MITIGATION PLAN

NESBIT SITE

Union County, North Carolina

DMS Project ID No. 100121
Full Delivery Contract No. 7868
USACE Action ID No. SAW-2019-00832
DWR Project No. 2019-0862
RFP No. 16-007704 (Issued: 9/6/2018)

Catawba River Basin
Cataloging Unit 03050103

Prepared for:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1652

May 2021

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

REPLY TO
ATTENTION OF:

February 2, 2021

Regulatory Division

Re: NCIRT Review and USACE Approval of the NCDMS Nesbit Mitigation Site / Union Co./ SAW-2019-00832/ NCDMS Project # 100121

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

Dear Mr. Baumgartner:

The purpose of this letter is to provide the North Carolina Division of Mitigation Services (NCDMS) with all comments generated by the North Carolina Interagency Review Team (NCIRT) during the 30-day comment period for the Nesbit Draft Mitigation Plan, which closed on January 6, 2021. These comments are attached for your review.

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

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

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

Sincerely,

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

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List
Kelly Phillips, Paul Wiesner—NCDMS
Matthew Harrell, Raymond Holz—RS

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Response to IRT Comments – Mitigation Plan
Nesbit Mitigation Site (DMS ID No. 100121)
Contract No. 7868
Catawba River Basin 03050103, Union County
USACE AID#: SAW-2019-00832
DWR Project No. 2019-0862

Comments Received (Black Text) & Responses (Blue Text)

WRC Comments, Olivia Munzer:

1. Stringent sedimentation and erosion control to reduce any impacts to mussels downstream will be essential.
   Understood.

EPA Comments, Todd Bowers:

1. Section 3.2/Page 7: Be sure to include contingencies in the adaptive management plan should unknown areas of bedrock be encountered.
   The following sentence was added to the Document, "The Site is an alluvial valley that is characterized by relatively deep deposits; therefore, bedrock is not expected to pose as a hindrance to channel excavation. However, if bedrock contact is made during construction, the channel will be adjusted and noted on as-built red-line drawings."

2. Section 3.3/Page 7: While I agree that mitigation of site streams will reduce bank erosion rates and sediment loading of receiving waters, how much is the restoration efforts expected to reduce the rate? Will erosion rate be reduced to zero with restoration/enhancement efforts? Can this information be updated in the As-Built/MY 0 report?
   Although stream bank erosion will not be eliminated (particularly in MY-0), it is understood that a significant reduction in bank erosion will result from the project. Bank erosion would be expected to be minimized by MY-3 as bank vegetation establishes. A Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) evaluation at MY-0 will not be beneficial.

3. Section 3.4/Page 8: The nutrient load (nitrogen and phosphorous) reduction associated with the cessation of land use activities is based on the entire 18-acre site conversion. How much of the 18-acre site (stream banks and channel and forested areas) is not currently in row crops? How many acres of actual land are being taken out of row-crop production? What percentage of the total nutrient input to the streams be reduced? Is the 360 lbs of N and P per year reduction a significant amount? What is the expected result of indirect nutrient removal due to a functioning vegetated riparian zone?
   The nutrient model is based on published values for agricultural application of nitrogen and phosphorus in the form of fertilizer. The model does not account for nutrient removal from functioning vegetative riparian buffers, or other reductions (volatilization, absorption, conversion, etc.). Within the 18-acre Site, approximately 60 percent was planted in row crops; however, this year was overly wet and not plowed. In a typical year, when plows could access the lower slopes, the Site has more row crop production (approximately 78 percent).

4. Section 3.5/Page 8: There seems to be missing individual narrative descriptions of Glen Branch and the unnamed tributaries that would normally be presented in this section. The network of tributaries around Glen Branch have undergone significant change and alteration in the past 10 years and some additional information would be helpful to assess the current stressors as well as past manipulation of waters feeding into the site.
   A discussion of the individual reach descriptions, including photographs, has been added to Section 3.5 of the Document.

5. Section 7/Page 17: The road (Nestbit Road) at the downstream terminus of the project is the major constraint to the project as far as further activity is prevented beyond this point and could be a source of encroachment in the future. Also, may want to mention that bedrock may necessitate changes to the design if encountered during construction.
   A Section has been added to indicate the following, "Nesbit Road at the downstream terminus of the project is a constrain to further project expansion. Although this road may provide a source of encroachment, the conservation will be in place to hinder future development."

6. Table 19/Page 25: Recommend adding the number of consecutive days needed to meet the 12 percent of the growing season success criteria.
   The growing season is not a fixed period as it is based on documentation of bud burst from two species and appropriate soil temperatures at the beginning and end of the growing season. Thus, we feel it is not appropriate to list consecutive days to meet the 12 percent growing season success criteria.

7. Table 20/Page 26:
   a. Accolades to the site sponsor for including monitoring of benthic macroinvertebrates even without credits tied to the monitoring.
      Thank you

   b. Recommend adding the rain gauge (shown on Figure 10) as the method of monitoring rainfall data at the site.
      The rain gauge at the Site is intended to monitor rainfall data at the Site.

   c. Recommend the sponsor provide additional detail as to what constitutes "poor" growth to necessitate the random plots.
      Poor growth includes areas that do not qualitatively and quantitatively meet success criteria.

   d. In lieu of "poor" growth, I recommend 20% (3 plots) of all plots be located randomly each year for vegetation monitoring.
      Annual walkthroughs of the Site are expected to dictate the location of temporary vegetation plots. In addition, IRT reviews and infield visits will confirm the location of temporary plots.

DWR Comments, Erin Davis:

1. Page 1, Section 1.3 – Please include a discussion of past/historic onsite and adjacent area land use.
   A paragraph has been added to Section 1.3 to indicate the following. "Based on historic aerial photography, the Site has been in use for agriculture since before 1985. Aerials indicate that a primary residence and barn structure, with associated lagoons, driveway, and fencing were located on the downstream portion of the Site, near Nesbit Road. At this time, most of the Site was utilized for row crops and/or hay production and the streams had previously been dredged and straightened. Several ponds were located on the Site in topographic crenulations leading to Glen Branch. Floodplains were largely vegetated, except for the downstream barn area. It appears that the barn structure fell into disrepair by 2007 and by 2009 the barn and residential structures were removed. At this time, the ponds were also breached and turned into agriculture fields. Around 2013 the floodplains of the Site were timbered and left in the current condition."

2. Page 5, Section 2 – This section mentions watershed development pressures. Was a changing watershed a consideration in site design? Have local/regional planning agencies/documents been consulted? Are there any anticipated land use changes adjacent to the project site?
   No local/regional planning agencies/documents have been consulted for future development of the Site. No land use changes are anticipated for the project Site.

3. Page 6, Section 2 – Please clarify what is meant by the statement "requiring minimal long-term management" regarding site stream and wetland resources.
   This statement references Section 11 (Long-Term Management Plan), which outlines what is required for long-term management.

4. Page 8, Section 3.5 – Please provide more detail on existing stream conditions. While Table 4 provides a general reach summary, it doesn't identify why multiple approaches are proposed for each stream (e.g. why is UT1 broken into four reaches and three different approaches?). Please also provide more context for the noted wetland clearing and include a reference to presence of beaver.
   Section 3.5 has been expanded to include individual reach descriptions that include multiple channel types within each reach. The descriptions have photos that show what is in the descriptions and outlines beaver activity and the results of the beavers.

5. Page 8, Section 3.5.2 – All reaches are classified as unstable, even proposed EII reaches? Also, which reaches are characterized by sand substrate?
   The individual reach descriptions discussed above outline stable vs. unstable reaches and explains which reaches have cobble and sand.

6. Page 17, Table 14 – What are the artificial barriers listed as functional stressors?
   Forded crossings with extensive drops below them are the artificial barriers listed as functional stressors.

7. Page 18, Section 7 – DWR considers stream crossing easement breaks as project constraints to be listed in this section as they fragment the project site and reduce the potential uplift. DWR does appreciate that the project only proposes one easement break.
   A Subsection (Easement Breaks) was added with the following text. "Easement breaks were evaluated as a potential project constrain as they fragment the Site and reduce the potential functional uplift. This project reduces Site crossings from 4 crossings to 1 crossing and has only 1 easement break. Therefore, easement breaks do constitute a significant reduction of functional uplift at the Site and are not considered a project constraint."

8. Page 19, Section 7.4 – Were increased wetland hydrology and potential beaver presence considerations in the risk of trespass and landowner ditching outside the easement? DWR would have liked to see a buffer between wetland credit areas and the easement boundary.
   Hydrologic trespass was evaluated for all aspects of the project. Based on hydraulic models, soil mapping, and topography, hydrologic trespass will not occur. The desire for buffers on wetlands is noted.

9. Page 19, Section 7.5 – A utility right-of-way abuts the south easement boundary. Are there any concerns with maintenance (e.g. mowing, spraying) along the conservation easement?
   No. All sites have edges, and the mowing/spraying conducted by the utility provider outside but adjacent to the easement is expected to have a negligible impact on the easement. In fact, the utility may make a better neighbor than a roadway, for example, as roadways experience mowing/spraying at a higher interval than most utility ROW's. In any case, we expect any neighboring use to respect the properly marked boundary and adhere to the legal requirements of the conservation easement.

10. Page 20, In-stream Structures – DWR is slightly concerned with all wood grade control structures on intermittent streams in the slate belt due to observed decomposition during monitoring periods on other projects. Was project location and flow a consideration in determining grade control material? As shown on design details, footer logs will be critical structure components.
    Stream flow is a consideration for grade control material. Hardwood logs will be required for structures. It is anticipated that woody material will degrade over time, and natural woody material will develop a suitable root structure to compensate for erosive forces. Footer logs are included as an integral part of these structures.

11. Page 20, Marsh Treatment Area – Please specify that no long-term maintenance is needed for this feature. Also, please discuss alternatives to a riprap outlet. DWR prefers not to have a hardened outlet unless no feasible alternative can maintain a stable connection.
    A sentence was added stating that no long-term maintenance is needed for this feature. In addition, a statement was added that indicates that other suitable material for the outlet may include woody material or riffle bed material.

12. Page 21, Drop Structure – Please clarify "drop structure may be constructed out of large cobble". What's the alternative? How does this relate to the information provided in the Drop Structure Detail?
    Please note that Figures 8A and 8B have been removed from the Document to reduce confusion. This section now refers to the construction plans located in Appendix M for descriptions.

13. Page 21, Table 16 – Please provide a brief description of the proposed floodplain interceptors to go along with the Detail (e.g. purpose, material, any long-term stabilization risks).
    A description of a floodplain interceptor has been added to Section 8.1.1 and includes the following text. "A floodplain interceptor is a small depression in the design channel bank that directs return flow into the channel to reduces bank erosion/headcut formation in the channel bank. The interceptor will include a depression armored with erosion control matting and/or riffle bed material to control erosion until channel bank vegetation has been established. The interceptor will be located in the field during construction at locations where return flow occurs or would be anticipated."

14. Page 22, Section 8.3 – Is any wetland grading proposed? If so, please identify areas that will be excavated beyond 12 inches. Also, ephemeral pools are noted in the text but not shown on the draft design sheets. If construction of ephemeral pools is proposed, a typical detail (with max. depth indicated) and approximate locations should be included in the final mitigation plan.
    No wetland grading is proposed for this project. Wetland will be reestablished, rehabilitated, and enhanced by priority 1 stream restoration of incised channels. Discussions of ephemeral pools have been removed from the Document.

15. Page 24, Table 17 – The elm and hickory species in the planting list differ from RFE Table 9. Is this due to availability? Also, please indicate if any of the species will be installed as live stakes. And include a native permanent seed mix(s) in the final mitigation plan.
    The planting plan has been updated to indicate the elm and hickory species shown in RFE Table 9 and now shows the permanent seed mix to be installed. The primary tree planting will be completed with bare root material. Live staking will be made with additional plant material and include regionally appropriate species such as silky dogwood, elderberry, willow sp, and arrowwood viburnum.

16. Page 24, Section 8.5.2 – Table 4 indicates 15% invasive site cover, what species are present? I have a field note about parrot feather onsite, which can be extremely difficult to manage. What is the proposed treatment plan for this species?
    The primary invasive species identified at the Site is Chinese privet. An extensive control regimen will be initiated before construction and will continue through the end of monitoring. Parrot feather is not expected to be a problem once proper stream hydrology has been established. This emergent species does not establish well with normal Piedmont stream flow.

17. Page 24, Section 9 – Please add a sentence to this section stating that success criteria and monitoring will be completed in accordance with the 2016 NCIRT Guidance.
    The statement "Monitoring will be conducted in accordance with 2016 NCIRT Guidelines." Has been added to the beginning of Section 9.

18. Page 25, Table 18 – DWR understands that the macro sampling is not proposed for credit, but please provide a brief description to accompany the table listed action.
    Benthic macroivertebrate sampling is outlined in Table 20 and is stated as follows. "Qual 4" method described in *Standard Operating Procedures for Collection and Analysis of Benthic Macroinvertebrates, Version 5.0* (NCDWR 2016)."

19. Page 25, Table 19 – Please clarify that the surface flow criteria is for intermittent reaches and that the wetland hydrology is an annual criterion.
    Stream success criteria has the flowing added to the table. "Intermittent streams will demonstrate at least 30-days consecutive flow." In addition, wetland hydrology criteria has been changed to include "Annual saturation or inundation……"

20. Page 26, Table 20 – DWR requests a flow gauge at the top of UT2 Reach 2.
    A surface water flow gauge has been added to UT2 Reach 2.

21. Page 27, Section 9.2 – DWR appreciates the inclusion of this section. Please note that some of the listed actions will require IRT review as adaptive management and may need USACE/DWR permit authorizations.
    A sentence has been added to indicate that "some aspects of adaptive management may require IRT review and USACE/DWR permit authorizations."

22. Page 27, Section 9.2.2 – As noted, IRT consultation and approval will be necessary if any future earthwork is proposed. Depending on the depth of proposed ephemeral pools, the credit ratio may change to reflect wetland creation.
    The following sentence was added, "IRT consultation and approval will be necessary if future earthwork is proposed. In addition, if the depth of ephemeral pools exceed 1 foot, the credit ratio may be changed to reflect wetland creation."

23. Page 27, Section 9.2.3 – Again, DWR appreciates this discussion. We recommend an additional sentence addressing any identified cause for observed veg issue(s) (e.g. beaver trapping, pine thinning, soil amendments, additional signage for encroachments, landowner discussion on herbicide overspray).
    Noted, language added: "Supplemental plantings will rely on general site management strategies to identify and address obstacles to tree survival such as soil fertility, wildlife damage, or human encroachment."

24. Page 28, Section 9.2.4 – DWR recommends higher sign posts or PVC extensions be considered along the easement boundaries that abut row crop if corn will be in rotation, particularly given the irregular shape of the project easement.
    The minimum size post described is expected to be both highly visible and long-lasting.

25. Page 28, Section 10 – Please specify DMS as the point of contact to notify the IRT of any site issues.
    DMS has been noted as the contact for adaptive management.

26. Figure 9 – DWR appreciates the planting zones level of detail provided.
    Understood.

27. Figure 10 –
    a. Based on the icons size it's a bit difficult to determine how many plots and gauges are within each restoration type area. Please make sure to have at least 2 gauges and plots within the wetland rehabilitation areas. DWR requests that a representative number of gauges be placed streamside and near the upland edge, since these are the zones that we are most concerned with meeting the minimum hydroperiod performance standard.
    Gauge icons have been reduced in size. In addition, 2 gauges have been included in rehabilitation areas, in similar locations as preconstruction gauges. Gauges have been located in streamside and upland edge areas.

    b. Please show or note fix photo points at all veg plots, gauges, cross-sections and stream crossings.
    A note has been added that photo points will be located at all vegetation plots, cross sections, and stream crossings.

28. Figures – DWR would welcome the inclusion of LiDAR and historic aerial figures, as well as drone and ground photos of existing site conditions. All of these items are helpful in our review. Also, can a property boundaries layer please be added to a figure.
    Figure 10 (Lidar) has been added to the Document. In addition, property boundaries have been added to Figure 4 (Existing Conditions).

29. Appendix B – Since this was requested during the IRT site walk, DWR would like more detail included in the site soil investigation in the final mitigation plan, including a map indicating all soil check locations. Representative soil profile photos are also helpful. (Note that Appendix D did not include wetland determination forms with soil data.)
    A figure has been added to Appendix B (Figure B2 – Soil Mapping GPS Point Locations) that depicts the GPS points collected during hydric soil mapping and wetland delineation. A note has been included in the figure indicating that 3 soil cores were collected per GPS point. The map also shows the soil boring log locations.

30. Sheet 01A –
    a. Please identify locations where the floodplain interceptor is proposed on the plan sheets.
    This is a standard symbology sheet, and not all items shown are used. The interceptor will be located in the field during construction at locations where return flow occurs or would be anticipated.

    b. Is the step pool structure synonymous with the proposed drop structure? The details appear different.
    The step pool label has been changed drop structure.

    c. Please include the icon for channel fill. Please confirm that hatched channel fill areas will be completely backfilled to grade. Also, on the plan sheets it appears that sections of existing channel and ditches will remain open (areas not hatched). Please confirm. DWR requests that these areas have a max. open depth of 14 inches. If this request is not feasible, please provide a justification as to why.
    The icon for channel fill will be added to all plan sheets and a call-out for each location. The places where the channel fill is not shown are where the construction limits are already filling in the existing channel. All existing channel areas will be filled to grade.

31. Sheet 02, Riffle Rip Rap – Please provide approximate percent composition of Class A, Class B and smaller stone.
    The table on Sheet 02 has been revised to include percentages of each stone size.

32. Sheet 02B, Marsh Treatment Area – Please provide the max. depth proposed for the deep pools. Please provide stone size and percent composition of riprap outlet, if an alternative non- hardened stabilized outlet is not feasible. Will the associated outlets extend beyond the drawn marsh treatment areas on the plan sheets? Are marsh treatment areas proposed at all points where ditches connect to the project? Can ditch locations please be called out on plan sheets?
    A max. depth of 12 inches was added to the detail. There are four proposed locations for marsh treatment on Plan Sheets 09, 10, 11, and 14. Class A rip rap has been called out in detail and will be used at all locations between the marsh treatment and the wetland areas.

33. Sheet 02C, Reinforced Riffle Step – Please identified where this feature is proposed on the plan view drawings. Please specify stone size. And what necessitates stone placement to top of bank? DWR is concerned whether bank armoring is warranted.
    No Reinforced Riffle Steps are proposed on the project. This detail is shown for the contractor to have available in the event of a change due to field conditions.

34. Sheet 02E – Please make sure to enter the two blank minimum values.
    Values have been added.

35. Sheet 04 – DWR appreciates that existing and proposed wetlands are mapped on the design sheets. However, the hatching makes it difficult to view elevation data. Please improve the visibility of existing and proposed contour lines. Also, please update wetland "enhancement" note to "rehabilitation" on all plan sheets.
    The existing contours are now darker, the proposed wetland hatching has been lightened. The note has been adjusted on all sheets.

36. Sheet 07 – Please confirm that the easement is proposed to be partially fenced, some sheets have fence line callouts and some don't.
    The easement line is now shown on all sheets.

37. Detail – Please add a typical planting detail.
    Detail has been added to the planting sheet.

38. General Design – There are no meander bend bank treatments proposed for stabilization or habitat (e.g. brush toe, boulder toe, vegetated/live lift). Are there any concerns with long-term bank stability, particularly within a developing watershed?
    No bank stability issues are anticipated. We believe meander bend treatments lead to instability and that within two years adequate root mats, woody debris, and leaf matter develop naturally.

USACE Comments, Kim Browning:

1. The correct USACE Action ID for this project is SAW-2019-00832. Please correct the cover page.
   The USACE Action ID has been updated on the cover page.

2. Page 8: The text describes all reaches as being unstable but EII is planned on two reaches. Please correct the contradiction.
   Section 3.5 has been expanded to include individual reach descriptions that include multiple channel types within each reach. The descriptions have photos that show what is in the descriptions and outlines stability of each reach.

3. A flow gauge should be placed on UT-2 at the beginning of the restoration reach. There are concerns with this tributary maintain flow.
   A flow gauge has been added to the beginning of UT 2 Reach 2.

4. I appreciate the marsh treatment areas planned; however, these treatment areas should not be placed in existing or proposed wetlands. On Figure 6 it appears that two of these BMPs are located in proposed jurisdictional areas on Glen Branch upstream of UT-1. Please confirm that these treatment areas will not be constructed in proposed wetlands.
   The two marsh treatment areas in the upstream reach of Glen Branch have been removed. Other marsh treatment areas will not be constructed in wetland areas.

5. Section 3.6.1 and Appendix K: Given that wetland gauges 1 and 2 already meet hydrology performance standards, rehabilitation is not appropriate in these two locations since functional uplift cannot be demonstrated. Please change these areas to wetland enhancement at 2:1.
   a. After a discussion with RS on January 8, 2021, it was discovered that beaver were trapped near gauges 1 and 2 which contributed to the increased hydrology. If you can demonstrate that the hydrology is in fact not meeting performance standards prior to the final mitigation plan, these areas may be credited at the rehabilitation ratio of 1.5:1.

   Additional gauges were added in beaver-affected areas and monitored for the spring 2021 growing season (see Figure 4 for additional gauge locations). Once groundwater gauge data was processed, areas of wetland rehabilitation were reassessed. Some areas of wetland rehabilitation characterized by a significant hydroperiod were converted to wetland enhancement (see Figure 6 for wetland credit areas).

6. UT1 Reach 1 is proposed for a 2.5:1 ratio, which is consistent with our notes from the July 2019 site visit, so why not list it as an enhancement II ratio, rather than EI?
   During the IRT visit, it was determined that an EI approach was to be undertaken in this reach; however, the functional uplift was only suitable for a 2.5:1 credit ratio.

7. Table 1: The wetland rehabilitation section lists 2.46 existing acres but only 1.789 acres proposed in the plan. Do you anticipate a loss of wetlands? Additionally, I can't figure out how you came up with 1.193 mitigation credits based on a 1.5:1 ratio.
   The 2.459 acres of existing wetland is based on the approved PJD. However, some of the wetland in the PJD were located outside of the conservation easement (mainly in the upstream crossing). In addition, there are some areas of wetland that the design channel will traverse through, which will be removed from the total wetland acreage. The total existing wetland area has been updated to include pre-construction gauge data, within the easement and after removing wetland beneath the design channel includes 1.977 acres. A note has been added to Tabl1 1 explaining the adjustments to existing stream lengths and wetland areas following the approval of the PJD. Overall, considering the net gain realized from wetland reestablishment combined with wetland rehabilitation and enhancement this project does not cause the loss of wetland acreage, or function as the existing wetland area will increase from 2.459 acres to 7.315 acres.
   a. This table will need to be updated when you address comment #5 above.
   Understood.

   b. The existing acres of 2.46 is not consistent with Section 1.4 or Table 4.
   Please see the discussion above.

8. Section 3.5: This section should be expanded to include a narrative with more detail of existing conditions, and broken out to describe each reach separately. Photos of existing conditions would also be beneficial.
   Section 3.5 has been expanded to include individual reach descriptions that include multiple channel types within each reach. The descriptions have photos that show what is in the descriptions and outlines stability of each reach.

9. Section 3.6: This section should also be expanded to include a more detailed narrative of existing wetland conditions. Will you be proposing wetland rehabilitation based on restoring an appropriate plant community and elevating the water table? Will wetland re-establishment only be proposed within areas clearly delineated as having drained hydric soils?
   An added description of Wetland Rehabilitation and Reestablishment have been included in Section 8.3 (Wetland Restoration). This statement includes the following, "Wetland re-establishment is intended for portions of the Site that are currently not jurisdictional and will therefore include the restoration of wetland hydrology and vegetation. Wetland rehabilitation is intended for portions of the Site currently characterized by wetland hydrology; however, the hydrology has been impacted by stream channel incision. Therefore, wetland rehabilitation will include the enhancement of wetland hydrology and vegetation."

10. Are photo-points located at all cross-sections? If so, please also include a photo point of the crossing and at the top and bottom of the project.
    A note has been added to Figure 9 (Monitoring Plan) that photo points will be located at all vegetation plots, cross sections, and stream crossings.

11. Table 14 discusses the functional uplift potential and references NCSAM/WAM, including the water quality and habitat uplift. These are benefits that are presumed and will not be measured by monitoring. Unless you intend to demonstrate actual uplift in these areas, I recommend that this section be reworded that uplift in these areas is implied.
    Table 14 has been updated to depict goals and objectives that can be measured for success. Other functional uplift metrics are described as academically likely areas of functional uplift and are not tied to goals, monitoring, or success criteria.

12. It would be beneficial to add some coarse woody debris to the depressional areas in the buffers and

throughout the adjacent wetlands for habitat, and to help store sediment, increase water storage/infiltration, and absorb water energy during overbank events.
Understood

13. Section 7.5: While no utilities are located on the site, there appears to be a power line at the downstream end of the project. Is there an appropriate setback from the utility corridor?
The project stops at the recorded boundary of the utility corridor. No further setback is needed.

14. Page 22: Ephemeral pools should be 8-14" depressions that dry up yearly so that predatory species cannot colonize, and should not be so numerous that trees do not grow in large areas of the buffer. Additionally, please indicate the number and location of these areas.
References concerning ephemeral pools have been removed from the Document.

15. Section 8.5.2: Several invasive species were identified during the IRT site walk. These species should be listed in this section.
A discussion of invasive species has been added to this section of the Document.

16. Section 9.1: Wilmington District guidance requires a macroinvertebrate reference location be sampled for comparison purposes.
Reference macroinvertebrate data was collected in May 2021 at the Uwharrie stream reference reach and will be included in the as-built and monitoring reports when required.

17. Table 19: 30-days consecutive flow is only in relation to intermittent streams.
Stream success criteria has the flowing added to the table. "Intermittent streams will demonstrate at least 30-days consecutive flow."

18. Figure 10: It's difficult to tell from the map because the icons for groundwater gauges are so large, but please make sure that there is a well located in the wetland rehabilitation area (near the area where Gauge 1 was located for pre-data).
The size of the icons for groundwater gauges has been reduced for clarity. In addition, groundwater gauges have been moved to add two gauges in wetland rehabilitation areas. These gauges are as close to preconstruction gauges as feasible. In several locations, the preconstruction groundwater gauges are located where the design channel is proposed. In that situation the monitoring gauge has been moved to a similar setting as close to the preconstruction gauge as possible.

19. Section 9.2: I appreciate the thoughtfulness of this section. It may be beneficial to add beaver to this section since they are already on-site.
Beaver have been added to the stream contingency list. Text has been added to read as follows. "Indications of beaver establishment will be monitored throughout the 7-year monitoring period. If beaver are identified in the Site, the dam's location will be depicted on CCPV mapping, and the beaver will be trapped. Once the beaver have been trapped, the dam will be removed. Removal of the dam is expected to occur by hand to minimized disturbance to the adjacent mitigation areas."

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NESBIT SITE

Union County, North Carolina

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Catawba River Basin
Cataloging Unit 03050103

Prepared for:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
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Contact: Raymond Holz
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And

Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603
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919-215-1693 (phone)

May 2021

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

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

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

This document was assembled using the June 2017 DMS Stream and Wetland Mitigation Plan Template and Guidance and the October 24, 2016 NC Interagency Review Team Wilmington District Stream and Wetland Compensatory Mitigation Update.

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TABLES

APPENDICES

1 PROJECT INTRODUCTION

The Nesbit Stream & Wetland Mitigation Site (hereafter referred to as the "Site") encompasses 18.0 acres of agricultural row crops along warm waters of Glen Branch and unnamed tributaries to Glen Branch. The Site is located seven miles southwest of Monroe and five miles southeast of Waxhaw in the southwest corner of Union County near the North Carolina and South Carolina border (Figures 1 and 2, Appendix A).

1.1 Directions to Site

Directions to the Site from Raleigh, North Carolina.

- Head south on US-1 for 43 miles,
- Merge onto US-15/US-501 South and travel 17.5 miles,
- Turn left onto NC-73 West and travel 19 miles,
- Turn left to merge onto I-74, which becomes US-220 South,
- After 14 miles, turn right onto US-74 Bus West, which becomes US-74 West,
- After 42 miles, turn right onto East Franklin Street, then left onto Sunset Drive,
- After 2 miles, turn right onto Griffith Road, then left onto South Bragg Street,
- After 0.2 mile, turn left onto Lancaster Avenue,
- After 8 miles, turn right onto Nesbit Road,
- The Site is on the right after approximately 1.1 miles.
    - Site Latitude, Longitude
      34.893600, -80.654400 (WGS84)

1.2 USGS Hydrologic Unit Code and NCDWR River Basin Designation

The Site is located within the Catawba River Basin in 14-digit United States Geological Survey (USGS) Cataloging Unit and **Targeted Local Watershed 03050103030030** of the South Atlantic/Gulf Region (North Carolina Division of Water Resources [NCDWR] subbasin number 03-08-38) [Figures 1 and 2, Appendix A]). Site hydrology drains to warm waters of Glen Branch and unnamed tributaries to Glen Branch (Stream Index Number 11-139-1), which has been assigned a Best Usage Classification of **C** (NCDWR 2013). Glen Branch is not listed on the North Carolina Department of Environment and Natural Resources (NCDENR) draft 2018 or final 2016 303(d) lists (NCDEQ 2018a, NCDEQ 2018b).

1.3 Physiography and Land Use

The Site is in the Carolina Slate Belt portion of the Piedmont ecoregion of North Carolina. Regional physiography is characterized by dissected, irregular plains with moderate to steep slopes and low to moderate gradient streams over boulder and cobble-dominated substrate (Griffith et al. 2002). Onsite elevations range from a high of 640 feet National Geodetic Vertical Datum (NGVD) at the upper reaches to a low of approximately 620 feet NGVD at the Site outfall (USGS Waxhaw, North Carolina 7.5-minute topographic quadrangle) (Figures 1 and 3, Appendix A).

Based on historic aerial photography, the Site has been in use for agriculture since before 1985. Aerials indicate that a primary residence and barn structure, with associated lagoons, driveway, and fencing were located on the downstream portion of the Site, near Nesbit Road. At this time, most of the Site was utilized for row crops and/or hay production and the streams had previously been dredged and straightened. Several ponds were located on the Site in topographic crenulations leading to Glen Branch. Floodplains were largely vegetated, except for the downstream barn area. It appears that the barn structure fell into disrepair by 2007 and by 2009 the barn and residential structures were removed. At this time, the ponds were also breached and turned into agriculture fields. Around 2013 the floodplains of the Site were timbered and left in the current condition.

The Site provides water quality functions to an approximately 1.25-square mile (798.8-acre) watershed at the outfall; Site tributary watershed sizes range from 0.07 to 0.28 square miles (45.6 to 176.2 acres) (Figure 3, Appendix A). The watershed is dominated by pasture, agricultural land, forest, and sparse residential development. Impervious surfaces account for less than 2 percent of the upstream watershed land surface. Land use at the Site is characterized by agricultural row crops.

1.4 Project Components and Structure

The Site encompasses 18.0 acres of agricultural row crops along the warm waters of Glen Branch and unnamed tributaries to Glen Branch. The Site includes 5423 linear feet of degraded stream channel (based on the approved PJD), 2.459 acres of degraded wetland, 6.57 acres of drained hydric soil (Figure 4, Appendix A).

Site restoration activities include the construction of a meandering E/C-type stream channel, resulting in 4800 linear feet of Priority I stream restoration, 316 linear feet of stream enhancement (Level I), 541 linear feet of stream enhancement (Level II), 5.338 acres of riparian wetland re-establishment, 0.902 acres of riparian wetland rehabilitation, and 1.075 acres of wetland enhancement (Table 1) (Figure 6, Appendix A). Completed project activities, reporting history, completion dates, project contacts, and background information are summarized in Tables 1-4.

Table 1 – Project Components and Mitigation Credits Nesbit Site

Project Segment	Existing[1] Ft/Ac	Mitigation Plan Ft/Ac	Mitigation Category	Restoration Level	Mitigation Ratio	Mitigation Credits	Comment
Glen Br Reach 1	1195	1275	Warm	R	1.000	1275.000	
Glen Br Reach 2	63	63	Warm	EI	1.500	42.000	
Glen Br Reach 3	2555	2776	Warm	R	1.000	2776.000	
UT 1A	311	314	Warm	EII	5.000	62.800	Reach is EII; however, is generating a 5:1 credit ratio.
UT 1 Reach 1	253	253	Warm	EI	2.500	101.200	Reach is EI; however, is generating a 2.5:1 credit ratio.
UT 1 Reach 2	373	381	Warm	R	1.000	381.000	
UT 1 Reach 3	110	115	Warm	EII	2.500	46.000	
UT 1 Reach 4	169	171	Warm	R	1.000	171.000	
UT 2 Reach 1	112	112	Warm	EII	2.500	44.800	
UT 2 Reach 2	243	197	Warm	R	1.000	197.000	
Wetland Reestablishment	--	5.338	NA	Re-establishment	1.000	5.338	
Wetland Rehabilitation	0.902	0.902	NA	Rehabilitation	1.500	0.601	
Wetland Enhancement	1.075	1.075	NA	Enhancement	2.000	0.538	

[1]Existing stream length from PJD is 5,423-lft while existing stream length for mitigation is 5,384-lft. Existing wetland area from PJD is 2.459-ac while existing wetland area for mitigation is 1.977-ac. These differences are due to adjustments in the final easement since the PJD was completed and accounts for the channel relocation associated with the stream restoration.

Table 1 – Project Components and Mitigation Credits (Continued)
Nesbit Site

Restoration Level	Stream			Riparian Wetland		Non-riparian wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Nonriverine		
Restoration	4800.000	--	--	--	--	--	--
Re-establishment	--	--	--	5.338	--	--	--
Rehabilitation	--	--	--	0.601	--	--	--
Enhancement I	143.200	--	--	0.538	--	--	--
Enhancement II	153.600	--	--	--	--	--	--
Benthics 2%	101.936	--	--	--	--	--	--
Totals	**5198.736**	**--**	**--**	**6.477**	**--**	**--**	**--**

Table 2 – Project Activity and Reporting History
Nesbit Site

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Technical Proposal	January 2019	January 2019
Institution Date	--	April 18, 2019
Mitigation Plan	June 2020	May 2021
Construction Plans	--	May 2021

Table 3 – Project Contacts Table
Nesbit Site

Role	Firm
Full Delivery Provider, Planting Contractor, General Contractor	Restoration Systems 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 Raymond Holz: 919-755-9490
Designer & Monitoring	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis: 919-215-1693
Engineer	Sungate Design Group, P.A. 905 Jones Franklin Road Raleigh, NC 27606 Josh Dalton: 919-859-2243
Surveyor	k2 Design Group - John Rudolph (L-4194) 5688 U.S. Hwy. 70 East Goldsboro, NC 27534 919-394-2547

Table 4 – Project Attribute Table
Nesbit Site

Project Information					
Project Name	Nesbit Site				
Project County	Union County, North Carolina				
Project Area (acres)	18.0				
Project Coordinates (latitude & latitude)	34.8936, -80.6544				
Planted Area (acres)	16.0				
Project Watershed Summary Information					
Physiographic Province	Piedmont				
Project River Basin	Catawba				
USGS HUC for Project (14-digit)	03050103030030				
NCDWR Sub-basin for Project	03-08-38				
Project Drainage Area (acres)	798.8				
Percentage of Project Drainage Area that is Impervious	<5%				
CGIA Land Use Classification	Managed Herbaceous Cover				
Reach Summary Information					
Parameters	**Glen Br Upstream**	**Glen Br Downstream**	**UT 1A**	**UT1**	**UT 2**
Length of reach (linear feet)	1487	2326	311	905	355
Valley Classification & Confinement	Alluvial, confined				
Drainage Area (acres)	494.6	798.8	152.6	176.7	45.6
NCDWR Stream ID Score	--	--	28	33	30
Stream Thermal Regime	Warm				
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial/ Intermittent	Perennial	Perennial/ Intermittent
NCDWR Water Quality Classification	C				
Existing Morphological Description (Rosgen 1996)	Cg4	Eg 4	-----	Eg 4	Eg 6
Proposed Stream Classification (Rosgen 1996)	Ce 3/4	Ce 3/4	-----	Ce 3/4	Ce 3/4
Existing Evolutionary Stage (Simon and Hupp 1986)	III/IV	III/IV	III	II/III	II/III
Underlying Mapped Soils	Secrest Cid complex				
Drainage Class	Somewhat poorly drained				
Hydric Soil Status	Nonhydric (may contain hydric inclusions)				
Valley Slope	0.0077	0.0048	0.0204	0.0086	0.0147
FEMA Classification	AE floodway	AE floodway	NA	NA	AE floodway
Native Vegetation Community	Piedmont Alluvial Forest/Dry-Mesic Oak-Hickory Forest				
Watershed Land Use/Land Cover (Site)	30% forest, 65% ag. land, 5% low density residential/impervious surface				
Watershed Land Use/Land Cover (Uwharrie Reference Channel)	100% forest				
Percent Composition of Exotic Invasive Vegetation	15%				

Table 4 – Project Attribute Table
Nesbit Site (continued)

Wetland Summary Information			
Parameters	**Wetlands**		
Wetland acreage	6.57 acre drained & 2.459 acre degraded		
Wetland Type	Riparian riverine		
Mapped Soil Series	Secrest Cid Complex		
Drainage Class	Somewhat Poorly drained		
Hydric Soil Status	Nonhydric (may contain hydric inclusions)		
Source of Hydrology	Groundwater, stream overbank		
Hydrologic Impairment	Incised streams, compacted soils, agriculture		
Native Vegetation Community	Piedmont/Low Mountain Alluvial Forest		
% Composition of Exotic Invasive Vegetation	<5%		
Restoration Method	Hydrologic and vegetative		
Enhancement Method	---		
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States-Section 401	Yes	Yes	Section 401 Certification
Waters of the United States-Section 404	Yes	Yes	Section 404 Permit
Endangered Species Act	Yes	Yes	CE Document (App E)
Historic Preservation Act	Yes	Yes	CE Document (App E)
Coastal Zone Management Act	No	--	NA
FEMA Floodplain Compliance	Yes	Yes	DMS FEMA Checklist (App E)
Essential Fisheries Habitat	No	--	NA

2 WATERSHED APPROACH AND SITE SELECTION

Primary considerations for Site selection included the potential for water quality improvement within a region of North Carolina under livestock/agricultural pressure. More specifically, considerations included: desired aquatic resource functions; hydrologic conditions; soil characteristics; aquatic habitat diversity; habitat connectivity; compatibility with adjacent land uses; reasonably foreseeable effects the mitigation project will have on ecologically important aquatic and terrestrial resources; and potential development trends and land use changes.

Currently, the proposed Site is characterized by agricultural row crops. A summary of existing Site characteristics in favor of proposed stream and wetland activities includes the following.

- Streams and wetlands have been cleared of forest vegetation
- The Site receives nonpoint source inputs, including agricultural chemicals
- Wetland soils have been compacted by agricultural equipment
- Wetland hydrology has been removed by stream channel entrenchment

In addition to the opportunity for ecological improvements at the Site, the use of the particular mitigation activities and methods proposed in the Design Approach & Mitigation Work Plan (Section 8.0) are

expected to produce naturalized stream and wetland resources that will be ecologically self-sustaining, requiring minimal long-term management (Long-term Management Plan [Section 11.0]).

The *Lower Catawba River Basin Restoration Priorities* (RBRP) report (NCEEP 2007) documents that the main goal in urbanized watersheds of this river basin is to better manage stormwater runoff. The Waxhaw Creek watershed, which includes the Site, is a priority for land preservation because it faces development pressures from the Charlotte Metro area. The hydrologic unit (HU) is the only one in the Catawba Basin that supports a population of the federally endangered Carolina heel-splitter mussel (one of only six populations in the world). Stream water quality is critical to its survival and requires the use of forested buffers and the prevention of siltation and other pollution sources.

Site-specific mitigation goals and objectives have been developed by using the North Carolina Stream Assessment Method (NC SAM) and the North Carolina Wetland Assessment Method (NC WAM). Both are discussed further in Section 6.0 (Functional Uplift and Project Goals/Objectives).

3 BASELINE AND EXISTING CONDITIONS

3.1 Soils and Land Form

Soils that occur within the Site, according to the *Web Soil Survey* (USDA 2020), are described in Table 5.

Table 5 – Web Soil Survey Soils Mapped within the Site

Map Unit Symbol	Map Unit Name (Classification)	Hydric Status	Description
BdB2	Badin channery silty clay loam (*Typic Hapludults*)	Non-hydric	This series consists of moderately eroded, well-drained soils found on interfluves with 2-8 percent slopes. The parent material is residuum weathered from metavolcanics and/or argillite. Depth to the water table is more than 80 inches. Depth to restrictive features is 20-40 inches to paralithic bedrock and 40-80 inches to lithic bedrock.
CmB	Cid channery silt loam loam (*Aquic Hapludults*)	Non-hydric	This series consists of moderately well-drained soils found on interfluves with 1-5 percent slopes. The parent material is residuum weathered from metavolcanics and/or argillite. Depth to the water table 12-30 inches. Depth to restrictive features is 20-40 inches to paralithic bedrock and 40-80 inches to lithic bedrock.
ScA	Secrest-Cid complex (*Aeric Epiaquults/Aquic Hapludults*)	Non-hydric, but may contain hydric inclusions	This series consists of moderately well-drained soils found on interfluves with 0-3 percent slopes. The parent material is residuum weathered from metavolcanics and/or argillite. Depth to the water table 12-30 inches. Depth to restrictive features is 40-60 inches to paralithic bedrock and 60-80 inches to lithic bedrock.
TaB, TaC, TaB2	Tarrus gravelly silt loam (*Typic Kanhapludults*)	Non-hydric	This series consists of well-drained soils found on interfluves with 2-15 percent slopes. The parent material is residuum weathered from metavolcanics and/or argillite. Depth to the water table more than 80 inches. Depth to restrictive features is 40-60 inches to paralithic bedrock.

3.2 Geology

The Site is located within the Carolina Slate Belt which consists of heated and deformed (metamorphic) volcanic rocks, specifically metamudstone and Meta-Argillite. It was the Site of a series of oceanic volcanic islands about 650-550 million years ago. Ash and rock from these volcanoes formed the Carolina Slate Belt's parent material that, through extensive metamorphism, change the sediments into slates, phyllites, schists, and quartzites.

Specifically, the Site is in a Cid Formation, which is composed of shale that is mostly even grained, and consequently, splits along bedding planes. The Cid Formation is named for the community of Cid near the Town of Denton. The mudstone of the Cid Formation contains felsic lavas that did not extend far from their sources and were associated with the eruption of andesitic basalt.

Several areas of the Site exhibit bedrock contact; however, contact is confined to incised stream channels that will be backfilled. The proposed stream channels will be tied into the bedrock were feasible to hinder headcut migration through the Site. The Site is an alluvial valley that is characterized by relatively deep deposits; therefore, bedrock is not expected to pose as a hindrance to channel excavation. However, if bedrock contact is made during construction, the channel will be adjusted and noted on as-built red-line drawings.

3.3 Sediment Model

Sediment load modeling was performed using methodologies outlined in A Practical Method of Computing Streambank Erosion Rate (Rosgen 2009) and Estimating Sediment Loads using the Bank Assessment of Non-point Sources Consequences of Sediment (Rosgen 2011). These models provide a quantitative prediction of streambank erosions by calculating Bank Erosion Hazard Index (BEHI) and Near-Bank Stress (NBS) along each reach of the Site. The resulting BEHI and NBS values are then compared to streambank erodibility graphs prepared for North Carolina by the NC Stream Restoration Institute and NC Sea Grant.

Streambank characteristics involve measurements of bank height, angles, materials, presence of layers, rooting depth, rooting density, and percent of the bank protected by rocks, logs, roots, or vegetation. Site reaches have been measured for each BEHI and NBS characteristic and predicted lateral erosion rate, height, and length to calculate a cubic volume of sediment contributed per year by each reach. Data forms for the analysis are available upon request, and the data output is presented in Appendix B. Results of the model are shown in Table 6.

Table 6 – BEHI and NBS Modeling Summary

Stream Reach	Proposed Mitigation Treatment	Predicted Sediment Contribution (tons/year)
Glen Branch	Restoration and Enhancement (Level I)	223.8
UT 1	Restoration and Enhancement (Level II)	3.9
UT 2	Restoration and Enhancement (Level II)	4.8
	Total Sediment Contribution (tons/year)	**232.5**

Based on this analysis, mitigation of Site streams will reduce streambank erosion and subsequent pollution of receiving waters.

3.4 Nutrient Model

A preliminary land use nutrient model was developed to estimate nitrogen and phosphorus inputs from row crops adjacent to the Site. Model inputs include area, percent land use, rainfall, and row-crop type. Using published values of nitrogen and phosphorus, the model predicts the nutrient input of fertilizer associated with land uses (USDA 2015, USDA 1992, NC State 2016, SMRC 2016). A copy of the model input and output is presented in Appendix B.

Based on the land use nutrient model, cessation of land use activities at the Site will result in a direct reduction of 360 pounds of phosphorus per year and 360 pounds of nitrogen per year.

3.5 Project Site Streams

Streams targeted for restoration include Glen Branch and unnamed tributaries to Glen Branch, which have been cleared, straightened, plowed for row crop production, and have eroded vertically and laterally. Approximately 35 percent of the existing stream channel has been degraded, contributing to sediment export from the Site. In addition, streamside wetlands have been cleared and drained by channel downcutting and land uses. Current Site conditions have resulted in degraded water quality, a loss of aquatic habitat, reduced nutrient and sediment retention, and unstable channel characteristics (loss of horizontal flow vectors that maintain pools and an increase in erosive forces to channel bed and banks). Site restoration activities will restore riffle-pool morphology, aid in energy dissipation, increase aquatic habitat, stabilize channel banks, and significantly reduce channel bank sediment loss.

Reach Descriptions

Individual reach descriptions are as follows.

Glen Branch

Glen Branch, the main receiving stream within the Site, has been dredged and straightened through the entire reach of the Site and pushed to the edge of the valley. The channel has a narrow fringe of successional vegetation primarily characterized by Chinese privet (*Ligustrum sinense*), black willow (*Salix nigra*), and blackberry (*Rhubus* sp.). Glen Branch has three distinct reach including the upstream incised reach, a bedrock controlled middle section, and the downstream incised reach. The upstream reach is relatively incised and oversized as eveidenced by a bank-height ratio ranging from 1.0 to 2.2 (averaging 1.8). The 1.0 bank height ratio is located near the middle, bedrock-controlled reach that is proposed for Enhancement (Level I). The upstream reach has frequent eroding banks and a resultant gravel substrate. The middle, bedrock-controlled reach has a forded crossing that will be removed, which hold the channel bed and reduces scour and downward incision. The as the channel descends the valley bank-height ratios increase to an average of 1.7; however, frequent beaver dams have resulted in a series of low erosion areas upstream of the dams and extensive erosion below the dams. Control of the beavers and removal of the

dams have resulted in a denuded stream bank that is subject to establishment of opportunistic species such as Chinese privet and blackberry.

UT 1

Similar to Glen Branch, UT 1 has been dredged and straightened through the entire reach of the Site. The valley for UT 1 is relatively narrow and the channel meanders as the valley migrates downstream. The upper reaches of the channel, as it leaves the upstream wooded property is characterized by a relatively stable channel with cobble substrate; however, the channel is incised and quickly becomes unstable with eroding banks and a bank-height-ratio of 1.4 to 1.8. A short section of the channel located upstream of a forded crossing has been stabilized by the ford. This short reach is characterized by low slope and stable stream banks. However, below the ford the channel is characterized as incised and eroding. Similar to Glen Branch, a narrow fringe of successional vegetation has established adjacent to the channel that is largely composed of Chinese privet, red maple (*Acer rubrum*), dog fennel (*Eupatorium capillifolium*), and blackberry. Substrate is a mixture of cobble and sand.

UT 1A

UT 1A is an intermittent channel (NCDWQ Form Score of 28) that originates immediately upstream from the project boundary and converges with UT 1 after flowing for approximately 300 linear feet. UT 1A has pine plantation on its right bank and row crops on its left bank. Due to the small drainage area, the channel remains relatively stable and is therefore proposed for Enhancement (Level II).

UT 2

UT 2 originates within the Site boundaries at the confluence of two topographic crenulations within an agricultural field. The upper reaches of the channel are completely devoid of vegetation (except for row crops and annual, herbaceous species). The upper reaches of the channel are oversized with a bank-heigh-ratio of approximately 1.6. However, as the channel descends toward Glen Branch, the significant incision begins as the channel cuts to the elevation of the larger stream. In these lower reaches the channel becomes highly incised and oversized as evidenced by bank-heigh-ratios ranging averaging 2.5. Channel substrate is primarily silt/clay, primarily from repeated plowing and clearing of the channel for row crops.

3.5.1 Existing Conditions Survey

Site stream dimension, pattern, and profile were measured to characterize existing channel conditions. Stream geometry measurements under existing conditions are summarized in Table 7 (Essential Morphology Parameters) and presented in detail in Table B1 (Appendix B).

3.5.2 Channel Classification and Morphology

Stream geometry and substrate data have been evaluated to classify existing stream conditions based on a classification utilizing fluvial geomorphic principles (Rosgen 1996). Existing Site reaches are classified as unstable, slightly entrenched Cg- and Eg-type streams with variable sinuosity. Existing Site reaches are characterized by variable substrate ranging from sand and gravel substrate due to channel impacts, including channel straightening, adjacent agriculture, and riparian vegetation removal.

3.5.3 Channel Evolution

Site streams targeted for restoration have been channelized and are continually eroding. As such, channels are primarily classified as channelized (Class II), degraded (Class III), and degraded and widened (Class IV) channels throughout the Site (Simon and Hupp 1986).

3.5.4 Valley Classification

Site Streams are characterized by a small stream, headwater, moderately confined to confined, alluvial valleys with approximately 50- to 100-foot floodplain valley widths. Valley slopes are typical for the Piedmont region and range from 0.0048 on Glen Branch to 0.0147 on UT2. Typical streams in this region include C- and E-type streams with slightly entrenched, meandering channels with a riffle-pool sequence.

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Table 7 – Essential Morphology Parameters

Parameter	Existing				Reference	Proposed			
	Glen Br (Upstream)	Glen Br (Downstream)	UT1	UT2	Uwharrie	Glen Br (Upstream)	Glen Br (Downstream)	UT1	UT2
Valley Width (ft)	75	100	75	50	50	75	100	75	50
Contributing Drainage Area (sq. mi.)	0.77	1.25	0.28	0.07	0.60	0.77	1.25	0.28	0.07
Channel/Reach Classification	Cg4	Eg4	Eg4	Eg6	E 4	Ce ¾	Ce ¾	Ce ¾	Ce ¾
Design Discharge Width (ft)	15.1	15.7	8.7	4.7	12.1	15.3	18.0	10.8	6.7
Design Discharge Depth (ft)	0.6-1.5	1.2-1.4	0.9-1.2	0.4-0.9	1.2	1.1	1.3	0.8	0.5
Design Discharge Area (ft^2)	16.7	23.2	8.4	3.2	14.2	16.7	23.2	8.4	3.2
Design Discharge Velocity (ft/s)	4.1	4.2	3.9	3.7	4.1	4.1	4.2	3.9	3.7
Design Discharge Discharge (cfs)	68.7	97.3	32.9	11.8	57.6	68.7	97.3	32.9	11.8
Water Surface Slope	0.0075	0.0047	0.0081	0.0143	0.0042	0.0067	0.0042	0.0075	0.0128
Sinuosity	1.03	1.03	1.06	1.03	1.14	1.15	1.15	1.15	1.15
Width/Depth Ratio	7.3-43.3	5.3-14.0	5.9-10.6	3.8-19.8	10.1	14.0	14.0	14.0	14
Bank Height Ratio	1.0-2.2	1.3-2.1	1.4-1.8	1.6-8.7	1.0	1.0	1.0	1.0	1.0
Entrenchment Ratio	1.4-6.5	1.4-8.9	2.5-7.0	1.5-14.7	4.2	4.9	5.5	6.9	7.5
Substrate	Gravel	Gravel	Gravel	Gravel	Gravel	Gravel/cobble	Gravel/cobble	Gravel/cobble	Gravel/cobble

3.5.5 Discharge

This hydrophysiographic region is characterized by moderate rainfall, with precipitation averaging approximately 46.7 inches per year (USDA 1996). Drainage basin sizes range from 0.07- to 0.28-square miles on UT1-UT2 and 1.25 square miles for Glen Branch.

The Site's discharge is dominated by a combination of upstream basin catchment, groundwater flow, and precipitation. Based on indicators of bankfull at the reference reach and onsite, the designed channel will equal approximately 93 percent of the channel size indicated by Piedmont regional curves (Harman et al. 1999); this is discussed in Section 5.2 (Bankfull Verification). Based on bankfull studies, the bankfull discharge ranges from 11.8-32.9 cubic feet per second for UT1-UT2 and is 97.3 cubic feet per second for Glen Branch.

3.6 Project Site Wetlands

Jurisdictional wetlands/hydric soils within the Site were delineated in the field following guidelines outlined in the *Corps of Engineers Wetlands Delineation Manual* and subsequent regional supplements and located using GPS technology with reported submeter accuracy (Environmental Laboratory 1987). A jurisdictional wetland delineation was completed and approved by the United States Army Corps of Engineers (USACE) representative Bryan Roden Reynolds during a field meeting on October 30, 2019. Documentation of the delineation is included in Appendix D. Existing jurisdictional wetlands are depicted in orange crosshatch, and drained hydric soils are shown in blue crosshatch in Figure 4 (Appendix A).

3.6.1 Hydrological Characterization

Construction activities are expected to reestablish approximately 5.338 acres of drained riparian hydric soils, rehabilitate 0.902 acres of hydrologically affected riparian wetlands, and enhance 1.075 acres of vegetatively affected riparian wetlands. Areas of the Site targeted for riparian wetlands will receive hydrological inputs from periodic overbank flooding of restored tributaries, groundwater migration into wetlands, upland/stormwater runoff, and, to a lesser extent, direct precipitation. Hydrological impairment in drained soils has resulted from lateral draw-down of the water table adjacent to existing, incised stream channels.

Wetlands impacted by drainage features (incised channels or ditches) were monitored by groundwater gauges before mitigation alterations. Four groundwater gauges were installed at the Site to catalog the existing hydrology of these wetland areas. The preconstruction gauge locations are depicted in Figure 4, and the data is provided in Appendix K.

Overall, the gauges appeared to have water within 12 inches of the ground surface for between 15 days and 101 days of the growing season. For this analysis, the growing season is defined as occurring between March 1 and October 22. Although no ground temperature data was collected, the March 1 growing season start is being used for consistency with requested annual monitoring growing season length, verified by soil temperatures and bud burst.

It should be noted that during preconstruction groundwater monitoring, the growing season was unusually wet. Using the USACE Antecedent Precipitation Tool, it appears the period of monitoring is wetter than normal, particularly immediately before the March 1 growing season initiation and the months of May-June. The Antecedent Precipitation Tool output is included in Appendix K.

Groundwater gauge data indicates that the downstream portion of the Site (gauges 1 and 2) are significantly wetter than the upstream gauges (gauges 3 and 4). Downstream gauges were saturated

within 1 foot of the soil surface for 101 and 95 consecutive days and upstream gauges for 15 and 29 consecutive days. This is mostly the result of beaver activity in the lower reaches. The removal of beavers and subsequent dams occurred, and additional groundwater gauges were installed (gauges 5, 6, and 7) to collect data in the spring of 2021 (see Figure 4, Appendix A for gauge locations). Based on additional groundwater gauge data from the spring of 2021 presented in Table 8, it has been confirmed that downstream wetland areas are more suitable for wetland enhancement through vegetative planting and are not suitable for rehabilitation of groundwater hydrology. Wetland enhancement areas are depicted on Figure 6, Appendix A.

Table 8 – Preconstruction Groundwater Gauge Data

Location	Gauge Number	Proposed Wetland Mitigation Treatment	Consecutive Days of Saturation	
			2020	2021
Downstream	1	Enhancement	101+	60
Downstream	2	Rehabilitation	95	0
Upstream	3	Rehabilitation	15	5
Upstream	4	Rehabilitation	29	9
Downstream	5	Enhancement	Installed in 2021	60
Downstream	6	Enhancement	Installed in 2021	60
Upstream	7	Rehabilitation	Installed in 2021	37

3.6.2 Soil Characterization

Detailed soil mapping conducted by a North Carolina Licensed Soil Scientist (NCLSS) in May 2020 determined the Site is underlain by hydric soils of the Wehadkee series (Figure 4, Appendix A). Wetlands have been cleared of vegetation and plowed for agriculture. Hydric soils have been affected by stream channel incision or relocation of stream channels to the floodplain margins.

Onsite hydric soils are grey to gley in color and are leveled by agriculture plowing. Plowing has resulted in an herbaceous vegetative community. Groundwater springs and surface runoff contribute hydrology to these areas. However, the dominant hydrological influence is the lateral draw-down of the water table adjacent to incised stream channels or streams relocated to the floodplain margins. A detailed soil profile conducted by a NCLSS is as follows; the location is depicted in Figure 4 (Appendix A).

Table 9 – Profile Description

Depth (inches)	Color	Texture
0 - 4	10 YR 3/3	Silty clay loam
4 - 10	10 YR 3/3 10 YR 5/2 mottles 40%	Silty clay loam
10 - 12	10 YR 5/2 10 YR 5/3 mottles 30%	Silty clay loam
12+	10 YR 6/3 10 YR 6/2 mottles 25% 10 YR 4/6 mottles 5%	Silty clay loam

The Web Soil Survey (USDA 2020) indicates the Site is mapped as a Secrest Cid complex. Secrest Cid complex is listed as a non-hydric soil series with hydric inclusion of the Wehadkee soil series. Detailed soil

mapping confirms the mapped soil series, with some inclusions matching a Worsham soil series profile. However, disturbance from past timber, agriculture, and beaver activity has made a direct profile correlation difficult. Therefore, hydric soil indicators such as F3 (Depleted Matrix), F8 (Redox Depressions), and F19 (Piedmont Floodplain Soils) have been used to delineate soil mapping boundaries in the field.

4 REFERENCE STUDIES

4.1 REFERENCE STREAMS

A reference reaches was identified for the Site that is in the same physiographic region and geology. The reference stream is located approximately 54 miles north-northeast of the Site in the Uwharrie Mountains. The Site is situated along Horsepen Creek, a tributary to the Uwharrie River. Horsepen Creek exhibits a similar slope, size, geology, and substrate that is expected to occur in Site streams. The stream was measured and classified by stream type (Rosgen 1996).

4.1.1 Channel Classification

The reference reach is characterized as an E-type stream with a moderately sinuous (1.14) channel, dominated by gravel substrate.

4.1.2 Discharge

Field indicators of bankfull indicate an average discharge of 57.6 cfs, which is 93 percent of that predicted by the regional curves.

4.1.3 Channel Morphology

Dimension: Data collected indicate a bankfull cross-sectional area of 14.2 square feet, slightly smaller than predicted by regional curves (15.3 square feet). The reference site exhibits a bankfull width of 12.1, a bankfull depth of 1.2 feet, and width-to-depth ratios of 10.1 (see Table B1, Morphological Stream Characteristics). Figure 5 (Appendix A) provides a plan view and cross-sectional data for the reference reach. The reference reach exhibits a bank-height ratio of 1.0.

Pattern and Profile: In-field measurements of the reference reach yields an average sinuosity of 1.14 (thalweg distance/straight-line distance). Water surface slope measures 0.0168, slightly higher than the Site; however, this appears to result from several debris jams in the reach that inflate the slope measurement. The reference reach has a suitable pattern (similar sinuosity) with no shoot cutoffs, eroding outer bends, or excessively tight radius of curvatures, in addition to appropriate pool-to-pool spacing and meander wavelengths.

Substrate: Reference channels are characterized by substrate dominated by gravel sized particles.

4.2 Reference Forest Ecosystem

A Reference Forest Ecosystem (RFE) is a forested area to model restoration efforts at the Site in relation to soils and vegetation. RFEs should be ecologically stable climax communities and should represent the area as it likely existed before human disturbances. Data describing plant community composition and structure should be collected at the RFEs and subsequently applied as reference data to emulate a natural climax community.

The RFE for this project is located immediately upstream of the Site in forests adjacent to Glen Branch. The RFE supports plant community and landform characteristics that restoration efforts will attempt to

emulate. Tree and shrub species identified within the reference forest and outlined in Table 10 will be used, in addition to other relevant species listed in appropriate Schafale and Weakley (1990) and Schafale (2012) community descriptions.

Table 10 – Reference Forest Ecosystem

Piedmont/Mountain Bottomland Forest	
Red maple (*Acer rubrum*)	Sweetgum (*Liquidambar styraciflua*)
Eastern redbud (*Cercis canadensis*)	Tulip poplar (*Liriodendron tulipifera*)
Ironwood (*Carpinus caroliniana*)	Willow oak (*Quercus phellos*)
Shagbark hickory (*Carya ovata*)	Cherrybark oak (*Quercus pagoda*)
White oak (*Quercus alba*)	Mockernut hickory (*Carya tomentosa*)
Slippery elm (*Ulmus rubra*)	

5 CHANNEL ASSESSMENTS

5.1 Channel Stability Assessment

Stream power and shear stress were estimated for 1) existing dredged and straightened reaches, 2) the reference reaches, and 3) proposed Site conditions. Important input values and output results (including stream power, shear stress, and per unit shear power and shear stress) are presented in Table 11. Average stream velocity and bankfull discharge values were calculated for the existing Site stream reaches, the reference reach, and proposed conditions.

The proposed channel should exhibit stream power and shear stress values to maintain sediment transport functions of a stable stream system, so the channel is neither aggrading nor degrading. The analysis indicates the proposed channel reaches are expected to maintain stream power as a function of width values of approximately 1.41-1.88 and shear stress values of approximately 0.32-0.40 (Table 11).

Table 81 – Stream Power (Ω) and Shear Stress (τ) Values

	Bankfull Discharge (ft^3/s)	Water surface Slope (ft/ft)	Total Stream Power (Ω)	Ω/W	Hydraulic Radius	Shear Stress (τ)	Velocity (v)	τ v	τ_{max}
Existing Conditions									
Glen Br – Upstream	68.7	0.0075	32.15	**1.79**	2.08	**0.98**	1.63	1.59	1.46
Glen Br – Downstream	97.3	0.0047	28.54	**1.82**	2.52	**0.74**	2.07	1.53	1.11
UT 1	32.9	0.0081	16.63	**1.91**	2.00	**1.01**	1.54	1.55	1.52
UT 2	11.8	0.0143	10.53	**1.57**	1.27	**1.14**	1.20	1.37	1.70
Reference Conditions									
Uwharrie Ref	57.6	0.0168	60.38	**4.99**	0.98	**1.03**	4.06	4.16	1.54
Proposed Conditions									
Glen Br – Upstream	68.7	0.0067	28.72	**1.88**	0.95	**0.40**	4.11	1.64	0.60
Glen Br – Downstream	97.3	0.0042	25.50	**1.62**	0.96	**0.25**	5.41	1.36	0.38
UT 1	32.9	0.0075	15.40	**1.43**	0.68	**0.32**	3.92	1.24	0.48
UT 2	11.8	0.0128	9.42	**1.41**	0.42	**0.33**	3.69	1.22	0.50

The Uwharrie reference reach values for stream power are elevated due to steeper valley/water surface slopes and narrow width-to-depth ratios. Shear stress values for the reference reach are also slightly elevated due to higher slopes; however, they appear similar to the measurement of the existing condition, as expected for the incised onsite reaches.

Existing, Site streams are characterized by a wide range of water surface slopes and varying degrees of degradation. In general, stream power values of existing streams are not significantly high due to several dams attenuating erosive stormwater pulses. Onsite channels have been straightened and are slightly incised, however, the channels do not receive excessive erosive forces that may lead to mass wasting. Overall, the proposed channel stream power and shear stress values are slightly high than the proposed values. Proposed stream power and shear stress values appear adequate to mobilize and transport sediment through the Site, without aggradation or erosion on proposed stream banks. The reduction in stream power and shear stress should normalize erosion across the Site and result in the direct reduction of 232.5 tons of sediment per year (see Section 3.3 Sediment Model).

5.2 Bankfull Verification

Discharge estimates for the Site utilize an assumed definition of "bankfull" and the return interval associated with that bankfull discharge. For this study, the bankfull channel is defined as the channel dimensions designed to support the "channel forming" or "dominant" discharge (Gordon et al. 1992).

Based on available Piedmont regional curves, the predicted bankfull discharge for the reference reach averages approximately 61.9 cubic feet per second (cfs) (Harmen et al. 1999). The Piedmont region's USGS regional regression equation indicates that bankfull discharge for the reference reach at a 1.3-1.5-year return interval averages approximately 63-73 cfs (USGS 2006).

Field indicators of bankfull, primarily topographic breaks identified on the banks, and riffle cross-sections were utilized to obtain an average bankfull cross-sectional area for the reference reach. The Piedmont regional curves were then utilized to plot the watershed area and discharge for the reference reach cross-sectional area. Field indicators of bankfull approximate an average discharge of 57.6 for the reference reach, which is 93 percent of that predicted by the regional curves; which is verified by the range approximated by the USGS regional regression equation.

Based on the above analysis of methods to determine bankfull discharge, proposed conditions at the Site will be based on reference reaches and indicators of bankfull on cross-sections located at the Site. The designed onsite channel restoration area will equal approximately 93 percent of the channel size indicated by Piedmont regional curves. Table 12 summarizes all methods analyzed for estimating bankfull discharge.

Table 12 – Reference Reach Bankfull Discharge Analysis

Method	Watershed Area (square miles)	Return Interval (years)	Discharge (cfs)
Uwharrie Reference Reach			
Piedmont Regional Curves (Harman et al. 1999)	0.6	1.3-1.5	61.9
Piedmont Regional Regression Model (USGS 2004)	0.6	1.3-1.5	63-73
Field Indicators of Bankfull	0.6	1.3-1.5	57.6

6 FUNCTIONAL UPLIFT AND PROJECT GOALS/OBJECTIVES

Site-specific mitigation goals and objectives have been academically developed through the use of the North Carolina Stream Assessment Method (NC SAM) and the North Carolina Wetland Assessment Method (NC WAM) analyses of existing and reference stream systems at the Site (NC SFAT 2015 and NC WFAT 2010). These methodologies rate functional metrics for streams and wetlands as high, medium, or low based on field data collected on forms and transferred into a rating calculator. Using Boolean logic, the rating calculator assigns a high, medium, or low value for each metric and overall function. Site functional assessment data forms are included in Appendix B.

Tables 13– 14 summarize NC SAM and NC WAM metrics targeted for functional uplift and the corresponding mitigation activities proposed to provide functional uplift. Metrics targeted to meet the Site's goals and objectives are depicted in bold.

Table 93 – NC SAM Summary

NC SAM Function Class Rating Summary	SAM 1-UT 1	SAM 2- Glen Br Upper	SAM 3- Glen Br Lower
(1) HYDROLOGY	HIGH	**LOW**	**LOW**
(2) Baseflow	HIGH	HIGH	HIGH
(2) Flood Flow	HIGH	**LOW**	**LOW**
(3) Streamside Area Attenuation	MEDIUM	**LOW**	**LOW**
(4) Floodplain Access	HIGH	MEDIUM	MEDIUM
(4) Wooded Riparian Buffer	**LOW**	**LOW**	**LOW**
(4) Microtopography	**LOW**	**LOW**	**LOW**
(3) Stream Stability	HIGH	**LOW**	**LOW**
(4) Channel Stability	HIGH	**LOW**	**LOW**
(4) Sediment Transport	HIGH	MEDIUM	MEDIUM
(4) Stream Geomorphology	HIGH	**LOW**	**LOW**
(1) WATER QUALITY	**LOW**	**LOW**	**LOW**
(2) Baseflow	HIGH	HIGH	HIGH
(2) Streamside Area Vegetation	**LOW**	**LOW**	**LOW**
(3) Upland Pollutant Filtration	**LOW**	**LOW**	**LOW**
(3) Thermoregulation	MEDIUM	MEDIUM	MEDIUM
(2) Indicators of Stressors	NO	NO	NO
(2) Aquatic Life Tolerance	**LOW**	**LOW**	**LOW**
(1) HABITAT	MEDIUM	**LOW**	**LOW**
(2) In-stream Habitat	HIGH	**LOW**	**LOW**
(3) Baseflow	HIGH	HIGH	HIGH
(3) Substrate	HIGH	MEDIUM	MEDIUM
(3) Stream Stability	HIGH	**LOW**	**LOW**
(3) In-Stream Habitat	HIGH	**LOW**	**LOW**
(2) Streamside Habitat	**LOW**	**LOW**	**LOW**
(3) Streamside Habitat	**LOW**	**LOW**	**LOW**
(3) Thermoregulation	**LOW**	**LOW**	**LOW**
OVERALL	MEDIUM	**LOW**	**LOW**

Based on NC SAM output, all three primary stream functional metrics (Hydrology, Water Quality, and Habitat), as well as 16 sub-metrics are under-performing as exhibited by a LOW metric rating (see Figure 4, Appendix A for NC SAM data reaches). LOW performing metrics are to be academically targeted for functional uplift through mitigation activities, goals, objectives, monitoring, and success criteria.

Table 14 – Nesbit NC WAM Summary

NC WAM Sub-function Rating Summary	WAM1
Wetland Type	Bottomland Hardwood Forest
(1) HYDROLOGY	MEDIUM
(2) Surface Storage & Retention	MEDIUM
(2) Sub-surface Storage and Retention	MEDIUM
(1) WATER QUALITY	MEDIUM
(2) Pathogen change	MEDIUM
(2) Particulate Change	**LOW**
(2) Soluble change	MEDIUM
(2) Physical Change	MEDIUM
(1) HABITAT	**LOW**
(2) Physical Structure	**LOW**
(2) Landscape Patch Structure	**LOW**
(2) Vegetative Composition	**LOW**
OVERALL	MEDIUM

Based on NC WAM output, one of the primary wetland functional metrics (Habitat) and 4 sub-metrics are under-performing as exhibited by a LOW metric rating. LOW performing metrics are to be academically targeted for functional uplift through mitigation activities, goals, objectives, monitoring, and success criteria.

The following table outlines stream and wetland functions targeted for functional uplift, goals that are tied to the specific functions, and objectives to be completed to achieve the proposed goals.

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Table 105 – Targeted Functions, Goals, Objectives, and Uplift Evaluation

Goal	Objective/Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Reconnect channels with floodplains and riparian wetlands to allow a natural flooding regime.	Reconstruct stream channels with appropriate bankfull dimensions and depth relative to the existing floodplain. Remove overburden to reconnect with adjacent wetlands.	Dispersion of high flows on the floodplain, increase in biogeochemical cycling within the system, and recharging of riparian wetlands.	Four bankfull events and within monitoring period.	1 Crest gauge (pressure transducers) on Glen Branch	To be determined
Improve stability of stream channels.	Construct stream channels that will maintain stable cross-sections, patterns, and profiles over time.	Reduction in sediment inputs from bank erosion, reduction of shear stress, and improved overall hydraulic function.	Bank height ratios remain below 1.2 over the monitoring period. Visual assessments showing progression towards stability.	12 Cross section surveys	To be determined
Restore and enhance native floodplain and streambank vegetation.	Plant native tree and understory species in riparian zones and plant appropriate species on streambanks.	Reduction in floodplain sediment inputs from runoff, increased bank stability, increased LWD and organic material in streams, increased	Survival rate of 320 stems per acre at MY3, 260 planted stems per acre at MY5, and 210 stems per acre at MY7.	16 veg plots	To be determined
Restore and enhance groundwater hydrology to drained or impacted hydric soil areas.	Reduce channel depth in incised stream reaches, remove drain tile, fill drainage ditches, and alleviate soil compaction from agriculture activities.	Particulate and pollution conversion, groundwater storage and reduced downstream flooding, habitat diversification, and vegetative composition conversion.	Groundwater saturation within 12 inches of the soil surface for 12 % of the growing season for reestablishment and improvement of hydrology in rehabilitation areas.	9 groundwater gauges	To be determined

Note: Soil temperature at the beginning of each monitoring period to verify the start of the growing season, groundwater and rain data for each monitoring period.

7 SITE DESIGN AND IMPLEMENTATION CONSTRAINTS

The presence of conditions or characteristics that could hinder restoration activities on the Site was evaluated. The evaluation focused primarily on the presence of hazardous materials, utilities, restrictive easements, rare/threatened/endangered species or critical habitats, and the potential for hydrologic trespass. Existing information regarding Site constraints was acquired and reviewed. In addition, any Site conditions that could restrict the restoration design and implementation were documented during the field investigation.

No known Site constraints that may hinder proposed mitigation activities were identified during field surveys. Potential constraints reviewed include the following.

7.1 Threatened & Endangered Species

Three federally protected species is listed as occurring in Union County (USFWS 2018); the following table summarizes potential habitat and a preliminary biological conclusion.

Table 16 – Endangered Species Act Determinations

Species-Status	Habitat	Potential Habitat at Site	Biological Conclusion
Carolina heelsplitter (*Lasmigona decorata*) Endangered	In North Carolina, the species is now known only from a handful of streams in the Pee Dee and Catawba River systems. The species exists in very low abundances, usually within 6 feet of shorelines, throughout its known range. The general habitat requirements for the Carolina heelsplitter are shaded areas in large rivers to small streams, often burrowed into clay banks between the root systems of trees, or in runs along steep banks with moderate current. The more recent habitat where the Carolina heelsplitter has been found is in sections of streams containing bedrock with perpendicular crevices filled with sand and gravel, and with wide riparian buffers.	No	May effect, not likely to adversely effect
Michaux's sumac (*Rhus michauxii*) Endangered	Grows in sandy or rocky, open, upland woods on acidic or circumneutral, well-drained sands or sandy loam soils with low cation exchange capacities. The species is also found on sandy or submesic loamy swales and depressions in the fall line Sandhills region as well as in openings along the rim of Carolina bays; maintained railroad, roadside, power line, and utility rights-of way; areas where forest canopies have been opened up by blowdowns and/or storm damage; small wildlife food plots; abandoned building sites; under sparse to moderately dense pine or pine/hardwood canopies; and in and along edges of other artificially maintained clearings undergoing natural succession. In the central Piedmont, it occurs on clayey soils derived from mafic rocks. The plant is shade intolerant and, therefore, grows best where disturbance (e.g., mowing, clearing, grazing, periodic fire) maintains its open habitat.	Yes	No effect*
Schweinitz's sunflower (*Helianthus schweinitzii*) Endangered	This species is found along roadside rights-of-way, maintained power lines and other utility rights-of-way, edges of thickets and old pastures, clearings and edges of upland oak-pine-hickory woods and Piedmont longleaf pine forests, and other sunny or semi-sunny habitats where disturbances (*e.g.*, mowing, clearing, grazing, blow downs, storms, frequent fire) help create open or partially open areas for sunlight. It is intolerant of full shade and excessive competition from other vegetation. Schweinitz's sunflower occurs in a variety of soil series; it is generally found growing on shallow sandy soils with high gravel content; shallow, poor, clayey hardpans; or shallow rocky soils, especially those derived from mafic rocks.	Yes	No effect*

* See the approved Categorical Exclusion document in Appendix E for species survey information.

7.2 Cultural Resources

The term "cultural resources" refers to prehistoric or historic archaeological sites, structures, or artifact deposits over 50 years old. "Significant" cultural resources are those that are eligible or potentially eligible for inclusion in the National Register of Historic Places. Evaluations of site significance are made with reference to the eligibility criteria of the National Register (36 CFR 60) and in consultation with the North Carolina State Historic Preservation Office (SHPO).

Field visits were conducted at the Site in December 2018, October 2019, and May 2020 to ascertain the presence of structures or other features that may be eligible for inclusion on the National Register of Historic Places. No structures were identified within proposed easement boundaries. SHPO concurrence for the project has been received and is included in Appendix E (Categorical Exclusion).

7.3 North Carolina Natural Heritage Elements

A query of the North Carolina Natural Heritage Program (NCNHP) database indicates there are no records for rare species, important natural communities, natural areas, or conservation/managed areas within the proposed project boundary. Within a one-mile radius of the Site, NCNHP lists the Eastern creekshell (*Villosa delumbis*) and the Waxhaw Creek Aquatic Habitat (Appendix E).

7.4 FEMA and Hydrologic Trespass

Inspection of the FEMA Flood Insurance Rate Maps 3710540000J, Panel 5400, effective October 16, 2008, indicates that the lower reaches of the Site are located within a Zone AE flood area. Therefore, a HEC-RAS analysis will be completed on the existing and proposed conditions of Glen Branch and its tributaries to assess hydraulic performance. As per North Carolina Floodplain Mapping requirements, a Conditional Letter of Map Revision (CLOMR) may need to be prepared for the Site.

Given the sloping nature of the Site, relatively confined valleys, and the landowner's possession of land adjacent to and immediately upstream of the project boundary, the risk of hydrologic trespass is relatively small. The Site's lower reaches will be modeled using a HEC RAS analysis for the CLOMAR, during which adjustments may be made to reduce hydrologic trespass, if necessary; however, these adjustments are not expected.

7.5 Utilities

No utilities are located on the Site.

7.6 Air Transport Facilities

No air transport facility is located within 5 miles of the Site; however, a landing field is located approximately 2 miles southeast of the Site.

7.7 Nesbit Road

Nesbit Road at the downstream terminus of the project is a constrain to further project expansion in the future. Although this road may provide a source of encroachment, the conservation will be in place to hinder future development.

7.8 Easement Breaks

Easement breaks were evaluated as a potential project constrain as they fragment the Site and reduce the potential functional uplift. This project reduces Site crossings from 4 crossings to 1 crossing and has only 1 easement break. Therefore, easement breaks do constitute a significant reduction of functional uplift at the Site and are not considered a project constraint.

8 DESIGN APPROACH AND MITIGATION WORK PLAN

8.1 Stream Design

Onsite streams targeted for restoration have endured significant disturbance from land use activities such as land clearing, straightening/rerouting of channels, ditching within the floodplain, plowing, row crop production, and other anthropogenic maintenance. Site streams will be restored to emulate historical conditions at the Site utilizing parameters from relatively undisturbed reference streams (see Section 4.1 Reference Streams).

Primary activities designed to restore Site streams include 1) stream restoration, 2) stream enhancement (Level I), 3) stream enhancement (Level II), 4) wetland re-establishment, 5) wetland rehabilitation, 6) construction of marsh treatment areas, and 7) vegetation planting (Figure 6, Appendix A).

8.1.1 Stream Restoration

Stream restoration efforts are designed to restore a stable stream that approximates hydrodynamics, stream geometry, and local microtopography relative to reference conditions. Restoration at the Site will be Priority I restoration; therefore, bankfull elevations will be raised to meet the adjacent valley floodplain elevation.

Stream restoration is expected to entail 1) channel excavation, 2) channel stabilization, 3) channel diversion, and 4) channel backfill.

In-stream Structures

In-stream structures will be used for grade control, habitat, and to elevate local water surface profiles in the channel, flattening the water energy slope or gradient and directing stream energy into the center of the channel and away from banks. The structures will consist of log cross-vanes or log j-hook vanes; however, rock cross-vanes or rock j-hook vanes may be substituted if dictated by field conditions at the engineer's discretion. In addition, the structures will be placed in relatively straight reaches to provide secondary (perpendicular) flow cells during bankfull events.

Log or rock cross vanes are expected to be interchangeable, depending upon the availability of materials. This will largely be a field decision based on the contractor. Given the availability of logs and the expense of rock, it is expected that logs will be primarily used for vane construction. Log vanes are used extensively in intermittent channels with success. They are designed to stabilize the stream banks until suitable vegetation has been established, which will reduce erosion.

Forded Channel Crossing

Landowner constraints will necessitate installing two forded channel crossings within breaks in the easement to allow access to portions of the property isolated by stream restoration activities Figure 6 (Appendix A). The crossings will be constructed with suitable sized material to allow for stormwater flows (See Sheet 02D in Appendix M). Materials will include hydraulically stable rip-rap or suitable rock. The crossings will be large enough to handle anticipated vehicular traffic. Approach grades to the crossings will be at an approximate 10:1 slope and constructed of hard, scour-resistant crushed rock or other permeable material, which is free of fines. The two proposed fords are located outside of the conservation easement, and the landowner will be responsible for the maintenance of all stream crossings.

Marsh Treatment Area

Seven shallow wetland marsh treatment areas will be excavated in the floodplain to intercept surface waters draining through agricultural areas before discharging into Site tributaries. Marsh treatment areas

are intended to improve the mitigation project and are not generating mitigation credit. The proposed marsh treatment area locations are depicted in Figure 6 (Appendix A). They will consist of shallow depressions that will provide treatment and attenuation of initial stormwater pulses. The outfall will be constructed of hydraulically stable rip-rap or other suitable material such as wood or riffle bed material to protect against headcut migration into the constructed depression. It is expected that the treatment area will fill with sediment and organic matter over time. No long-term maintenance is needed for this feature.

Floodplain Interceptor

A floodplain interceptor is a small depression in the design channel bank that directs return flow into the channel to reduces bank erosion/headcut formation in the channel bank. The interceptor will include a depression armored with erosion control matting and/or riffle bed material to control erosion until channel bank vegetation has been established. The interceptor will be located in the field during construction at locations where return flow occurs or would be anticipated.

Drop Structure

A drop structure is proposed on Glen Branch at the transition from restoration to the historic channel at the Site outfall. The drop structure may be constructed out of large cobble depending upon anticipated scour from the restored stream channels. The structure will be built to resist erosive forces associated with hydraulic drops proposed at the Site.

8.1.2 Stream Enhancement (Level I)

Stream enhancement (level I) will entail stream dimension restoration, installation of habitat and grade control structures, easement markers, and planting riparian buffers with native forest vegetation to facilitate stream recovery and prevent further stream degradation.

8.1.3 Stream Enhancement (Level II)

Stream enhancement (level II) will entail installing easement markers and planting riparian buffers with native forest vegetation to facilitate stream recovery and prevent further degradation of the stream.

8.2 Individual Reach Discussions

Mitigation strategies proposed for each reach are presented in Table 17.

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Table 117 – Individual Reach Descriptions and Functional Uplift

Individual Reach	Mitigation Activities	Functional Uplift Provided for Identified Stressors
Glen Branch (Upstream)	- Install forded channel crossing upstream of Site easement boundary. - Tie into upstream property boundary and elevate the stream bed with grade control/habitat structures and contour the channel banks to the appropriate dimension. - Move the channel across the floodplain using Priority 1 stream restoration on a new location. - Tie to bedrock grade control at a short reach of Enhancement (Level I) and reinitiate restoration measures. - Add two marsh treatment areas in agriculture swales. - Control discharge from marsh treatment areas by directing flow to floodplain interceptors. - Plant a vegetative buffer within the entire floodplain.	- Non-functioning riparian buffer/wetland vegetation - Sediment - Nutrients - Fecal Coliform* - Peak Flows - Limited Bedform Diversity - Absence of Large Woody Debris
Glen Branch (Downstream)	- Tie to upstream restoration measures and continue Priority 1 stream restoration on a new location. - Add four marsh treatment areas. - Control discharge from marsh treatment areas by directing flow to floodplain interceptors. - Tie to downstream elevations with a drop structure. - Plant a vegetative buffer within the entire floodplain.	- Non-functioning riparian buffer/wetland vegetation - Sediment - Nutrients - Fecal Coliform* - Peak Flows - Limited Bedform Diversity - Absence of Large Woody Debris
UT-1A	- Clear undesirable species (invasive species and young pines) and replant with native hardwood forest (credited at a 5:1 ratio). - Tie into UT 1 at the lower reaches.	- Non-functioning riparian buffer/wetland vegetation - Sediment - Nutrients - Fecal Coliform*

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Table 17 – Individual Reach Descriptions and Functional Uplift (Continued)

Individual Reach	Mitigation Activities	Functional Uplift Provided for Identified Stressors
UT-1	- In the upper reaches of UT 1, clear undesirable species (invasive species and young pines) and replant with native hardwood forest. - As UT 1 descends toward restoration reaches begin Enhance (Level I) measures including installing habitat/grade control structures, excavate channel to proper dimension, and install cobble material. Enhancement (Level I) measures will be credited at a 2.5:1 ratio in this reach. - Restore the lower reaches of the stream through Priority 1 excavation of a channel on a new location. - A short reach will be credited as Enhancement (Level II) and will include planting and bank stabilization. - Installation of a forded channel crossing. - Tie into the forded channel crossing and restore the channel as it ties into Glen Branch. - Install a marsh treatment area in an agriculture swale. - Plant a vegetative buffer within the entire floodplain.	- Non-functioning riparian buffer/wetland vegetation - Sediment - Nutrients - Fecal Coliform* - Peak Flows - Limited Bedform Diversity - Absence of Large Woody Debris
UT-2	- Install a marsh treatment area above the stream origination point. - Plant vegetation along the upper reaches and stabilize stream banks using Enhancement (Level II) measures. - In the lower restoration reaches, excavate the channel and tie into Glen Branch. - Install grade control/habitat structures. - Plant a vegetative buffer within the entire floodplain.	- Non-functioning riparian buffer/wetland vegetation - Sediment - Nutrients - Fecal Coliform - Peak Flows - Limited Bedform Diversity - Absence of Large Woody Debris

*Fecal Coliform has been included in the functional uplift stressor category based on the land application of manure to row crops.

8.3 Wetland Reestablishment/Rehabilitation/Enhancement

Alternatives for wetland mitigation are designed to restore a fully functioning wetland system, provide surface water storage, nutrient cycling, remove imported elements and compounds, and create a variety and abundance of wildlife habitat.

Portions of the Site underlain by hydric soils have been impacted by stream dredging, vegetative clearing, agriculture plowing, and other land disturbances associated with land use management. Wetland re-establishment/rehabilitation/enhancement options will focus on the restoration of vegetative communities, stream corridors, historic groundwater tables, soil structure, and microtopographic variations. These activities will result in the re-establishment and rehabilitation of approximately 5.338 and 0.902 acres of jurisdictional riparian riverine wetlands, respectively with an additional 1.075 acres of enhancement.

Wetland re-establishment is intended for portions of the Site that are currently not jurisdictional and will therefore include the restoration of wetland hydrology and vegetation. Wetland rehabilitation is intended for portions of the Site currently characterized by wetland hydrology; however, the hydrology has been

impacted by stream channel incision. Wetland enhancement is intended for portions of the Site currently characterized by wetland hydrology that hydrology cannot sufficiently be improved by proposed mitigation activities and functional uplift comes solely from vegetation planting.

It should be noted that existing wetlands have been avoided to the maximum extent feasible. Wetland functional uplift has increased wetland acreage at the Site from 2.459 acres (based on the PJD documentation, including some acreage of existing wetland outside the Site boundary) to 7.315 acres. In addition, the functional uplift to wetlands within the Site boundaries has been documented in Section 6.0 (Functional Uplift and Project Goals).

8.4 Soil Restoration

Soil grading will occur during stream restoration activities. Topsoils will be stockpiled during construction activities and spread across the Site's surface once critical subgrade has been established. The replaced topsoil will serve as a viable growing medium for community restoration to provide nutrients and aid in the survival of planted species.

8.5 Natural Plant Community Restoration

Restoration of floodplain forest and streamside habitat allows for the development and expansion of characteristic species across the landscape. Ecotonal changes between community types contribute to the diversity and provide secondary benefits, such as enhanced feeding and nesting opportunities for mammals, birds, amphibians, and other wildlife. Reference Forest Ecosystem (RFE) data, onsite observations, and community descriptions from *Classification of the Natural Communities of North Carolina* (Schafale and Weakley 1990) were used to develop the primary plant community associations that will be promoted during community restoration activities.

8.5.1 Planting Plan

Streamside trees and shrubs include species with high value for sediment stabilization, rapid growth rate, and the ability to withstand hydraulic forces associated with bankfull flow and overbank flood events. Streamside trees and shrubs will be planted within 15 feet of the channel top of bank throughout the meander belt-width. Shrub elements will be planted along the reconstructed stream banks, concentrated along outer bends. Piedmont/Mountain Bottomland Forest is the target community for Site floodplains, and Dry-Mesic Oak-Hickory Forest is the target community for upland side-slopes.

Bare-root seedlings within the Piedmont/Mountain Bottomland and Dry-Mesic Oak-Hickory Forests will be planted at a density of approximately 680 stems per acre on 8-foot centers. Shrub species in the streamside assemblage will be planted at a density of 2720 stems per acre on 4-foot centers.

Table 18 depicts the total number of stems and species distribution within each vegetation association (Figure 8, Appendix A). Planting will be performed between December 1 and March 15 to allow plants to stabilize during the dormant period and set root during the spring season.

Table 128 – Planting Plan

Vegetation Association	Piedmont/Mountain Bottomland Forest*		Dry-Mesic Oak-Hickory Forest*		Stream-side Assemblage**		TOTAL
Area (acres)	**7.2**		**5.0**		**3.8**		**16.0**
Species	**# planted***	**% of total**	**# planted***	**% of total**	**# planted****	**% of total**	**# planted**
River birch (*Betula nigra*)	245	5	--	--	1550	15	1795
Shagbark hickory (*Carya ovata*)	490	10	--	--	--	--	490
Slippery elm (*Ulmus rubra*)	245	5	170	5	--	--	415
Red bud (*Cercis canadensis*)	--	--	510	15	--	--	510
Silky dogwood (*Cornus amomum*)	245	5	--	--	2067	20	2312
Persimmon (*Diospyros virginiana*)	--	--	510	15	--	--	510
Hackberry (*Celtis occidentalis*)	490	10	--	--	517	5	1006
Green ash (*Fraxinus pennsylvanica*)	245	5	--	--	517	5	762
Tulip poplar (*Liriodendron tulipifera*)	245	5	170	5	517	5	932
Sycamore (*Platanus occidentalis*)	245	5	170	5	1550	15	1965
Red mulberry (*Morus rubra*)	--	--	170	5	517	5	687
Water oak (*Quercus nigra*)	734	15	680	20	--	--	1414
White oak (*Quercus alba*))	490	10	680	20	1034	10	2203
Red oak (*Quercus rubra*)	--	--	340	10	--	--	340
Black gum (*Nyssa sylvatica*)	490	10	--	--	1034	10	1523
Willow oak (*Quercus phellos*)	245	5	--	--	1034	10	1278
Shumard oak (*Quercus shumardii*)	490	10	--	--	--	--	490
TOTAL	**4896**	**100**	**3400**	**100**	**10336**	**100**	**18632**

* Planted at a density of 680 stems/acre. ** Planted at a density of 2720 stems/acre.

Wetland Seed Mix: Stablization & Native diversity		
Rate: 10 lbs /acre. Species subject to availability.		
Panicum rigidulum	Carex albolutescens	Carex lupulina
Bidens aristosa	Elymus virginicus	Carex vulpinoidea
Helianthus angustifolius	Juncus effusus	

General Seed Mix: Pollinator & Stabilization			
Rate: 2 lbs /acre. Species subject to availability.			
Tridens flavus	Echinacea purpurea	Gaillardia aristata	Rudbeckia amplexus
Agrostis alba	Elymus virginicus	Achillea millefolium	Verbena hastata
Agrostis hyemalis	Chrysanthemum leucanthemum	Chamaecrista fasciculata	Eupatorium coelestinum
Dicanthelium clandestinum	Coreopsis lanceloata	Chamaecrista nictitans	Eupatorium perfoliatum
Schizachyrium scoparium	Coreopsis tinctoria	Cosmos bipinnatus	Hibiscus moscheutos
Agrostis stolonifera	Chrysanthemum maximum	Desmodium canadense	Lespedeza capitata
Panicum rigidulum	Rudbeckia hirta	Helianthus angustifolius	Liatris spicata
Carex vulpinoidea	Baptisia australis	Heliopsis helianthoides	Monarda fistulosa
Juncus tenuis	Delphinium ajacis	Penstemon digitalis	Senna hebecarpa
Tridens flavus	Echinacea purpurea	Gaillardia aristata	Rudbeckia amplexus

8.5.2 Nuisance Species Management

Invasive plant species will be observed and controlled mechanically and/or chemically as part of this project. No other nuisance species controls are proposed at this time. Inspections for beaver and other potential nuisance species will occur throughout the monitoring period. Appropriate actions may be taken to ameliorate any negative impacts regarding vegetation development and/or water management on an as-needed basis. The presence of nuisance species will be monitored over the course of the monitoring period. Appropriate actions will be taken to ameliorate any negative impacts regarding vegetation development and/or water management on an as-needed basis.

The primary invasive species identified at the Site is Chinese privet (*Ligustrum sinense*). This species will be targeted for control starting prior to construction and extending through the monitoring period. Other invasive species include Parrot feather (Myriophyllum aquaticum) which is an herbaceous emergent species. Parrot feather is expected to be controlled once normal hydrologic flows are restored to the reach. If necessary, chemical treatment by a licensed herbicide applicator will occur.

9 MONITORING AND SUCCESS CRITERIA

Monitoring will be conducted in accordance with 2016 NCIRT Guidelines. Monitoring will be conducted by Axiom Environmental, Inc based on the schedule in Table 19. A summary of monitoring is outlined in Table 21 (Figure 9, Appendix A). Annual monitoring reports will be submitted to the NCDMS by Restoration Systems no later than December 1 of each monitoring year data is collected.

Table 139 – Monitoring Schedule

Resource	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Streams	x	x	x		x		x
Wetlands	x	x	x	x	x	x	x
Vegetation	x	x	x		x		x
Macroinvertebrates			x		x		x
Visual Assessment	x	x	x	x	x	x	x
Report Submittal	x	x	x	x	x	x	x

9.1 Success Criteria

Monitoring and success criteria for stream restoration should relate to project goals and objectives identified from onsite NC SAM and NC WAM data collection. From a mitigation perspective, several of the goals and objectives are assumed to be functionally elevated by restoration activities without direct measurement. Other goals and objectives will be considered successful upon achieving success criteria. Table 20 summarizes Site success criteria.

Table 20 – Success Criteria

Streams
- All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05. - A continuous surface flow must be documented each year for at least 30 consecutive days. - Bank height ratio (BHR) cannot exceed 1.2 at any measured cross-section. - BHR at any measure riffle cross-section should not change by more than 10% from baseline condition during any given monitoring period. - The stream project shall remain stable, and all other performance standards shall be met through four separate bankfull events, occurring in individual years, during the monitoring years 1-7. - Intermittent streams will demonstrate at least 30-days consecutive flow.
Wetland Hydrology
- Annual saturation or inundation within the upper 12 inches of the soil surface for, at a minimum, 12 percent of the growing season during average climatic conditions.
Vegetation
- Within planted portions of the Site, a minimum of 320 stems per acre must be present at year 3; a minimum of 260 stems per acre must be present at year 5; and a minimum of 210 stems per acre must be present at year 7. - Trees must average 7 feet in height at year 5 and 10 feet in height at year 7 in each plot. - Planted and volunteer stems are counted, provided they are included in the approved planting list for the Site; natural recruits not on the planting list may be considered by the IRT on a case-by-case basis.

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Table 141 – Monitoring Summary

Stream Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Stream Profile	Full longitudinal survey	As-built (unless otherwise required)	All restored stream channels	Graphic and tabular data.
Stream Dimension	Cross-sections	Years 1, 2, 3, 5, and 7	Total of 12 cross-sections on restored channels	Graphic and tabular data.
Channel Stability	Visual Assessments	Yearly	All restored stream channels	Areas of concern will be depicted on a plan view figure with a written assessment and photographs
	Additional Cross-sections	Yearly	Only if instability is documented during monitoring	Graphic and tabular data.
Stream Hydrology	Continuous monitoring of surface water gauges and/or trail camera	Continuous recording through the monitoring period	1 surface water gauge on UT1 and 1 surface water gauge on UT2	Surface water data for each monitoring period
Bankfull Events	Continuous monitoring of surface water gauges and/or trail camera	Continuous recording through the monitoring period	1 surface water gauges on Glen Branch	Surface water data for each monitoring period
	Visual/Physical Evidence	Continuous through the monitoring period	All restored stream channels	Visual evidence, photo documentation, and/or rain data.
Benthic Macroinvertebrates	"Qual 4" method described in *Standard Operating Procedures for Collection and Analysis of Benthic Macroinvertebrates, Version 5.0* (NCDWR 2016)	Preconstruction, Years 3, 5, and 7 during the "index period" referenced in *Small Streams Biocriteria Development* (NCDWQ 2009)	2 stations (on Glen Br lower reaches and UT 1 lower reaches); however, the exact locations will be determined at the time preconstruction benthics are collected	Results* will be presented on a site-by-site basis and will include a list of taxa collected, an enumeration of *Ephemeroptera, Plecoptera,* and *Tricopetera* taxa as well as Biotic Index values.
Wetland Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Wetland Restoration	Groundwater gauges	Years 1, 2, 3, 4, 5, 6, and 7 throughout the year with the growing season defined as March 1-October 22	9 gauges spread throughout restored wetlands	Soil temperature at the beginning of each monitoring period to verify the start of the growing season, groundwater and rain data for each monitoring period**
Vegetation Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Vegetation establishment and vigor	Permanent vegetation plots 0.0247 acre (100 square meters) in size; *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008)	As-built, Years 1, 2, 3, 5, and 7	16 plots spread across the Site	Species, height, planted vs. volunteer, stems/acre
	Annual random vegetation plots, 0.0247 acre (100 square meters) in size	As-built, Years 1, 2, 3, 5, and 7	Only if poor vegetation grow is documented during monitoring	Species and height

*Benthic Macroinvertebrate sampling data will not be tied to success criteria; however, the data may be used as a tool to observe positive gains to in-stream habitat.

**The growing season will not be initiated prior to March 1 based on confirmed soil temperature unless evidence of vegetative indicators such as bud burst is present and documented by more than two species (excluding red maple and sambucus).

9.2 Contingency

If stream success criteria are not fulfilled, a mechanism for contingency will be implemented. It should be noted that some aspects of adaptive management may require IRT review and USACE/DWR permit authorizations.

9.2.1 Stream Contingency

Stream contingency may include, but may not be limited to, 1) structure repair and/or installation; 2) repair of dimension, pattern, and/or profile variables; and 3) bank stabilization. The contingency method is expected to be dependent upon stream variables that are not in compliance with success criteria. Primary concerns, which may jeopardize stream success, include 1) structure failure, 2) headcut migration through the Site, and/or 3) bank erosion.

Structure Failure

In the event that structures are compromised, the affected structure will be repaired, maintained, or replaced. Once the structure is repaired or replaced, it must function to stabilize adjacent stream banks and/or maintain grade control within the channel. Structures that remain intact but exhibit flow around (beneath or through the header/footer) will be repaired by excavating a trench on the structure's upstream side and reinstalling filter fabric in front of the sills. Structures that have been compromised, resulting in shifting or collapse of a header/footer, will be removed and replaced with a structure suitable for Site flows.

Headcut Migration Through the Site

In the event that a headcut occurs within the Site (identified visually or through measurements [i.e., bank-height ratios exceeding 1.4]), provisions for impeding headcut migration and repairing damage caused by the headcut will be implemented. Headcut migration may be impeded by installing in-stream grade control structures (rip-rap sill and/or log cross-vane weir) and/or restoring stream geometry variables until channel stability is achieved. Channel repairs to stream geometry may include channel backfill with coarse material and stabilizing the material with erosion control matting, vegetative transplants, and/or willow stakes.

Bank Erosion

In the event that severe bank erosion occurs within the Site, resulting in incision, lateral instability, and/or elevated width-to-depth ratios locally or systemically, contingency measures to reduce bank erosion and width-to-depth ratio will be implemented. Bank erosion contingency measures may include the installation of log-vane weirs and/or other bank stabilization measures. If the resultant bank erosion induces shoot cutoffs or channel abandonment, a channel may be excavated to reduce shear stress to stable values.

Beaver

Indications of beaver establishment will be monitored throughout the 7-year monitoring period. If beaver are identified in the Site, the dam's location will be depicted on CCPV mapping, and the beaver will be trapped. Once the beaver have been trapped, the dam will be removed. Removal of the dam is expected to occur by hand to minimized disturbance to the adjacent mitigation areas.

9.2.2 Wetland Contingency

Hydrological contingency will require consultation with hydrologists and regulatory agencies if wetland hydrology enhancement is not achieved. Floodplain surface modifications, including the construction of ephemeral pools, represent a likely mechanism to increase the floodplain area in support of jurisdictional

wetlands. Recommendations for a contingency to establish wetland hydrology will be implemented and monitored until Hydrology Success Criteria are achieved. IRT consultation and approval will be necessary if future earthwork is proposed. In addition, if the depth of ephemeral pools exceed 1 foot, the credit ratio may be changed to reflect wetland creation.

9.2.3 Vegetation Contingency

If vegetation success criteria are not achieved, supplemental planting may be performed with tree species approved by regulatory agencies. Supplemental planting will be completed as needed until the achievement of vegetation success criteria. Supplemental plantings will rely on general site management strategies to identify and address obstacles to tree survival such as soil fertility, wildlife damage, or human encroachment.

9.2.4 Boundary Marking and Site Protection Contingency

Easement corners will be marked with treated wooden posts (minimum 5" diameter, minimum 5' height) to facilitate installation of signage. The top 12" of each post will be painted with yellow boundary marking paint. In the event that easement corners are more than 200' apart a post will be added in the gap. If encroachment is detected during the monitoring period, including scalloping by agricultural equipment, additional posts will be added as needed in problem areas.

9.3 Compatibility with Project Goals

The following table (See Table 22) outlines the compatibility of Site performance criteria described above to Site goals and objectives that will be utilized to evaluate if Site goals and objectives are achieved.

10 ADAPTIVE MANAGEMENT PLAN

If the mitigation Site or a specific component of the Site fails to achieve the necessary performance standards as specified in the mitigation plan, the Sponsor shall notify the members of NCDMS and work with the IRT to develop contingency plans for remedial action.

11 LONG-TERM MANAGEMENT PLAN

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

Table 152 – Compatibility of Performance Criteria to Project Goals and Objectives

Goals	Objectives	Success Criteria
(1) HYDROLOGY		
- Minimize downstream flooding to the maximum extent possible. - Connect streams to functioning wetland systems.	- Construct a new channel at historic floodplain elevation to restore overbank flows and restore/enhance jurisdictional wetlands - Plant woody riparian buffer - Install marsh treatment areas - Remove agricultural row crops - Deep rip floodplain soils to reduce compaction and increase soil surface roughness - Protect riparian buffers with a perpetual conservation easement	- BHR not to exceed 1.2 - Document four overbank events in separate monitoring years - Attain Wetland Hydrology Success Criteria - Attain Vegetation Success Criteria - Conservation Easement recorded
- Increase stream stability within the Site so that channels are neither aggrading nor degrading.	- Construct channels with a proper pattern, dimension, and longitudinal profile - Remove agricultural row crops - Construct stable channels with the appropriate substrate - Upgrade forded crossings - Plant woody riparian buffer - Stabilize stream banks	- Cross-section measurements indicate a stable channel with the appropriate substrate - Visual documentation of stable channels and structures - BHR not to exceed 1.2 - < 10% change in BHR in any given year - Attain Vegetation Success Criteria
(1) WATER QUALITY		
- Remove direct nutrient and pollutant inputs from the Site and reduce contributions to downstream waters.	- Remove agricultural row crops and reduce agricultural land/inputs - Install marsh treatment areas - Plant woody riparian buffer - Restore/enhance jurisdictional wetlands adjacent to Site streams - Provide surface roughness and reduce compaction through deep ripping/plowing - Restore overbank flooding by constructing channels at historic floodplain elevation	- Attain Wetland Hydrology Success Criteria - Attain Vegetation Success Criteria
(1) HABITAT		
- Improve instream and streamside habitat.	- Construct stable channels with the appropriate substrate - Plant woody riparian buffer to provide organic matter and shade - Construct a new channel at historic floodplain elevation to restore overbank flows - Plant woody riparian buffer - Protect riparian buffers with a perpetual conservation easement - Restore/enhance jurisdictional wetlands adjacent to Site streams - Stabilize stream banks - Install in-stream structures	- Cross-section measurement indicates a stable channel with the appropriate substrate - Visual documentation of stable channels and in-stream structures - Attain Wetland Hydrology Success Criteria - Attain Vegetation Success Criteria - Conservation Easement recorded

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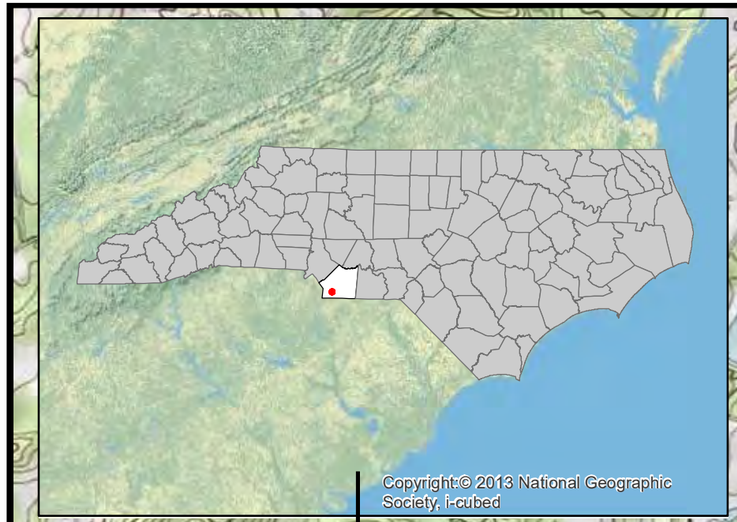
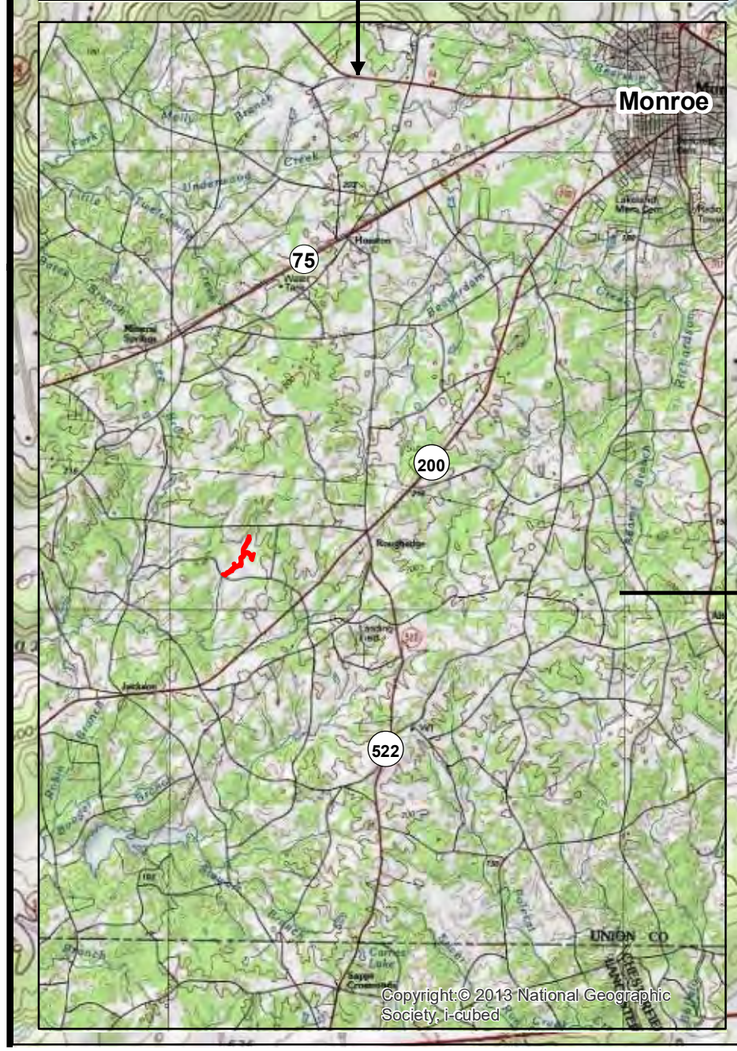
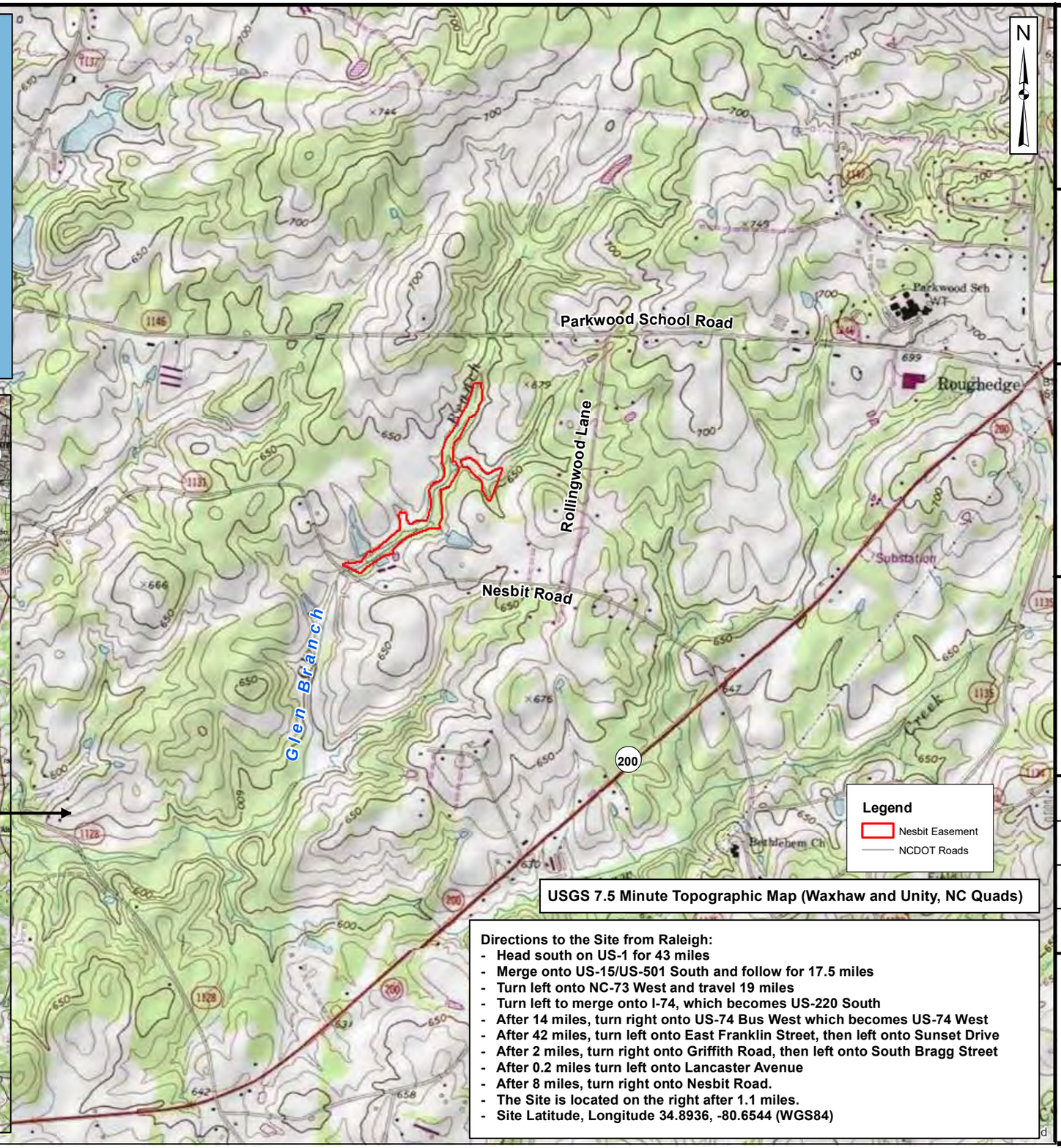
APPENDIX A: Figures







USGS 7.5 Minute Topographic Map (Waxhaw and Unity, NC Quads)

Directions to the Site from Raleigh:

- Head south on US-1 for 43 miles
- Merge onto US-15/US-501 South and follow for 17.5 miles
- Turn left onto NC-73 West and travel 19 miles
- Turn left to merge onto I-74, which becomes US-220 South
- After 14 miles, turn right onto US-74 Bus West which becomes US-74 West
- After 42 miles, turn left onto East Franklin Street, then left onto Sunset Drive
- After 2 miles, turn right onto Griffith Road, then left onto South Bragg Street
- After 0.2 miles turn left onto Lancaster Avenue
- After 8 miles, turn right onto Nesbit Road.
- The Site is located on the right after 1.1 miles.
- Site Latitude, Longitude 34.8936, -80.6544 (WGS84)

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS LLC

Project:

NESBIT SITE

Union County, NC

Title:

SITE LOCATION

Drawn by: KRJ

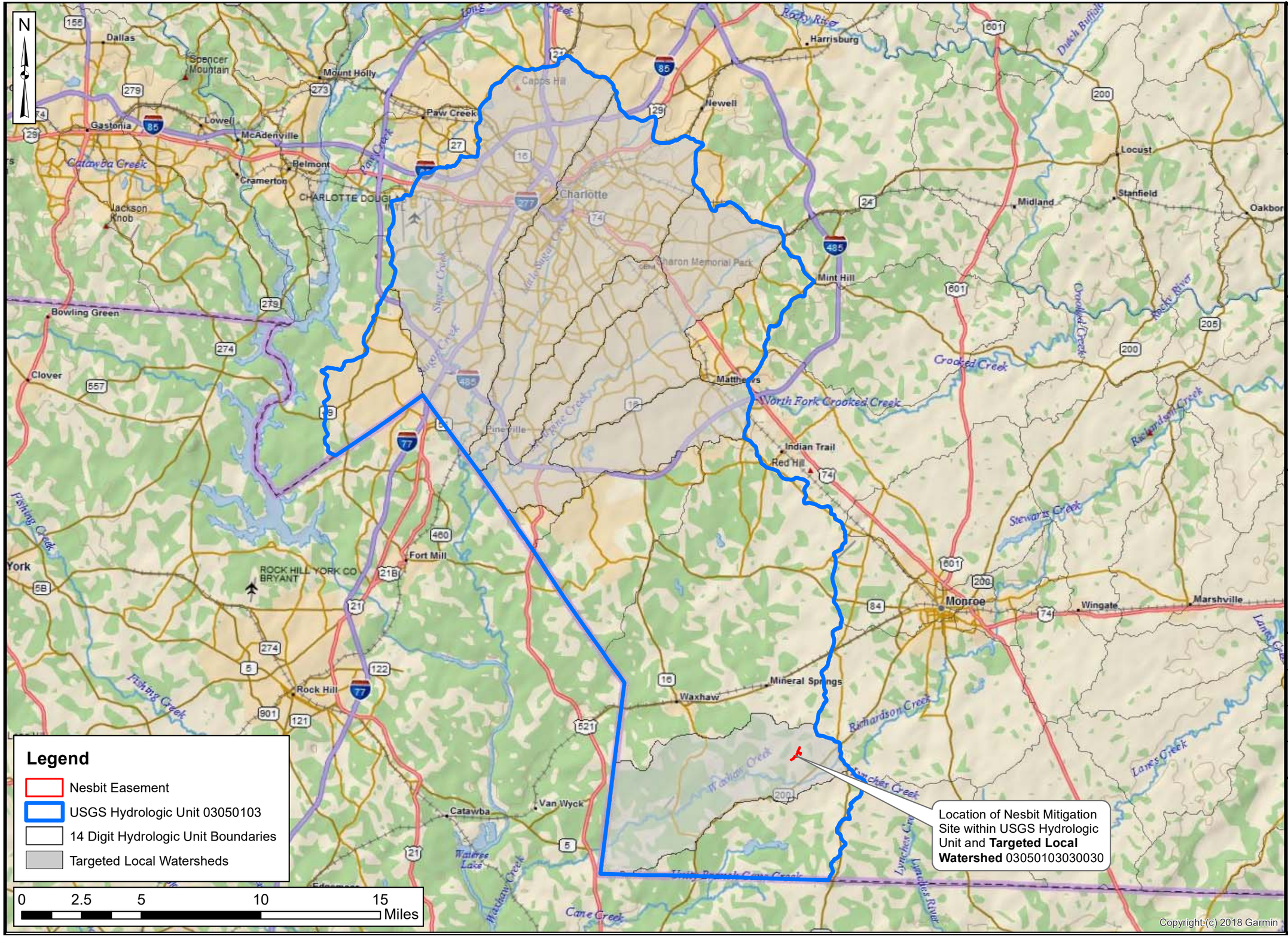
Date: APR 2020

Scale: 1:20,000

Project No.: 20-007

FIGURE

1



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS LLC

Project:

NESBIT SITE

Union County, NC

Title:

HYDROLOGIC UNIT MAP

Drawn by: KRJ

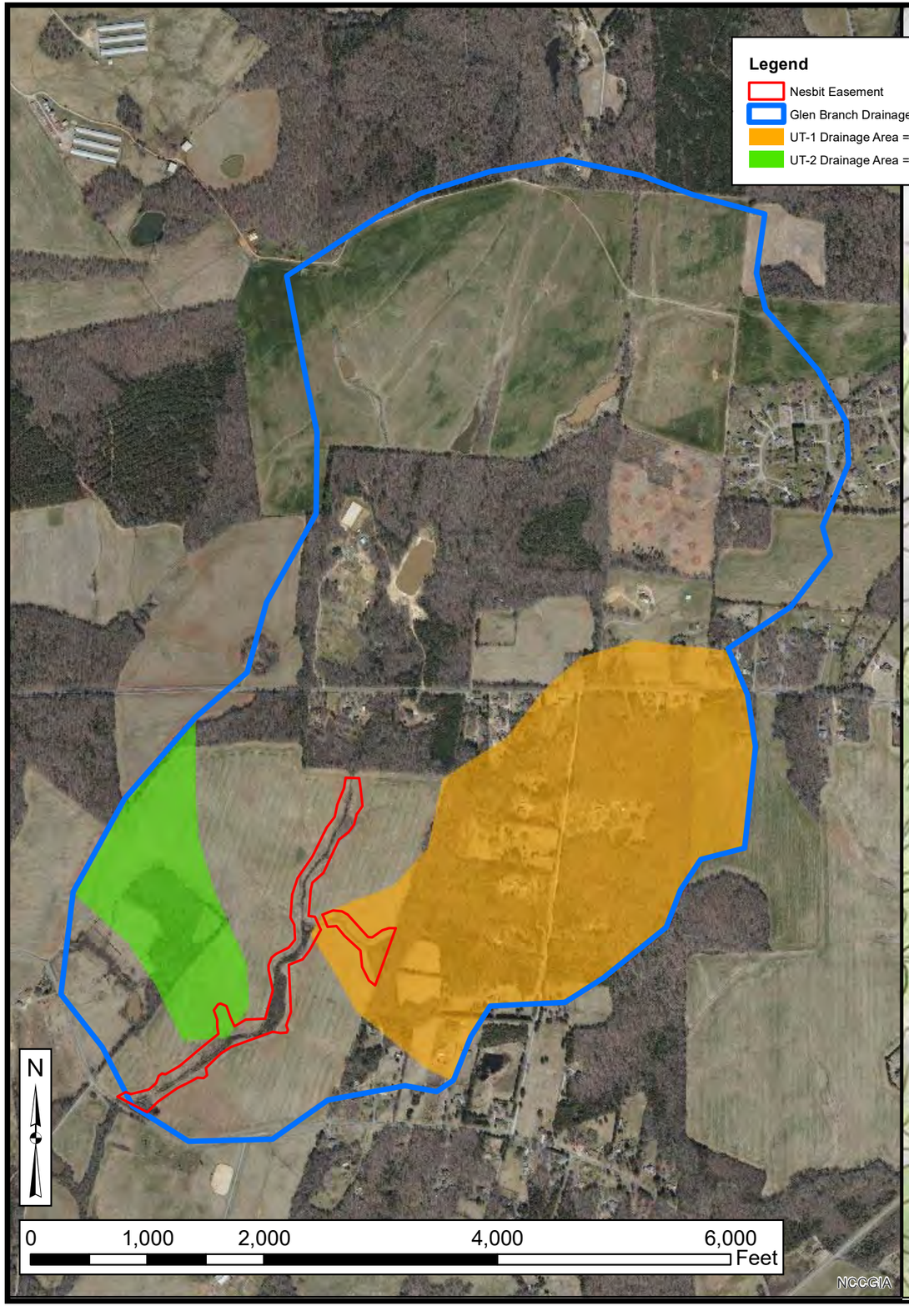
Date: APR 2020

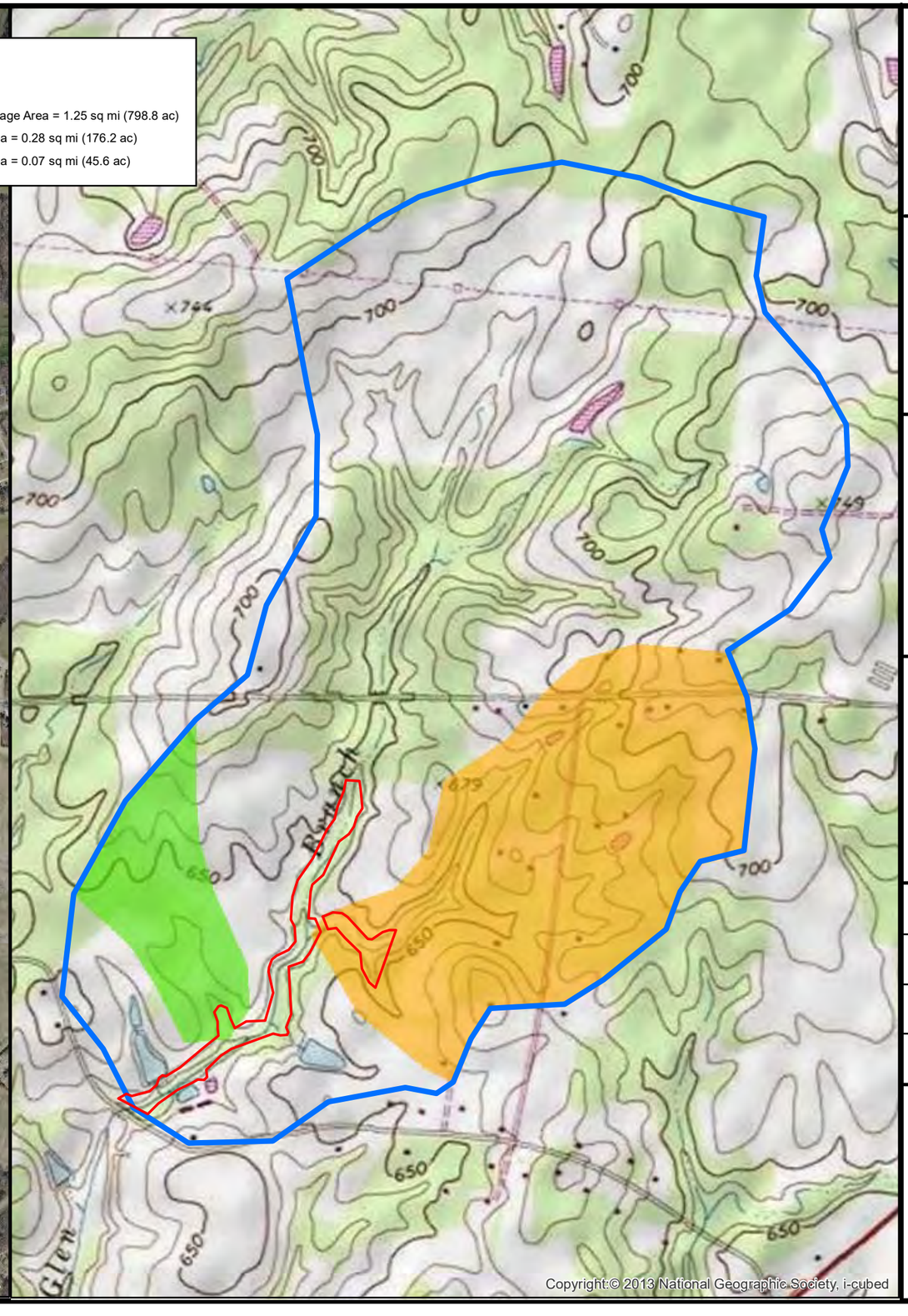
Scale: 1:240,000

Project No.: 20-007

FIGURE

2





Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT SITE

Union County, NC

Title:

TOPOGRAPHY AND DRAINAGE AREA

Drawn by:	KRJ
Date:	APR 2020
Scale:	1:13,000
Project No.:	20-007

FIGURE

3

Soil Map Unit	Soil Series
BdB2	Badin channery silt clay loam
CmB	Cid channery silt loam
ScA	Secrest Cid complex
TaB, TbB2	Tatum gravelly silt clay loam

TaB
TbB2
TbB2
TaC
CmB
CmB
TbB2
ScA
ZnB
TbB2
TaB
BdB2
TbB2
W
CmB
BaB
TbB2

Soil Profile C
NCSAM Form #2
Score: Low
NCDWR Form #1
Score: 33
NCSAM Form #1
Score: Medium
Soil Profile A
Soil Profile B
NCDWR Form #1A
Score: 28
NCWAM Form #1
Score: Medium
NCDWR Form #3
Score: 30
Soil Profile E
Soil Profile D
NCSAM Form #3
Score: Low
UT-1
UT-1A
UT-2
Glen Branch

1
2
3
4
5
6
7

N

0 300 600 1,200 Feet

Legend

- Union County Parcels
- Nesbit Easement = 18.0 ac
- Existing Streams = 5423 ft
- Existing Wetlands = 2.45 ac
- Drained Hydric Soils = 6.57 ac
- NCSAM Form Locations
- NCWAM Form Locations
- NCDWR Form Locations
- Gauge Locations
- Soil Profile
- Powerline
- Soil Boundary
- 2-foot Lidar Contours

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT SITE

Union County, NC

Title:

EXISTING CONDITIONS AND SOILS

Drawn by: KRJ

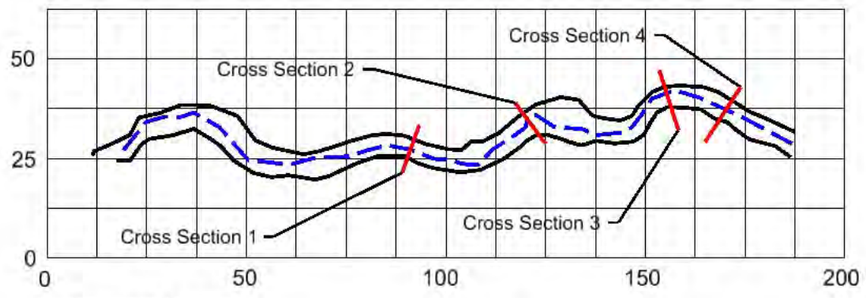
Date: May 2021

Scale: 1:3700

Project No.: 20-007

FIGURE

4



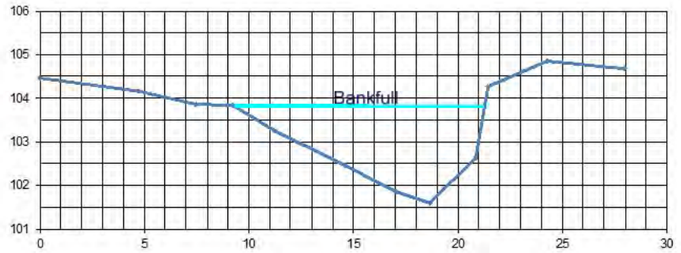
Reference Pattern

Lp-p = 52 (37 - 64) ft
Lm = 86 (60 - 97) ft
Wbelt = 28 (24 - 33) ft
Rc = 21 (12 - 28) ft
Lp-p/Wbkf = 4.2 (3.0 - 5.3)
Lm/Wbkf = 7.1 (5.0 - 8.0)
Wbelt/Wbkf = 2.3 (2.0 - 2.7)
Rc/Wbkf = 1.7 (1.0 - 2.3)
SIN = 1.14

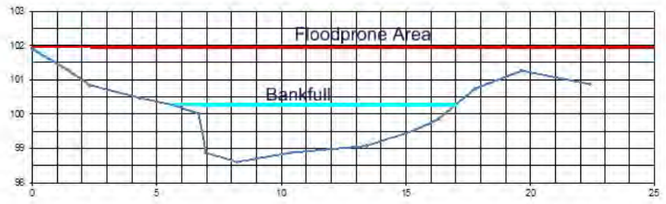
Pattern Legend

- Top of Bank
- Thalweg
- Cross Section

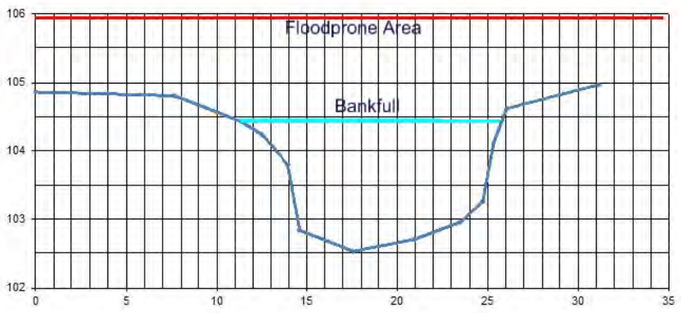
Cross Section 2 - Pool
Abkf = 16.9 ft
Wbkf = 13.3 ft
Dmax = 2.0 ft



Cross Section 3 - Pool
Abkf = 15.4 ft
Wbkf = 12.0 ft
Dmax = 2.2 ft

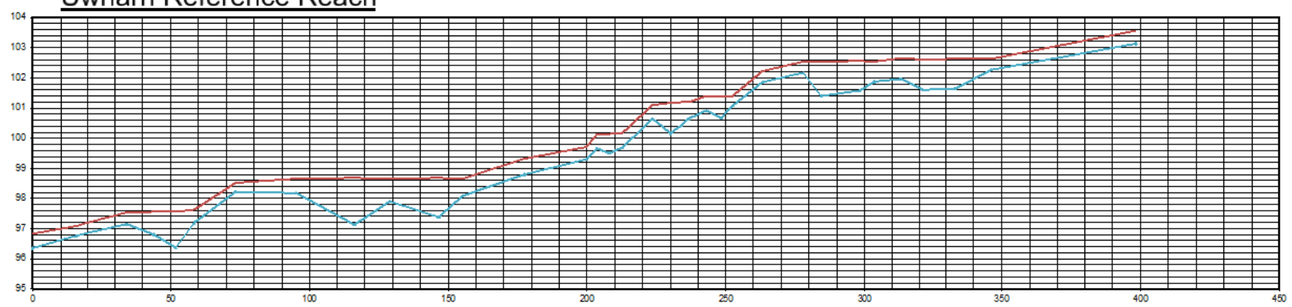


Cross Section 1 - Riffle
Abkf = 12.0 ft
Dave = 1.1 ft
Wbkf = 11.2 ft
Dmax = 1.6 ft
Bank Height = 1.6 ft
Bank Height Ratio = 1.0
W/D = 10.6
FPA = 50
ENT = 4.4
Stream Type = E



Cross Section 4 - Riffle
Abkf = 16.3 ft
Dave = 1.3 ft
Wbkf = 13.0 ft
Dmax = 1.7 ft
Bank Height = 1.7 ft
Bank Height Ratio = 1.0
W/D = 10.4
FPA = 50
ENT = 3.8
Stream Type = E

Uwharri Reference Reach



Profile (Reference Reach)

Save = 0.0168 rise/run
Svalley = 0.0192 rise/run
Sriffle = 0.0283 (0.0096 - 0.0846) rise/run
Spool = 0.0013 (0 - 0.0082) rise/run
Srun = 0 (0 - 0.0091) rise/run
Sglide = 0.0027 (0 - 0.0102) rise/run

- Water Surface
- Channel Bed

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Nesbit
Mitigation Site

Union County
North Carolina

Title:
Uwharri
Reference Reach
Dimension, Pattern,
and Profile

Scale: NA

Date: March 2020

Project No.: 20-007

FIGURE NO.

5

LEGEND

- Easement Boundary = ~18.0 ac
- 5 ft Major Topography Line
- 1 ft Minor Topography Line
- Stream Restoration = 4800 ft
- Stream Enhancement (Level I) = 316 ft
- Stream Enhancement (Level II) = 541 ft
- Wetland Reestablishment = 5.338 ac
- Wetland Rehabilitation = 0.902 ac
- Wetland Enhancement = 1.075 ac
- Forded Crossing
- Marsh Treatment Area
- Drop Structure
- Floodplain Intercepter
- Log Cross Vane
- Log Vane

Glen Branch (Reach 1) = 1275 ft
Restoration
Mitigation Activities
- Install forded channel crossing in upper reaches.
- Initiate stream restoration by bringing the channel up to the historic floodplain elevation.
- Install habitat/grade control structures.
- Contour the design channel to the proper dimension.
- Backfill the historic channel.
- Add a marsh treatment area in agriculture swale.
- Plant with native forest vegetation.

Glen Branch (Reach 2) = 63 ft
Enhancement (Level I)
Mitigation Activities
- Tie the channel into the bedrock outcrop.
- Install habitat/grade control structures.
- Contour the design channel to the proper dimension.
- Plant with native forest vegetation.

UT 2 (Reach 1) = 112 ft
Enhancement (Level II)
Mitigation Activities
- Install a marsh treatement area at the initiation point of the stream.
- Plant with native forest vegetation.

UT 2 (Reach 2) = 197 ft
Restoration
Mitigation Activities
- Tie into upstream Enhancement reach elevations and begin shallowing the channel to historic floodplain elevation.
- Install habitat/grade control structures.
- Contour the design channel to the proper dimension.
- Backfill the historic channel.
- Tie to Glen Branch across and inner meander bend.
- Plant with native forest vegetation.

Glen Branch (Reach 3) = 2776 ft
Restoration
Mitigation Activities
- Tie to bedrosck grade control at the upper ends of the reach.
- Continue Priority 1 stream restoration at the historic floodplain elevation.
- Install habitat/grade control structures.
- Add 4 marsh treatmet areas in agriculture swales.
- Backfill the historic channel.
- Tie to the historic channel elevation at the Site outfall with a drop structure.
- Plant with native forest vegetation.

UT 1 (Reach 1) = 253 ft
Enhancement (Level I)*
Mitigation Activities
- Tie to upstream elevation at property boundary.
- Step channel up to the historic floodplain prior to downstream restoration reaches.
- Install habitat/grade control structures.
- Contour design channel to the proper dimension.
- Plant with native forest vegetation.
* Note: This reach is credited at a 2.5:1 ratio.

UT 1 (Reach 2) = 381 ft
Restoration
Mitigation Activities
- Install habitat/grade control structures.
- Contour design channel to the proper dimension.
- Backfill the historic channel.
- Add a marsh treatment area.
- Plant with native forest vegetation.

UT 1A = 314 ft
Enhancement (Level II)*
Mitigation Activities
- Plant with native forest vegetation.
*Note: This reach is credited at a 5:1 ratio.

UT 1 (Reach 3) = 115 ft
Enhancement (Level II)
Mitigation Activities
- Install a forded channel crossing.
- Plant with native forest vegetation.

UT 1 (Reach 4) = 171 ft
Restoration
Mitigation Activities
- Tie to the upstream channel crossing.
- Excavate a channel at the historic floodplain elevation.
- Install habitat/grade control structures.
- Tie to Glen Branch across an inner meander bend.
- Plant with native forest vegetation.

UT-1
UT-1A
UT-2
GLEN BRANCH

0 200 400
SCALE IN FEET

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Nesbit Site

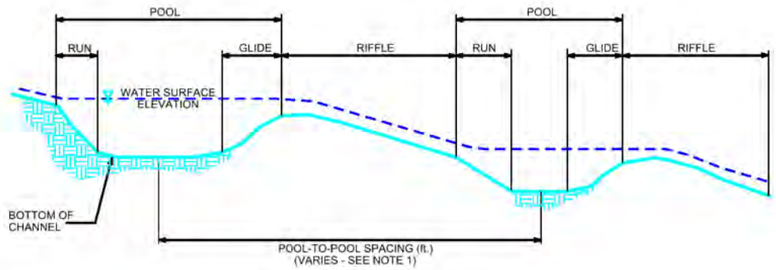
Union County
North Carolina

Title:

RESTORATION PLAN

Scale: AS SHOWN
Date: May 2020
Project No.: 20-007

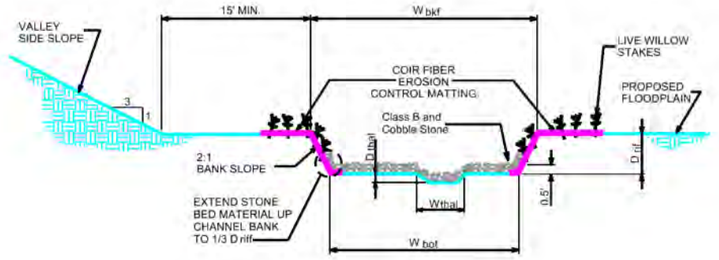
FIGURE NO.
6



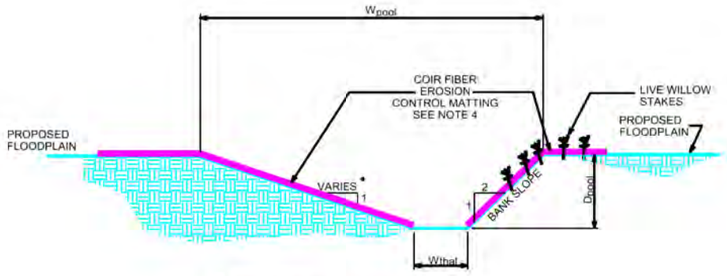
TYPICAL CHANNEL PROFILE

NOTES:

1. POOL-TO-POOL SPACING IS MEASURED FROM CENTER OF POOL BEND TO CENTER OF POOL BEND.



TYPICAL RIFFLE CROSS-SECTION



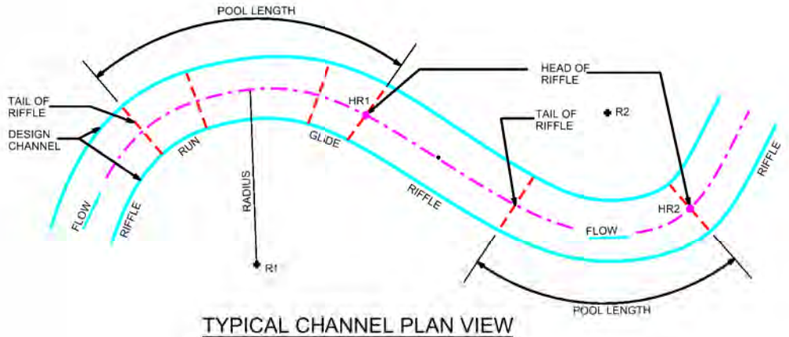
TYPICAL POOL CROSS-SECTION

CHANNEL CONSTRUCTION NOTES:

1. MATERIAL EXCAVATED FROM CHANNEL AND FLOODPLAIN SHALL BE USED TO BACKFILL EXISTING CHANNEL.

2. BANK PROTECTION SHALL CONSIST OF NATURAL COIR FIBER MATTING.

3. THE CONTRACTOR SHALL SUPPLY BED MATERIAL FOR THE ENTIRE BED LENGTH OF EACH RIFFLE SECTION. THE BED MATERIAL SHALL CONSIST OF A MIX OF CLASS A AND SMALLER STONE.



TYPICAL CHANNEL PLAN VIEW

CHANNEL PLAN VIEW NOTES:

1. THE CONTRACTOR SHALL LAYOUT THE CHANNEL ALIGNMENT BY LOCATING THE RADII AND SCRIBING THE CENTER LINE FOR EACH POOL BEND. THE CONNECTING TANGENT SECTIONS SHALL COMPLETE THE LAYOUT OF THE CHANNEL.

2. FIELD ADJUSTMENTS OF THE ALIGNMENT MAY BE REQUIRED TO SAVE TREES OR AVOID OBSTACLES. THE STAKE-OUT SHALL BE APPROVED BY THE CONSTRUCTION MANAGER BEFORE CONSTRUCTION OF THE CHANNEL.

CROSS-SECTION DIMENSIONS

REACH	Wbkf (ft.)	Wbot (ft.)	Driff (ft.)	Dthal (ft.)	Dpool (ft.)	Wpool (ft.)	Wthal (ft.)
Glen Br Upstream	15.3	9.7	1.3	0.1	1.9	18.3	1.0
Glen Br Downstream	18.0	11.2	1.6	0.1	2.2	21.6	1.0
UT 1	10.8	6.8	0.9	0.1	1.3	13.0	1.0
UT 2	6.7	4.3	0.5	0.1	0.8	8.0	1.0

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Nesbit Site

Union County
North Carolina

Title:

PROPOSED DIMENSION, PATTERN, AND PROFILE

Scale: NA

Date: May 2020

Project No.: 20-007

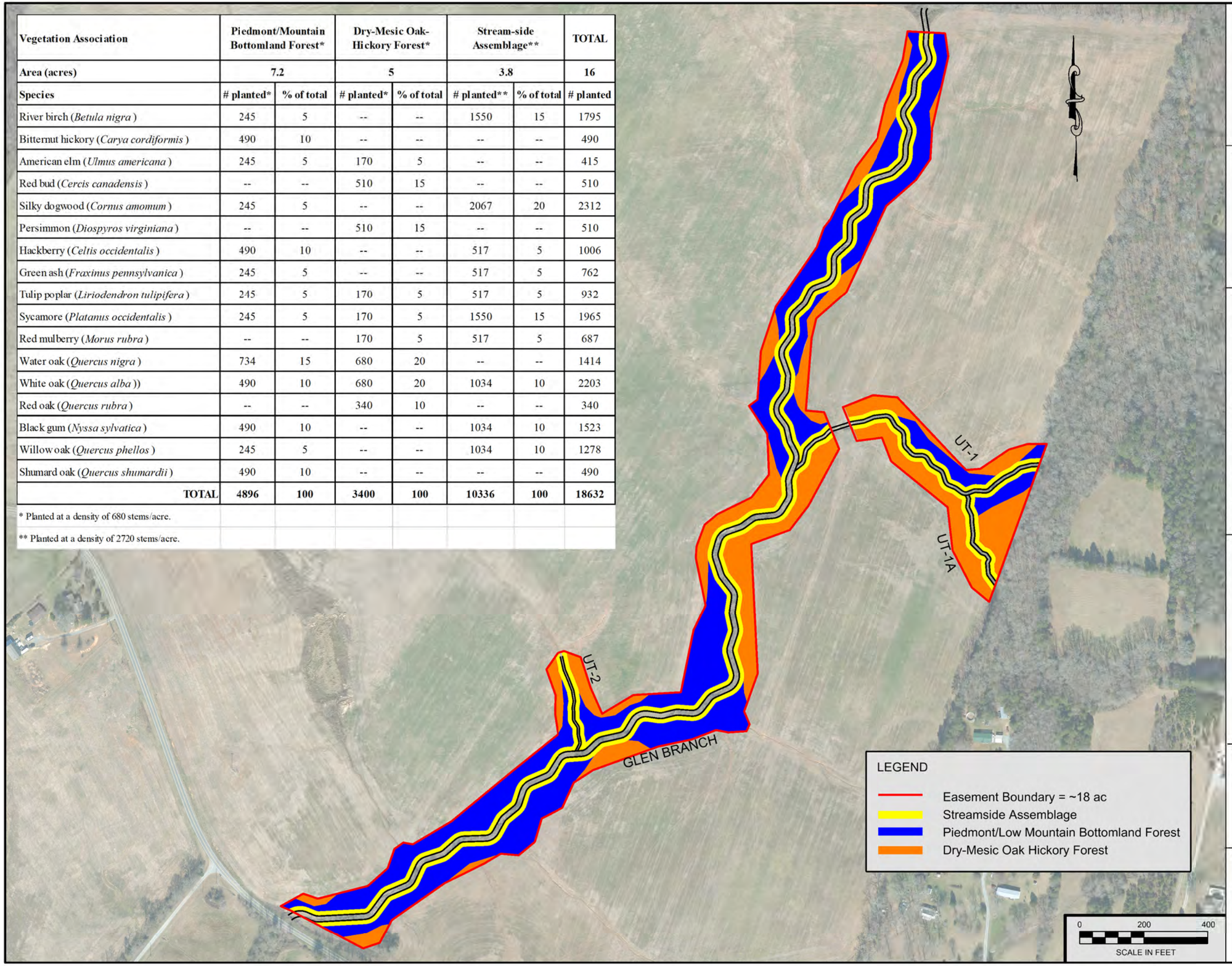
FIGURE NO.

7

Vegetation Association	Piedmont/Mountain Bottomland Forest*		Dry-Mesic Oak-Hickory Forest*		Stream-side Assemblage**		TOTAL
Area (acres)	7.2		5		3.8		16
Species	# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
River birch (*Betula nigra*)	245	5	--	--	1550	15	1795
Bitternut hickory (*Carya cordiformis*)	490	10	--	--	--	--	490
American elm (*Ulmus americana*)	245	5	170	5	--	--	415
Red bud (*Cercis canadensis*)	--	--	510	15	--	--	510
Silky dogwood (*Cornus amomum*)	245	5	--	--	2067	20	2312
Persimmon (*Diospyros virginiana*)	--	--	510	15	--	--	510
Hackberry (*Celtis occidentalis*)	490	10	--	--	517	5	1006
Green ash (*Fraxinus pennsylvanica*)	245	5	--	--	517	5	762
Tulip poplar (*Liriodendron tulipifera*)	245	5	170	5	517	5	932
Sycamore (*Platanus occidentalis*)	245	5	170	5	1550	15	1965
Red mulberry (*Morus rubra*)	--	--	170	5	517	5	687
Water oak (*Quercus nigra*)	734	15	680	20	--	--	1414
White oak (*Quercus alba*))	490	10	680	20	1034	10	2203
Red oak (*Quercus rubra*)	--	--	340	10	--	--	340
Black gum (*Nyssa sylvatica*)	490	10	--	--	1034	10	1523
Willow oak (*Quercus phellos*)	245	5	--	--	1034	10	1278
Shumard oak (*Quercus shumardii*)	490	10	--	--	--	--	490
TOTAL	**4896**	**100**	**3400**	**100**	**10336**	**100**	**18632**

* Planted at a density of 680 stems/acre.

** Planted at a density of 2720 stems/acre.



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Nesbit Site

Union County
North Carolina

Title:

PLANTING
PLAN

Scale: AS SHOWN

Date: May 2020

Project No.: 20-007

FIGURE NO.

8

LEGEND

- Easement Boundary = ~18.0 ac
- 5 ft Major Contour
- 1 ft Minor Contour
- Stream Restoration = 4800 ft
- Stream Enhancement (Level I) = 316 ft
- Stream Enhancement (Level II) = 541 ft
- Wetland Reestablishment = 5.338 ac
- Wetland Rehabilitation = 0.902 ac
- Wetland Enhancement = 1.075 ac
- Permanent Monumented Cross Section
- Vegetation Plot
- Groundwater Gauge
- Flow Gauge
- Crest Gauge
- Rain Gauge/Soil Temperature Probe

Note: Photo points will be taken at all vegetation plots, cross sections, and stream crossings.

UT-1

UT-1A

UT-2

GLEN BRANCH

0 200 400

SCALE IN FEET

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Nesbit Site

Union County
North Carolina

Title:

MONITORING
PLAN

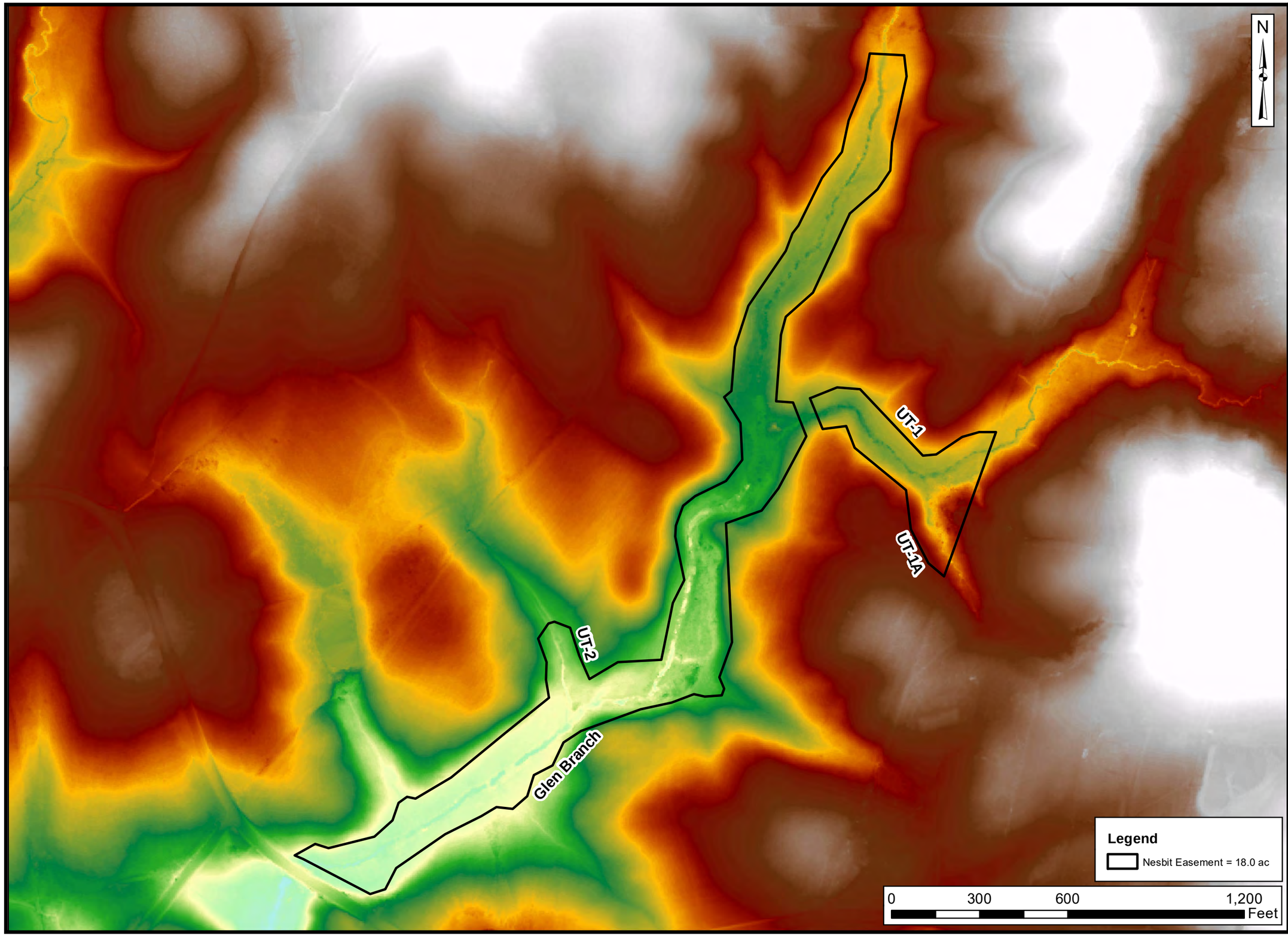
Scale:
AS SHOWN

Date:
May 2020

Project No.:
20-007

FIGURE NO.

9



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT SITE

Union County, NC

Title:

LIDAR

Drawn by: KRJ

Date: FEB 2021

Scale: 1:3700

Project No.: 20-007

FIGURE

10

Appendix B: Existing Stream & Wetland Data

Table B1. Nesbit Morphological Stream Characteristics
Existing Stream Cross-section Data
NC SAM Forms
NC WAM Forms
NCDWQ Stream Forms
BEHI/NBS Data
Soil Boring Log

Table B1. Nesbit Site Morphological Stream Characteristics

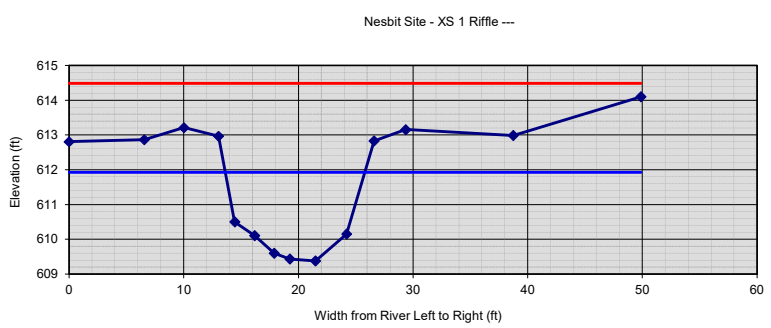
Variables	REFERENCE - UWHARRIE	Existing (Glen Branch Upstream)	Proposed (Glen Branch Upstream)	Existing (Glen Branch Downstream)	Proposed (Glen Branch Downstream)
Stream Type	E 4	Cg 4	Ce 3/4	Eg 4	Ce 3/4
Drainage Area (mi^2)	0.60	0.77	0.77	1.25	1.25
Bankfull Discharge (cfs)	57.6	68.7	68.7	97.3	97.3
Dimension Variables					
Bankfull Cross-Sectional Area (A_{bkf})	14.2	16.7	16.7	23.2	23.2
Existing Cross-Sectional Area ($A_{existing}$)	14.2	16.7 - 67.8	16.7	34.8 - 59.5	23.2
Bankfull Width (W_{bkf})	Mean: 12.1 Range: 11.2 - 13.0	Mean: 15.1 Range: 11.0 to 26.0	Mean: 15.3 Range: 14.2 to 16.3	Mean: 15.7 Range: 11.2 to 18.2	Mean: 18.0 Range: 16.7 to 19.3
Bankfull Mean Depth (D_{bkf})	Mean: 1.2 Range: 1.1 - 1.3	Mean: 1.1 Range: 0.6 to 1.5	Mean: 1.1 Range: 1.0 to 1.2	Mean: 1.5 Range: 1.3 to 2.1	Mean: 1.3 Range: 1.2 to 1.4
Bankfull Maximum Depth (D_{max})	Mean: 1.7 Range: 1.6 - 1.7	Mean: 2.0 Range: 1.3 to 2.2	Mean: 1.4 Range: 1.3 to 1.8	Mean: 2.4 Range: 1.6 to 2.8	Mean: 1.7 Range: 1.5 to 2.1
Pool Width (W_{pool})	Mean: 12.7 Range: 12.0 - 13.3	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 18.3 Range: 15.3 to 21.4	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 21.6 Range: 18.0 to 25.2
Maximum Pool Depth (D_{pool})	Mean: 2.1 Range: 2.0 - 2.2		Mean: 1.9 Range: 1.6 to 2.2		Mean: 2.2 Range: 1.9 to 2.6
Width of Floodprone Area (W_{fpa})	Mean: 50 Range:	Mean: 50 Range: 16 to 100	Mean: 75 Range: 50 to 100	Mean: 100 Range: 25 to 100	Mean: 100 Range: 50 to 150
Dimension Ratios					
Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean: 4.2 Range: 3.8 - 4.5	Mean: 2.8 Range: 1.4 to 6.5	Mean: 4.9 Range: 3.5 to 6.1	Mean: 5.9 Range: 1.4 to 8.9	Mean: 5.5 Range: 3.0 to 7.8
Width / Depth Ratio (W_{bkf}/D_{bkf})	Mean: 10.1 Range: 10.0 - 10.2	Mean: 13.7 Range: 7.3 to 43.3	Mean: 14.0 Range: 12.0 to 16.0	Mean: 10.5 Range: 5.3 to 14.0	Mean: 14.0 Range: 12.0 to 16.0
Max. D_{bkf} / D_{bkf} Ratio	Mean: 1.4 Range: 1.3 - 1.5	Mean: 1.5 Range: 1.4 to 2.2	Mean: 1.3 Range: 1.2 to 1.5	Mean: 1.3 Range: 1.2 to 1.7	Mean: 1.3 Range: 1.2 to 1.5
Low Bank Height / Max. D_{bkf} Ratio	Mean: 1.0 Range:	Mean: 1.8 Range: 1.0 to 2.2	Mean: 1.0 Range: 1.0 to 1.3	Mean: 1.7 Range: 1.3 to 2.1	Mean: 1.0 Range: 1.0 to 1.3
Maximum Pool Depth / Bankfull Mean Depth (D_{pool}/D_{bkf})	Mean: 1.8 Range: 1.7 - 1.8	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.7 Range: 1.5 to 2.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.7 Range: 1.5 to 2.0
Pool Width / Bankfull Width (W_{pool}/W_{bkf})	Mean: 1.0 Range: 1.0 - 1.1		Mean: 1.2 Range: 1.0 to 1.4		Mean: 1.2 Range: 1.0 to 1.4
Pool Area / Bankfull Cross Sectional Area	Mean: 1.1 Range: 1.1 - 1.2		Mean: 1.2 Range: 1.0 to 1.4		Mean: 1.2 Range: 1.0 to 1.4
Pattern Variables					
Pool to Pool Spacing (L_{p-p})	Med: 51.2 Range: 36.7 - 64.3	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 61.2 Range: 45.9 to 91.7	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 72.1 Range: 54.1 to 144.2
Meander Length (L_m)	Med: 85.9 Range: 60.2 - 97.1		Med: 130.0 Range: 91.7 to 152.9		Med: 153.2 Range: 108.1 to 216.3
Belt Width (W_{belt})	Med: 27.8 Range: 24.0 - 32.6		Med: 30.6 Range: 22.9 to 45.9		Med: 36.0 Range: 27.0 to 54.1
Radius of Curvature (R_c)	Med: 20.5 Range: 11.9 - 27.7		Med: 45.9 Range: 30.6 to 76.5		Med: 54.1 Range: 36.0 to 90.1
Sinuosity (Sin)	1.14	1.03	1.15	1.03	1.15
Pattern Ratios					
Pool to Pool Spacing/ Bankfull Width (L_{p-p}/W_{bkf})	Med: 4.2 Range: 3.0 - 5.3	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 6.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 8.0
Meander Length/ Bankfull Width (L_m/W_{bkf})	Med: 7.1 Range: 5.0 - 8.0		Med: 8.5 Range: 6.0 to 10.0		Med: 8.5 Range: 6.0 to 12.0
Meander Width Ratio (W_{belt}/W_{bkf})	Med: 2.3 Range: 2.0 - 2.7		Med: 2.0 Range: 1.5 to 3.0		Med: 2.0 Range: 1.5 to 3.0
Radius of Curvature/ Bankfull Width (Rc/W_{bkf})	Med: 1.7 Range: 1.0 - 2.3		Med: 3.0 Range: 2.0 to 5.0		Med: 3.0 Range: 2.0 to 5.0
Profile Variables					
Average Water Surface Slope (S_{ave})	0.0168	0.0075	0.0067	0.0047	0.0042
Valley Slope (S_{valley})	0.0192	0.0077	0.0077	0.0048	0.0048
Riffle Slope (S_{riffle})	Mean: 0.0283 Range: 0.0096 - 0.0846	No distinct repetitive pattern of riffles and pools due to channel incision	Mean: 0.0107 Range: 0.0080 to 0.0121	No distinct repetitive pattern of riffles and pools due to channel incision	Mean: 0.0067 Range: 0.0050 to 0.0075
Pool Slope (S_{pool})	Mean: 0.0013 Range: 0 - 0.0082		Mean: 0.0007 Range: 0.0000 to 0.0047		Mean: 0.0004 Range: 0.0000 to 0.0029
Run Slope (S_{run})	Mean: 0.0000 Range: 0 - 0.0091		Mean: 0.0027 Range: 0.0000 to 0.0054		Mean: 0.0017 Range: 0.0000 to 0.0033
Glide Slope (S_{glide})	Mean: 0.0027 Range: 0 - 0.0102		Mean: 0.0007 Range: 0.0000 to 0.0054		Mean: 0.0005 Range: 0.0000 to 0.0033
Profile Ratios					
Riffle Slope/ Water Surface Slope (S_{riffle}/S_{ave})	Mean: 1.7 Range: 0.6 - 5.0	No distinct repetitive pattern of riffles and pools due to channel incision	Mean: 1.60 Range: 1.2 to 1.8	No distinct repetitive pattern of riffles and pools due to channel incision	Mean: 1.60 Range: 1.2 to 1.8
Pool Slope/Water Surface Slope (S_{pool}/S_{ave})	Mean: 0.1 Range: 0 - 0.49		Mean: 0.10 Range: 0.0 to 0.7		Mean: 0.10 Range: 0.0 to 0.7
Run Slope/Water Surface Slope (S_{run}/S_{ave})	Mean: 0.00 Range: 0 - .55		Mean: 0.40 Range: 0.0 to 0.8		Mean: 0.40 Range: 0.0 to 0.8
Glide Slope/Water Surface Slope (S_{glide}/S_{ave})	Mean: 0.16 Range: 0 - 0.61		Mean: 0.11 Range: 0.0 to 0.8		Mean: 0.11 Range: 0.0 to 0.8

Table B1 continuted. Nesbit Site Morphological Stream Characteristics

Variables	REFERENCE - UWHARRIE	Existing (UT 1)	Proposed (UT 1)	Existing (UT 2)	Proposed (UT 2)
Stream Type	E 4	Eg 4	Ce 3/4	Eg 6	Ce 3/4
Drainage Area (mi^2)	0.60	0.28	0.28	0.07	0.07
Bankfull Discharge (cfs)	57.6	32.9	32.9	11.8	11.8
Dimension Variables				**Dimension Variables**	
Bankfull Cross-Sectional Area (A_{bkf})	14.2	8.4	8.4	3.2	3.2
Existing Cross-Sectional Area ($A_{existing}$)	14.2	12.8 - 29.9	8.4	5.1 - 14.5	3.2
Bankfull Width (W_{bkf})	Mean: 12.1 Range: 11.2 - 13.0	Mean: 8.7 Range: 7.1 to 9.5	Mean: 10.8 Range: 10.0 to 11.6	Mean: 4.7 Range: 3.4 to 7.9	Mean: 6.7 Range: 6.2 to 7.2
Bankfull Mean Depth (D_{bkf})	Mean: 1.2 Range: 1.1 - 1.3	Mean: 1.0 Range: 0.9 to 1.2	Mean: 0.8 Range: 0.7 to 0.8	Mean: 0.7 Range: 0.4 to 0.9	Mean: 0.5 Range: 0.4 to 0.5
Bankfull Maximum Depth (D_{max})	Mean: 1.7 Range: 1.6 - 1.7	Mean: 1.4 Range: 1.2 to 1.6	Mean: 1.0 Range: 0.9 to 1.3	Mean: 1.1 Range: 0.6 to 1.5	Mean: 0.6 Range: 0.6 to 0.8
Pool Width (W_{pool})	Mean: 12.7 Range: 12.0 - 13.3	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 13.0 Range: 10.8 to 15.2	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 8.0 Range: 6.7 to 9.4
Maximum Pool Depth (D_{pool})	Mean: 2.1 Range: 2.0 - 2.2		Mean: 1.3 Range: 1.2 to 1.5		Mean: 0.8 Range: 0.7 to 1.0
Width of Floodprone Area (W_{fpa})	Mean: 50 Range:	Mean: 29 Range: 20.0 to 50	Mean: 75 Range: 50 to 100	Mean: 30 Range: 7 to 50	Mean: 50 Range: 25 to 75
Dimension Ratios				**Dimension Ratios**	
Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean: 4.2 Range: 3.8 - 4.5	Mean: 3.2 Range: 2.5 to 7.0	Mean: 6.9 Range: 5.0 to 8.6	Mean: 3.8 Range: 1.5 to 14.7	Mean: 7.5 Range: 4.0 to 10.5
Width / Depth Ratio (W_{bkf}/D_{bkf})	Mean: 10.1 Range: 10.0 - 10.2	Mean: 8.7 Range: 5.9 to 10.6	Mean: 14.0 Range: 12.0 to 16.0	Mean: 6.7 Range: 3.8 to 19.8	Mean: 14.0 Range: 12.0 to 16.0
Max. D_{bkf} / D_{bkf} Ratio	Mean: 1.4 Range: 1.3 - 1.5	Mean: 1.4 Range: 1.2 to 1.8	Mean: 1.3 Range: 1.2 to 1.5	Mean: 1.6 Range: 1.5 to 1.7	Mean: 1.3 Range: 1.2 to 1.5
Low Bank Height / Max. D_{bkf} Ratio	Mean: 1.0 Range:	Mean: 1.7 Range: 1.4 to 1.8	Mean: 1.0 Range: 1.0 to 1.3	Mean: 2.5 Range: 1.6 to 8.7	Mean: 1.0 Range: 1.0 to 1.3
Maximum Pool Depth / Bankfull Mean Depth (D_{pool}/D_{bkf})	Mean: 1.8 Range: 1.7 - 1.8	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.7 Range: 1.5 to 2.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.7 Range: 1.5 to 2.0
Pool Width / Bankfull Width (W_{pool}/W_{bkf})	Mean: 1.0 Range: 1.0 - 1.1		Mean: 1.2 Range: 1.0 to 1.4		Mean: 1.2 Range: 1.0 to 1.4
Pool Area / Bankfull Cross Sectional Area	Mean: 1.1 Range: 1.1 - 1.2		Mean: 1.2 Range: 1.0 to 1.4		Mean: 1.2 Range: 1.0 to 1.4

Variables	REFERENCE - UWHARRIE	Existing (UT 1)	Proposed (UT 1)	Existing (UT 2)	Proposed (UT 2)
Pattern Variables				**Pattern Variables**	
Pool to Pool Spacing (L_{p-p})	Med: 51.2 Range: 36.7 - 64.3	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 43.4 Range: 32.5 to 86.8	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 26.8 Range: 20.1 to 53.5
Meander Length (L_m)	Med: 85.9 Range: 60.2 - 97.1		Med: 92.2 Range: 65.1 to 130.1		Med: 56.9 Range: 40.2 to 80.3
Belt Width (W_{belt})	Med: 27.8 Range: 24.0 - 32.6		Med: 21.7 Range: 16.3 to 32.5		Med: 13.4 Range: 10.0 to 20.1
Radius of Curvature (R_c)	Med: 20.5 Range: 11.9 - 27.7		Med: 32.5 Range: 21.7 to 54.2		Med: 20.1 Range: 13.4 to 33.5
Sinuosity (Sin)	1.14	1.06	1.15	1.03	1.15
Pattern Ratios				**Pattern Ratios**	
Pool to Pool Spacing/ Bankfull Width (L_{p-p}/W_{bkf})	Med: 4.2 Range: 3.0 - 5.3	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 8.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 8.0
Meander Length/ Bankfull Width (L_m/W_{bkf})	Med: 7.1 Range: 5.0 - 8.0		Med: 8.5 Range: 6.0 to 12.0		Med: 8.5 Range: 6.0 to 12.0
Meander Width Ratio (W_{belt}/W_{bkf})	Med: 2.3 Range: 2.0 - 2.7		Med: 2.0 Range: 1.5 to 3.0		Med: 2.0 Range: 1.5 to 3.0
Radius of Curvature/ Bankfull Width (Rc/W_{bkf})	Med: 1.7 Range: 1.0 - 2.3		Med: 3.0 Range: 2.0 to 5.0		Med: 3.0 Range: 2.0 to 5.0
Profile Variables				**Profile Variables**	
Average Water Surface Slope (S_{ave})	0.0168	0.0081	0.0075	0.0143	0.0128
Valley Slope (S_{valley})	0.0192	0.0086	0.0086	0.0147	0.0147
Riffle Slope (S_{riffle})	Mean: 0.0283 Range: 0.0096 - 0.0846	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 0.0120 Range: 0.0090 to 0.0135	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 0.0205 Range: 0.0153 to 0.0230
Pool Slope (S_{pool})	Mean: 0.0013 Range: 0 - 0.0082		Mean: 0.0007 Range: 0.0000 to 0.0052		Mean: 0.0013 Range: 0.0000 to 0.0089
Run Slope (S_{run})	Mean: 0.0000 Range: 0 - 0.0091		Mean: 0.0030 Range: 0.0000 to 0.0060		Mean: 0.0051 Range: 0.0000 to 0.0102
Glide Slope (S_{glide})	Mean: 0.0027 Range: 0 - 0.0102		Mean: 0.0008 Range: 0.0000 to 0.0060		Mean: 0.0014 Range: 0.0000 to 0.0102
Profile Ratios				**Profile Ratios**	
Riffle Slope/ Water Surface Slope (S_{riffle}/S_{ave})	Mean: 1.7 Range: 0.6 - 5.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.60 Range: 1.2 to 1.8	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.60 Range: 1.2 to 1.8
Pool Slope/Water Surface Slope (S_{pool}/S_{ave})	Mean: 0.1 Range: 0 - 0.49		Mean: 0.10 Range: 0.0 to 0.7		Mean: 0.10 Range: 0.0 to 0.7
Run Slope/Water Surface Slope (S_{run}/S_{ave})	Mean: 0.00 Range: 0 - .55		Mean: 0.40 Range: 0.0 to 0.8		Mean: 0.40 Range: 0.0 to 0.8
Glide Slope/Water Surface Slope (S_{glide}/S_{ave})	Mean: 0.16 Range: 0 - 0.61		Mean: 0.11 Range: 0.0 to 0.8		Mean: 0.11 Range: 0.0 to 0.8

Cross Section



section:	Nesbit Site - XS 1
	Riffle

	---
description:	Nesbit Site - XS 1
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	87.19232	612.8077
		6.556981	87.13462	612.8654
		10.02873	86.78667	613.2133
		13.03368	87.03487	612.9651
		14.45362	89.50394	610.4961
		16.1816	89.8914	610.1086
		17.8879	90.39729	609.6027
		19.2539	90.56648	609.4335
		21.49334	90.62539	609.3746
		24.21175	89.84523	610.1548
		26.59823	87.17349	612.8265
		29.34691	86.84378	613.1562
		38.74088	87.0082	612.9918
		49.87444	85.89983	614.1002

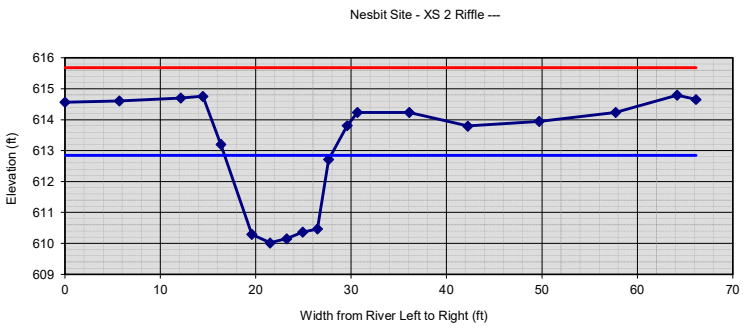
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
88.07	87.17	100.0		
611.93	612.83			

dimensions			
23.2	x-section area	1.9	d mean
12.2	width	14.0	wet P
2.6	d max	1.7	hyd radi
3.5	bank ht	6.4	w/d ratio
100.0	W flood prone area	8.2	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 2
	Riffle

	---
description:	Nesbit Site - XS 2
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	85.42994	614.5701
		5.700387	85.3923	614.6077
		12.14427	85.2989	614.7011
		14.47001	85.24498	614.755
		16.34845	86.80447	613.1955
		19.60631	89.70912	610.2909
		21.49206	89.98328	610.0167
		23.25853	89.84686	610.1531
		24.92041	89.63004	610.37
		26.47159	89.53601	610.464
		27.64867	87.28585	612.7142
		29.59245	86.19463	613.8054
		30.65972	85.76695	614.2331
		36.0853	85.75941	614.2406
		42.23119	86.20508	613.7949
		49.71577	86.05174	613.9483
		57.72077	85.76214	614.2379
		64.16948	85.20673	614.7933
		66.15977	85.34501	614.655

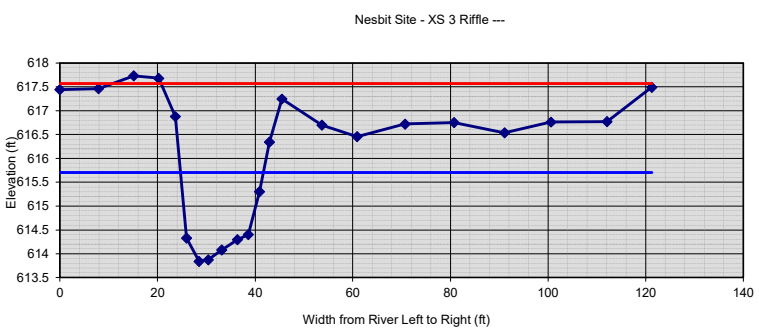
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
87.15	85.77	100.0		
612.85	614.23			

dimensions			
23.2	x-section area	2.1	d mean
11.2	width	13.6	wet P
2.8	d max	1.7	hyd radi
4.2	bank ht	5.4	w/d ratio
100.0	W flood prone area	9.0	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 3
	Riffle

	---
description:	Nesbit Site - XS 3
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	82.56104	617.439
		7.907813	82.53935	617.4606
		15.08566	82.27333	617.7267
		20.25677	82.31899	617.681
		23.63626	83.12336	616.8766
		25.95492	85.67224	614.3278
		28.50577	86.15699	613.843
		30.38136	86.126	613.874
		33.11042	85.91707	614.0829
		36.34341	85.70378	614.2962
		38.59538	85.59872	614.4013
		40.87869	84.69743	615.3026
		42.90315	83.6569	616.3431
		45.45341	82.75439	617.2456
		53.63053	83.30517	616.6948
		60.85985	83.54505	616.4549
		70.68075	83.27853	616.7215
		80.7552	83.24869	616.7513
		91.0547	83.4648	616.5352
		100.6072	83.23896	616.761
		112.1021	83.23201	616.768
		121.2396	82.50839	617.4916

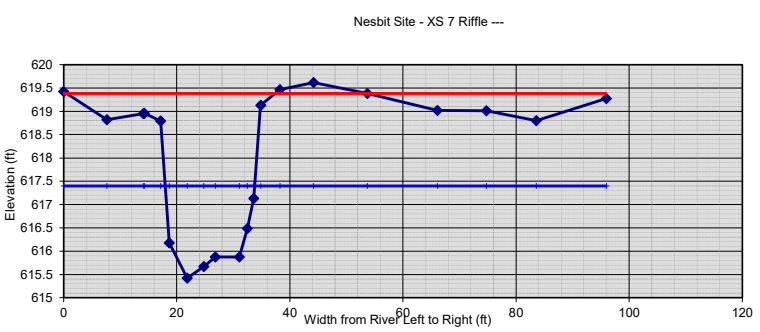
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
84.295	82.75	100.0		
615.705	617.25			

dimensions			
23.2	x-section area	1.4	d mean
17.0	width	17.9	wet P
1.9	d max	1.3	hyd radi
3.4	bank ht	12.4	w/d ratio
100.0	W flood prone area	5.9	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 7
	Riffle

	---
description:	Nesbit Site - XS 7
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	80.5798	619.4202
		7.63269	81.1823	618.8177
		14.0657	81.04861	618.9514
		14.25308	81.04317	618.9568
		17.14688	81.20682	618.7932
		18.66811	83.82612	616.1739
		21.81941	84.58122	615.4188
		24.78644	84.32869	615.6713
		26.84753	84.12184	615.8782
		31.07733	84.12218	615.8778
		32.50524	83.51325	616.4868
		33.6135	82.86819	617.1318
		34.84368	80.87039	619.1296
		38.20841	80.53392	619.4661
		44.19806	80.38594	619.6141
		53.71285	80.61593	619.3841
		66.06706	80.97847	619.0215
		74.76914	80.98766	619.0123
		83.55496	81.19975	618.8002
		95.93767	80.72816	619.2718

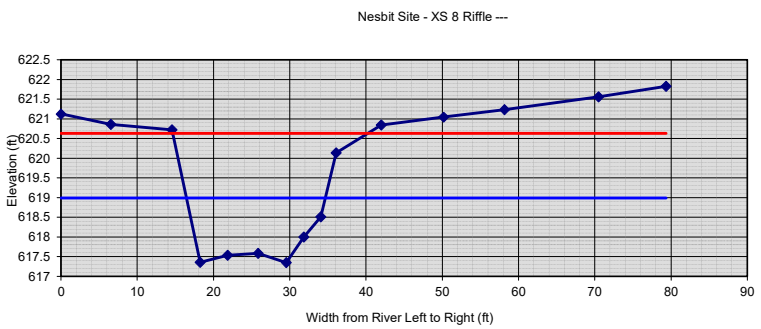
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
82.6	81.21	80.0		
617.4	618.79			

dimensions			
23.2	x-section area	1.5	d mean
15.8	width	17.1	wet P
2.0	d max	1.4	hyd radi
3.4	bank ht	10.8	w/d ratio
80.0	W flood prone area	5.1	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 8
	Riffle

	---
description:	Nesbit Site - XS 8
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	78.87256	621.1274
		6.526308	79.13799	620.862
		14.53264	79.27643	620.7236
		18.23393	82.63976	617.3602
		21.86924	82.46725	617.5328
		25.83994	82.41774	617.5823
		29.54084	82.65384	617.3462
		31.83158	82.0035	617.9965
		34.07941	81.49079	618.5092
		36.07839	79.861	620.139
		41.99417	79.15825	620.8418
		50.15401	78.95433	621.0457
		58.17213	78.76671	621.2333
		70.45886	78.44119	621.5588
		79.36098	78.173	621.827

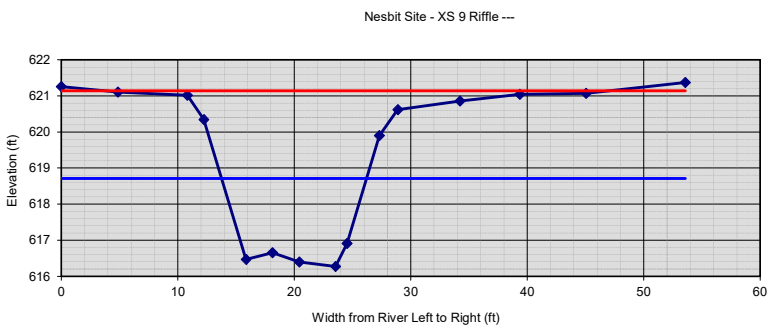
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
81.01	79.28	25.0		
618.99	620.72			

dimensions			
23.2	x-section area	1.3	d mean
18.2	width	19.2	wet P
1.6	d max	1.2	hyd radi
3.4	bank ht	14.3	w/d ratio
25.0	W flood prone area	1.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 9
	Riffle

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description:	Nesbit Site - XS 9
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	78.74355	621.2564
		4.861298	78.89132	621.1087
		10.82829	78.97818	621.0218
		12.23742	79.64947	620.3505
		15.86161	83.52825	616.4718
		18.13406	83.34269	616.6573
		20.44682	83.60316	616.3968
		23.55343	83.72484	616.2752
		24.54375	83.09243	616.9076
		27.30092	80.09811	619.9019
		28.89003	79.38111	620.6189
		34.2355	79.14085	620.8592
		39.35624	78.95169	621.0483
		45.05915	78.92574	621.0743
		53.57584	78.62277	621.3772

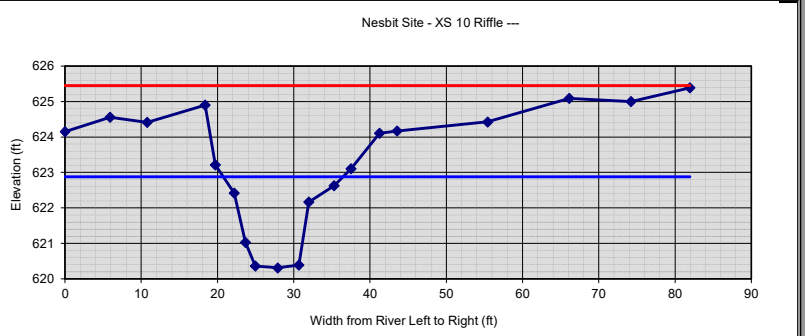
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
81.29	79.38	40.0		
618.71	620.62			

dimensions			
23.2	x-section area	1.9	d mean
12.4	width	14.4	wet P
2.4	d max	1.6	hyd radi
4.3	bank ht	6.7	w/d ratio
40.0	W flood prone area	3.2	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	**Nesbit Site - XS 10**
	Riffle --- ---
description:	**Nesbit Site - XS 10**
height of instrument (ft):	**700.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	**75.84821**	624.1518
		5.908071	**75.44332**	624.5567
		10.78059	**75.58986**	624.4101
		18.35318	**75.09905**	624.901
		19.70736	**76.78718**	623.2128
		22.18131	**77.57833**	622.4217
		23.65137	**78.97398**	621.026
		24.93997	**79.63728**	620.3627
		27.87898	**79.68627**	620.3137
		30.66881	**79.61502**	620.385
		31.94975	**77.83436**	622.1656
		35.29266	**77.37331**	622.6267
		37.47492	**76.895**	623.105
		41.22637	**75.8987**	624.1013
		43.5399	**75.82747**	624.1725
		55.41265	**75.57615**	624.4238
		66.14028	**74.90741**	625.0926
		74.20604	**74.99603**	625.004
		81.94289	**74.61251**	625.3875

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
77.12	**75.9**	**100.0**		
622.88	624.1			

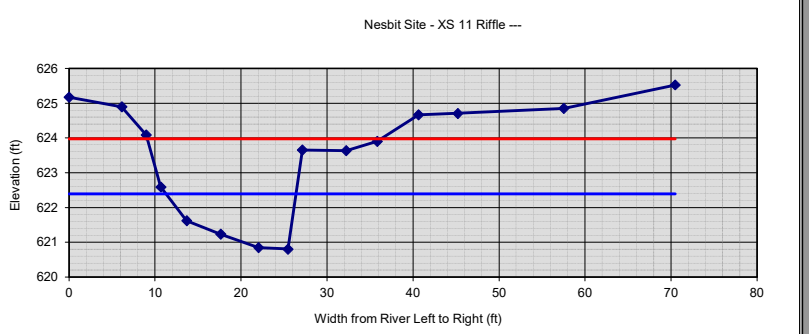
dimensions			
23.2	x-section area	1.5	d mean
15.7	width	17.5	wet P
2.6	d max	1.3	hyd radi
3.8	bank ht	10.6	w/d ratio
100.0	W flood prone area	6.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

For additional cross sections make a copy of the "Dimension" worksheet.
To create a copy "right click" on the dimension tab below.

Cross Section



section:	Nesbit Site - XS 11
	Riffle

	---
description:	Nesbit Site - XS 11
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	74.82798	625.172
		6.136844	75.10569	624.8943
		8.97037	75.91156	624.0884
		10.68129	77.40736	622.5926
		13.68604	78.38153	621.6185
		17.63616	78.76379	621.2362
		22.04486	79.14982	620.8502
		25.44055	79.19337	620.8066
		27.13875	76.34324	623.6568
		32.22141	76.36292	623.6371
		35.82424	76.09657	623.9034
		40.62768	75.33102	624.669
		45.19232	75.28907	624.7109
		57.5372	75.1456	624.8544
		70.49812	74.47274	625.5273

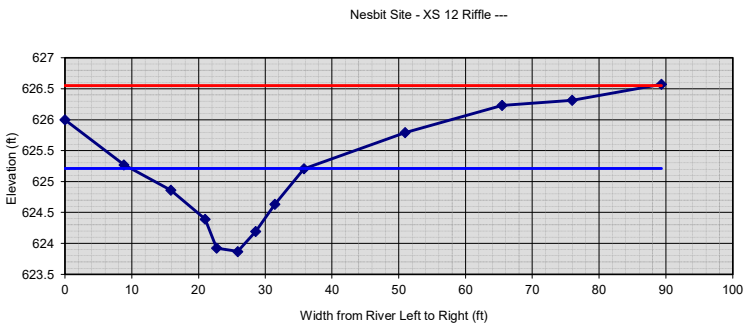
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
77.61	76.34	25.0		
622.39	623.66			

dimensions			
16.7	x-section area	1.1	d mean
15.1	width	16.1	wet P
1.6	d max	1.0	hyd radi
2.9	bank ht	13.6	w/d ratio
25.0	W flood prone area	1.7	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 12
	Riffle

	---
description:	Nesbit Site - XS 12
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	73.99994	626.0001
		8.830923	74.72981	625.2702
		15.87635	75.14103	624.859
		20.99744	75.60716	624.3928
		22.71029	76.07591	623.9241
		25.89862	76.13153	623.8685
		28.57457	75.80807	624.1919
		31.41849	75.36629	624.6337
		35.79881	74.79064	625.2094
		50.92756	74.20867	625.7913
		65.44647	73.76661	626.2334
		75.97458	73.68598	626.314
		89.31544	73.42628	626.5737

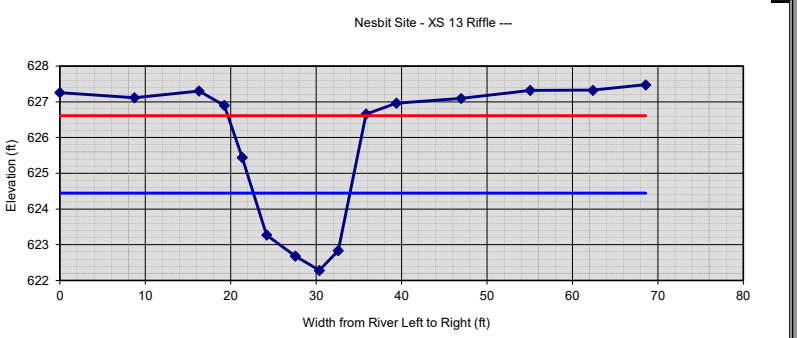
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
74.79	74.79	100.0		
625.21	625.21			

dimensions			
16.7	x-section area	0.6	d mean
26.0	width	26.1	wet P
1.3	d max	0.6	hyd radi
1.3	bank ht	40.3	w/d ratio
100.0	W flood prone area	3.9	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 13
	Riffle

	---
description:	Nesbit Site - XS 13
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	72.74123	627.2588
		8.719964	72.89038	627.1096
		16.28351	72.69674	627.3033
		19.24573	73.09936	626.9006
		21.32972	74.55538	625.4446
		24.20274	76.72887	623.2711
		27.5591	77.3112	622.6888
		30.35369	77.71441	622.2856
		32.59441	77.16769	622.8323
		35.82126	73.34488	626.6551
		39.37943	73.04031	626.9597
		46.95703	72.91016	627.0898
		55.04469	72.68239	627.3176
		62.39528	72.67631	627.3237
		68.57196	72.52356	627.4764

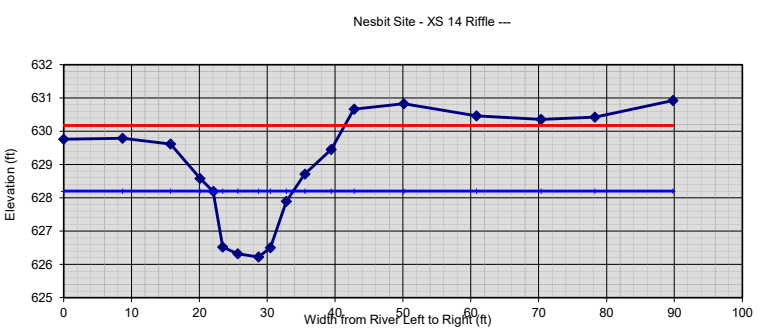
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
75.55	73.35	16.0		
624.45	626.65			

dimensions			
16.7	x-section area	1.5	d mean
11.3	width	12.6	wet P
2.2	d max	1.3	hyd radi
4.4	bank ht	7.7	w/d ratio
16.0	W flood prone area	1.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 14
	Riffle

	---
description:	Nesbit Site - XS 14
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	70.24016	629.7598
		8.659147	70.20768	629.7923
		15.76016	70.37763	629.6224
		20.09342	71.41652	628.5835
		22.05631	71.80226	628.1977
		23.43174	73.47613	626.5239
		25.64433	73.67541	626.3246
		28.71036	73.77099	626.229
		30.46698	73.49833	626.5017
		32.80757	72.10369	627.8963
		35.5369	71.2859	628.7141
		39.42916	70.54136	629.4586
		42.7938	69.33871	630.6613
		50.10394	69.17385	630.8261
		60.84711	69.53391	630.4661
		70.36023	69.64002	630.36
		78.27929	69.57563	630.4244
		89.76667	69.07753	630.9225

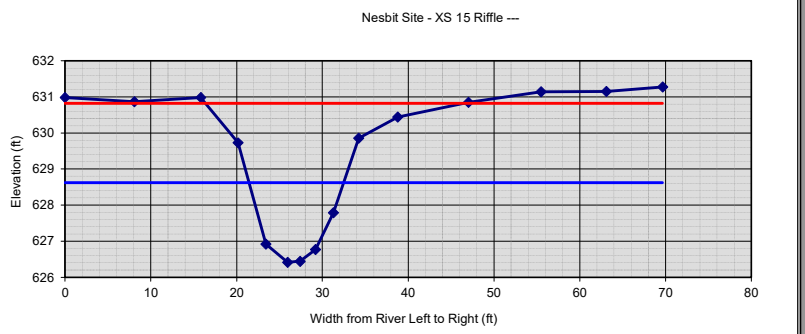
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
71.8	70.38	50.0		
628.2	629.62			

dimensions			
16.7	x-section area	1.4	d mean
11.8	width	13.0	wet P
2.0	d max	1.3	hyd radi
3.4	bank ht	8.3	w/d ratio
50.0	W flood prone area	4.2	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 15
	Riffle

	---
description:	Nesbit Site - XS 15
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	69.01578	630.9842
		8.061564	69.12828	630.8717
		15.82263	69.01878	630.9812
		20.17129	70.26958	629.7304
		23.40179	73.07902	626.921
		25.95147	73.58437	626.4156
		27.3865	73.55409	626.4459
		29.19392	73.22925	626.7707
		31.27467	72.21311	627.7869
		34.22288	70.14165	629.8584
		38.77419	69.55657	630.4434
		47.03048	69.14843	630.8516
		55.50261	68.85451	631.1455
		63.09436	68.84562	631.1544
		69.64679	68.72058	631.2794

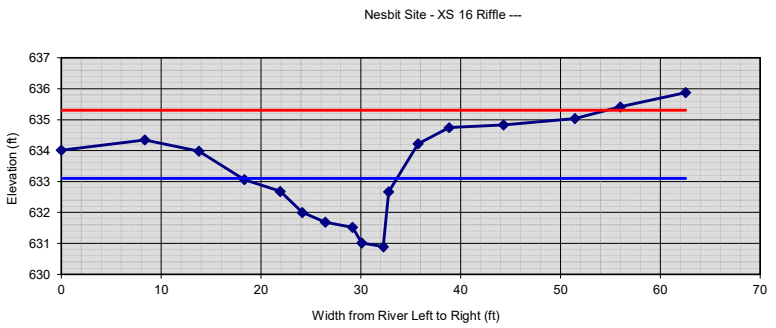
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
71.38	69.56	31.0		
628.62	630.44			

dimensions			
16.7	x-section area	1.5	d mean
11.0	width	12.2	wet P
2.2	d max	1.4	hyd radi
4.0	bank ht	7.3	w/d ratio
31.0	W flood prone area	2.8	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 16
	Riffle

	---
description:	Nesbit Site - XS 16
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	65.98432	634.0157
		8.36315	65.65313	634.3469
		13.7893	66.01762	633.9824
		18.3363	66.94403	633.056
		21.93076	67.31582	632.6842
		24.13395	68.00288	631.9971
		26.4375	68.32206	631.6779
		29.14764	68.48568	631.5143
		30.09063	68.98257	631.0174
		32.2559	69.1083	630.8917
		32.77915	67.33377	632.6662
		35.72858	65.78243	634.2176
		38.83182	65.25742	634.7426
		44.27976	65.16544	634.8346
		51.44308	64.95837	635.0416
		55.97473	64.58704	635.413
		62.51331	64.12514	635.8749

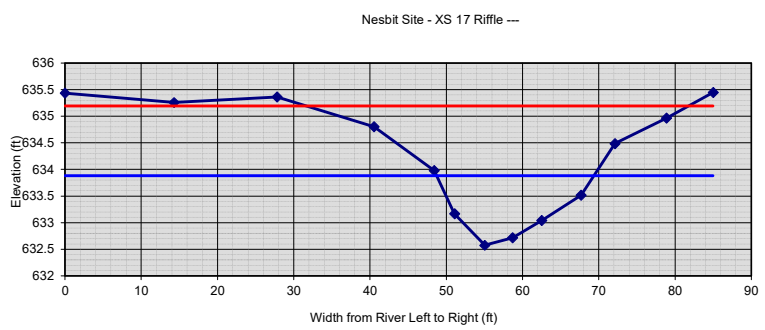
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
66.9	66.02	100.0		
633.1	633.98			

dimensions			
16.7	x-section area	1.1	d mean
15.5	width	17.2	wet P
2.2	d max	1.0	hyd radi
3.1	bank ht	14.3	w/d ratio
100.0	W flood prone area	6.5	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site - XS 17
	Riffle

	---
description:	Nesbit Site - XS 17
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	64.56646	635.4335
		14.28445	64.74059	635.2594
		27.81776	64.63427	635.3657
		40.53477	65.19762	634.8024
		48.40666	66.0199	633.9801
		51.07525	66.83105	633.1689
		55.04776	67.42298	632.577
		58.70889	67.2854	632.7146
		62.527	66.95919	633.0408
		67.68139	66.48059	633.5194
		72.12228	65.5128	634.4872
		78.87478	65.03178	634.9682
		84.98577	64.55444	635.4456

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
66.115	64.63	50.0		
633.885	635.37			

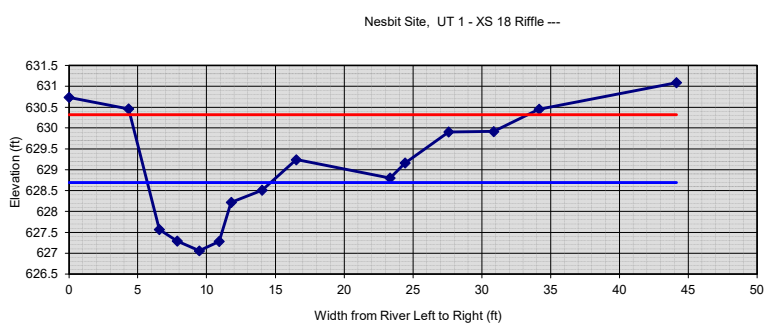
dimensions			
16.7	x-section area	0.8	d mean
20.6	width	20.9	wet P
1.3	d max	0.8	hyd radi
2.8	bank ht	25.6	w/d ratio
50.0	W flood prone area	2.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

For additional cross sections make a copy of the "Dimension" worksheet.
To create a copy "right click" on the dimension tab below.

Cross Section



section:	Nesbit Site, UT 1 - XS 18
	Riffle

	---
description:	Nesbit Site, UT 1 - XS 18
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	69.26233	630.7377
		4.327645	69.53927	630.4607
		6.56815	72.43408	627.5659
		7.876206	72.70646	627.2935
		9.476137	72.94215	627.0579
		10.9115	72.72038	627.2796
		11.78842	71.7829	628.2171
		14.03484	71.49359	628.5064
		16.52135	70.75689	629.2431
		23.32007	71.1972	628.8028
		24.4275	70.83883	629.1612
		27.59727	70.09375	629.9062
		30.8538	70.0843	629.9157
		34.15496	69.54894	630.4511
		44.1414	68.91143	631.0886

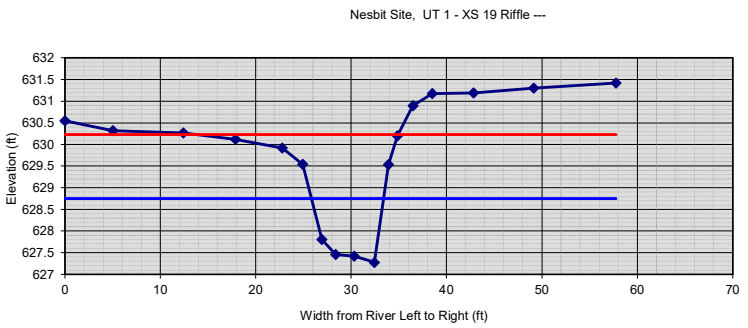
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
71.31	70.09	29.0		
628.69	629.91			

dimensions			
8.4	x-section area	0.9	d mean
9.0	width	10.0	wet P
1.6	d max	0.8	hyd radi
2.9	bank ht	9.6	w/d ratio
29.0	W flood prone area	3.2	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site, UT 1 - XS 19
	Riffle

	---
description:	Nesbit Site, UT 1 - XS 19
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	69.45097	630.549
		5.046731	69.68008	630.3199
		12.41081	69.73549	630.2645
		17.86978	69.88398	630.116
		22.76294	70.07949	629.9205
		24.9078	70.45882	629.5412
		26.93543	72.19603	627.804
		28.38297	72.54569	627.4543
		30.31586	72.58147	627.4185
		32.44831	72.72524	627.2748
		33.90864	70.46479	629.5352
		34.85156	69.80191	630.1981
		36.48118	69.10759	630.8924
		38.50654	68.82105	631.179
		42.85012	68.81127	631.1887
		49.16295	68.69559	631.3044
		57.77831	68.58173	631.4183

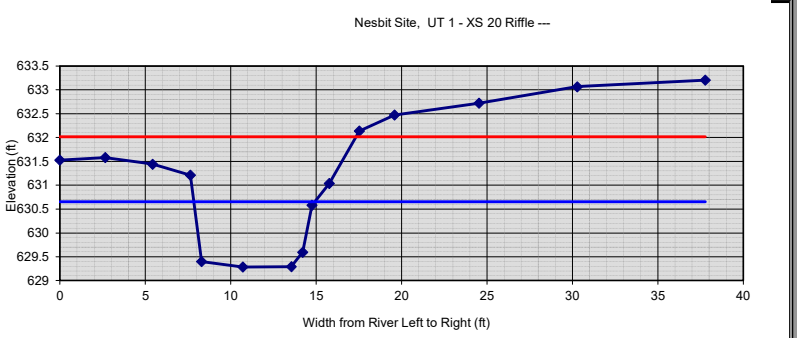
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
71.25	70.08	20.0		
628.75	629.92			

dimensions			
8.4	x-section area	1.1	d mean
7.6	width	8.8	wet P
1.5	d max	1.0	hyd radi
2.6	bank ht	6.8	w/d ratio
20.0	W flood prone area	2.6	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site, UT 1 - XS 20
	Riffle

	---
description:	Nesbit Site, UT 1 - XS 20
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	68.47341	631.5266
		2.642045	68.41701	631.583
		5.416862	68.55675	631.4432
		7.643959	68.78541	631.2146
		8.293746	70.602	629.398
		10.69627	70.71519	629.2848
		13.54676	70.70568	629.2943
		14.20262	70.40399	629.596
		14.74407	69.42045	630.5795
		15.77149	68.96272	631.0373
		17.51541	67.86042	632.1396
		19.5855	67.52962	632.4704
		24.52118	67.27593	632.7241
		30.27455	66.93432	633.0657
		37.77896	66.79724	633.2028

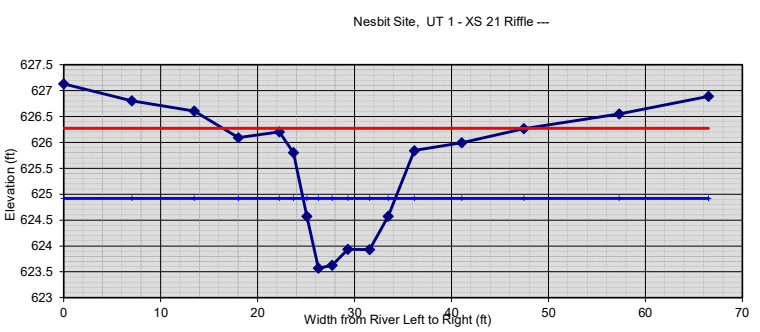
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
69.35	68.79	50.0		
630.65	631.21			

dimensions			
8.4	x-section area	1.2	d mean
7.1	width	8.6	wet P
1.4	d max	1.0	hyd radi
1.9	bank ht	5.9	w/d ratio
50.0	W flood prone area	7.1	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	Nesbit Site, UT 1 - XS 21
	Riffle

	---
description:	Nesbit Site, UT 1 - XS 21
height of instrument (ft):	700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	72.87009	627.1299
		7.023326	73.1957	626.8043
		13.45909	73.39453	626.6055
		18.01249	73.90867	626.0913
		22.23624	73.79629	626.2037
		23.71385	74.19729	625.8027
		25.0865	75.42571	624.5743
		26.26265	76.42953	623.5705
		27.69069	76.37004	623.63
		29.32707	76.06497	623.935
		31.55295	76.07049	623.9295
		33.47405	75.42723	624.5728
		36.17965	74.15731	625.8427
		41.07402	74.01052	625.9895
		47.44676	73.73633	626.2637
		57.29793	73.4508	626.5492
		66.49856	73.10778	626.8922

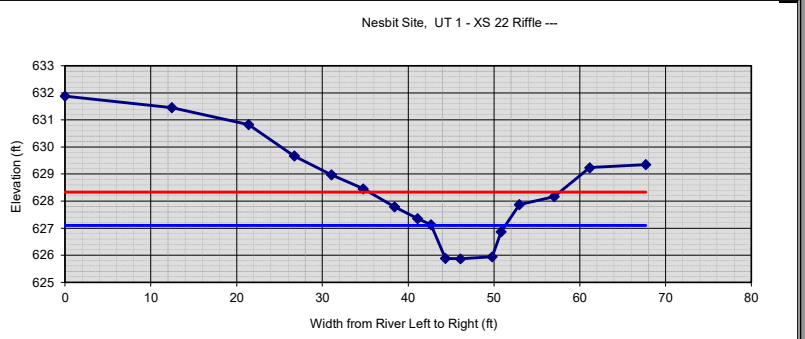
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
75.08	74.16	32.0		
624.92	625.84			

dimensions			
8.4	x-section area	0.9	d mean
9.5	width	10.2	wet P
1.3	d max	0.8	hyd radi
2.3	bank ht	10.7	w/d ratio
32.0	W flood prone area	3.4	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: Nesbit Site, UT 1 - XS 22
Riffle

---

description: Nesbit Site, UT 1 - XS 22

height of instrument (ft): 700.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	68.11763	631.8824
		12.45285	68.54265	631.4574
		21.40902	69.17282	630.8272
		26.71743	70.33275	629.6672
		31.06029	71.02825	628.9717
		34.74662	71.54608	628.4539
		38.40293	72.20858	627.7914
		41.07188	72.64571	627.3543
		42.64934	72.87945	627.1205
		44.34712	74.11094	625.8891
		46.0925	74.13452	625.8655
		49.78611	74.06128	625.9387
		50.85093	73.13758	626.8624
		52.96243	72.12804	627.872
		57.0125	71.82904	628.171
		61.16945	70.76205	629.238
		67.71239	70.64507	629.3549

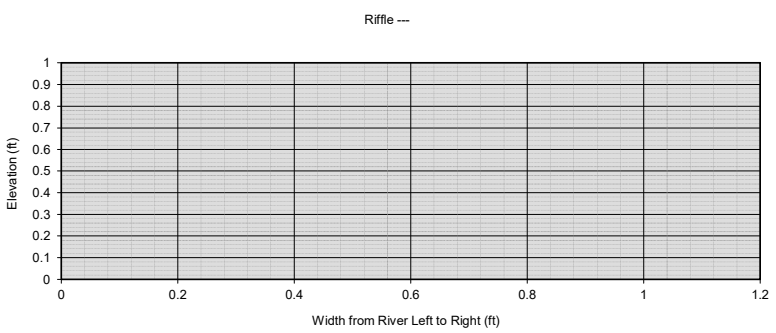
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
72.9	72.13	22.0		
627.1	627.87			

dimensions			
8.4	x-section area	1.0	d mean
8.7	width	9.5	wet P
1.2	d max	0.9	hyd radi
2.0	bank ht	9.0	w/d ratio
22.0	W flood prone area	2.5	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:
Riffle

---

description:

height of instrument (ft):

notes	omit pt.	distance (ft)	FS (ft)	elevation

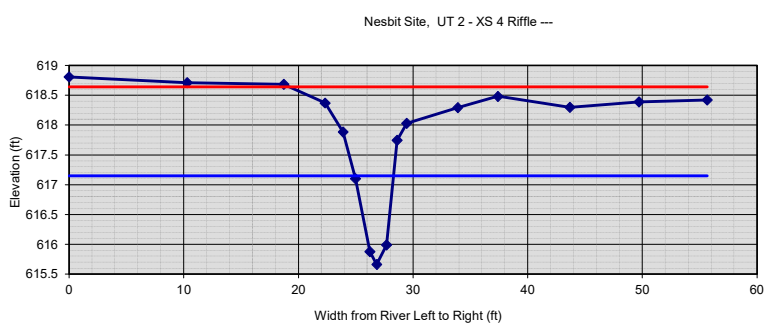
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
0	---			

dimensions			
0.0	x-section area	0.0	d mean
0.0	width	0.0	wet P
0.0	d max	0.0	hyd radi
0.0	bank ht	0.0	w/d ratio
0.0	W flood prone area	0.0	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Nesbit Site, UT 2 - XS 4**
Riffle

---
description: **Nesbit Site, UT 2 - XS 4**
height of instrument (ft): **700.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	81.19118	618.8088
		10.28424	81.2853	618.7147
		18.7212	81.31576	618.6842
		22.32821	81.62926	618.3707
		23.89947	82.11715	617.8829
		24.97721	82.90026	617.0997
		26.24376	84.12589	615.8741
		26.84069	84.34008	615.6599
		27.69232	84.01378	615.9862
		28.60996	82.25682	617.7432
		29.45342	81.97018	618.0298
		33.89462	81.70805	618.2919
		37.40562	81.51597	618.484
		43.67716	81.701	618.299
		49.7142	81.60792	618.3921
		55.65522	81.5788	618.4212

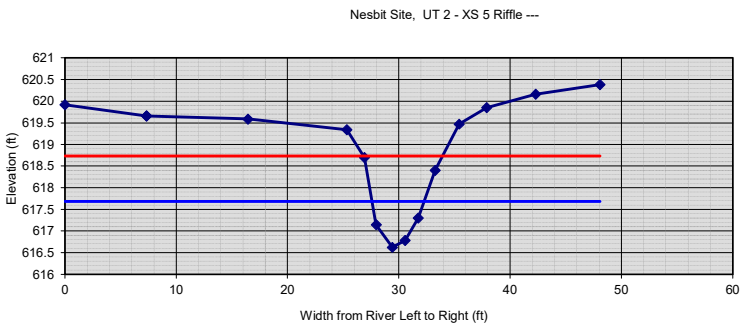
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
82.85	81.97	50.0		
617.15	618.03			

dimensions			
3.2	x-section area	0.9	d mean
3.4	width	4.7	wet P
1.5	d max	0.7	hyd radi
2.4	bank ht	3.7	w/d ratio
50.0	W flood prone area	14.7	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section: **Nesbit Site, UT 2 - XS 5**
Riffle

---
description: **Nesbit Site, UT 2 - XS 5**
height of instrument (ft): **700.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	80.0841	619.9159
		7.3329	80.34496	619.655
		7.342673	80.33915	619.6609
		16.43701	80.41136	619.5886
		25.31695	80.6587	619.3413
		26.91776	81.30461	618.6954
		27.9606	82.85826	617.1417
		29.42391	83.37669	616.6233
		30.57204	83.21878	616.7812
		31.74616	82.7006	617.2994
		33.28583	81.59714	618.4029
		35.4078	80.52972	619.4703
		37.89112	80.15127	619.8487
		42.30832	79.83857	620.1614
		48.0689	79.62058	620.3794

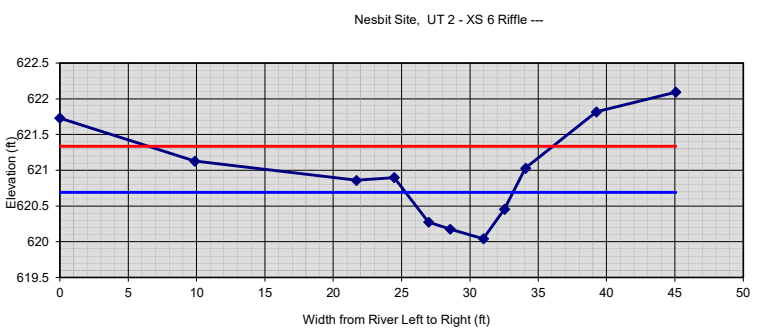
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
82.32	80.66	7.0		
617.68	619.34			

dimensions			
3.2	x-section area	0.7	d mean
4.7	width	5.3	wet P
1.1	d max	0.6	hyd radi
2.7	bank ht	6.8	w/d ratio
7.0	W flood prone area	1.5	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Cross Section



section:	**Nesbit Site, UT 2 - XS 6**
	Riffle

	---
description:	**Nesbit Site, UT 2 - XS 6**
height of instrument (ft):	**700.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
		0	**78.2697**	621.7303
		9.864925	**78.87237**	621.1276
		21.69583	**79.14082**	620.8592
		24.4559	**79.10187**	620.8981
		26.97377	**79.72477**	620.2752
		28.5645	**79.82479**	620.1752
		30.97985	**79.95538**	620.0446
		32.51857	**79.54573**	620.4543
		34.07462	**78.96992**	621.0301
		39.24694	**78.18264**	621.8174
		45.07075	**77.90816**	622.0918

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
79.31	**79.1**	**30.0**		
620.69	620.9			

dimensions			
3.2	x-section area	0.4	d mean
7.9	width	8.0	wet P
0.6	d max	0.4	hyd radi
0.9	bank ht	19.1	w/d ratio
30.0	W flood prone area	3.8	ent ratio

hydraulics	
0.0	velocity (ft/sec)
0.0	discharge rate, Q (cfs)
0.00	shear stress ((lbs/ft sq)
0.00	shear velocity (ft/sec)
0.000	unit stream power (lbs/ft/sec)
0.00	Froude number
0.0	friction factor u/u*
~~0.0~~	threshold grain size (mm)

check from channel material			
0	measured D84 (mm)		
0.0	relative roughness	0.0	fric. factor
0.000	Manning's n from channel material		

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Nesbit Site - UT1	Date of Assessment	8/18/18
Stream Category	Pa2	Assessor Name/Organization	AXE/WGL

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

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

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Nesbit Site - Glen Br Upper	Date of Assessment	8/18/18
Stream Category	Pa3	Assessor Name/Organization	AXE/WGL

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

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

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name	Nesbit Site - Glen Br lower	Date of Assessment	8/18/18
Stream Category	Pa3	Assessor Name/Organization	AXE/WGL

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

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

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	WAM #1	Date of Assessment	12/18/18
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	Jernigan/Axiom

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

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	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	**LOW**
		Condition/Opportunity	**LOW**
		Opportunity Presence (Y/N)	**NO**
	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	**LOW**
	Landscape Patch Structure	Condition	**LOW**
	Vegetation Composition	Condition	**LOW**

Function Rating Summary

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

Overall Wetland Rating **MEDIUM**

NC DWQ Stream Identification Form Version 4.11

UT-1 (EII reach)

Date: 12/18/18	**Project/Site:** Nesbit Farm #1	**Latitude:** 34.894877
Evaluator: Jernigan / Axiom	**County:** Union	**Longitude:** -80.652282
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 33	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** waxhaw *e.g. Quad Name:*

A. Geomorphology (Subtotal = 16.5 or 19.5)	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)				
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 = 7.5)				
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: 1 Dragonfly larva found, 1 amphibian egg found

Sketch:

Form #3

NC DWQ Stream Identification Form Version 4.11

Date: 12/18/18	**Project/Site:** Nesbit UT-2	**Latitude:** 34.892955
Evaluator: Jernigan / Axiom	**County:** Union	**Longitude:** -80.655875
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** Waxhaw *e.g. Quad Name:*

A. Geomorphology (Subtotal = 13.5)	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)				
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 = 7.5)				
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: Several aquatic snails + leeches found
Hydrology is excessive, BPJ says intermittent

Sketch:

Worksheet 20. BEHI variable worksheet

Stream: Nesbit Site	Cross Section: Glen 3 r	Date: 12/18/18	Observers: AxE

Bank Height/Max Depth Bankfull (C)

Study Bank Height (ft)	Bankfull Height (ft)	A/B =
3 A	1.5 B	2 C

Root Depth/Bank Height (E)

Root Depth (ft)	Study Bank Height (ft)	D/A =
1 D	3 A	0.33 E

Weighted Root Density (G)

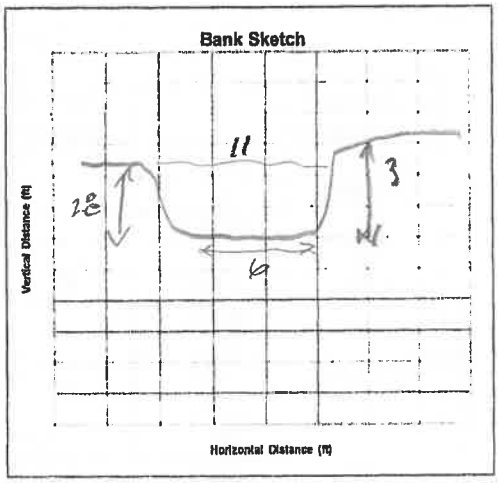
Root Density (%)	F*E =
10 F	3.3 G

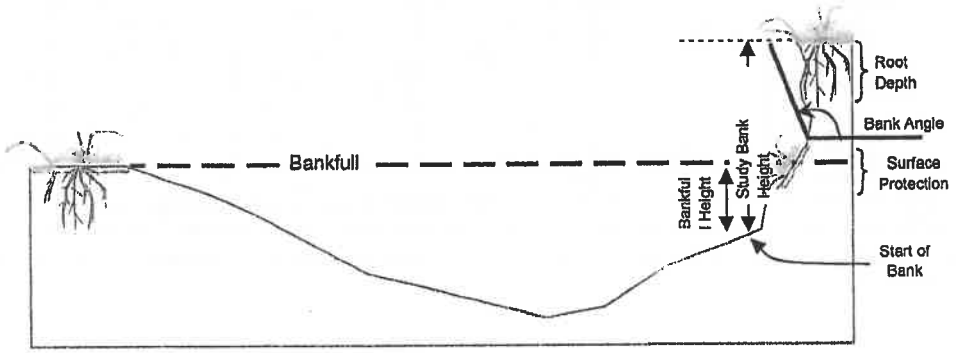
Bank Angle (H)

Bank Angle (Degrees)
90 H

Surface Protection (I)

Surface Protection %
10 I





(2)

Worksheet 21. Summary of bank erosion hazard index (BEHI)

Bank Erosion Hazard Rating Guide

Stream Nesbit S. Fk Reach Glen 8 Date 12/18/18 Crew AYE

Bank Erosion Potential		Bank Height (ft): / Bankfull Height (ft):	Bank Height/ Bankfull Ht	Root Depth/ Bank Height	Root Density %	Bank Angle (Degrees)	Surface Protection%
VERY LOW	Value		1.0-1.1	1.0-0.9	100-80	0-20	100-80
	Index		1.0-1.9	1.0-1.9	1.0-1.9	1.0-1.9	1.0-1.9
	Choice		V: I:	V: I:	V: I:	V: I:	V: I:
LOW	Value		1.11-1.19	0.89-0.5	79-55	21-60	79-55
	Index		2.0-3.9	2.0-3.9	2.0-3.9	2.0-3.9	2.0-3.9
	Choice		V: I:	V: I:	V: I:	V: I:	V: I:
MODERATE	Value		1.2-1.5	0.49-0.3	54-30	61-80	54-30
	Index		4.0-5.9	4.0-5.9	4.0-5.9	4.0-5.9	4.0-5.9
	Choice		V: I:	V: 0.3 I: 5.8	V: I:	V: I:	V: I:
HIGH	Value		1.6-2.0	0.29-0.15	29-15	81-90	29-15
	Index		6.0-7.9	6.0-7.9	6.0-7.9	6.0-7.9	6.0-7.9
	Choice		V: I:	V: I:	V: I:	V: 90 I: 7.9	V: I:
VERY HIGH	Value		2.1-2.8	0.14-0.05	14-5.0	91-119	14-10
	Index		8.0-9.0	8.0-9.0	8.0-9.0	8.0-9.0	8.0-9.0
	Choice		V: I:	V: I:	V: 10 I: 8.3	V: I:	V: I:
EXTREME	Value		>2.8	<0.05	<5	>119	<10
	Index		10	10	10	10	10
	Choice		V: 2 I: 7.9	V: 0.3 I: 5.8	V: 10 I: 8.3	V: 90 I: 7.9	V: 10 I: 10
V = value, I = index					SUB-TOTAL (Sum one index from each column)		39.7

Bank Material Description:

Bank Materials

Bedrock (Bedrock banks have very low bank erosion potential)
Boulders (Banks composed of boulders have low bank erosion potential)
Cobble (Subtract 10 points. If sand/gravel matrix greater than 50% of bank material, then do not adjust)
Gravel (Add 5-10 points depending percentage of bank material that is composed of sand)
Sand (Add 10 points)
Silt Clay (+ 0: no adjustment)

BANK MATERIAL ADJUSTMENT 5

Stratification Comments:

Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage

STRATIFICATION ADJUSTMENT 0

VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	EXTREME
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Bank location description (circle one)

Straight Reach Outside of Bend

GRAND TOTAL BEHI RATING 44.9

Worksheet 22A. Various field methods of estimating Near-Bank Stress risk ratings for the calculation of erosion rate.

Estimating Near-Bank Stress (NBS)

Stream: Neshit Side Location: Glen Br Date: 12/18/18 Crew: AXE

Methods for Estimating Near-Bank Stress

(1) Transverse bar or split channel/central bar creating NBS/high velocity gradient: **Level I - Reconnaissance.**

(2) Channel pattern (Rc/W): **Level II - General Prediction.**

(3) Ratio of pool slope to average water surface slope (S_p/S): **Level II - General Prediction.**

(4) Ratio of pool slope to riffle slope (S_p/S_{rif}): **Level II - General Prediction.**

(5) Ratio of near-bank maximum depth to bankfull mean depth (d_{nb}/d_{bkf}): **Level III - Detailed Prediction.**

(6) Ratio of near-bank shear stress to bankfull shear stress (τ_{nb}/τ_{bkf}): **Level III - Detailed Prediction.**

(7) Velocity profiles/Isovels /Velocity gradient: **Level IV - Validation.**

use →

Level I

(1) Transverse and/or central bars - short and/or discontinuous. NBS = High/Very High
Extensive deposition (continuous, cross channel). NBS = Extreme
Chute cutoffs, down-valley meander migration, converging flow (Figure X). NBS = Extreme

Level II

(2)

Radius of Curvature Rc (feet)	Bankfull Width W_{bkf} (feet)	Ratio Rc/W	Near-Bank Stress

(3)

Pool Slope S_p	Average Slope S	Ratio S_p/S	Near-Bank Stress

(4)

Pool Slope S_p	Riffle Slope S_{rif}	Ratio S_p/S_{rif}	Near-Bank Stress

Dominant Near-Bank Stress: Low

Level III

use →

(5)

Near-Bank Max Depth d_{nb} (feet)	Mean Depth d (feet)	Ratio d_{nb}/d	Near-Bank Stress
3	2.5	1.2	Low

(6)

Near-Bank Max Depth d_{nb} (feet)	Near-Bank Slope S_{nb}	Near-Bank Shear Stress τ_{nb} (lb/ft^2)	Mean Depth d (feet)	Average Slope S	Shear Stress τ (lb/ft^2)	Ratio τ_{nb}/τ	Near-Bank Stress

Level IV

use →

(7)

Velocity Gradient (ft/s/ft)	Near-Bank Stress

Converting Values to a Near-Bank Stress Rating

Near-Bank Stress Rating	Method Number						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Very Low	N/A	>3.0	< 0.20	< 0.4	<1.0	<0.8	<1.0
Low		2.21 - 3.0	0.20 - 0.40	0.41 - 0.60	1.0 - 1.5	0.8 - 1.05	1.0 - 1.2
Moderate		2.01 - 2.2	0.41 - 0.60	0.61 - 0.80	1.51 - 1.8	1.06 - 1.14	1.21 - 1.6
High	See (1) Above	1.81 - 2.0	0.61 - 0.80	0.81 - 1.0	1.81 - 2.5	1.15 - 1.19	1.61 - 2.0
Very High		1.5 - 1.8	0.81 - 1.0	1.01 - 1.2	2.51 - 3.0	1.20 - 1.60	2.01 - 2.3
Extreme		< 1.5	> 1.0	> 1.2	> 3.0	> 1.6	> 2.3

Overall Near-Bank Stress Rating

(4)

Glen Br
Both Banks
Top of Sik
0-80

Map -

Worksheet 23. Total Bank Erosion Calculation

Stream: Nesbit site				Total Bank Length:		Stream Type:	
Observers: AXE				Date: 12/18/18		Graph Used:	
	Station (ft)	BEHI (adjective)*	Near Bank Stress (adjective)	Erosion Rate (ft/yr)*	Length of Bank (ft)	Bank Height (ft)	Erosion Sub-Total (ft^3/yr)
1	0-80	Low	Low		80	2.5	
2	80-	V H	Low		595	3.0	
3		Low	Low		210	1.5	
4		V H	Low		670	3	
5		Low	Low		260	3	
6		High	Low		235	2	
7		Low	Low		2135	(2)	
8							
9							
10							
11							
12							
13							
14							
15							

I. Sum erosion sub-totals for each BEHI/NBS combination	Total Erosion (ft^3/yr)	
II. Divide total erosion ($feet^3$) by 27 $feet^3/yard^3$	Total Erosion (yd^3/yr)	
III. Multiply Total Erosion ($yard^3$) by 1.3 (conversion of yd^3 to tons for average material type)	Total Erosion (tons/year)	
IV. Calculate erosion per unit length: divide total erosion (ton/year) by total length of stream (ft) surveyed	Total Erosion (tons/yr/ft)	

*Use numerical category spread to predict rates. (i.e. 21 = Moderate but at start of category, where as 28 is on upper end of relation - use prediction values appropriate to numerical rating).

Worksheet 22A. Various field methods of estimating Near-Bank Stress risk ratings for the calculation of erosion rate.

Estimating Near-Bank Stress (NBS)

Stream: _____ **Location:** _____ **Date:** _____ **Crew:** _____

Methods for Estimating Near-Bank Stress

(1) Transverse bar or split channel/central bar creating NBS/high velocity gradient: **Level I - Reconnaissance.**

(2) Channel pattern (Rc/W): **Level II - General Prediction.**

(3) Ratio of pool slope to average water surface slope (S_p/S): **Level II - General Prediction.**

(4) Ratio of pool slope to riffle slope (S_p/S_{rif}): **Level II - General Prediction.**

(5) Ratio of near-bank maximum depth to bankfull mean depth (d_{nb}/d_{bkf}): **Level III - Detailed Prediction.**

(6) Ratio of near-bank shear stress to bankfull shear stress (τ_{nb}/τ_{bkf}): **Level III - Detailed Prediction.**

(7) Velocity profiles/Isovels/Velocity gradient: **Level IV - Validation.**

use →

Level I (1) Transverse and/or central bars - short and/or discontinuous. NBS = High/Very High
Extensive deposition (continuous, cross channel). NBS = Extreme
Chute cutoffs, down-valley meander migration, converging flow (Figure X). NBS = Extreme

Level II

(2) Radius of Curvature Rc (feet)	Bankfull Width W_{bkf} (feet)	Ratio Rc/W	Near-Bank Stress

(3) Pool Slope S_p	Average Slope S	Ratio S_p/S	Near-Bank Stress

(4) Pool Slope S_p	Riffle Slope S_{rif}	Ratio S_p/S_{rif}	Near-Bank Stress

Dominant Near-Bank Stress

use →

Level III

(5) Near-Bank Max Depth d_{nb} (feet)	Mean Depth d (feet)	Ratio d_{nb}/d	Near-Bank Stress

(6) Near-Bank Max Depth d_{nb} (feet)	Near-Bank Slope S_{nb}	Near-Bank Shear Stress τ_{nb} (lb/ft^2)	Mean Depth d (feet)	Average Slope S	Shear Stress τ (lb/ft^2)	Ratio τ_{nb}/τ	Near-Bank Stress

use →

Level IV

(7) Velocity Gradient (ft/s/ft)	Near-Bank Stress

Converting Values to a Near-Bank Stress Rating

Near-Bank Stress Rating	Method Number						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Very Low	N/A	>3.0	< 0.20	< 0.4	<1.0	<0.8	<1.0
Low		2.21 - 3.0	0.20 - 0.40	0.41 - 0.60	1.0 - 1.5	0.8 - 1.05	1.0 - 1.2
Moderate		2.01 - 2.2	0.41 - 0.60	0.61 - 0.80	1.51 - 1.8	1.06 - 1.14	1.21 - 1.6
High	See (1) Above	1.81 - 2.0	0.61 - 0.80	0.81 - 1.0	1.81 - 2.5	1.15 - 1.19	1.61 - 2.0
Very High		1.5 - 1.8	0.81 - 1.0	1.01 - 1.2	2.51 - 3.0	1.20 - 1.60	2.01 - 2.3
Extreme		< 1.5	> 1.0	> 1.2	> 3.0	> 1.6	> 2.3

Overall Near-Bank Stress Rating

UT2

(5)

Worksheet 23. Total Bank Erosion Calculation

Stream: Nesbit Site (UT 2)				Total Bank Length:		Stream Type:	
Observers: AXE				Date: 12/18/18		Graph Used:	
	Station (ft)	BEHI (adjective)*	Near Bank Stress (adjective)	Erosion Rate (ft/yr)*	Length of Bank (ft)	Bank Height (ft)	Erosion Sub-Total (ft^3/yr)
LB 1	0 - 40	H	M		40	2	
2	40 - 60	H	H		20	3	
3	60 - 80	L	L		20	1	
4	86 - 200	M	M		120	3	
5							
6							
7							
8							
RB 9	0 - 40	H	M		40	2	
10	40 - 80	M	L		40	1.5	
11	80 - 200	H	M		120	2.5	
12							
13							
14							
15							

I. Sum erosion sub-totals for each BEHI/NBS combination	Total Erosion (ft^3/yr)	
II. Divide total erosion ($feet^3$) by 27 $feet^3/yard^3$	Total Erosion (yd^3/yr)	
III. Multiply Total Erosion ($yard^3$) by 1.3 (conversion of yd^3 to tons for average material type)	Total Erosion (tons/year)	
IV. Calculate erosion per unit length: divide total erosion (ton/year) by total length of stream (ft) surveyed	Total Erosion (tons/yr/ft)	

*Use numerical category spread to predict rates. (i.e. 21 = Moderate but at start of category, where as 28 is on upper end of relation - use prediction values appropriate to numerical rating).

Site		Nesbit Steam Mitigation Site						
Stream		Glen Br			Bank Length		8370	
Observers		WGL			Date		18-Dec-18	
	Station	Bank	BEHI	NBS	Erosion Rate	Length	Bank Height	Erosion
1	80	left	Low	Low	0	80	2.5	0.0
2	675	left	VH	Low	0.6	595	3	1071.0
3	885	left	Low	Low	0	210	1.5	0.0
4	1555	left	VH	Low	0.6	670	3	1206.0
5	1815	left	Low	Low	0	260	3	0.0
6	2050	left	High	Low	0.1	235	2	47.0
7	4185	left	Low	Low	0	2135	2	0.0
8								
9	80	right	Low	Low	0	80	2.5	0.0
10	675	right	VH	Low	0.6	595	3	1071.0
11	885	right	Low	Low	0	210	1.5	0.0
12	1555	right	VH	Low	0.6	670	3	1206.0
13	1815	right	Low	Low	0	260	3	0.0
14	2050	right	High	Low	0.1	235	2	47.0
15	4185	right	Low	Low	0	2135	2	0.0
16								
17								
18								
19								
20								
21								
22								
23								
24								
Sum erosion sub-totals for each BEHI/NBS						Total Erosion (ft3/yr)		4648.0
Divide total erosion (ft3) by 27						Total Erosion (yd/yr)		172.1
Multiply Total erosion (yard3) by 1.3						Total Erosion (tons/yr)		223.8
Erosion per unit length						Total Erosion (Tons/yr/ft)		0.027

Site		Nesbit Steam Mitigation Site						
Stream		UT 1			Bank Length		1802	
Observers		WGL			Date		18-Dec-18	
	Station	Bank	BEHI	NBS	Erosion Rate	Length	Bank Height	Erosion
1	741	right	Low	Low	0	741	2	0.0
2	901	right	High	Low	0.1	160	2.5	40.0
3								
4	741	left	Low	Low	0	741	2	0.0
5	901	left	High	Low	0.1	160	2.5	40.0
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
Sum erosion sub-totals for each BEHI/NBS						Total Erosion (ft3/yr)		80.0
Divide total erosion (ft3) by 27						Total Erosion (yd/yr)		3.0
Multiply Total erosion (yard3) by 1.3						Total Erosion (tons/yr)		3.9
Erosion per unit length						Total Erosion (Tons/yr/ft)		0.002

Site		Nesbit Steam Mitigation Site						
Stream		UT 2			Bank Length		400	
Observers		WGL			Date		18-Dec-18	
	Station	Bank	BEHI	NBS	Erosion Rate	Length	Bank Height	Erosion
1	40	left	High	Mod	0.15	40	2	12.0
2	60	left	High	High	0.2	20	3	12.0
3	80	left	Low	Low	0	20	1	0.0
4	200	left	Mod	Mod	0.05	120	3	18.0
5								
6	40	right	High	Mod	0.15	40	2	12.0
7	80	right	Mod	Low	0.02	40	1.5	1.2
8	200	right	High	Mod	0.15	120	2.5	45.0
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
Sum erosion sub-totals for each BEHI/NBS						Total Erosion (ft3/yr)		100.2
Divide total erosion (ft3) by 27						Total Erosion (yd/yr)		3.7
Multiply Total erosion (yard3) by 1.3						Total Erosion (tons/yr)		4.8
Erosion per unit length						Total Erosion (Tons/yr/ft)		0.012

BEHI/NBS Summary

Stream Reach	Erosion Rate (tons/year)
Glen Br	223.8
UT 1	3.9
UT 2	4.8
Total	**232.5**

Nesbit

Land Use Nutrient Model

Stream Length	
Site Buffer Width	
Site Area (ft sq)	784080

Land Use	%
Pasture	
Woods	
Row Crop	100
Urban	
must total 100	100

	Rainfall
Annual	

Land Use Characteristics		Number of Animals	N inputs lbs/au/yr	P inputs lbs/au/yr	Total N (lbs)	Total P (lbs)	
Pasture	Beef		113	40	0	0	
	Dairy		164	26	0	0	
	Pig		153	58	0	0	
	Horse		102	40	0	0	
	fert/ac		60	45	0	0	
					0	0	Total Pasture N and P

		% Row Crop Area	N inputs lbs/ac/yr	P inputs lbs/ac/yr	Total N	Total P	
Row Crop	Corn	100	20	20	360	360	
18.0	Cotton		20	20	0	0	
	Soybeans		0	15	0	0	
	Hay Fescue		50	45	0	0	
	Hay Bermuda		70	45	0	0	
	must total 100	100			360	360	Total Row Crop N and P

Woods Minimal Nutrients

		% Area	Runnoff	Concentration N (mg/l)	Concentration P (mg/l)	Total N (lbs)	Total P (lbs)	
Urban	Residential		0	2.2	0.4	0	0	
	Commercial/Industrial		0	2.3	0.3	0	0	
	Roadway		0	3.0	0.5	0	0	
						0.0	0.0	Total Urban N and P

Notes: Residential Assumes 25 % Impervious Surfac
Commercial/Industrial Assumes 75% Impervous Surface
Roadway Assumes 100% Impervious Surface
Annual Load (lbs) = 0.226*Annual Runoff (inches)*Concentration (mg/l)*Acres

Total Nutrients Removed within Easement

Total N Removed (lbs/yr)	**360**
Total P Removed (lbs/yr)	**360**

Soil Map Unit	Soil Series
BdB2	Badin channery silt clay loam
CmB	Cid channery silt loam
ScA	Secrest Cid complex
TaB, TbB2	Tatum gravelly silt clay loam

TaB

TbB2

TbB2

TaC

CmB

CmB

Soil Profile C

Soil Profile A

Soil Profile B

UT-1

UT-1A

TbB2

ScA

ZnB

TbB2

UT-2

BdB2

TaB

Soil Profile E

TbB2

Soil Profile D

Glen Branch

W

CmB

TbB2

BaB

N

Legend

- Nesbit Easement = 18.0 ac
- GPS Point Location
- Existing Wetlands = 2.45 ac
- Drained Hydric Soils = 6.57 ac
- Soil Profile
- Soil Boundary

Note: Each GPS point location has a minimum of 3 soil cores collected.

0 300 600 1,200 Feet

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT SITE

Union County, NC

Title:

SOIL MAPPING GPS POINT LOCATIONS

Drawn by: KRJ

Date: APR 2020

Scale: 1:3700

Project No.: 20-007

FIGURE

B2

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Date: 5/7/2020

Project/Site: Nesbit Mitigation Site

County, State: Union County, NC

Sampling Point/ Coordinates: **Soil Profile A (34.89455, -80.653434)**

Investigator: W. Grant Lewis

Soil Series: Wehadkee

Notes: Location is shown on Figure 4.

Depth (inches)	Matrix		Mottling		Type	Location	Texture
	Color	%	Color	%			
0-4	10 YR 3/3	100					Silty clay loam
4-10	10 YR 3/3	60	10 YR 5/2	40	D	M	Silty clay loam
10-12	10 YR 5/2	70	10 YR 5/3	30	C	M	Silty clay loam
12+	10 YR 6/3	70	10 YR 6/2	25	D	M	Silty clay loam
			10 YR 4/6	5	C	M	

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

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Date: 5/7/2020

Project/Site: Nesbit Mitigation Site

County, State: Union County, NC

Sampling Point/ Coordinates: **Soil Profile B (34.894549, -80.651711)**

Investigator: W. Grant Lewis

Soil Series: Wehadkee

Notes: Location is shown on Figure 4.

Depth (inches)	Matrix		Mottling		Type	Location	Texture
	Color	%	Color	%			
0-6	10 YR 3/3	80	10 YR 6/2	15	D	M	Silty clay loam
			10 YR 5/6	5	C	M	
6-12	10 YR 6/2	80	10 YR 7/1	10	D	M	Silty clay loam
			10 YR 5/6	10	C	M	
12+	10 YR 7/1	85	10 YR 6/2	10	C	M	Silty clay loam
			10 YR 5/6	5	C	M	

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

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Date: 5/7/2020

Project/Site: Nesbit Mitigation Site

County, State: Union County, NC

Sampling Point/ Coordinates: **Soil Profile C (34.898151, -80.652095)**

Investigator: W. Grant Lewis

Soil Series: Wehadkee

Notes: Location is shown on Figure 4.

Depth (inches)	Matrix		Mottling		Type	Location	Texture
	Color	%	Color	%			
0-3	10 YR 5/3	80	10 YR 6/2	15	D	M	Silty clay loam
			10 YR 5/6	5	C	M	
3-9	10 YR 5/3	80	10 YR 7/1	15	D	M	Silty clay loam
			10 YR 4/4	5	C	M	
9-14	10 YR 5/2	95	10 YR 4/4	5	C	M	Silty clay loam
14+	10 YR 6/1	90	10 YR 5/8	5	C	M	Silty clay loam
			10 YR 4/4	5	C	M	

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

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Date: 5/7/2020

Project/Site: Nesbit Mitigation Site

County, State: Union County, NC

Sampling Point/ Coordinates: **Soil Profile D (34.891243, -80.657263)**

Investigator: W. Grant Lewis

Soil Series: Wehadkee

Notes: Location is shown on Figure 4.

Depth (inches)	Matrix Color	Matrix %	Mottling Color	Mottling %	Type	Location	Texture
0-8	10 YR 5/3	85	10 YR 5/6	10	C	M	Silty clay loam
			10 YR 4/4	5	C	M	
8+	10 YR 5/3	80	10 YR 6/2	10	D	M	Silty clay loam
			10 YR 4/4	10	C	M	

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

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Date: 12/18/2018

Project/Site: Nesbit Mitigation Site

County, State: Union County, NC

Sampling Point/ Coordinates: **Soil Profile E (34.89201, -80.65613)**

Investigator: W. Grant Lewis

Soil Series: Wehadkee

Notes: Location is shown on Figure 4.

Depth (inches)	Matrix Color	Matrix %	Mottling Color	Mottling %	Type	Location	Texture
0-9	10 YR 5/3	90	10 YR 4/6	5	C	M	fine sandy loam
			10 YR 6/4	5	C	M	
9-11	10 YR 6/1	100					fine sandy loam
11+	2.5 YR 6/2	70	2.5 YR 6/3	20	C	M	sandy clay
			10 YR 5/8	10	C	M	

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

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

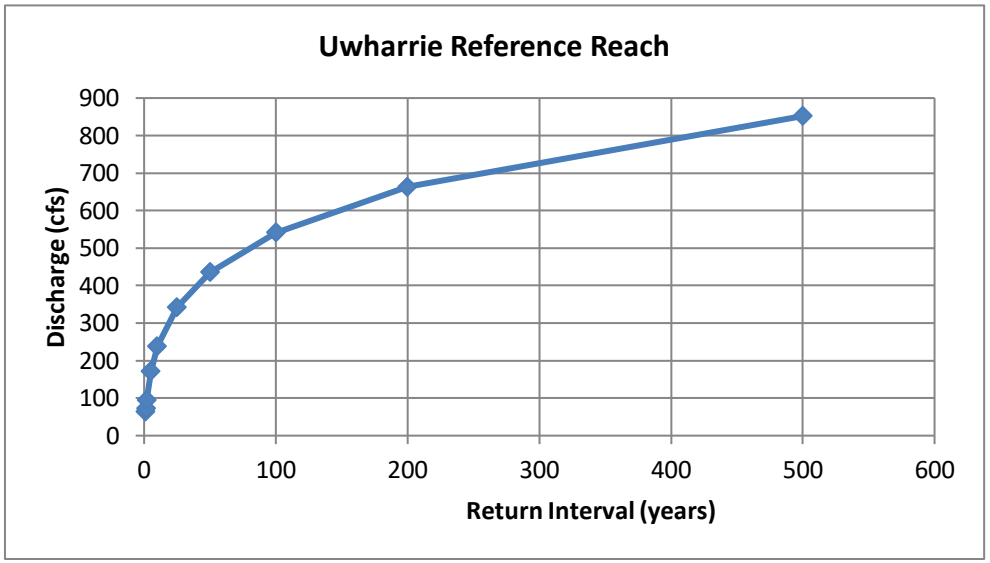
Appendix C: Flood Frequency Analysis Data

Reference Reaches

Flood Frequency Analaysis-Regional Regression Equation (USGS 2004)

McRae Land Reference Reach

Return Interval (years)	Discharge (cfs)
1.3	**63**
1.5	**73**
2	94.3
5	171
10	238
25	342
50	435
100	541
200	663
500	852



Appendix D: Jurisdictional Determination Info

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2019-01470** County: **Union** U.S.G.S. Quad: **NC- Waxhaw**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Current Landowner: **Allison and Franklin Howey**
Address: **4321 Nesbit Road**
Monroe, NC 28112
Telephone Number: **704-975-2200**
E-mail: **franklinhowey@aol.com**

Size (acres) **~28**
Nearest Waterway **Glen Branch**
USGS HUC **03050103**

Nearest Town **Waxhaw**
River Basin **Santee**
Coordinates Latitude: **34.8936**
Longitude: **-80.6544**

Location description: **The review area is located between the north side of Nesbit Road and the south side of Parkwood School Road. PIN: 04335001. Reference review area description shown in Jurisdictional Determination Request package entitled "Figure 1, Site Location" and Printed Date of August 2019.**

Indicate Which of the Following Apply:

A. Preliminary Determination

☒ There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The **waters, including wetlands** have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. The approximate boundaries of these waters are shown on the enclosed delineation map dated **October 2019**. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.

☐ There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the **waters, including wetlands** have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the **waters, including wetlands** at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the **waters, including wetlands** on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

B. Approved Determination

☐ There are Navigable Waters of the United States within the above described project area/property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ There are **waters, including wetlands**on the above described project area/property subject to the permit requirements of Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ We recommend you have the **waters, including wetlands** on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

SAW-2019-01470

☐ The **waters, including wetlands** on your project area/property have been delineated and the delineation has been verified by the Corps. The approximate boundaries of these waters are shown on the enclosed delineation map dated **DATE**. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

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

☐ There are no waters of the U.S., to include wetlands, present on the above described project area/property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in **Morehead City, NC, at (252) 808-2808** to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Bryan Roden-Reynolds** at **704-510-1440** or **bryan.roden-reynolds@usace.army.mil**.

C. Basis For Determination: Basis For Determination: See the preliminary jurisdictional determination form dated 10/30/2019.

D. Remarks: None.

E. Attention USDA Program Participants

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

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

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

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

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **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: RODEN REYNOLDS.BRYAN.KENNETH.1263385574 Digitally signed by RODEN REYNOLDS.BRYAN.KENNETH.1263385574 Date: 2019.10.30 08:08:42 -04'00'

Date of JD: **10/30/2019** Expiration Date of JD: **Not applicable**

SAW-2019-01470

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:

Agent:	**Axiom Environmental, Inc.**
	Grant Lewis
Address:	**218 Snow Avenue**
	Raleigh, NC 27603
Telephone Number:	**919-215-1693**
E-mail:	**glewis@axiomenvironmental.org**

Agent:	**Restoration Systems, LLC**
	Matthew Harrell
Address:	**1101 Haynes Street, Suite 211**
	Raleigh, NC 27604
Telephone Number:	**919-755-9490**
E-mail:	**mharrell@restorationsystems.com**

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Allison and Franklin Howey**	File Number: **SAW-2019-01470**	Date: **10/10/2019**

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

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

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

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

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

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

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

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

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

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

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT		
REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)		
ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.		
POINT OF CONTACT FOR QUESTIONS OR INFORMATION:		
If you have questions regarding this decision and/or the appeal process you may contact: **District Engineer, Wilmington Regulatory Division** **Attn: Bryan Roden-Reynolds** **Charlotte Regulatory Office** **U.S Army Corps of Engineers** **8430 University Executive Park Drive, Suite 615** **Charlotte, North Carolina 28262**	If you only have questions regarding the appeal process you may also contact: Mr. Jason Steele, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137	
RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.		
_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, **Attn: Bryan Roden-Reynolds, 69 Darlington Avenue, Wilmington, North Carolina 28403**

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

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

PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD: 10/10/2019

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Allison and Franklin Howey, 4321 Nesbit Road, Monroe, NC 28112

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: Wilmington District, Nesbit Stream and Wetland Mitigation Site, SAW-2019-01470

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: The review area is located between the north side of Nesbit Road and the south side of Parkwood School Road. PIN:

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

State: NC County: Union City: Waxhaw
Center coordinates of site (lat/long in degree decimal format): Latitude: 34.8936 Longitude: -80.6544

Universal Transverse Mercator:

Name of nearest waterbody: Glen Branch

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

☐ Office (Desk) Determination. Date:
☒ Field Determination. Date(s): **10/24/2019**

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

Feature	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resources in review area (acreage and linear feet, if applicable	Type of aquatic resources (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
Glen Branch	34.8963	-80.6532	3,834 linear feet	Non-wetland	404
Stream UT1	34.8948	-80.6522	982 linear feet	Non-wetland	404
Stream UT1A	34.8937	-80.6514	308 linear feet	Non-wetland	404
Stream UT2	34.8929	-80.6558	299 linear feet	Non-wetland	404
Wetland JA	34.8906	-80.6577	0.27 acre	Wetland	404
Wetland JC	34.8928	-80.6543	0.65 acre	Wetland	404
Wetland JD	34.8941	-80.6538	0.01 acre	Wetland	404
Wetland JE	34.8972	-80.6535	0.04 acre	Wetland	404

Feature	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resources in review area (acreage and linear feet, if applicable	Type of aquatic resources (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
Wetland JF	34.8972	-80.6525	049 acre	Wetland	404
Wetland KA	34.8908	-80.6587	0.40 acre	Wetland	404
Wetland KB	34.8915	-80.6566	0.36 acre	Wetland	404
Wetland KC	34.8934	-80.6543	0.01 acre	Wetland	404
Wetland KD	34.8941	-80.6541	0.07 acre	Wetland	404
Wetland KE	34.8952	-80.6535	0.07 acre	Wetland	404
Wetland KF	34.8958	-80.6535	0.06 acre	Wetland	404
Wetland KI	34.8982	-80.6522	0.01 acre	Wetland	404
Wetland KJ	34.8984	-80.6521	0.01 acre	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: **Figures 1-3 and 3A-3B**

☒ Data sheets prepared/submitted by or on behalf of the PJD requestor.

☒ Office concurs with data sheets/delineation report.

☐ Office does not concur with data sheets/delineation report. Rationale:_____

☐ Data sheets prepared by the Corps:_____

☐ Corps navigable waters' study:_____

☐ U.S. Geological Survey Hydrologic Atlas:_____

☐ USGS NHD data.

☐ USGS 8 and 12 digit HUC maps.

☐ U.S. Geological Survey map(s). Cite scale & quad name: **Figure 1, Site Location (1:24,000 Waxhaw, NC)**

☒ Natural Resources Conservation Service Soil Survey. Citation: **Figure 2, Project Mapping (Soil Survey of Union County)**

☐ 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): **Figure 3, Jurisdictional Area Overview (Dated August 2019) and Figures 3A and 3B, Jurisdictional Areas (Dated October 2019)**

or ☐ Other (Name & Date):_____

☐ Previous determination(s). File no. and date of response letter:_____

☒ Other information (please specify): **NCWAM Field Assessment Results (Dated 12/18/2018), NCWAM Wetland Rating Sheets (Dated 12/18/2018), NCDWQ Stream Identification Forms (Version 4.11) Dated 12/18/2018, NCSAM Field Assessment Results (Dated 08/18/2018), and NCSAM Stream Rating Sheets (Dated 08/18/2018)**

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.

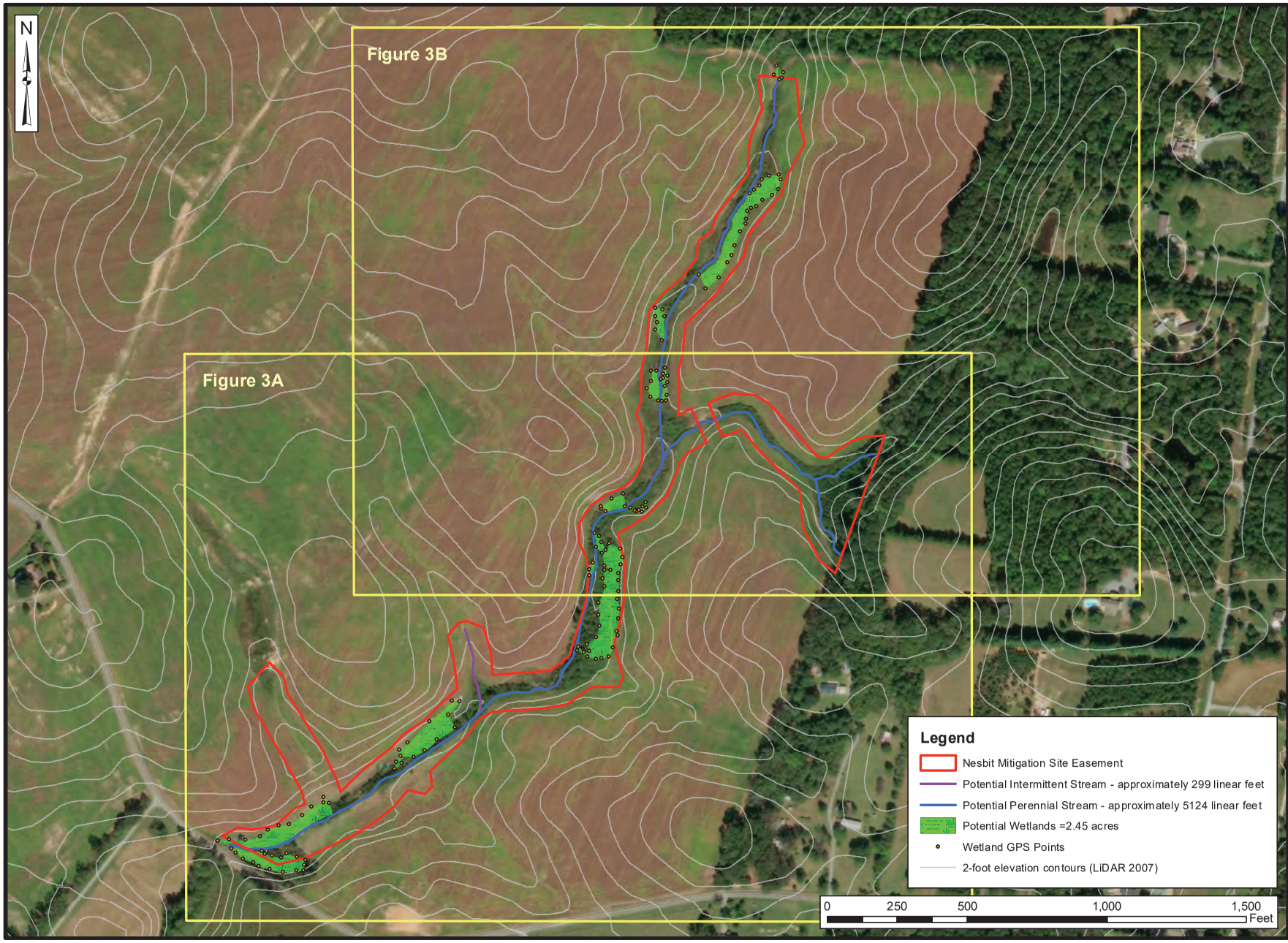
RODEN REYNOLDS.BRYAN.KENNETH.1263385574

Digitally signed by RODEN REYNOLDS.BRYAN.KENNETH.1263385574
Date: 2019.10.30 08:08:19 -04'00'

Signature and date of Regulatory staff member completing PJD
10/30/2019

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

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



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT MITIGATION SITE

Union County, NC

Title:

JURISDICTIONAL AREAS OVERVIEW

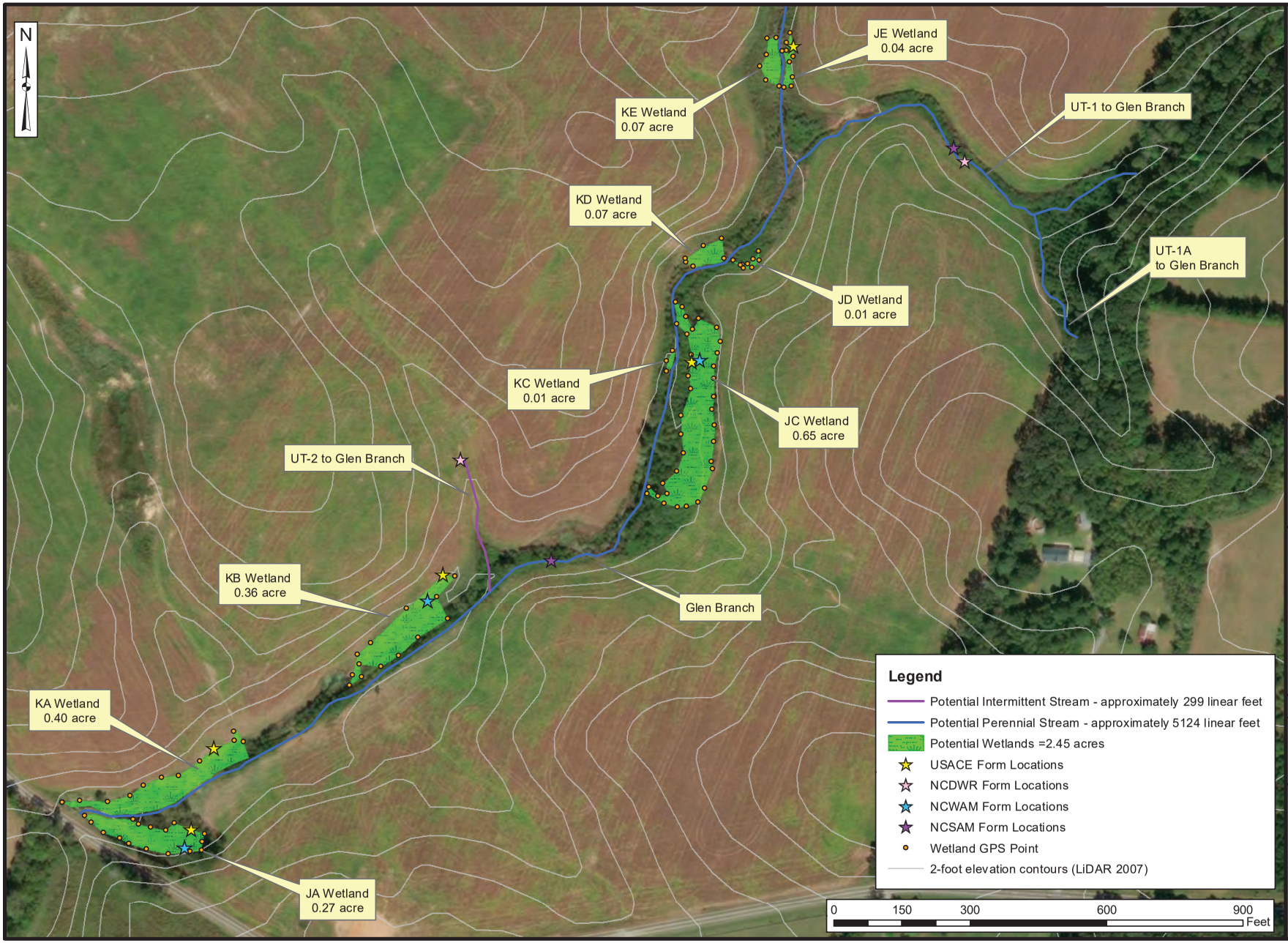
Notes:

1. Background Imagery Source: 2015 aerial photography provided by the NC OneMap program (online, provided by the NC Geographic Information Coordination Council)

Drawn by:	AEK
Date:	OCT 2019
Scale:	1:3900
Project No.:	19-018

FIGURE

3



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT MITIGATION SITE

Union County, NC

Title:

JURISDICTIONAL AREAS

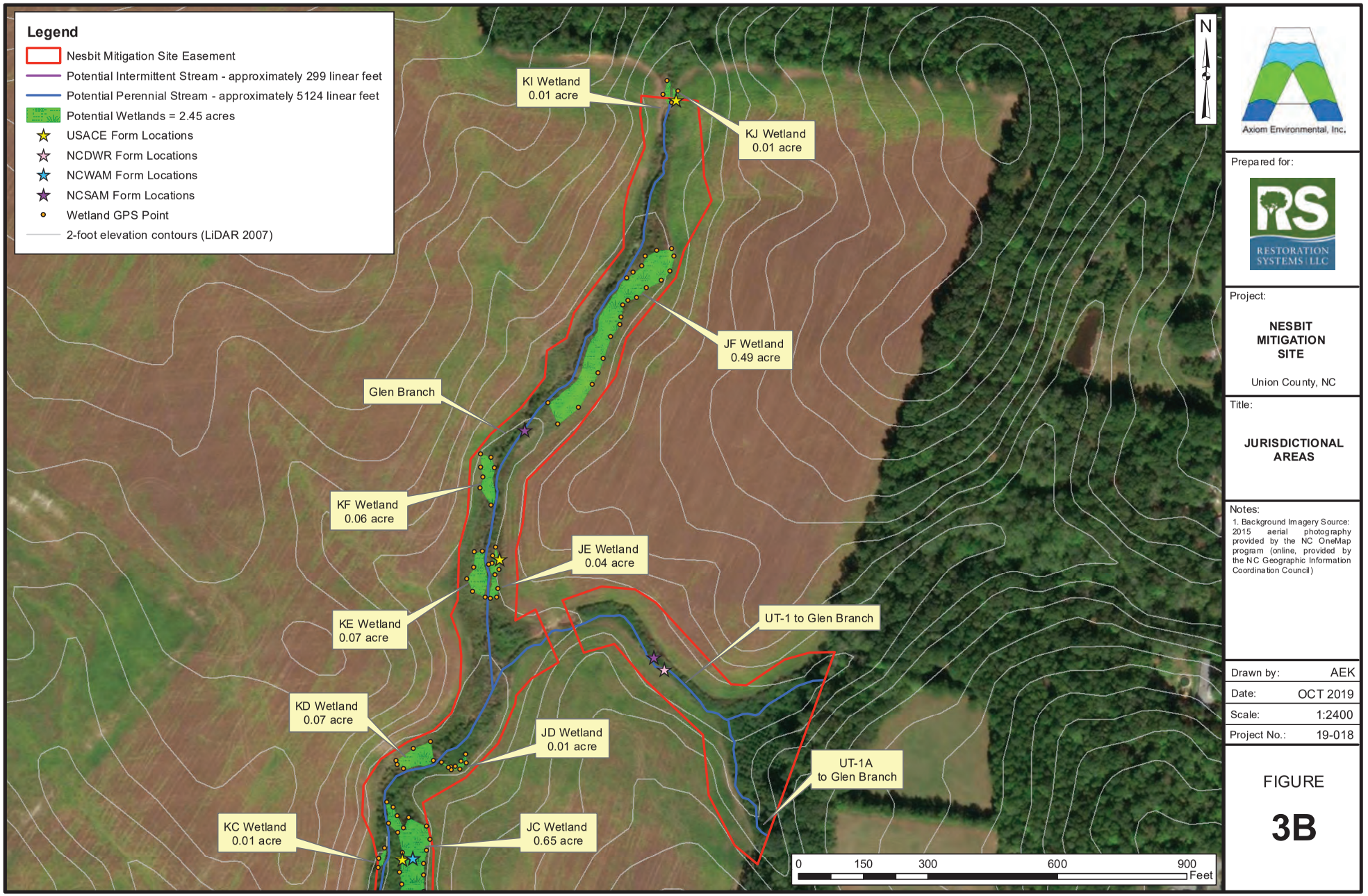
Notes:

1. Background Imagery Source: 2015 aerial photography provided by the NC OneMap program (online, provided by the NC Geographic Information Coordination Council)

Drawn by:	AEK
Date:	OCT 2019
Scale:	1:2400
Project No.:	19-018

FIGURE

3A



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT MITIGATION SITE

Union County, NC

Title:

JURISDICTIONAL AREAS

Notes:

1. Background Imagery Source: 2015 aerial photography provided by the NC OneMap program (online, provided by the NC Geographic Information Coordination Council)

Drawn by:	AEK
Date:	OCT 2019
Scale:	1:2400
Project No.:	19-018

FIGURE

3B

Appendix E: NC NHP Letter and Categorical Exclusion Document

NC DEPARTMENT OF
NATURAL AND CULTURAL RESOURCES

Roy Cooper, **Governor**
Susi Hamilton, **Secretary**
Walter Clark, **Director, Land and Water Stewardship**

NCNHDE-7778

December 20, 2018

Phillip Perkinson
Axiom Environmental Inc.
218 Snow Avenue
Raleigh, NC 27612
RE: Nesbit; 18-002.08

Dear Phillip Perkinson:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

Based on the project area mapped with your request, a query of the NCNHP database, indicates that there are no records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. Please note that although there may be no documentation of natural heritage elements within the project boundary, it does not imply or confirm their absence; the area may not have been surveyed. The results of this query should not be substituted for field surveys where suitable habitat exists. In the event that rare species are found within the project area, please contact the NCNHP so that we may update our records.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists. Tables of natural areas and conservation/managed areas within a one-mile radius of the project area, if any, are also included in this report.

If a Federally-listed species is found within the project area or is indicated within a one-mile radius of the project area, the NCNHP recommends contacting the US Fish and Wildlife Service (USFWS) for guidance. Contact information for USFWS offices in North Carolina is found here: https://www.fws.gov/offices/Directory/ListOffices.cfm?statecode=37.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

The NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Clean Water Management Trust Fund easement, or Federally-listed species are documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at rodney.butler@ncdcr.gov or 919-707-8603.

Sincerely,
NC Natural Heritage Program

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Nesbit
Project No. 18-002.08
December 20, 2018
NCNHDE-7778

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Freshwater Bivalve	29553	Villosa delumbis	Eastern Creekshell	2011-06-08	E	3-Medium	---	Significantly Rare	G4	S4

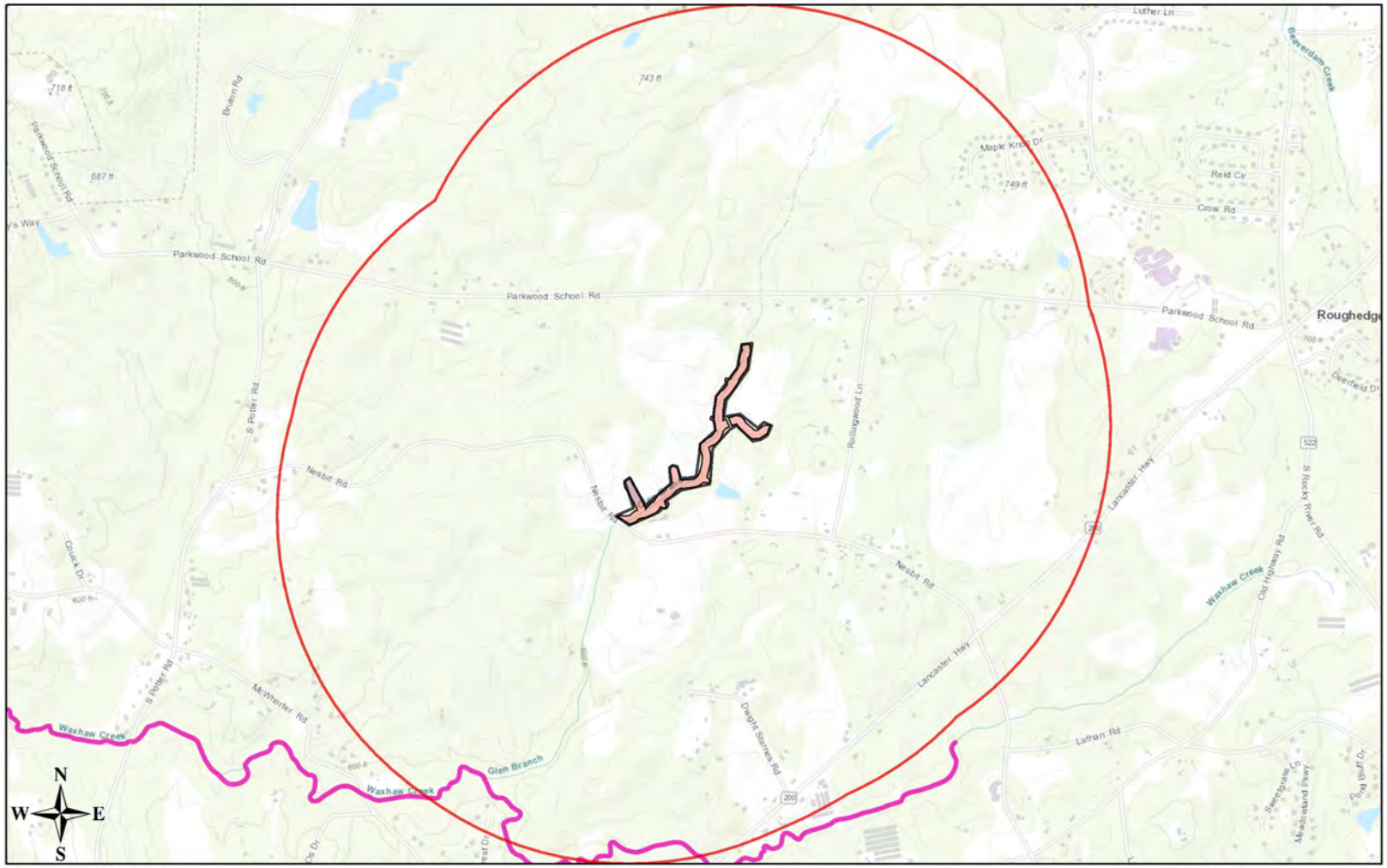
Natural Areas Documented Within a One-mile Radius of the Project Area

Site Name	Representational Rating	Collective Rating
CTB/Waxhaw Creek Aquatic Habitat	R1 (Exceptional)	C4 (Moderate)

No Managed Areas are Documented Within a One-mile Radius of the Project Area

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on December 20, 2018; source: NCNHP, Q4 Oct 2018. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-7778: Nesbit



December 20, 2018

- Project Boundary
- Buffered Project Boundary
- NHP Natural Area (NHNA)

1:25,712

0 0.2 0.4 0.8 mi

0 0.35 0.7 1.4 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Nesbit Stream & Wetland Mitigation Site

Task 1b: Categorical Exclusion

Contents:

Prepared for:

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

2/3/2020

Summary of Part 2 - Categorical Exclusion Form V. 2

All Projects Regulation/Questions

Coastal Zone Management Act: Not applicable; Not located within a CAMA county.

CERCLA

No Issue – please see the report from a Limited Phase 1 Site Assessment performed by Environmental Data Resources, Inc. on July 1st, 2019.

National Historic Preservation Act (Section 106)

No Issue – please see attached letter from Ramona M. Bartos - State of the Historic Preservation Office.

Uniform Act

Please see the attached letter, sent to the landowners June 5th, 2019.

Summary of Part 3 - Categorical Exclusion Form V. 2

Ground-Disturbing Activities Regulation/Questions

American Indian Religious Freedom Act (AIRFA): No Issue; Not within a claimed county.

Antiquities Act (AA): Not applicable; Not located on Federal land.

Archaeological (ARPA): Not applicable – the project is not located on federal or Indian lands.

Endangered Species Act (ESA)

Three federally protected species were identified by USFWS through the online project review (Online Species List/ IPac). Multiple site surveys of the Property have been conducted and the best available science reviewed. Table 1 below provides a detailed summary of the review for each species. Appendix B includes Mussel Survey Report & USFWS Concurrence letter.

Table 1. Threatened and Endangered Species

Common Name (Scientific Name)	Federal Status	Habitat at Site	Biological Conclusion	Summary
Carolina Heelsplitter (*Lasmigona decorate)*	Endangered Clam	Unlikely but Potentially	May affect, not likely to adversely affect	While no individuals were found during the survey, and the habitat appears unsuitable, a downstream population may benefit from the project through improved water quality. USFWS Asheville Field office concurred. See Appendix B.
Michaux's Sumac (*Rhus michauxii*)	Endangered Plant	Yes; No individuals found	No Effect	Suitable habitat is present at site; however, during multiple site visits and field surveys (10/2018- 7/2019) no individuals were found. Therefore, no effect is concluded.
Schweinitz's Sunflower (*Helianthus schweinitzii*)	Endangered Plant	Yes; No individuals found	No Effect	Suitable habitat is present at site; however, during multiple site visits and field surveys (10/2018- 7/2019) no individuals were found. Therefore, no effect is concluded.

Summary of Part 3 - Categorical Exclusion Form V. 2 CONTINUED

Executive Order 13007 (Indian Sacred Sites): No Issue; Not within a claimed county.

Farmland Protection Policy Act (FPPA)

See Appendix B; Email response and Form AD-1006 completed by Milton Cortes of the NRCS on 6/23/2019.

Fish and Wildlife Coordination Act (FWCA)

USFWS and NCWRC have been consulted. See Appendix B: USFWS (Claire Ellwanger, Asheville Field Office) was contacted via email on 9/1/2019 with a scoping letter, but no response was received. NCWRC (Shannon Deaton, Habitat Conservation Program Manager) was contacted via email on 4/26/2019 but did not respond; however, an NCWRC member (Olivia Munzer) was present at the IRT site visit and provided comment at that time. Those comments were integrated into the IRT Meeting Notes.

Land & Water Conservation Fund Act (Section 6(f)): Not applicable

Magnuson-Stevens (Essential Fish Habitat): Not applicable; Not within an estuarine system

Migratory Bird Treaty Act (MBTA)

USFWS has no recommendation with the project relative to the MBTA, other than general guidelines regarding Bald Eagle breeding. No Bald Eagles have been observed during site visits, and the lack of open water and mature trees on the site make it an unsuitable nesting location.

Wilderness Act: Not applicable; Not located within a Wilderness area.

Appendix A

Categorical Exclusion Form for Division of Mitigation Services Projects
Version 2

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

Part 1: General Project Information	
Project Name:	Nesbit Stream & Wetland Mitigation Site
County Name:	Union County
DMS Number:	100121
Project Sponsor:	Restoration Systems, LLC
Project Contact Name:	Matthew Harrell
Project Contact Address:	1101 Haynes St. Suite 211, Raleigh, NC 27604
Project Contact E-mail:	mharrell@restorationsystems.com
DMS Project Manager:	Kelly Phillips

Project Description

The Nesbit Stream & Wetland Mitigation Site is located in Target Local Watershed 03050103030030 near Waxhaw and includes a portion of Glen Branch and several unnamed tributaries. It is proposed to include 4,895 lf of stream restoration, 1,446 lf of stream enhancement, 2.8 acres of riparian riverine wetland restoration, and 3.8 acres of riparian riverine enhancement. Site alterations include cessation of agriculture, restoration of streams & wetlands, and planting native woody vegetation. Mitigation will result in net gains in hydrology, water quality, and habitat functions, and will provide 5,264 stream mitigation units and 4.7 riparian riverine wetland mitigation units. The proposed conservation easement will be +/- 18 acres. The total site impact will be ~19 acres during construction.

The Area of Potential Effect evaluated in the Categorical Exclusion Form includes all anticipated haul roads and staging areas that will be necessary for project construction.

For Official Use Only

Reviewed By:

11/21/2019 — Kelly Phillips

Date — **DMS Project Manager**

Conditional Approved By:

Date — **For Division Administrator FHWA**

☐ **Check this box if there are outstanding issues**

Final Approval By:

11-22-19 — Donald W. Brew

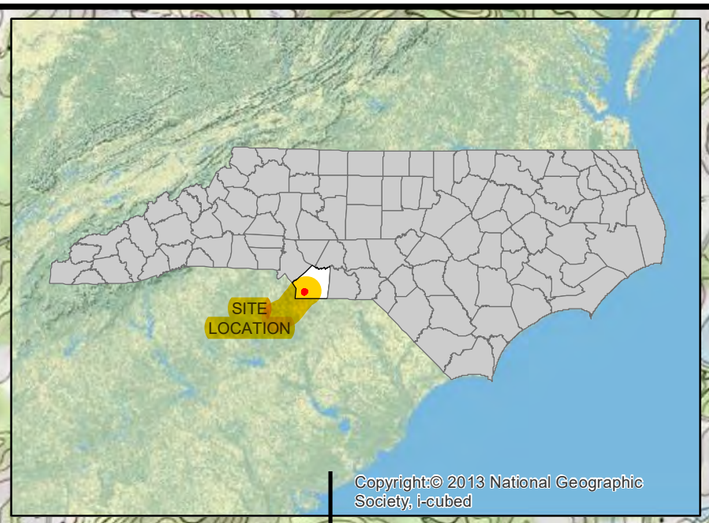
Date — **For Division Administrator FHWA**

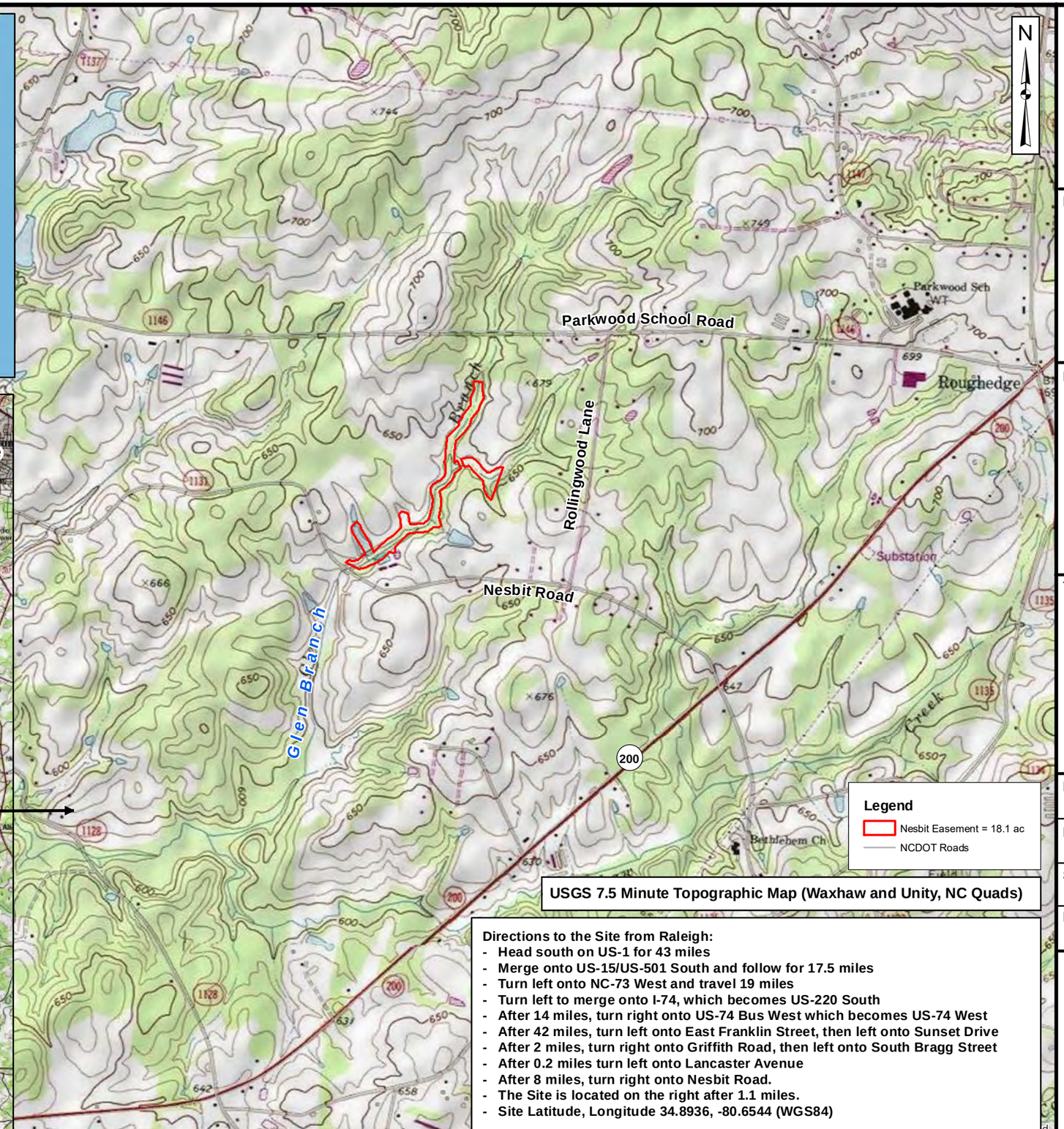
Part 2: All Projects Regulation/Question	Response
Coastal Zone Management Act (CZMA)	
1. Is the project located in a CAMA county?	☐ Yes ☑ No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?	☐ Yes ☐ No ☑ N/A
3. Has a CAMA permit been secured?	☐ Yes ☐ No ☑ N/A
4. Has NCDCM agreed that the project is consistent with the NC Coastal Management Program?	☐ Yes ☐ No ☑ N/A
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	
1. Is this a "full-delivery" project?	☑ Yes ☐ No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?	☐ Yes ☑ No ☐ N/A
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☑ No ☐ N/A
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☐ No ☑ N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?	☐ Yes ☐ No ☑ N/A
6. Is there an approved hazardous mitigation plan?	☐ Yes ☐ No ☑ N/A
National Historic Preservation Act (Section 106)	
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?	☐ Yes ☑ No
2. Does the project affect such properties and does the SHPO/THPO concur?	☐ Yes ☐ No ☑ N/A
3. If the effects are adverse, have they been resolved?	☐ Yes ☐ No ☑ N/A
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)	
1. Is this a "full-delivery" project?	☑ Yes ☐ No
2. Does the project require the acquisition of real estate?	☑ Yes ☐ No ☐ N/A
3. Was the property acquisition completed prior to the intent to use federal funds?	☐ Yes ☑ No ☐ N/A
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?	☑ Yes ☐ No ☐ N/A

Part 3: Ground-Disturbing Activities Regulation/Question	Response
American Indian Religious Freedom Act (AIRFA)	
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?	☐ Yes ☑ No
2. Is the site of religious importance to American Indians?	☐ Yes ☐ No ☑ N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?	☐ Yes ☐ No ☑ N/A
4. Have the effects of the project on this site been considered?	☐ Yes ☐ No ☑ N/A
Antiquities Act (AA)	
1. Is the project located on Federal lands?	☐ Yes ☑ No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Archaeological Resources Protection Act (ARPA)	
1. Is the project located on federal or Indian lands (reservation)?	☐ Yes ☑ No
2. Will there be a loss or destruction of archaeological resources?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Endangered Species Act (ESA)	
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	☑ Yes ☐ No
2. Is Designated Critical Habitat or suitable habitat present for listed species?	☑ Yes ☐ No ☐ N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?	☐ Yes ☑ No ☐ N/A
4. Is the project "likely to adversely affect" the specie and/or "likely to adversely modify" Designated Critical Habitat?	☐ Yes ☑ No ☐ N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?	☑ Yes ☐ No ☐ N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	☐ Yes ☑ No ☐ N/A

Executive Order 13007 (Indian Sacred Sites)	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	☐ Yes ☑ No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	☐ Yes ☐ No ☑ N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	☐ Yes ☐ No ☑ N/A
Farmland Protection Policy Act (FPPA)	
1. Will real estate be acquired?	☑ Yes ☐ No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	☑ Yes ☐ No ☐ N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	☑ Yes ☐ No ☐ N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	☑ Yes ☐ No
2. Have the USFWS and the NCWRC been consulted?	☑ Yes ☐ No ☐ N/A
Land and Water Conservation Fund Act (Section 6(f))	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	☐ Yes ☑ No
2. Has the NPS approved of the conversion?	☐ Yes ☐ No ☑ N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	☐ Yes ☑ No
2. Is suitable habitat present for EFH-protected species?	☐ Yes ☐ No ☑ N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	☐ Yes ☐ No ☑ N/A
4. Will the project adversely affect EFH?	☐ Yes ☐ No ☑ N/A
5. Has consultation with NOAA-Fisheries occurred?	☐ Yes ☐ No ☑ N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	☐ Yes ☑ No
2. Have the USFWS recommendations been incorporated?	☐ Yes ☐ No ☑ N/A
Wilderness Act	
1. Is the project in a Wilderness area?	☐ Yes ☑ No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	☐ Yes ☐ No ☑ N/A

Appendix B: Supporting Documents





USGS 7.5 Minute Topographic Map (Waxhaw and Unity, NC Quads)

Directions to the Site from Raleigh:

- Head south on US-1 for 43 miles
- Merge onto US-15/US-501 South and follow for 17.5 miles
- Turn left onto NC-73 West and travel 19 miles
- Turn left to merge onto I-74, which becomes US-220 South
- After 14 miles, turn right onto US-74 Bus West which becomes US-74 West
- After 42 miles, turn left onto East Franklin Street, then left onto Sunset Drive
- After 2 miles, turn right onto Griffith Road, then left onto South Bragg Street
- After 0.2 miles turn left onto Lancaster Avenue
- After 8 miles, turn right onto Nesbit Road.
- The Site is located on the right after 1.1 miles.
- Site Latitude, Longitude 34.8936, -80.6544 (WGS84)

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT MITIGATION SITE

Union County, NC

Title:

BANK SITE LOCATION

Drawn by: KRJ

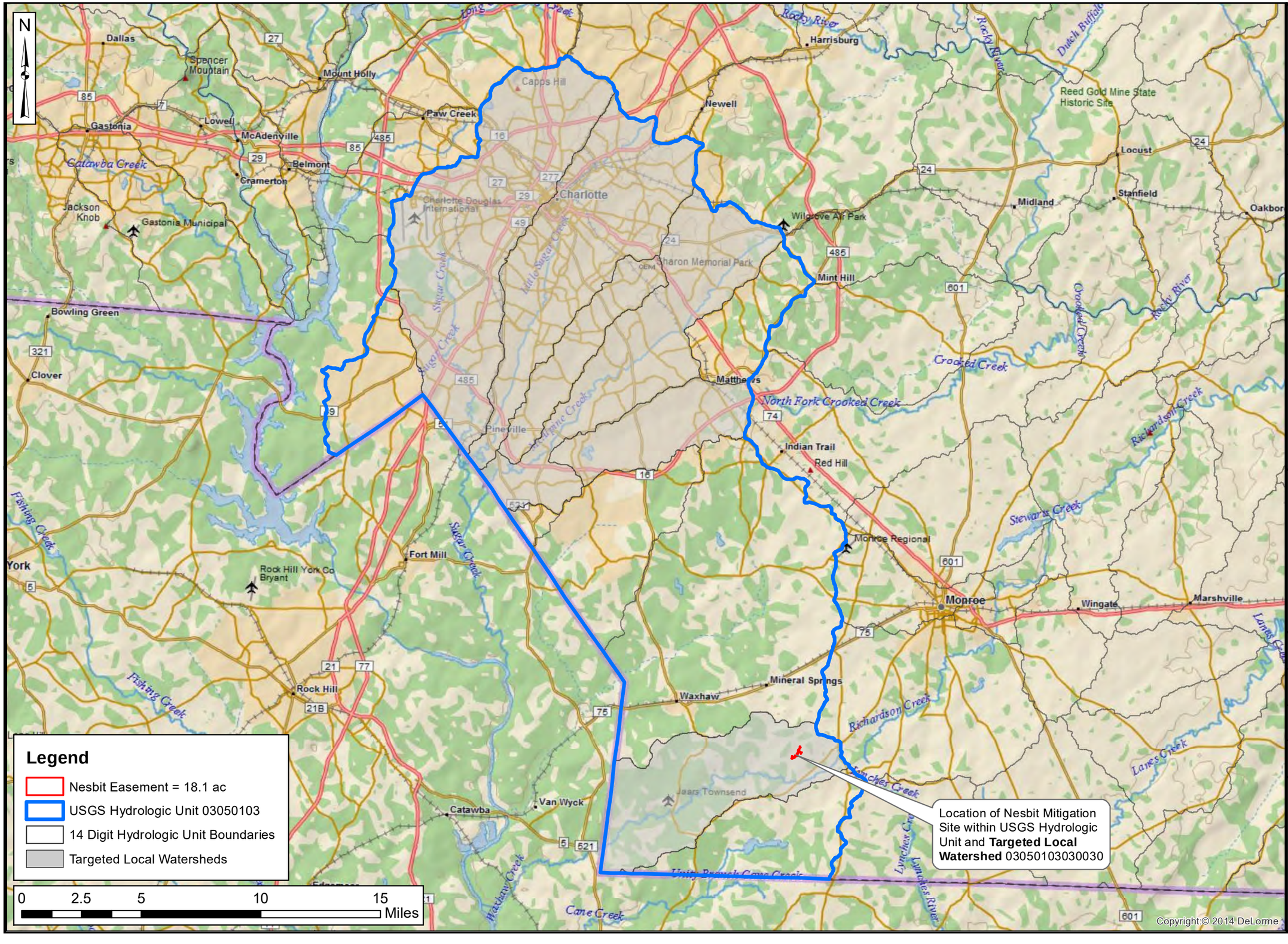
Date: DEC 2018

Scale: 1:20,000

Project No.: 18-002.08

FIGURE

1



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT MITIGATION SITE

Union County, NC

Title:

HYDROLOGIC UNIT MAP

Drawn by: KRJ

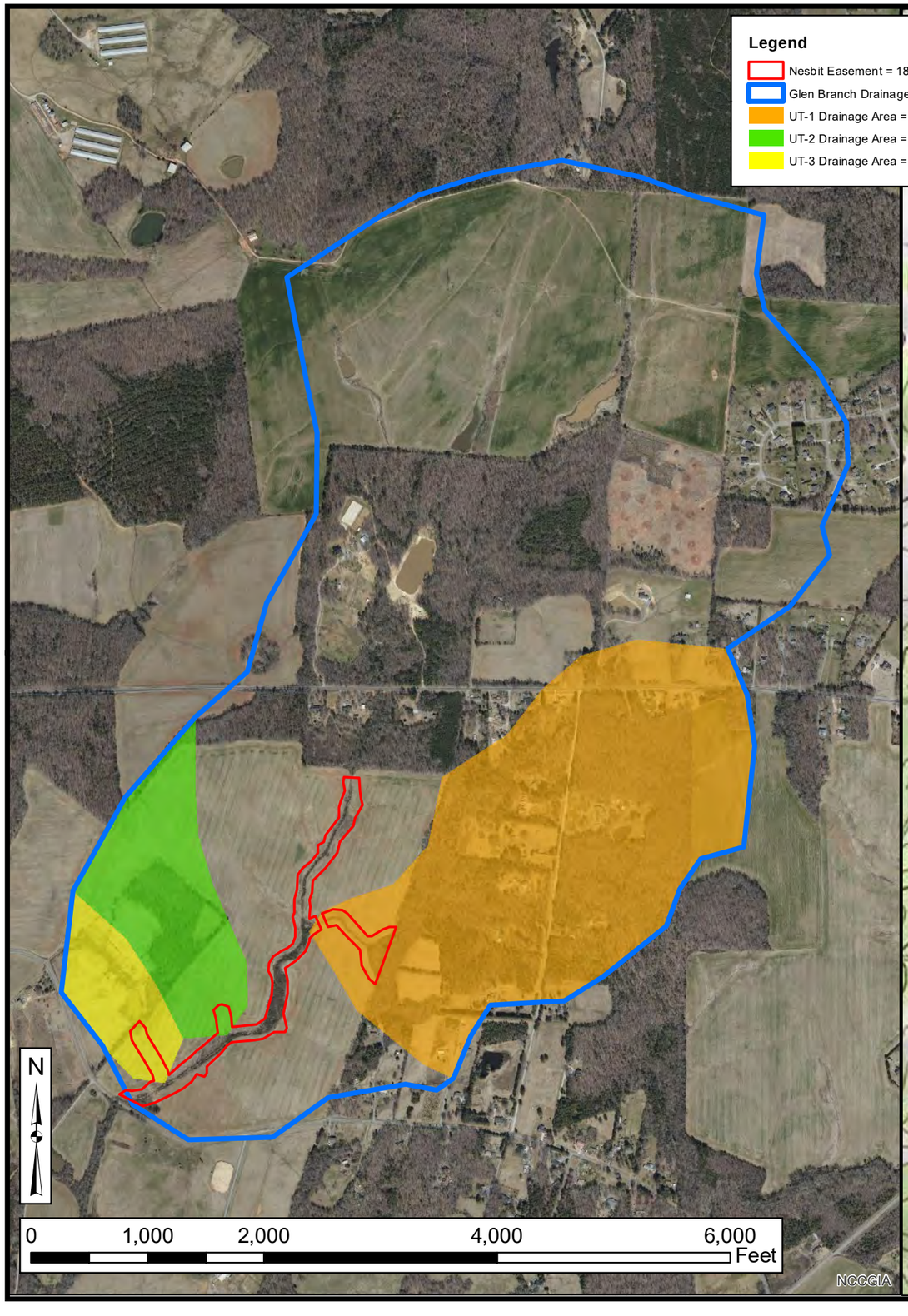
Date: DEC 2018

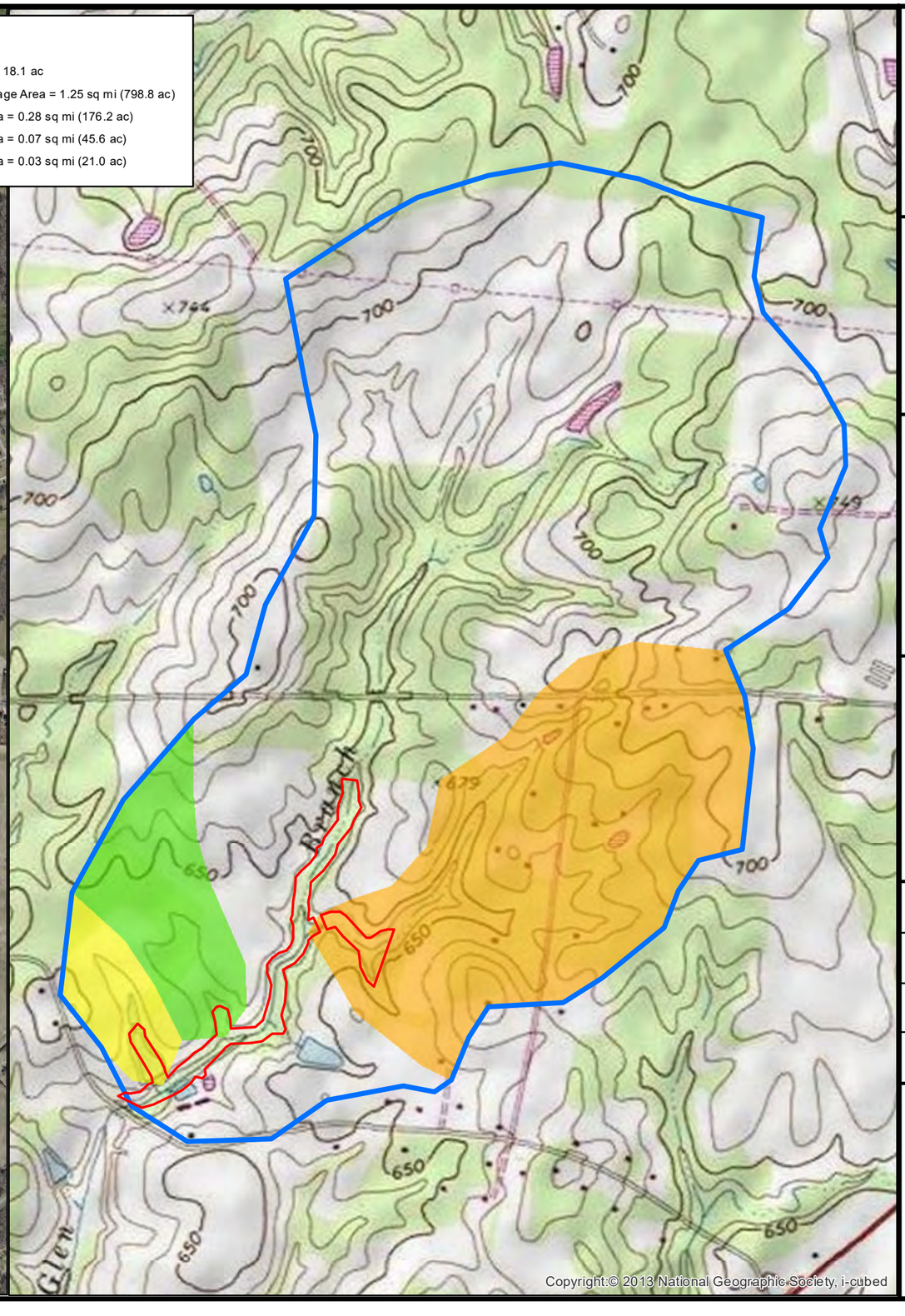
Scale: 1:240,000

Project No.: 18-002.08

FIGURE

2





Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT MITIGATION SITE

Union County, NC

Title:

TOPOGRAPHY AND DRAINAGE AREA

Drawn by: KRJ

Date: DEC 2018

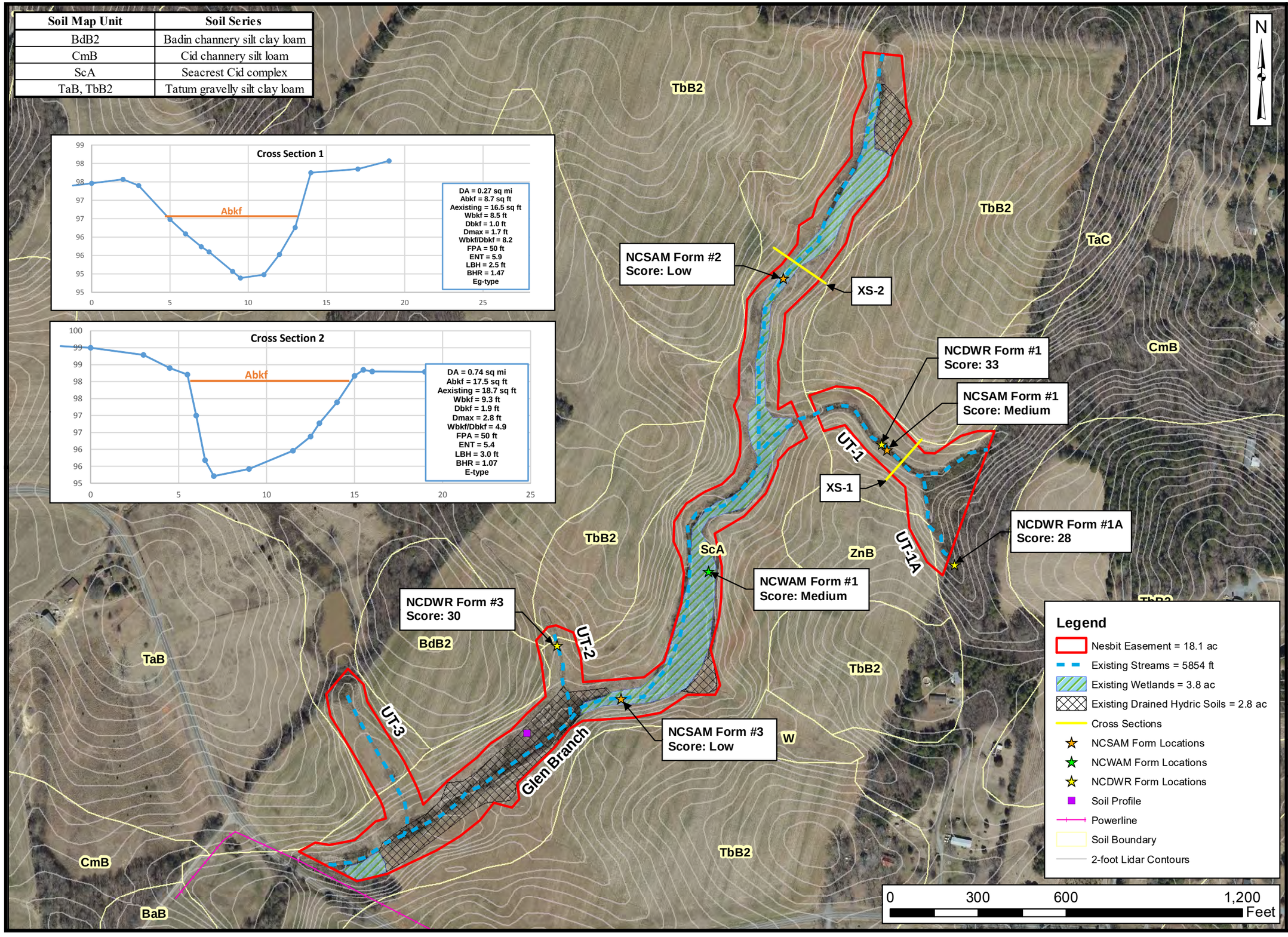
Scale: 1:13,000

Project No.: 18-002.08

FIGURE

3

Soil Map Unit	Soil Series
BdB2	Badin channery silt clay loam
CmB	Cid channery silt loam
ScA	Seacrest Cid complex
TaB, TbB2	Tatum gravelly silt clay loam



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT MITIGATION SITE

Union County, NC

Title:

EXISTING CONDITIONS AND SOILS

Drawn by: KRJ

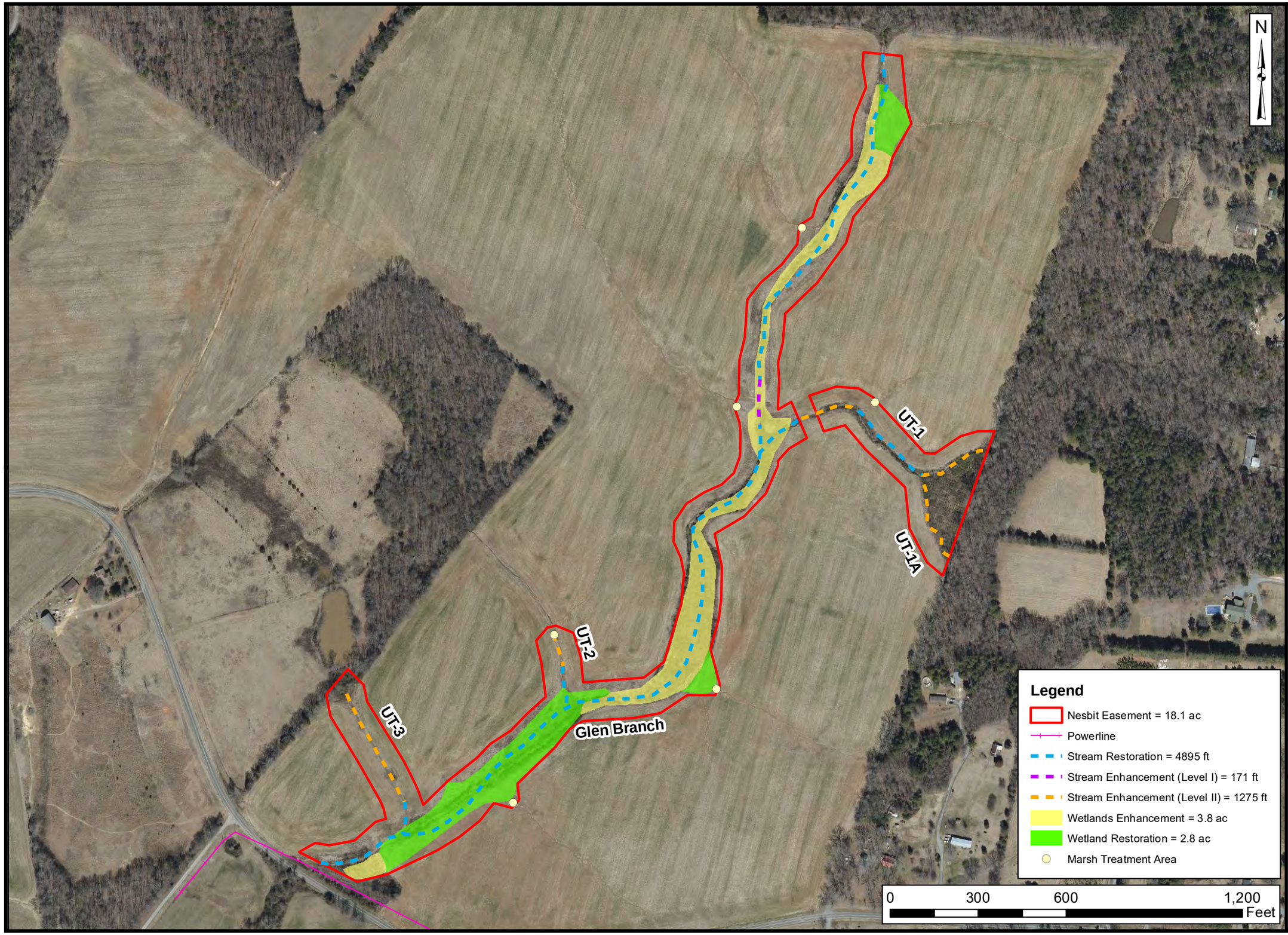
Date: DEC 2018

Scale: 1:3700

Project No.: 18-002.08

FIGURE

4



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT MITIGATION SITE

Union County, NC

Title:

PROPOSED CONDITIONS

Drawn by: KRJ

Date: DEC 2018

Scale: 1:3700

Project No.: 18-002.08

FIGURE

5

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

June 21, 2019

Matthew Harrell
Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, NC 27604

Re Nesbit Stream and Wetland Mitigation, Union County, ER 19-1767

Dear Mr. Harrell:

Thank you for email of May 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

Free and Fair Purchase Notice

April 25, 2019

Buford Township Farms, LLC
c/o Frank Howey
PO Box 429
Monroe, NC 28111

Dear Landowner,

The purpose of this letter is to notify you that Restoration Systems, LLC, in offering to purchase an easement on your property in Union County, North Carolina, does not have the power to acquire it by eminent domain. Furthermore, the contracted price for the easement on your property is based on what we believe to be its fair market value.

If you have any questions please contact me at 919.755.9490.

Sincerely,

Matthew Harrell
Sr. Project Manager

Endangered Species, Threatened Species,Federal Species of Concern, and Candidate Species,

Union County, North Carolina

Updated: 06-27-2018

Critical Habitat Designations:

Carolina heelsplitter - *Lasmigona decorata* - The main stem of Goose Creek (Pee Dee River system), from the N.C. Highway 218 Bridge, downstream to its confluence with the Rocky River, and the main stem of Duck Creek, from the Mecklenburg/Union County line, downstream to its confluence with Goose Creek; the main stem of Waxhaw Creek (Catawba River system), from the N.C.Highway 200 Bridge, downstream to the North Carolina/South Carolina State line; and the main stem of Flat Creek (Pee Dee River system), Lancaster County, South Carolina, from the S.C. Route 204 Bridge, downstream to its confluence with the Lynches River, and the main stem of the Lynches River, Lancaster and Chesterfield Counties, South Carolina, from the confluence of Belk Branch, Lancaster County, northeast (upstream) of the U.S.Highway 601 Bridge, downstream to the S.C. Highway 903 Bridge in Kershaw County, South Carolina. Within these areas, the primary constituent elements include: (i)Permanent, flowing, cool, clean water; (ii)Geomorphically stable stream and river channels and banks; (iii)Pool, riffle, and run sequences within the channel; (iv)Stable substrates with no more than low amounts of fine sediment; (v)Moderate stream gradient; (vi)Periodic natural flooding; and (vii)Fish hosts, with adequate living, foraging, and spawning areas for them.
Federal Register Reference: July 2, 2002, Federal Register, 67:44501-44522.

Common Name	Scientific name	Federal Status	Record Status
Vertebrate:			
Carolina darter	*Etheostoma collis collis*	FSC	Current
Invertebrate:			
Atlantic pigtoe Range by Basin	*Fusconaia masoni*	ARS	Current
Carolina creekshell	*Villosa vaughaniana*	FSC	Current
Carolina heelsplitter	*Lasmigona decorata*	E	Current
Savannah lilliput	*Toxolasma pullus*	FSC	Current
Yellow lampmussel	*Lampsilis cariosa*	FSC	Probable/potential

Vascular Plant:			
Georgia aster	*Symphyotrichum georgianum*	C	Current
Michaux's sumac	*Rhus michauxii*	E	Historic
Piedmont aster	*Eurybia mirabilis*	FSC	Current
Ravine Sedge	*Carex impressinervia*	FSC	Current
Schweinitz's sunflower	*Helianthus schweinitzii*	E	Current
Virginia quillwort	*Isoetes virginica*	FSC	Historic
Nonvascular Plant:			
Lichen:			

Definitions of Federal Status Codes:
E = endangered. A taxon "in danger of extinction throughout all or a significant portion of its range."
T = threatened. A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."
C = candidate. A taxon under consideration for official listing for which there is sufficient information to support listing. (Formerly "C1" candidate species.)
BGPA =Bald and Golden Eagle Protection Act. See below.
ARS = At Risk Species. Species that are Petitioned, Candidates or Proposed for Listing under the Endangered Species Act. Consultation under Section 7(a)(2) of the ESA is not required for Candidate or Proposed species; although a Conference, as described under Section 7(a)(4) of the ESA is recommended for actions affecting species proposed for listing.
FSC=Federal Species of Concern. FSC is an informal term. It is not defined in the federal Endangered Species Act. In North Carolina, the Asheville and Raleigh Field Offices of the US Fish and Wildlife Service (Service) define Federal Species of Concern as those species that appear to be in decline or otherwise in need of conservation and are under consideration for listing or for which there is insufficient information to support listing at this time.Subsumed under the term "FSC" are all species petitioned by outside parties and other selected focal species identified in Service strategic plans, State Wildlife Action Plans, or Natural Heritage Program Lists.
T(S/A) = threatened due to similarity of appearance. A taxon that is threatened due to similarity of appearance with another listed species and is listed for its protection. Taxa listed as T(S/A) are not biologically endangered or threatened and are not subject to Section 7 consultation. See below.
EXP = experimental population. A taxon listed as experimental (either essential or nonessential). Experimental, nonessential populations of endangered species (e.g., red wolf) are treated as threatened species on public land, for consultation purposes, and as species proposed for listing on private land.
P = proposed. Taxa proposed for official listing as endangered or threatened will be noted as "PE" or "PT", respectively.

Bald and Golden Eagle Protection Act (BGPA):

In the July 9, 2007 Federal Register(72:37346-37372), the bald eagle was declared recovered, and removed (de-listed) from the Federal List of Threatened and Endangered wildlife. This delisting took effect August 8,2007. After delisting, the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668-668d) becomes the primary law protecting bald eagles. The Eagle Act prohibits take of bald and golden eagles and provides a statutory definition of "take" that includes "disturb". The USFWS has developed National Bald Eagle Management Guidelines to provide guidance to land managers, landowners, and others as to how to avoid disturbing bald eagles. For mor information, visit http://www.fws.gov/migratorybirds/baldeagle.htm

Threatened due to similarity of appearance(T(S/A)):

In the November 4, 1997 Federal Register (55822-55825), the northern population of the bog turtle (from New York south to Maryland) was listed as T (threatened), and the southern population (from Virginia south to Georgia) was listed as T(S/A) (threatened due to similarity of appearance). The T(S/A) designation bans the

collection and interstate and international commercial trade of bog turtles from the southern population. The T(S/A) designation has no effect on land management activities by private landowners in North Carolina, part of the southern population of the species. In addition to its official status as T(S/A), the U.S. Fish and Wildlife Service considers the southern population of the bog turtle as a Federal species of concern due to habitat loss.

Definitions of Record Status:

Current - the species has been observed in the county within the last 50 years.
Historic - the species was last observed in the county more than 50 years ago.
Obscure - the date and/or location of observation is uncertain.
Incidental/migrant - the species was observed outside of its normal range or habitat.
Probable/potential - the species is considered likely to occur in this county based on the proximity of known records (in adjacent counties), the presence of potentially suitable habitat, or both.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
Phone: (828) 258-3939 Fax: (828) 258-5330
http://www.fws.gov/nc-es/es/countyfr.html

In Reply Refer To:
Consultation Code: 04EN1000-2019-SLI-0280
Event Code: 04EN1000-2019-E-00736
Project Name: Nesbit

April 24, 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 attached species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. Although not required by section 7, many agencies request species lists to start the informal consultation process and begin their fulfillment of the requirements under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

This list, along with other helpful resources, is also available on the U.S. Fish and Wildlife Service (Service) Asheville Field Office's (AFO) website: https://www.fws.gov/raleigh/species/cntylist/nc_counties.html. The AFO website list includes "species of concern" species that could potentially be placed on the federal list of threatened and endangered species in the future. Also available are:

Design and Construction Recommendations
https://www.fws.gov/asheville/htmls/project_review/Recommendations.html

Optimal Survey Times for Federally Listed Plants
https://www.fws.gov/nc-es/plant/plant_survey.html

Northern long-eared bat Guidance
https://www.fws.gov/asheville/htmls/project_review/NLEB_in_WNC.html

Predictive Habitat Model for Aquatic Species
https://www.fws.gov/asheville/htmls/Maxent/Maxent.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could require modifications of these lists. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of the species lists should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website or the AFO website (the AFO website dates each county list with the day of the most recent update/change) at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list or by going to the AFO website.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological Evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12 and on our office's website at https://www.fws.gov/asheville/htmls/project_review/assessment_guidance.html.

If a Federal agency (or their non-federal representative) determines, based on the Biological Assessment or Biological Evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF.

Though the bald eagle is no longer protected under the Endangered Species Act, please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require additional consultation (see https://www.fws.gov/southeast/our-services/permits/eagles/). Wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds (including bald and golden eagles) and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://

www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
(828) 258-3939

Project Summary

Consultation Code: 04EN1000-2019-SLI-0280

Event Code: 04EN1000-2019-E-00736

Project Name: Nesbit

Project Type: STREAM / WATERBODY / CANALS / LEVEES / DIKES

Project Description: This proposal describes the Nesbit Stream & Wetland Mitigation Site (Site) and is designed specifically to assist in fulfilling North Carolina Department of Environment and Natural Resources (NCDENR) Division of Mitigation Services (NCDMS) mitigation goals. The Site is located within 14-digit Cataloging Unit and Targeted Local Watershed 03050103030030, approximately 7 miles southwest of Monroe and 5 miles southeast of Waxhaw in the southwest corner of Union County near the North Carolina and South Carolina border. The Site is not located within a Regional or Local Watershed Planning area. The Site is situated along warm water, Glen Branch and unnamed tributaries to Glen Branch.

The Nesbit Stream & Wetland Mitigation Site is proposed to include 4895 linear feet of stream restoration, 171 linear feet of stream enhancement (level I), 1275 linear feet of stream enhancement (level II), 2.8 acres of riparian riverine wetland restoration, and 3.8 acres of riparian riverine wetland enhancement. Site alterations include cessation of agriculture, restoration of streams and wetlands, and planting native, woody vegetation. Mitigation outlined in this report will result in net gains in hydrology, water quality, and habitat functions, and are designed to provide 5264 Stream Mitigation Units and 4.7 Riparian Riverine Wetland Mitigation Units, as calculated in accordance with the requirements stipulated in RFP #16-007704

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/34.8944289929299N80.65151406245305W

Counties: Union, NC

Endangered Species Act Species

There is a total of 3 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.

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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.

Clams

NAME	STATUS
Carolina Heelsplitter *Lasmigona decorata* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3534	Endangered

Flowering Plants

NAME	STATUS
Michaux's Sumac *Rhus michauxii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5217	Endangered
Schweinitz's Sunflower *Helianthus schweinitzii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3849	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project

activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

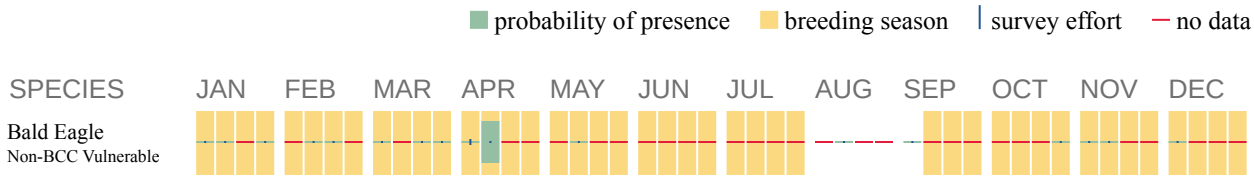
1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.
Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1A
- PSS1A

FRESHWATER POND

- PUBHh

RIVERINE

- R4SBC
- R5UBH

Freshwater Mussel Survey Report

Nesbit Stream Mitigation Bank
Glen Branch
Union County, North Carolina

Glen Branch during the survey effort

Prepared For:

RESTORATION SYSTEMS | LLC

1102 Haynes St. Suite 211
Raleigh NC 27604

Contact:
Matthew Harrell
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October 18, 2019

Prepared by:

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TABLE OF CONTENTS

1.0 INTRODUCTION

Restoration Systems, LLC (RS) is pursuing the Nesbit Stream Mitigation Bank (Nesbit Site), which involves restoration of a portion of Glen Branch, a tributary to Waxhaw Creek of the Catawba River Basin in Union County (Figure 1). The proposed project involves in-channel stream restoration work within an approximately 3,823 lf section of Glen Branch southeast of the town of Waxhaw.

The federally Endangered Carolina Heelsplitter (*Lasmigona decorata*) is known to occur in Waxhaw Creek downstream of the project in Union County, North Carolina and Lancaster County, South Carolina. Other rare freshwater mussel species are also known to occur in Union County, including the Atlantic Pigtoe (*Fusconaia masoni*), which is proposed for federal listing as a Threatened species, as well as the NC Endangered Savannah Liliput (*Toxolasma pullus*) and Carolina Creekshell (*Villosa vaughaniana*) and the NC listed Special Concern Notched Rainbow (*Villosa constricta*). Three Oaks Engineering (Three Oaks) was retained by RS to conduct surveys for freshwater mussels in the proposed restoration reach, plus an approximately 2,043 lf downstream buffer.

2.0 METHODOLOGY

The project site was visited on September 26, 2019, by Three Oaks personnel Tim Savidge (Permit #19-ES0034) and Wade Biltoft. Mussel surveys began at the most downstream limits of the reach, approximately 2,043 lf downstream of the Nesbit Road crossing of the stream and proceeded upstream through the project parcel, for a total survey reach of 5,866 lf (Figure 1). Areas of appropriate habitat were searched, concentrating on the habitats preferred by the target species. Visual surveys were conducted using bathyscopes. Tactile methods were employed, particularly in streambanks under submerged rootmats. If encountered, all freshwater bivalves were to be recorded and returned to the substrate and timed survey efforts would provide Catch Per Unit Effort (CPUE) data for each mussel species encountered. Additionally, relative abundances for freshwater snails and freshwater clam species were estimated using the following criteria:

- (VA) Very abundant > 30 per square meter
- (A) Abundant 16-30 per square meter
- (C) Common 6-15 per square meter
- (U) Uncommon 3-5 per square meter
- (R) Rare 1-2 per square meter
- (P-) Ancillary adjective “Patchy” indicates an uneven distribution of the species within the sampled site.

3.0 RESULTS

Large sections of Glen Branch within the survey reach were totally dry and there was no discernable flow in areas where water was present. No live freshwater mussels were found during the surveys; however, an individual relict shell of one species, the Eastern Elliptio (*Elliptio complanata*), was found within the project site. The two target mussel species are unlikely to be present. The details of the survey are provided below.

3.1 *Stream Conditions*

The survey reach was divided into two segments of unequal length: Segments A and B which occur downstream and within the project site, respectively (Figure 1). Habitat conditions varied widely between and within the segments and were influenced primarily by geology, Beaver (*Castor canadensis*) dams, and surrounding land use.

Segment A

Segment A extends from a point approximately 2,043 lf downstream of the Nesbit Road crossing upstream to the culvert. The channel ranges from approximately 12 to 16 feet wide, with banks two to six feet high. The stream is bordered by cropland, with generally narrow (0-20 feet wide) forested riparian buffers. The right descending side of the channel is bordered by woodland in the lower 300 feet of the segment. The substrate consists of a mixture of cobble, and sand, with occasional bedrock outcrops oriented perpendicular to the channel. With the exception of a few short (10-60 feet in length), stagnant pools, that were created either by log jams or Beaver dams, the streambed was dry. There is a wide (15-20 feet) scour pool immediately below the road crossing with more incised banks than the rest of the segment.

Segment B

Segment B extends from the Nesbit Road crossing upstream through the project site (approximately 3,823 lf). From the crossing to a point approximately 350 feet upstream, the channel is relatively narrow (8-10 feet wide) and incised (banks 8-10 feet high). The substrate consists of compact clay. The water appears to be ponded because of the culvert and ranges from six to eight inches deep; there was no discernable flow. Immediately above this, there is a relatively short (50 feet) rocky section that was totally dry. In the remaining portion of the segment, the channel widens to about 12 to 15 feet, with banks up to six feet high that are moderately to severely eroded. It gradually becomes narrower, but less incised. The substrate alternates between sand and pebble, cobble and bedrock, and muddy clay, with sandy clay banks. A number of small Beaver dams occurred periodically within the channel. Water was ponded up to two feet deep behind the dams for varying distances. Large amounts of duckweed (Lemnoideae) covered the water surface in these wetted areas and the substrate was covered with detritus and other organic material. There were long stretches of the streambed between dams

that were totally dry. In the uppermost 250-350 feet of the reach, water was present, but flow was not discernable and much of the channel was choked with emergent aquatic vegetation such as Water Primrose (*Ludwigia* sp.), Arrowleaf Tearthumb (*Polygonum sagittatum*) and Smartweed (*Polygonum* sp.). The stream is bordered by a narrow (<20 feet) strip of vegetation, consisting largely of Chinese Privet (*Ligustrum sinense*), Multiflora Rose (*Rosa multiflora*), and saplings and small sized native trees. Large corn fields occur beyond the narrow buffer.

3.2 *Mussel Surveys*

A total of 6.0 person-hours of survey time were spent in the reach and one relict shell of the Eastern Elliptio was the only freshwater mussel species found. Other mollusk species found include Fingernail Clams (Sphariidae), which were common with a patchy distribution and the Pointed Campeloma (*Campeloma decisum*), an aquatic snail that was uncommon.

4.0 CONCLUSIONS

Neither the Carolina Heelsplitter nor Atlantic Pigtoe were observed in the evaluated portion of Glen Branch and both are very unlikely to currently occur within the stream. At least one freshwater mussel species, the Eastern Elliptio, occurs in very low numbers within the surveyed reach of Glen Branch. This is a common and widespread species that is considered stable throughout its range and has been shown to persist in streams that are subject to periodic cessation of flow (Tim Savidge, personal observations). Project conclusions on potential effects to the targeted species are provided below.

4.1 *Biological Conclusion: Carolina Heelsplitter*

Although Glen Branch flows into Waxhaw Creek, which is currently occupied by the Carolina Heelsplitter, it is apparent that the surveyed portion of the stream is subject to periods of interrupted flow. Being a rather thin-shelled species, the Carolina Heelsplitter is very susceptible to desiccation during drought. Although it is unlikely to occur within the surveyed portion of Glen Branch, given the connectivity to an extant population downstream in Waxhaw Creek, its presence within the project area cannot be totally discounted based on a one-time survey.

As such, it can be concluded that the project construction **"May Affect/Not Likely to Adversely Affect" the Carolina Heelsplitter.** The proposed restoration of Glen Branch may result in a "Beneficial Affect" to the species, by improving water quality in Glen Branch, which ultimately flows into Waxhaw Creek, as well as allow for future colonization of the species once habitat conditions improve (See Section 5.0).

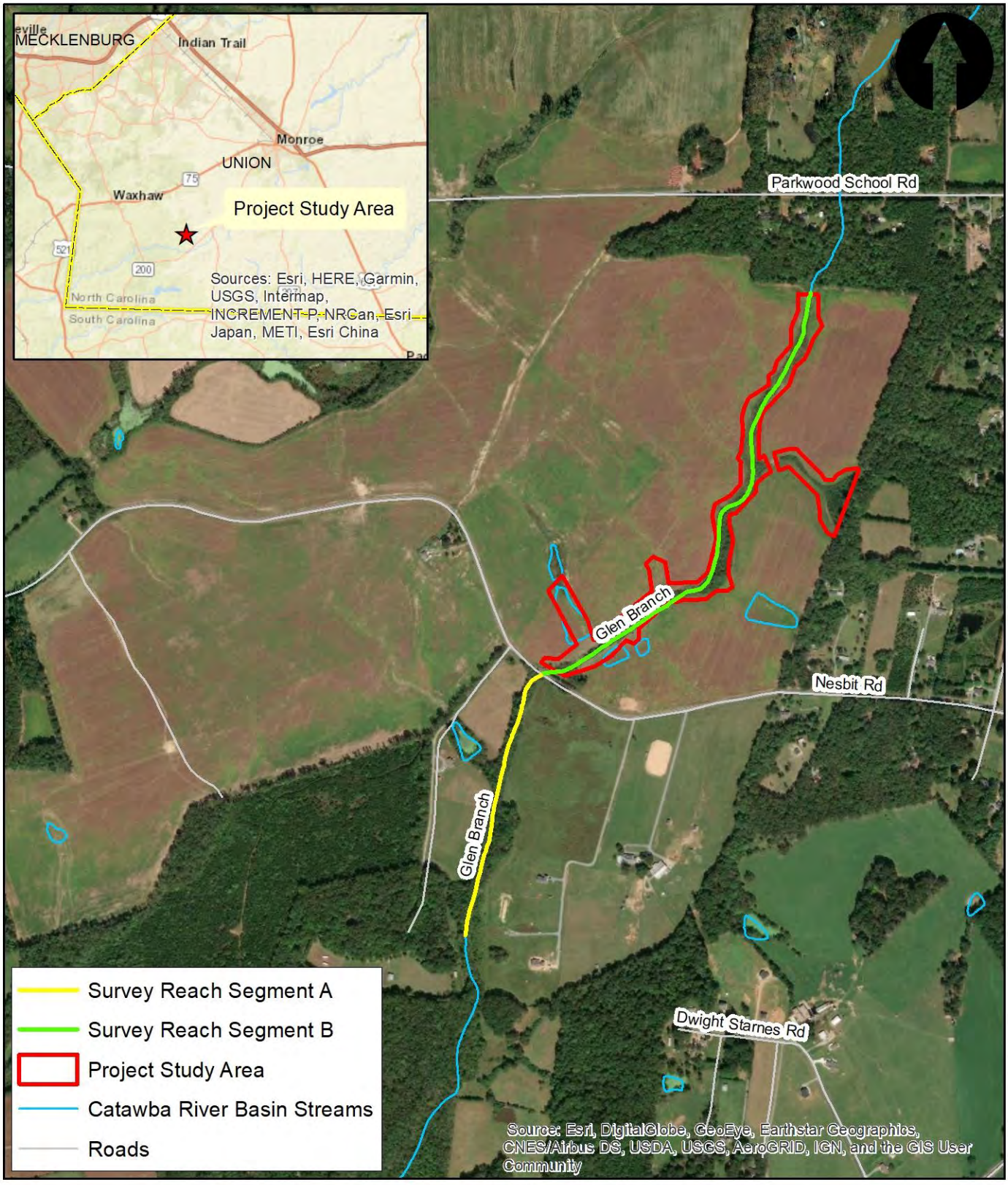
4.2 *Atlantic Pigtoe*

While the Atlantic Pigtoe is a thicker-shelled species, it typically occurs in relatively swift streams and rivers with a substrate that often has gravel as a major component. This type of habitat is not present in Glen Branch, and there are no know populations of the species in this general portion of the Catawba River Basin.

Given the habitat conditions in Glen Branch and the lack of any known populations with connectivity to the stream, it can be concluded that the project construction will have **"No Effect" on the Atlantic Pigtoe.**

5.0 RECOMMENDATIONS

Adverse effects to the Carolina Heelsplitter and Atlantic Pigtoe are unlikely to occur. As mentioned in Section 4.1 project construction may actually result in a "Beneficial Affect" to the Carolina Heelsplitter by improving water quality. Additionally, improved habitat conditions in Glen Branch may allow for the Waxhaw Creek population to expand its range into Glen Branch. Considerations should be taken into account to incorporate a component of the project that involves stocking mussels, such as the Eastern Elliptio, or other associate species like creekshells (*Villosa* spp.) into the restored reach. If stocking these non-protected species proves successful, resource managers may then consider establishing Carolina Heelsplitter in the stream.



Prepared For:

Freshwater Mussel Survey
Nesbit Mitigation Site

Vicinity Map

Union County, North Carolina

Date: October 2019

Scale: 0 100 200 Meters

Job No.: 19-324

Drawn By: LSC

Checked By: TWS

Figure 1

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Field Office
160 Zillicoa Street Suite #B
Asheville, North Carolina 28801

November 18, 2019

Donnie Brew
Preconstruction & Environment Engineer
Federal Highway Administration
310 New Bern Ave, Suite 410
Raleigh, NC 27601

Subject: **20-056,** Section 7 Concurrence for NC DMS stream/Wetland mitigation project on Glen Branch in Union County, NC

Dear Mr. Brew,

On October 21, 2019, we received your email requesting section 7 concurrence on effects the subject project may have on the federally endangered Carolina heelsplitter (*Lasmigona decorata*). The following comments are provided in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) (Act).

Freshwater mussel surveys in Glen Branch on September 26, 2019 were negative for Carolina heelsplitter or any alive mussels. However, although very unlikely, presence in the project area cannot be completely discounted due to intermittent connectively to an extant population downstream in Waxhaw Creek. Accordingly, we concur with your determination that the proposed project may affect, but is not likely to adversely affect, the Carolina heelsplitter.

Therefore, we believe the requirements under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 15 31 - 1543), are fulfilled. Obligations under Section 7 of the ESA must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered, (2) this action is subsequently modified in a manner that was not considered in this review, or (3) a new species is listed or critical habitat is determined that may be affected by the identified action.

If you have questions about these comments please contact Ms. Claire Ellwanger of our staff at 828/258-3939, Ext. 42235. In any future correspondence concerning these projects, please reference our Log Number 20-056.

Sincerely,

-original signed-

Janet Mizzi
Field Supervisor

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 6/3/19
Name Of Project Nesbit Stream and Wetland Mitigation Site	Federal Agency Involved Federal Highway Administration
Proposed Land Use Stream and Wetland Restoration	County And State Union County, NC
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 6/3/19

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 190 acres
Major Crop(s) CORN	Farmable Land In Govt. Jurisdiction Acres: 384,651 acres	% 94	Amount Of Farmland As Defined in FPPA Acres: 291,581 acres	% 77
Name Of Land Evaluation System Used Union County, NC LESA	Name Of Local Site Assessment System N/A		Date Land Evaluation Returned By NRCS June 23, 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	18.1			
B. Total Acres To Be Converted Indirectly	0.0			
C. Total Acres In Site	18.1	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	0.1			
B. Total Acres Statewide And Local Important Farmland	18.0			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0.0062			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	49.0			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*				

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	14			
2. Perimeter In Nonurban Use	10	10			
3. Percent Of Site Being Farmed	20	10			
4. Protection Provided By State And Local Government	20	20			
5. Distance From Urban Builtup Area	15	15			
6. Distance To Urban Support Services	15	10			
7. Size Of Present Farm Unit Compared To Average	10	10			
8. Creation Of Nonfarmable Farmland	10	0			
9. Availability Of Farm Support Services	5	5			
10. On-Farm Investments	20	10			
11. Effects Of Conversion On Farm Support Services	10	0			
12. Compatibility With Existing Agricultural Use	10	0			
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or a local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260	185	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)

From:	Cortes, Milton - NRCS, Raleigh, NC
To:	Matthew Harrell
Subject:	RE: Nesbit Stream and Wetland Mitigation Project, Union County, NC: Form AD-1006
Date:	Sunday, June 23, 2019 5:01:50 PM
Attachments:	NRCS Form AD-1006 Nesbit.pdf
Importance:	High

Mathew:

Please find attached the AD1006 form for the Nesbit Stream and Wetland Mitigation Project, Union County, NC

If I can be of further assistance please let me know
Best Regards

Milton Cortes
State Soil Scientist
USDA NRCS
4407 Bland Rd., Suite 117
Raleigh, NC 27609
Desk: 919-873-2171

From: Matthew Harrell <mharrell@restorationsystems.com>
Sent: Monday, June 3, 2019 3:06 PM
To: Cortes, Milton - NRCS, Raleigh, NC <milton.cortes@usda.gov>
Subject: Nesbit Stream and Wetland Mitigation Project, Union County, NC: Form AD-1006

Hi Milton,

Please review the attached documents regarding our farmland impact evaluation for the Nesbit Stream and Wetland Mitigation Project. This is the first one of these I've sent your way, so please let me know if I am missing something or if you prefer a different format in the future.

Thanks,

Matthew Harrell
Sr. Project Manager |Restoration Systems, LLC
1101 Haynes St.|Suite 211|Raleigh, NC 27604
c: 252.299.1655 |p: 919.755.9490
www.restorationsystems.com

From:	Matthew Harrell
To:	Claire_ellwanger@fws.gov
Cc:	Phillips, Kelly D
Subject:	FHA Review Request: NC DMS Project "Nesbit", Union County, NC
Date:	Tuesday, September 17, 2019 4:12:00 PM
Attachments:	Nesbit_USFWSScopingLetter.pdf Nesbit_USGS_Map.pdf Nesbit_ExistingConditions.pdf

---

Ms. Ellwanger,

Please review the attached letter and figures relating to our proposed stream and wetland mitigation project in Union County, NC near Mineral Springs. I look forward to any comment USFWS staff may have to offer.

Thank you,

Matthew Harrell
Sr. Project Manager |Restoration Systems, LLC
1101 Haynes St.|Suite 211|Raleigh, NC 27604
c: 252.299.1655 |p: 919.755.9490
www.restorationsystems.com

September 17, 2019

Claire Ellwanger
US Fish and Wildlife Service
Asheville Field Office
Claire_ellwanger@fws.gov

Federal-Aid project (FHWA lead federal agency) administered by NC DMS Stream/Wetland mitigation project in Union County

Nesbit Stream and Wetland Mitigation Project

NCDEQ DMS Full-Delivery Project ID #: 100121

To US FWS Staff:

The Nesbit site has been identified for the purpose of providing compensatory mitigation for unavoidable stream channel and/or wetland impacts. Several sections of channel have been identified as significantly degraded including Glen Branch and several tributaries.

The Site is proposed to include 6,341 feet of combined restored and enhanced stream channel along with 6.6 acres of reestablished and enhanced riparian wetlands. Site alterations include cessation of agriculture, restoration of streams and wetlands, and planting native, woody vegetation within the easement. Mitigation outlined in this report will result in net gains in hydrology, water quality, and habitat functions, and are designed to provide 5,264 Stream Mitigation Units and 4.7 Riparian Wetland Mitigation Units.

The Site is located in the Carolina Slate Belt portion of the Piedmont ecoregion of North Carolina. Regional physiography is characterized by dissected, irregular plains with moderate to steep slopes and low to moderate gradient streams over boulder and cobble-dominated substrate (Griffith et al. 2002). Onsite elevations range from a high of 640 feet National Geodetic Vertical Datum (NGVD) at the upper reaches to a low of approximately 620 feet NGVD at the Site outfall (USGS Waxhaw, NC 7.5 minute topo_quad).

We have already obtained an updated species list for Union County from your web site (https://www.fws.gov/raleigh/species/cntylist/nc_counties.html). The threatened or endangered species for this county are:

Common Name (Scientific Name)	Federal Status
Carolina Heelsplitter (*Lasmigona decorata)*	Endangered Clam
Atlantic pigtoe (*Fusconaia masoni*)	ARS (Listing coming soon?)
Michaux's Sumac (*Rhus michauxii*)	Endangered Plant
Schweinitz's Sunflower (*Helianthus schweinitzii*)	Endangered Plant

We are requesting that you please provide any known information for each species in the county. The USFWS will be contacted if we determine that the project may affect one or more federally listed species, or designated critical habitat.

Please provide comments on any possible issues that might emerge with respect to endangered species, migratory birds or other trust resources from the construction of a wetland and/or stream restoration project on the subject property. A USGS map showing the approximate property lines and areas of potential ground disturbance is enclosed.

If we have not heard from you in 30 days we will assume that our species list is correct, that you do not have any comments regarding associated laws, and that you do not have any information relevant to this project at the current time.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the extent of site disturbance associated with this project.

Yours truly,
Restoration Systems, LLC

Matthew HarreII
Sr. Project Manager
mharrell@restorationsytems.com
919-755-9490

Attachments: Location and USGS Map

CC: DMS Project Manager (Kelly Phillips)

From:	Matthew Harrell
To:	shannon.deaton@ncwildlife.org
Subject:	Nesbit Stream & Wetland Mitigation Project: Concurrence Request and Fish & Wildlife Coordination Act review
Date:	Tuesday, May 21, 2019 5:13:00 PM
Attachments:	Nesbit_NCWRC_Letter.pdf Nesbit_ExistingConditions.pdf Nesbit_USGS_Map.pdf

---

Ms. Deaton,

Please review the attached letter and figures relating to our proposed Stream & Wetland Mitigation Project in Union County near Mineral Springs. I look forward to any comment your staff may offer.

Thank you,

Matthew Harrell

Sr. Project Manager |Restoration Systems, LLC

1101 Haynes St.|Suite 211|Raleigh, NC 27604

c: 252.299.1655 |p: 919.755.9490

www.restorationsystems.com

April 26th, 2019

Shannon Deaton
Habitat Conservation Program Manager
North Carolina Wildlife Resources Commission
Shannon.deaton@ncwildlife.org

Re: Nesbit Stream and Wetland Mitigation Project, Union County, NC

Dear Ms. Deaton:

The purpose of this letter is to request concurrence from NCWRC concerning a stream and wetland restoration project located in Union County for the N.C. Division of Mitigation Services. The project will restore stream channels and riparian wetlands through an agricultural field and young forest area. Please review and comment on any possible issues that might emerge with respect to the Fish and Wildlife Coordination Act from the potential project. Attached is a USGS base map with the projects 18.1 acre footprint identified. The Site is located approximately 3 miles south of Mineral Springs. Site land use consists of a row crops, and disturbed forest and riparian buffer areas. All Site hydrology drains to Glen Branch.

The Site is located in the Carolina Slate Belt portion of the Piedmont ecoregion of North Carolina. Regional physiography is characterized by dissected, irregular plains with moderate to steep slopes and low to moderate gradient streams over boulder and cobble-dominated substrate (Griffith et al. 2002). Onsite elevations range from a high of 640 feet National Geodetic Vertical Datum (NGVD) at the upper reaches to a low of approximately 620 feet NGVD at the Site outfall (USGS Waxhaw, NC 7.5 minute topo_quad).

The Site is proposed to include 6,341 feet of combined restored and enhanced stream channel along with 6.6 acres of reestablished and enhanced riparian wetlands. Site alterations include cessation of agriculture, restoration of streams and wetlands, and planting native, woody vegetation within the easement. Mitigation outlined in this report will result in net gains in hydrology, water quality, and habitat functions, and are designed to provide 5,264 Stream Mitigation Units and 4.7 Riparian Wetland Mitigation Units.

We thank you in advance for your timely response and cooperation. Please feel free to contact the below referenced Project Manager with any questions that you may have concerning the extent of site disturbance associated with this project. If we do not hear from you within 30 days, we will assume you have no comments on the project. Your valuable time and cooperation are much appreciated.

Yours truly,
Restoration Systems, LLC

Matthew Harrell
Sr. Project Manager
mharrell@restorationsytems.com
919-755-9490

Attachments: Location and USGS Map

Task 1 a.) Inter-Agency Post Contract Site Visit: Site Visit Notes

As specified within RFP #16-007704, an on-site meeting with regulatory agencies and DMS staff was conducted on July 22th, 2019. Below is a list of attendees and general site visit notes.

Attendees:

USACE:
- Todd Tugwell
- Kim Browning

NC WRC:
- Olivia Munzer

NC DMS:
- Kelly Phillips (PM)
- Paul Wiesner
- Matthew Reid
- Periann Russell
- Kirsten Ullman

NC DWR:
- Mac Haupt
- Erin Davis

Restoration Systems:
- Matthew Harrell (PM)
- Raymond Holz
- Alex Baldwin

Axiom Environmental
- Grant Lewis
- Kenan Jernigan

Site Visit Notes:
- Members of the IRT evaluated this site for wetland and stream restoration potential and assessed credit ratios outlined in the Technical Proposal.
- IRT would like to see historic aerials included in future technical proposals to better illustrate in recent changes in land use, including tree clearing.
- RS noted history of beavers on the site and continuing landowner management activities relating to beaver removal.
- RS noted heavy presence of invasive species (mainly privet) and plan to treat those species beginning before construction.

Stream Notes:
- Main Channel (Glen Branch): The proposed credit ratios were accepted as proposed with little comment.
- UT 1: Proposed approach included Level II Enhancement (2.5:1) and Restoration (1:1). IRT stated the portion above the confluence with UT1A should be treated as Level I Enhancement for design purposes but still credited at 2.5:1. The IRT requested a gauge be installed in the upper reaches of UT 1 to determine the flow regime, particularly if the channel bed elevation is raised.
- UT1A: Proposed approach was Level II Enhancement at 2.5:1 credit ratio. IRT is willing to accept Level II enhancement at 5:1 credit ratio.
- UT 2: Proposed credit ratios were accepted as proposed, pending the official JD call for origin location.

- UT 3: It appeared this reach may not be considered jurisdictional. If it is not jurisdictional, the favored option is to install a BMP as the valley enters the buffer of Glen Branch. If it is jurisdictional, flow gauges will be required.

Wetland Notes:

- IRT had questions about tree clearing within existing wetlands circa 2012 and the potential for a violation. T. Tugwell stated that given the current condition of the project area he did not see a reason to hold up the project, but that he would pass the information along to the Charlotte USACE office for their review.
- Some areas of Wetland Enhancement depicted on Figure 5 of the Technical Proposal may be suitable for Wetland Rehabilitation. Wetland Rehabilitation may be suitable for portions of the Site currently characterized by hydric soils and jurisdictional hydrology that have been cleared of woody vegetation and are affected by groundwater table alterations from the adjacent, incised stream channel. Gauges must be installed and monitored to verify the hydrologic modifications prior to mitigation activities.
- The extent of wetland potential on the site as shown in the figures was difficult to assess during the visit due to lush vegetation and dry conditions. Axiom explained that the extent shown in the technical proposal figures is based on soil hydrology observed in December 2018 as well as elevation data derived from the latest NC Lidar data. The JD process is expected to clarify any questions about extent of wetland potential on the site. The delineation process will begin this month.
- IRT requested that more comprehensive soil borings be taken in each of the primary wetland areas and included at the Draft Mitigation Plan stage at a minimum. This will be addressed by including logs of the soil borings taken during the JD process.

From:	Matthew Harrell
To:	Tugwell, Todd J CIV USARMY CESAW (US); Wiesner, Paul
Cc:	Jones, M Scott (Scott) CIV USARMY CESAW (USA); Roden Reynolds, Bryan K CIV (US); Phillips, Kelly D; Ray Holz; Lewis, Grant; Worth Creech
Subject:	RE: [External] RE: NC DMS Site: Nesbit- Question about wetlands
Date:	Thursday, January 30, 2020 4:09:00 PM
Attachments:	NRCS_Email.pdf NRCS_Map.pdf SoilBoringLogNesbit.pdf Nesbit_Fig5_Updated.pdf

---

Todd:

Thanks for seeing things through with the landowner and the Charlotte office. I want to make sure we address your concerns both with the history of the site and the planned mitigation approach.

Regarding site history: In June 2019, with authorization from the landowner, I visited the NRCS office. I have attached an email and tract map related to that visit. This map was the only record NRCS was able to provide for the project site, as no active NRCS programs were being implemented which might have required a more detailed file. As you can see in those documents, NRCS did not identify any wetlands on the site. From my conversation with the Soil Conservationist I gathered that they did not examine soil profiles but instead made basic observations of USGS mapped soil type and the lack of obvious hydrology to draw their map.

Regarding site mitigation approach: (Existing Wetlands, Drained Hydric Soils, Other)
The completed and approved PJD delineated all areas of jurisdictional wetland in the project footprint. These existing wetland areas have been considered for wetland preservation, wetland enhancement, and wetland rehabilitation credit. We will be proposing wetland rehabilitation credit in our mitigation plan, based on restoring an appropriate plant community and elevating the water table by reducing stream incision. Groundwater gauges installed prior to construction will help demonstrate the functional uplift provided by our project warrants this credit type.

Hydric soils outside of the jurisdictional wetland boundaries established in the PJD are considered drained hydric soils and will be proposed as wetland re-establishment. There may have been some confusion about the extent of these areas simply because they have been mapped and approximated on figures (mapping via Lidar, Aerials, etc) but not field delineated. Once delineated (with appropriate soil boring locations and logs), the figures and acreage totals will be revised and included in the mitigation plan. The attached soil boring log is an example of the type of profile we expect in these areas. Wetland re-establishment will only be proposed within areas clearly delineated as having drained hydric soils.

Other areas situated outside the hydric soil boundary (and therefore by default beyond the jurisdictional wetland boundary) may considered wetland creation if they become jurisdictional through the construction of the Site. As you can see from our attached figure, we have not explicitly mapped any such areas in our preliminary mitigation plan, and at this time do not expect to have any such areas detailed in our draft mitigation plan.

In conclusion:
Please find attached an updated mitigation approach figure which accounts for IRT feedback during the Post-Contract Site Visit as well as the approved PJD. Further refinement of the wetland mitigation approach will occur before submission of the Draft Mitigation Plan after the full hydric soil delineation and a detailed topographic survey have been completed.

Thanks,

Matthew Harrell
Sr. Project Manager |Restoration Systems, LLC
1101 Haynes St.|Suite 211|Raleigh, NC 27604
c: 252.299.1655 |p: 919.755.9490

www.restorationsystems.com

-----Original Message-----
From: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>
Sent: Wednesday, January 29, 2020 12:08 PM
To: Wiesner, Paul <paul.wiesner@ncdenr.gov>; Matthew Harrell <mharrell@restorationsystems.com>
Cc: Jones, M Scott (Scott) CIV USARMY CESAW (USA) <Scott.Jones@usace.army.mil>; Roden Reynolds, Bryan K CIV (US) <Bryan.K.RodenReynolds@usace.army.mil>; Phillips, Kelly D <Kelly.Phillips@ncdenr.gov>; Ray Holz <rholz@restorationsystems.com>; Lewis, Grant <glewis@axiomenvironmental.org>; Worth Creech <worth@restorationsystems.com>
Subject: RE: [External] RE: NC DMS Site: Nesbit- Question about wetlands

Paul, normally I would say we could review at the draft mit plan stage, but in this case it may make sense for us to get on the same page before that. My concern is that there were areas on the site that had marginal soils (i.e., soils that did not meet necessary hydric indicators), which is one reason why we did not view logging/clearing in these areas to be a potential unauthorized activity, but if these same areas are proposed for reestablishment, that would seem to be an inconsistent approach. It would be more appropriate to view these areas as creation. Also, I think there were areas that were previously identified as either enhancement or rehabilitation that are not currently jurisdictional based on the JD, so these areas may potentially be either reestablishment or creation (again, depending on the soils). Because of this I think it would be good to look at a revised approach map in case there might be changes to credit ratios that could affect the viability of the site. I think the final map may also need some further refining to capture hydric inclusions within the soils to get a better idea of the appropriate approach.

I'm happy to discuss more with you or RS/Grant, if that would help.

Thanks,
Todd

-----Original Message-----
From: Wiesner, Paul [mailto:paul.wiesner@ncdenr.gov]
Sent: Wednesday, January 29, 2020 10:26 AM
To: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>; Matthew Harrell <mharrell@restorationsystems.com>
Cc: Jones, M Scott (Scott) CIV USARMY CESAW (USA) <Scott.Jones@usace.army.mil>; Roden Reynolds, Bryan K CIV (US) <Bryan.K.RodenReynolds@usace.army.mil>; Phillips, Kelly D <Kelly.Phillips@ncdenr.gov>; Raymond Holz <rholz@restorationsystems.com>; Lewis, Grant <glewis@axiomenvironmental.org>; Worth Creech <worth@restorationsystems.com>
Subject: [Non-DoD Source] RE: [External] RE: NC DMS Site: Nesbit- Question about wetlands

Thanks Todd;

The draft mitigation plan will include the PJD documentation and the proposed mitigation approaches will be reassessed based on that determination.

Do you all want to see a revised conceptual map and asset table before IRT submittal of the draft mitigation plan or do you want to review any potential revisions at the draft mitigation plan stage?

I just want to make sure we are all on the same page.

Thanks

Paul Wiesner
Western Regional Supervisor
North Carolina Department of Environmental Quality Division of Mitigation Services

828-273-1673 Mobile
paul.wiesner@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Drive
Suite 102
Asheville, N.C. 28801

-----Original Message-----
From: Tugwell, Todd J CIV USARMY CESAW (US) [mailto:Todd.J.Tugwell@usace.army.mil]
Sent: Tuesday, January 28, 2020 5:16 PM
To: Matthew Harrell <mharrell@restorationsystems.com>
Cc: Jones, M Scott (Scott) CIV USARMY CESAW (USA) <Scott.Jones@usace.army.mil>; Roden Reynolds, Bryan K CIV (US) <Bryan.K.RodenReynolds@usace.army.mil>; Wiesner, Paul <paul.wiesner@ncdenr.gov>
Subject: [External] RE: NC DMS Site: Nesbit- Question about wetlands

Matthew,
Scott Jones, Bryan Roden Reynolds, and I met with Mr. Howey at the Nesbit site today to look at the past clearing activities. Based on that review, we found no evidence that activities were conducted within jurisdictional areas that would have required prior authorization during the land clearing and pond removal conducted by Mr. Howey. As a result, we can continue to coordinate with you and DMS on the development of the mitigation site. I appreciate your patience during this process.

Mr. Howey mentioned during the meeting that when he cleared the land he coordinated with NRCS, which means that there should be some documentation that NRCS concurred that the work would be consistent with federal regulations at the time. Do you happen to have any paperwork from NRCS, or would it be possible for you to contact the local NRCS office to see about getting a copy of any relevant materials? It would help complete our file and add further verification that Mr. Howey's work on the site complied with federal regulations.

With regard to the mitigation plan for the site, I would also like to see any revisions that may have been made to the approach following the JD review that Bryan conducted, especially within the wetland areas. I think it's important to make sure that the findings of the JD and today's review of the site are consistent with the mitigation approaches being proposed (i.e., enhancement or rehabilitation within currently jurisdictional areas, reestablishment within areas that were previously wetland, and establishment within areas that were not wetland before).

Thanks,
Todd

-----Original Message-----
From: Matthew Harrell [mailto:mharrell@restorationsystems.com]
Sent: Tuesday, January 07, 2020 3:53 PM
To: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>
Subject: [Non-DoD Source] RE: NC DMS Site: Nesbit- Question about wetlands

Ok, thanks for letting me know.

-MH

-----Original Message-----
From: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>

Sent: Monday, January 6, 2020 5:01 PM
To: Matthew Harrell <mharrell@restorationsystems.com>
Subject: RE: NC DMS Site: Nesbit- Question about wetlands

Matthew, I got your message today and have reached out to Scott again. I'll let you know as soon as I hear something from him. I know you're waiting so I'm trying to push for an answer.

Todd

-----Original Message-----
From: Matthew Harrell [mailto:mharrell@restorationsystems.com]
Sent: Thursday, December 12, 2019 11:43 AM
To: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>
Cc: Ray Holz <rholz@restorationsystems.com>
Subject: [Non-DoD Source] Re: NC DMS Site: Nesbit- Question about wetlands

Ok, thanks for the update.

Sent from my iPhone

> On Dec 12, 2019, at 11:35 AM, Tugwell, Todd J CIV USARMY CESAW (US)
<Todd.J.Tugwell@usace.army.mil> wrote:
>
> Matthew, sorry, no word yet. I think Scott (Asheville/Charlotte office chief) is waiting to hear from Wilmington on some answers related to age of projects we may pursue as potential unauthorized activities. I will let you know as soon as I hear anything.
>
> Todd
>
> -----Original Message-----
> From: Matthew Harrell [mailto:mharrell@restorationsystems.com]
> Sent: Thursday, December 12, 2019 10:48 AM
> To: Tugwell, Todd J CIV USARMY CESAW (US)
> <Todd.J.Tugwell@usace.army.mil>
> Subject: [Non-DoD Source] RE: NC DMS Site: Nesbit- Question about
> wetlands
>
> Hey Todd,
>
> Just following up on this again. If you haven't heard anything back from Charlotte I'll try contacting them directly so I can keep the project timeline from slipping too much.
>
> Thanks,
> Matthew
>
> -----Original Message-----
> From: Tugwell, Todd J CIV USARMY CESAW (US)
> <Todd.J.Tugwell@usace.army.mil>
> Sent: Thursday, November 21, 2019 12:19 PM
> To: Matthew Harrell <mharrell@restorationsystems.com>
> Subject: RE: NC DMS Site: Nesbit- Question about wetlands
>
> I've contacted the Charlotte office again to see how they want to proceed. Sorry for the delay, but sometimes it can take a bit of time before they make a decision on these sites as it could mean contacting the landowner.
>
> I'll let you know as soon as I hear something.

>
> Todd
>
> -----Original Message-----
> From: Matthew Harrell [mailto:mharrell@restorationsystems.com]
> Sent: Thursday, November 21, 2019 11:37 AM
> To: Tugwell, Todd J CIV USARMY CESAW (US)
> <Todd.J.Tugwell@usace.army.mil>
> Subject: [Non-DoD Source] RE: NC DMS Site: Nesbit- Question about
> wetlands
>
> Hi Todd- just following up on this again. Have you heard back from the Charlotte office? Also, is this something you would prefer for us to go directly to them about?
>
> Thanks,
> Matthew
>
> -----Original Message-----
> From: Tugwell, Todd J CIV USARMY CESAW (US)
> <Todd.J.Tugwell@usace.army.mil>
> Sent: Wednesday, November 13, 2019 8:30 AM
> To: Matthew Harrell <mharrell@restorationsystems.com>
> Subject: RE: NC DMS Site: Nesbit- Question about wetlands
>
> Matthew,
> I got the message and I'm checking with the Charlotte office now. By any chance, were our concerns about the site history mentioned at the time of the JD?
> Thanks,
> Todd
>
> -----Original Message-----
> From: Matthew Harrell [mailto:mharrell@restorationsystems.com]
> Sent: Tuesday, November 12, 2019 2:18 PM
> To: Tugwell, Todd J CIV USARMY CESAW (US)
> <Todd.J.Tugwell@usace.army.mil>
> Cc: Phillips, Kelly D <Kelly.Phillips@ncdenr.gov>; Ray Holz
> <rholz@restorationsystems.com>
> Subject: [Non-DoD Source] NC DMS Site: Nesbit- Question about wetlands
>
> Hi Todd,
>
>
>
> I left you a voicemail about this, but wanted to follow up in writing.
>
>
>
> During the IRT site visit to this Union County site you mentioned a concern about potential historic wetland violations on site due to land use change(See attached notes). At that time you indicated it was not an issue for you, but that you would be notifying the Charlotte USACE office of the potential issue and allowing them to address it.
>
>
>
> Since that time we have been through the JD process with the Charlotte office (See attached signed PJD). During that process there was no further mention of any past or ongoing wetland violations.
>
>

>
> As we proceed with our contract tasks for DMS on this project, I'd like to be certain that we have laid this issue to rest. Does the signed PJD satisfy the issue and clear the site to proceed, or do I need to get an additional letter from you or the Charlotte office?
>
>
>
> Thanks for guiding me through this.
>
>
>
> Matthew Harrell
>
> Sr. Project Manager |Restoration Systems, LLC
>
> 1101 Haynes St.|Suite 211|Raleigh, NC 27604
>
> c: 252.299.1655 |p: 919.755.9490
>
> BlockedBlockedBlockedBlockedBlockedBlockedwww.restorationsystems.com
> <BlockedBlockedBlockedBlockedBlockedBlockedhttp://www.restorationsyste
> ms.com>
>
>
>
>
>

From:	Britt, Shauntae - NRCS, Monroe, NC
To:	Matthew Harrell
Subject:	RE: Frank Howey - Nesbit Rd Stream Restoration
Date:	Tuesday, June 4, 2019 3:16:14 PM
Attachments:	image001.png NC179_F9126_T54385.pdf

Matthew, upon review of the Farm 9126 T54385 as authorized by Mr. Frank Howey; there are no active NRCS programs being implemented on this Tract. Further more this tract is actively applying a conservation system based on records (not based on a current field visit) and is in compliance with Highly Erodible Land and Wetland Provisions. As outlined on the Tract Map Provided there are no wetlands identified on the Tract.
If you need further information please feel free to contact our office.

Regards,

Shauntae Britt
USDA/NRCS
Supervisory Soil Conservationist
Team 11
704-233-1621 x 3
704-694-3516 x3

From: Matthew Harrell <mharrell@restorationsystems.com>
Sent: Friday, May 31, 2019 10:40 AM
To: Britt, Shauntae - NRCS, Monroe, NC <shauntae.britt@usda.gov>
Subject: Frank Howey - Nesbit Rd Stream Restoration

Hi Shauntae,

It was nice to meet you yesterday. I just wanted to get our email chain started and let you know I appreciate your help finding any records that might relate to our stream restoration project on parcel owned by the Howey's on Nesbit Road.

Hope you have a great weekend!

Matthew Harrell
Sr. Project Manager |Restoration Systems, LLC

1101 Haynes St.|Suite 211|Raleigh, NC 27604
c: 252.299.1655 |p: 919.755.9490
www.restorationsystems.com

USDA United States Department of Agriculture

Union County, North Carolina

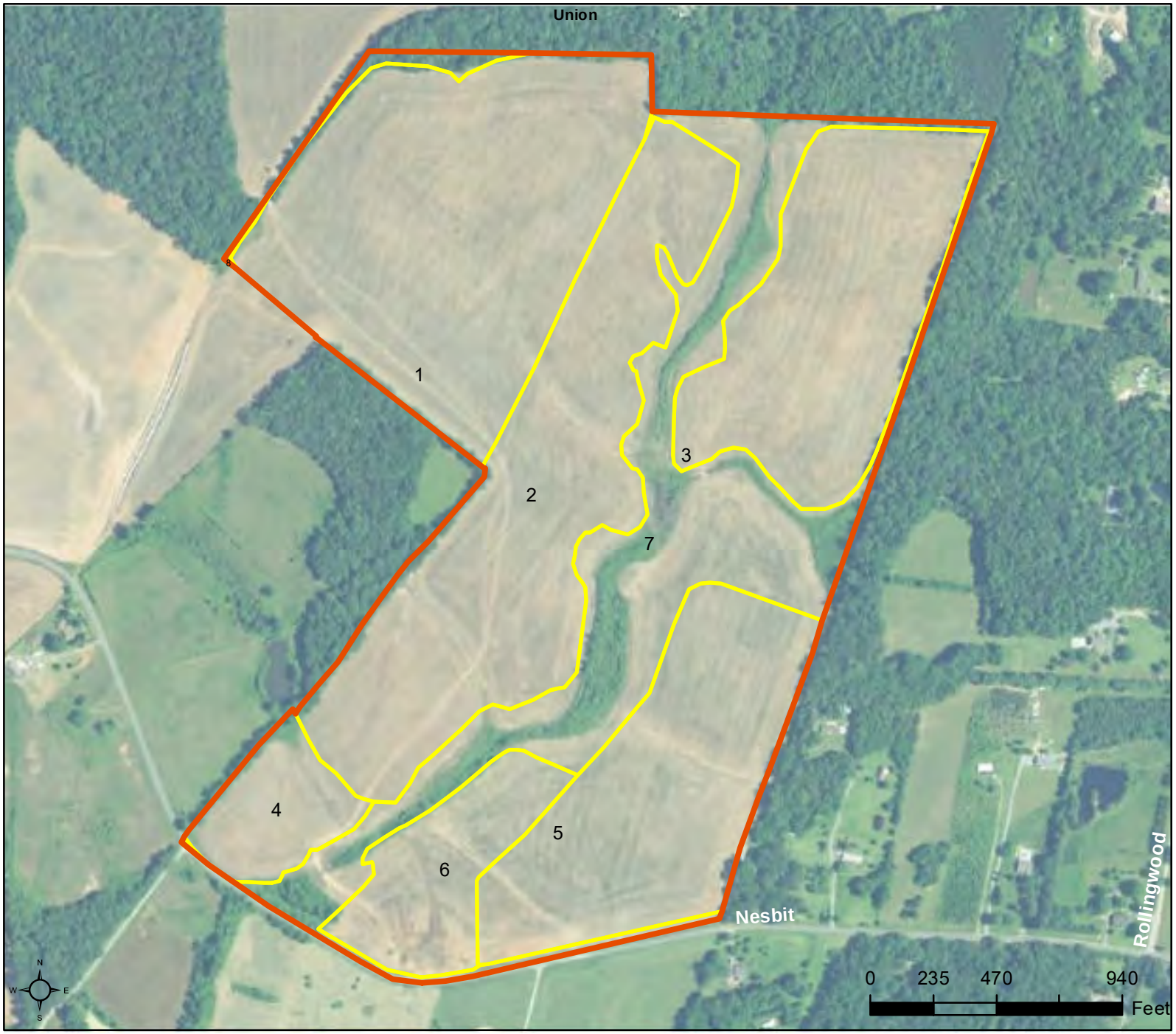
Farm 9126

Tract 54385

2017 Program Year

CLU	Acres	HEL	Crop
1	33.23	HEL	
2	31.0	HEL	
3	21.3	HEL	
4	5.39	HEL	
5	20.86	HEL	
6	8.36	HEL	
7	28.07	HEL	
8	1.03	HEL	

Page Cropland Total: 149.24 acres



Map Created August 21, 2017

Base Image Layer flown in 2016

Common Land Unit
- Cropland
- Tract Boundary

Wetland Determination Identifiers
- Restricted Use
- Limited Restrictions
- Exempt from Conservation Compliance Provisions

AXIOM ENVIRONMENTAL, INC

218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Date: 12/18/2018

Project/Site: Nesbit Mitigation Site

County, State: Union County, NC

Sampling Point/
Coordinates: Soil Profile (35.892134, -80.655905)

Investigator: W. Grant Lewis

Soil Series: Worsham

Notes: Location is shown on Figure 4.

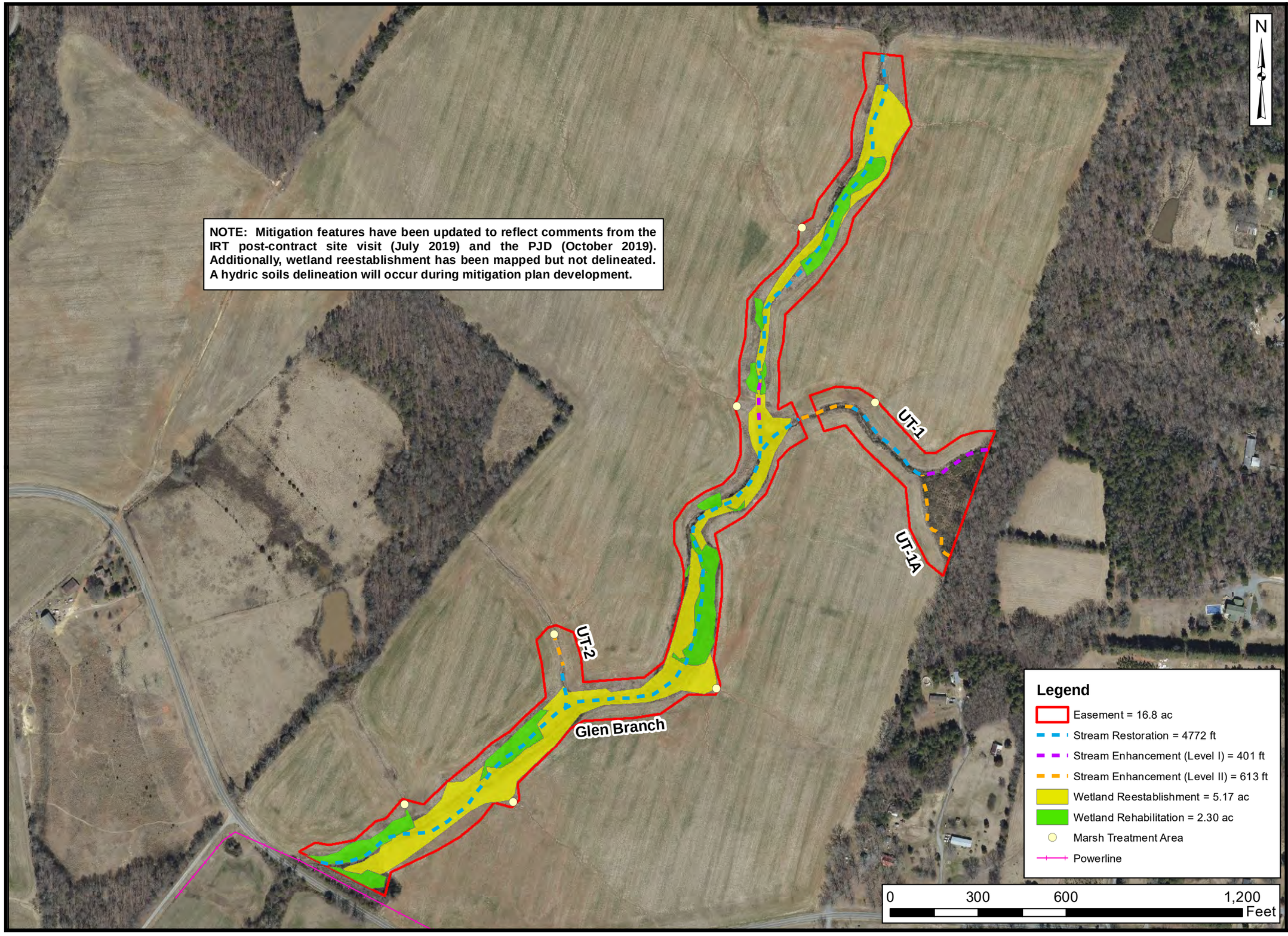
Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-9	10 YR 5/3	90	10 YR 4/6	5	fine sandy loam
			10 YR 6/4	5	
9-11	10 YR 6/1	100			fine sandy loam
11+	2.5 YR 6/2	70	2.5 YR 6/3	20	sandy clay
			10 YR 5/8	10	

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT MITIGATION SITE

Union County, NC

Title:

PROPOSED CONDITIONS

Drawn by: AMR

Date: JAN 2020

Scale: 1:3700

Project No.: 19-015

FIGURE

5

Nesbit
4321 Nesbit Rd.
Monroe, NC 28112

Inquiry Number: 5704558.2s
July 01, 2019

The EDR Radius Map™ Report with GeoCheck®

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

TABLE OF CONTENTS

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

EXECUTIVE SUMMARY

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

TARGET PROPERTY INFORMATION

ADDRESS

4321 NESBIT RD.
MONROE, NC 28112

COORDINATES

Latitude (North):	34.8936000 - 34° 53' 36.96''
Longitude (West):	80.6544000 - 80° 39' 15.84''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	531578.1
UTM Y (Meters):	3861101.0
Elevation:	655 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5946503 WAXHAW, NC
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140517
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
4321 NESBIT RD.
MONROE, NC 28112

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing
SEMS ---------- Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ---------- Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators
RCRA-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System
US ENG CONTROLS ---------- Engineering Controls Sites List

US INST CONTROL ---------- Sites with Institutional Controls

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State- and tribal - equivalent NPL

NC HSDS ---------- Hazardous Substance Disposal Site

State- and tribal - equivalent CERCLIS

SHWS ---------- Inactive Hazardous Sites Inventory

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

SWF/LF ---------- List of Solid Waste Facilities
OLI ---------- Old Landfill Inventory
DEBRIS ---------- Solid Waste Active Disaster Debris Sites Listing
LCID ---------- Land-Clearing and Inert Debris (LCID) Landfill Notifications

State and tribal leaking storage tank lists

LUST ---------- Regional UST Database
LAST ---------- Leaking Aboveground Storage Tanks
INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land
LUST TRUST ---------- State Trust Fund Database

State and tribal registered storage tank lists

FEMA UST ---------- Underground Storage Tank Listing
UST ---------- Petroleum Underground Storage Tank Database
AST ---------- AST Database
INDIAN UST ---------- Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL ---------- No Further Action Sites With Land Use Restrictions Monitoring

State and tribal voluntary cleanup sites

INDIAN VCP ---------- Voluntary Cleanup Priority Listing
VCP ---------- Responsible Party Voluntary Action Sites

State and tribal Brownfields sites

BROWNFIELDS ---------- Brownfields Projects Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY ---------- Recycling Center Listing

HIST LF ---- Solid Waste Facility Listing
INDIAN ODI ---- Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9 ---- Torres Martinez Reservation Illegal Dump Site Locations
ODI ---- Open Dump Inventory
IHS OPEN DUMPS ---- Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

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

Local Land Records

LIENS 2 ---- CERCLA Lien Information

Records of Emergency Release Reports

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

Other Ascertainable Records

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

US AIRS ---- Aerometric Information Retrieval System Facility Subsystem
US MINES ---- Mines Master Index File
ABANDONED MINES ---- Abandoned Mines
FINDS ---- Facility Index System/Facility Registry System
ECHO ---- Enforcement & Compliance History Information
UXO ---- Unexploded Ordnance Sites
DOCKET HWC ---- Hazardous Waste Compliance Docket Listing
FUELS PROGRAM ---- EPA Fuels Program Registered Listing
AIRS ---- Air Quality Permit Listing
ASBESTOS ---- ASBESTOS
COAL ASH ---- Coal Ash Disposal Sites
DRYCLEANERS ---- Drycleaning Sites
Financial Assurance ---- Financial Assurance Information Listing
NPDES ---- NPDES Facility Location Listing
UIC ---- Underground Injection Wells Listing
AOP ---- Animal Operation Permits Listing
PCSRP ---- Petroleum-Contaminated Soil Remediation Permits
SEPT HAULERS ---- Permitted Septage Haulers Listing
CCB ---- Coal Ash Structural Fills (CCB) Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP ---- EDR Proprietary Manufactured Gas Plants
EDR Hist Auto ---- EDR Exclusive Historical Auto Stations
EDR Hist Cleaner ---- EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

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

SURROUNDING SITES: SEARCH RESULTS

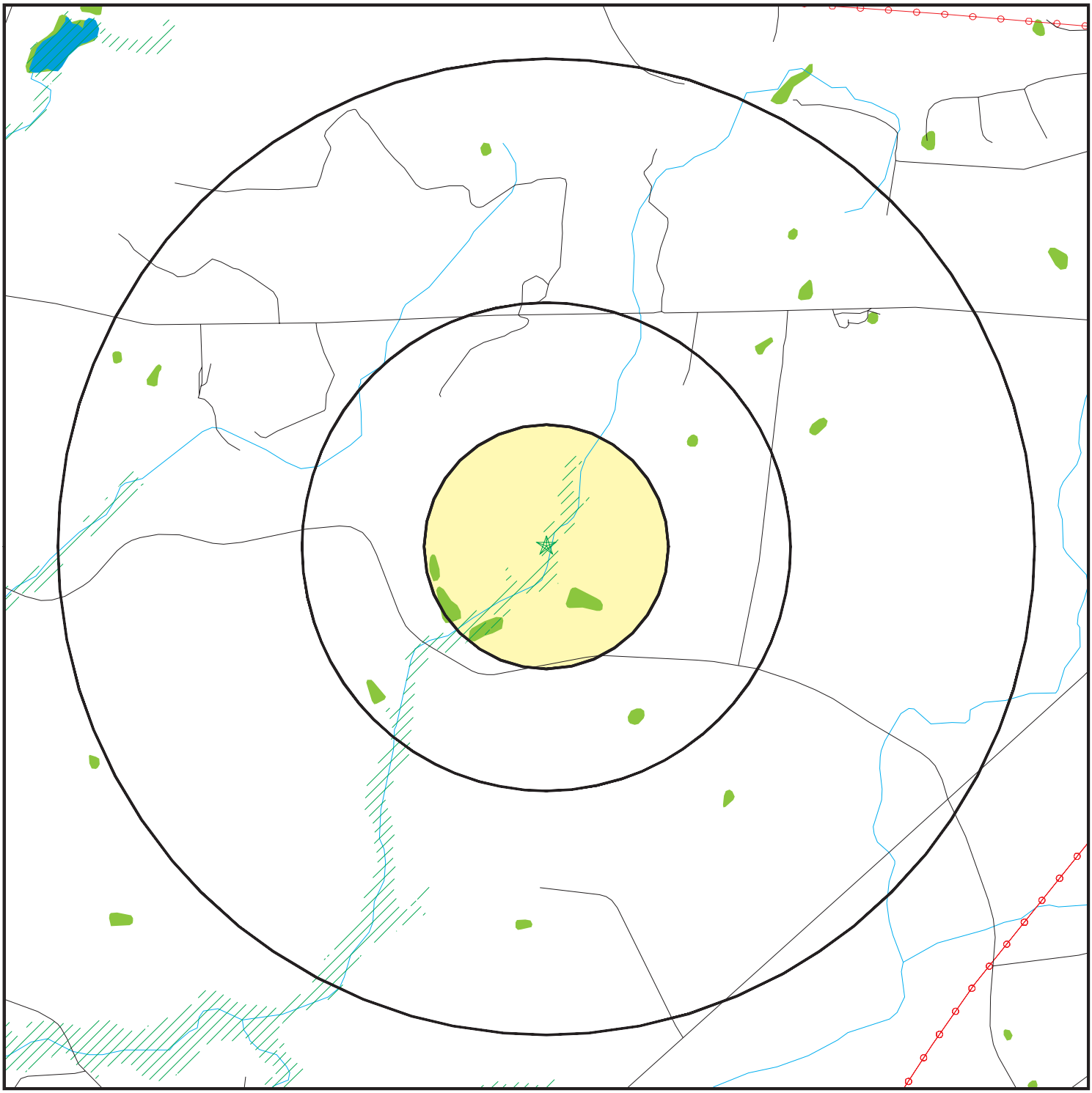
Surrounding sites were not identified.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 5704558.2S

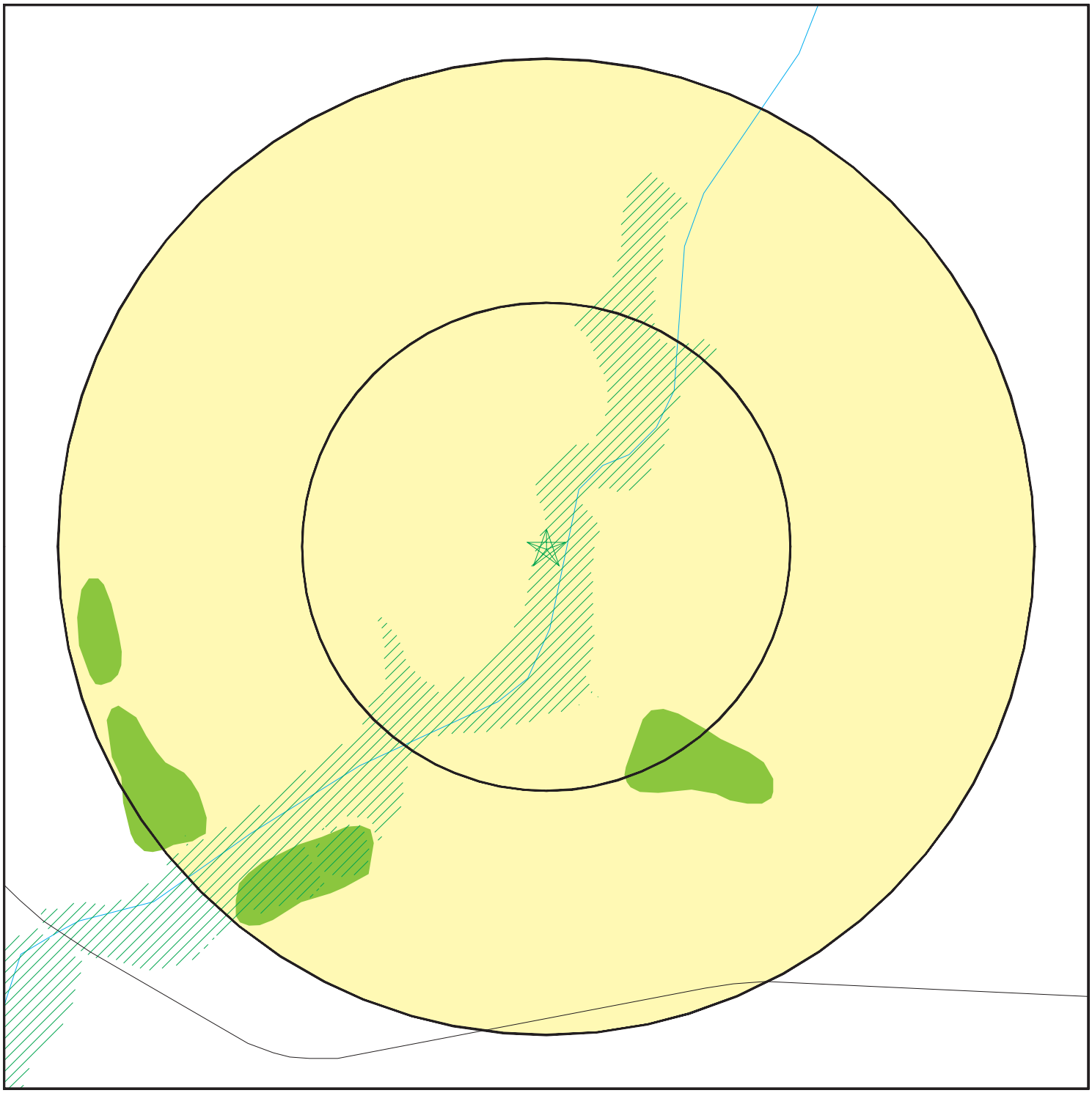


- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Hazardous Substance Disposal Sites

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:	Nesbit	CLIENT:	Restoration Systems, LLC
ADDRESS:	4321 Nesbit Rd. Monroe NC 28112	CONTACT:	JD Hamby
LAT/LONG:	34.8936 / 80.6544	INQUIRY #:	5704558.2s
		DATE:	July 01, 2019 4:50 pm

DETAIL MAP - 5704558.2S



- 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
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Hazardous Substance Disposal Sites

N

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

SITE NAME: Nesbit	CLIENT: Restoration Systems, LLC
ADDRESS: 4321 Nesbit Rd. Monroe NC 28112	CONTACT: JD Hamby
LAT/LONG: 34.8936 / 80.6544	INQUIRY #: 5704558.2s
	DATE: July 01, 2019 4:51 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
NC HSDS	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
OLI	0.500		0	0	0	NR	NR	0
DEBRIS	0.500		0	0	0	NR	NR	0
LCID	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0
LAST	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
LUST TRUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	0	0	NR	NR	0
HIST LF	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
IMD	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
SPILLS 90	TP		NR	NR	NR	NR	NR	0
SPILLS 80	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
ASBESTOS	TP		NR	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
AOP	TP		NR	NR	NR	NR	NR	0
PCSRP	0.500		0	0	0	NR	NR	0
SEPT HAULERS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
CCB	0.500		0	0	0	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	TP		NR	NR	NR	NR	NR	0
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

MAP FINDINGS

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number

NO SITES FOUND

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 06/06/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

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

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

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

Date of Government Version: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 06/06/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

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

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 06/06/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

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

Date of Government Version: 04/03/2019
Date Data Arrived at EDR: 04/05/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/05/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/23/2019
Number of Days to Update: 35

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/06/2019
Next Scheduled EDR Contact: 07/29/2019
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/23/2019
Number of Days to Update: 35

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/06/2019
Next Scheduled EDR Contact: 07/29/2019
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

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

Date of Government Version: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

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

Date of Government Version: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

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

Date of Government Version: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

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

Date of Government Version: 02/22/2019
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 41

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 05/10/2019
Next Scheduled EDR Contact: 08/26/2019
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

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

Date of Government Version: 01/31/2019
Date Data Arrived at EDR: 02/04/2019
Date Made Active in Reports: 03/08/2019
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/29/2019
Next Scheduled EDR Contact: 09/09/2019
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

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

Date of Government Version: 01/31/2019
Date Data Arrived at EDR: 02/04/2019
Date Made Active in Reports: 03/08/2019
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/29/2019
Next Scheduled EDR Contact: 09/09/2019
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/25/2019
Date Data Arrived at EDR: 03/26/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 36

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Quarterly

State- and tribal - equivalent NPL

HSDS: Hazardous Substance Disposal Site

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

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

Source: North Carolina Center for Geographic Information and Analysis
Telephone: 919-754-6580
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Biennially

State- and tribal - equivalent CERCLIS

SHWS: Inactive Hazardous Sites Inventory

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

Date of Government Version: 02/08/2019
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 05/17/2019
Number of Days to Update: 65

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 06/12/2019
Next Scheduled EDR Contact: 09/23/2019
Data Release Frequency: Quarterly

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

SWF/LF: List of Solid Waste Facilities

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

Date of Government Version: 10/05/2018
Date Data Arrived at EDR: 12/26/2018
Date Made Active in Reports: 02/05/2019
Number of Days to Update: 41

Source: Department of Environment and Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Varies

OLI: Old Landfill Inventory

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

Date of Government Version: 10/09/2018
Date Data Arrived at EDR: 01/15/2019
Date Made Active in Reports: 03/26/2019
Number of Days to Update: 70

Source: Department of Environment & Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 04/12/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Varies

DEBRIS: Solid Waste Active Disaster Debris Sites Listing
NCDEQ Division of Waste Management Solid Waste Section Temporary Disaster Debris Staging Site (TDDSS) Locations which are available to be activated in a disaster or emergency.. Disaster Debris Sites can only be used for temporary disaster debris storage if the site's responsible party activates the site for use by notifying the NCDEQ DWM Solid Waste Section staff during an emergency

Date of Government Version: 03/19/2019
Date Data Arrived at EDR: 03/20/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 57
Source: Department of Environmental Quality
Telephone: 919-707-8247
Last EDR Contact: 06/19/2019
Next Scheduled EDR Contact: 09/30/2019
Data Release Frequency: Varies

LCID: Land-Clearing and Inert Debris (LCID) Landfill Notifications
A list all of the Land-Clearing and Inert Debris (LCID) Landfill Notification facilities (under 2 acres in size) in North Carolina.

Date of Government Version: 09/06/2018
Date Data Arrived at EDR: 01/09/2019
Date Made Active in Reports: 03/25/2019
Number of Days to Update: 75
Source: Department of Environmental Quality
Telephone: 919-707-8248
Last EDR Contact: 04/12/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LAST: Leaking Aboveground Storage Tanks
A listing of leaking aboveground storage tank site locations.

Date of Government Version: 02/01/2019
Date Data Arrived at EDR: 02/06/2019
Date Made Active in Reports: 03/25/2019
Number of Days to Update: 47
Source: Department of Environment & Natural Resources
Telephone: 877-623-6748
Last EDR Contact: 05/08/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Quarterly

LUST: Regional UST Database
This database contains information obtained from the Regional Offices. It provides a more detailed explanation of current and historic activity for individual sites, as well as what was previously found in the Incident Management Database. Sites in this database with Incident Numbers are considered LUSTs.

Date of Government Version: 02/01/2019
Date Data Arrived at EDR: 02/06/2019
Date Made Active in Reports: 03/25/2019
Number of Days to Update: 47
Source: Department of Environment and Natural Resources
Telephone: 919-707-8200
Last EDR Contact: 05/08/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Quarterly

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

Date of Government Version: 11/01/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 09/24/2018
Date Data Arrived at EDR: 03/12/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 50
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 10/10/2018
Date Data Arrived at EDR: 03/08/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

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

Date of Government Version: 10/12/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 02/19/2019
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/16/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

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

Date of Government Version: 10/13/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 10/17/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

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

Date of Government Version: 04/05/2019
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/17/2019
Number of Days to Update: 37

Source: Department of Environment and Natural Resources
Telephone: 919-733-1315
Last EDR Contact: 04/10/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 05/15/2017
Date Data Arrived at EDR: 05/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 136
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/25/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Varies

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

Date of Government Version: 02/01/2019
Date Data Arrived at EDR: 02/06/2019
Date Made Active in Reports: 03/25/2019
Number of Days to Update: 47
Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 05/09/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Quarterly

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

Date of Government Version: 03/08/2019
Date Data Arrived at EDR: 03/21/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 56
Source: Department of Environment and Natural Resources
Telephone: 919-715-6183
Last EDR Contact: 06/17/2019
Next Scheduled EDR Contact: 09/30/2019
Data Release Frequency: Semi-Annually

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 11/01/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55
Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 11/07/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 10/16/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55
Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 09/24/2018
Date Data Arrived at EDR: 03/12/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 50

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 10/12/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

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

Date of Government Version: 10/17/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/03/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 10/10/2018
Date Data Arrived at EDR: 03/08/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 54

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: No Further Action Sites With Land Use Restrictions Monitoring

A land use restricted site is a property where there are limits or requirements on future use of the property due to varying levels of cleanup possible, practical, or necessary at the site.

Date of Government Version: 12/19/2018
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 05/17/2019
Number of Days to Update: 65

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 06/12/2019
Next Scheduled EDR Contact: 09/23/2019
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

VCP: Responsible Party Voluntary Action Sites
Responsible Party Voluntary Action site locations.

Date of Government Version: 02/08/2019
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 05/17/2019
Number of Days to Update: 65

Source: Department of Environment and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 06/12/2019
Next Scheduled EDR Contact: 09/23/2019
Data Release Frequency: Quarterly

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 06/20/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Projects Inventory
A brownfield site is an abandoned, idled, or underused property where the threat of environmental contamination has hindered its redevelopment. All of the sites in the inventory are working toward a brownfield agreement for cleanup and liabitliy control.

Date of Government Version: 04/01/2019
Date Data Arrived at EDR: 04/03/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 43

Source: Department of Environment and Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 04/03/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 12/17/2018
Date Data Arrived at EDR: 12/18/2018
Date Made Active in Reports: 01/11/2019
Number of Days to Update: 24

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/04/2019
Next Scheduled EDR Contact: 09/30/2019
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY: Recycling Center Listing
A listing of recycling center locations.

Date of Government Version: 01/28/2019
Date Data Arrived at EDR: 01/29/2019
Date Made Active in Reports: 03/26/2019
Number of Days to Update: 56

Source: Department of Environment & Natural Resources
Telephone: 919-707-8137
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Varies

HIST LF: Solid Waste Facility Listing
A listing of solid waste facilities.

Date of Government Version: 11/06/2006
Date Data Arrived at EDR: 02/13/2007
Date Made Active in Reports: 03/02/2007
Number of Days to Update: 17

Source: Department of Environment & Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 01/19/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 04/23/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 02/24/2019
Date Data Arrived at EDR: 02/26/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 50

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/24/2019
Next Scheduled EDR Contact: 09/09/2019
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/24/2019
Date Data Arrived at EDR: 02/26/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 50

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/24/2019
Next Scheduled EDR Contact: 09/09/2019
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/23/2019
Number of Days to Update: 35

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 06/06/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 03/25/2019
Date Data Arrived at EDR: 03/26/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 49

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Quarterly

SPILLS: Spills Incident Listing

A listing spills, hazardous material releases, sanitary sewer overflows, wastewater treatment plant bypasses and upsets, citizen complaints, and any other environmental emergency calls reported to the agency.

Date of Government Version: 12/12/2018
Date Data Arrived at EDR: 12/17/2018
Date Made Active in Reports: 12/18/2018
Number of Days to Update: 1

Source: Department of Environment & Natural Resources
Telephone: 919-807-6308
Last EDR Contact: 06/20/2019
Next Scheduled EDR Contact: 09/23/2019
Data Release Frequency: Quarterly

IMD: Incident Management Database

Groundwater and/or soil contamination incidents

Date of Government Version: 07/21/2006
Date Data Arrived at EDR: 08/01/2006
Date Made Active in Reports: 08/23/2006
Number of Days to Update: 22

Source: Department of Environment and Natural Resources
Telephone: 877-623-6748
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 09/27/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/06/2013
Number of Days to Update: 62

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SPILLS 80: SPILLS80 data from FirstSearch

Spills 80 includes those spill and release records available from FirstSearch databases prior to 1990. Typically, they may include chemical, oil and/or hazardous substance spills recorded before 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 80.

Date of Government Version: 06/14/2001
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/06/2013
Number of Days to Update: 62

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 03/07/2019
Date Data Arrived at EDR: 04/03/2019
Date Made Active in Reports: 05/23/2019
Number of Days to Update: 50

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 05/21/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/12/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/12/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 05/13/2019
Next Scheduled EDR Contact: 08/26/2019
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 03/25/2019
Date Data Arrived at EDR: 03/26/2019
Date Made Active in Reports: 05/07/2019
Number of Days to Update: 42

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 05/06/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 05/10/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/21/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 198

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/18/2019
Next Scheduled EDR Contact: 09/30/2019
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 01/10/2018
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 2

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/24/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 04/24/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/23/2019
Number of Days to Update: 35

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 06/06/2019
Next Scheduled EDR Contact: 09/16/2019
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 04/25/2019
Date Data Arrived at EDR: 05/02/2019
Date Made Active in Reports: 05/23/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/23/2019
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 06/06/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 03/20/2019
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 34

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/10/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 04/08/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/2016
Date Data Arrived at EDR: 09/08/2016
Date Made Active in Reports: 10/21/2016
Number of Days to Update: 43
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 06/07/2019
Next Scheduled EDR Contact: 09/16/2019
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/07/2019
Next Scheduled EDR Contact: 09/16/2019
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 05/24/2017
Date Data Arrived at EDR: 11/30/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 15
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 04/02/2019
Date Data Arrived at EDR: 04/02/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 42

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/02/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 12/03/2018
Date Data Arrived at EDR: 01/29/2019
Date Made Active in Reports: 03/21/2019
Number of Days to Update: 51

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 04/30/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Quarterly

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 03/31/2019
Date Data Arrived at EDR: 04/23/2019
Date Made Active in Reports: 05/23/2019
Number of Days to Update: 30

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 04/05/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 06/26/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/11/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 08/08/2017
Date Data Arrived at EDR: 09/11/2018
Date Made Active in Reports: 09/14/2018
Number of Days to Update: 3

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 05/02/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 06/23/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 11/03/2017
Number of Days to Update: 23

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 05/24/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 26

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 06/06/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 11/27/2018
Date Data Arrived at EDR: 02/27/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 33

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 05/29/2019
Next Scheduled EDR Contact: 09/09/2019
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 05/31/2019
Next Scheduled EDR Contact: 09/09/2019
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 05/31/2019
Next Scheduled EDR Contact: 09/09/2019
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 03/27/2019
Date Data Arrived at EDR: 03/28/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 34

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 06/19/2019
Next Scheduled EDR Contact: 09/23/2019
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 02/15/2019
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 03/15/2019
Number of Days to Update: 10

Source: EPA
Telephone: (404) 562-9900
Last EDR Contact: 06/05/2019
Next Scheduled EDR Contact: 09/16/2019
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 07/26/2018
Date Made Active in Reports: 10/05/2018
Number of Days to Update: 71

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 05/24/2019
Next Scheduled EDR Contact: 09/09/2019
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 01/17/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 74

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 04/15/2019
Next Scheduled EDR Contact: 07/29/2019
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 04/07/2019
Date Data Arrived at EDR: 04/09/2019
Date Made Active in Reports: 05/23/2019
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 04/09/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Quarterly

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 02/19/2019
Date Data Arrived at EDR: 02/21/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 39

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 05/21/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Quarterly

AIRS: Air Quality Permit Listing

A listing of facilities with air quality permits.

Date of Government Version: 03/11/2019
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 64

Source: Department of Environmental Quality
Telephone: 919-707-8726
Last EDR Contact: 06/12/2019
Next Scheduled EDR Contact: 09/23/2019
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ASBESTOS: ASBESTOS
Asbestos notification sites

Date of Government Version: 01/31/2019
Date Data Arrived at EDR: 02/08/2019
Date Made Active in Reports: 03/25/2019
Number of Days to Update: 45

Source: Department of Health & Human Services
Telephone: 919-707-5973
Last EDR Contact: 06/03/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites
A listing of coal combustion products distribution permits issued by the Division for the treatment, storage, transportation, use and disposal of coal combustion products.

Date of Government Version: 02/25/2019
Date Data Arrived at EDR: 02/28/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 77

Source: Department of Environment & Natural Resources
Telephone: 919-807-6359
Last EDR Contact: 06/24/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Varies

DRYCLEANERS: Drycleaning Sites
Potential and known drycleaning sites, active and abandoned, that the Drycleaning Solvent Cleanup Program has knowledge of and entered into this database.

Date of Government Version: 10/24/2018
Date Data Arrived at EDR: 03/20/2019
Date Made Active in Reports: 05/17/2019
Number of Days to Update: 58

Source: Department of Environment & Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 06/21/2019
Next Scheduled EDR Contact: 09/30/2019
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing
A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 11/02/2018
Date Data Arrived at EDR: 11/07/2018
Date Made Active in Reports: 11/19/2018
Number of Days to Update: 12

Source: Department of Environment & Natural Resources
Telephone: 919-733-1322
Last EDR Contact: 05/08/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Quarterly

Financial Assurance 2: Financial Assurance Information Listing
Information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 10/02/2012
Date Data Arrived at EDR: 10/03/2012
Date Made Active in Reports: 10/26/2012
Number of Days to Update: 23

Source: Department of Environmental & Natural Resources
Telephone: 919-508-8496
Last EDR Contact: 06/20/2019
Next Scheduled EDR Contact: 10/07/2019
Data Release Frequency: Varies

Financial Assurance 3: Financial Assurance Information
Hazardous waste financial assurance information.

Date of Government Version: 06/11/2018
Date Data Arrived at EDR: 06/12/2018
Date Made Active in Reports: 07/25/2018
Number of Days to Update: 43

Source: Department of Environment & Natural Resources
Telephone: 919-707-8222
Last EDR Contact: 06/10/2019
Next Scheduled EDR Contact: 09/23/2019
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NPDES: NPDES Facility Location Listing
General information regarding NPDES(National Pollutant Discharge Elimination System) permits.

Date of Government Version: 01/03/2019
Date Data Arrived at EDR: 01/30/2019
Date Made Active in Reports: 03/27/2019
Number of Days to Update: 56

Source: Department of Environment & Natural Resources
Telephone: 919-733-7015
Last EDR Contact: 05/01/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Varies

UIC: Underground Injection Wells Listing
A listing of uncerground injection wells locations.

Date of Government Version: 03/05/2019
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/17/2019
Number of Days to Update: 71

Source: Department of Environment & Natural Resources
Telephone: 919-807-6412
Last EDR Contact: 06/03/2019
Next Scheduled EDR Contact: 09/16/2019
Data Release Frequency: Quarterly

AOP: Animal Operation Permits Listing
This listing includes animal operations that are required to be permitted by the state.

Date of Government Version: 02/12/2019
Date Data Arrived at EDR: 03/15/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 62

Source: Department of Environmental Quality
Telephone: 919-707-9129
Last EDR Contact: 06/14/2019
Next Scheduled EDR Contact: 09/23/2019
Data Release Frequency: Varies

PCSRP: Petroleum-Contaminated Soil Remediation Permits
To treat petroleum-contaminated soil in order to protect North Carolinaa??s environment and the health of the citizens of North Carolina.

Date of Government Version: 01/08/2019
Date Data Arrived at EDR: 01/09/2019
Date Made Active in Reports: 03/26/2019
Number of Days to Update: 76

Source: Department of Environmental Quality
Telephone: 919-707-8248
Last EDR Contact: 04/12/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Varies

CCB: Coal Ash Structural Fills (CCB) Listing
These are not permitted Coal Ash landfills A list all of the now closed Coal Ash Structural Fills (CCB) in North Carolina, in point data form. The purpose is to provide the public and other government entities a visual overview of coal ash structural fills throughout the state and increase public awareness of their current locations.

Date of Government Version: 09/06/2018
Date Data Arrived at EDR: 01/09/2019
Date Made Active in Reports: 03/25/2019
Number of Days to Update: 75

Source: Department of Environmental Quality
Telephone: 919-707-8248
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Varies

SEPT HAULERS: Permitted Septage Haulers Listing
This list of all active and permitted Septage Land Application Site (SLAS) and Septage Detention and Treatment Facility (SDTF) sites in North Carolina. The purpose of this map is to provide the public and government entities a visual overview of the businesses that manage septage and septage facilities throughout the state.

Date of Government Version: 07/23/2018
Date Data Arrived at EDR: 10/19/2018
Date Made Active in Reports: 01/04/2019
Number of Days to Update: 77

Source: Department of Environmental Quality
Telephone: 919-707-8248
Last EDR Contact: 04/12/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/24/2013
Number of Days to Update: 176

Source: Department of Environment, Health and Natural Resources
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Environment, Health and Natural Resources
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/20/2013
Number of Days to Update: 172

Source: Department of Environment, Health and Natural Resources
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 02/11/2019
Date Data Arrived at EDR: 02/12/2019
Date Made Active in Reports: 03/04/2019
Number of Days to Update: 20

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 05/14/2019
Next Scheduled EDR Contact: 08/26/2019
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 04/10/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 01/01/2019
Date Data Arrived at EDR: 05/01/2019
Date Made Active in Reports: 06/21/2019
Number of Days to Update: 51

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/01/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 10/23/2018
Date Made Active in Reports: 11/27/2018
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 04/15/2019
Next Scheduled EDR Contact: 07/29/2019
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 02/23/2018
Date Made Active in Reports: 04/09/2018
Number of Days to Update: 45

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 05/17/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 06/15/2018
Date Made Active in Reports: 07/09/2018
Number of Days to Update: 24

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 06/10/2019
Next Scheduled EDR Contact: 09/23/2019
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: PennWell Corporation
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data
Source: PennWell Corporation
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Facility List
Source: Department of Health & Human Services
Telephone: 919-662-4499

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: US Fish & Wildlife Service
Telephone: 703-358-2171

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

NESBIT
4321 NESBIT RD.
MONROE, NC 28112

TARGET PROPERTY COORDINATES

Latitude (North):	34.8936 - 34° 53' 36.96''
Longitude (West):	80.6544 - 80° 39' 15.84''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	531578.1
UTM Y (Meters):	3861101.0
Elevation:	655 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5946503 WAXHAW, NC
Version Date:	2013

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

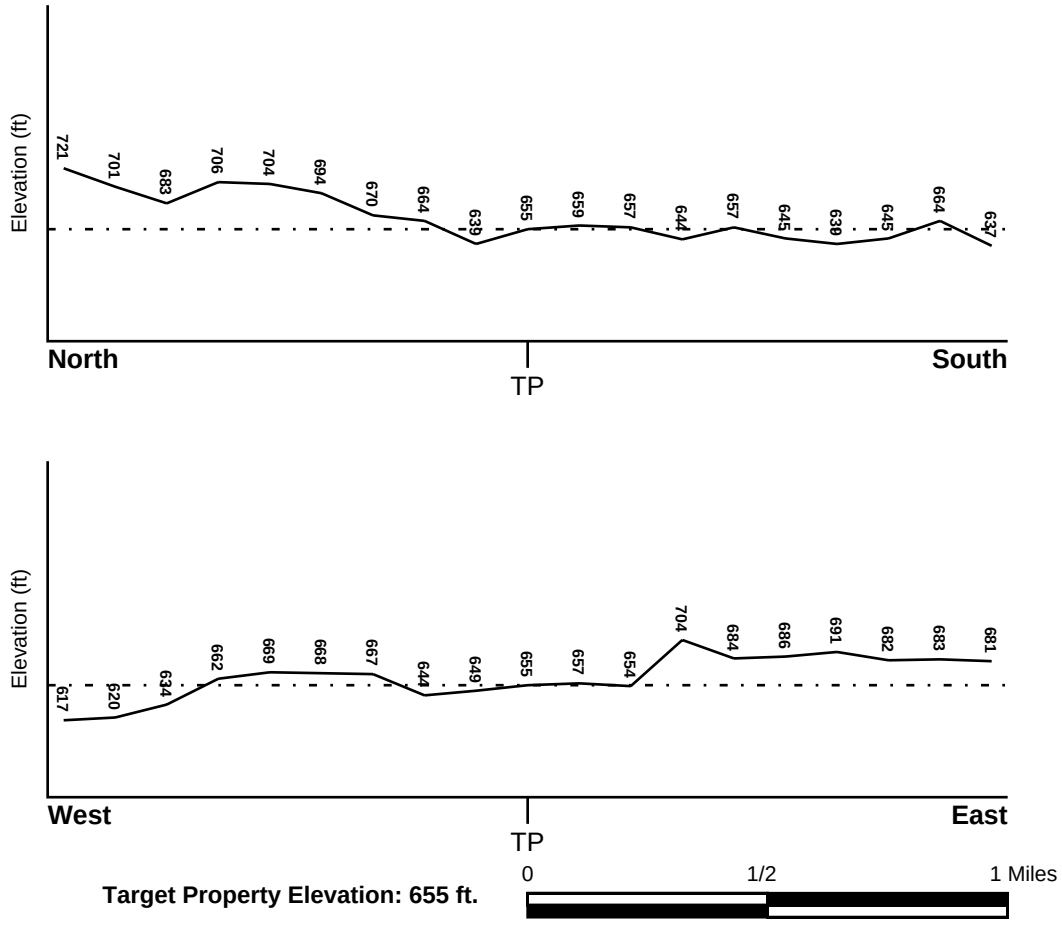
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General WSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
3710540200J	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
3710449200J	FEMA FIRM Flood data
3710540000J	FEMA FIRM Flood data
3710448000J	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
WAXHAW	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

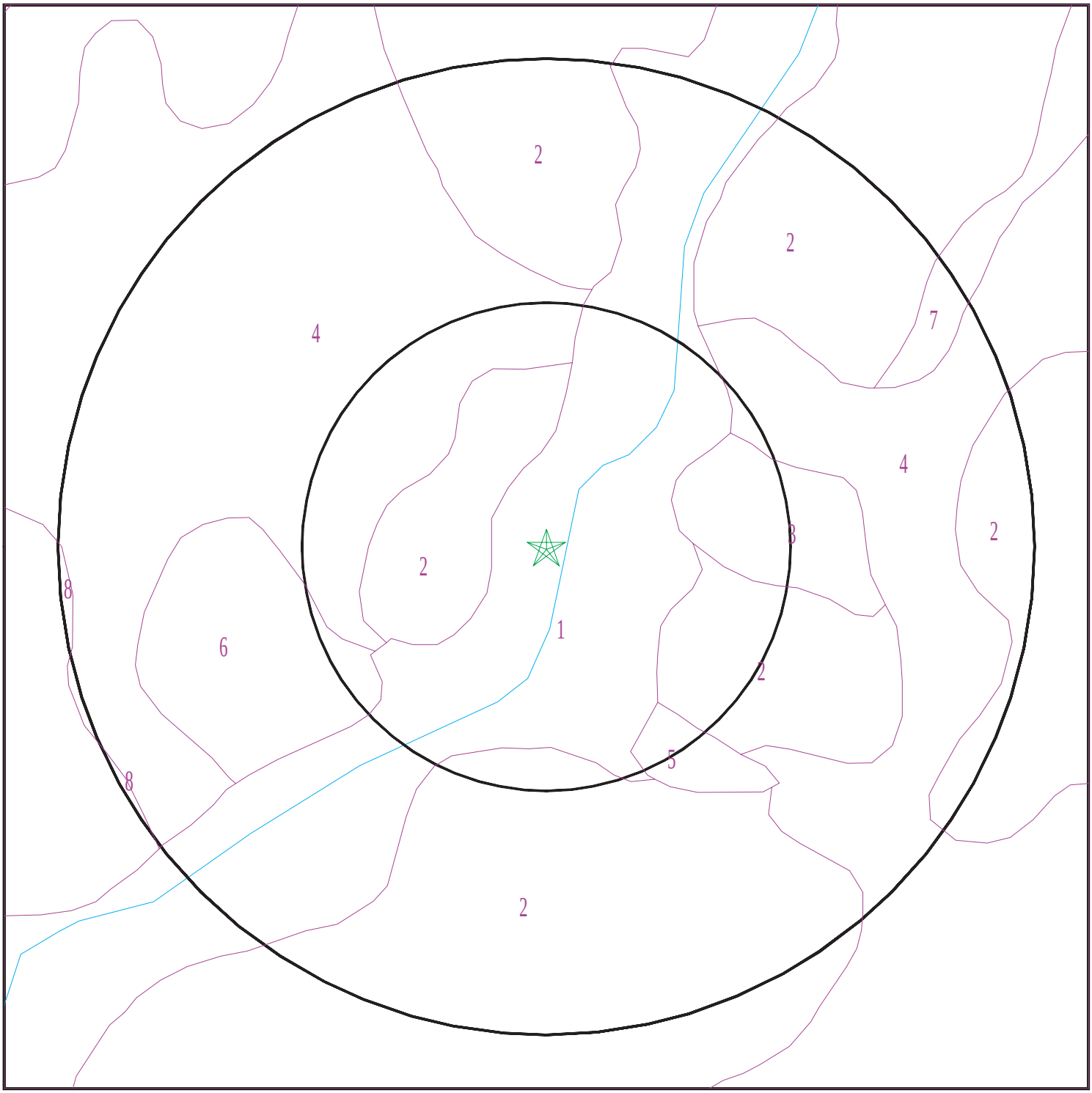
Era:	Paleozoic
System:	Cambrian
Series:	Cambrian
Code:	Ce *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Eugeosynclinal Deposits

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 5704558.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Nesbit	CLIENT:	Restoration Systems, LLC
ADDRESS:	4321 Nesbit Rd. Monroe NC 28112	CONTACT:	JD Hamby
LAT/LONG:	34.8936 / 80.6544	INQUIRY #:	5704558.2s
		DATE:	July 01, 2019 4:51 pm

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Secrest

Soil Surface Texture: silt loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Moderately well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 77 inches

Depth to Watertable Min: > 61 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:
2	11 inches	42 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:
3	42 inches	53 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:
4	53 inches	61 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
5	61 inches	66 inches	unweathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:

Soil Map ID: 2

Soil Component Name: Tatum

Soil Surface Texture: gravelly silty clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	gravelly silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 14 Min: 0	Max: Min:
2	5 inches	44 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 14 Min: 0	Max: Min:

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
3	44 inches	53 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 14 Min: 0	Max: Min:

Soil Map ID: 3

Soil Component Name: Zion

Soil Surface Texture: gravelly loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 77 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	gravelly loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 0.07 Min: 0	Max: Min:
2	7 inches	25 inches	gravelly clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 0.07 Min: 0	Max: Min:

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
3	25 inches	29 inches	gravelly clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 0.07 Min: 0	Max: Min:
4	29 inches	33 inches	unweathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 0.07 Min: 0	Max: Min:

Soil Map ID: 4

Soil Component Name: Cid

Soil Surface Texture: channery silt loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 77 inches

Depth to Watertable Min: > 61 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	channery silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	9 inches	22 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:
3	22 inches	27 inches	channery silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:
4	27 inches	31 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:
5	31 inches	35 inches	unweathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:

Soil Map ID: 5

Soil Component Name: Water

Soil Surface Texture: channery silt loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Map ID: 6

Soil Component Name: Badin

Soil Surface Texture: silty clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 5.5 Min: 3.5
2	5 inches	19 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 5.5 Min: 3.5
3	27 inches	42 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 5.5 Min: 3.5
4	42 inches	59 inches	unweathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 5.5 Min: 3.5
5	19 inches	27 inches	channery silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 5.5 Min: 3.5

Soil Map ID: 7

Soil Component Name: Tatum

Soil Surface Texture: gravelly silt loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	gravelly silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:
2	7 inches	42 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:
3	42 inches	53 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:

Soil Map ID: 8

Soil Component Name: Tatum

Soil Surface Texture: gravelly silt loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	gravelly silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:
2	7 inches	42 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:
3	42 inches	53 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: 14 Min: 0	Max: Min:

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

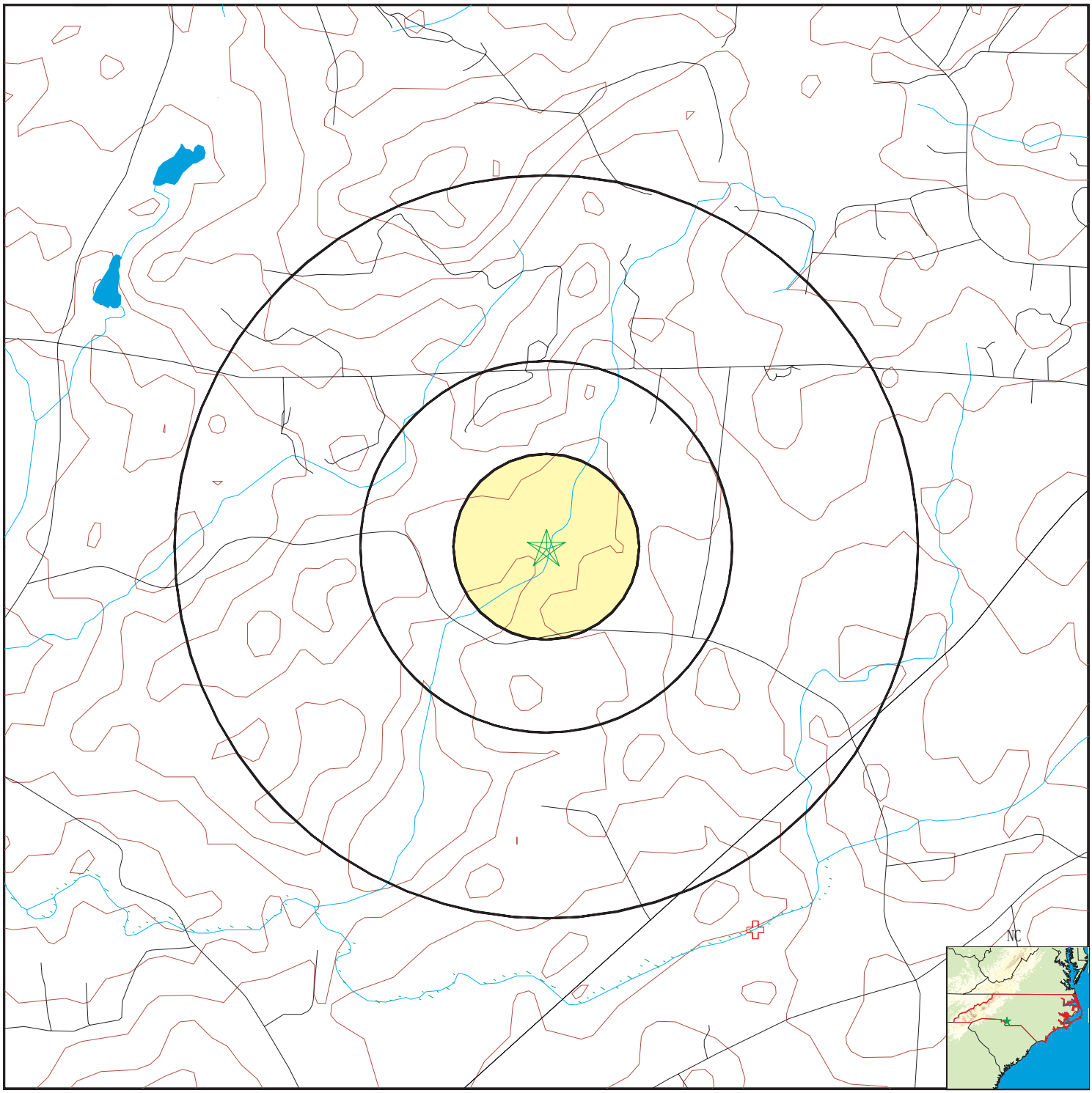
Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

OTHER STATE DATABASE INFORMATION

PHYSICAL SETTING SOURCE MAP - 5704558.2s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- Wildlife Areas
- Natural Areas
- Rare & Endangered Species

SITE NAME: Nesbit	CLIENT: Restoration Systems, LLC
ADDRESS: 4321 Nesbit Rd.	CONTACT: JD Hamby
Monroe NC 28112	INQUIRY #: 5704558.2s
LAT/LONG: 34.8936 / 80.6544	DATE: July 01, 2019 4:51 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

NC_NHEO NC50003029

Elclass:	I	Precision1:	S
Eostat:	E	Gisid:	22499
Edr id:	NC50003029		

NC_NHEO NC50022774

Elclass:	I	Precision1:	S
Eostat:	E	Gisid:	22499
Edr id:	NC50022774		

NC_SNHA NC10001560

Acres:	50.5	Sitename:	WAXHAW CREEK AQUATIC HABITAT
Quality type:	Not Reported	Sig:	A
Site id:	1560	Edr id:	NC10001560

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for UNION County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for UNION COUNTY, NC

Number of sites tested: 4

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.575 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: US Fish & Wildlife Service
Telephone: 703-358-2171

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

North Carolina Public Water Supply Wells
Source: Department of Environmental Health
Telephone: 919-715-3243

OTHER STATE DATABASE INFORMATION

North Carolina Wildlife Resources/Game Lands
Source: Center for Geographic Information and Analysis
Telephone: 919-733-2090
All publicly owned game lands managed by the North Carolina Wildlife Resources Commission and as listed in Hunting and Fishing Maps.

NC Natural Heritage Sites: Natural Heritage Element Occurrence Sites
Source: Natural Heritage Occurrence Sites Center for Geographic Information and Analysis
Telephone: 919-733-2090
A point coverage identifying locations of rare and endangered species, occurrences of exemplary or unique natural ecosystems (terrestrial or aquatic), and special animal habitats (e.g., colonial waterbird nesting sites).

NC Natural Areas: Significant Natural Heritage Areas
Source: Center for Geographic Information and Analysis
Telephone: 919-733-2090
A polygon converage identifying sites (terrestrial or aquatic) that have particular biodiversity significance. A site's significance may be due to the presenceof rare species, rare or high quality natural communities, or other important ecological features.

RADON

State Database: NC Radon
Source: Department of Environment & Natural Resources
Telephone: 919-733-4984
Radon Statistical and Non Statiscal Data

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

STREET AND ADDRESS INFORMATION

Appendix F: FEMA Coordination

From:	Grant Lewis
To:	brian.hawkins@unioncountync.gov
Cc:	Matthew Harrell
Subject:	Nesbit Stream and Wetland Restoration Site Floodplain Mapping Coordination
Date:	Thursday, May 14, 2020 3:21:00 PM
Attachments:	Nesbit_FEMA_Coordination.pdf

Hello Brian;

I am doing a stream and wetland restoration project in Union County and need to coordinate with you all concerning floodplain mapping. The project is being conducted with the NC Division of Mitigation Services. Part of the due diligence is getting a DMS floodplain checklist signed by the local floodplain administrator. I looked on the Union County website and believe you are the proper person to coordinate with. If not, can you please forward this to the proper authority?

For my coordination, can you please review the attached information and sign/fill out the last page of the NCDMS floodplain checklist and return to my attention?

Thank you for your time.

Grant Lewis

Grant Lewis
Senior Project Manager
Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603
glewis@axiomenvironmental.org
(919) 215-1693 (cell)

Axiom Environmental, Inc.

Axiom Environmental, Inc.

218 Snow Avenue, Raleigh, North Carolina 27603 919-215-1693

May 14, 2020

Brian Hawkins, PE, CFM
Union County Stormwater Engineer
500 N Main Street, Suite 70
Monroe, NC 28112

Re: Nesbit Stream and Wetland mitigation project
Union County **20-007**
FEMA Floodplain Requirements Checklist

Dear Mr. Hawkins:

The purpose of this letter is to request concurrence from the Union County concerning a stream and wetland restoration site located in Union County. The Site encompasses approximately 18.0 acres of agriculture land used for row crops along Glen Branch and unnamed tributaries to Glen Branch. Proposed activities at the Site include the restoration of perennial stream channels and riparian wetlands.

Stream reaches are depicted on the attached figures and lengths/priority are as follows:

Reach	**Length**	**Priority**
Glen Branch	4115	Restoration and Enhancement (Level I)
UT 1A	314	Enhancement (Level II)
UT 1	917	Restoration and Enhancement (Level I and II)
UT 2	309	Restoration and Enhancement (Level II)

FEMA mapping was reviewed to determine if the project is located in a FEMA study area (DFIRM panel numbers 5402 and 5400). Based on existing floodplain mapping, Glen Branch and its floodplain are characterized as a Zone AE Flood Zone. We request guidance from your organization as to how to mover forward with the project.

We thank you in advance for your timely response and cooperation. Please feel free to contact the below referenced NC DMS Project Manager with any questions that you may have concerning the extent of site disturbance associated with this project.

Yours truly,

AXIOM ENVIRONMENTAL

W. Grant Lewis
Senior Project Manager

Attachments

- Figure 1 Site Location
- Figure 2 Hydrologic Unit Map
- Figure 3 Topography and Drainage Area
- Figure 4 Existing Conditions
- Figure 5 Reference Reach
- Figure 6 Proposed Conditions
- EEP Floodplain Requirements Checklist

Cc Matthew Harrel

EEP Floodplain Requirements Checklist

This form was developed by the National Flood Insurance program, NC Floodplain Mapping program and Ecosystem Enhancement Program to be filled for all EEP projects. The form is intended to summarize the floodplain requirements during the design phase of the projects. The form should be submitted to the Local Floodplain Administrator with three copies submitted to NFIP (attn. State NFIP Engineer), NC Floodplain Mapping Unit (attn. State NFIP Coordinator) and NC Ecosystem Enhancement Program.

Project Location

Name of project:	Nesbit Site
Name if stream or feature:	Glen Branch
County:	Union
Name of river basin:	Catawba
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Monroe/Union
DFIRM panel number for entire site:	5402 and 5400
Consultant name:	Axiom Environmental, Inc.
Phone number:	919-215-1693
Address:	218 Snow Avenue Raleigh, NC 27603

Design Information

Provide a general description of project (one paragraph). Include project limits on a reference orthophotograph at a scale of 1" = 500". (See Attached)

Summarize stream reaches or wetland areas according to their restoration priority.
(See Attached)

Example

Reach	Length	Priority
Example: Reach A	*1000*	*One (Restoration)*
Example: Reach B	*2000*	*Three (Enhancement)*

Floodplain Information

Is project located in a Special Flood Hazard Area (SFHA)?

☑ Yes ☐ No The lower reaches

If project is located in a SFHA, check how it was determined:

☐ Redelineation

☐ Detailed Study

☐ Limited Detail Study

☐ Approximate Study

☑ Don't know

List flood zone designation:

Check if applies:

☑ AE Zone

- ☑ Floodway
- ☐ Non-Encroachment
- ☐ None

☐ A Zone

- ☐ Local Setbacks Required
- ☐ No Local Setbacks Required

If local setbacks are required, list how many feet:

Does proposed channel boundary encroach outside floodway/non-encroachment/setbacks?

☐ Yes ☑ No

Land Acquisition (Check)

☐ State owned (fee simple)

☐ Conservation easment (Design Bid Build)

☑ Conservation Easement (Full Delivery Project)

Note: if the project property is state-owned, then all requirements should be addressed to the Department of Administration, State Construction Office (attn: Herbert Neily, (919) 807-4101)

Is community/county participating in the NFIP program?

☑ Yes ☐ No

Note: if community is not participating, then all requirements should be addressed to NFIP (attn: State NFIP Engineer, (919) 715-8000

Name of Local Floodplain Administrator: Brian Hawkins
Phone Number: 704-283-3942

Floodplain Requirements

This section to be filled by designer/applicant following verification with the LFPA

☐ No Action

☐ No Rise

☐ Letter of Map Revision

☐ Conditional Letter of Map Revision

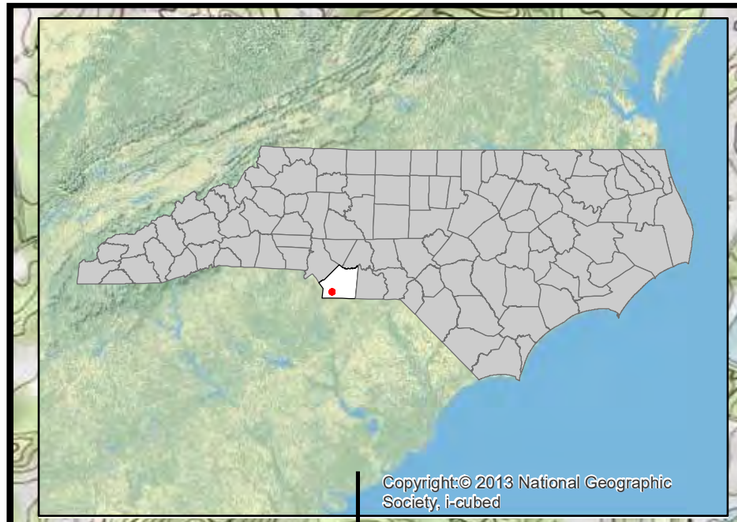
☐ Other Requirements

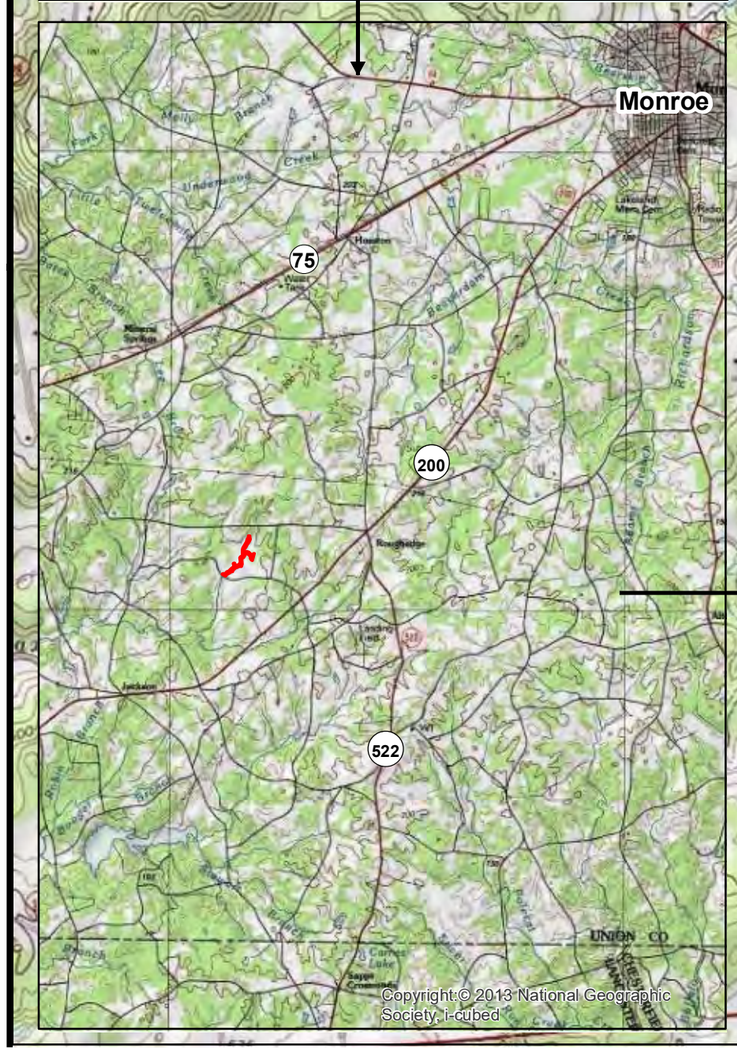
List other requirements:

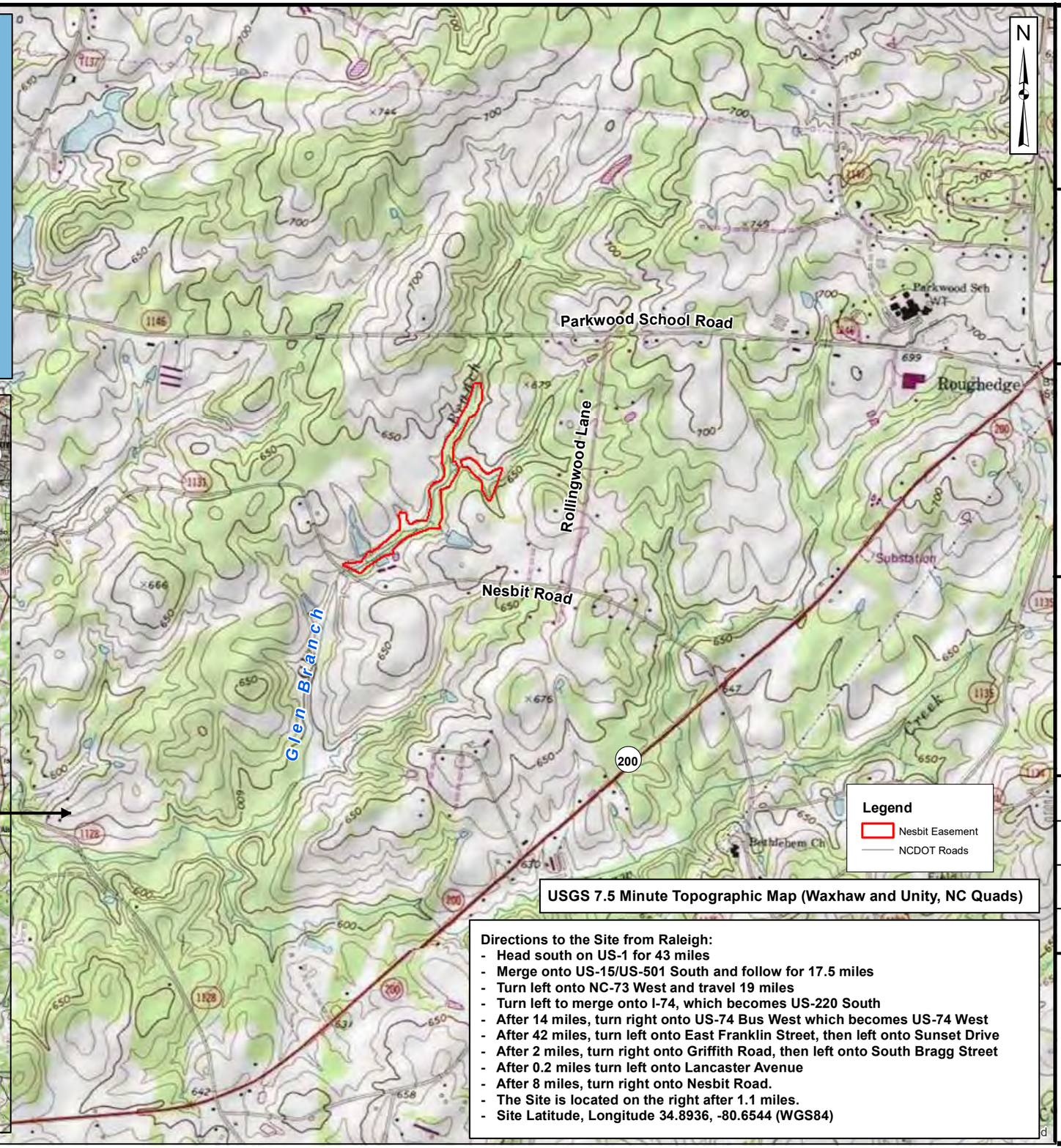
Comments:

Name: W. Grant Lewis Signature: _____

Title: President Date: _____







USGS 7.5 Minute Topographic Map (Waxhaw and Unity, NC Quads)

Directions to the Site from Raleigh:

- Head south on US-1 for 43 miles
- Merge onto US-15/US-501 South and follow for 17.5 miles
- Turn left onto NC-73 West and travel 19 miles
- Turn left to merge onto I-74, which becomes US-220 South
- After 14 miles, turn right onto US-74 Bus West which becomes US-74 West
- After 42 miles, turn left onto East Franklin Street, then left onto Sunset Drive
- After 2 miles, turn right onto Griffith Road, then left onto South Bragg Street
- After 0.2 miles turn left onto Lancaster Avenue
- After 8 miles, turn right onto Nesbit Road.
- The Site is located on the right after 1.1 miles.
- Site Latitude, Longitude 34.8936, -80.6544 (WGS84)

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS LLC

Project:

NESBIT SITE

Union County, NC

Title:

SITE LOCATION

Drawn by: KRJ

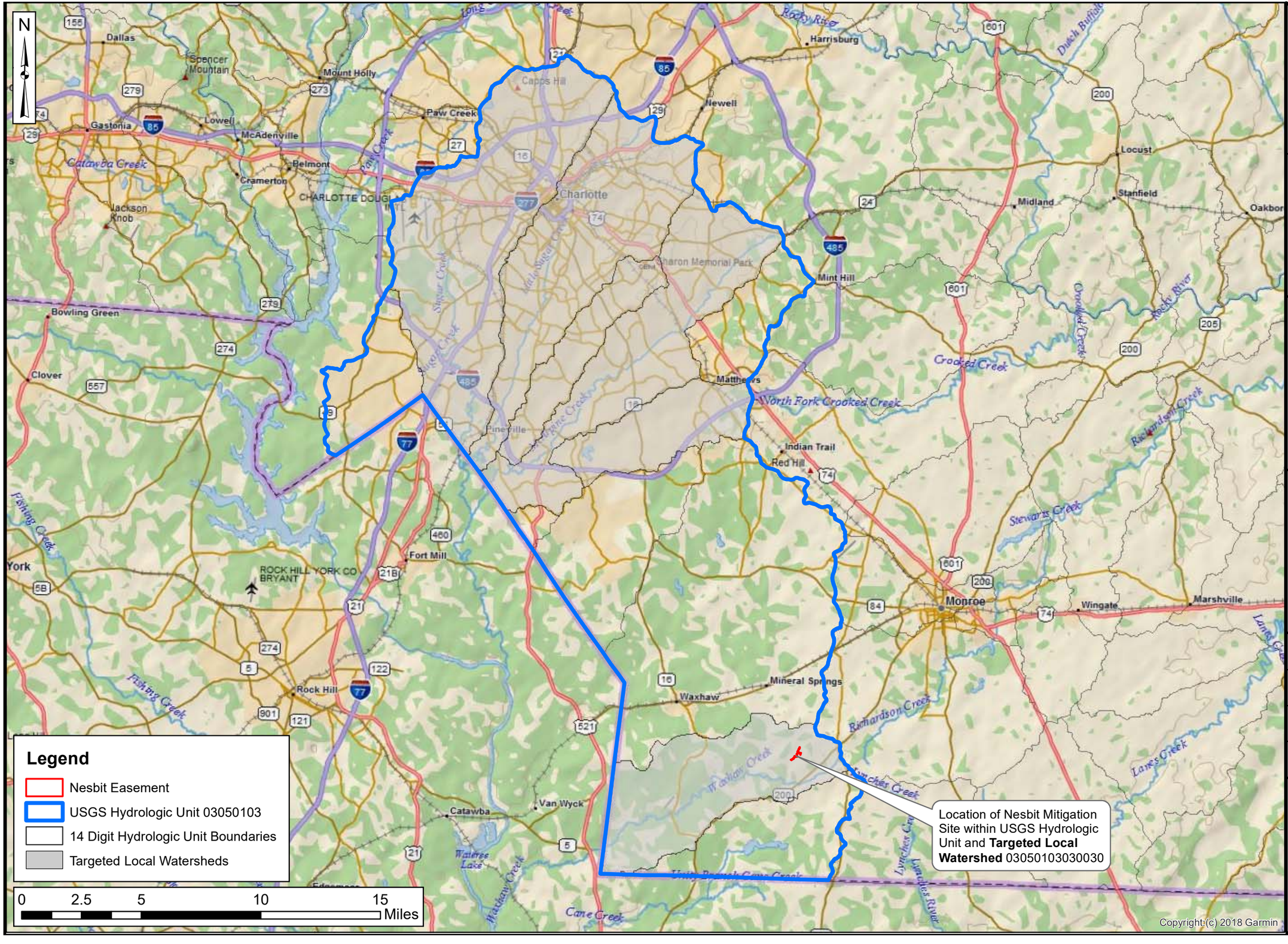
Date: APR 2020

Scale: 1:20,000

Project No.: 20-007

FIGURE

1



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS LLC

Project:

NESBIT SITE

Union County, NC

Title:

HYDROLOGIC UNIT MAP

Drawn by: KRJ

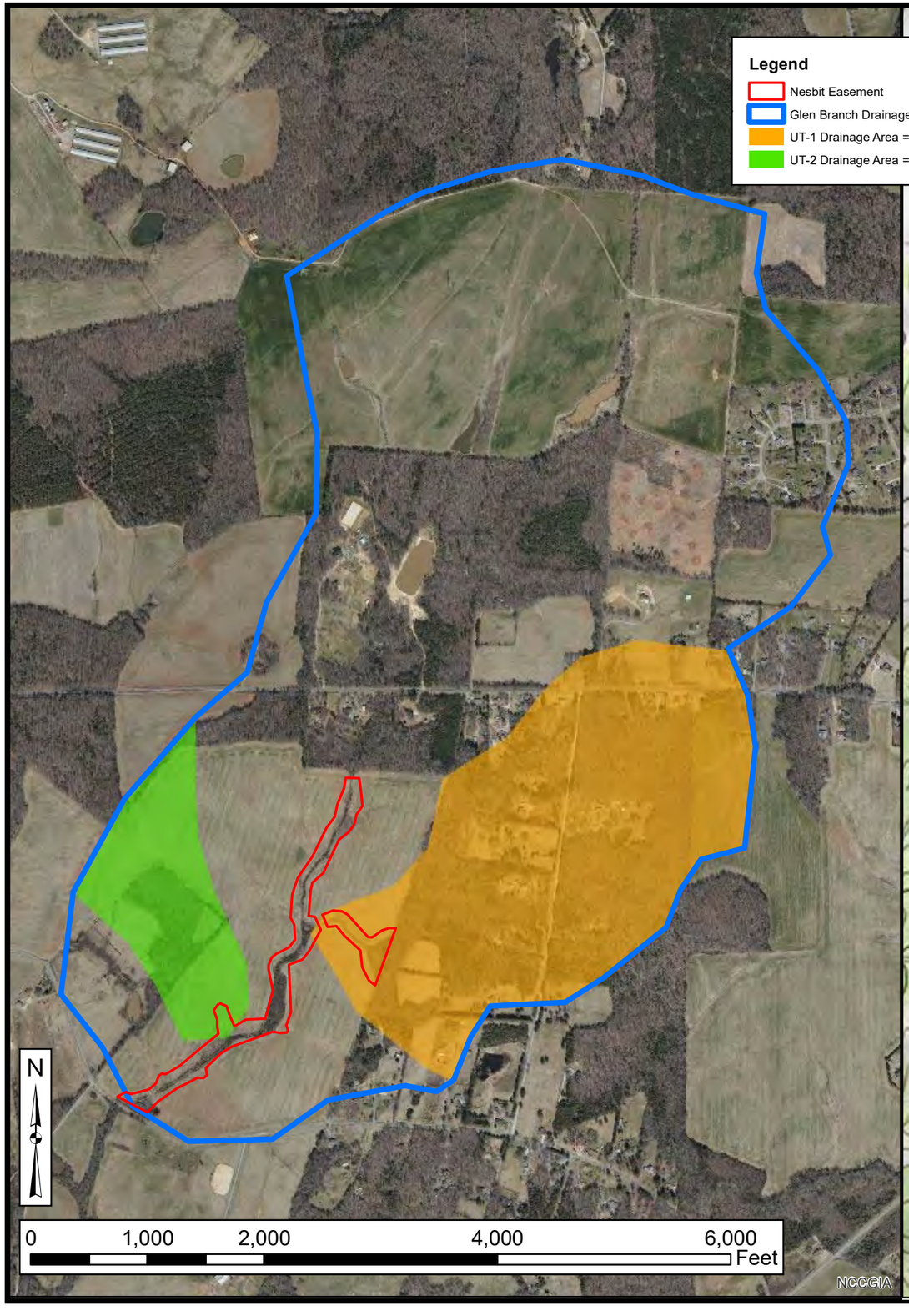
Date: APR 2020

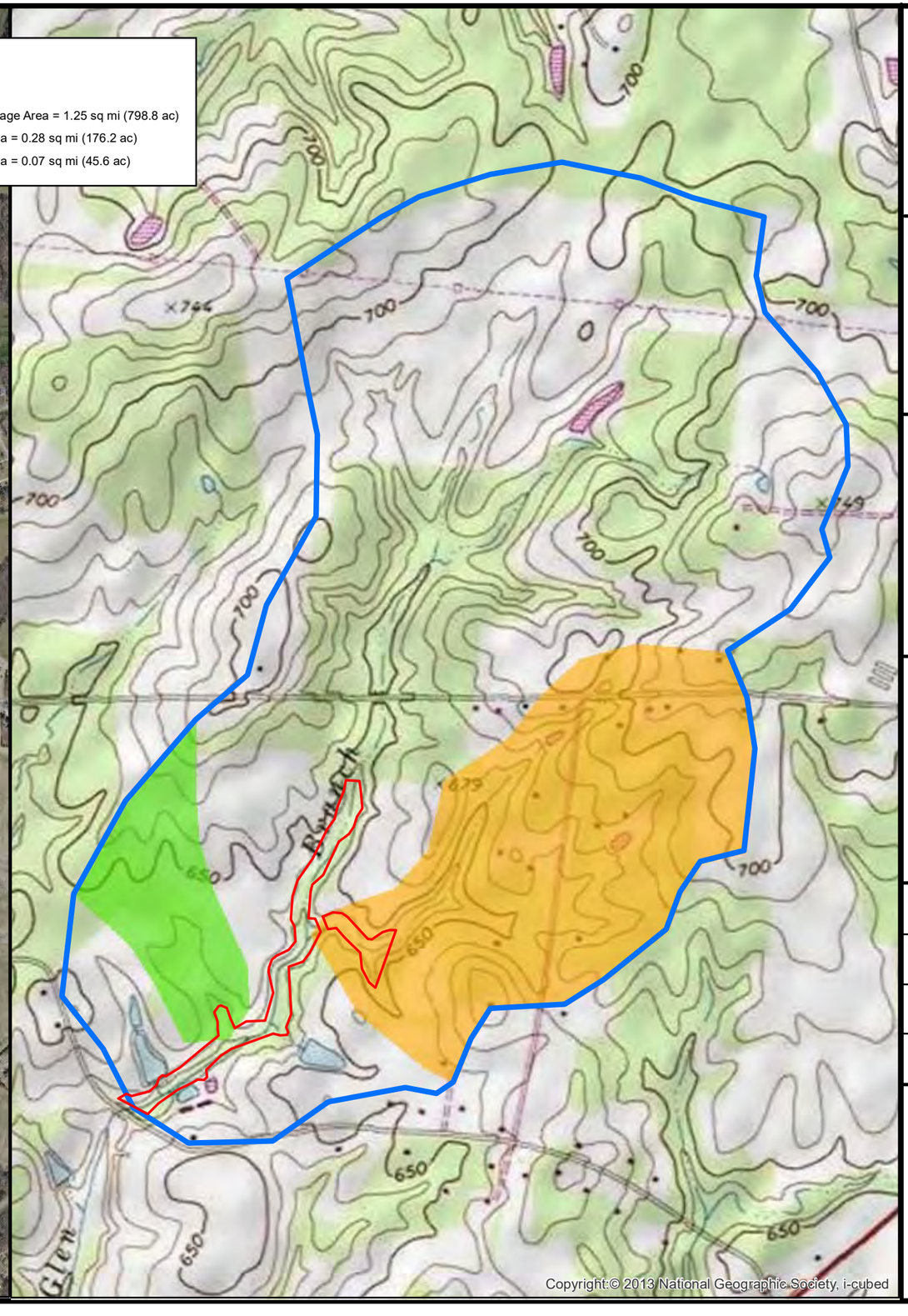
Scale: 1:240,000

Project No.: 20-007

FIGURE

2





Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT SITE

Union County, NC

Title:

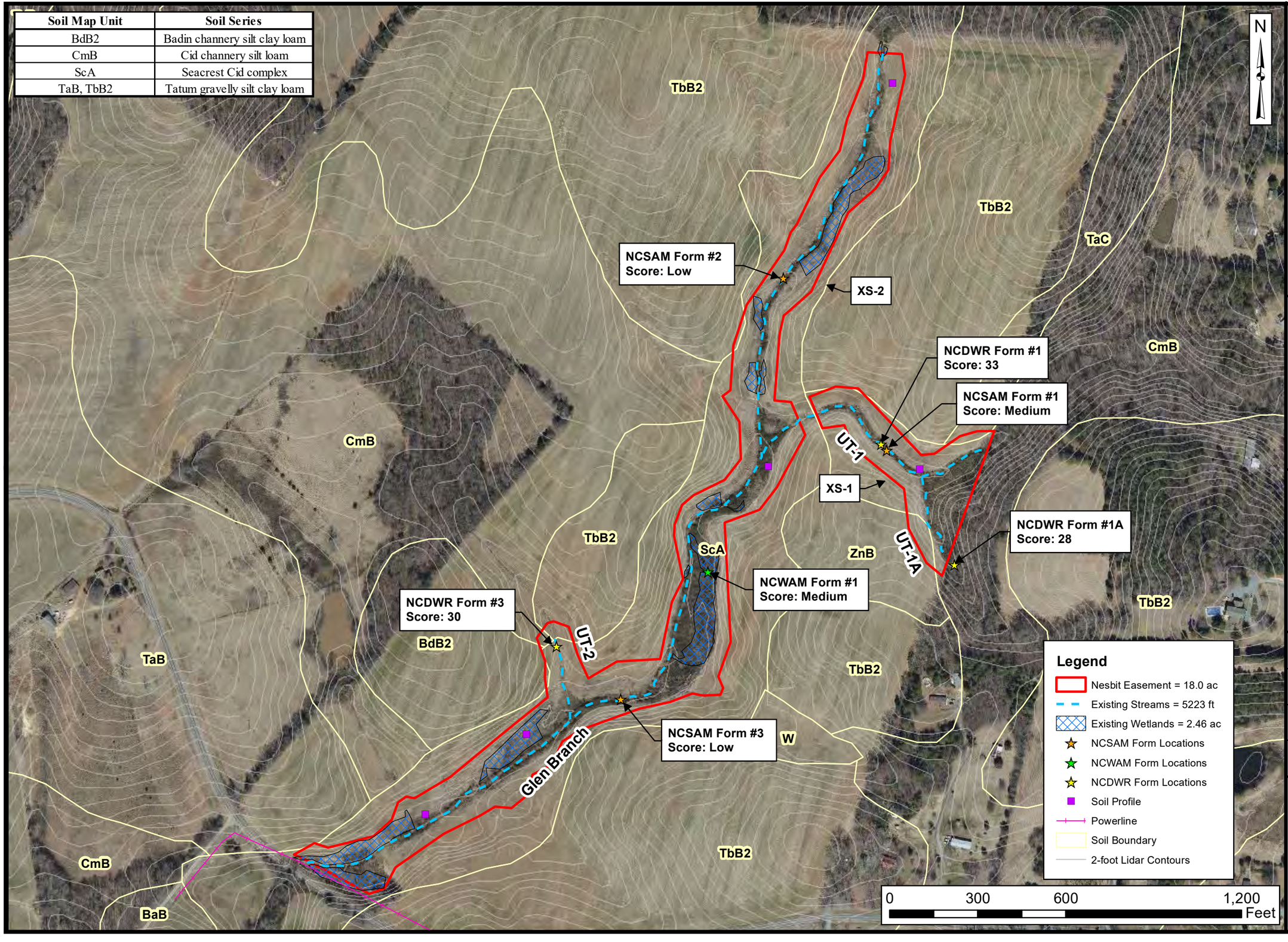
TOPOGRAPHY AND DRAINAGE AREA

Drawn by:	KRJ
Date:	APR 2020
Scale:	1:13,000
Project No.:	20-007

FIGURE

3

Soil Map Unit	Soil Series
BdB2	Badin channery silt clay loam
CmB	Cid channery silt loam
ScA	Seacrest Cid complex
TaB, TbB2	Tatum gravelly silt clay loam



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

NESBIT SITE

Union County, NC

Title:

EXISTING CONDITIONS AND SOILS

Drawn by: KRJ

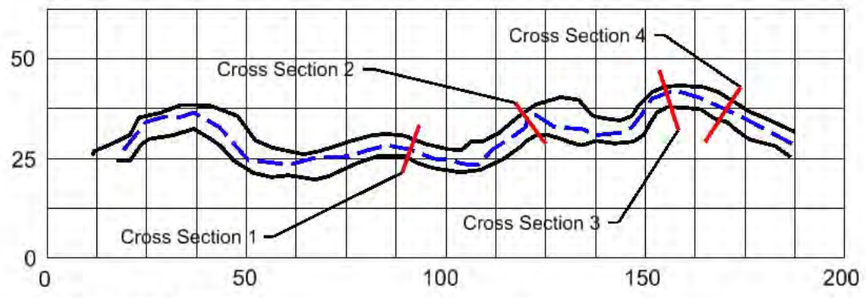
Date: APR 2020

Scale: 1:3700

Project No.: 20-007

FIGURE

4



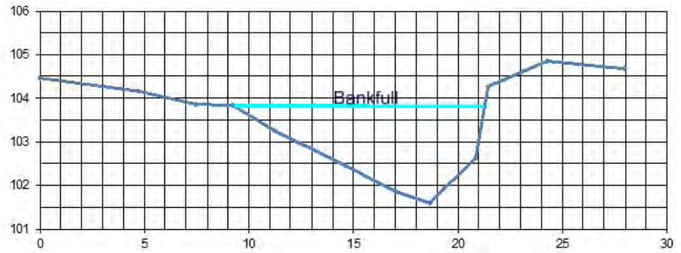
Reference Pattern

Lp-p = 52 (37 - 64) ft
Lm = 86 (60 - 97) ft
Wbelt = 28 (24 - 33) ft
Rc = 21 (12 - 28) ft
Lp-p/Wbkf = 4.2 (3.0 - 5.3)
Lm/Wbkf = 7.1 (5.0 - 8.0)
Wbelt/Wbkf = 2.3 (2.0 - 2.7)
Rc/Wbkf = 1.7 (1.0 - 2.3)
SIN = 1.14

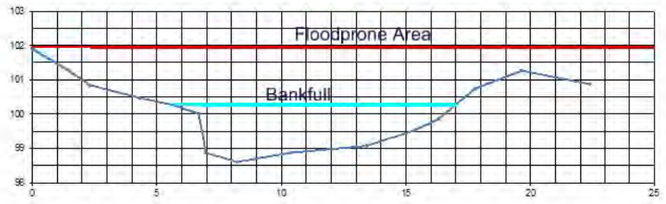
Pattern Legend

- Top of Bank
- Thalweg
- Cross Section

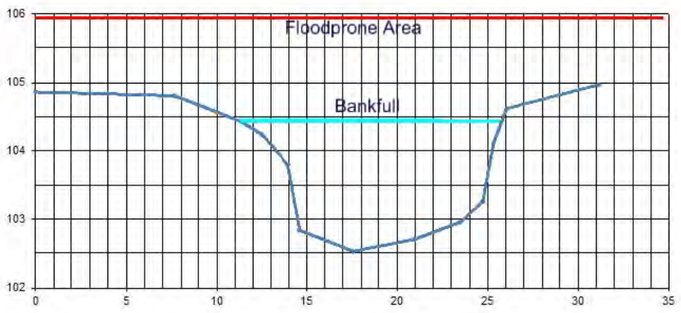
Cross Section 2 - Pool
Abkf = 16.9 ft
Wbkf = 13.3 ft
Dmax = 2.0 ft



Cross Section 3 - Pool
Abkf = 15.4 ft
Wbkf = 12.0 ft
Dmax = 2.2 ft

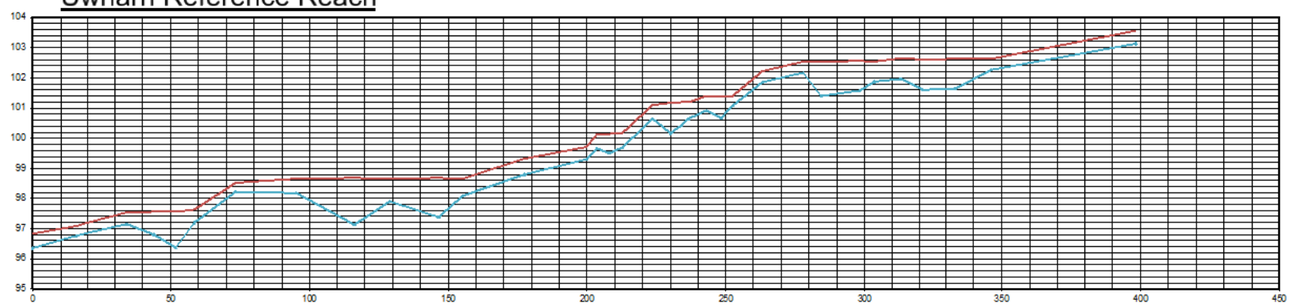


Cross Section 1 - Riffle
Abkf = 12.0 ft
Dave = 1.1 ft
Wbkf = 11.2 ft
Dmax = 1.6 ft
Bank Height = 1.6 ft
Bank Height Ratio = 1.0
W/D = 10.6
FPA = 50
ENT = 4.4
Stream Type = E



Cross Section 4 - Riffle
Abkf = 16.3 ft
Dave = 1.3 ft
Wbkf = 13.0 ft
Dmax = 1.7 ft
Bank Height = 1.7 ft
Bank Height Ratio = 1.0
W/D = 10.4
FPA = 50
ENT = 3.8
Stream Type = E

Uwharri Reference Reach



Profile (Reference Reach)

Save = 0.0168 rise/run
Svalley = 0.0192 rise/run
Sriffle = 0.0283 (0.0096 - 0.0846) rise/run
Spool = 0.0013 (0 - 0.0082) rise/run
Srun = 0 (0 - 0.0091) rise/run
Sglide = 0.0027 (0 - 0.0102) rise/run

- Water Surface
- Channel Bed

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Nesbit
Mitigation Site

Union County
North Carolina

Title:
Uwharri
Reference Reach
Dimension, Pattern,
and Profile

Scale: NA

Date: March 2020

Project No.: 20-007

FIGURE NO.

5

LEGEND

- Easement Boundary = ~18.0 ac
- Major Topography Line
- Minor Topography Line
- Stream Restoration = 4803 ft
- Stream Enhancement (Level I) = 316 ft
- Stream Enhancement (Level II) = 536 ft
- Wetland Reestablishment = 5.338 ac
- Wetland Rehabilitation = 2.065 ac
- Piped Crossing
- Marsh Treatment Area
- Drop Structure
- Floodplain Intercepter
- Log Cross Vane
- Log Vane

Glen Branch (Reach 1) = 1275 ft
Restoration
Mitigation Activities
- Install piped channel crossing in upper reaches.
- Initiate stream restoration by bringing the channel up to the historic floodplain elevation.
- Install habitat/grade control structures.
- Contour the design channel to the proper dimension.
- Backfill the historic channel.
- Add a marsh treatment area in agriculture swale.
- Plant with native forest vegetation.

Glen Branch (Reach 2) = 63 ft
Enhancement (Level I)
Mitigation Activities
- Tie the channel into the bedrock outcrop.
- Install habitat/grade control structures.
- Contour the design channel to the proper dimension.
- Plant with native forest vegetation.

UT 2 (Reach 1) = 112 ft
Enhancement (Level II)
Mitigation Activities
- Install a marsh treatement area at the initiation point of the stream.
- Plant with native forest vegetation.

UT 2 (Reach 2) = 197 ft
Restoration
Mitigation Activities
- Tie into upstream Enhancement reach elevations and begin shallowing the channel to historic floodplain elevation.
- Install habitat/grade control structures.
- Contour the design channel to the proper dimension.
- Backfill the historic channel.
- Tie to Glen Branch across and inner meander bend.
- Plant with native forest vegetation.

Glen Branch (Reach 3) = 2777 ft
Restoration
Mitigation Activities
- Tie to bedrosck grade control at the upper ends of the reach.
- Continue Priority 1 stream restoration at the historic floodplain elevation.
- Install habitat/grade control structures.
- Add 4 marsh treatmet areas in agriculture swales.
- Backfill the historic channel.
- Tie to the historic channel elevation at the Site outfall with a drop structure.
- Plant with native forest vegetation.

UT 1 (Reach 1) = 253 ft
Enhancement (Level I)*
Mitigation Activities
- Tie to upstream elevation at property boundary.
- Step channel up to the historic floodplain prior to downstream restoration reaches.
- Install habitat/grade control structures.
- Contour design channel to the proper dimension.
- Plant with native forest vegetation.
* Note: This reach is credited at a 2.5:1 ratio.

UT 1 (Reach 2) = 382 ft
Restoration
Mitigation Activities
- Install habitat/grade control structures.
- Contour design channel to the proper dimension.
- Backfill the historic channel.
- Add a marsh treatment area.
- Plant with native forest vegetation.

UT 1A = 314 ft
Enhancement (Level II)*
Mitigation Activities
- Plant with native forest vegetation.
*Note: This reach is credited at a 5:1 ratio.

UT 1 (Reach 3) = 110 ft
Enhancement (Level II)
Mitigation Activities
- Install a piped channel crossing.
- Plant with native forest vegetation.

UT 2 (Reach 4) = 172 ft
Restoration
Mitigation Activities
- Tie to the upstream channel crossing.
- Excavate a channel at the historic floodplain elevation.
- Install habitat/grade control structures.
- Tie to Glen Branch across an inner meander bend.
- Plant with native forest vegetation.

UT-1
UT-1A
UT-2
GLEN BRANCH

0 200 400
SCALE IN FEET

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Nesbit Site

Union County
North Carolina

Title:

RESTORATION PLAN

Scale: AS SHOWN
Date: May 2020
Project No.: 20-007

FIGURE NO.
6

Appendix G: Financial Assurances

Pursuant to Section IV H and Appendix III of the NCDEQ DMS (formerly Ecosystem Enhancement Program) In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environmental Quality (NCDEQ) has provided the USACE-Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by NCDEQ DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.

Appendix H: Site Protection Instrument

FILED
UNION COUNTY, NC
CRYSTAL D. GILLIARD
REGISTER OF DEEDS
FILED Aug 28, 2020
AT 08:12 am
BOOK 07788
START PAGE 0883
END PAGE 0895
INSTRUMENT # 33657
EXCISE TAX $1,080.00
JT

Excise Tax: $1,080.00

STATE OF NORTH CAROLINA

UNION COUNTY

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

SPO File Number: 90-BM
DMS Project Number: 100121

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

THIS DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS, made this 27th day of August, 2020, by Buford Township Farms, LLC, a North Carolina limited liability company ("**Grantor**"), whose mailing address is P.O. Box 429, Monroe, NC 28111, to the State of North Carolina, ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

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

protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between Restoration Systems, LLC, a North Carolina limited liability company, 1101 Haynes St., Suite 211, Raleigh, NC 27604-1499 and the North Carolina Department of Environmental Quality, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environmental Quality Purchase and Services Contract Number 7868.

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

WHEREAS, the Department of Environment and Natural Resources and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Understanding, (MOU) duly executed by all parties on November 4, 1998. This MOU recognized that the Wetlands Restoration Program was to provide effective compensatory mitigation for authorized impacts to wetlands, streams and other aquatic resources by restoring, enhancing and preserving the wetland and riparian areas of the State; and

WHEREAS, the Department of Environment and Natural Resources, the North Carolina Department of Transportation and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Agreement, (MOA) duly executed by all parties in Greensboro, NC on July 22, 2003, which recognizes that the Division of Mitigation Services (formerly Ecosystem Enhancement Program) is to provide for compensatory mitigation by effective protection of the land, water and natural resources of the State by restoring, enhancing and preserving ecosystem functions; and

WHEREAS, the Department of Environment and Natural Resources, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the North Carolina Wildlife Resources Commission, the North Carolina Division of Water Quality, the North Carolina Division of Coastal Management, and the National Marine Fisheries Service entered into an agreement to continue the In-Lieu Fee operations of the North Carolina Department of Natural Resources' Division of Mitigation Services (formerly Ecosystem Enhancement Program) with an effective date of 28 July, 2010, which supersedes and replaces the previously effective MOA and MOU referenced above; and

WHEREAS, the acceptance of this instrument for and on behalf of the State of North Carolina was granted to the Department of Administration by resolution as approved by the Governor and Council of State adopted at a meeting held in the City of Raleigh, North Carolina, on the 8th day of February 2000; and

WHEREAS, the Division of Mitigation Services in the Department of Environmental Quality, which has been delegated the authority authorized by the Governor and Council of State to the Department of Administration, has approved acceptance of this instrument; and

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in Jackson and Buford Townships, Union County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately 151.54 acres and being conveyed to the Grantor by deed as recorded in **Deed Book 7279 at Page 643** of the Union County Registry, North Carolina; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of **Glen Branch and several unnamed tributaries to Glen Branch**.

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement along with a general Right of Access.

The Conservation Easement Area consists of the following:

Conservation Easement Area 1 and Conservation Easement Area 2 containing a total of approximately **18.00 acres** as shown on the plats of survey titled "Conservation Easement Survey for the State of North Carolina, Division of Mitigation Services, DMS Project ID No. 100121, SPO File Number 90-BM, of Nesbit Mitigation Site over and across the Lands of Buford Township Farms, LLC per DB 7279, Pg. 643 (a Portion of Parcel # 04335001), Buford Township, Union County, North Carolina" dated June 15, 2020, by John A. Rudolph, PLS Number L-4194 and recorded in the Union County, North Carolina Register of Deeds at **Plat Book P, Pages 248 through 249.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the

use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat.

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. Damage to Vegetation. Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. Roads and Trails. There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

III. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees and agents, successors and assigns, receive a perpetual Right of Access to the Conservation Easement Area over the Property at reasonable times to undertake any activities on the property to restore, construct, manage, maintain, enhance, protect, and monitor the stream, wetland and any other riparian resources in the Conservation Easement Area, in accordance with restoration activities or a long-term management plan. Unless otherwise specifically set forth in this Conservation Easement, the rights granted herein do not include or establish for the public any access rights.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

E. Crossing Area(s). The Grantee is not responsible for maintenance of crossing area(s), however, the Grantee, its employees and agents, successors or assigns, reserve the right to repair crossing area(s), at its sole discretion and to recover the cost of such repairs from the Grantor if such repairs are needed as a result of activities of the Grantor, his successors or assigns.

IV. ENFORCEMENT AND REMEDIES

A. Enforcement. To accomplish the purposes of this Conservation Easement, Grantee is allowed to prevent any activity within the Conservation Easement Area that is inconsistent with the purposes of this Conservation Easement and to require the restoration of such areas or features in the Conservation Easement Area that may have been damaged by such unauthorized activity or use. Upon any breach of the terms of this Conservation Easement by Grantor, the

Grantee shall, except as provided below, notify the Grantor in writing of such breach and the Grantor shall have ninety (90) days after receipt of such notice to correct the damage caused by such breach. If the breach and damage remains uncured after ninety (90) days, the Grantee may enforce this Conservation Easement by bringing appropriate legal proceedings including an action to recover damages, as well as injunctive and other relief. The Grantee shall also have the power and authority, consistent with its statutory authority: (a) to prevent any impairment of the Conservation Easement Area by acts which may be unlawful or in violation of this Conservation Easement; (b) to otherwise preserve or protect its interest in the Property; or (c) to seek damages from any appropriate person or entity. Notwithstanding the foregoing, the Grantee reserves the immediate right, without notice, to obtain a temporary restraining order, injunctive or other appropriate relief, if the breach is or would irreversibly or otherwise materially impair the benefits to be derived from this Conservation Easement, and the Grantor and Grantee acknowledge that the damage would be irreparable and remedies at law inadequate. The rights and remedies of the Grantee provided hereunder shall be in addition to, and not in lieu of, all other rights and remedies available to Grantee in connection with this Conservation Easement.

B. Inspection. The Grantee, its employees and agents, successors and assigns, have the right, with reasonable notice, to enter the Conservation Easement Area over the Property at reasonable times for the purpose of inspection to determine whether the Grantor is complying with the terms, conditions and restrictions of this Conservation Easement.

C. Acts Beyond Grantor's Control. Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury or change in the Conservation Easement Area caused by third parties, resulting from causes beyond the Grantor's control, including, without limitation, fire, flood, storm, and earth movement, or from any prudent action taken in good faith by the Grantor under emergency conditions to prevent, abate, or mitigate significant injury to life or damage to the Property resulting from such causes.

D. Costs of Enforcement. Beyond regular and typical monitoring expenses, any costs incurred by Grantee in enforcing the terms of this Conservation Easement against Grantor, including, without limitation, any costs of restoration necessitated by Grantor's acts or omissions in violation of the terms of this Conservation Easement, shall be borne by Grantor.

E. No Waiver. Enforcement of this Easement shall be at the discretion of the Grantee and any forbearance, delay or omission by Grantee to exercise its rights hereunder in the event of any breach of any term set forth herein shall not be construed to be a waiver by Grantee.

V. MISCELLANEOUS

A. This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be invalid, the remainder of the provisions of the Conservation Easement, and the application of such provision to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

B. Grantor is responsible for any real estate taxes, assessments, fees, or charges levied upon the Property. Grantee shall not be responsible for any costs or liability of any kind related to the ownership, operation, insurance, upkeep, or maintenance of the Property, except as expressly provided herein. Upkeep of any constructed bridges, fences, or other amenities on the Property are the sole responsibility of the Grantor. Nothing herein shall relieve the Grantor of the obligation to comply with federal, state or local laws, regulations and permits that may apply to the exercise of the Reserved Rights.

C. Any notices shall be sent by registered or certified mail, return receipt requested to the parties at their addresses shown herein or to other addresses as either party establishes in writing upon notification to the other.

D. Grantor shall notify Grantee in writing of the name and address and any party to whom the Property or any part thereof is to be transferred at or prior to the time said transfer is made. Grantor further agrees that any subsequent lease, deed, or other legal instrument by which any interest in the Property is conveyed is subject to the Conservation Easement herein created.

E. The Grantor and Grantee agree that the terms of this Conservation Easement shall survive any merger of the fee and easement interests in the Property or any portion thereof.

F. This Conservation Easement and Right of Access may be amended, but only in writing signed by all parties hereto, or their successors or assigns, if such amendment does not affect the qualification of this Conservation Easement or the status of the Grantee under any applicable laws, and is consistent with the purposes of the Conservation Easement. The owner of the Property shall notify the State Property Office and the U.S. Army Corps of Engineers in writing sixty (60) days prior to the initiation of any transfer of all or any part of the Property or of any request to void or modify this Conservation Easement. Such notifications and modification requests shall be addressed to:

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

General Counsel
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403

G. The parties recognize and agree that the benefits of this Conservation Easement are in gross and assignable provided, however, that the Grantee hereby covenants and agrees, that in the event it transfers or assigns this Conservation Easement, the organization receiving the

interest will be a qualified holder under N.C. Gen. Stat. § 121-34 et seq. and § 170(h) of the Internal Revenue Code, and the Grantee further covenants and agrees that the terms of the transfer or assignment will be such that the transferee or assignee will be required to continue in perpetuity the conservation purposes described in this document.

VI. QUIET ENJOYMENT

Grantor reserves all remaining rights accruing from ownership of the Property, including the right to engage in or permit or invite others to engage in only those uses of the Conservation Easement Area that are expressly reserved herein, not prohibited or restricted herein, and are not inconsistent with the purposes of this Conservation Easement. Without limiting the generality of the foregoing, the Grantor expressly reserves to the Grantor, and the Grantor's invitees and licensees, the right of access to the Conservation Easement Area, and the right of quiet enjoyment of the Conservation Easement Area,

TO HAVE AND TO HOLD, the said rights and easements perpetually unto the State of North Carolina for the aforesaid purposes,

AND Grantor covenants that Grantor is seized of said premises in fee and has the right to convey the permanent Conservation Easement herein granted; that the same is free from encumbrances and that Grantor will warrant and defend title to the same against the claims of all persons whomsoever.

IN TESTIMONY WHEREOF, the Grantor has hereunto set his hand and seal, the day and year first above written.

Buford Township Farms, LLC,
a North Carolina limited liability company

By: _____
Name: Franklin W. Howey, Jr.
Title: Manager

NORTH CAROLINA
COUNTY OF UNION

I, Connie H. Mangum, a Notary Public in and for the County and State aforesaid, do hereby certify that Franklin W. Howey, Jr., ~~Grantor~~, personally appeared before me this day and acknowledged the execution of the foregoing instrument., in the capacity of Manager of Buford Township Farms, LLC, as indicated above.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the 27th day of August, 2020.

_____
Notary Public

My commission expires: May 9, 2023

CONNIE H. MANGUM NOTARY PUBLIC UNION COUNTY, NC

Exhibit A

Legal Description

CONSERVATION EASEMENT OF THE NESBIT MITIGATION SITE

Conservation Easement Area 1

BEING ALL OF Conservation Easement Area 1 of the Nesbit Mitigation Site over a portion of the land of Buford Township Farms, LLC with Parcel No. 04335001, lying and being situated in Buford Township, Union County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 1 and being the Southwestern most corner of the Conservation Easement Area 1 and being located South 71°47'17" West 1349.30 feet from an iron stake with a blue cap (Point No. 101) with N.C. Grid Coordinates N=419,781.0117', E=1,503,901.5078' (NAD '83, 2011).

Thence from the Point of Beginning (Point No.1), North 61°00'28" East 80.29' to an iron stake; thence South 71°22'49" East 48.23' to an iron stake; thence North 75°47'07" East 160.43' to an iron stake; thence North 48°23'14" East 82.98' to an iron stake; thence North 19°18'10" East 63.60' to an iron stake; thence North 54°26'41" East 34.41' to an iron stake; thence South 79°00'41" East 29.80' to an iron stake; thence North 59°13'42" East 141.00' to an iron stake; thence North 50°31'00" East 238.79' to an iron stake; thence North 51°13'30" East 189.50' to an iron stake; thence North 08°38'49" West 63.84' to an iron stake; thence North 01°20'30" East 58.55' to an iron stake; thence North 19°42'52" West 85.02' to an iron stake; thence North 35°04'36" East 62.29' to an iron stake; thence North 72°53'13" East 21.76' to an iron stake; thence South 69°43'20" East 55.42' to an iron stake; thence South 17°59'36" East 100.98' to an iron stake; thence South 23°56'06" East 87.42' to an iron stake; thence North 59°04'31" East 113.43' to an iron stake; thence North 86°42'51" East 148.03' to an iron stake; thence North 11°33'24" East 197.50' to an iron stake; thence North 25°43'46" East 86.63' to an iron stake; thence North 11°37'31" West 151.26' to an iron stake; thence North 03°34'26" East 36.66' to an iron stake; thence North 20°30'04" East 71.77' to an iron stake; thence North 50°45'51" East 51.34' to an iron stake; thence North 63°41'08" East 118.27' to an iron stake; thence North 37°36'03" East 89.58' to an iron stake; thence North 02°17'45" West 126.68' to an iron stake; thence North 32°57'05" West 104.77' to an iron stake; thence North 53°08'12" East 32.92' to an iron stake; thence North 04°04'38" East 151.78' to an iron stake; thence North 18°27'59" East 146.00' to an iron stake; thence North 34°24'40" East 226.07' to an iron stake; thence North 19°58'10" East 64.61' to an iron stake; thence North 38°06'44" East 33.28' to an iron stake; thence North 26°06'57" East 180.37' to an iron stake; thence North 36°50'44" East 112.46' to an iron stake; thence North 12°59'41" East 108.76' to an iron stake; thence North 21°42'33" East 148.80' to an iron stake; thence North 09°44'35" East 90.86' to an iron stake; thence South 86°55'46" East 116.99' to an iron stake; thence South 07°51'22" East 72.47' to an iron stake;

thence South 12°39'58" West 230.01' to an iron stake; thence South 03°11'34" West 96.13' to an iron stake; thence South 34°35'56" West 78.32' to an iron stake; thence South 48°47'05" West 123.46' to an iron stake; thence South 25°02'16" West 297.06' to an iron stake; thence South 48°36'02" West 124.81' to an iron stake; thence South 13°19'48" West 63.98' to an iron stake; thence South 04°32'43" West 225.88' to an iron stake; thence South 84°48'12" East 57.27' to an iron stake; thence South 22°10'40" East 123.57' to an iron stake; thence South 28°20'43" West 201.00' to an iron stake; thence South 37°27'21" West 95.58' to an iron stake; thence South 69°58'39" West 127.85' to an iron stake; thence South 02°49'46" East 405.06' to an iron stake; thence South 19°37'34" West 125.46' to an iron stake; thence South 22°46'09" East 43.40' to an iron stake; thence South 23°56'55" West 23.64' to an iron stake; thence South 86°20'07" West 57.07' to an iron stake; thence North 79°11'44" West 38.64' to an iron stake; thence South 68°55'38" West 81.12' to an iron stake; thence South 78°03'46" West 105.76' to an iron stake; thence South 70°11'07" West 216.59' to an iron stake; thence South 57°06'14" West 71.86' to an iron stake; thence South 24°39'51" West 86.18' to an iron stake; thence South 62°56'58" West 73.30' to an iron stake; thence South 16°26'55" West 76.03' to an iron stake; thence South 50°34'36" West 65.57' to an iron stake; thence North 84°55'11" West 55.67' to an iron stake; thence South 59°15'12" West 59.50' to an iron stake; thence South 63°41'12" West 138.02' to an iron stake; thence South 55°04'11" West 200.62' to an iron stake; thence South 27°45'32" West 81.30' to an iron stake; thence South 71°06'46" West 54.61' to an iron stake; thence North 62°11'36" West 60.12' to an iron stake; thence North 62°11'36" West 198.20' to an iron stake; thence North 66°41'51" West 31.10' to an iron stake, which is the Point of Beginning (Point No. 1), having an area of approximately 14.83 acres.

Conservation Easement Area 2

BEING ALL OF Conservation Easement Area 2 of the Nesbit Mitigation Site over a portion of the land of Buford Township Farms, LLC with Parcel No. 04335001, lying and being situated in Buford Township, Union County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 79 and being a Southwestern corner of the Conservation Easement Area 2 and being located North 22°35'21" East 1227.91 feet from an iron stake with a blue cap (Point No. 101) with N.C. Grid Coordinates N=419,781.0117', E=1,503,901.5078' (NAD '83, 2011).

Thence from the Point of Beginning (Point No.79), North 68°16'11" East 100.62' to an iron stake; thence South 85°19'31" East 77.60' to an iron stake; thence South 43°18'55" East 311.78' to an iron stake; thence North 84°52'49" East 44.89' to an iron stake; thence North 55°55'22" East 106.90' to an iron stake; thence North 73°32'24" East 59.74' to an iron stake;
thence North 89°36'27" East 60.93' to an iron stake; thence South 20°02'31" West 523.83' to an iron stake; thence North 50°19'35" West 70.18' to an iron stake; thence North 27°16'48" West 130.68' to an iron stake; thence North 06°31'22" West 134.90' to an iron stake; thence North 50°49'35" West 226.75' to an iron stake; thence North 21°08'14" West 78.83' to an iron stake;
thence South 82°45'51" West 80.94' to an iron stake; thence North 22°10'40" West 113.66' to an iron stake, which is the Point of Beginning (Point No. 79), having an area of approximately 3.17 acres.

ALL OF THE FOREGOING CONSERVATION EASEMENT AREAS as shown on plat of survey titled "Conservation Easement Survey for the State of North Carolina, Division of Mitigation Services, DMS Project ID No. 100121, SPO File Number 90-BM, of Nesbit Mitigation Site over and across the Lands of Buford Township Farms, LLC per DB 7279, Pg. 643 (a Portion of Parcel # 04335001), Buford Township, Union County, North Carolina" dated June 15, 2020, by John A. Rudolph, PLS Number L-4194, K2 Design Group, and recorded in Plat Book P, Pages 248 through 249, Union County Register of Deeds.

ALL SUCH CONSERVATION EASEMENT AREAS TOGETHER WITH that certain new sixty (60) foot-wide non-exclusive access easement labeled as Access Easement 1 and that certain new sixty (60) foot-wide non-exclusive access easement labeled as Access Easement 2, as well as any other access easements shown on the plat hereinafter referenced, all for ingress, egress, and regress and all as shown on the foregoing described plat of survey recorded in Plat Book P, Pages 248 through 249, Union County Register of Deeds.

Appendix I: Credit Release Schedule

The schedules below list the updated credit release schedules for stream and wetland mitigation projects developed by bank and ILF sites in North Carolina:

Credit Release Schedule and Milestones for Wetlands					
Credit Release Milestone	**Release Activity**	**Banks**		**ILF/NCDMS**	
		Interim Release	**Total Released**	**Interim Release**	**Total Released**
1	Site Establishment (includes all required criteria stated above)	15%	15%	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	15%	30%	30%	30%
3	Year 1 monitoring report demonstrates that interim performance standards have been met	10%	40%	10%	40%
4	Year 2 monitoring report demonstrates that interim performance standards have been met	10%	50%	10%	50%
5	Year 3 monitoring report demonstrates that interim performance standards have been met	15%	65%	15%	65%
6*	Year 4 monitoring report demonstrates that interim performance standards have been met	5%	70%	5%	70%
7	Year 5 monitoring report demonstrates that interim performance standards have been met	15%	85%	15%	85%
8*	Year 6 monitoring report demonstrates that interim performance standards have been met	5%	90%	5%	90%
9	Year 7 monitoring report demonstrates that performance standards have been met	10%	100%	10%	100%

*Please note that vegetation plot 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.

Credit Release Schedule and Milestones for Streams					
Credit Release Milestone	Release Activity	Banks		ILF/NCDMS	
		Interim Release	Total Released	Interim Release	Total Released
1	Site Establishment (includes all required criteria stated above)	15%	15%	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	15%	30%	30%	30%
3	Year 1 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	40%	10%	40%
4	Year 2 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	50%	10%	50%
5	Year 3 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	60%	10%	60%
6*	Year 4 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	65% (75%**)	5%	65% (75%**)
7	Year 5 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	75% (85%**)	10%	75% (85%**)
8*	Year 6 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	80% (90%**)	5%	80% (90%**)
9	Year 7 monitoring report demonstrates that channels are stable, performance standards have been met	10%	90% (100%**)	10%	90% (100%**)

*Please note that vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the NCIRT.

**10% reserve of credits to be held back until the bankfull event performance standard has been met.

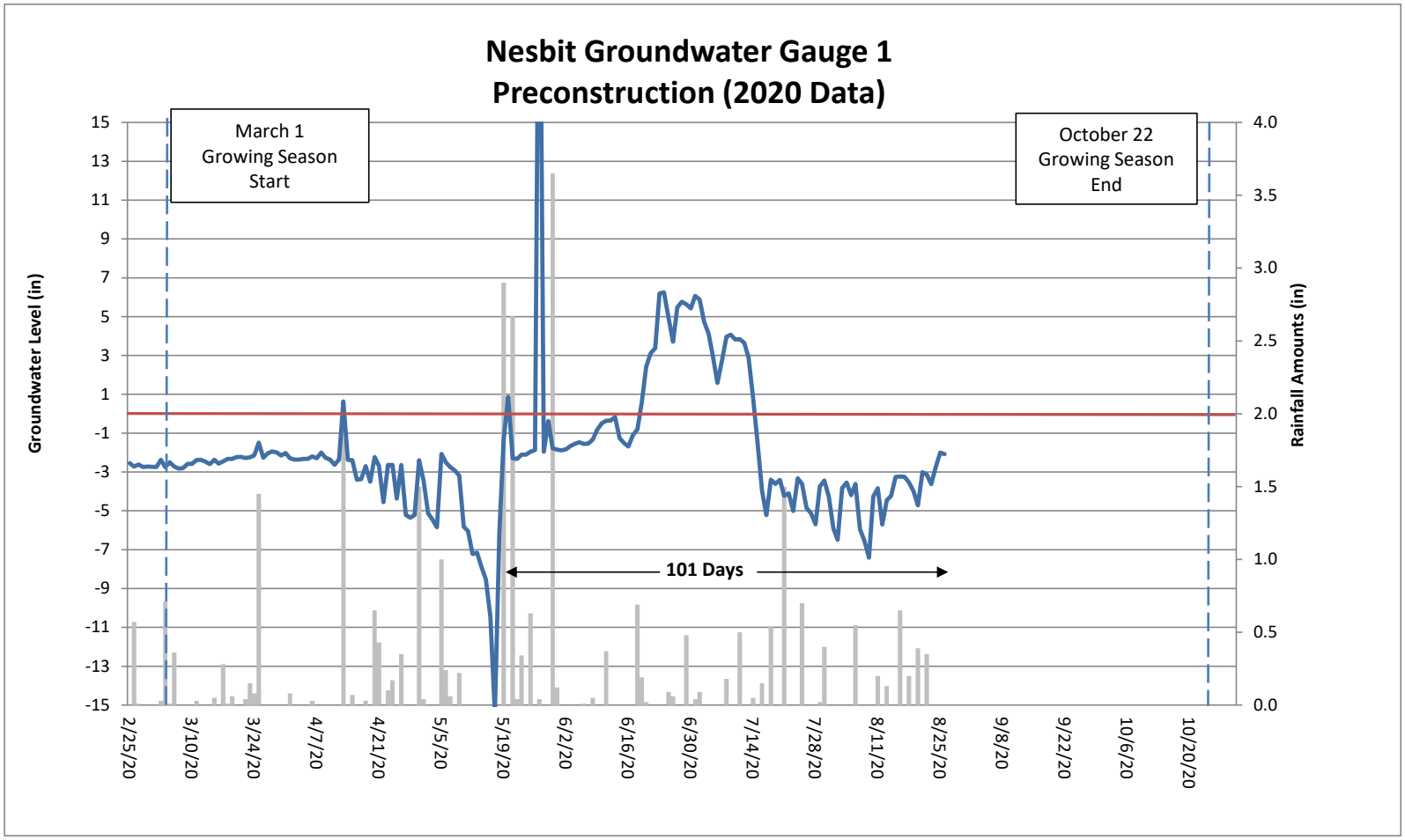
Appendix J: Maintenance Plan

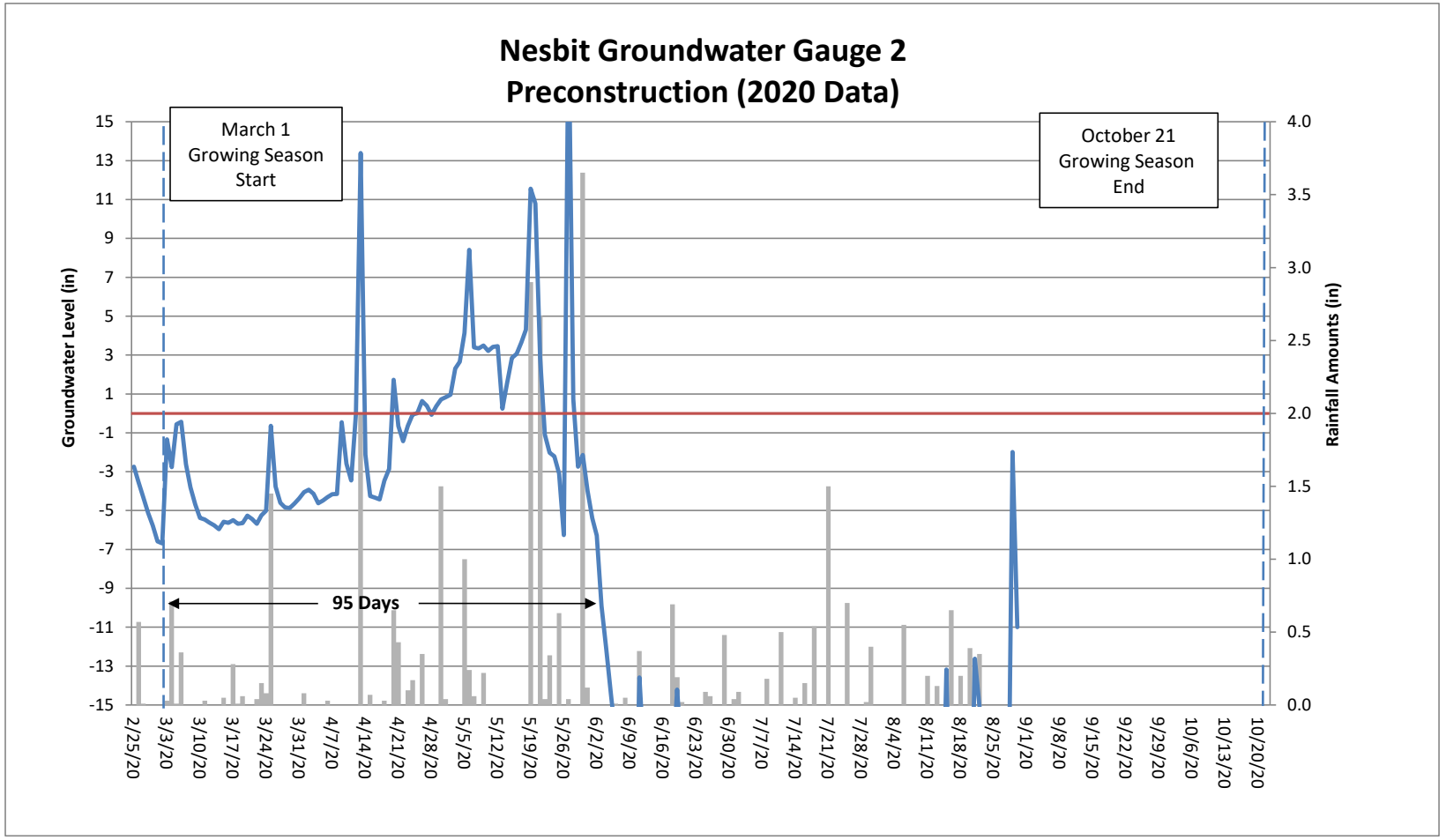
Maintenance Plan

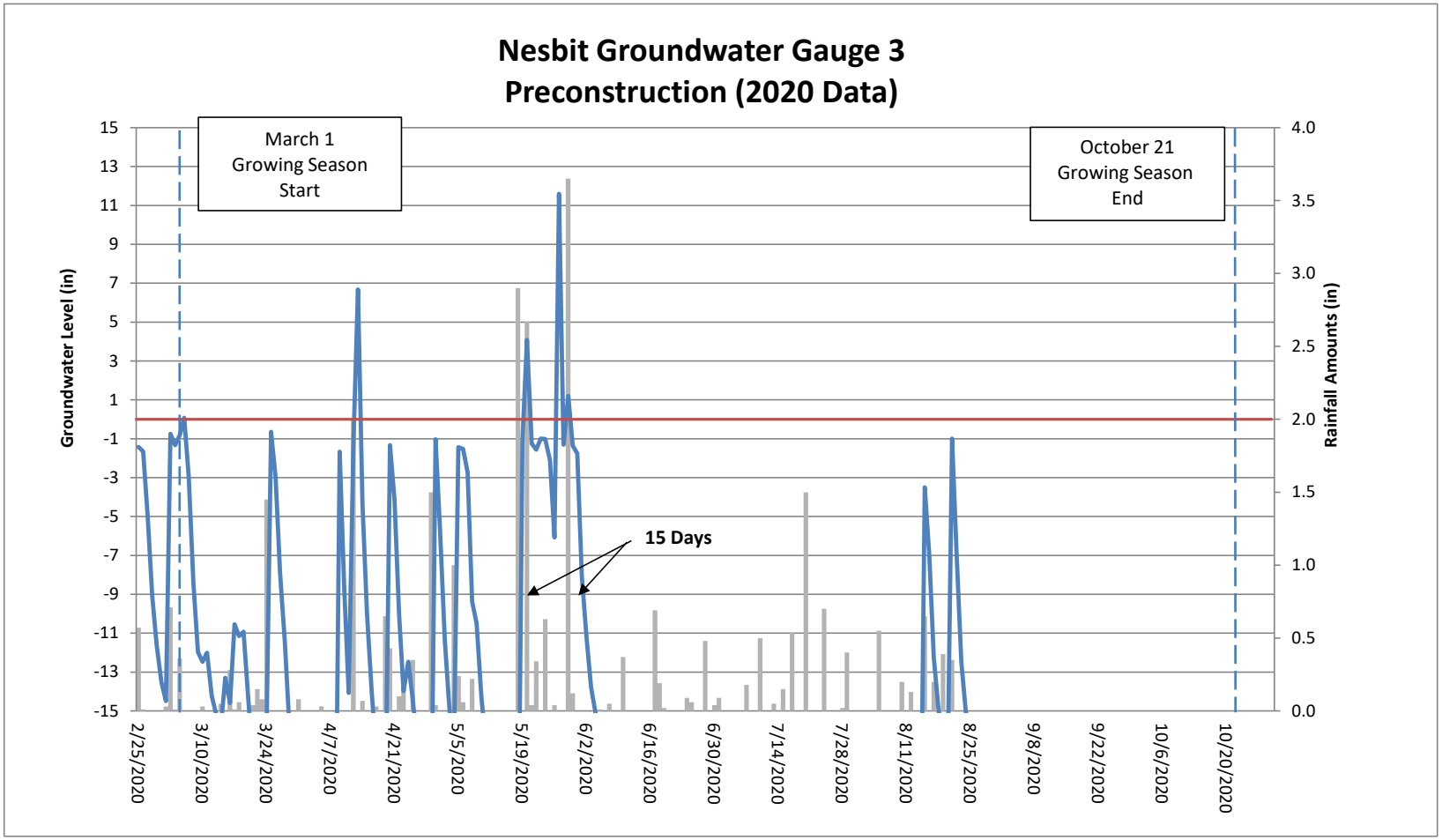
The Site shall be monitored on a regular basis and a physical inspection of the site shall be conducted a minimum of once per year throughout the post-construction monitoring period until performance standards are met. These site inspections may identify site components and features that require routine maintenance. Routine maintenance should be expected most often in the first two years following site construction and may include the following:

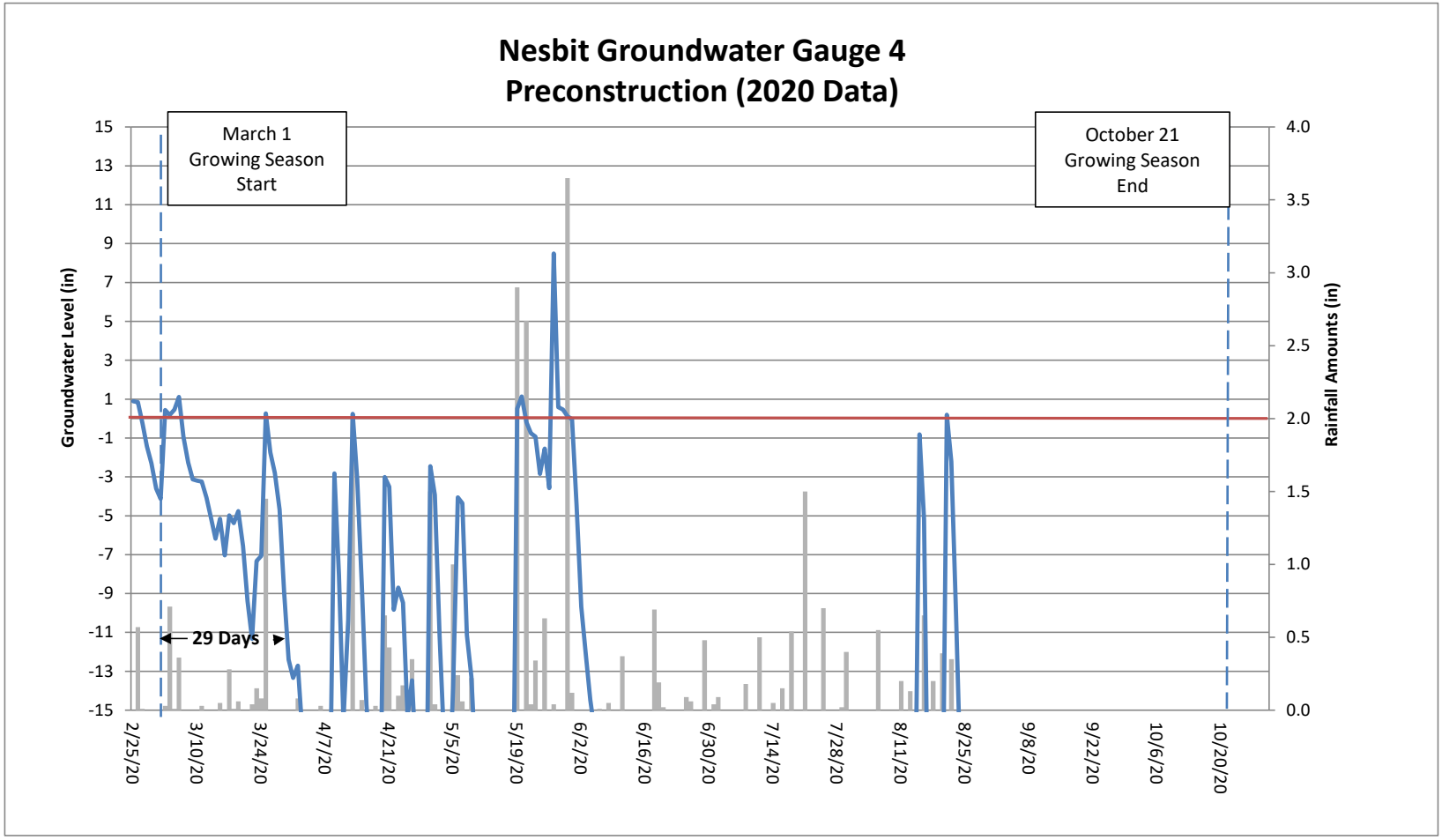
Component/Feature	**Maintenance through project close-out**
Stream	Routine channel maintenance and repair activities may include securing of loose coir matting and supplemental installations of live stakes and other target vegetation along the channel. Areas where stormwater and floodplain flows intercept the channel may also require maintenance to prevent bank failures and head-cutting.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Exotic invasive plant species shall be 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.
Beaver	Beaver and associated dams are to be removed as they colonize and until the project is closed.
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.
Road Crossing	Road crossings within the site may be maintained only as allowed by Conservation Easement or existing easement, deed restrictions, rights of way, or corridor agreements.
Drop Structure	Routine maintenance and repair activities may include removal of debris and supplemental installation of live stakes and other target vegetation along the channel. Undermining of the structure may require repair or replacement.

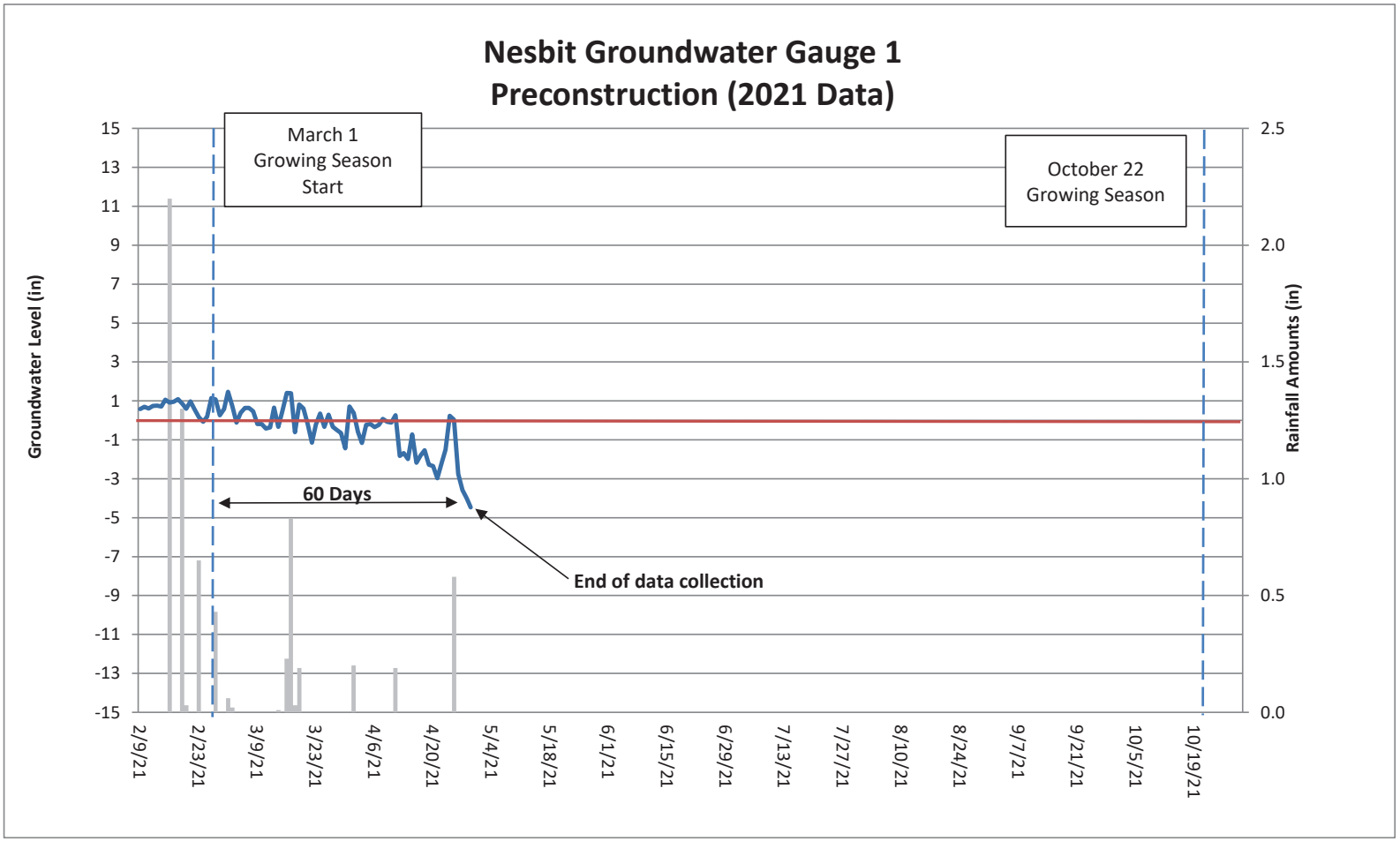
Appendix K: Preconstruction Groundwater Gauges

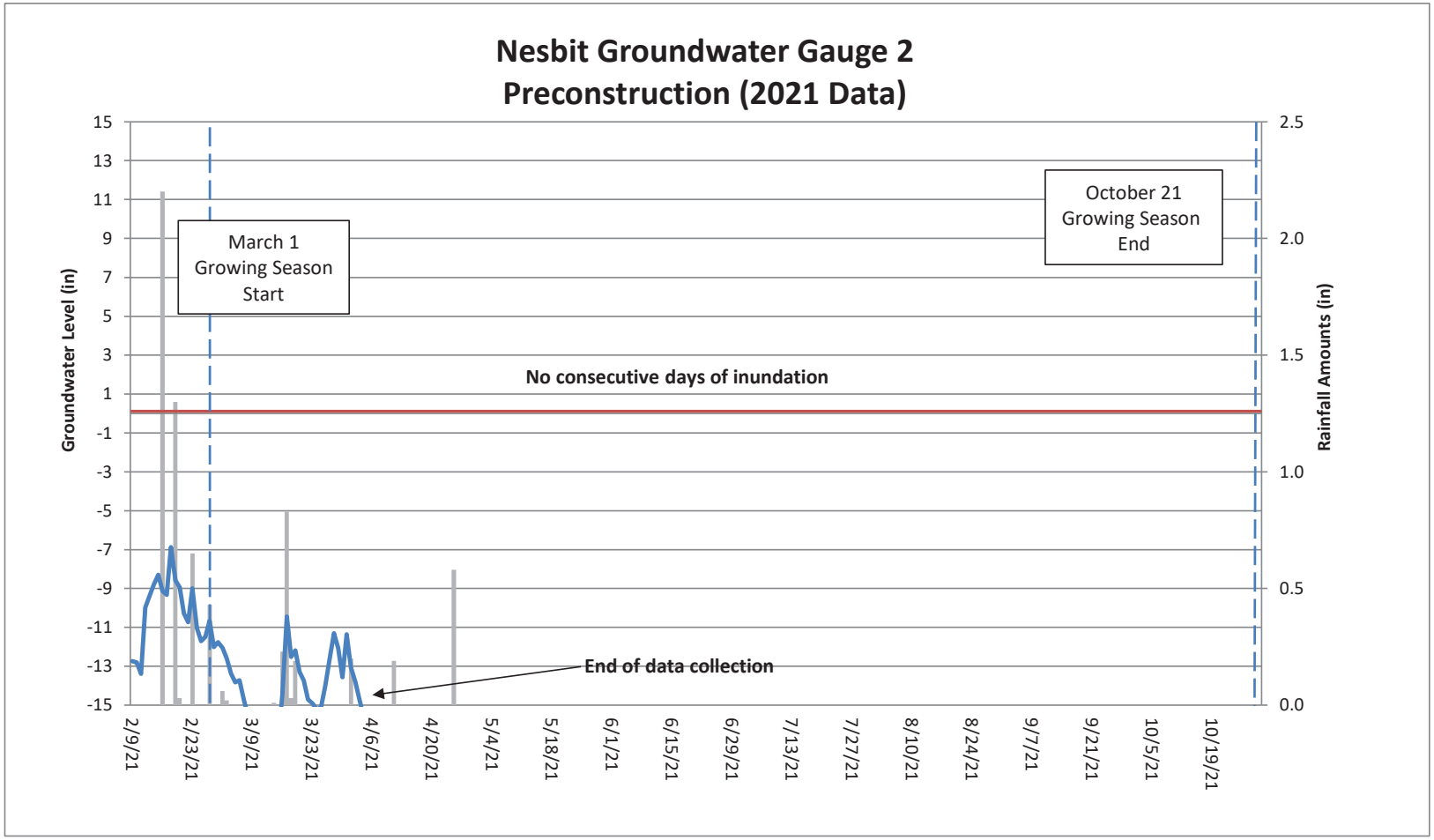

Nesbit Groundwater Gauge 1
Preconstruction (2020 Data)
March 1
Growing Season
Start
October 22
Growing Season
End
101 Days
Groundwater Level (in)
Rainfall Amounts (in)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2/25/20
3/10/20
3/24/20
4/7/20
4/21/20
5/5/20
5/19/20
6/2/20
6/16/20
6/30/20
7/14/20
7/28/20
8/11/20
8/25/20
9/8/20
9/22/20
10/6/20
10/20/20

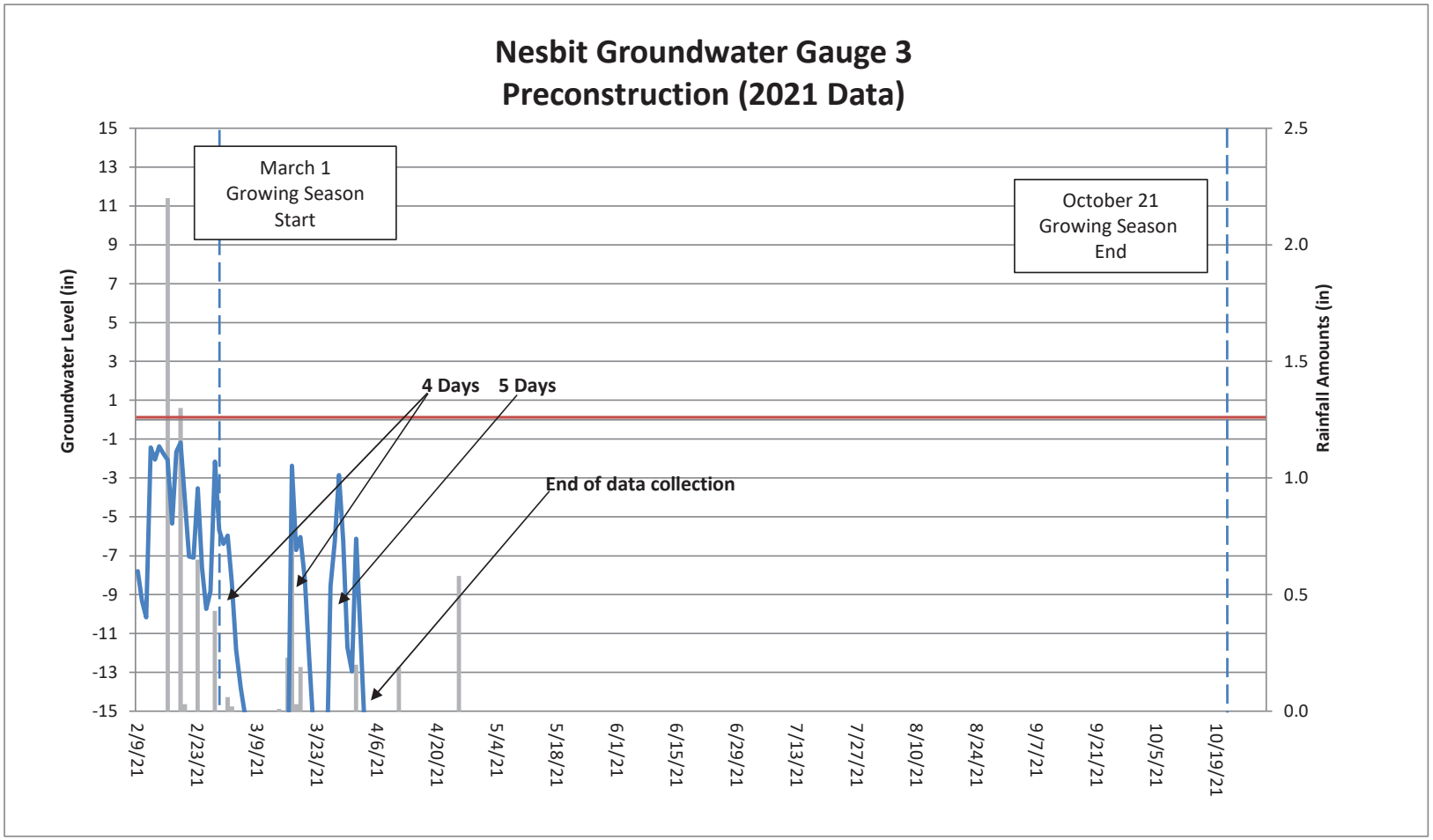

Nesbit Groundwater Gauge 2
Preconstruction (2020 Data)
March 1
Growing Season
Start
October 21
Growing Season
End
95 Days
Groundwater Level (in)
Rainfall Amounts (in)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2/25/20
3/3/20
3/10/20
3/17/20
3/24/20
3/31/20
4/7/20
4/14/20
4/21/20
4/28/20
5/5/20
5/12/20
5/19/20
5/26/20
6/2/20
6/9/20
6/16/20
6/23/20
6/30/20
7/7/20
7/14/20
7/21/20
7/28/20
8/4/20
8/11/20
8/18/20
8/25/20
9/1/20
9/8/20
9/15/20
9/22/20
9/29/20
10/6/20
10/13/20
10/20/20

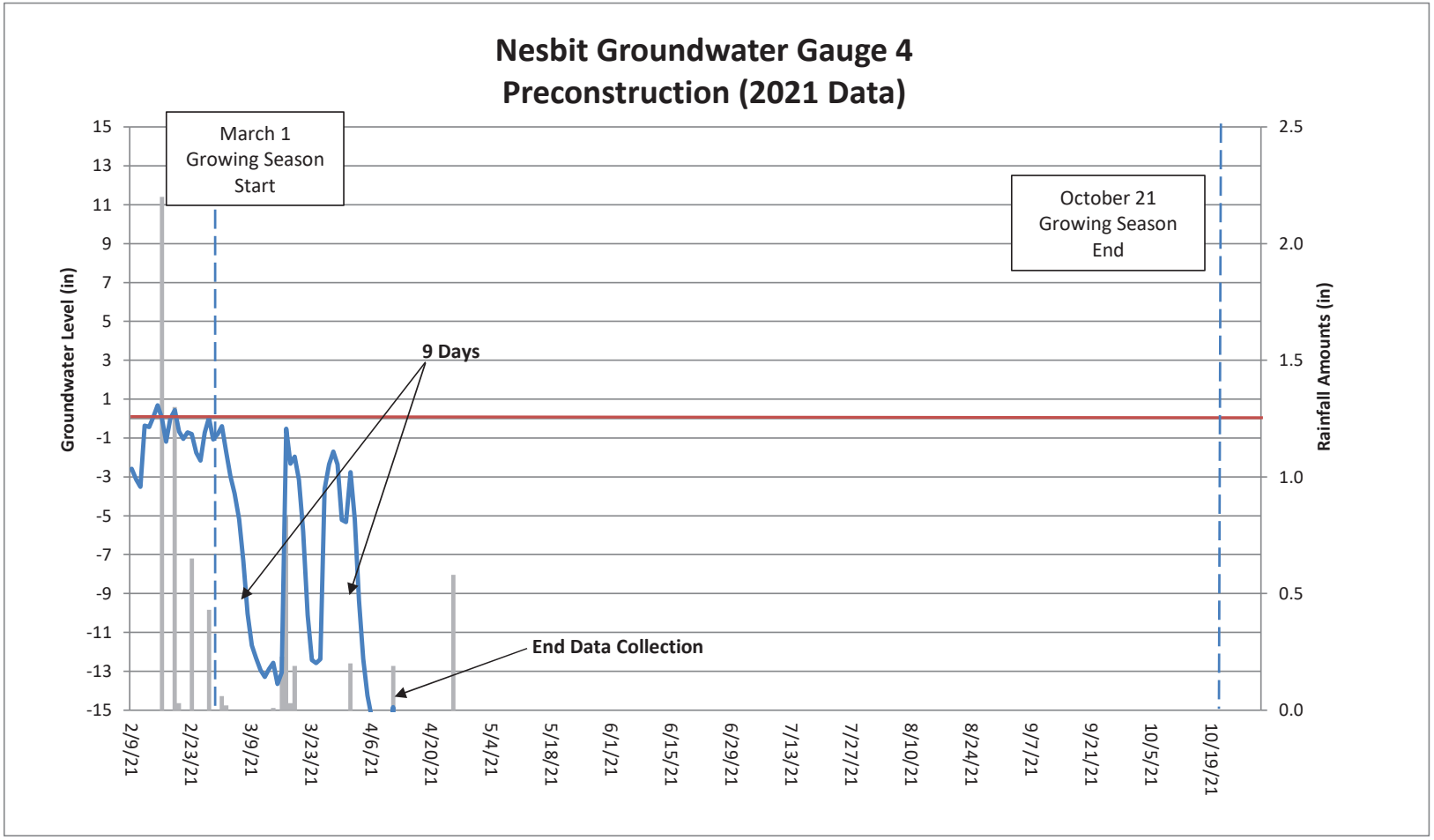

Nesbit Groundwater Gauge 3
Preconstruction (2020 Data)
March 1
Growing Season
Start
October 21
Growing Season
End
15 Days
Groundwater Level (in)
Rainfall Amounts (in)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2/25/2020
3/10/2020
3/24/2020
4/7/2020
4/21/2020
5/5/2020
5/19/2020
6/2/2020
6/16/2020
6/30/2020
7/14/2020
7/28/2020
8/11/2020
8/25/2020
9/8/2020
9/22/2020
10/6/2020
10/20/2020

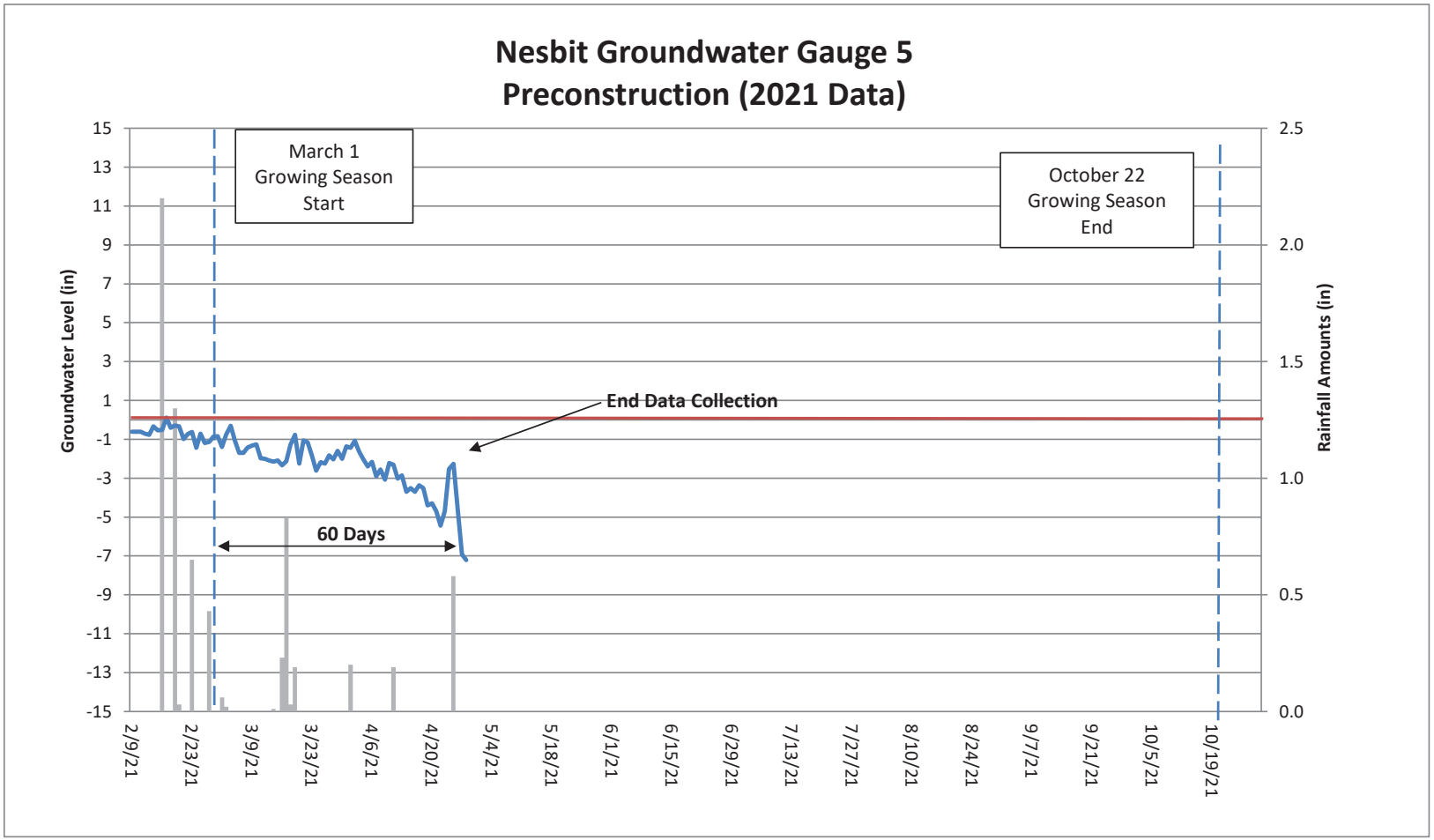

Nesbit Groundwater Gauge 4
Preconstruction (2020 Data)
March 1
Growing Season
Start
October 21
Growing Season
End
29 Days
Groundwater Level (in)
Rainfall Amounts (in)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2/25/20
3/10/20
3/24/20
4/7/20
4/21/20
5/5/20
5/19/20
6/2/20
6/16/20
6/30/20
7/14/20
7/28/20
8/11/20
8/25/20
9/8/20
9/22/20
10/6/20
10/20/20

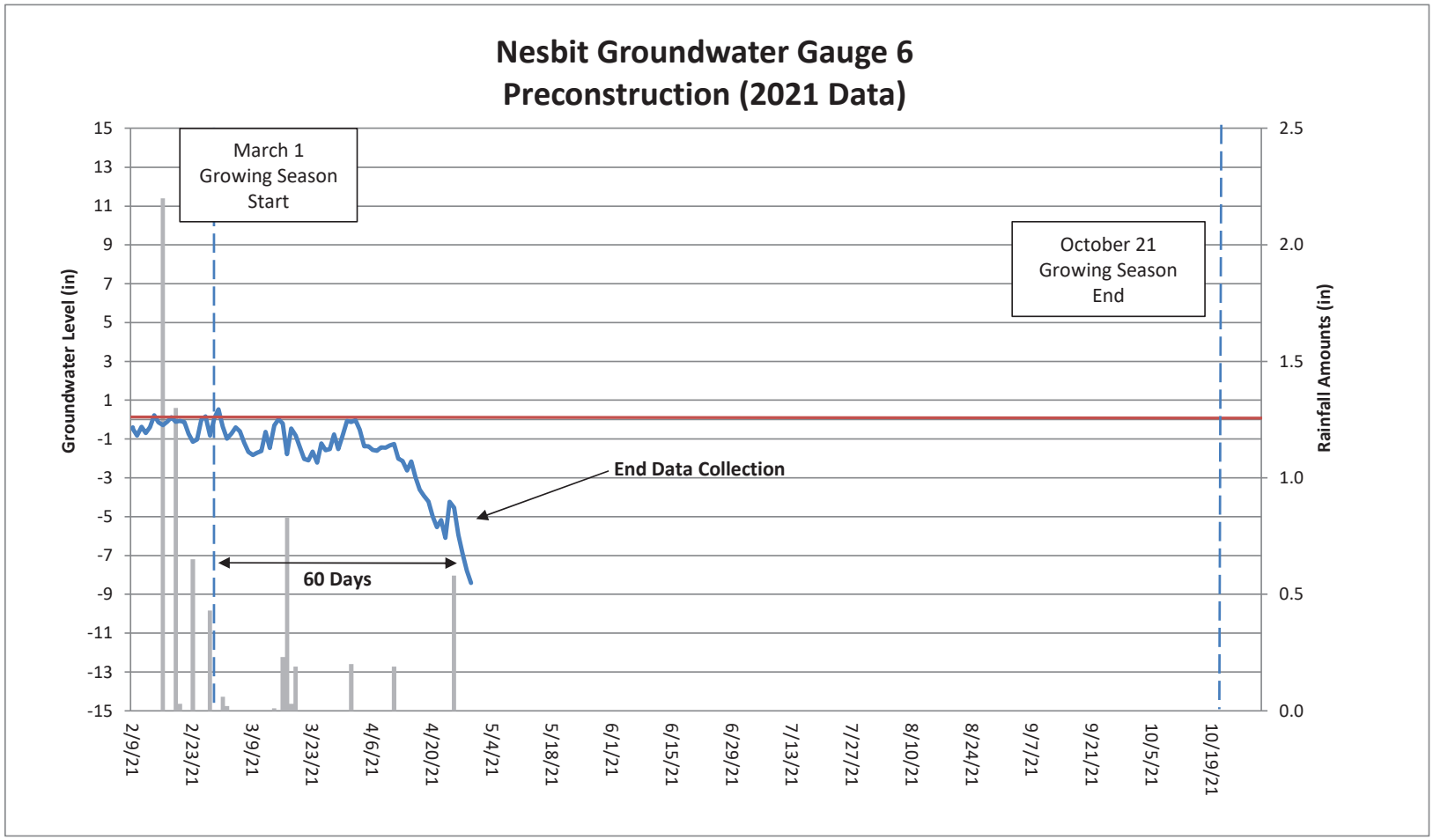

Nesbit Groundwater Gauge 1
Preconstruction (2021 Data)
March 1
Growing Season
Start
October 22
Growing Season
60 Days
End of data collection
Groundwater Level (in)
Rainfall Amounts (in)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
2.5
2.0
1.5
1.0
0.5
0.0
2/9/21
2/23/21
3/9/21
3/23/21
4/6/21
4/20/21
5/4/21
5/18/21
6/1/21
6/15/21
6/29/21
7/13/21
7/27/21
8/10/21
8/24/21
9/7/21
9/21/21
10/5/21
10/19/21

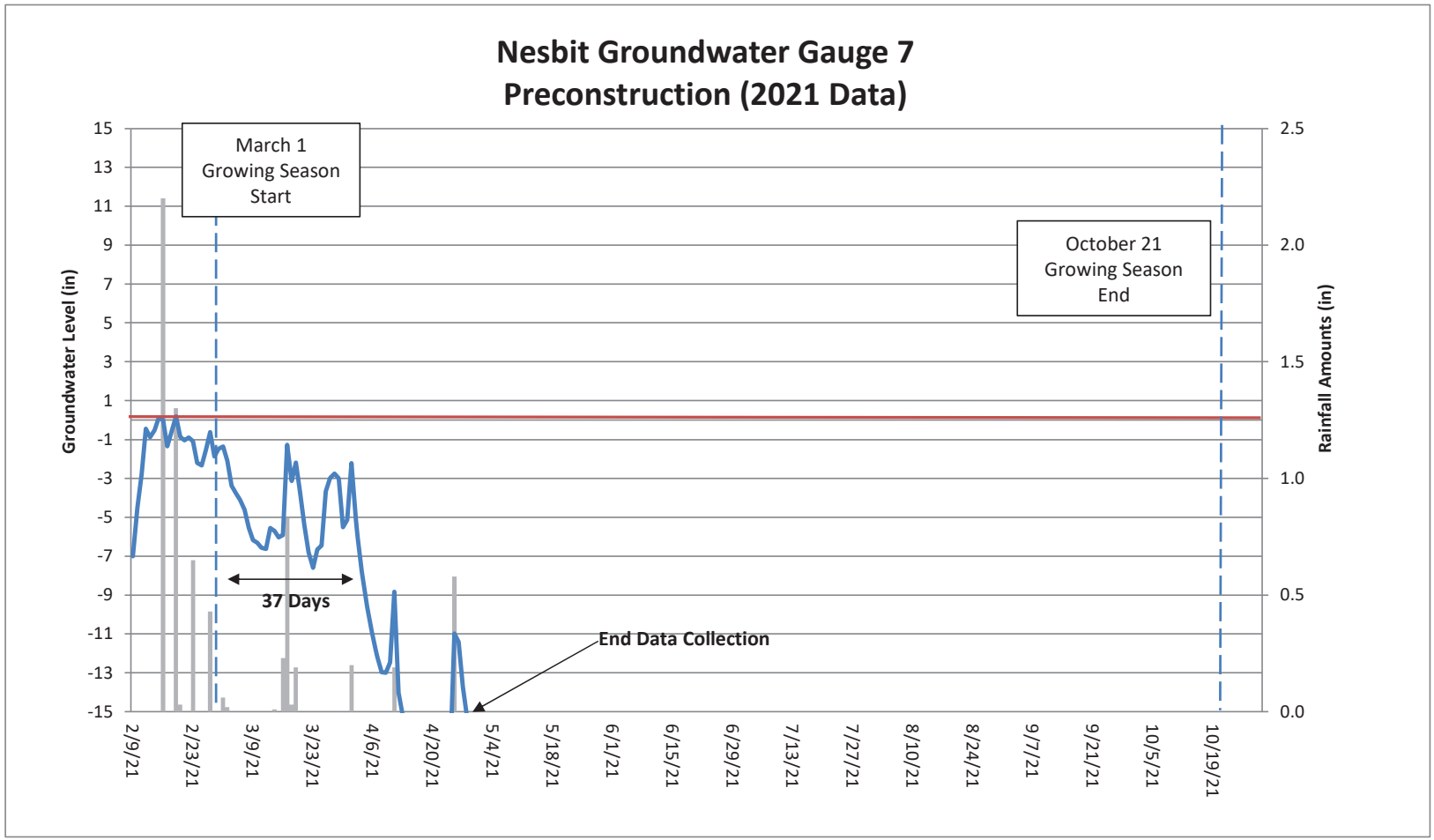

Nesbit Groundwater Gauge 2
Preconstruction (2021 Data)
Groundwater Level (in)
Rainfall Amounts (in)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
2.5
2.0
1.5
1.0
0.5
0.0
March 1
Growing Season
Start
October 21
Growing Season
End
No consecutive days of inundation
End of data collection
2/9/21
2/23/21
3/9/21
3/23/21
4/6/21
4/20/21
5/4/21
5/18/21
6/1/21
6/15/21
6/29/21
7/13/21
7/27/21
8/10/21
8/24/21
9/7/21
9/21/21
10/5/21
10/19/21

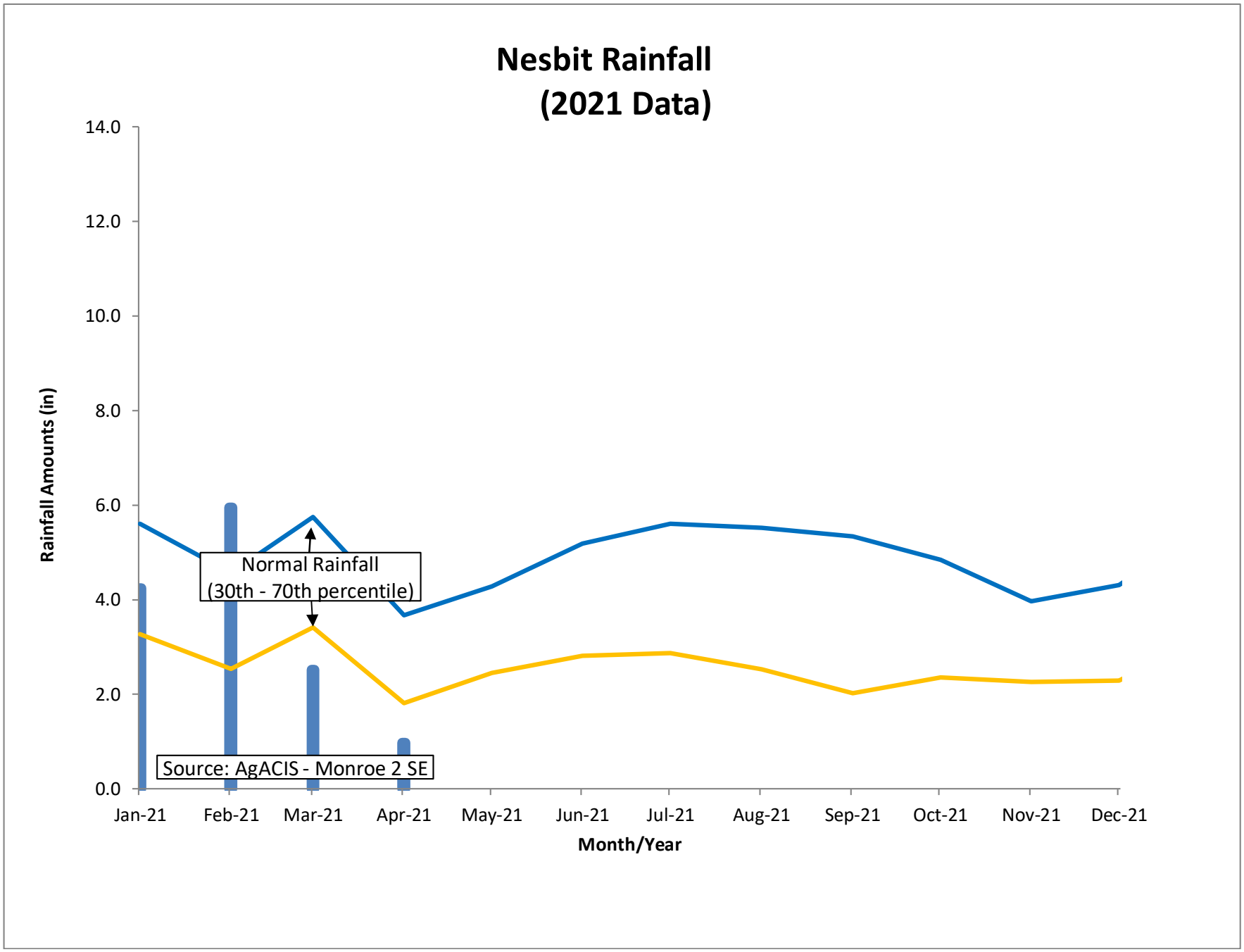

Nesbit Groundwater Gauge 3
Preconstruction (2021 Data)
Groundwater Level (in)
Rainfall Amounts (in)
March 1
Growing Season
Start
October 21
Growing Season
End
4 Days
5 Days
End of data collection
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
2.5
2.0
1.5
1.0
0.5
0.0
2/9/21
2/23/21
3/9/21
3/23/21
4/6/21
4/20/21
5/4/21
5/18/21
6/1/21
6/15/21
6/29/21
7/13/21
7/27/21
8/10/21
8/24/21
9/7/21
9/21/21
10/5/21
10/19/21

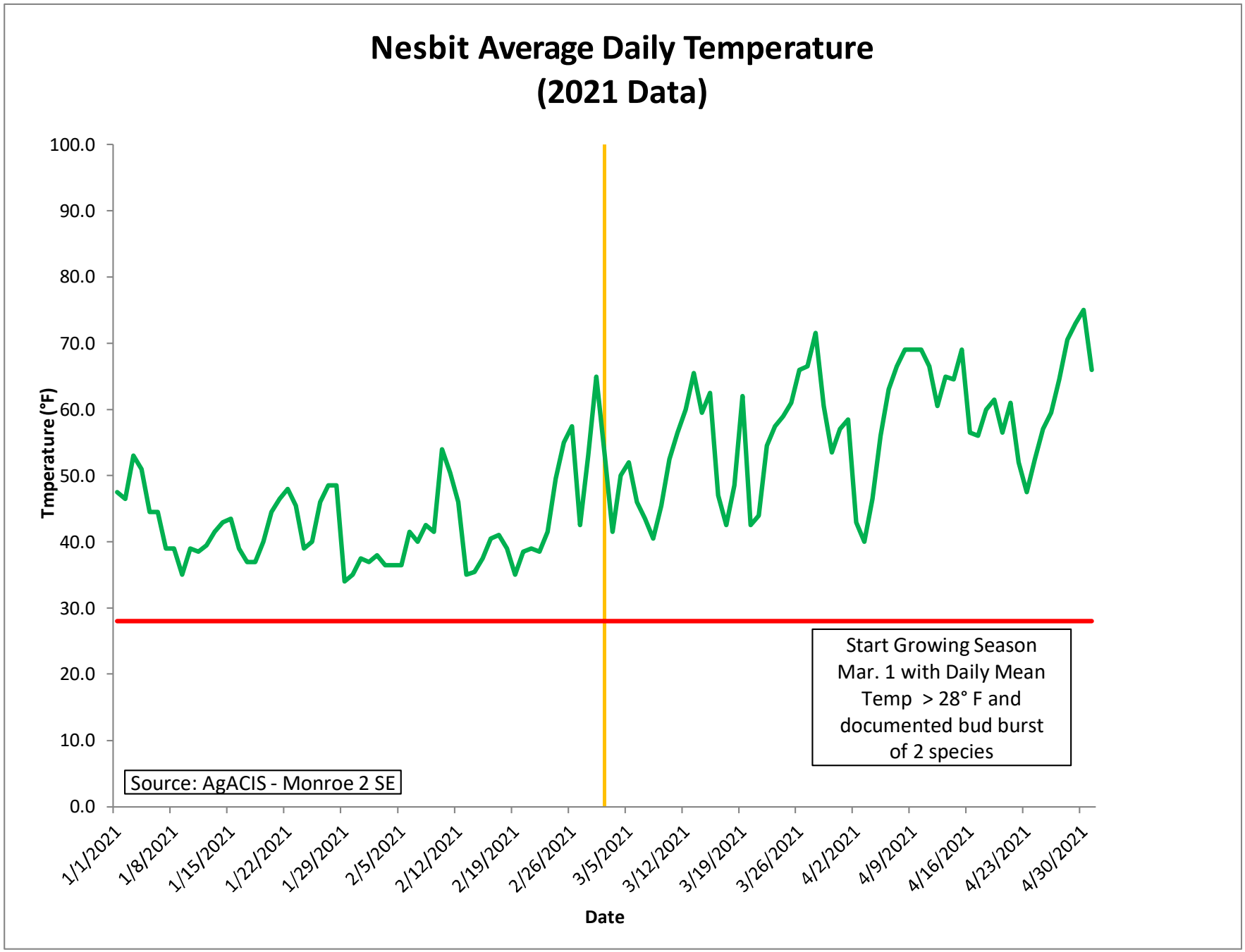

Nesbit Groundwater Gauge 4
Preconstruction (2021 Data)
March 1
Growing Season
Start
October 21
Growing Season
End
9 Days
End Data Collection
Groundwater Level (in)
Rainfall Amounts (in)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
2.5
2.0
1.5
1.0
0.5
0.0
2/9/21
2/23/21
3/9/21
3/23/21
4/6/21
4/20/21
5/4/21
5/18/21
6/1/21
6/15/21
6/29/21
7/13/21
7/27/21
8/10/21
8/24/21
9/7/21
9/21/21
10/5/21
10/19/21


Nesbit Groundwater Gauge 5
Preconstruction (2021 Data)
March 1
Growing Season
Start
October 22
Growing Season
End
End Data Collection
60 Days
Groundwater Level (in)
Rainfall Amounts (in)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
2.5
2.0
1.5
1.0
0.5
0.0
2/9/21
2/23/21
3/9/21
3/23/21
4/6/21
4/20/21
5/4/21
5/18/21
6/1/21
6/15/21
6/29/21
7/13/21
7/27/21
8/10/21
8/24/21
9/7/21
9/21/21
10/5/21
10/19/21


Nesbit Groundwater Gauge 6
Preconstruction (2021 Data)
March 1
Growing Season
Start
October 21
Growing Season
End
End Data Collection
60 Days
Groundwater Level (in)
Rainfall Amounts (in)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
2.5
2.0
1.5
1.0
0.5
0.0
2/9/21
2/23/21
3/9/21
3/23/21
4/6/21
4/20/21
5/4/21
5/18/21
6/1/21
6/15/21
6/29/21
7/13/21
7/27/21
8/10/21
8/24/21
9/7/21
9/21/21
10/5/21
10/19/21


Nesbit Groundwater Gauge 7
Preconstruction (2021 Data)
March 1
Growing Season
Start
October 21
Growing Season
End
37 Days
End Data Collection
Groundwater Level (in)
Rainfall Amounts (in)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
2.5
2.0
1.5
1.0
0.5
0.0
2/9/21
2/23/21
3/9/21
3/23/21
4/6/21
4/20/21
5/4/21
5/18/21
6/1/21
6/15/21
6/29/21
7/13/21
7/27/21
8/10/21
8/24/21
9/7/21
9/21/21
10/5/21
10/19/21


Nesbit Rainfall
(2021 Data)
Rainfall Amounts (in)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Normal Rainfall
(30th - 70th percentile)
Source: AgACIS - Monroe 2 SE
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Month/Year


Nesbit Average Daily Temperature
(2021 Data)
Tmperature (°F)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1/1/2021
1/8/2021
1/15/2021
1/22/2021
1/29/2021
2/5/2021
2/12/2021
2/19/2021
2/26/2021
3/5/2021
3/12/2021
3/19/2021
3/26/2021
4/2/2021
4/9/2021
4/16/2021
4/23/2021
4/30/2021
Date
Start Growing Season
Mar. 1 with Daily Mean
Temp > 28° F and
documented bud burst
of 2 species
Source: AgACIS - Monroe 2 SE

Appendix L: Post Contract IRT Visit Minutes

Task 1 a.) Inter-Agency Post Contract Site Visit: Site Visit Notes

As specified within RFP #16-007704, an on-site meeting with regulatory agencies and DMS staff was conducted on July 22th, 2019. Below is a list of attendees and general site visit notes.

Attendees:

USACE:
- Todd Tugwell
- Kim Browning

NC WRC:
- Olivia Munzer

NC DMS:
- Kelly Phillips (PM)
- Paul Wiesner
- Matthew Reid
- Periann Russell
- Kirsten Ullman

NC DWR:
- Mac Haupt
- Erin Davis

Restoration Systems:
- Matthew Harrell (PM)
- Raymond Holz
- Alex Baldwin

Axiom Environmental
- Grant Lewis
- Kenan Jernigan

Site Visit Notes:
- Members of the IRT evaluated this site for wetland and stream restoration potential and assessed credit ratios outlined in the Technical Proposal.
- IRT would like to see historic aerials included in future technical proposals to better illustrate in recent changes in land use, including tree clearing.
- RS noted history of beavers on the site and continuing landowner management activities relating to beaver removal.
- RS noted heavy presence of invasive species (mainly privet) and plan to treat those species beginning before construction.

Stream Notes:
- Main Channel (Glen Branch): The proposed credit ratios were accepted as proposed with little comment.
- UT 1: Proposed approach included Level II Enhancement (2.5:1) and Restoration (1:1). IRT stated the portion above the confluence with UT1A should be treated as Level I Enhancement for design purposes but still credited at 2.5:1. The IRT requested a gauge be installed in the upper reaches of UT 1 to determine the flow regime, particularly if the channel bed elevation is raised.
- UT1A: Proposed approach was Level II Enhancement at 2.5:1 credit ratio. IRT is willing to accept Level II enhancement at 5:1 credit ratio.
- UT 2: Proposed credit ratios were accepted as proposed, pending the official JD call for origin location.

- UT 3: It appeared this reach may not be considered jurisdictional. If it is not jurisdictional, the favored option is to install a BMP as the valley enters the buffer of Glen Branch. If it is jurisdictional, flow gauges will be required.

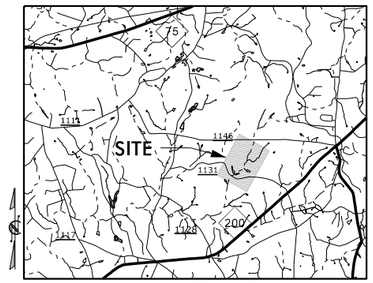
Wetland Notes:

- IRT had questions about tree clearing within existing wetlands circa 2012 and the potential for a violation. T. Tugwell stated that given the current condition of the project area he did not see a reason to hold up the project, but that he would pass the information along to the Charlotte USACE office for their review.
- Some areas of Wetland Enhancement depicted on Figure 5 of the Technical Proposal may be suitable for Wetland Rehabilitation. Wetland Rehabilitation may be suitable for portions of the Site currently characterized by hydric soils and jurisdictional hydrology that have been cleared of woody vegetation and are affected by groundwater table alterations from the adjacent, incised stream channel. Gauges must be installed and monitored to verify the hydrologic modifications prior to mitigation activities.
- The extent of wetland potential on the site as shown in the figures was difficult to assess during the visit due to lush vegetation and dry conditions. Axiom explained that the extent shown in the technical proposal figures is based on soil hydrology observed in December 2018 as well as elevation data derived from the latest NC Lidar data. The JD process is expected to clarify any questions about extent of wetland potential on the site. The delineation process will begin this month.
- IRT requested that more comprehensive soil borings be taken in each of the primary wetland areas and included at the Draft Mitigation Plan stage at a minimum. This will be addressed by including logs of the soil borings taken during the JD process.

Appendix M: Construction Plans

NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
CONSTRUCTION PLANS
NESBIT SITE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	NESBIT SITE	1	



VICINITY MAP
Not to Scale

LOCATION: UNION COUNTY, NORTH CAROLINA

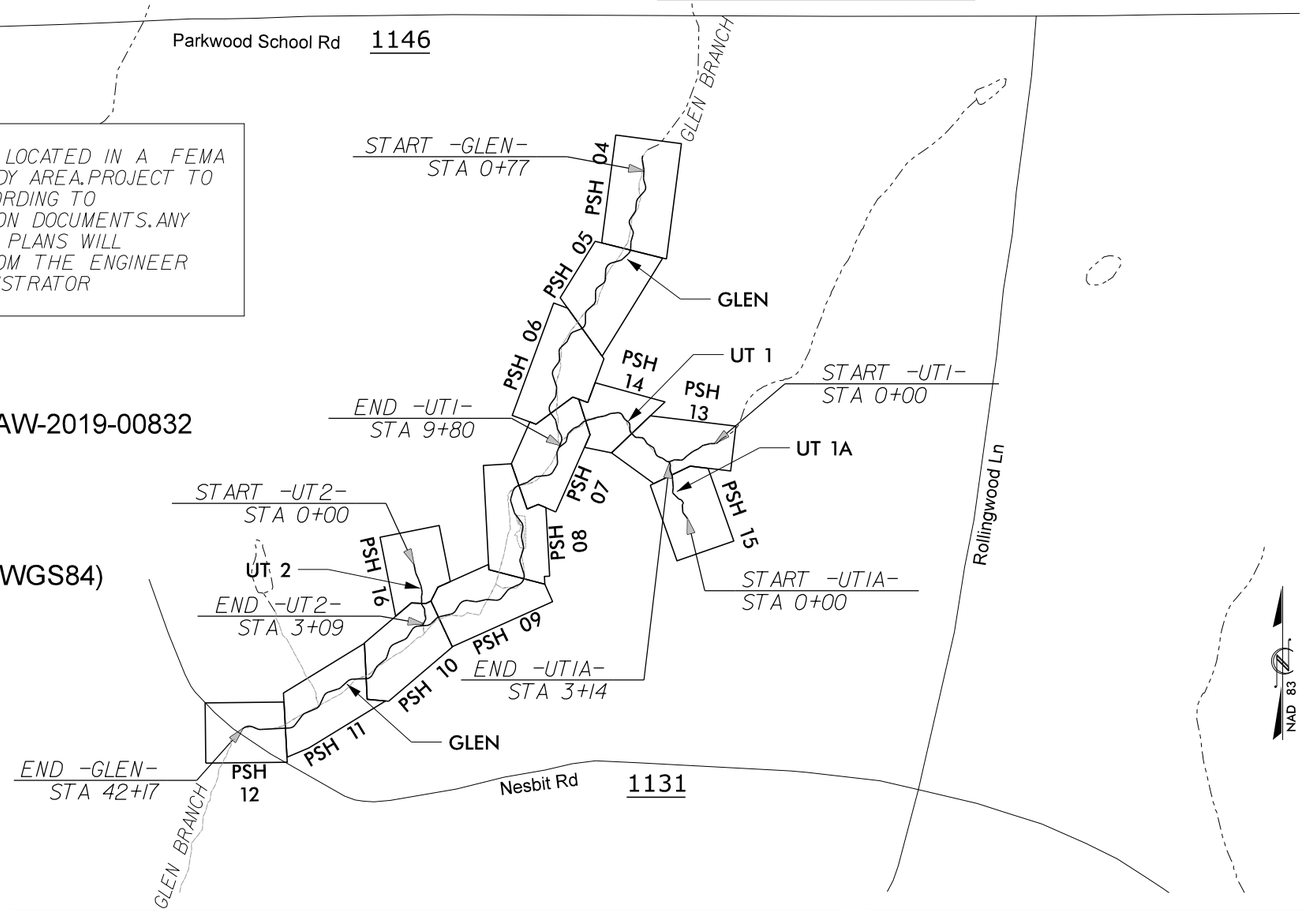
TYPE OF WORK: STREAM RESTORATION AND ENHANCEMENT (CLEARING, GRUBBING, GRADING, EROSION CONTROL AND PLANTING)

100% SUBMITTAL PLANS

INDEX OF SHEETS

NOTE: GLEN BRANCH IS LOCATED IN A FEMA LIMITED DETAILED STUDY AREA. PROJECT TO BE CONSTRUCTED ACCORDING TO APPROVED CONSTRUCTION DOCUMENTS. ANY DEVIATIONS FROM THE PLANS WILL REQUIRE APPROVAL FROM THE ENGINEER AND FLOODPLAIN ADMINISTRATOR

Nesbit Site
Site #100121
USACE Action ID: SAW-2019-00832
Catawba 03030030;
Union County
Contract #00077868
Latitude: 34.8936
Longitude: -80.6544(WGS84)



CONTRACT: NESBIT SITE

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 5
PROFILE (VERTICAL)

PROPOSED LENGTH OF -GLEN- = 4140		PROPOSED LENGTH OF -UT 1A- = 314	
PROPOSED LENGTH OF -UT 1- = 980		PROPOSED LENGTH OF -UT 2- = 309	
	TOTAL STREAM LENGTHS (LF) = 5743		
RESTORATION LEVEL	STREAM (linear footage)	RIPARIAN WETLAND (acreage)	NONRIPARIAN WETLAND (acreage)
RESTORATION	4801	5.338 (Reestablishment)	0.000
ENHANCEMENT I	316	1.075 (Enhancement)	0.000
ENHANCEMENT II	541	.902 (Rehabilitation)	0.000
PRESERVATION	0	0.000	0.000
TOTALS	5658	7.315	0.000
MITIGATION UNITS	5199.756 SMUs	6.477 RIPARIAN WMUs	NONRIPARIAN WMUs

Axiom Environmental, Inc.
Axiom Environmental
218 Snow Ave
Raleigh, NC 27603
GRANT LEWIS
PROJECT DESIGNER

RESTORATION SYSTEMS LLC
Restoration Systems
1101 Haynes St.
Suite 211
Raleigh, NC 27604
WORTH CREECH
SITE CONSTRUCTION MANAGER

Prepared in the Office of:
SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
ENG FIRM LICENSE NO. C-890

JOSHUA G. DALTON, P.E.
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

DocuSigned by:
Joshua G. Dalton
1089AD8C1498423...

5/24/2021
DATE:

CONVENTIONAL PLAN SHEET SYMBOLS

Note: Not to Scale **S.U.E. = Subsurface Utility Engineering*

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin (EIP)
- Computed Property Corner
- Property Monument (ECM)
- Parcel/Sequence Number (123)
- Existing Fence Line
- Proposed Fence Gate
- Proposed Barbed Wire Fence
- Existing Wetland Boundary (WLB)
- Proposed Wetland Boundary (WLB)
- Existing Endangered Animal Boundary (EAB)
- Existing Endangered Plant Boundary (EPB)
- Existing Historic Property Boundary (HPB)

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign (S)
- Well (W)
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream (JS)
- Buffer Zone 1 (BZ 1)
- Buffer Zone 2 (BZ 2)
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch (FLOW)

RIGHT OF WAY & PROJECT CONTROL:

- Secondary Horiz and Vert Control Point
- Primary Horiz Control Point
- Primary Horiz and Vert Control Point

- Exist Permanent Easment Pin and Cap
- New Permanent Easement Pin and Cap
- Vertical Benchmark
- Existing Right of Way Marker
- Existing Right of Way Line
- New Right of Way Line (RW)
- New Right of Way Line with Pin and Cap (RW)
- New Right of Way Line with Concrete or Granite R/W Marker (RW)
- New Control of Access Line with Concrete C/A Marker (CA)
- Existing Control of Access (CA)
- New Control of Access (CA)
- Existing Easement Line (E)
- New Conservation Easement (CE)
- New Temporary Drainage Easement (TDE)
- New Permanent Drainage Easement (PDE)
- New Permanent Drainage / Utility Easement (DUE)
- New Permanent Utility Easement (PUE)
- New Temporary Utility Easement (TUE)
- New Aerial Utility Easement (AUE)

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut (C)
- Proposed Slope Stakes Fill (F)
- Proposed Curb Ramp (CR)
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert (CONC)
- Bridge Wing Wall, Head Wall and End Wall (CONC WW)

MINOR:

- Head and End Wall (CONC HW)
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB (CB)
- Paved Ditch Gutter
- Storm Sewer Manhole (S)
- Storm Sewer (S)

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole (P)
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole
- H-Frame Pole
- U/G Power Line LOS B (S.U.E.*) (P)
- U/G Power Line LOS C (S.U.E.*) (P)
- U/G Power Line LOS D (S.U.E.*) (P)

TELEPHONE:

- Existing Telephone Pole

WATER:

- Water Manhole (W)
- Water Meter
- Water Valve
- Water Hydrant
- U/G Water Line LOS B (S.U.E*) (W)
- U/G Water Line LOS C (S.U.E*) (W)
- U/G Water Line LOS D (S.U.E*) (W)
- Above Ground Water Line (A/G Water)

GAS:

- Gas Valve
- Gas Meter
- U/G Gas Line LOS B (S.U.E.*) (G)
- U/G Gas Line LOS C (S.U.E.*) (G)
- U/G Gas Line LOS D (S.U.E.*) (G)
- Above Ground Gas Line (A/G Gas)

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line (SS)
- Above Ground Sanitary Sewer (A/G Sanitary Sewer)
- SS Forced Main Line LOS B (S.U.E.*) (FSS)
- SS Forced Main Line LOS C (S.U.E.*) (FSS)
- SS Forced Main Line LOS D (S.U.E.*) (FSS)

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box (S)
- Utility Unknown U/G Line LOS B (S.U.E.*) (?UTL)
- U/G Tank; Water, Gas, Oil
- Underground Storage Tank, Approx. Loc. (UST)
- A/G Tank; Water, Gas, Oil
- Geoenvironmental Boring
- U/G Test Hole LOS A (S.U.E.*)
- Abandoned According to Utility Records (AATUR)
- End of Information (E.O.I.)
- Existing Contour Major
- Existing Contour Minor
- Contour Interval = 1 ft
- Riffle Rip Rap
- Log Vane
- Log Cross Vane
- Drop Structure (Begin / End)
- Stream Plug
- Floodplain Interceptor
- Proposed Fence
- Limits of Disturbance (LOD)

SUNGATE DESIGN GROUP, P.A.
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Axiom Environmental, Inc.

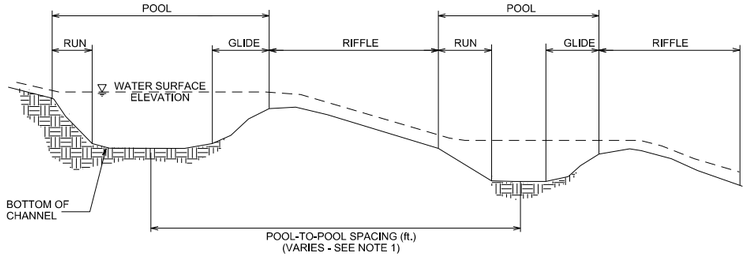
NESBIT
UNION COUNTY, NC

SYMBOLOGY

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. **01A**

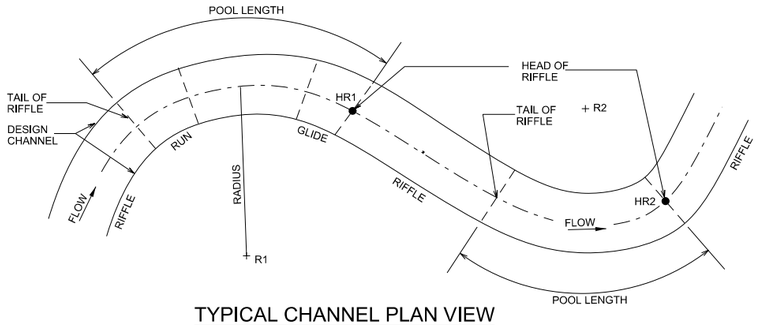
5/24/2021
Nesbit_Rdy_PSH_01a.dgn
Harvey



TYPICAL CHANNEL PROFILE

NOTES:

1. POOL-TO-POOL SPACING IS MEASURED FROM CENTER OF POOL BEND TO CENTER OF POOL BEND.



TYPICAL CHANNEL PLAN VIEW

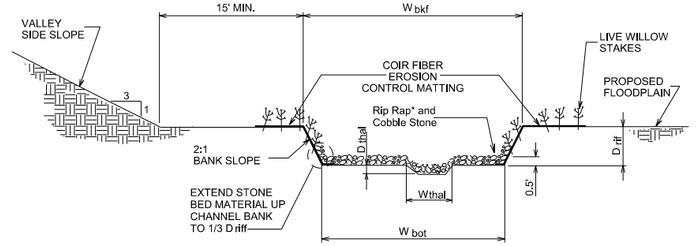
CHANNEL PLAN VIEW NOTES:

1. THE CONTRACTOR SHALL LAYOUT THE CHANNEL ALIGNMENT BY LOCATING THE RADII AND SCRIBING THE CENTER LINE FOR EACH POOL BEND. THE CONNECTING TANGENT SECTIONS SHALL COMPLETE THE LAYOUT OF THE CHANNEL.

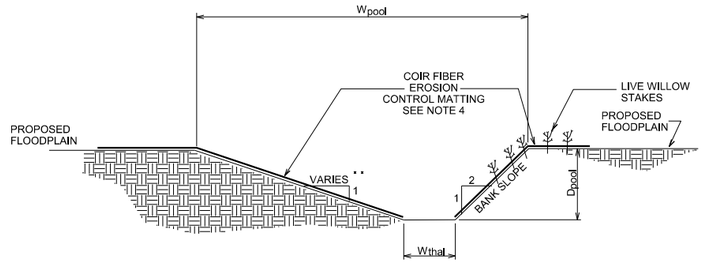
2. FIELD ADJUSTMENTS OF THE ALIGNMENT MAY BE REQUIRED TO SAVE TREES OR AVOID OBSTACLES. THE STAKE-OUT SHALL BE APPROVED BY THE CONSTRUCTION MANAGER BEFORE CONSTRUCTION OF THE CHANNEL.

3. GPS EQUIPMENT ACCEPTABLE FOR USE TO PERFORM CHANNEL ALIGNMENT LAYOUT.

* Riffle Rip Rap			
REACH	RIP RAP CL 'B' %	RIP RAP CL 'A' %	RIP RAP COBBLE %
GLEN (upstream and downstream)	30	30	40
UT 1	0	40	60
UT 2	0	40	60



TYPICAL RIFFLE CROSS-SECTION



•• MAX. 1:1 SLOPE

TYPICAL POOL CROSS-SECTION

CHANNEL CONSTRUCTION NOTES:

1. MATERIAL EXCAVATED FROM CHANNEL AND FLOODPLAIN SHALL BE USED TO BACKFILL EXISTING CHANNEL.

2. BANK PROTECTION SHALL CONSIST OF NATURAL COIR FIBER MATTING.

3. THE CONTRACTOR SHALL SUPPLY BED MATERIAL FOR THE ENTIRE BED LENGTH OF EACH RIFFLE SECTION. THE BED MATERIAL SHALL CONSIST OF A MIX OF RIP RAP* AND SMALLER STONE.

CROSS-SECTION DIMENSIONS							
REACH	Wbkf (ft.)	Wbot (ft.)	Driff (ft.)	Dthal (ft.)	Dpool (ft.)	Wpool (ft.)	Wthal (ft.)
Glen Br Upstream (0+00 to 16+55)	15.3	9.7	1.3	0.1	1.9	18.3	6.9
Glen Br Downstream (16+55 to 41+92)	18.0	11.2	1.6	0.1	2.2	21.6	8.4
UT 1	10.8	6.8	0.9	0.1	1.3	13.0	5.2
UT 2	6.7	4.3	0.5	0.1	0.8	8.0	3.2

DocuSigned by: Joshua G. Dalton
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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

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NESBIT
UNION COUNTY, NC

TYPICALS

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

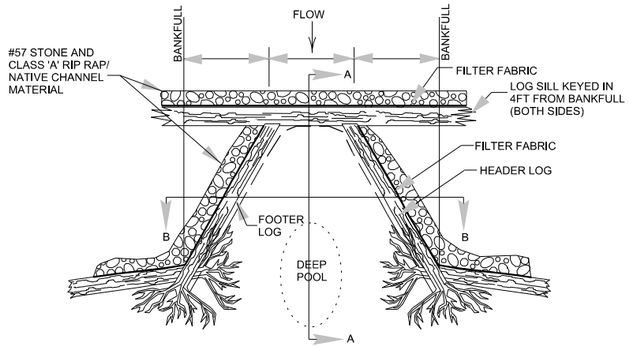
SHEET NO.
02

5/24/2021
Nesbit_Rdy_psh_02.dgn
Jharvell

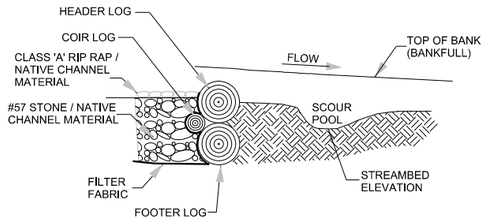
LOG CROSS VANE

SCALE:NTS

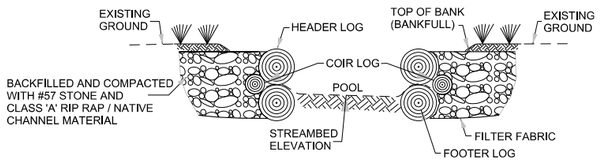
PLAN VIEW



NOTES:
1. HEADER AND FOOTER LOGS SHALL BE A MINIMUM OF 18" DIAMETER AND SHALL BE A HARDWOOD SPECIES. (FOOTER LOG MAY BE SUBSTITUTED WITH PINE)
2. A DOUBLE FOOTER LOG MAY BE REQUIRED IN SAND BED STREAMS.
3. ALL STONES ARE TO BE STRUCTURE STONES.
4. FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH LOG GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF THE STRUCTURE.
5. PERPENDICULAR ROOTWAD LOGS ARE REQUIRED IF THE LOG VANE ARM DOES NOT HAVE A ROOTBALL TO TIE INTO THE BANK.



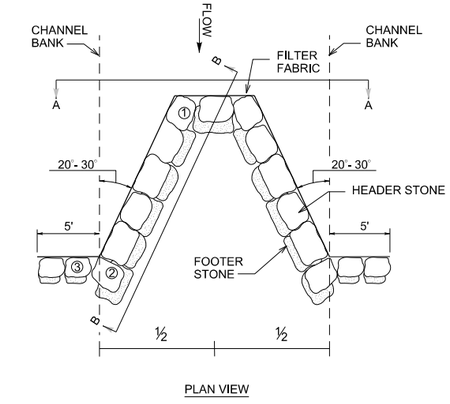
SECTION A-A



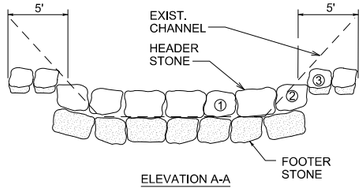
SECTION B-B

REACH	ARM LENGTH (FT.)	CHANNEL DEPTH (FT.)
Glen Br Upstream (0+00 to 16+55)	14	1.3 - 1.8
Glen Br Downstream (16+55 to 41+92)	17	1.5 - 2.1
UT 1	10	0.9 - 1.3
UT 2	6	0.6 - 0.8

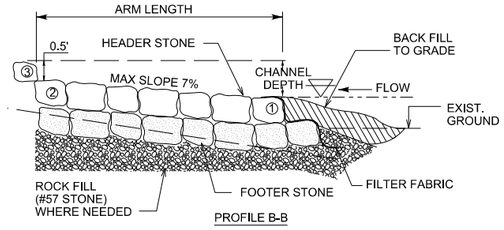
NOTE:
HEADER AND FOOTER STONES ARE LARGE, ANGULAR BOULDERS MEASURING A MINIMUM OF 24" ALONG THE SHORTEST DIMENSION.



PLAN VIEW

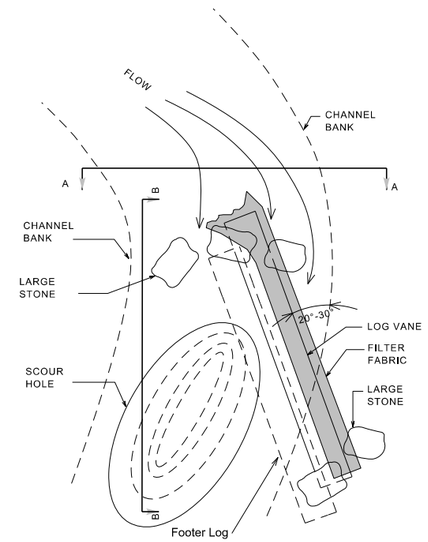


ELEVATION A-A



PROFILE B-B

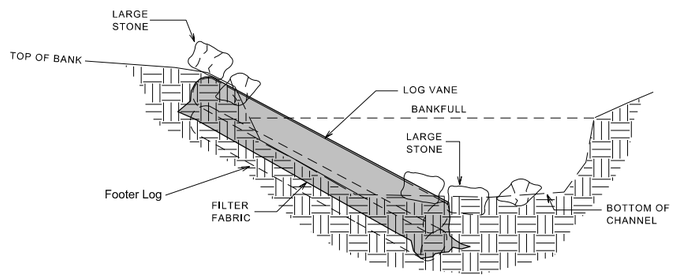
TYPICAL CROSS-VANE



NOTE:
FILTER FABRIC TOED IN AND DRAPED ON UPSTREAM SIDE OF LOG VANE PRIOR TO BACKFILL.

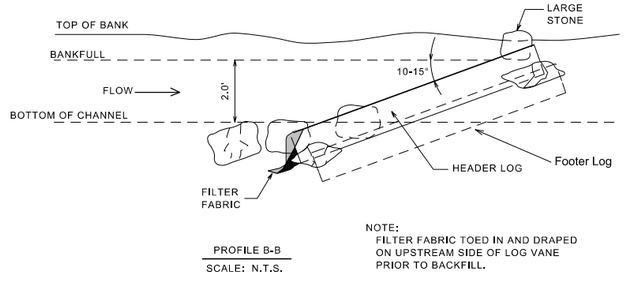
PLAN VIEW

SCALE: N.T.S.



CROSS-SECTION A-A

SCALE: N.T.S.



PROFILE B-B

SCALE: N.T.S.

NOTE:
FILTER FABRIC TOED IN AND DRAPED ON UPSTREAM SIDE OF LOG VANE PRIOR TO BACKFILL.

TYPICAL LOG VANE

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1088AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

DETAILS

PROJECT # :

DRAWING NAME:

DATE: 2021

DRAWN BY: JRH

REVIEWED BY: JGD

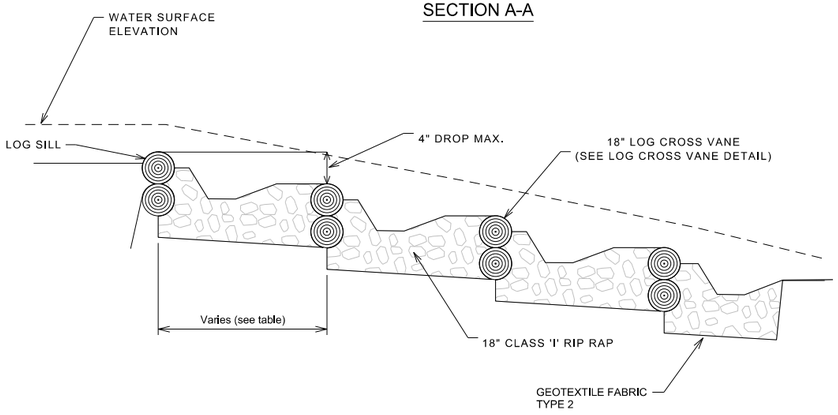
REVISIONS:

SHEET NO. ***02A***

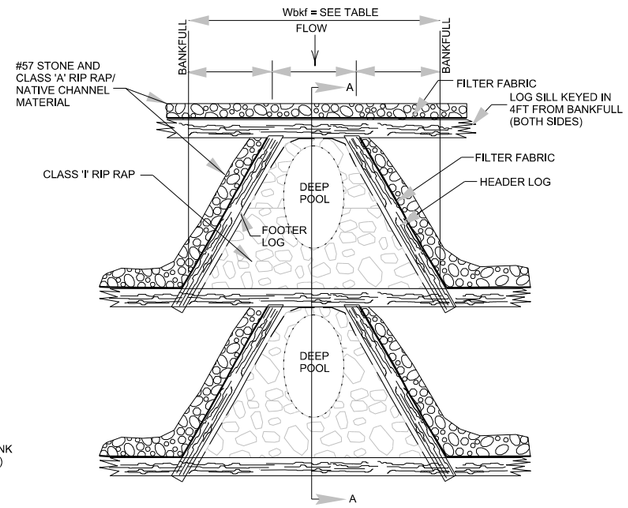
5/24/2021
Nesbit_Rdy_psh_02a.dgn
jarvey

DROP STRUCTURE

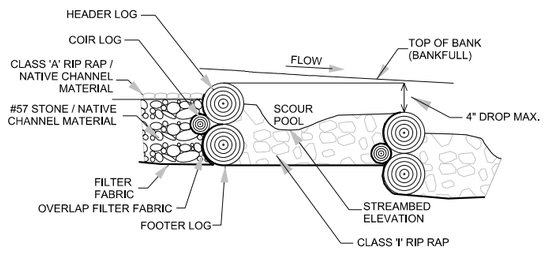
SECTION A-A



PLAN VIEW



DROP STRUCTURE ENLARGEMENT



STRUCTURE NOTES:
1. FILL CLASS '1' RIP RAP VOIDS WITH CLASS 'A' RIP RAP/ #57 STONE/ NATIVE CHANNEL MATERIAL MIXTURE.

CROSS-SECTION DIMENSIONS		
REACH	Wbkf (ft.)	Distance between Drops
GLEN	18.0	20'
UT 1	10.8	10'
UT 2	6.7	10'

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5/24/2021

DATE:

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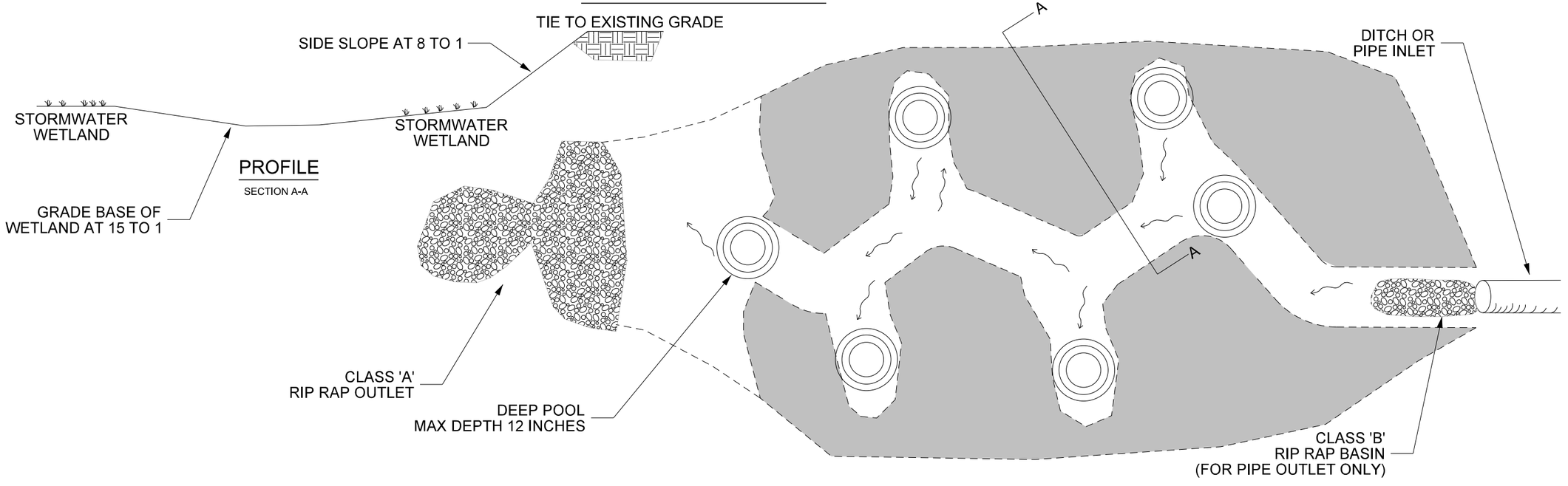
MARSH TREATMENT AREA



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Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

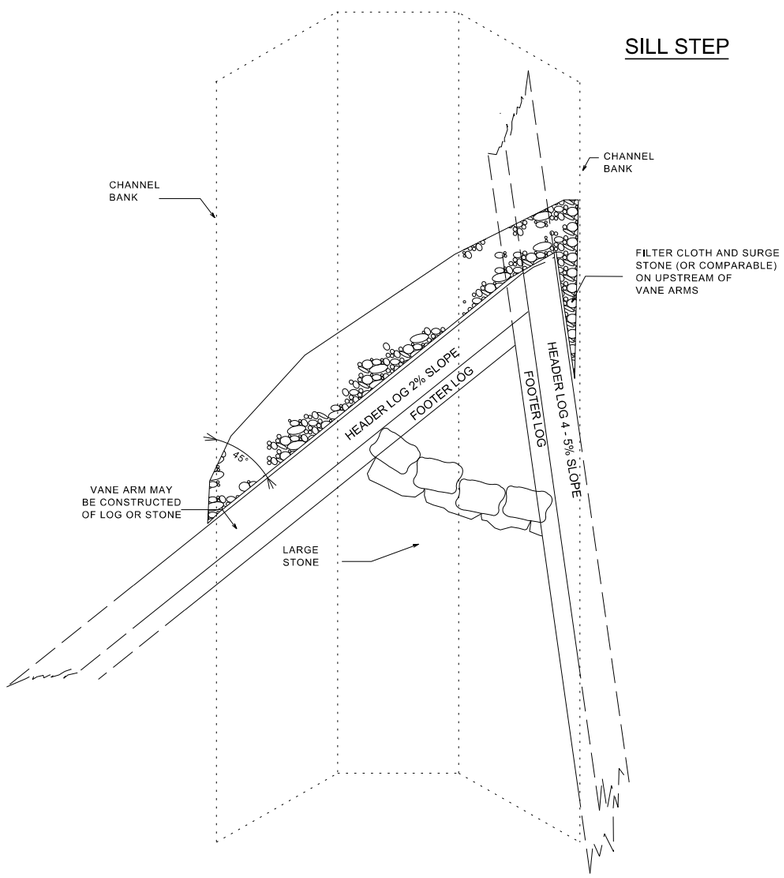
DETAILS

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

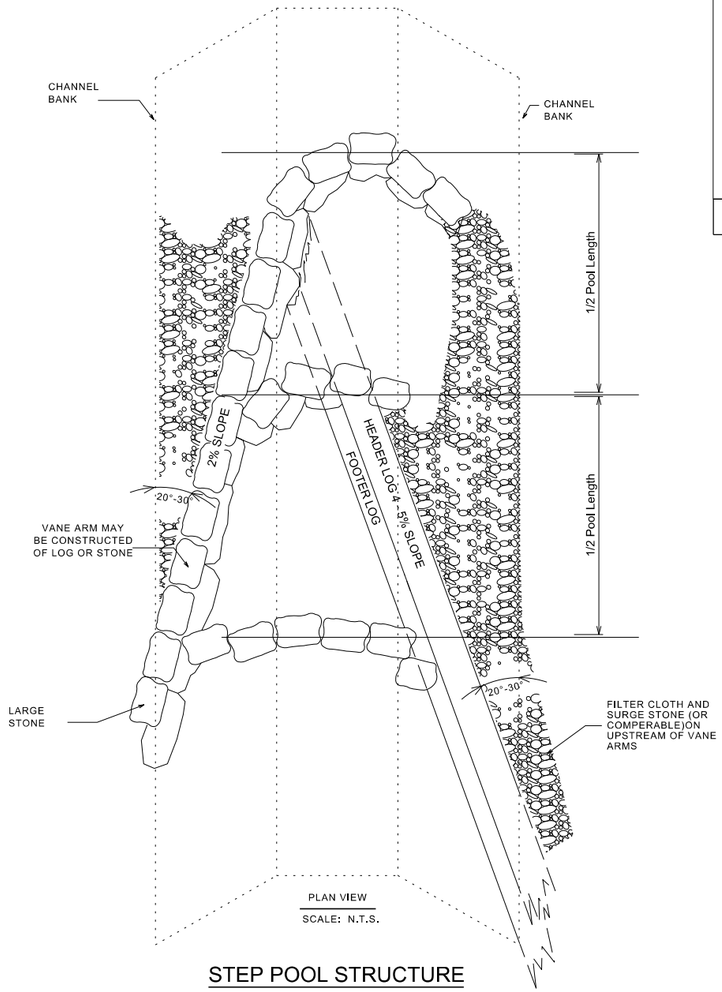
SHEET NO.
02B

5/24/2021
Nesbit_Rdy_psh_02b.dgn
Jarvis

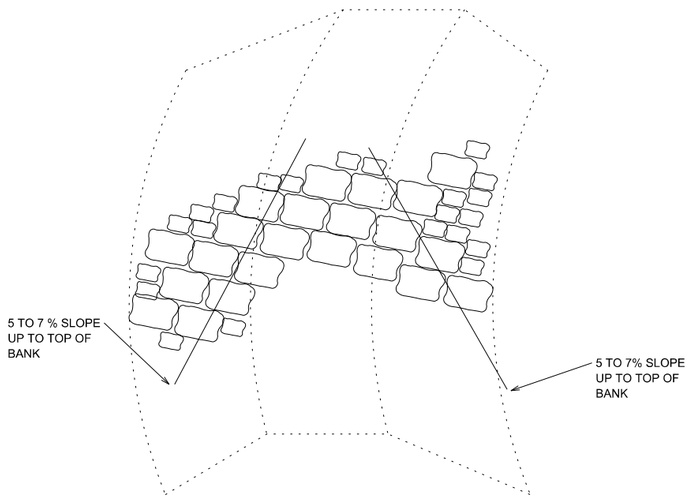
SILL STEP

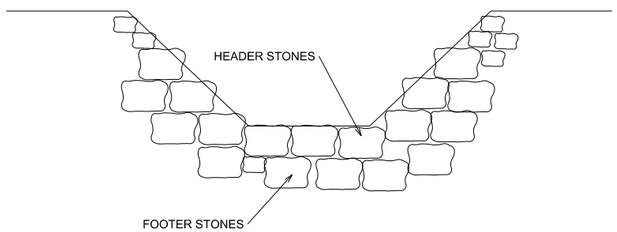


STEP POOL STRUCTURE



REINFORCED RIFFLE STEP





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Joshua G. Dalton
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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

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DETAILS

PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***02C***

5/24/2021
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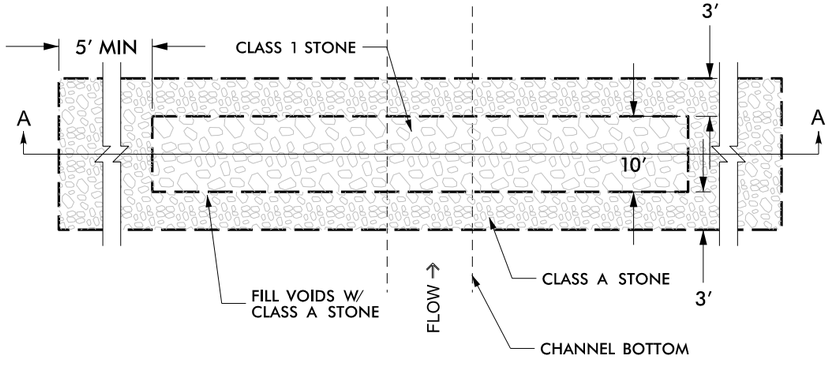
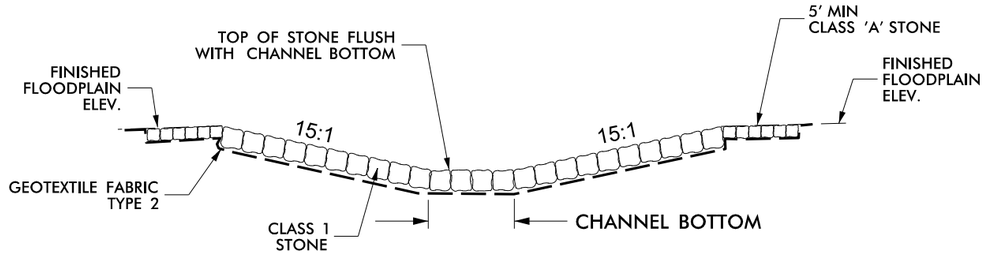
jharvey

PERMANENT CHANNEL FORD DETAIL

SCALE: N.T.S.



PLAN VIEW



SECTION A-A

NOTES:
1) KEEP FORD CROSS FALL WITHIN 1–2% OF STREAM GRADIENT.
2) FILL VOIDS BETWEEN CLASS 1 STONE WITH CLASS A TO CREATE DRIVEABLE SURFACE.

DocuSigned by:
Joshua G Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

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NESBIT
UNION COUNTY, NC

DETAILS

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO.
02D

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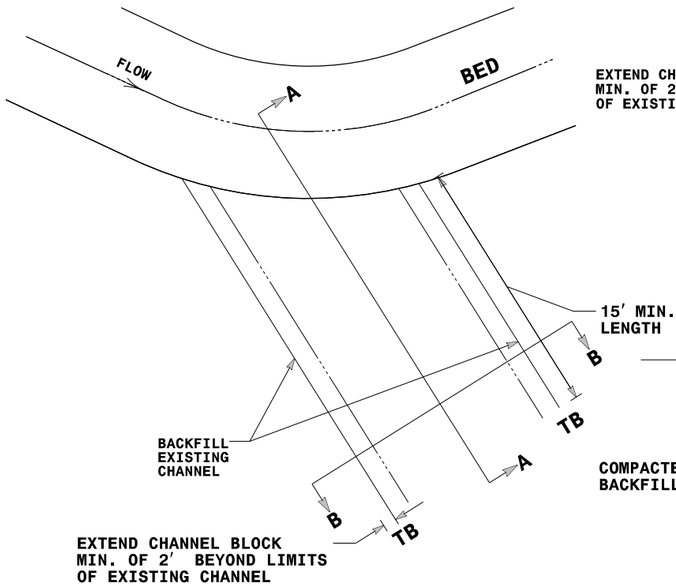
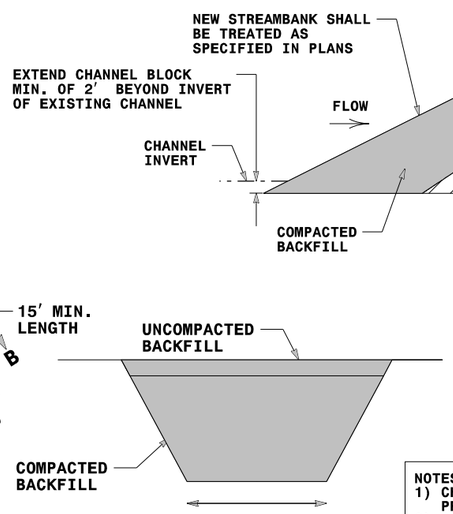
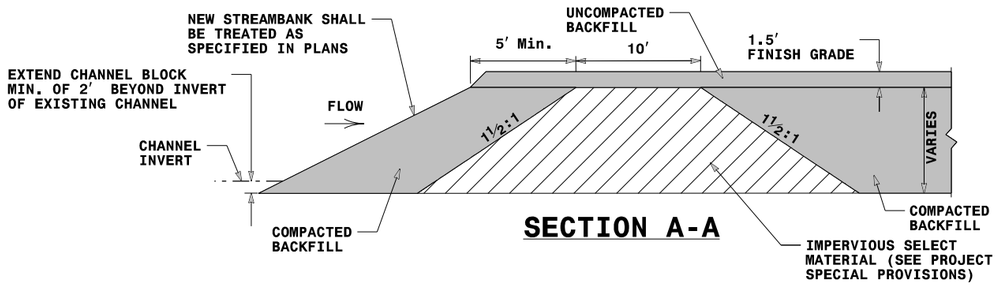
Joshua Dalton



PLAN VIEW



SECTION B-B

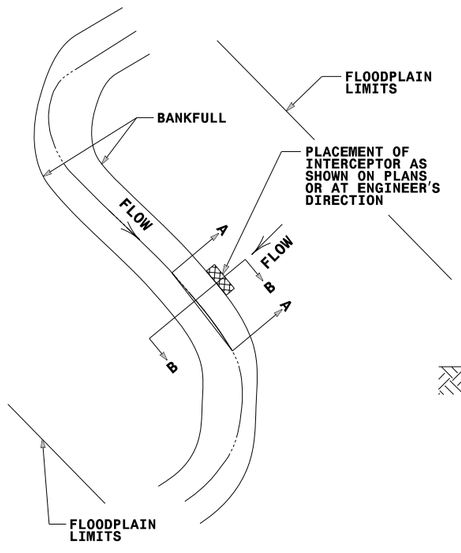


SECTION A-A

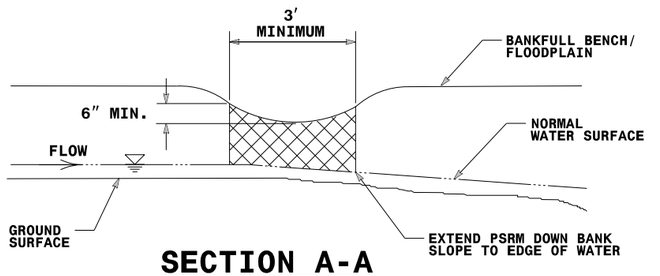
NOTES:
1) CHANNEL BLOCK SHALL BE INSTALLED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
2) BLOCK SHOULD BE INSTALLED AT THE INTERFACE BETWEEN EXISTING CHANNEL AND PROPOSED CHANNEL.
3) BOTTOM OF BLOCK SHOULD BE A MINIMUM OF 2′ BELOW THE INVERT OF THE EXISTING CHANNEL.
4) BLOCK SHOULD EXTEND A MINIMUM OF 2′ BEYOND THE LIMITS OF THE EXISTING STREAM CHANNEL.
5) INSTALL EROSION CONTROL MATTING AND SEED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS IMMEDIATELY AFTER GRADING.
6) COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.

STREAM PLUG

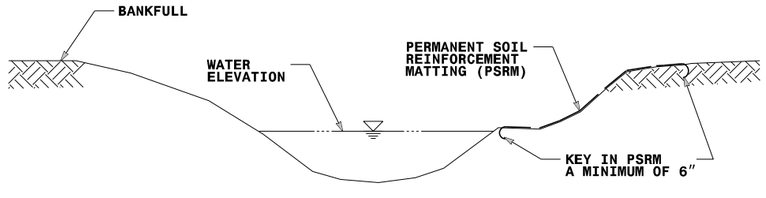
NOT TO SCALE



PLAN VIEW



SECTION A-A



SECTION B-B

FLOODPLAIN INTERCEPTOR DETAIL

NOT TO SCALE

DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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UNION COUNTY, NC

DETAILS

PROJECT # :

DRAWING NAME:

DATE: 2021

DRAWN BY: JRH

REVIEWED BY: JGD

REVISIONS:

SHEET NO.
02E

5/24/2021
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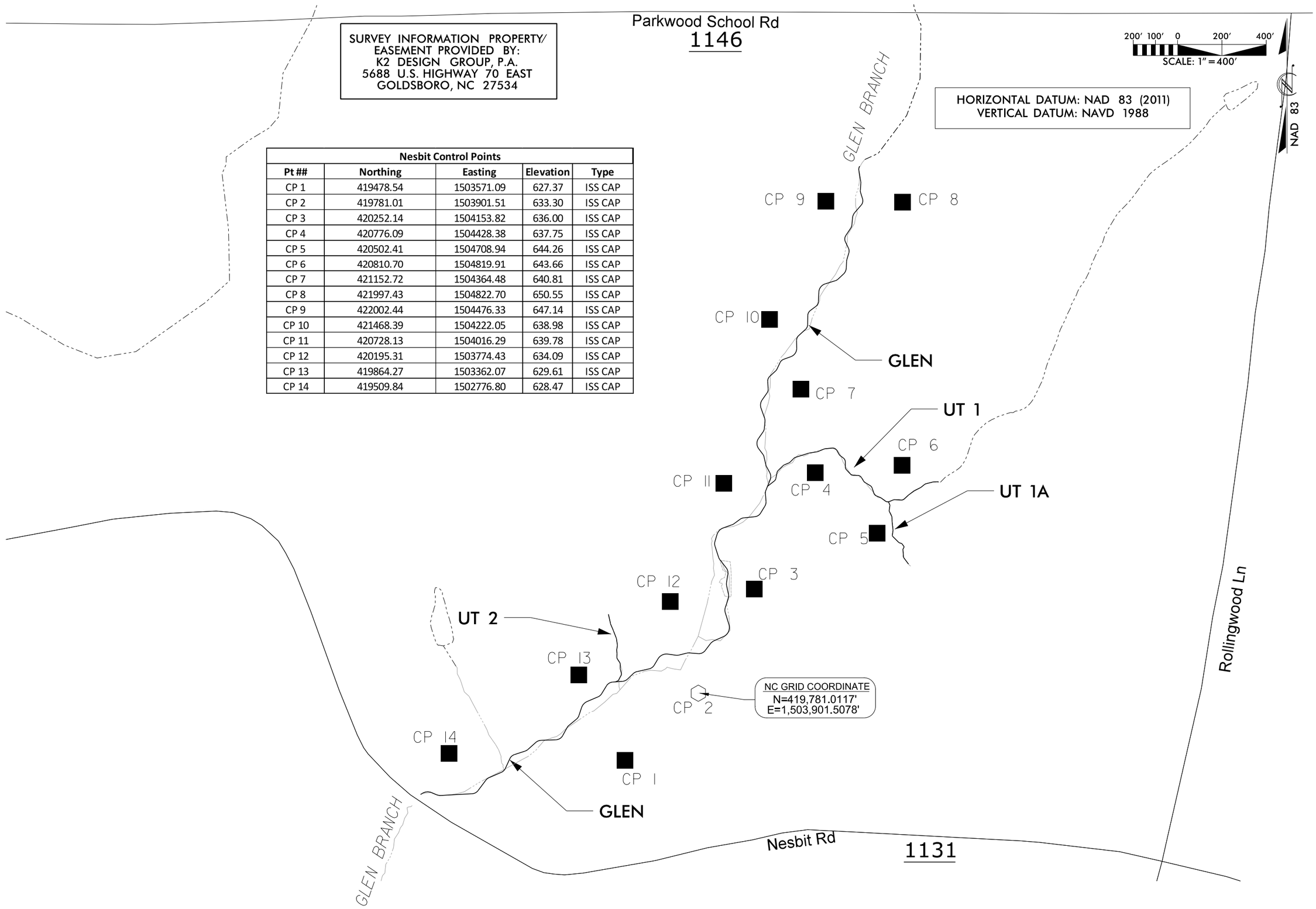
Darren

SURVEY INFORMATION PROPERTY/
EASEMENT PROVIDED BY:
K2 DESIGN GROUP, P.A.
5688 U.S. HIGHWAY 70 EAST
GOLDSBORO, NC 27534

Nesbit Control Points				
Pt ##	Northing	Easting	Elevation	Type
CP 1	419478.54	1503571.09	627.37	ISS CAP
CP 2	419781.01	1503901.51	633.30	ISS CAP
CP 3	420252.14	1504153.82	636.00	ISS CAP
CP 4	420776.09	1504428.38	637.75	ISS CAP
CP 5	420502.41	1504708.94	644.26	ISS CAP
CP 6	420810.70	1504819.91	643.66	ISS CAP
CP 7	421152.72	1504364.48	640.81	ISS CAP
CP 8	421997.43	1504822.70	650.55	ISS CAP
CP 9	422002.44	1504476.33	647.14	ISS CAP
CP 10	421468.39	1504222.05	638.98	ISS CAP
CP 11	420728.13	1504016.29	639.78	ISS CAP
CP 12	420195.31	1503774.43	634.09	ISS CAP
CP 13	419864.27	1503362.07	629.61	ISS CAP
CP 14	419509.84	1502776.80	628.47	ISS CAP



5/24/2021
Nesbit_Rdy_PSH_03.dgn
harveu

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
PH: 919.852.1003
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

CONTROL POINTS

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. 03

SURVEY INFORMATION PROPERTY/
EASEMENT PROVIDED BY:
K2 DESIGN GROUP, P.A.
5688 U.S. HIGHWAY 70 EAST
GOLDSBORO, NC 27534

Parkwood School Rd
1146

200' 100' 0 200' 400'
SCALE: 1" = 400'

HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

NAD 83

GLEN BRANCH

CE

GLEN

UT 1

UT 1A

UT 2

GLEN

GLEN BRANCH

Rollingwood Ln

Nesbit Rd
1131

5/24/2021
Nesbit_Rdy_PSH_03a.dgn
Darren

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
PH: (919) 859-2243
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EASEMENT

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

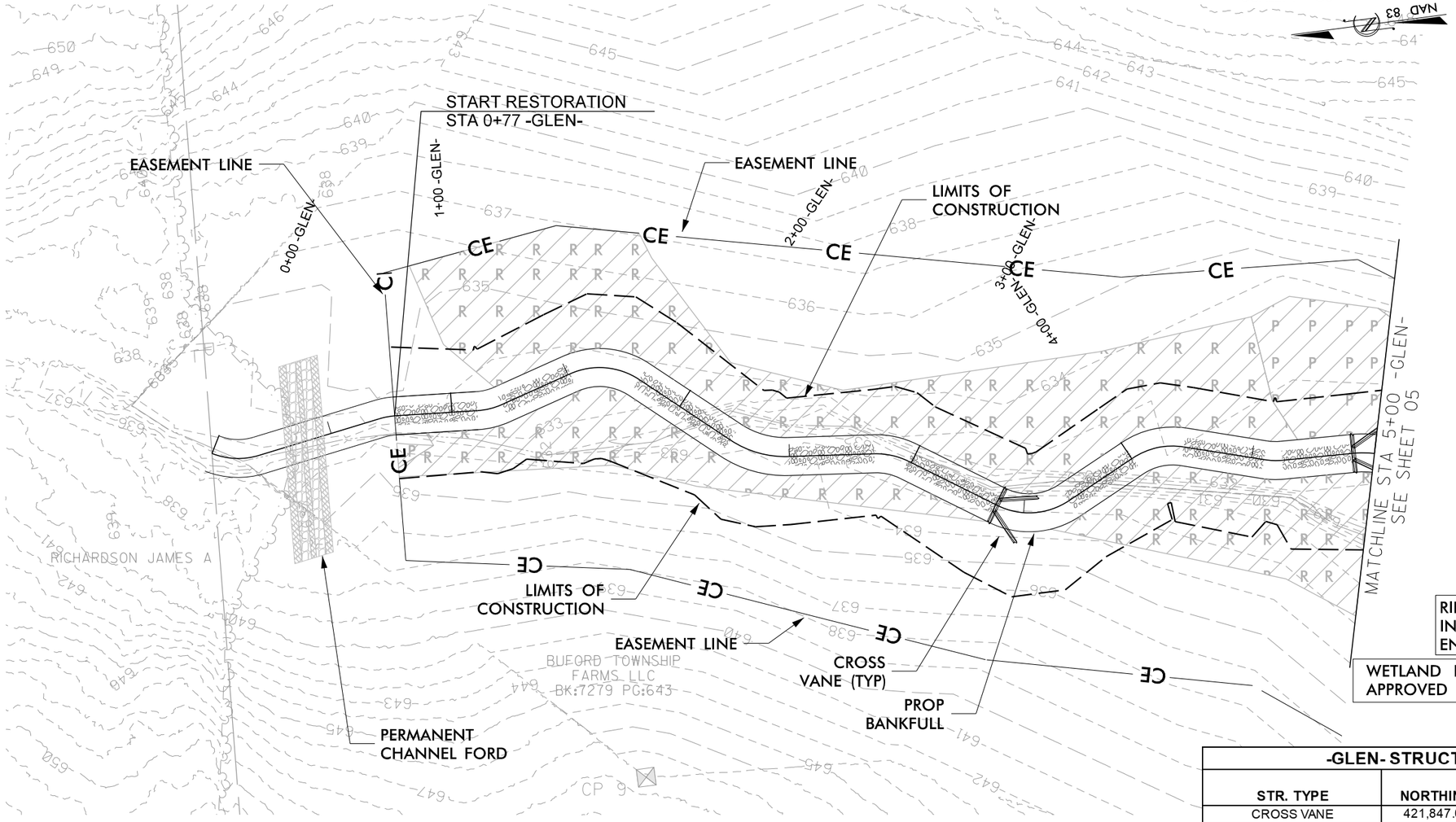
SHEET NO.
03A

P P DENOTES WETLAND REHABILITATION

R R DENOTES WETLAND REESTABLISHMENT

25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

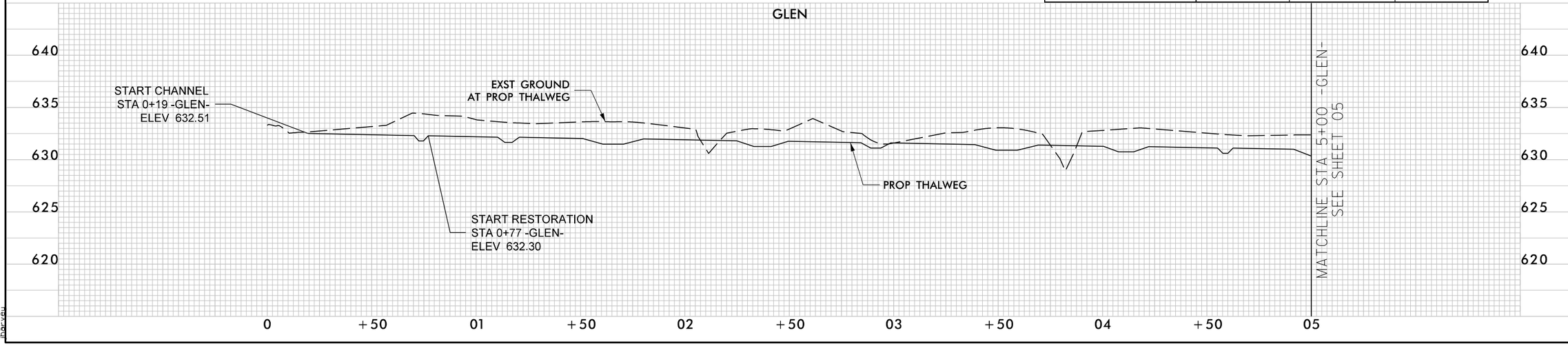
NAD 83



RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

-GLEN- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	421,847.05	1,504,567.15	631.45
CROSS VANE	421,701.08	1,504,569.32	631.00



DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021
DATE:

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HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

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905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL: 919.851.1403
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

PLAN AND PROFILE

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO.
04

5/24/2021
Nesbit_Rdy_psh_04.dgn
Default

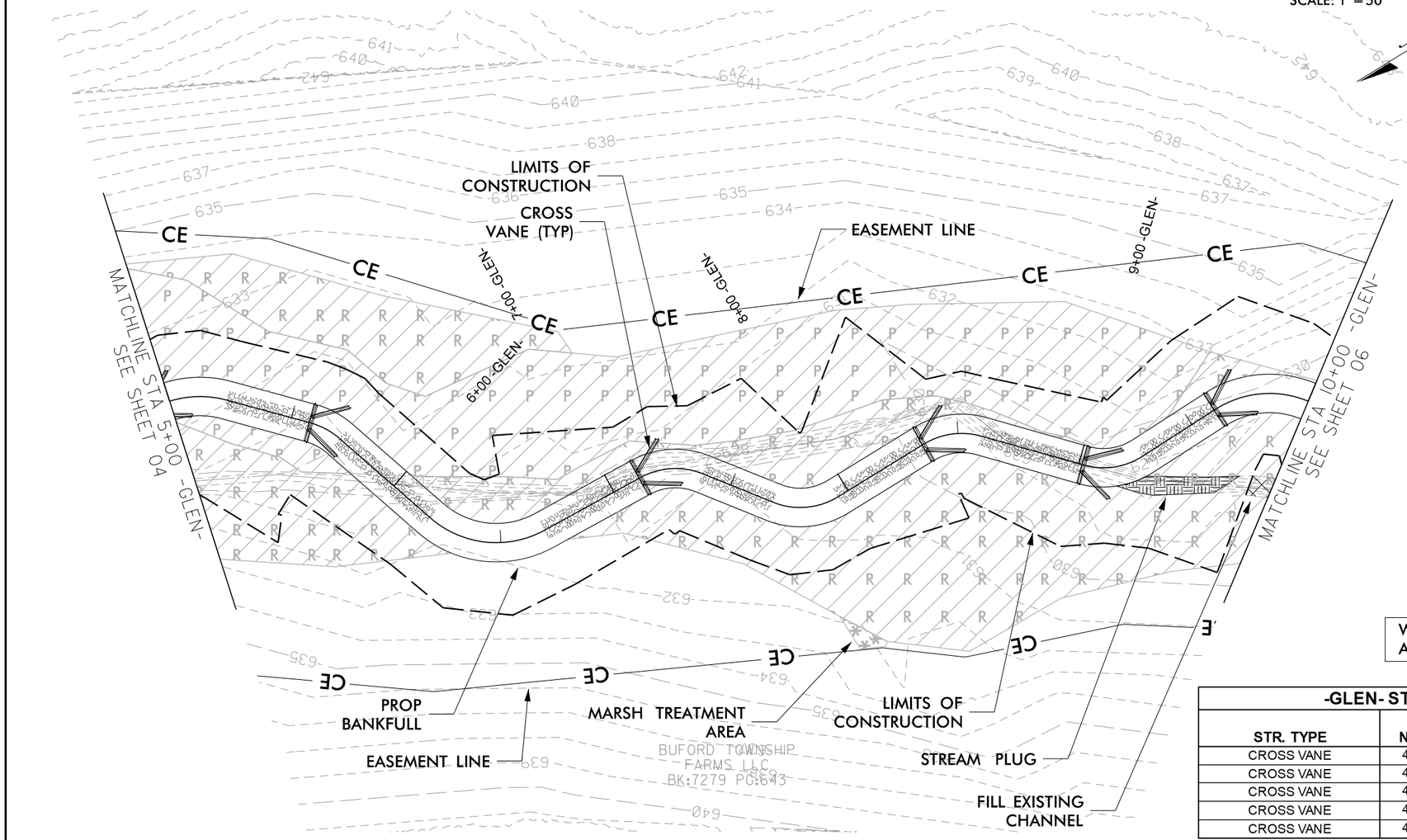
DENOTES MARSH TREATMENT

DENOTES WETLAND REHABILITATION

DENOTES WETLAND REESTABLISHMENT

SCALE: 1" = 50'

NAD 83



HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

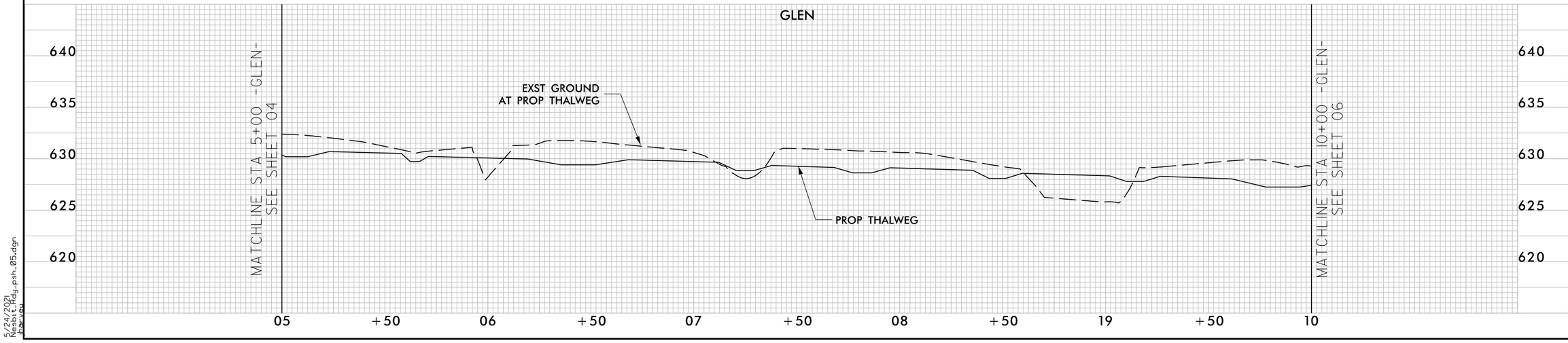
FILL EXISTING CHANNEL

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

-GLEN- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	421,649.30	1,504,531.06	630.52
CROSS VANE	421,548.54	1,504,443.25	629.65
CROSS VANE	421,445.17	1,504,395.08	628.88
CROSS VANE	421,395.15	1,504,354.34	628.33
CROSS VANE	421,338.52	1,504,345.58	628.05



DocuSigned by: Joshua G Dalton 1089AD8C149d4C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

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905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
919.859.9515
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

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UNION COUNTY, NC

PLAN AND PROFILE

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. **05**

5/24/2021
Nesbit_Rdy.psh_05.dgn
jarvey

-GLEN- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
LOG VANE	421,288.32	1,504,286.87	627.51
CROSS VANE	421,244.86	1,504,257.11	627.26
CROSS VANE	421,210.94	1,504,223.69	626.70
CROSS VANE	421,154.68	1,504,216.66	626.43
CROSS VANE	421,021.64	1,504,200.78	625.46
CROSS VANE	420,974.54	1,504,199.01	625.20

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

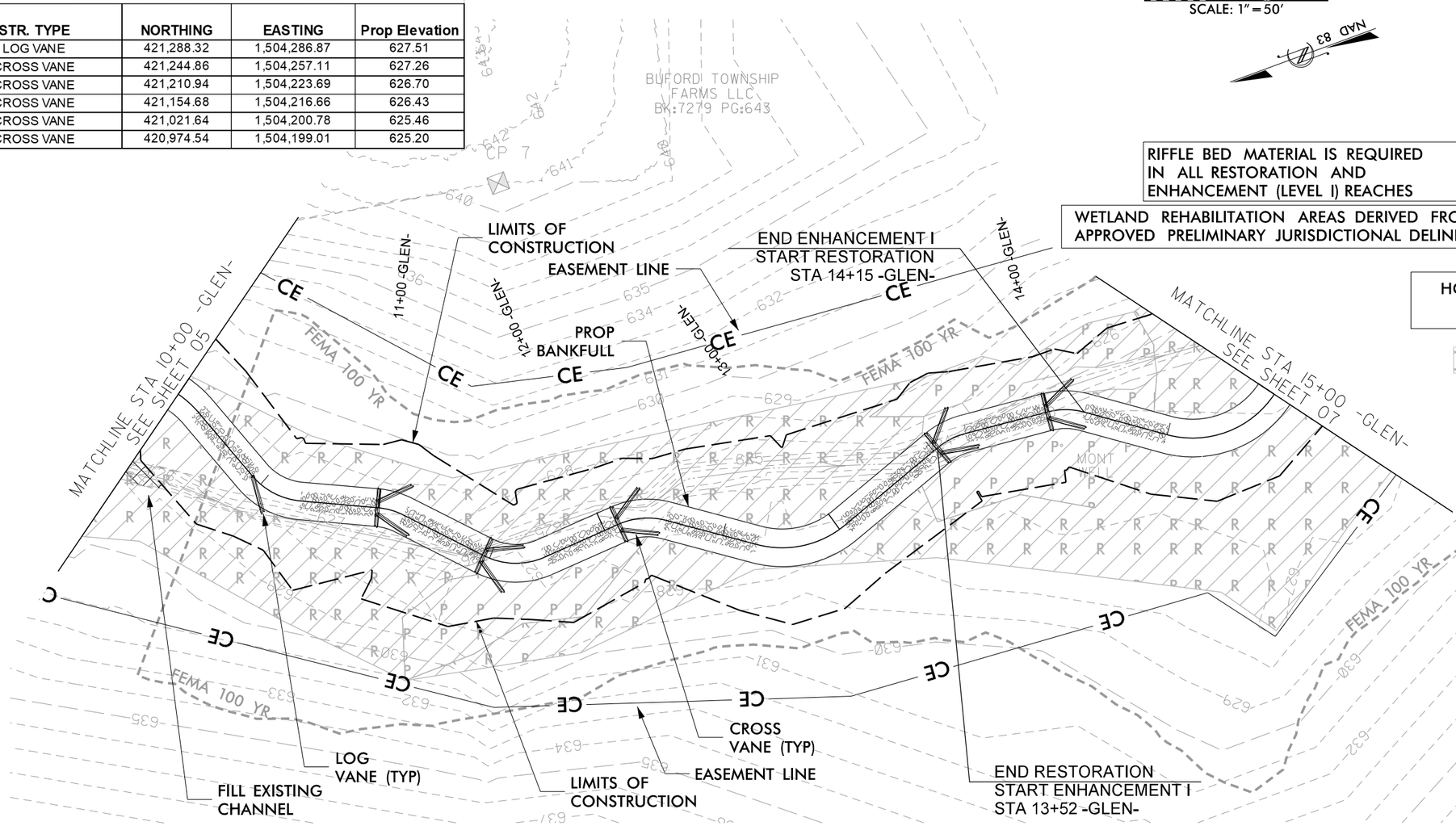
NAD 83

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

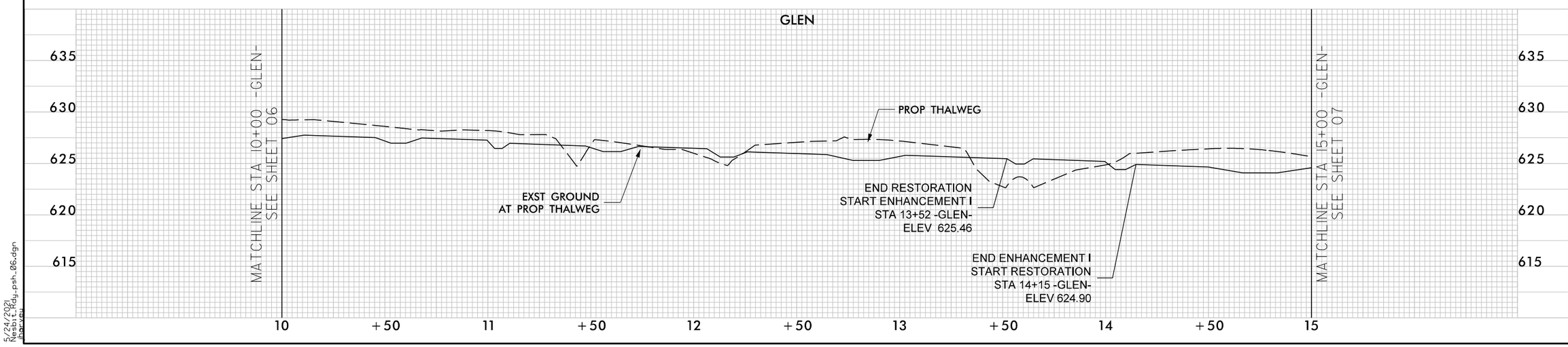
HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

FILL EXISTING CHANNEL



P P DENOTES WETLAND REHABILITATION

R R DENOTES WETLAND REESTABLISHMENT



DocuSigned by: Joshua G. Dalton 1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021
DATE:

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905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
PH: 919.851.1530
ENG FIRM LICENSE NO. C-2890

Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

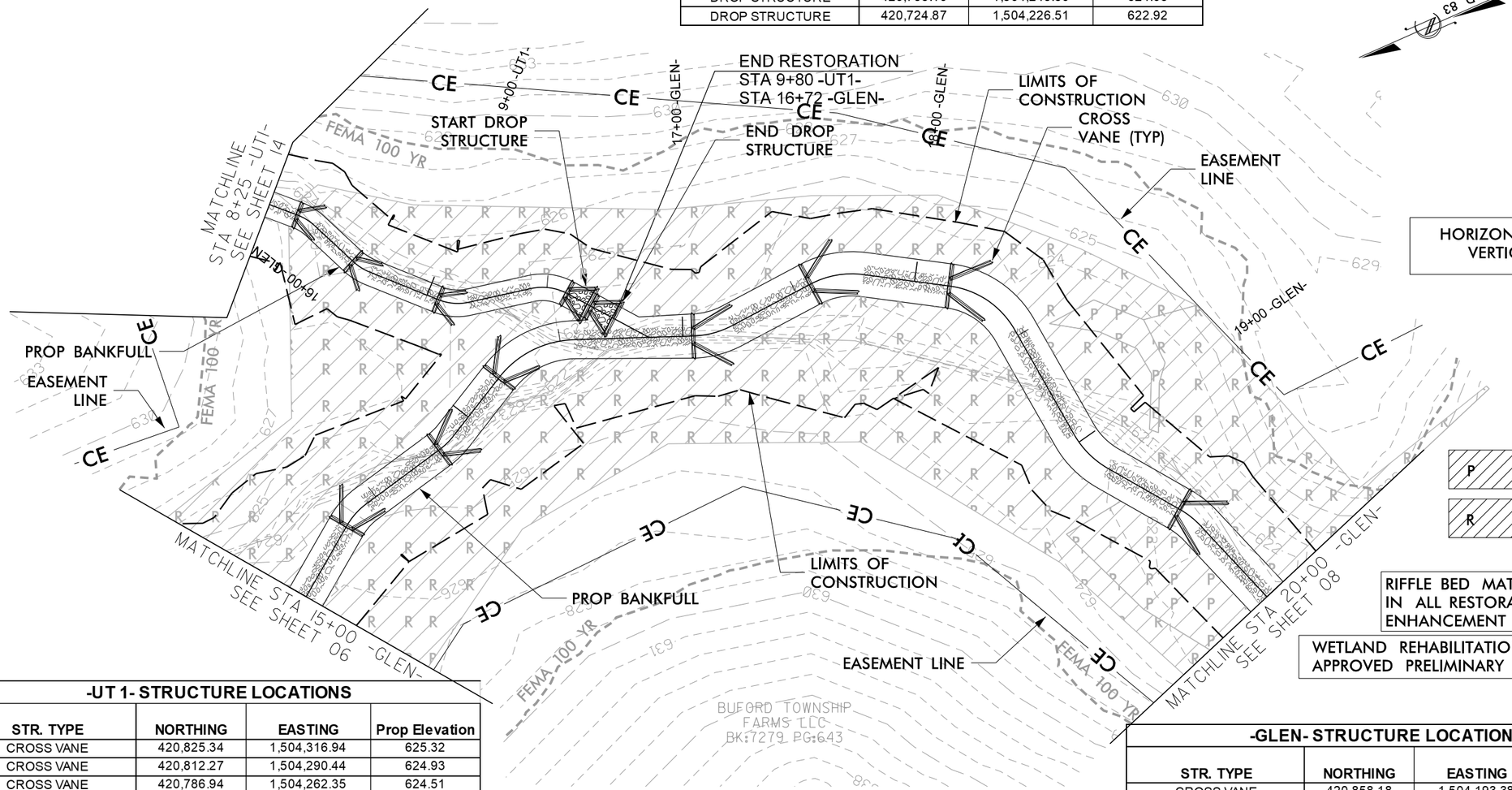
PLAN AND PROFILE

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. 06

5/24/2021
Nesbit_Rdy_psh_06.dgn
jarvey

-UT 1- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
DROP STRUCTURE	420,738.10	1,504,243.50	624.08
DROP STRUCTURE	420,724.87	1,504,226.51	622.92



25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

NAD 83

DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021
DATE:

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HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

P P DENOTES WETLAND REHABILITATION

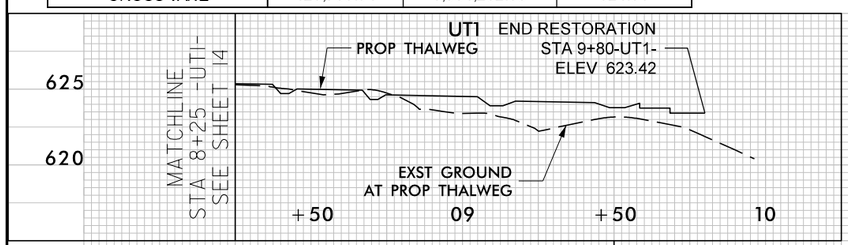
R R DENOTES WETLAND REESTABLISHMENT

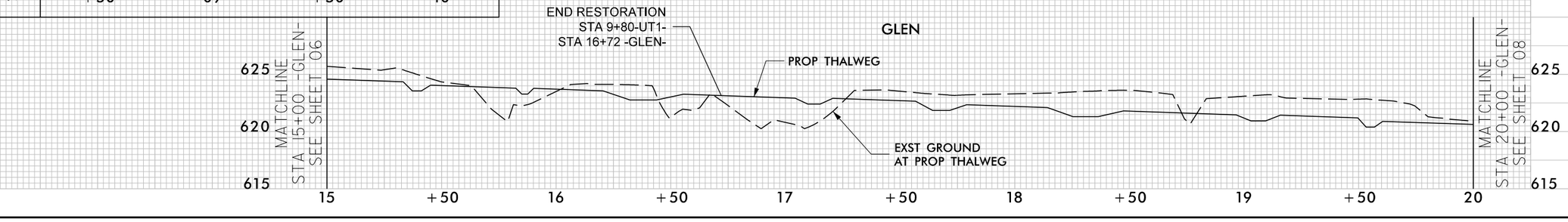
RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

-UT 1- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	420,825.34	1,504,316.94	625.32
CROSS VANE	420,812.27	1,504,290.44	624.93
CROSS VANE	420,786.94	1,504,262.35	624.51

-GLEN- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	420,858.18	1,504,193.38	624.35
CROSS VANE	420,811.13	1,504,206.43	623.79
CROSS VANE	420,777.11	1,504,223.41	623.56
CROSS VANE	420,698.11	1,504,206.85	622.92
CROSS VANE	420,646.00	1,504,206.84	622.65
CROSS VANE	420,594.61	1,504,183.26	622.10
CROSS VANE	420,545.73	1,504,062.30	621.19





SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL: 919.852.1183
ENG FIRM LICENSE NO. C-890

Ardurra Environmental, Inc.

NESBIT
UNION COUNTY, NC

PLAN AND PROFILE

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:
SHEET NO. **07**

5/24/2021
Nesbit_Rdy_psh_07.dgn
JGDalton

P P DENOTES WETLAND REHABILITATION

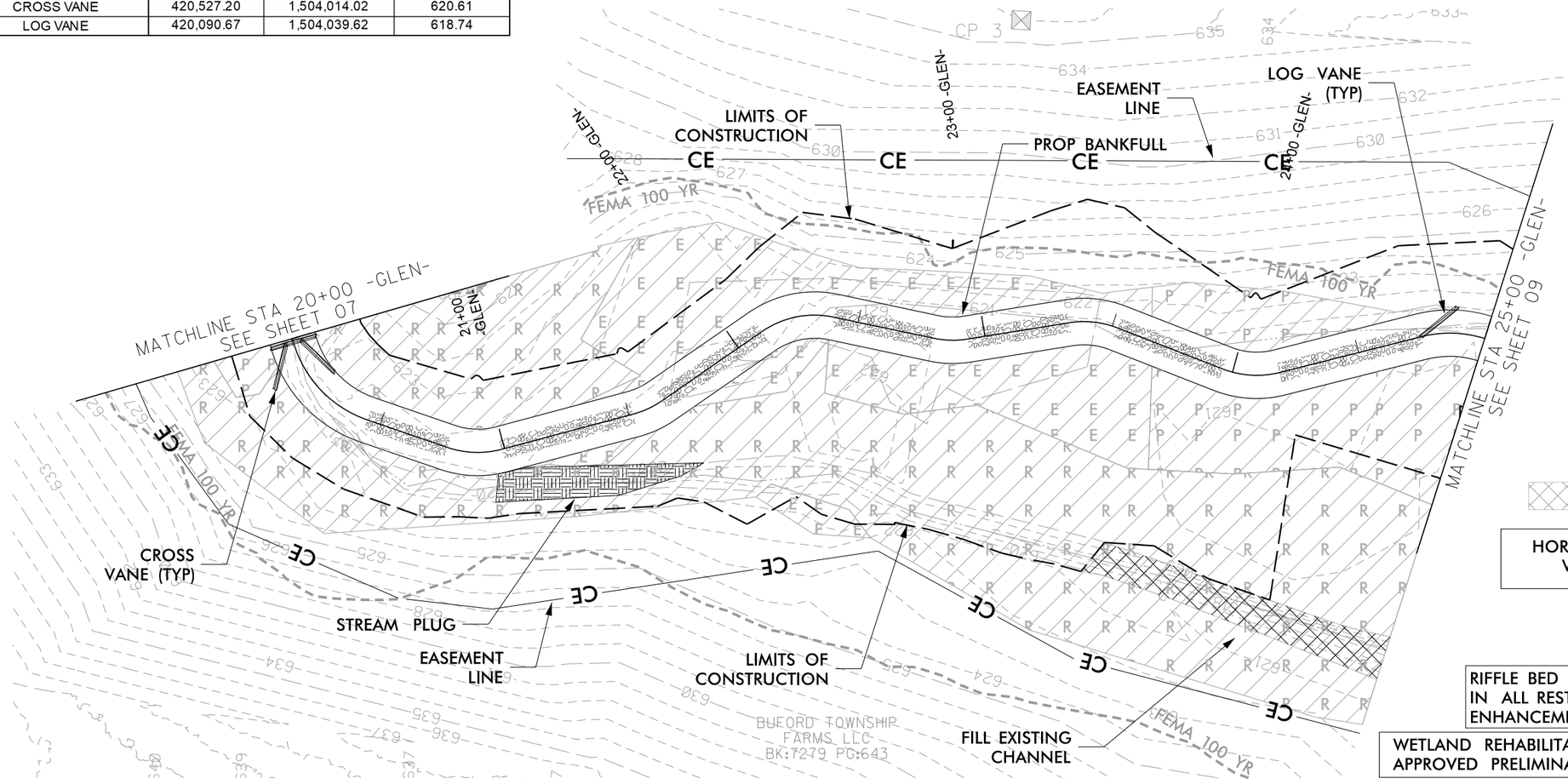
E E DENOTES WETLAND ENHANCEMENT

R R DENOTES WETLAND REESTABLISHMENT

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83

-GLEN- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	420,527.20	1,504,014.02	620.61
LOG VANE	420,090.67	1,504,039.62	618.74

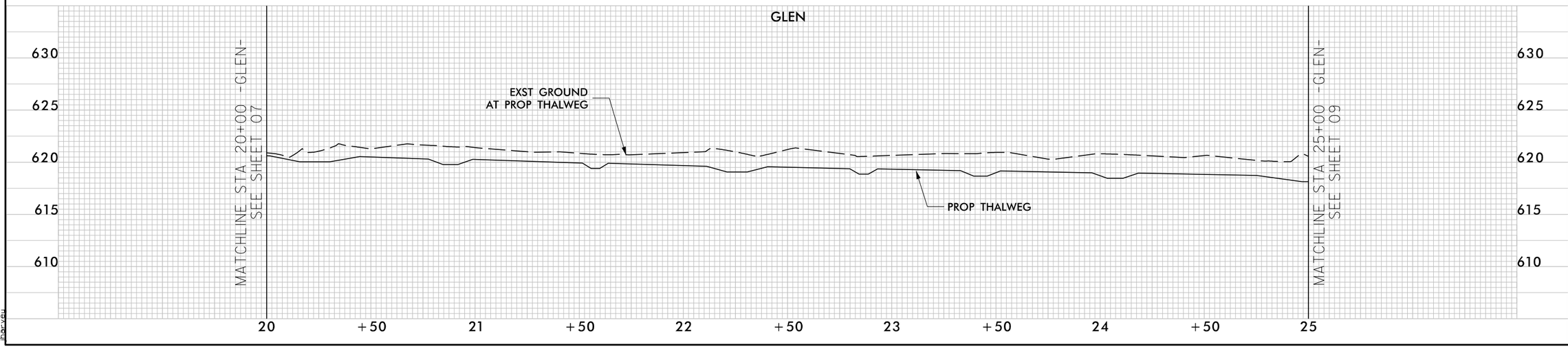


FILL EXISTING CHANNEL

HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION



DocuSigned by:
Joshua G Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021
DATE:

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905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
PH: (919) 851-9545
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

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UNION COUNTY, NC

PLAN AND PROFILE

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. 08

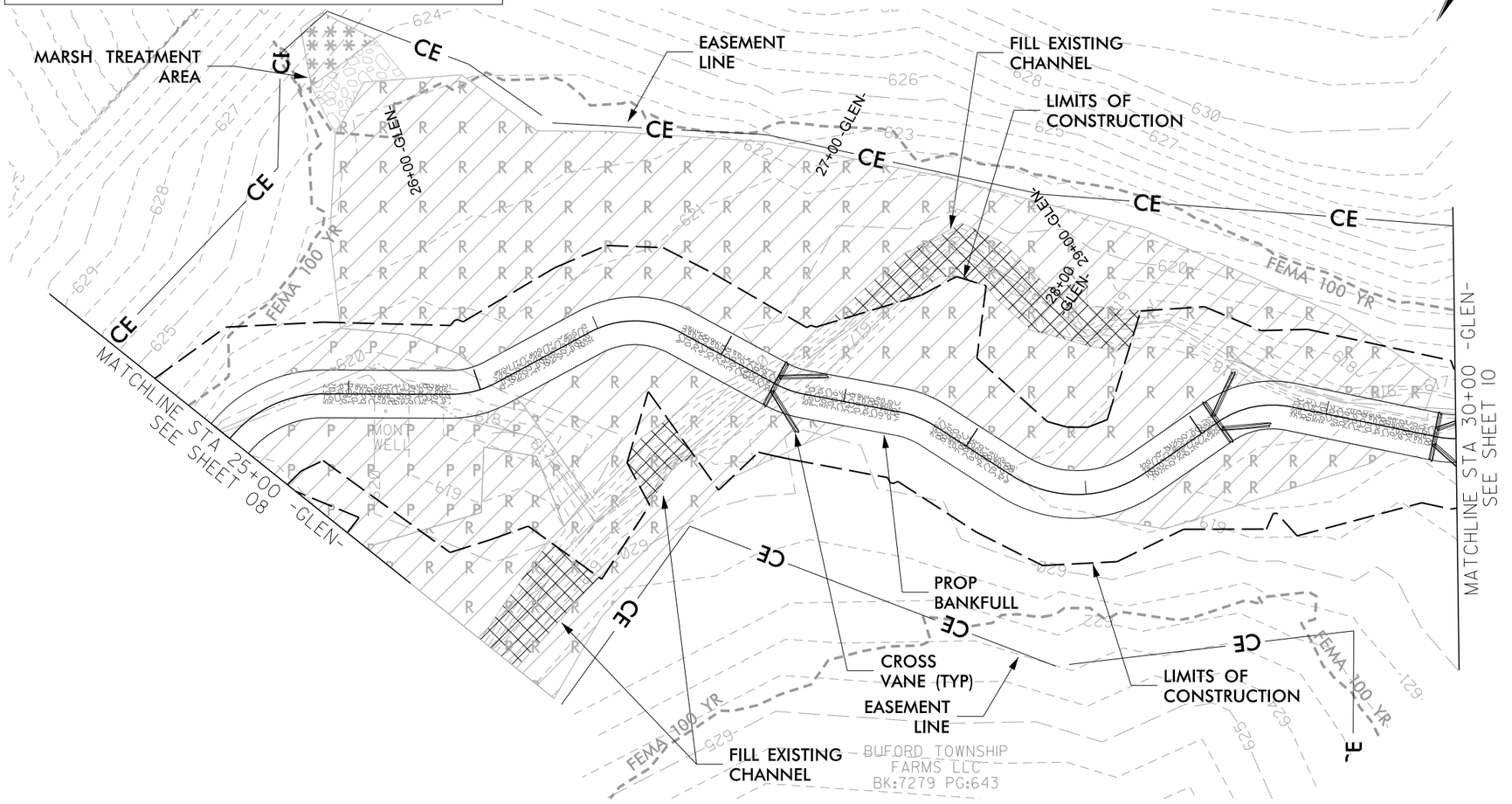
5/24/2021
Nesbit_Rdy_psh_08.dgn
Layout

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

-GLEN- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	419,962.76	1,503,860.41	618.01
CROSS VANE	419,907.35	1,503,702.20	617.26
CROSS VANE	419,878.66	1,503,624.97	616.63



25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83

DocuSigned by: Joshua G Dalton 1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021
DATE:

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HORIZONTAL DATUM: NAD 83 (2011)
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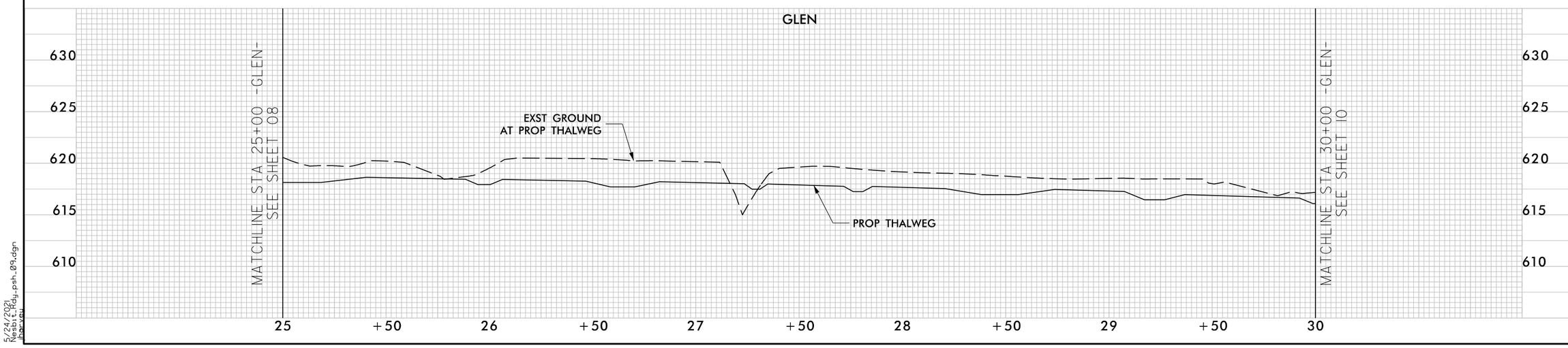
P P DENOTES WETLAND REHABILITATION

DENOTES MARSH TREATMENT

R R DENOTES WETLAND REESTABLISHMENT

FILL EXISTING CHANNEL



SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
PH: 919.851.2545
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PLAN AND PROFILE

PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	09

5/24/2021
Nesbit_Rdy_psh_09.dgn
harvey

-GLEN- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	419,844.28	1,503,581.33	616.38
CROSS VANE	419,743.25	1,503,399.45	615.16
CROSS VANE	419,636.42	1,503,318.18	614.35

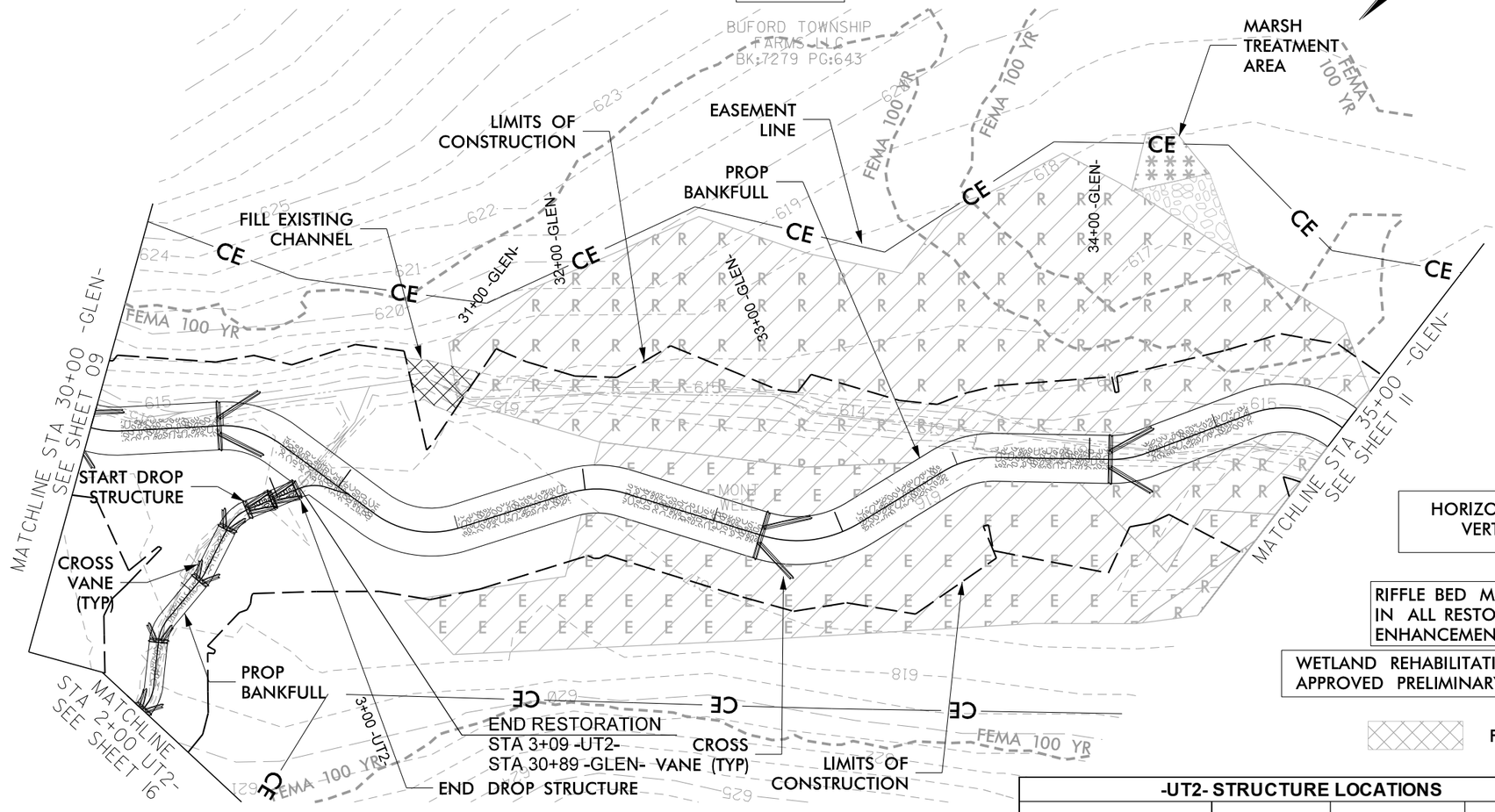
R R DENOTES WETLAND REESTABLISHMENT

E E DENOTES WETLAND ENHANCEMENT

DENOTES MARSH TREATMENT

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83



HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

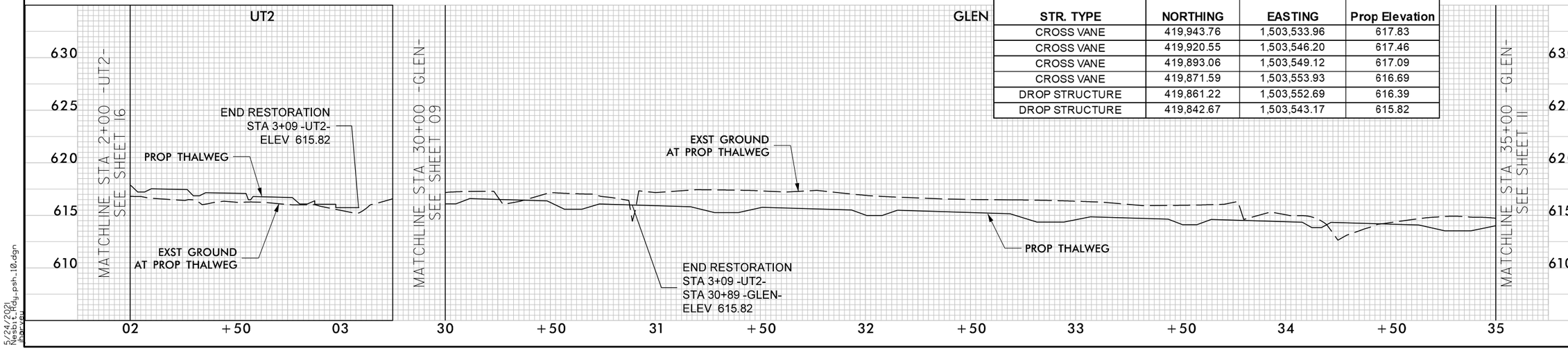
RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

FILL EXISTING CHANNEL

-UT2- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	419,943.76	1,503,533.96	617.83
CROSS VANE	419,920.55	1,503,546.20	617.46
CROSS VANE	419,893.06	1,503,549.12	617.09
CROSS VANE	419,871.59	1,503,553.93	616.69
DROP STRUCTURE	419,861.22	1,503,552.69	616.39
DROP STRUCTURE	419,842.67	1,503,543.17	615.82



DocuSigned by: Joshua G Dalton 1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

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RALEIGH, NORTH CAROLINA 27606
PH: 919.851.1403
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

PLAN AND PROFILE

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. **10**

5/24/2021
Nesbit_Rdy_psh_10.dgn
jharden

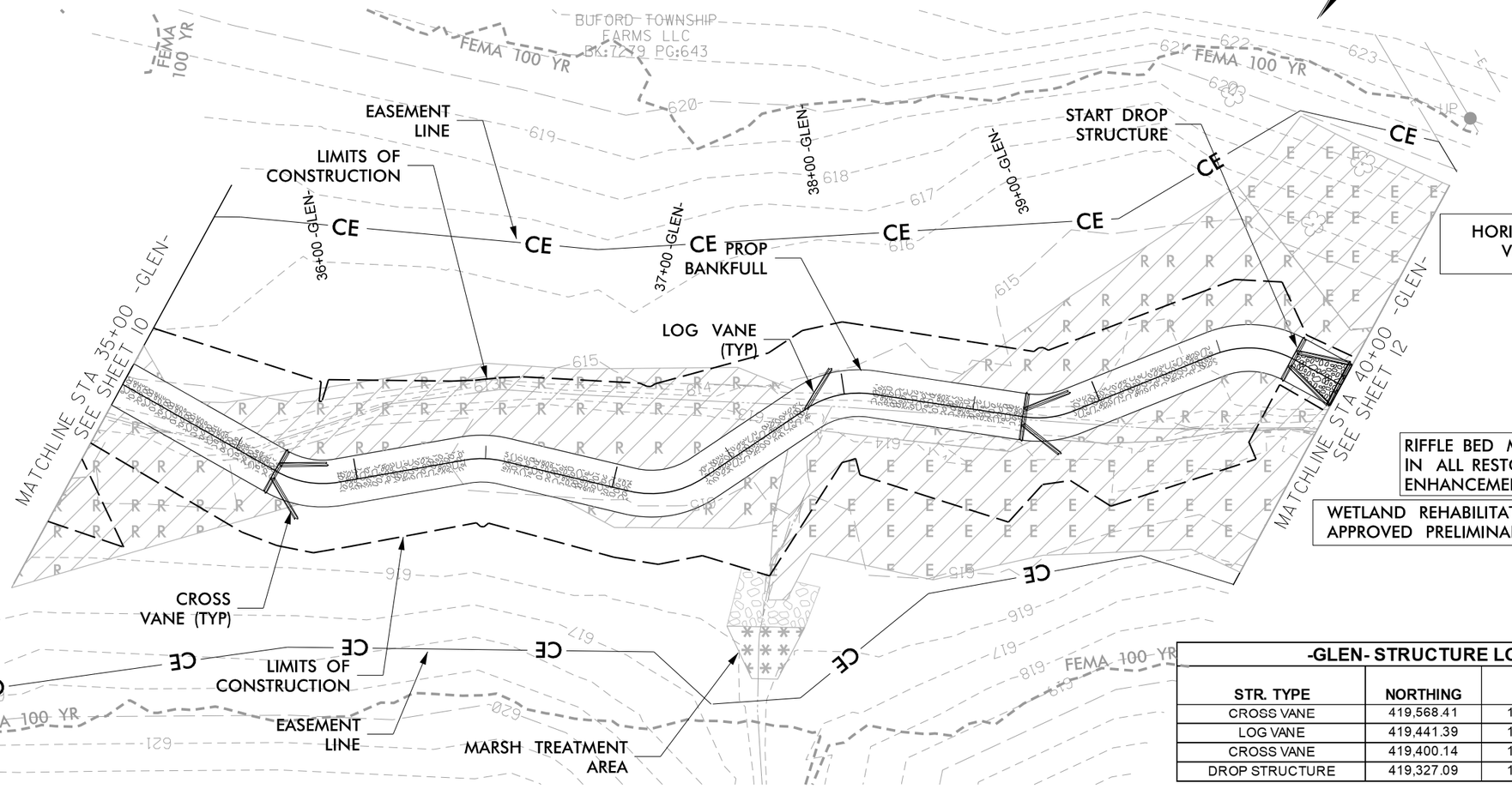
E E DENOTES WETLAND ENHANCEMENT

DENOTES MARSH TREATMENT

R R DENOTES WETLAND REESTABLISHMENT

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83



DocuSigned by:
Joshua G. Dalton
1089ADBC14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021
DATE:

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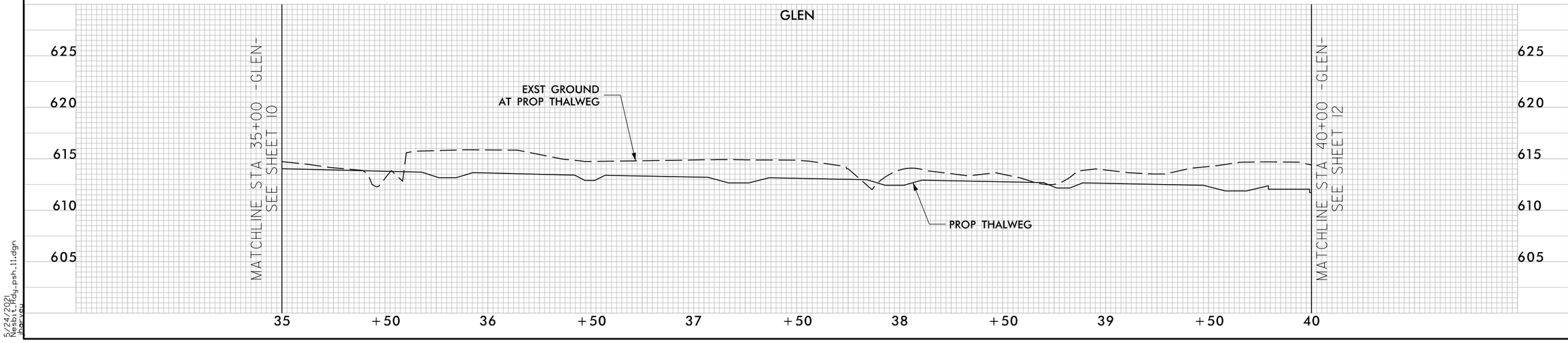
HORIZONTAL DATUM: NAD 83 (2011)
VERTICAL DATUM: NAVD 1988

RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

-GLEN- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	419,568.41	1,503,191.67	613.69
LOG VANE	419,441.39	1,503,030.54	612.96
CROSS VANE	419,400.14	1,502,957.46	612.68
DROP STRUCTURE	419,327.09	1,502,880.74	612.37



SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL: 919.852.1003
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

PLAN AND PROFILE

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO. **11**

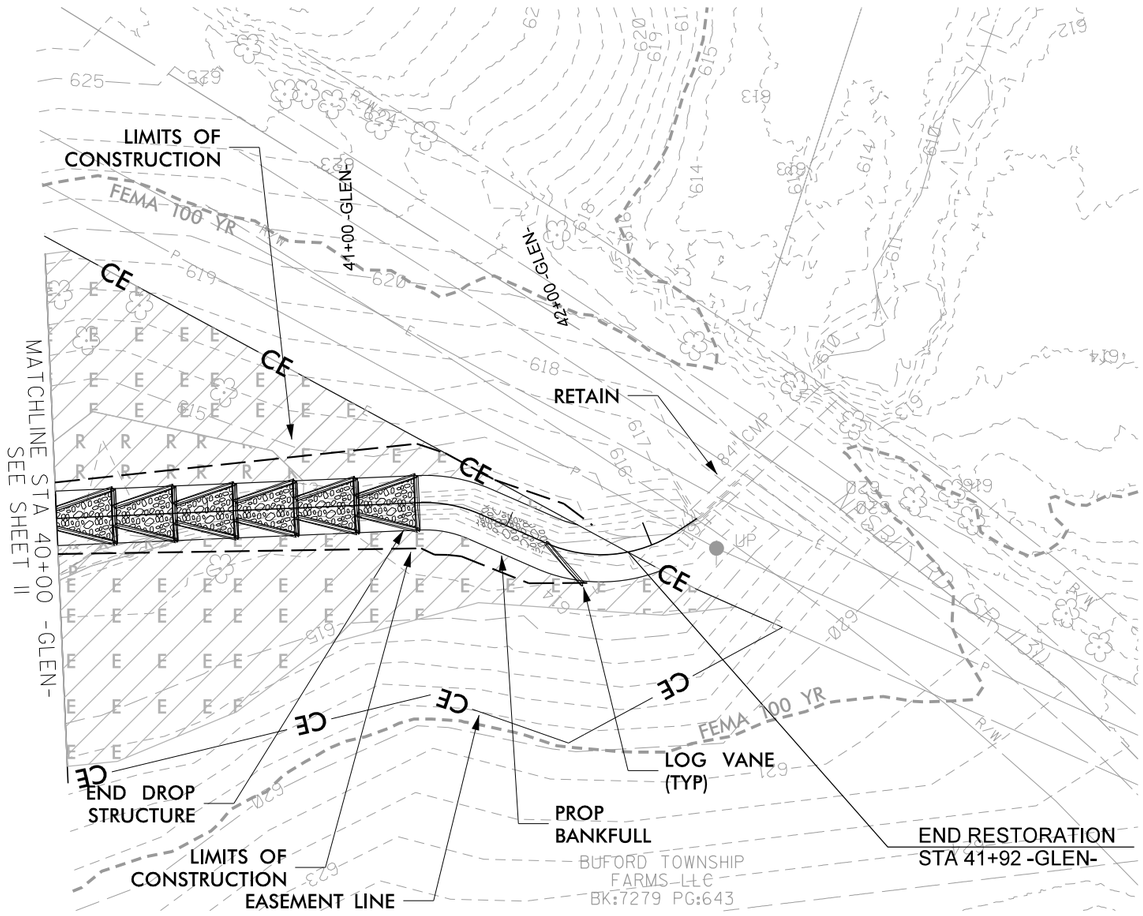
5/24/2021
Nesbit_Rdy_psh_11.dgn
jharvell

E E DENOTES WETLAND ENHANCEMENT

R R DENOTES WETLAND REESTABLISHMENT

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83



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1089AD8C1494C3...

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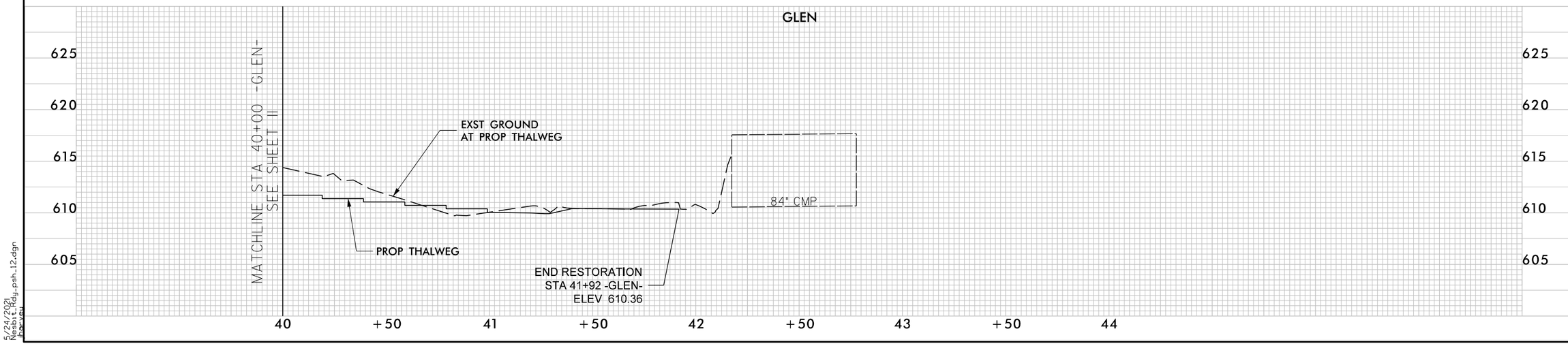
RIFFLE BED MATERIAL IS REQUIRED IN ALL RESTORATION AND ENHANCEMENT (LEVEL I) REACHES

WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

-GLEN- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
DROP STRUCTURE	419,319.49	1,502,740.15	609.99
LOG VANE	419,332.39	1,502,698.02	610.37



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UNION COUNTY, NC

PLAN AND PROFILE

PROJECT # :
DRAWING NAME:
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REVIEWED BY: JGD
REVISIONS:

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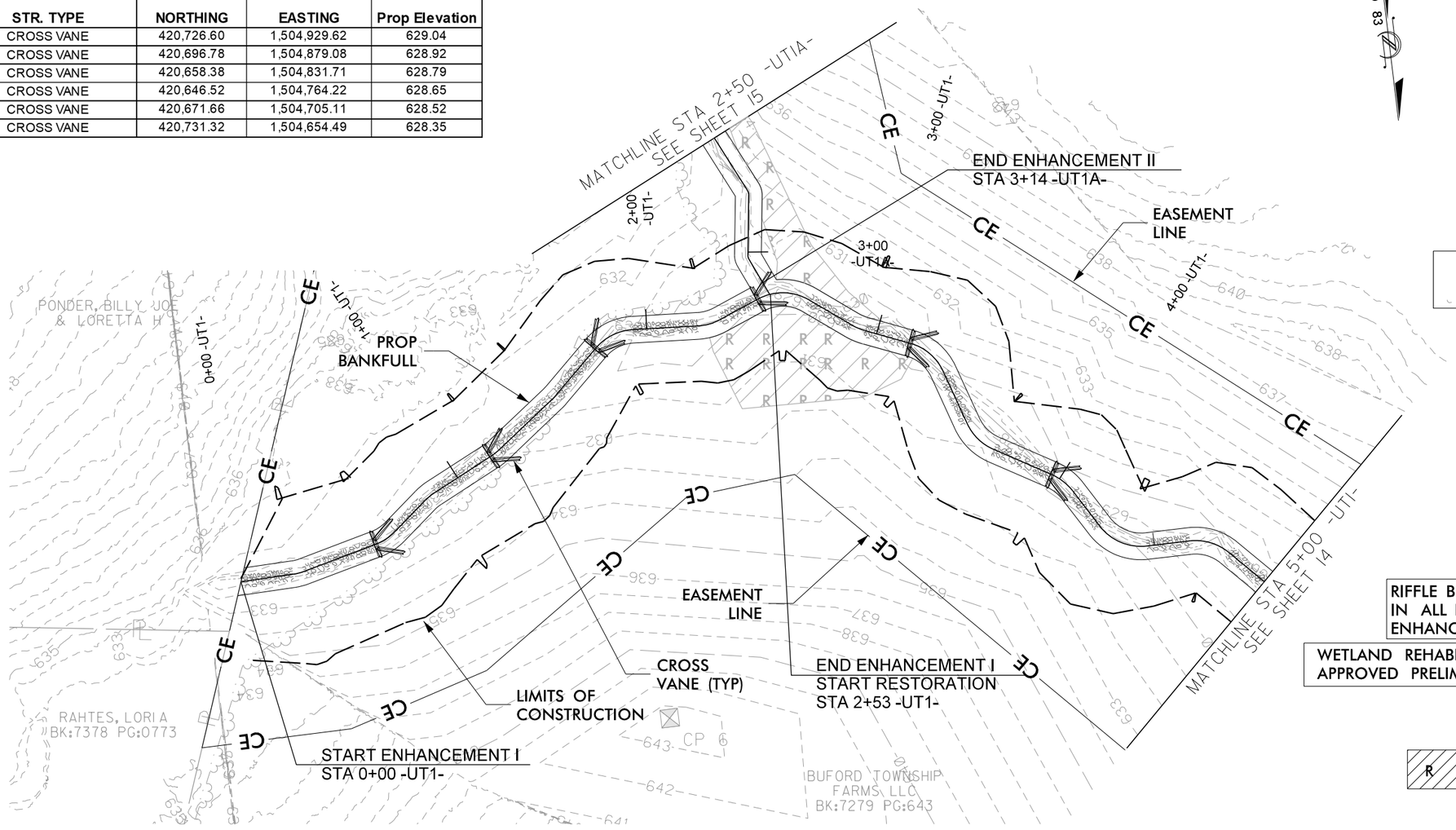
Darren

-UT 1- STRUCTURE LOCATIONS

STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	420,726.60	1,504,929.62	629.04
CROSS VANE	420,696.78	1,504,879.08	628.92
CROSS VANE	420,658.38	1,504,831.71	628.79
CROSS VANE	420,646.52	1,504,764.22	628.65
CROSS VANE	420,671.66	1,504,705.11	628.52
CROSS VANE	420,731.32	1,504,654.49	628.35

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

NAD 83



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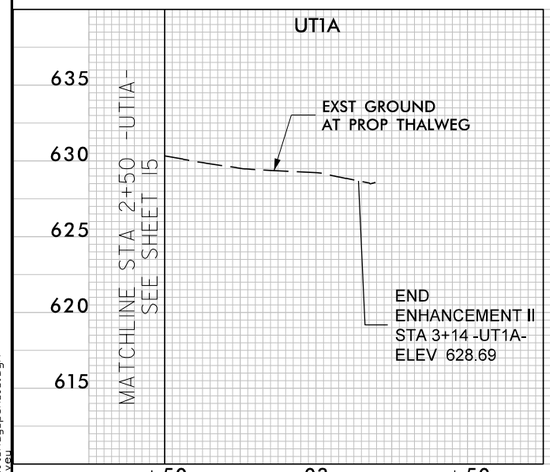
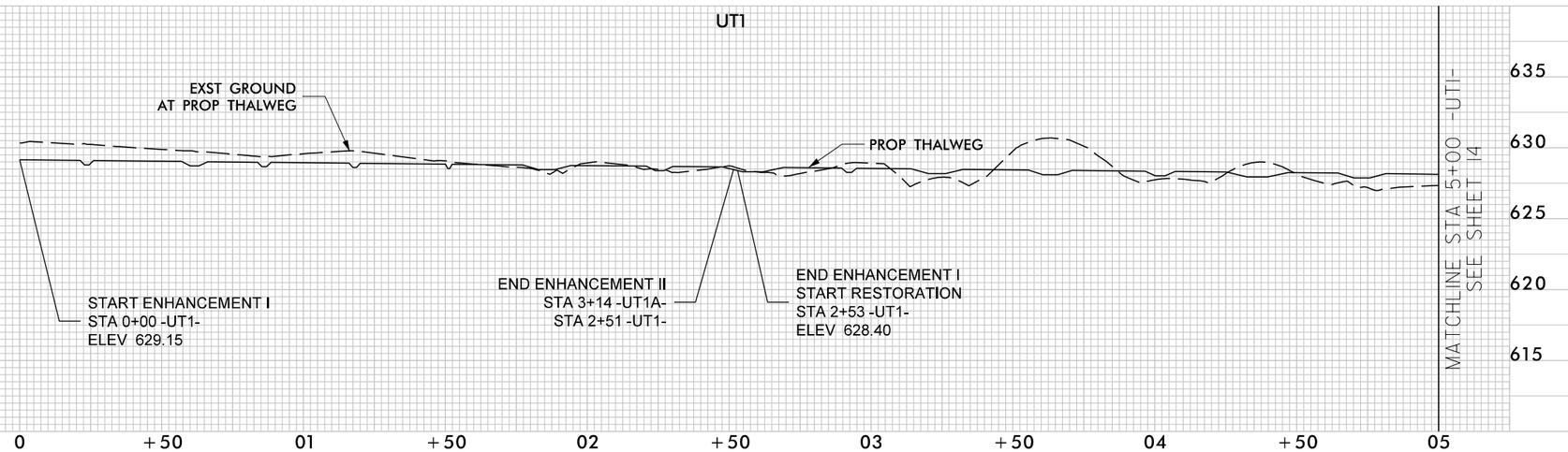
WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

R R DENOTES WETLAND REESTABLISHMENT





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-UT 1- STRUCTURE LOCATIONS			
STR. TYPE	NORTHING	EASTING	Prop Elevation
CROSS VANE	420,845.31	1,504,339.96	625.70
CROSS VANE	420,788.20	1,504,570.84	628.11
CROSS VANE	420,853.55	1,504,541.68	627.63
CROSS VANE	420,877.08	1,504,526.39	627.25
CROSS VANE	420,871.67	1,504,440.70	626.69
CROSS VANE	420,864.90	1,504,402.19	626.25

25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

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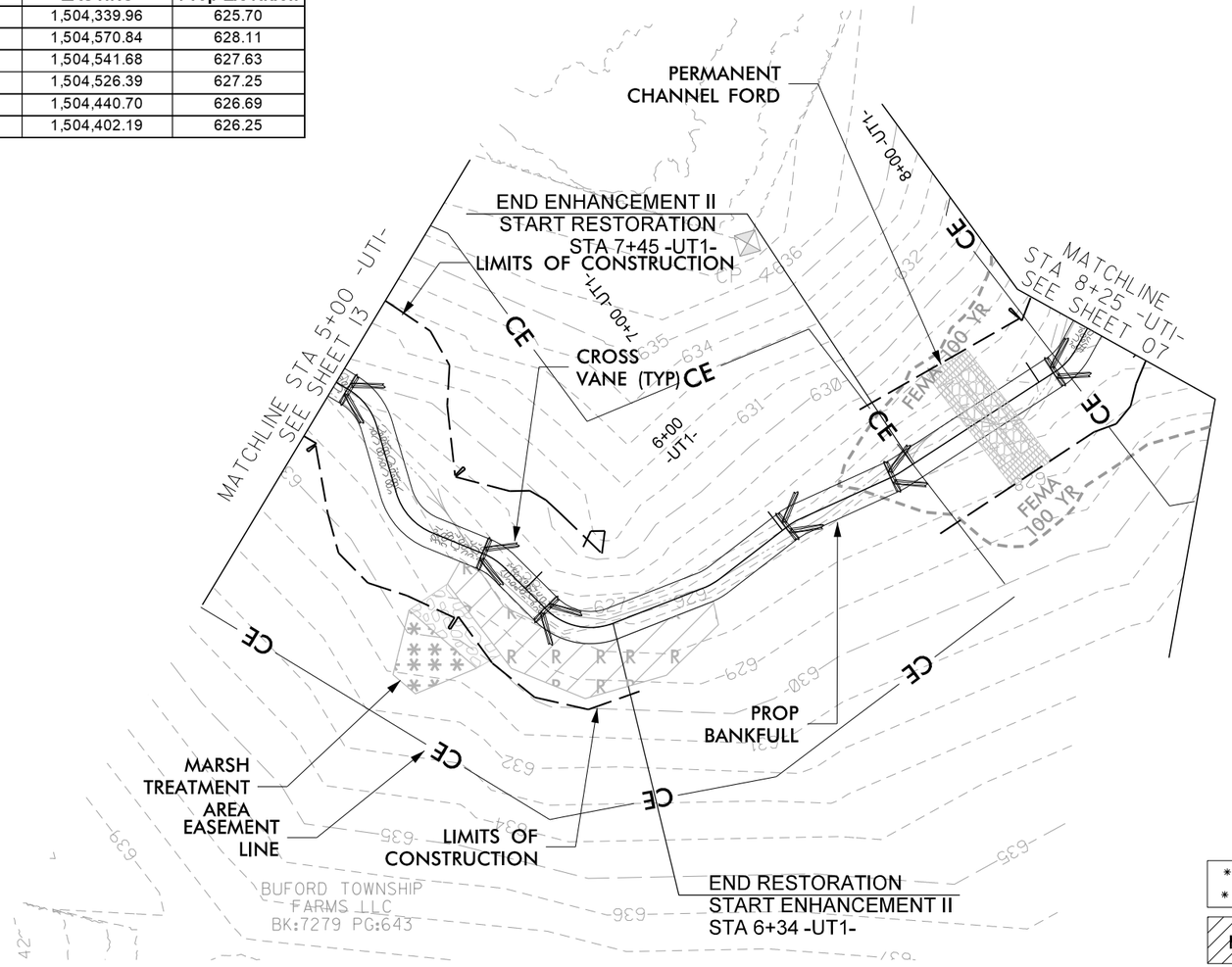

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WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

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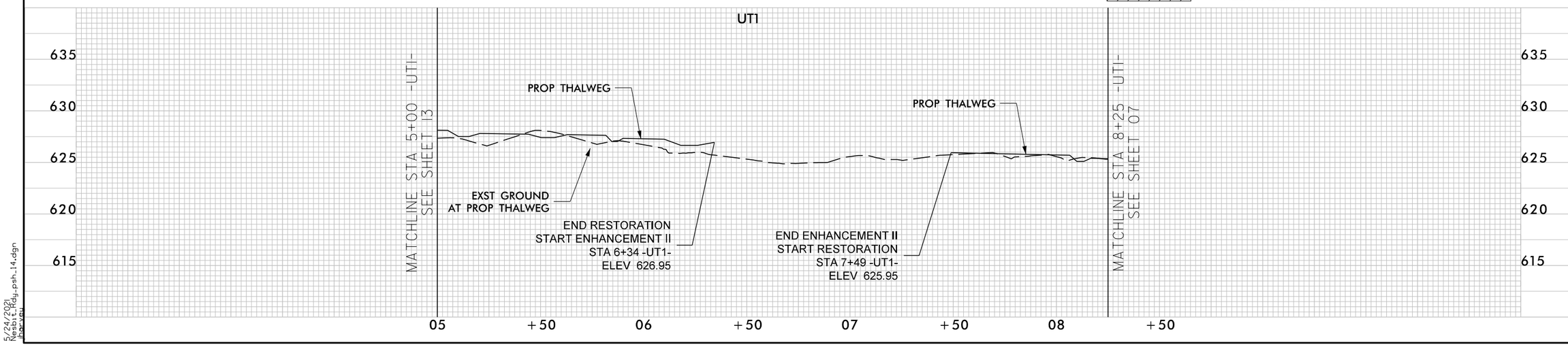
R R DENOTES WETLAND REESTABLISHMENT



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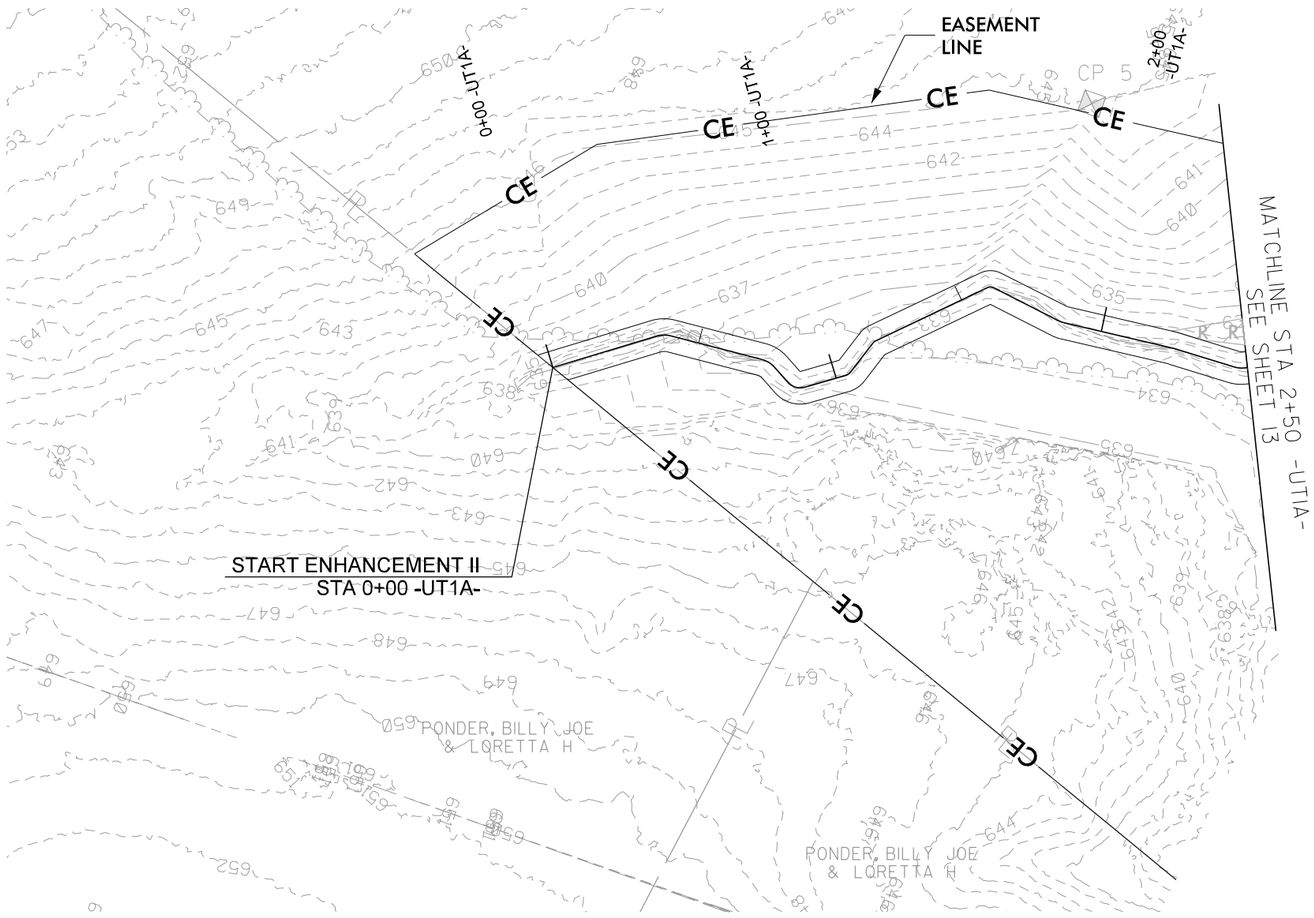

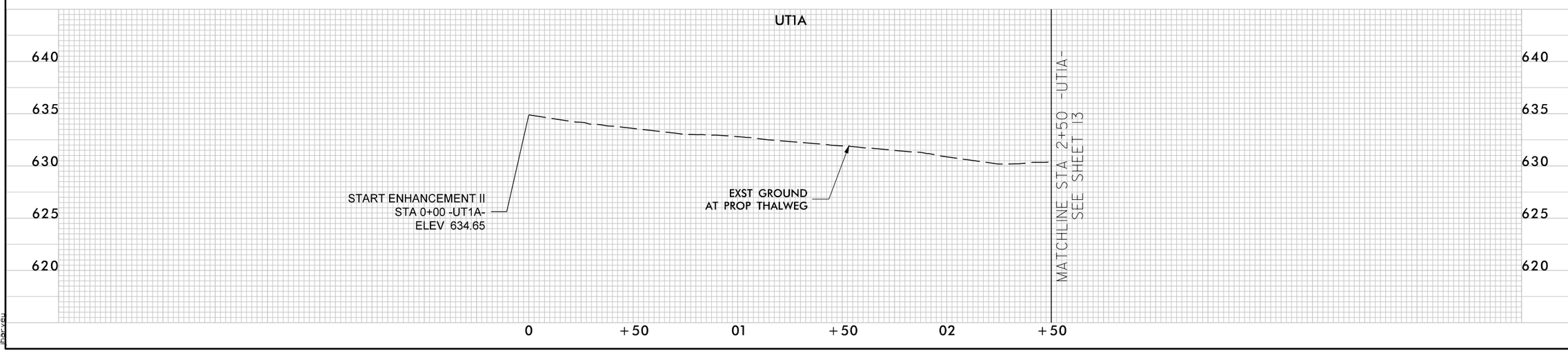

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WETLAND REHABILITATION AREAS DERIVED FROM APPROVED PRELIMINARY JURISDICTIONAL DELINEATION

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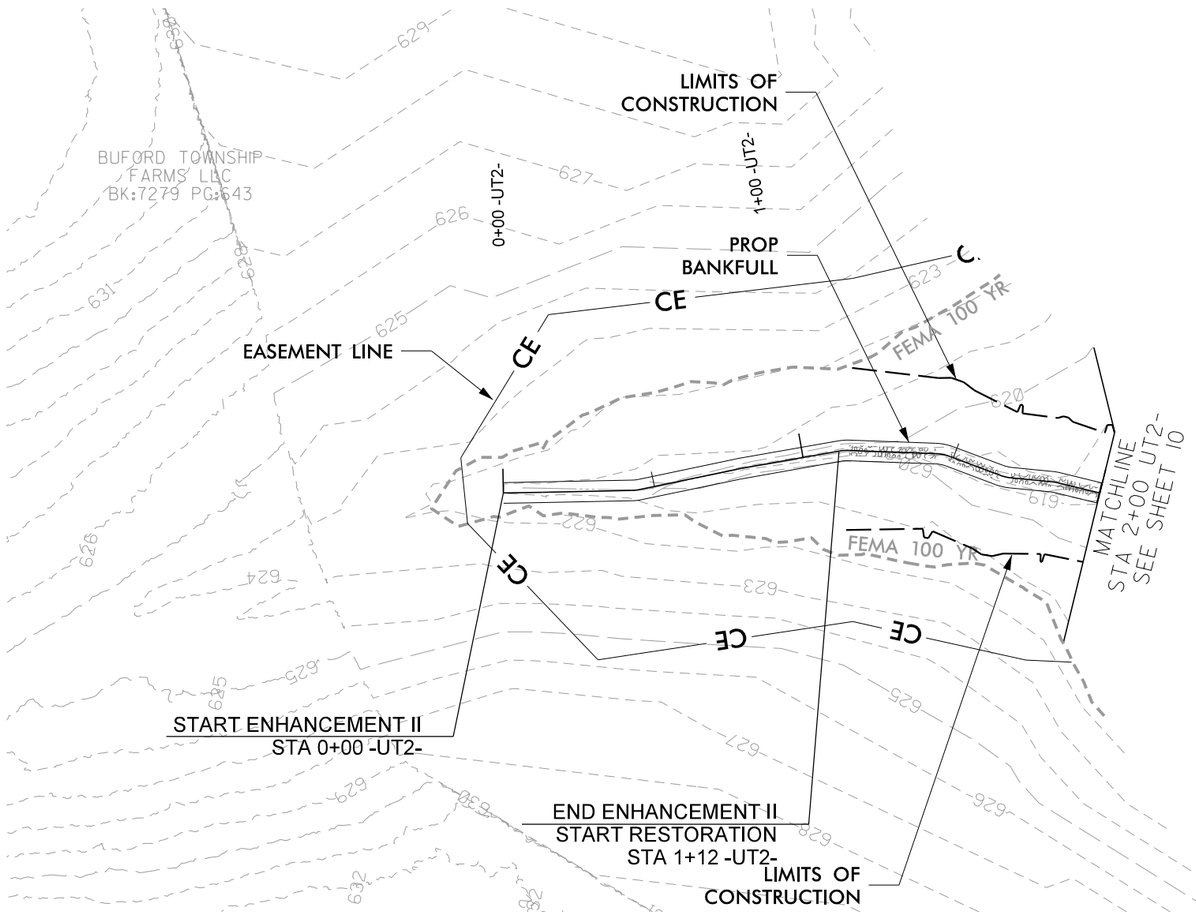

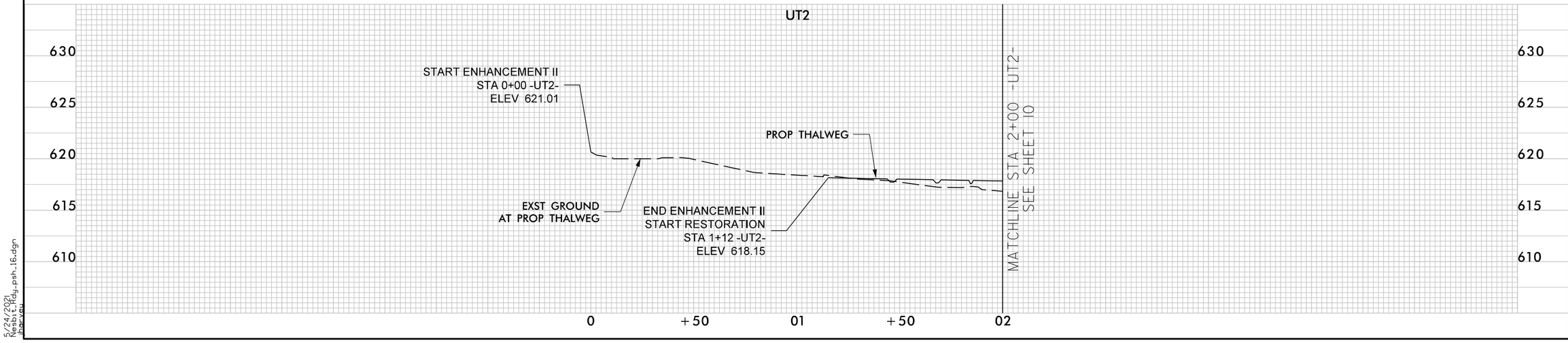

25' 12.5' 0 25' 50'

SCALE: 1" = 50'

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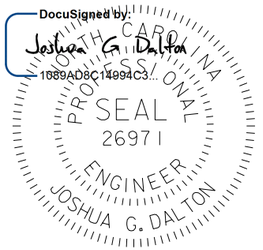

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CONSTRUCTION SEQUENCE

Construction Notes:

1. Staging areas, stockpile areas, construction entrances and access roads will be identified and located according to the Erosion Control Plans and landowner agreements. Variances will be allowed assuming both the Contractor and Designer verbally agree.

2. A construction entrance (as shown on sheet E03E) from Secondary Road 1131 (Nesbit Rd) will be installed for access to GLEN, UT1, UT1A, and UT2, as shown on the Erosion Control Plans.

3. The Contractor will install silt fencing, as noted on the Erosion Control Plans, at applicable staging and stockpile areas.

4. The proposed stream alignment and structure locations will be staked for each reach (GLEN, UT1, UT1A, and UT2). Staking will be restricted to riffle elevations only in order to establish and maintain grade for the entire system. Pools will be excavated once structures are installed.

5. The Contractor will begin stockpiling materials in a designated staging area. General details associated with all sections include:

    a. Sediment bags will be used to filter the groundwater and placed within areas of newly excavated channel that are offline from the existing flow. These bags will be utilized as the contractor or designer deem necessary.
    b. Temporary and permanent seed mixes, including applicable mulching, will be applied to the streambanks and disturbed areas at the end of each working day as definable sections are completed. Erosion control matting will be installed on top of the seed and straw in accordance with the Erosion Control Construction Sequence.
    c. Excavated material that is stockpiled will follow erosion and sediment control guidelines as they relate to material storage and stockpiling.
    d. All remaining disturbed areas are to be seeded and covered according to the Erosion Control Construction Sequence.
    e. Riprap aprons will be constructed to impede any erosion of the channel and streambanks by the water diverted from the pump-around procedure.

6. Boulders and materials used for stream structures will be delivered through the primary construction entrance and stockpiled in the appropriate area.

7. This project will require pumping water around the channels during construction. Work will generally proceed from upstream to downstream.

8. Adjust haul roads and associated silt fence as necessary when permanent stream crossings are installed.

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EROSION CONTROL NOTES

PROJECT # :
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E02

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Construction Sequence

1. The Contractor will excavate the proposed channel and modify portions of the existing channel based on riffle elevations in sections no greater than 300' in length at a time (except where longer sections are necessary to maintain constructability) in an upstream to downstream fashion. Impervious dikes will be installed upstream and downstream of the current work section before work on the section is initiated unless noted otherwise (see Table 1.-Working Sections below for suggested work section stations and progression). Water will be diverted around the current work section through the use of a pump and temporary flexible hose. The current work section will be dewatered using an additional pump and a sediment bag. Work sections that involve the construction of a confluence of two reaches may require the use of two pump-around operations. Structures will be installed according to the details presented in the Construction Plans. Excavate only a portion of the channel that can be completed and stabilized within the same day. All excavated material will be placed in an appropriate stockpile area. Pools will be established once structures and channel alignments have been completed locally. Permanent stream crossings will be installed while the working section containing the crossing has been dewatered.

   Grading of some portions of the proposed floodplain may need to be delayed until after work in subsequent sections has been completed, especially near confluences. Haul roads and temporary silt fence may also need to be removed before the proposed floodplain can be completed and/or unused existing channel can be filled.

Table 1. - Working Sections

Order of Progress	Pump Station #	Reach	Begin Station	End Station	Construction Notes
1	P-1	**GLEN**	0+00	3+00	Construct ford crossing.
2	P-2	**GLEN**	3+00	6+00	
3	P-3	**GLEN**	6+00	9+00	
4	P-4	**GLEN**	9+00	12+00	
5	P-5	**GLEN**	12+00	15+00	
6	P-6	**UT1**	0+00	2+00	
7	P-7	**UT1**	2+00	4+50	
8	P-8	**UT1A**	3+00	3+14	Operate pump stations P-8 and P-9 simultaneously to build confluence of UT1 and UT1A.
9	P-9	**UT1**	2+00	4+50	
10	P-10	**UT1**	4+50	7+00	
11	P-11	**UT1**	7+00	9+00	Construct ford crossing.
12	P-12	**UT1**	9+00	9+80	Operate pump stations P-12 and P-13 simultaneously to build confluence of UT1 and GLEN. Construct drop structure.
13	P-13	**GLEN**	15+00	17+00	
14	P-14	**GLEN**	17+00	20+00	
15	P-15	**GLEN**	20+00	23+00	
16	P-16	**GLEN**	23+00	26+00	
17	P-17	**GLEN**	26+00	29+00	
18	P-18	**GLEN**	29+00	30+50	
19	P-19	**GLEN**	30+50	31+50	Operate pump stations P-19 and P-20 simultaneously to build confluence of UT2 and GLEN. Construct drop structure.
20	P-20	**UT2**	1+12	3+09	
21	P-21	**GLEN**	31+50	34+50	
22	P-22	**GLEN**	34+50	37+50	
23	P-23	**GLEN**	37+50	39+50	
24	P-24	**GLEN**	39+50	41+92	Construct drop structure.

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CONSTRUCTION SEQUENCE (CONTINUED)

1. Ponds shall be dewatered prior to dam removal using the following methods:

   a. For ponds with an outlet structure, open the outlet structure to dewater the pond at a rate that does not cause excessive erosion downstream of the dam.

   b. For ponds without an outlet structure or that require supplemental drawdown, use a pump and temporary flexible hose to dewater the pond into the downstream channel. A rip rap dissipation pad shall be used at the outlet of the temporary flexible hose. Dewater at a rate that does not cause excessive erosion downstream of the discharge point.

2. At the end of each working day, the Contractor will be responsible for the application of seed and straw, as applicable, to newly established streambanks and disturbed areas. Erosion control matting will be installed on top of the seed and straw in accordance with the Erosion Control Construction Sequence.

Post-Construction
After all channel work has been completed:

1. All remaining disturbed areas are to be seeded and mulched in accordance with the Erosion Control Construction Sequence.

2. Live staking can begin on all completed sections of channel (GLEN, UT1, UT1A, and UT2) in accordance with the Planting Plans.

3. Once channel construction and seeding has been complete, bare-rooted seedlings will be installed.

4. All haul road locations to be restored to pre-construction conditions.

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EROSION CONTROL NOTES

PROJECT # :
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E02A

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jharvell

EROSION CONTROL CONSTRUCTION SEQUENCE

1. Obtain grading permit.
2. Install temporary construction entrance, silt fencing, access roads, and other measures shown on the approved erosion and sedimentation control plan.
3. Install rain gage on site. Contractor shall provide a log book at the project site and shall read and record rain amounts at the same time each day.
4. Contact local Soil Erosion Authority or State for on-site inspection by Environmental Inspector and obtain certificate of compliance.
5. Begin clearing - maintain devices as necessary.
6. Begin channel construction - stockpile waste material in designated spoil areas and surround with silt fencing.
7. Temporary or permanent ground cover stabilization shall occur within 7 calendar days from the last land-disturbing activity, with the following exceptions in which temporary or permanent ground cover shall be provided within 14 calendar days from the last land-disturbing activity:
    a. Slopes between 2:1 and 3:1, with a slope length of 10 feet or less
    b. Slopes 3:1 or flatter, with a slope length of 50 feet or less
    c. Slopes 4:1 or flatter
8. All graded stream banks must be seeded, mulched, and matted at the end of each day. For this reason, daily disturbance is limited to the length of stream that can be completed within daily work hours.
9. Once a newly constructed channel section is stabilized, impervious dikes and pump around stations may be removed, and water may be reintroduced to the channel.
10. When construction is complete and all areas are stabilized completely, call for inspection by Environmental Inspector.
11. If site is approved, remove silt fencing, access roads, etc. and seed out any resulting bare areas.
12. When vegetation has been established, call for final site inspection by Environmental Inspector.

SOIL AMENDMENTS

In lieu of a soil test:

Fertilizer	10 – 10 -10 1000 lb./acre

Mulch

Small grain mulch must be applied at a rate of 2 tons/acre to all seeded areas.

SEEDING SCHEDULE

TEMPORARY HERBACEOUS SEED

Common Name	Scientific Name	Application Rate	Application Dates
Grain Rye [A]	*Secale cereale*	130 lbs. per acre (3 lbs. per 1,000 ft^2)	Year-round
Orchard Grass [B]	*Dactylis glomerata*	15 lbs per acre (0.35 lbs. per 1,000 ft^2)	September - March
Brown Top Millet [B]	*Panicum ramosum*	40 lbs. per acre (1.0 lbs. per 1,000 ft^2)	May – September
German Millet [B]	*Setaria italica*	25 lbs. per acre (0.5 lbs. per 1,000 ft^2)	May – September

[A] Primarily utilized on disturbed or stockpiled areas.
[B] Primarily utilized near stream channels and streambanks.

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EROSION CONTROL NOTES

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GROUND STABILIZATION AND MATERIALS HANDLING PRACTICES FOR COMPLIANCE WITH THE NCG01 CONSTRUCTION GENERAL PERMIT

Implementing the details and specifications on this plan sheet will result in the construction activity being considered compliant with the Ground Stabilization and Materials Handling sections of the NCG01 Construction General Permit (Sections E and F, respectively). The permittee shall comply with the Erosion and Sediment Control plan approved by the delegated authority having jurisdiction. All details and specifications shown on this sheet may not apply depending on site conditions and the delegated authority having jurisdiction.

SECTION E: GROUND STABILIZATION

Required Ground Stabilization Timeframes

Site Area Description	Stabilize within this many calendar days after ceasing land disturbance	Timeframe variations
(a) Perimeter dikes, swales, ditches, and perimeter slopes	7	None
(b) High Quality Water (HQW) Zones	7	None
(c) Slopes steeper than 3:1	7	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
(d) Slopes 3:1 to 4:1	14	-7 days for slopes greater than 50' in length and with slopes steeper than 4:1 -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed
(e) Areas with slopes flatter than 4:1	14	-7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed unless there is zero slope

Note: After the permanent cessation of construction activities, any areas with temporary ground stabilization shall be converted to permanent ground stabilization as soon as practicable but in no case longer than 90 calendar days after the last land disturbing activity. Temporary ground stabilization shall be maintained in a manner to render the surface stable against accelerated erosion until permanent ground stabilization is achieved.

GROUND STABILIZATION SPECIFICATION

Stabilize the ground sufficiently so that rain will not dislodge the soil. Use one of the techniques in the table below:

Temporary Stabilization	Permanent Stabilization
• Temporary grass seed covered with straw or other mulches and tackifiers • Hydroseeding • Rolled erosion control products with or without temporary grass seed • Appropriately applied straw or other mulch • Plastic sheeting	• Permanent grass seed covered with straw or other mulches and tackifiers • Geotextile fabrics such as permanent soil reinforcement matting • Hydroseeding • Shrubs or other permanent plantings covered with mulch • Uniform and evenly distributed ground cover sufficient to restrain erosion • Structural methods such as concrete, asphalt or retaining walls • Rolled erosion control products with grass seed

POLYACRYLAMIDES (PAMS) AND FLOCCULANTS

1. Select flocculants that are appropriate for the soils being exposed during construction, selecting from the *NC DWR List of Approved PAMS/Flocculants*.
2. Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
3. Apply flocculants at the concentrations specified in the *NC DWR List of Approved PAMS/Flocculants* and in accordance with the manufacturer's instructions.
4. Provide ponding area for containment of treated Stormwater before discharging offsite.
5. Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

1. Maintain vehicles and equipment to prevent discharge of fluids.
2. Provide drip pans under any stored equipment.
3. Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
4. Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
5. Remove leaking vehicles and construction equipment from service until the problem has been corrected.
6. Bring used fuels, lubricants, coolants, hydraulic fluids and other petroleum products to a recycling or disposal center that handles these materials.

LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE

1. Never bury or burn waste. Place litter and debris in approved waste containers.
2. Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
3. Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
4. Locate waste containers on areas that do not receive substantial amounts of runoff from upland areas and does not drain directly to a storm drain, stream or wetland.
5. Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
6. Anchor all lightweight items in waste containers during times of high winds.
7. Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
8. Dispose waste off-site at an approved disposal facility.
9. On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, sized and placed appropriately for the needs of site.
5. Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

PORTABLE TOILETS

1. Install portable toilets on level ground, at least 50 feet away from storm drains, streams or wetlands unless there is no alternative reasonably available. If 50 foot offset is not attainable, provide relocation of portable toilet behind silt fence or place on a gravel pad and surround with sand bags.
2. Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
3. Monitor portable toilets for leaking and properly dispose of any leaked material. Utilize a licensed sanitary waste hauler to remove leaking portable toilets and replace with properly operating unit.

EARTHEN STOCKPILE MANAGEMENT

1. Show stockpile locations on plans. Locate earthen-material stockpile areas at least 50 feet away from storm drain inlets, sediment basins, perimeter sediment controls and surface waters unless it can be shown no other alternatives are reasonably available.
2. Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
3. Provide stable stone access point when feasible.
4. Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.

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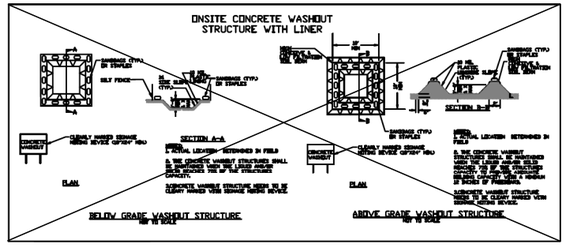

CONCRETE WASHOUTS

1. Do not discharge concrete or cement slurry from the site.
2. Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
3. Manage washout from mortar mixers in accordance with the above item and in addition place the mixer and associated materials on impervious barrier and within lot perimeter silt fence.
4. Install temporary concrete washouts per local requirements, where applicable. If an alternate method or product is to be used, contact your approval authority for review and approval. If local standard details are not available, use one of the two types of temporary concrete washouts provided on this detail.
5. Do not use concrete washouts for dewatering or storing defective curb or sidewalk sections. Stormwater accumulated within the washout may not be pumped into or discharged to the storm drain system or receiving surface waters. Liquid waste must be pumped out and removed from project.
6. Locate washouts at least 50 feet from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. At a minimum, install protection of storm drain inlet(s) closest to the washout which could receive spills or overflow.
7. Locate washouts in an easily accessible area, on level ground and install a stone entrance pad in front of the washout. Additional controls may be required by the approving authority.
8. Install at least one sign directing concrete trucks to the washout within the project limits. Post signage on the washout itself to identify this location.
9. Remove leavings from the washout when at approximately 75% capacity to limit overflow events. Replace the tarp, sand bags or other temporary structural components when no longer functional. When utilizing alternative or proprietary products, follow manufacturer's instructions.
10. At the completion of the concrete work, remove remaining leavings and dispose of in an approved disposal facility. Fill pit, if applicable, and stabilize any disturbance caused by removal of washout.

HERBICIDES, PESTICIDES AND RODENTICIDES

1. Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
2. Store herbicides, pesticides and rodenticides in their original containers with the label, which lists directions for use, ingredients and first aid steps in case of accidental poisoning.
3. Do not store herbicides, pesticides and rodenticides in areas where flooding is possible or where they may spill or leak into wells, stormwater drains, ground water or surface water. If a spill occurs, clean area immediately.
4. Do not stockpile these materials onsite.

HAZARDOUS AND TOXIC WASTE

1. Create designated hazardous waste collection areas on-site.
2. Place hazardous waste containers under cover or in secondary containment.
3. Do not store hazardous chemicals, drums or bagged materials directly on the ground.

NCG01 GROUND STABILIZATION AND MATERIALS HANDLING

EFFECTIVE: 04/01/19

DocuSigned by: Joshua G Dalton 1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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NESBIT
UNION COUNTY, NC

EROSION CONTROL NOTES

PROJECT # :

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DRAWN BY: JRH

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PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION A: SELF-INSPECTION

Self-inspections are required during normal business hours in accordance with the table below. When adverse weather or site conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection may be delayed until the next business day on which it is safe to perform the inspection. In addition, when a storm event of equal to or greater than 1.0 inch occurs outside of normal business hours, the self-inspection shall be performed upon the commencement of the next business day. Any time when inspections were delayed shall be noted in the Inspection Record.

Inspect	Frequency (during normal business hours)	Inspection records must include:
(1) Rain gauge maintained in good working order	Daily	Daily rainfall amounts. If no daily rain gauge observations are made during weekend or holiday periods, and no individual day rainfall information is available, record the cumulative rain measurement for those un-attended days (anc this will determine if a site inspection is needed). Days on which no rainfall occurred shall be recorded as "zero." The permittee may use another rain-monitoring device approved by the Division.
(2) E&SC Measures	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the measures inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Indication of whether the measures were operating properly, 5. Description of maintenance needs for the measure, 6. Description, evidence, and date of corrective actions taken.
(3) Stormwater discharge outfalls (SDCs)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the discharge outfalls inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5. Indication of visible sediment leaving the site, 6. Description, evidence, and date of corrective actions taken.
(4) Perimeter of site	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If visible sedimentation is found outside site limits, then a record of the following shall be made: 1. Actions taken to clean up or stabilize the sediment that has left the site limits, 2. Description, evidence, and date of corrective actions taken, and 3. An explanation as to the actions taken to control future releases.
(5) Streams or wetlands onsite or offsite (where accessible)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If the stream or wetland has increased visible sedimentation or a stream has visible increased turbidity from the construction activity, then a record of the following shall be made: 1. Description, evidence and date of corrective actions taken, and 2. Records of the required reports to the appropriate Division Regional Office per Part III, Section C, Item (2)(a) of this permit.
(6) Ground stabilization measures	After each phase of grading	1. The phase of grading (installation of perimeter E&SC measures, clearing and grubbing, installation of storm drainage facilities, completion of all land-disturbing activity, construction or redevelopment, permanent ground cover). 2. Documentation that the required ground stabilization measures have been provided within the required timeframe or an assurance that they will be provided as soon as possible.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

The approved E&SC plan as well as any approved deviation shall be kept on the site. The approved E&SC plan must be kept up-to-date throughout the coverage under this permit. The following items pertaining to the E&SC plan shall be kept on site and available for inspection at all times during normal business hours.

Item to Document	Documentation Requirements
(a) Each E&SC measure has been installed and does not significantly deviate from the locations, dimensions and relative elevations shown on the approved E&SC plan.	Initial and date each E&SC measure on a copy of the approved E&SC plan or complete, date and sign an inspection report that lists each E&SC measure shown on the approved E&SC plan. This documentation is required upon the initial installation of the E&SC measures or if the E&SC measures are modified after initial installation.
(b) A phase of grading has been completed.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate completion of the construction phase.
(c) Ground cover is located and installed in accordance with the approved E&SC plan.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate compliance with approved ground cover specifications.
(d) The maintenance and repair requirements for all E&SC measures have been performed.	Complete, date and sign an inspection report.
(e) Corrective actions have been taken to E&SC measures.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate the completion of the corrective action.

2. Additional Documentation to be Kept on Site

In addition to the E&SC plan documents above, the following items shall be kept on the site and available for inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

(a) This General Permit as well as the Certificate of Coverage, after it is received.

(b) Records of inspections made during the previous twelve months. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements. Use of electronically-available records in lieu of the required paper copies will be allowed if shown to provide equal access and utility as the hard-copy records.

3. Documentation to be Retained for Three Years

All data used to complete the e-NOI and all inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that Must be Reported

Permittees shall report the following occurrences:

(a) Visible sediment deposition in a stream or wetland.

(b) Oil spills if:
- They are 25 gallons or more,
- They are less than 25 gallons but cannot be cleaned up within 24 hours,
- They cause sheen on surface waters (regardless of volume), or
- They are within 100 feet of surface waters (regardless of volume).

(c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.

(d) Anticipated bypasses and unanticipated bypasses.

(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Department's Environmental Emergency Center personnel at (800) 858-0368.

Occurrence	Reporting Timeframes (After Discovery) and Other Requirements
(a) Visible sediment deposition in a stream or wetland	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the sediment and actions taken to address the cause of the deposition. Division staff may waive the requirement for a written report on a case-by-case basis. • If the stream is named on the NC 303(d) list as impaired for sediment-related causes, the permittee may be required to perform additional monitoring, inspections or apply more stringent practices if staff determine that additional requirements are needed to assure compliance with the federal or state impaired-waters conditions.
(b) Oil spills and release of hazardous substances per Item 1(b)-(c) above	• ***Within 24 hours***, an oral or electronic notification. The notification shall include information about the date, time, nature, volume and location of the spill or release.
(c) Anticipated bypasses [40 CFR 122.41(m)(3)]	• ***A report at least ten days before the date of the bypass, if possible***. The report shall include an evaluation of the anticipated quality and effect of the bypass.
(d) Unanticipated bypasses [40 CFR 122.41(m)(3)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days,*** a report that includes an evaluation of the quality and effect of the bypass.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment[40 CFR 122.41(l)(7)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the noncompliance, and its causes; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time noncompliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6). • Division staff may waive the requirement for a written report on a case-by-case basis.

PART II, SECTION G, ITEM (4)
DRAW DOWN OF SEDIMENT BASINS FOR MAINTENANCE OR CLOSE OUT

Sediment basins and traps that receive runoff from drainage areas of one acre or more shall use outlet structures that withdraw water from the surface when these devices need to be drawn down for maintenance or close out unless this is infeasible. The circumstances in which it is not feasible to withdraw water from the surface shall be rare (for example, times with extended cold weather). Non-surface withdrawals from sediment basins shall be allowed only when all of the following criteria have been met:

(a) The E&SC plan authority has been provided with documentation of the non-surface withdrawal and the specific time periods or conditions in which it will occur. The non-surface withdrawal shall not commence until the E&SC plan authority has approved these items,
(b) The non-surface withdrawal has been reported as an anticipated bypass in accordance with Part III, Section C, Item (2)(c) and (d) of this permit,
(c) Dewatering discharges are treated with controls to minimize discharges of pollutants from stormwater that is removed from the sediment basin. Examples of appropriate controls include properly sited, designed and maintained dewatering tanks, weir tanks, and filtration systems,
(d) Vegetated, upland areas of the sites or a properly designed stone pad is used to the extent feasible at the outlet of the dewatering treatment devices described in Item (c) above,
(e) Velocity dissipation devices such as check dams, sediment traps, and riprap are provided at the discharge points of all dewatering devices, and
(f) Sediment removed from the dewatering treatment devices described in Item (c) above is disposed of in a manner that does not cause deposition of sediment into waters of the United States.

NORTH CAROLINA *Environmental Quality*

NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING

EFFECTIVE: 04/01/19

DocuSigned by: Joshua G. Dalton 1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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NESBIT
UNION COUNTY, NC

EROSION CONTROL NOTES

PROJECT # :

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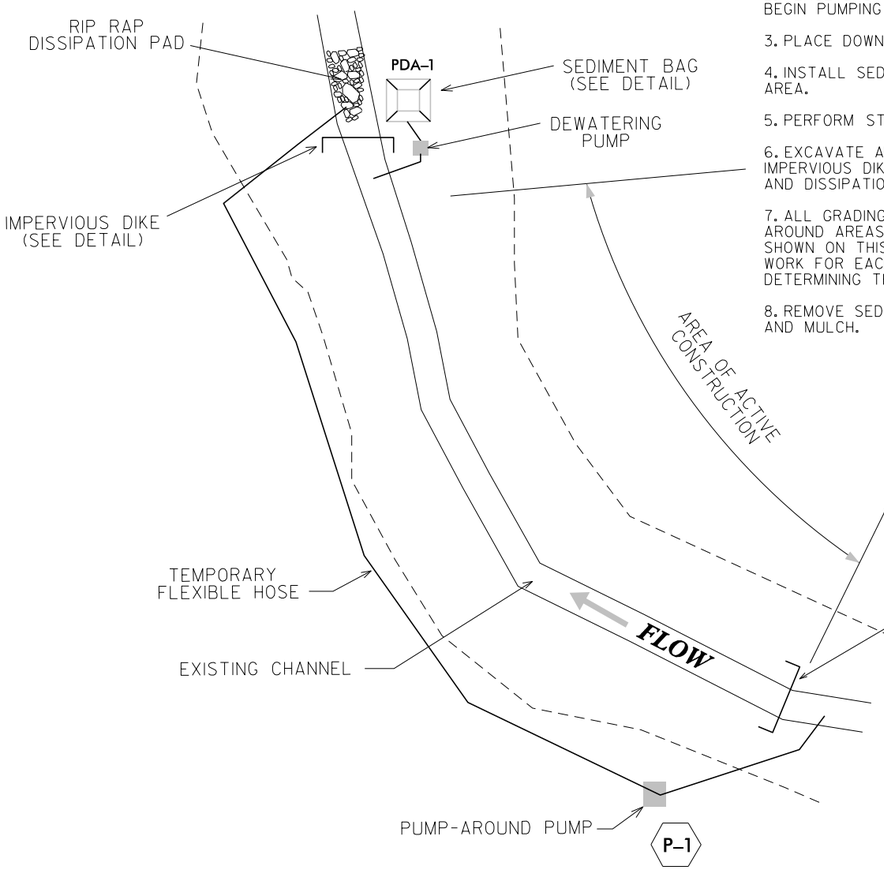


CONSTRUCTION SEQUENCE FOR TYPICAL PUMP-AROUND:

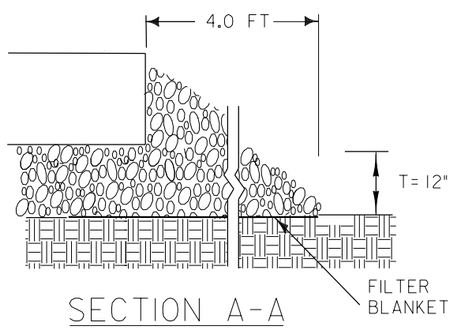
1. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
2. PLACE UPSTREAM IMPERVIOUS DIKE, DOWNSTREAM RIP RAP DISSIPATION PAD, AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
3. PLACE DOWNSTREAM IMPERVIOUS DIKE.
4. INSTALL SEDIMENT BAG AND ASSOCIATED PUMP. DEWATER THE ENTRAPPED AREA.
5. PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLANS.
6. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERVIOUS DIKES. REMOVE IMPERVIOUS DIKES, PUMPS, TEMPORARY FLEXIBLE HOSE, AND DISSIPATION PAD (BEGIN WITH DOWNSTREAM IMPERVIOUS DIKE FIRST).
7. ALL GRADING AND STABILIZATION MUST BE COMPLETED WITHIN THE PUMP AROUND AREAS BETWEEN THE IMPERVIOUS DIKES. THE IMPERVIOUS LOCATIONS AS SHOWN ON THIS SHEET ONLY REPRESENT THE UPPER AND LOWER EXTENT OF WORK FOR EACH STREAM SEGMENT. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE IMPERVIOUS DIKES.
8. REMOVE SEDIMENT BAG(S) AND BACKFILL. STABILIZE DISTURBED AREA WITH SEED AND MULCH.

NOTES:

1. ALL EXCAVATION SHALL BE PERFORMED IN ONLY DRY OR ISOLATED SECTIONS OF CHANNEL
2. IMPERVIOUS DIKES ARE TO BE USED TO ISOLATE WORK FROM STREAM FLOW WHEN NECESSARY
3. ALL GRADED STREAM BANKS SHALL BE SEEDED, MULCHED, AND MATTED AT THE END OF EACH WORKING DAY. ALL OTHER GRADED AREAS SHALL BE SEEDED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS.
4. MAINTENANCE OF STREAM FLOW OPERATIONS SHALL BE INCIDENTAL TO THE WORK, THIS INCLUDES POLYETHYLENE SHEETING, DIVERSION PIPES, PUMPS, AND HOSES.
5. PUMPS AND HOSES SHALL BE OF A SUFFICIENT SIZE AND NUMBER TO DEWATER THE WORK AREA.
6. RIP RAP DISSIPATION PAD TO BE INSTALLED DOWNSTREAM OF LOWER IMPERVIOUS DIKE

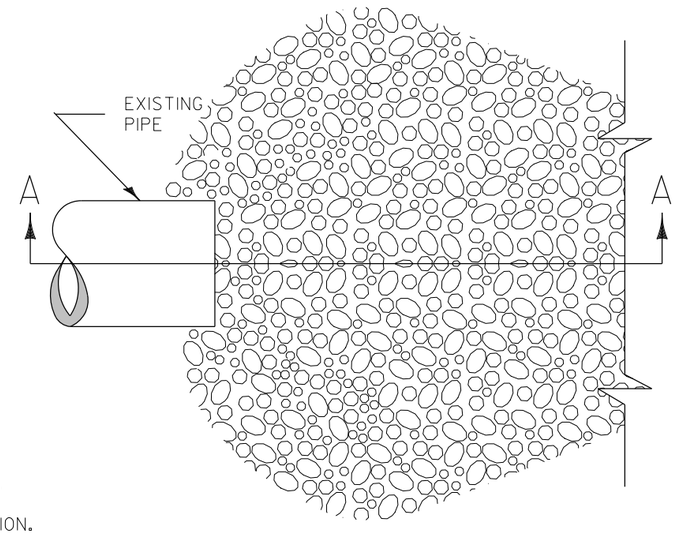
TYPICAL PUMP-AROUND OPERATION

RIPRAP DISSIPATION PAD



SECTION A-A

PLAN VIEW



NOTES:

1. La IS THE LENGTH OF THE RIPRAP APRON.
2. T = THICKNESS
3. IN A WELL-DEFINED CHANNEL EXTEND THE APRON UP THE CHANNEL BANKS TO THE TOP OF THE BANK.
4. A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION.

RIP RAP DISIPATION PAD SPECIFICATIONS

ASSUMED HOSE SIZE (IN)	PERMANENT (Y/N)	LENGTH La (FT)	WIDTH Wo (FT)	STONE SIZE d50 (IN)	STONE CLASS	THICKNESS (IN)
4"	N	4.0	1.0	3	A	12

DocuSigned by:
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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

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EROSION CONTROL DETAILS

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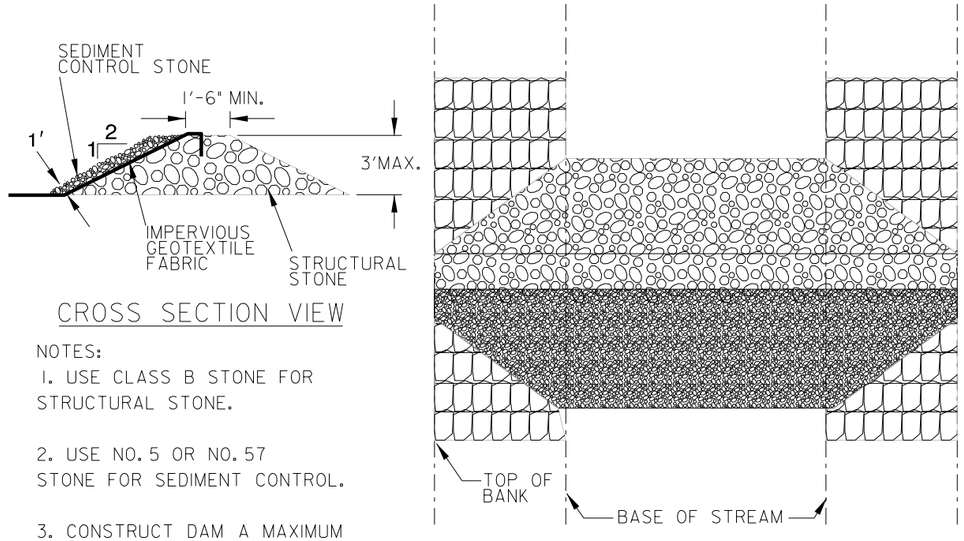
Darren

IMPERVIOUS DIKE



CROSS SECTION VIEW

NOTES:

1. USE CLASS B STONE FOR STRUCTURAL STONE.

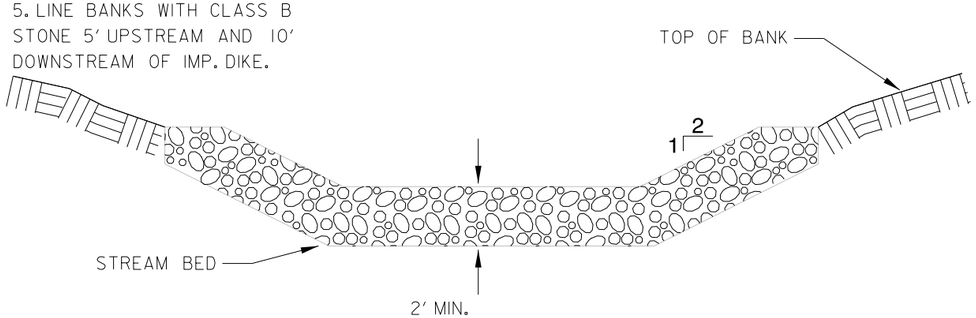
2. USE NO. 5 OR NO. 57 STONE FOR SEDIMENT CONTROL.

3. CONSTRUCT DAM A MAXIMUM OF 1 FT. ABOVE NORMAL FLOW DEPTH.

4. TOE IN IMPERVIOUS MATERIAL

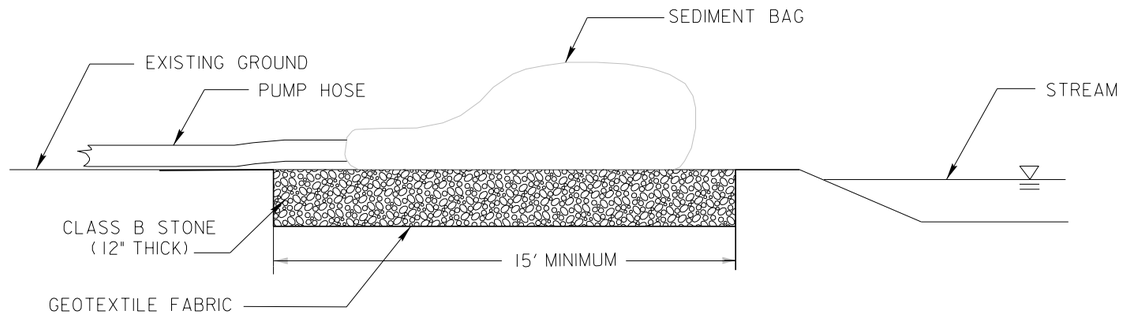
5. LINE BANKS WITH CLASS B STONE 5' UPSTREAM AND 10' DOWNSTREAM OF IMP. DIKE.

TOP VIEW



FRONT VIEW

SEDIMENT BAG



INSTALLATION:

1. INSTALL SEDIMENT BAG ON A SLOPE SO INCOMING WATER FLOWS DOWNHILL THROUGH BAG WITHOUT CREATING MORE EROSION. TO INCREASE THE EFFICIENCY OF FILTRATION, PLACE THE BAG ON A GRAVEL BED IN ORDER TO MAXIMIZE WATER FLOW THROUGH THE SURFACE AREA OF THE BAG.

2. BAG IS FULL WHEN IT NO LONGER CAN EFFICIENTLY FILTER SEDIMENT OR ALLOW WATER TO PASS AT A REASONABLE RATE. FLOW RATES WILL VARY DEPENDING ON THE SIZE OF SEDIMENT BAG, THE TYPE AND AMOUNT OF SEDIMENT DISCHARGED INTO THE BAG, THE TYPE OF GROUND, ROCK OR OTHER SUBSTANCE UNDER THE BAG AND THE DEGREE OF THE SLOPE ON WHICH THE BAG LIES. UNDER MOST CIRCUMSTANCES THE SEDIMENT BAG WILL ACCOMMODATE FLOW RATES OF 1100 GALLONS PER MINUTE. USE OF EXCESSIVE FLOW RATES OR OVERFILLING WITH SEDIMENT WILL CAUSE THE BAG TO RUPTURE OR FAILURE OF THE HOSE ATTACHMENT STRAPS.

3. DISPOSE OF SEDIMENT BAG AS DIRECTED BY THE SITE DESIGNER. IF ALLOWED, BAG MAY BE CUT OPEN AND THE CONTENTS SEEDED AFTER REMOVING VISIBLE FABRIC.

4. REFER TO DETAIL REGARDING GEOTEXTILE FABRIC ATTRIBUTES.

DocuSigned by:
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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

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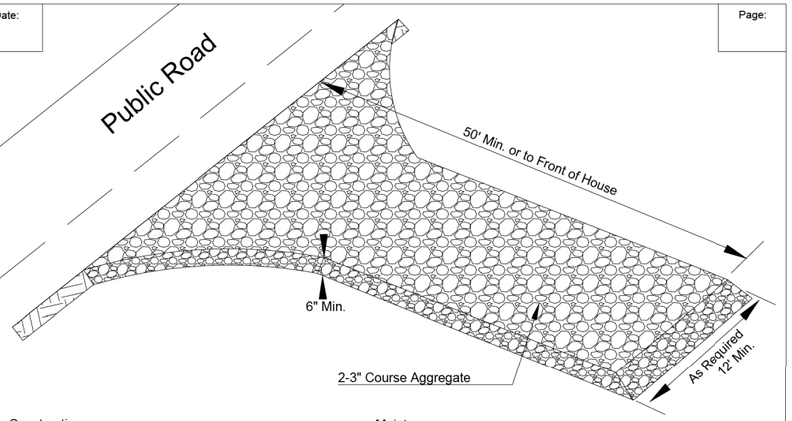


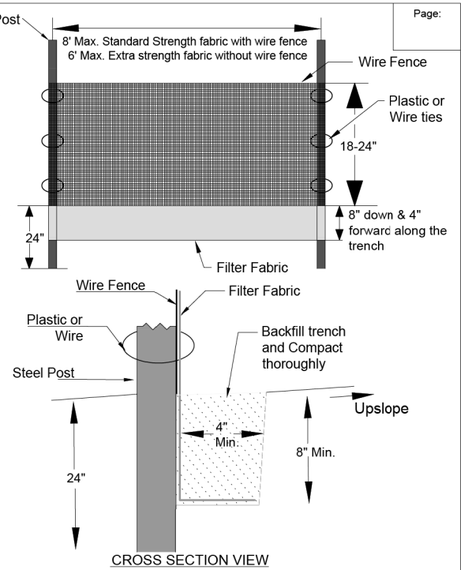
Construction:
1. Clear the entrance and exit area of all vegetation, roots, and other objectionable material and properly grade it.
2. Place the gravel to the specific grade and dimensions shown on the plans, and smooth it.
3. Provide drainage to carry water to a sediment trap or other suitable outlet.
4. Use geotextile fabrics in order to improve stability of the foundation in locations subject to seepage or high water table.

Maintenance:
1. Per NCG-01 inspect at least once a week and after each 1 inch or greater rainfall; make any required repairs immediately.
2. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site. This may require periodic topdressing with 2 inch stone.
3. Immediately remove all objectionable materials spilled, washed or tracked onto public roadways.

NORTH CAROLINA Environmental Quality
EFFECTIVE DATE: 11/12/2020

CONSTRUCTION ENTRANCE / EXIT

Date: Page:



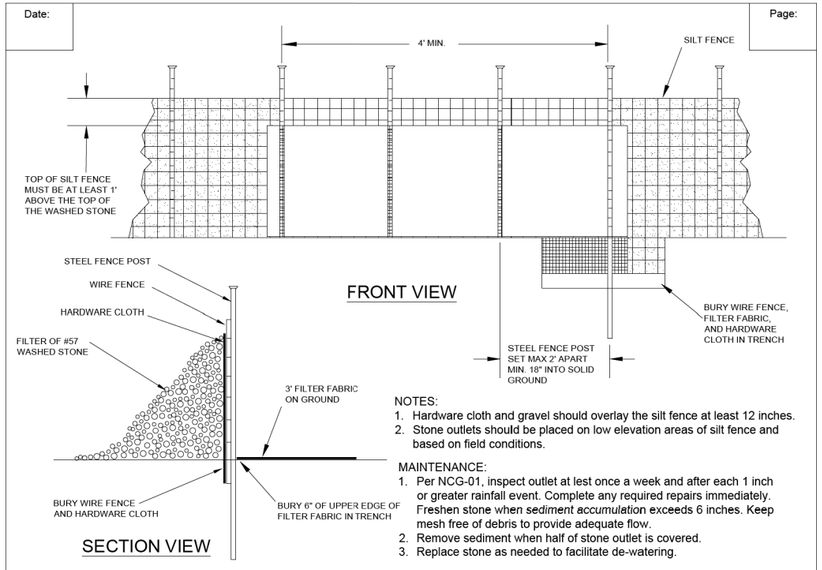
Construction:
1. Construct the sediment barrier of standard strength or extra strength synthetic filter fabrics.
2. Ensure that the height of the sediment fence does not exceed 24 inches above the ground. (Higher fences may impound volumes of water sufficient to cause failure of the structure.)
3. Construct the filter fabric from a continuous roll cut to the length of the barrier to avoid joints. When joints are necessary, securely fasten the filter cloth only at a support post with 4 fee! minimum overlap to the next post.
4. Support standard strength filter fabric by wire mesh fastened securely to the upslope side of the posts. Extend the wire mesh support to the bottom of the trench. Fasten the wire reinforcement, then fabric on the upslope side of the fence post. Wire or plastic zip ties should have a minimum 50 pound tensile strength.
5. When a wire mesh support fence is used, space posts a maximum of 8 feet apart. Supports should be driven securely into the ground a minimum of 24 inches.
6. Extra strength filter fabric with 6 feet post spacing does not require wire mesh support fence. Securely fasten the filter fabric directly to posts. Wire or plastic zip ties should have a minimum of 50 pound tensile strength.
7. Excavate the trench approximately 4 inches wide and 8 inches deep along the proposed line of the posts and upslope from the barrier.
8. Place 12 inches of fabric along the bottom and side of the trench.
9. Backfill the trench with soil placed over the filter fabric and compact. Thorough compaction of the backfill is critical to silt fence performance.
10. Do not attach filter fabric to existing trees.

Maintenance:
1. Inspect sediment fences at least once a week and after each 1 inch rainfall. Make any required repairs immediately.
2. Should the fabric of a sediment fence collapse, tear, decompose, or become ineffective, replace it promptly.
3. Remove sediment deposits as necessary to provide adequate storage volume for the next rain and reduce pressure on the fence. Take care to avoid undermining the fence during cleanout.
4. Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized.

NORTH CAROLINA Environmental Quality
EFFECTIVE DATE: 11/12/2020

SILT FENCE

Date: Page:



NOTES:
1. Hardware cloth and gravel should overlay the silt fence at least 12 inches.
2. Stone outlets should be placed on low elevation areas of silt fence and based on field conditions.

MAINTENANCE:
1. Per NCG-01, inspect outlet at lest once a week and after each 1 inch or greater rainfall event. Complete any required repairs immediately. Freshen stone when *sediment accumulation* exceeds 6 inches. Keep mesh free of debris to provide adequate flow.
2. Remove sediment when half of stone outlet is covered.
3. Replace stone as needed to facilitate de-watering.

NORTH CAROLINA Environmental Quality
EFFECTIVE DATE: 11/12/2020

SILT FENCE OUTLET

DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021
DATE:

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SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
PH: 919.859.1865
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EROSION CONTROL DETAILS

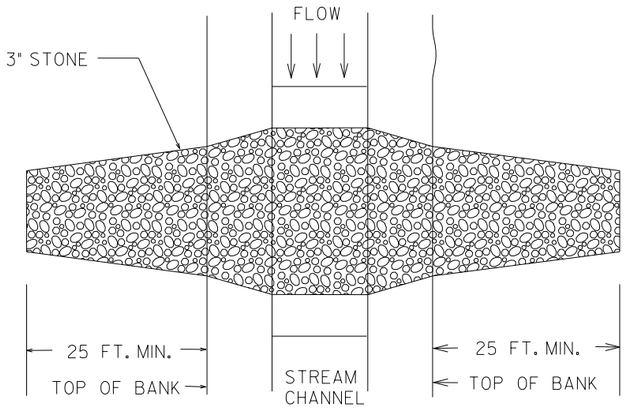
PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO.
E03B

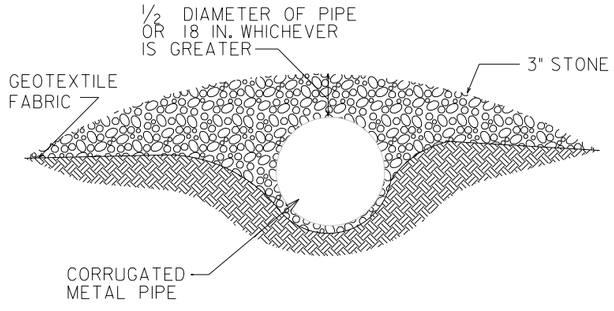
5/24/2021
Nesbit_Rdy_PSH_E03b.dgn
Jarvis

TEMPORARY CULVERTED STREAM CROSSING

NOTE: FOR USE IN EXISTING CHANNELS ONLY.
NOT FOR USE IN RESTORED STREAMS.

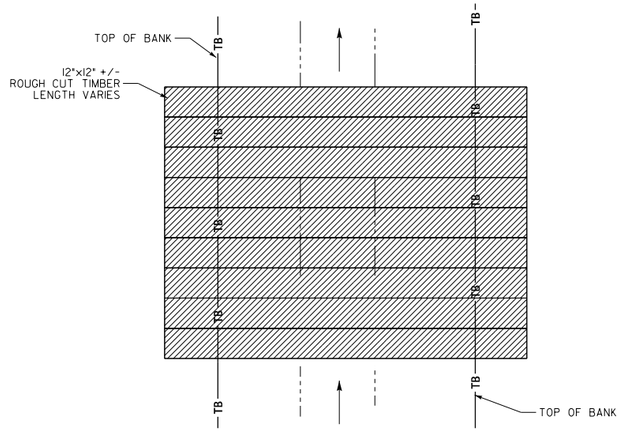


PLAN VIEW



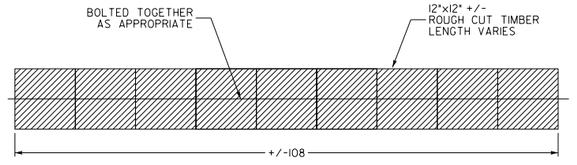
PROFILE VIEW

LOG MAT BRIDGE

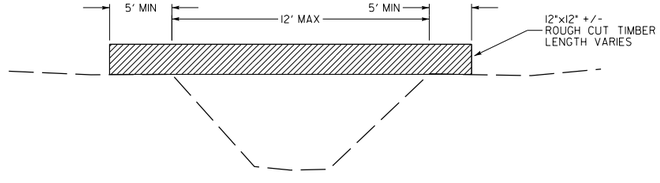


PLAN VIEW

NOTE:
DETAIL PROVIDED FOR INFORMATIONAL PURPOSES. USE OF LOG MAT BRIDGE IS AT CONTRACTORS DISCRETION.



SECTION THROUGH LOG MAT BRIDGE



CROSS SECTION VIEW

DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EROSION CONTROL DETAILS

PROJECT # :

DRAWING NAME:

DATE: 2021

DRAWN BY: JRH

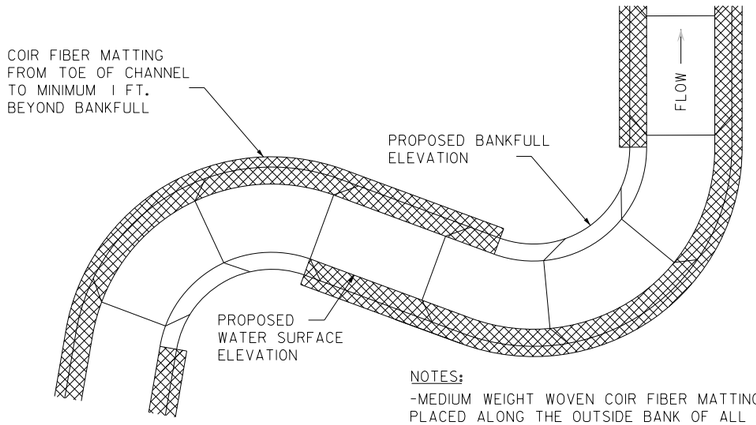
REVIEWED BY: JGD

REVISIONS:

SHEET NO.
E03C

5/24/2021
Nesbit_Rdy_PSH_E03c.dgn
Jarvis

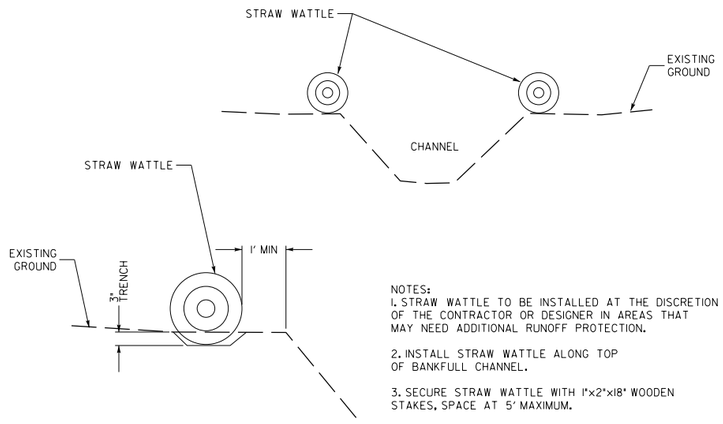
TYPICAL MATTING LOCATION



NOTES:

-MEDIUM WEIGHT WOVEN COIR FIBER MATTING SHALL BE PLACED ALONG THE OUTSIDE BANK OF ALL BENDS AND ALONG BOTH SIDES OFTHE CHANNEL IN TANGENT AREAS.
-FIELD ADJUSTMENTS TO MATTING LOCATION MAY BE MADE AT THE DESIGNERS OR CONTRACTORS DISCRETION AS NECESSARY.

STRAW WATTLE



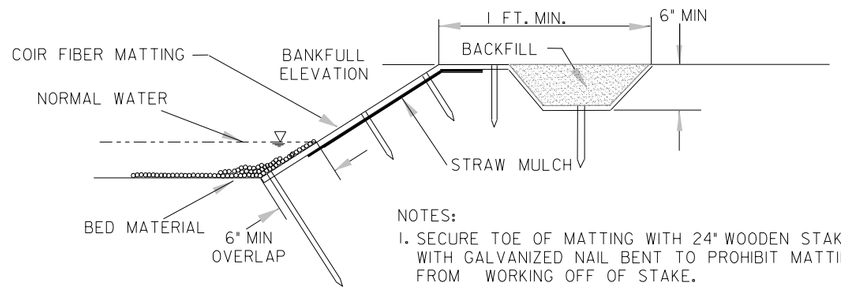
NOTES:
1. STRAW WATTLE TO BE INSTALLED AT THE DISCRETION OF THE CONTRACTOR OR DESIGNER IN AREAS THAT MAY NEED ADDITIONAL RUNOFF PROTECTION.

2. INSTALL STRAW WATTLE ALONG TOP OF BANKFULL CHANNEL.

3. SECURE STRAW WATTLE WITH 1"x2"x18" WOODEN STAKES. SPACE AT 5' MAXIMUM.

4. STRAW SHALL BE CERTIFIED WEED FREE.

COIR MATTING CROSS SECTION



NOTES:
1. SECURE TOE OF MATTING WITH 24" WOODEN STAKES WITH GALVANIZED NAIL BENT TO PROHIBIT MATTING FROM WORKING OFF OF STAKE.

2. USE 12" WOODEN STAKES ON 5' CENTERS OR AS DIRECTED BY MANUFACTURER'S RECOMMENDATIONS.

3. MINIMUM 1' WIDE, 6" DEEP TRENCH OVER TOP OF BANK WITH MATTING LAID FLAT AND STAKED. TRENCH TO BE BACKFILLED WITH EXCAVATED MATERIAL.

DocuSigned by:
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1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

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Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EROSION CONTROL DETAILS

PROJECT # :

DRAWING NAME:

DATE: 2021

DRAWN BY: JRH

REVIEWED BY: JGD

REVISIONS:

SHEET NO.
E03D

5/24/2021
Nesbit_Rdy_PSH_E03d.dgn
harveu

Parkwood School Rd
1146

SCALE: 1" = 400'
200' 100' 0 200' 400'

NAD 83

GLEN BRANCH

HAUL RD

GLEN

HAUL RD

UT 1

UT 1A

HAUL RD

UT 2

HAUL RD

GLEN

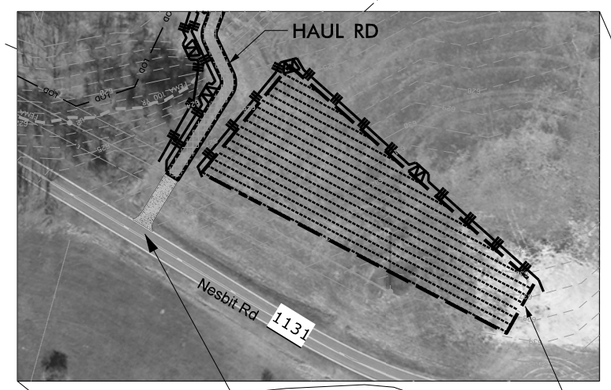
STAGING AREA

GLEN BRANCH

GRAVEL CONSTRUCTION ENTRANCE

Nesbit Rd
1131

Rollingwood Ln



DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA
PROFESSIONAL
SEAL
26971
ENGINEER
JOSHUA G. DALTON

5/24/2021
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Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

HAUL ROADS

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO.
E03E

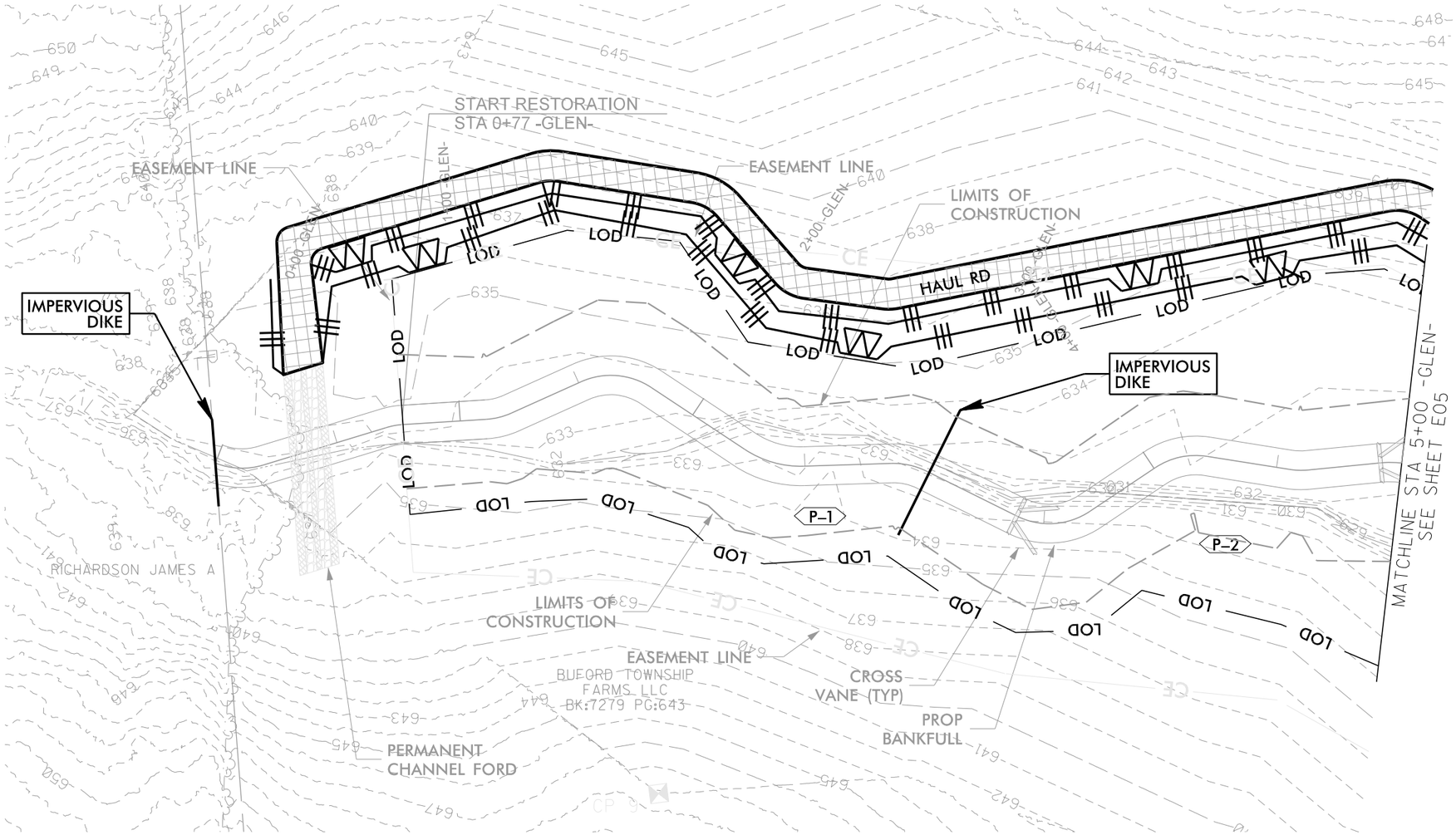
5/24/2021
Nesbit_Rd_PSH_E03e.dgn
harvey

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK

25′ 12.5′ 0 25′ 50′

SCALE: 1″ = 50′

NAD 83



DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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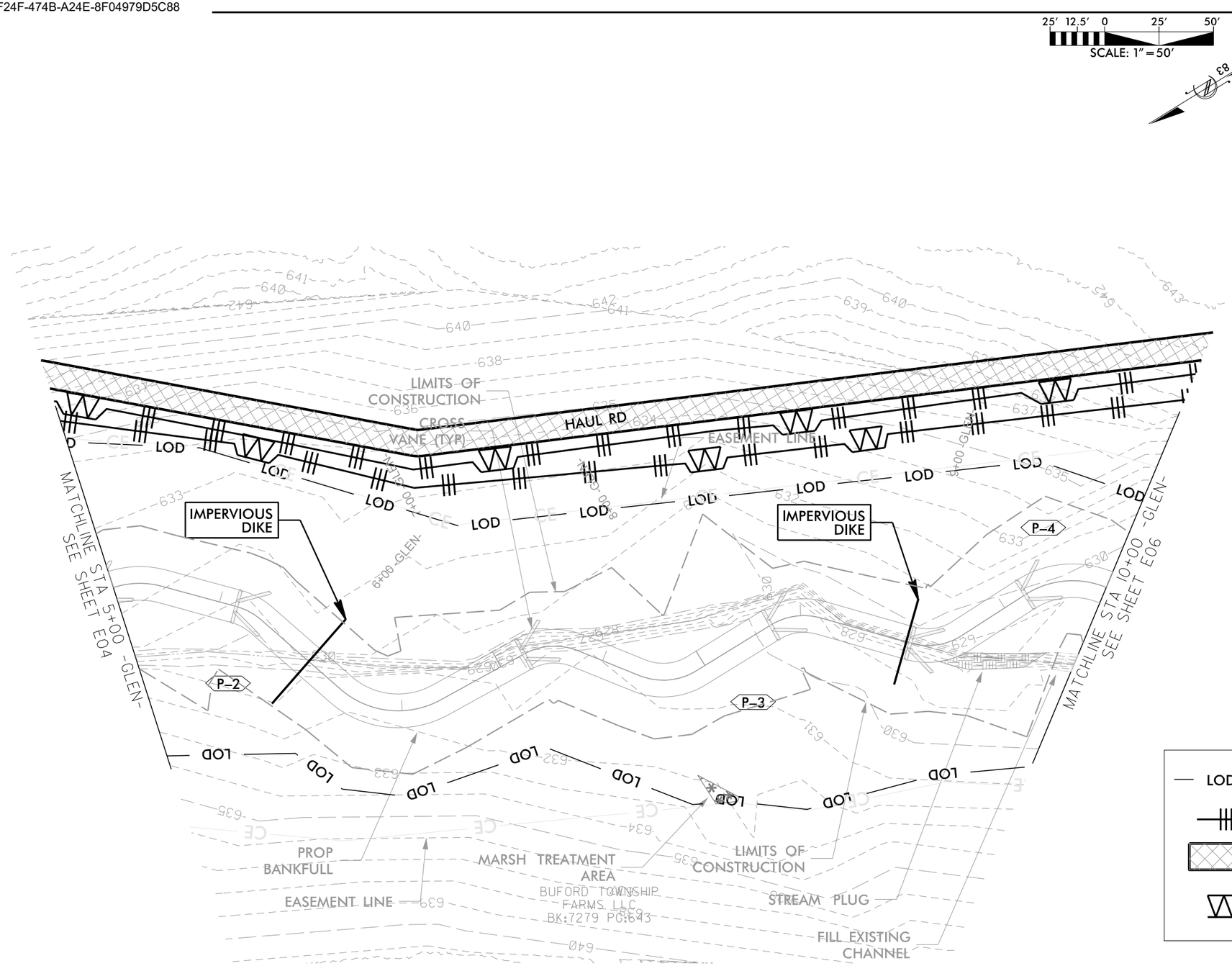
Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EROSION CONTROL

PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E04***

5/24/2021
Nesbit_Rdy_psh_E04.dgn
Darren



DocuSigned by:
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NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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Axiom Environmental, Inc.

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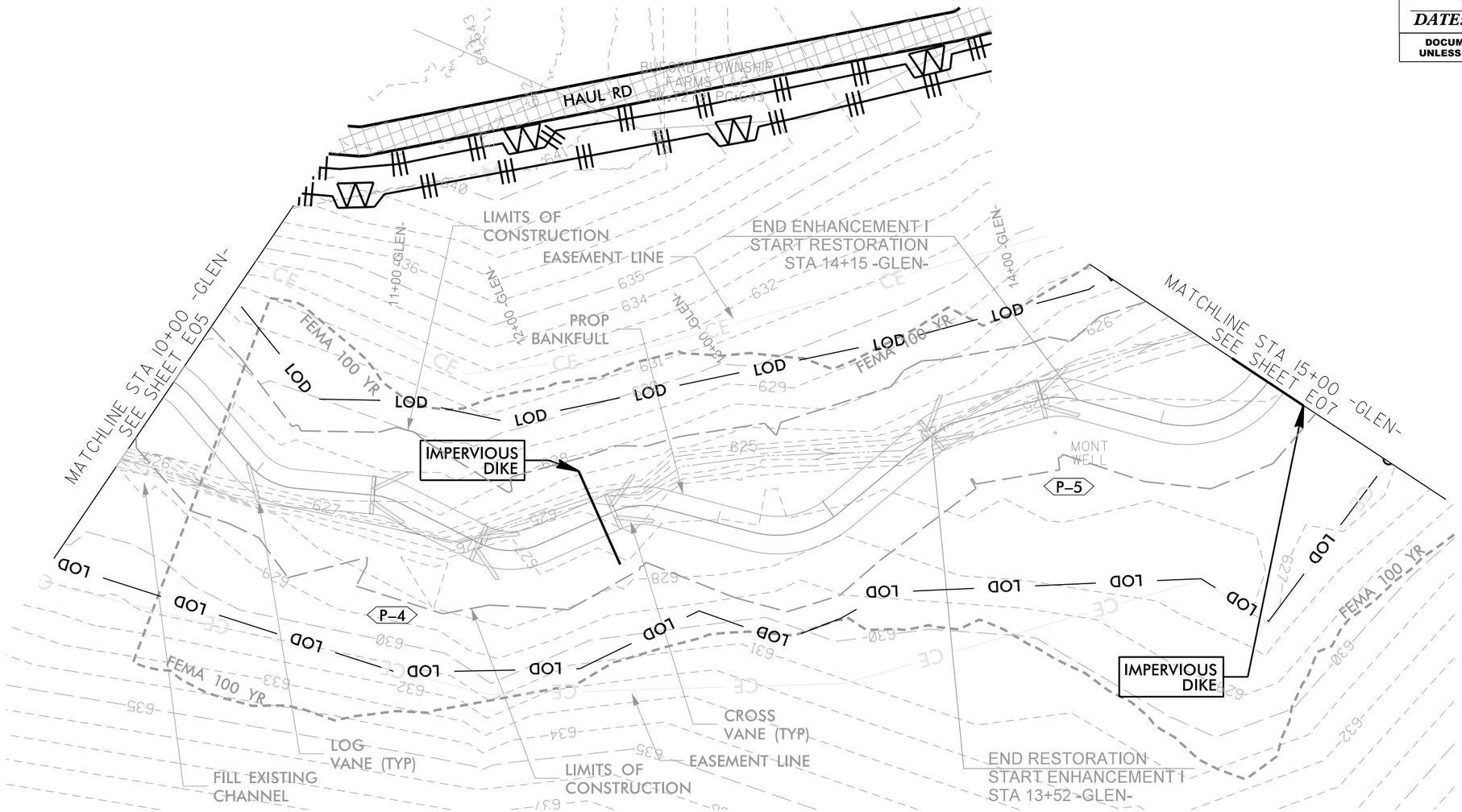
UNION COUNTY, NC

EROSION CONTROL

PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E05***

5/24/2021
Nesbit_Rdy_psh_E05.dgn
Harvey

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

NAD 83

DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021
DATE:

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Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EROSION CONTROL

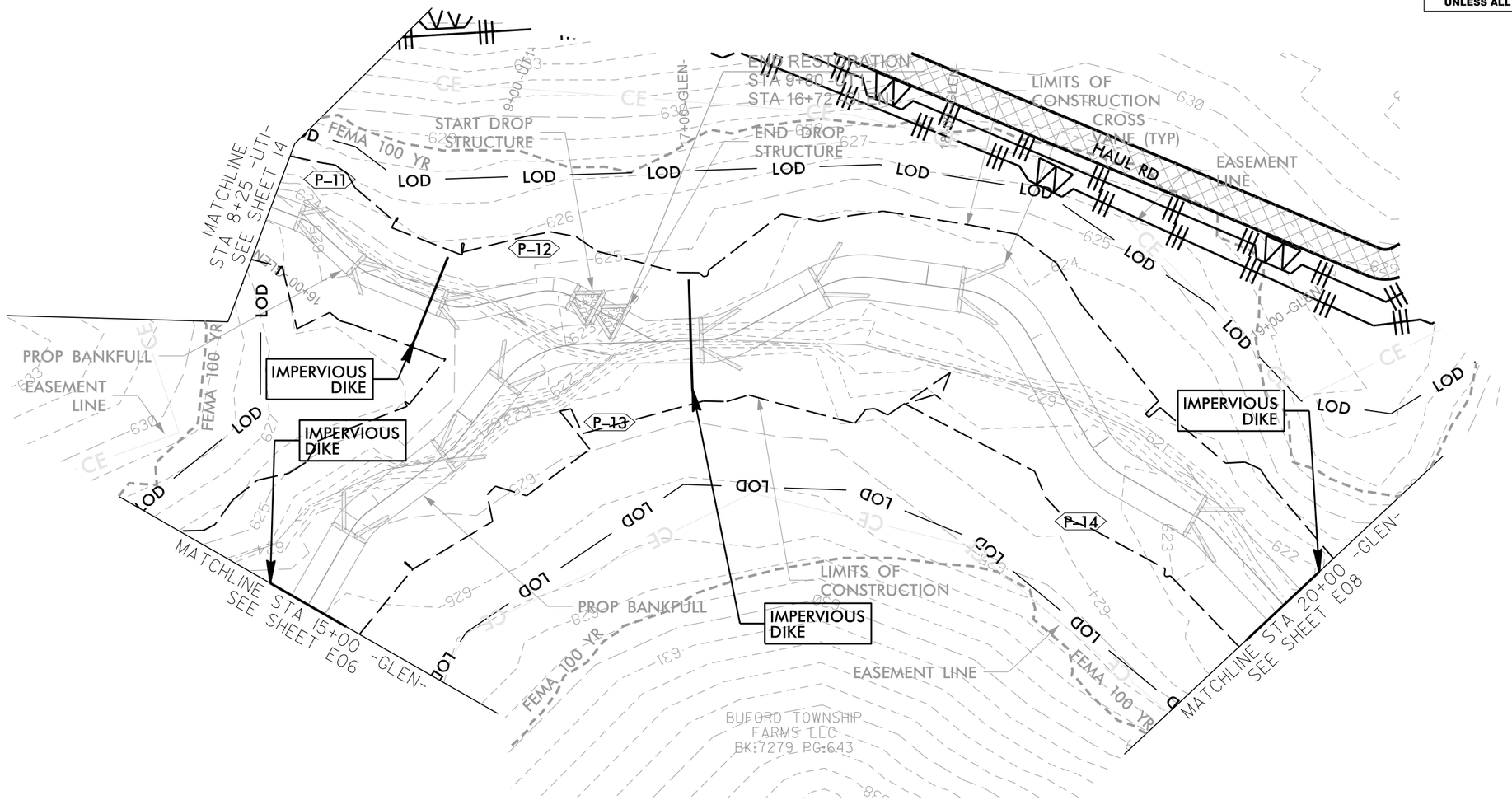
PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E06***

5/24/2021
Nesbit_Rdy_psh_E06.dgn
Darren

25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

NAD 83

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



DocuSigned by:
Joshua G Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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RALEIGH, NORTH CAROLINA 27606
TEL: 919.852.1003
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EROSION CONTROL

PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E07***

5/24/2021
Nesbit_Rdy_psh_E07.dgn
Jarvai

25′ 12.5′ 0 25′ 50′

SCALE: 1″ = 50′

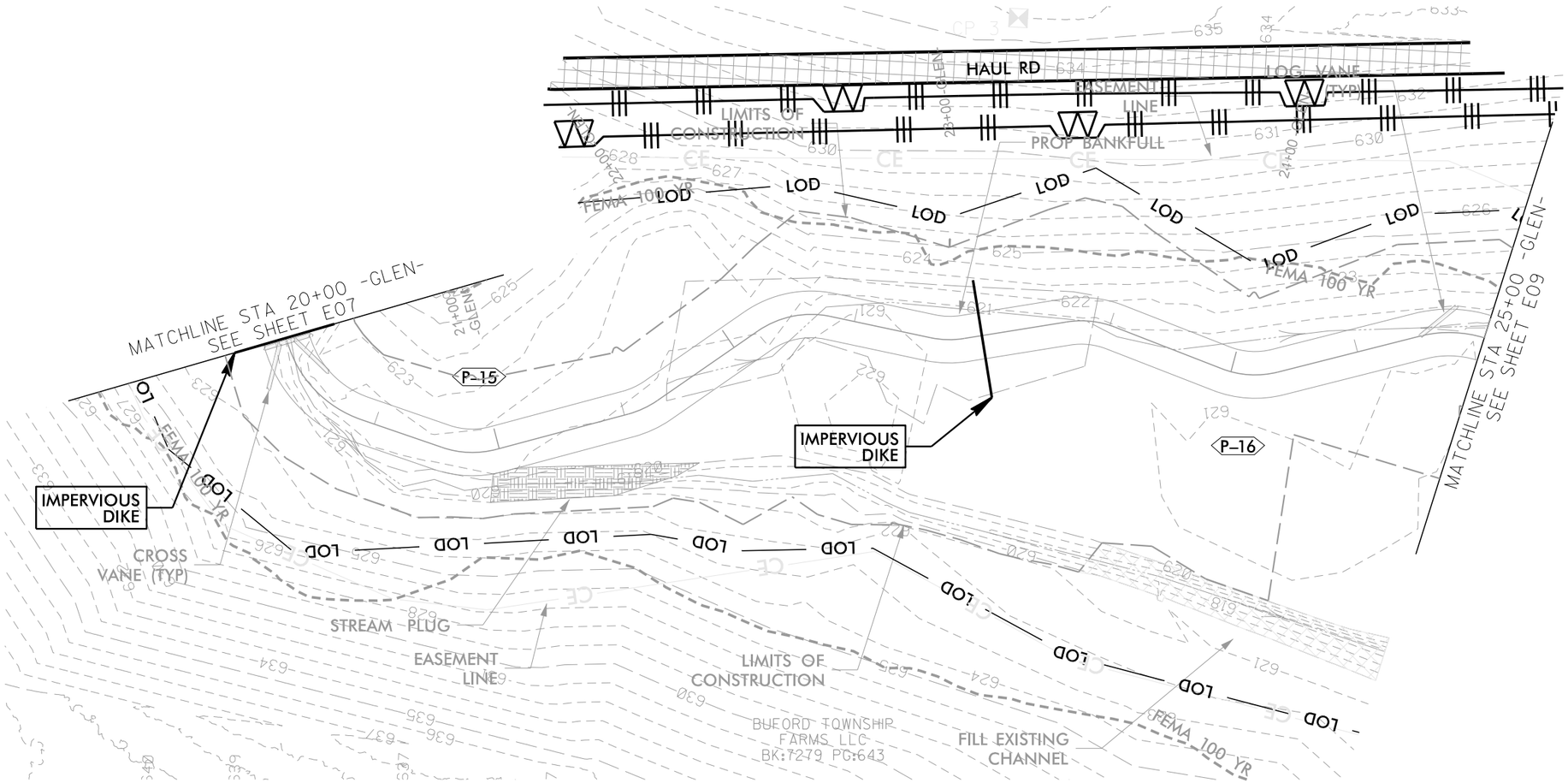
NAD 83

— LOD — LIMITS OF DISTURBANCE

TEMPORARY SILT FENCE

HAUL ROAD

SPECIAL SEDIMENT CONTROL FENCE BREAK



DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

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5/24/2021

DATE:

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TEL: 919.852.1183
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EROSION CONTROL

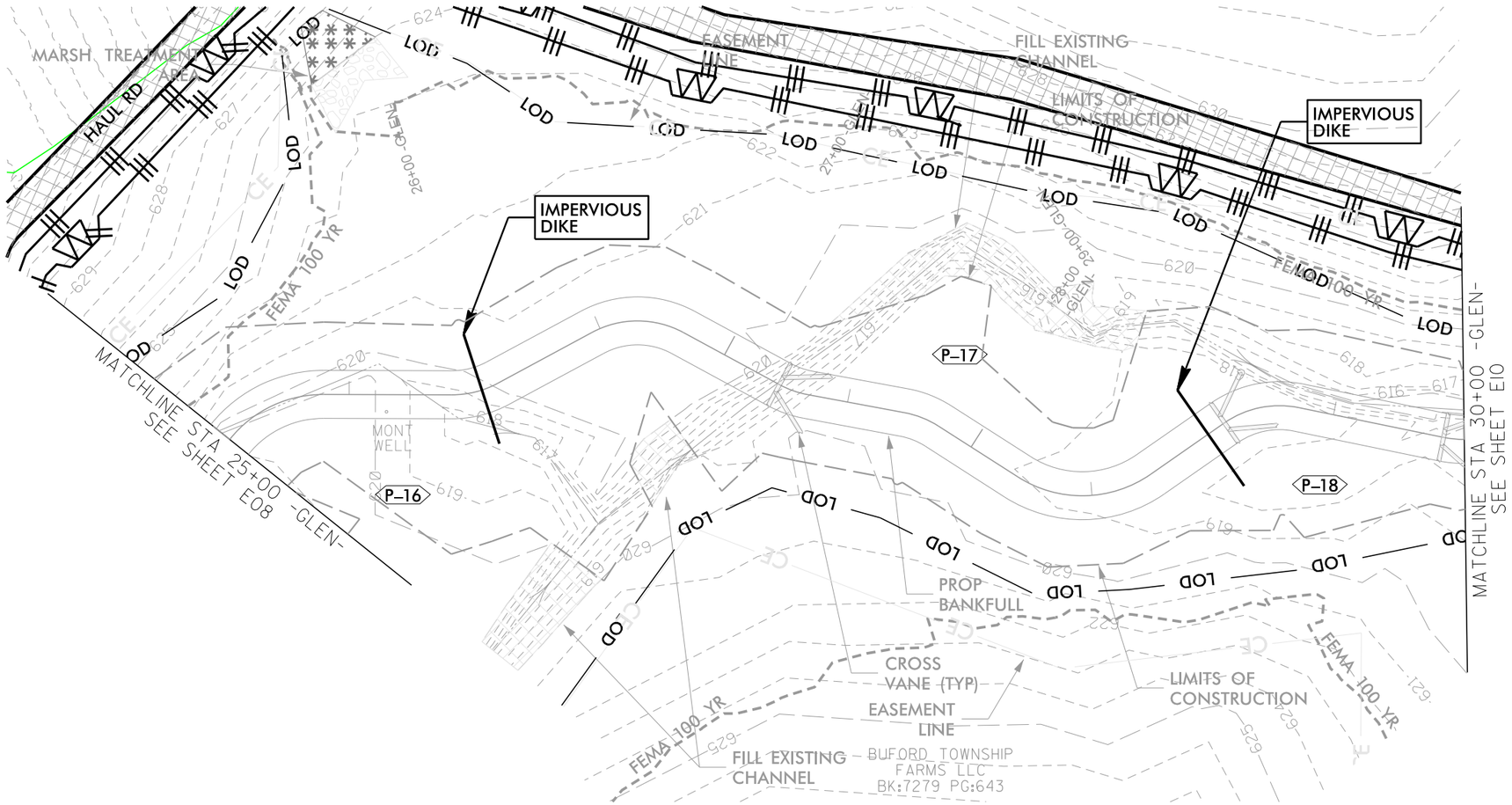
PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E08***

5/24/2021
Nesbit_Rdy_psh_E08.dgn
Harvey

25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

NAD 83

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021
DATE:

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Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EROSION CONTROL

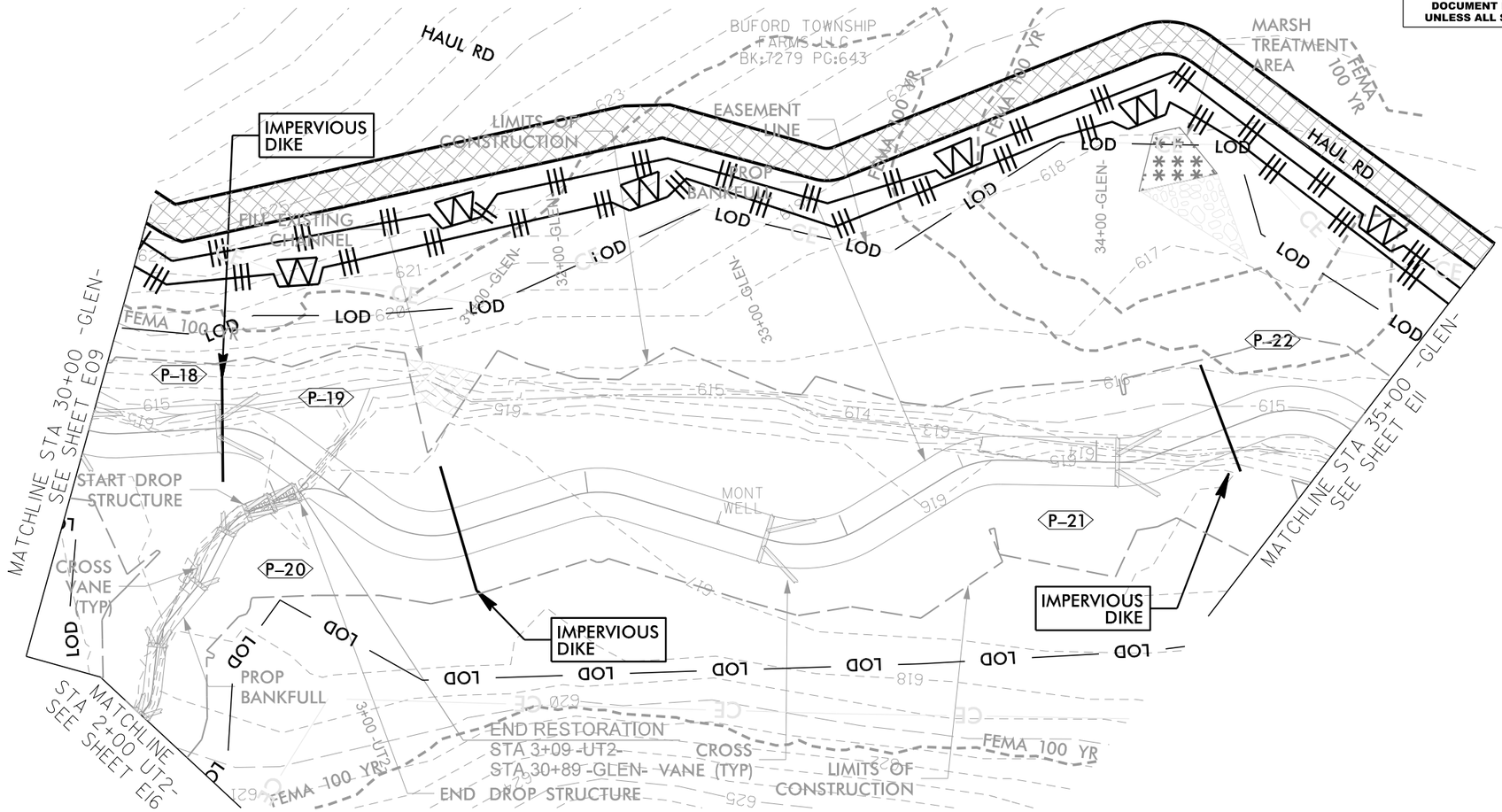
PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E09***

5/24/2021
Nesbit_Rdy_psh_E09.dgn
Jarvis

25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

NAD 83

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EROSION CONTROL

PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E10***

5/24/2021
Nesbit_Rdy_psh_E10.dgn
Jarvis

25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

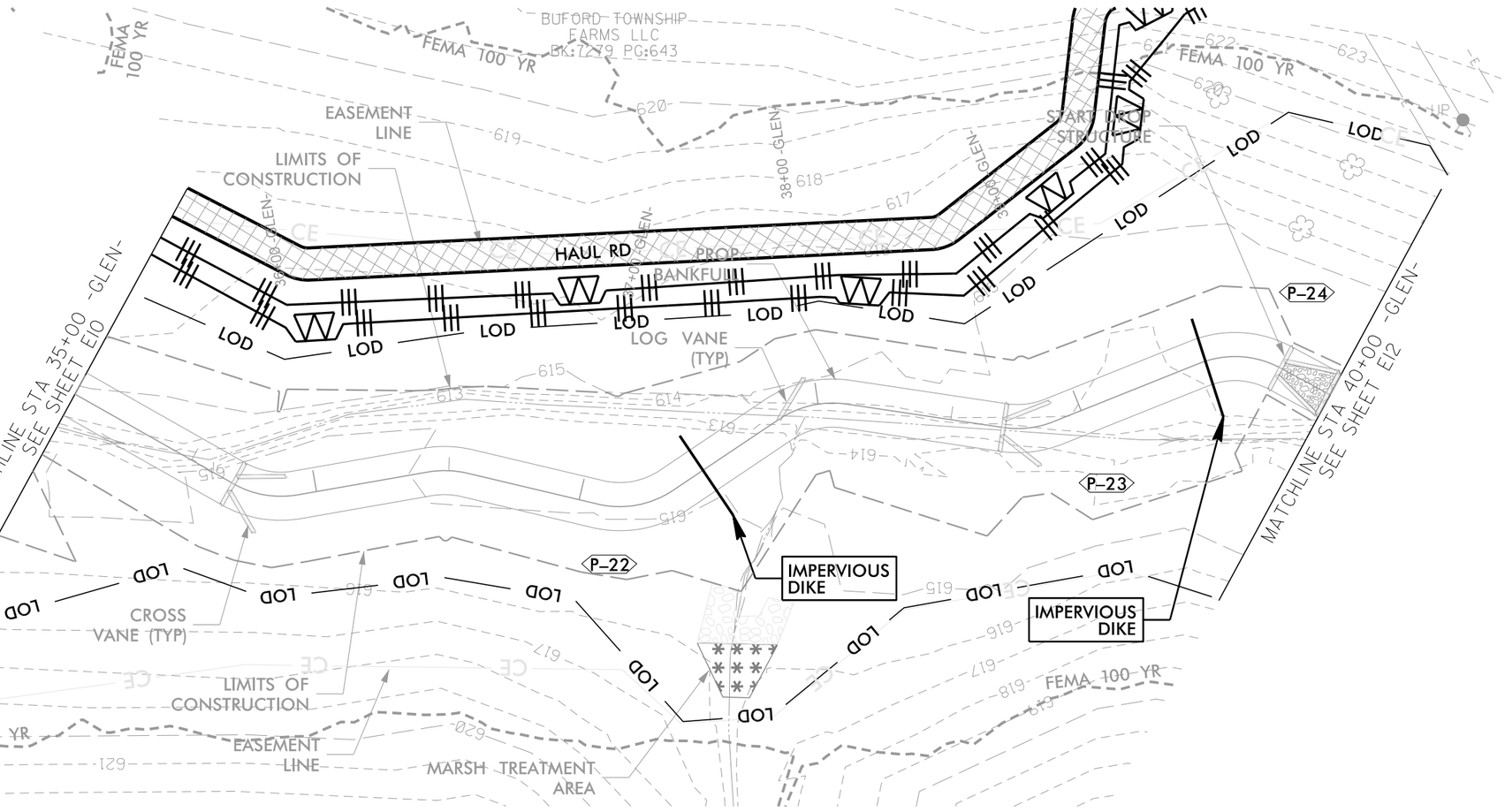
NAD 83

LOD — LIMITS OF DISTURBANCE

TEMPORARY SILT FENCE

HAUL ROAD

SPECIAL SEDIMENT CONTROL FENCE BREAK



DocuSigned by: Joshua G Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

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Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

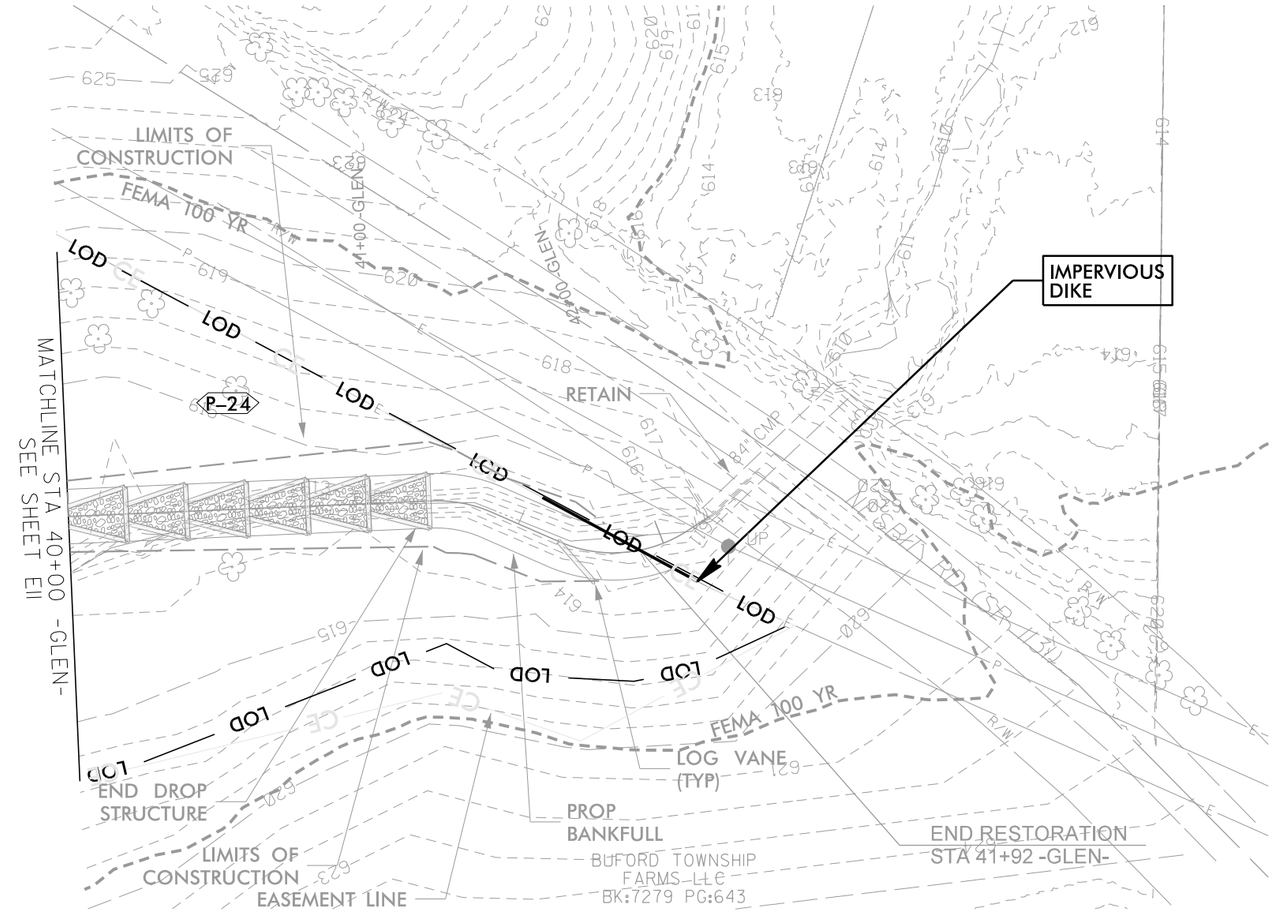
EROSION CONTROL

PROJECT # :
DRAWING NAME:
DATE: 2021
DRAWN BY: JRH
REVIEWED BY: JGD
REVISIONS:

SHEET NO.
E11

5/24/2021
Nesbit_Rdy_psh_E11.dgn
Darren

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

NAD 83

DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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ENG FIRM LICENSE NO. C-3890

Axiom Environmental, Inc.

NESBIT
UNION COUNTY, NC

EROSION CONTROL

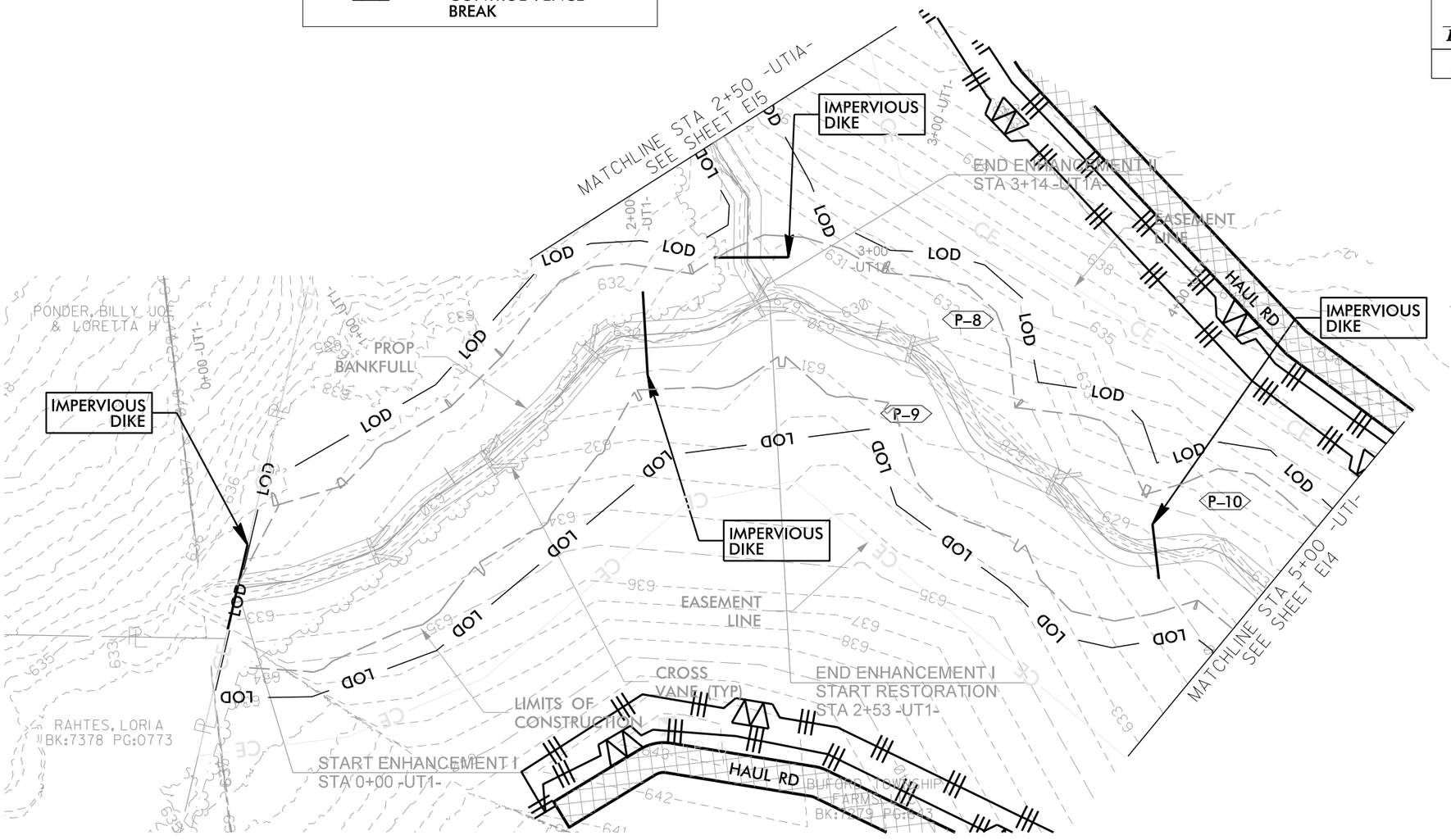
PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E12***

5/24/2021
Nesbit_Rdy_psh_E12.dgn
jarvis

— LOD —	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK

25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

NAD 83



DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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Axiom Environmental, Inc.

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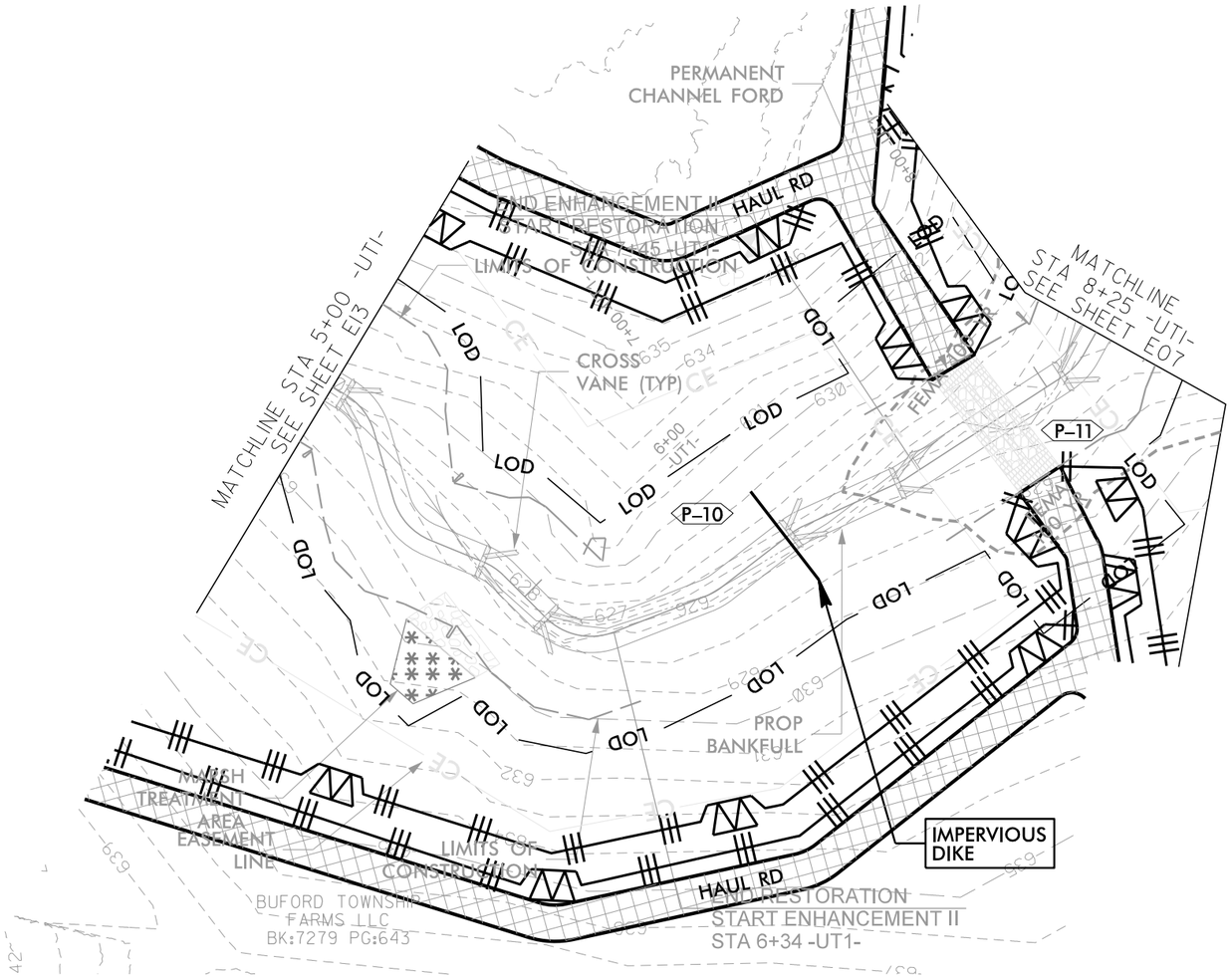
UNION COUNTY, NC

EROSION CONTROL

PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E13***

5/24/2021
Nesbit_Rdy_psh_E13.dgn
Darren

LOD	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′

NAD 83

DocuSigned by:
Joshua G Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021
DATE:

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SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
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TEL: 919.852.1183
ENG FIRM LICENSE NO. C-890

Axiom Environmental, Inc.

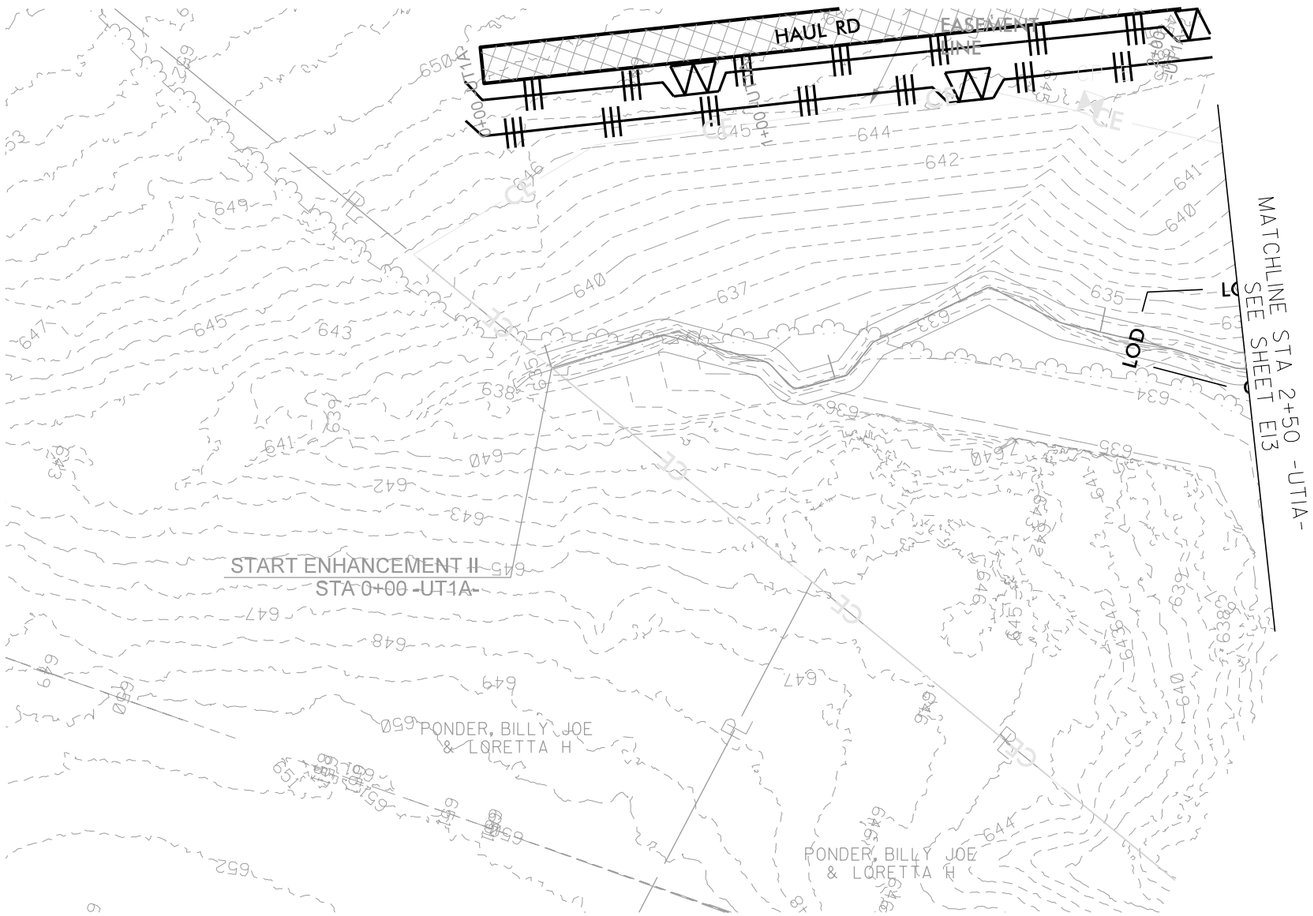
NESBIT
UNION COUNTY, NC

EROSION CONTROL

PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E14***

5/24/2021
Nesbit_Rdy_psh_E14.dgn
Harvell

LOD	LIMITS OF DISTURBANCE
	TEMPORARY SILT FENCE
	HAUL ROAD
	SPECIAL SEDIMENT CONTROL FENCE BREAK



25′ 12.5′ 0 25′ 50′
SCALE: 1″ = 50′
NAD 83

DocuSigned by:
Joshua G. Dalton
1089AD8C14994C3...

NORTH CAROLINA PROFESSIONAL SEAL 26971 ENGINEER JOSHUA G. DALTON

5/24/2021

DATE:

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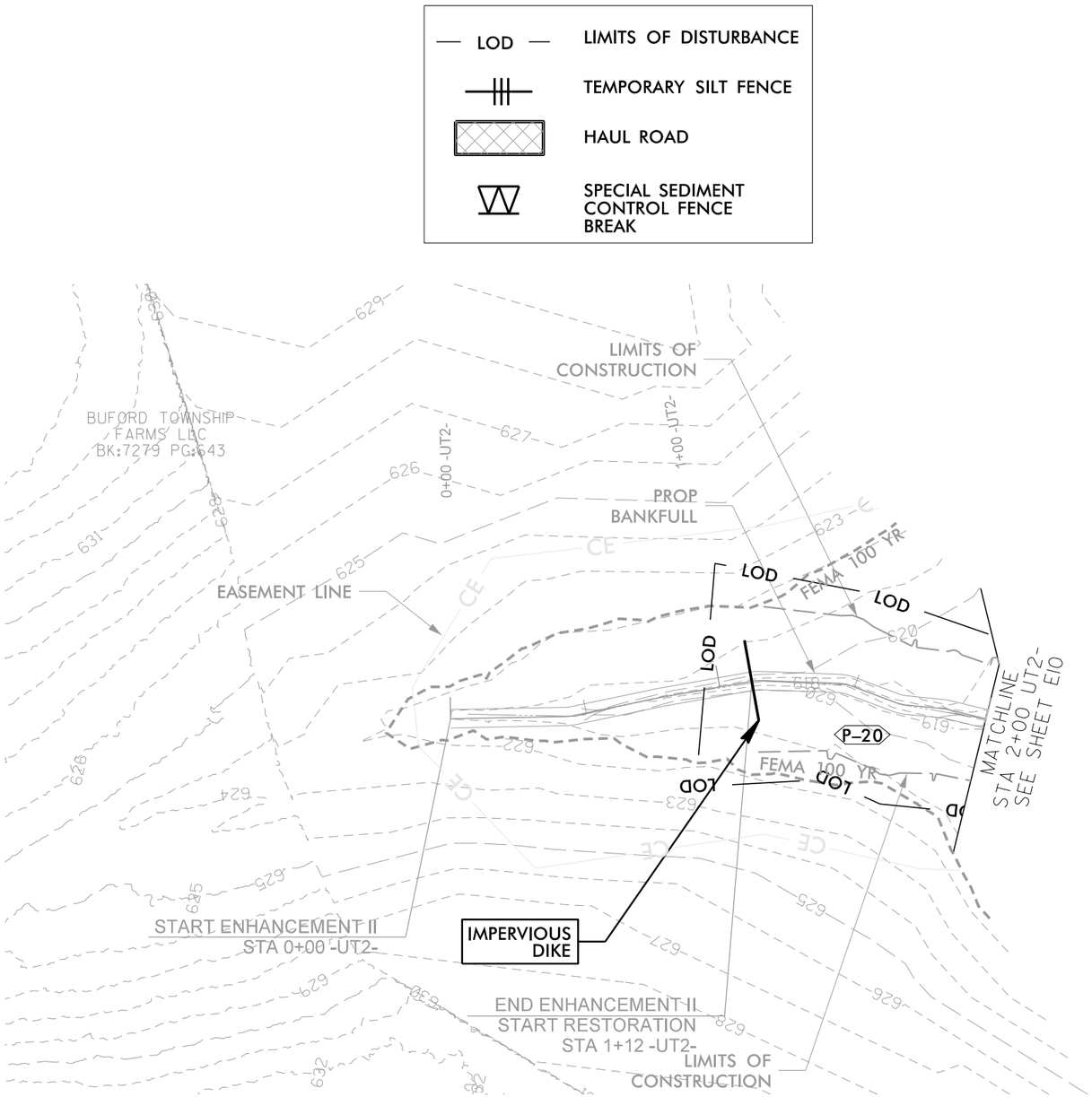
Axiom Environmental, Inc.

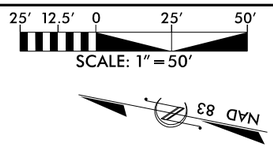
NESBIT
UNION COUNTY, NC

EROSION CONTROL

PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E15***

5/24/2021
Nesbit_Rdy_psh_E15.dgn
Harvey





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Joshua G. Dalton
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DATE:

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UNION COUNTY, NC

EROSION CONTROL

PROJECT # :	
DRAWING NAME:	
DATE:	2021
DRAWN BY:	JRH
REVIEWED BY:	JGD
REVISIONS:	
SHEET NO.	***E16***

5/24/2021
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Marvel

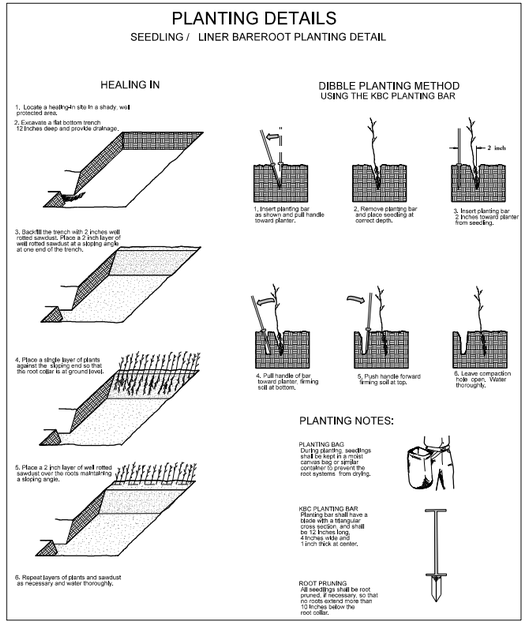
Vegetation Association	Piedmont/Mountain Bottomland Forest*		Dry-Mesic Oak-Hickory Forest*		Stream-side Assemblage**		TOTAL
Area (acres)	**7.2**		**5**		**3.8**		**16**
Species	**# planted***	**% of total**	**# planted***	**% of total**	**# planted****	**% of total**	**# planted**
River birch (*Betula nigra*)	245	5	--	--	1550	15	1795
Bitternut hickory (*Carya cordiformis*)	490	10	--	--	--	--	490
American elm (*Ulmus americana*)	245	5	170	5	--	--	415
Red bud (*Cercis canadensis*)	--	--	510	15	--	--	510
Silky dogwood (*Cornus amomum*)	245	5	--	--	2067	20	2312
Persimmon (*Diospyros virginiana*)	--	--	510	15	--	--	510
Hackberry (*Celtis occidentalis*)	490	10	--	--	517	5	1006
Green ash (*Fraxinus pennsylvanica*)	245	5	--	--	517	5	762
Tulip poplar (*Liriodendron tulipifera*)	245	5	170	5	517	5	932
Sycamore (*Platanus occidentalis*)	245	5	170	5	1550	15	1965
Red mulberry (*Morus rubra*)	--	--	170	5	517	5	687
Water oak (*Quercus nigra*)	734	15	680	20	--	--	1414
White oak (*Quercus alba*))	490	10	680	20	1034	10	2203
Red oak (*Quercus rubra*)	--	--	340	10	--	--	340
Black gum (*Nyssa sylvatica*)	490	10	--	--	1034	10	1523
Willow oak (*Quercus phellos*)	245	5	--	--	1034	10	1278
Shumard oak (*Quercus shumardii*)	490	10	--	--	--	--	490
TOTAL	**4896**	**100**	**3400**	**100**	**10336**	**100**	**18632**

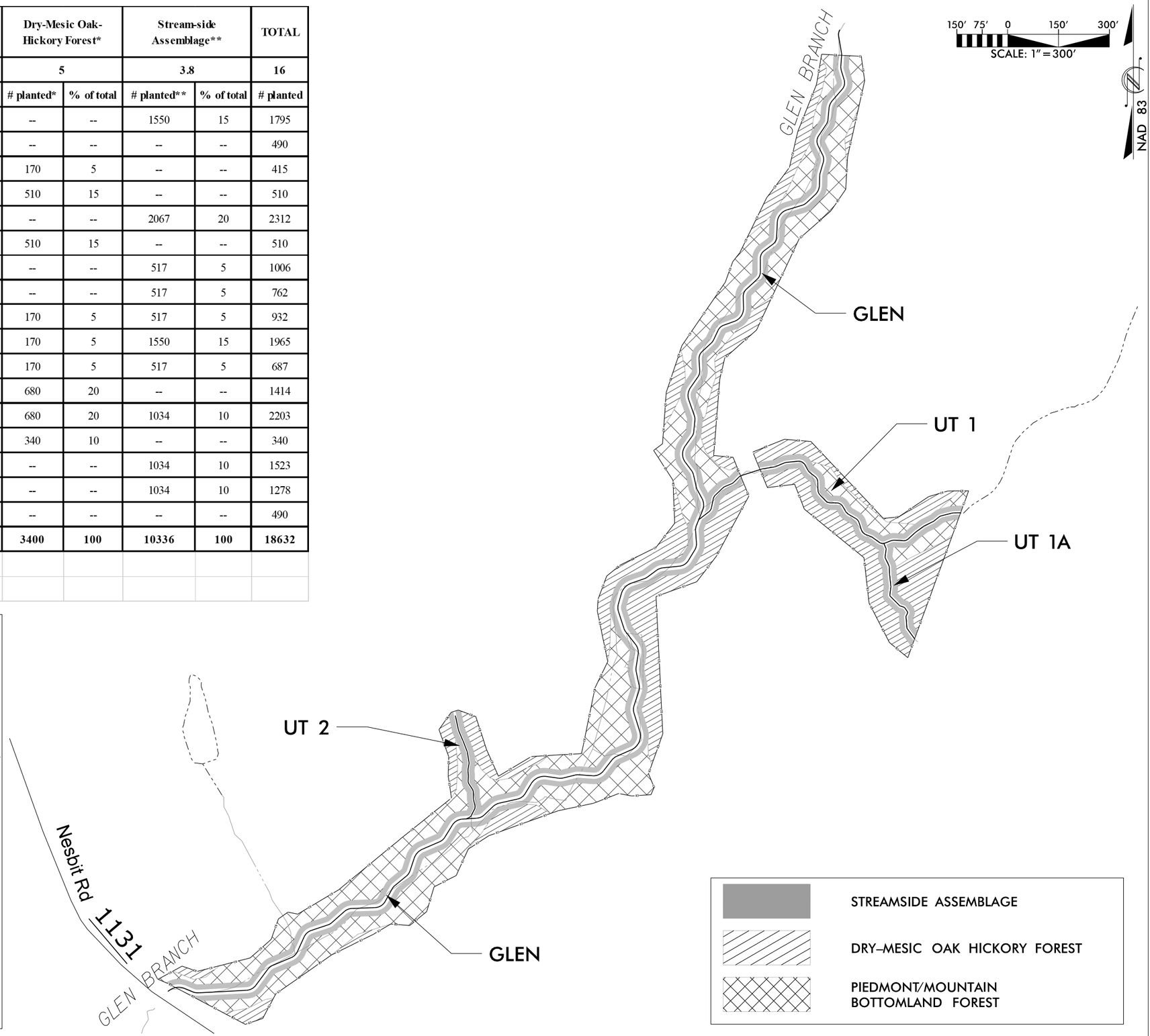
* Planted at a density of 680 stems/acre.

** Planted at a density of 2720 stems/acre.

PLANTING DETAILS

SEEDLING / LINER BAREROOT PLANTING DETAIL





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UNION COUNTY, NC

PLANTING

PROJECT # :

DRAWING NAME:

DATE: 2020

DRAWN BY: JRH

REVIEWED BY: JGD

REVISIONS:

SHEET NO. ***P01***

5/24/2021
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Harvey