rockingham County, NC

Appendix 6

Maintenance Plan

1.0 Maintenance Plan

The site shall be monitored on a regular basis 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 (2) years following site construction and may include the following:

Table1: Maintenance Plan

Component/Feature	Maintenance through project close-out
Stream/ Wetlands	Routine channel maintenance and repair activities may include chinking of in-stream structures to prevent piping, securing of loose coir matting, and supplemental installations of live stakes and other target vegetation along the channel. Areas where storm water and floodplain flows intercept the channel may also require maintenance to prevent bank erosion. Beaver dams that inundate the stream channels shall be removed and the beaver shall be trapped if deemed necessary. If a major flooding event occurs on the Dan River, it may require removal of large debris and alluvial deposits. Depending on the extent and volume of alluvial deposition, an adaptive management plan reviewed by the NCIRT may be warranted.
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. Exotic invasive plant species shall be controlled by mechanical and/or chemical methods. Any vegetation control requiring herbicide application will be performed in accordance 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.

Additional maintenance activities are discussed in the Vegetation and Land Management section of the mitigation plan.

Appendix 7

Credit Release Schedule

1.0 Credit Release Schedule

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 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

Credit Release Milestone	Credit Release Activity	Interim Release	Total Released
1	Site establishment	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	30%	30%
3	Year 1 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	40%
4	Year 2 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	50%
5	Year 3 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	60%
6	Year 4 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	65% (75%*)
7	Year 5monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	75% (85%*)
8**	Year 6 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	80% (90%*)
9	Year 7 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	90% (100%*)

*10% reserve credits to be held back until the bankfull performance standard has been met.

*Please note that vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the NCIRT.

Table B: Credit Release Schedule – Wetlands Credits

Credit Release Milestone	Credit Release Activity	Interim Release	Total Released
1	Site establishment	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	30%	30%
3	First year monitoring report demonstrates performance standards are being met	10%	40%

Credit Release Milestone	Credit Release Activity	Interim Release	Total Released
4	Second year monitoring report demonstrates performance standards are being met	10%	50%
5	Third year monitoring report demonstrates performance standards are being met	15%	65%
6	Fourth year monitoring report demonstrates performance standards are being met	5%	70%
7	Fifth year monitoring report demonstrates performance standards are being met; Provided that all performance standards are met, the IRT may allow the DMS to discontinue hydrologic monitoring after the fifth year, but vegetation monitoring must continue for an additional two years after the fifth year for a total of seven years.	15%	85%
8	Sixth year monitoring report demonstrates performance standards are being met	5%	90%
9	Seventh year monitoring report demonstrates performance standards are being met, and project has received close-out approval	10%	100%

1.1 Initial Allocation of Released Credits

For In-Lieu-Fee (ILF) sites (including all NCDMS projects), no initial release of credits (Milestone 1) is provided because ILF programs utilize advance credits, so no initial release is necessary to help fund construction. To account for this, the 15% credit release associated with the first milestone (Site Establishment) is help until the second milestone, so the total credit release at the second milestone is 30%. In order for NCDMS to release (shown in schedules as Milestone 2) they must comply with the credit release requirements stated in Section IV(I)I(3) of the approved NCDMS instrument. The Milestone 2 credit release, as specified in the mitigation plan, can be released by NCDMS without prior written approval of the DE upon satisfactory completion of the following activities:

a. Approval of the final Mitigation Plan.
b. Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.
c. Completion of project construction (the initial physical and biological improvements to the mitigation site) pursuant to the mitigation plan; per the DMS Instrument, construction means that a mitigation site has been constructed in its entirety, to include planting, and an as-built report has been produced. As-built reports must be sealed by an engineer prior to project closeout, if appropriate but not prior to the initial allocation of released credits.
d. Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

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. For stream projects a reserve of 10% of a site's total stream credits shall be released after four bankfull events have occurred, in separate years, provided the channel is stable and all other performance standards are met. In the event that less than two bankfull events occur during the monitoring period, release of these reserve credits shall be at the discretion of the IRT. As projects approach milestones associated with credit release, 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 8

Site Protection Instrument

1.0 Site Protection Instrument

The land required for construction, management, and stewardship of this mitigation project includes portions of the parcels listed in Table 1. A conservation easement was recorded on the parcels and includes streams being restored along with their corresponding riparian buffers.

Table 1: Site Protection Instrument

Landowner	PIN	County	Site Protection Instrument	Deed Book and Page Number	Acreage to be Protected
329 Partners LLC	7989.16-94-7057	Rockingham	DB: 1594, PG: 54	DB: 87, PG: 52	22.92

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.

CERTIFICATE OF SURVEY AND ACCURACY:

I, HAMPTON JAMES LARK, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION FROM DEED DESCRIPTION(S) RECORDED IN DB: 313 PG: 180; THAT THE BOUNDARIES NOT SURVEYED ARE INDICATED AS DRAWN FROM INFORMATION AS REFERENCED; THAT THE RATIO OF PRECISION AS CALCULATED IS GREATER THAN 1:10,000; THAT THE GPS PORTION OF THIS PROJECT WAS TO PERFORM A GRID TIE TO THE NC STATE PLANE COORDINATE SYSTEM AND INFORMATION USED IS SHOWN & NOTED HEREON; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED.

I ALSO HEREBY CERTIFY THAT THIS PLAT IS OF ONE OF THE FOLLOWING: GS 47-30 F(11) D; THAT THE SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT-ORDERED SURVEY, OR OTHER EXEMPTION OR EXCEPTION TO THE DEFINITION OF SUBDIVISION.

GPS METADATA
CLASS OF SURVEY: HORIZONTAL: A
FIELD PROCEDURE: STATIC NETWORK
DATES: 10/07/19
DATUM: NAD83(2011)
EPOCH: 2010
GEOID: 12B
AVERAGE COMBINED FACTOR: 1.00008601
POSITIONAL ACCURACY: HORIZONTAL: 0.04'
UNITS: USFT
CORS USED: NCRE, NCRX, NCBU, HIPT

WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, & SEAL THIS 1ST DAY OF DECEMBER, 2020.

NORTH CAROLINA PROFESSIONAL SEAL L-2865 LAND SURVEYOR HAMPTON JAMES LARK

HAMPTON JAMES LARK PLS L-2865

ROCKINGHAM COUNTY, NORTH CAROLINA

THIS PLAT DOES NOT CREATE A SUBDIVISION OF PROPERTY IN ROCKINGHAM COUNTY. THE PURPOSE OF THIS SURVEY IS TO IDENTIFY THE CONSERVATION EASEMENT AREAS ONLY. NO TRANSFER OF PROPERTY IS TAKING PLACE.

I, EMILY BACON, REVIEW OFFICER FOR ROCKINGHAM COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

Emily K Bacon 12/21/20
REVIEW OFFICER DATE

REGISTERED THIS THE ___ DAY OF _____,
20___ AT _____ AND RECORDED IN
PLAT BOOK _____ PAGE _____ BY:

_____
DEPUTY

_____
REGISTER OF DEEDS

CERTIFICATE OF OWNERSHIP AND DEDICATION

I (WE) CERTIFY THAT I AM (WE ARE) ALL OF THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH PROPERTY IS LOCATED IN THE JURISDICTION OF ROCKINGHAM COUNTY AND THAT I/WE HEREBY ADOPT THIS PLAN WITH MY/OUR FREE CONSENT.

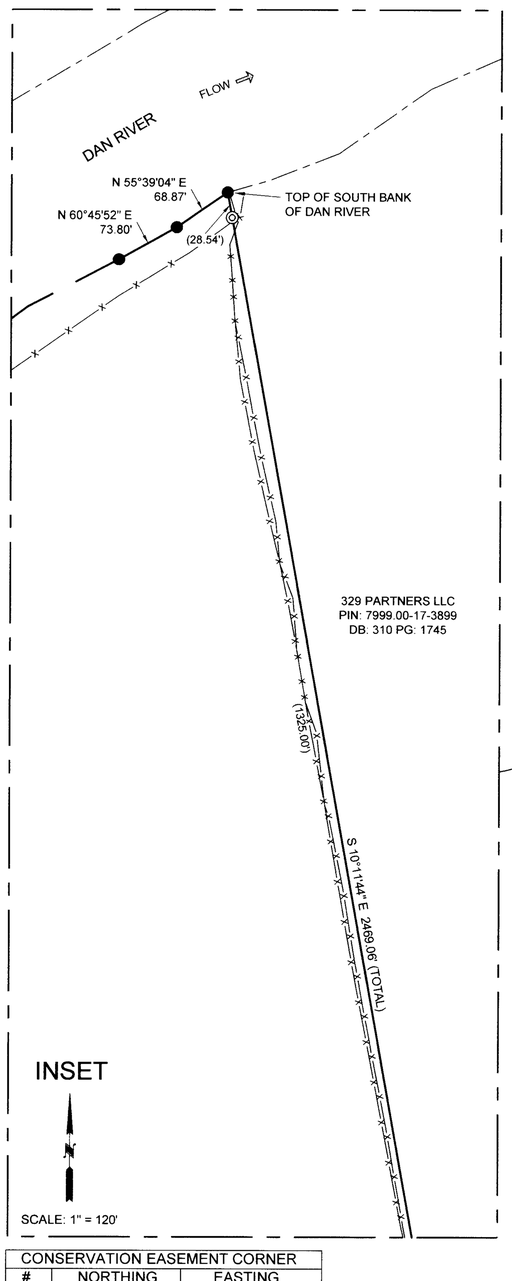
Robert H. Kluttz DEC 17 2020
ROBERT H. KLUTTZ DATE
MANAGER AND REGISTERED AGENT
329 PARTNERS LLC

THE CONSERVATION EASEMENT ON THE PROPERTY SHOWN ON THIS PLAT IS AN EXCEPTION TO THE SUBDIVISION ORDINANCE OF ROCKINGHAM COUNTY, NORTH CAROLINA.

Emily K Bacon 12/21/20
DEPARTMENT OF PLANNING AND BUILDING INSPECTIONS DATE

THE AREAS A & B OF THE DYNAMITE CREEK CONSERVATION EASEMENT, TO THE BEST OF MY KNOWLEDGE, DO NOT LIE WITHIN A PROTECTED WATERSHED AS DESIGNATED BY THE ENVIRONMENTAL MANAGEMENT COMMISSION AS APPEARS ON THE WATERSHED PROTECTION MAP OF ROCKINGHAM COUNTY.

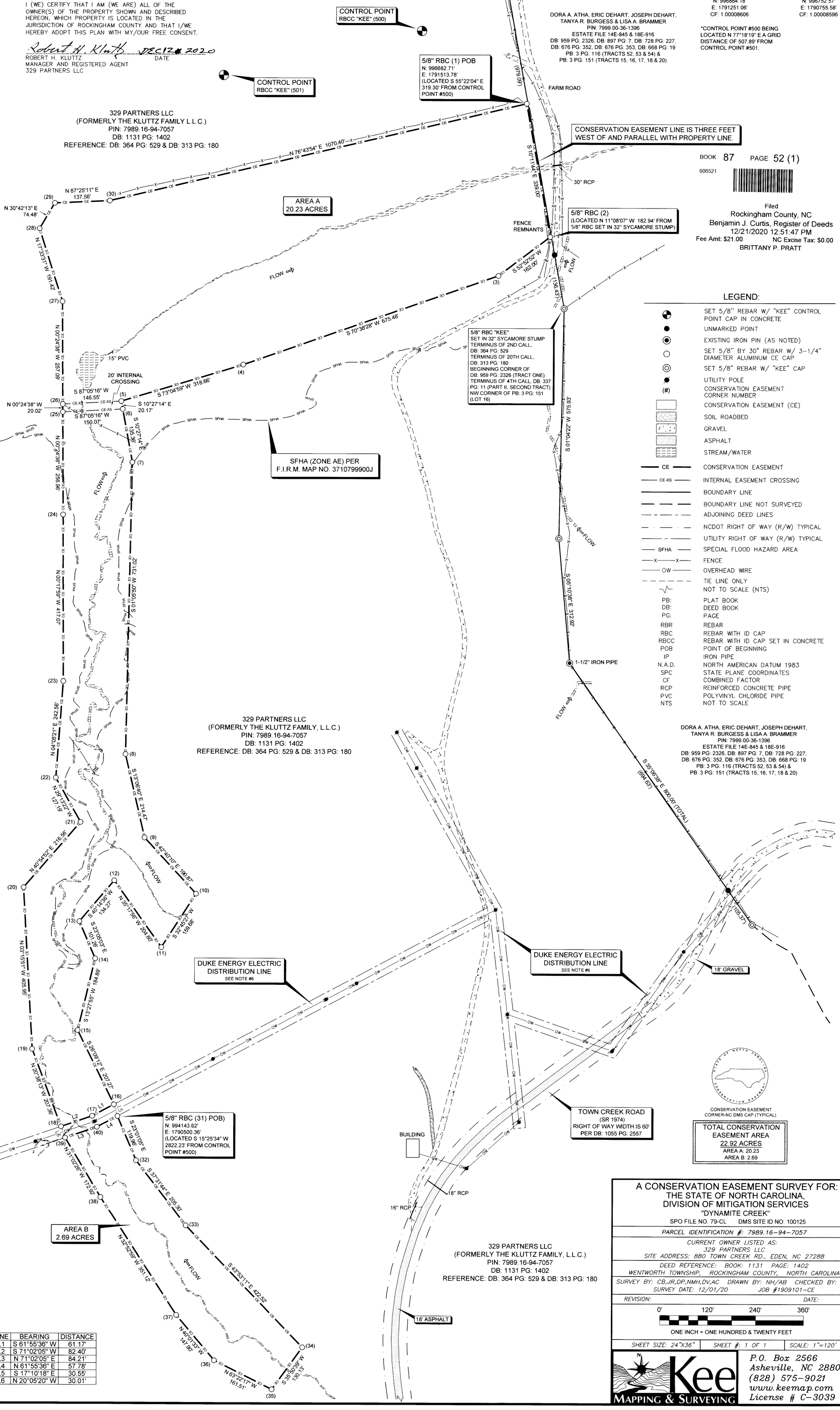
Emily K Bacon 12/21/20
DEPARTMENT OF PLANNING AND BUILDING INSPECTIONS DATE



CONSERVATION EASEMENT CORNER		
#	NORTHING	EASTING
1	996682.72	1791513.78
2	996349.07	1791573.79
3	996251.31	1791444.61
4	996027.40	1790807.33
5	995934.67	1790502.46
6	995914.83	1790506.12
7	995781.72	1790530.68
8	995050.83	1790516.68
9	994841.95	1790565.33
10	994701.61	1790694.70
11	994567.32	1790608.30
12	994734.31	1790490.07
13	994631.82	1790403.33
14	994538.67	1790443.03
15	994358.86	1790399.98
16	994172.81	1790491.34
17	994144.02	1790437.37
18	994117.24	1790359.43
19	994311.30	1790286.35
20	994716.59	1790263.24
21	994880.24	1790405.06
22	994991.25	1790342.97
23	995233.19	1790360.27
24	995650.25	1790358.09
25	995907.21	1790356.24
26	995927.23	1790356.10
27	996184.32	1790354.26
28	996366.82	1790296.51
29	996430.85	1790334.54
30	996437.05	1790471.96
31	994143.62	1790500.36
32	994033.21	1790547.27
33	993870.40	1790672.33
34	993565.88	1790965.24
35	993460.39	1790889.04
36	993532.78	1790744.66
37	993646.04	1790649.54
38	993940.90	1790458.91
39	994089.06	1790369.74
40	994116.43	1790449.37

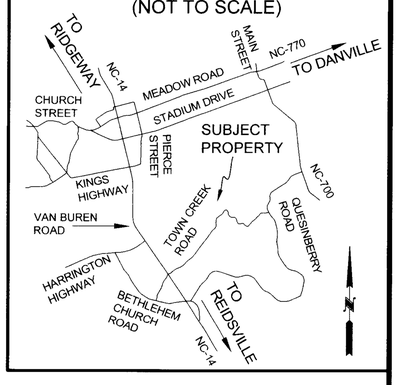
SURVEYOR NOTES:

1. ALL DISTANCES AND COORDINATES ARE GROUND MEASUREMENTS IN US SURVEY FEET UNLESS OTHERWISE NOTED.
2. AREAS CALCULATED BY THE COORDINATE METHOD.
3. PROPERTY SUBJECT TO ALL EASEMENTS, RIGHT OF WAYS AND RESTRICTIONS THAT ARE RECORDED, UNRECORDED, WRITTEN AND UNWRITTEN.
4. ROCKINGHAM COUNTY GIS WEBSITE USED TO IDENTIFY ADJOINING PROPERTY OWNERS.
5. THE PROFESSIONAL SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS, RIGHT OF WAYS, ENCUMBRANCES, RESTRICTIVE COVENANTS, CORRECT OWNERSHIP OR ANY OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE SEARCH MAY DISCLOSE. A NC LICENSED ATTORNEY SHOULD BE CONSULTED.
6. THE TYPICAL RIGHT OF WAY WIDTH REQUIRED FOR OVERHEAD DISTRIBUTION POWER LINES OF ANY VOLTAGE IS NORMALLY A 30 FOOT WIDE CORRIDOR (15 FEET ON EACH SIDE) PER DUKE ENERGY. REFERENCE IS MADE TO DB: 384, PG: 562 AND DB: 599, PG: 462, IN WHICH NO WIDTH IS GIVEN.
7. UTILITIES WERE LOCATED BASED ON VISIBLE ABOVE GROUND STRUCTURES, THEREFORE THE LOCATION OF UNDERGROUND UTILITIES ARE APPROXIMATE OR MAY BE PRESENT AND NOT SHOWN HEREON. CALL 1-800-632-4949 BEFORE DIGGING.
8. BY GRAPHIC DETERMINATION, A PORTION OF THE SUBJECT PROPERTY APPEARS TO LIE WITHIN A SPECIAL FLOOD HAZARD AREA (SFHA) AS DETERMINED BY THE F.E.M.A. MAP# 3710799900J DATED 07/03/2007.
9. THE STATE OF NORTH CAROLINA, ITS EMPLOYEES AND AGENTS, SUCCESSORS AND ASSIGNS, RECEIVE A PERPETUAL RIGHT OF ACCESS TO THE EASEMENT AREA OVER THE PROPERTY AT REASONABLE TIMES TO UNDERTAKE ANY ACTIVITIES TO RESTORE, CONSTRUCT, MANAGE, MAINTAIN, ENHANCE, AND MONITOR THE STREAM, WETLAND AND ANY OTHER RIPARIAN RESOURCES IN THE EASEMENT AREA, IN ACCORDANCE WITH RESTORATION ACTIVITIES OR A LONG-TERM MANAGEMENT PLAN AS DESCRIBED IN SECTION II OF THE CONSERVATION EASEMENT AGREEMENT.
10. PROPERTY IS ZONED RESIDENTIAL SUBURBAN (RS) DEFINED BY THE TOWN OF EDEN, NC ZONING ORDINANCE SECTION 11-24.
11. ALL EXISTING FENCES WITHIN THE CONSERVATION EASEMENT AREAS ARE TO BE REMOVED.
12. FIELD WORK WAS CONDUCTED BETWEEN THE DATES OF 10/07/19 & 09/22/20.



LINE	BEARING	DISTANCE
L1	S 61°55'36" W	61.17'
L2	S 71°02'05" W	82.40'
L3	N 71°02'05" E	84.21'
L4	N 61°55'36" E	57.78'
L5	S 17°10'18" E	30.55'
L6	N 20°05'20" W	30.01'

VICINITY MAP
(NOT TO SCALE)



GRID TIE INFORMATION

CONTROL POINT	CONTROL POINT
RBCC "KEE" (500)	RBCC "KEE" (501)
STATE PLANE COORDINATES	STATE PLANE COORDINATES
N: 996864.18'	N: 996752.57'
E: 1791251.06'	E: 1790755.58'
CF: 1.00008606	CF: 1.00008596

*CONTROL POINT #500 BEING LOCATED N 77°18'19" E A GRID DISTANCE OF 507.89' FROM CONTROL POINT #501.

GRID NORTH
NAD 83(2011)

BOOK 87 PAGE 52 (1)
606521

Filed
Rockingham County, NC
Benjamin J. Curtis, Register of Deeds
12/21/2020 12:51:47 PM
Fee Amt: $21.00 NC Excise Tax: $0.00
BRITTANY P. PRATT

LEGEND:

- SET 5/8" REBAR W/ "KEE" CONTROL POINT CAP IN CONCRETE
- UNMARKED POINT
- EXISTING IRON PIN (AS NOTED)
- SET 5/8" BY 30" REBAR W/ 3-1/4" DIAMETER ALUMINUM CE CAP
- SET 5/8" REBAR W/ "KEE" CAP
- UTILITY POLE
- (#) CONSERVATION EASEMENT CORNER NUMBER
- CONSERVATION EASEMENT (CE)
- SOIL ROADBED
- GRAVEL
- ASPHALT
- STREAM/WATER
- CE — CONSERVATION EASEMENT
- CE-XS — INTERNAL EASEMENT CROSSING
- BOUNDARY LINE
- BOUNDARY LINE NOT SURVEYED
- ADJOINING DEED LINES
- NCDOT RIGHT OF WAY (R/W) TYPICAL
- UTILITY RIGHT OF WAY (R/W) TYPICAL
- SFHA — SPECIAL FLOOD HAZARD AREA
- FENCE
- OW — OVERHEAD WIRE
- TIE LINE ONLY
- NOT TO SCALE (NTS)

PB:	PLAT BOOK
DB:	DEED BOOK
PG:	PAGE
RBR	REBAR
RBC	REBAR WITH ID CAP
RBCC	REBAR WITH ID CAP SET IN CONCRETE
POB	POINT OF BEGINNING
IP	IRON PIPE
N.A.D.	NORTH AMERICAN DATUM 1983
SPC	STATE PLANE COORDINATES
CF	COMBINED FACTOR
RCP	REINFORCED CONCRETE PIPE
PVC	POLYVINYL CHLORIDE PIPE
NTS	NOT TO SCALE

CONSERVATION EASEMENT CORNER-NC DMS CAP (TYPICAL)

TOTAL CONSERVATION EASEMENT AREA
22.92 ACRES
AREA A: 20.23
AREA B: 2.69

A CONSERVATION EASEMENT SURVEY FOR: THE STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES

"DYNAMITE CREEK"
SPO FILE NO. 79-CL DMS SITE ID NO. 100125

PARCEL IDENTIFICATION #: 7989.16-94-7057

CURRENT OWNER LISTED AS:
329 PARTNERS LLC
SITE ADDRESS: 880 TOWN CREEK RD., EDEN, NC 27288

DEED REFERENCE: BOOK: 1131 PAGE: 1402
WENTWORTH TOWNSHIP, ROCKINGHAM COUNTY, NORTH CAROLINA

SURVEY BY: CB,JR,DP,NMH,DV,AC DRAWN BY: NH/AB CHECKED BY: HJL
SURVEY DATE: 12/01/20 JOB #1909101-CE

REVISION: DATE:

0' 120' 240' 360'
ONE INCH = ONE HUNDRED & TWENTY FEET

SHEET SIZE: 24"X36" | SHEET #: 1 OF 1 | SCALE: 1"=120'

Kee MAPPING & SURVEYING
P.O. Box 2566
Asheville, NC 28802
(828) 575-9021
www.keemap.com
License # C-3039

Appendix 9

Financial Assurances

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.

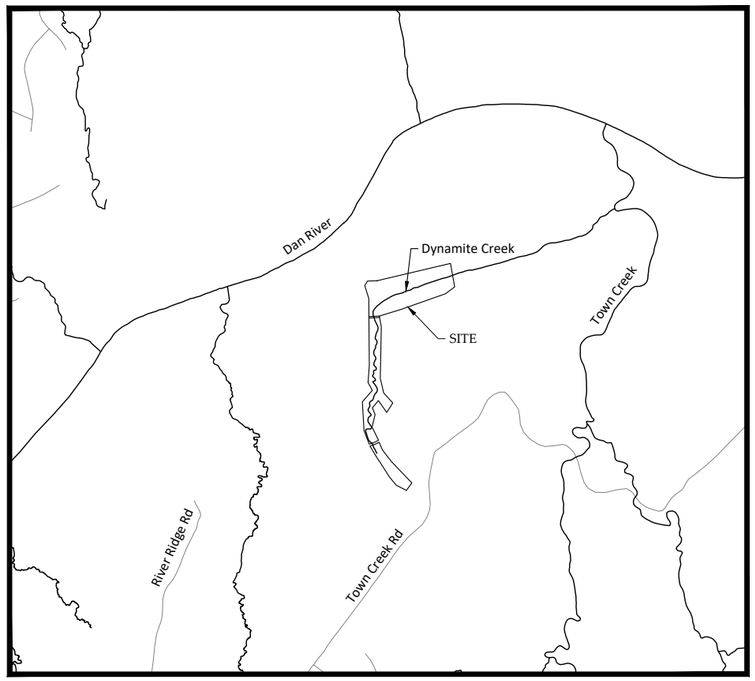
Appendix 10

Plan Sheets

February 8, 2021

Dynamite Creek Mitigation Site

Rockingham County, North Carolina
for
NCDENR
Division of Mitigation Services



Vicinity Map
Not to Scale

Project Location
36°29'3.32" N , 79°42'39.31" W

BEFORE YOU DIG!
CALL 1-800-632-4949
N.C. ONE-CALL CENTER
IT'S THE LAW!

CONSTRUCTION PLANS
ISSUED FOR PERMITTING

Sheet Index

Project Directory

Engineering:
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License No. F-0831
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Raleigh, NC 27609
Angela Allen, PE, Project Engineer
Richard Wright, EI, Project Designer
919-851-9986

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Owner:
NCDEQ DMS
1652 Mail Service Center
Raleigh, NC 27699-1652
Attention: Jeremiah Dow
919-707-8976

NCDEQ Contract No. 7911
DMS ID No. 100125
DWR No. 20190868
USACE Action ID No. 2019-00909

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License No. F-0831

DRAFT

Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Title Sheet

Revisions:

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 0.1

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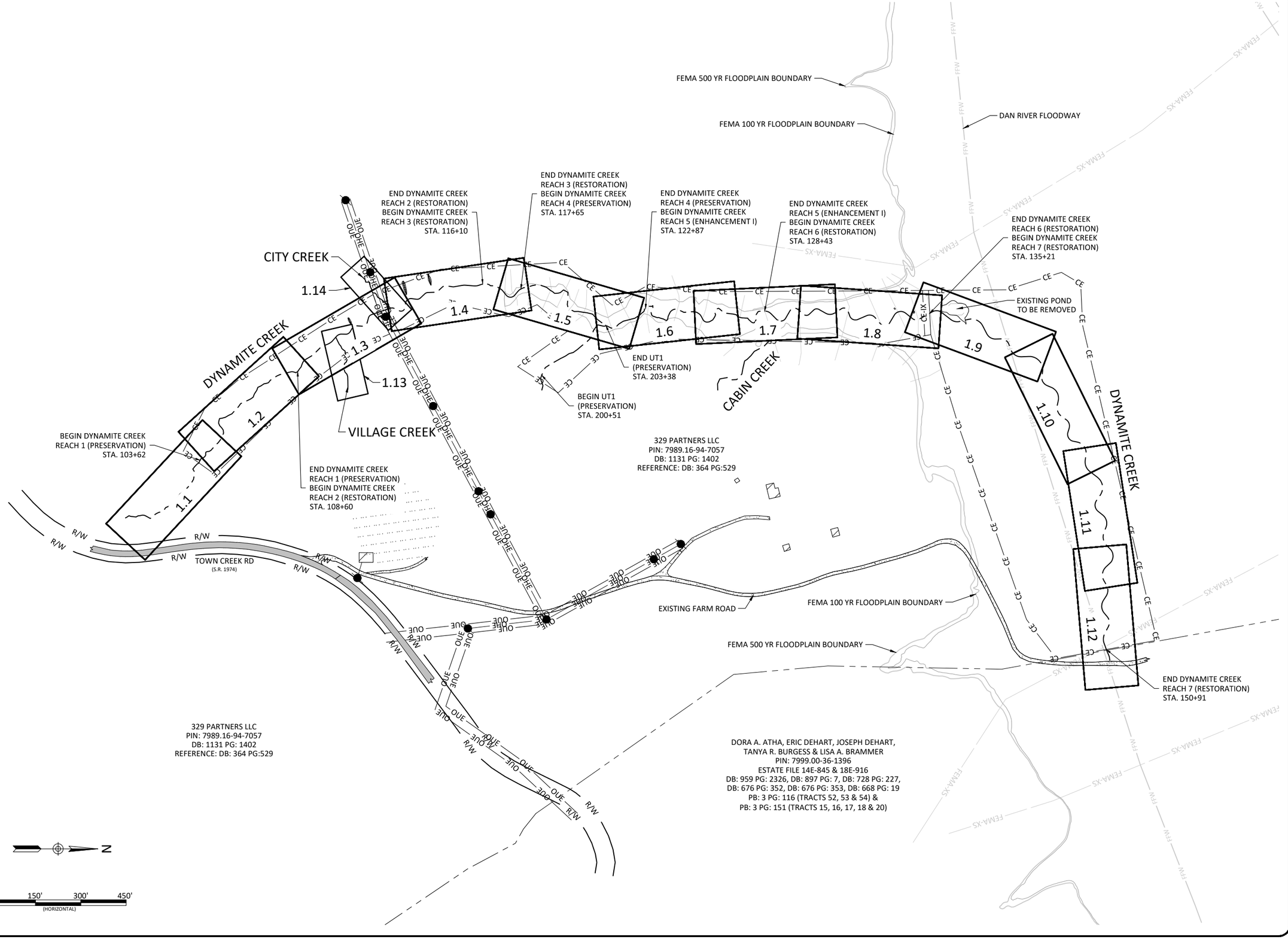
February 8, 2021



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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Project Overview

Revisions:

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 0.2

February 8, 2021

General Notes for All Construction Reaches

1. All erosion and sediment control practices shall comply with the North Carolina Erosion and Sediment Control Planning and Design Manual.
2. Contractor will install pump-around systems to divert flow while working in live, flowing channels. The Contractor shall operate and maintain the pump-around system 24 hours a day until all disturbed areas are stabilized. The disturbed area within the pump around must be stabilized with temporary seeding, mulch, and erosion control matting by the end of each workday. Contractor shall not remove pump-around systems and advance to the next work area until the current work area is completed and stabilized.
3. No material from the off-line proposed stream channel excavation may be backfilled into the adjacent existing stream channel until the newly constructed proposed stream section is completed, stabilized, and the stream flow has been diverted into it, not even if that section of old/existing stream is being pumped.
4. In areas without a pump-around system, Contractor shall disturb only as much channel bank as can be stabilized with temporary seeding, mulch, and sod mat or erosion control matting by the end of each workday.
5. Clearing and grubbing activities shall not extend more than 150 linear feet ahead of in-stream work.
6. When crossing an active section of new or old stream channel, a timber mat shall be installed according to the details and specifications.
7. All graded areas with slopes steeper than 3:1 will be stabilized within seven (7) working days. All other areas will be stabilized within 14 working days.
8. Locations for staging and stockpile areas and temporary stream crossings have been provided in the plans. Additional or alternative staging and/or stockpile areas and stream crossings may be used by the Contractor provided that all practices comply with the North Carolina Erosion and Sediment Control Planning and Design Manual and that the areas are approved by Engineer prior to implementation. Short-term stockpile areas are those that will remain in place for a short period of time so that the disturbed area can be stabilized within the timeframes in item #7 of the General Notes for All Construction Reaches. Additional stockpile areas and other short-term stockpiles, staging areas, and stream crossings not shown in the plans will require approval of the Division of Energy, Mineral, and Land Resources.
9. Vegetation onsite to be used as transplant material (Juncus, small trees, and sod mats) shall not be disturbed until Contractor is prepared to install transplants.
10. Various types of constructed riffles are specified in the plans. Contractor shall build the specific types of constructed riffles at locations shown in the plans. Changes in constructed riffle type must be approved by Engineer.
11. Existing fence located inside the conservation easement shall be removed during construction.
12. Contractor is to make every effort to avoid damaging or removing existing trees.
13. Under no circumstances will Contractor exceed the limits of disturbance and/or go outside of temporary construction access areas shown in the plans.

Initial Site Preparation

1. Call NC DEQ LQS at the Winston Salem Regional Office (336-776-9800) to schedule a pre-construction meeting at least 48 hours prior to project activation.
2. Contact North Carolina "One Call" Center (800-632-4949) before any excavation.
3. Contact Division of Energy, Mineral and Land Resources (336-776-9800) before any work begins on the project and notify them of the start date.
4. Mobilize equipment and materials to the Site.
5. Identify and establish construction entrance, staging and stockpile areas, haul roads, silt fence, tree protection fencing, safety fencing, and temporary stream crossings as indicated in the plans for work areas.
6. All haul roads shall be monitored for sediment loss daily. In the event of sediment loss, silt fence or other acceptable sediment and erosion control practices shall be installed. Silt fence outlets shall be located at points of low elevation or a maximum spacing of 150 ft.
7. Set up temporary facilities, locate equipment within the staging area, and stockpile materials needed for the initial stages of construction within the stockpile area(s).
8. Install and maintain an onsite rain gauge and logbook to record the rainfall amounts and dates. Maintain an approved copy of the E&SC plan with placard and approval letter and a copy of the NPDES permit with a minimum of 30 days of self-inspection reports onsite until project closure by NCDEQ. Complete self-inspections as required by NCDEQ permit. Rainfall records, completed self-inspection forms, and permits should be maintained onsite.
9. Monitor site for sediment loss and inspect all erosion control features after each rain event. Maintain erosion control features according to the North Carolina Erosion and Sediment Control Planning and Design Manual.

Construction Sequence

1. Erosion and Sediment Control (E&SC) permit and Certificate of Coverage (COC) must be obtained before land disturbing activities occur. The COC can be obtained by filling out the Electronic Notice of Intent (e-NOI) form at edocs.deq.nc.gov/Forms/NCG01-NOI. Please note, the e-NOI form may only be filled out once the plans have been approved. A copy of the E&SC permit, the COC and a hardcopy of the plans must be kept onsite, preferably in a permit box, and accessible during inspection.
2. This project may be constructed in phases according to construction entrances . Contractor shall not start construction on one phase and move to another phase before stabilizing the first, unless a crew is continuing work on the initial phase.
3. Install temporary livestock fencing as necessary to secure project area under construction. Conservation easement fencing may be installed prior to construction to reduce or eliminate the need for temporary fencing.
4. Perform any necessary clearing and grubbing in phases as work progresses. Bank vegetation and vegetation immediately adjacent to live channels shall be left undisturbed as long as possible. Remove all non-native and invasive vegetation prior to beginning channel construction. Take care with vegetation marked for transplant from old channel to new channel. Do not disturb transplant vegetation until time of transplant.
5. Construction of all channels is to be done in the dry. Construction should generally progress from upstream to downstream to prevent sediment runoff from upstream construction affecting completed downstream reaches. Use a pump-around system as shown in the plans and discussed in the General Notes for All Construction Reaches.
6. Where feasible, multiple offline sections may be constructed concurrently. Offline sections shall be tied online sequentially from downstream to upstream.
7. As work progresses, remove and stockpile the top three (3) inches of soil from the active grading area. Stockpiled topsoil shall be kept separate for onsite replacement prior to floodplain seeding.
8. Construct proposed stream channel to the grades specified in the cross sections and profiles. Transfer coarse material from abandoned channel riffles to new channel riffles, utilizing a pump-around system when doing so.
9. Grade the adjacent floodplain area according to grades shown in the plans.
10. Install in-stream structures (riffles, angled log sills, log vanes, lunker logs, and log-j-hooks) and in-bank bioengineering such as brush toe and transplanted sod mats after channel grading is completed according to details and specifications.
11. Seed with specified temporary seed and permanent seed mixes and straw mulch areas where coir fiber matting is to be installed.
12. Install coir fiber matting according to plans and specifications.
13. Sod mats may be used in lieu of coir fiber matting, where available, to stabilize all stream banks as the preferential stabilization method. Coir fiber matting may be used where sod mats are not available or if coir fiber matting is preferred at the discretion of Engineer.
14. Backfill abandoned channel sections with stockpiled soil according to grades shown in the plans. Non-native and invasive vegetation (e.g. Chinese privet and multiflora rose) shall be removed from the existing channel prior to backfilling.
15. Prepare floodplain for seeding by applying stockpiled topsoil to the floodplain between bankfull elevation and grading limits, ripping, and raking/smoothing. Seed with specified temporary and permanent seed mix and mulch. Any areas within the conservation easement that have not been graded shall be treated according to the planting plan.
16. If at any time circumstances should arise where water has been turned into new channel and additional work must be done on the floodplain, erosion control devices shall be installed to protect the new channel from sedimentation.
17. Once all phases of channel and floodplain construction are complete, prepare floodplain areas for planting per the specifications.
18. Install live stakes and herbaceous plugs along the stream banks according to the plans and specifications.
19. When the project is complete, the permittee shall contact DEMLR to close out the E&SC Plan. After DEMLR informs the permittee of the project close out, via inspection report, the permittee shall visit edocs.deq.nc.gov/Forms/NCG01-Termination to submit an electronic notice of Termination (e-NOT). A $100 annual general permit fee will be charged until the e-NOT has been filled out.

Construction Demobilization

1. Remove temporary stream crossings.
2. Contractor shall ensure that the site is free of trash and leftover materials prior to demobilization of equipment from the site.
3. Complete the removal of any additional stockpiled material from the site.
4. Demobilize grading equipment from the site.
5. All rock and other stockpiled materials must be removed from within the limits of disturbance and conservation easement. All areas outside the conservation easement shall be returned to pre-project conditions or better.
6. Seed, mulch, and stabilize staging areas, stockpile areas, haul roads, and construction entrances. Pasture seed mix is to be applied to areas of disturbance outside of the conservation easement.
7. Remove all temporary erosion control measures once permanent stabilization has been achieved.

Existing Features

- FEMA-XS — FEMA CROSS SECTIONS
- FEMA — FEMA 100 YR FLOODPLAIN BOUNDARY
- FEMA FP — FEMA 500 YR FLOODPLAIN BOUNDARY
- FFW — FFW — FEMA FLOODWAY
- TB — TB — EXISTING TOP OF BANK
- EXISTING THALWEG
- X — X — EXISTING FENCE
- EXISTING STORM PIPE
- 100 — EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING PROPERTY LINE
- OHE — OHE — OVERHEAD ELECTRIC
- OUE — OUE — OVERHEAD ELECTRIC UTILITY EASEMENT
- EXISTING TREE LINE
- EXISTING BEDROCK
- EXISTING FARM PATH
- EXISTING WETLAND
- EXISTING POND
- EXISTING UTILITY POLE
- EXISTING GUY WIRE
- EXISTING DECIDUOUS TREE

Proposed Features

- 100+00 — PROPOSED THALWEG
- PROPOSED BANKFULL
- 100 — PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- CE — CE — PROPOSED CONSERVATION EASEMENT
- CE-IX — CE-IX — PROPOSED CONSERVATION EASEMENT INTERNAL CROSSING
- LOG VANE
- LOG SILL
- ROCK SILL
- LOG J-SILL
- PROPOSED BOULDER TOE
- LUNKER LOG
- PROPOSED ROCK OUTLET
- CR-ALR — PROPOSED ANGLED LOG RIFFLE
- CR-CH — PROPOSED CHUNKY RIFFLE
- CR-NM — PROPOSED NATIVE MATERIAL RIFFLE
- CR-WD — PROPOSED WOODY RIFFLE
- PROPOSED STREAM BANK GRADING
- PROPOSED FORD CROSSING
- PROPOSED BRUSH TOE
- PROPOSED VEGETATED SOIL LIFT
- EARTHEN VALLEY SILL

Erosion Control Features

- LOD — LOD — LIMITS OF DISTURBANCE
- SAF — SAF — SAFETY FENCE
- [X] — [X] — SILT FENCE
- SILT FENCE OUTLET
- PUMP AROUND
- TEMPORARY CROSSING
- STAGING/STOCKPILE AREA
- PROPOSED CONSTRUCTION ACCESS
- PROPOSED HAUL ROAD

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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

General Notes and Symbols

Revisions:

Date: 02/08/20
Job Number: 005-02184
Project Engineer: ANA
Drawn By: RHW
Checked By: NMM

Sheet 0.3

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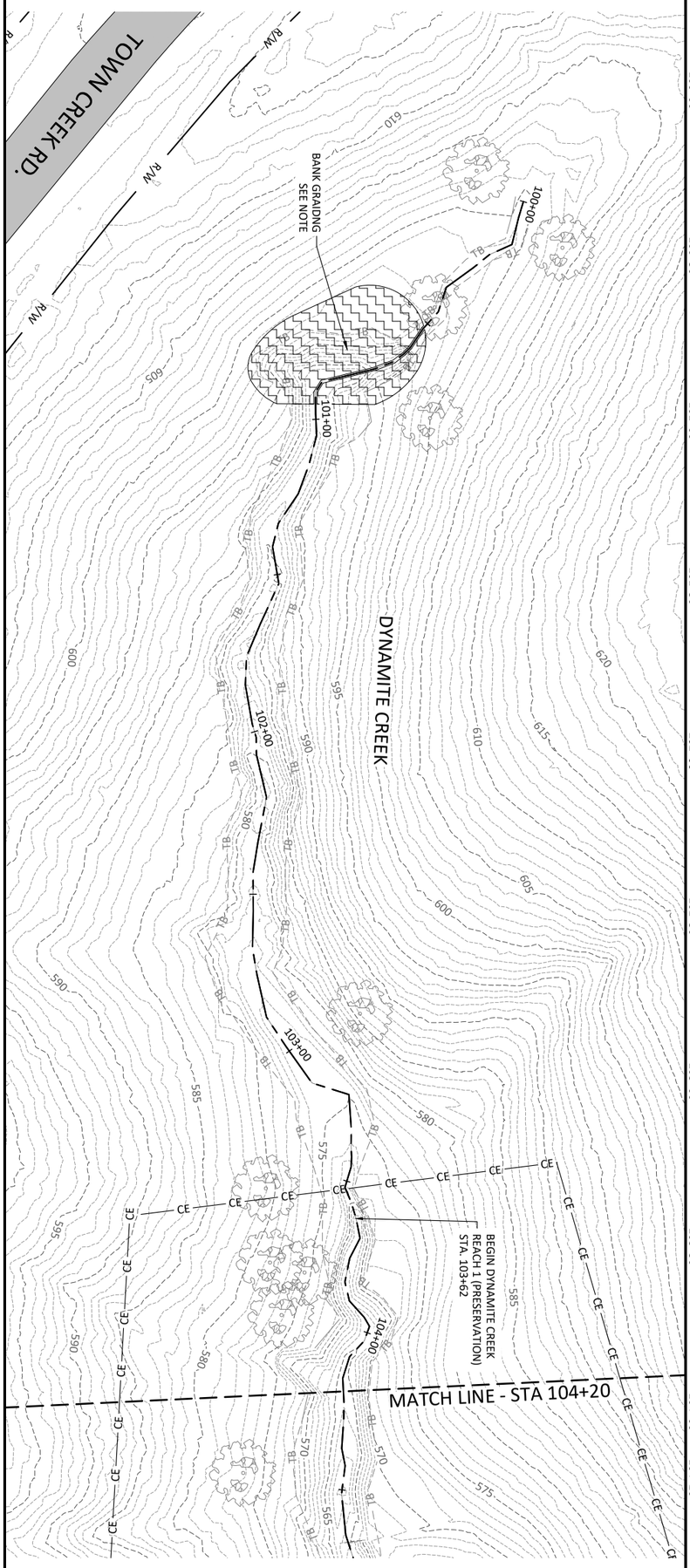

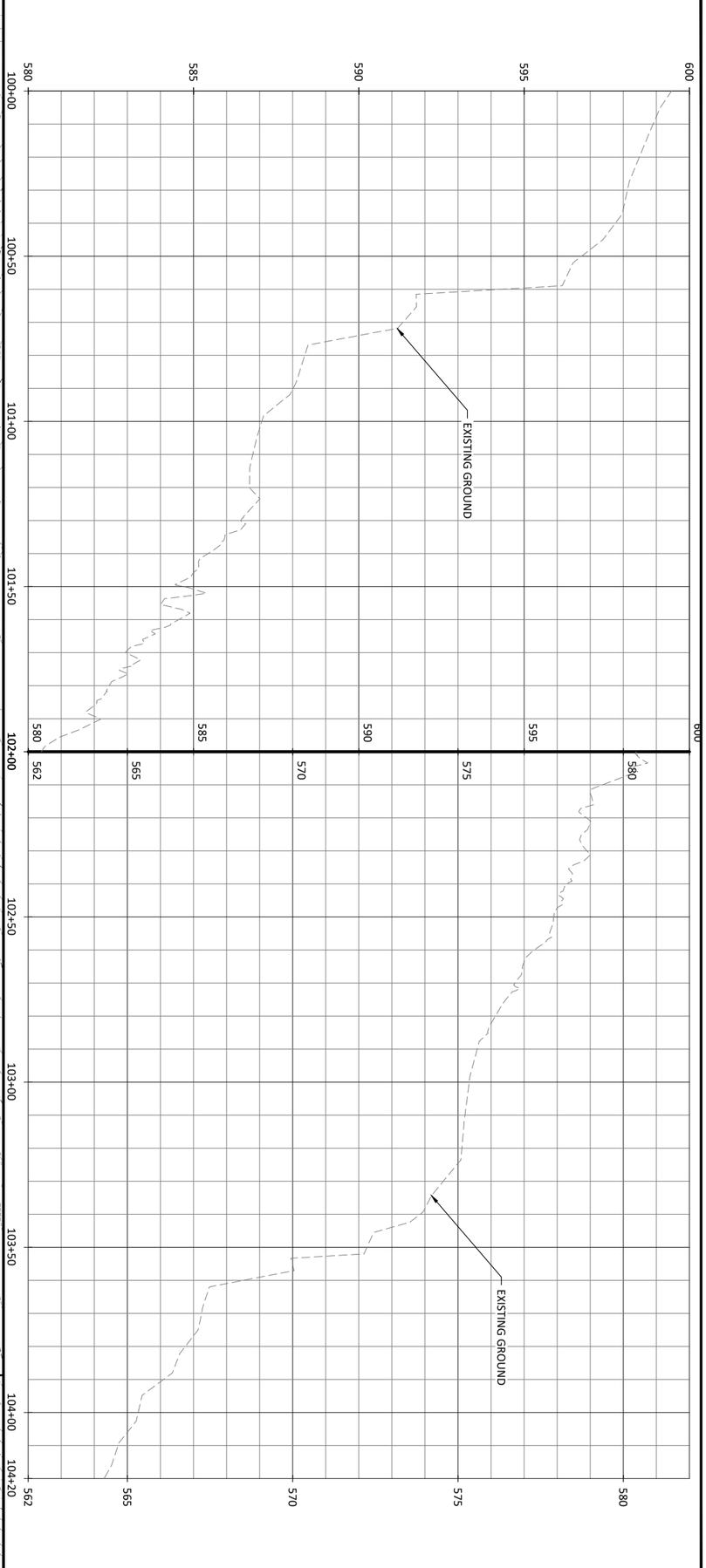

Note:
1. Grade stream banks to 3(H):1(V) slope where possible. Mat and seed exposed and disturbed areas.

N

0' 20' 40' 60' (HORIZONTAL)

0' 2' 4' 6' (VERTICAL)

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Revisions:

1.1
Sheet

Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Dynamite Creek
Stream Plan and Profile

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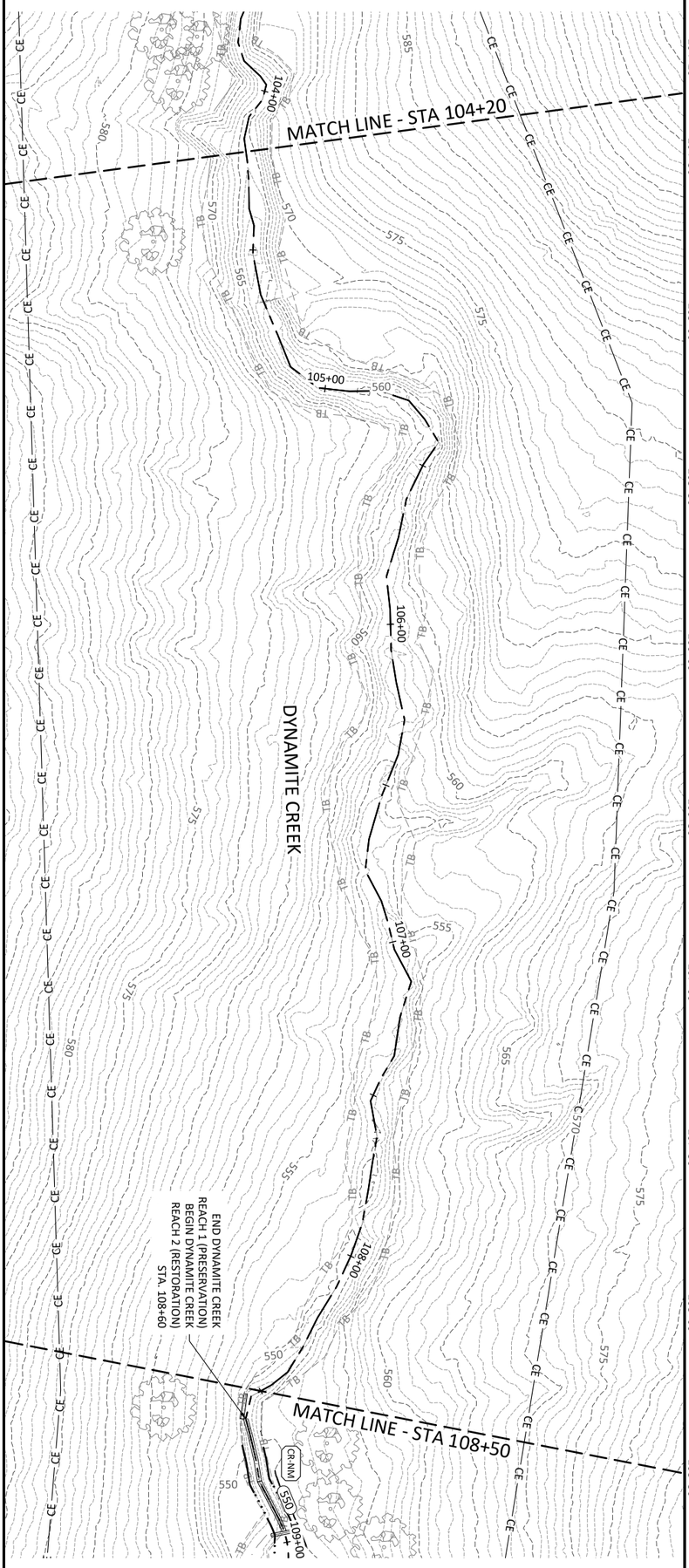

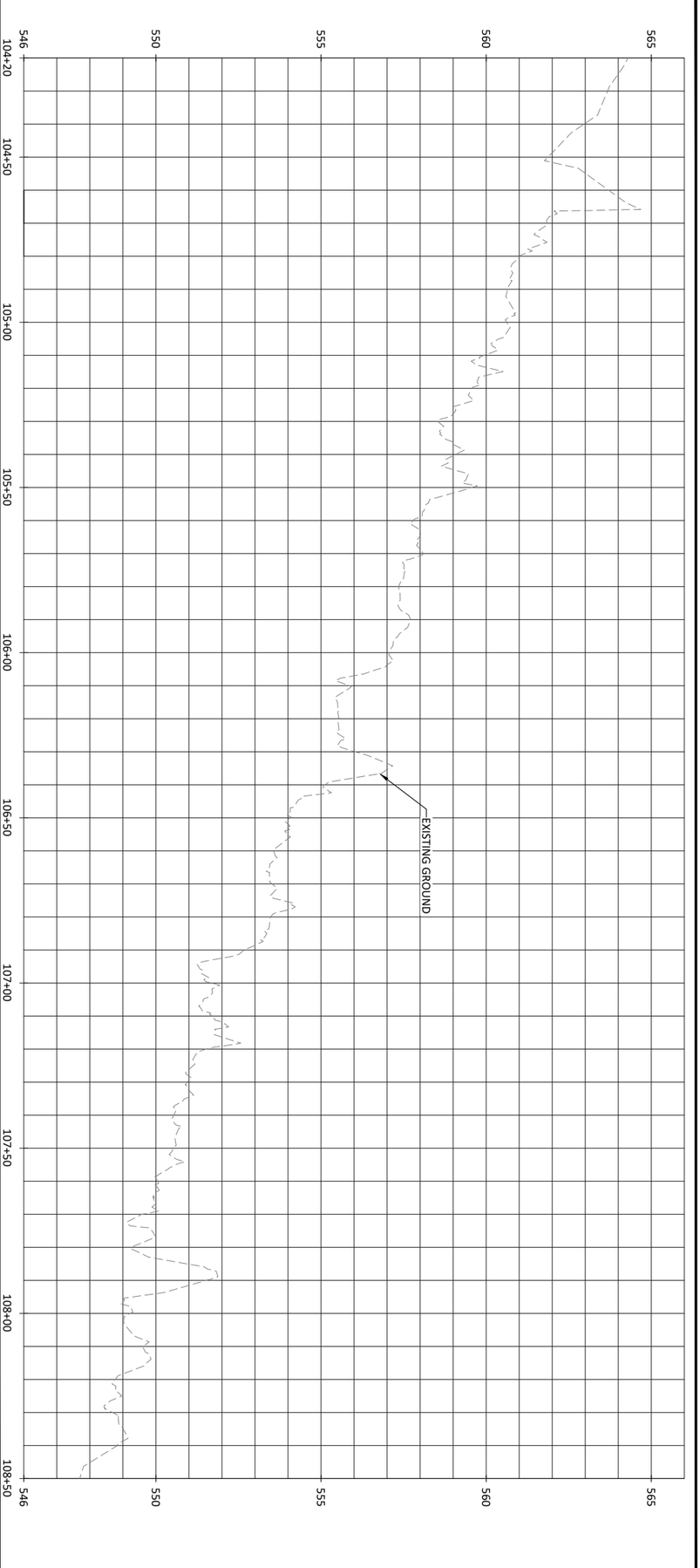

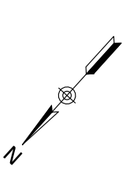

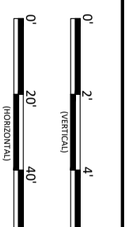

Date:	02/08/20
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Drawn By:	RHW
Checked By:	NMM

Revisions:

1.2
Sheet

Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Dynamite Creek
Stream Plan and Profile

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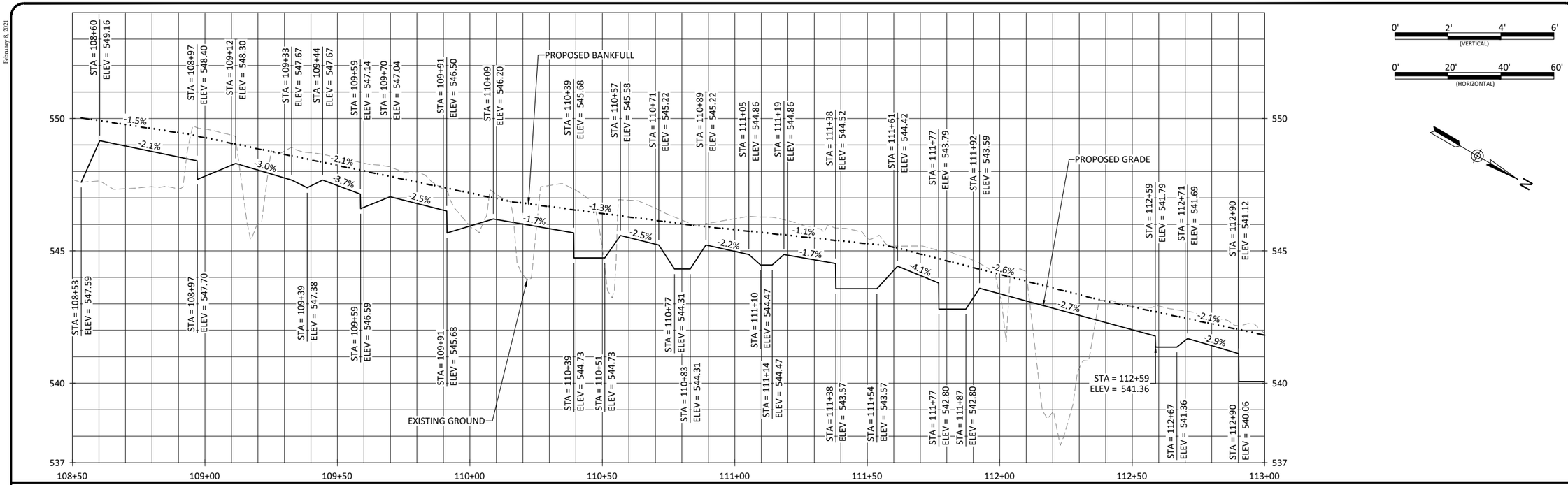
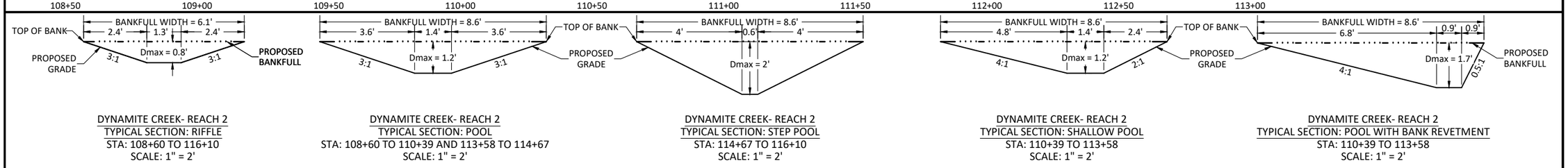




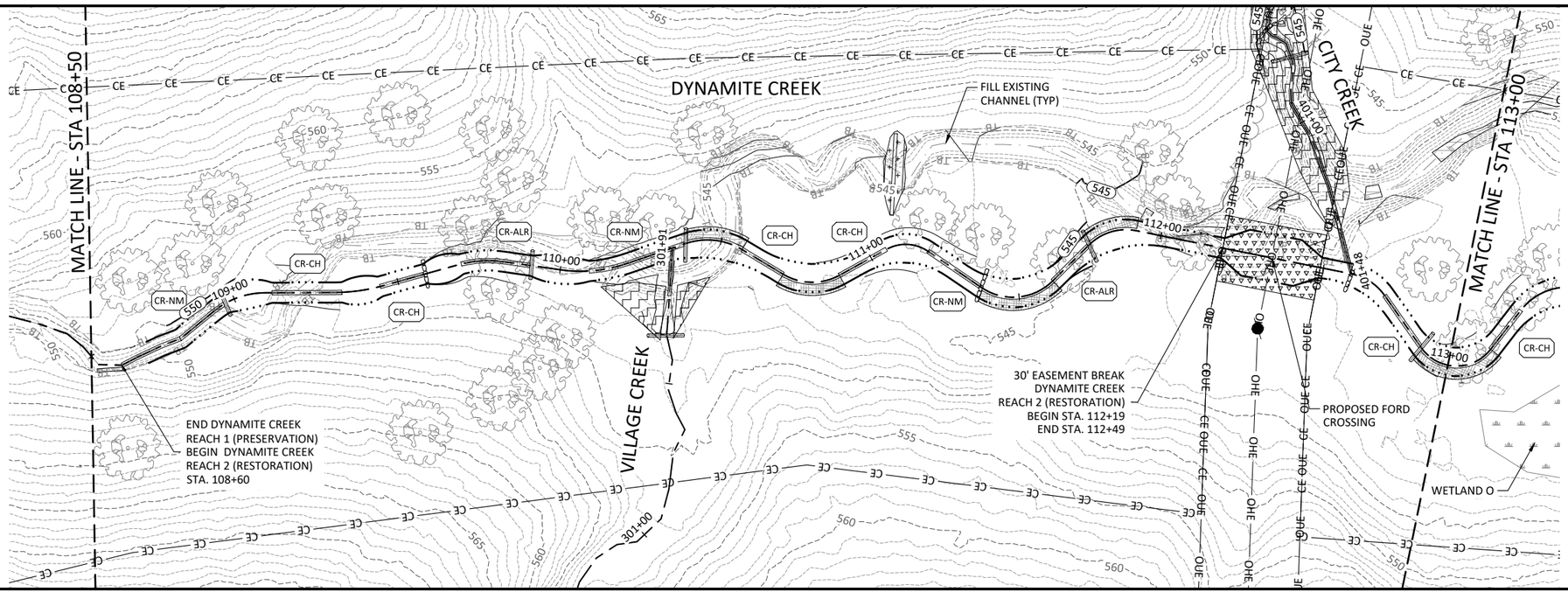
DYNAMITE CREEK- REACH 2
TYPICAL SECTION: RIFFLE
STA: 108+60 TO 116+10
SCALE: 1" = 2'

DYNAMITE CREEK- REACH 2
TYPICAL SECTION: POOL
STA: 108+60 TO 110+39 AND 113+58 TO 114+67
SCALE: 1" = 2'

DYNAMITE CREEK- REACH 2
TYPICAL SECTION: STEP POOL
STA: 114+67 TO 116+10
SCALE: 1" = 2'

DYNAMITE CREEK- REACH 2
TYPICAL SECTION: SHALLOW POOL
STA: 110+39 TO 113+58
SCALE: 1" = 2'

DYNAMITE CREEK- REACH 2
TYPICAL SECTION: POOL WITH BANK REVETMENT
STA: 110+39 TO 113+58
SCALE: 1" = 2'



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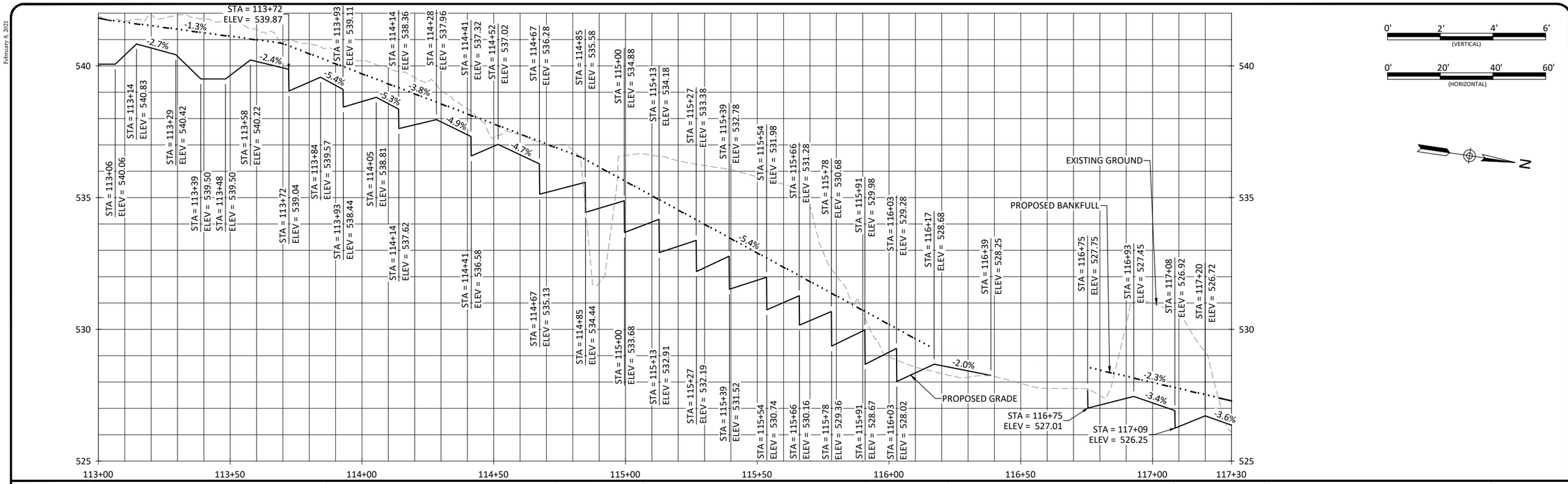
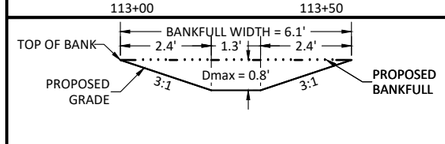
Sheet 1.3

February 8, 2021





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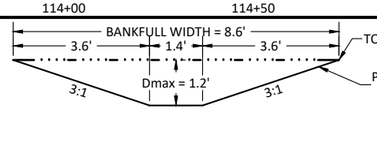

DYNAMITE CREEK- REACH 2
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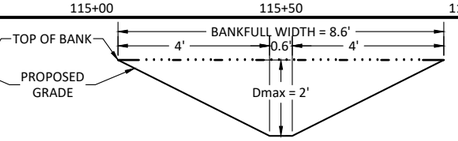

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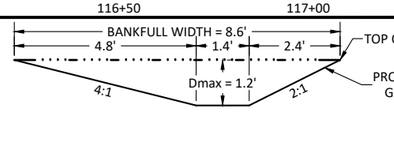

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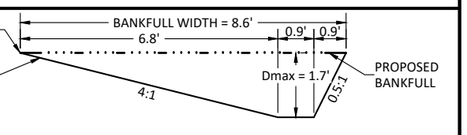

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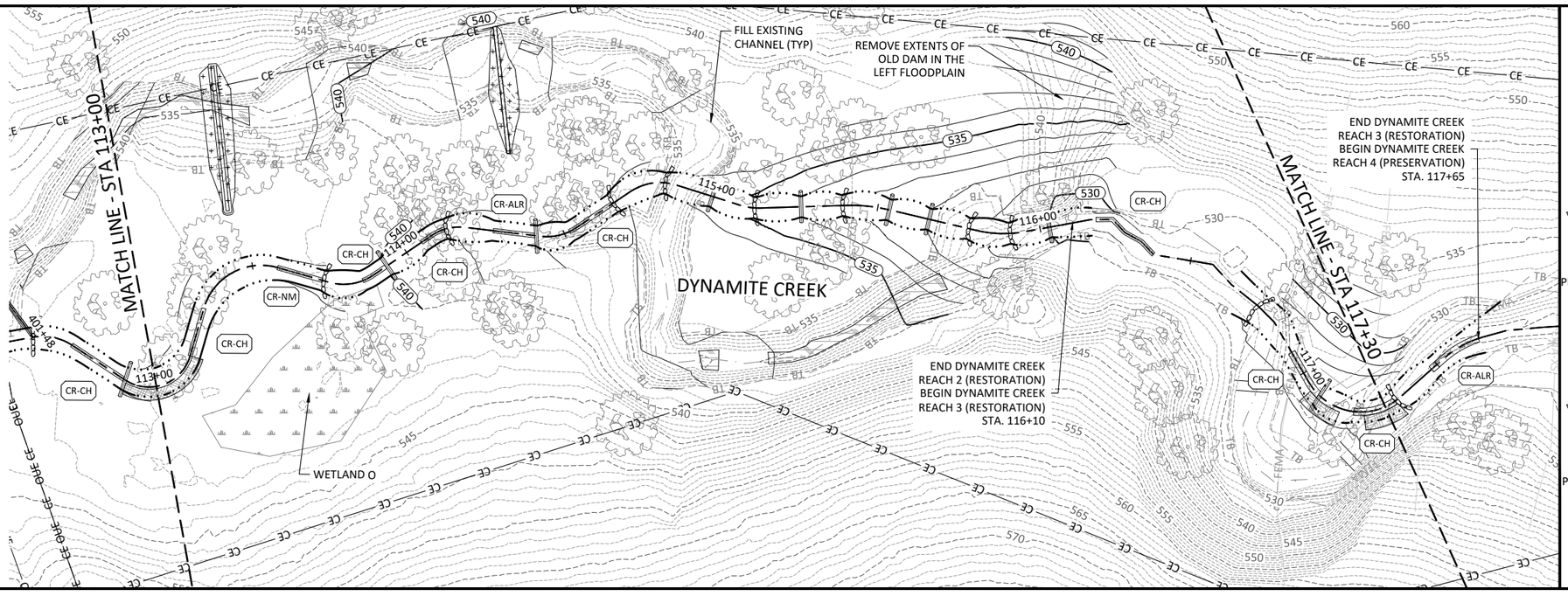
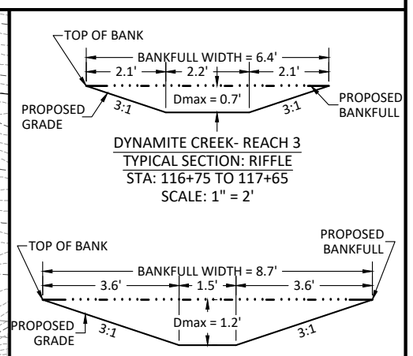
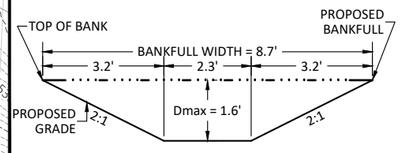




DYNAMITE CREEK- REACH 3
TYPICAL SECTION: RIFFLE
STA: 116+75 TO 117+65
SCALE: 1" = 2'

DYNAMITE CREEK- REACH 3
TYPICAL SECTION: SHALLOW POOL
STA: 116+75 TO 117+65
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 3
TYPICAL SECTION: POOL WITH BANK REVETMENT
STA: 116+75 TO 117+65
SCALE: 1" = 2'

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Dynamite Creek Mitigation Site

Rockingham County, North Carolina

Dynamite Creek
Stream Plan and Profile

Revisions:

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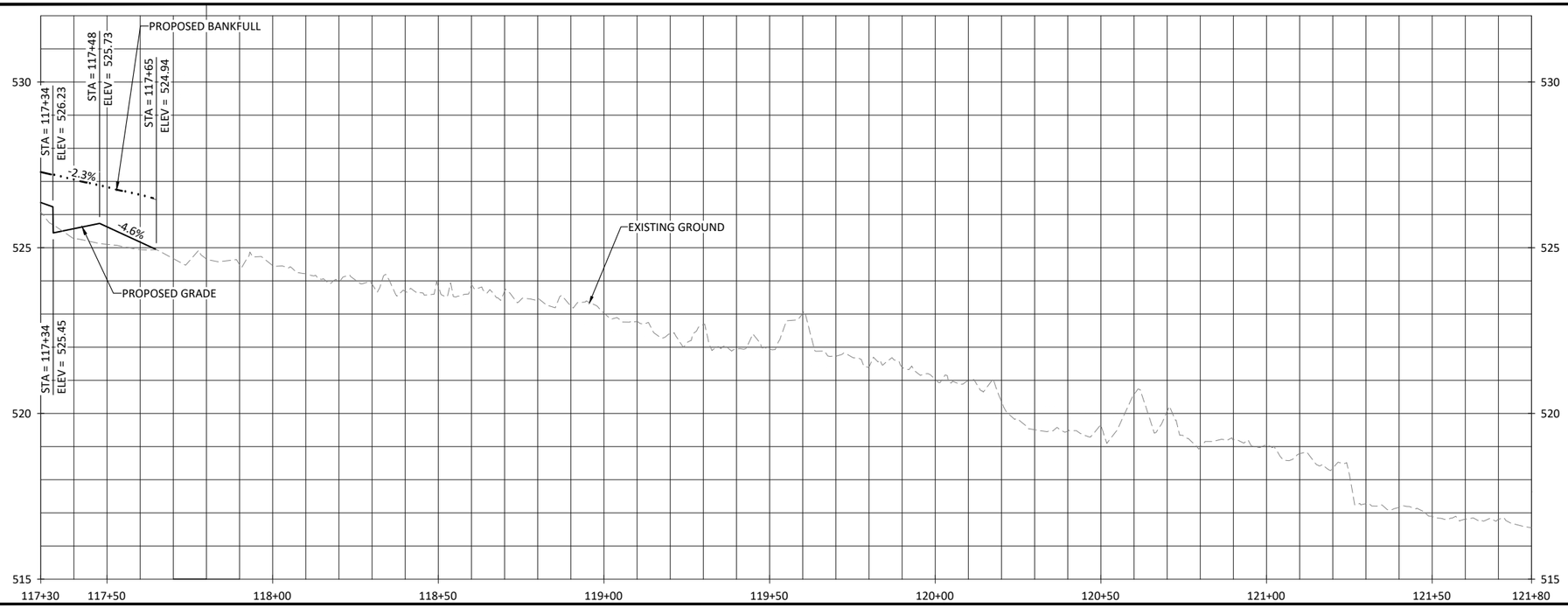
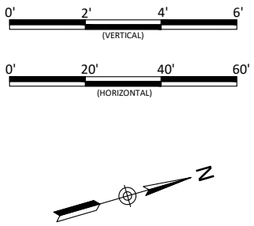
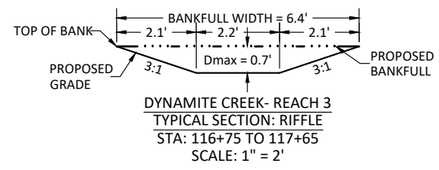
Sheet 1.4

February 8, 2021







DYNAMITE CREEK- REACH 3
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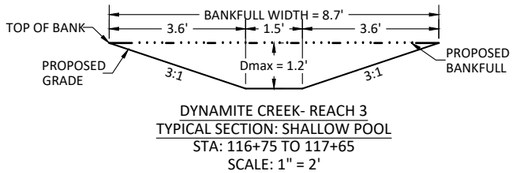
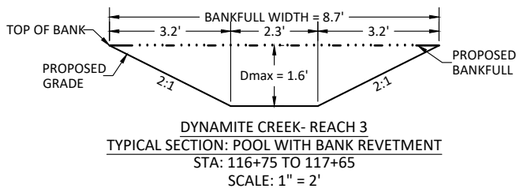
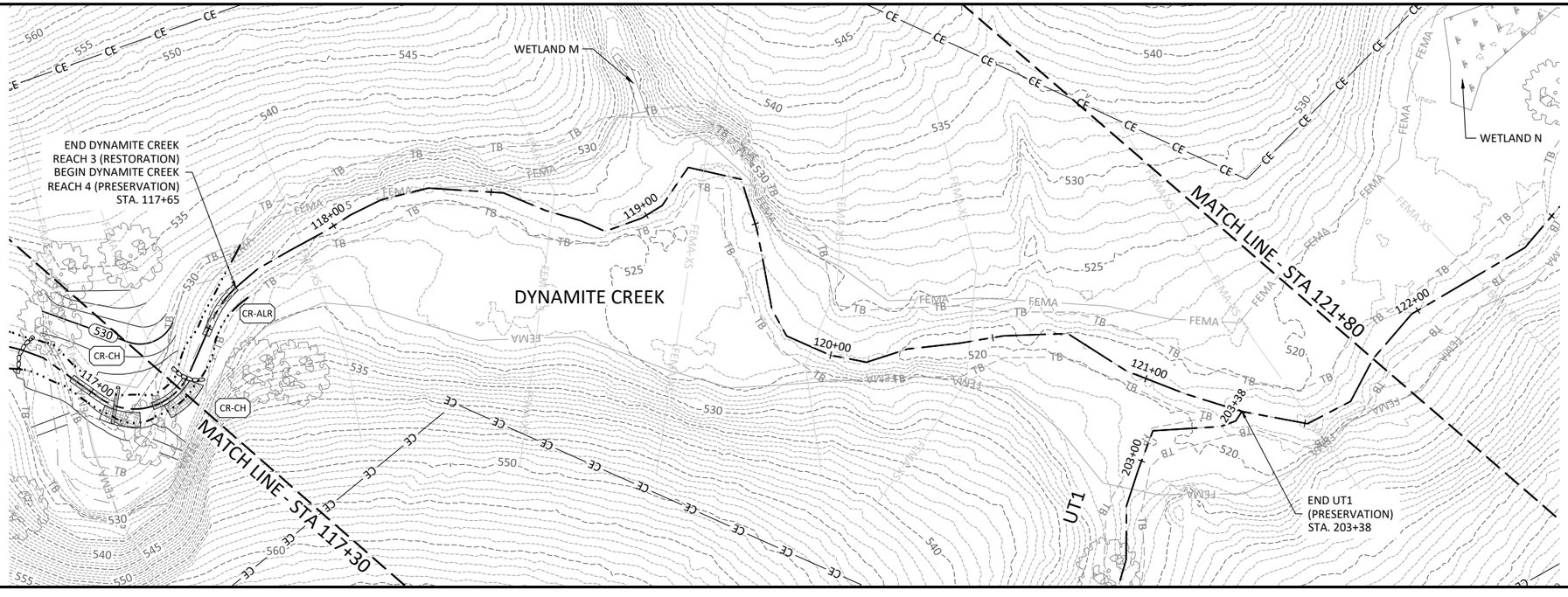
STA: 116+75 TO 117+65
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 3
TYPICAL SECTION: SHALLOW POOL
STA: 116+75 TO 117+65
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 3
TYPICAL SECTION: POOL WITH BANK REVETMENT
STA: 116+75 TO 117+65
SCALE: 1" = 2'



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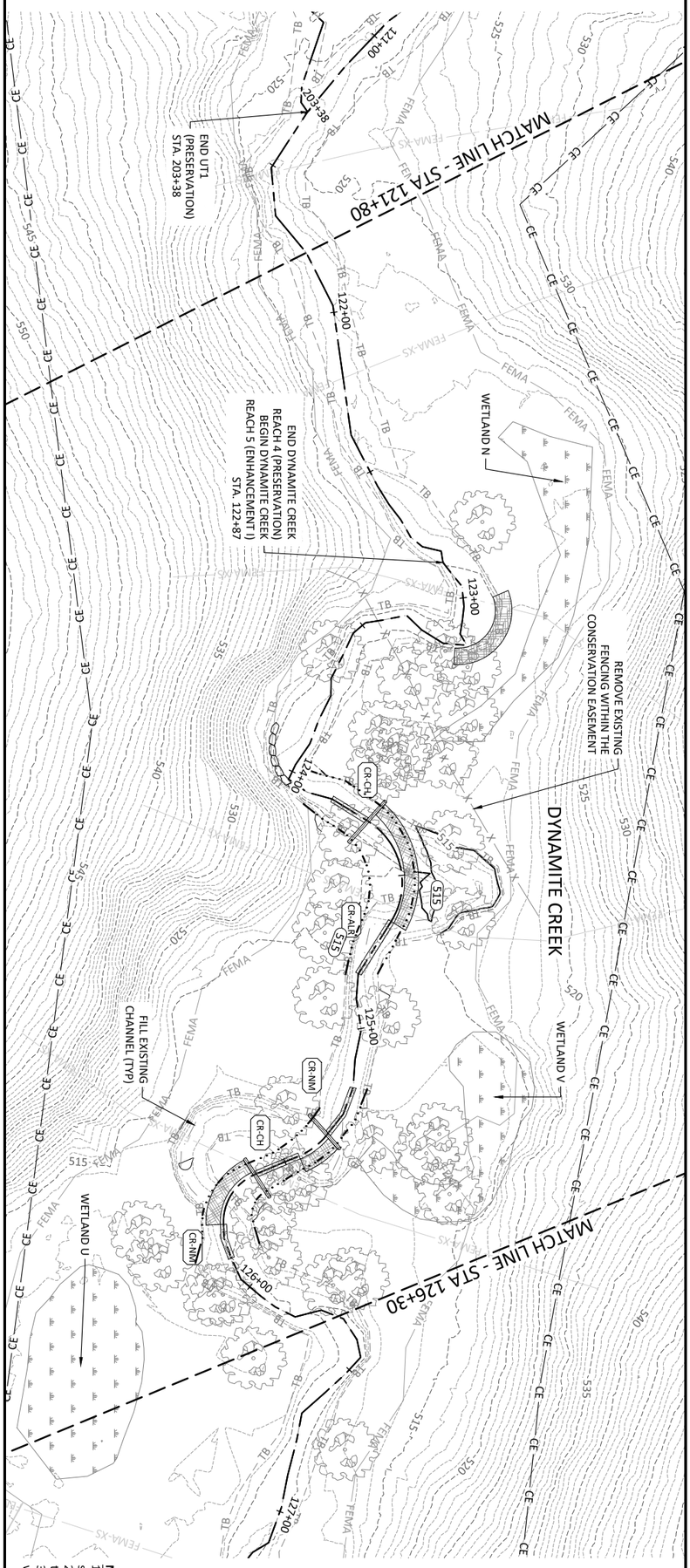
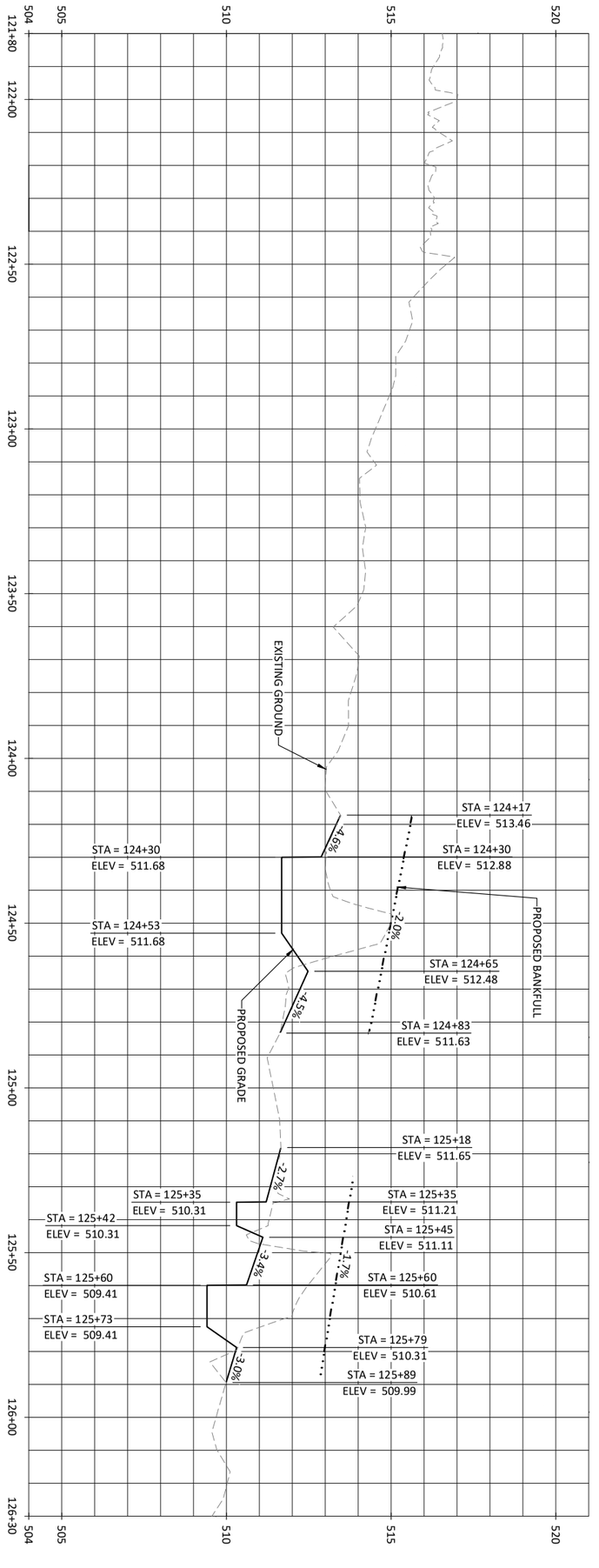
Dynamite Creek Mitigation Site
Rockingham County, North Carolina
Dynamite Creek
Stream Plan and Profile

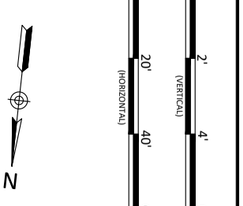
Revisions:

Date:	02/08/20
Job Number:	105-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 1.5







Notes:
1. Realign the channel per the proposed bankfull alignments shown on the plans.
2. Grade the channel per the proposed grade profile. Construct the channel to have a bottom width of 1.9'.
3. Side slopes should be no steeper than 2(H):1(V) slope except where bank revetments are to be installed.

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

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1.6
Sheet

Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Dynamite Creek
Stream Plan and Profile

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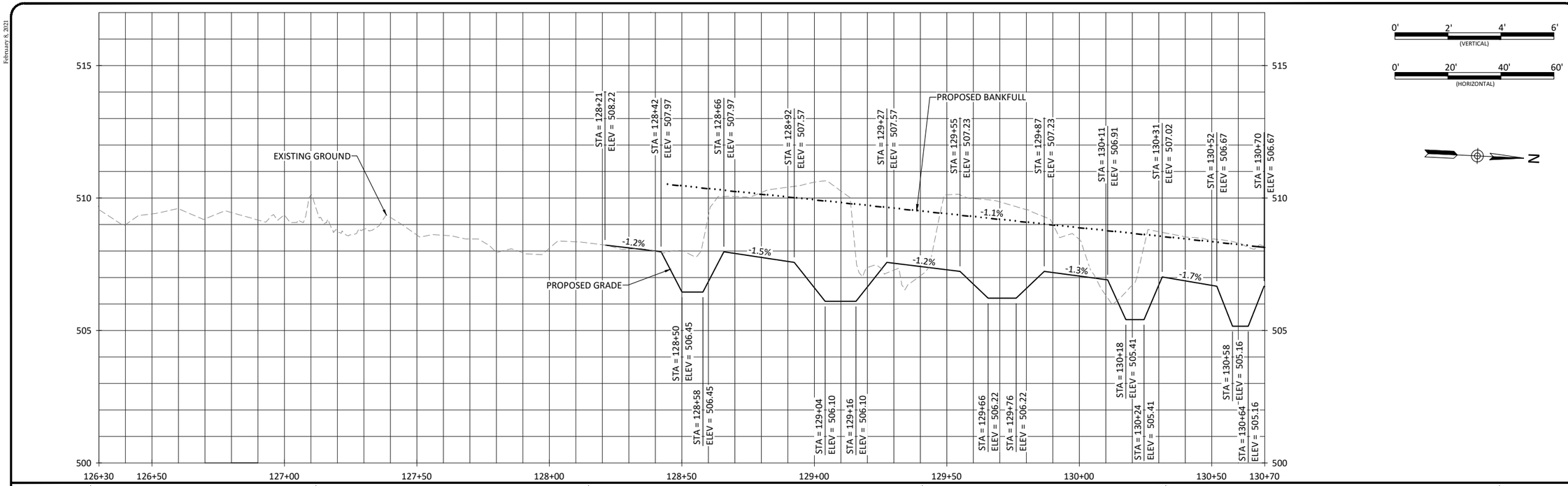
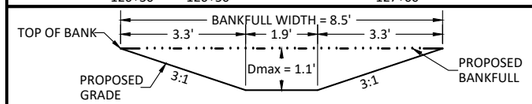
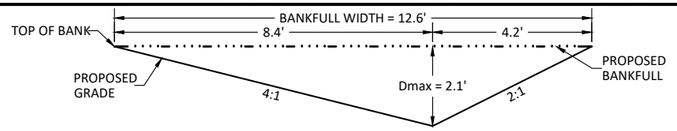
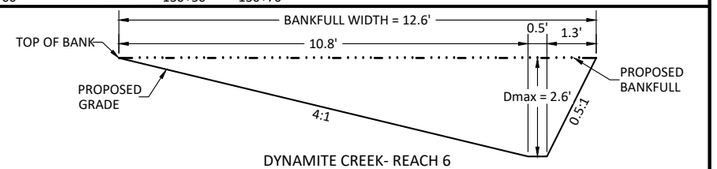




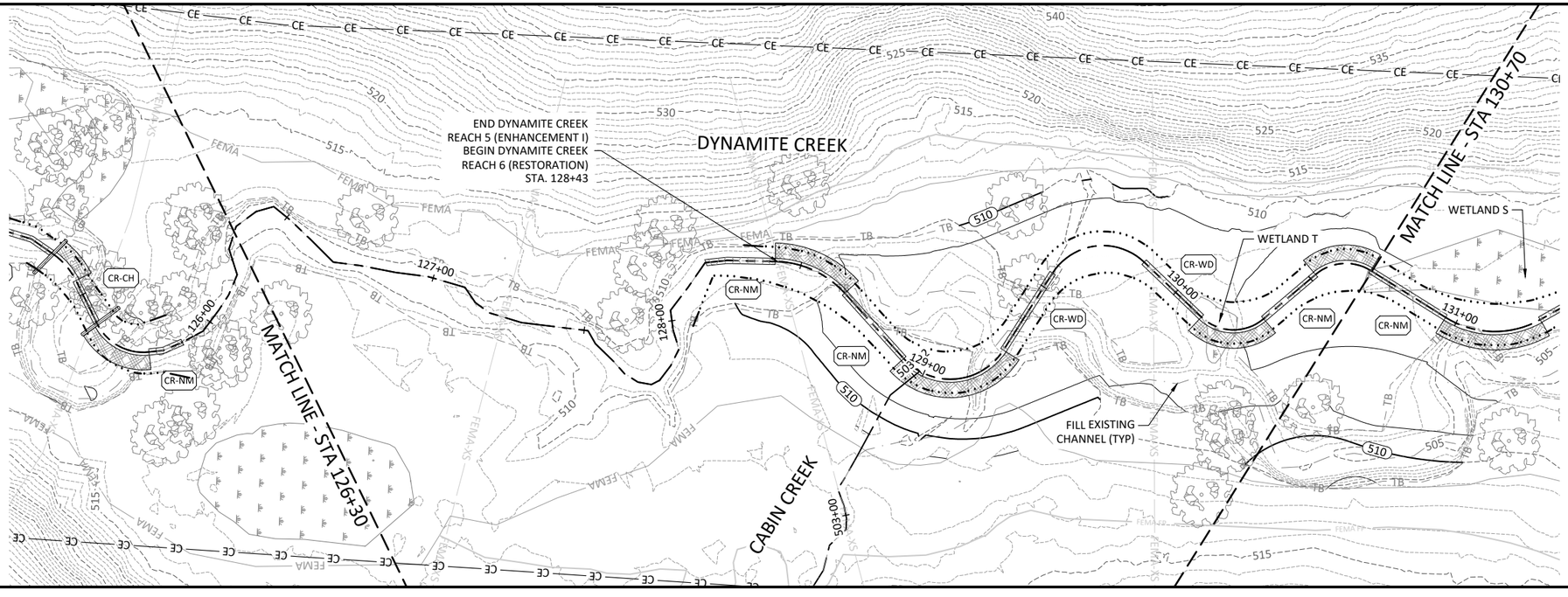
DYNAMITE CREEK- REACH 6
TYPICAL SECTION: RIFFLE
STA: 128+43 TO 135+21
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 6
TYPICAL SECTION: SHALLOW POOL
STA: 128+43 TO 135+21
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 6
TYPICAL SECTION: POOL WITH BANK REVETMENT
STA: 128+43 TO 135+21
SCALE: 1" = 2'



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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

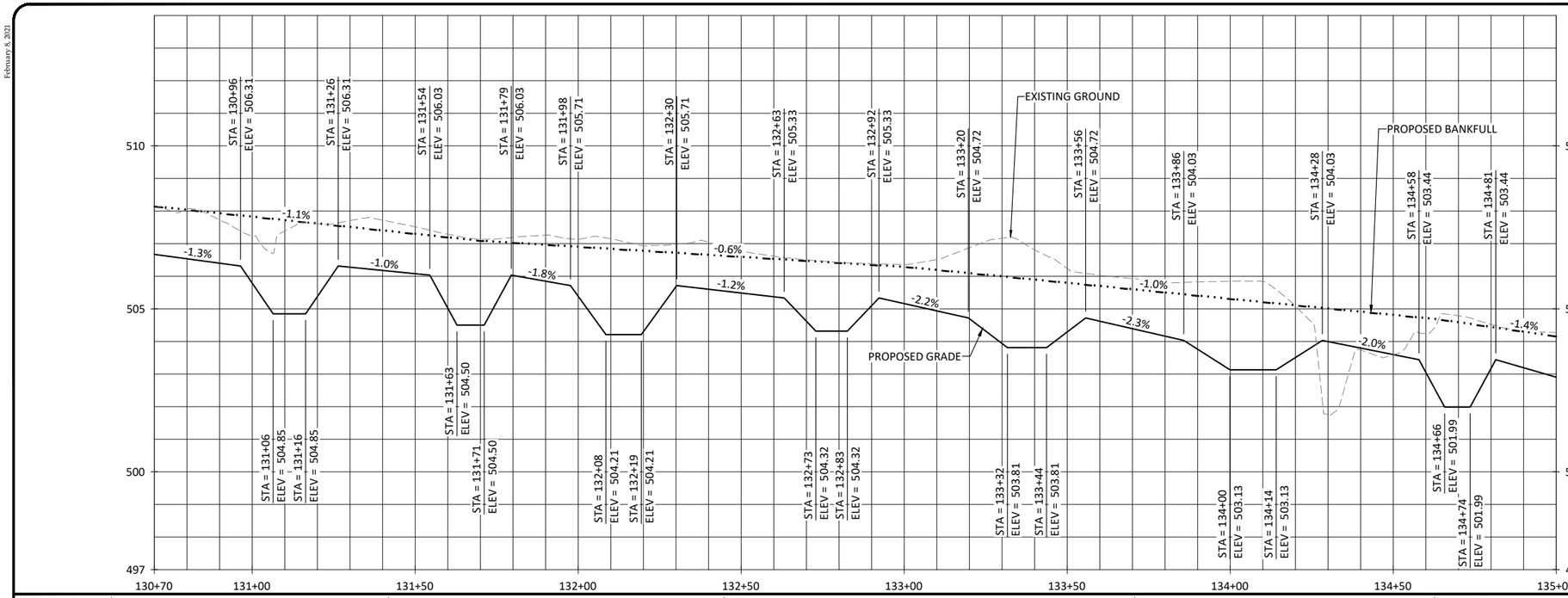
Dynamite Creek
Stream Plan and Profile

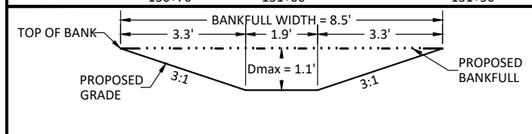
Revisions:

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

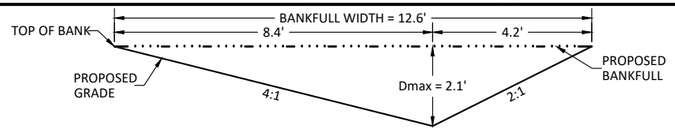
Sheet 1.7

February 8, 2021

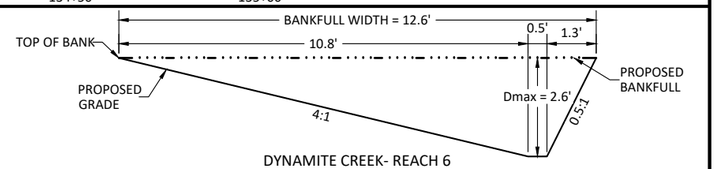




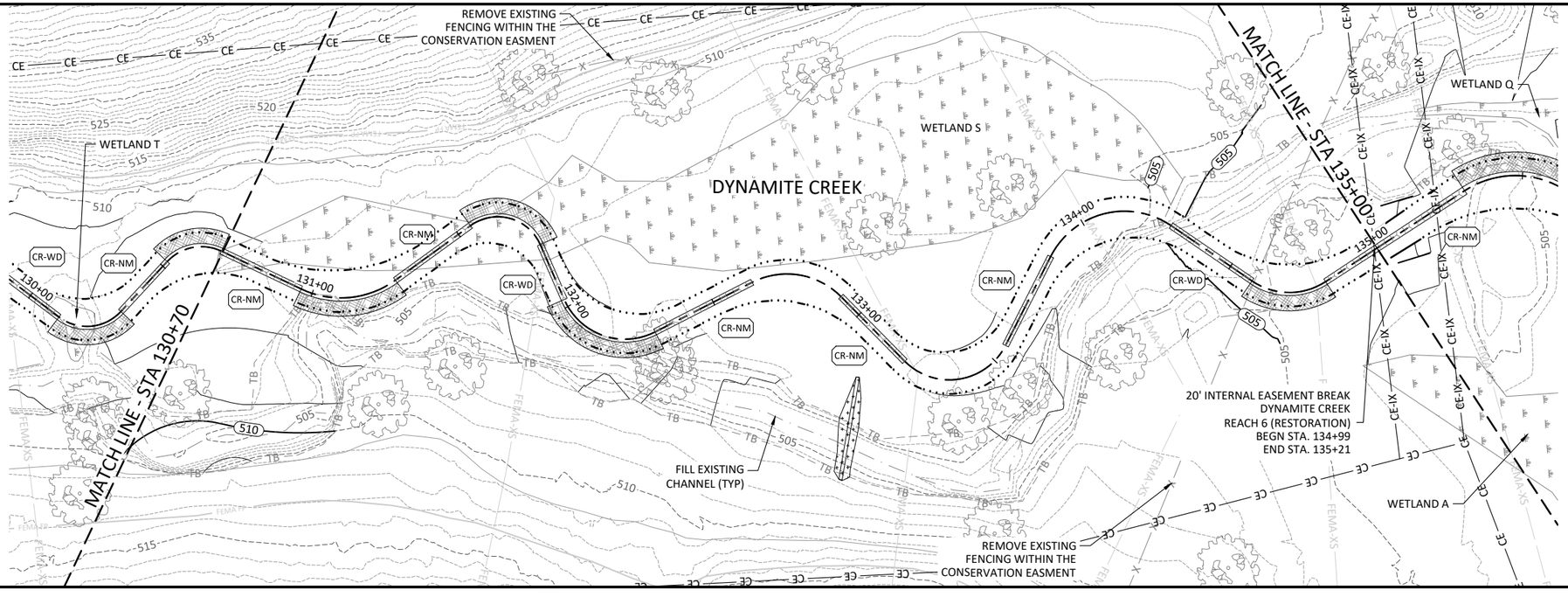
DYNAMITE CREEK- REACH 6
TYPICAL SECTION: RIFFLE
STA: 128+43 TO 135+21
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 6
TYPICAL SECTION: SHALLOW POOL
STA: 128+43 TO 135+21
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 6
TYPICAL SECTION: POOL WITH BANK REVETMENT
STA: 128+43 TO 135+21
SCALE: 1" = 2'



0' 2' 4' 6' (VERTICAL)

0' 20' 40' 60' (HORIZONTAL)

N

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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Dynamite Creek
Stream Plan and Profile

Revisions:

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

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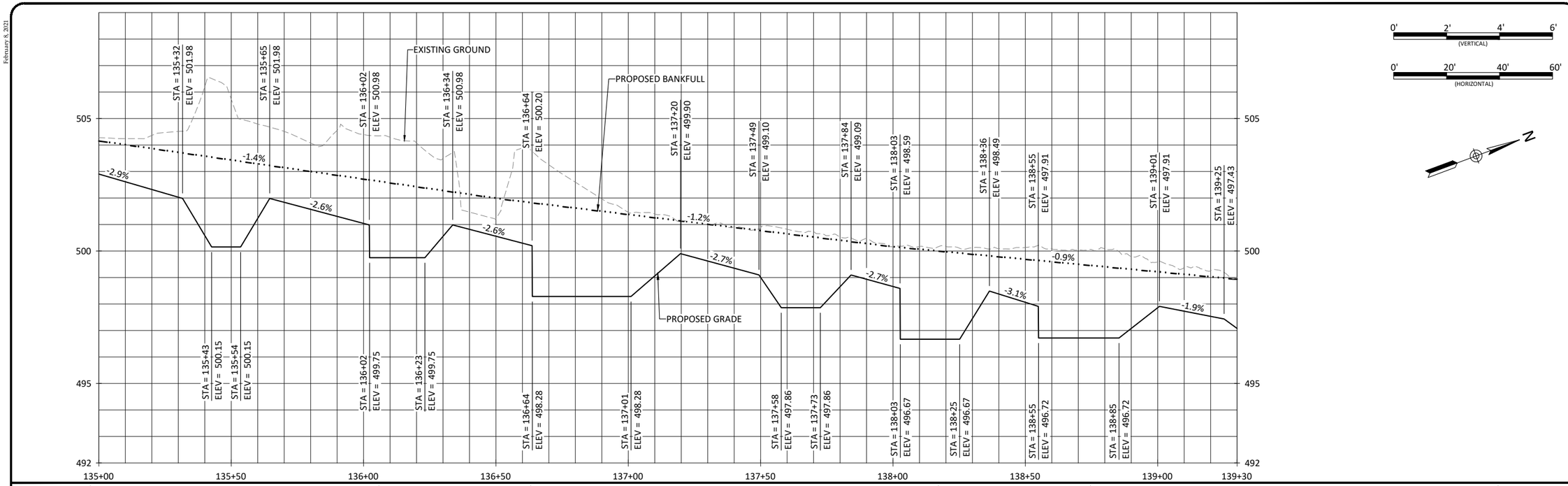
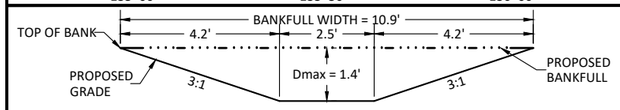
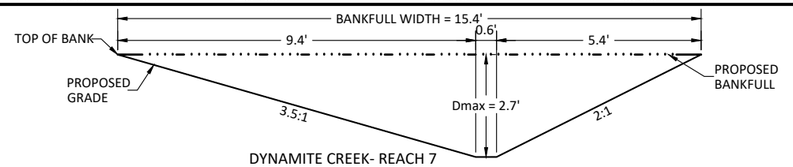
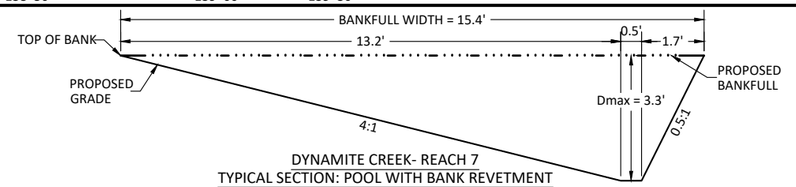




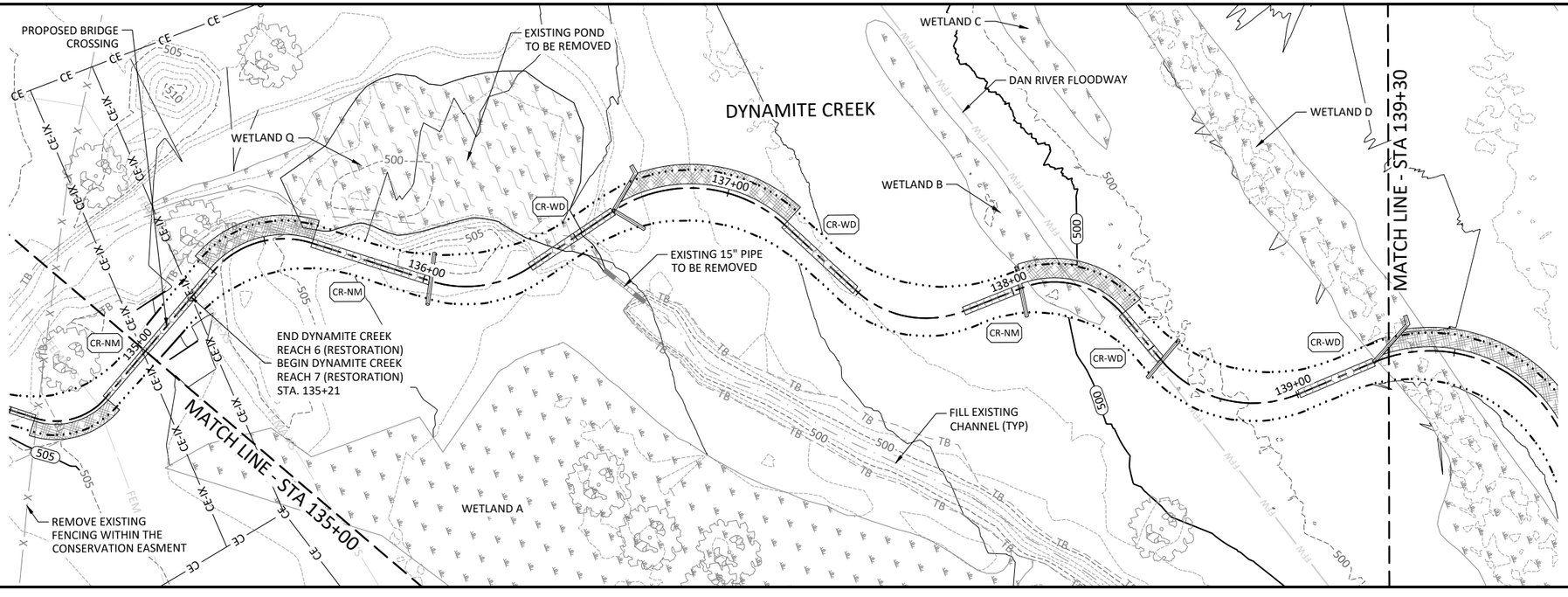
DYNAMITE CREEK- REACH 7
TYPICAL SECTION: RIFFLE
STA: 135+21 TO 150+91
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 7
TYPICAL SECTION: SHALLOW POOL
STA: 135+21 TO 150+91
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 7
TYPICAL SECTION: POOL WITH BANK REVETMENT
STA: 135+21 TO 150+91
SCALE: 1" = 2'



0' 2' 4' 6' (VERTICAL)

0' 20' 40' 60' (HORIZONTAL)

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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Dynamite Creek
Stream Plan and Profile

Date:	02/09/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Revisions:

Sheet 1.9

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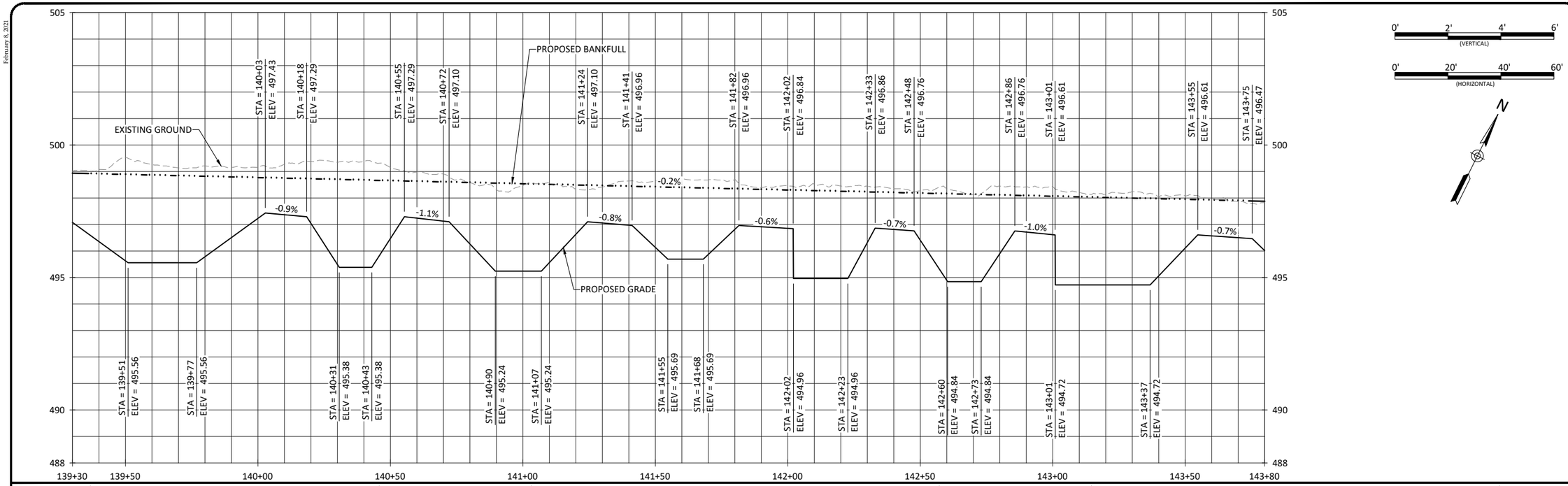
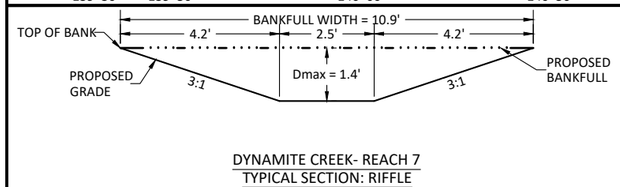
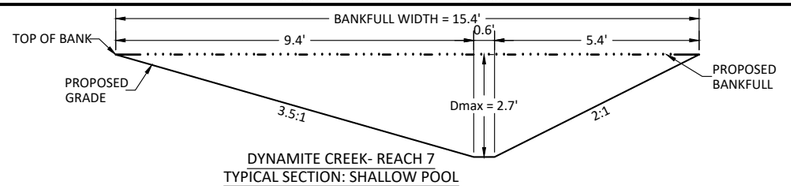
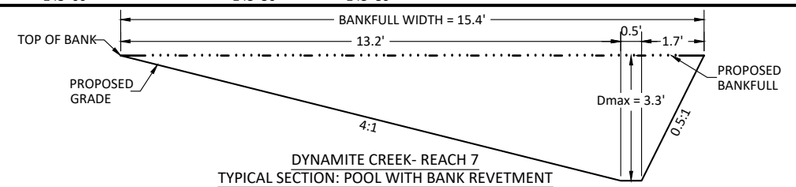




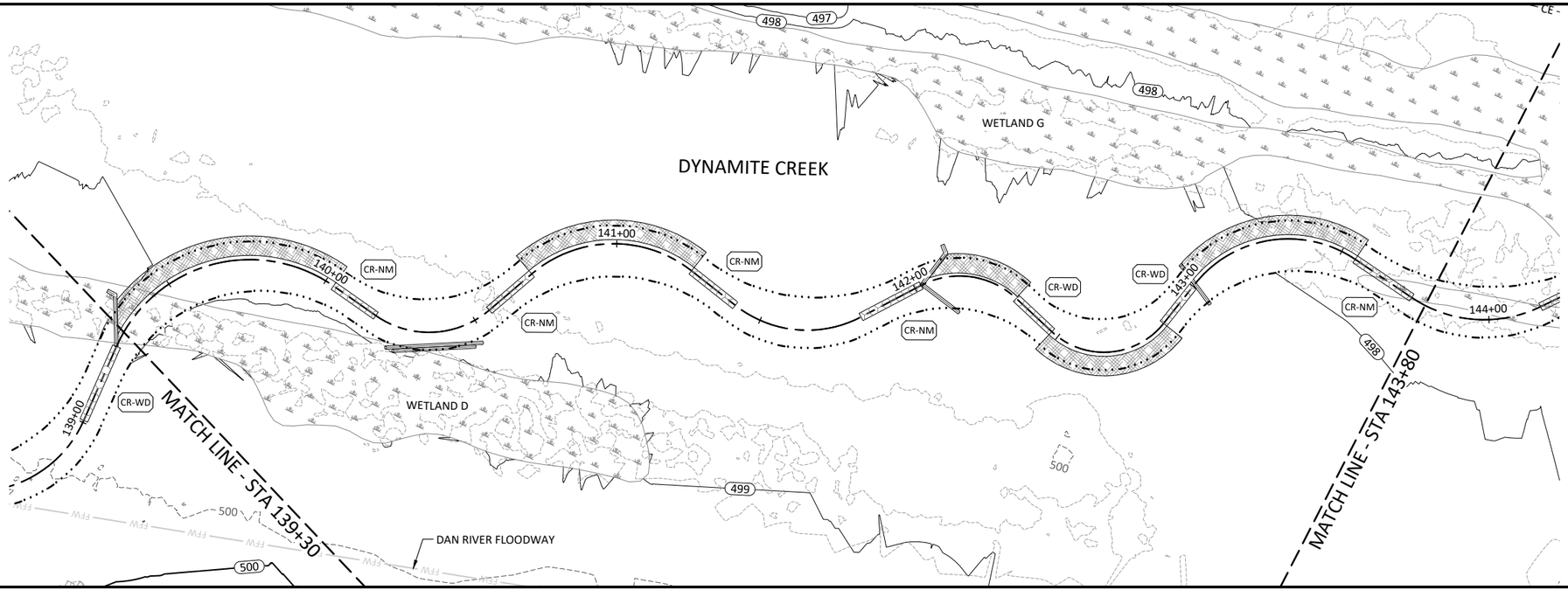
DYNAMITE CREEK- REACH 7
TYPICAL SECTION: RIFFLE
STA: 135+21 TO 150+91
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 7
TYPICAL SECTION: SHALLOW POOL
STA: 135+21 TO 150+91
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 7
TYPICAL SECTION: POOL WITH BANK REVETMENT
STA: 135+21 TO 150+91
SCALE: 1" = 2'



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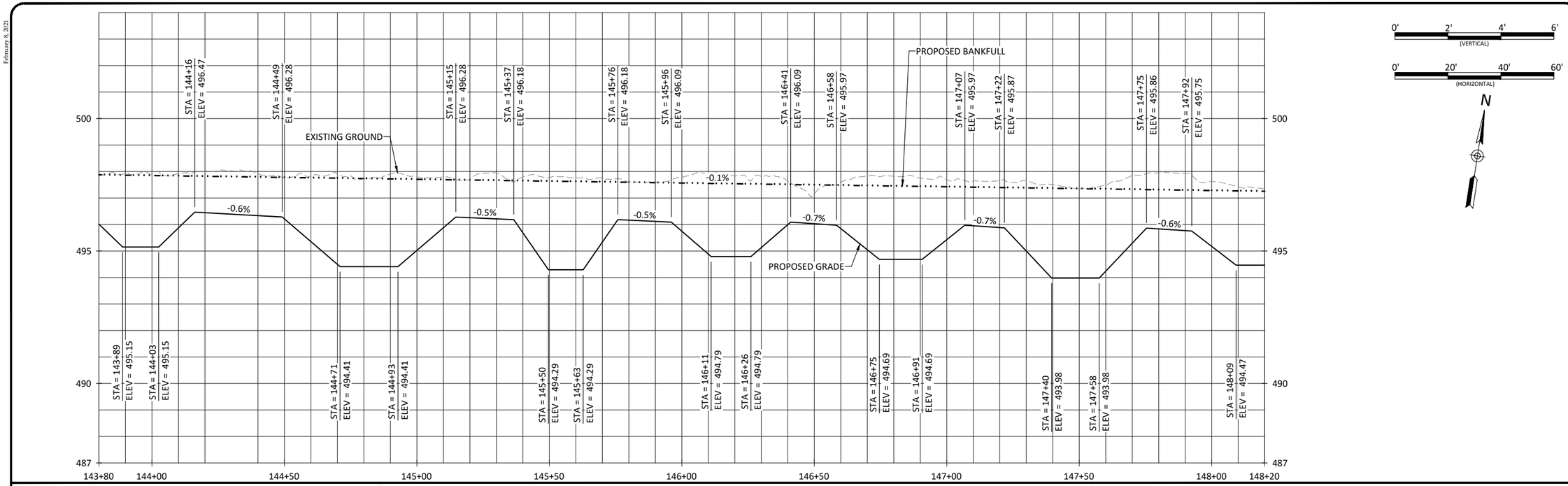
Dynamite Creek Mitigation Site
Rockingham County, North Carolina
Dynamite Creek
Stream Plan and Profile

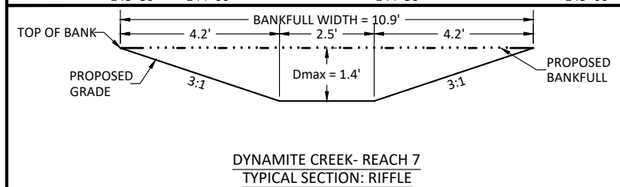
Revisions:

Date:	02/09/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

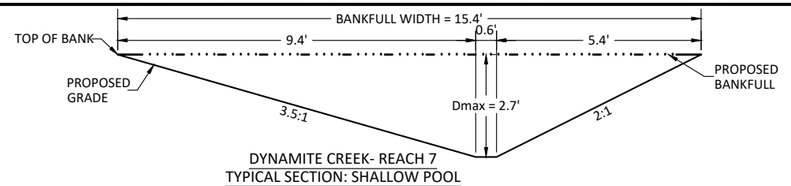
Sheet 1.10

February 8, 2021

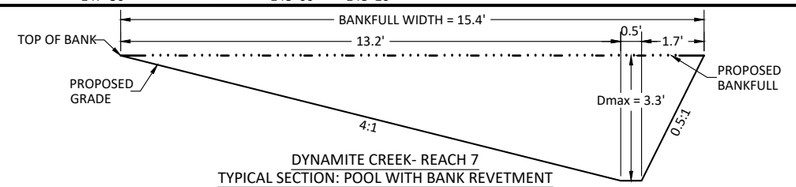




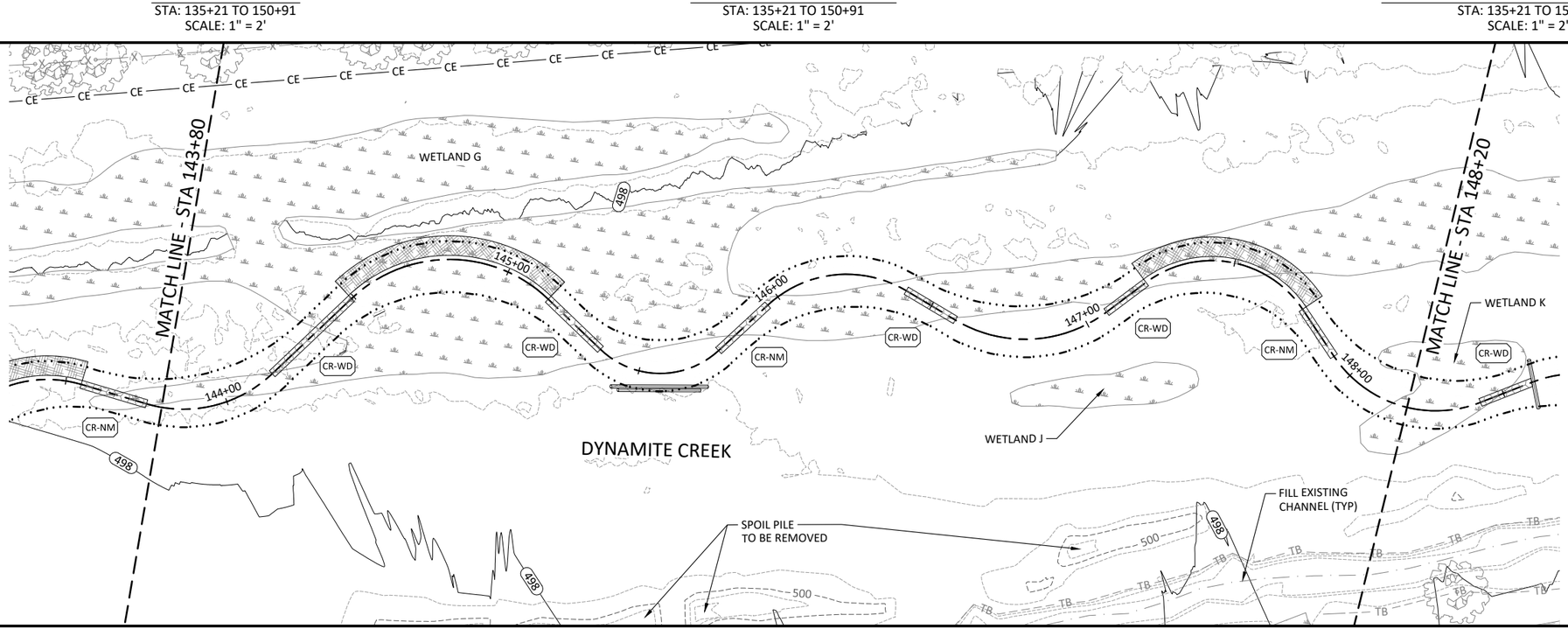
DYNAMITE CREEK- REACH 7
TYPICAL SECTION: RIFFLE
STA: 135+21 TO 150+91
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 7
TYPICAL SECTION: SHALLOW POOL
STA: 135+21 TO 150+91
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 7
TYPICAL SECTION: POOL WITH BANK REVETMENT
STA: 135+21 TO 150+91
SCALE: 1" = 2'



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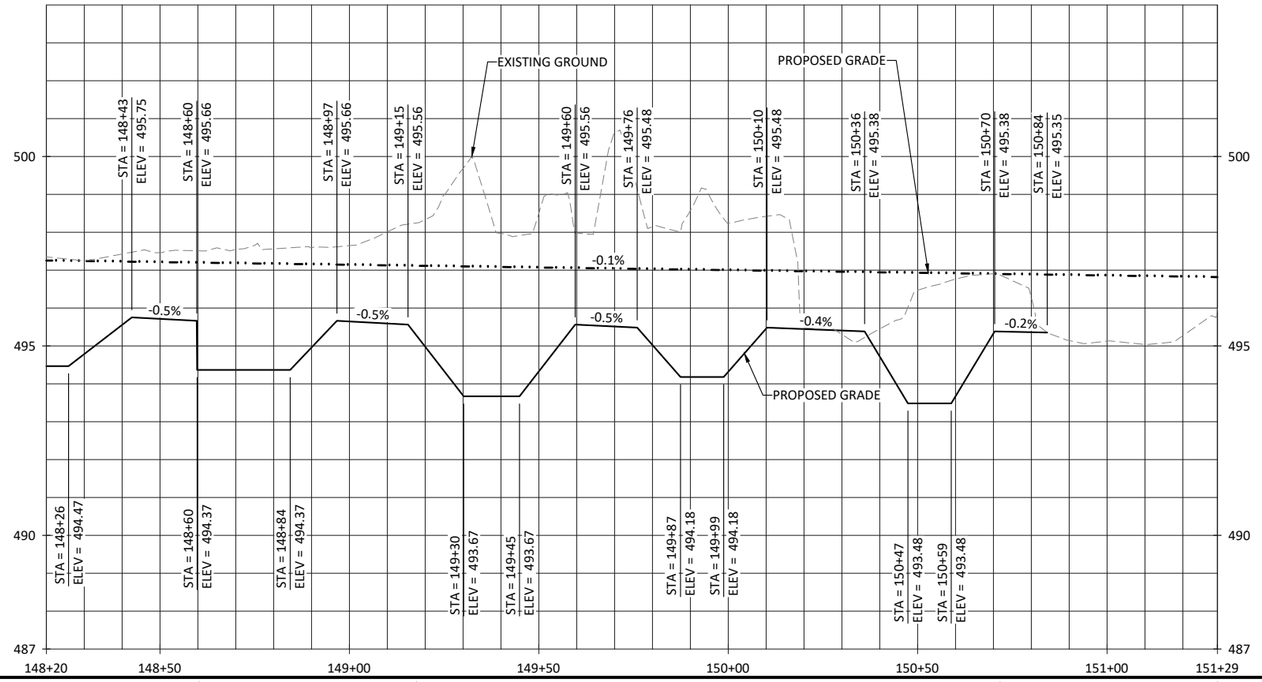
Dynamite Creek Mitigation Site
Rockingham County, North Carolina
Dynamite Creek
Stream Plan and Profile

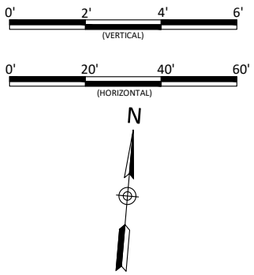
Revisions:

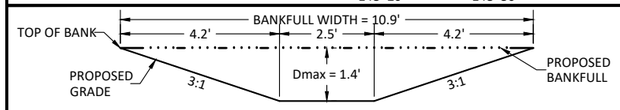
Date:	02/09/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 1.11

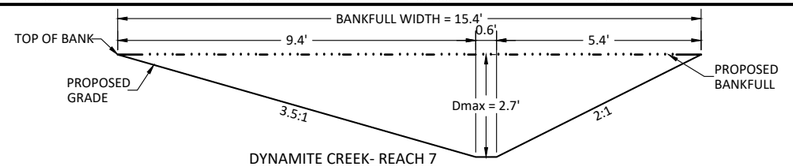
February 8, 2021



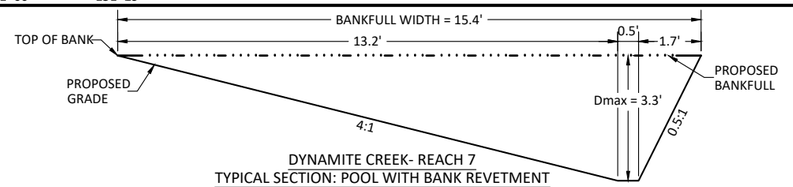




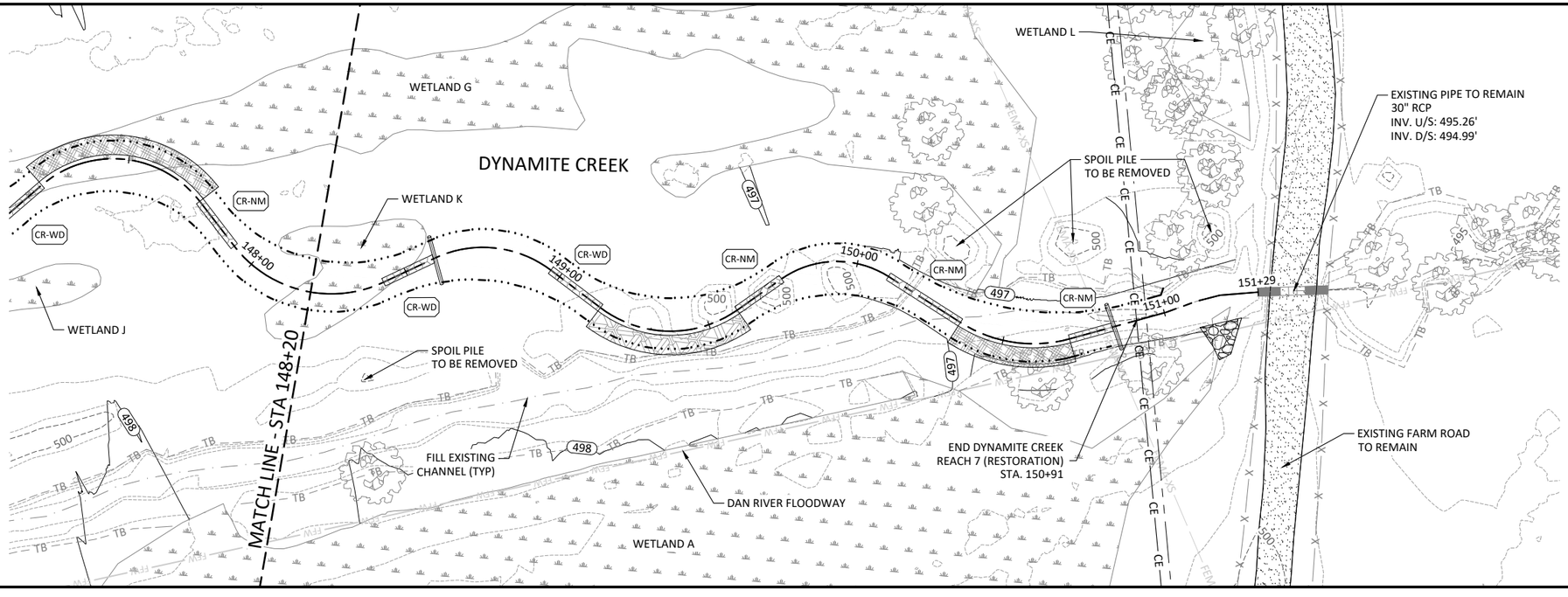
DYNAMITE CREEK- REACH 7
TYPICAL SECTION: RIFFLE
STA: 135+21 TO 150+91
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 7
TYPICAL SECTION: SHALLOW POOL
STA: 135+21 TO 150+91
SCALE: 1" = 2'



DYNAMITE CREEK- REACH 7
TYPICAL SECTION: POOL WITH BANK REVETMENT
STA: 135+21 TO 150+91
SCALE: 1" = 2'



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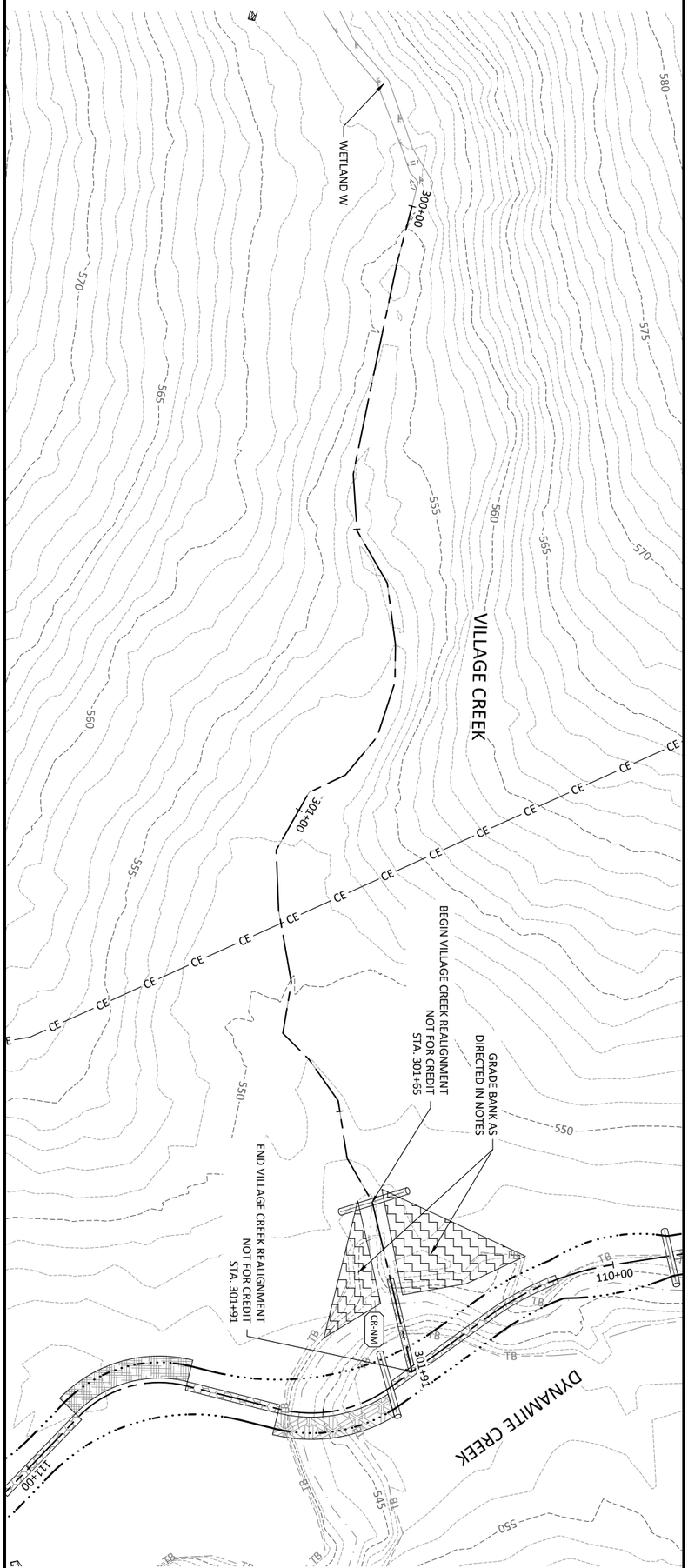
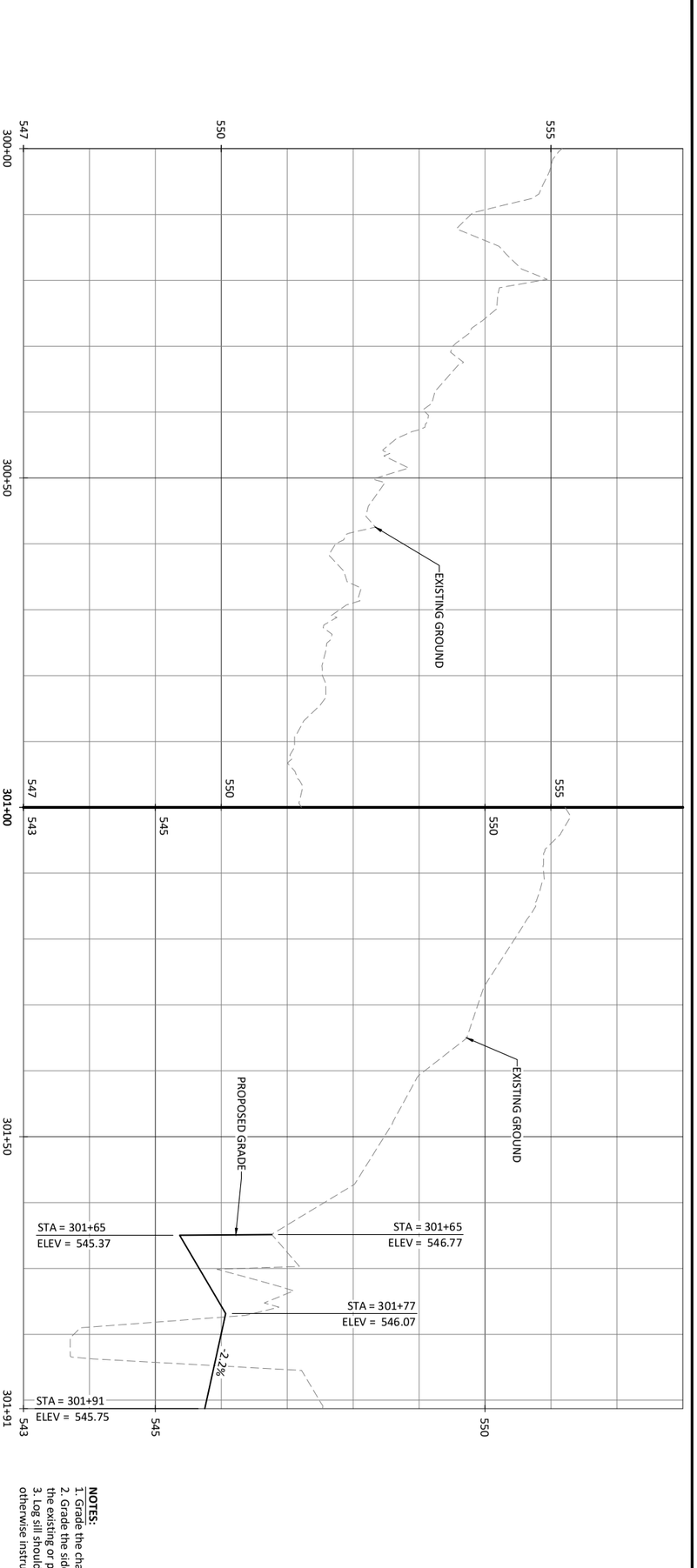
Dynamite Creek Mitigation Site
Rockingham County, North Carolina
Dynamite Creek
Stream Plan and Profile

Revisions:

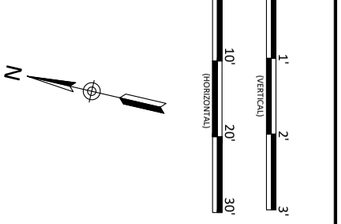
Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 1.12





NOTES:
1. Grade the channel to have 1' bottom width.
2. Grade the side slopes of the channel to max. 3(H):1(V) slope. Tie into the existing or proposed grade per the grading model.
3. Log sill should extend 3' (min.) into each bank of the channel unless otherwise instructed by the engineer.



Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Village Creek - NOT FOR CREDIT
Stream Plan and Profile

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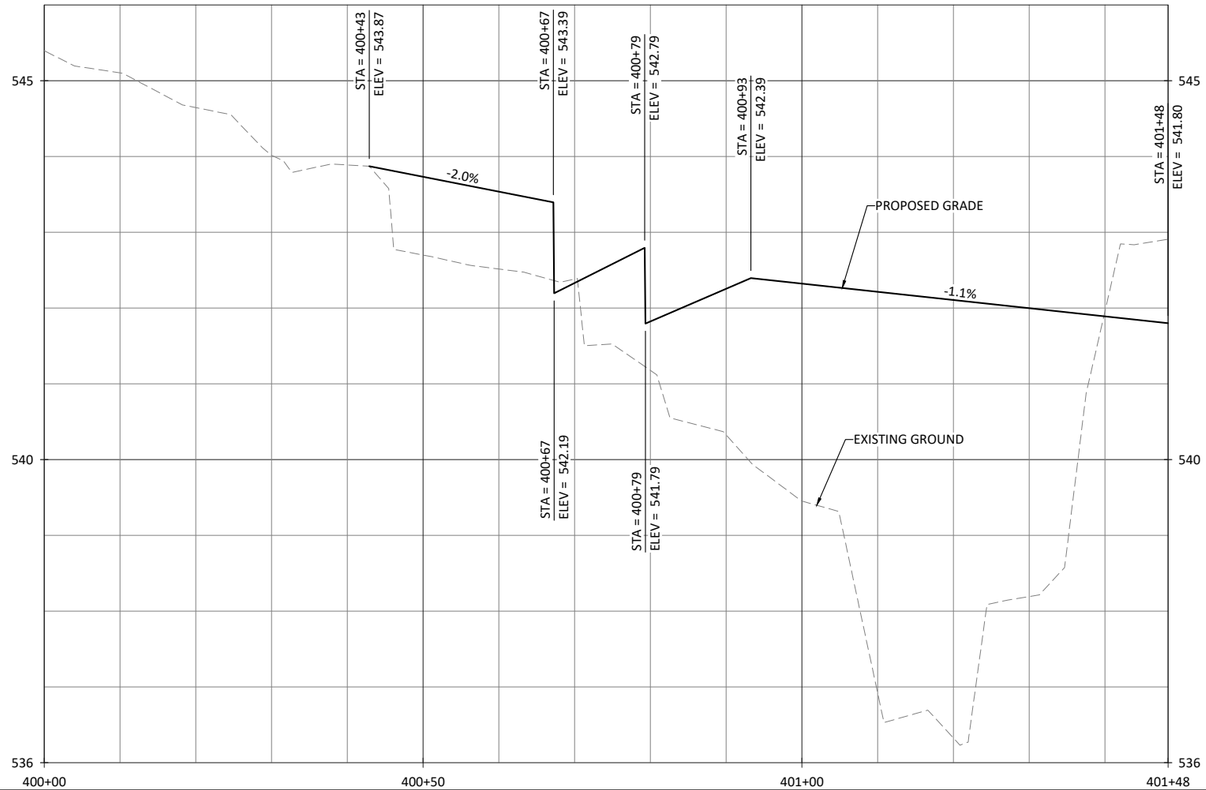
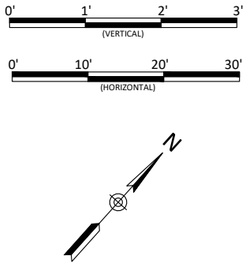
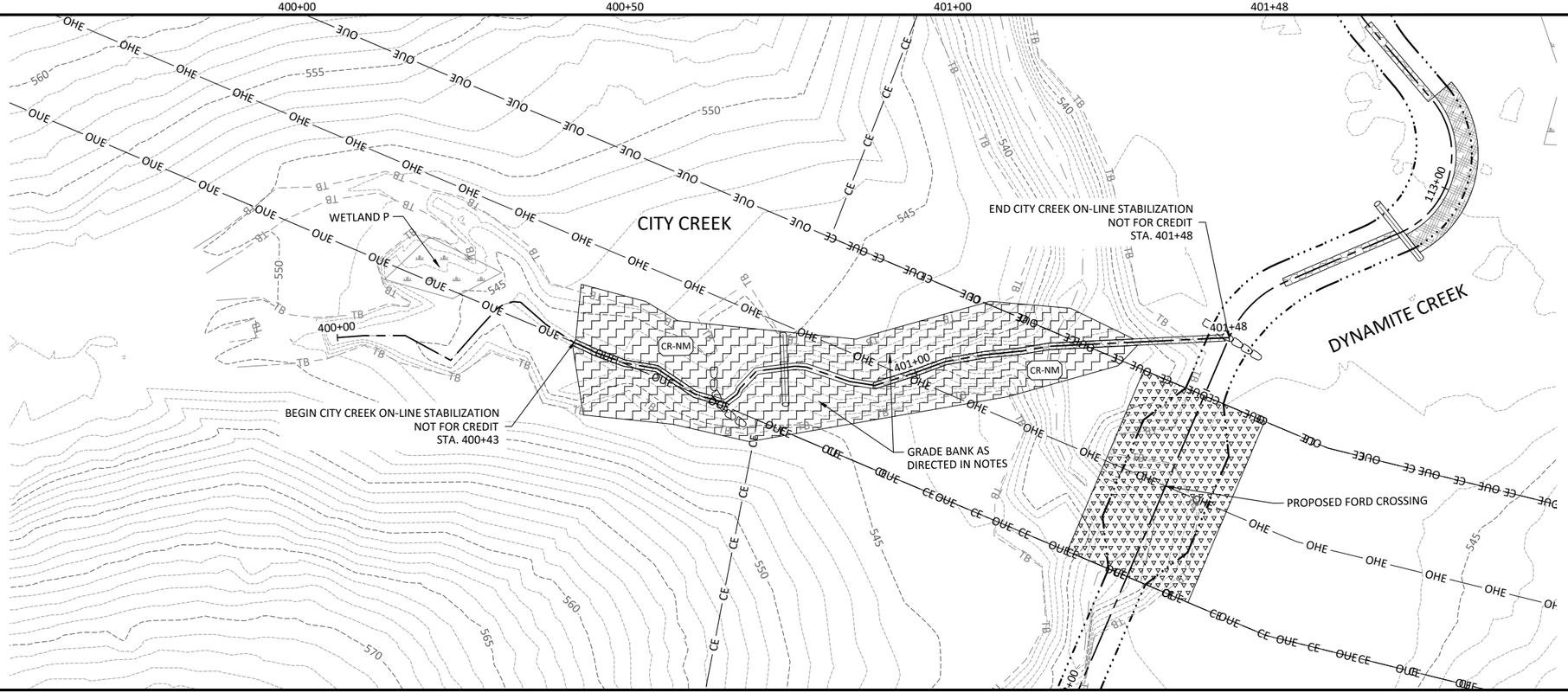




Notes:
1. Grade the channel per the proposed grade profile. Construct the channel to have a bottom width of 1'.
2. Fill channel to the existing top of bank.
3. Ensure side slopes are no steeper than 3(H):1(V) slope south of the overhead utility and 8(H):1(V) slope north of the utility
3. Drop structures should extend 3' (min.) into each bank of the channel unless otherwise instructed by the engineer.



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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

City Creek - NOT FOR CREDIT
Stream Plan and Profile

Revisions:

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 1.14

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February 8, 2021

FEMA 500 YR FLOODPLAIN BOUNDARY

FEMA 100 YR FLOODPLAIN BOUNDARY

DAN RIVER FLOODWAY

CITY CREEK

DYNAMITE CREEK

VILLAGE CREEK

UT1

CABIN CREEK

DYNAMITE CREEK

2.2

2.1

TOWN CREEK RD
(S.R. 1974)

EXISTING FARM ROAD

FEMA 100 YR FLOODPLAIN BOUNDARY

FEMA 500 YR FLOODPLAIN BOUNDARY

N

0' 150' 300' 400'
(HORIZONTAL)

X:\Shared \Projects\005-02184 Dynamite Creek \Cadd \Plans \02184-Grading Overview.dwg

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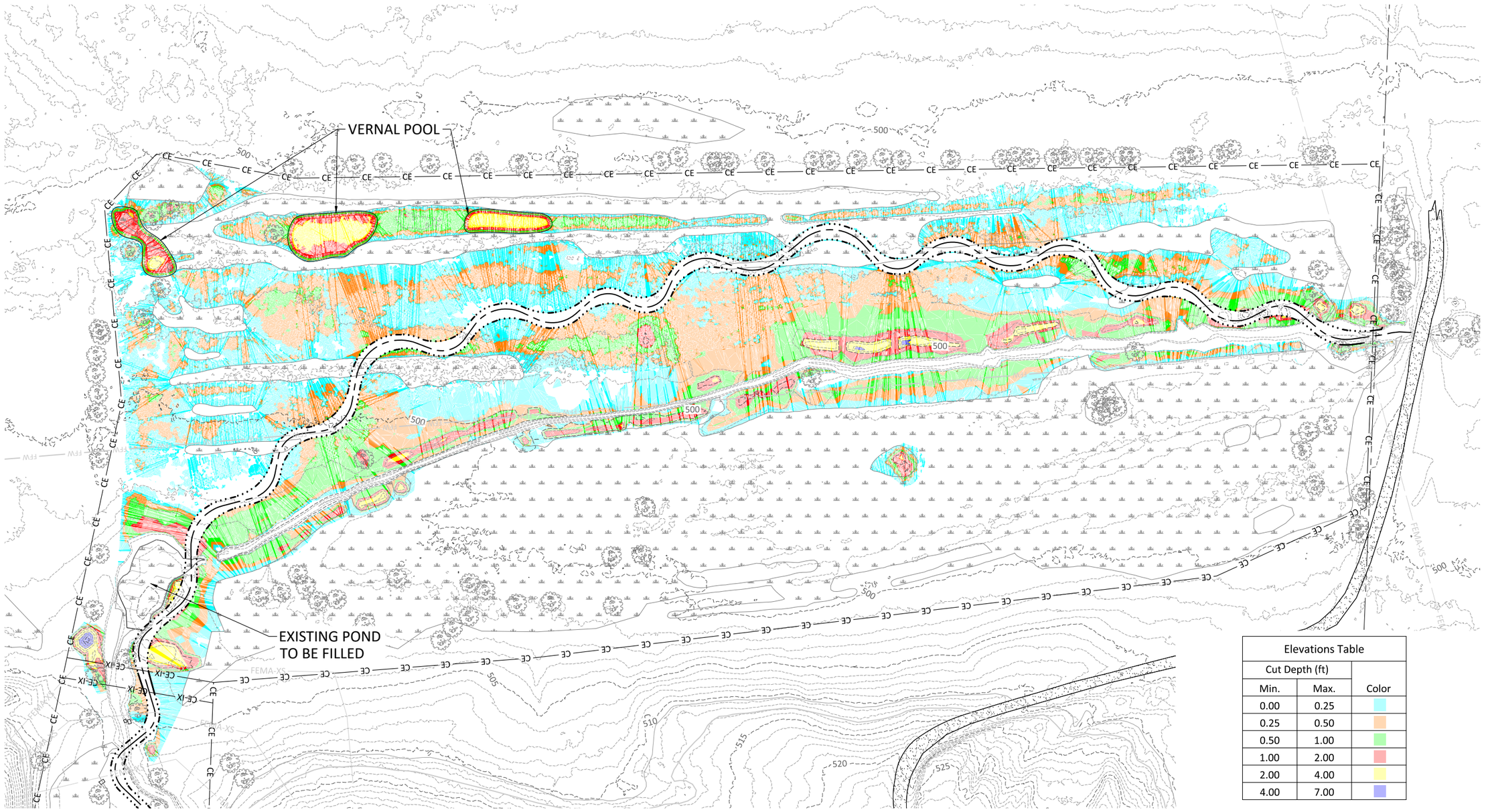
Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Additional Grading Overview

Revisions:

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 2.0



Elevations Table		
Cut Depth (ft)		
Min.	Max.	Color
0.00	0.25	
0.25	0.50	
0.50	1.00	
1.00	2.00	
2.00	4.00	
4.00	7.00	

WETLAND RESTORATION AREA = APPROX. 12.4 AC

Notes:
1. No grading is to occur in the existing wetland areas.
2. Avoid damaging trees in the floodplain. Do not work within the dripline of trees.
3. Remove and stockpile topsoil from the Wetland Restoration Area in areas of cut greater than 0.5'.
4. Remove overburden from the Wetland Restoration Area as shown above and as directed by the Engineer in the field.
5. Reapply top soil to areas of cut greater than 0.5'.
6. Rip the Wetland Restoration Area to minimum depth of 18" in a direction perpendicular to the proposed channel. Do not rip areas within 10' of the proposed stream channel.
7. Disc the Wetland Restoration Area, in a direction perpendicular to the proposed channel, until exposed soil masses are less than 4" in diameter.

N

0' 40' 80' 120'
(HORIZONTAL)

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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Wetland Grading
Additional Grading

Revisions:

Date: 02/08/20
Job Number: 005-02184
Project Engineer: ANA
Drawn By: RHW
Checked By: NMM

Sheet 2.1

February 8, 2021

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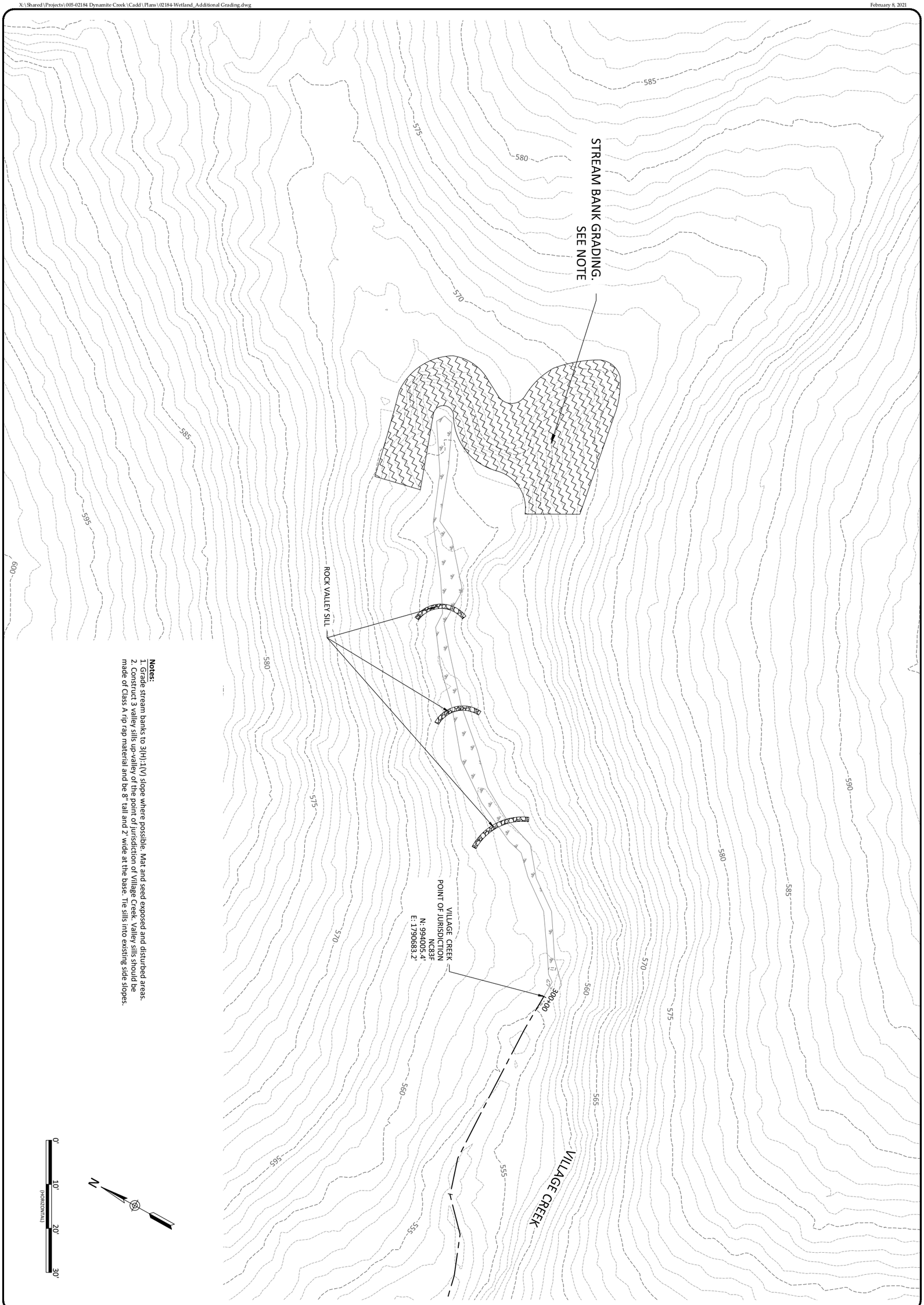

Notes:
1. Grade stream banks to 3(H):1(V) slope where possible. Mat and seed exposed and disturbed areas.
2. Construct 3 valley sills up-valley of the point of jurisdiction of Village Creek. Valley sills should be made of Class A rip rap material and be 8' tall and 2' wide at the base. Tie sills into existing side slopes.

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
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Revisions:

2.2
Sheet

Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Headwaters of Village Creek
Additional Grading

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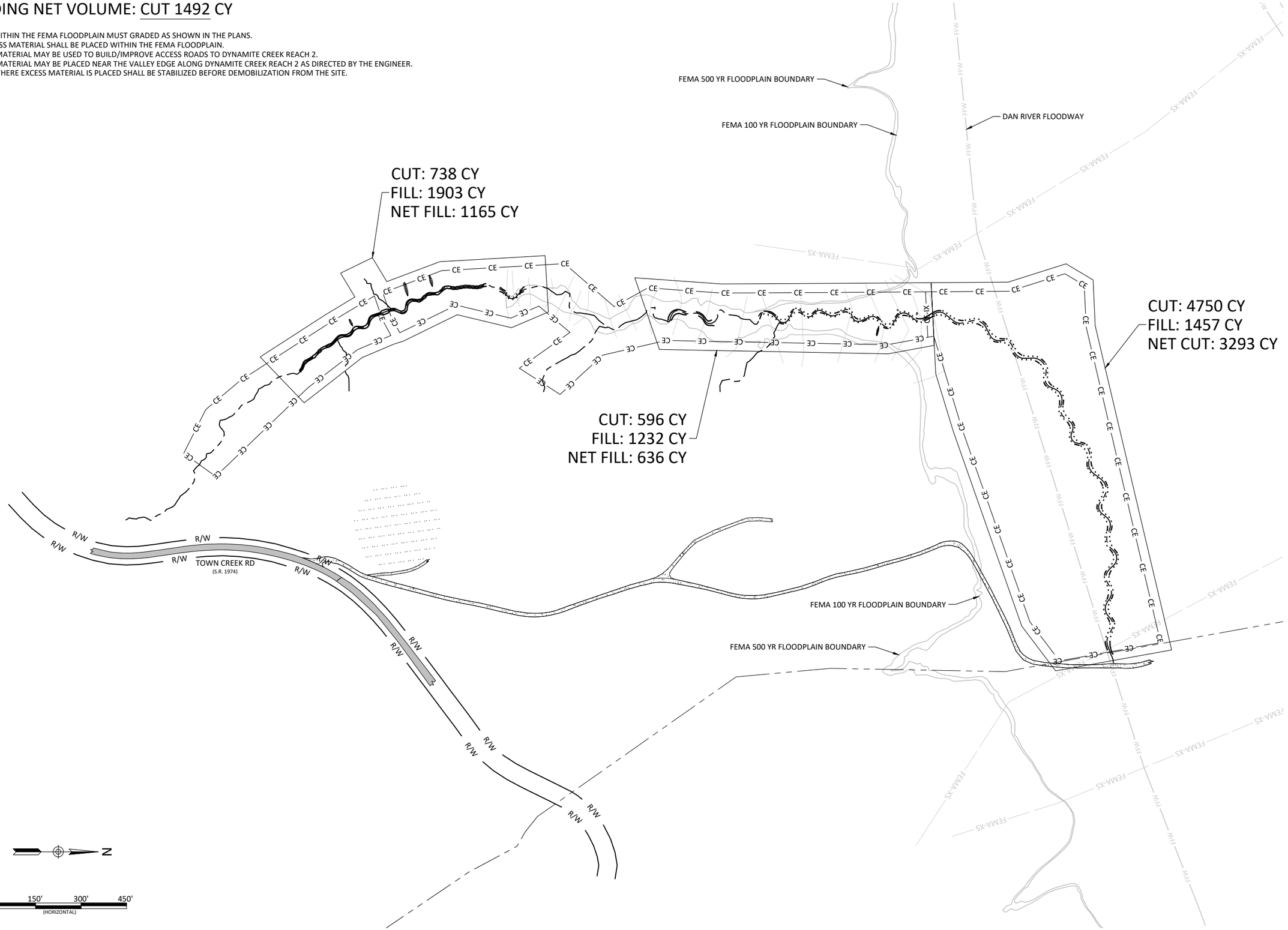
February 8, 2021

GRADING NET VOLUME: CUT 1492 CY

NOTES:
1. AREAS WITHIN THE FEMA FLOODPLAIN MUST GRADED AS SHOWN IN THE PLANS.
2. NO EXCESS MATERIAL SHALL BE PLACED WITHIN THE FEMA FLOODPLAIN.
3. EXCESS MATERIAL MAY BE USED TO BUILD/IMPROVE ACCESS ROADS TO DYNAMITE CREEK REACH 2.
4. EXCESS MATERIAL MAY BE PLACED NEAR THE VALLEY EDGE ALONG DYNAMITE CREEK REACH 2 AS DIRECTED BY THE ENGINEER.
5. AREAS WHERE EXCESS MATERIAL IS PLACED SHALL BE STABILIZED BEFORE DEMOBILIZATION FROM THE SITE.



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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Grading Volumes

Revisions:

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 2.3

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February 8, 2021

Buffer Planting Zone (2.22 acres)

Bare Root

Species	Common Name	Wetland Rating	Indiv. Spacing	Caliper Size	Stratum	% of Stems
Platanus occidentalis	Sycamore	FACW	6-12 ft.	0.25"-1.0"	Canopy	15%
Quercus rubra	Northern Red Oak	FACU	6-12 ft.	0.25"-1.0"	Canopy	10%
Quercus alba	White Oak	FACU	6-12 ft.	0.25"-1.0"	Canopy	10%
Betula nigra	River Birch	FACW	6-12 ft.	0.25"-1.0"	Canopy	15%
Celtis laevigata	Sugarberry	FACW	6-12 ft.	0.25"-1.0"	Canopy	10%
Ulmus rubra	Slippery Elm	FAC	6-12 ft.	0.25"-1.0"	Canopy	5%
Liriodendron tulipifera	Tulip Poplar	FACU	6-12 ft.	0.25"-1.0"	Canopy	5%
Diospyros virginiana	Persimmon	FAC	6-12 ft.	0.25"-1.0"	Canopy	10%
Acer negundo	Boxelder	FAC	6-12 ft.	0.25"-1.0"	Canopy	10%
Oxydendron arboreum	Sourwood	UPL	6-12 ft.	0.25"-1.0"	Subcanopy	5%
Asimina triloba	Pawpaw	FAC	6-12 ft.	0.25"-1.0"	Subcanopy	5%
						100%

Note: Buffer zone species to be planted on 6' spacing in rows spaced 12' apart.

Permanent Seeding Outside Easement (0.25 acres)

Approved Dates	Species Name	Common Name	Wetland Rating	Stratum	Density (lbs/acre)
All Year	*Festuca arundinacea*	Tall Fescue	FACU	Herb	30
All Year	*Dactylis glomerata*	Orchardgrass	FACU	Herb	20

Wetland Planting Zone (12.39 acres)

Species	Common Name	Wetland Rating	Indiv. Spacing	Caliper Size	Stratum	% of Stems
Bare Root						
Platanus occidentalis	Sycamore	FACW	6-12 ft.	0.25"-1.0"	Canopy	15%
Ulmus americana	American Elm	FACW	6-12 ft.	0.25"-1.0"	Canopy	10%
Betula nigra	River Birch	FACW	6-12 ft.	0.25"-1.0"	Canopy	15%
Acer negundo	Boxelder	FAC	6-12 ft.	0.25"-1.0"	Canopy	10%
Quercus lyrata	Overcup Oak	OBL	6-12 ft.	0.25"-1.0"	Canopy	5%
Quercus michauxii	Swamp Chestnut Oak	FACW	6-12 ft.	0.25"-1.0"	Canopy	5%
Ulmus rubra	Slippery Elm	FAC	6-12 ft.	0.25"-1.0"	Canopy	5%
Celtis laevigata	Sugarberry	FACW	6-12 ft.	0.25"-1.0"	Canopy	5%
Alnus serrulata	Tag Alder	OBL	6-12 ft.	0.25"-1.0"	Subcanopy	5%
Live Stake						
Sambucus canadensis	Elderberry	FACW	6-12 ft.	0.25"-1.0"	Subcanopy	*7%*
Salix sericea	Silky Willow	OBL	6-12 ft.	0.25"-1.0"	Subcanopy	8%
Salix nigra	Black Willow	OBL	6-12 ft.	0.25"-1.0"	Canopy	10%
						100%

Note: Wetland zone species to be planted on 6' spacing in rows spaced 12' apart.

Streambank Planting Zone 1 - Dynamite Creek Reach 5, 6, 7 (0.66 acres)

Live Stakes

Species	Common Name	Wetland Rating	Indiv. Spacing	Size	Stratum	% of Stems
Salix nigra	Black Willow	OBL	3-6 ft.	0.5"-1.5" cal.	Shrub	35%
Cornus ammomum	Silky Dogwood	FACW	3-6 ft.	0.5"-1.5" cal.	Shrub	20%
Salix sericea	Silky Willow	OBL	3-6 ft.	0.5"-1.5" cal.	Shrub	25%
Sambucus canadensis	Elderberry	FACW	3-6 ft.	0.5"-1.5" cal.	Shrub	10%
Cephalanthus occidentalis	Buttonbush	OBL	3-6 ft.	0.5"-1.5" cal.	Shrub	10%
						100%
Herbaceous Plugs						
Juncus effusus	Common Rush	FACW	4 ft.	1.0"- 2.0" plug	Herb	40%
Carex lurida	Lurid Sedge	OBL	4 ft.	1.0"- 2.0" plug	Herb	20%
Carex crinita	Fringed Sedge	OBL	4 ft.	1.0"- 2.0" plug	Herb	20%
Scirpus cyperinus	Woolgrass	FACW	4 ft.	1.0"- 2.0" plug	Herb	20%
						100%

Streambank Planting Zone 2 - Dynamite Creek Reach 2, 3 (0.14 acres)

Live Stakes

Species	Common Name	Wetland Rating	Indiv. Spacing	Size	Stratum	% of Stems
Cornus ammomum	Silky Dogwood	FACW	3-6 ft.	0.5"-1.5" cal.	Shrub	30%
Salix sericea	Silky Willow	OBL	3-6 ft.	0.5"-1.5" cal.	Shrub	35%
Sambucus canadensis	Elderberry	FACW	3-6 ft.	0.5"-1.5" cal.	Shrub	20%
Cephalanthus occidentalis	Buttonbush	OBL	3-6 ft.	0.5"-1.5" cal.	Shrub	15%
						100%
Herbaceous Plugs						
Juncus effusus	Common Rush	FACW	4 ft.	1.0"- 2.0" plug	Herb	40%
Carex lurida	Lurid Sedge	OBL	4 ft.	1.0"- 2.0" plug	Herb	20%
Carex crinita	Fringed Sedge	OBL	4 ft.	1.0"- 2.0" plug	Herb	20%
Scirpus cyperinus	Woolgrass	FACW	4 ft.	1.0"- 2.0" plug	Herb	20%
						100%

Zone 1 - Streambank Planting - Dynamite Creek Reach 5, 6, 7
(See Detail 2, Sheet 6.7)

Zone 2 - Streambank Planting - Dynamite Creek Reach 2, 3
(See Detail 2, Sheet 6.7)

Zone 3 - Buffer Planting Zone
(See Detail 1, Sheet 6.7)

Zone 4 - Wetland Planting Zone
(See Detail 1, Sheet 6.7)

Zone 5 - Permanent Seeding Outside Easement

Note: Non-hatched areas within easement are currently vegetated and will be planted as needed to achieve target density. Buffer planting will occur within the Limits of Disturbance

Permanent Riparian Seeding (2.71 acres)

Pure Live Seed (20 lbs/acre)

Approved Dates	Species Name	Common Name	Wetland Rating	Stratum	lbs/acre
All Year	*Panicum anceps*	Beaked Panicgrass	FAC	Herb	1.0
All Year	*Schizachyrium scoparium*	Little Bluestem	FACU	Herb	2.0
All Year	*Sorghastrum nutans*	Indian Grass	FACU	Herb	2.0
All Year	*Chasmanthium latifolium*	River Oats	FACU	Herb	0.5
All Year	*Elymus virginicus*	Virginia Wild Rye	FACW	Herb	3.0
All Year	*Panicum virgatum*	Switchgrass	FAC	Herb	1.0
All Year	*Tripsacum dactyloides*	Eastern Gamagrass	FACW	Herb	1.5
All Year	*Panicum clandestinum*	Deertongue	FAC	Herb	3.0
All Year	*Carex vulpinoidea*	Fox Sedge	OBL	Herb	1.0
All Year	*Rudbeckia hirta*	Blackeyed Susan	FACU	Herb	1.0
All Year	*Coreopsis lanceolata*	Lanceleaf Coreopsis	FACU	Herb	1.0
All Year	*Bidens aristosa*	Bur-marigold	FACW	Herb	1.0
All Year	*Chamaecrista fasciculata var. fasciculata*	Partridge Pea	FACU	Herb	1.0
All Year	*Achillea millefolium*	Yarrow	FACU	Herb	0.5
All Year	*Juncus tenuis*	Path Rush	FAC	Herb	0.5
					20.0

Permanent Wetland Seeding (11.90 acres)

Pure Live Seed (20 lbs/acre)

Approved Dates	Species Name	Common Name	Wetland Rating	Stratum	Density (lbs/acre)
All Year	*Panicum rigidulum*	Redtop Panicgrass	FACW	Herb	1.0
All Year	*Panicum anceps*	Beaked Panicgrass	FAC	Herb	2.4
All Year	*Agrostis hyemalis*	Winter Bentgrass	FAC	Herb	1.0
All Year	*Elymus virginicus*	Virginia Wild Rye	FACW	Herb	2.0
All Year	*Panicum virgatum*	Switchgrass	FAC	Herb	1.0
All Year	*Tripsacum dactyloides*	Eastern Gamagrass	FACW	Herb	1.4
All Year	*Panicum clandestinum*	Deertongue	FAC	Herb	3.0
All Year	*Carex lurida*	Lurid Sedge	OBL	Herb	0.4
All Year	*Carex vulpinoidea*	Fox Sedge	OBL	Herb	2.5
All Year	*Carex lupulina*	Hop Sedge	OBL	Herb	0.4
All Year	*Juncus effusus*	Common Rush	FACW	Herb	1.0
All Year	*Carex frankii*	Frank's Sedge	OBL	Herb	1.0
All Year	*Peltandra virginica*	Arrow Arum	OBL	Herb	1.0
All Year	*Cephalanthus occidentalis*	Buttonbush	OBL	Shrub	0.5
All Year	*Bidens aristosa*	Bur-Marigold	FACW	Herb	1.4
					20.0

Temporary Seeding (14.86 acres)

Pure Live Seed

Approved Dates	Species Name	Common Name	Wetland Rating	Stratum	Density (lbs/acre)
Aug 15 - May 1	*Secale cereale*	Rye Grain		Herb	110
May 1 - Aug 15	*Setaria italica*	German Millet	FACU	Herb	50
Aug 15 - May 1	*Avena sativa*	Winter Oats	UPL	Herb	30
All Year	*Trifolium repens*	Ladino Clover	FACU	Herb	5
All Year	*Trifolium incarnatum*	Crimson Clover		Herb	5

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60% PLANS
DO NOT
USE FOR
CONSTRUCTION

Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Planting Tables

Revisions:

Date: 02/08/20
Job Number: 005-02184
Project Engineer: ANA
Drawn By: RHW
Checked By: NMM

Sheet 3.0

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February 8, 2021

Zone 1 - Streambank Planting - Dynamite Creek Reach 5, 6, 7
(See Detail 2, Sheet 6.7)

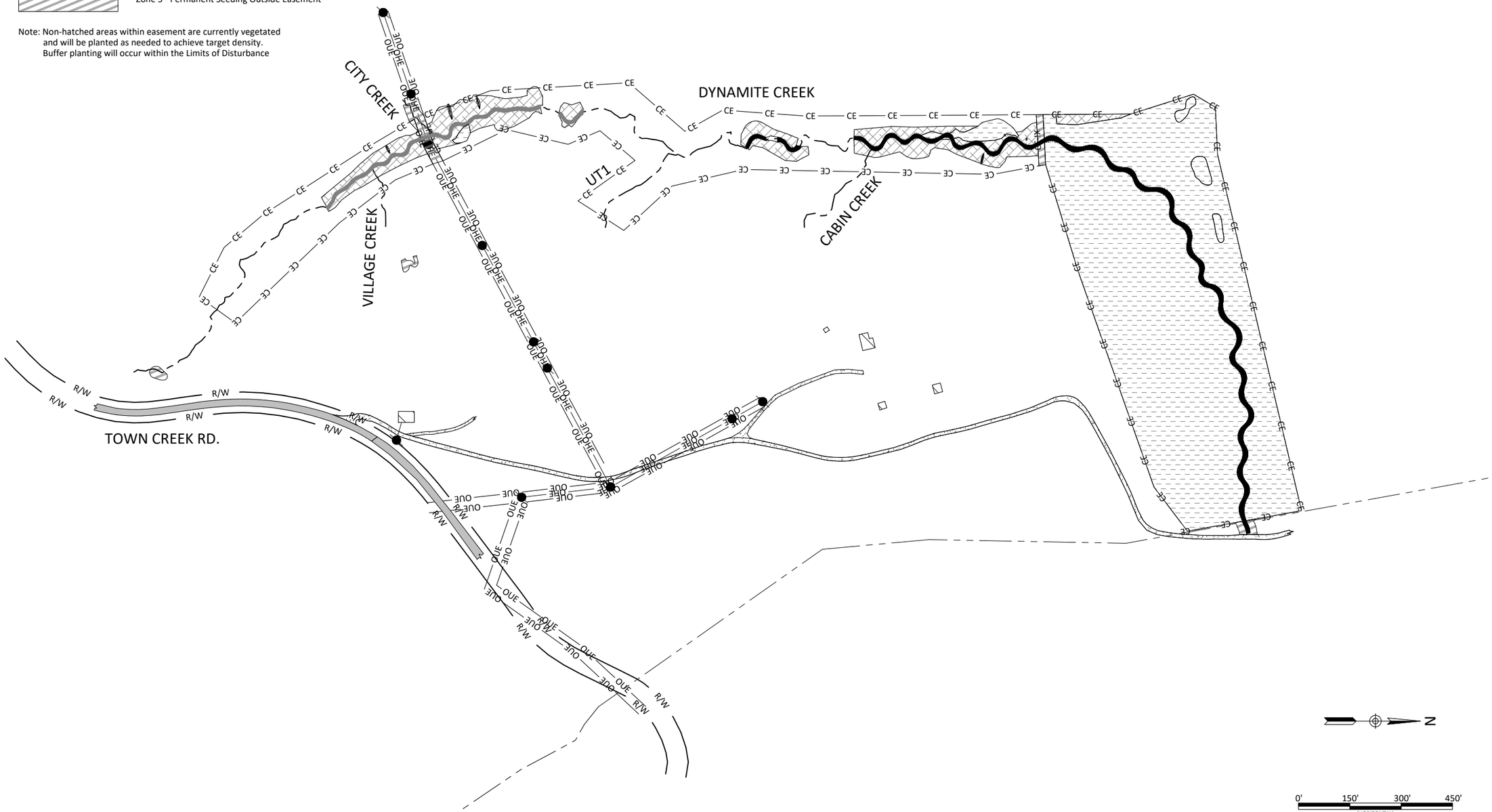
Zone 2 - Streambank Planting - Dynamite Creek Reach 2, 3
(See Detail 2, Sheet 6.7)

Zone 3 - Buffer Planting Zone
(See Detail 1, Sheet 6.7)

Zone 4 - Wetland Planting Zone
(See Detail 1, Sheet 6.7)

Zone 5 - Permanent Seeding Outside Easement

Note: Non-hatched areas within easement are currently vegetated and will be planted as needed to achieve target density. Buffer planting will occur within the Limits of Disturbance



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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Planting Overview

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Revisions:

Sheet 3.1

X:\Shared\Projects\005-02184 Dynamite Creek (Cadd)\Plans\02184 Planting Areas.dwg

February 8, 2021

FOUR-STRAND HIGH TENSILE WIRE FENCING
(DETAIL 1, SHEET 6.10)
8" X 8" WOODEN POSTS

NOTE: FENCING TO BE PLACED 1' OUTSIDE OF THE CONSERVATION EASEMENT AREA AS SHOWN ON PLANS

N

0' 100' 200' 300'
(HORIZONTAL)

12' GATE
TIE FENCING TO EXISTING FENCING
12' GATE
REMOVE EXISTING FENCING
12' GATE
12' GATE
FENCING TO BE INSTALLED TO FORM A SINGLE CORNER
8"X8" WOODEN POST OFFSET 5' FROM FENCE LINE. POST TO BE PLACED BETWEEN SUPPORT POSTS OF FENCE AS PROTECTION FROM FLOOD DEBRIS (TYP.)
DYNAMITE CREEK
12' GATE
2X10' STEEL GATE
SEE DETAIL 2, SHEET 6.10
FENCING TO CONTINUE WEST THROUGH OLD PATH IN WOODS AND TIE INTO EXISTING FENCING AT POWER LINE EASEMENT ON THE WEST SIDE OF THE PROPERTY

X:\Shared\Projects\005-02184 Dynamite Creek\Cadd\Plans\02184-Fencing Overview.dwg

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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Fencing

Revisions:

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

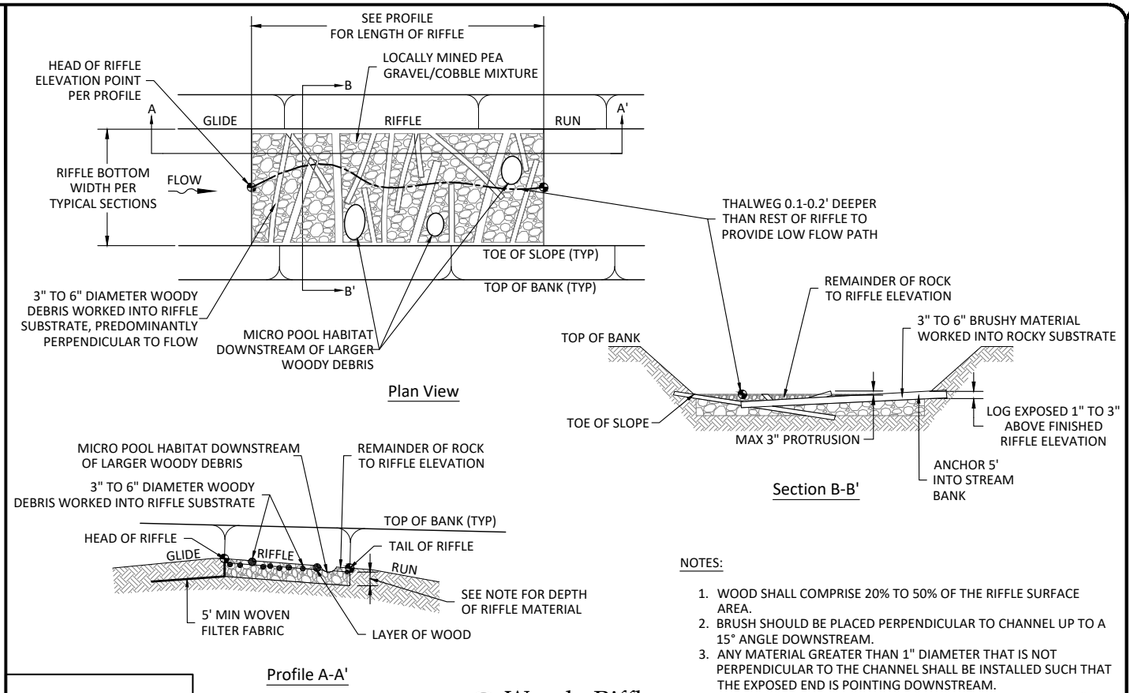
Sheet 5.0

February 8, 2021

RIFFLE MATERIAL TABLE			
REACH	BOTTOM WIDTH (FT)	RIFFLE THICKNESS (IN)	RIFFLE MATERIAL STONE SIZE EQUIVALENTS (% OF MATRIX)
Dynamite Creek Reach 2	1.3	12	CLASS A (90%), ABC STONE (10%)
Dynamite Creek Reach 3	2.2	12	CLASS A (90%), ABC STONE (10%)
Dynamite Creek Reach 5	2.0	12	CLASS A (90%), ABC STONE (10%)
Dynamite Creek Reach 6	1.9	12	CLASS A (90%), ABC STONE (10%)
Dynamite Creek Reach 7	2.5	12	CLASS A (70%), ABC STONE (30%)
NOTES:			
1. ALL RIFFLE MATERIAL SHALL BE COMPACTED IN LIFTS AT A THICKNESS NOT TO EXCEED DMAX.			

RECOMMENDED LOG MATERIAL TABLE - ALL LOG STRUCTURES	
REACH	MINIMUM REQUIRED LOG DIAMETER (IN)
Dynamite Creek (All)	12

1 / 6.1 Material Sizing Tables



NOTES:

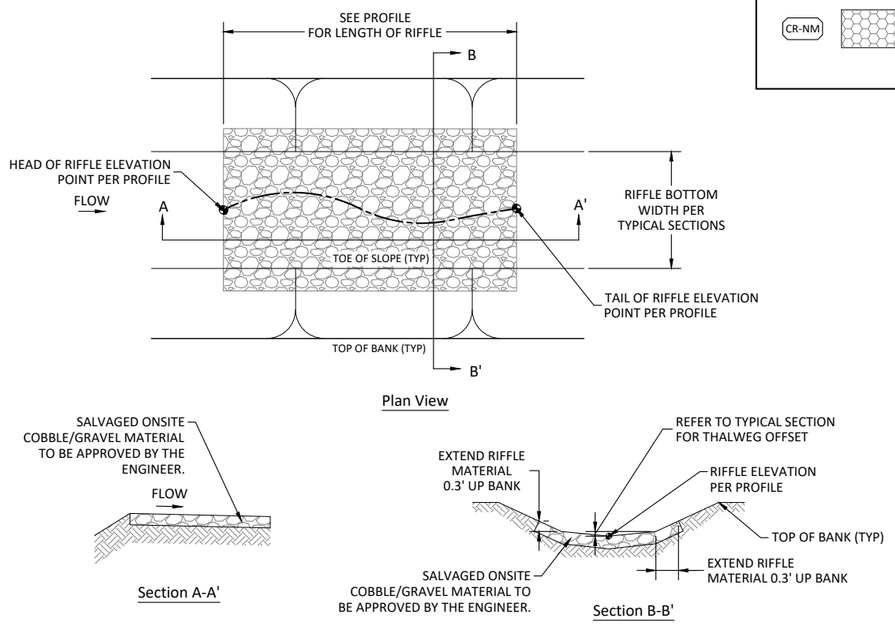
1. WOOD SHALL COMPRISE 20% TO 50% OF THE RIFFLE SURFACE AREA.
2. BRUSH SHOULD BE PLACED PERPENDICULAR TO CHANNEL UP TO A 15° ANGLE DOWNSTREAM.
3. ANY MATERIAL GREATER THAN 1" DIAMETER THAT IS NOT PERPENDICULAR TO THE CHANNEL SHALL BE INSTALLED SUCH THAT THE EXPOSED END IS POINTING DOWNSTREAM.
4. WOODY MATERIAL SHOULD NOT PROTRUDE GREATER THAN 3" ABOVE RIFFLE BED.
5. BRUSH CUTTERS OR OTHER DEVICE MUST BE USED TO ENSURE PROTRUSION LIMITED TO TOLERANCE IN NOTE 2.
6. SEE DETAIL 1 SHEET 6.1 FOR RIFFLE MATERIAL SIZING.

2 / 6.1 Woody Riffle
Not to Scale

CR-WD

CR-NM

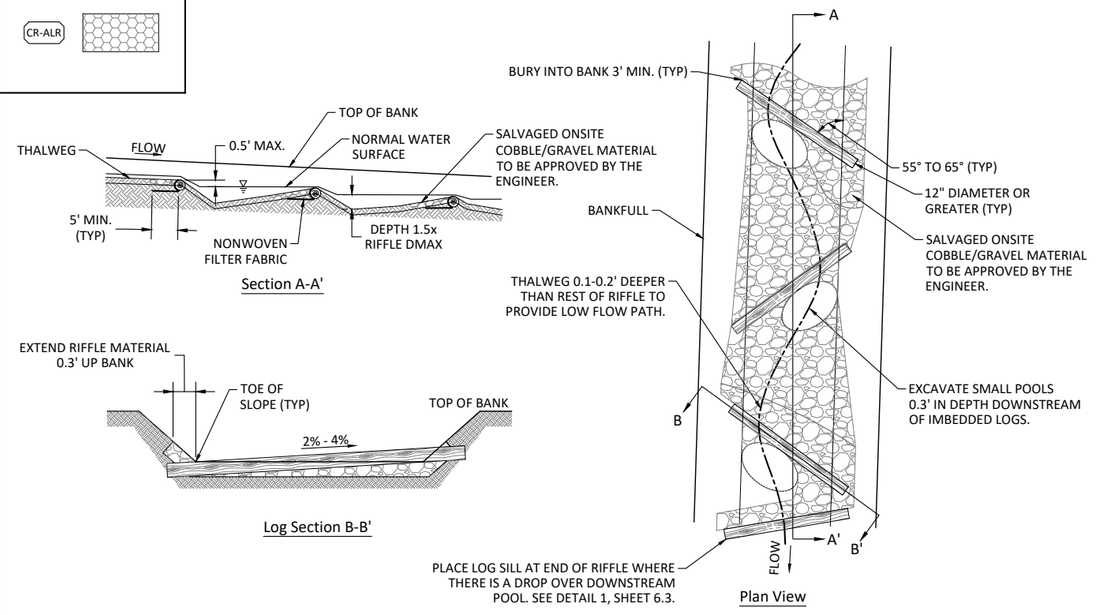
CR-ALR



NOTE:

1. RECOMMENDED STONE SIZE AND DISTRIBUTION NOTED BY REACH IN RIFFLE MATERIAL TABLE.
2. IF NECESSARY, SALVAGED ONSITE ROCK MAY BE SUBSTITUTED WITH QUARRY ROCK OF SIMILAR SIZE.

3 / 6.1 Native Material Riffle
Not to Scale



NOTES:

1. RECOMMENDED STONE SIZE AND DISTRIBUTION NOTED BY REACH IN RIFFLE MATERIAL TABLE.
2. MINIMUM LOG DIAMETER 12".
3. MINIMUM THREE LOGS PER STRUCTURE.
4. IF NECESSARY, SALVAGED ONSITE ROCK MAY BE SUBSTITUTED WITH QUARRY ROCK OF SIMILAR SIZE.

4 / 6.1 Angled Log Riffle
Not to Scale

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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Details

Revisions:

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 6.1

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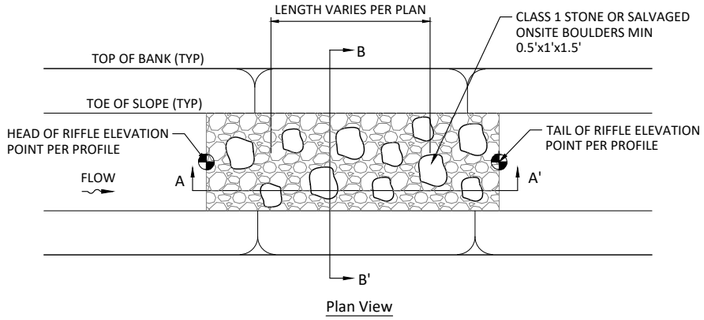
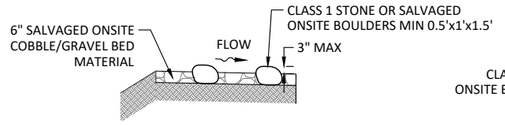
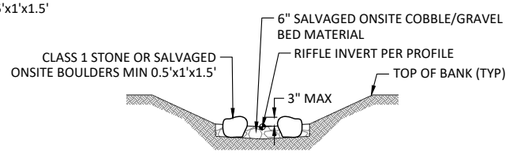
February 8, 2021



Plan View

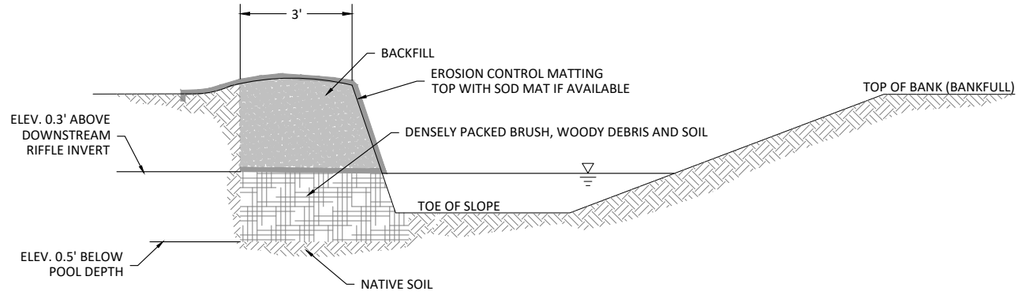


Section A-A'



Section B-B'

1 6.2 Chunky Riffle
Not to Scale



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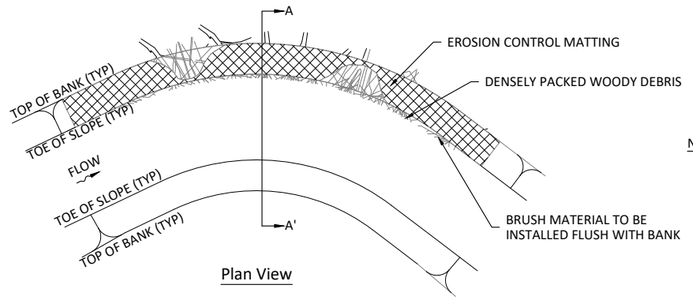
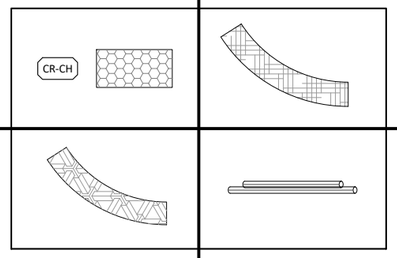


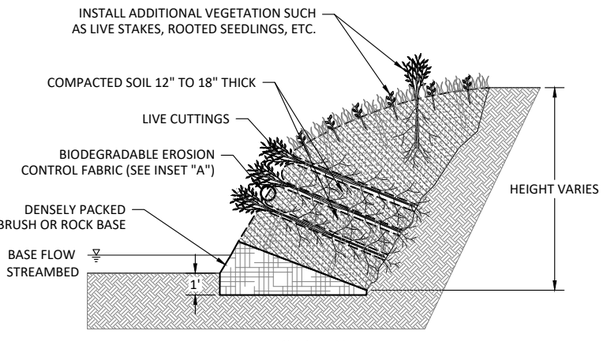
Plan View

2 6.2 Brush Toe
Not to Scale

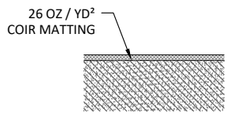
NOTES:

1. OVEREXCAVATE 3' OUTSIDE OF TOP OF BANK (BANKFULL).
2. INSTALL A LAYER OF BRUSH/WOODY DEBRIS, WHICH SHALL CONSIST OF SMALL BRANCHES AND ROOTS COLLECTED ON-SITE. LIGHTLY COMPACT BRUSH/WOODY DEBRIS LAYER.
3. BRUSH SHOULD BE ALIGNED SO STEMS ARE ROUGHLY PARALLEL AND IS INSTALLED POINTING SLIGHTLY UPSTREAM.
4. LAY EROSION CONTROL MATTING OVER BRUSH/WOODY LAYER.
5. INSTALL EARTH BACKFILL OVER MATTING ACCORDING TO TYPICAL SECTION DIMENSIONS.
6. WRAP MATTING AROUND COMPACTED SOIL AND STABILIZE.
7. TRIM BRUSH SUCH THAT IT IS FLUSH WITH BANK.
8. TOP MATTING WITH SOD MAT IF SOD MAT AVAILABLE.

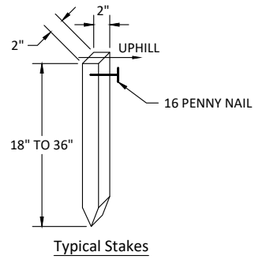




Section View



Inset "A"
Matting and Blanket

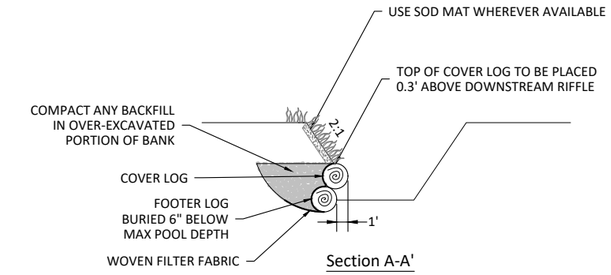


Typical Stakes

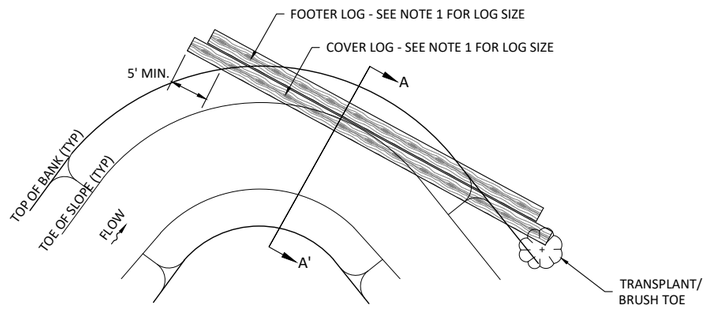
NOTES:

1. ROOTED/LEAFED CONDITION OF THE LIVING PLANT MATERIAL IS NOT REPRESENTATIVE OF THE TIME OF INSTALLATION.
2. BOTTOM OF FIRST COMPACTED EARTH LIFT TO BE PLACED 6" ABOVE NORMAL BASEFLOW.
3. NUMBER OF COMPACTED EARTH LIFTS TO VARY DEPENDING ON DESIGN TOP OF BANK HEIGHT. LIFTS NOT TO EXCEED 18" THICKNESS.

3 6.2 Vegetated Soil Lift
Not to Scale



Section A-A'



Plan View

NOTES:

1. SEE DETAIL 1, SHEET 6.1 FOR MINIMUM LOG DIAMETER.
2. WHEREVER AVAILABLE, USE SOD MATS ABOVE LUNKER LOG.
3. IF SOD MAT UNAVAILABLE, USE A SOIL LIFT WITH COIR FIBER MATTING

4 6.2 Lunker Log
Not to Scale

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Revisions:

Date:	02/08/20
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Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 6.2

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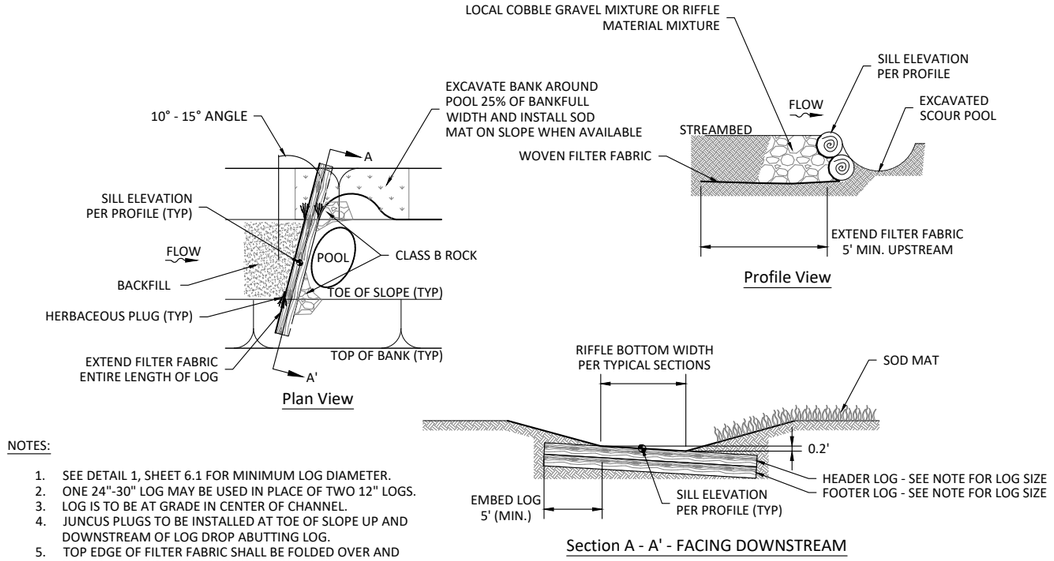
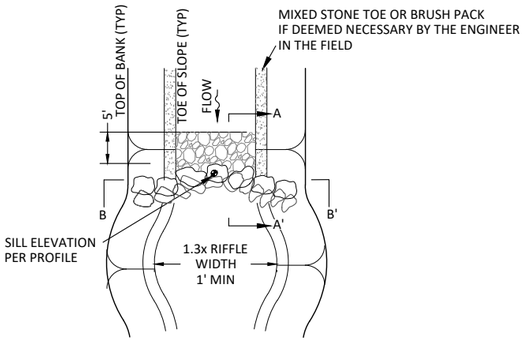
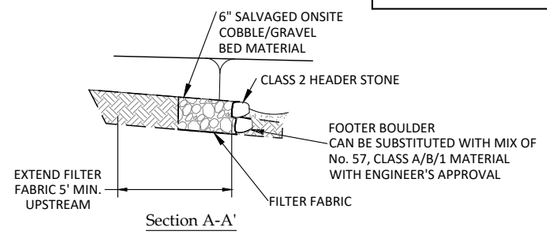


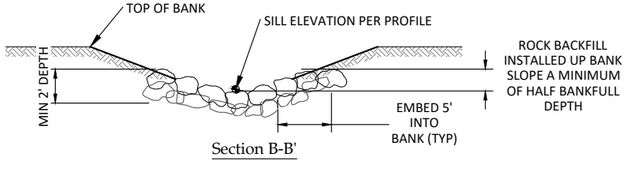
NOTES:

1. SEE DETAIL 1, SHEET 6.1 FOR MINIMUM LOG DIAMETER.
2. ONE 24"-30" LOG MAY BE USED IN PLACE OF TWO 12" LOGS.
3. LOG IS TO BE AT GRADE IN CENTER OF CHANNEL.
4. JUNCUS PLUGS TO BE INSTALLED AT TOE OF SLOPE UP AND DOWNSTREAM OF LOG DROP ABUTTING LOG.
5. TOP EDGE OF FILTER FABRIC SHALL BE FOLDED OVER AND NAILED TO HEADER LOG ALONG ENTIRE LENGTH.

2 / 6.3 Angled Log Sill
Not to Scale



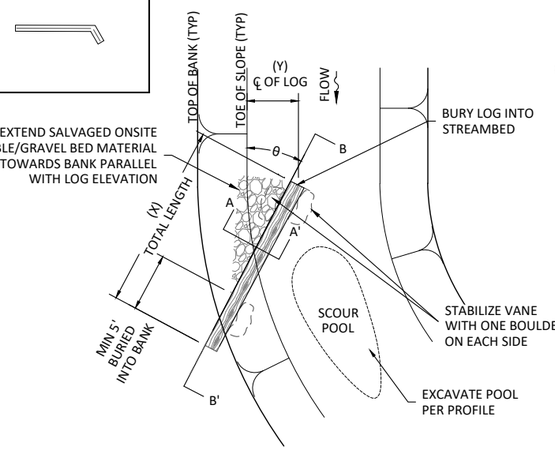




2 / 6.3 Rock Sill
Not to Scale

NOTE:

1. 2.0' X 2.0' X 1.0' MINIMUM BOULDER DIMENSION.

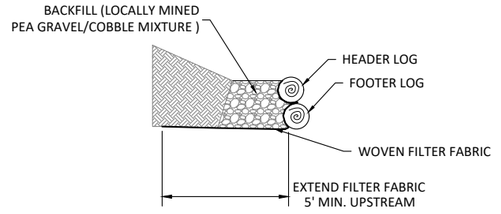


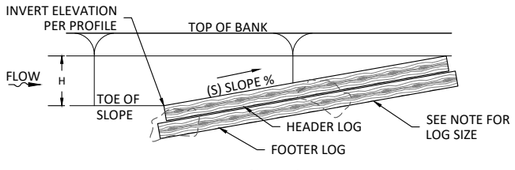
DIMENSIONS (TYP)	
DIMENSIONS	DYNAMITE CREEK
X (FT)	12.0
Y (FT)	2.1
H (FT)	0.4
θ (DEGREE)	20 - 30
S (%)	3% - 5%
MINIMUM REQUIRED LOG DIAMETER	
DIMENSIONS	DYNAMITE CREEK
(INCHES)	12

3 / 6.3 Log Vane
Not to Scale

NOTES:

1. SEE TABLE FOR SIZING.
2. ON SMALLER STREAMS THE STABILIZATION BOULDERS MAY BE REMOVED PER THE ENGINEER'S DISCRETION.





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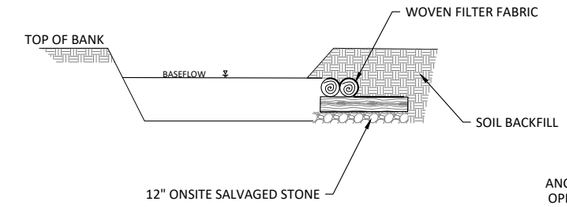
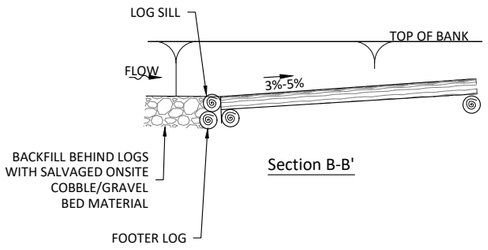


Section A-A'



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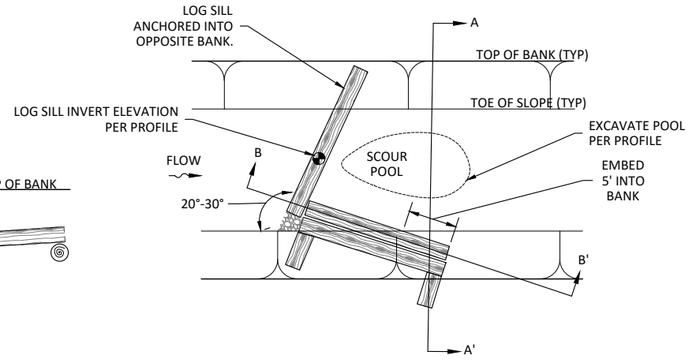
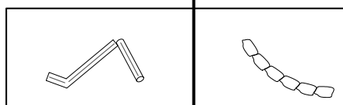


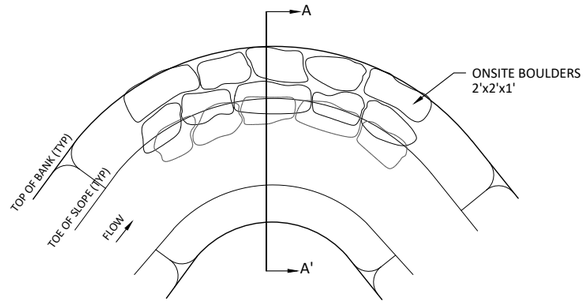
Plan View

NOTES:

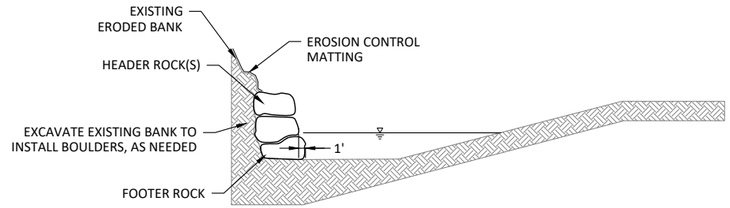
1. SEE DETAIL 1, SHEET 6.1 FOR MINIMUM LOG DIAMETER.
2. FOOTER LOG NOT NEEDED IF LOG SILL IS 24" OR GREATER.
3. WHEREVER POSSIBLE, USE SOD MATS ABOVE STRUCTURE.
4. IF SOD MAT UNAVAILABLE, USE SOIL LIFT WITH COIR FIBER MATTING.

1/6.4 Log J-Sill with Lunker Structure
Not to Scale





Plan View

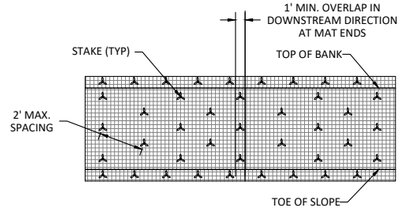


Section A-A'

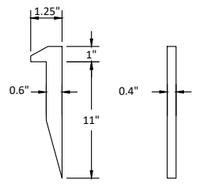
2/6.4 Boulder Toe
Not to Scale

NOTE:

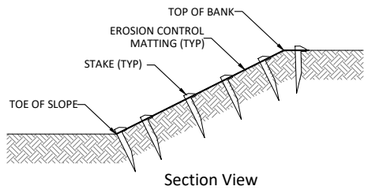
1. FOR STREAMBEDS WITH COARSE SUBSTRATE, PROVIDE FOOTER ROCKS.



Plan View



Typical Stake



Section View

Materials
Coir Fiber Matting is to be machine-produced mat made of 100% coconut fiber and must adhere to the specifications listed in the table above. A hardwood Eco-STAKE™ or similar biodegradable stakes shall be used to secure matting. No metal staples will be used on this project.

Construction Methods
The Contractor will install Coir Fiber Matting in locations and to the widths and lengths as shown on the plans and details or as directed. Coir Fiber Matting will be secured with wooden stakes and installed at three (3) feet on center in offset rows to affect a diamond pattern. Overlap the Coir Fiber Matting at seams a minimum of six inches. Coir Fiber Matting will be overlapped so that the upstream mat end is on top of the downstream mat start. Stakes will secure matting at three foot spacing on the overlapping seams. Coir Fiber Matting will be dry when installed placed on slopes not too loosely but not in tension.

Prior to mat placement, proposed grades shall be achieved and no voids will occur in the slope. The area will be treated with soil amendments and seeding as specified elsewhere in the plans and specifications. Straw mulch will be used to cover the finished grade to achieve a 60% coverage on the soil.

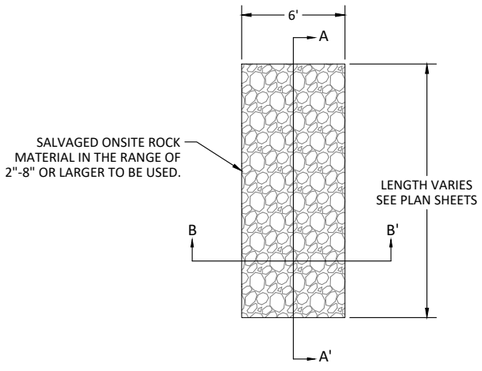
Maintenance

1. Inspect coir fiber matting at least weekly and after each significant ½ inch rain event and repair immediately.
2. Good contact with the ground must be maintained and erosion must not occur beneath the matting
3. Any areas of the matting that are damaged or not in close contact with the ground shall be repaired and staked.
4. If erosion occurs due to poorly controlled drainage, the problem shall be fixed and the eroded area protected.
5. Monitor and repair matting as necessary until ground cover is established.

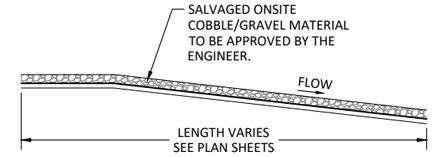
Coir Fiber Matting Specifications		
Property	**Requirement**	**Test Method**
matrix	100% coconut fiber	ECTC*
roll size	6.6 feet x 164 feet	ECTC*
thickness	0.30 inches (minimum)	ASTM D5199
elongation	34% x 38% (maximum)	ECTC*
flexibility	65030 x 29590 mg cm	ECTC*
mass per unit area	20 ounces per square yard (minimum)	ASTM D5261
stable flow velocity	11 feet per second (minimum)	ECTC*
open area (measured)	50% (maximum)	ECTC*
tensile strength	1348 x 626 pounds per foot	ASTM D5035
'C' factor	0.002	ASTM D5035

*Testing methods specified by Erosion Control Technology Council (ECTC) guidelines.

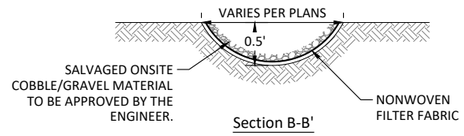
3/6.4 Erosion Control Matting
Not to Scale



Plan View



Section A-A'



Section B-B'

NOTES:

1. FLOODPLAIN OUTLET TO BE CONSTRUCTED WITH NATIVE ROCK MATERIAL IN THE RANGE OF 2"-8" OR LARGER.
2. IF NECESSARY, SALVAGED ONSITE ROCK MAY BE SUBSTITUTED WITH QUARRY ROCK OF SIMILAR SIZE.

4/6.4 Rock Floodplain Outlet
Not to Scale

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Checked By:	NMM

Sheet 6.4

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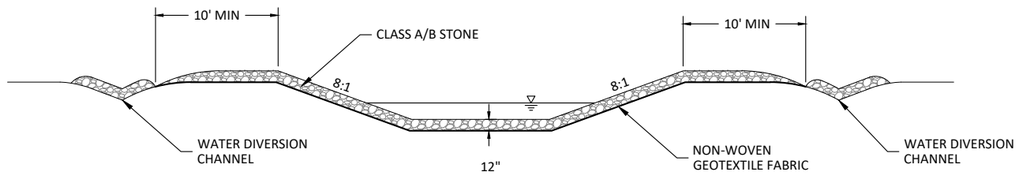
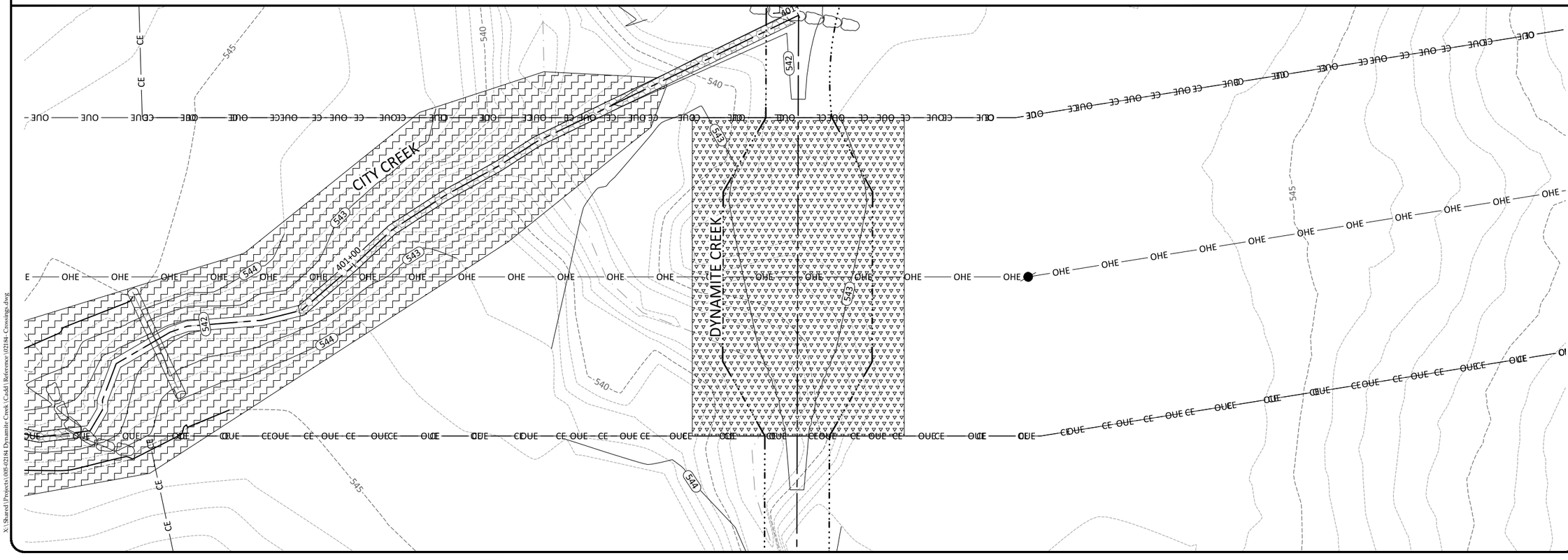


NOTES:

1. FORD CROSSING SHALL BE INSTALLED PERPENDICULAR TO CHANNEL BANKS.
2. MAINTAIN DIVERSION CHANNEL TO INSURE RUNOFF DOES NOT ENTER CHANNEL.

1 / 6.5 Ford Crossing - Dynamite Creek Sta. 112+34

Not to Scale



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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Crossing Detail

Revisions:

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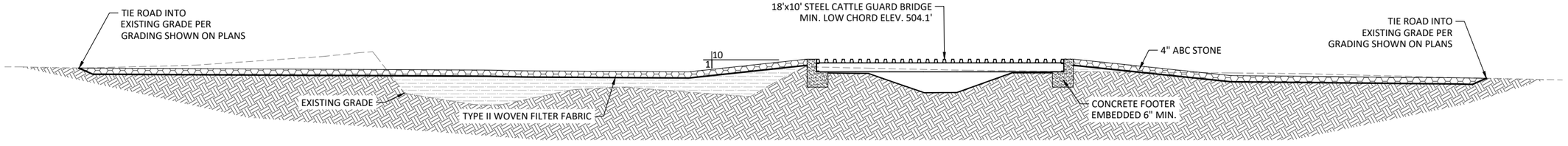
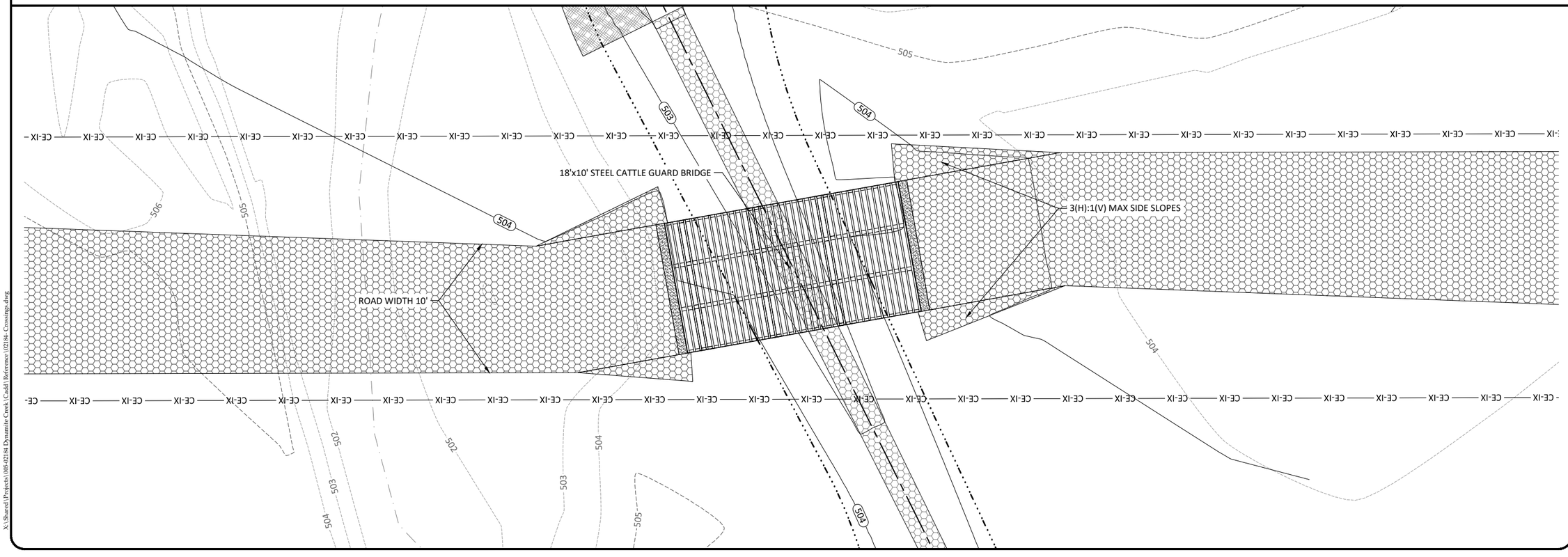
Checked By:	NMM

Sheet 6.5

February 8, 2021



1 / 6.6 Bridge Crossing - Dynamite Creek Sta. 135+10
Not to Scale



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Crossing Detail

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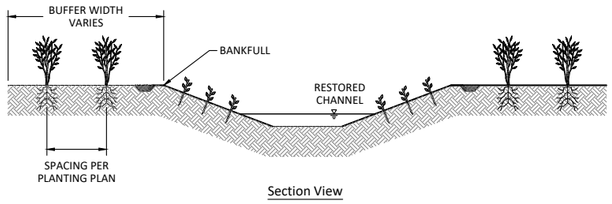
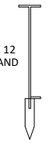
Sheet 6.6



Section View

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.

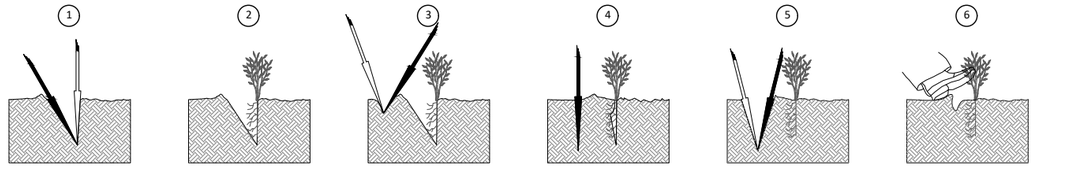


ROOTING PRUNING

ALL ROOTS SHALL BE PRUNED TO AN APPORIATE LENGTH TO PREVENT J-ROOTING.

NOTES:

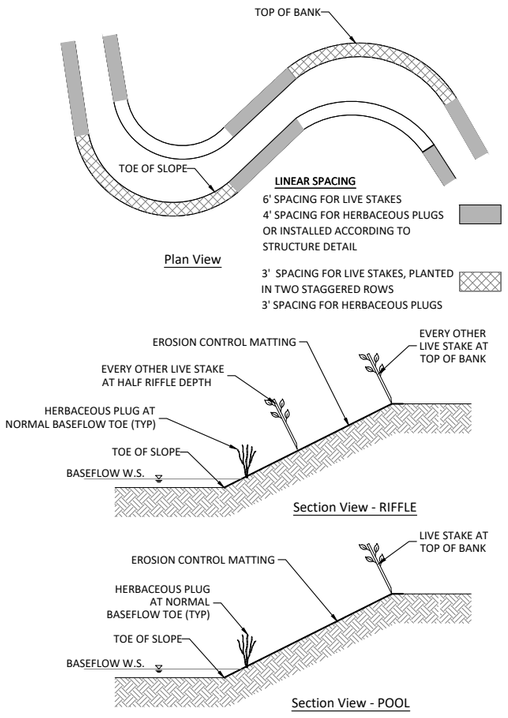
1. ALL SOILS WITHIN THE BUFFER PLANTING AREA SHALL BE DISKED, AS REQUIRED, PRIOR TO PLANTING.
2. ALL PLANTS SHALL BE PROPERLY HANDLED PRIOR TO INSTALLATION TO INSURE SURVIVAL.



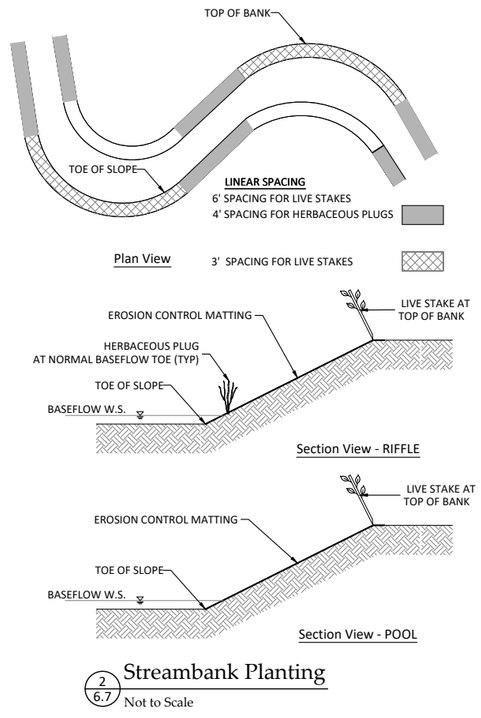
1 / 6.7 Bare Root Planting

Not to Scale

Zone 1 - Dynamite Creek Reach 5, 6, 7

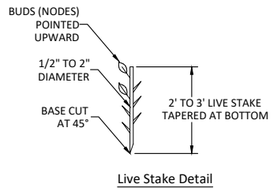


Zone 2 - Dynamite Creek Reach 2, 3



2 / 6.7 Streambank Planting

Not to Scale



Live Stake Detail

NOTE:

1. CONTRACTOR RESPONSIBLE TO FOLLOW PLAN VIEW DETAILS BY REACH SHOWN ABOVE.
2. REFER TO SPECIFICATIONS FOR PROPER STORAGE, HANDLING AND INSTALLATION.
3. FORM PILOT HOLE IN HARD SOIL OR STONY CONDITIONS TO PREVENT DAMAGE TO LIVE STAKES.
4. LIVE STAKES TO BE PLANTED IN AREAS AS SHOWN ON PLANS AND DIRECTED BY THE ENGINEER.
5. INSTALL DORMANT PRIOR TO LEAF OUT. DEPICTED CONDITION WITH LEAVES NOT REPRESENTATIVE OF STAKES AT TIME OF INSTALLATION.
6. ALL HERBACEOUS PLUGS ARE TO BE INSTALLED IN LOCATIONS REFERENCED IN INDIVIDUAL IN-STREAM STRUCTURE DETAILS.

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Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Details

Revisions:

Date:	02/08/20
Job Number:	005-02184
Project Engineer:	ANA
Drawn By:	RHW
Checked By:	NMM

Sheet 6.7

February 8, 2021

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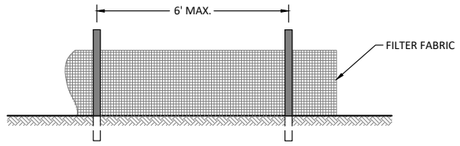
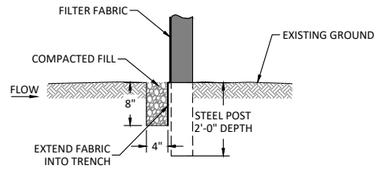
February 8, 2021

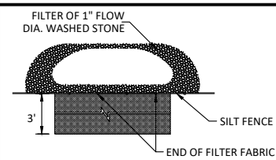




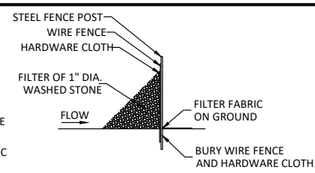
NOTES:

1. USE WIRE A MINIMUM OF 32" IN WIDTH AND WITH A MINIMUM OF 6 LINES OF WIRES WITH 12" STAY SPACING.
2. USE FILTER FABRIC A MINIMUM OF 36" IN WIDTH AND FASTEN ADEQUATELY TO THE WIRES AS DIRECTED BY THE ENGINEER.
3. FILTER FABRIC WILL BE BURIED A MINIMUM OF 8" IN THE GROUND WITH A 4" SKIRT.
4. PROVIDE 5' STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE.
5. INSPECT AFTER EACH RAIN EVENT AND MAINTAIN ACCORDING TO NCDEQ DESIGN MANUAL.
   A. SHOULD FABRIC COLLAPSE, TEAR, DECOMPOSE, OR BECOME INEFFECTIVE, REPLACE IMMEDIATELY.
   B. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEAN OUT.
   C. REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND BRING AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

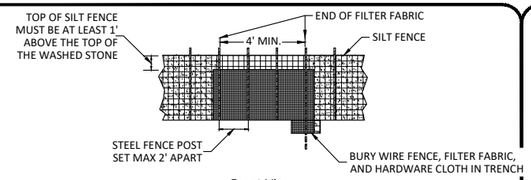
1 / 6.8 Temporary Silt Fence
Not to Scale



Plan View



Section View



Front View

INSTALLATION
REFER TO THE PLANS FOR LOCATIONS AND SPECIFICATIONS. DURING INSTALLATION OF THE SILT BARRIER OR SILT FENCE, INSPECT THE INSTALLATION TO DETERMINE IF OUTLETS ARE NEEDED ACCORDING TO THE CRITERIA SET FORTH IN THE SPECIFICATIONS FOR THE BARRIER AND FENCE. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER, ARCHITECT, OR RESPONSIBLE PERSONNEL ON THE SITE FOR ASSISTANCE. EROSION CONTROL PERSONNEL HAVE COPIES OF INSTRUCTIONS AND MAY HAVE PHOTOGRAPHS OF PROPERLY INSTALLED OUTLETS AS AN AID TO INSTALLATION.

IF THE SILT FENCE OUTLET IS NOT INSTALLED CORRECTLY THE FIRST TIME, IT WILL HAVE TO BE REBUILT.

DETERMINE THE EXACT LOCATION ON THE GROUND BEFORE COMPLETING INSTALLATION OF THE SILT FENCE, TAKING INTO CONSIDERATION:

INSTALL THE OUTLET AT THE LOWEST POINT (S) IN THE BARRIER OR FENCE WHERE WATER WILL POND.

INSTALL THE OUTLET WHERE IT IS ACCESSIBLE FOR INSTALLATION, MAINTENANCE, AND REMOVAL.

ALLOW AT LEAST:
15 FEET BETWEEN THE BARRIER OR FENCE AND SINGLE-STORY BUILDINGS.
25 FEET FOR FORK LIFTS BETWEEN THE BARRIER OR FENCE AND MULTIPLE-STORY BUILDINGS.
10 FEET BETWEEN THE BARRIER OR FENCE AND THE TOE OF FILL SLOPES.

PLACE THE OUTLET SO THAT WATER FLOWING THROUGH IT WILL NOT CREATE AN EROSION HAZARD BELOW: AVOID STEEP SLOPES BELOW THE OUTLET AND AREAS WITHOUT PROTECTIVE VEGETATION. USE SLOPE DRAINS IF NECESSARY.

DETERMINE THE LOCATION OF THE OUTLET: FOR A SILT BARRIER, WHEN THE TRENCH IS DUG TO BURY THE BOTTOM OF THE FABRIC BECAUSE THE BARRIER WILL BE OMITTED AT THE OUTLET; FOR A SILT FENCE, WHEN THE WIRE FENCE IS IN PLACE BECAUSE THE FILTER FABRIC WILL BE OMITTED AT THE OUTLET.

REFER TO THE ILLUSTRATIONS OF THE OUTLET IN THE PLAN.

CLEAR STUMPS AND ROOTS FROM THE LOCATION OF THE OUTLET. CLEAR ADEQUATE ACCESS FOR THE EQUIPMENT NEEDED FOR INSTALLATION, MAINTENANCE, AND REMOVAL.

FOR A SILT BARRIER:
JUST BELOW THE GAP IN THE BARRIER, PLACE A LAYER OF FILTER FABRIC ON THE GROUND TO PROTECT THE SOIL FROM EROSION BY OUTFLOW FROM THE OUTLET; PLACE 6 INCHES OF THE UPPER EDGE IN THE TRENCH. STAKE THE REMAINING EDGES OF THE FABRIC TO HOLD IT IN PLACE.

ALONG THE GAP WHERE THE OUTLET WILL GO, PLACE STEEL FENCE POSTS FOR STRENGTH. THE POSTS MUST BE A MAXIMUM OF 2 FEET APART AND DRIVEN INTO SOLID GROUND AT LEAST 18 INCHES.

PLACE HARDWARE CLOTH (WELDED GALVANIZED SCREEN WITH SQUARE 1/4 - 1/2-INCH HOLES) ON THE UPHILL SIDE OF THE POSTS TO HOLD THE WASHED STONE IN PLACE. PUT 6 INCHES OF THE BOTTOM OF THE CLOTH IN THE TRENCH AND FASTEN IT TO THE POSTS WITH LENGTHS OF WIRE.

BURY THE BOTTOM OF THE HARDWARE CLOTH AND THE UPPER EDGE OF THE FILTER FABRIC BELOW THE OUTLET IN THE TRENCH AND COMPACT THE FILL.

PLACE A FILTER OF 1-INCH DIAMETER WASHED STONE ON THE UPHILL SIDE OF THE OUTLET. PILE THE STONE UP TO THE TOP OF THE HARDWARE CLOTH AND OVER THE JOINT BETWEEN THE OUTLET AND THE BARRIER.

FOR A SILT FENCE:
JUST BELOW THE GAP IN THE BARRIER, PLACE A LAYER OF FILTER FABRIC ON THE GROUND TO PROTECT THE SOIL FROM EROSION BY OUTFLOW FROM THE OUTLET; PLACE 6 INCHES OF THE UPPER EDGE IN THE TRENCH. STAKE THE OTHER EDGES OF THE FABRIC TO HOLD IT IN PLACE.

ALONG THE GAP WHERE THE OUTLET WILL GO, PLACE ADDITIONAL STEEL FENCE POSTS FOR STRENGTH. THE POSTS MUST BE A MAXIMUM OF 2 FEET APART AND DRIVEN INTO SOLID GROUND AT LEAST 18 INCHES.

PLACE HARDWARE CLOTH (WELDED GALVANIZED SCREEN WITH SQUARE 1/4 - 1/2-INCH HOLES) ON THE UPHILL SIDE OF THE POSTS TO HOLD THE WASHED STONE IN PLACE. PUT 6 INCHES OF THE BOTTOM OF THE CLOTH IN THE TRENCH AND FASTEN IT TO THE POSTS WITH LENGTHS OF WIRE.

BURY THE BOTTOM OF THE HARDWARE CLOTH, THE UPPER EDGE OF THE FILTER FABRIC BELOW THE OUTLET, AND THE WIRE FENCE IN THE TRENCH AND COMPACT THE FILL.

PLACE A FILTER OF 1-INCH DIAMETER WASHED STONE ON THE UPHILL SIDE OF THE OUTLET. PILE THE STONE UP TO THE TOP OF THE HARDWARE CLOTH AND OVER THE JOINT BETWEEN THE OUTLET AND THE SILT FENCE.

MAINTENANCE:
CHECK OUTLET FOR EROSION, PIPING, AND ROCK DISPLACEMENT WEEKLY AND AFTER EACH SIGNIFICANT (½ INCH OR GREATER) RAINFALL AND REPAIR IMMEDIATELY.

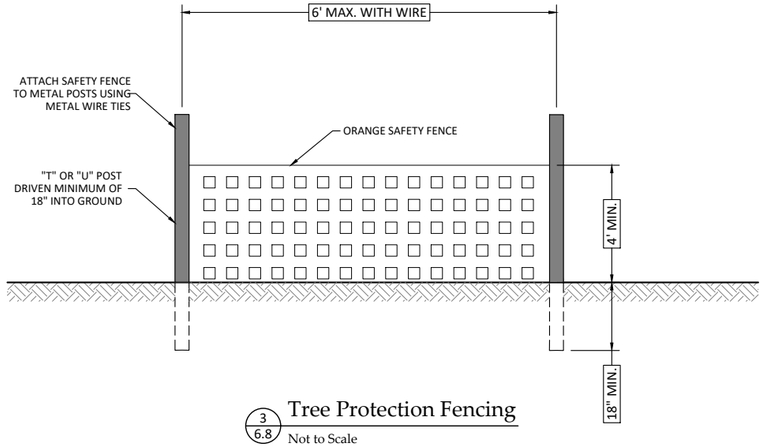
REMOVE THE STRUCTURE AND ANY UNSTABLE SEDIMENT IMMEDIATELY AFTER CONSTRUCTION SITE HAS BEEN PERMANENTLY STABILIZED.

2 / 6.8 Temporary Silt Fence Gravel Outlet
Not to Scale

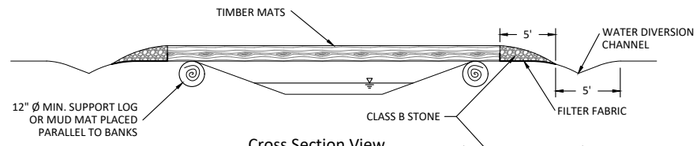
[X]

SAF

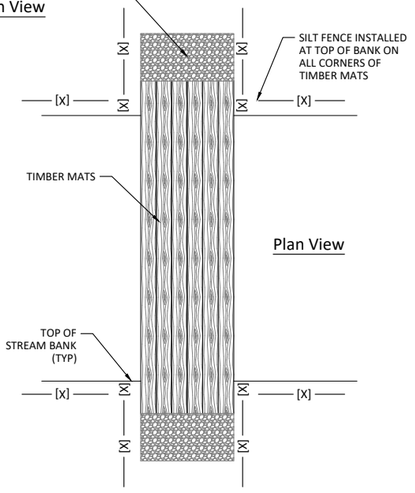
MATERIAL SPECIFICATIONS		
PHYSICAL PROPERTY	TESTS	REQUIREMENTS
MATERIAL	N/A	POLYETHYLENE
RECOMMENDED COLOR	N/A	"INTERNATIONAL ORANGE"
TENSILE YIELD	ASTM D638	AVE. 2000 LBS. PER 4' WIDE
ULTIMATE TENSILE STRENGTH	ASTM D638	AVE. 2900 LBS. PER 4' WIDE
ELONGATION AT BREAK (%)	ASTM D638	GREATER THAN 1000%
CHEMICAL RESISTANCE	N/A	INERT TO MOST CHEMICALS AND ACIDS



3 / 6.8 Tree Protection Fencing
Not to Scale



Cross Section View



Plan View

NOTES:

1. CONSTRUCT STREAM CROSSING WHEN FLOW IS AT NORMAL BASEFLOW.
2. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM.
3. INSTALL STREAM CROSSING PERPENDICULAR TO THE FLOW.
4. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL.
5. STABILIZE AN ACCESS RAMP OF CLASS B STONE TO THE EDGE OF THE TIMBER MAT.
6. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED.
7. TIMBER MAT IS TO BE WIDER THAN BIGGEST PIECE OF EQUIPMENT CROSSING IT WITH A SOLID DECK & SIDEBOARD TO PREVENT SEDIMENT LOSS TO STREAM.
8. ALL MATS SHALL HAVE NO GAPS BETWEEN TIMBERS.

4 / 6.8 Temporary Stream Crossing with Silt Fence - Timber Mat
Not to Scale

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Rockingham County, North Carolina

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Drawn By:	RHW
Checked By:	NMM

Sheet 6.8

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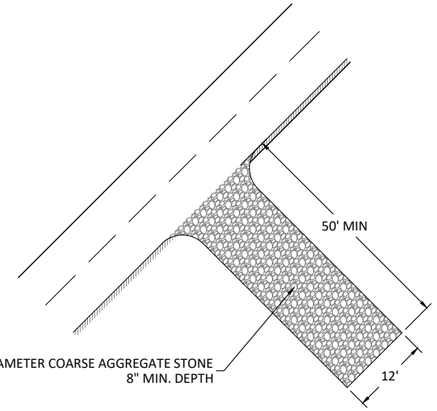
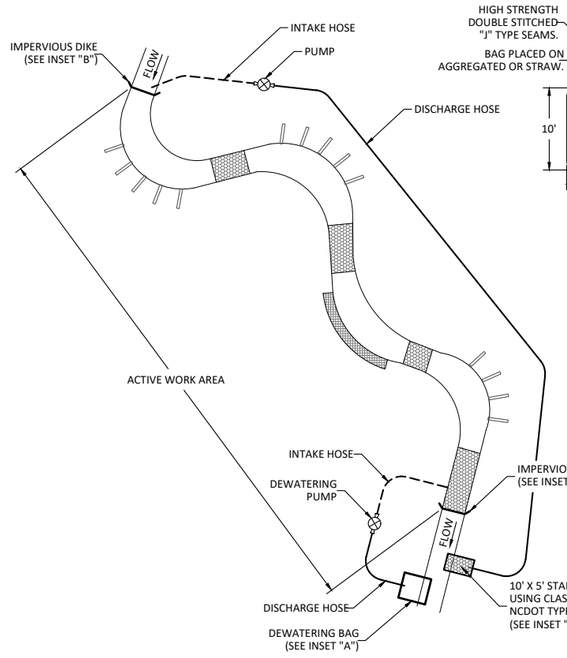
February 8, 2021



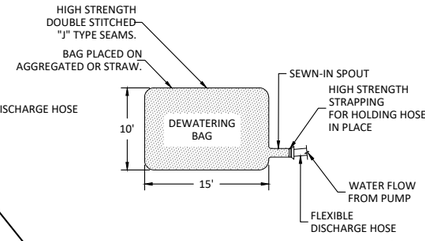
NOTES:

1. PROVIDE TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS.
2. LOCATE CONSTRUCTION ENTRANCE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. PROVIDE FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE.
3. 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.
4. ENTRANCE WILL BE EXTENDED AS NEEDED TO PROVIDE ADEQUATE SEDIMENT REMOVAL.
5. ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED IMMEDIATELY.
6. USE CLASS A STONE OR OTHER COARSE AGGREGATE APPROVED BY THE ENGINEER.
7. PLACE FILTER FABRIC BENEATH STONE.
8. AFTER EACH RAINFALL, INSPECT ANY STRUCTURE USED TO TRAP SEDIMENT AND CLEAN IT OUT AS NECESSARY. IMMEDIATELY REMOVE ALL OBJECTIONABLE MATERIALS SPILLED, WASHED, OR TRACKED ONTO PUBLIC ROADWAYS.
9. REMOVE CONSTRUCTION ENTRANCE UPON COMPLETION OF THE PROJECT AND RETURN TO PRE-PROJECT GRADES, ELEVATIONS, AND CONDITIONS, UNLESS DIRECTED TO KEEP CONSTRUCTION ENTRANCE BY LANDOWNER.

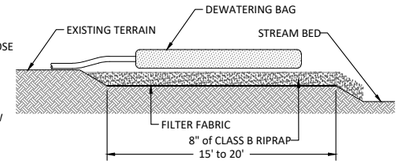
1 / 6.9 Construction Entrance
Not to Scale



Plan View

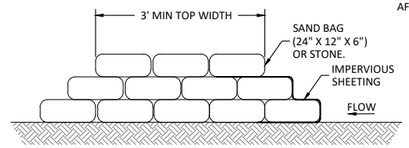


Inset "A"
Dewatering Bag

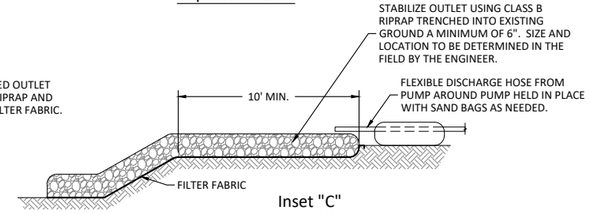


NOTE:

1. PROVIDE STABILIZED OUTLET TO STREAMBED.
2. DEWATERJNG BAG SHALL BE INSPECTED AFTER 1/2" OR GREATER RAINFALL EVENT

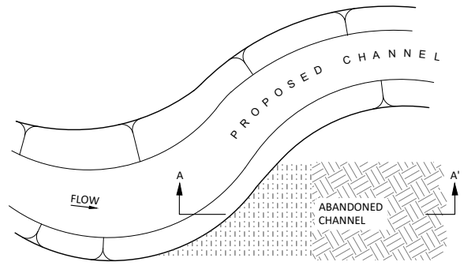


Inset "B"
Impervious Dike

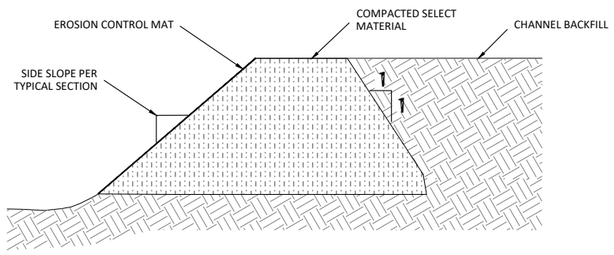


Inset "C"
Stabilized Outlet

2 / 6.9 Pump Around System
Not to Scale

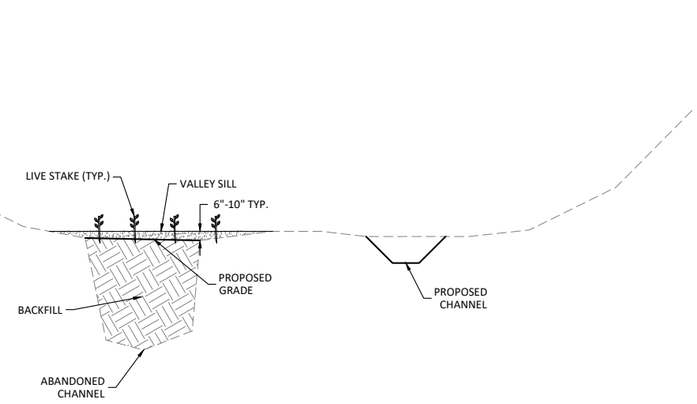


Plan View



Section A-A'

3 / 6.9 Channel Plug
Not to Scale



4 / 6.9 Earthen Valley Sill
Not to Scale

NOTES:

1. CONSTRUCT EARTHEN VALLEY SILLS TO PREVENT CONCENTRATED FLOW OVER THE ABANDONED CHANNEL.
2. VALLEY SILLS SHALL HAVE A MINIMUM 1' TOP WIDTH AND MINIMUM 5:1 SIDE SLOPES.
3. DENSELY PACKED BRUSH MATERIAL MAY BE INCORPORATED INTO THE VALLEY SILL.
4. PLANT THE VALLEY SILL WITH LIVE STAKES OR ROOTED SEEDLINGS.

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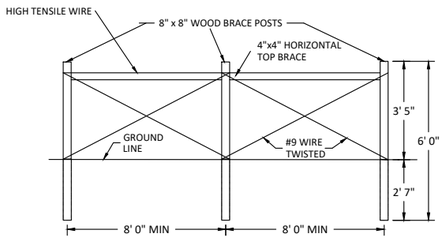
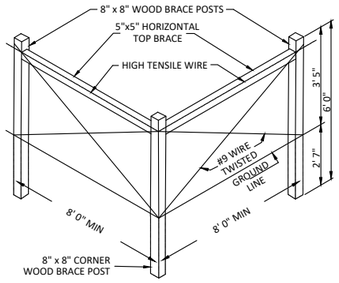
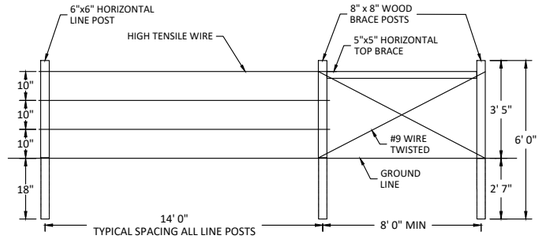


LINE BRACES
(MAXIMUM SPACING 330')

ALTERNATE TYPES OF STAPLES
USE ONE #9 STAPLE OR TWO #16 STAPLES AT EACH POINT OF ATTACHMENT.

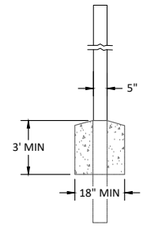


CORNER BRACE
USE WHEN CORNER ANGLE IS 15° OR GREATER

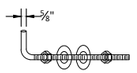


END OR GATE BRACES

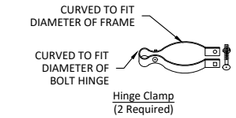
1 / 6.10 Four-Strand High Tensile Wire Fence
Not to Scale



Detail of Gate Post Anchor



Bolt Hinge
(2 Required)

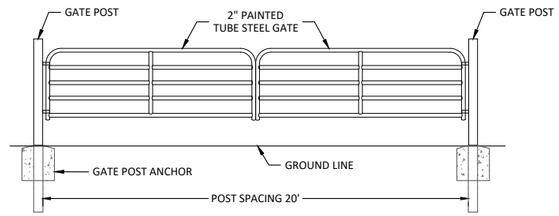


Hinge Clamp
(2 Required)

Hinge Assembly

GATE POST:

USE CLASS "B" CONCRETE AT GATE POSTS OR WHERE REQUIRED BY SOIL CONDITIONS. CONCRETE MAY ALSO BE USED IN LIEU OF SETTING POSTS TO THEIR MAXIMUM DEPTH.



Access Gate

2 / 6.10 2" Tube Steel Double Gate
Not to Scale

GENERAL NOTES:

ALL POSTS AND BRACES MAY BE EITHER ROUND OR SQUARE AT THE OPTION OF THE CONTRACTOR, PROVIDED THE SAME TYPE IS USED THROUGHOUT THE PROJECT.

DIMENSIONS SHOWN ARE THE DIAMETER OF ROUND OR EDGE DIMENSIONS OF SQUARE POSTS AND BRACES.

ERECT LINE BRACES BETWEEN END, CORNER OR GATE POSTS. PLACE LINE BRACES AT INTERVALS NOT TO EXCEED 300' AND AT THE END OF THE WIRE ROLL.

THE 300' INTERVAL MAY BE REDUCED BY THE ENGINEER ON CURVES WHERE THE DEGREE OF CURVATURE IS GREATER THAN 3 DEGREES.

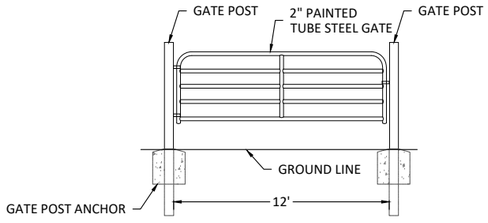
NOTCH BRACE POSTS 1" MINIMUM FOR HORIZONTAL BRACES. PLACE TWO GALVANIZED 12d OR THREE GALVANIZED 10d NAILS AT EACH END OF ALL BRACES.

PLACE THE BRACE WIRE AROUND THE POST. DRAW ALL BRACE WIRE TAUT BY TWISTING BETWEEN EACH POST.

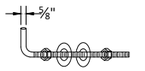
INSTALL THE FENCE FACING THE PROPERTY OWNER EXCEPT THAT ON HORIZONTAL CURVES GREATER THAN THREE DEGREES (3°) INSTALL THE FENCE TO PULL AGAINST ALL POSTS. SEE NCDOT STD. 866.02 FOR FENCING AT DITCH CROSSINGS, BREAKS IN GRADES AND R/W BREAKS.

USE LATCH DEVICE APPROVED BY THE ENGINEER. HINGE ASSEMBLY AS SHOWN IS SUGGESTED. SUBSTITUTION MAY BE SUBJECT TO APPROVAL BY THE ENGINEER. USED 2" PAINTED STEEL PIPE FOR GATE FRAME EXCEPT AS SHOWN HERE.

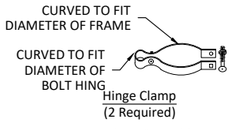
ANY COMBINATION OF GATE AND FENCE TYPE MEETING THE APPROVAL OF THE ENGINEER IS ACCEPTABLE AND IS NOT LIMITED TO THE EXAMPLES SHOWN HEREON.



Access Gate

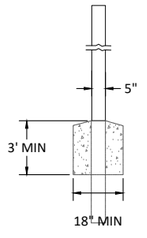


Bolt Hinge
(2 Required)



Hinge Clamp
(2 Required)

Hinge Assembly



Detail of Gate Post Anchor

GATE POST:

USE CLASS "B" CONCRETE AT GATE POSTS OR WHERE REQUIRED BY SOIL CONDITIONS. CONCRETE MAY ALSO BE USED IN LIEU OF SETTING POSTS TO THEIR MAXIMUM DEPTH.

3 / 6.10 Single 2" Tube 12' Steel Gate
Not to Scale

GENERAL NOTES:

ALL POSTS AND BRACES MAY BE EITHER ROUND OR SQUARE AT THE OPTION OF THE CONTRACTOR, PROVIDED THE SAME TYPE IS USED THROUGHOUT THE PROJECT.

DIMENSIONS SHOWN ARE THE DIAMETER OF ROUND OR EDGE DIMENSIONS OF SQUARE POSTS AND BRACES.

ERECT LINE BRACES BETWEEN END, CORNER OR GATE POSTS. PLACE LINE BRACES AT INTERVALS NOT TO EXCEED 300' AND AT THE END OF THE WIRE ROLL.

THE 300' INTERVAL MAY BE REDUCED BY THE ENGINEER ON CURVES WHERE THE DEGREE OF CURVATURE IS GREATER THAN 3 DEGREES.

NOTCH BRACE POSTS 1" MINIMUM FOR HORIZONTAL BRACES. PLACE TWO GALVANIZED 12d OR THREE GALVANIZED 10d NAILS AT EACH END OF ALL BRACES.

PLACE THE BRACE WIRE AROUND THE POST. DRAW ALL BRACE WIRE TAUT BY TWISTING BETWEEN EACH POST.

INSTALL THE FENCE FACING THE PROPERTY OWNER EXCEPT THAT ON HORIZONTAL CURVES GREATER THAN THREE DEGREES (3°) INSTALL THE FENCE TO PULL AGAINST ALL POSTS. SEE NCDOT STD. 866.02 FOR FENCING AT DITCH CROSSINGS, BREAKS IN GRADES AND R/W BREAKS.

USE LATCH DEVICE APPROVED BY THE ENGINEER. HINGE ASSEMBLY AS SHOWN IS SUGGESTED. SUBSTITUTION MAY BE SUBJECT TO APPROVAL BY THE ENGINEER. USED 2" PAINTED STEEL PIPE FOR GATE FRAME EXCEPT AS SHOWN HERE.

ANY COMBINATION OF GATE AND FENCE TYPE MEETING THE APPROVAL OF THE ENGINEER IS ACCEPTABLE AND IS NOT LIMITED TO THE EXAMPLES SHOWN HEREON.

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DRAFT

Dynamite Creek Mitigation Site
Rockingham County, North Carolina

Details

Revisions:

Date: 02/08/20
Job Number: 005-02184
Project Engineer: ANA
Drawn By: RHW
Checked By: NMM

Sheet 6.10