FINAL MITIGATION PLAN

Stewarts Creek Tributaries Stream Restoration Project

Surry County, North Carolina

NCDEQ Contract No. 7183
DMS ID No. 100023
USACE Action ID No. SAW-2017-01508
DWR ID No. 20171043
RFP No. 16-006993

Yadkin River Basin
HUC 03040101

Prepared for:

Mitigation Services
ENVIRONMENTAL QUALITY

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

May 2019

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

REPLY TO
ATTENTION OF:

May 17, 2019

Regulatory Division

Re: NCIRT Review and USACE Approval of the Stewarts Creek Tributaries Mitigation Plan; SAW-2017-01508; NCDMS Project # 100023

Mr. Tim Baumgartner
North Carolina Ecosystem Enhancement Program
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 Stewarts Creek Tributaries Mitigation Plan, which closed on April 20, 2019. 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 appropriate USACE field 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,

BROWNING.KIMBERLY.DANIELLE.1527683510

Digitally signed by BROWNING.KIMBERLY.DANIELLE.1527683510
Date: 2019.05.17 11:55:49 -04'00'

Kim Browning
Mitigation Project Manager
for Henry Wicker

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List
Paul Wiesner – NCDMS
Harry Tsomides – NCDMS
Kevin Tweedy

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May 28, 2019

Paul Wiesner
Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services (NCDMS)
Western DMS Field Office
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

Subject: **Mitigation Plan Report and Construction Plans**
Stewarts Creek Tributaries Stream Restoration Project
Yadkin River Basin Cataloging Unit 03040101 – Surry County
DMS Project ID #100023
Contract #7183

Dear Mr. Wiesner,

Ecosystem Planning and Restoration (EPR) has reviewed the comments of the Mitigation Plan and Preliminary Plans for the Stewarts Creek Tributaries Stream Restoration Project (Project) provided by the North Carolina Interagency Review Team (NCIRT) on 5/1/2019. The comments have been addressed as described below to create the Mitigation Plan Report and Construction Plans for the Project.

Comments from the NCIRT are provided on the following pages in italics with our responses immediately following the comment, according to the following format:

Reviewer

1. *NCIRT Comment*
    - EPR Response

Please contact me at the above phone number or address with any questions.
Sincerely,

Kevin Tweedy, PE

Todd Bowers, USEPA

1. *Section 4.0/Table 6/Page 10: Recommend that EPR provide calculations used to derive the reductions in TN, TP and fecal coliform. The DMS reference used to calculate these yield reductions assumes a 50-foot ideal riparian buffer/cattle exclusion and the proposed buffer widths for the project are 30 feet wide throughout much of the project.*
    - Response: EPR has provided the calculations in Appendix 2. Data Analysis. In correspondence with Lin Xu from NCDMS he stated: "The nutrient and fecal reduction estimation based on the DMS method was not based on 50 feet of riparian buffer. It was based on an approval method of 'NC Division of Water Quality – Methodology and Calculation (1998) for determining nutrient reductions associated with Riparian Buffer Establishment'. The buffer efficiency in that method was based on a minimal 30-feet of buffer, and the unit of calculation is acre not a width. "
2. *Section 4.0/Table 6/Page 10: Rather than assuming modest lift without direct measurement, I recommend that water quality samples be considered to directly measure the physiochemical functional uplift.*
    - Response: EPR will not be collecting water quality samples because Level 4 function-based parameters and monitoring activities will not be tied to performance standards nor required to demonstrate success for credit release.
3. *Section 7.1/Page 16/UT1: The statement "The rest of UT1 will be restored using Priority Level 1..." is erroneous as there is a Priority 2 restoration reach prior to confluence with Stewarts Creek.*
    - Response: The text has been updated to reflect the Priority Level II restoration proposed where UT1 ties into Stewarts Creek.
4. *Section 7.3/Page 19/UT3 Reach 1: Recommend adding the word "restored" to the last sentence of the first paragraph to differentiate with the existing reach which does not have a confluence with UT2.*
    - Response: Change incorporated.
5. *Section 7 General: Recommend denoting the crossing widths where appropriate.*
    - Response: All farm crossings are 50-foot. This was added to Section 1.2/Page 2.
6. *Section 7.8: "These structures will be observed during the monitoring period to ensure that they are functioning as designed and providing the necessary stability". Is there a quantifiable method of determining proper function and/or stability or is this just best professional judgement?*
    - Response: The BMPs discussed are used to address potential erosion and head cutting from drainage of agricultural fields. EPR will use professional

judgement during visual assessments to ensure the BMPs are functioning as designed. If the BMPs are not functioning as designed, maintenance will occur.

7. *Table 10A/Page 29: UT1, UT2 and UT3 restoration priority levels should be P1 and P2.*
    - Response: Change incorporated.
8. *Table 12/Page 34: It appears that there is a lack of gauges to monitor hydrologic function in Moores Fork per Section 9.1.*
    - Response: Gauges were placed at the UTs to document that the stream flow will remain perennial after restoration. Moores Fork has a large drainage area (4.4 sq. miles), is currently perennial, and the proposed design is a Priority Level II, so no stream gauges are proposed along this reach to monitor flow because it will remain perennial after restoration.
9. *Table 13/Page 34: Recommend listing the acreage for the vegetation plots as 0.024 acres. This will minimize any confusion that the plots are covering less than 2% of the planted area.*
    - Response: Change incorporated as a table note.
10. *Figures 10A and 10B: The color gradient used for the riparian buffer zones makes interpretation difficult especially as the CE boundary is the same (or very similar) color as the 30-50' zone color. This is creating what appears to me as clipped boundary edges on the outer bends of the buffer. Additionally, I recommend that the stream belt width is used to estimate appropriate buffer widths rather than following the stream sinuosity. I recall this recommended approach coming directly from Mr. Will Harman in many presentations over the years.*
    - Response: The color of the CE boundary has been changed to eliminate confusion. EPR was following the NCDMS guidance for additional stream credits for extra buffer areas using the buffer tool in GIS using concentric buffers off OHWM (bankfull). A copy of the Excel sheet and GIS files will be included in the final mitigation plan submittal.

Mac Haupt, DWR

1. *EPR response letter to DMS comments (DMS letter 2/8/2019)- while there is no wetland credit proposed on this project, it is likely that wetlands will form given some of the soils present on site (Dillard- {Aquic Hapludult}, and Arkaqua- {Fluvaquentic Dystrochrept}-same taxonomically as Chewacla) and the proposed design (highly sinuous, more about that later). DWR believes the references should have been left in the document.*
    - Response: The language was removed at DMS's request because no wetland mitigation credits are being claimed.
2. *Figure 8A/Table 10A, pg. 29: DWR believes it is unfortunate that the upper reach of UT3 R1 was left out because the IRT recommended it would not garner E2 credit. The*

inclusion of the upper reach would have helped protect the lower reach proposed for restoration.

- Response: The upper reach of UT3 is still included in the conservation easement to protect the existing buffer but is not proposed for stream mitigation credits.

3. *Figure 2A shows that the upper reach of UT3 is still present. Is the reach above the Priority 2 portion of UT3 still in the easement? EPR's comment letter to DMS states it has been removed.*

    - Response: See above. The upper section of UT3 was removed as an asset; however, it is not excluded from the easement. Figure 2A therefore shows the existing location of UT3.

4. *Section 8.1 includes the 30-day flow metric for streams, however, all of these streams were perennial as per your DWR scoresheets. If the streams on site are perennial, then the 30-day flow metric does not apply. For perennial streams, DWR expects flow to be nearly continuous and show prominent channel features including fluvial biological characteristics.*

    - Response: Change incorporated.

5. *Figure 10B - DWR is concerned with the lack of buffer width on the meander bends for R2 of Moores Fork. Particularly those bends facing the field/pasture side.*

    - Response: The buffer width is at least 30 feet wide in all locations of Stewarts Creek Tributaries.

6. *DWR's primary concern for this project is whether streams were ever present for the proposed locations of UT1, UT2 and UT3, and whether the proposed design will maintain flow, particularly for UT2, and the upper reaches of UT3 and UT1 once the stream is relocated out into the field.*

    a. *On page 18, 2nd paragraph, the plan states, "To ensure ample floodplain connectivity and promote a headwater stream complex, the channel hydraulics erred conservatively to design a channel that will see frequent overbank flooding." While DWR does support the notion of ample floodplain connectivity, in the upper reaches of the UTs perhaps a headwater method is more conducive rather than the very sinuous single thread channel that is proposed. DWR believes a very sinuous single thread channel with perhaps a limited flow (smaller drainage area and/or a dam above the tributary) will cause either loss of flow or stagnant flow and wetland formation.*

        - Response: EPR has provided significant data to support the existence of these streams prior to agricultural conversion. Further, our design analyses indicate the designs proposed will be effective and functional. Though these are headwater streams, EPR is not designing with a headwater approach.

b. *Does EPR have any concerns that once the UTs are brought up, several feet in some cases, and into the field that a loss of flow is likely to occur?*

   - Response: Our expectation is that the water table will rebound and loss of flow will not occur. We have used this approach effectively on other projects in this area.

c. *Given the valley slope, wouldn't a somewhat less sinuous channel (1.2) provide the hydraulics that would help maintain channel characteristics?*

   - Response: EPR believes that, based on past project experience and reference analysis from the same geographic vicinity as Stewarts Creek Tributaries, these designs are appropriate.

d. *DWR believes the proposed sinuosity for UT3 reach 2 is too high (1.4).*

   - Response: EPR believes that, based on past project experience and reference analysis from the same geographic vicinity as Stewarts Creek Tributaries, these designs are appropriate.

e. *DWR will require that the stream gauges be relocated to the following locations: (i) Upper UT3 R1- station 17+00; (ii) Upper UT2- station 17+00; (iii) Upper UT1- station 19+00; (iv) Lower UT3 R2- station 33+50; and (v) Lower UT1- station 33+25.*

   - Response: The stream gauges and monitoring cross sections have been relocated to the closest max depth of the pools to the stations mentioned above.

7. *Design sheets- the end of UT1 shows a tie in to Stewarts Creek with several constructed riffles and drop structures, however; UT3 does not show any tie in structures. Is EPR confident that the design provides protection for the UT3 channel given the backflow conditions that will likely occur due to the larger stream of Stewarts Creek?*

   - Response: A constructed riffle was added to the end of UT3 for grade control.

8. *Design sheets 26 and 27- DWR is concerned about stability issues of the channel going into and out of the road culvert as well as the channel connection to the major stream. Is EPR confident that the current design sufficiently addresses these areas?*

   - Response: There is a bridge at Race Track Road. We are not concerned with stability issues because we have modeled the proposed conditions with the bridge for our CLOMR submittal.

Kim Browning, USACE

1. *Section 7.9, Vegetation Planting Plan: A list of species to be planted on site should be provided. I would also recommend adding this to the Vegetation Plan Sheet 28.*

   - Response: The list of species is found in the plan set; therefore, it does not need to be duplicated in the narrative. Due to space constraints, the species list

is found on its own sheet (Sheet 3B) and not on the individual vegetation plan sheets.

2. *UT3: it appears that the upper portion of Reach 1 was not proposed for preservation. The IRT comments during the field visit suggested that this reach should be preserved, possibly at 10:1 ratio, so that if problems arose during monitoring you would have access to the channel to fix issues, and capture as much of the upstream portion as possible in the easement.*

    - Response: The upper portion of UT3 R1 is protected by the easement to protect the existing buffer but is not proposed for stream mitigation credits.

3. *BMPs are discussed in section 7.8. Please provide a brief narrative of any maintenance required for the BMPs, if any, since they are located within the easement. Please depict these on figures 9A and 9B since they will be monitored.*

    - Response: The BMPs discussed are used to address potential erosion and head cutting from drainage of agricultural fields. EPR will use professional judgement during visual assessments to ensure the BMPs are functioning as designed. If the BMPs are not functioning as designed, maintenance will occur.

4. *If cattle are going to be present on site and have use of the crossings, maintenance of these crossings should be addressed. Perhaps adding this to the Monitoring section and the long-term management section would be beneficial. Placing photo points at crossings is suggested. It would also be beneficial to show that the crossings do not receive credit on the Asset Maps.*

    - Response: None of the proposed crossings will be used by cattle. Figures 8A and 8B have been revised as suggested to better reflect the asset table.

5. *Functional Uplift Potential is described by the Stream Functions Pyramid SQT tool, which is good information, but it would be beneficial to have this information tied in relation to the NCSAM forms, since it is the approved stream assessment method for the Wilmington District, to show the current functional assessment and room for functional uplift, or at the very least correlate the results of the USACE Stream Quality Assessment Worksheets found in Appendix 8.*

    - Response: From the June 2017 DMS mitigation template, “DMS recognizes the functional pyramid (Harman et al 2012) and functional objectives described by Fischenich (2006) as effective organizational tools for conducting analysis of stream and wetland systems”. Since the NCSAM forms are not required by DMS and since they recognize the functional pyramid for functional assessment, EPR is not including NCSAM forms.

6. *Section 9: It would be beneficial to have fixed photo points to assist with monitoring. Please include the location of these points on the Monitoring Components Map. This should also be added to Table 12.*

    - Response: Photos will be taken at all monitored cross sections, all vegetation plots, and all monitoring gauges and stream stations as indicated in NCDMS’s

guidance *Annual Monitoring and Closeout Reporting Format, Data Requirements, and Content Guidance*, dated February 2014. A sentence was added to Section 9.3 to clarify this. If proposed stream station photos are not acceptable, NCDMS will indicate it after reviewing the "As-built Monitoring Report".

7. *There is concern whether UT2 and UT3 will maintain flow, particularly if the channels are raised. On page 18, a headwater stream complex approach is discussed; if this is the case, this area should be assessed at valley-length for crediting, and not as a sinuous channel design. Please verify the planned approach and crediting. Additionally, if a headwater stream is the approach, appropriate success criteria should be listed in section 8.*

    - Response: EPR has provided significant data to support the existence of these streams prior to agricultural conversion. Further, our design analyses indicate the designs proposed will be effective and functional. Though these are headwater streams, EPR is not designing with a headwater approach. Our expectation is that the water table will rebound and loss of flow will not occur. We have used this approach effectively on other projects in this area.

8. *For monitoring purposes, and to help document flow, it is recommended that fixed photo points be added and that these areas be depicted on the monitoring maps.*

    - Response: Photos will be taken at all monitored cross sections, all vegetation plots, and all monitoring gauges and stream stations as indicated in NCDMS's guidance *Annual Monitoring and Closeout Reporting Format, Data Requirements, and Content Guidance*, dated February 2014. A sentence was added to Section 9.3 to clarify this. If proposed stream station photos are not acceptable, NCDMS will indicate it after reviewing the "As-built Monitoring Report".

9. *It is recommended to add a statement regarding the functional uplift of the restoration priority 2 sections since several of these sections are already in relatively good condition with a decent buffer, and this will not garner the full benefit of returning floodplain access.*

    - Response: This is discussed in Section 7.0 Design Approach and Mitigation Work Plan for each of the reaches.

10. *Table 10A: please add a column to show where/how many additional buffer credits are being calculated.*

    - Response: The column is named in Table 10A as "New Change in Credit from Buffers."

11. *Section 8.2: Volunteer stems may be counted towards success criteria, provided they have been present and documented for at least two growing seasons.*

    - Response: Change has been incorporated.

FINAL MITIGATION PLAN

Stewarts Creek Tributaries Stream Restoration Project

Surry County, North Carolina
NCDEQ Contract No. 7183
DMS ID No. 100023
DWR ID No. 20171043
USACE Action ID No. SAW-2018-1440

Yadkin River Basin
HUC 03040101

Prepared for:

NC Department of Environmental Quality
Division of Mitigation Services
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EXECUTIVE SUMMARY

The Stewarts Creek Tributaries Stream Restoration Project (Project; Site) is located in the Upper Yadkin watershed of the Yadkin River Basin, in NCDENR subbasin 03-07-03 and NCDMS targeted local watershed 03040101100010. The Project is located in Surry County, approximately five miles west of Mount Airy, north of NC 89, and along Race Track Road. It involves the restoration of several tributaries to Stewarts Creek, all of which have been channelized and impacted by past agricultural activities, and the restoration of their associated riparian buffers. Stewarts Creek is listed by the NCDWR as a class "WS-IV" water and is approximately three miles upstream of the Mount Airy water intake. Proposed improvements to the streams and their permanent protection will ensure the protection of these systems and improve the overall hydrologic regime and water quality of Stewarts Creek, and the waters to which it contributes (Ararat and Yadkin Rivers).

The project area is impacted by farming practices, past stream channelization, direct cattle access, agricultural runoff, and upstream suburban runoff. The Site has been in some type of agricultural production for at least the past 80 years. Restoration practices will involve raising the streambeds of the smaller tributaries and restoring them back to their historic locations along the fall of the valley, thereby restoring historic flow dynamics and a healthy headwater stream complex. Larger stream reaches will be both enhanced and restored depending on the level of impairment and site constraints. These approaches will re-establish naturally functioning stream systems to the Site.

The Project involves the restoration or enhancement of four tributaries to Stewarts Creek, Moores Fork and three unnamed tributaries (UTs; UT1, UT2, and UT3). As a result of the proposed mitigation activities, this Project will provide an estimated 10,649 SMUs within a 30-acre conservation easement.

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 North Carolina Division of Mitigation Services (NCDMS) operations and procedures for the delivery of compensatory mitigation.

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1.0 PROJECT INTRODUCTION

Ecosystem Planning and Restoration, PLLC (EPR) is contracted with the NC Division of Mitigation Services (DMS) to provide SMUs in the Yadkin-Pee Dee River Basin (Cataloging Unit 03040101). The Stewarts Creek Tributaries Stream Restoration Project (Project; Site) is located in Surry County, approximately five miles west of Mount Airy, north of NC 89, and along Race Track Road (Figure 1). The project is located within DMS targeted local watershed 03040101100010 (Figure 3), NC Division of Water Resources (NCDWR) subbasin 03-07-03, and the Northern Inner Piedmont EPA Level IV ecoregion.

The Project includes four tributaries to Stewarts Creek: Moores Fork and three UTs (Figures 2A and 2B). Site mitigation activities will provide an estimated 10,649 SMUs within a 30-acre conservation easement and include the following:

- Restoration of 9,498 linear feet of stream channels (excluding easement breaks) that have been straightened and channelized for agricultural purposes; and
- Enhancement of 1,573 linear feet of stream channels (excluding easement breaks) that have been straightened and channelized for agricultural purposes

Table 1. General Project Information.

Project Information	
Project Name	Stewarts Creek Tributaries Mitigation Site
County	Surry
Easement Area (acres)	29.976
Project Coordinates (latitude and longitude)	36° 30' 44.04" N, 80° 41' 38.47" W
Planted Acreage (acres of woody stems planted)	30 acres

1.1 Site Directions

From Raleigh: Take I-40 West to Exit 206 for I-40 Bus/US 421 N. Take Exit 6B to continue on to US-52 N. Take the I-74 West exit and take Exit 6 for NC-89 towards Mt Airy. Turn right onto NC-89 E then turn left onto Race Track Road and Moores Fork will be on your left. Continue up Race Track Road to reach UTs 1, 2, and 3.

1.2 Property Ownership and Boundary

The property is held by Charlie, Gail, Howard, Brent, Howard W., and Cathy Hull. A perpetual conservation easement is currently being prepared and recorded that incorporates the results of this Mitigation Plan (copy of final conservation easement plat provided in Appendix 3; boundary provided on plan sheets in Appendix 1). Since livestock are present on portions of the Site and anticipated for these portions in the future, fencing is proposed for the conservation easement boundary in existing pasture areas. Fencing will be located slightly outside of the recorded and monumented easement boundary, to prevent encroachment. Fencing will follow NRCS standard

practices and will consist of multi-strand barbed wire to match the current fencing that is being used by the landowner. The easement boundary will be monumented with witness posts as required by NCDMS guidelines, with required signage installed on fence posts.

Three 50-foot farm crossings on the UTs are required to allow access on either side of the Site streams:

1) *UT1 upstream of agricultural field* – an existing stream crossing will be replaced with a culverted stream crossing sized appropriately for the watershed, and stabilization practices will be applied to ensure stable crossings while providing the required site access.
2) *UT3 Reach 1 upstream of agricultural field* – an existing stream crossing will be replaced with a culverted stream crossing sized appropriately for the watershed, and stabilization practices will be applied to ensure stable crossings while providing the required site access.
3) *UT3 Reach 2 downstream of the confluence with UT2* – a culverted stream crossing will be constructed in this location, sized appropriately for the watershed, and stabilization practices will be applied to ensure stable crossings while providing the required site access.

1.3 Utilities

There is a powerline easement along Moores Fork near Race Track Road that has been excluded from the conservation easement boundary. There are also two existing and one proposed crossing that are excluded from the conservation easement on the UTs. These crossings will allow farm equipment to access fields and pastures on either side of the Site streams. The crossings will be sized based on the watershed size and stabilization practices will be applied to ensure stable crossings while providing the required site access.

1.4 Site Access

To access Moores Fork, there is a gate to the pasture off Race Track Road (Figure 2B), where additional gates in the pasture can be accessed. Access to the UTs is from an unnamed dirt road off Sparger Road. There is a gate at the bottom of the hill to park at and cross the fence (Figure 2A).

2.0 WATERSHED APPROACH AND SITE SELECTION

The Stewarts Creek Tributaries Project will provide numerous water quality and ecological benefits within the Stewarts Creek and Ararat River watersheds. Major goals for the Upper Yadkin Pee-Dee River basin, as described in the Upper Yadkin Pee-Dee River Basin Restoration Priorities (RBRP; NCEEP, 2009), include: 1) restoration of water quality and aquatic habitat in impaired stream segments, 2) protection of high-resource value waters, including WSW designated waters, 3) continuation of existing watershed restoration and protection initiatives, 4) improved management of stormwater runoff in urban and suburban areas contributing to downstream degradation of stream habitat and impairment of water quality, 5) collaborative efforts to implement new stream and riparian buffer restoration and enhancement project and 6) implementation of agricultural BMPs within high-priority rural sub-watersheds, especially with respect to limiting inputs of sediment, nutrients, and fecal coliform to streams from active farming operations. The proposed Project will address each of these goals by:

- Restoring aquatic habitats that are currently degraded by livestock access and bank erosion;
- Excluding livestock from Site streams;
- Converting row crop agriculture to riparian buffer;
- Restoring riparian buffers and a functional floodplain;
- Stabilizing streams that are part of a WS-IV watershed; and
- Adding to on-going water quality initiatives in the watershed.

Water quality impacts from degraded riparian buffers are specific concerns listed for HUC 03040101100010 (Stewarts Creek) in the RBRP. The 42-square mile Stewarts Creek watershed is described as 36% agricultural land use, with 12 permitted animal operations. The proposed restoration work for the Stewarts Creek Tributaries Stream Restoration Site would restore approximately 30 acres of riparian buffers, at least 30 feet in width, along all stream reaches.

The Site is located within the Ararat-Pilot Mountain Local Watershed Plan (LWP) area. The LWP identifies five primary water quality stressors: 1) excess nutrients, 2) fecal coliform bacteria, 3) excess sediment in streams, 4) lack of riparian buffers, and 5) stormwater runoff. Restoration practices proposed at the Site will specifically address all these water quality stressors by excluding livestock from existing streams, restoring and protecting stable stream systems with functioning floodplains and riparian buffers, treatment of agricultural runoff prior to discharging to receiving waters, and filtering stormwater. All restoration activities and areas will be protected with a conservation easement held by the State of North Carolina.

In the Yadkin Pee-Dee Basinwide Water Quality Plan (NCDWQ, 2008), Yadkin River Headwaters, Stewarts Creek is considered impacted by degraded riparian buffers. The Upper Yadkin Basin Local Watershed Plan, Technical Memorandum, Task 2, EEP-08050 (NCEEP 2008) identified stressors to Stewarts Creek as urban developments in the eastern region and high concentrations of agricultural land use located in the southeast region. The proposed Stewarts Creek Tributaries project will exclude livestock from the project streams and buffers, stabilize eroding stream

banks, and provide riparian buffers and agricultural BMP's to improve the water quality of runoff entering the project streams and protecting lands from future development.

3.0 BASELINE AND EXISTING CONDITIONS

The project area is impacted by farming practices, past stream channelization, direct cattle access, agricultural runoff, and upstream suburban runoff. The Site has been in some type of agricultural production for at least the past 80 years.

The existing watersheds were delineated using a variety of information, including USGS 7.5-minute topographic quadrangles, field investigations, site-specific topographic survey data, Surry County GIS data, and USGS StreamStats. All Project streams are considered cool water channels. Land use and watershed areas for each stream reach are provided in Table 2.

Table 2. Project Land Use and Watershed Characteristics.

Land Use and Watershed Characteristics				
Physiographic Province	Piedmont			
Level III, IV Ecoregions	Piedmont, Northern Inner Piedmont			
River Basin	Yadkin			
USGS Hydrologic Units 8-digit, 14-digit	03040101, 03040101100010			
DWR Sub-basin	03-07-03			
Reaches	**UT1**	**UT2**	**UT3**	**Moores Fork**
Drainage area (acres)*	70	45	70	2816
Drainage area (sq. miles)*	0.11	0.07	0.11	4.4
Thermal Regime	Cool	Cool	Cool	Cool
USDA/NRCS – National Geospatial Center of Excellence 2011 National Land Cover Dataset				
Agriculture	27%	27%	38%	49%
Forested/Scrubland	59%	59%	45%	37%
Residential	12%	12%	7%	11%
Impervious Area	1%	1%	1%	2%

* Represents the most downstream portion of the existing reach.

3.1 Landscape Characteristics

3.1.1 Physiography, Topography, and Soils

The Site lies within the upland portion of the Piedmont physiographic province and the Level III Piedmont ecoregion. This area is a transitional area between the mountainous Appalachians ecoregions and the flat coastal plain (Figure 5) with irregular plains and some hills. The annual average local rainfall is 47 inches, with most of the precipitation falling during summer and winter. Soils found within this area are derived from sedimentary and metamorphic rock with a large gneiss and mica component. There are some bedrock-controlled portions of Moores Fork, though bedrock is not exposed elsewhere on the project (see Appendix 1).

As shown in Figure 6A, soils in the northern project area (near the three UTs) are primarily comprised of Colvard and Suches complex and Arkaqua loam, found along the floodplains (both present and historic) of Stewart's Creek and its unnamed tributaries. Dillard fine sandy loam and

Woolwine-Fairview-Westfield complex soils are found on the upslope portions of the Site, with small amounts of Braddock fine sandy loam soils east of UT3. Colvard and Suches soils are comprised of very deep, well drained loam to sandy loam soils found in floodplains of the Piedmont and Blue Ridge, generally in long, narrow bands that vary greatly in width. Similarly, areas of Arkaqua loam are found in long, narrow bands along floodplains in the Piedmont and Blue Ridge, and while these soils are also very deep, drainage is somewhat poor. Dillard fine sandy loam and Braddock fine sandy loam are very deep, moderately to well-drained soils, generally found along stream terraces, fans, and fan remnants (Braddock only), while Woolwine-Fairview-Westfield complex soils are gravelly loams that are well drained, moderately to very deep soils found on uplands along ridges and side slopes of low hills.

Five soil profiles were distributed across the proposed UT3 channel location to characterize the soils and to identify any evidence of a historic channel (Figure 6A). The soil profiles were all investigated to a depth of 40-inches during January 2017 when the fields were fallow. The water table was closest to the surface at soil profile 5 (3-inches) and was found to occur at an average depth of 25-inches (soil profiles 2 -5). The water table was the deepest at profile 1 (36-inches), located adjacent to Stewarts Creek. Hydric soil indicators were present in all profiles except profile 4 and occurred at an average depth of 22-inches. Profiles 2 – 5 contained gravel layers at an average depth of 21-inches with gravel sizes ranging from 5 to 50-mm. The water table, hydric soil indicators, and gravel identified in these soil profiles further documents the presence of a historic channel as seen on Figures 4A and 4B.

As shown in Figure 6B, soils in the Moores Fork project area are primarily comprised of Colvard and Suches complex soils that are found along the floodplain of Moore's Fork. Braddock fine sandy loam and Fairview sandy clay loam are found along terraces and moderate slopes on the Site, while Devotion-Rhodhiss-Bannertown complex soils are found on steep slopes at the valley edge. The Colvard and Suches soils and Braddock fine sandy loam soils are also present along the Moores Fork project area and are described in the section above. Fairview sandy clay loams are very deep, well-drained soils found on uplands along ridges and moderate side slopes of low hills. Areas of Devotion-Rhodhiss-Bannertown complex are moderately to very deep, well-drained to excessively drained soils on steep slopes, and can contain minor rock outcroppings.

Soil mapping units are based on the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Soil Survey for Surry County. Soil types within the project area mapped by the NRCS Web Soil Survey are described below in Table 3 and depicted in Figures 6A and 6B.

Table 3. Project Soil Types and Descriptions.

Soil Name	Description	Hydric Status
Arkaqua loam	Arkaqua loam is a somewhat poorly drained soil found in long, narrow bands along floodplains in the Piedmont and Blue Ridge. It is a very deep soil with a moderate or high-water capacity and is frequently flooded.	Non-hydric
Braddock fine sandy loam	Braddock fine sandy loam is a well-drained soil located on stream terraces, fans and fan remnants. It has a moderate or high-water capacity and is not subject to flooding.	Non-hydric
Colvard and Suches soils	Colvard and Suches soils are a well-drained soil located on floodplains. It has a low to water capacity and is subject to occasional flooding.	Non-hydric
Devotion – Rhodhiss – Bannertown complex	Devotion-Rhodhiss-Bannertown complex is a somewhat excessively drained to a well-drained soil located on ridges and low hills. It has a very low to high water capacity and is not subject to flooding.	Non-hydric
Fairview sandy clay loam	Fairview sandy clay loam is a well-drained soil located on interfluves, ridges and low hills. It has a moderate to high water capacity and is not subject to flooding.	Non-hydric
Fairview-Stott-Knob complex	Fairview-Stott-Knob is a well-drained soil located on ridges and low hills. It has a low to high water capacity and is not subject to flooding.	Non-hydric
Woolwine-Fairview-Westfield complex	Woolwine-Fairview-Westfield is a well-drained soil located on interfluves, ridges and low hills. It has a very-low to high water capacity and is not subject to flooding.	Non-hydric

3.1.2 Land Use and Land Cover

The Site is in a rural but developing area of north-central Surry County and has been in some type of agricultural production for at least the past 80 years. Aerial photographs show UT1, UT2, and UT3 running across the current farm fields up until 1966 (Figures 4A and 4B). Photography from 1977 show the tributaries channelized to their current locations (Figure 4C). According to the photography, Moores Fork has been in relatively the same location for the past 80 years (see Figures 4A through 4D for historical aerial photos).

Current land use near the Site is predominately forested with some agriculture (crop and livestock production) and residential areas. Since the Site is near (< 3 miles) I-77, this is a developing area with impending residential land use changes. The conservation easement will eliminate potential for future development and/or agricultural use in the floodplain areas of the restored streams.

3.2 Existing Vegetation

Vegetation present along most stream reaches is very limited and generally poor quality. Canopy and sapling species are composed of red maple (*Acer rubrum*), river birch (*Betula nigra*), tulip poplar (*Liriodendron tulipifera*), black cherry (*Prunus serotina*), sycamore (*Platanus occidentalis*), and American beech (*Fagus grandifolia*). The understory is dominated by Chinese privet (*Ligustrum sinense*) with some younger canopy species present. Herbaceous vegetation is dominated by fescue grass (*Festuca* spp.), blackberry (*Rubus* spp.), multiflora rose (*Rosa multiflora*), beefsteak plant (*Perilla frutescens*), pokeweed (*Phytolacca americana*), and New York ironweed (*Vernonia noveborancensis*). Vine species present are honeysuckle (*Lonicera japonica*), greenbrier (*Smilax rotundifolia*), and poison ivy (*Toxicodendron radicans*). Photographs of project areas illustrating the vegetation communities can be found in Appendix 13.

3.3 Project Resources

EPR conducted investigations for jurisdictional waters of the U.S. on January 26, 2017 and February 1, 2018. Streams were assessed using the NCDWR Stream Identification Form and the USACE Wilmington District Stream Quality Assessment Worksheet. Four potential jurisdictional streams were found during the on-site investigations (Table 4). Copies of the NCDWR stream identification forms can be found in Appendix 7 and the USACE stream assessment forms are located in Appendix 8.

No jurisdictional wetlands were identified within the project limits.

Table 4. Jurisdictional Resources Within the Project Boundary.

Reach Summary				
Reach	**UT-1**	**UT-2**	**UT-3**	**Moores Fork**
Existing Length (LF)	2,373	397	1,814	4,047
Drainage area (acres)	70	45	70	2816
Drainage area (sq. miles)	0.11	0.07	0.11	4.4
Valley slope (ft/ft)	0.027	0.027	0.021	0.005
EPR - NCDWR Stream Score	Blue line (39*)	Blue line (38*)	Blue line (37*)	Blue line (47*)
Perennial or Intermittent	P	P	P	P
NCDWR Classification	WS-IV			
Rosgen Classification of Existing Conditions	G4	G4	F4	F4
Simon Evolutionary Stage	V	V	V	V
FEMA Zone Classification	AE	AE	AE	AE

* Represents the total points in the NCDWR stream identification forms (Appendix 7).

4.0 FUNCTIONAL UPLIFT

This section of the report is provided to document the existing and proposed functional conditions of the Project. While functional parameters are assessed and presented, the functional assessment used is not proposed for mitigation crediting or determining project success. Performance standards are provided in Section 8.0.

In their current condition, the project reaches are severely degraded. Of the impairments present on the Site, direct livestock access to streams, past channelization, and the loss of riparian buffers are the most severe; resulting in direct input of nutrients and fecal coliform, channel instability and erosion, lack of bedform diversity, and lack of riparian vegetation and habitat.

Ecological uplift will come from: 1) excluding livestock from all streams and buffers, 2) restoring the project streams to a stable, functioning condition, 3) restoring natural riparian vegetation, 4) conversion of row crops to forested buffer, and 4) protecting all areas with a conservation easement. The exclusion of livestock will remove a direct source of nutrients, fecal coliform, and sediment from the system. Appropriate channel dimensions and in-stream log and wood structures will ensure channel stability and improve aquatic habitats. Restored riparian buffers will: 1) provide a source of woody debris and detritus for aquatic organisms, 2) restore diverse aquatic and terrestrial habitats appropriate for the ecoregion and landscape setting, and 3) provide shade, reduce water temperatures, and increase dissolved oxygen concentrations. Approximately 30 acres of riparian buffer will be restored and/or protected as part of the proposed project.

Based on field evaluations of the project stream reaches and proposed mitigation practices, functional ratings were developed for the existing and proposed conditions of the project reaches using the North Carolina Stream Quantification Tool Version 3.0 (SQT; Harman and Jones, 2017). The SQT follows the methodology and definitions described in Harman, et al. (2012). The functional uplift in each of the five functional categories of the stream functions pyramid were assessed using the function-based parameters and measurement methods listed in Table 5. Table 6 shows the SQT scores and proposed lift that could be achieved during the monitoring period. The SQT scores function-based parameters and functional categories on a scale of 0.00 to 1.00 where 0.00 to 0.30 represents conditions that are not functioning like a reference condition (shown in red), scores of 0.70 to 1.00 are functioning similar to a reference condition (shown in green), and scores falling in the middle of these ranges are functioning-at-risk (shown in yellow). The Quantification Tool worksheets from the SQT v3.0 are provided in Appendix 2.

The proposed restoration will lead to some improvements in reach hydrology by changing adjacent land uses from pasture to riparian and addressing concentrated flow points that drain to the reaches. The proposed restoration will establish bank height ratios near 1 and capture available lift in the SQT. Additionally, the proposed restoration will improve the channel hydraulics further to support a headwater stream complex on the smaller UTs, though these functional benefits are not captured directly in the SQT. Though direct measurements were not taken for the physicochemical function category, reductions in TN, TP and fecal coliform loads were estimated using Quantifying Benefits to Water Quality from Livestock Exclusion and

Riparian Buffer Establishment for Stream Restoration (DMS, 2016). The combination of restored riparian buffers in agricultural fields and cattle exclusion fences yielded a total TN reduction of 1370 lbs/ year, a total TP reduction of 94.6 lbs/year, and a total fecal coliform reduction of 1.2332 x 10^{12} col for the Project (Appendix 2). Given these estimated reductions, the existing physicochemical conditions of Project streams were still assumed to be Functioning-at-risk or Not Functioning even though the measured biology scores were in the Functioning range.

Table 5. Function-Based Parameter and Measurement Methods Applied to Project Reaches.

Functional Category	Function-Based Parameters	Measurement Methods
Hydrology	Reach Runoff	Curve Number Concentrated Flow Points
Hydraulics	Floodplain Connectivity	Bank Height Ratio Entrenchment Ratio
Geomorphology	Large Woody Debris	Pieces of wood per 100’
	Lateral Stability	Dominant BEHI/NBS Percent Eroding Bank
	Riparian Vegetation	Canopy Cover Buffer Width
	Bed Form Diversity	Pool Spacing Ratio Pool Depth Ratio Percent Riffle
	Plan Form	Sinuosity
Physicochemical	Bacteria	*N/A*
	Organic Matter	*N/A*
	Nitrogen	*N/A*
	Phosphorus	*N/A*
Biology	Macroinvertebrates	Biotic Index

Table 6. Functional Category Summary for Project Reaches.

Functional Category	Existing						Proposed Score
	UT1	UT2	UT3	MF – R1	MF – R2	MF – R3	
Hydrology	0.39	0.50	0.48	0.36	0.46	0.46	0.71 – 0.74
Hydraulics	0	0.40	0.36	0	0	0	0.85[A] - 1.00
Geomorphology	0.58	0.24	0.55	0.20	0.26	0.14	0.46[A] – 0.94
Physicochemical	Assumed[B]				Assumed[B]		Modest Lift Assumed[B]
Biology	0.98	0.98	1.0	1.0	1.0	1.0	0.98 – 1.0

[A] The larger ranges are due to Enhancement II in Moores Fork Reach 1.

[B] Functional category still assumed since no direct measurement methods have or will be taken.

5.0 REGULATORY CONSIDERATIONS

Regulatory considerations for the Site are shown in Table 7 and described in the following sections.

Table 7. Summary of Regulatory Considerations.

Regulatory Parameter	Applicable?	Resolved?	Supporting Docs.
Waters of the United States - Section 401/404	Yes	Yes	Appendix 8
Endangered Species Act	Yes	Yes	Appendix 10
National Historic Preservation Act	Yes	Yes	Appendix 10
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	No	Appendix 11
Essential Fisheries Habitat	No	N/A	N/A

5.1 401/404

There will be no impacts to wetlands onsite. A Preliminary Jurisdictional Determination (PJD) package was submitted to NCDWR and USACE on July 9th, 2018 and a JD site visit was conducted on November 7th, 2018 with William Elliot (USACE) and Sue Homewood (NCDWR). Notification of PJD was received on March 19, 2019. Stream channel impacts will be due to restoration activities and relocation of the restored channels to their historic alignments. Construction activities will be conducted under a Nationwide Permit #27, Aquatic Habitat Restoration, Enhancement, and Establishment Activities with the submittal and approval of a pre-construction notification.

5.2 Categorical Exclusion for Biological and Historical Resources

A Categorical Exclusion (CE) document for the Stewarts Creek Tributaries Stream Restoration Project was approved by the Federal Highway administration (FHWA) on September 29, 2017 and is provided in Appendix 10. The CE document investigates the presence of threatened and endangered species and any historical resources that may occur within the Site.

5.2.1 Biological Resources

The Endangered Species Act (ESA) of 1973, as amended (16 U.S.C 1531 et seq.), defines protection for species with the Federal Classification of Threatened (T) or Endangered (E). An "Endangered Species" is defined as "any species which is in danger of extinction throughout all or a significant portion of its range" and a "Threatened Species" is defined as "any species which is likely to become an Endangered Species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C 1532).

EPR requested review and comment from the U.S. Fish and Wildlife Service (USFWS) on June 22, 2017, regarding the project's potential impacts to threatened or endangered species. The USFWS did not provide any comment within the 45-day time frame. Additionally, a Northern Long-Eared Bat (NLEB) 4(d) Streamlined Consultation Form was approved by the FHWA on September 12,

2017 and sent to USFWS. The USFWS did not respond within the 30-day time frame and it is presumed that the requirements of Section 7 (a)(2) of the Endangered Species Act with respect to the NLEB are fulfilled for the project. The USFWS letter and NLEB Streamlined Consultation Form are included in the Categorical Exclusion document found in Appendix 10.

5.2.2 Historical Resources

The CE document investigates the occurrence of any historical resources protected under The National Historic Preservation Act (NHPA) of 1966. The NHPA, as amended (16 U.S.C. 470), defines the policy of historic preservation to protect, restore, and reuse districts, sites, structures, and objects significant in American history, architecture, and culture. Section 106 of the NHPA mandates that federal agencies account for the effect of an undertaking on any property that is included in, or is eligible for inclusion in, the National Register of Historic Places.

EPR sent an email to the North Carolina State Historic Preservation Office (SHPO) on June 22, 2017, requesting review and comment for the potential of cultural resources potentially affected by the project. Following a review of the project, SHPO responded with a letter on July 19, 2017, and stated that "they were aware of no historic resources which would be affected by the project". All correspondence with SHPO is included in the Categorical Exclusion document found in Appendix 10.

5.3 FEMA Floodplain Compliance and Hydrologic Trespass

Review of the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program's Digital Flood Insurance Rate Mapping (DFIRM) panels 3711500000J and 3711500100J effective August 18, 2009, found that the proposed work may impact regulatory models for Stewarts Creek and Moores Fork. The three unnamed tributaries within the Stewarts Creek Tributaries Site are not regulated but are within the Stewarts Creek floodplain. Stewarts Creek has been studied using a detailed analysis resulting in base flood elevations and a regulatory floodway. Moores Fork is a regulated tributary to Stewarts Creek that has been studied using limited detail analysis. The Moores Fork model extends from approximately 0.5 miles upstream of Race Track Road to the confluence with Stewarts Creek while the proposed work on Moores Fork extends approximately 0.9 miles upstream of Race Track Road. The work proposed for the Stewarts Creek Tributaries Stream Restoration Project may impact the 1.0 Percent Chance Annual Flooding Zone (AE) for both Stewarts Creek and Moores Fork. (Figure 7).

The Stewarts Creek Tributaries Site will result in excavation in the floodplain and regulatory floodway of Stewarts Creek. The Stewarts Creek Tributaries Site will also result in excavation in the floodplain, requiring modification of base flood elevations, encroachment widths, bank stations, and Mannings "n" roughness values of Moores Fork. A Conditional Letter of Map Revision (CLOMR) is being prepared for Moores Fork and will be submitted to FEMA prior to construction. The subsequent LOMR package will be submitted after construction is complete. A floodplain development permit and no-rise package are being prepared to submit for work on the unnamed tributaries to Stewarts Creek. The completed NCDMS Floodplain Requirements Checklist can be found in Appendix 11.

The limited detailed FEMA model for Moores Fork does not encompass the entire project and begins 800 feet downstream in Reach 1 (enhancement area) of the Project. The upstream cross sections were analyzed for elevation increases. Because elevations for the stream bed will only be deepened in three spots (less than 35 feet in total length) in the upstream enhancement portion of Moore's Fork, water surface elevations in this reach were reduced due to sloping and bankfull benches. Therefore, enhancement activities as proposed will not increase water surface elevations upstream of the Project causing hydrologic trespass.

6.0 MITIGATION PROJECT GOALS AND OBJECTIVES

While the ultimate goal of the Project is to restore a self-sustaining stream system, more specific project goals and objectives were developed for the Stewarts Creek Watershed based on the Upper Yadkin Pee-Dee RBRP (NCEEP, 2009) and Yadkin Pee-Dee River Basinwide Water Quality Plan (NCDWQ, 2008) and are provided in Table 8 below:

Table 8. Goals and Objectives for the Stewarts Creek Tributaries Stream Restoration Project.

Goals	Objectives
Reduce Sediment Inputs and Stream Turbidity	▪ Reduce the amount of land in active livestock pasture. ▪ Install fencing to exclude livestock from project buffers and streams. ▪ Increase distance between active farming operations and receiving waters. ▪ Restore and protect riparian buffers to filter runoff. ▪ Stabilize eroding stream banks and concentrated runoff areas.
Reduce Nutrient Inputs	▪ Reduce the amount of land in active livestock pasture and row crop agriculture. ▪ Install fencing to exclude livestock from project buffers and streams. ▪ Increase buffer widths between active farming operations and receiving waters. ▪ Restore and protect riparian buffers to filter runoff. ▪ Promote higher water table conditions, and thus denitrification, along restored headwaters.
Reduce Fecal Coliform Inputs	▪ Reduce the amount of land in active livestock pasture. ▪ Exclude livestock from project streams and buffers. ▪ Increase buffer width between active farming operations and receiving waters. ▪ Restore and protect riparian buffers to filter runoff.
Restore/Enhance Degraded Riparian Buffers	▪ Restore riparian buffer vegetation to filter runoff and provide organic matter and shade. ▪ Protect riparian buffers with permanent conservation easement.
Reduce Urban/Suburban Stormwater Runoff	▪ Restore minimum 30-foot riparian buffers along headwater streams that drain suburban areas. ▪ Protect riparian buffers with permanent conservation easement.
Reduce Stream Channel and Stream Bank Instability	▪ Restore degraded stream channels by establishing appropriate dimension, pattern and profile. ▪ Install in-stream structures to provide stream channel and stream bank stability. ▪ Restore and protect riparian buffer to provide bank protection and stability. ▪ Install fencing to exclude livestock from project streams and buffers.
Implement Structural Agricultural BMPs in Agricultural Watersheds	▪ Construct agricultural conveyance system to filter and reduce agricultural runoff into restored stream systems. ▪ Construct a critical area restoration BMP by removing and decommissioning a heavily eroding forest road and cattle use area.

7.0 DESIGN APPROACH AND MITIGATION WORK PLAN

The Project involves the restoration and enhancement of four perennial UTs to Stewarts Creek: UT1, UT2, UT3, and Moores Fork. UT1, 2, and 3 share a similar design approach, as described in the following sections, with changes due to drainage area and slope differences. UT1 and 2 are comprised of one reach each, UT3 is broken into two reaches at the point where it merges with UT2, and Moores Fork is broken into three reaches. Moores Fork Reach 1 is an enhancement reach that includes creating a bankfull bench, sloping, and riparian buffer planting. Moores Fork Reach 2 and 3 are separated by the bridge at Race Track Road and share a similar design approach, as described in the following sections. The construction drawings provided in Appendix 1 describe the proposed construction methods including channel sizing, planimetric geometry, slopes, instream structures, and elevations of all pertinent features. Data characterizing the existing, proposed, and design morphological characteristics for each reach can be found in Appendix 2. The design approach for each reach is described in the sections below. The naming convention and locations of the hydrologic assets on the Site are illustrated in Figures 8A and 8B.

The rural Piedmont regional curve (Harman, 1999) was used to verify bankfull discharge and area on project streams. However, the dataset used to create the regional curve only contains two sites with drainage areas less than 2 square miles. Additionally, data collected in neighboring Surry County (provided in Appendix 2), indicates that the rural Piedmont regional curve may overestimate bankfull dimensions for sites with drainage areas less than 10 square miles.

Rather than relying on a single reference reach for design criteria, the design criteria applied to the Project are based on surveys of multiple reference reaches conducted in the past, two new reference reach sites (described below), published reference reach data, and design criteria and monitoring data from past successful restoration projects performed throughout the Piedmont region of North Carolina. Reference data compiled and presented by Lowther (2008) for similar stream types, drainage areas, and slopes within the Piedmont of North Carolina were reviewed to evaluate appropriate ranges of sinuosity and pattern data. Lowther evaluated 19 reference reach streams across the Piedmont of North Carolina – our assessment only focused on the streams in the western portion of the presented data set that were closest to the project site. Since the ranges provided by this analysis were quite wide, EPR evaluated this reference information against past completed stream restoration projects that have performed well and have been tested by significant storm events. EPR staff have several successful projects similar to the Moores Fork Reaches that were restored over 15 years ago and have remained stable. These include the Hanging Rock Creek Site in Avery County, the Mitchell River – Darnell Site in Surry County, the Mitchell River – Kraft Site in Surry County, and the Mitchell River – Boyd Woods Site in Surry County. Each of these past projects have comparable drainage areas to the design stream reaches on Moores Fork, similar slopes and bed conditions, and have been in place for over 15 years.

For the smaller UT's on the project site, two potential reference sites were located, both of which are on private property and require permission to access. The first site, UT to Pauls Creek, has a drainage area of 0.14 square miles and had consistent bankfull indicators throughout the reach but was impacted by a gravel road running down the hillslope to a neighboring agricultural field.

Rapid methods were used to collect a riffle cross section and the difference between water surface and bankfull features to provide a small drainage area point to the regional curve data. The second site, UT to Little Fisher River, has a drainage area of 0.02 square miles and was surveyed in detail. The bankfull area of these reference sites are provided with the regional curve data in Appendix 2.

UT to Little Fisher River reference site was separated into two reaches and EPR collected longitudinal profiles and cross sections within both reaches. While there was flowing water in both reaches, the two reaches are separated by a dry section of channel (14 feet in length) where the flow was subterranean during both site visits. The upstream reach (riffle 1 and pool 1) was within a colluvial valley draining to the large Little Fisher River floodplain. The downstream reach (riffle 2) consisted of 40 feet of a single-thread sandy channel on the Little Fisher River floodplain before a collapsed pedestrian/ATV crossing disrupts the channel and the flow disperses into a wetland. Geomorphic data are summarized for both of these reaches in Appendix 2.

7.1 UT1

UT1 begins at the northeast corner of the project area within a 5-10-year-old cut-over forest and ends at its confluence with Stewarts Creek. The existing reach is an incised channel with an average bank height ratio of 8.2, an average entrenchment ratio of 1.5 and has little to no floodplain connectivity. Though there is a wooded upstream portion of the reach, this wooded area still has low entrenchment ratios (1.2), high bank height ratios (6.6), bank erosion and tortuous bends. The existing reach is laterally unstable with 80% stream bank erosion and has been channelized along the field edge. The hydraulics of the system is not functioning while the geomorphology of the system is functioning-at-risk. Water quality stressors include excess sediment from past logging, a heavily eroded forested road area, and stream bank erosion; suburban stormwater runoff from upstream development; excess nutrients from agricultural runoff; and fecal coliform bacteria from upstream pastures, although livestock do not have direct access to the stream. The reach ends at the confluence with Stewarts Creek.

A new culverted crossing for UT1 will be installed at the current culverted crossing. UT1 will be restored to the fall of the valley, which will require roughly 500 feet of Priority Level II restoration to tie into the historic valley downstream. The rest of UT1 will be restored using Priority Level I approaches where the stream is re-meandered along its historic floodplain, except for a short section of Priority II restoration where it ties into Stewarts Creek. There will be portions of bench excavation to create material to fill existing UT1, since this existing channel is so large and incised. The width of the excavated valley will allow for the design meander belt width plus an additional 1.5 bankfull widths beyond the stream belt width.

The restored stream channel will utilize wood structures, constructed riffles, and transplanted vegetation. Boulder structures will only be used to step down the channel towards Stewarts Creek. In-stream structures will include log vanes to improve bed form diversity and provide refugia for aquatic organisms. A combination of log vanes, toe-wood, rootwads, and transplants will also be used to stabilize outer bends and provide organic matter and refugia to the stream.

A Rosgen "C" type channel was selected as the design stream type for this reach. The expectation is that the design channels may narrow to form an "E" or a lower width-to-depth ratio "C" channel within the first few years after restoration, due to herbaceous vegetation establishment along the banks and the associated deposition of sediment. To ensure ample floodplain connectivity and promote a headwater stream complex, the channel hydraulics erred conservatively to design a channel that will see frequent overbank flooding. Table 9A provides a summary of existing and proposed stream morphological information and design criteria for UT1. Detailed morphological tables are provided for all stream reaches in Appendix 2.

A sediment transport analysis was performed to ensure that the stream restoration design creates a stable channel that does not aggrade or degrade over time. The existing reach exhibits signs of degradation rather than aggradation. Sediment supply to the Site is expected to be transportable since there is little evidence of aggradation within the Site. The shear stress and maximum particle size entrained were calculated and compared with the sub-pavement and pavement samples collected from the existing reach as shown in Table 9A. The proposed design will reduce the shear stresses observed in the existing condition that were leading to degradation while entraining particle sizes near the riffle d84 during a bankfull flow event. This analysis provides evidence that the stresses predicted for the design channels will be within the range of stable values calculated for similar stream systems. The full sediment transport analysis is provided in Appendix 2 along with the sub-pavement and pavement sample results.

Table 9A. Morphology Table for UT1.

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	0.11			
Channel Thalweg Length (ft)	-	2373	-	2805
Valley Width (feet)	>13.5			
Channel/Reach Classification	-	G4-> F4	Cb4	C4/Cb4
Bankfull Width (feet)	4.0 – 7.0	4.3 – 5.7	5.6 – 6.6	5.6 – 6.6
Bankfull Mean Depth (feet)	0.5 – 0.8	0.5 – 0.6	0.4 – 0.7	0.4 – 0.7
Bankfull Area (ft^2)	3.1– 4.8	3.2	-	3.2
Bank Height Ratio	-	5.6 – 12.5	1.0 - 1.1	1.0
Entrenchment Ratio	-	1.2– 1.9	> 2.2	2.2 – 4.0
Bankfull Shear Stress (lb/ft^2)	-	0.66	-	0.56
Average Bankfull Velocity (fps)	1 – 10.8	3.2	< 4	2.5
Bankfull Discharge (cfs)	4 – 40	8-16	-	8
Avg. Water Surface Slope (ft/ft)	-	0.021	-	0.018
Sinuosity	-	1.29	1.2 - 1.4	1.3
D16 / 35 / 50 / 84 / 95/ di_pavement/ di_subpavement (mm)*	-	3 / 7.1 / 11 / 41.3 / 90 / 72 / 31.5		

* D16/35/50/84/95 are the average of the riffle counts; di_pavement and di_subpavement are the largest particles from the pavement and sub-pavement samples.

7.2 UT2

UT2 begins at the northern corner of the project area within a 5-10-year-old cut-over forest and ends at its confluence with UT1. The existing reach is an incised channel with an average bank height ratio of 7.5, average entrenchment ratio of 3.2 and has little to moderate floodplain connectivity. The existing reach is laterally unstable with 70% stream bank erosion and was channelized to the east along the field edge. The hydraulics of the system is functioning-at-risk while the geomorphology of the system is not functioning. Water quality stressors include suburban stormwater runoff, active bed and bank erosion, past channelization, narrow buffers due to agricultural row cropping on the right bank, and excess nutrients from agricultural runoff. UT2 will be restored to the fall of the valley to its original floodplain to converge with UT3. This will require roughly 325 feet of Priority Level II restoration to tie into the historic floodplain. The rest of UT2 will be restored using Priority Level I approaches, where the stream is re-meandered along its historic floodplain. A culverted crossing for UT2 will be installed at the beginning of the project reach, but outside the conservation easement and project area. The reach ends at the confluence with UT3.

The restored stream channel will utilize wood structures, constructed riffles, and transplanted vegetation. In-stream structures will include log vanes to improve bed form diversity and provide refugia for aquatic organisms. A combination of log vanes, toe-wood, rootwads, and transplants will also be used to stabilize outer bends and provide organic matter and refugia to the stream. A Rosgen “C” type channel was selected as the design stream type for this reach. The expectation is that the design channels may narrow to form an “E” or a lower width-to-depth ratio “C” channel within the first few years after restoration, due to herbaceous vegetation establishment along the banks, and the associated deposition of sediment. To ensure ample floodplain connectivity and promote a headwater stream complex, the channel hydraulics erred conservatively to design a channel that will see frequent overbank flooding. Table 9B provides a summary of existing and proposed stream morphological information and design criteria for UT2. Detailed morphological tables are provided for all stream reaches in Appendix 2.

A sediment transport analysis was performed to ensure that the stream restoration design creates a stable channel that does not aggrade or degrade over time. The existing reach exhibits signs of degradation rather than aggradation. Sediment supply to the reach is expected to be transportable since there is little evidence of aggradation within the Site. The shear stress and maximum particle size entrained were calculated and compared with the sub-pavement and pavement samples collected from the existing reach as shown in Table 9B. The proposed design will reduce the shear stresses observed in the existing condition that were leading to degradation while entraining particle size near the riffle d84 during a bankfull flow event. This analysis provides evidence that the stresses predicted for the design channels will be within the range of stable values calculated for similar stream systems. The full sediment transport analysis is provided in Appendix 2 along with the sub-pavement and pavement sample results.

Table 9B. Morphology Table for UT2.

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	0.07			
Channel Thalweg Length (ft)	-	397	-	1060
Valley Width (feet)	>11.3			
Channel/Reach Classification	-	Channelized E4	Cb4	Cb4
Bankfull Width (feet)	4.0 – 7.0	2.5– 4.5	4.7 – 5.5	4.7 – 5.5
Bankfull Mean Depth (feet)	0.5 – 0.7	0.5 – 0.9	0.3 – 0.6	0.3 – 0.6
Bankfull Area (ft^2)	2.0– 3.0	2.1 – 2.3	-	2.2
Bank Height Ratio	-	4.0 – 10.9	1.0 - 1.1	1.0
Entrenchment Ratio	-	1.5– 4.8	> 2.2	2.2 – 4.0
Bankfull Shear Stress (lb/ft^2)	-	1.10	-	0.50
Average Bankfull Velocity (fps)	1 – 10.8	3.7	< 4	3.6
Bankfull Discharge (cfs)	4– 40	8	-	8
Water Surface Slope (ft/ft)	-	0.026	-	0.022
Sinuosity*	-	1.06	1.2 - 1.4	1.34
D16 / 35 / 50 / 84/ 95/ di_pavement/ di_subpavement (mm)*	-	2.6 / 4.0 / 5.4 / 10.4 / 19.3 / 67 / 31.5		

* D16/35/50/84/95 are the average of the riffle counts; di_pavement and di_subpavement are the largest particles from the pavement and sub-pavement samples.

7.3 UT3 Reach 1

UT3 begins at the northwest corner of the project area within a 5-10-year-old cut-over forest and currently flows along the field edge to its confluence with Stewarts Creek. To follow this alignment, the reach was channelized through a hillslope in the past and directed away from its historic alignment. The existing reach is an incised channel with an average bank height ratio of 4.2, an average entrenchment ratio of 2.5 and has little to no floodplain connectivity. Though there is a wooded upstream portion of the reach, this wooded area still has low entrenchment ratios (1), high bank height ratios (2.2), bank erosion and tortuous bends. The existing reach is laterally unstable with 60% stream bank erosion. The hydraulics and geomorphology of the system is functioning-at-risk. Water quality stressors include excess sediment from bank erosion, suburban stormwater runoff from upstream development, narrow riparian buffers, and excess nutrients from agricultural runoff. The reach ends at the confluence with restored UT2.

UT3 Reach 1 (UT3 R1) will be restored to the fall of the valley to its original floodplain. This will require roughly 400 feet of Priority Level II restoration to tie into the historic floodplain. The remainder of UT3 R1 will be restored using Priority Level I approaches, where the stream is re-meandered along its historic floodplain. A culverted crossing will be installed at the current crossing in the woods.

The restored stream channel will utilize wood structures, constructed riffles, and transplanted vegetation. In-stream structures will include log vanes and rollers to improve bed form diversity and provide refugia for aquatic organisms. A combination of log vanes, toe-wood, rootwads, and transplants will also be used to stabilize outer bends and provide organic matter and refugia to the stream.

A Rosgen "C" type channel was selected as the design stream type for this reach. The expectation is that the design channels may narrow to form an "E" or a lower width-to-depth ratio "C" channel within the first few years after restoration, due to herbaceous vegetation establishment along the banks and the associated deposition of sediment. To ensure ample floodplain connectivity and promote a headwater stream complex, the channel hydraulics erred conservatively to design a channel that will see frequent overbank flooding. Table 9C provides a summary of existing and proposed stream morphological information and design criteria for UT3 R1. Detailed morphological tables are provided for all stream reaches in Appendix 2.

A sediment transport analysis was performed to ensure that the stream restoration design creates a stable channel that does not aggrade or degrade over time. The existing reach exhibits signs of degradation rather than aggradation. Sediment supply to the Site is expected to be transportable since there is little evidence of aggradation within the Site. The shear stress and maximum particle size entrained were calculated and compared with the sub-pavement and pavement samples collected from the existing reach as shown in Table 9C. The proposed design will slightly increase the bankfull shear stresses observed in the existing condition due to a small increase in stream slope but will reduce flood flow shear stresses due to access to the floodplain. Particles will be entrained near the riffle d84 during a bankfull flow event. This analysis provides evidence that the stresses predicted for the design channels will be within the range of stable values calculated for similar stream systems. The full sediment transport analysis is provided in Appendix 2 along with the sub-pavement and pavement sample results.

Table 9C. Morphology Table for UT3 Reach 1.

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	0.11			
Channel Thalweg Length (ft)	-	1814	-	994
Valley Width (feet)	>13.5			
Channel/Reach Classification	-	F4	Cb4	Cb4
Bankfull Width (feet)	4.0 – 7.0	4.3 – 5.7	5.6 – 6.6	5.6 – 6.6
Bankfull Mean Depth (feet)	0.5 – 0.8	0.5 – 0.6	0.4 – 0.7	0.4 – 0.7
Bankfull Area (ft^2)	3.1– 4.8	3.2	-	3.2
Bank Height Ratio	-	5.6 – 12.5	1.0 - 1.1	1.0
Entrenchment Ratio	-	1.2– 1.9	> 2.2	2.2 – 4.0
Bankfull Shear Stress (lb/ft^2)	-	0.58	-	0.62
Average Bankfull Velocity (fps)	1 – 10.8	3.0	< 4	2.8
Bankfull Discharge (cfs)	4 – 40	9	-	9
Water Surface Slope (ft/ft)	-	0.016	-	0.020
Sinuosity*	-	1.31	1.2 - 1.4	1.24
D16 / 35/ 50 / 84 / 95/ di_pavement/ di_subpavement (mm)*	-	2.5 / 7.2 / 13.9 / 39.4 / 73.4 / 62 / 31.5		

* D16/35/50/84/95 are the average of the riffle counts; di_pavement and di_subpavement are the largest particles from the pavement and sub-pavement samples.

7.4 UT3 Reach 2

Restored UT3 Reach 2 (UT3 R2) begins after the confluence with restored UT2. UT3 R2 will be restored to the fall of the valley and to its original floodplain using Priority Level I approaches for the majority of the reach, where the stream is re-meandered along its historic floodplain. A culverted crossing will be installed at approximately station 27+50.00. Approximately 900 feet of Priority II restoration will be required at the end of the reach to tie to the elevation of Stewarts Creek in a stable manner. The reach ends at the confluence with Stewarts Creek.

The restored stream channel will utilize wood structures, constructed riffles, and transplanted vegetation. In-stream structures will include log vanes and rollers to improve bed form diversity and provide refugia for aquatic organisms. A combination of log vanes, toe-wood, rootwads, and transplants will also be used to stabilize outer bends and provide organic matter and refugia to the stream.

A Rosgen “C” type channel was selected as the design stream type for this reach. The expectation is that the design channels may narrow to form an “E” or a lower width-to-depth ratio “C” channel within the first few years after restoration, due to herbaceous vegetation establishment along the banks, and the associated deposition of sediment. To ensure ample floodplain connectivity and promote a headwater stream complex, the channel hydraulics erred conservatively to design a channel that will see frequent overbank flooding. Table 9D provides a summary of existing and

proposed stream morphological information and design criteria for UT3 R2. Detailed morphological tables are provided for all stream reaches in Appendix 2.

A sediment transport analysis was performed to ensure that the stream restoration design creates a stable channel that does not aggrade or degrade over time. Sediment supply to the Site is expected to be transportable since there is little evidence of aggradation within the Site. The shear stress and maximum particle size entrained were calculated and compared with the sub-pavement and pavement samples collected from the existing reach as shown in Table 9D. The proposed design will reduce the shear stresses observed in the existing condition that were leading to degradation while entraining particle size near the riffle d84 during a bankfull flow event. In the farm field the reach will decrease in slope, so a deeper channel will be designed to convey sediment (UT3 R2b). This analysis provides evidence that the stresses predicted for the design channels will be within the range of stable values calculated for similar stream systems. The full sediment transport analysis is provided in Appendix 2 along with the sub-pavement and pavement sample results.

Table 9D. Morphology Table for UT3 Reach 2.

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	-	-	-	0.18
Channel Thalweg Length (ft)	-	-	-	2523
Valley Width (feet)	>16.1			
Channel/Reach Classification	-	-	C4	C4
Bankfull Width (feet)	5.0 – 9.0	-	6.8 – 7.8	6.8 – 7.8
Bankfull Mean Depth (feet)	0.8 – 1.2	-	0.5 – 0.8	0.5 – 0.8
Bankfull Area (ft^2)	4.0– 5.0	-	-	4.4
Bank Height Ratio	-	-	1.0 - 1.1	1.0
Entrenchment Ratio	-	-	> 2.2	2.2 – 4.0
Bankfull Shear Stress (lb/ft^2)	-	-	-	0.25
Average Bankfull Velocity (fps)	2.25 – 22.5	-	< 4	3.9
Bankfull Discharge (cfs)	9 – 90	-	-	17
Water Surface Slope (ft/ft)	-	-	-	0.0067
Sinuosity*	-	-	1.2 – 1.4	1.4
D16 / 35/ 50 /84 / 95/ di_pavement/ di_subpavement (mm)*	-	2.5 / 7.2 / 13.9 / 39.4 / 73.4 / 62 / 31.5		

* D16/35/50/84/95 are the average of the riffle counts; di_pavement and di_subpavement are the largest particles from the pavement and sub-pavement samples.

7.5 Moores Fork Reach 1

Moores Fork Reach 1 (MF R1) begins at the easement boundary. The existing reach is an incised channel with an average bank height ratio of 8.2, an average entrenchment ratio of 1.5 and has moderate to little floodplain connectivity. Agricultural row crops are planted up to the top of the stream banks on the left side of the stream. Bedrock outcrops are scattered through the reach. The existing reach is laterally unstable with 33% stream bank erosion but past erosion has provided some bankfull benches. The hydraulics and geomorphology of the system is not functioning. Water quality stressors include excess sediment from bank erosion, suburban stormwater runoff from upstream development, lack of riparian buffer on the right bank, and excess nutrients from agricultural runoff. The reach ends at station 25+72 where there is no existing left side buffer and cows have access to the stream.

This reach is proposed for Enhancement Level II and will include bench grading, bank sloping, and in-stream rock structures due to the amount of bedrock in the reach. Stabilizing the banks along the reach, installing in-stream structures, and a riparian buffer will provide improved aquatic habitat diversity and stability. A Rosgen “C” type channel was selected as the design stream type for this reach. Grading and bank work will primarily be focused on the right bank since the left bank is more stable due to mature trees being present. The grading work will seek to establish benches and stable bank angles that will be planted to restore a riparian buffer along both banks of the stream. Table 9E provides a summary of existing and proposed stream morphological information and design criteria for MF R1. Detailed morphological tables are provided for all stream reaches in Appendix 2.

Table 9E. Morphology Table for Moores Fork Reach 1

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	4.40			
Channel Thalweg Length (ft)	-	1573	-	1573
Valley Width (feet)	>53			
Channel/Reach Classification	-	F4	C4	C4
Bankfull Width (feet)	20 – 30	30.7	21.9 - 25.9	21.9 - 25.9
Bankfull Mean Depth (feet)	1.8 – 3.0	1.7	1.6 – 2.6	1.6 – 2.6
Bankfull Area (ft^2)	40– 50	51.6	-	47.8
Bank Height Ratio	-	3.2	1.0 - 1.1	1.0
Entrenchment Ratio	-	1.1	> 2.2	2.2 – 4.0
Bankfull Shear Stress (lb/ft^2)	-	0.40	-	0.46
Average Bankfull Velocity (fps)	2.5 – 20.0	3.1	< 4	3.1
Bankfull Discharge (cfs)	100 – 800	150	-	150
Water Surface Slope (ft/ft)	-	0.003	-	0.003
Sinuosity*	-	1.07	1.2-1.4	1.07
D16 / 35/ 50 / 84 / 95/ di_pavement/ di_subpavement (mm)*	-	13.1/ 21.9 / 30.5 / 75.3 / 142.0 / 61 / 90		

* D16/35/50/84/95 are the average of the riffle counts; di_pavement and di_subpavement are the largest particles from the pavement and sub-pavement samples.

7.6 Moores Fork Reach 2

Moores Fork Reach 2 (MF R2) begins at station 25+72. The existing reach is an incised channel with an average bank height ratio of 2.9, an average entrenchment ratio of 1.5 and has little to no floodplain connectivity. The upstream portion of Reach 2 has little to no pattern, similar bank height and entrenchment ratios as stated above, and no buffer on the left side where the cattle graze. The existing reach is laterally unstable with 30% stream bank erosion. The hydraulics and geomorphology of the system is not functioning. Water quality stressors include excess sediment from bank erosion as a result of cattle access, suburban stormwater runoff from upstream development, and lack of riparian buffer on the left bank. The reach ends at the crossing of Race Track Road bridge.

MF R2 will be restored to a meandering channel though the adjacent pasture/floodplain using a Priority II restoration approach due to the depth of the existing channel and the constraint of the bridge and road crossing on Race Track Road. This will reconnect the stream to an active floodplain and provide a better approach to the Race Track Road bridge. Boulder, constructed riffles, and wood structures will be used to divert high stream velocities towards the center of the channel and provide grade control. Toe-wood will also be used to stabilize outer bends and provide organic matter and refugia to the stream.

A Rosgen "C" type channel was selected as the design stream type for this reach. Table 9F provides a summary of existing and proposed stream morphological information and design criteria for MF R2. Detailed morphological tables are provided for all stream reaches in Appendix 2.

A sediment transport analysis was performed to ensure that the stream restoration design creates a stable channel that does not aggrade or degrade over time. The shear stress and maximum particle size entrained were calculated and compared with the sub-pavement and pavement samples collected from the existing reach as shown in Table 9F. The proposed design will slightly increase the shear stresses observed in the existing condition and entraining particle size near the riffle d84 during a bankfull flow event. This analysis provides evidence that the stresses predicted for the design channels will be within the range of stable values calculated for similar stream systems. The full sediment transport analysis is provided in Appendix 2 along with the sub-pavement and pavement sample results.

Table 9F. Morphology Table for Moores Fork Reach 2

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	4.40			
Channel Thalweg Length (ft)	-	2007	-	2176
Valley Width (feet)	>53			
Channel/Reach Classification	-	F4	C4	C4
Bankfull Width (feet)	20 – 30	30.7	21.9 - 25.9	21.9 - 25.9
Bankfull Mean Depth (feet)	1.8 – 3.0	1.7	1.6 – 2.6	1.6 – 2.6
Bankfull Area (ft^2)	40– 50	51.6	-	47.8
Bank Height Ratio	-	3.2	1.0 - 1.1	1.0
Entrenchment Ratio	-	1.1	> 2.2	2.2 – 4.0
Bankfull Shear Stress (lb/ft^2)	-	0.40	-	0.46
Average Bankfull Velocity (fps)	2.5 – 20.0	3.1	< 4	3.1
Bankfull Discharge (cfs)	100 – 800	150	-	150
Water Surface Slope (ft/ft)	-	0.004	-	0.0037
Sinuosity*	-	1.11	1.2-1.4	1.28
D16 / 35 / 50 / 84 / 95/ di_pavement/ di_subpavement (mm)*	-	13.1 / 21.9 / 30.5 / 75.3 / 142.0 / 61 / 90		

* D16/35/50/84/95 are the average of the riffle counts; di_pavement and di_subpavement are the largest particles from the pavement and sub-pavement samples.

7.7 Moores Fork Reach 3

Moores Fork Reach 3 (MF R3) begins after the Race Track Road bridge and ends downstream at the property line. The reach is completely straight and incised due to past channelization, with eroding banks and no riparian buffer. Agricultural row crops are planted up to the top of the stream banks on both sides of the stream. The hydraulics and geomorphology of the system is

not functioning. Water quality stressors include excess sediment from bank erosion, suburban stormwater runoff from upstream development, excess nutrients from agricultural runoff, and lack of riparian buffer on both banks. The reach ends at the confluence with the UT of Moores Fork that has bedrock control.

MF R3 will be restored by adjusting channel pattern, bank grading/benching, and structure placement. Priority II restoration approach is utilized due to the depth of the existing channel, the constraint of the bridge and road crossing on Race Track Road, and the property line. The channel will be designed to connect with bedrock at the confluence of an unnamed tributary downstream and the project limits. Cross vanes, offset vanes, and constructed riffles will be used as grade control due to its low design sinuosity. Table 9G provides a summary of existing and proposed stream morphological information and design criteria for MF R3. Detailed morphological tables are provided for all stream reaches in Appendix 2. Discussions regarding sediment transport in MF R2 also apply to MF R3.

Table 9G. Morphology Table for Moores Fork Reach 3

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	4.40			
Channel Thalweg Length (ft)	-	380	-	384
Valley Width (feet)	>53			
Channel/Reach Classification	-	F4	C4	C4
Bankfull Width (feet)	20 – 30	30.7	21.9 - 25.9	21.9 - 25.9
Bankfull Mean Depth (feet)	1.8 – 3.0	1.7	1.6 – 2.6	1.6 – 2.6
Bankfull Area (ft^2)	40– 50	51.6	-	47.8
Bank Height Ratio	-	3.2	1.0 - 1.1	1.0
Entrenchment Ratio	-	1.1	> 2.2	2.2 – 4.0
Bankfull Shear Stress (lb/ft^2)	-	0.40	-	0.46
Average Bankfull Velocity (fps)	2.5 – 20.0	3.1	< 4	3.1
Bankfull Discharge (cfs)	100 – 800	150	-	150
Water Surface Slope (ft/ft)	-	0.0076	-	0.0037
Sinuosity*	-	1.02	1.2-1.4	1.03
D16 / 35 / 50 / 84 / 95 / di_pavement / di_subpavement (mm)*	-	13.1 / 21.9 / 30.5 / 75.3 / 142.0 / 61 / 90		

* D16/35/50/84/95 are the average of the riffle counts; di_pavement and di_subpavement are the largest particles from the pavement and sub-pavement samples.

7.8 Best Management Practices

As part of the proposed Project, two areas of field gullies and concentrated runoff were addressed. The first location is near station 31+45 on the design for UT1 (Figure 8A); the second location is near station 23+10 on MF R1 (Figure 8B). In both locations, rock cascade structures

will be installed as a series of rock steps and pools that dissipate energy and allow runoff to enter the project reaches without causing erosion. The structure on MF will be larger and require more steps than the structure on UT1 due to the amount of expected water and the elevation drop to reach the stream. These structures will be observed during the monitoring period to ensure that they are functioning as designed and providing the necessary stability.

7.9 Vegetation and Planting Plan

Species selection for re-vegetation of stream buffer areas will generally follow those suggested by Schafale and Weakley (1990) for Piedmont/Low Mountain Alluvial Forest and Schafale (2012) for Piedmont Alluvial Forest, as well as wetness tolerances cited in *WRP Technical Note VN-RS-4.1* (WRP 1997). Where the easement includes steeper slopes or areas outside Priority II benching limits, upland seeding and tree species will be planted. The native species selected for establishment at the Site represent a range of growth rates and varying tolerances to shade and moisture. This range of characteristics were selected to ensure that the appropriate vegetation cover develops over the life of the project.

The species list, site preparation, planting density, planting methods, and materials are provided in the construction drawings included in Appendix 1. Vegetation will be planted during the dormant season (November 15 – March 15) following the handling and installation procedures outlined on the plan sheets to achieve the vegetative success criteria outlined in Section 7.2. An invasive species control plan is included in Appendix 9.

7.10 Project Risks and Uncertainties

Listed below are identified project risks and uncertainties that have been evaluated in the development of design plans for the site, along with methods that have been/will be used to address these concerns.

- Land use development: There is potential for increased land development around the site in the future that could lead to additional runoff and changes to watershed hydrology.
    - Methods to Address: The project area has seen little development in recent years and it is unlikely that development will threaten the site in the foreseeable future. Restoration of the site to reconnect streams to their floodplains will reduce the likelihood of future degradation from watershed changes, as increased flows will spread over a wider floodplain. Grade control (in the form of constructed instream structures and natural bedrock outcrops) present across the restored site decrease the chances of future channel incision.

- Easement Encroachment: There is potential for landowner encroachment into the permanent conservation easement.
    - Methods to Address: EPR has had considerable discussions with the landowners regarding the project requirements and limitations of easement access and is

confident that the landowners fully understand and will maintain the easement protections. The easement boundaries will also be clearly marked per NCDMS requirements. Any encroachments that do occur will be remedied by EPR or the long-term steward to remedy any damage and provide any other corrections required by NCDMS and/or the IRT.

- Drought and Floods: There is potential for extreme climatic conditions during the monitoring period of the project.

    - Methods to Address: EPR will apply adaptive management techniques as necessary to meet the site performance criteria. Such adaptive management may include replanting, channel damage repair, irrigation, or other methods. If adaptive management activities are significant, additional monitoring may be required by the IRT.

- Beavers: While there was no evidence of beaver activity during recent assessments, there is potential for beavers to affect the site during the monitoring period of the project.

    - Methods to Address: EPR will take steps to trap and remove beaver if they affect to the Site during the monitoring period.

7.11 Determination of Credits

Mitigation credits presented in Tables 10A through 10C are projections based upon the proposed designs. Upon completion of construction, the project components and credit data will be adjusted, if necessary, to be consistent with the as-built condition, and any changes will be described in the As-built Monitoring Report. The project proposes to provide stream credits derived from stream enhancement, stream restoration activities, and non-standard buffer widths as shown in Figures 8 and 10.

Descriptions of the stream restoration ratios are presented below in Table 10A. Table 10B presents the length and area summations by mitigation category and Table 10C shows the overall summary of assets. The proposed credit release schedule is provided in Appendix 4. Appendix 12 provides the Wilmington District Stream Buffer Credit Calculator spreadsheet and shapefiles.

Table 10A. Stewarts Creek Tributaries Stream Restoration Project Streams Asset Table.

Project Component	Existing Footage	Stationing	Mitigation Plan Footage[B]	Restoration Level [A]	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Credits	Notes / Comments
UT1	2,373	10+00 – 38+05	2,742	R	P1, P2	1	2,742	Full Channel Restoration, Planted Buffer, Exclusion of Livestock, and Permanent Conservation Easement.
UT2	397	10+00 – 20+60	1,009	R	P1, P2	1	1,009	
UT3 R1	1,814[C]	10+00 – 19+95	944	R	P1, P2	1	944	
UT3 R2	N/A	19+95 – 45+17	2,421	R	P1, P2	1	2,421	
Moores Fork R1	1,660	10+00 – 25+72.50	1,573	E2	E2	2.5	629	Habitat Structures, Benching, Planted Buffer, Exclusion of Livestock, and Permanent Conservation Easement.
Moores Fork R2	2,007	25+72.5 – 47+67	1,998	R	P2	1	1,998	Full Channel Restoration, Planted Buffer, Exclusion of Livestock, and Permanent Conservation Easement.
Moores Fork R3	380	47+67 – 51+53.62	384	R	P2	1	384	
Net Change in Credit from Buffers	-	-	-	-	-	-	522	Wilmington District Stream Buffer Credit Calculator (Updated 1/19/2018).
Total Assets Summary: 10,649 SMUs[B]								

[A] R = Restoration, E = Enhancement

[B] Lengths exclude channel work areas between easement breaks/crossings.

[C] Length is for the entire existing UT3 Reach.

Table 10B. Length and Area Summations by Mitigation Category.

Restoration Level	Stream (linear feet)[A]	Riparian Wetland (acres)		Non-riparian Wetland (acres)
		Riverine	Non-Riverine	
Restoration	9,498			
Enhancement				
Enhancement I				
Enhancement II	1,573			
Rehabilitation				
Preservation				
High Quality Pres				

[A] Lengths exclude channel work areas between easement breaks/crossings.

Table 10C. Overall Assets Summary.

Asset Category	Overall Credits
Stream	**10,649**

8.0 PERFORMANCE STANDARDS

Performance criteria outlined in the NCDMS Mitigation Stream and Wetland Mitigation Plan Template (ver. 06/2017), and U.S. Army Corps of Engineers – Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District (October 24, 2016), will be followed and are briefly outlined below. Monitoring information can be found in Section 9.0.

8.1 Restored Stream Channels

The required performance criteria for restored stream channels, per USACE Guidance (October 24, 2016) are summarized briefly below:

- All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05.
- Bank height ratio (BHR) cannot exceed 1.2 for all measured riffle cross sections on a given reach.
- BHR should not change by more than 10% in any given year for all measured cross sections on a given reach.
- Must document occurrence of at least 4 bankfull events in separate years during the monitoring period.

8.2 Riparian Vegetation

The required performance criteria for planted riparian vegetation, per USACE Guidance (October 24, 2016) are summarized below:

- 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 4; 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 addition to planted stems, volunteer stems may be counted, provided they are included in the approved planting list for the site and have been present and documented for at least two growing seasons (for monitoring years 5 and 7).
- Any single species can only account for 50% of the required stems per monitoring plot.

8.3 Compatibility with Project Goals

The required performance criteria described above, while following regulatory and NCDMS guidance, allow evaluation of whether the project goals have been met after the site has been completed. In Table 11, the Project goals and objectives are listed, along with the performance criteria that will allow documentation of whether the goals have been achieved. Fulfillment of these objectives will allow the Project to achieve the goals outlined in Section 6.0.

Table 11. Project Goals and Associated Performance Criteria.

Goals	Objectives	Success Criteria
Reduce Sediment Inputs and Stream Turbidity	Reduce the amount of land in active livestock pasture.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Exclude livestock from project streams.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Increase distance between active farming operations and receiving waters.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Restore riparian buffers to filter runoff.	▪ Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.
	Stabilize eroding stream banks.	▪ Geomorphic cross sections indicate stable sections over the monitoring period.
Reduce Nutrient Inputs	Reduce the amount of land in active livestock pasture.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Exclude livestock from project streams.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Increase distance between active farming operations and receiving waters.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Restore riparian buffers to filter runoff.	▪ Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.
Reduce Fecal Coliform Inputs	Reduce the amount of land in active livestock pasture.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Exclude livestock from project streams.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Increase distance between active farming operations and receiving waters.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Restore riparian buffers to filter runoff.	▪ Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.
Restore/Enhance Degraded Riparian Buffers	Restore riparian buffer vegetation to filter runoff and provide organic matter and shade	▪ Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.
	Protect riparian buffers with a permanent conservation easement.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
Reduce Urban/Suburban Stormwater Runoff	Restore minimum 30-foot riparian buffers along all streams.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Protect riparian buffers with a permanent conservation easement.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
Reduce Stream Channel and Stream Bank Instability	Restore degraded stream channels with appropriate dimension, pattern and profile.	▪ Geomorphic cross sections and profile indicate stable sections over the monitoring period.
	Install in-stream structures to provide stream channel and stream bank stability.	▪ Geomorphic cross sections and profile indicate stable sections over the monitoring period.
	Restore riparian buffer to provide bank protection and stability.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.
	Install fencing to exclude livestock from project streams.	▪ Recordation and protection of a conservation easement meeting NCDMS guidelines.

9.0 MONITORING PLAN

The monitoring plan for the Site will follow the guidance outlined in the *NCDMS Mitigation Plan Template* (ver. 06/2017), and *U.S. Army Corps of Engineers – Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District* (October 24, 2016). Monitoring data collected on the site will include reference photos, plant survival analyses, channel stability analyses, and biological data if specifically required by permit conditions.

Monitoring will be conducted for a period of seven years unless the USACE, in consultation with the IRT, agrees that monitoring may be terminated early. Early closure will only be provided through written approval from the USACE in consultation with the IRT. Annual monitoring reports will be submitted to the NCDMS by EPR no later than November 30 of each monitoring year.

The *As-Built Baseline Monitoring Report Template* (ver. 06/2017) will be used to document the baseline conditions and to prepare the as-built record drawings for the Site. As-built surveys will be conducted within 60 days after project implementation is completed (following planting and monitoring installations) to document the recently constructed features and conditions of the Site.

Annual monitoring data will be reported using the *NCDMS Monitoring Report Template* (ver. 06/2017). The monitoring report shall provide a project data chronology that will facilitate an understanding of project status and trends, population of DMS databases for analysis, and assist in decision making regarding project close-out.

While monitoring reports will be completed annually, not all monitoring reports will include the same information. All monitoring reports will include at least a brief narrative of site developments, a representative photo log, and a Current Condition Plan View (CCPV). Further monitoring measurements are detailed in the following sections.

9.1 Stream Monitoring

Stream monitoring will include monitoring of the hydrologic and geomorphic functions of UT1, UT2, UT3, and Moores Fork. Monitored parameters, methods, schedule/frequency, and extent are summarized in Table 12. Monitoring parameters follow USACE guidance but will also allow monitoring of parameters to document site performance related to the project goals listed in Section 6.0. The proposed locations of monitored cross sections are shown in Figures 9A and 9B.

Table 12. Stream Monitoring Summary.

Parameter	Method	Schedule/ Frequency	Number/ Extent
Stream Profile	Full longitudinal survey	As-built, (unless otherwise required)	All restored stream channels
Stream Dimension [A]	Cross sections	Years 1, 2, 3, 5, and 7	UTs: 16 Moores Fork: 9
Channel Stability	Visual Assessment	Yearly	All restored and enhanced stream channels
	Additional Cross sections	Yearly	Only if instability is documented during monitoring
Stream Hydrology	Pressure transducers Precipitation recorder Photos of flood indicators	Continuous recording through monitoring period	Two gauges on UT1 and UT 3; one gauge on UT2

[A] Parameters for stream dimension to be measured as described in the 2018 Standard Measurement of the BHR monitoring parameter technical workgroup.

9.2 Riparian Vegetation Monitoring

Vegetation monitoring will evaluate the establishment of planted and volunteer vegetation across the site. Monitored parameters, methods, schedule/frequency, and extent are summarized in Table 13. Monitoring parameters follow USACE guidance but will also allow monitoring of parameters to document site performance related to the project goals listed in Section 6.0.

Table 13. Riparian Vegetation Monitoring Summary.

Parameter	Method	Schedule/ Frequency	Number/ Extent	Data Collected
Vegetation establishment and vigor	Permanent vegetation plots, 0.02* acre in size (minimum)	As-built, Years 1, 2, 3, 5, and 7 Between July 1st and leaf drop	11 plots, spread across site	Species, height, location, planted vs. volunteer, and age
	Annual random vegetation plots, 0.02* acre in size (minimum)		11 plots, randomly selected each year	Species, and height

* Plots will be between 0.020 and 0.024 acre in size, at a minimum.

During quantitative vegetation sampling, sample plots (100 square meters, or 0.02 acre) will be installed within the site as per guidelines established by the Level 1 and 2 protocols in *CVS-DMS Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph. The proposed locations of permanent vegetation plots are shown in Figures 9A and 9B.

9.3 Visual Assessment Monitoring

A visual assessment of the entire project will be conducted on an annual basis. The culmination of this data will be presented in the Current Condition Plan View (CCPV), with supporting documentation presented in the tables outlined by NCDMS's guidance *Annual Monitoring and Closeout Reporting Format, Data Requirements, and Content Guidance*, dated February 2014. This includes photos of all vegetation plots, all monitoring cross sections, and all monitoring gauges and stream stations. Specifically, problem areas of vegetation, in-stream structures, and channel migration will be noted and documented with photos. After NCDMS's review of the documentation, additional monitoring protocols may be required to ensure project success can be achieved.

10.0 ADAPTIVE MANAGEMENT PLAN

In the event the mitigation site or a specific component of the mitigation site fails to achieve the necessary performance standards as specified in the mitigation plan, the sponsor shall notify the members of the IRT and work with the IRT to develop contingency plans and remedial actions.

A maintenance plan is provided in Appendix 6, summarizing the types of issues that may arise during monitoring and how those issues would be addressed.

11.0 LONG-TERM MANAGEMENT PLAN

The site will be transferred to the NCDEQ Stewardship Program. This party shall serve as conservation easement holder and long-term steward for the property and will conduct periodic inspection of the site to ensure that restrictions required in the conservation easement are upheld. 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 Statue GS 113A-232(d)(3). Interest gained by the endowment fund may be used for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable.

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

12.0 REFERENCES

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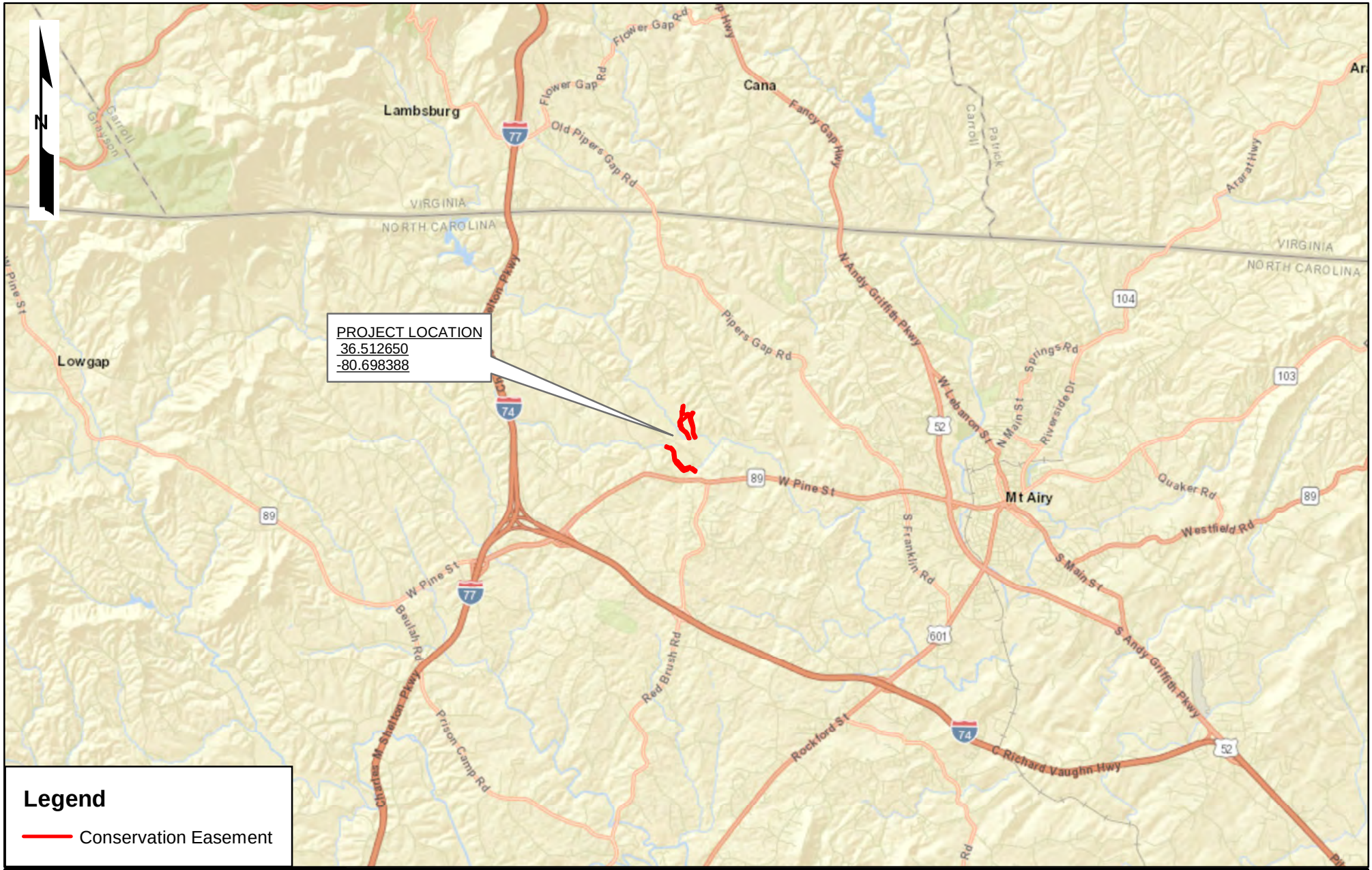


0 1 2 Miles

STEWARTS CREEK TRIBUTARIES

VICINITY MAP

PREPARED FOR:

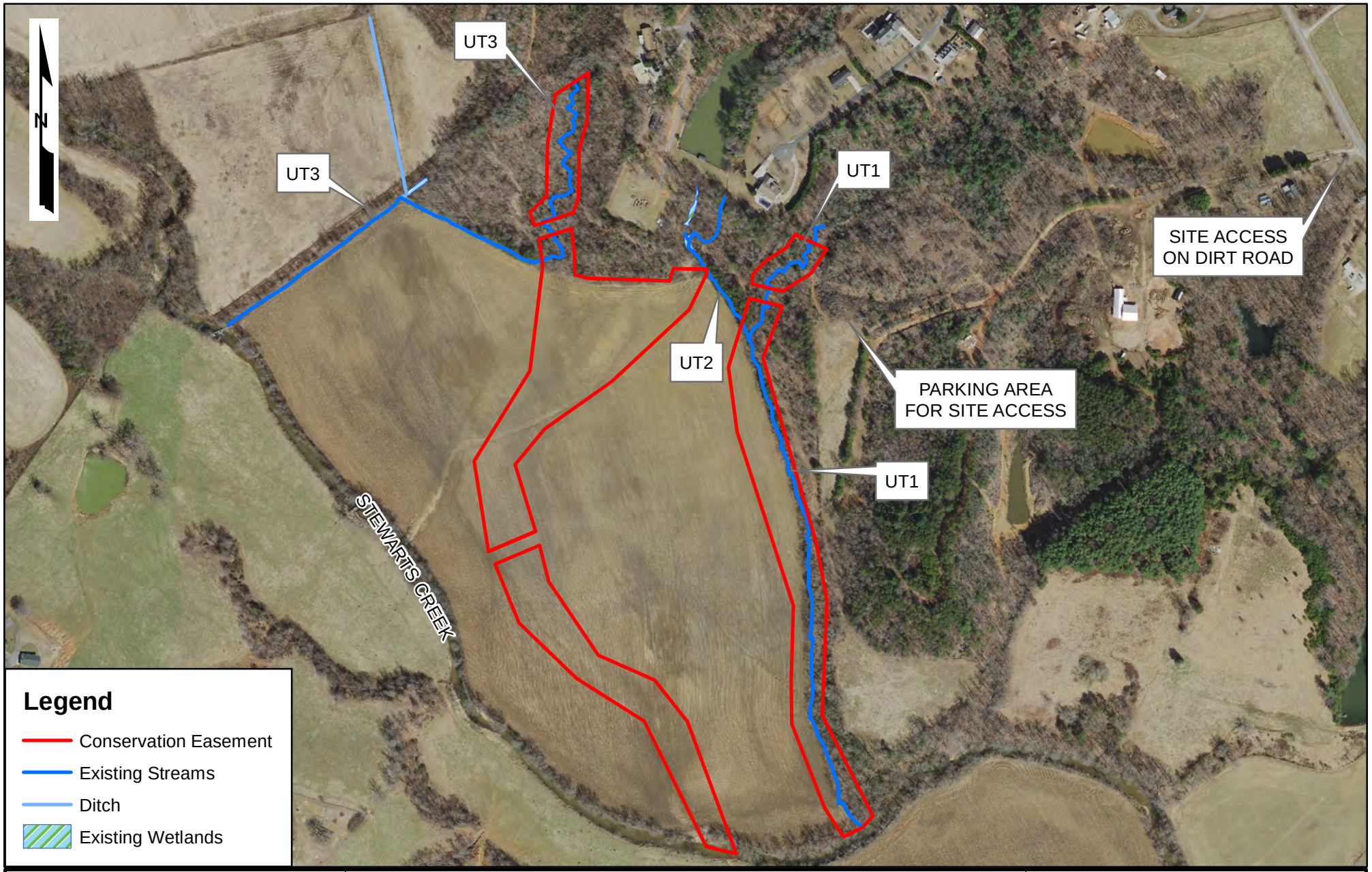
NCDEQ
DIVISION OF
MITIGATION SERVICES

FIGURE 1

SURRY COUNTY, NC

PREPARED BY:

Ecosystem Planning & Restoration



0 225 450 Feet

STEWARTS CREEK TRIBUTARIES

EXISTING STREAM REACH MAP

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MITIGATION SERVICES

FIGURE 2A

SURRY COUNTY, NC

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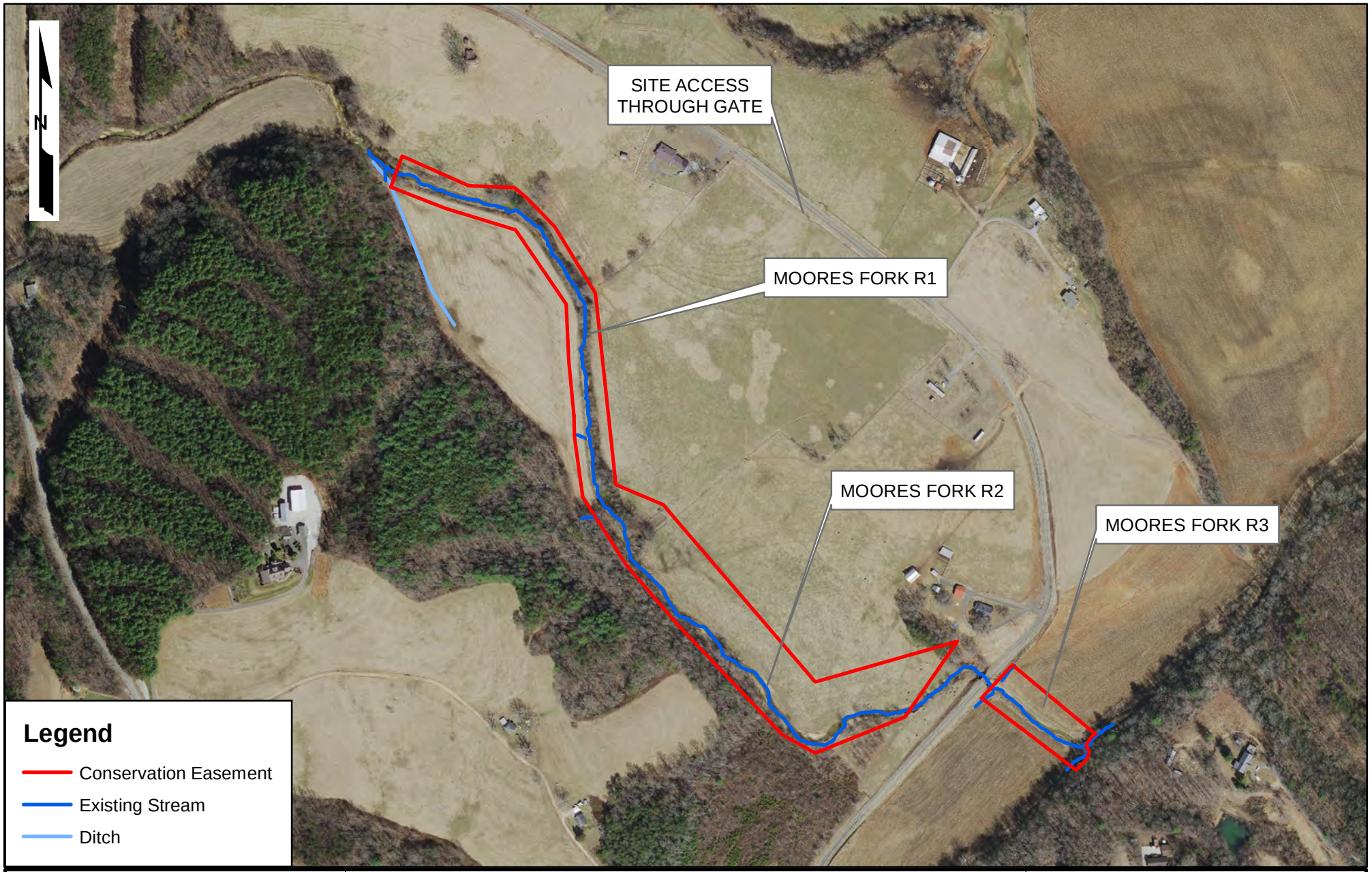

0 225 450 Feet

STEWARTS CREEK TRIBUTARIES

EXISTING STREAM REACH MAP

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MITIGATION SERVICES

FIGURE 2B

SURRY COUNTY, NC

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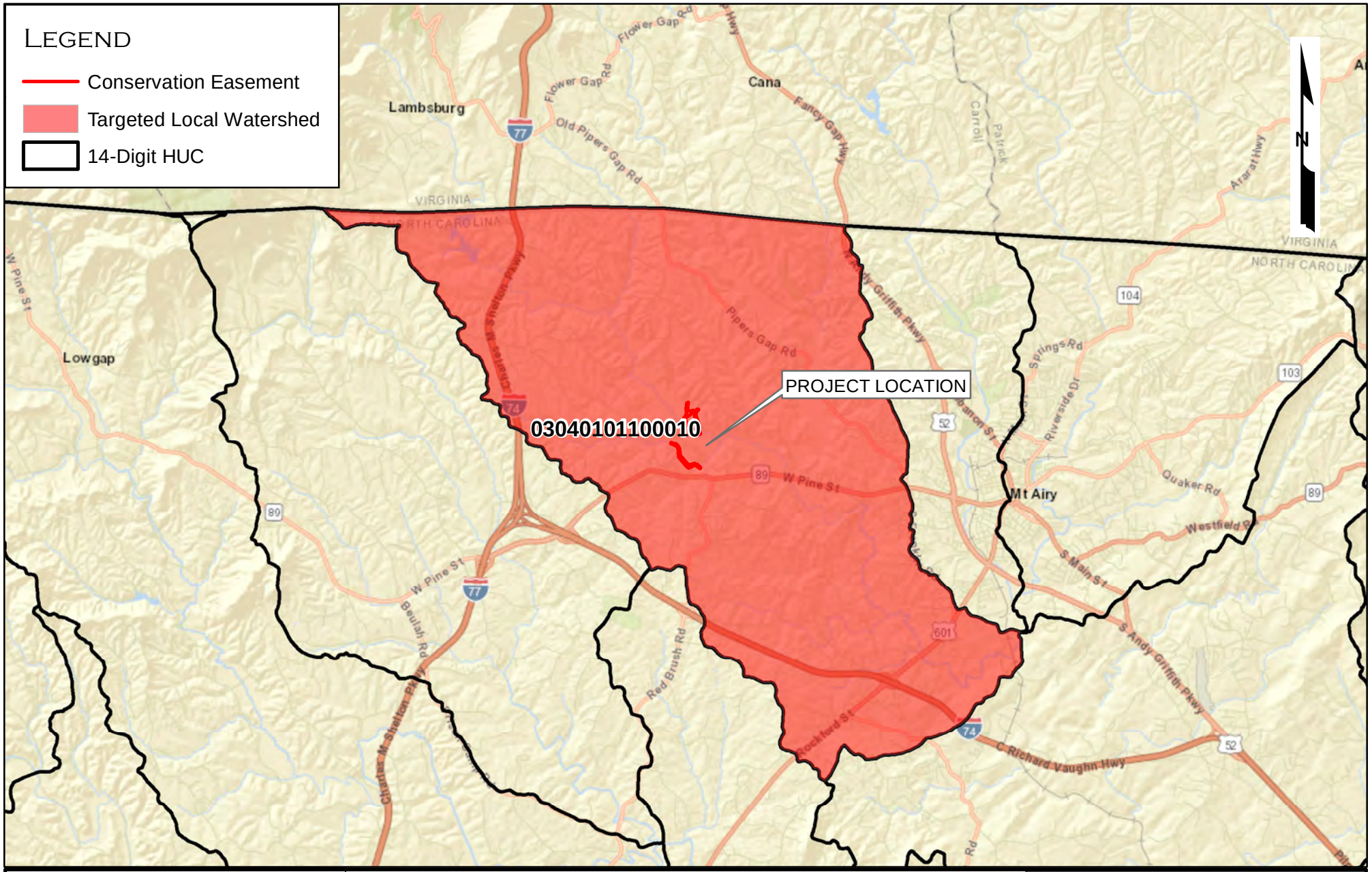

0 1 2 MILES

STEWARTS CREEK TRIBUTARIES

HYDROLOGIC UNIT MAP

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FIGURE 3

SURRY COUNTY, NC

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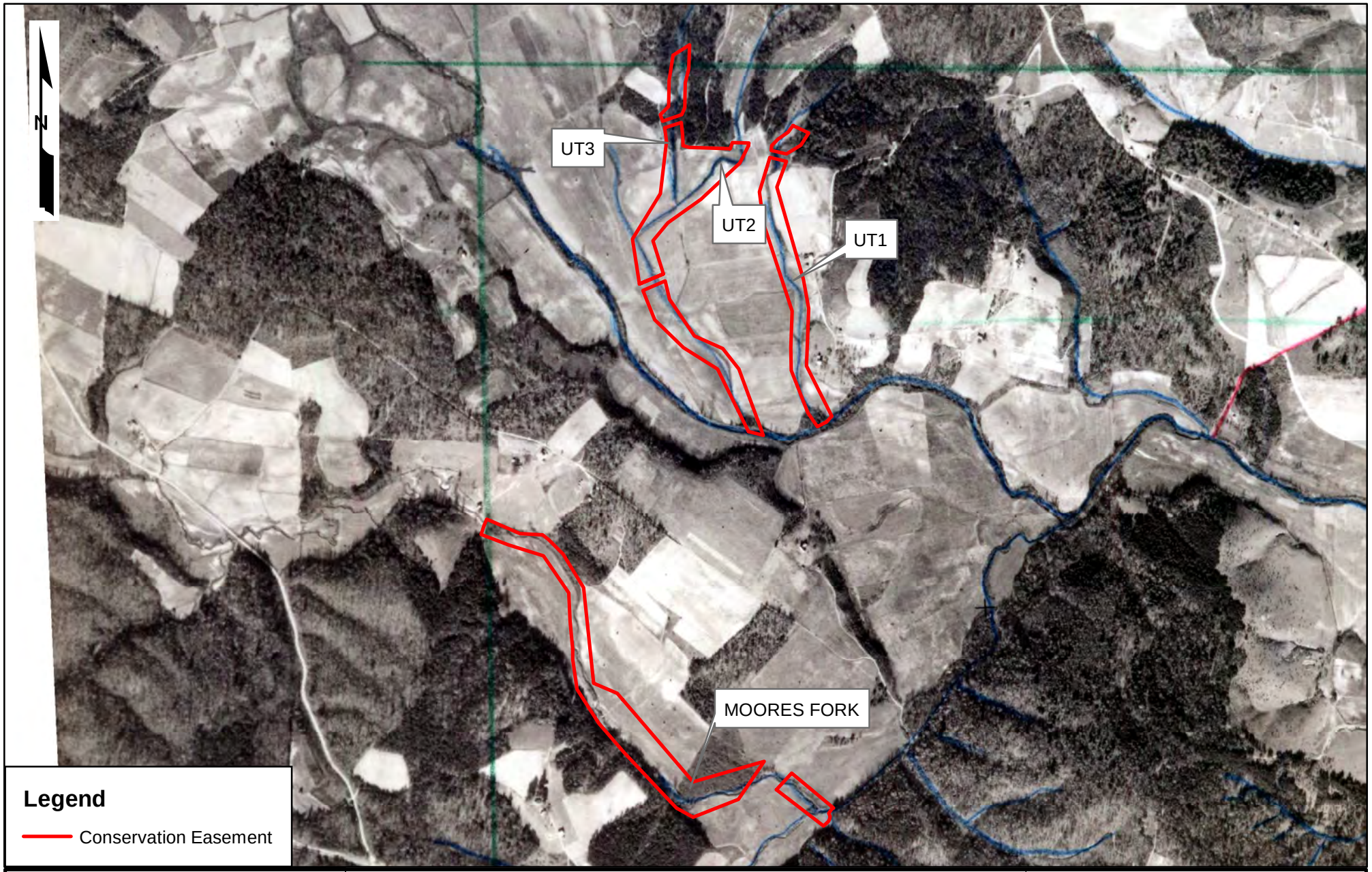

Feet
0 450 900

STEWARTS CREEK TRIBUTARIES

1936 HISTORICAL AERIAL MAP

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MITIGATION SERVICES

FIGURE 4A

SURRY COUNTY, NC

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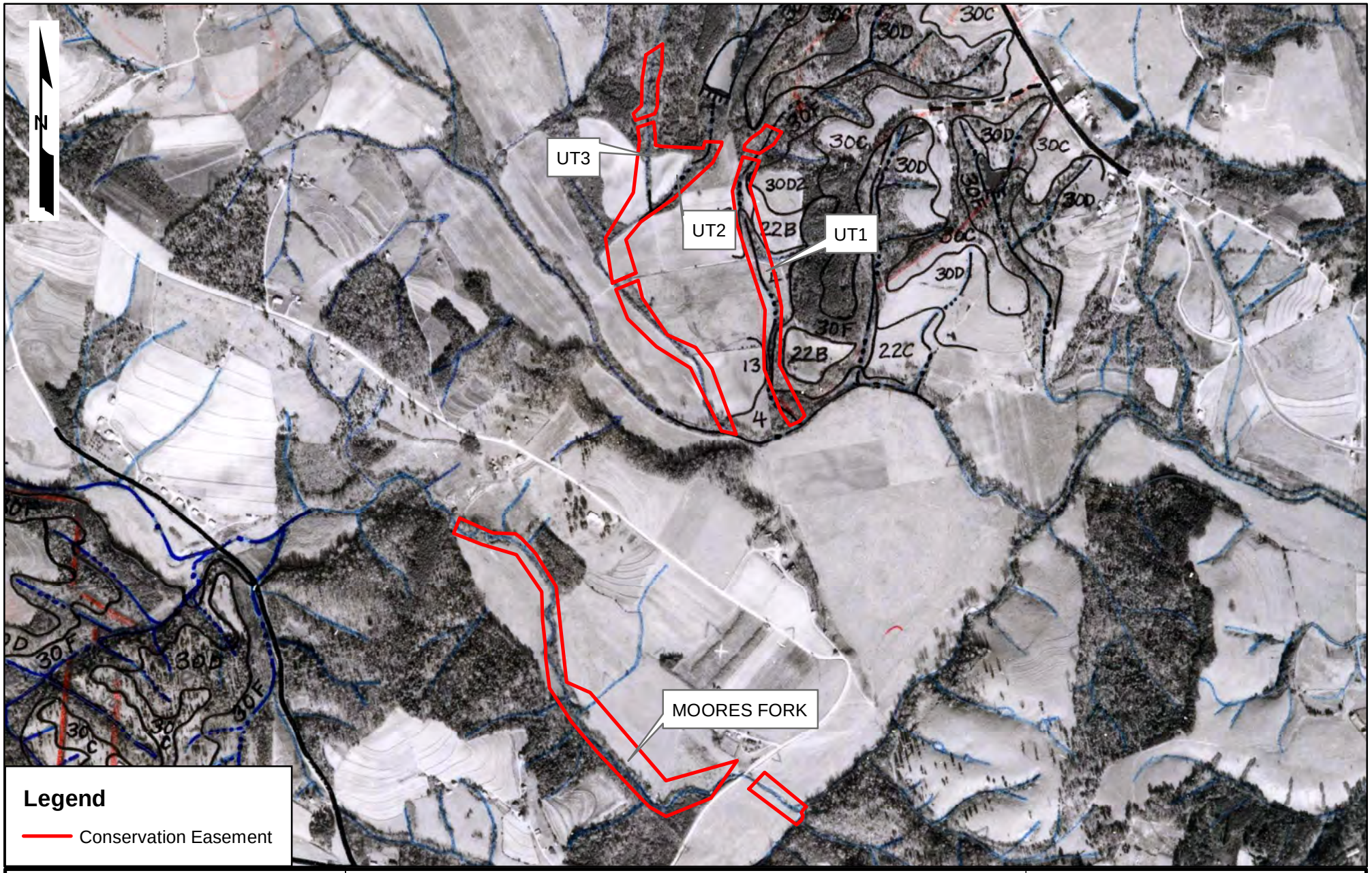

STEWARTS CREEK TRIBUTARIES

1966 HISTORICAL AERIAL MAP

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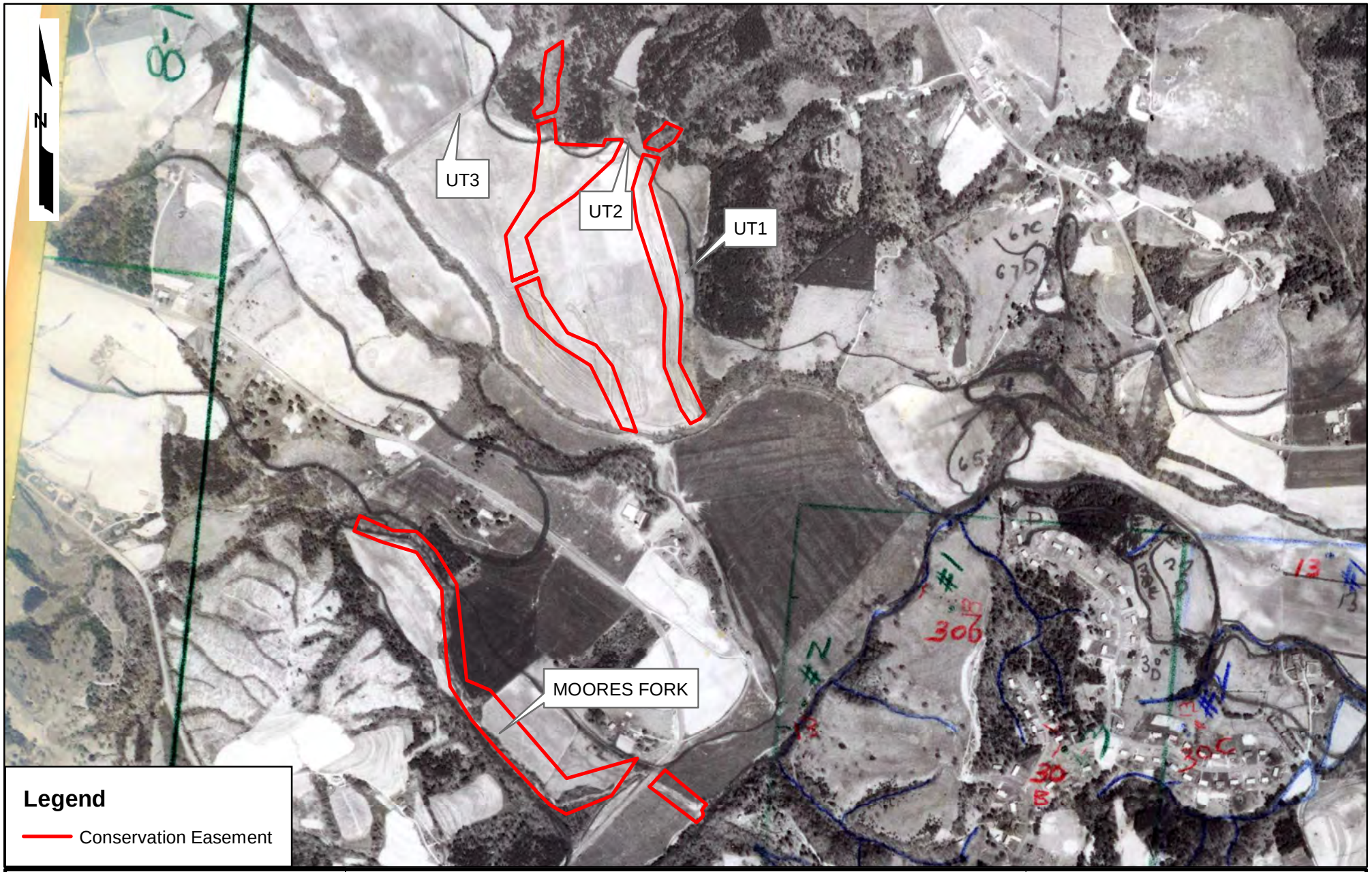
FIGURE 4B

SURRY COUNTY, NC

PREPARED BY:
EPR Ecosystem Planning & Restoration



Feet
0 450 900

STEWARTS CREEK TRIBUTARIES

1977 HISTORICAL AERIAL MAP

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MITIGATION SERVICES

FIGURE 4C

SURRY COUNTY, NC

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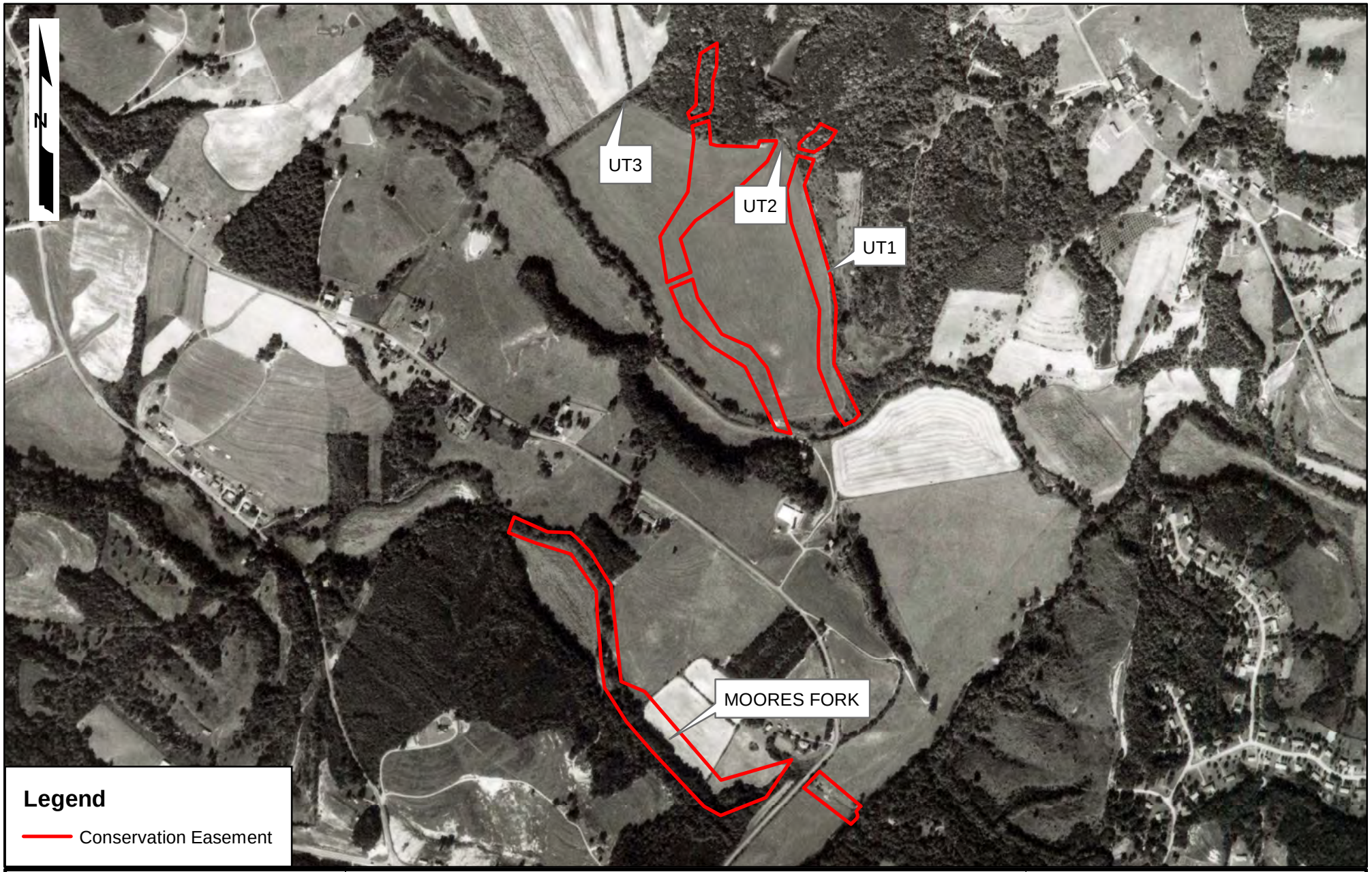
Ecosystem Planning & Restoration



Feet
0 450 900

STEWARTS CREEK TRIBUTARIES

1992 HISTORICAL AERIAL MAP

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MITIGATION SERVICES

FIGURE 4D

SURRY COUNTY, NC

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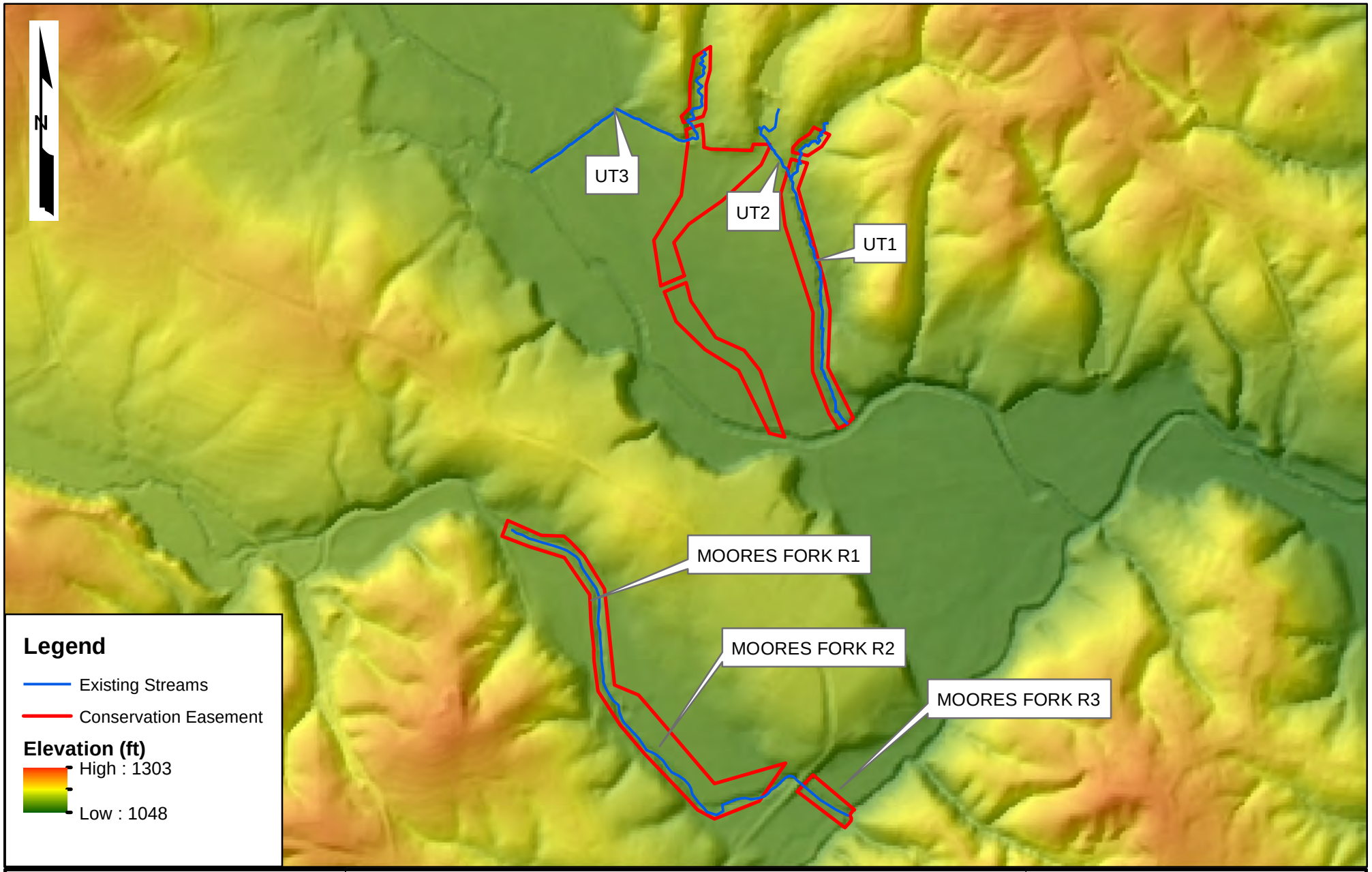

0 450 900 Feet

STEWARTS CREEK TRIBUTARIES

LIDAR MAP

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DIVISION OF
MITIGATION SERVICES

FIGURE 5

SURRY COUNTY, NC

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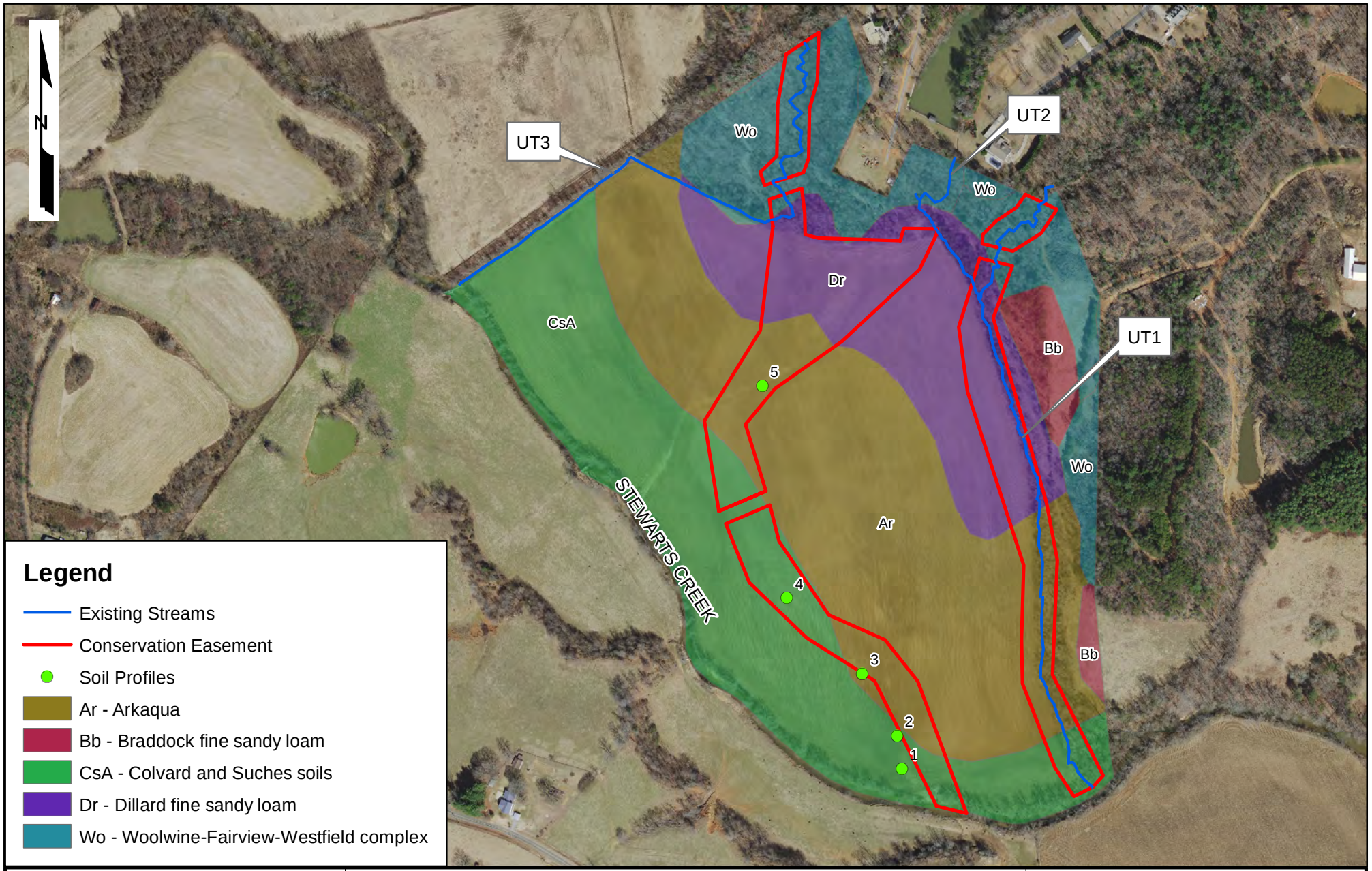

0 225 450 Feet

STEWARTS CREEK TRIBUTARIES

SOILS MAP

PREPARED FOR:
NCDEQ
DIVISION OF
MITIGATION SERVICES

FIGURE 6A

SURRY COUNTY, NC

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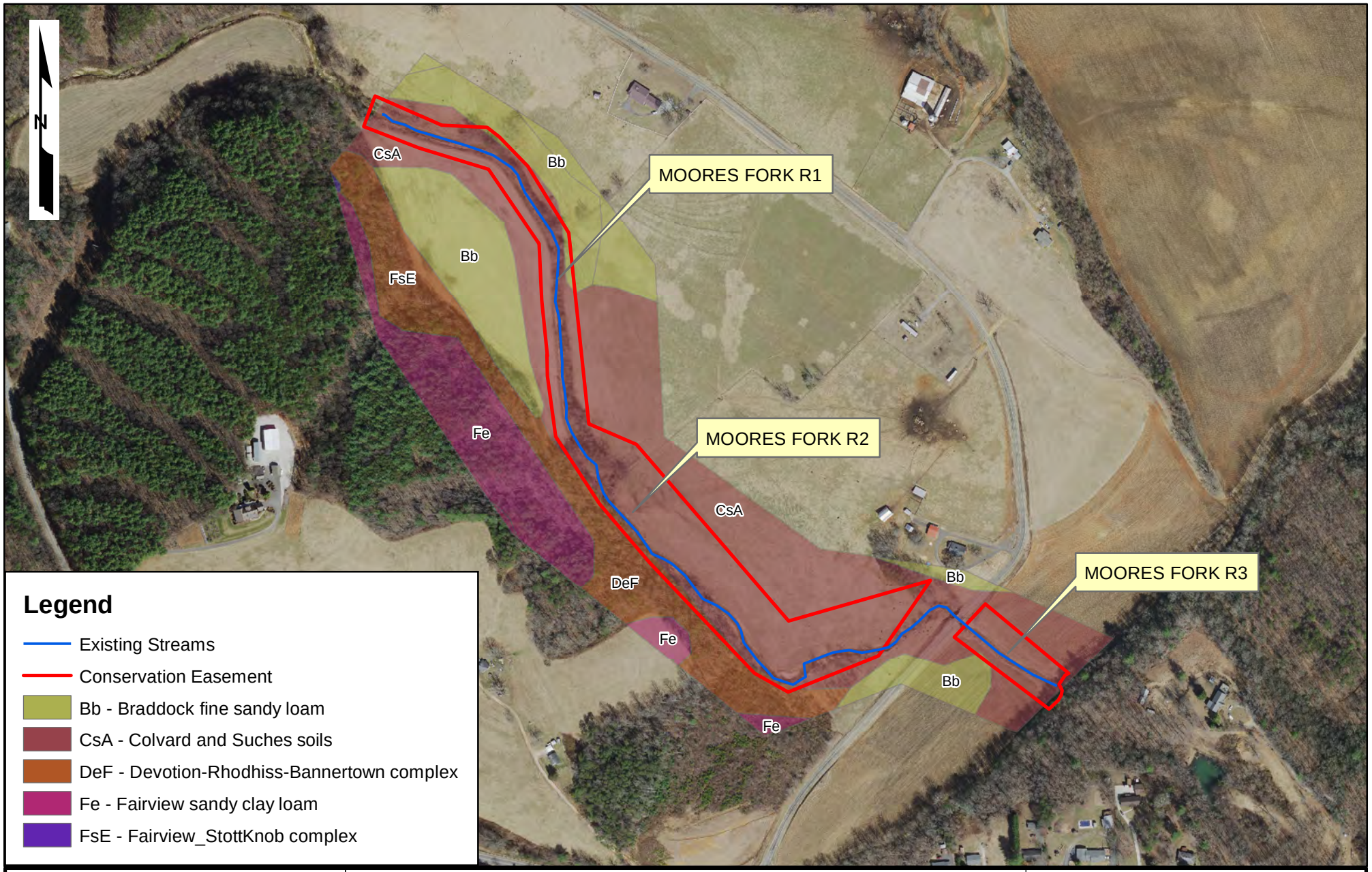

0 225 450 Feet

STEWARTS CREEK TRIBUTARIES

SOILS MAP

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MITIGATION SERVICES

FIGURE 6B

SURRY COUNTY, NC

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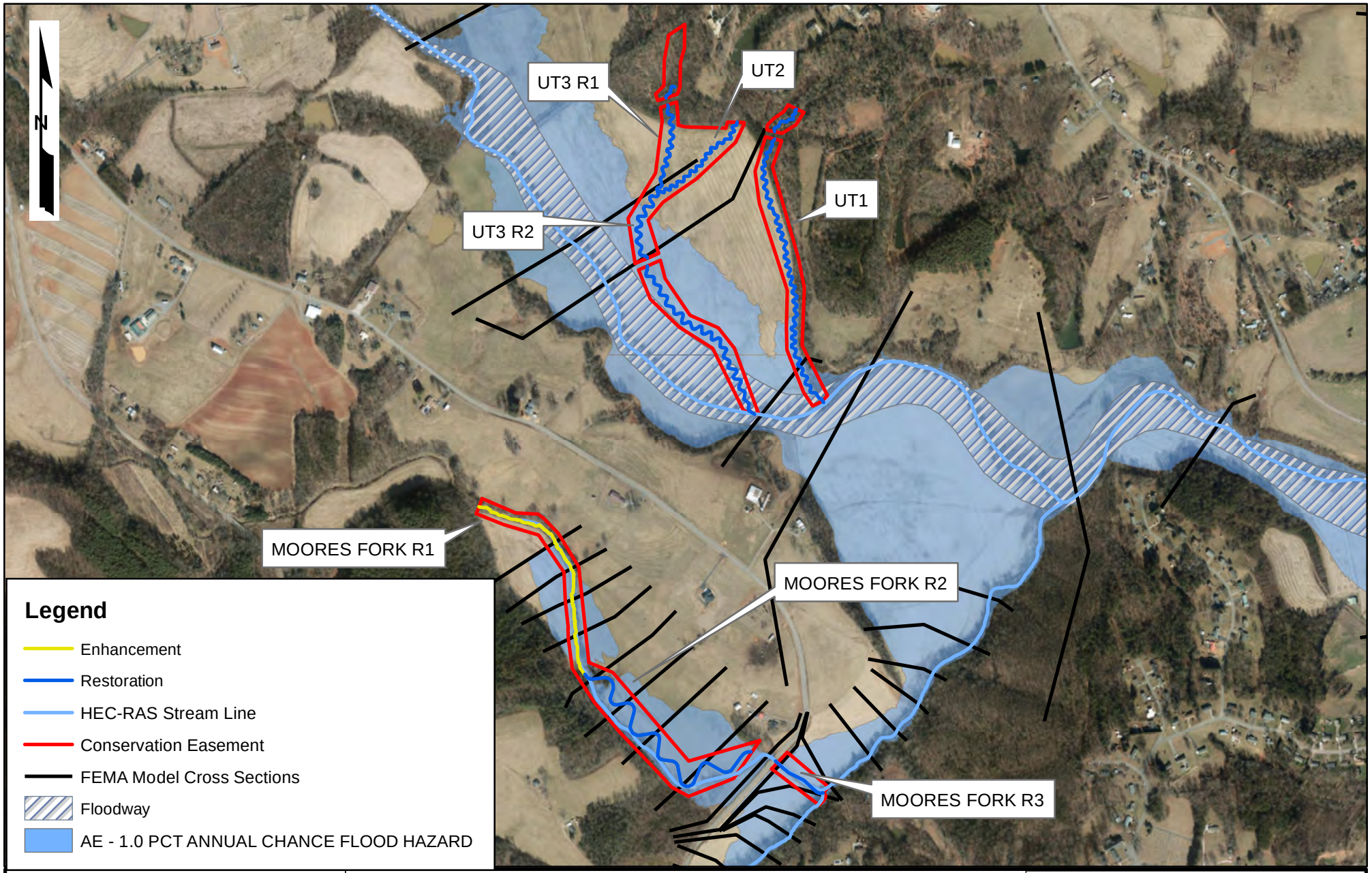

0 450 900 Feet

STEWARTS CREEK TRIBUTARIES

FEMA FLOODPLAIN MAP

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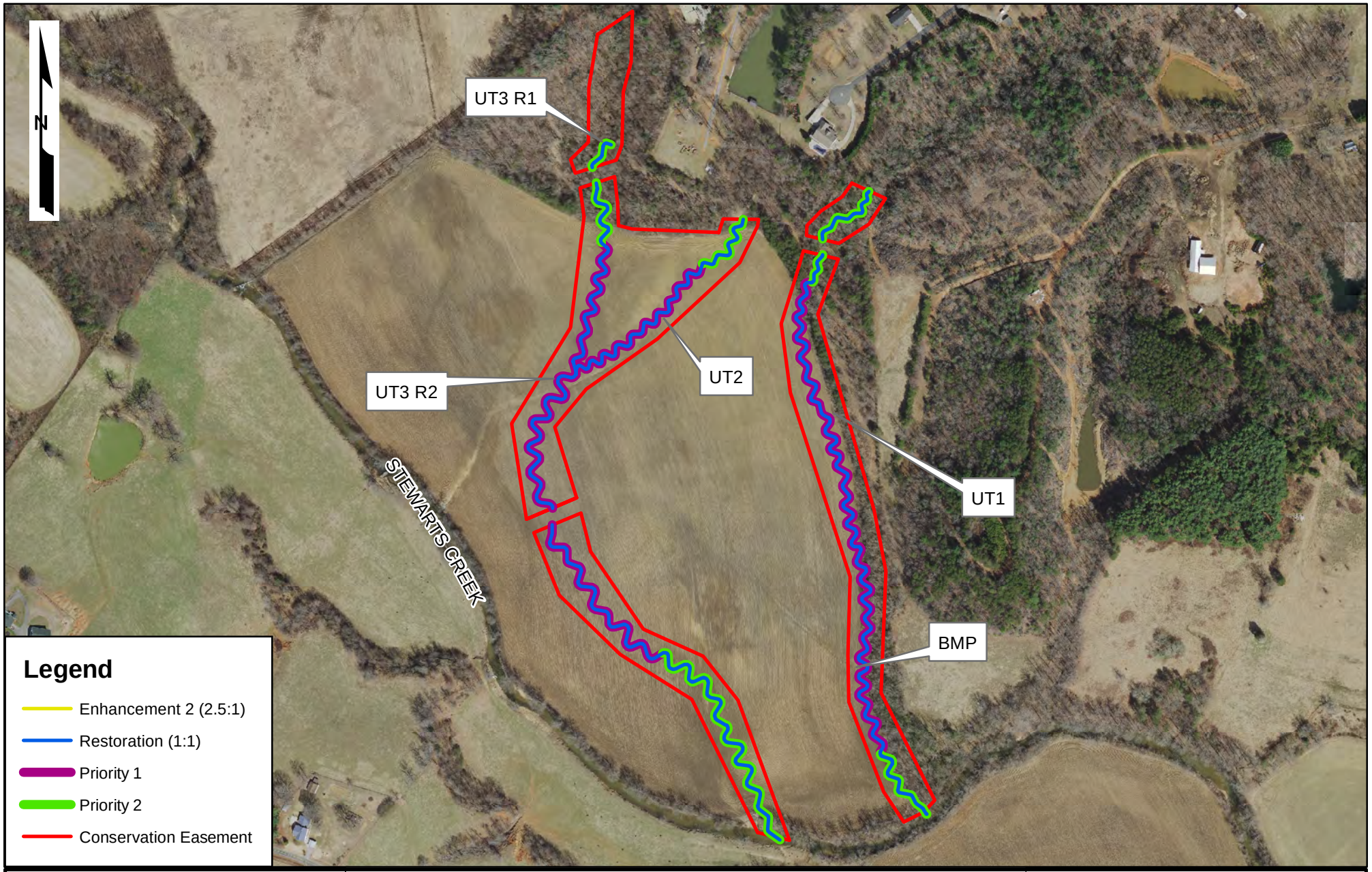
MITIGATION SERVICES

FIGURE 7

SURRY COUNTY, NC

PREPARED BY:

Ecosystem Planning & Restoration



0 215 430 Feet

STEWARTS CREEK TRIBUTARIES

ASSET MAP

PREPARED FOR:
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DIVISION OF
MITIGATION SERVICES

FIGURE 8A

SURRY COUNTY, NC

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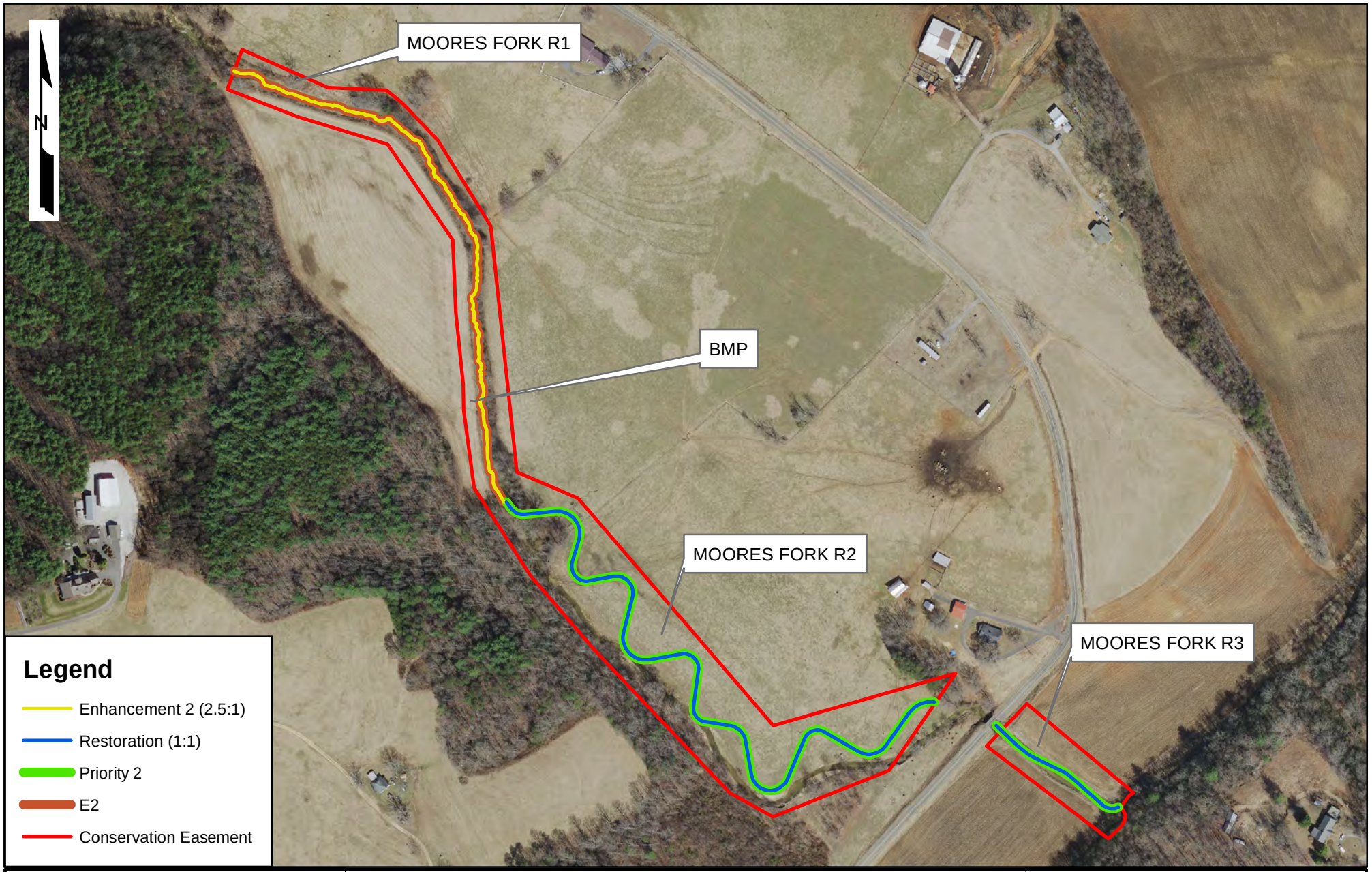

0 175 350 Feet

STEWARTS CREEK TRIBUTARIES

ASSET MAP

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FIGURE 8B

SURRY COUNTY, NC

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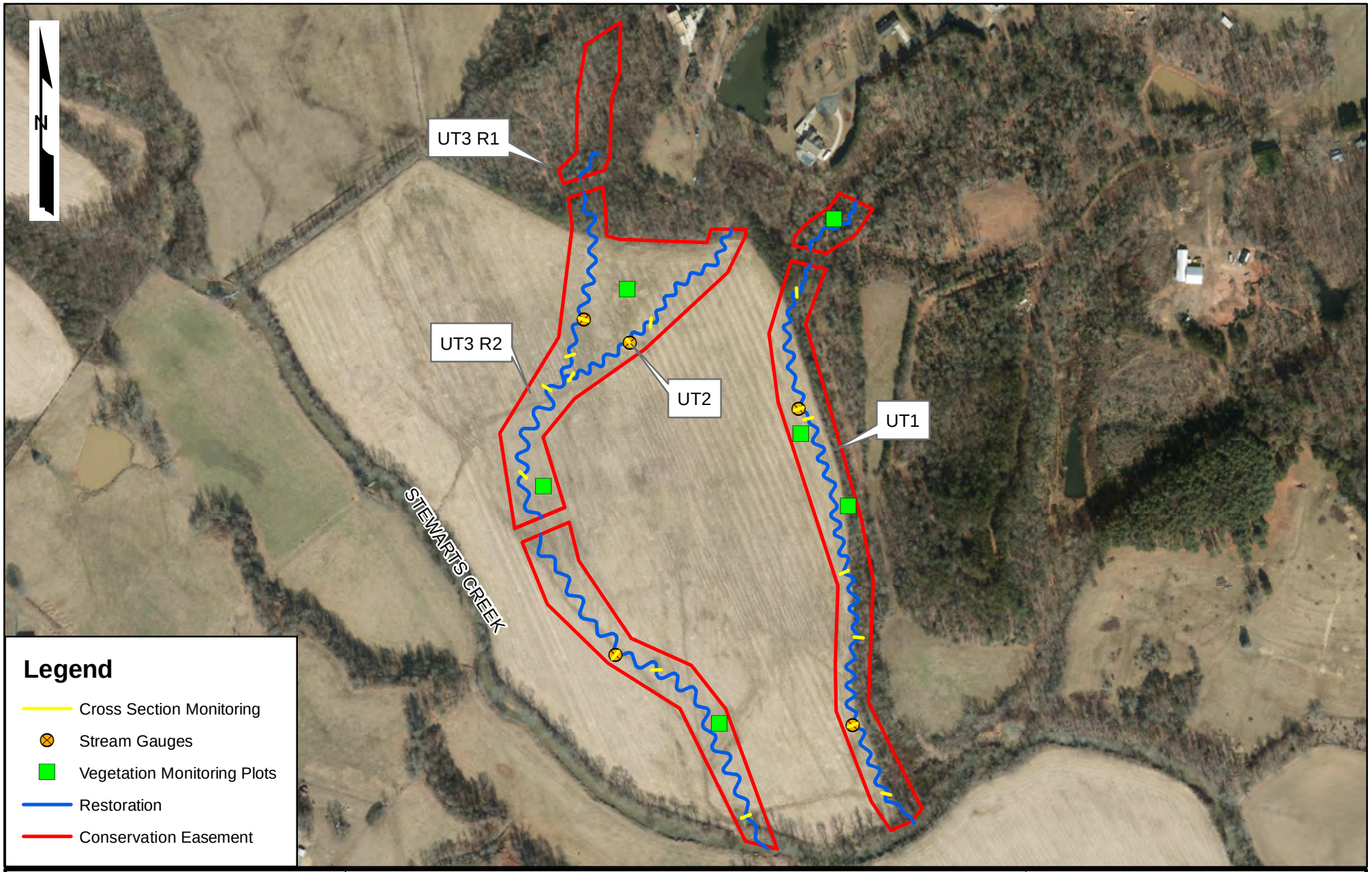

0 212.5 425 Feet

STEWARTS CREEK TRIBUTARIES

PROPOSED MONITORING FEATURES

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DIVISION OF
MITIGATION SERVICES

FIGURE 9A

SURRY COUNTY, NC

PREPARED BY:
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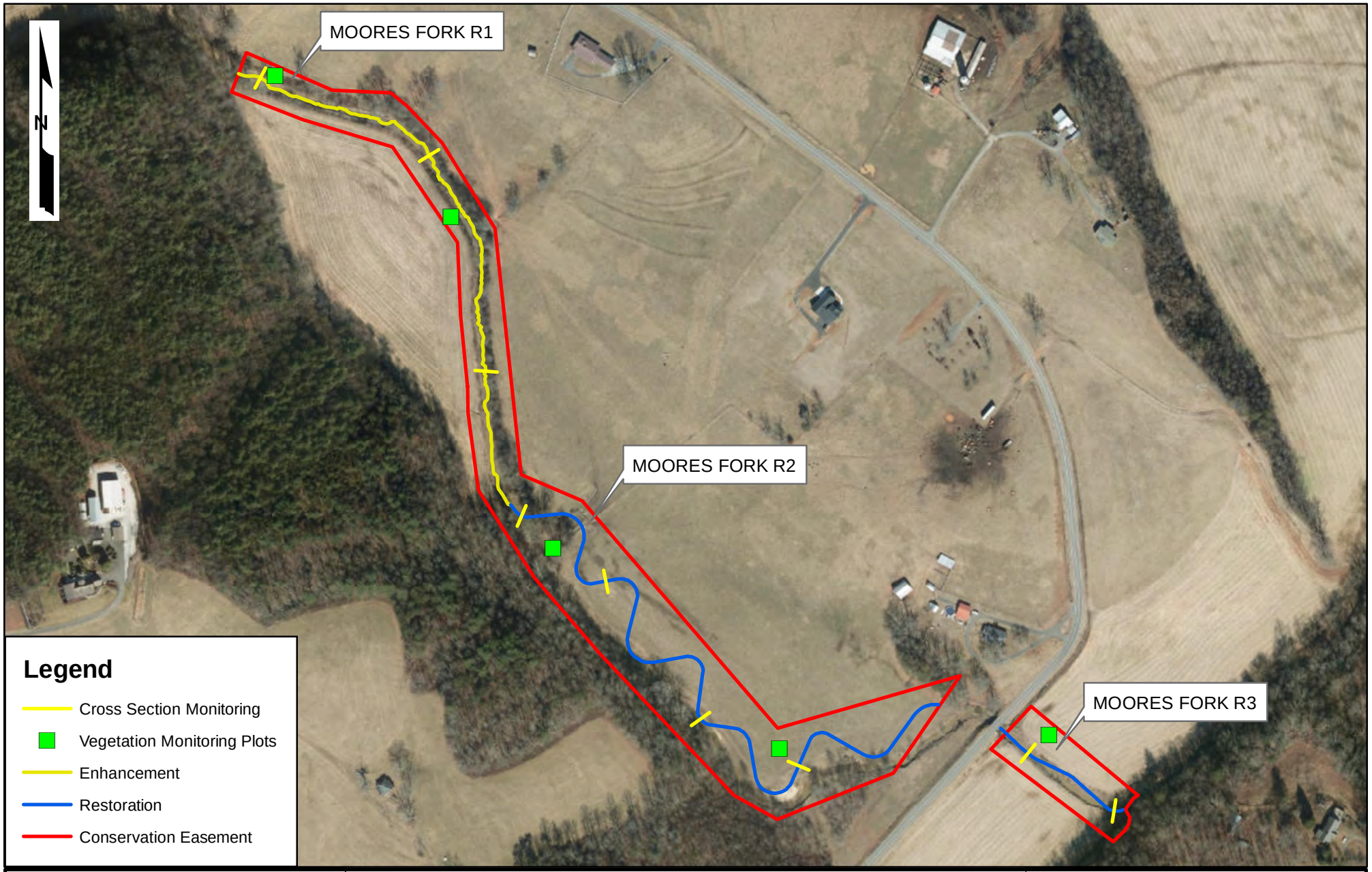

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STEWARTS CREEK TRIBUTARIES

PROPOSED MONITORING FEATURES

PREPARED FOR:
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DIVISION OF
MITIGATION SERVICES

FIGURE 9B

SURRY COUNTY, NC

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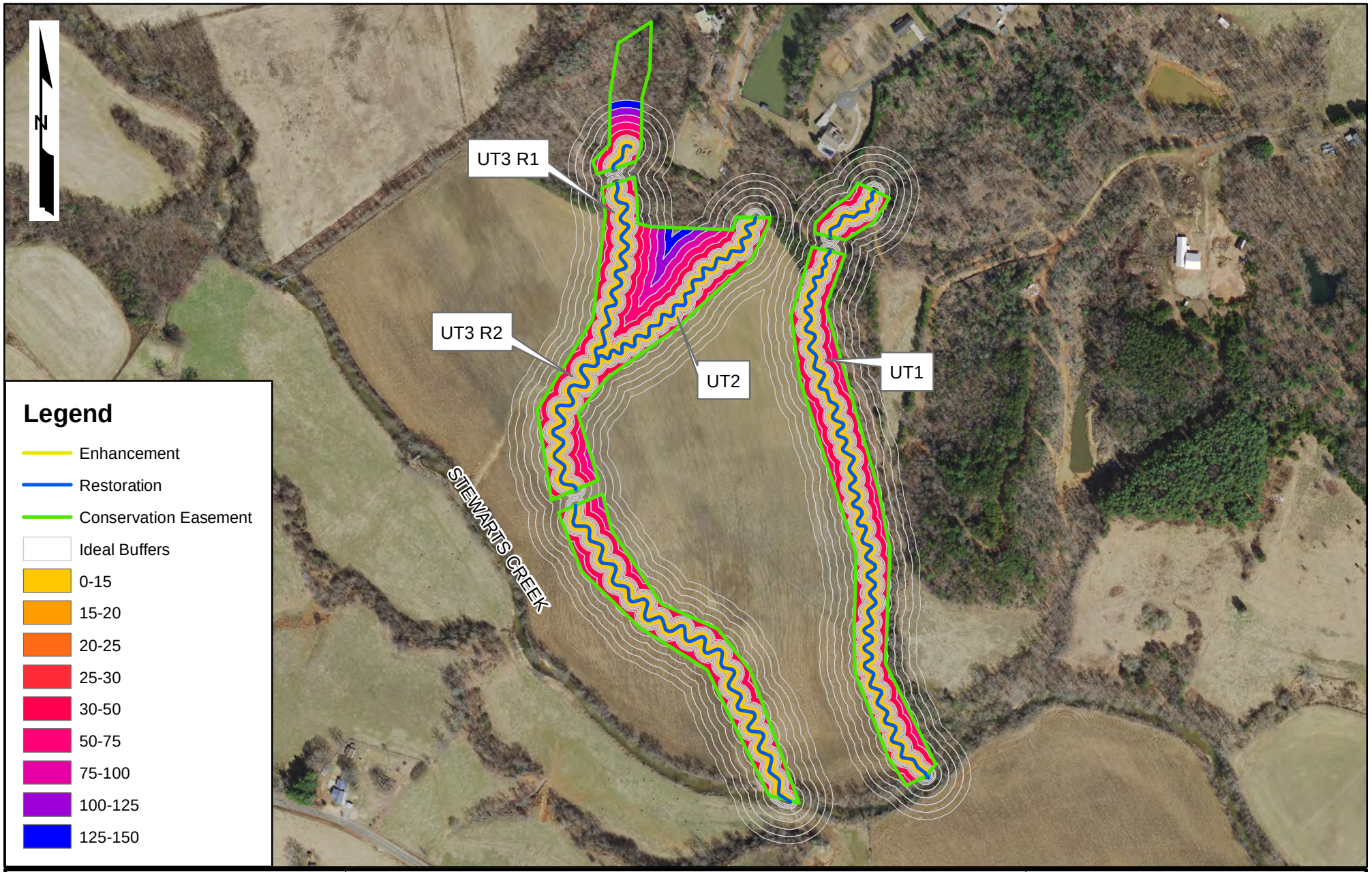

0 225 450 Feet

STEWARTS CREEK TRIBUTARIES

RIPARIAN BUFFER ZONES MAP

PREPARED FOR:
NCDEQ
DIVISION OF
MITIGATION SERVICES

FIGURE 10A

SURRY COUNTY, NC

PREPARED BY:
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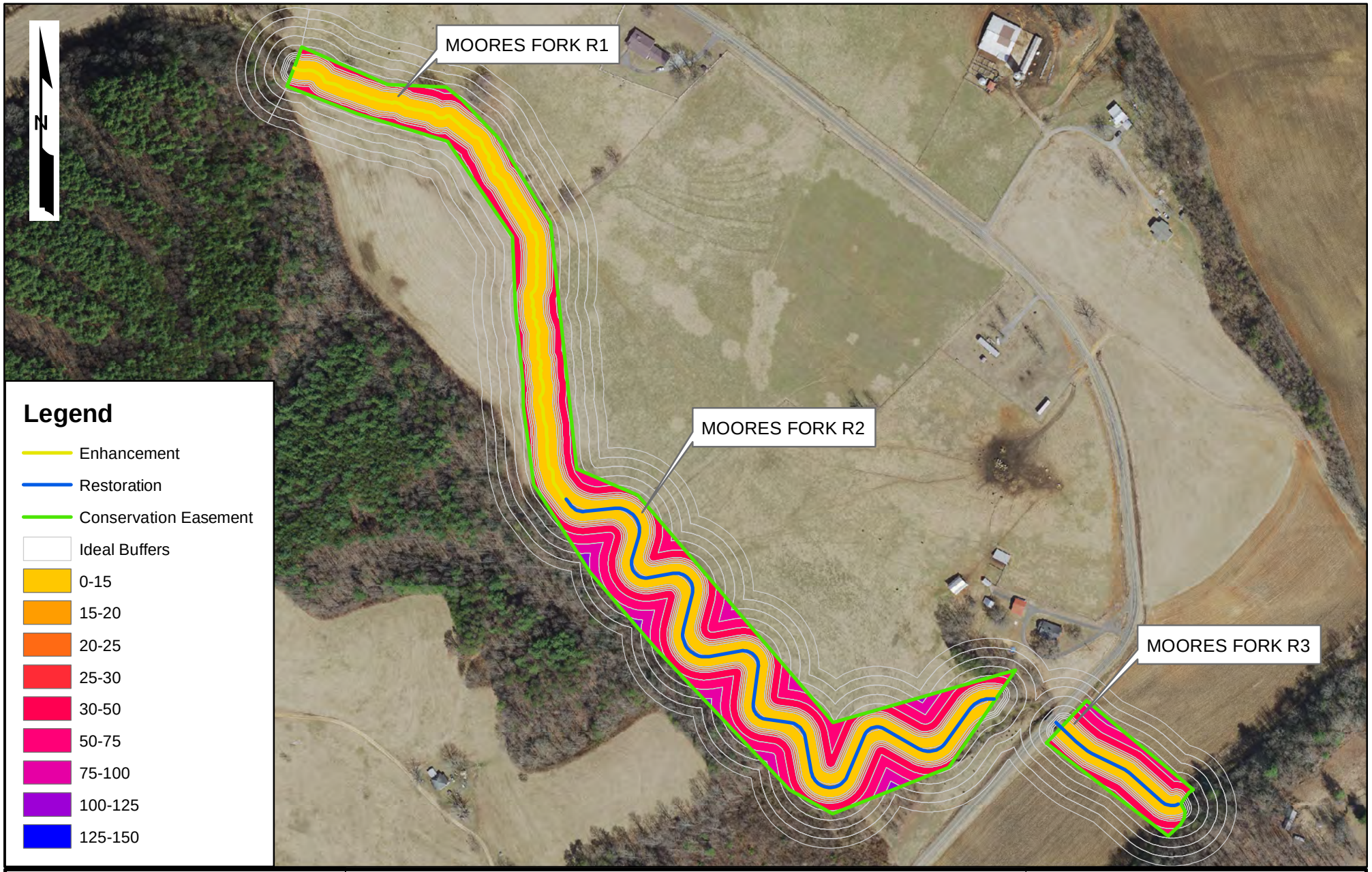

0 175 350 Feet

STEWARTS CREEK TRIBUTARIES

RIPARIAN BUFFER ZONES MAP

PREPARED FOR:
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DIVISION OF
MITIGATION SERVICES

FIGURE 10B

SURRY COUNTY, NC

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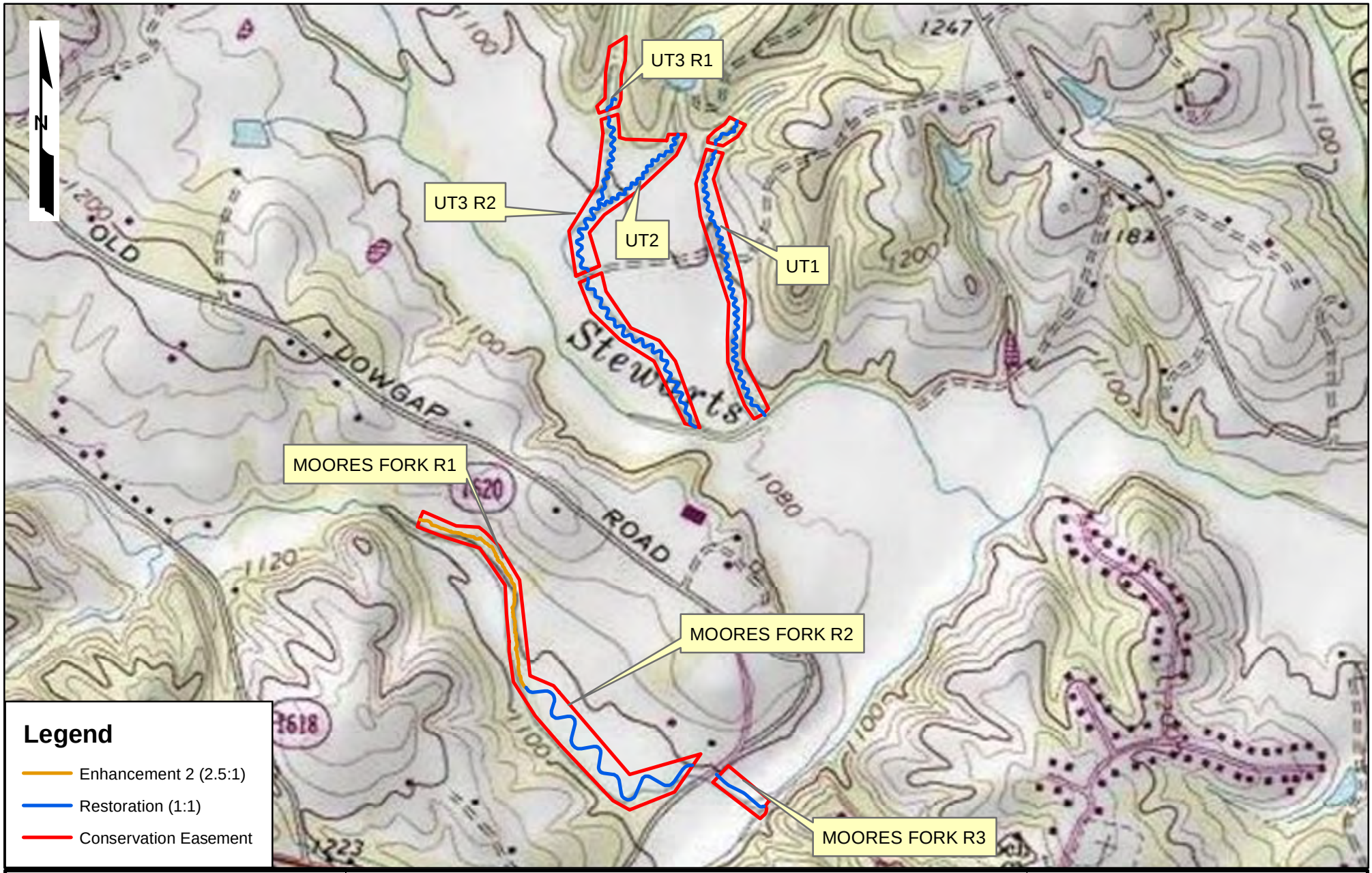

STEWARTS CREEK TRIBUTARIES

USGS MAP

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MITIGATION SERVICES

FIGURE 11

SURRY COUNTY, NC

PREPARED BY:
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Appendix 1

PLAN SHEETS

PROJECT: STEWARTS CREEK TRIBUTARIES

NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES

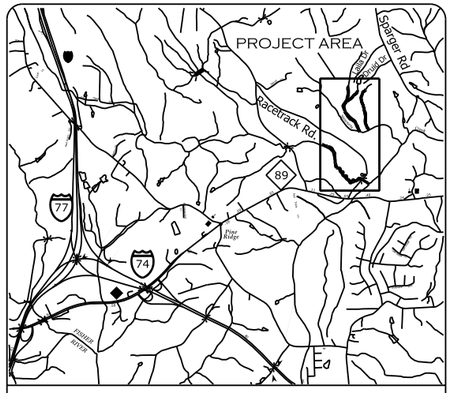
SURRY COUNTY

LOCATION: SURRY COUNTY, NC

STATE	PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	083	1	43

PROPOSED DESIGN STREAM LENGTH

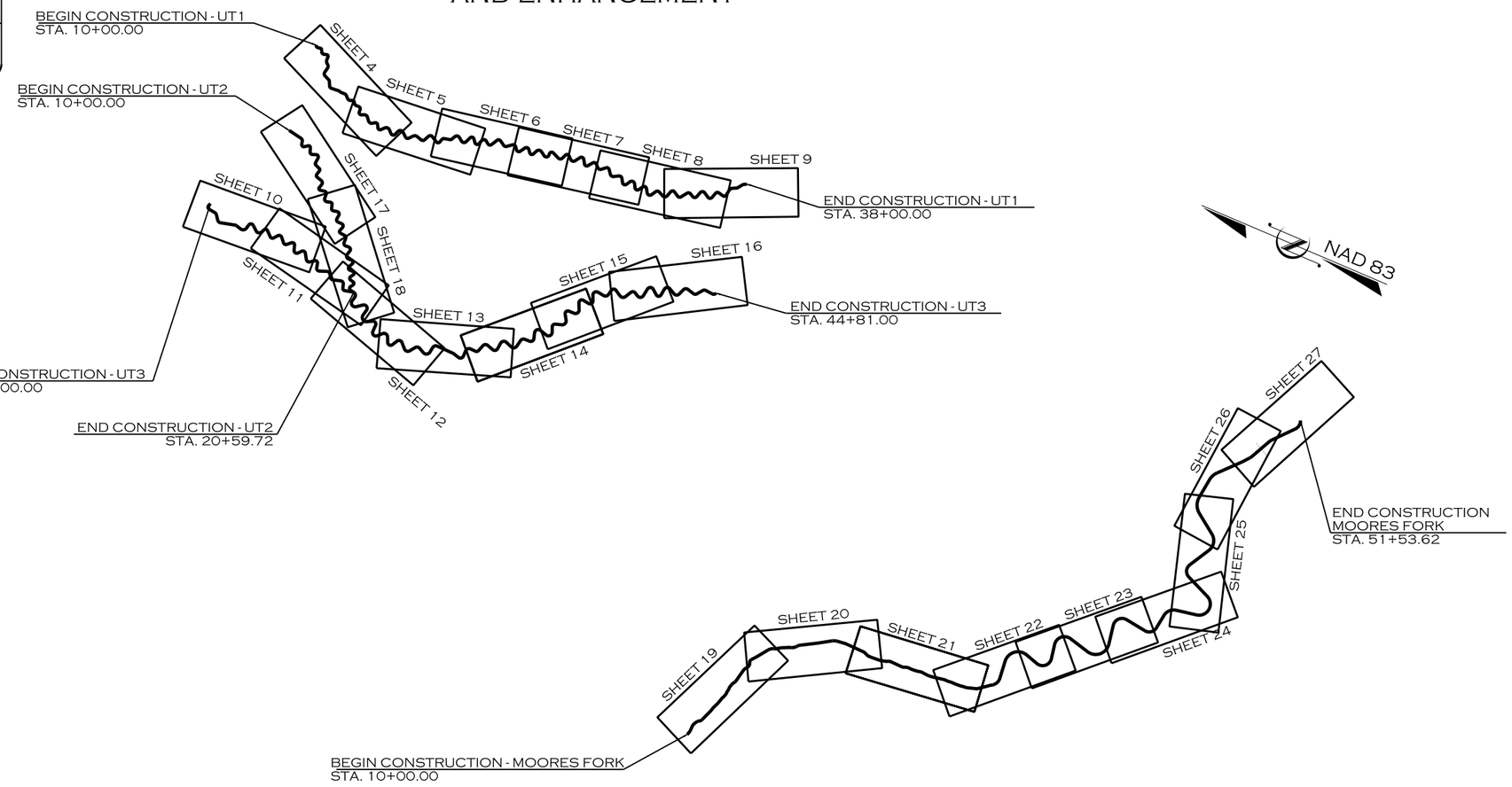
UT1	=	2,800 FEET
UT2	=	1,060 FEET
UT3	=	3,481 FEET
MOORES FORK	=	4,154 FEET



VICINITY MAP

INDEX OF SHEETS

TYPE OF WORK: STREAM RESTORATION AND ENHANCEMENT



GRAPHIC SCALES

20 10 0 20 40
PLANS

20 10 0 20 40
PROFILE (HORIZONTAL)

5 2.5 0 5 10
PROFILE (VERTICAL)

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:

Mitigation Services
ENVIRONMENTAL QUALITY

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

PAUL WIESNER
PROJECT ENGINEER

PREPARED IN THE OFFICE OF:

EPR ECOSYSTEM PLANNING & RESTORATION
559 JONES FRANKLIN RD
SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

LETTING DATE:

KEVIN TWEEDY, PE
PROJECT ENGINEER

PROJECT ENGINEER

PROGRESS DRAWING
FOR REVIEW PURPOSES ONLY
DO NOT USE FOR CONSTRUCTION

SIGNATURE: P.E.

STREAM CONVENTIONAL SYMBOLS

- ROCK J-HOOK (JH)
- ROCK VANE (RV)
- OFFSET ROCK CROSS VANE (OV)
- ROCK CROSS VANE (XV)
- TEMPORARY SILT CHECK
- ROOT WAD (RW)
- GRADE CONTROL LOG J-HOOK (LJH)
- LOG VANE (LV)
- LOG STEP (LS)
- ROCK STEP (RS)
- LOG CROSS VANE (XV)
- CONSTRUCTED CASCADE (CC)
- CONSTRUCTED RIFFLE (CR)
- BOULDER CLUSTER
- LOG ROLLER (LR)
- GRADE CONTROL WOODY RIFFLE (WR)
- TOEWOOD WITH GEOLIFT (TW)
- SOD MAT (SM)
- DEBRIS JAM (DJ-T#)
- SINGLE WING DEFLECTOR (SW)
- DOUBLE WING DEFLECTOR (DW)

- SF — SAFETY FENCE
- TP — TAPE FENCE
- SILT FENCE
- CE — CONSERVATION EASEMENT
- 20 — EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- LIMITS OF DISTURBANCE
- BANKFULL BENCH (GRADE)
- PROPERTY LINE
- ACCESS ROAD
- 10+00 STREAM THALWEG
- STREAM TOP OF BANKS
- FOOT BRIDGE
- TEMPORARY STREAM CROSSING
- PERMANENT FORD STREAM CROSSING (PFC)
- TRANSPLANTED VEGETATION
- TREE REMOVAL
- TREE PROTECTION
- GEOLIFT
- CHANNEL FILL / DITCH PLUG
- GRADE BANK 2:1 OR FLATTER
- EXISTING WETLANDS
- EXISTING BEDROCK
- OUTLET PROTECTION (OP)

**NOTE: ALL ITEMS ABOVE MAY NOT BE USED ON THIS PROJECT

GENERAL NOTES

1. THE CONTRACTOR IS REQUIRED TO INSTALL INSTREAM STRUCTURES USING A TRACK HOE WITH A HYDRAULIC THUMB OF SUFFICIENT SIZE TO PLACE BOULDERS, AND STRUCTURES.
2. WORK IS BEING PERFORMED AS AN ENVIRONMENTAL RESTORATION PLAN. THE CONTRACTOR SHOULD MAKE ALL REASONABLE EFFORTS TO REDUCE SEDIMENT LOSS AND MINIMIZE DISTURBANCE OF THE SITE WHILE PERFORMING THE CONSTRUCTION WORK.
3. CONSTRUCTION IS SCHEDULED TO BEGIN WINTER 2019.

CONSTRUCTION SEQUENCE

CONSTRUCTION SEQUENCE TO BE DETERMINED AT 100% DESIGN

PROJECT # 083 | SHEET NO. 1A

SYMBOLOGY / NOTES

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:
NC Mitigation Services ENVIRONMENTAL QUALITY
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

STEWARTS CREEK TRIBUTARIES PROJECT
SURRY COUNTY, NC

PREPARED IN THE OFFICE OF:
EPR ECOSYSTEM PLANNING & RESTORATION
559 JONES FRANKLIN ROAD, SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER

PROGRESS DRAWING
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DO NOT USE FOR CONSTRUCTION

5/24/2019
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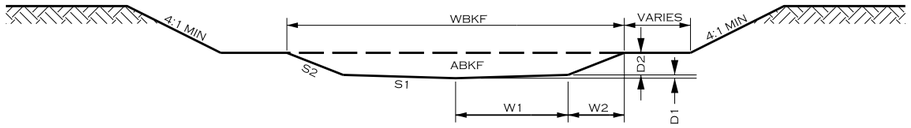
MKOPEN

TYPICAL SECTIONS

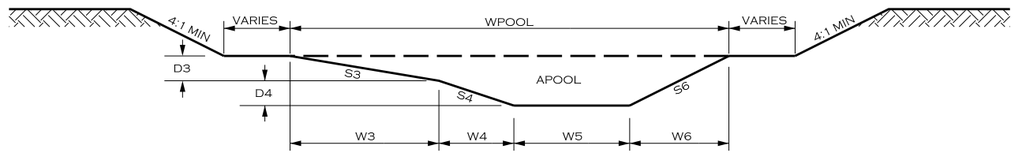
PROJECT # 083 | SHEET NO. 2

DETAILS

"C" TYPE CHANNELS
UT1, UT2, UT3
MOORES FORK STA. 25+72 - 51+53

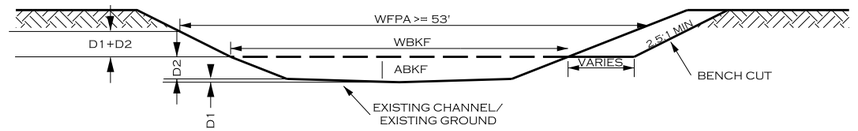


TYPICAL RIFFLE CROSS SECTION



TYPICAL POOL RIGHT CROSS SECTION

MOORES FORK BENCHING TYPICAL
STA. 10+00 - 25+72



TYPICAL BENCHING RIFFLE CROSS SECTION

NOTES:
1. BENCH WIDTHS MINIMUMS AND MAXIMUMS ON EACH PLAN SHEET.

C STREAM TYPE TYPICAL CROSS SECTION DIMENSIONS

		RIFFLES								POOLS										
Stream	Station	ABKF	WBKF	W1	W2	D1	D2	S1	S2	APool	WPool	W3	W4	W5	W6	D3	D4	S3	S4	S6
Moores Fork	25+72.50 - 51+53.62	47.7	23.9	5.30	6.65	0.34	2.66	15.6:1	2.5:1	88.4	35.9	13.80	6.90	6.00	9.20	2.30	2.30	6:1	3:1	2:1
UT1	10+00.00 - 38+05.06	3.2	6.1	1.90	1.15	0.10	0.60	19:1	1.9:1	5.9	9.1	3.50	1.80	1.50	2.30	0.60	0.60	5.8:1	3:1	1.9:1
UT2	10+00.00 - 20+59.72	2.2	5.1	1.55	1.00	0.10	0.50	15.5:1	2:1	4.1	7.7	3.00	1.40	1.30	2.00	0.50	0.50	6:1	2.8:1	2:1
UT3 - R1	10+00.00 - 19+95.00	3.2	6.1	1.90	1.15	0.10	0.60	19:1	1.9:1	5.9	9.1	3.50	1.80	1.50	2.30	0.60	0.60	5.8:1	3:1	1.9:1
UT 3 - R2	19+95.00 - 29+00.00 40+46.00 - 45+17.31	4.4	7.3	2.25	1.40	0.10	0.70	22.5:1	2:1	8.2	10.9	4.20	2.10	1.80	2.80	0.70	0.70	6:1	3:1	2:1
UT 3 - R2b	29+00.00 - 40+46.00	4.4	6.6	1.30	2.00	0.20	0.90	6.5:1	2.2:1	9.4	10.9	4.20	2.10	1.80	2.80	0.70	1.00	6:1	2.1:1	1.6:1

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER

PROGRESS DRAWING
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MKORN

PROJECT # 083 | SHEET NO. 2A

DETAILS

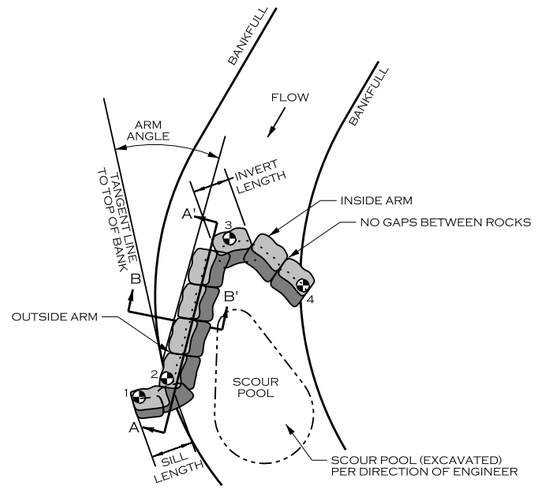
OFFSET ROCK CROSS VANE (OV)

OFFSET ROCK CROSS VANE SPECIFICATIONS

MATERIALS:	SPECIFICATIONS:	
BOULDER	TYPE: SIZE: NUMBER OF HEADER ROWS: NUMBER OF FOOTER ROWS:	GRANITE OR COMPARABLE UTs - 3 FT X 2 FT X 2 FT MF - 4 FT X 3 FT X 3 FT 1 1
FILTER FABRIC	TYPE: WIDTH UPSTREAM:	TYPE 2 NON-WOVEN 6 FT MINIMUM
STONE BACKFILL	CLASS A AND ON-SITE ALLUVIUM (50/50 MIX)	

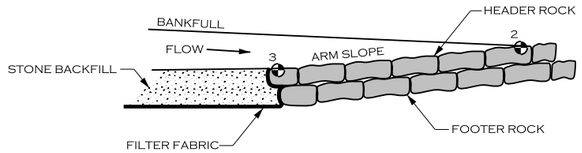
NOTES FOR OFFSET ROCK CROSS VANE:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURES TABLE SHEET.
2. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK.
3. PLACE FOOTER ROCKS AND THEN HEADER ROCKS TO ACHIEVE DESIGN DIMENSIONS AND ELEVATIONS.
4. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
5. PLACE FILTER FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTENDING DOWN TO THE DEPTH OF THE FOOTER ROCKS, THEN OUTWARD THE DISTANCE SPECIFIED IN THE STRUCTURES TABLE SHEET.
6. INSTALL STONE BACKFILL AS SHOWN, TO THE DIMENSIONS INDICATED IN THE STRUCTURES TABLE SHEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE FO THE STRUCTURE WITH ONSITE ALLUVIUM TO THE ELEVATION OF THE TOP OF HEADER ROCK.

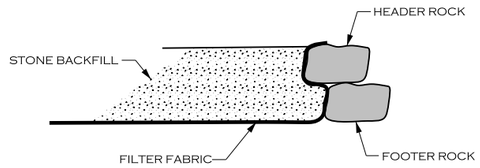


PLAN VIEW

- ELEVATION POINT (SEE STRUCTURE TABLES)



PROFILE VIEW A - A'
VANE OUTSIDE ARM



SECTION B - B'
VANE ARM CROSS SECTION

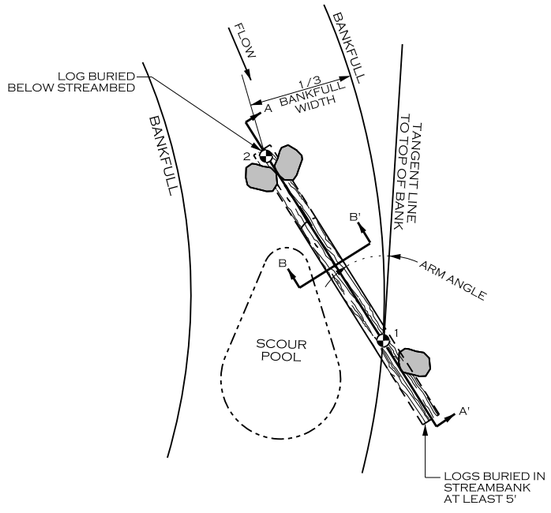
LOG VANE (LV)

LOG VANE SPECIFICATIONS

MATERIALS:	SPECIFICATIONS:	
BOULDER	TYPE: SIZE:	GRANITE OR COMPARABLE MF - 4 FT X 3 FT X 3 FT
LOGS	TYPE: SIZE: NUMBER OF HEADER LOGS: NUMBER OF FOOTER LOGS:	HARDWOOD 12 INCH Ø MIN. 1 1
FILTER FABRIC	TYPE: WIDTH UPSTREAM:	TYPE 2 NON-WOVEN 6 FT MINIMUM
STONE BACKFILL	CLASS A AND ON-SITE ALLUVIUM (50/50 MIX)	

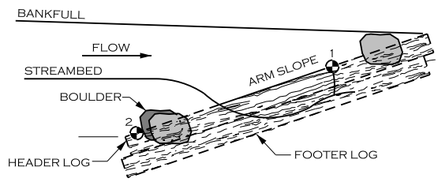
NOTES FOR LOG VANE STRUCTURES:

1. BOULDERS NOT NEEDED FOR UT1, UT2 AND UT3.
2. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES SHEET.
3. LOGS SHOULD BE STRAIGHT, HARDWOOD, AND NOT ROTTEN.
4. BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
5. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
6. BOULDER SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
7. FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.

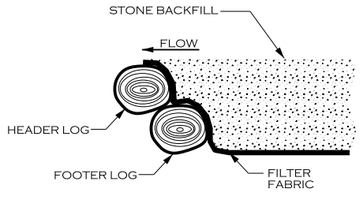


PLAN VIEW

- ELEVATION POINT (SEE STRUCTURE TABLES)



PROFILE VIEW A - A'



SECTION B - B'

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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LICENSE # P-1182

PROJECT ENGINEER

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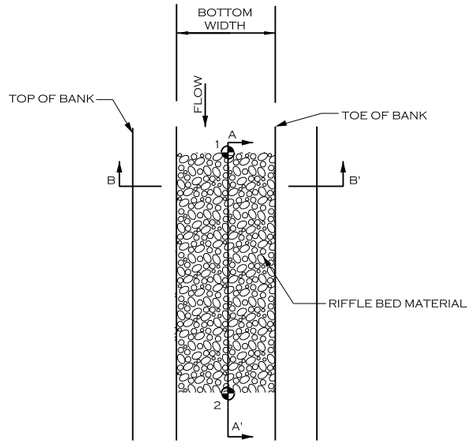
MKOCH

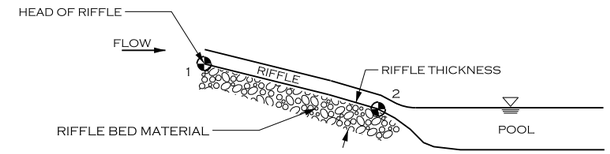
PROJECT # 083 | SHEET NO. 2B

DETAILS

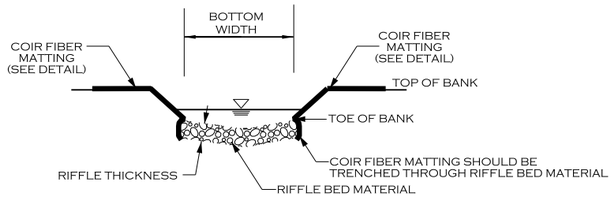
CONSTRUCTED RIFFLE (CR)



PLAN VIEW



PROFILE A - A'



SECTION B - B'

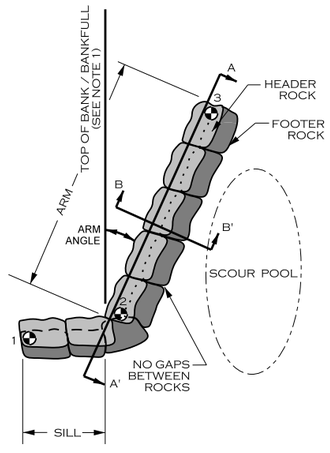
● - ELEVATION POINT (SEE STRUCTURE TABLES)

CONSTRUCTED RIFFLE SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
RIFFLE BED MATERIAL	TYPE: HARVESTED ON-SITE OR COMPARABLE SIZE: CLASS B AND 57 STONE (50/50 MIX) THICKNESS: 16 INCHES MIN.
COIR FIBER MATTING	SEE DETAIL

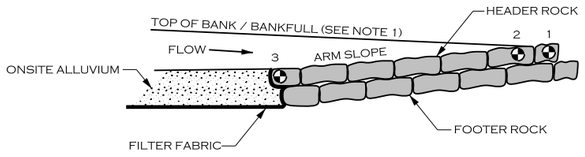
NOTES FOR CONSTRUCTED RIFFLE STRUCTURES:

1. GRADE STREAMBED AND BANKS TO PROPOSED DIMENSIONS PER TYPICAL CROSS-SECTION AND PROFILE.
2. EXCAVATE TRENCH BELOW PROPOSED STREAMBED ELEVATION EQUAL TO OR GREATER THAN RIFFLE THICKNESS.
3. INSTALL COIR FIBER MATTING ALONG STREAMBANKS ENSURING MATTING IS SUFFICIENTLY TRENCHED ALONG TOE OF BANK.
4. FILL TRENCH WITH RIFFLE BED MATERIAL TO FINAL DESIGN STREAM GRADE.

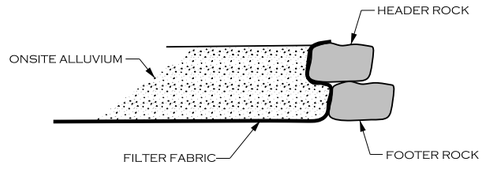
ROCK VANE (RV)



PLAN VIEW



PROFILE VIEW A - A'
VANE ARM



SECTION B - B'
VANE ARM CROSS SECTION

● - ELEVATION POINT (SEE STRUCTURES TABLE)

ROCK VANE SPECIFICATIONS		
MATERIALS:	SPECIFICATIONS:	
BOULDER	TYPE: SIZE: NUMBER OF HEADER ROWS: NUMBER OF FOOTER ROWS:	GRANITE OR COMPARABLE UTs - 3 FT X 2 FT X 2 FT MF - 4 FT X 3 FT X 3 FT 1 1
FILTER FABRIC	TYPE: WIDTH UPSTREAM:	TYPE 2 NON-WOVEN 6 FT MINIMUM

NOTES FOR ROCK VANE STRUCTURES:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURES TABLE SHEET.
2. DIG A TRENCH BELOW THE STREAM BED FOR FOOTER AND HEADER ROCKS, FILTER FABRIC AND STONE BACKFILL.
3. PLACE FOOTER ROCKS AND THEN HEADER ROCKS TO ACHIEVE DESIGN DIMENSIONS AND ELEVATIONS.
4. USE HAND PLACED STONE TO FILL GAPS AND VOIDS ON UPSTREAM SIDE OF THE HEADER AND FOOTER ROCKS.
5. PLACE FILTER FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTENDING DOWN TO THE DEPTH OF THE FOOTER ROCKS, THEN OUTWARD THE DISTANCE SPECIFIED IN THE STRUCTURES TABLE SHEET.
6. INSTALL STONE BACKFILL AND ONSITE ALLUVIUM AS SHOWN, TO THE DIMENSIONS INDICATED IN THE STRUCTURES TABLE SHEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH ONSITE ALLUVIUM TO THE ELEVATION OF THE TOP OF THE HEADER ROCK.

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
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MKOCH

PROJECT # 083 | SHEET NO. 2C

DETAILS

ROCK CROSS VANE (XV)

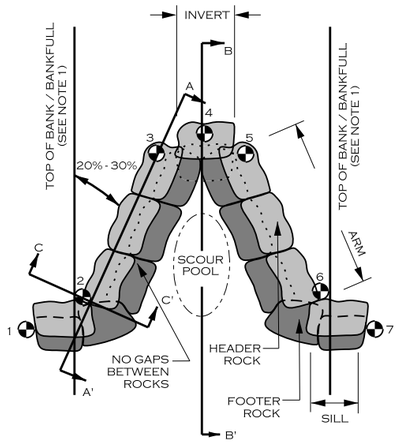
⊕ - ELEVATION POINT (SEE STRUCTURES TABLE)

ROCK CROSS VANE SPECIFICATIONS

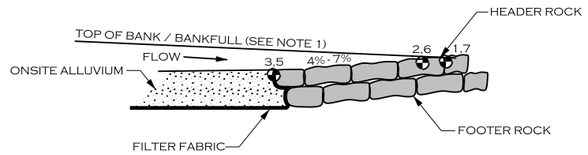
MATERIALS:	SPECIFICATIONS:	
BOULDER	TYPE: SIZE: NUMBER OF HEADER ROWS: NUMBER OF FOOTER ROWS:	GRANITE OR COMPARABLE UTs - 3 FT X 2 FT X 2 FT MF - 4 FT X 3 FT X 3 FT 1 1
FILTER FABRIC	TYPE: WIDTH UPSTREAM:	TYPE 2 NON-WOVEN 6 FT MINIMUM

NOTES FOR CROSS VANE STRUCTURES:

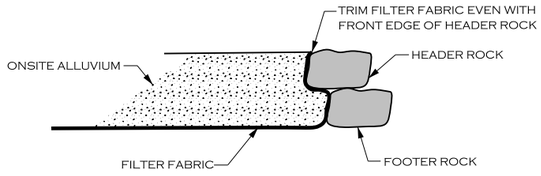
1. DIG A TRENCH BELOW THE STREAM BED FOR FOOTER AND HEADER ROCKS, FILTER FABRIC AND STONE BACKFILL.
2. PLACE FOOTER ROCKS AND THEN HEADER ROCKS TO ACHIEVE DESIGN DIMENSIONS AND ELEVATIONS.
3. USE HAND PLACED STONE TO FILL GAPS AND VOIDS ON UPSTREAM SIDE OF THE HEADER AND FOOTER ROCKS.
4. PLACE FILTER FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTENDING DOWN TO THE DEPTH OF THE FOOTER ROCKS, THEN OUTWARD THE DISTANCE SPECIFIED IN THE STRUCTURES TABLE SHEET.
5. INSTALL STONE BACKFILL AND ONSITE ALLUVIUM AS SHOWN, TO THE DIMENSIONS INDICATED IN THE STRUCTURES TABLE SHEET.
6. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH ONSITE ALLUVIUM TO THE ELEVATION OF THE TOP OF THE HEADER ROCK.



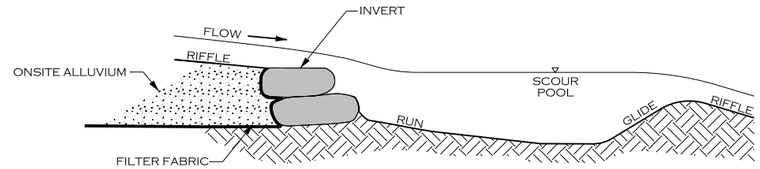
PLAN VIEW



PROFILE VIEW A - A'
VANE ARM



SECTION C - C'
INVERT AND POOL



PROFILE VIEW B - B'
INVERT

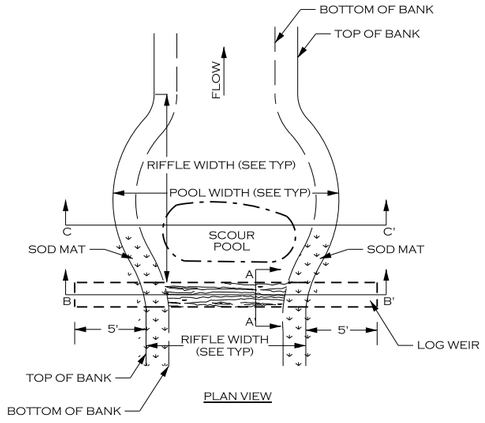
LOG STEP (LS)

LOG STEP SPECIFICATIONS

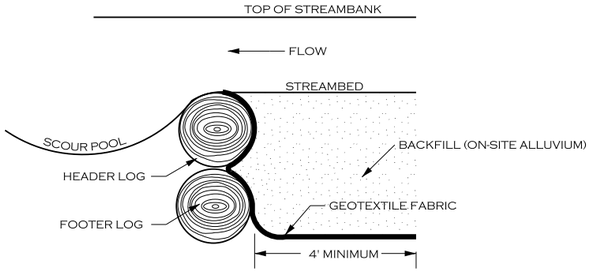
MATERIALS:	SPECIFICATIONS:	
LOGS	TYPE: SIZE: NUMBER OF HEADER LOGS: NUMBER OF FOOTER LOGS:	HARDWOOD LENGTH - 2 x WBKF, 12 INCH Ø MIN. 1 1
FILTER FABRIC	TYPE: WIDTH UPSTREAM:	TYPE 2 NON-WOVEN 6 FT MINIMUM

NOTES FOR LOG STEP STRUCTURES:

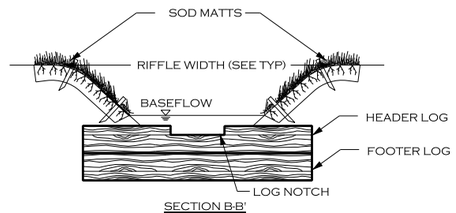
1. LOGS SHOULD BE AT LEAST 12 INCHES IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. LOGS >24 INCHES IN DIAMETER MAY BE USED ALONE WITHOUT AN ADDITIONAL LOG. GEOTEXTILE FABRIC SHOULD STILL BE USED TO SEAL AROUND LOG
3. PLACE FOOTER LOGS FIRST AND THEN HEADER (TOP) LOG. SET HEADER LOG APPROXIMATLEY 3 INCHES ABOVE THE INVERT ELEVATION.
4. CUT A NOTCH IN THE HEADER LOG APPROXIMATLEY 50 PERCENT OF THE CHANNEL BOTTOM WIDTH AND EXTENDING DOWN TO THE INVERT ELEVATION.
5. USE GEOTEXTILE FABRIC TO SEAL GAPS BETWEEN LOGS.
6. PLACE TRANSPLANTS FROM TOE OF STREAMBANK TO TOP OF STREAMBANK.
7. TRANSPLANTS CAN BE SUBSITUTED WITH COIR FIBER MATTING AT THE DIRECTION OF THE ENGINEER.



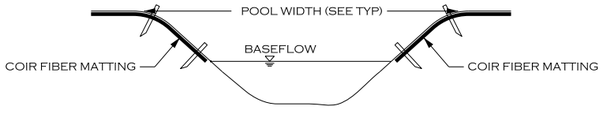
PLAN VIEW



SECTION A-A'



SECTION B-B'



SECTION C-C'

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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RALEIGH, NC 27699-1652

STEWARTS CREEK TRIBUTARIES PROJECT
SURRY COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
559 JONES FRANKLIN ROAD, SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER

PROGRESS DRAWING
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DO NOT USE FOR CONSTRUCTION

5/24/2019
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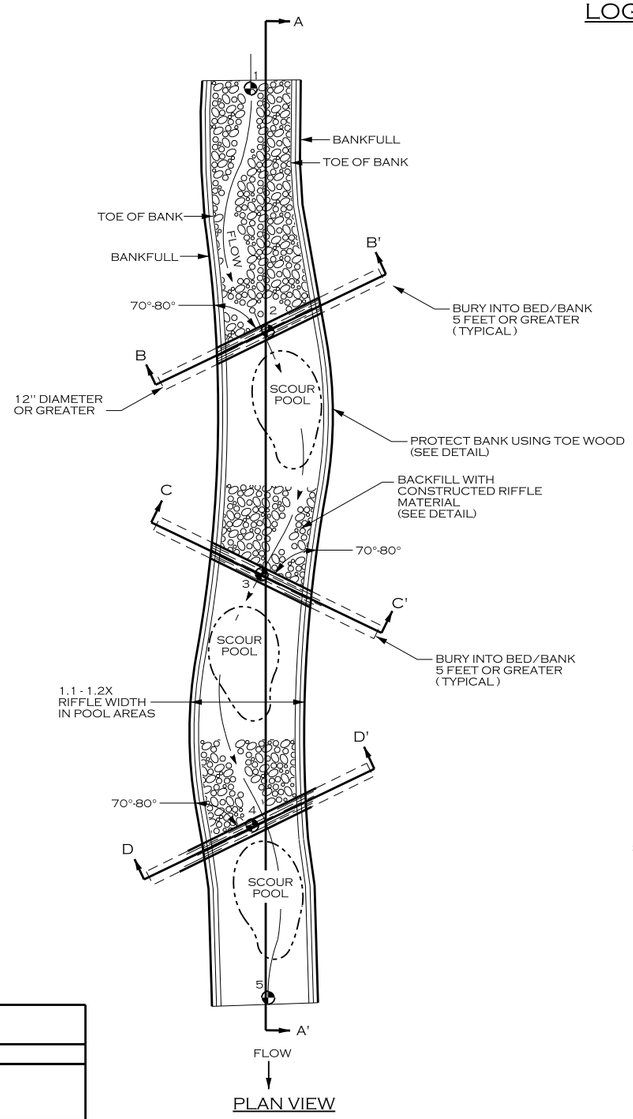
MKOCH

LOG ROLLER (LR)

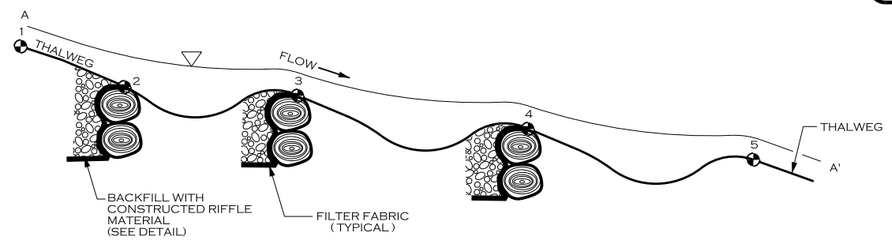
PROJECT # 083 | SHEET NO. 2D

DETAILS

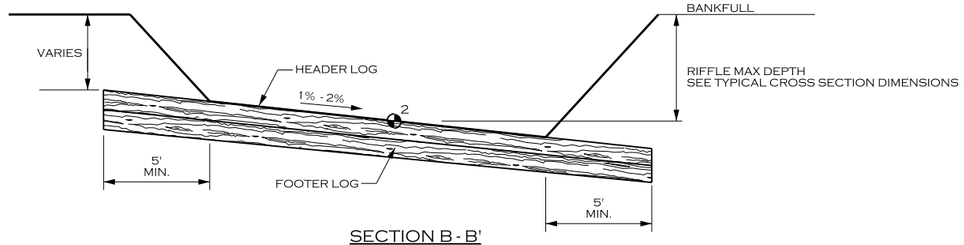


PLAN VIEW

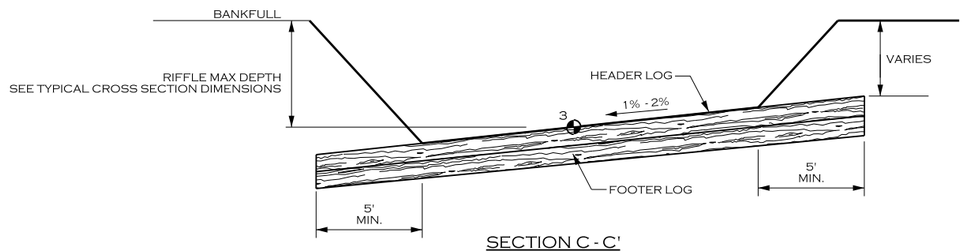
- ELEVATION POINT (SEE STRUCTURE TABLES)



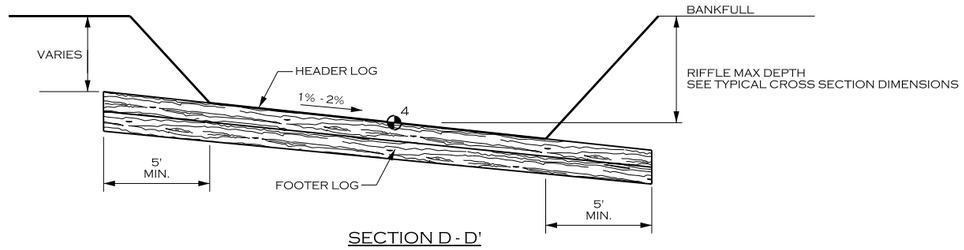
SECTION A - A'



SECTION B - B'



SECTION C - C'



SECTION D - D'

LOG ROLLER SPECIFICATIONS

MATERIALS:	SPECIFICATIONS:
RIFFLE BED MATERIAL	SEE CONSTRUCTED RIFFLE DETAIL
LOGS	TYPE: HARDWOOD SIZE: LENGTH = 2 X W_{BKF}, 12" DIA. NUMBER OF HEADER LOGS: 1
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM

NOTES FOR LOG ROLLER STRUCTURES:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES SHEET. NUMBER OF LOGS MAY VARY.
2. LOGS SHOULD BE STRAIGHT, HARDWOOD, AND NOT ROTTEN.
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
4. FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
5. RIFFLE STATIONS AND ELEVATIONS (1 & 5) ARE SHOWN ON BOTH THE STRUCTURE TABLES FOR LOG ROLLERS AND CONSTRUCTED RIFFLES IF APPLICABLE.

REVISIONS

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1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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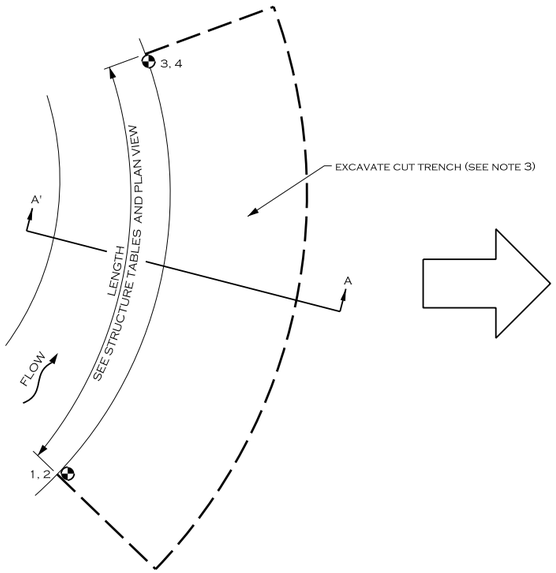
MKOPN

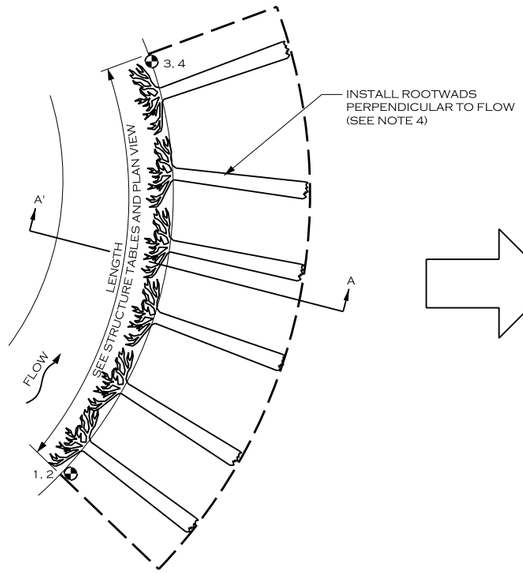
TOE WOOD WITH GEOLIFT (TW)

PROJECT # 083 | SHEET NO. 2E

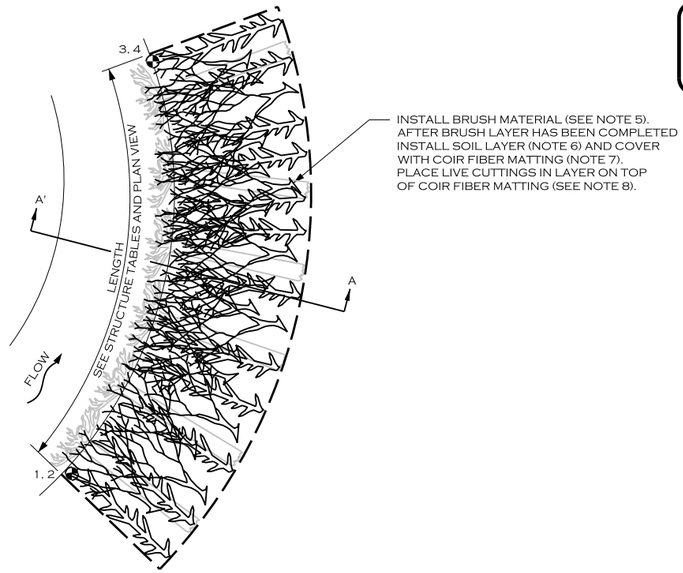
DETAILS



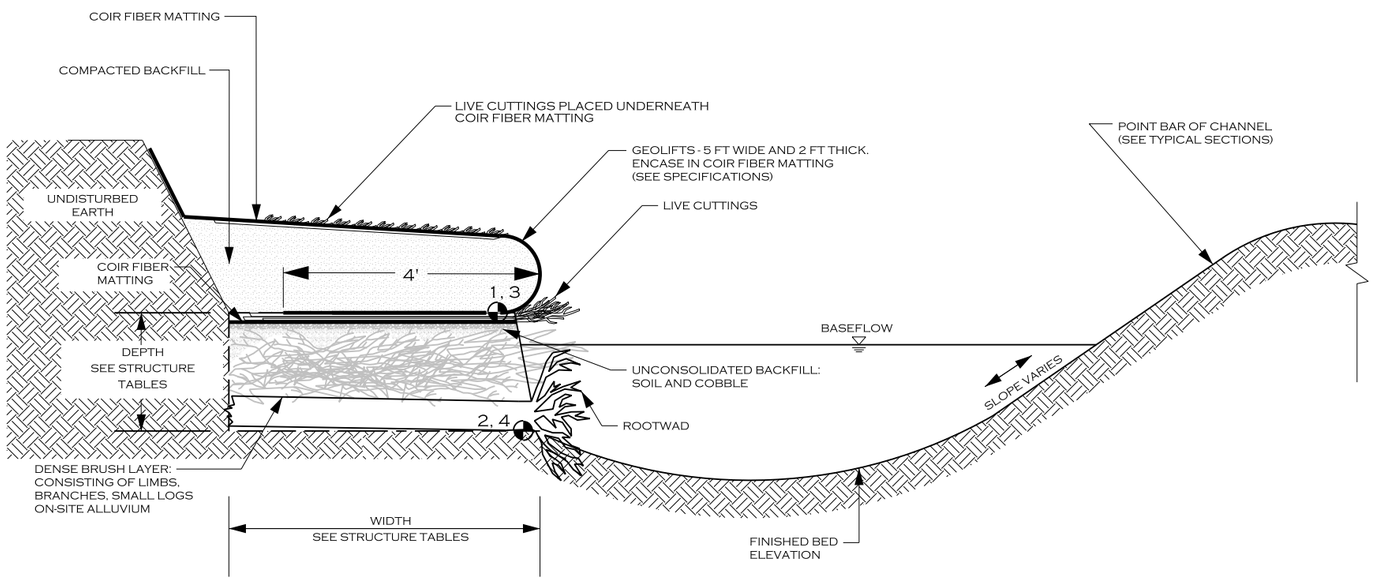
PLAN VIEW - 1
TRENCH EXCAVATION



PLAN VIEW - 2
ROOTWAD INSTALLATION



PLAN VIEW - 3
BRUSH LAYER INSTALLATION



SECTION VIEW

- ELEVATION POINT (SEE STRUCTURE TABLES)

TOE WOOD SPECIFICATIONS

MATERIALS:	SPECIFICATIONS:
BRUSH MATERIAL	TYPE: BRUSH MATERIAL SIZE: MIN. 5 FT LONG. 1 INCH DIAMETER
ROOTWAD MATERIAL	TYPE: HARDWOOD SIZE: MIN. 6 FT LONG MIN. 12 INCH DIAMETER
COIR FIBER MATTING	SEE DETAIL

NOTES FOR TOE WOOD STRUCTURES:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES SHEET.
2. DIG A TRENCH ALONG BANK WHERE TOE WOOD IS TO BE INSTALLED, TO THE DEPTH AND WIDTH SPECIFIED IN THE DETAILS AND STRUCTURE TABLES. IF TOE WOOD IS BEING PLACED IN A LOCATION WHERE THERE IS NOT EXISTING GROUND, PLACE FILL MATERIAL AND COMPACT TO FORM THE TRENCH FOR THE TOE WOOD MATERIALS.
3. EXCAVATE TRENCH BELOW TOEWOOD GRADE (PLAN VIEW 1). TO ELEVATION POINTS 2 AND 4.
4. INSTALL ROOTWADS PERPENDICULAR TO THE FLOW AS SHOWN IN PLAN VIEW 2.
5. INSTALL BRUSH MATERIAL INCLUDING BRANCHES, LOGS, AND BRUSH, AND AT LEAST 1 "IN DIAMETER. LARGE MATERIALS AND SMALL MATERIALS SHALL BE MIXED, PLACED IN LAYERS NO MORE THAN 1 FOOT DEEP, COVERED IN A THIN LAYER OF ONSITE ALLUVIUM, AND COMPACTED BEFORE PLACING THE NEXT LAYER OF TOE WOOD MATERIAL. CONTINUE PLACING MATERIALS TO FORM A DENSE LAYER OF WOODY MATERIALS AND ONSITE ALLUVIUM TO THE DEPTH AND ELEVATIONS SPECIFIED (PLAN VIEW 3).
6. PLACE AN UNCONSOLIDATED LAYER OF SOIL AND COBBLE ON TOP OF BRUSH LAYER.
7. COVER SOIL AND COBBLE LAYER IN COIR FIBER MATTING.
8. INSTALL LIVE CUTTINGS, INCLUDING BRANCHES AND BRUSH, AT LEAST 5 FEET IN LENGTH, AND AT LEAST 1 INCH IN DIAMETER.
9. CONSTRUCT GEOLIFTS OR PLACE TRANSPLANTS AS SPECIFIED OR DIRECTED BY THE ENGINEER) TO REBUILD THE STREAMBANK ABOVE THE TOE WOOD LAYER.

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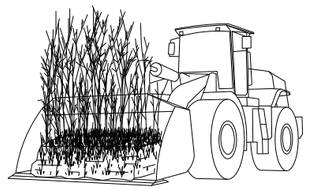
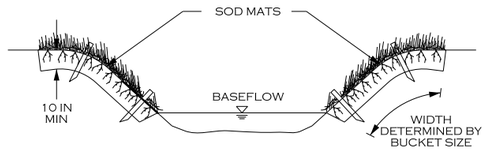
DETAILS

SOD MAT (SM)



SOD MAT HARVESTING



SOD MAT PLACEMENT

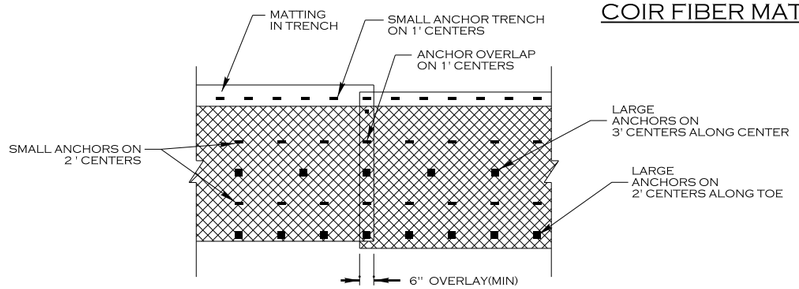
NOTES:
HARVESTING

1. USE FULL-SIZE LOADER, OR SIMILAR APPROVED EQUIPMENT, FOR EXCAVATING, TRANSPORTING, AND PLACING ON-SITE SOD MATS.
2. DISTURB SOD MATS AS LITTLE AS POSSIBLE AND MAINTAIN SOIL MOISTURE.
3. MINIMUM MAT DEPTH IS 10 INCH.

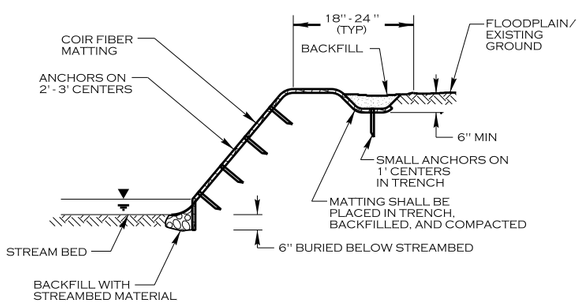
PLACEMENT

1. PLACE SOD MATS FROM TOE OF STREAMBANK TO TOP OF STREAMBANK OR TOEWOOD.
2. SOD MATS CAN BE SUBSITUTED WITH COIR FIBER MATTING AT THE DIRECTION OF THE ENGINEER.

COIR FIBER MATTING



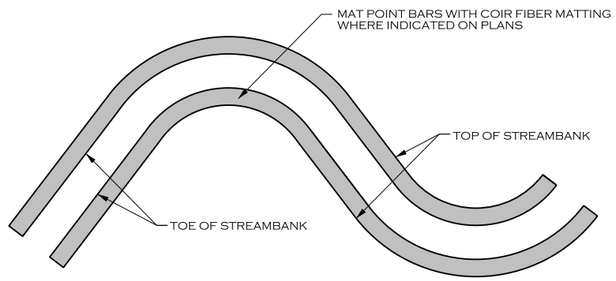
PLAN VIEW



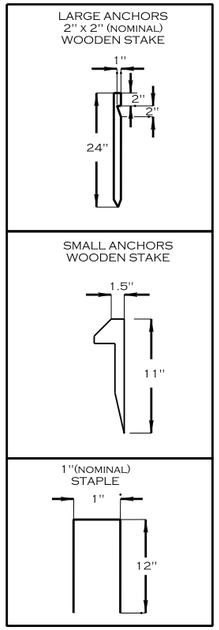
TYPICAL CROSS SECTION

NOTES:

1. IN AREAS TO BE MATTED, ALL SEEDING, SOIL AMENDMENTS, AND SOIL PREPARATION MUST BE COMPLETED PRIOR TO PLACEMENT OF COIR FIBER MATTING.
2. WOODEN STAKES ARE PREFERRED. USE OF STAPLES AS SMALL ANCHORS MUST BE PRE-APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.



TYPICAL MATTING PLAN VIEW



ANCHOR OPTIONS

REVISIONS

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1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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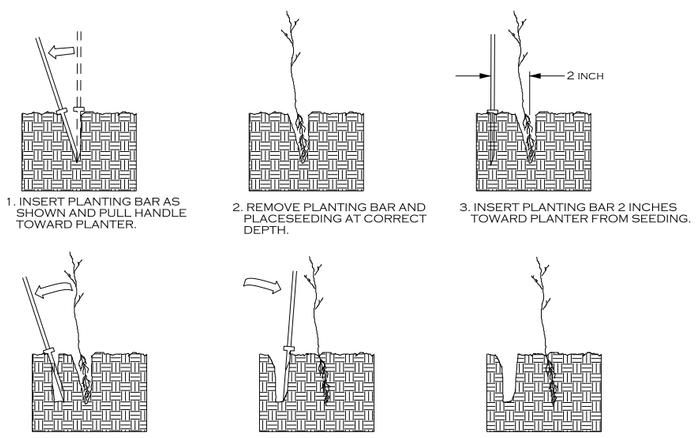
MKOEN

PROJECT # 083 | SHEET NO. 2G

DETAILS

DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



1. INSERT PLANTING BAR AS SHOWN AND PULL HANDLE TOWARD PLANTER.
2. REMOVE PLANTING BAR AND PLACESEEDING AT CORRECT DEPTH.
3. INSERT PLANTING BAR 2 INCHES TOWARD PLANTER FROM SEEDING.
4. PULL HANDLE OF BAR TOWARD PLANTER, FIRMING SOIL AT BOTTOM.
5. PUSH HANDLE FORWARD FIRMING SOIL AT TOP.
6. LEAVE COMPATION HOLE OPEN. WATER THOROUGHLY.

PLANTING NOTES:

PLANTING BAG

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

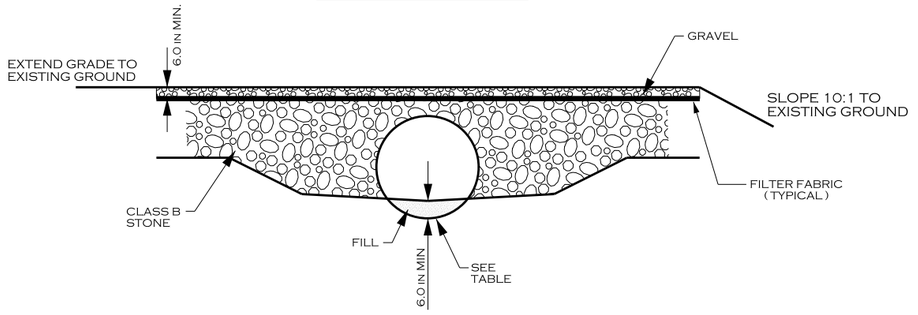
KBC PLANTING BAR

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

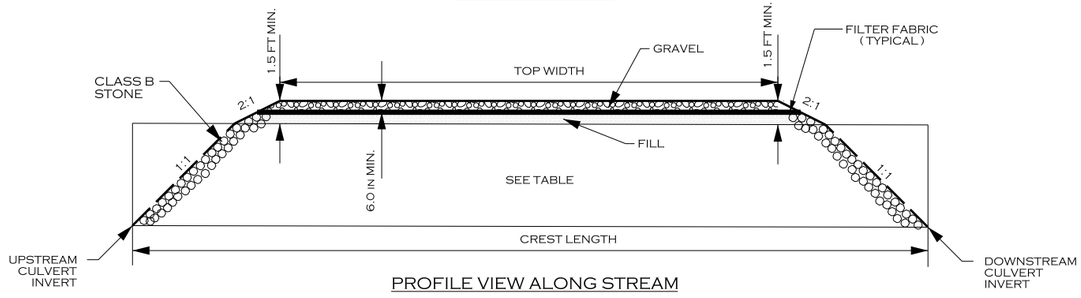
ROOT PRUNING

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

CULVERT DETAIL



CROSS SECTION



PROFILE VIEW ALONG STREAM

VARIABLE	CULVERT UT1	CULVERT UT2	CULVERT UT3 - R1	CULVERT UT3 - R2
REQUIRED COVER DEPTH	1.0 FT MIN.	1.0 FT MIN.	1.0 FT MIN.	1.0 FT MIN.
UPSTREAM INLET ELEV.	1113.06	1111.25	1106.68	1084.91
DOWNSTREAM INLET ELEV.	1112.12	1110.24	1105.8	1084.46
UPSTREAM INLET STA.	12+75	10+22	11+38	27+30
DOWNSTREAM INLET STA.	13+05	10+52	11+68	27+60
FARM PATH ELEV.	1117.06	1114.75	1110.68	1089.91
PIPE SIZE	1 x 36"	1 x 30"	1 x 36"	1 x 48"
TOP WIDTH (FT)	19	19	19	19
CREST LENGTH (FT)	25	25	25	25

CULVERT SPECIFICATIONS

MATERIALS:	SPECIFICATIONS:
PIPE	TYPE: REINFORCED CONCRETE PIPE
GRAVEL	TYPE: #57 STONE AND CRUSHER RUN (50/50 MIX)
FILL	TYPE: ON-SITE ALLUVIUM
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM

NOTES FOR CULVERT STRUCTURES:

1. TYPE 4 BEDDING, POSITIVE EMBANKMENT CONDITION.
2. CLASS I OR STRONGER 48 IN X 35 FT MINIMUM TO BE INSTALLED.
3. STABILIZE FILL AROUND CULVERTS WITH CLASS B STONE. STABILIZE REMAINING ROAD SIDE SLOPES WITH EROSION MATTING ACCORDING TO SPECIFICATIONS.

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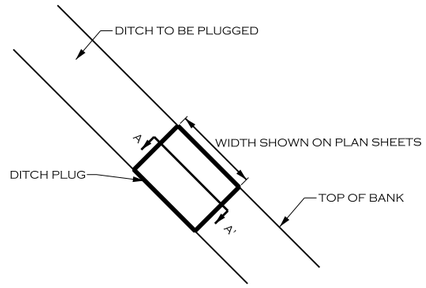
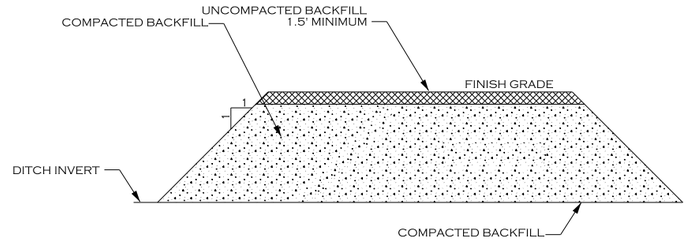
PROJECT #	SHEET NO.
083	2H

DETAILS

DITCH PLUG



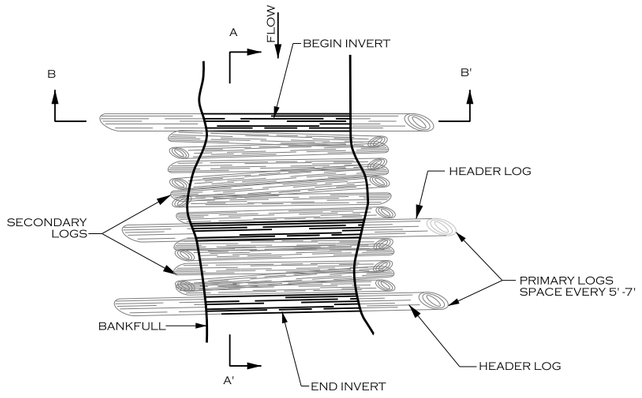
PLAN VIEW



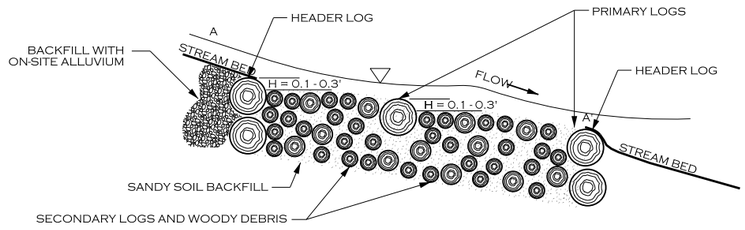
SECTION A - A'

NOTE:
COMPACT BACKFILL USING ON-SITE HEAVY EQUIPMENT IN 10 INCH LIFTS.

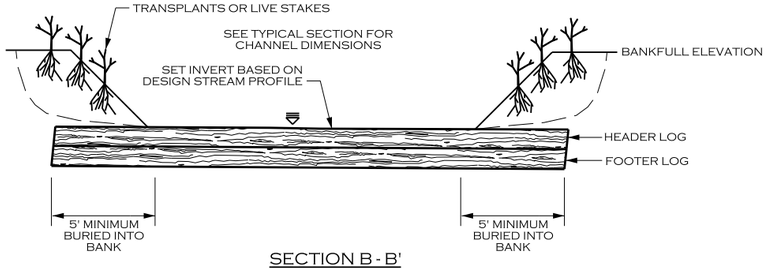
GRADE CONTROL WOODY RIFFLE (WR)



PLAN VIEW



SECTION A - A'



SECTION B - B'

NOTES:
1. PRIMARY LOGS SHOULD BE AT LEAST 12'' OR MORE IN DIAMETER, RELATIVELY STRAIGHT, AND RECENTLY HARVESTED AND EXTENDING INTO THE BANK 5' ON EACH SIDE.
2. SECONDARY LOGS SHOULD BE AT LEAST 1'' IN DIAMETER AND NO LARGER THAN 10'', AND EXTEND INTO THE BANK 2 FEET ON EACH SIDE. WOOD MATERIAL SHALL BE VARYING DIAMETER TO ALLOW MATERIAL TO BE COMPACTED.
3. ROOTWADS AND COIR FIBER MATTING CAN BE USED INSTEAD OF TRANSPLANTS OR LIVE STAKES, PER DIRECTION OF ENGINEER.
4. AFTER TRENCH HAS BEEN EXCAVATED A LAYER OF SECONDARY LOGS AND WOODY DEBRIS SHOULD BE PLACED WITH MINIMAL GAPS. A LAYER OF ON-SITE ALLUVIUM SHOULD BE APPLIED TO FILL VOIDS BETWEEN SECONDARY LOGS BEFORE ADDITIONAL LAYERS ARE PLACED.

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MKOCH

OUTLET PROTECTION (OP)

PROJECT # 083 | SHEET NO. 21

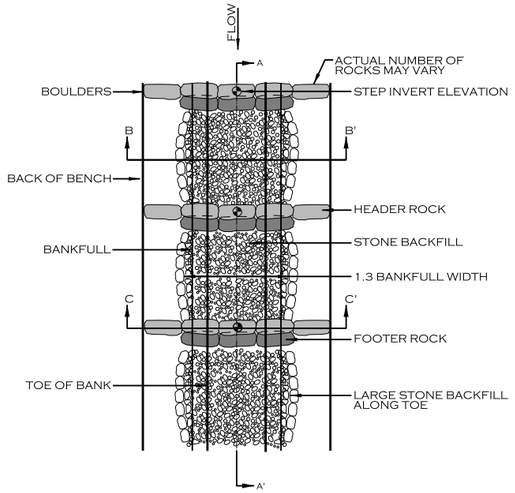
DETAILS

OUTLET PROTECTION SPECIFICATIONS

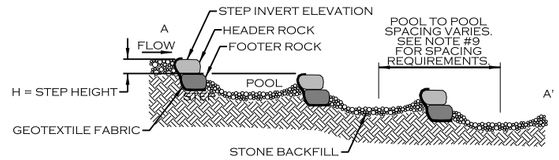
MATERIALS:	SPECIFICATIONS:	
BOULDER	TYPE: SIZE: NUMBER OF HEADER ROWS: NUMBER OF FOOTER ROWS:	GRANITE OR COMPARABLE 2 FT X 2 FT X 2FT 1 1
FILTER FABRIC	TYPE: WIDTH UPSTREAM:	TYPE 2 NON-WOVEN 6 FT MINIMUM

NOTES FOR CROSS VANE STRUCTURES:

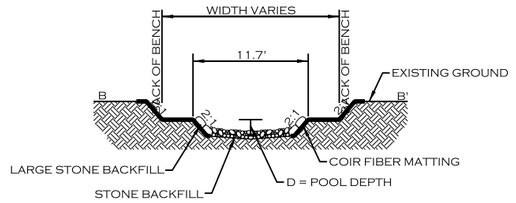
1. FOOTER ROCKS SHALL BE INSTALLED SUCH THAT 1/4 TO 1/3 OF THE LENGTH IS DOWNSTREAM OF THE HEADER ROCKS.
2. SOIL SHALL BE WELL COMPACTED AROUND BURIED PORTION OF FOOTER ROCKS WITH BUCKET OF TRACK HOE.
3. INSTALL GEOTEXTILE FILTER FABRIC UNDERNEATH FOOTER ROCKS.
4. UNDERCUT POOL BED ELEVATION 8 INCHES TO ALLOW FOR LAYER OF STONE.
5. INSTALL COIR FIBER MATTING ALONG COMPLETED BANKS SUCH THAT THE COIR FIBER MATTING AT THE TOE OF THE BANK EXTENDS DOWN TO THE UNDERCUT ELEVATION.
6. INSTALL LARGE STONE BACKFILL ALONG SIDE SLOPES.
7. FINAL CHANNEL BED SHAPE SHOULD BE ROUNDED, COMPACTED, AND CONCAVE, WITH THE ELEVATION OF THE BED APPROXIMATELY 0.5 FT DEEPER IN THE CENTER THAN AT THE EDGES.
8. STEP HEIGHT (H) SHALL NOT EXCEED 0.8 FT.
9. IN GENERAL, POOL TO POOL SPACING SHALL BE NO LESS THAN AND NO GREATER THAN AS SPECIFIED BY ENGINEER BASED ON EXISTING CONDITIONS SUCH AS SLOPE AND SUITABLE FILL MATERIAL. CONSTRUCTED RIFFLES MAY BE SUBSTITUTED IN AREAS WHERE EXISTING SLOPES EXCEED 10% AS DETERMINED IN THE FIELD BY THE ENGINEER.



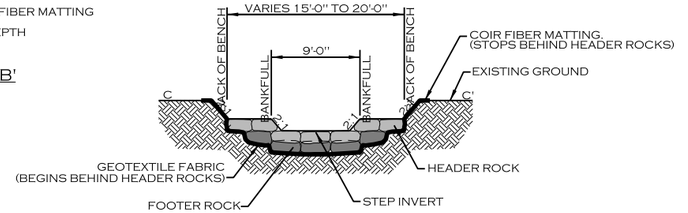
PLAN VIEW



PROFILE VIEW A-A'

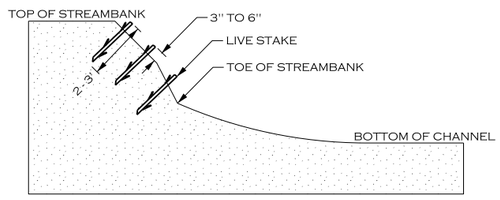


POOL CROSS SECTION B-B'

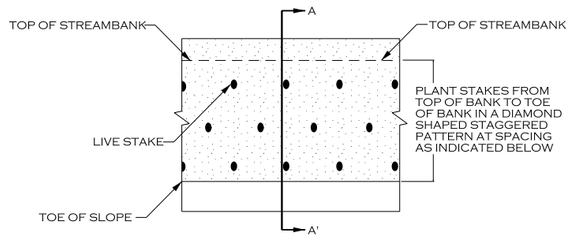


POOL CROSS SECTION C-C'

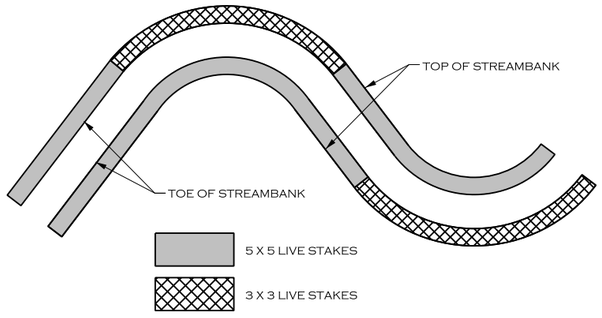
LIVE STAKING



SECTION A - A'

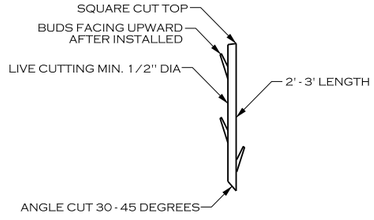


PLAN VIEW



SEE PLAN VIEW SHEET FOR LIVE STAKING LOCATIONS

TYPICAL LIVE STAKING AREA PLAN VIEW



LIVE STAKE DETAIL

NOTES:

1. ENHANCEMENT AREAS HAVE 5 X 5 SPACING ONLY.
2. IF STAKES ARE BEING HARVESTED NEAR THE SITE, STAKES SHOULD BE CUT AND INSTALLED ON THE SAME DAY.
3. KEEP STAKES COOL AND MOIST WHILE ON THE JOB SITE AND PRIOR TO INSTALLATION.
4. DO NOT INSTALL STAKES THAT HAVE BEEN SPLIT.
5. STAKES MUST BE INSTALLED WITH BUDS POINTING UPWARDS.
6. STAKES SHALL BE INSTALLED PERPENDICULAR TO BANK.
7. STAKES SHALL BE 1/2 TO 2 INCHES IN DIAMETER AND 2 TO 3 FT LONG.
8. STAKES SHALL BE INSTALLED LEAVING 1/5 OF STAKE ABOVE GROUND.

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

STEWARTS CREEK TRIBUTARIES PROJECT
SURRY COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
559 JONES FRANKLIN ROAD, SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER

PROGRESS DRAWING
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ARCHIVE

STRUCTURE TABLES - UNNAMED TRIBUTARIES

PROJECT # 083

SHEET NO. 3

TABLES

STRUCTURE TABLES TO BE DETERMINED AT 90% DESIGN

5/24/2019
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MKOCH

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV.	DATE
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STRUCTURE TABLES - MOORES FORK

PROJECT # 083

SHEET NO. 3A

TABLES

STRUCTURE TABLES TO BE
DETERMINED AT 90% DESIGN

5/24/2019
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MKOCH

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VEGETATION SELECTION

PROJECT # 083 | SHEET NO. 3B

VEGETATION SELECTION

Temporary Seeding

Temporary herbaceous seed mixtures for the restoration site shall be planted in all disturbed areas. Temporary seed shall be applied according to the construction specifications and the information specified below.

Scientific Name	Common Name	Rate	Dates
Secale cereale	Cereal Rye Grain	130 lbs/acre	September to March (Cool Season)
Urochloa ramosa	Browntop Millet	30 lbs/acre	April to August (Warm Season)

Total Planting Area for Temporary Seeding **27.1** *acre(s)*

Zone 1 - Live Staking (Stream Banks)

Live stakes will be installed along all stabilized bank areas, as indicated on the planting plan sheets, details, and according to the construction specifications. Live stake all disturbed banks with a single row at a **1,742 live stakes per acre (5' x 5' spacing), or 4,840 live stakes per acre (3'x3' spacing).** Not all of the species listed may be planted. Commercial availability may dictate which species are actually planted.

Scientific Name	Common Name	% by Species	Approx. Number of Stems (5x5)	Approx. Number of Stems (3x3)	Approx. Total Number of Stems	Wetland Indicator Status
Cornus amomum	Silky dogwood	40%	1115	1607	2722	FACW
Salix sericea	Silky willow	30%	836	1205	2041	OBL
Salix nigra	Black willow	20%	557	803	1361	OBL
Sambucus canadensis	Elderberry	10%	279	402	680	FAC
	Total	**100%**	2787	4017	6804	

Total Planting Area for Livestakes (5x5 spacing)	**1.6**	**acre(s)**
Total Planting Area for Livestakes (3x3 spacing)	**0.8**	**acre(s)**
Total Planting Area for Livestakes	**2.4**	**acre(s)**

Zone 2 - Riparian Buffer (Permanent Seeding)

This permanent seed mixture shall be planted in all disturbed areas as specified on the plans as **Zone 2**. This permanent seed mixture shall be applied with temporary seed, as defined in the construction specifications. This permanent seed shall be applied at a rate of **25 lbs/acre**.

Scientific Name	Common Name	% by Species	Wetland Indicator Status
Elymus virginicus	Virginia wildrye	20%	FACW
Agrostis perennans	Autumn bentgrass	15%	FACU
Panicum virgatum	Switchgrass	15%	FAC
Rudbeckia hirta	Black-Eyed Susan	10%	FACU
Coreopsis lanceolata	Lance-Leaved Tick Seed	10%	FACU
Andropogon gerardii	Big Blue Stem	10%	FAC
Juncus effusus	Soft Rush	5%	FACW
Schizachyrium scoparium	Little Blue Stem	5%	FACU
Sorghastrum nutans	Yellow Indian Grass	5%	FACU
Tripsacum dactyloides	Eastern Gamma Grass	5%	FACW
	Total	**100%**	

Total Planting Area for Permanent Seeding: **22.5** acre(s)

Zone 2 - Riparian Vegetation

Riparian vegetation species (bare-roots) shall be planted in the areas designated on the plans using the species mixture and percentages listed below. Riparian species shall be planted at an overall density of **680 stems per acre (8' x 8' spacing)**. All species will be planted according to the plans, details, and construction specifications. Not all of the species listed may be planted. Commercial availability may dictate which species are actually planted.

Scientific Name	Common Name	% by Species	Wetland Indicator Status
Betula nigra	River Birch	15%	FACW
Carpinus caroliniana	Ironwood	10%	FAC
Celtis laevigata	Sugarberry	5%	FACW
Diospryos virginiana	Persimmon	10%	FAC
Fraxinus pennsylvanica	Green Ash	5%	FACW
Platanus occidentalis	Sycamore	20%	FACW
Quercus nigra	Water Oak	10%	FAC
Quercus phellos	Willow Oak	15%	FAC
Ulmus americana	American Elm	10%	FACW
	Total	**100%**	

Total Planting Area for Riparian Vegetation **20.1** **acre(s)**

Zone 3 - Uplands (Permanent Seeding)

This permanent seed mixture shall be planted in all disturbed areas as specified on the plans as **Zone 3**. This permanent seed mixture shall be applied with temporary seed, as defined in the construction specifications. Permanent seed shall be applied at a rate of **25 lbs/acre**.

Scientific Name	Common Name	% by Species	Wetland Indicator Status
Elymus virginicus	Virginia wildrye	15%	FACW
Tripsacum dactyloides	Eastern Gamma Grass	13%	FACW
Agrostis scabra	Rough bentgrass	12%	FAC
Panicum virgatum	Switchgrass	12%	FAC
Carex vulpinoidea	Fox Sedge	10%	OBL
Tridens flavus	Purple Top	10%	FACU
Schizachyrium scoparium	Little Blue Stem	8%	FACU
Coreopsis lanceolata	Lance-Leaved Tick Seed	5%	FACU
Elymus hystrix	Bottlebrush Grass	5%	UPL
Sorghastrum nutans	Yellow Indian Grass	5%	FACU
Festuca ovina var. duriuscala	Hard Fescue	4%	UPL
Rudbeckia hirta	Black-Eyed Susan	1%	FACU
	Total	**100%**	

Total Planting Area for Permanent Seeding: **1.9** acre(s)

Zone 3 - Upland Vegetation

Upland vegetation species (bare-roots) shall be planted in the areas designated on the plans using the species mixture and percentages listed below. Species shall be planted at an overall density of **680 stems per acre (8' x 8' spacing)**. All species will be planted according to the plans, details, and construction specifications. Not all of the species listed may be planted. Commercial availability may dictate which species are actually planted.

Scientific Name	Common Name	% by Species	Wetland Indicator Status
Carya glabra	Pignut Hickory	10%	FACU
Carya tomentosa	Mockernut Hickory	10%	NI
Cercis canadensis	Redbud	5%	FACU
Cornus florida	Flowering Dogwood	5%	FACU
Diospyros virginiana	Persimmon	10%	FAC
Ilex opaca	American Holly	5%	FACU
Juniperus virginiana	Eastern Red Cedar	5%	FACU
Liriodendron tulipifera	Tulip Poplar	10%	FACU
Oxydendrum arboreum	Sourwood	5%	UPL
Prunus serotina	Black Cherry	5%	FACU
Quercus alba	White Oak	10%	FACU
Quercus falcata	Southern Red Oak	10%	FACU
Quercus rubra	Northern Red Oak	10%	FACU
NI = No indicator status	**Total**	**100%**	

Total Planting Area for Upland Vegetation **1.9** **acre(s)**

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JRICKEN

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:
NC Mitigation Services ENVIRONMENTAL QUALITY
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

STEWARTS CREEK TRIBUTARIES PROJECT
SURRY COUNTY, NC

PREPARED IN THE OFFICE OF:
EPR ECOSYSTEM PLANNING & RESTORATION
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RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER
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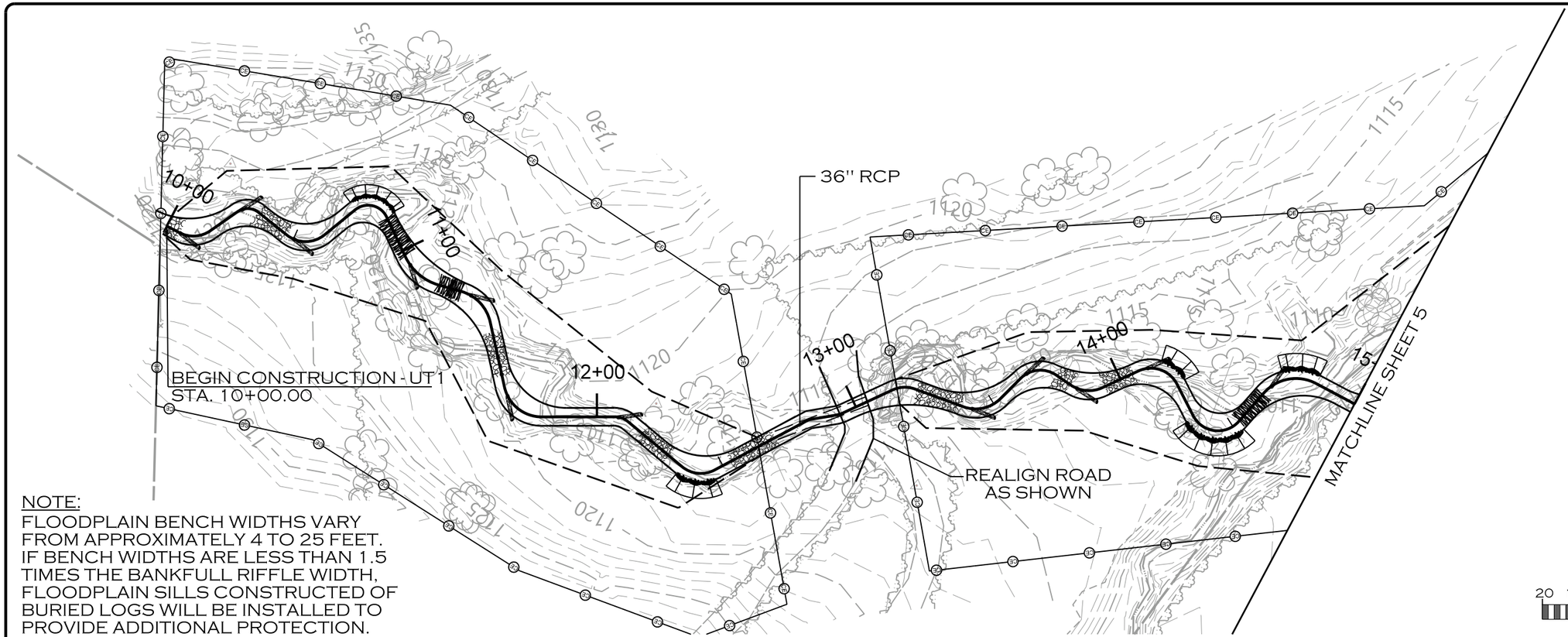
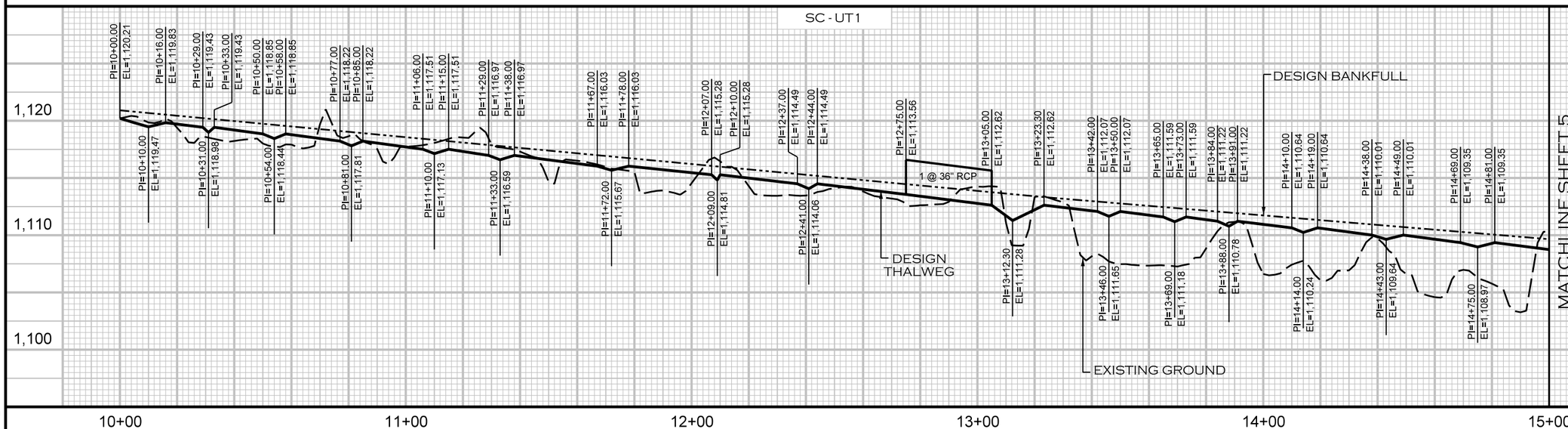
PROJECT #	SHEET NO.
083	4

PLAN / PROFILE



NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 4 TO 25 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.



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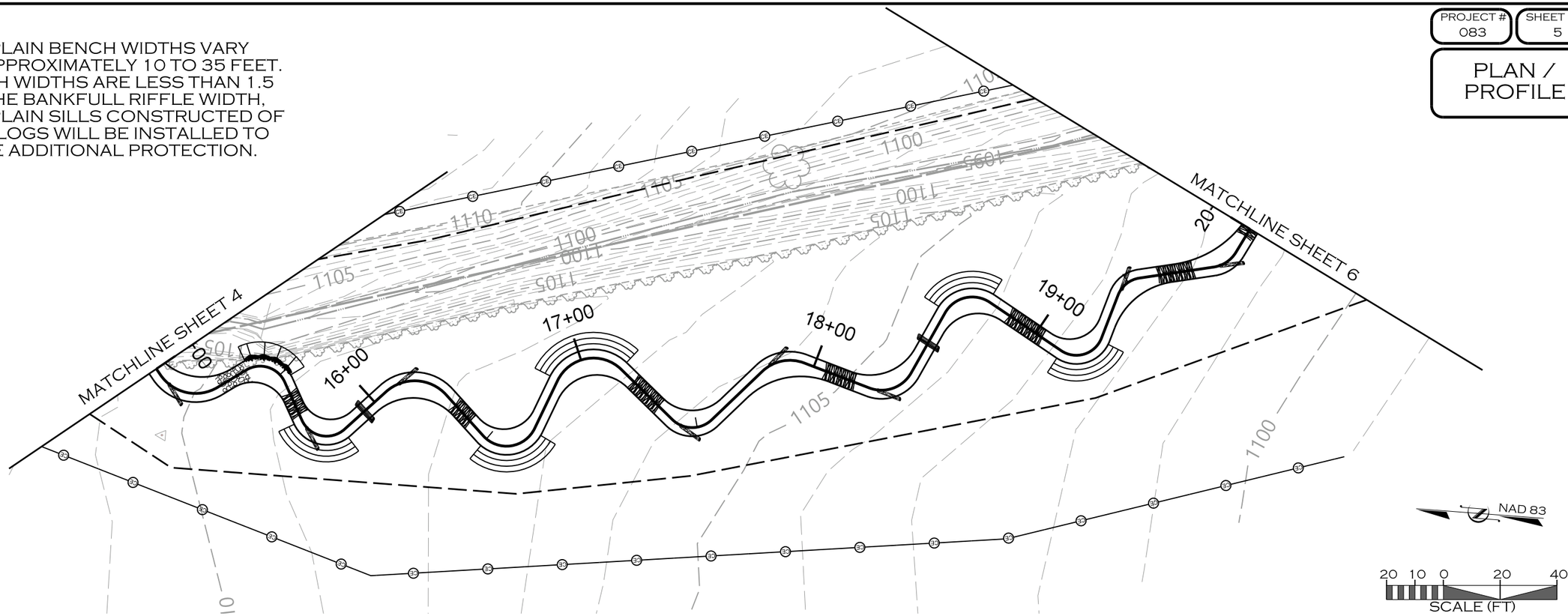
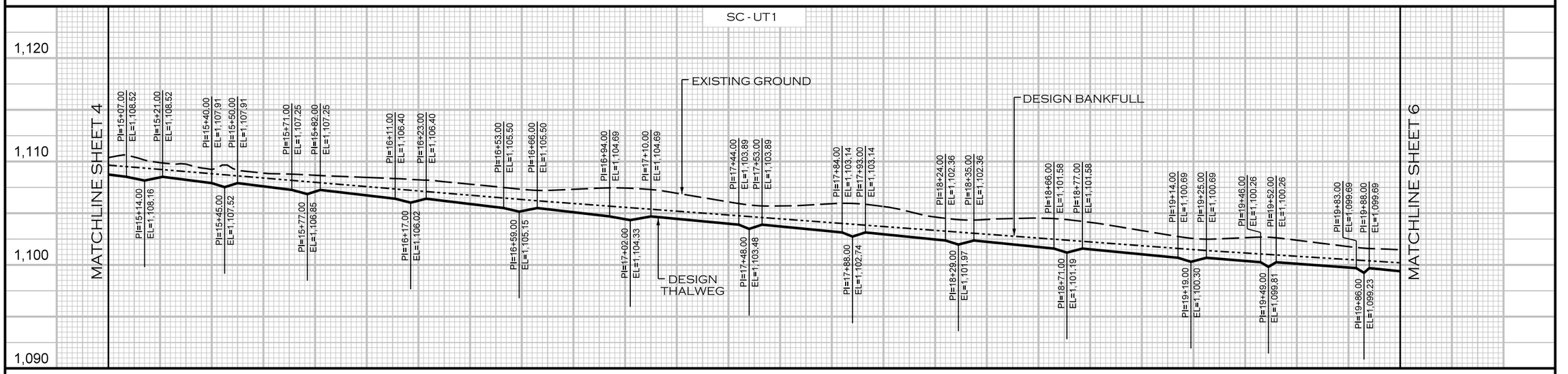
MKOON

NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 10 TO 35 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.

PROJECT #	SHEET NO.
083	5

PLAN / PROFILE





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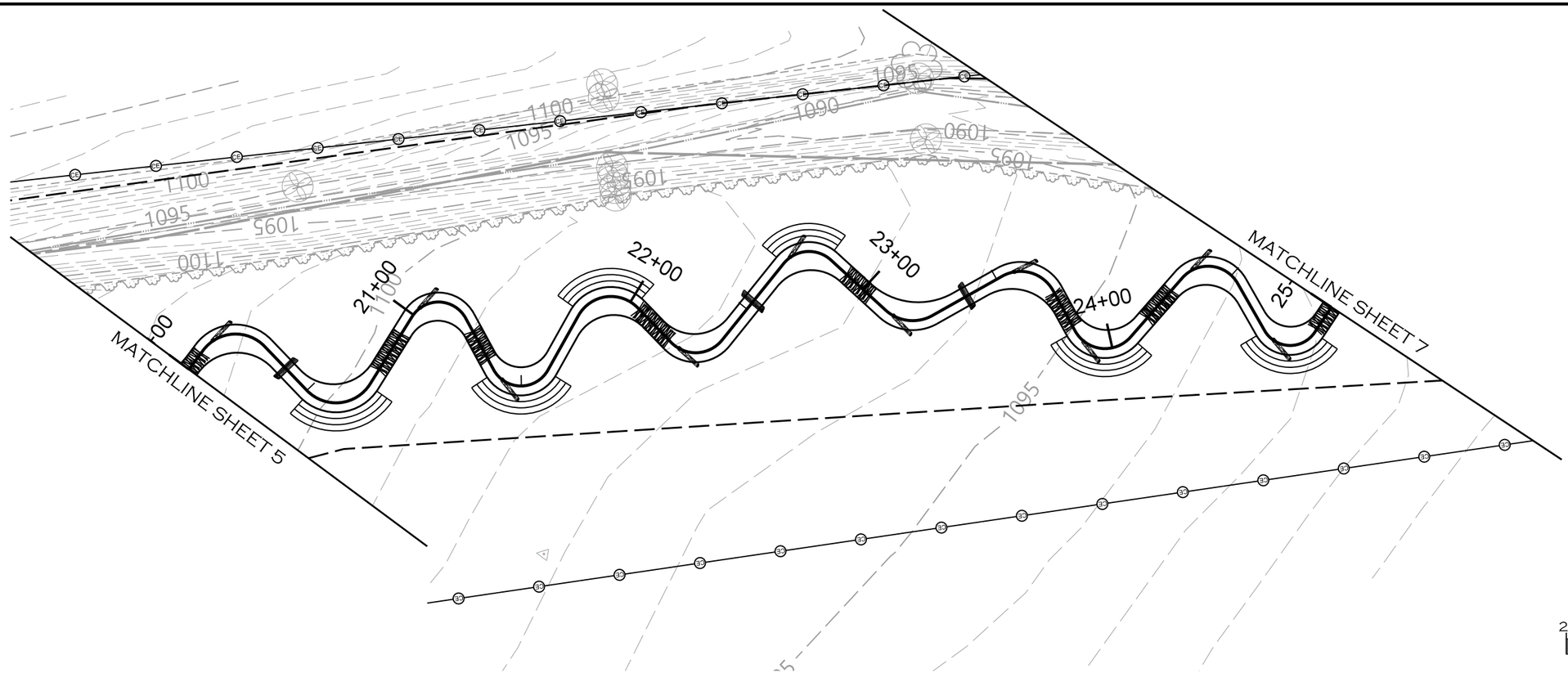
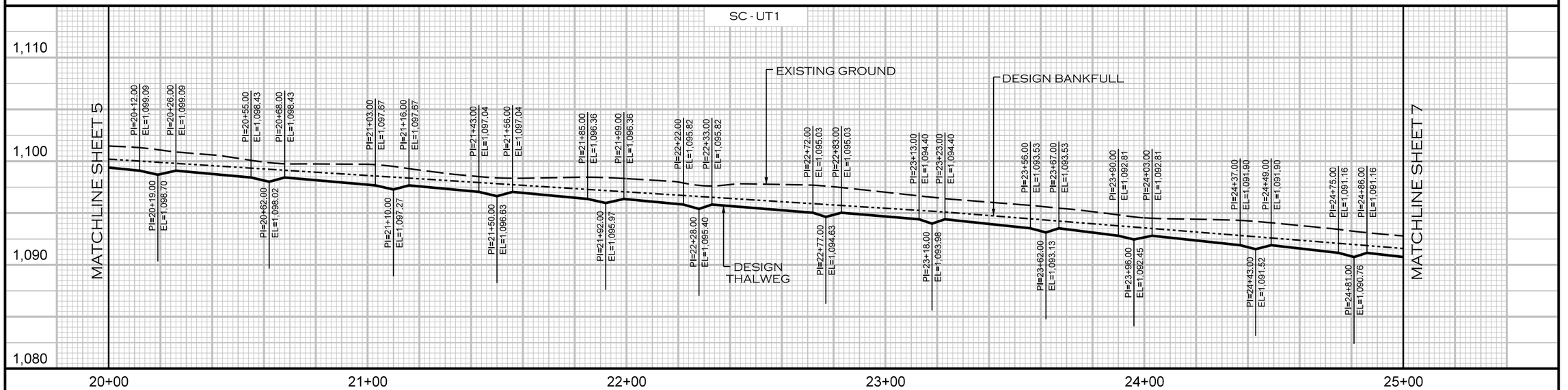
BROWN

PROJECT # 083 | SHEET NO. 6

PLAN / PROFILE





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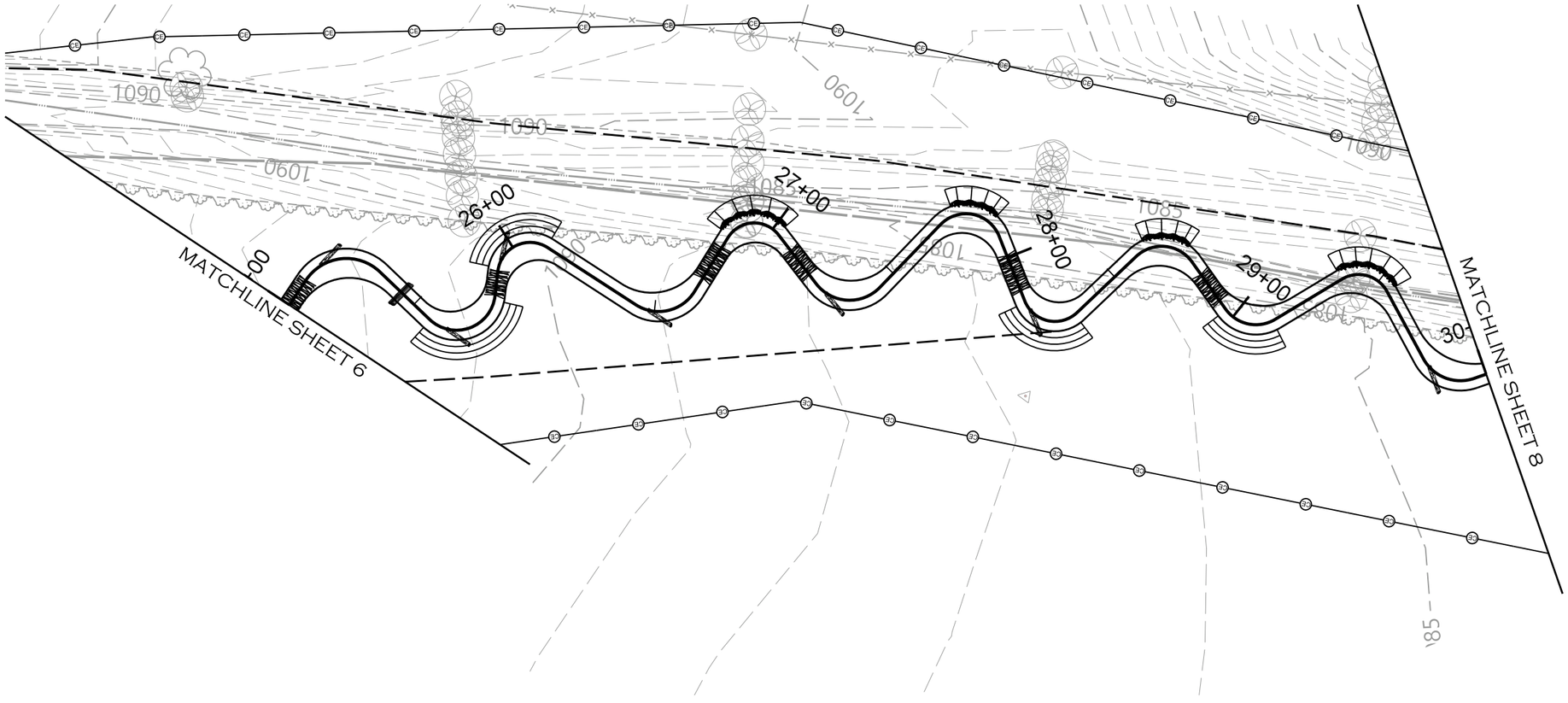
JMCCAN

PROJECT #	SHEET NO.
083	7

PLAN / PROFILE



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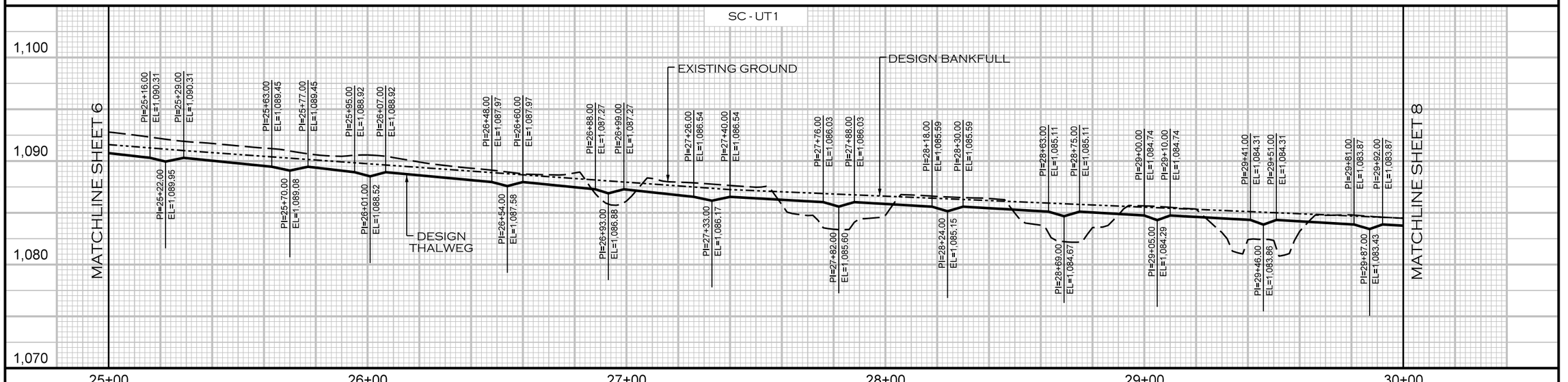

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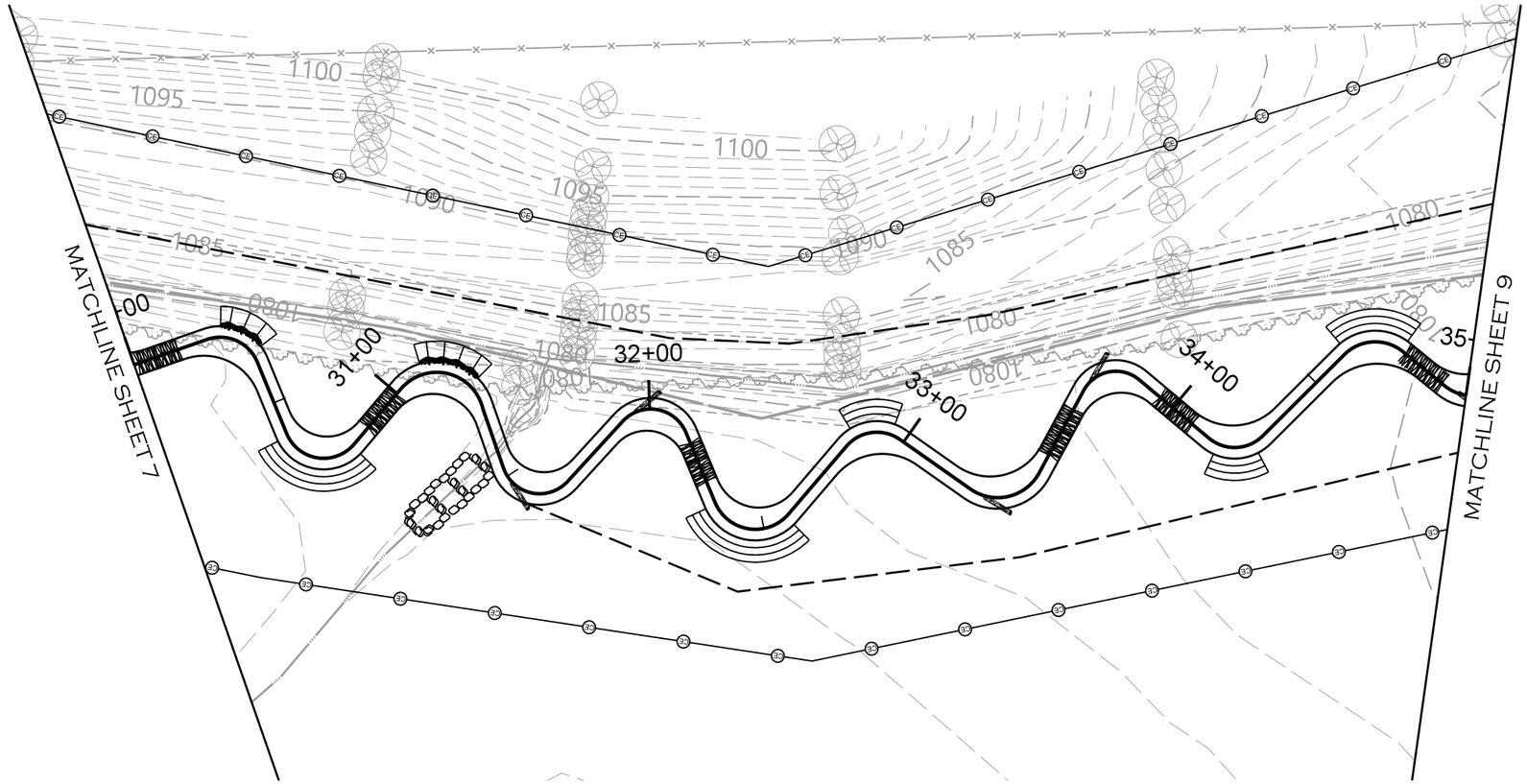
MKOHN

PROJECT #	SHEET NO.
083	8

PLAN / PROFILE



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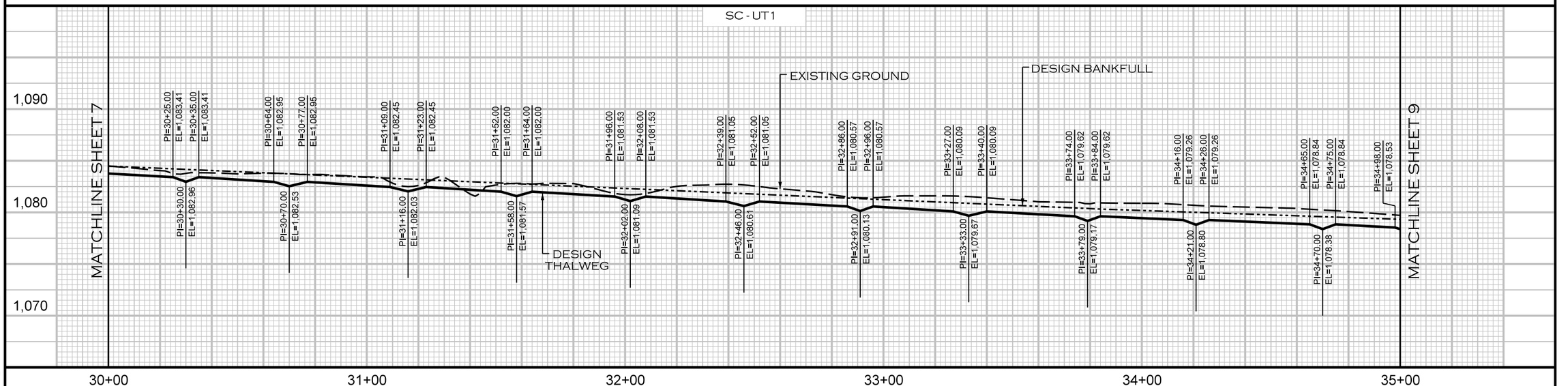

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mkoon

NOTE:
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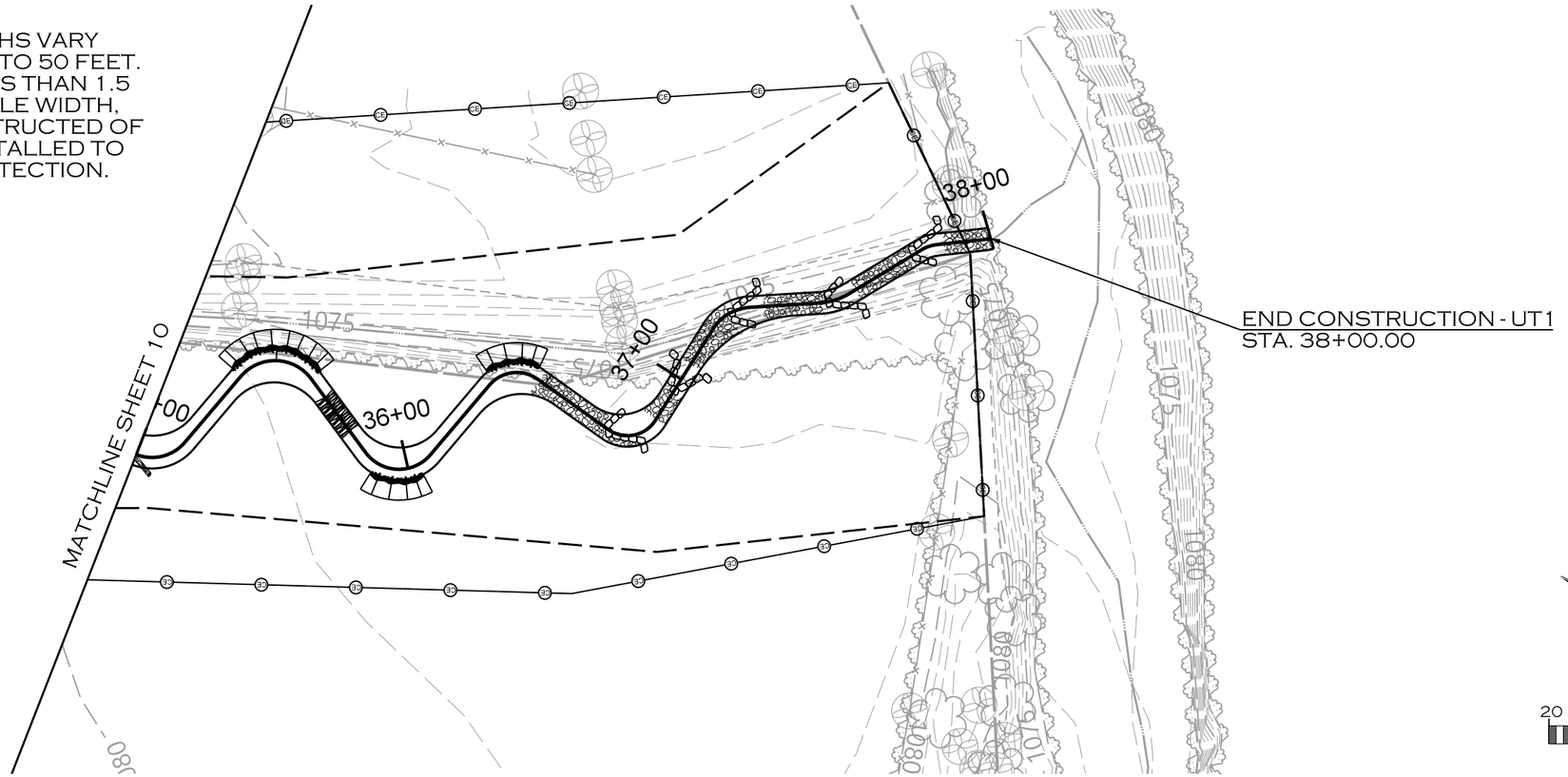
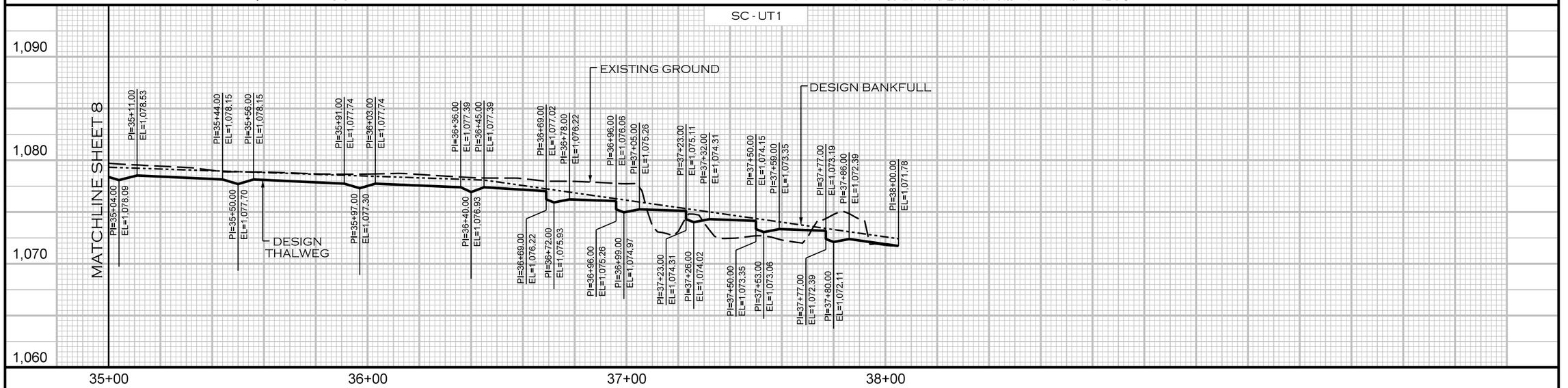
PROJECT # 083 | SHEET NO. 9

PLAN / PROFILE





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JBROWN

PROJECT #	SHEET NO.
083	10

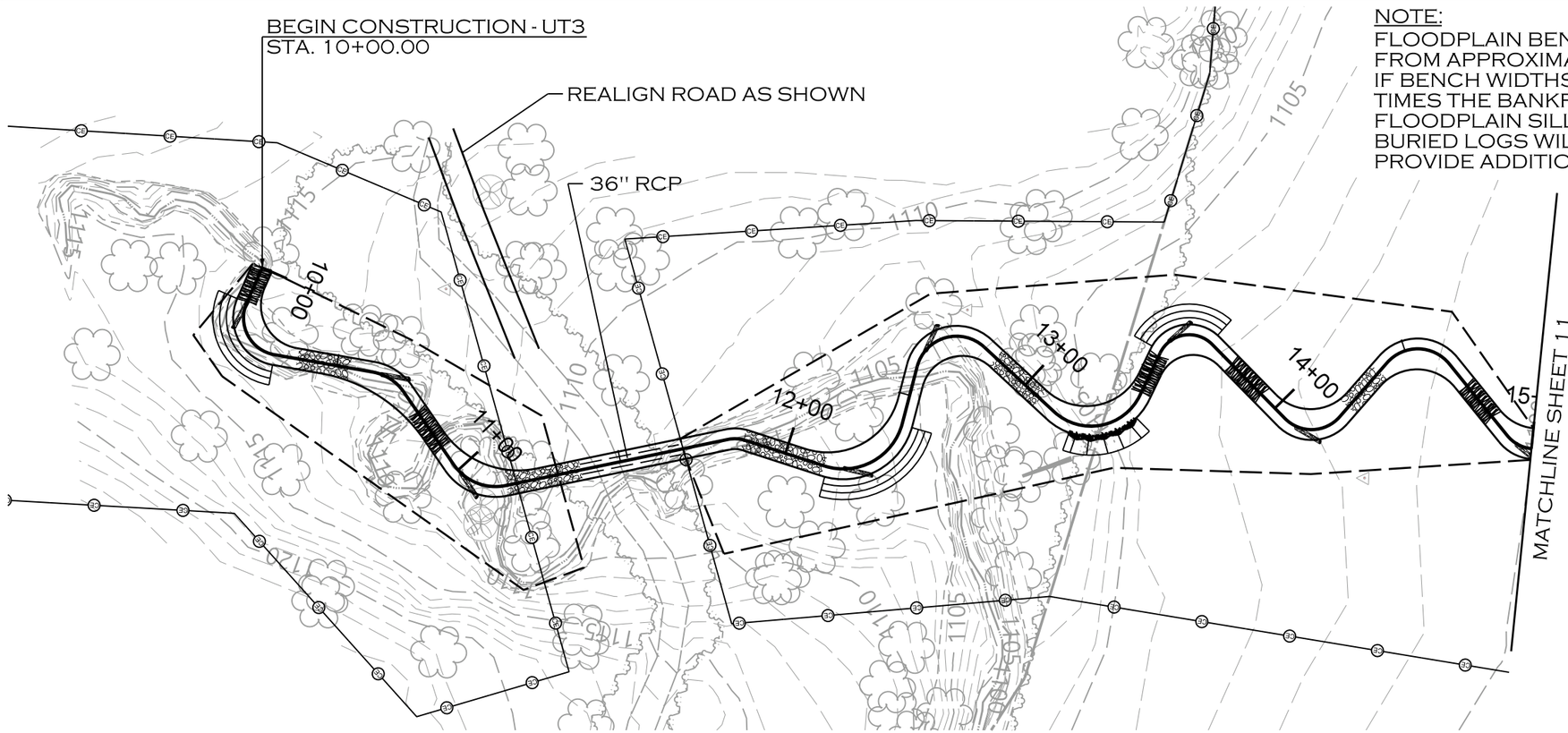
PLAN / PROFILE

BEGIN CONSTRUCTION - UT3
STA. 10+00.00

REALIGN ROAD AS SHOWN

36" RCP

NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 4 TO 33 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.



NAD 83

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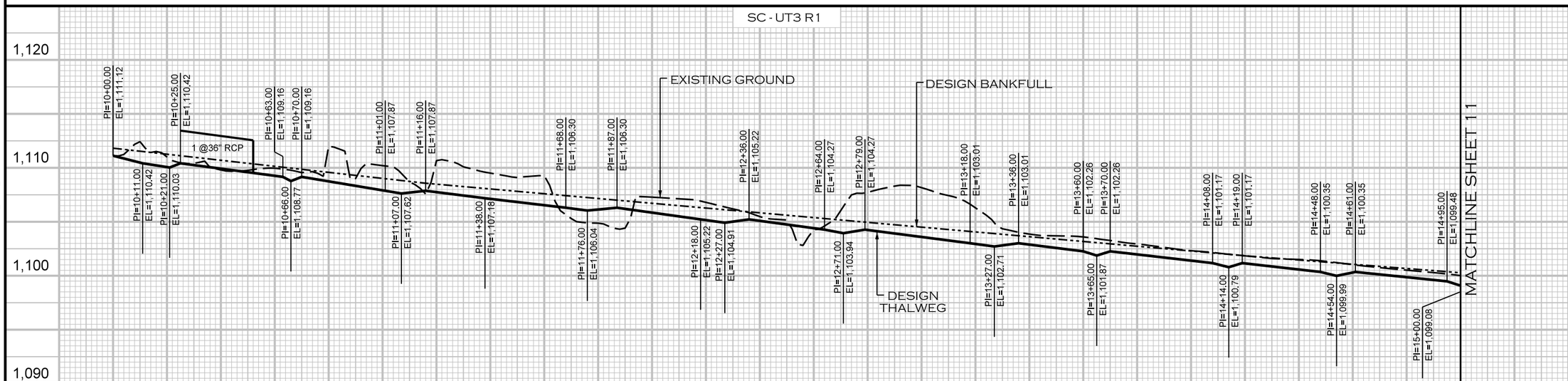
SCALE (FT)



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

STEWARTS CREEK TRIBUTARIES PROJECT
SURRY COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
559 JONES FRANKLIN RD. SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER

PROGRESS DRAWING
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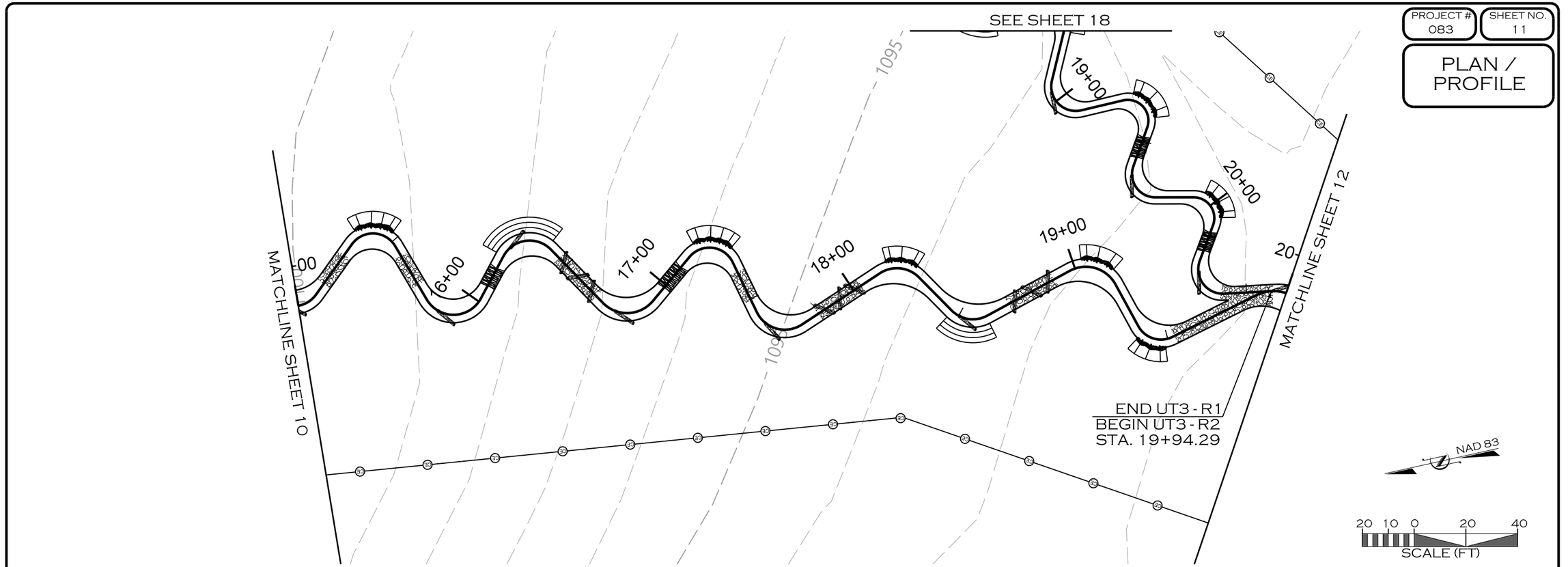
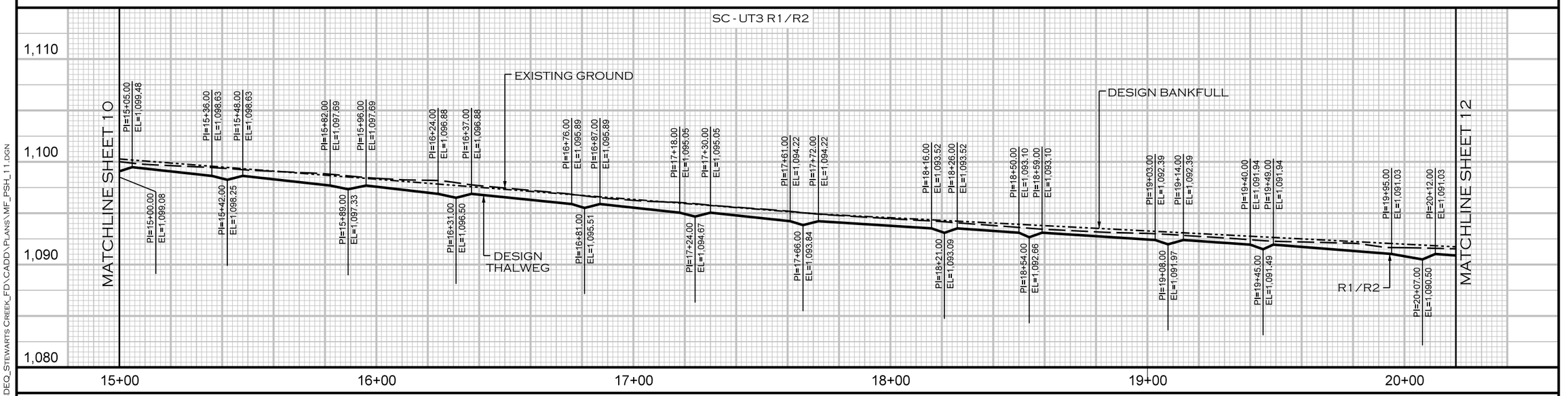
MKOCH

PROJECT # 083 | SHEET NO. 11

PLAN / PROFILE





REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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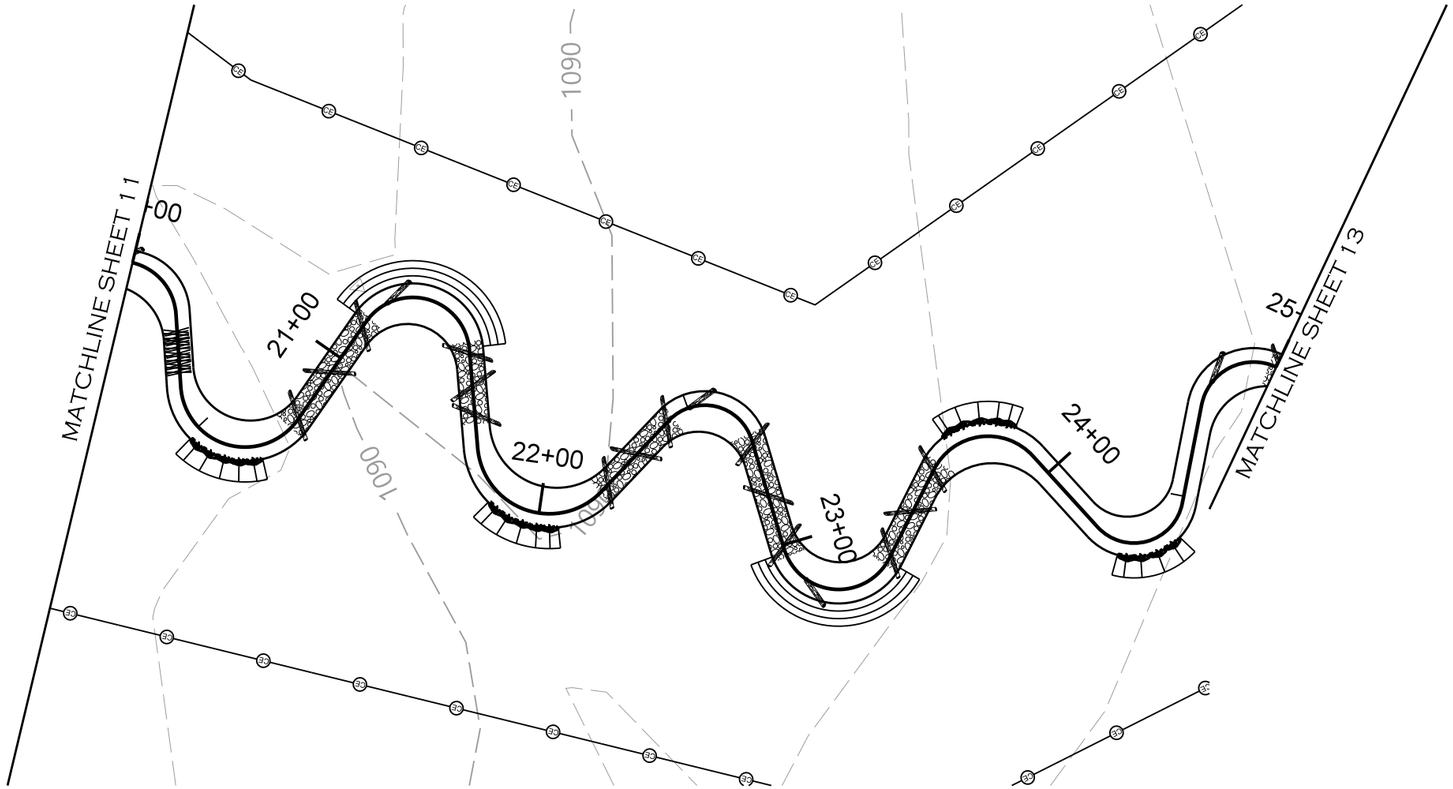
MKOCH

PROJECT #	SHEET NO.
083	12

PLAN / PROFILE



NAD 83

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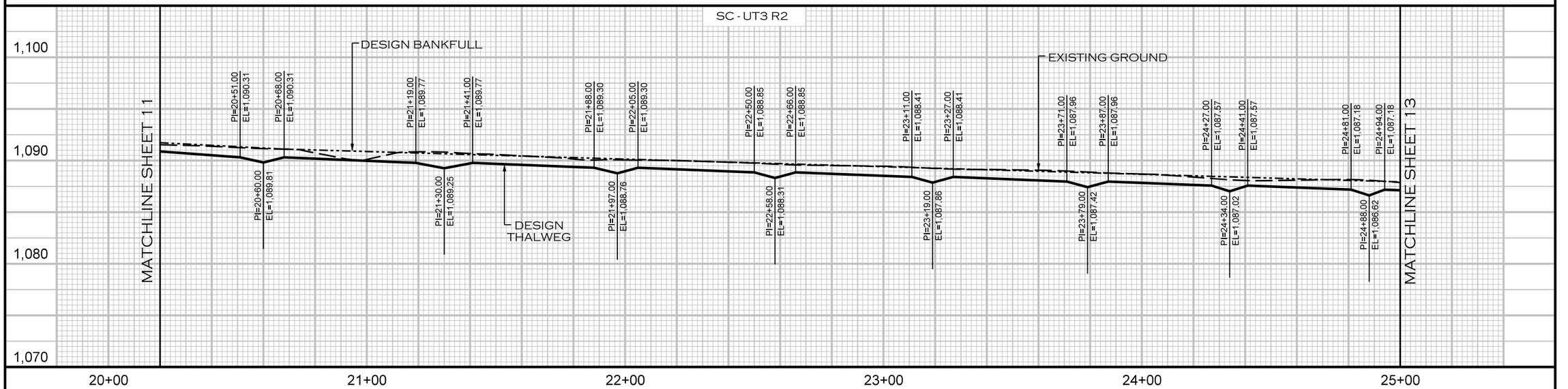
SCALE (FT)



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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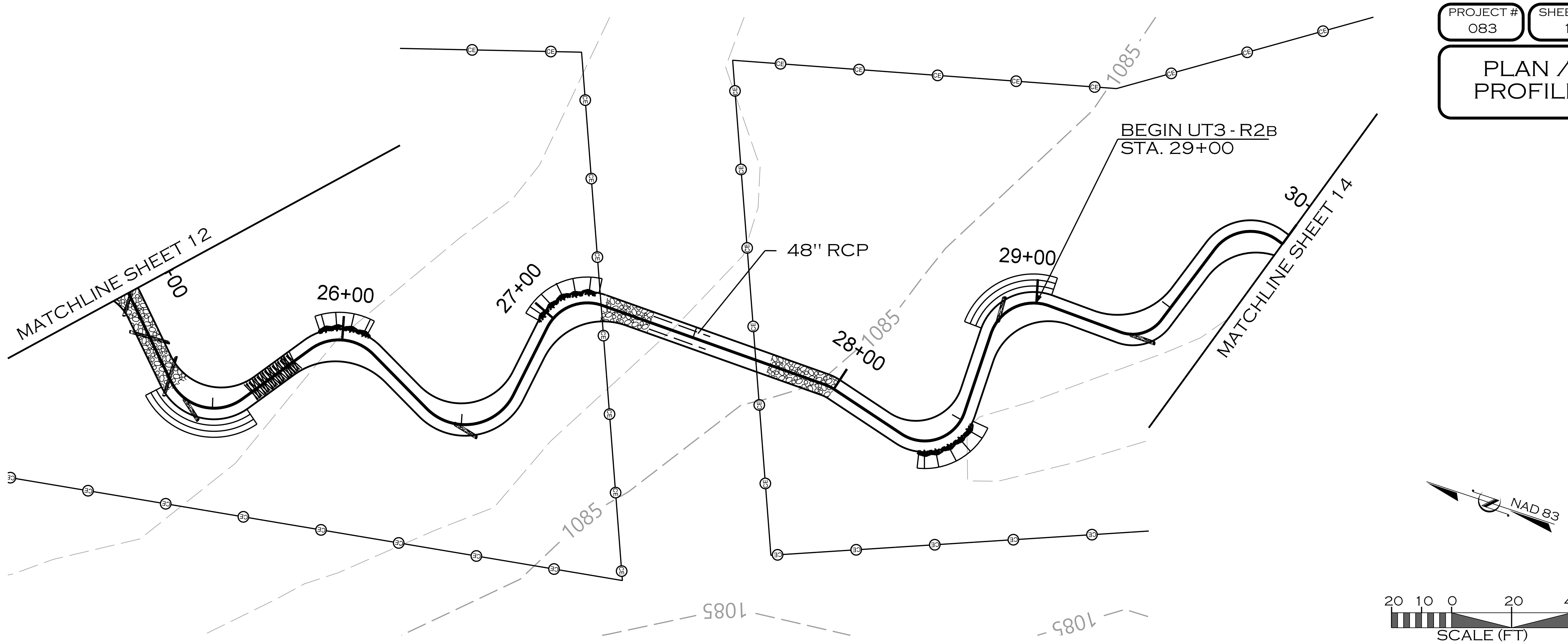
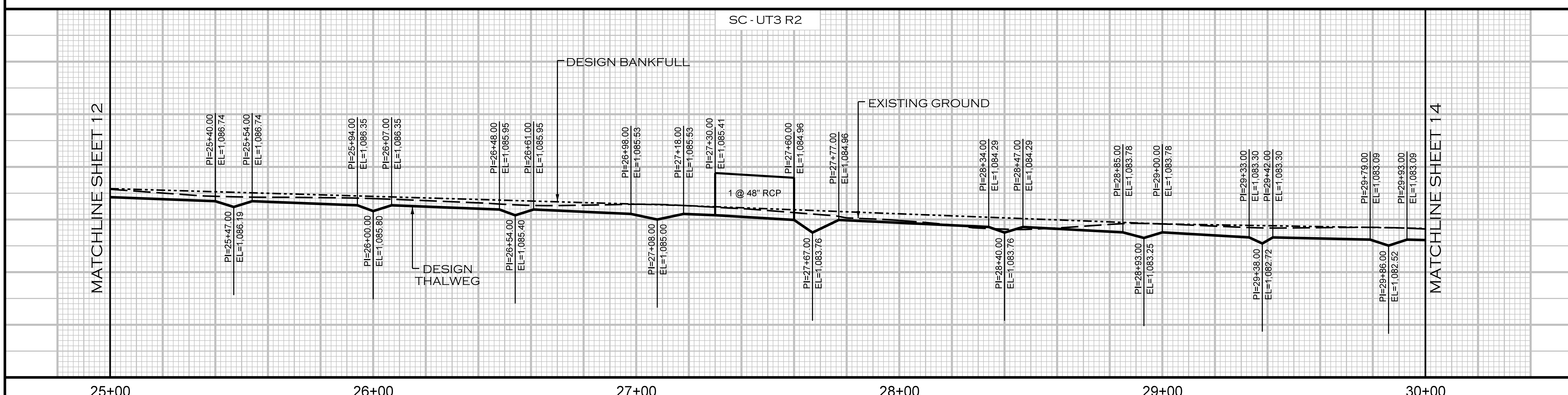
JRICKON

PROJECT # 083

SHEET NO. 13

PLAN / PROFILE





REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
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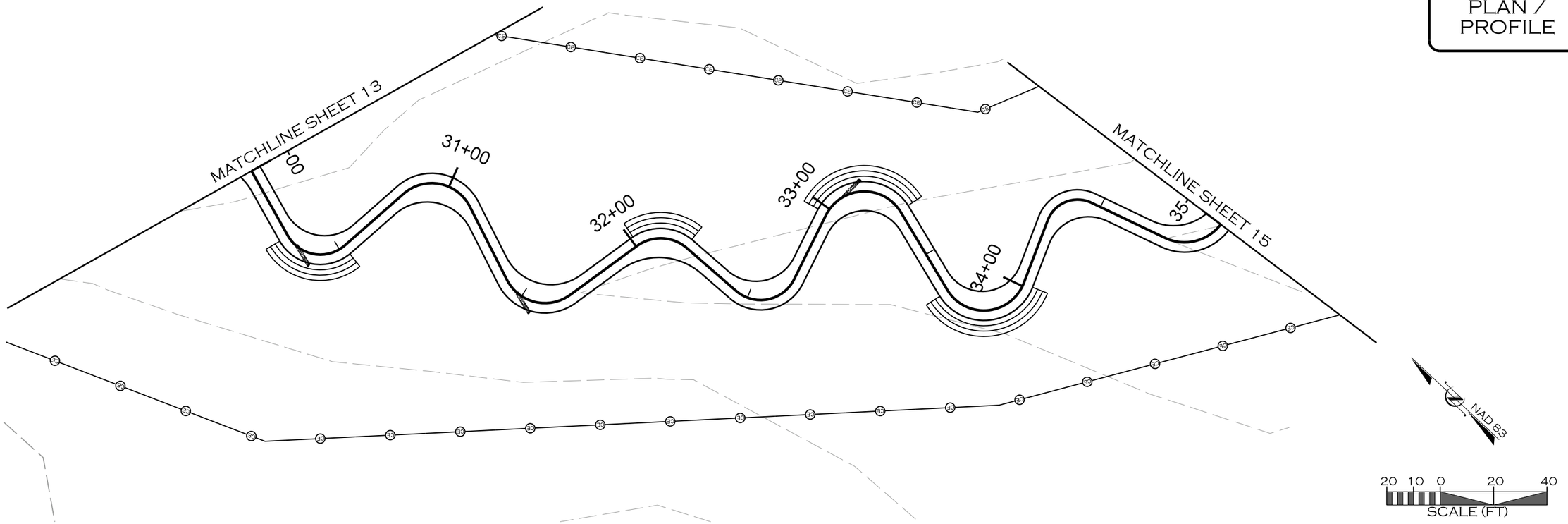
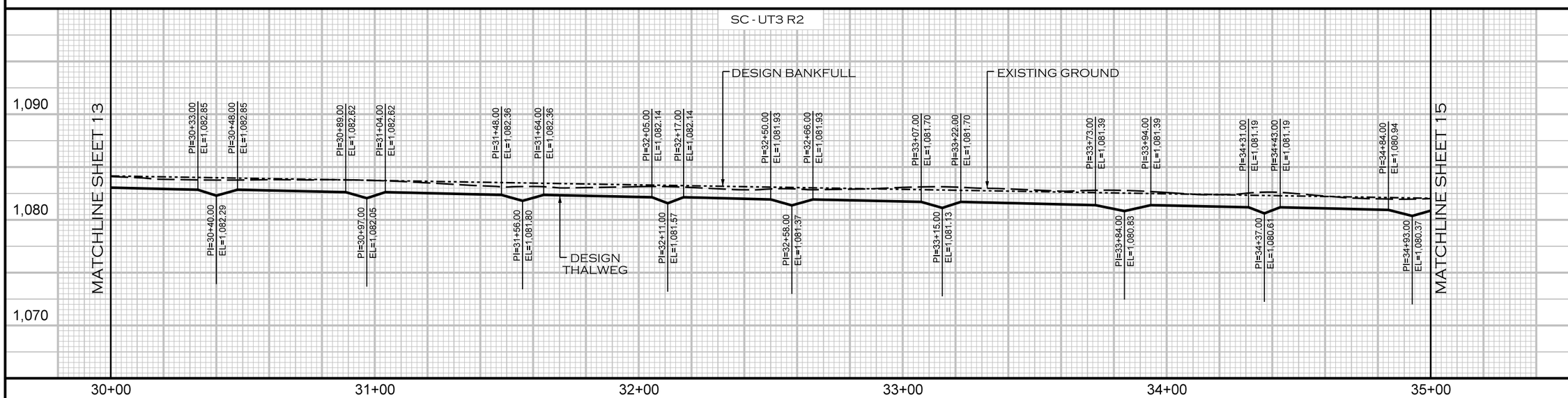
PROJECT # 083 | SHEET NO. 14

PLAN / PROFILE





REVISIONS				
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1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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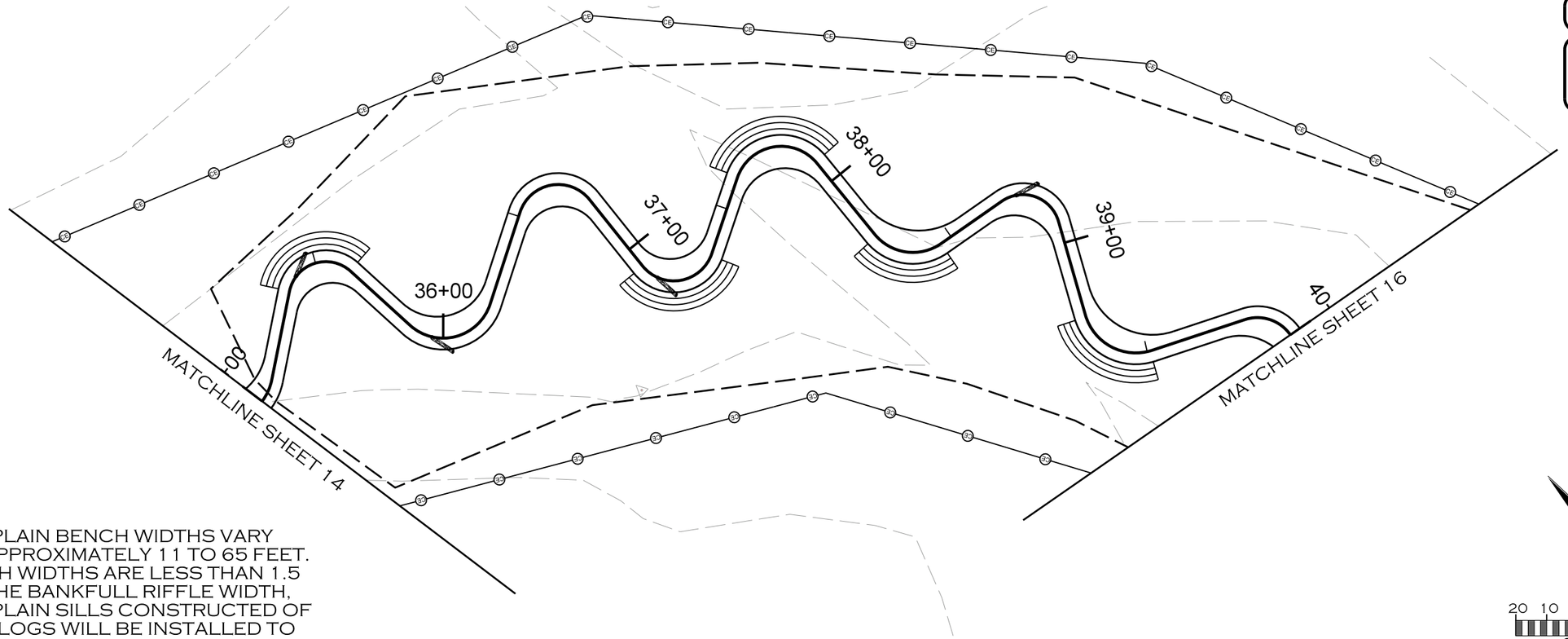
MKOHN

PROJECT # 083 | SHEET NO. 15

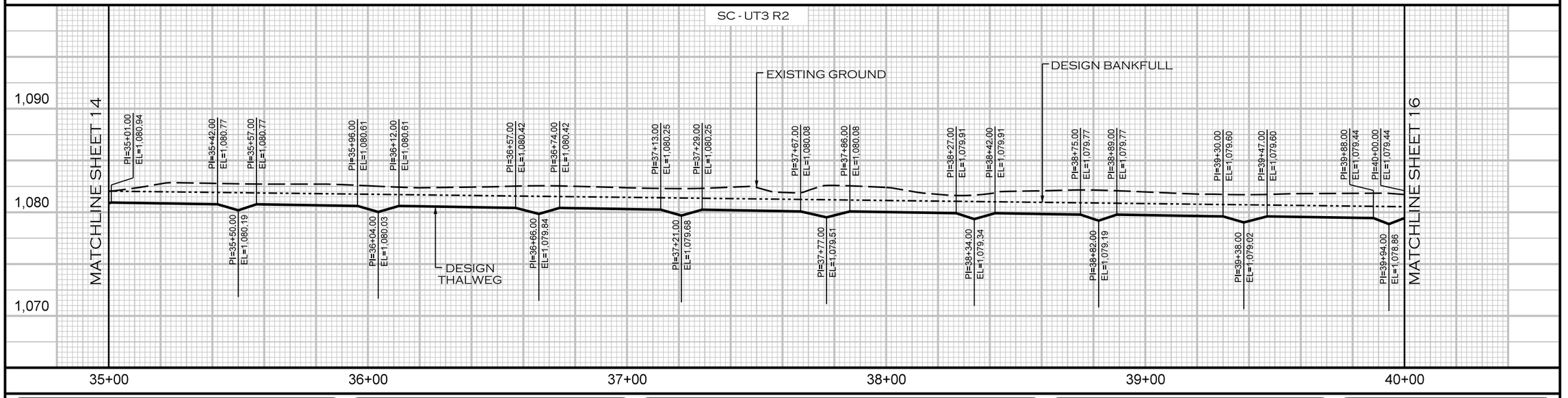
PLAN / PROFILE



NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 11 TO 65 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.

NAD 83

20 10 0 20 40
SCALE (FT)



REVISIONS				
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1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:
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MKOCH

NOTE:
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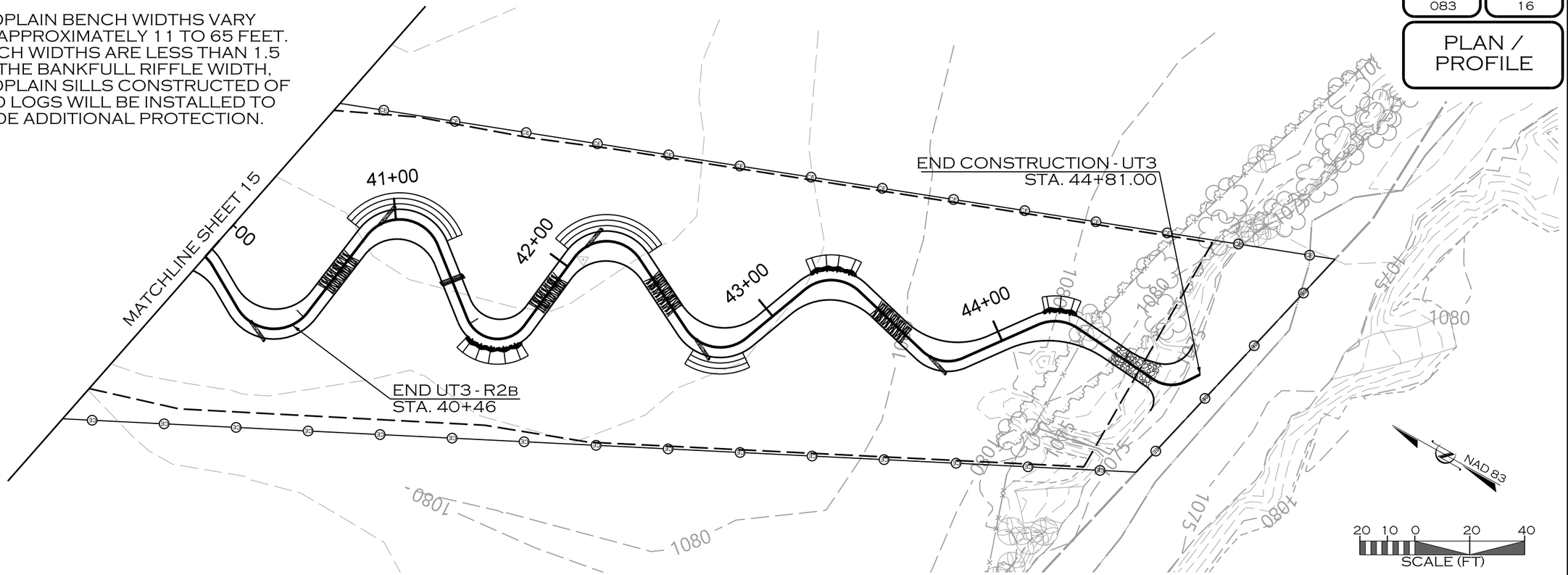
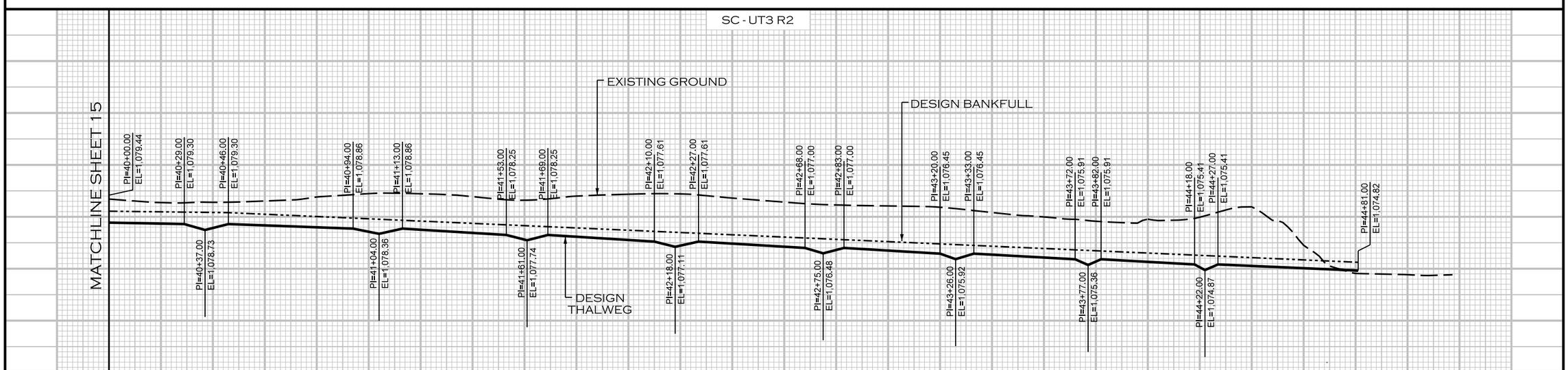
PROJECT # 083 | SHEET NO. 16

PLAN / PROFILE





REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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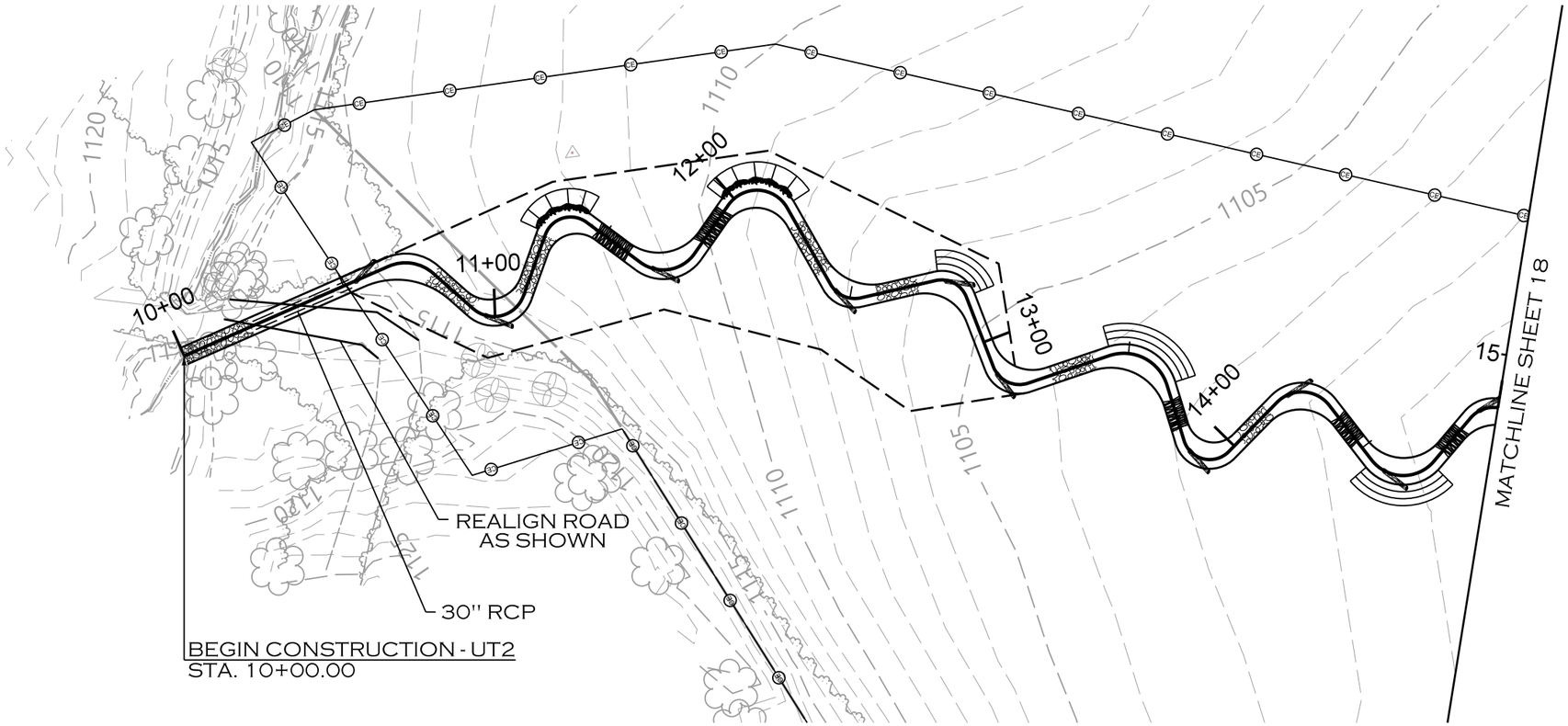
MKOCAN

PROJECT #	SHEET NO.
083	17

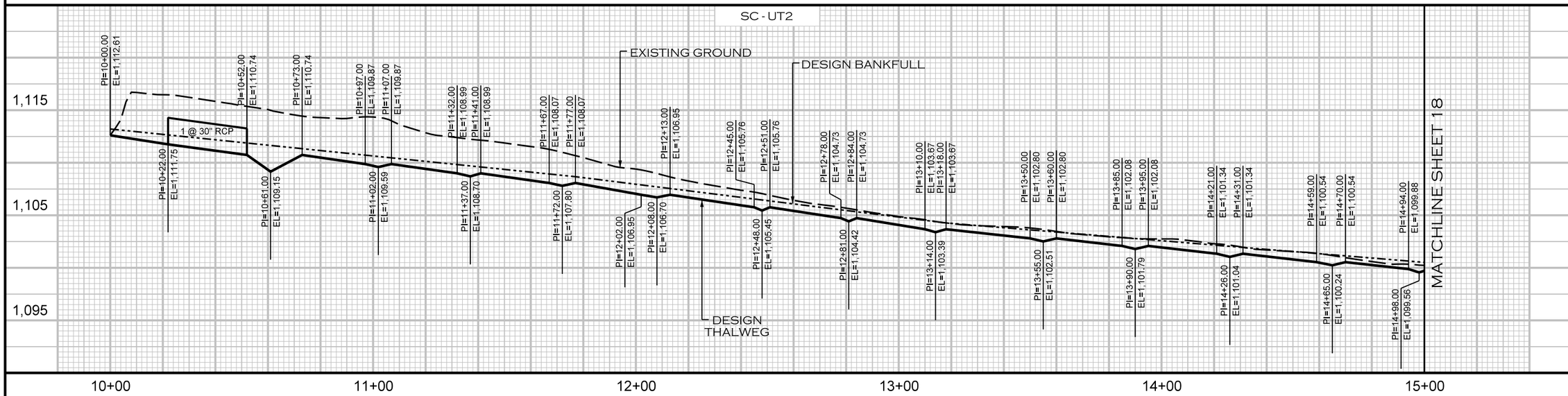
PLAN / PROFILE

NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 3 TO 30 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.



NAD 83

20 10 0 20 40
SCALE (FT)



REVISIONS				
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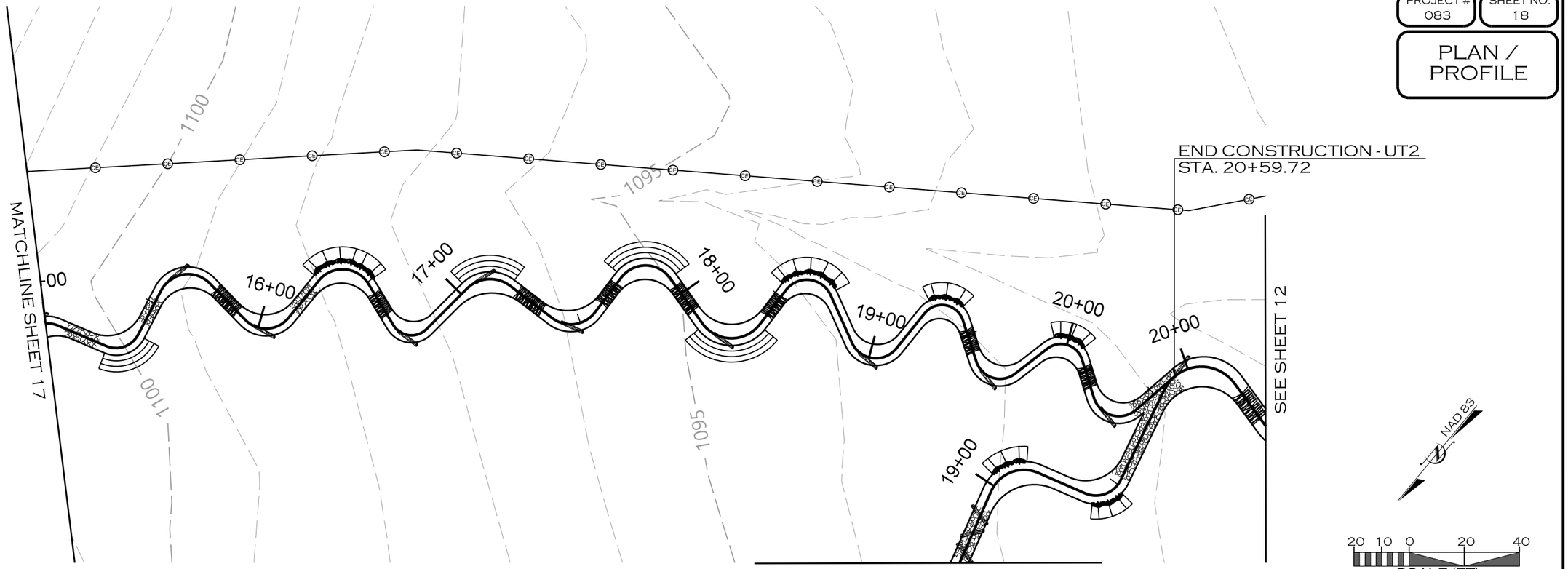
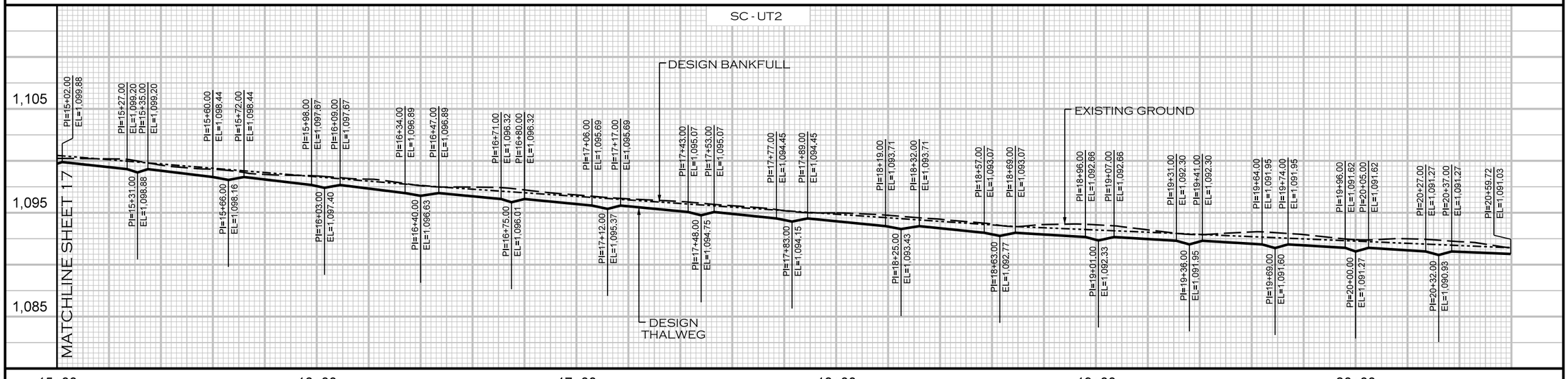
MKORN

PROJECT # 083 | SHEET NO. 18

PLAN / PROFILE





REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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NC DEPARTMENT OF ENVIRONMENTAL QUALITY
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1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

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SURRY COUNTY, NC

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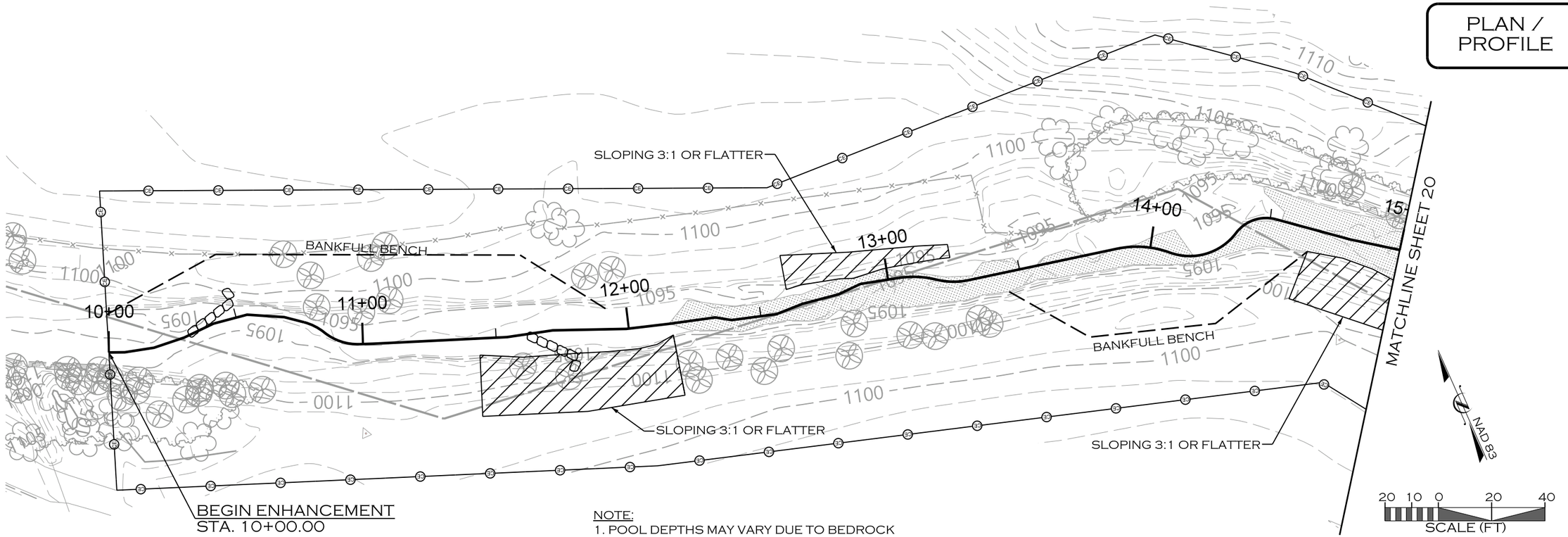
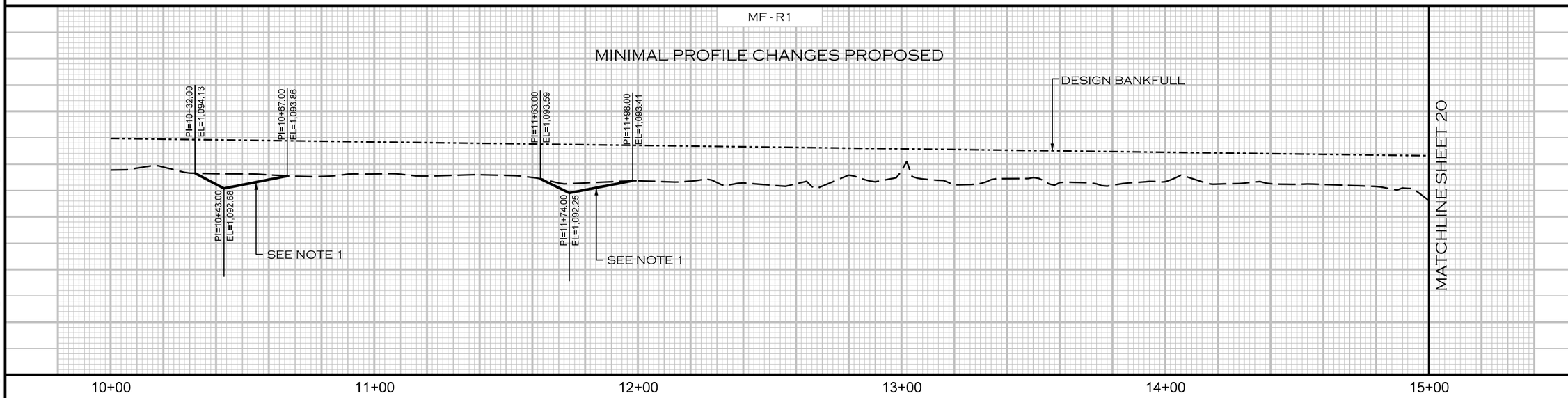
PROJECT # 083 | SHEET NO. 19

PLAN / PROFILE



NOTE:
1. POOL DEPTHS MAY VARY DUE TO BEDROCK



REVISIONS				
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1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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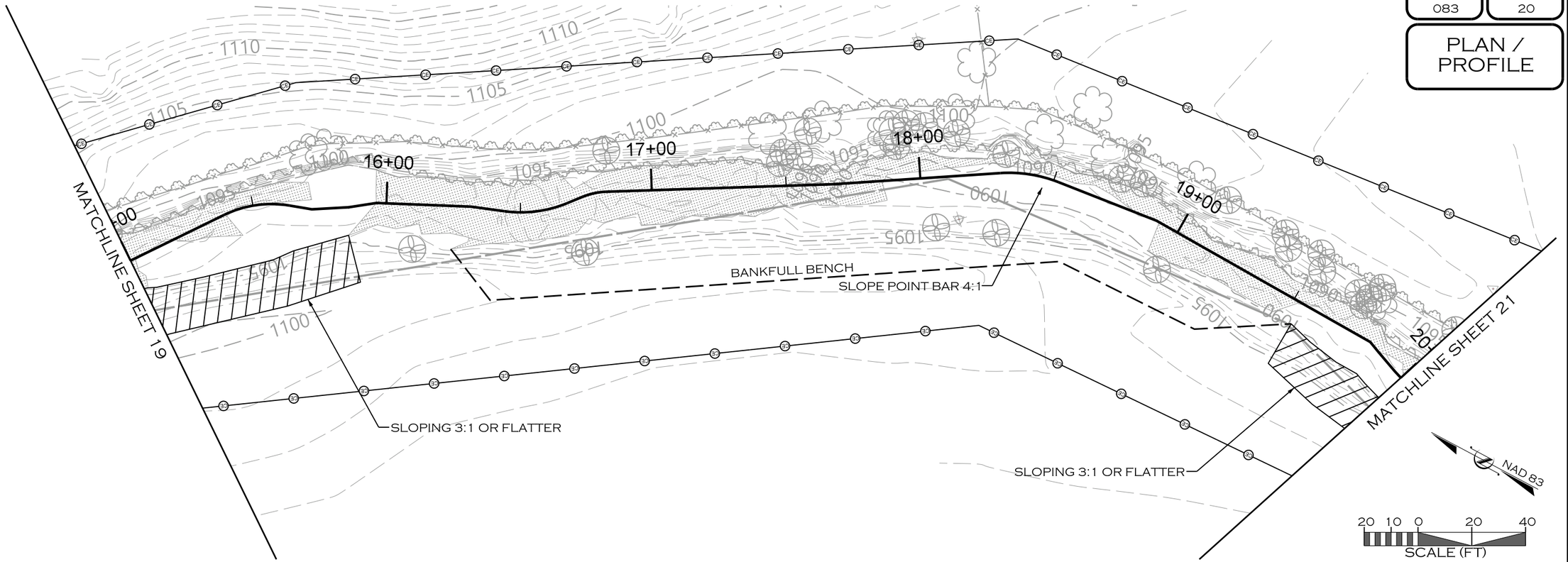
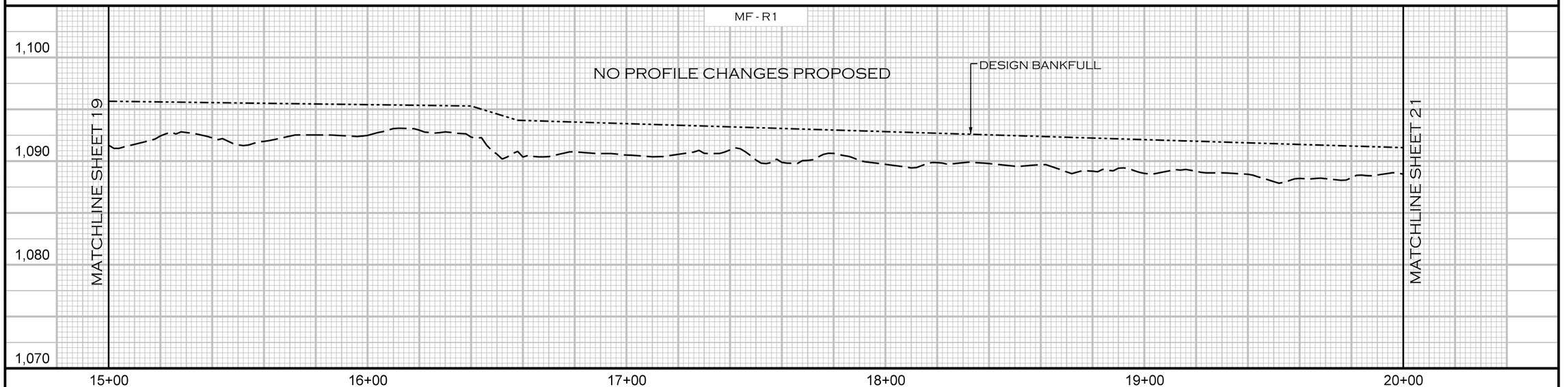
PROJECT # 083 | SHEET NO. 20

PLAN / PROFILE





REVISIONS				
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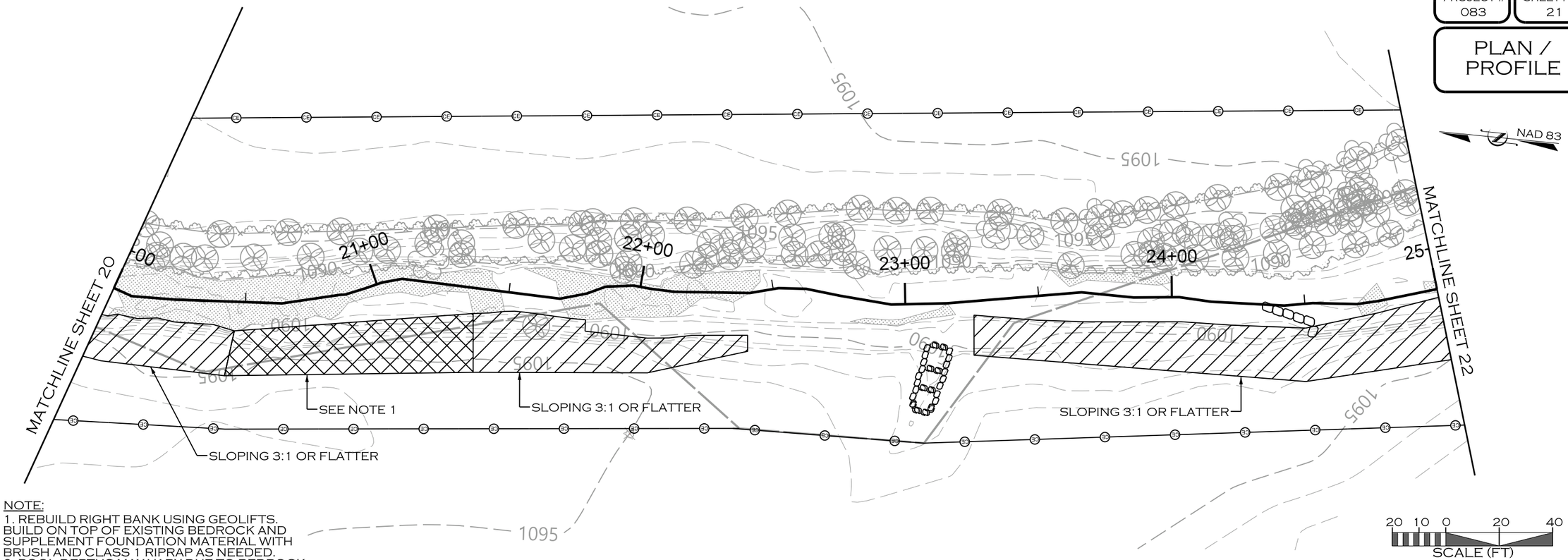
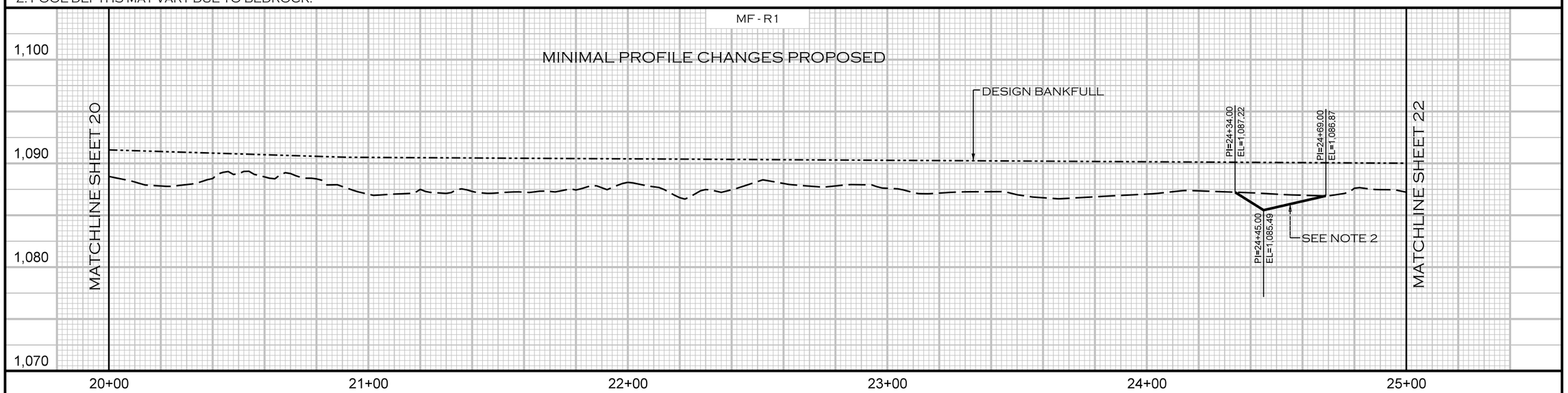
PROJECT # 083 | SHEET NO. 21

PLAN / PROFILE



NOTE:
1. REBUILD RIGHT BANK USING GEOLIFTS. BUILD ON TOP OF EXISTING BEDROCK AND SUPPLEMENT FOUNDATION MATERIAL WITH BRUSH AND CLASS 1 RIPRAP AS NEEDED.
2. POOL DEPTHS MAY VARY DUE TO BEDROCK.



REVISIONS				
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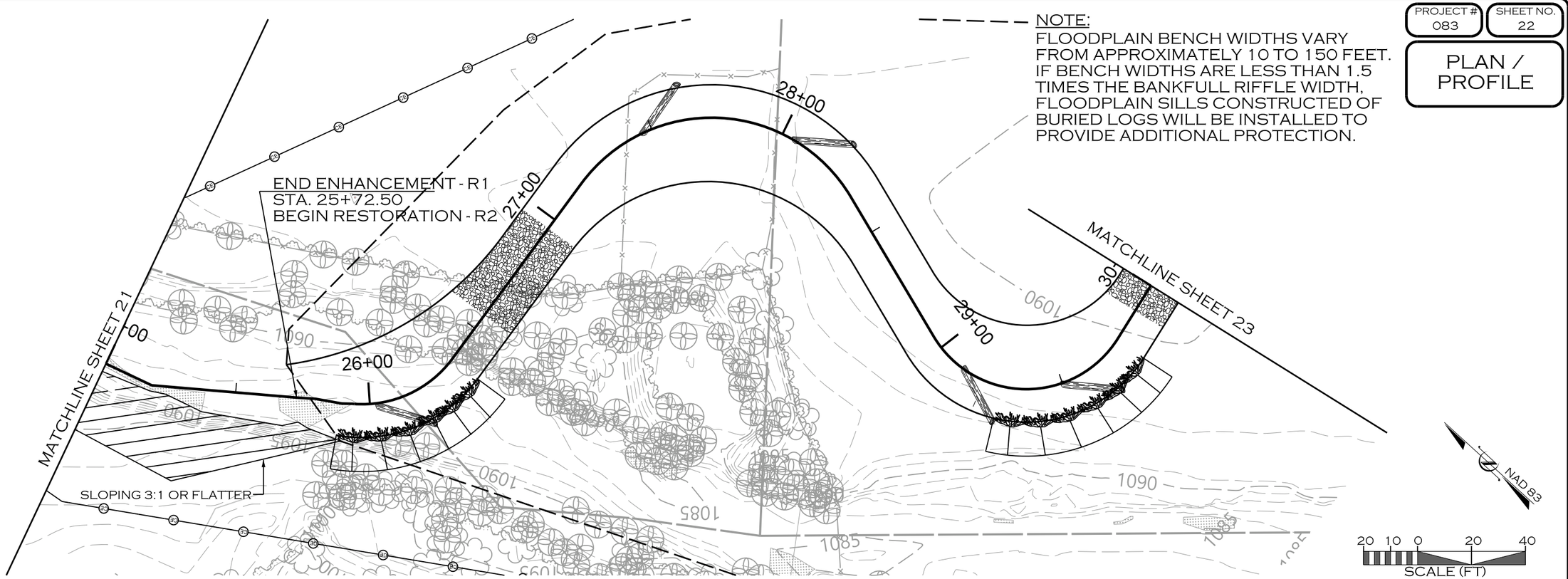
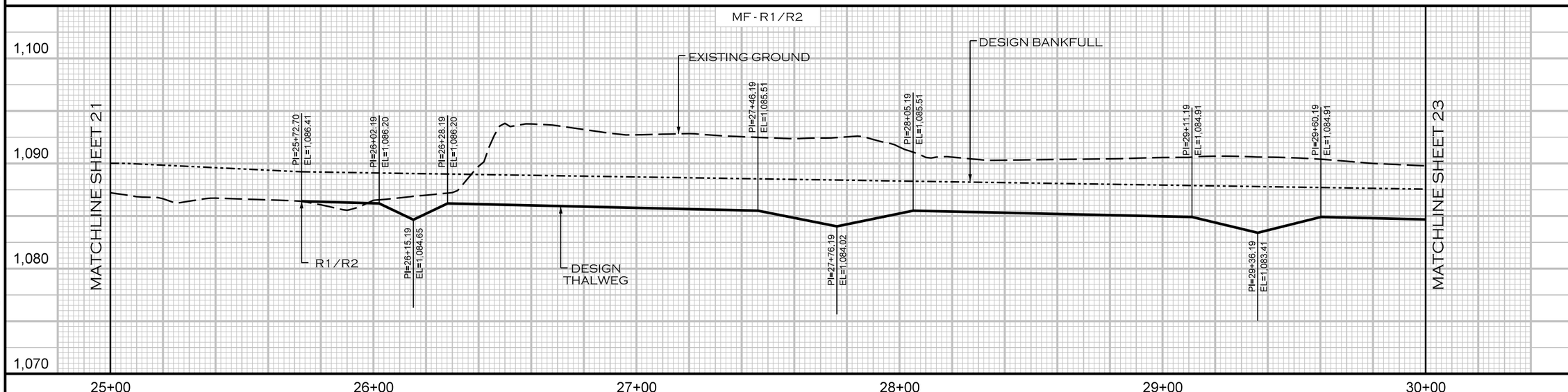
PROJECT # 083 | SHEET NO. 22

PLAN / PROFILE

NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 10 TO 150 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.





REVISIONS				
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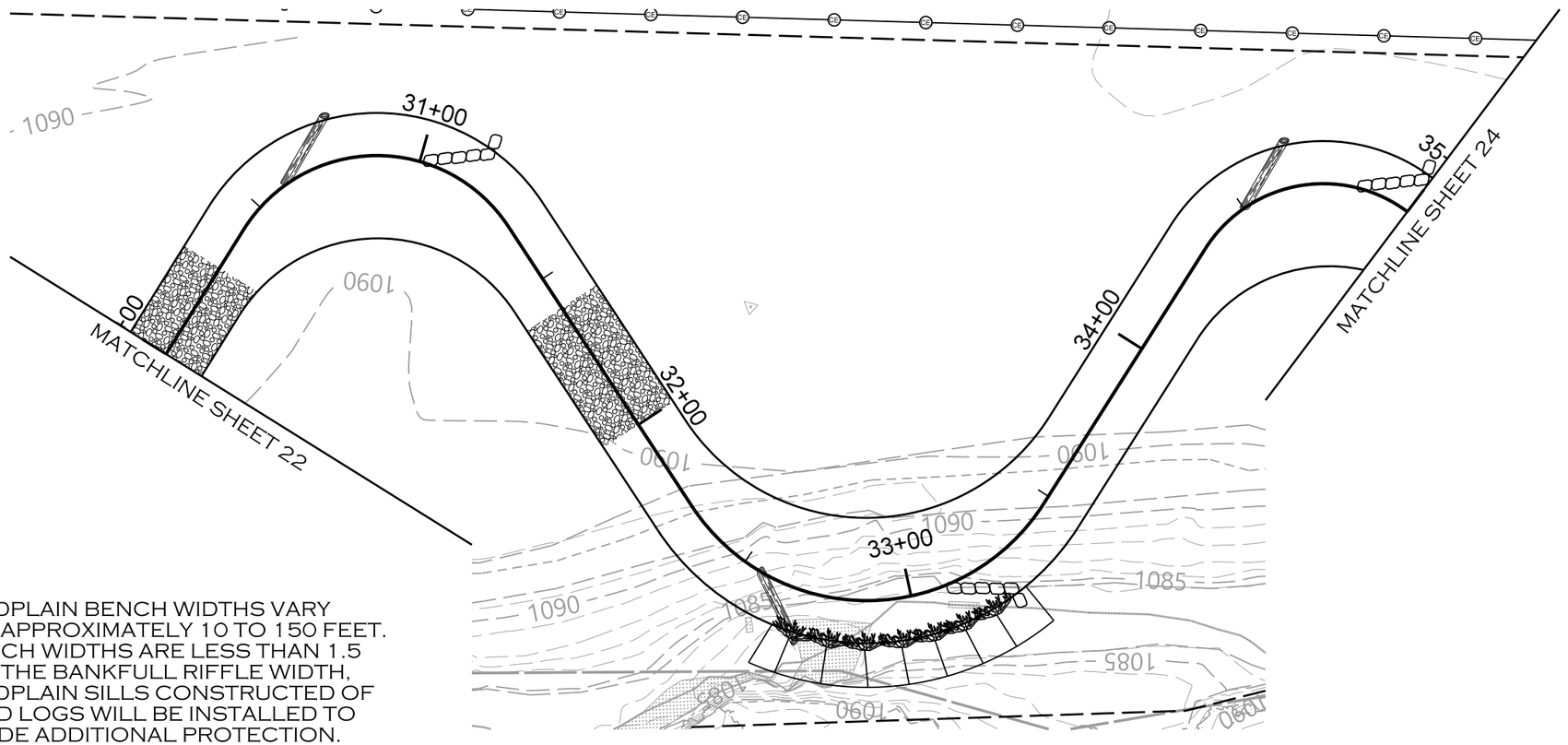
JKOON

PROJECT # 083 | SHEET NO. 23

PLAN / PROFILE



NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 10 TO 150 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.

NAD 83

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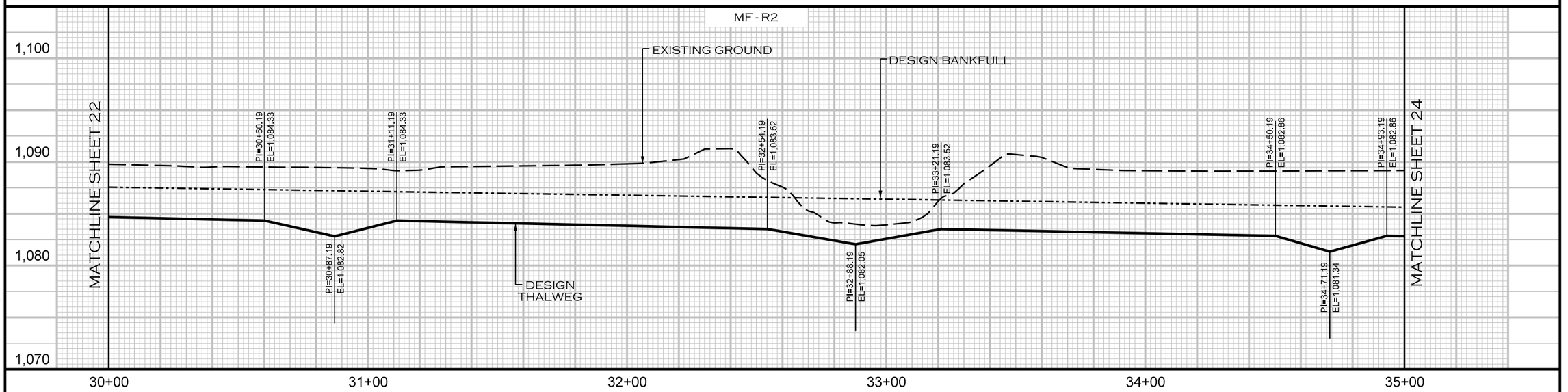
SCALE (FT)



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1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

STEWARTS CREEK TRIBUTARIES PROJECT
SURRY COUNTY, NC

PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
559 JONES FRANKLIN RD, SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER

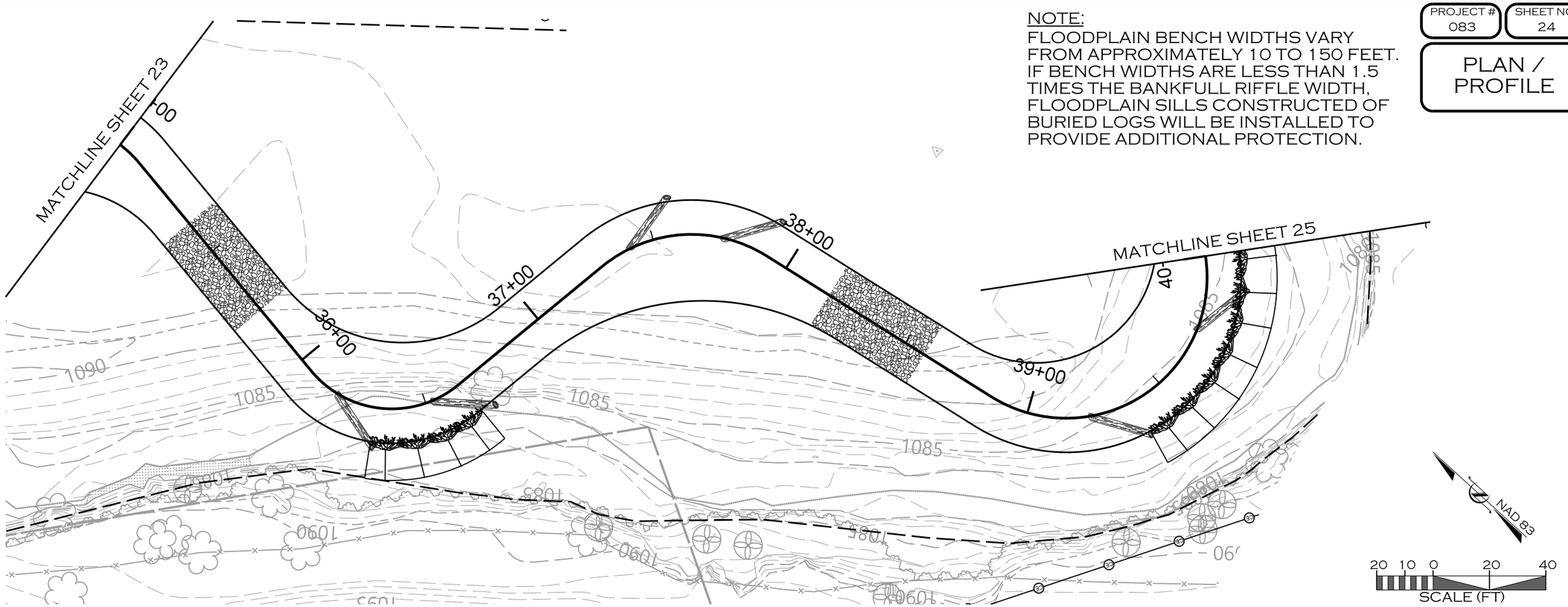
PROGRESS DRAWING
FOR REVIEW PURPOSES ONLY
DO NOT USE FOR CONSTRUCTION

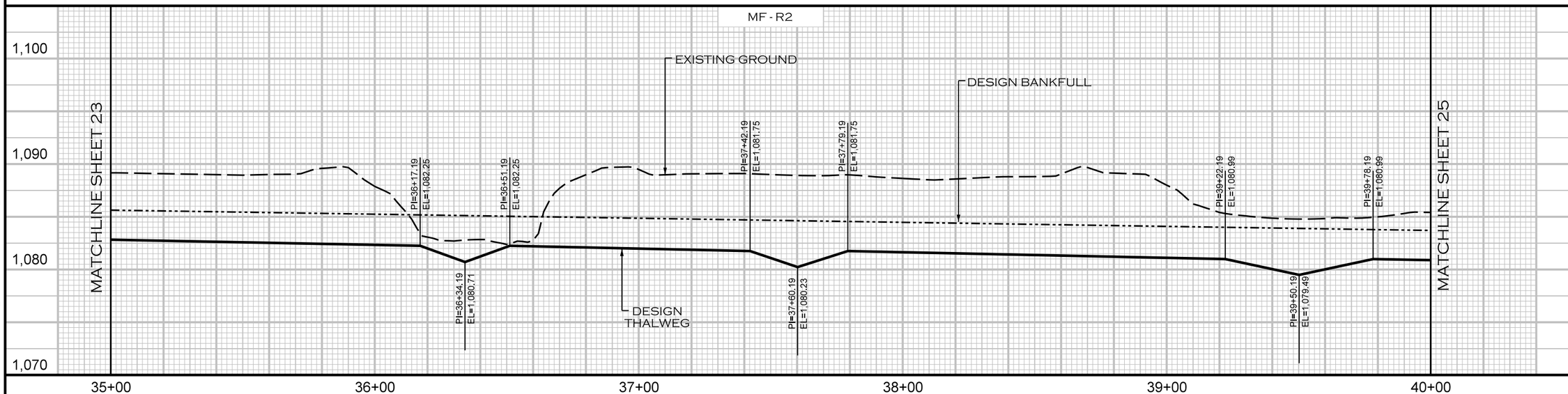
5/24/2019
R:\PROJECTS\RDU0083_NCDEQ_STEWARTS CREEK_FD\CADD\PLANS\MF_PSH_23.DGN
BROWN

PROJECT # 083 | SHEET NO. 24

PLAN / PROFILE

NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 10 TO 150 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.





REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

STEWARTS CREEK TRIBUTARIES PROJECT
SURRY COUNTY, NC

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RALEIGH, NC 27606
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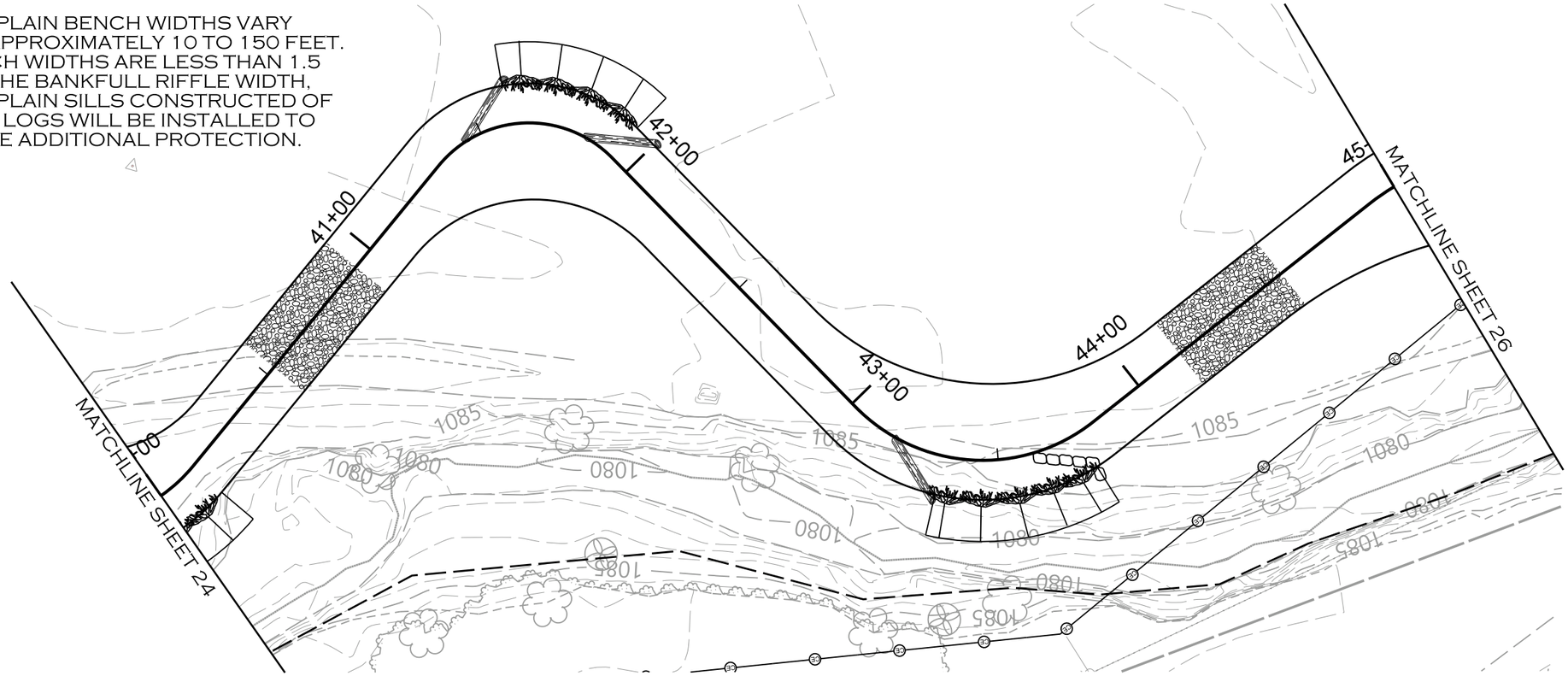
R:\PROJECTS\RDU0083_NCDEQ_STEWARTS CREEK_FD\CADD\PLANS\MF_PSH_24.DGN
MKOEN

NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 10 TO 150 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.

PROJECT # 083 | SHEET NO. 25

PLAN / PROFILE



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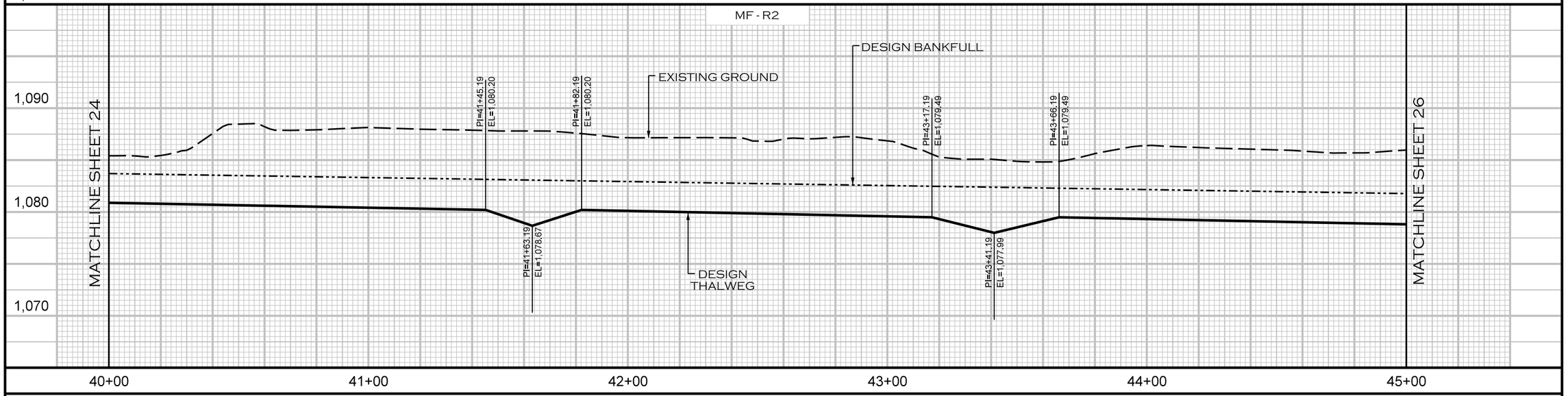

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:
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RALEIGH, NC 27606
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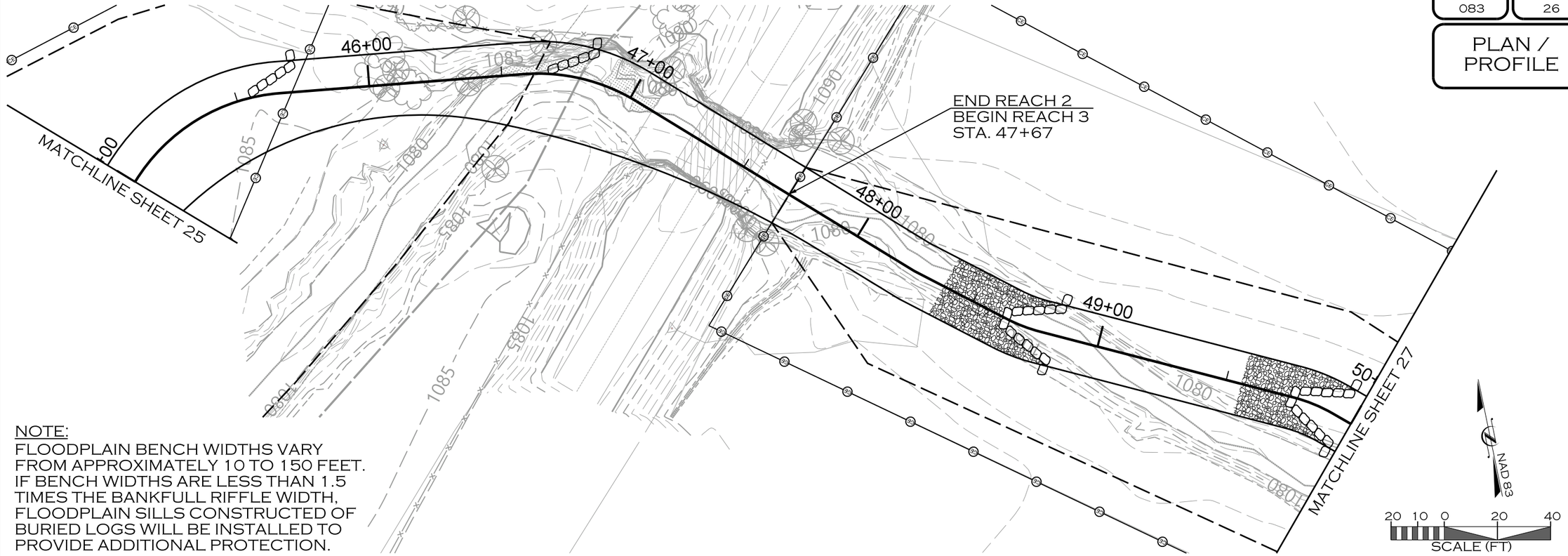
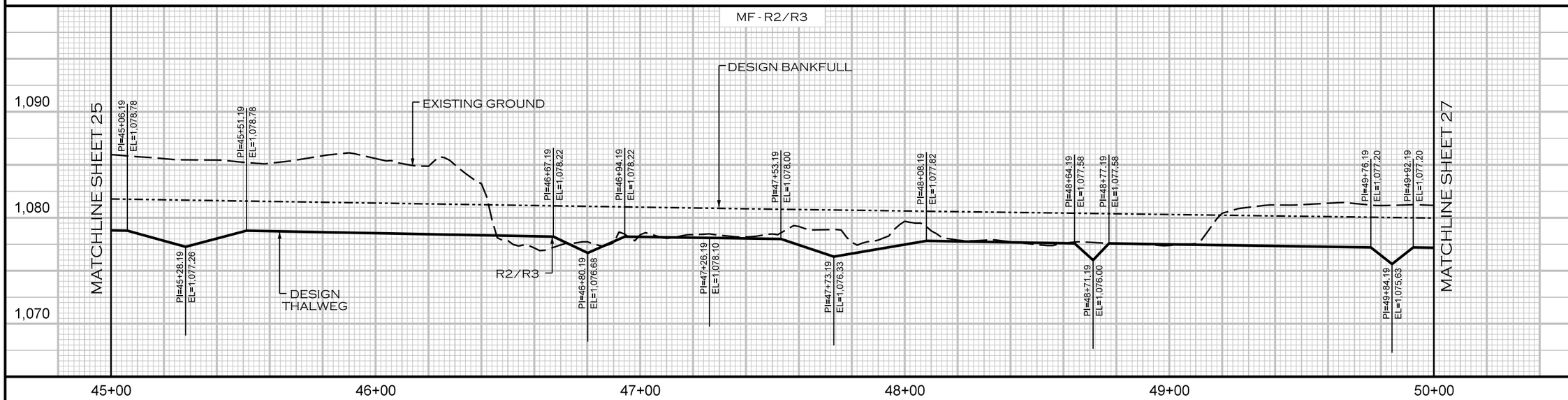
AECOM

PROJECT # 083 | SHEET NO. 26

PLAN / PROFILE



NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 10 TO 150 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
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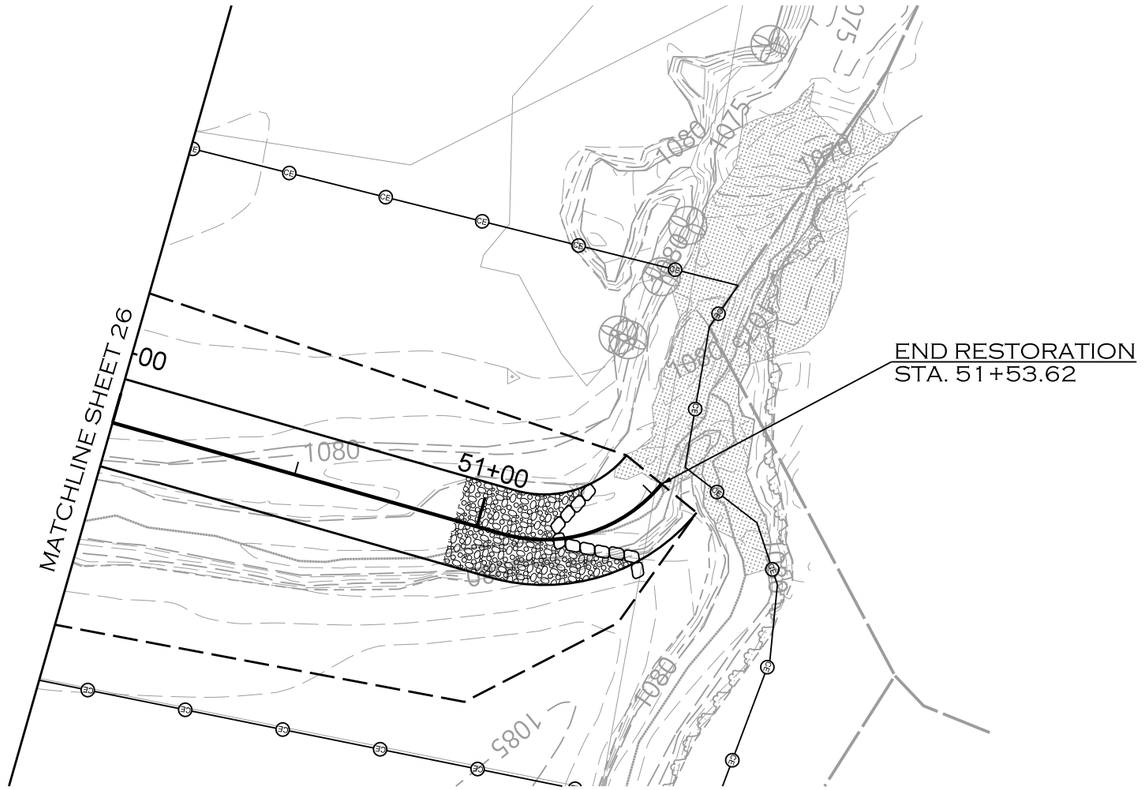
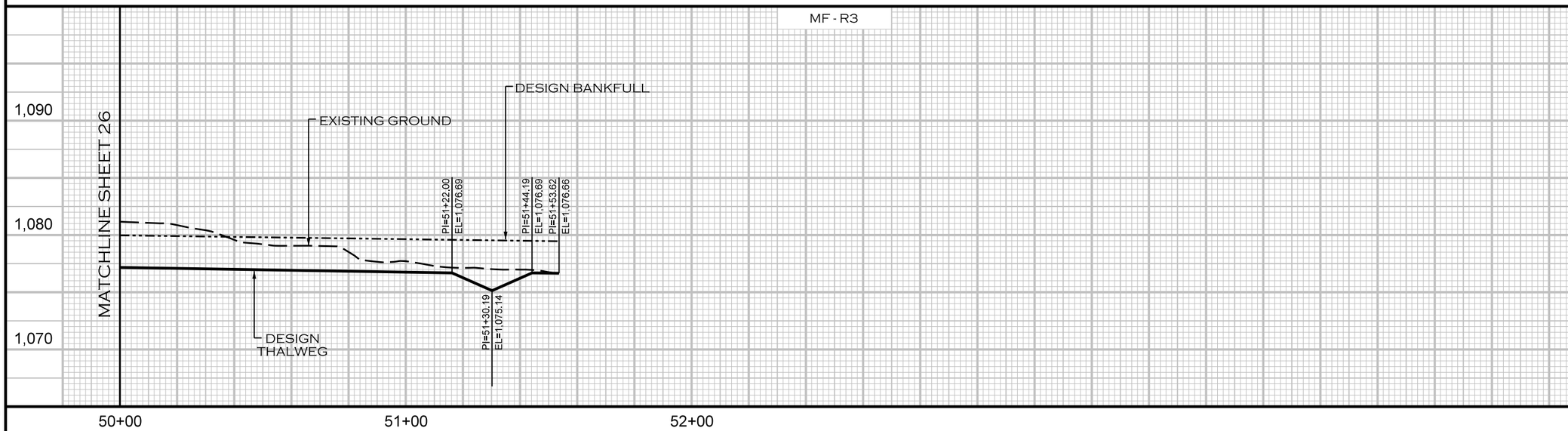
MKCPN

PROJECT # 083 | SHEET NO. 27

PLAN / PROFILE



NOTE:
FLOODPLAIN BENCH WIDTHS VARY FROM APPROXIMATELY 10 TO 150 FEET. IF BENCH WIDTHS ARE LESS THAN 1.5 TIMES THE BANKFULL RIFFLE WIDTH, FLOODPLAIN SILLS CONSTRUCTED OF BURIED LOGS WILL BE INSTALLED TO PROVIDE ADDITIONAL PROTECTION.



5/24/2019
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JRICKON

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:
NC DEPARTMENT OF ENVIRONMENTAL QUALITY
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RALEIGH, NC 27699-1652

STEWARTS CREEK TRIBUTARIES PROJECT
SURRY COUNTY, NC

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RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER

PROGRESS DRAWING
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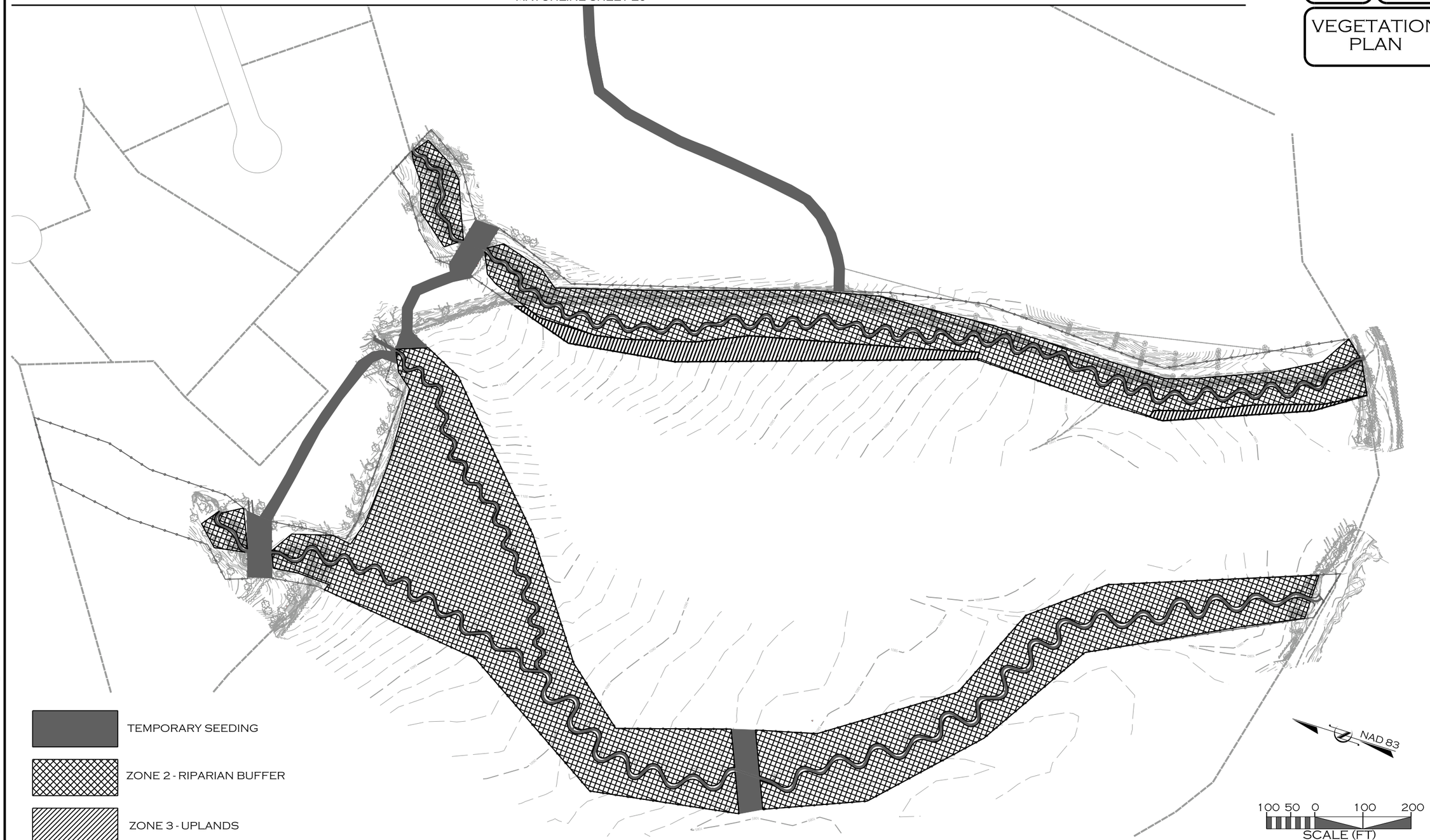
PROJECT # 083 | SHEET NO. 28

VEGETATION PLAN

MATCHLINE SHEET 29



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

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SURRY COUNTY, NC

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RALEIGH, NC 27606
LICENSE # P-1182

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MICHEN

PROJECT # 083

SHEET NO. 29

VEGETATION PLAN

TEMPORARY SEEDING

ZONE 2 - RIPARIAN BUFFER

ZONE 3 - UPLANDS

MATCHLINE SHEET 28

NAD 83

100 50 0 100 200

SCALE (FT)

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:

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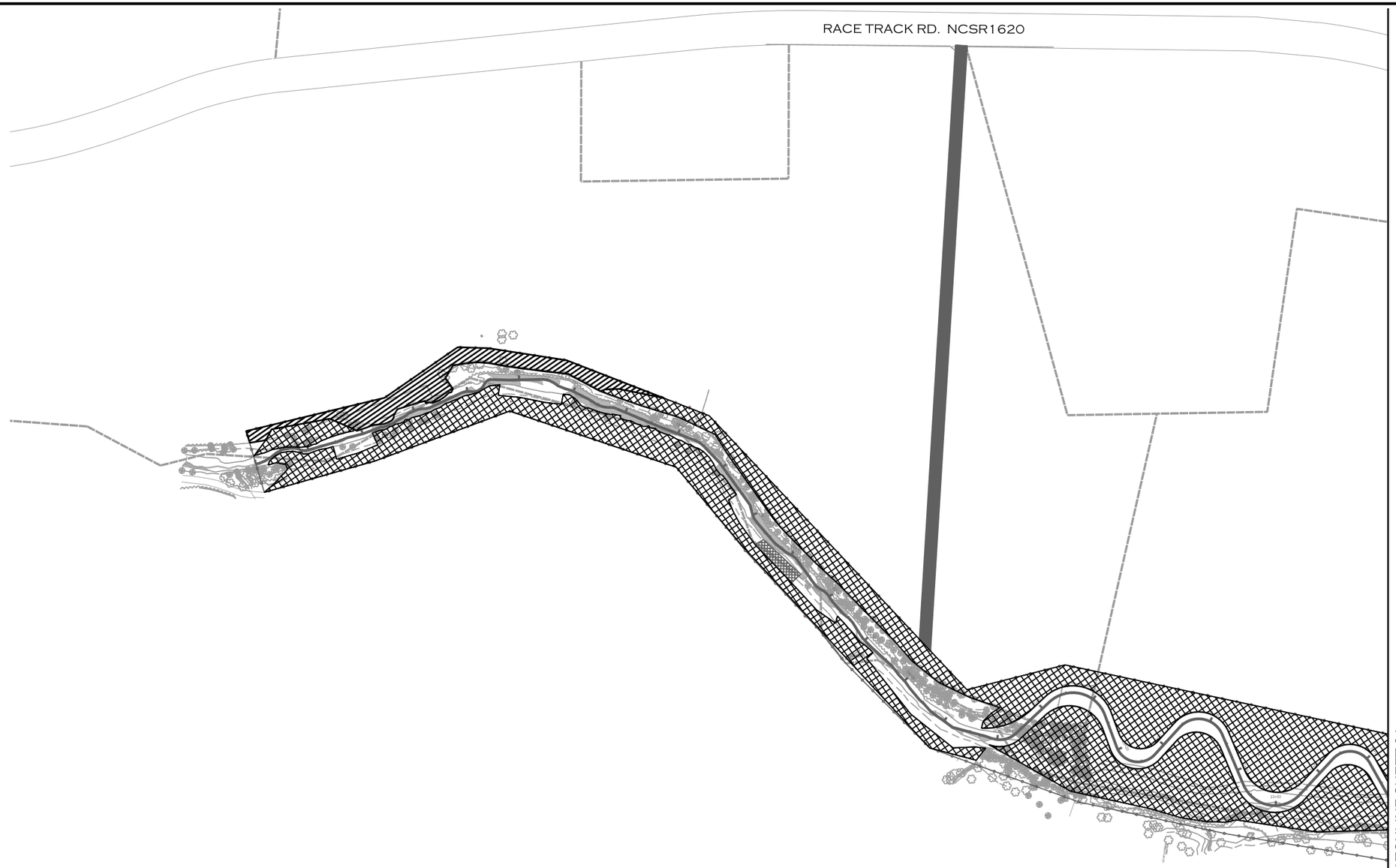
MKOEN

PROJECT # 083 | SHEET NO. 30

VEGETATION PLAN

RACE TRACK RD. NCSR1620



MATCHLINE SHEET 31

TEMPORARY SEEDING

ZONE 2 - RIPARIAN BUFFER

ZONE 3 - UPLANDS

NAD 83

100 50 0 100 200
SCALE (FT)

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:
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1652 MAIL SERVICE CENTER
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PROJECT ENGINEER

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5/24/2019
R:\PROJECTS\RDU0083_NCDEQ_STEWARTS CREEK_FD\CADD\PLANS\MF_PSH_30.DGN
MKOEN

PROJECT # 083

SHEET NO. 31

VEGETATION PLAN

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	EMB	KLT	5/28/19

PREPARED FOR:

NC DEPARTMENT OF ENVIRONMENTAL QUALITY
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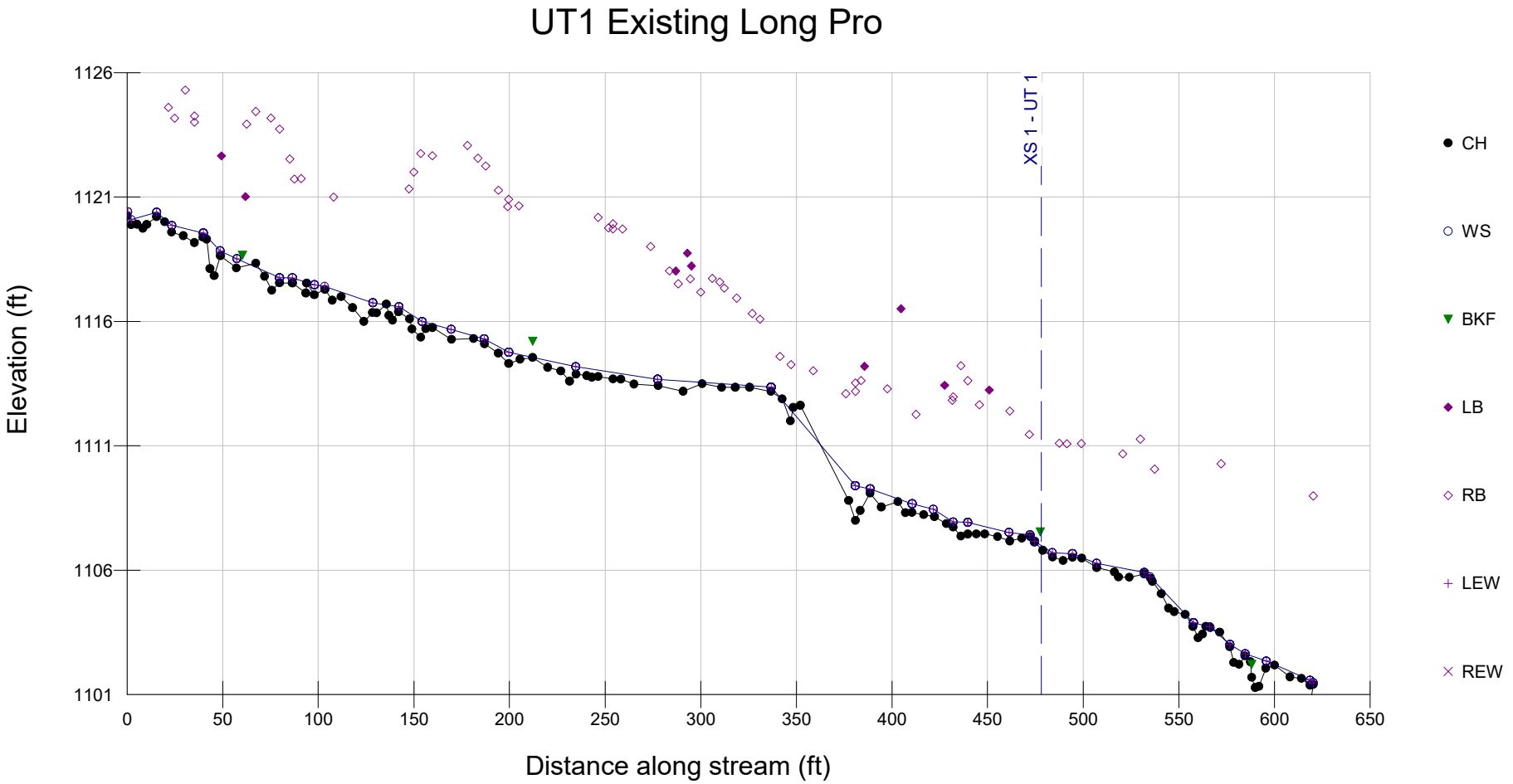
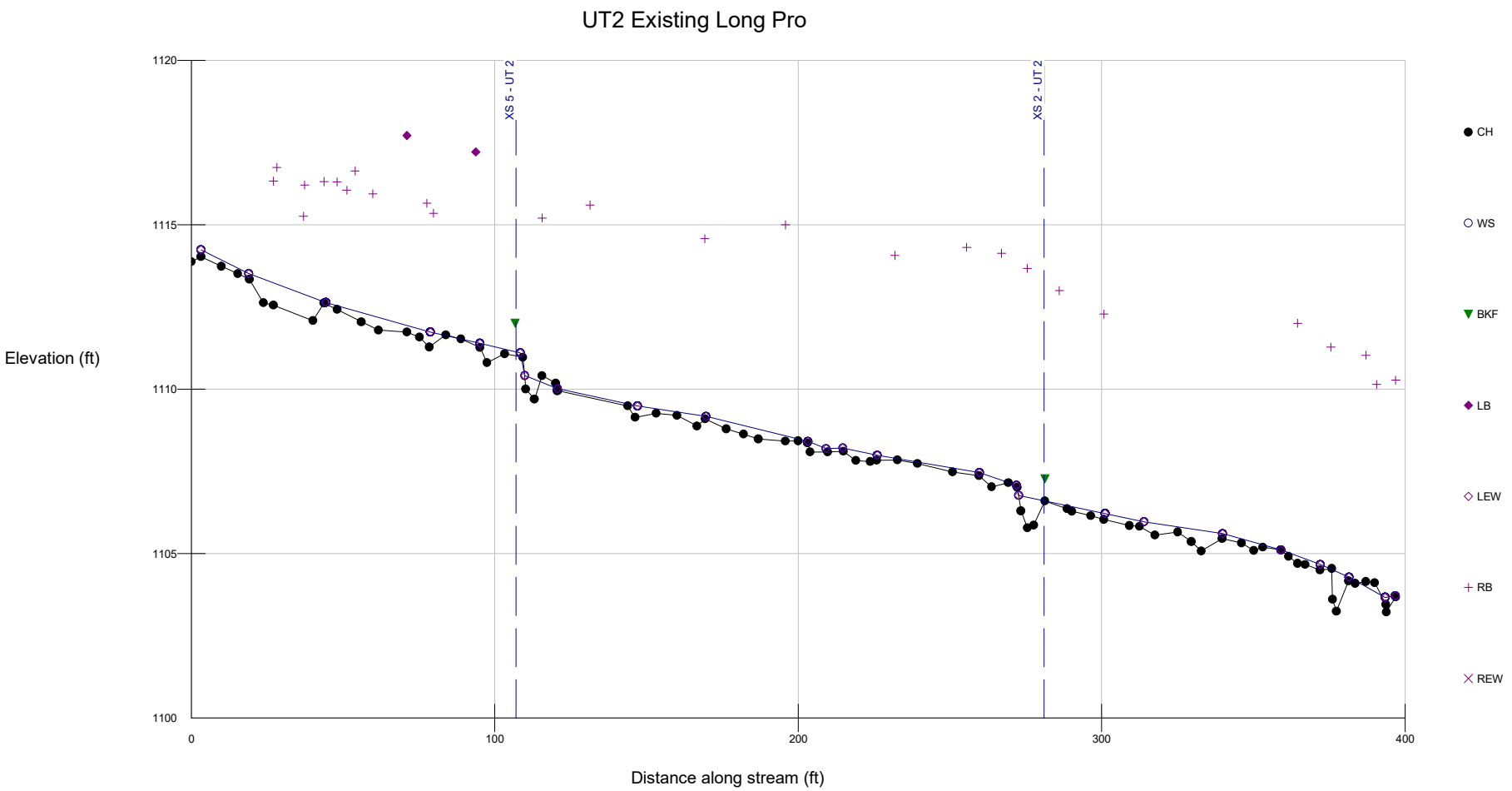
5/24/2019
R:\PROJECTS\RDU0083_NCDEQ_STEWART'S CREEK_FD\CADD\PLANS\MF_PSH_31.DGN
MKOCH

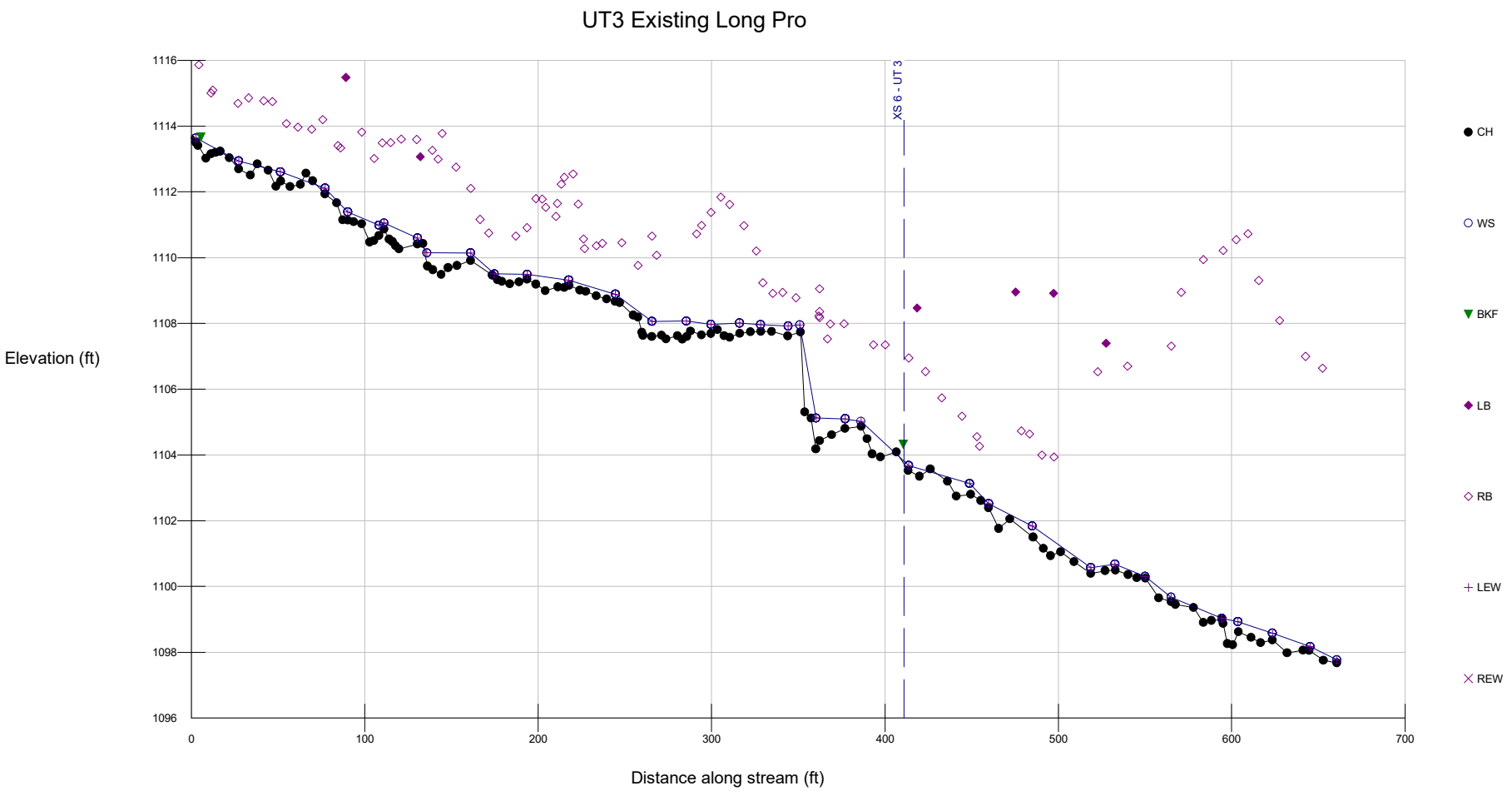
Appendix 2

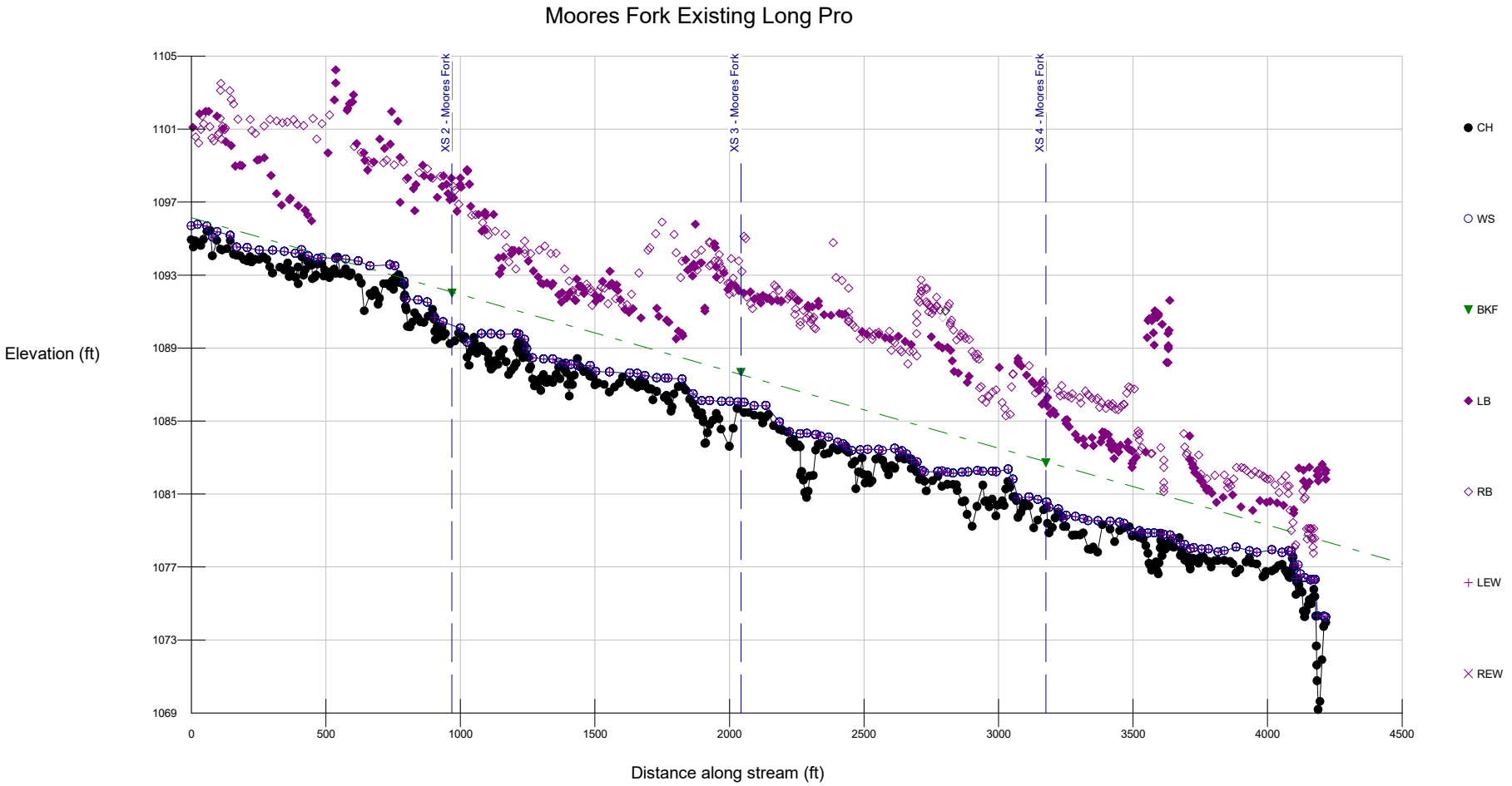
DATA ANALYSIS

Since survey was only collected in areas where work would occur, some of the originally collected cross-sections that were outside of the surveying footprint are relative. Also, due to this surveying footprint, existing longitudinal profile is not for the entire length of UT 1 and UT 3. Reference reach data is also relative.

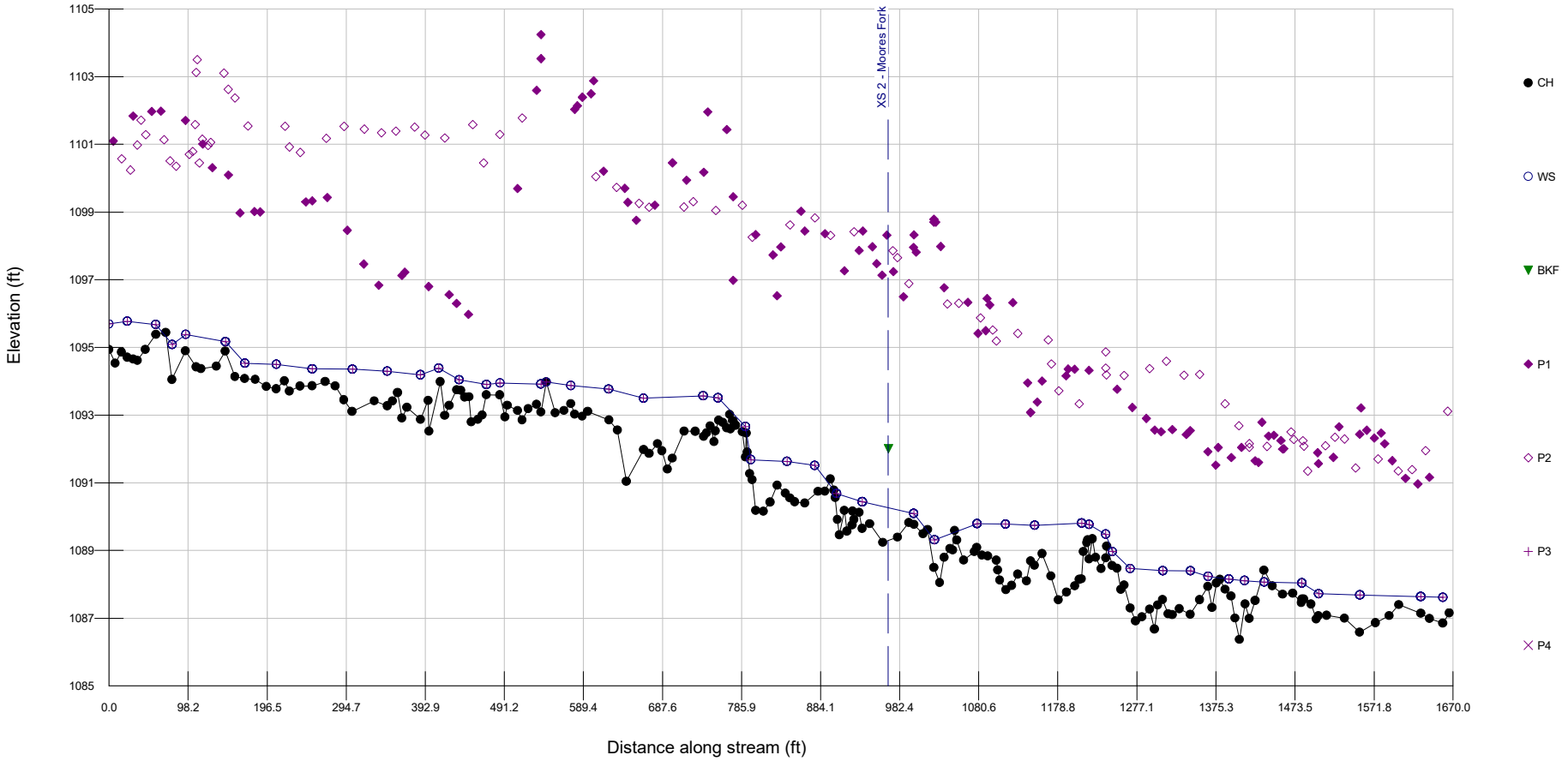

UT1 Existing Long Pro
Elevation (ft)
1126
1121
1116
1111
1106
1101
0
50
100
150
200
250
300
350
400
450
500
550
600
650
Distance along stream (ft)
XS 1 - UT 1
CH
WS
BKF
LB
RB
LEW
REW

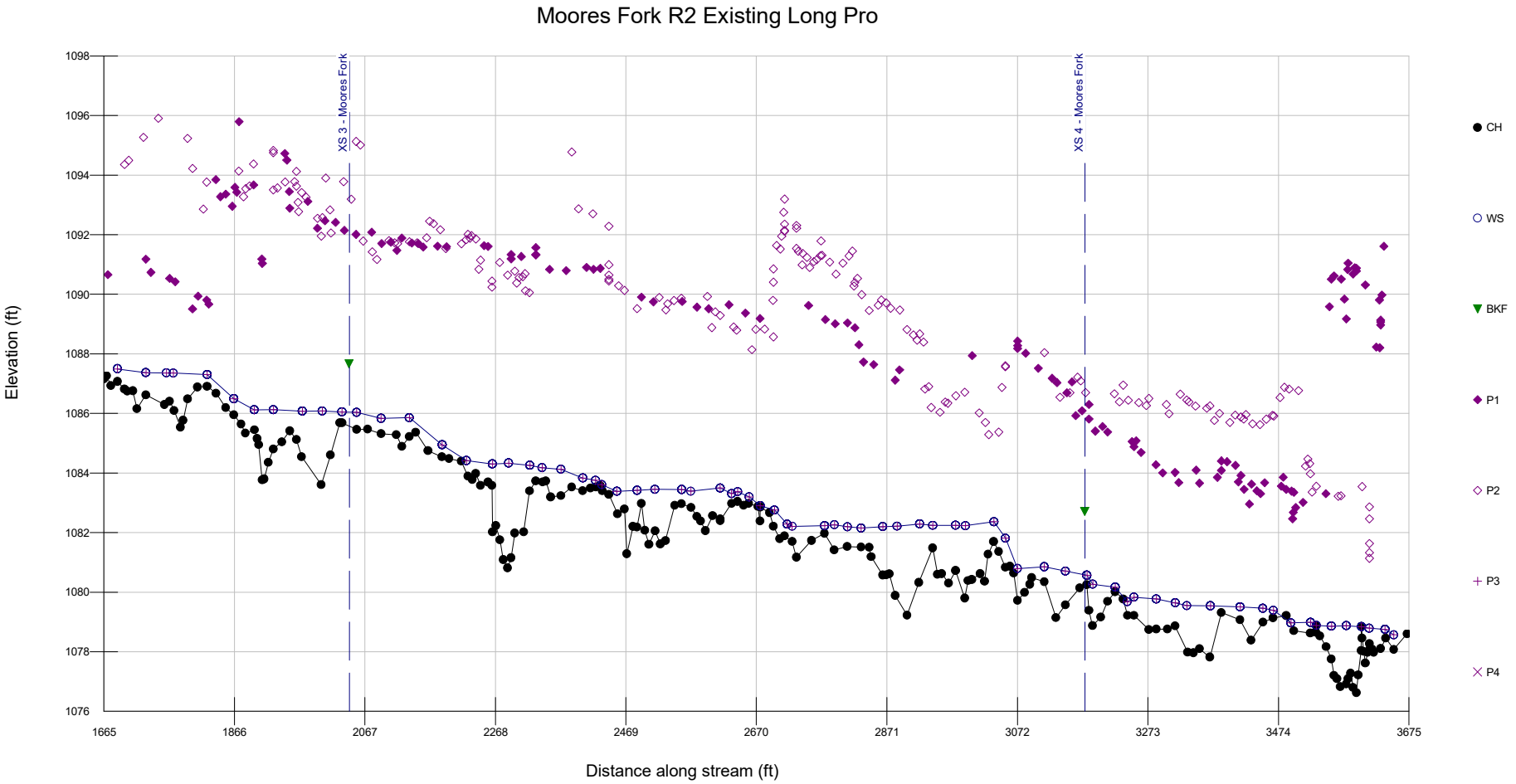

UT2 Existing Long Pro
Elevation (ft)
1120
1115
1110
1105
1100
0
100
200
300
400
Distance along stream (ft)
XS 5 - UT 2
XS 2 - UT 2
CH
WS
BKF
LB
LEW
RB
REW

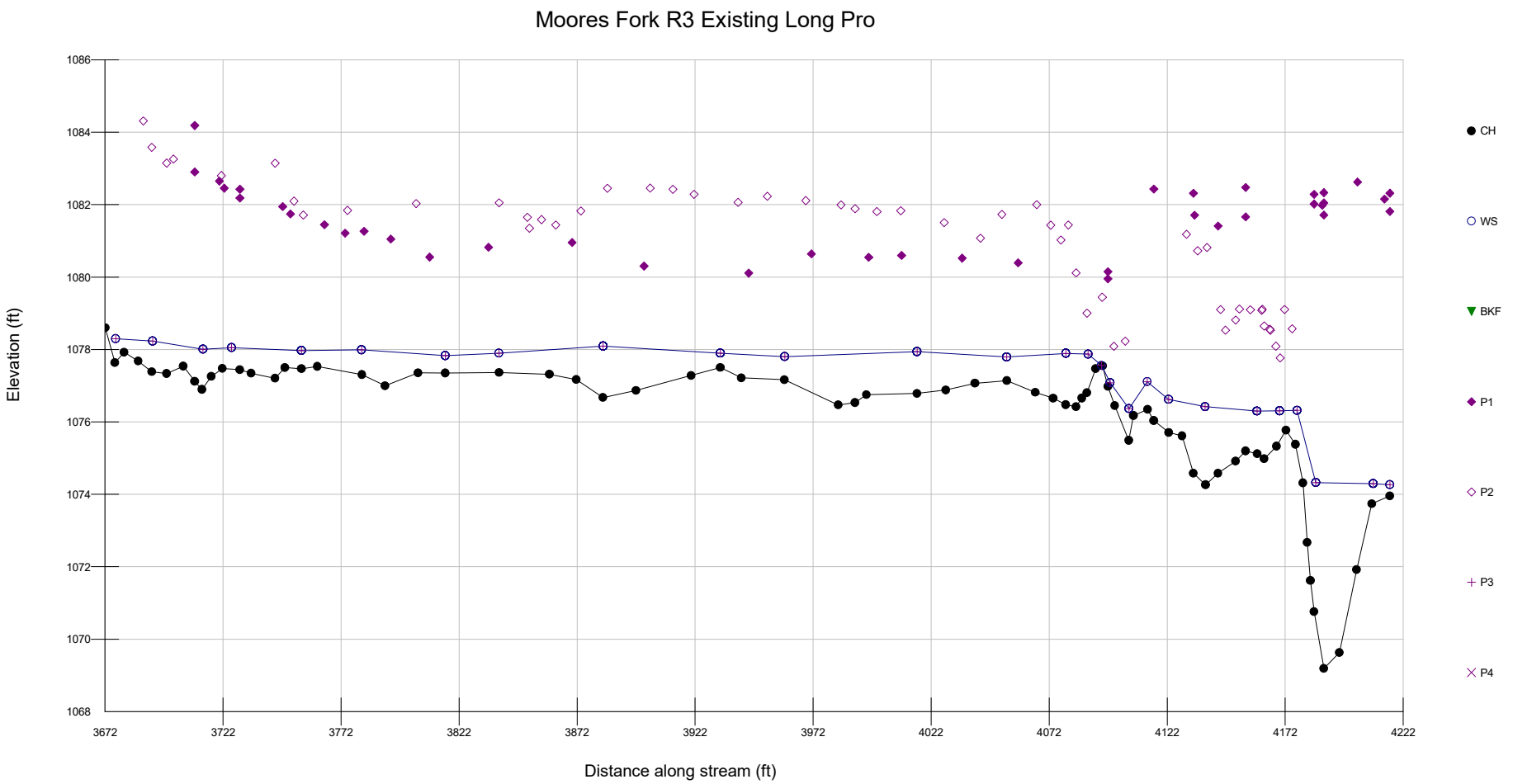

UT3 Existing Long Pro
Elevation (ft)
Distance along stream (ft)
XS 6 - UT 3
1116
1114
1112
1110
1108
1106
1104
1102
1100
1098
1096
0
100
200
300
400
500
600
700
CH
WS
BKF
LB
RB
LEW
REW

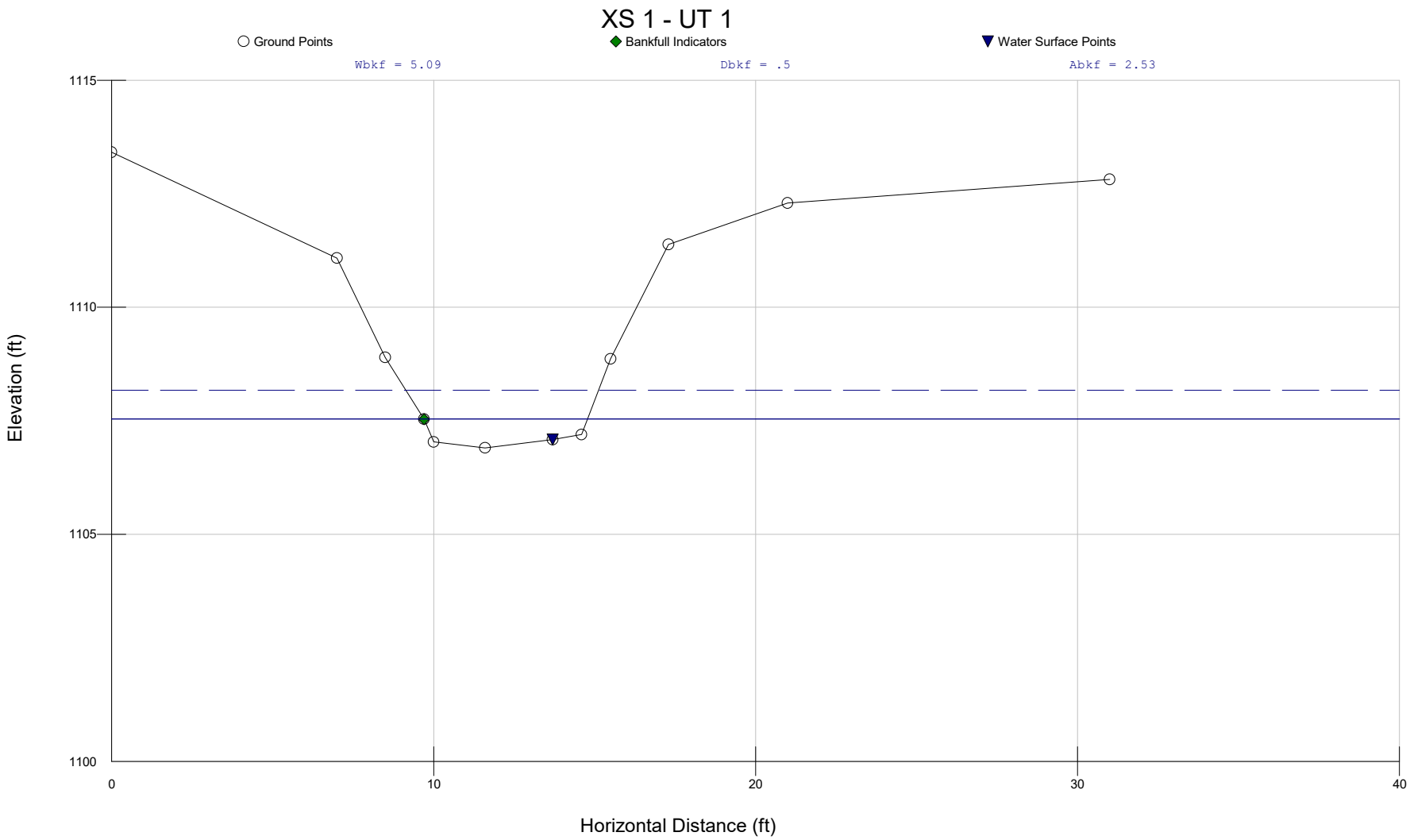

Moores Fork Existing Long Pro
Elevation (ft)
1105
1101
1097
1093
1089
1085
1081
1077
1073
1069
XS 2 - Moores Fork
XS 3 - Moores Fork
XS 4 - Moores Fork
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Distance along stream (ft)
CH
WS
BKF
LB
RB
LEW
REW

Moores Fork R1 Existing Long Pro




Moores Fork R2 Existing Long Pro
Elevation (ft)
1098
1096
1094
1092
1090
1088
1086
1084
1082
1080
1078
1076
XS 3 - Moores Fork
XS 4 - Moores Fork
1665
1866
2067
2268
2469
2670
2871
3072
3273
3474
3675
Distance along stream (ft)
CH
WS
BKF
P1
P2
P3
P4


Moores Fork R3 Existing Long Pro
Elevation (ft)
1086
1084
1082
1080
1078
1076
1074
1072
1070
1068
3672
3722
3772
3822
3872
3922
3972
4022
4072
4122
4172
4222
Distance along stream (ft)
CH
WS
BKF
P1
P2
P3
P4


XS 1 - UT 1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 5.09
Dbkf = .5
Abkf = 2.53
1115
1110
1105
1100
Elevation (ft)
0
10
20
30
40
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Cross Section Name: XS 1 - UT 1
Survey Date: 02/06/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1113.415	
7	0	1111.085	LB
8.5	0	1108.895	
9.7	0	1107.535	BKF
10	0	1107.035	
11.6	0	1106.905	TWG
13.7	0	1107.085	REW
14.6	0	1107.195	
15.5	0	1108.865	
17.3	0	1111.385	
21	0	1112.295	
31	0	1112.815	

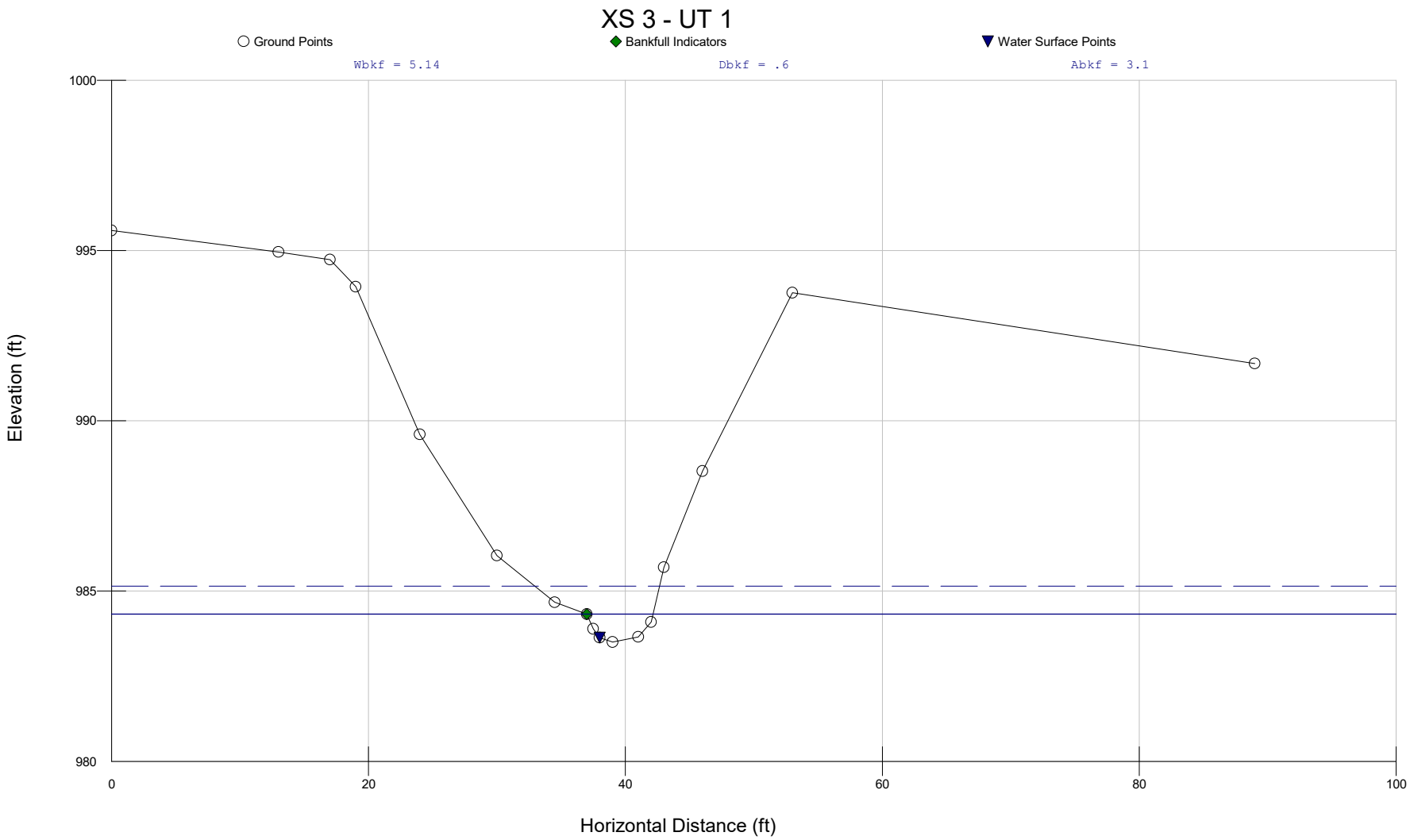
Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	1108.17	1108.17	1108.17
Bankfull Elevation (ft)	1107.54	1107.54	1107.54
Floodprone Width (ft)	5.99	-----	-----
Bankfull Width (ft)	5.09	2.54	2.55
Entrenchment Ratio	1.18	-----	-----
Mean Depth (ft)	0.5	0.54	0.45
Maximum Depth (ft)	0.63	0.63	0.58
Width/Depth Ratio	10.18	4.69	5.67
Bankfull Area (sq ft)	2.53	1.38	1.15
Wetted Perimeter (ft)	5.6	3.42	3.34
Hydraulic Radius (ft)	0.45	0.4	0.34
Begin BKF Station	9.7	9.7	12.24
End BKF Station	14.79	12.24	14.79

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			


XS 3 - UT 1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 5.14
Dbkf = .6
Abkf = 3.1
1000
995
990
985
980
Elevation (ft)
0
20
40
60
80
100
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Cross Section Name: XS 3 - UT 1
Survey Date: 10/17/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	995.59	
13	0	994.96	
17	0	994.73	
19	0	993.94	
24	0	989.6	
30	0	986.04	
34.5	0	984.67	
37	0	984.32	BKF
37.5	0	983.89	
38	0	983.63	LEW
39	0	983.5	TWG
41	0	983.65	
42	0	984.09	
43	0	985.7	
46	0	988.52	
53	0	993.76	RB
89	0	991.68	

Cross Sectional Geometry

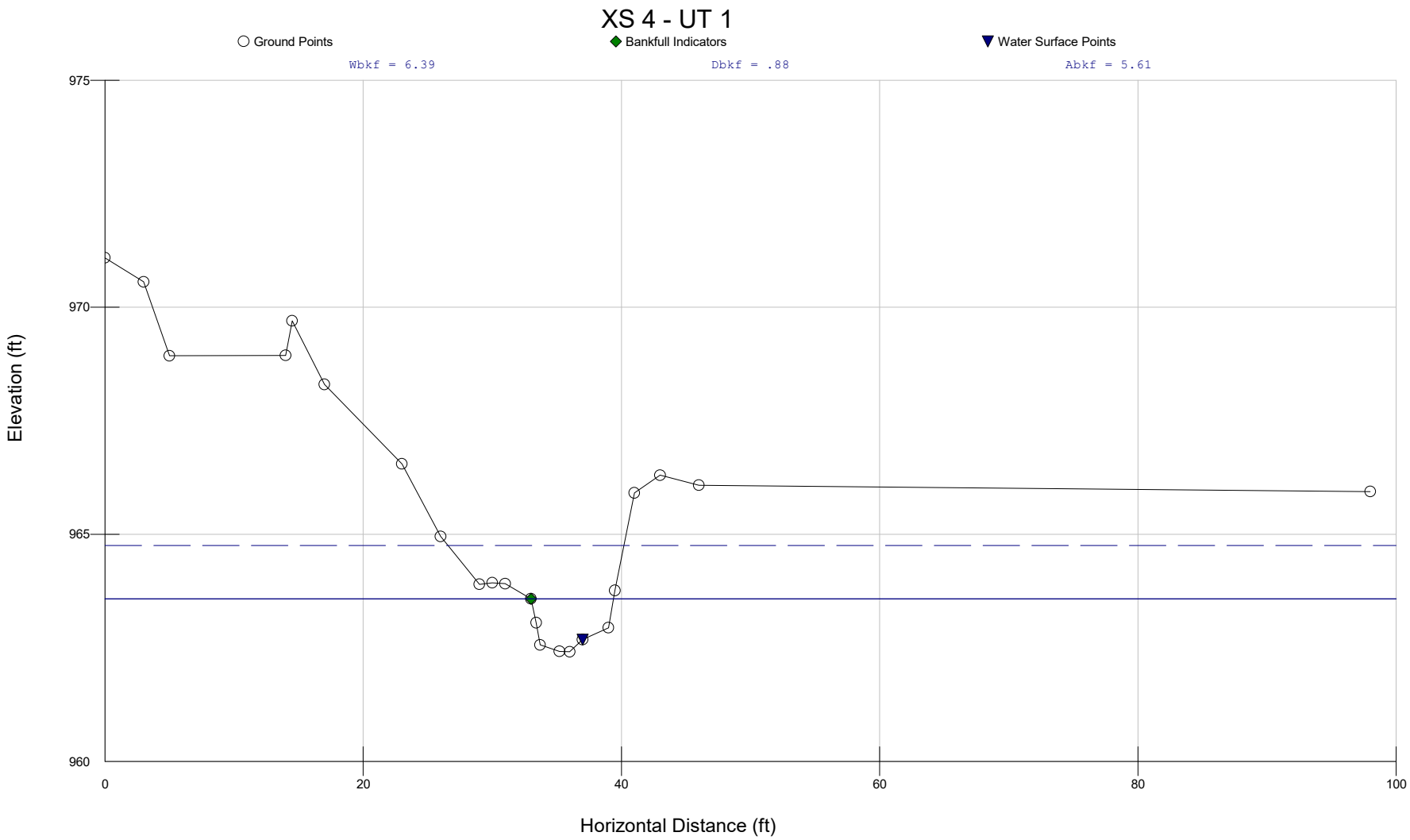
	Channel	Left	Right
Floodprone Elevation (ft)	985.14	985.14	985.14
Bankfull Elevation (ft)	984.32	984.32	984.32
Floodprone Width (ft)	9.7	-----	-----
Bankfull Width (ft)	5.14	2.57	2.57
Entrenchment Ratio	1.89	-----	-----
Mean Depth (ft)	0.6	0.62	0.58
Maximum Depth (ft)	0.82	0.82	0.78
Width/Depth Ratio	8.57	4.13	4.43

Bankfull Area (sq ft)	3.1	1.6	1.5
Wetted Perimeter (ft)	5.6	3.58	3.57
Hydraulic Radius (ft)	0.55	0.45	0.42
Begin BKF Station	37	37	39.57
End BKF Station	42.14	39.57	42.14

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			


XS 4 - UT 1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 6.39
Dbkf = .88
Abkf = 5.61
975
970
965
960
Elevation (ft)
0
20
40
60
80
100
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Cross Section Name: XS 4 - UT 1
Survey Date: 10/17/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	971.09	
3	0	970.56	
5	0	968.93	
14	0	968.94	
14.5	0	969.7	
17	0	968.3	
23	0	966.55	
26	0	964.95	
29	0	963.9	
30	0	963.93	
31	0	963.91	
33	0	963.58	BKF
33.4	0	963.05	
33.7	0	962.56	
35.2	0	962.42	TWG
36	0	962.41	
37	0	962.68	REW
39	0	962.94	
39.5	0	963.76	
41	0	965.91	
43	0	966.3	RB
46	0	966.08	
98	0	965.94	

Cross Sectional Geometry

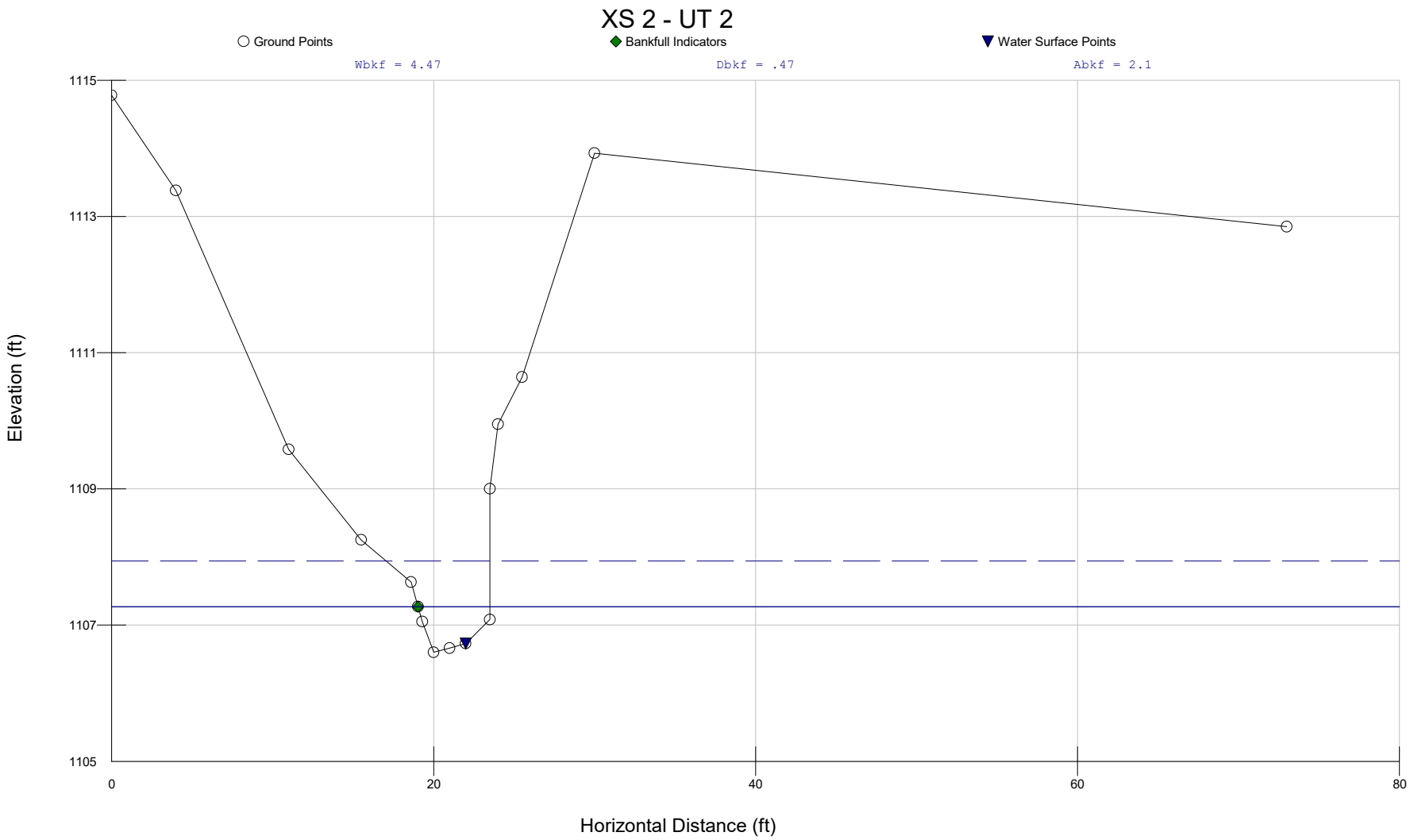
	Channel	Left	Right
Floodprone Elevation (ft)	964.75	964.75	964.75
Bankfull Elevation (ft)	963.58	963.58	963.58

Floodprone Width (ft)	13.62	-----	-----
Bankfull Width (ft)	6.39	3.2	3.19
Entrenchment Ratio	2.13	-----	-----
Mean Depth (ft)	0.88	0.98	0.77
Maximum Depth (ft)	1.17	1.17	1.12
Width/Depth Ratio	7.26	3.27	4.14
Bankfull Area (sq ft)	5.61	3.13	2.47
Wetted Perimeter (ft)	7.35	4.87	4.71
Hydraulic Radius (ft)	0.76	0.64	0.52
Begin BKF Station	33	33	36.2
End BKF Station	39.39	36.2	39.39

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			


XS 2 - UT 2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 4.47
Dbkf = .47
Abkf = 2.1
Elevation (ft)
1115
1113
1111
1109
1107
1105
0
20
40
60
80
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Cross Section Name: XS 2 - UT 2
Survey Date: 02/06/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1114.78	
4	0	1113.38	
11	0	1109.58	
15.5	0	1108.25	
18.6	0	1107.63	
19.034	0	1107.27	BKF
19.3	0	1107.05	*BKF
20	0	1106.6	TWG
21	0	1106.66	
22	0	1106.73	REW
23.5	0	1107.08	
23.5	0	1109	
24	0	1109.95	
25.5	0	1110.64	
30	0	1113.93	RB
73	0	1112.85	

Cross Sectional Geometry

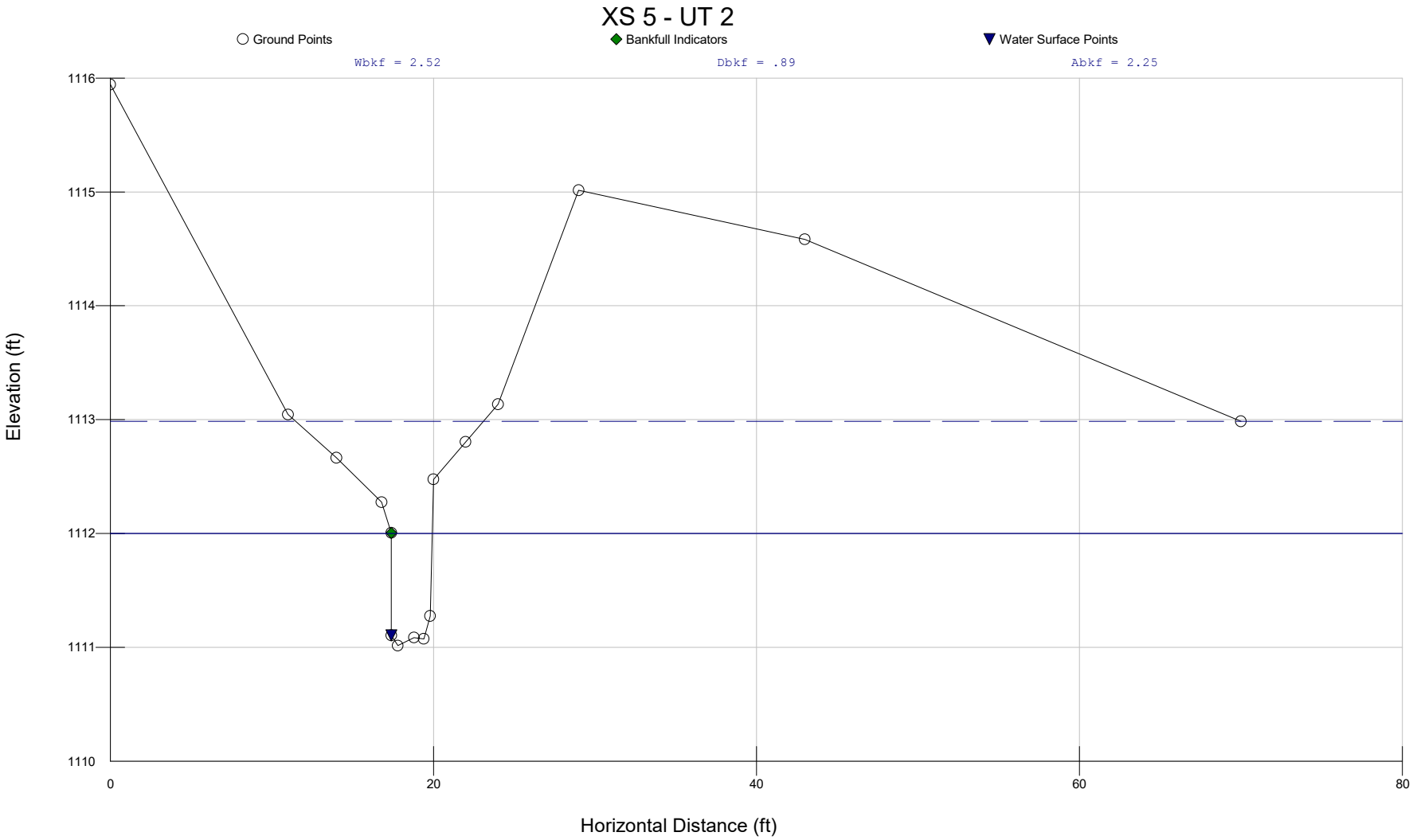
	Channel	Left	Right
Floodprone Elevation (ft)	1107.94	1107.94	1107.94
Bankfull Elevation (ft)	1107.27	1107.27	1107.27
Floodprone Width (ft)	6.45	-----	-----
Bankfull Width (ft)	4.47	2.3	2.17
Entrenchment Ratio	1.44	-----	-----
Mean Depth (ft)	0.47	0.51	0.43
Maximum Depth (ft)	0.67	0.67	0.59
Width/Depth Ratio	9.51	4.48	5.05
Bankfull Area (sq ft)	2.1	1.18	0.93

Wetted Perimeter (ft)	4.91	3.1	2.99
Hydraulic Radius (ft)	0.43	0.38	0.31
Begin BKF Station	19.03	19.03	21.33
End BKF Station	23.5	21.33	23.5

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			


XS 5 - UT 2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 2.52
Dbkf = .89
Abkf = 2.25
Elevation (ft)
1116
1115
1114
1113
1112
1111
1110
0
20
40
60
80
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Cross Section Name: XS 5 - UT 2
Survey Date: 02/06/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1115.944	
11	0	1113.044	
14	0	1112.664	
16.8	0	1112.274	
17.4	0	1112.004	BKF
17.4	0	1111.104	LEW
17.8	0	1111.014	TWG
18.8	0	1111.084	
19.4	0	1111.074	
19.8	0	1111.274	
20	0	1112.474	
22	0	1112.804	
24	0	1113.134	
29	0	1115.014	RB
43	0	1114.584	
70	0	1112.984	

Cross Sectional Geometry

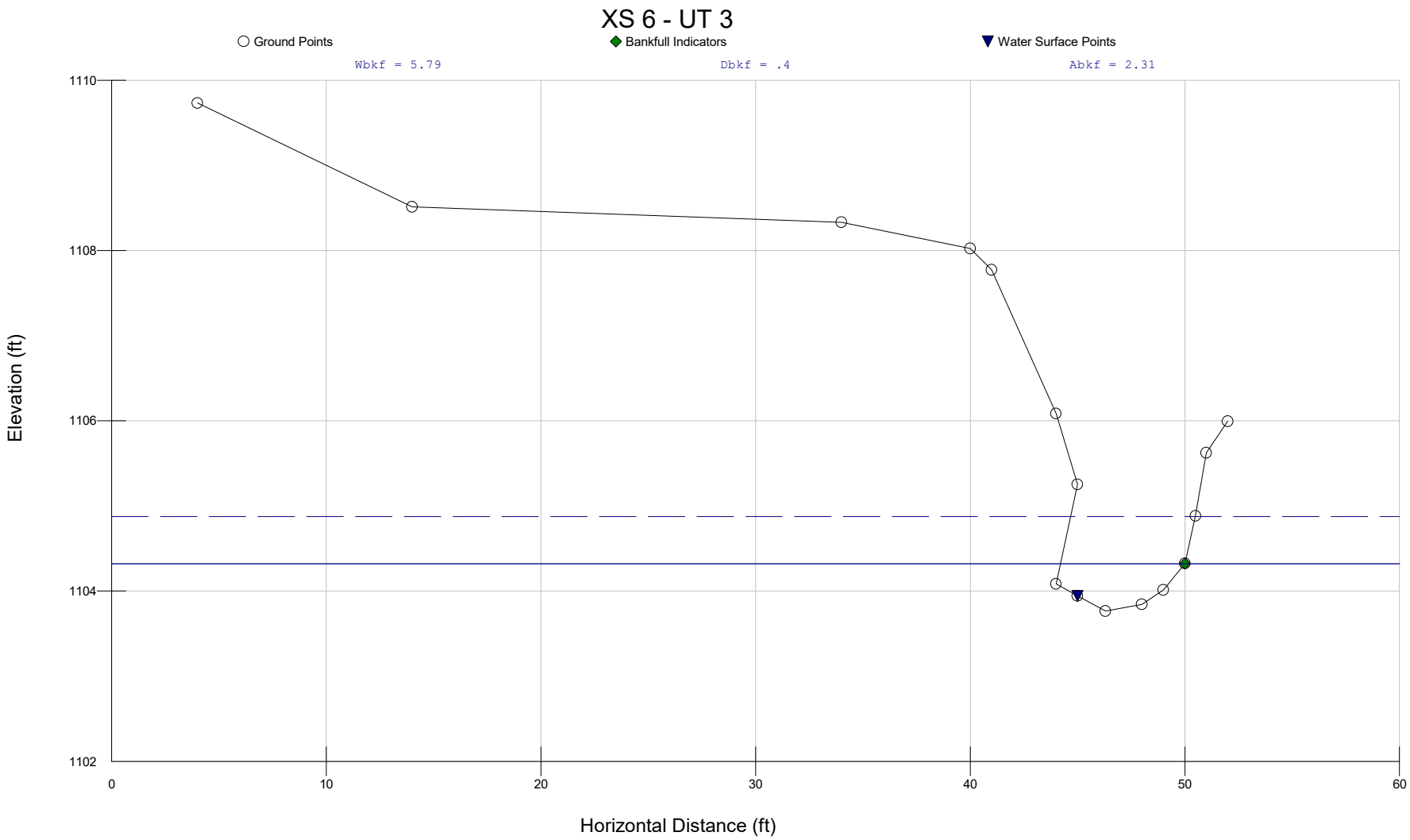
	Channel	Left	Right
Floodprone Elevation (ft)	1112.99	1112.99	1112.99
Bankfull Elevation (ft)	1112	1112	1112
Floodprone Width (ft)	11.68	-----	-----
Bankfull Width (ft)	2.52	1.26	1.26
Entrenchment Ratio	4.63	-----	-----
Mean Depth (ft)	0.89	0.95	0.84
Maximum Depth (ft)	0.99	0.99	0.93
Width/Depth Ratio	2.83	1.32	1.5
Bankfull Area (sq ft)	2.25	1.2	1.06

Wetted Perimeter (ft)	4.09	3.09	2.85
Hydraulic Radius (ft)	0.55	0.39	0.37
Begin BKF Station	17.4	17.4	18.66
End BKF Station	19.92	18.66	19.92

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			


XS 6 - UT 3
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 5.79
Dbkf = .4
Abkf = 2.31
Elevation (ft)
1110
1108
1106
1104
1102
0
10
20
30
40
50
60
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Cross Section Name: XS 6 - UT 3
Survey Date: 02/06/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
4	0	1109.733	
14	0	1108.513	
34	0	1108.333	
40	0	1108.023	
41	0	1107.773	
44	0	1106.083	
45	0	1105.253	
44	0	1104.083	UNDERCUT
45	0	1103.943	LEW
46.3	0	1103.763	TWG
48	0	1103.843	
49	0	1104.013	
50	0	1104.323	BKF
50.5	0	1104.883	
51	0	1105.623	
52	0	1105.993	RB

Cross Sectional Geometry

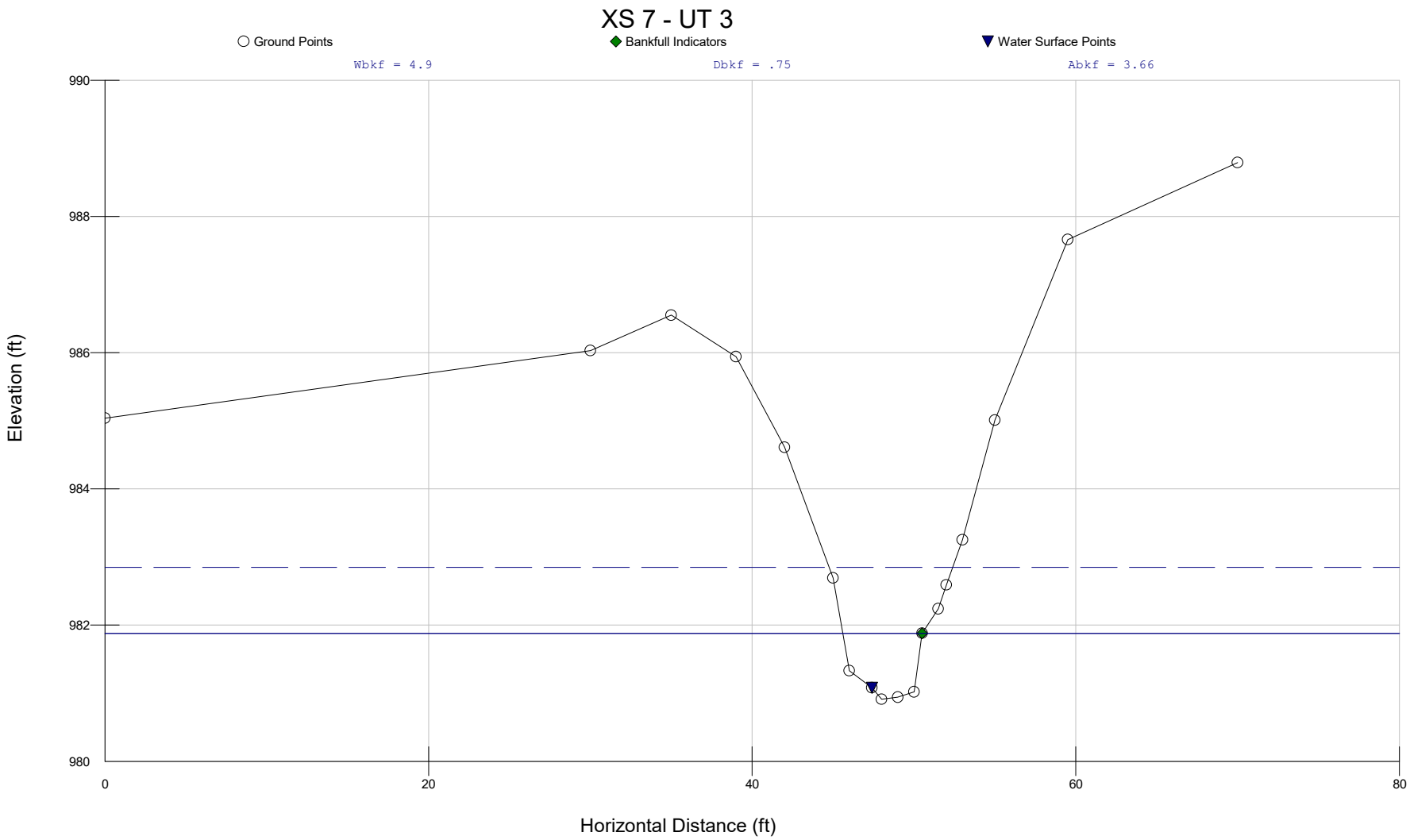
	Channel	Left	Right
Floodprone Elevation (ft)	1104.88	1104.88	1104.88
Bankfull Elevation (ft)	1104.32	1104.32	1104.32
Floodprone Width (ft)	5.82	-----	-----
Bankfull Width (ft)	5.79	2.9	2.89
Entrenchment Ratio	1	-----	-----
Mean Depth (ft)	0.4	0.45	0.34
Maximum Depth (ft)	0.56	0.56	0.52
Width/Depth Ratio	14.47	6.49	8.5
Bankfull Area (sq ft)	2.31	1.29	0.99

Wetted Perimeter (ft)	6.39	3.7	3.47
Hydraulic Radius (ft)	0.36	0.35	0.29
Begin BKF Station	44.2	44.2	47.1
End BKF Station	49.99	47.1	49.99

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			


XS 7 - UT 3
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 4.9
Dbkf = .75
Abkf = 3.66
990
988
986
984
982
980
Elevation (ft)
0
20
40
60
80
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Cross Section Name: XS 7 - UT 3
Survey Date: 10/17/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	985.04	
30	0	986.03	
35	0	986.55	LB
39	0	985.94	
42	0	984.61	
45	0	982.69	
46	0	981.33	
47.4	0	981.08	LEW
48	0	980.91	TWG
49	0	980.94	
50	0	981.02	
50.5	0	981.88	BKF
51.5	0	982.24	
52	0	982.59	
53	0	983.25	
55	0	985.01	
59.5	0	987.66	
70	0	988.79	

Cross Sectional Geometry

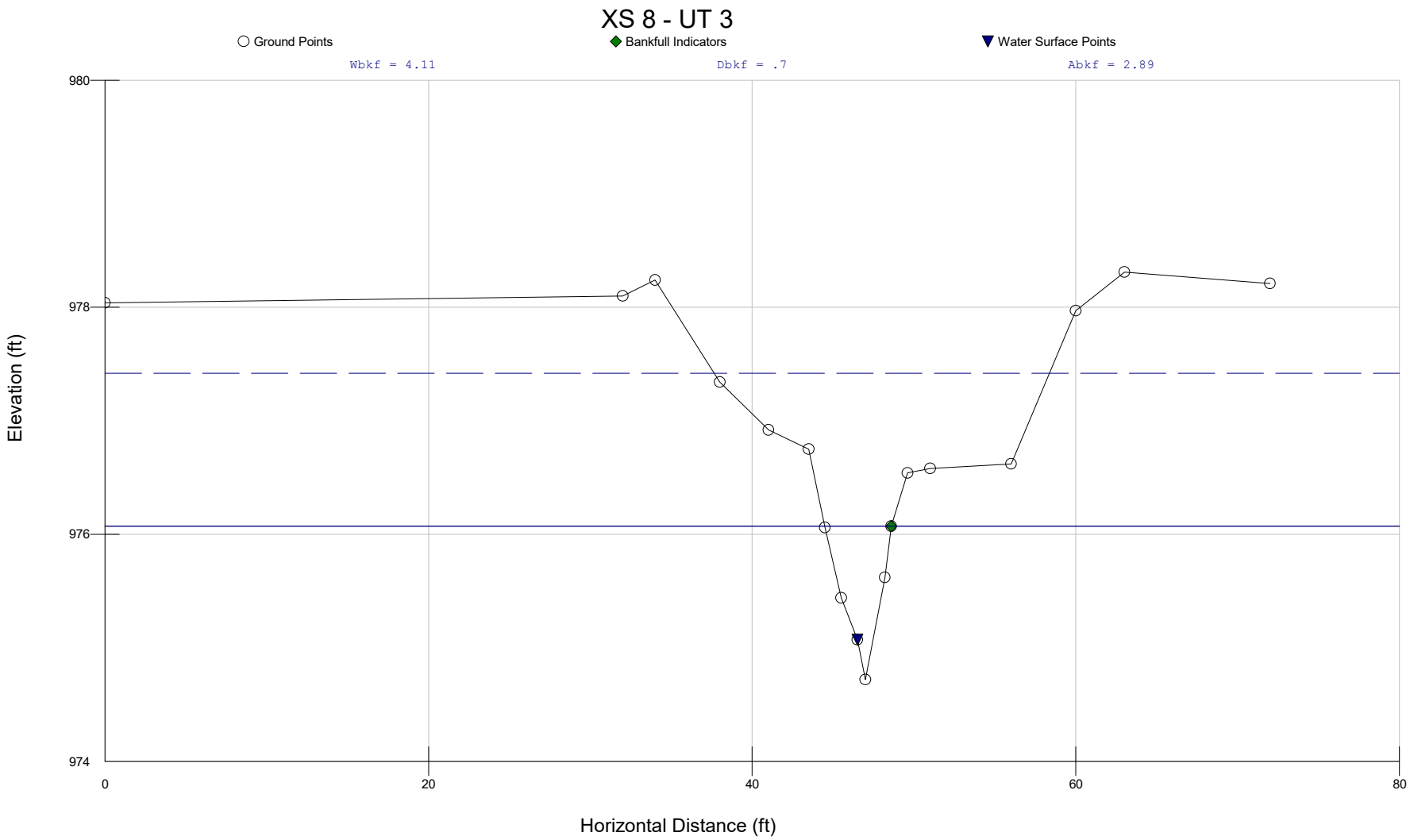
	Channel	Left	Right
Floodprone Elevation (ft)	982.85	982.85	982.85
Bankfull Elevation (ft)	981.88	981.88	981.88
Floodprone Width (ft)	7.64	-----	-----
Bankfull Width (ft)	4.9	2.45	2.45
Entrenchment Ratio	1.56	-----	-----
Mean Depth (ft)	0.75	0.67	0.83
Maximum Depth (ft)	0.97	0.97	0.97

Width/Depth Ratio	6.53	3.68	2.95
Bankfull Area (sq ft)	3.66	1.64	2.02
Wetted Perimeter (ft)	5.73	3.75	3.92
Hydraulic Radius (ft)	0.64	0.44	0.52
Begin BKF Station	45.6	45.6	48.05
End BKF Station	50.5	48.05	50.5

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			


XS 8 - UT 3
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 4.11
Dbkf = .7
Abkf = 2.89
980
978
976
974
Elevation (ft)
0
20
40
60
80
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Cross Section Name: XS 8 - UT 3
Survey Date: 10/17/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	978.04	
32	0	978.1	
34	0	978.24	
38	0	977.34	
41	0	976.92	
43.5	0	976.75	
44.5	0	976.06	
45.5	0	975.44	
46.5	0	975.07	LEW
47	0	974.72	TWG
48.2	0	975.62	
48.6	0	976.07	BKF
49.6	0	976.54	
51	0	976.58	
56	0	976.62	
60	0	977.97	
63	0	978.31	RB
72	0	978.21	

Cross Sectional Geometry

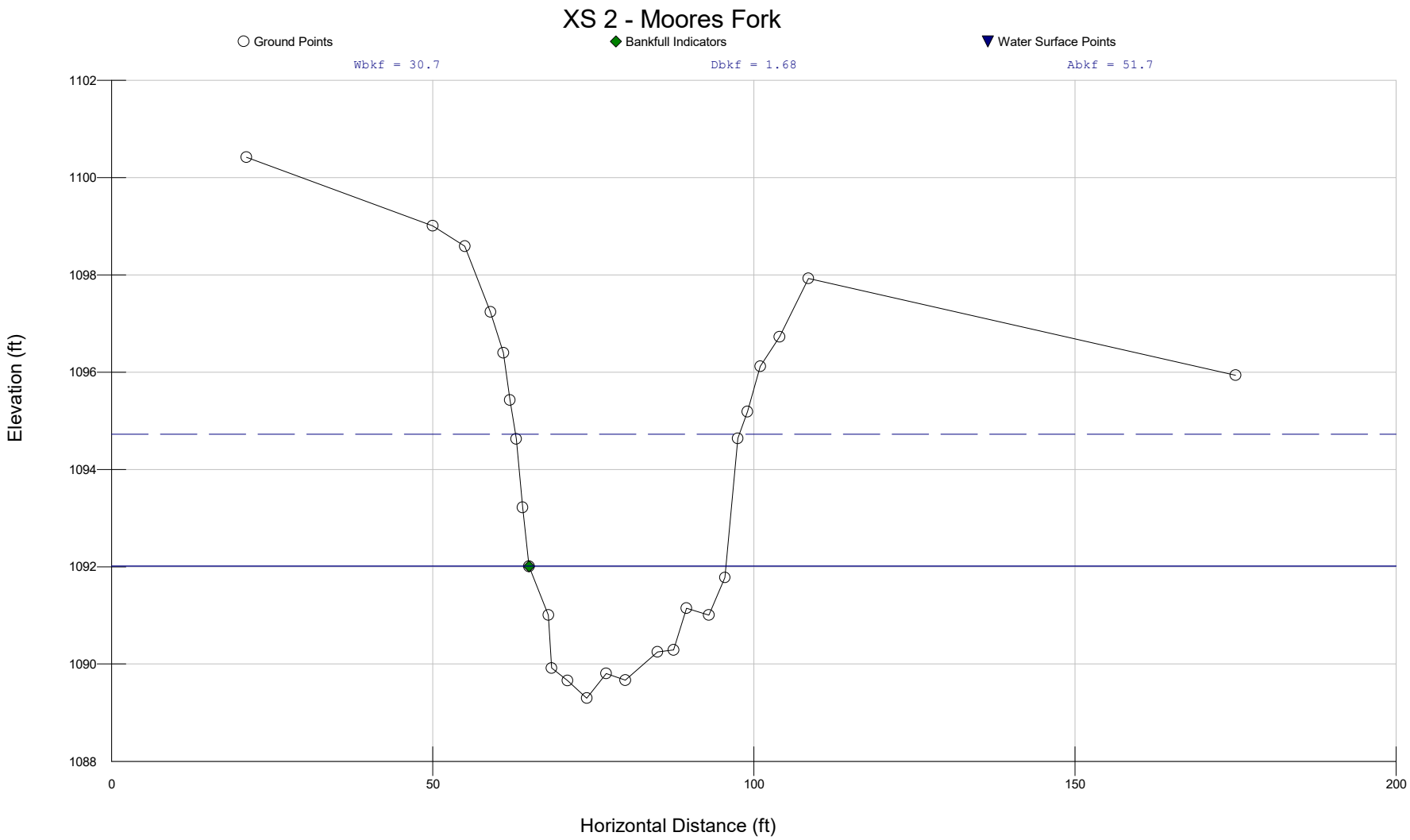
	Channel	Left	Right
Floodprone Elevation (ft)	977.42	977.42	977.42
Bankfull Elevation (ft)	976.07	976.07	976.07
Floodprone Width (ft)	20.73	-----	-----
Bankfull Width (ft)	4.11	2.05	2.06
Entrenchment Ratio	5.04	-----	-----
Mean Depth (ft)	0.7	0.57	0.83
Maximum Depth (ft)	1.35	1.03	1.35

Width/Depth Ratio	5.87	3.58	2.48
Bankfull Area (sq ft)	2.89	1.18	1.72
Wetted Perimeter (ft)	4.97	3.34	3.69
Hydraulic Radius (ft)	0.58	0.35	0.47
Begin BKF Station	44.49	44.49	46.54
End BKF Station	48.6	46.54	48.6

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			


XS 2 - Moores Fork
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 30.7
Dbkf = 1.68
Abkf = 51.7
Elevation (ft)
1102
1100
1098
1096
1094
1092
1090
1088
0
50
100
150
200
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: Moores Forks
Cross Section Name: XS 2 - Moores Fork
Survey Date: 02/06/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
21	0	1100.417	
50	0	1099.007	fence
55	0	1098.587	
59	0	1097.237	
61	0	1096.397	
62	0	1095.427	
63	0	1094.627	
64	0	1093.217	*BKF
65	0	1092.007	BKF
68	0	1091.007	
68.5	0	1089.917	
71	0	1089.657	
74	0	1089.297	TWG
77	0	1089.807	
80	0	1089.667	
85	0	1090.247	RB
87.5	0	1090.287	
89.5	0	1091.147	
93	0	1091.007	
95.5	0	1091.777	collapsing bank
97.5	0	1094.637	
99	0	1095.187	
101	0	1096.117	
104	0	1096.727	
108.5	0	1097.927	
175	0	1095.937	

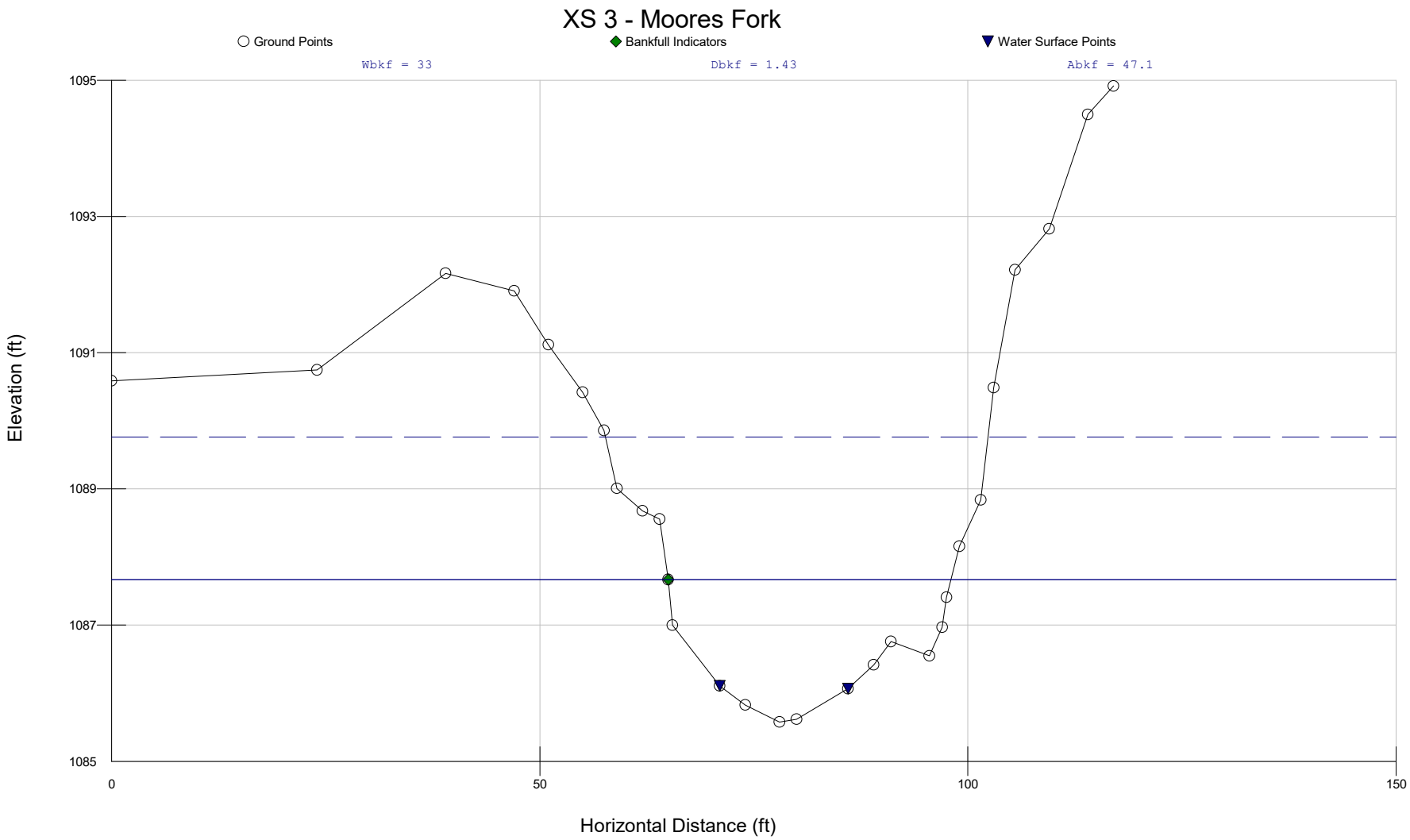
Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	1094.72	1094.72	1094.72
Bankfull Elevation (ft)	1092.01	1092.01	1092.01
Floodprone Width (ft)	34.85	-----	-----
Bankfull Width (ft)	30.67	15.25	15.41
Entrenchment Ratio	1.14	-----	-----
Mean Depth (ft)	1.68	1.98	1.39
Maximum Depth (ft)	2.71	2.71	2.31
Width/Depth Ratio	18.26	7.7	11.09
Bankfull Area (sq ft)	51.67	30.21	21.46
Wetted Perimeter (ft)	32.06	18.51	18.18
Hydraulic Radius (ft)	1.61	1.63	1.18
Begin BKF Station	65	65	80.25
End BKF Station	95.66	80.25	95.66

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			


XS 3 - Moores Fork
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 33
Dbkf = 1.43
Abkf = 47.1
Elevation (ft)
1095
1093
1091
1089
1087
1085
0
50
100
150
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: Moores Forks
Cross Section Name: XS 3 - Moores Fork
Survey Date: 02/06/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1090.587	
24	0	1090.747	
39	0	1092.167	
47	0	1091.907	
51	0	1091.117	cow path
55	0	1090.417	cow path
57.5	0	1089.857	cow path
59	0	1089.007	cow path
62	0	1088.677	
64	0	1088.557	
65	0	1087.667	BKF
65.5	0	1086.997	
71	0	1086.107	LEW
74	0	1085.827	
78	0	1085.577	TWG
80	0	1085.617	
86	0	1086.067	REW
89	0	1086.417	
91	0	1086.757	
95.5	0	1086.547	
97	0	1086.967	
97.5	0	1087.407	
99	0	1088.157	*BKF
101.5	0	1088.837	
103	0	1090.487	
105.5	0	1092.217	
109.5	0	1092.817	
114	0	1094.497	fence
117	0	1094.917	

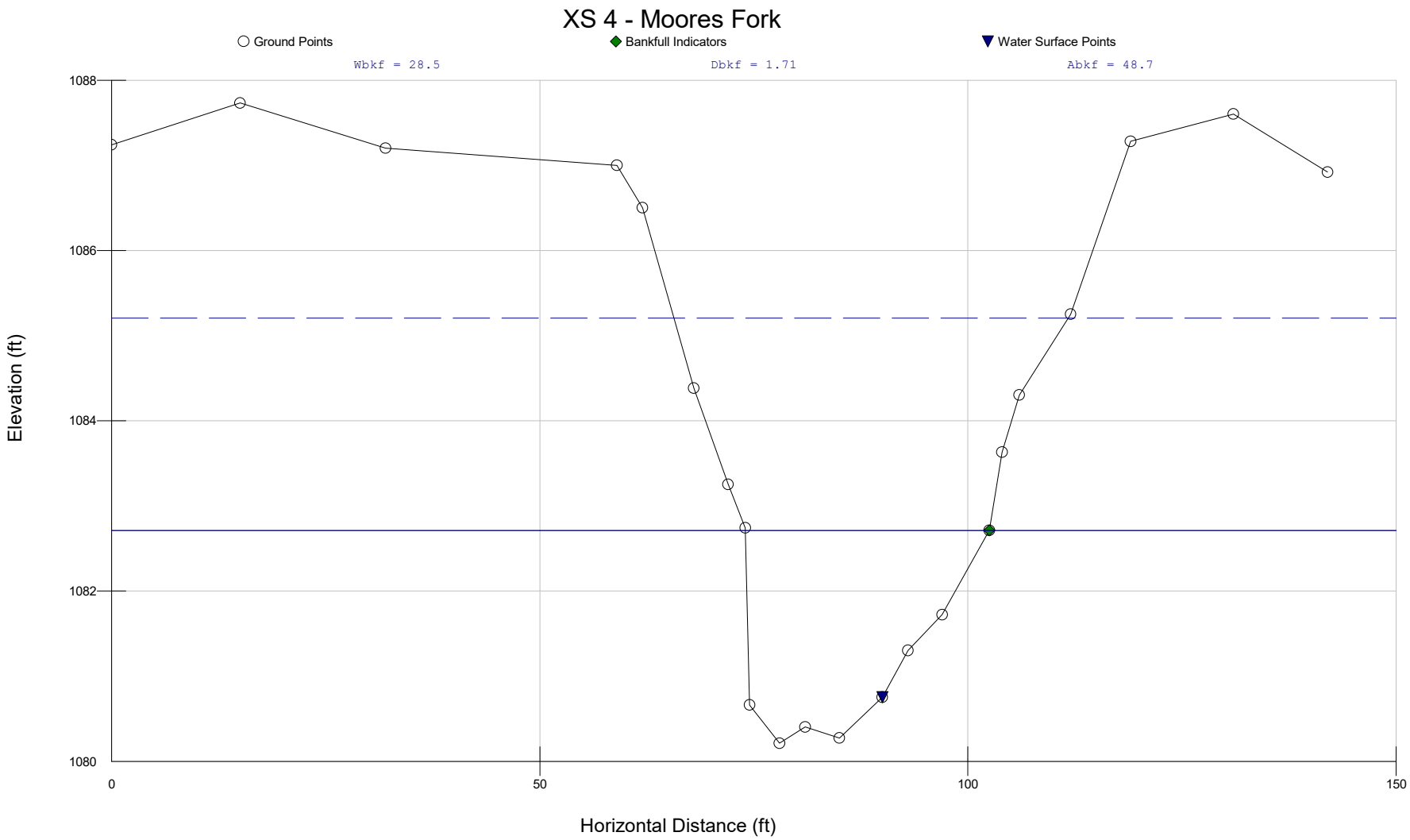
Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	1089.76	1089.76	1089.76
Bankfull Elevation (ft)	1087.67	1087.67	1087.67
Floodprone Width (ft)	44.68	-----	-----
Bankfull Width (ft)	33.03	16.51	16.52
Entrenchment Ratio	1.35	-----	-----
Mean Depth (ft)	1.43	1.6	1.25
Maximum Depth (ft)	2.09	2.09	1.94
Width/Depth Ratio	23.1	10.3	13.22
Bankfull Area (sq ft)	47.12	26.46	20.66
Wetted Perimeter (ft)	33.82	18.89	18.81
Hydraulic Radius (ft)	1.39	1.4	1.1
Begin BKF Station	65	65	81.51
End BKF Station	98.03	81.51	98.03

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			


XS 4 - Moores Fork
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 28.5
Dbkf = 1.71
Abkf = 48.7
1088
1086
1084
1082
1080
Elevation (ft)
0
50
100
150
Horizontal Distance (ft)

RIVERMORPH CROSS SECTION SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: Moores Forks
Cross Section Name: XS 4 - Moores Fork
Survey Date: 02/06/2018

Cross Section Data Entry

BM Elevation: 0 ft
Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1087.242	
15	0	1087.732	
32	0	1087.202	
59	0	1087.002	LB
62	0	1086.502	
68	0	1084.382	
72	0	1083.252	
74	0	1082.742	
74.5	0	1080.662	
78	0	1080.212	TWG
81	0	1080.402	
85	0	1080.272	
90	0	1080.752	REW
93	0	1081.302	
97	0	1081.722	
102.5	0	1082.712	BKF
104	0	1083.632	
106	0	1084.302	
112	0	1085.252	
119	0	1087.282	
131	0	1087.602	
142	0	1086.922	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	1085.21	1085.21	1085.21
Bankfull Elevation (ft)	1082.71	1082.71	1082.71
Floodprone Width (ft)	46.06	-----	-----

Bankfull Width (ft)	28.48	14.24	14.24
Entrenchment Ratio	1.62	-----	-----
Mean Depth (ft)	1.71	2.29	1.13
Maximum Depth (ft)	2.5	2.5	2.13
Width/Depth Ratio	16.65	6.23	12.6
Bankfull Area (sq ft)	48.7	32.58	16.13
Wetted Perimeter (ft)	30.32	18.03	16.53
Hydraulic Radius (ft)	1.61	1.81	0.98
Begin BKF Station	74.01	74.01	88.25
End BKF Station	102.49	88.25	102.49

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

Site Information and Performance Standard Stratification	
Project Name:	Tributaries to Stewarts Creek
Reach ID:	UT 1
Restoration Potential:	Level 3 - Geomorphology
Existing Stream Type:	G
Proposed Stream Type:	C
Region:	Piedmont
Drainage Area (sqmi):	0.11
Proposed Bed Material:	Gravel
Existing Stream Length (ft):	2373
Proposed Stream Length (ft):	2742
Stream Slope (%):	1.8
Flow Type:	Perennial
River Basin:	Yadkin-PeeDee
Stream Temperature:	Coolwater
Data Collection Season:	Winter/Spring
Valley Type:	Unconfined Alluvial

Notes
1. Users input values that are highlighted based on restoration potential
2. Users select values from a pull-down menu
3. Leave values blank for field values that were not measured

FUNCTIONAL CHANGE SUMMARY	
Exisiting Condition Score (ECS)	0.39
Proposed Condition Score (PCS)	0.72
Change in Functional Condition (PCS - ECS)	0.33
Percent Condition Change	85%
Existing Stream Length (ft)	2373
Proposed Stream Length (ft)	2742
Additional Stream Length (ft)	369
Existing Functional Foot Score (FFS)	925
Proposed Functional Foot Score (FFS)	1974
Proposed FFS - Existing FFS	1049
Functional Change (%)	113%

BMP FUNCTIONAL CHANGE SUMMARY	
Existing BMP Functional Feet Score (FFS)	0
Proposed BMP Functional Feet Score (FFS)	0
Proposed BMP FFS - Existing BMP FFS	0
Functional Change (%)	

FUNCTIONAL FEET (FF) SUMMARY	
Existing Stream FFS + Existing BMP FFS	925
Proposed Stream FFS + Proposed BMP FFS	1974
Total Proposed FFS - Total Existing FFS	1049
Functional Change (%)	113%

FUNCTION BASED PARAMETERS SUMMARY

Functional Category	Function-Based Parameters	Existing Parameter	Proposed Parameter
Hydrology	Catchment Hydrology		
	Reach Runoff	0.39	0.74
Hydraulics	Floodplain Connectivity	0.00	1.00
Geomorphology	Large Woody Debris	0.30	0.79
	Lateral Stability	0.10	1.00
	Riparian Vegetation	0.67	0.65
	Bed Material		
	Bed Form Diversity	0.82	0.98
	Plan Form	1.00	1.00
Physicochemical	Temperature		
	Bacteria		
	Organic Matter		
	Nitrogen		
	Phosphorus		
Biology	Macros	0.98	1.00
	Fish		

FUNCTIONAL CATEGORY REPORT CARD

Functional Category	ECS	PCS	Functional Change
Hydrology	0.39	0.74	0.35
Hydraulics	0.00	1.00	1.00
Geomorphology	0.58	0.88	0.30
Physicochemical			
Biology	0.98	1.00	0.02

Site Information and Performance Standard Stratification	
Project Name:	Tributaries to Stewarts Creek
Reach ID:	UT 2
Restoration Potential:	Level 3 - Geomorphology
Existing Stream Type:	E
Proposed Stream Type:	C
Region:	Piedmont
Drainage Area (sqmi):	0.07
Proposed Bed Material:	Gravel
Existing Stream Length (ft):	397
Proposed Stream Length (ft):	1060
Stream Slope (%):	2.2
Flow Type:	Perennial
River Basin:	Yadkin-PeeDee
Stream Temperature:	Coolwater
Data Collection Season:	Winter/Spring
Valley Type:	Unconfined Alluvial

Notes
1. Users input values that are highlighted based on restoration potential
2. Users select values from a pull-down menu
3. Leave values blank for field values that were not measured

FUNCTIONAL CHANGE SUMMARY	
Exisiting Condition Score (ECS)	0.42
Proposed Condition Score (PCS)	0.71
Change in Functional Condition (PCS - ECS)	0.29
Percent Condition Change	69%
Existing Stream Length (ft)	397
Proposed Stream Length (ft)	1060
Additional Stream Length (ft)	663
Existing Functional Foot Score (FFS)	167
Proposed Functional Foot Score (FFS)	753
Proposed FFS - Existing FFS	586
Functional Change (%)	351%

BMP FUNCTIONAL CHANGE SUMMARY	
Existing BMP Functional Feet Score (FFS)	0
Proposed BMP Functional Feet Score (FFS)	0
Proposed BMP FFS - Existing BMP FFS	0
Functional Change (%)	

FUNCTIONAL FEET (FF) SUMMARY	
Existing Stream FFS + Existing BMP FFS	167
Proposed Stream FFS + Proposed BMP FFS	753
Total Proposed FFS - Total Existing FFS	586
Functional Change (%)	351%

FUNCTION BASED PARAMETERS SUMMARY			
Functional Category	**Function-Based Parameters**	**Existing Parameter**	**Proposed Parameter**
Hydrology	Catchment Hydrology		
	Reach Runoff	0.50	0.75
Hydraulics	Floodplain Connectivity	0.40	1.00
Geomorphology	Large Woody Debris	0.07	0.30
	Lateral Stability	0.25	1.00
	Riparian Vegetation	0.45	0.65
	Bed Material		
	Bed Form Diversity	0.46	1.00
	Plan Form	0.00	1.00
Physicochemical	Temperature		
	Bacteria		
	Organic Matter		
	Nitrogen		
	Phosphorus		
Biology	Macros	0.98	1.00
	Fish		

FUNCTIONAL CATEGORY REPORT CARD			
Functional Category	**ECS**	**PCS**	**Functional Change**
Hydrology	0.50	0.75	0.25
Hydraulics	0.40	1.00	0.60
Geomorphology	0.24	0.79	0.55
Physicochemical			
Biology	0.98	1.00	0.02

Site Information and Performance Standard Stratification	
Project Name:	Tributaries to Stewarts Creek
Reach ID:	UT 3
Restoration Potential:	Level 3 - Geomorphology
Existing Stream Type:	F
Proposed Stream Type:	C
Region:	Piedmont
Drainage Area (sqmi):	0.11
Proposed Bed Material:	Gravel
Existing Stream Length (ft):	1814
Proposed Stream Length (ft):	3365
Stream Slope (%):	1.3
Flow Type:	Perennial
River Basin:	Yadkin-PeeDee
Stream Temperature:	Coldwater
Data Collection Season:	Winter/Spring
Valley Type:	Unconfined Alluvial

Notes
1. Users input values that are highlighted based on restoration potential
2. Users select values from a pull-down menu
3. Leave values blank for field values that were not measured

FUNCTIONAL CHANGE SUMMARY	
Exisiting Condition Score (ECS)	0.48
Proposed Condition Score (PCS)	0.73
Change in Functional Condition (PCS - ECS)	0.25
Percent Condition Change	52%
Existing Stream Length (ft)	1814
Proposed Stream Length (ft)	3365
Additional Stream Length (ft)	1551
Existing Functional Foot Score (FFS)	871
Proposed Functional Foot Score (FFS)	2456
Proposed FFS - Existing FFS	1586
Functional Change (%)	182%

BMP FUNCTIONAL CHANGE SUMMARY	
Existing BMP Functional Feet Score (FFS)	0
Proposed BMP Functional Feet Score (FFS)	0
Proposed BMP FFS - Existing BMP FFS	0
Functional Change (%)	

FUNCTIONAL FEET (FF) SUMMARY	
Existing Stream FFS + Existing BMP FFS	871
Proposed Stream FFS + Proposed BMP FFS	2456
Total Proposed FFS - Total Existing FFS	1585
Functional Change (%)	182%

FUNCTION BASED PARAMETERS SUMMARY

Functional Category	Function-Based Parameters	Existing Parameter	Proposed Parameter
Hydrology	Catchment Hydrology		
	Reach Runoff	0.48	0.73
Hydraulics	Floodplain Connectivity	0.36	1.00
Geomorphology	Large Woody Debris	0.44	0.88
	Lateral Stability	0.10	1.00
	Riparian Vegetation	0.50	0.65
	Bed Material		
	Bed Form Diversity	0.70	0.96
	Plan Form	1.00	1.00
Physicochemical	Temperature		
	Bacteria		
	Organic Matter		
	Nitrogen		
	Phosphorus		
Biology	Macros	1.00	1.00
	Fish		

FUNCTIONAL CATEGORY REPORT CARD

Functional Category	ECS	PCS	Functional Change
Hydrology	0.48	0.73	0.25
Hydraulics	0.36	1.00	0.64
Geomorphology	0.55	0.90	0.35
Physicochemical			
Biology	1.00	1.00	0.00

Site Information and Performance Standard Stratification	
Project Name:	Moores Fork
Reach ID:	Reach 1
Restoration Potential:	Level 3 - Geomorphology
Existing Stream Type:	F
Proposed Stream Type:	C
Region:	Piedmont
Drainage Area (sqmi):	4.27
Proposed Bed Material:	Gravel
Existing Stream Length (ft):	1660
Proposed Stream Length (ft):	1573
Stream Slope (%):	0.3
Flow Type:	Perennial
River Basin:	Yadkin-PeeDee
Stream Temperature:	Coolwater
Data Collection Season:	Winter/Spring
Valley Type:	Unconfined Alluvial

Notes
1. Users input values that are highlighted based on restoration potential
2. Users select values from a pull-down menu
3. Leave values blank for field values that were not measured

FUNCTIONAL CHANGE SUMMARY	
Exisiting Condition Score (ECS)	0.31
Proposed Condition Score (PCS)	0.60
Change in Functional Condition (PCS - ECS)	0.29
Percent Condition Change	94%
Existing Stream Length (ft)	1660
Proposed Stream Length (ft)	1573
Additional Stream Length (ft)	-87
Existing Functional Foot Score (FFS)	515
Proposed Functional Foot Score (FFS)	944
Proposed FFS - Existing FFS	429
Functional Change (%)	83%

BMP FUNCTIONAL CHANGE SUMMARY	
Existing BMP Functional Feet Score (FFS)	0
Proposed BMP Functional Feet Score (FFS)	0
Proposed BMP FFS - Existing BMP FFS	0
Functional Change (%)	

FUNCTIONAL FEET (FF) SUMMARY	
Existing Stream FFS + Existing BMP FFS	515
Proposed Stream FFS + Proposed BMP FFS	944
Total Proposed FFS - Total Existing FFS	429
Functional Change (%)	83%

FUNCTION BASED PARAMETERS SUMMARY			
Functional Category	**Function-Based Parameters**	**Existing Parameter**	**Proposed Parameter**
Hydrology	Catchment Hydrology		
	Reach Runoff	0.36	0.71
Hydraulics	Floodplain Connectivity	0.00	0.85
Geomorphology	Large Woody Debris	0.00	0.01
	Lateral Stability	0.27	1.00
	Riparian Vegetation	0.16	0.65
	Bed Material		
	Bed Form Diversity	0.55	0.65
	Plan Form	0.00	0.00
Physicochemical	Temperature		
	Bacteria		
	Organic Matter		
	Nitrogen		
	Phosphorus		
Biology	Macros	1.00	1.00
	Fish		

FUNCTIONAL CATEGORY REPORT CARD			
Functional Category	**ECS**	**PCS**	**Functional Change**
Hydrology	0.36	0.71	0.35
Hydraulics	0.00	0.85	0.85
Geomorphology	0.20	0.46	0.26
Physicochemical			
Biology	1.00	1.00	0.00

Site Information and Performance Standard Stratification	
Project Name:	Moores Fork
Reach ID:	Reach 2
Restoration Potential:	Level 3 - Geomorphology
Existing Stream Type:	F
Proposed Stream Type:	C
Region:	Piedmont
Drainage Area (sqmi):	4.4
Proposed Bed Material:	Gravel
Existing Stream Length (ft):	2007
Proposed Stream Length (ft):	1998
Stream Slope (%):	0.4
Flow Type:	Perennial
River Basin:	Yadkin-PeeDee
Stream Temperature:	Coolwater
Data Collection Season:	Winter/Spring
Valley Type:	Unconfined Alluvial

Notes
1. Users input values that are highlighted based on restoration potential
2. Users select values from a pull-down menu
3. Leave values blank for field values that were not measured

FUNCTIONAL CHANGE SUMMARY	
Exisiting Condition Score (ECS)	0.34
Proposed Condition Score (PCS)	0.69
Change in Functional Condition (PCS - ECS)	0.35
Percent Condition Change	103%
Existing Stream Length (ft)	2007
Proposed Stream Length (ft)	1998
Additional Stream Length (ft)	-9
Existing Functional Foot Score (FFS)	682
Proposed Functional Foot Score (FFS)	1379
Proposed FFS - Existing FFS	696
Functional Change (%)	102%

BMP FUNCTIONAL CHANGE SUMMARY	
Existing BMP Functional Feet Score (FFS)	0
Proposed BMP Functional Feet Score (FFS)	0
Proposed BMP FFS - Existing BMP FFS	0
Functional Change (%)	

FUNCTIONAL FEET (FF) SUMMARY	
Existing Stream FFS + Existing BMP FFS	682
Proposed Stream FFS + Proposed BMP FFS	1379
Total Proposed FFS - Total Existing FFS	697
Functional Change (%)	102%

FUNCTION BASED PARAMETERS SUMMARY			
Functional Category	**Function-Based Parameters**	**Existing Parameter**	**Proposed Parameter**
Hydrology	Catchment Hydrology		
	Reach Runoff	0.46	0.71
Hydraulics	Floodplain Connectivity	0.00	1.00
Geomorphology	Large Woody Debris	0.02	0.10
	Lateral Stability	0.24	1.00
	Riparian Vegetation	0.23	0.65
	Bed Material		
	Bed Form Diversity	0.83	0.94
	Plan Form	0.00	1.00
Physicochemical	Temperature		
	Bacteria		
	Organic Matter		
	Nitrogen		
	Phosphorus		
Biology	Macros	1.00	1.00
	Fish		

FUNCTIONAL CATEGORY REPORT CARD			
Functional Category	**ECS**	**PCS**	**Functional Change**
Hydrology	0.46	0.71	0.25
Hydraulics	0.00	1.00	1.00
Geomorphology	0.26	0.74	0.48
Physicochemical			
Biology	1.00	1.00	0.00

Site Information and Performance Standard Stratification	
Project Name:	Moores Fork
Reach ID:	Reach 3
Restoration Potential:	Level 3 - Geomorphology
Existing Stream Type:	F
Proposed Stream Type:	C
Region:	Piedmont
Drainage Area (sqmi):	4.4
Proposed Bed Material:	Gravel
Existing Stream Length (ft):	380
Proposed Stream Length (ft):	384
Stream Slope (%):	0.57
Flow Type:	Perennial
River Basin:	Yadkin-PeeDee
Stream Temperature:	Coolwater
Data Collection Season:	Winter/Spring
Valley Type:	Unconfined Alluvial

Notes
1. Users input values that are highlighted based on restoration potential
2. Users select values from a pull-down menu
3. Leave values blank for field values that were not measured

FUNCTIONAL CHANGE SUMMARY	
Exisiting Condition Score (ECS)	0.32
Proposed Condition Score (PCS)	0.65
Change in Functional Condition (PCS - ECS)	0.33
Percent Condition Change	103%
Existing Stream Length (ft)	380
Proposed Stream Length (ft)	384
Additional Stream Length (ft)	4
Existing Functional Foot Score (FFS)	122
Proposed Functional Foot Score (FFS)	250
Proposed FFS - Existing FFS	128
Functional Change (%)	105%

BMP FUNCTIONAL CHANGE SUMMARY	
Existing BMP Functional Feet Score (FFS)	0
Proposed BMP Functional Feet Score (FFS)	0
Proposed BMP FFS - Existing BMP FFS	0
Functional Change (%)	

FUNCTIONAL FEET (FF) SUMMARY	
Existing Stream FFS + Existing BMP FFS	122
Proposed Stream FFS + Proposed BMP FFS	250
Total Proposed FFS - Total Existing FFS	128
Functional Change (%)	105%

FUNCTION BASED PARAMETERS SUMMARY			
Functional Category	**Function-Based Parameters**	**Existing Parameter**	**Proposed Parameter**
Hydrology	Catchment Hydrology		
	Reach Runoff	0.46	0.71
Hydraulics	Floodplain Connectivity	0.00	1.00
Geomorphology	Large Woody Debris	0.00	0.01
	Lateral Stability	0.30	1.00
	Riparian Vegetation	0.00	0.65
	Bed Material		
	Bed Form Diversity	0.42	0.94
	Plan Form	0.00	0.00
Physicochemical	Temperature		
	Bacteria		
	Organic Matter		
	Nitrogen		
	Phosphorus		
Biology	Macros	1.00	1.00
	Fish		

FUNCTIONAL CATEGORY REPORT CARD			
Functional Category	**ECS**	**PCS**	**Functional Change**
Hydrology	0.46	0.71	0.25
Hydraulics	0.00	1.00	1.00
Geomorphology	0.14	0.52	0.38
Physicochemical			
Biology	1.00	1.00	0.00

AGRICULTURE (ROW CROPS)

A1	13.5	ac
TN Reduction	1025.0	lbs/yr
TP Reduction	66.0	lbs/yr

Nutrient Reduction from Buffer Adjacent to Agricultural Fields
TN reduction (lbs/yr) = 75.77 (lbs/ac/yr) x Area (ac)
TP reduction (lbs/yr) = 4.88 (lbs/ac/yr) x Area (ac)

Where:
TN = total nitrogen;
TP = total phosphorus; and
Area = total area of restored riparian buffers adjacent to agricultural fields

A1 is the total area of restored riprarian buffers adjacent to agricultural fields in the UTs and Moores Fork R1.

CATTLE EXCLUSION GRAZING PASTURE

A2	6.8	ac
TN Reduction	345.3	lbs/yr
TP Reduction	28.6	lbs/yr

Cattle Exclusion (Grazing Pasture) : It is estimated that one acre of livestock exclusion areas removes 51.04 lbs of total nitrogen (TN) and 4.23 lbs of total phosphorus (TP) annually.

TN reduction (lbs/yr) = 51.04 (lbs/ac/yr) x Area (ac)
TP reduction (lbs/yr) = 4.23 (lbs/ac/yr) x Area (ac)

Where:
TN = total nitrogen;
TP = total phosphorus; and
Area = total area of restored riparian buffers inside of livestock exclusion fences

A2 is the total area of restored riprarian buffers inside of live stock exclusion fences in Moores Fork.

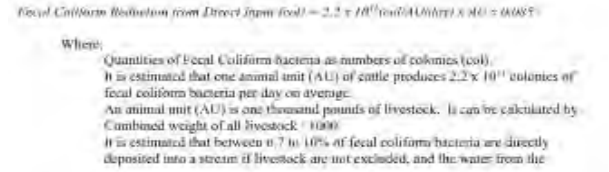
TOTAL

TN Reduction	1370.3	lbs/yr
TP Reduction	94.6	lbs/yr

Reference:
Quantifying Benefits to Water Quality from Livestock Exclusion and Riparian Buffer Establishment for Stream Restoration (DMS, 2016)

LIVESTOCK EXCLUSION

AU	1.1	
Total Fecal Coliform Reduction	20570000000	col



Where:

Quantities of Fecal Coliform bacteria as numbers of colonies (col).
It is estimated that one animal unit (AU) of cattle produces 2.2×10^{11} colonies of fecal coliform bacteria per day on average.
An animal unit (AU) is one thousand pounds of livestock. It can be calculated by Combined weight of all livestock / 1000
It is estimated that between 0.7 to 10% of fecal coliform bacteria are directly deposited into a stream if livestock are not excluded, and the water from the

AU is one thousand pounds of livestock on Moores Fork.

RIPARIAN BUFFER FILTRATION

CN	69.00	
S	4.49	
P	2.78	in
Q	0.56	in
A	0.08	sq.mi
	2157788.16	sq.ft
	99858.88	ft^3
Q	746996.37	gal

Fecal Coliform Concentration	1894000	col/gal
Runoff	746996	gal
Fecal Coliform Reduction	1.20259E+12	col

2. Estimating Fecal Coliform Reduction Due to Riparian Buffer Filtration (Fecal Coliform Reduction from Riparian Buffer Filtering)

Common Fecal Coliform Concentration from Grazed Pasture

Livestock Operation	Fecal Coliform Concentration (col/gal)
Pastures under Continually Grazing Year-round	1.894×10^6
Pastures Grazed for Half of Year	3.295×10^5
Pastures Grazed for Two Months of Year	3.409×10^4

The volume of runoff from pastures can be estimated by using SCS runoff curve number (USDA Natural Resources Conservation Service).

$$Q = (P - 0.2S)^2 / (P + 0.8S)$$

$$S = (1000 / CN) - 10$$

Where:

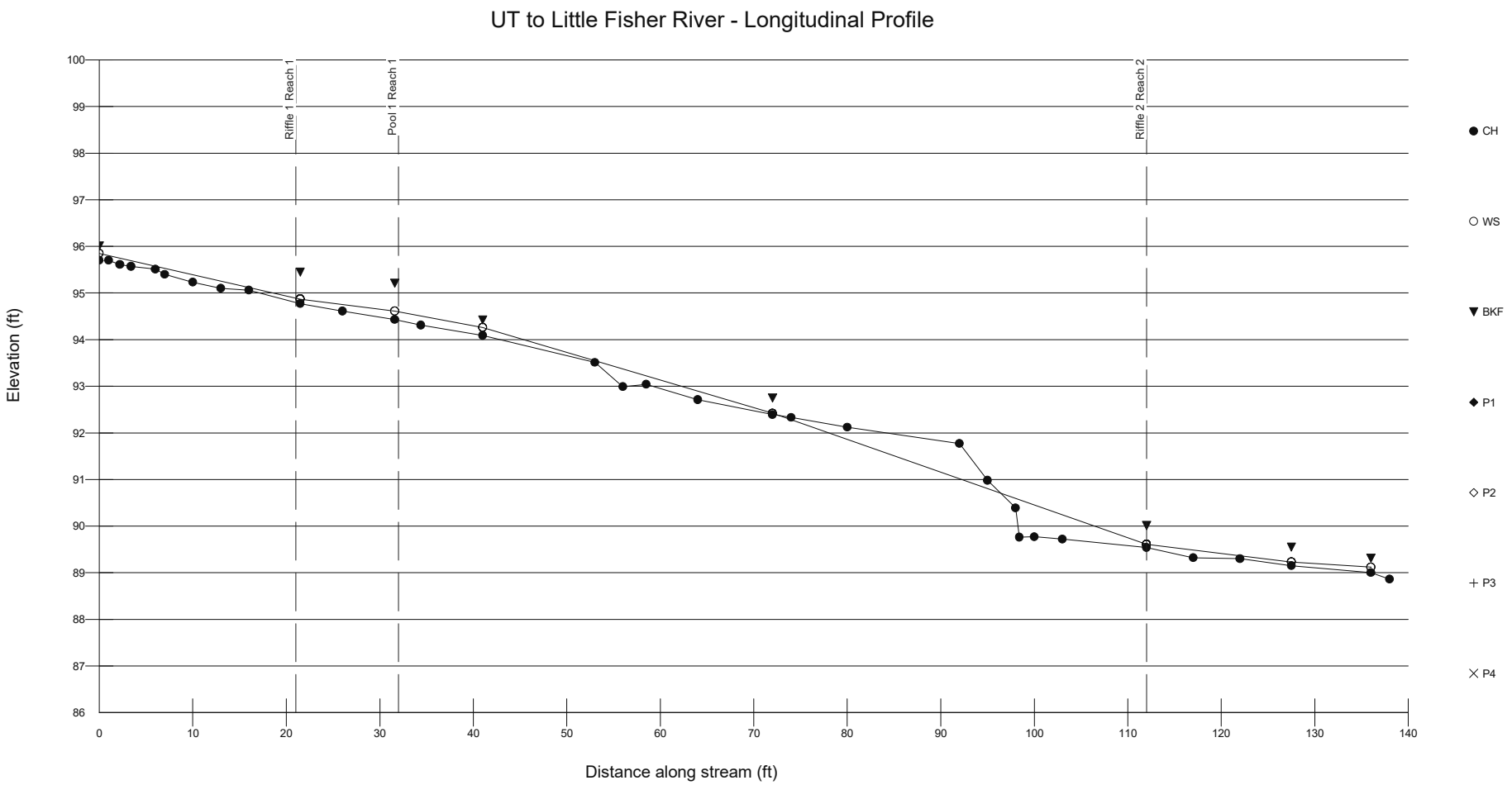
Q = accumulated direct runoff (in);
P = accumulated rainfall (in);
S = Potential maximum retention, and
CN = the runoff curve number.

On Moores Fork the cattle are continually grazed year-round.

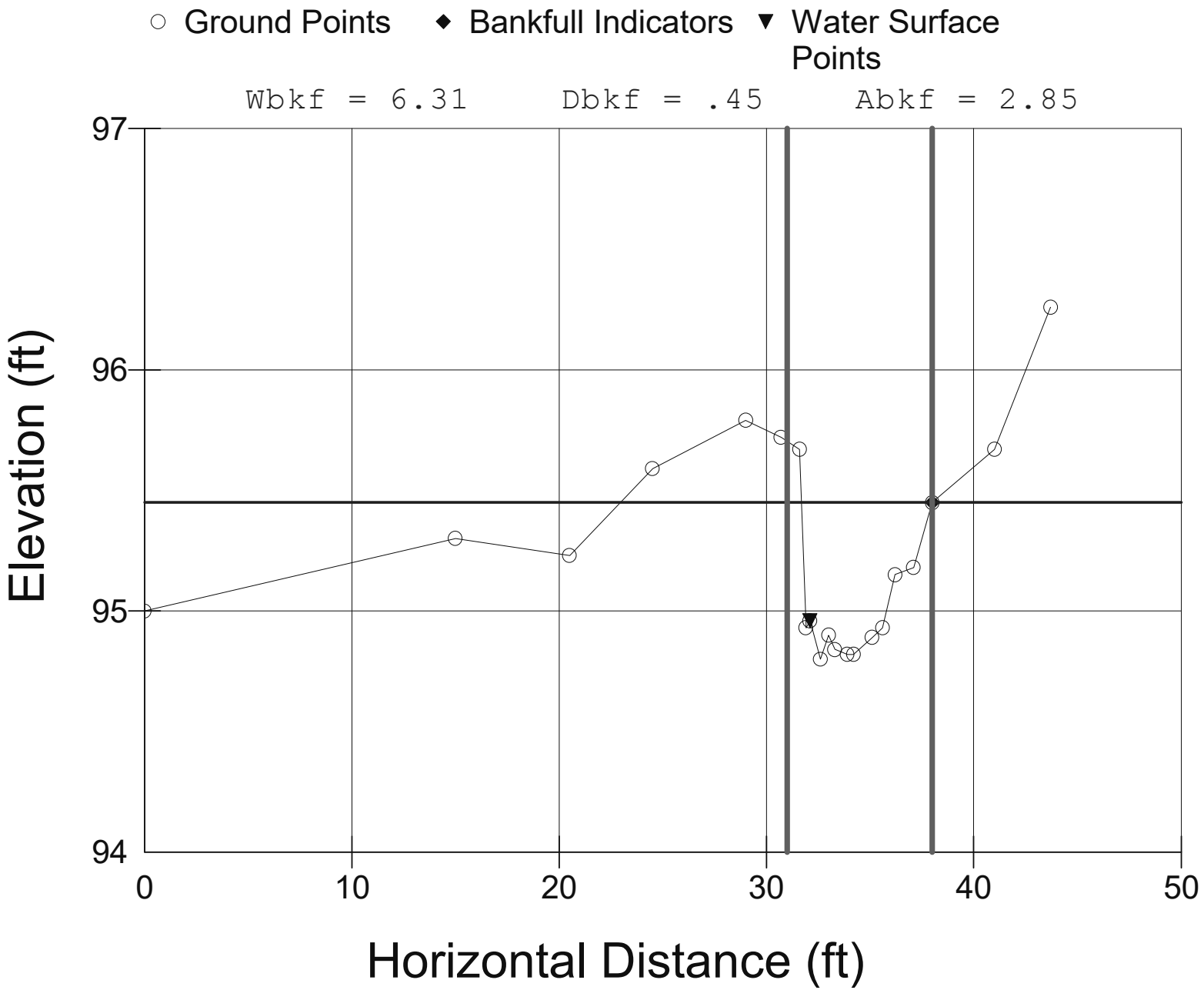
TOTAL

Total Fecal Coliform Reduction	1.22316E+12	col

Reference:
Quantifying Benefits to Water Quality from Livestock Exclusion and Riparian Buffer Establishment for Stream Restoration (DMS, 2016)


UT to Little Fisher River - Longitudinal Profile
Riffle 1 Reach 1
Pool 1 Reach 1
Riffle 2 Reach 2
Elevation (ft)
Distance along stream (ft)
CH
WS
BKF
P1
P2
P3
P4

UT to Little Fisher River - Riffle 1



RIVERMORPH CROSS SECTION SUMMARY

River Name: UT to Little Fisher River
Reach Name: Reach 1
Cross Section Name: Riffle 1 Reach 1
Survey Date: 07/19/2018

Cross Section Data Entry

BM Elevation: 99 ft
Backsight Rod Reading: 1 ft

TAPE	FS	ELEV	NOTE
0	5	95	LEP
15	4.7	95.3	
20.5	4.77	95.23	
24.5	4.41	95.59	
29	4.21	95.79	
30.7	4.28	95.72	
31.6	4.33	95.67	LB
31.9	5.07	94.93	UNDERCUT
32.1	5.04	94.96	LEW/WS
32.6	5.2	94.8	TW
33	5.1	94.9	
33.3	5.16	94.84	
33.9	5.18	94.82	
34.2	5.18	94.82	*REW/WS
35.1	5.11	94.89	
35.6	5.07	94.93	
36.2	4.85	95.15	
37.1	4.82	95.18	
38	4.55	95.45	BKF RB
41	4.33	95.67	
43.7	3.74	96.26	REP

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	96.1	96.1	96.1
Bankfull Elevation (ft)	95.45	95.45	95.45
Floodprone Width (ft)	42.97	-----	-----
Bankfull Width (ft)	6.31	2.21	4.1
Entrenchment Ratio	6.81	-----	-----
Mean Depth (ft)	0.45	0.55	0.39
Maximum Depth (ft)	0.65	0.65	0.63
Width/Depth Ratio	14.02	3.98	10.51
Bankfull Area (sq ft)	2.85	1.23	1.62
Wetted Perimeter (ft)	6.79	3.24	4.81
Hydraulic Radius (ft)	0.42	0.38	0.34
Begin BKF Station	31.69	31.69	33.9
End BKF Station	38	33.9	38

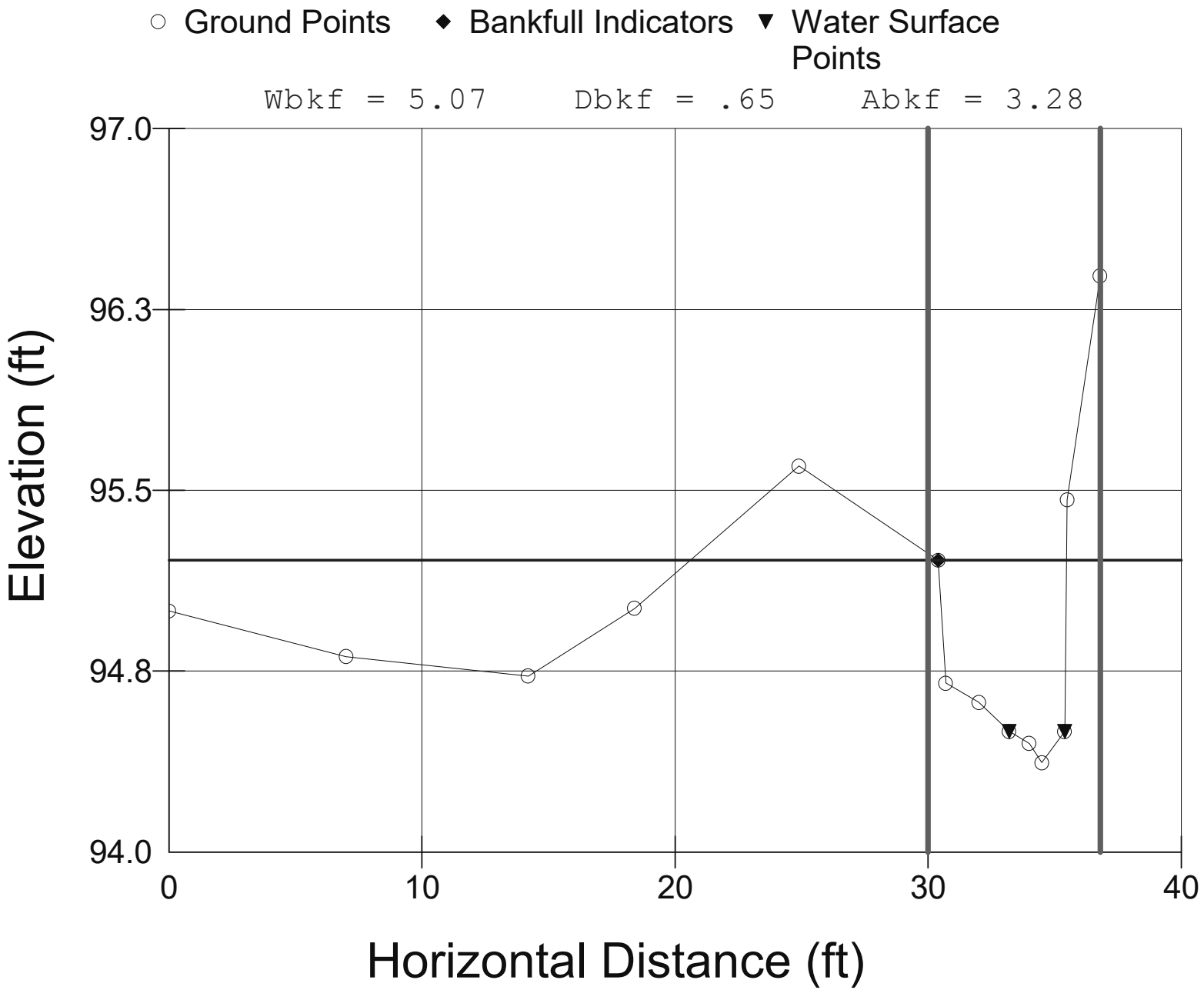
Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side

Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

UT to Little Fisher River - Pool 1



RIVERMORPH CROSS SECTION SUMMARY

River Name: UT to Little Fisher River
Reach Name: Reach 1
Cross Section Name: Pool 1 Reach 1
Survey Date: 07/19/2018

Cross Section Data Entry

BM Elevation: 99 ft
Backsight Rod Reading: 1 ft

TAPE	FS	ELEV	NOTE
0	5	95	LEP
7	5.19	94.81	
14.2	5.27	94.73	
18.4	4.99	95.01	
24.9	4.4	95.6	
30.4	4.79	95.21	BKF__LB/BKF
30.7	5.3	94.7	
32	5.38	94.62	
33.2	5.5	94.5	LEW
34	5.55	94.45	
34.5	5.63	94.37	
35.4	5.5	94.5	REW
35.5	4.54	95.46	RB
36.8	3.61	96.39	REP

Cross Sectional Geometry

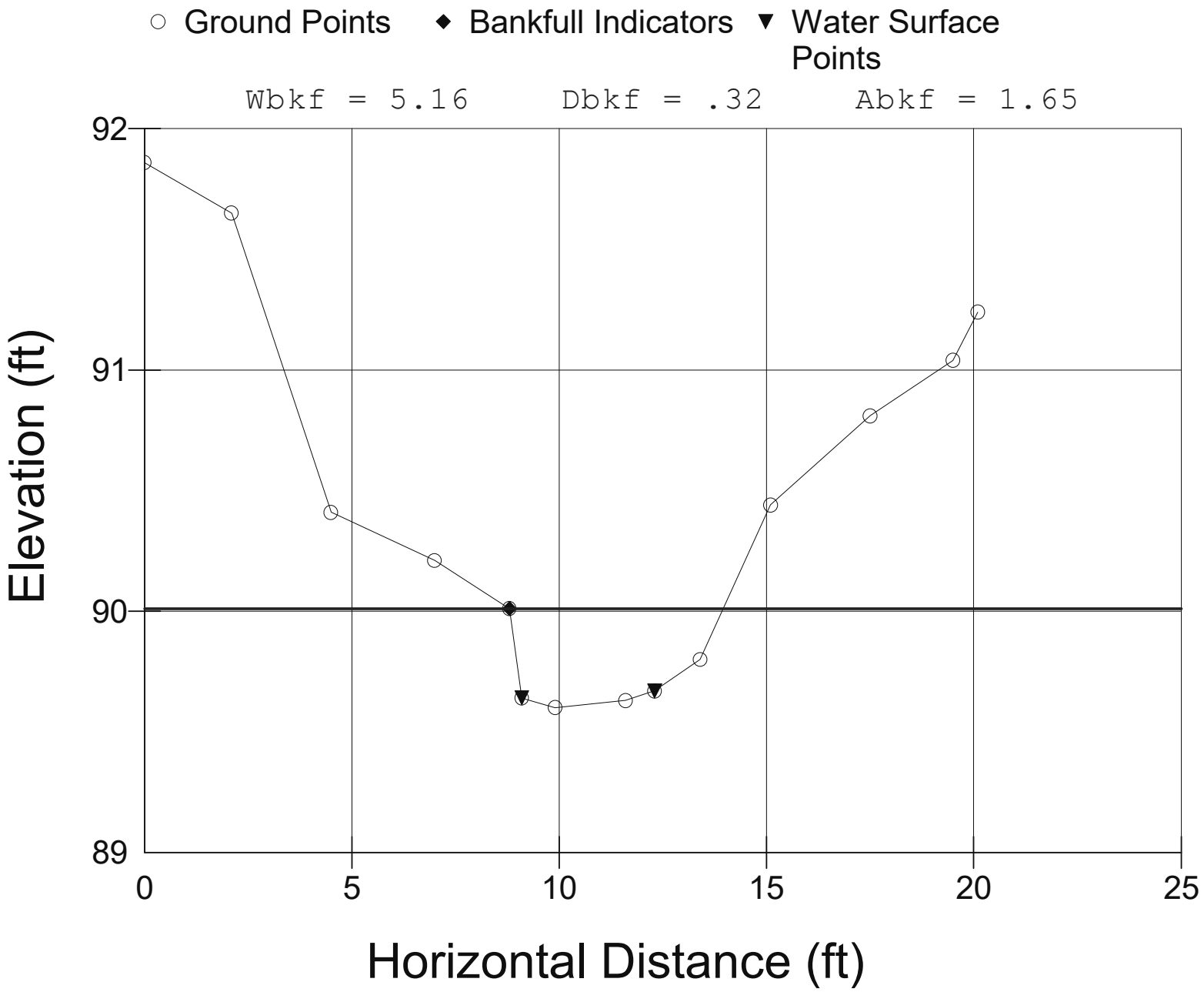
	Channel	Left	Right
Floodprone Elevation (ft)	96.05	96.05	96.05
Bankfull Elevation (ft)	95.21	95.21	95.21
Floodprone Width (ft)	36.32	-----	-----
Bankfull Width (ft)	5.07	2.71	2.36
Entrenchment Ratio	7.16	-----	-----
Mean Depth (ft)	0.65	0.56	0.75
Maximum Depth (ft)	0.84	0.7	0.84
Width/Depth Ratio	7.8	4.87	3.15
Bankfull Area (sq ft)	3.28	1.51	1.78
Wetted Perimeter (ft)	6.03	3.71	3.72
Hydraulic Radius (ft)	0.54	0.41	0.48
Begin BKF Station	30.4	30.4	33.11
End BKF Station	35.47	33.11	35.47

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

UT to Little Fisher River - Riffle 2



RIVERMORPH CROSS SECTION SUMMARY

River Name: UT to Little Fisher River
Reach Name: Reach 1
Cross Section Name: Riffle 2 Reach 2
Survey Date: 07/19/2018

Cross Section Data Entry

BM Elevation: 99 ft
Backsight Rod Reading: 1 ft

TAPE	FS	ELEV	NOTE
0	8.14	91.86	LEP
2.1	8.35	91.65	UPPER TERRACE
4.5	9.59	90.41	LOWER TERRACE
7	9.79	90.21	
8.8	9.99	90.01	BKF
9.1	10.36	89.64	LEW/WS
9.9	10.4	89.6	TW
11.6	10.37	89.63	
12.3	10.33	89.67	REW
13.4	10.2	89.8	LOWER TERRACE
15.1	9.56	90.44	UPPER TERRACE
17.5	9.19	90.81	
19.5	8.96	91.04	
20.1	8.76	91.24	REP

Cross Sectional Geometry

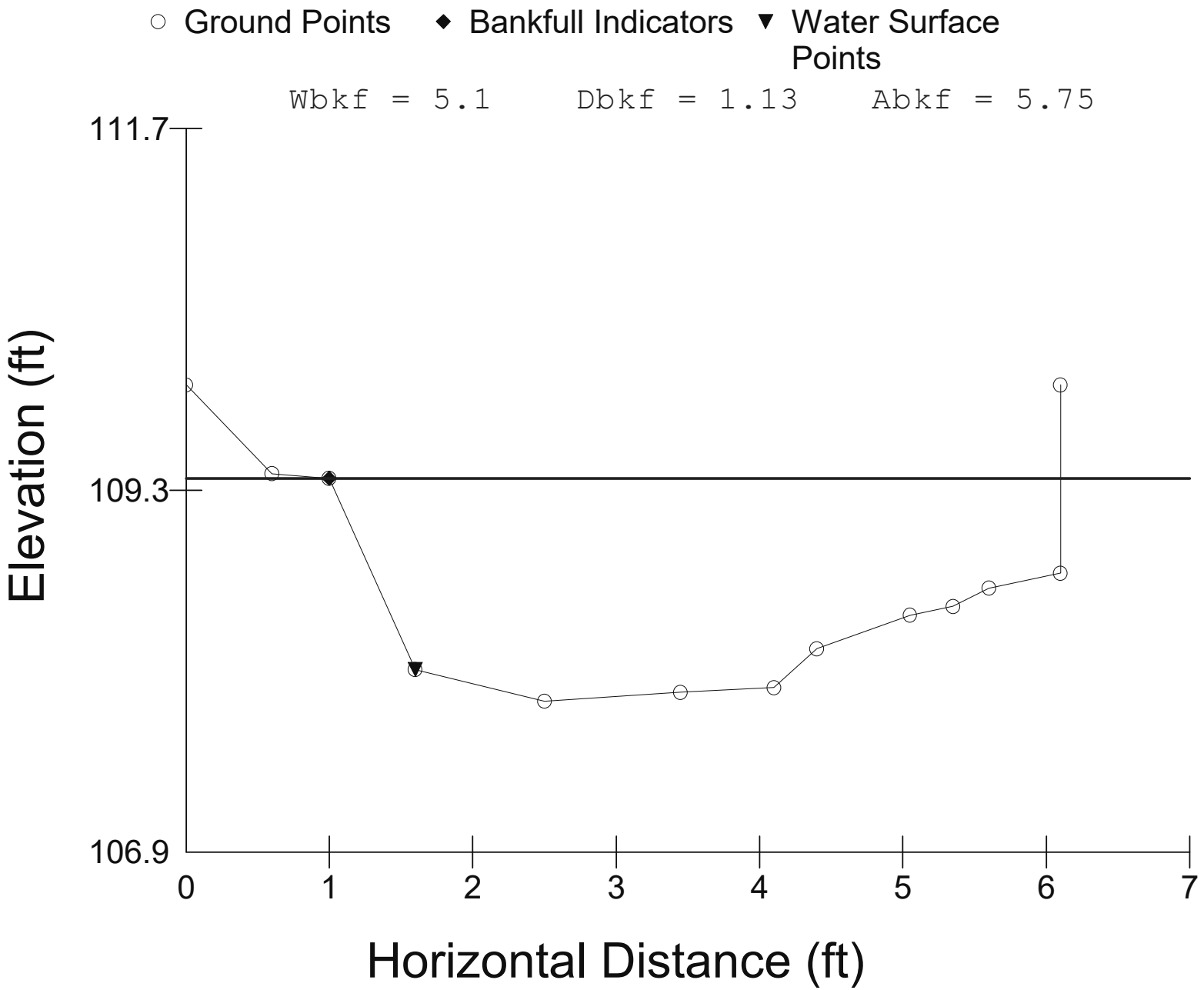
	Channel	Left	Right
Floodprone Elevation (ft)	90.42	90.42	90.42
Bankfull Elevation (ft)	90.01	90.01	90.01
Floodprone Width (ft)	10.57	-----	-----
Bankfull Width (ft)	5.16	2.58	2.58
Entrenchment Ratio	2.05	-----	-----
Mean Depth (ft)	0.32	0.37	0.27
Maximum Depth (ft)	0.41	0.41	0.38
Width/Depth Ratio	16.13	6.97	9.56
Bankfull Area (sq ft)	1.65	0.95	0.7
Wetted Perimeter (ft)	5.38	3.14	3.01
Hydraulic Radius (ft)	0.31	0.3	0.23
Begin BKF Station	8.8	8.8	11.38
End BKF Station	13.96	11.38	13.96

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

UT to Pauls Creek - Riffle 1



RIVERMORPH CROSS SECTION SUMMARY

River Name: UT to Pauls Creek
Reach Name: Reach 1
Cross Section Name: Riffle 1
Survey Date: 07/11/2018

Cross Section Data Entry

BM Elevation: 100 ft
Backsight Rod Reading: 10 ft

TAPE	FS	ELEV	NOTE
0	0	110	
0.6	0.59	109.41	
1	0.62	109.38	BKF
1.6	1.89	108.11	LEW
2.5	2.1	107.9	
3.45	2.04	107.96	
4.1	2.01	107.99	
4.4	1.75	108.25	
5.05	1.53	108.47	change in sediment on depositional f
5.35	1.47	108.53	
5.6	1.35	108.65	Lip in sand, recent flow marker?
6.1	1.25	108.75	
6.1	0	110	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	110.86	110.86	110.86
Bankfull Elevation (ft)	109.38	109.38	109.38
Floodprone Width (ft)	10	-----	-----
Bankfull Width (ft)	5.1	2.24	2.86
Entrenchment Ratio	1.96	-----	-----
Mean Depth (ft)	1.13	1.2	1.07
Maximum Depth (ft)	1.48	1.48	1.43
Width/Depth Ratio	4.51	1.86	2.67
Bankfull Area (sq ft)	5.75	2.7	3.06
Wetted Perimeter (ft)	6.74	4.5	5.1
Hydraulic Radius (ft)	0.85	0.6	0.6
Begin BKF Station	1	1	3.24
End BKF Station	6.1	3.24	6.1

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

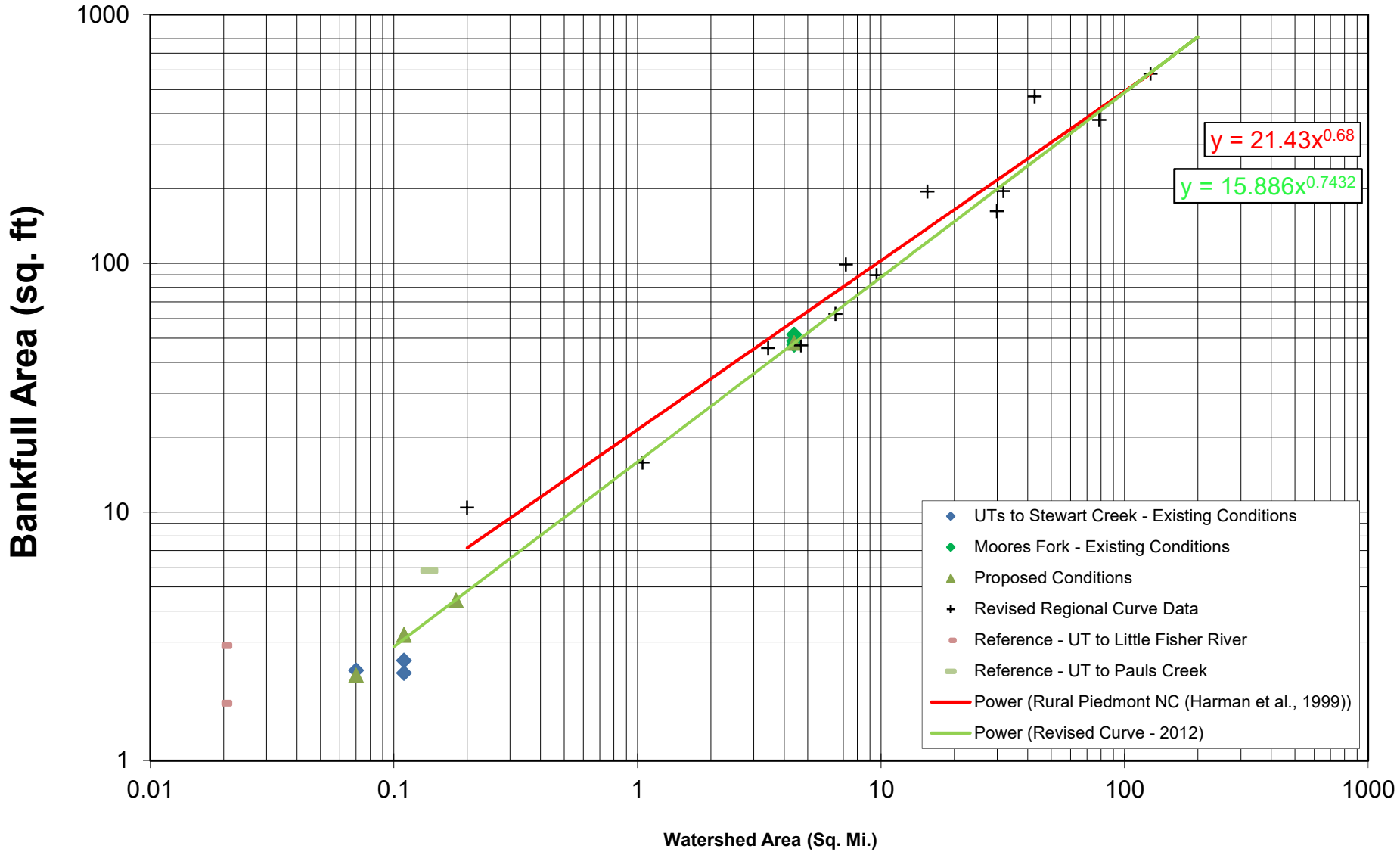
	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

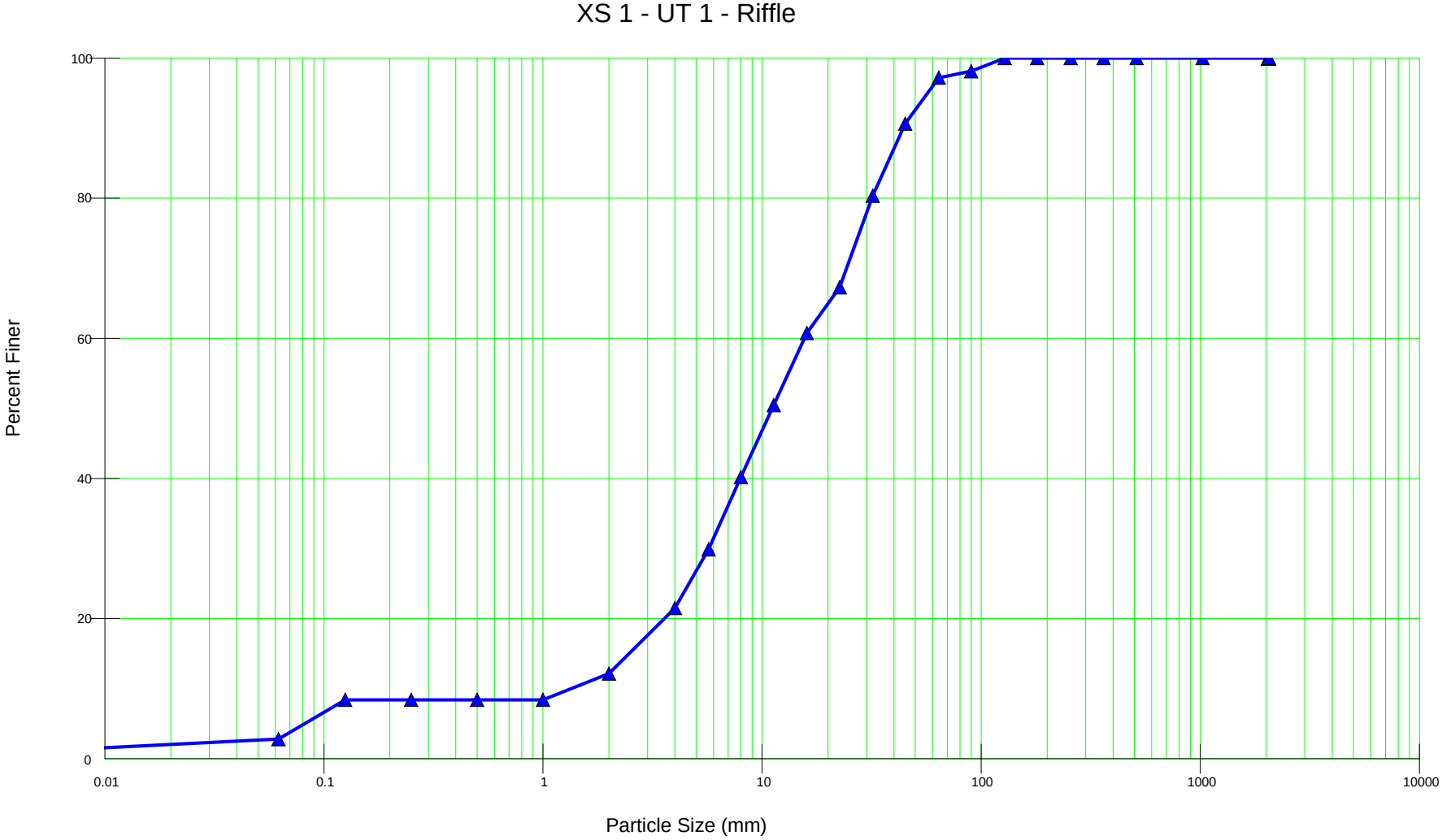
BANKFULL AREA REGIONAL CURVE DATA
STEWARTS CREEK STREAM RESTORATION PROJECT

Drainage Area (Sq.Mi.)	X-Sectional Area (SF)	Reference
0.2	10.4	Harman, W.H. et al. 1999. Bankfull Hydraulic Geometry Relationships for North Carolina Streams. AWRA Wildland Hydrology Symposium Proceedings. Edited by: D.S. Olsen and J.P. Potyondy . AWRA Summer Symposium. Bozeman, MT.
1.05	15.8	
3.44	45.6	
4.7	46.7	
6.5	62.5	
7.18	98.8	
9.6	89.6	
15.5	194	
29.9	162	
31.8	195	
42.8	469	
78.8	377	
128	578	
4	37.7	Harman, W.H. 2012. Revised Curve for Piedmont Rural Streams using Surry County Projects.
5	47.3	
17	127.2	
17.5	117.4	
0.02	2.9	Reference Reach - UT to Little Fisher River - Riffle 1
0.02	1.7	Reference Reach - UT to Little Fisher River - Riffle 2
0.14	5.8	Reference Reach - UT to Pauls Creek - Riffle 1
0.11	2.5	Stewarts Creek Tributaries Stream Restoration Project Existing Conditions
0.07	2.3	
0.11	2.3	
4.4	51.7	
4.4	47.1	
4.4	48.7	
0.11	3.2	Stewarts Creek Tributaries Stream Restoration Project Proposed Conditions
0.07	2.2	
0.11	3.2	
0.18	4.4	
4.4	47.8	

BANKFULL AREA

Regional Curve for Bankfull Characteristics in Rural Piedmont, NC




XS 1 - UT 1 - Riffle
Percent Finer
100
80
60
40
20
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)

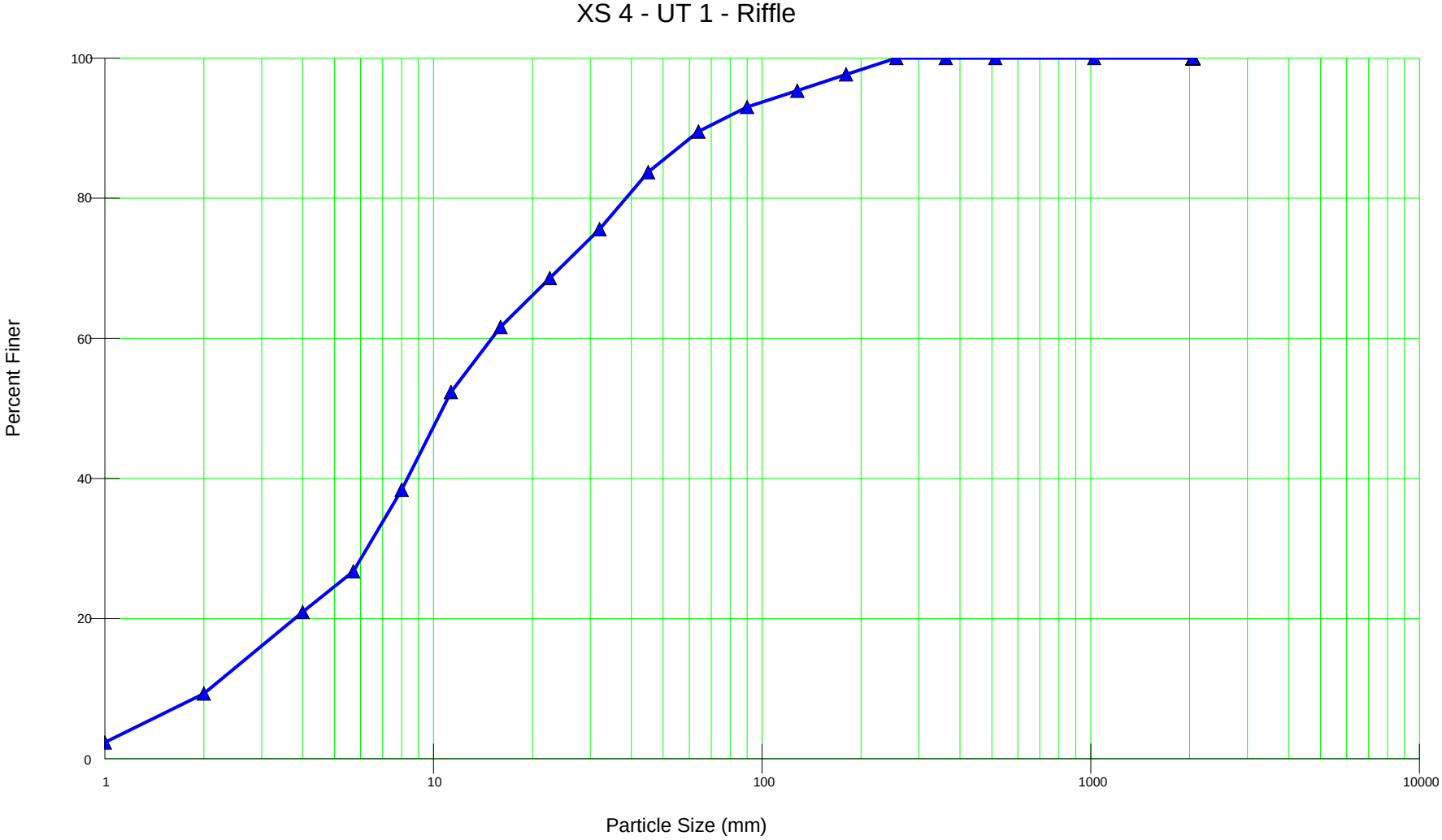
RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 1 - UT 1 - Riffle
Survey Date: 10/18/2018

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	3	2.80	2.80
0.062 - 0.125	6	5.61	8.41
0.125 - 0.25	0	0.00	8.41
0.25 - 0.50	0	0.00	8.41
0.50 - 1.0	0	0.00	8.41
1.0 - 2.0	4	3.74	12.15
2.0 - 4.0	10	9.35	21.50
4.0 - 5.7	9	8.41	29.91
5.7 - 8.0	11	10.28	40.19
8.0 - 11.3	11	10.28	50.47
11.3 - 16.0	11	10.28	60.75
16.0 - 22.6	7	6.54	67.29
22.6 - 32.0	14	13.08	80.37
32 - 45	11	10.28	90.65
45 - 64	7	6.54	97.20
64 - 90	1	0.93	98.13
90 - 128	2	1.87	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	2.82
D35 (mm)	6.84
D50 (mm)	11.15
D84 (mm)	36.59
D95 (mm)	57.62
D100 (mm)	128
Silt/Clay (%)	2.8
Sand (%)	9.35
Gravel (%)	85.05
Cobble (%)	2.8
Boulder (%)	0
Bedrock (%)	0

Total Particles = 107.


XS 4 - UT 1 - Riffle
Percent Finer
100
80
60
40
20
0
1
10
100
1000
10000
Particle Size (mm)

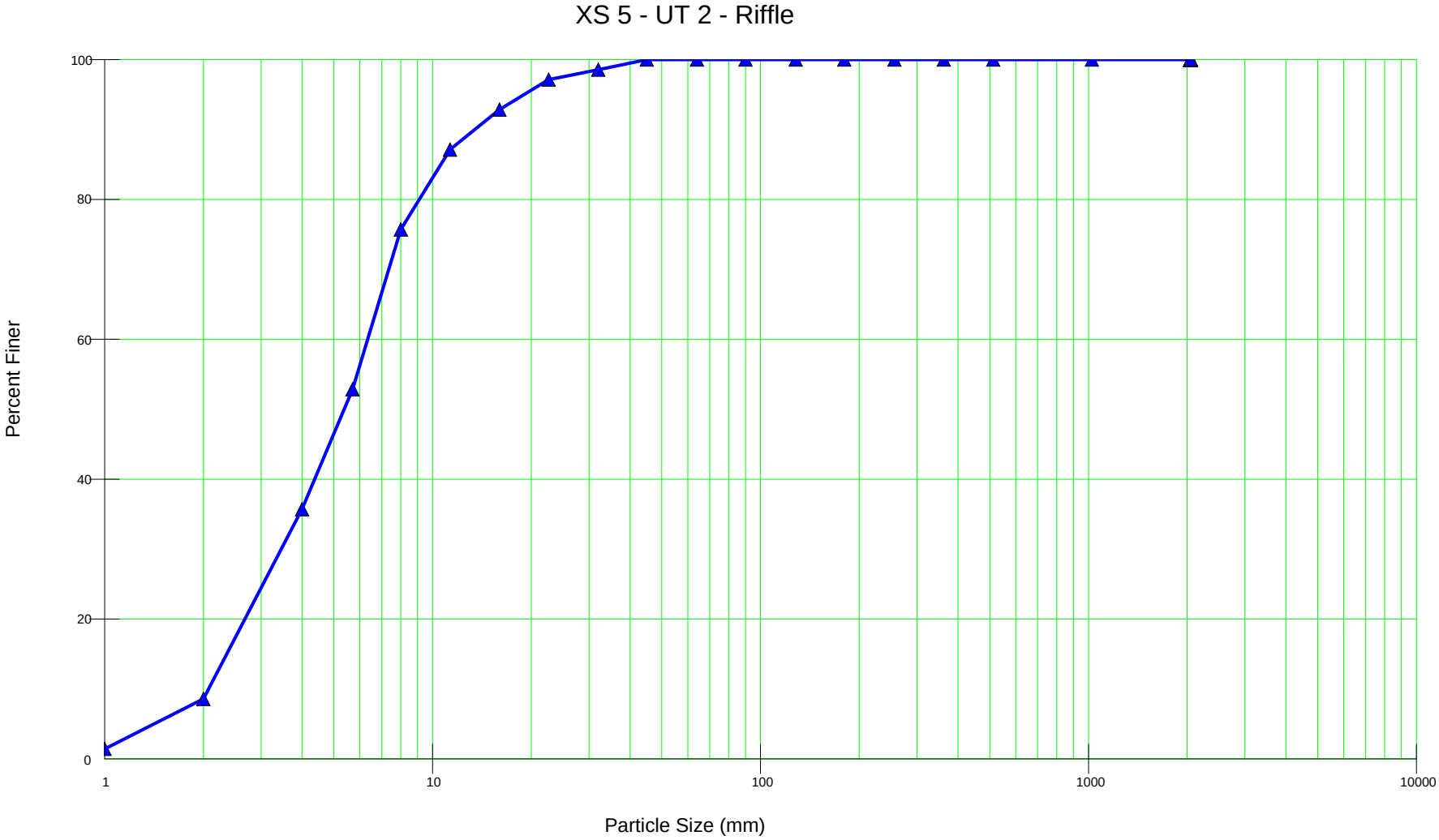
RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 4 - UT 1 - Riffle
Survey Date: 10/18/2018

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	0	0.00	0.00
0.50 - 1.0	2	2.33	2.33
1.0 - 2.0	6	6.98	9.30
2.0 - 4.0	10	11.63	20.93
4.0 - 5.7	5	5.81	26.74
5.7 - 8.0	10	11.63	38.37
8.0 - 11.3	12	13.95	52.33
11.3 - 16.0	8	9.30	61.63
16.0 - 22.6	6	6.98	68.60
22.6 - 32.0	6	6.98	75.58
32 - 45	7	8.14	83.72
45 - 64	5	5.81	89.53
64 - 90	3	3.49	93.02
90 - 128	2	2.33	95.35
128 - 180	2	2.33	97.67
180 - 256	2	2.33	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	3.15
D35 (mm)	7.33
D50 (mm)	10.75
D84 (mm)	45.92
D95 (mm)	122.29
D100 (mm)	256
Silt/Clay (%)	0
Sand (%)	9.3
Gravel (%)	80.23
Cobble (%)	10.47
Boulder (%)	0
Bedrock (%)	0

Total Particles = 86.


XS 5 - UT 2 - Riffle
Percent Finer
100
80
60
40
20
0
1
10
100
1000
10000
Particle Size (mm)

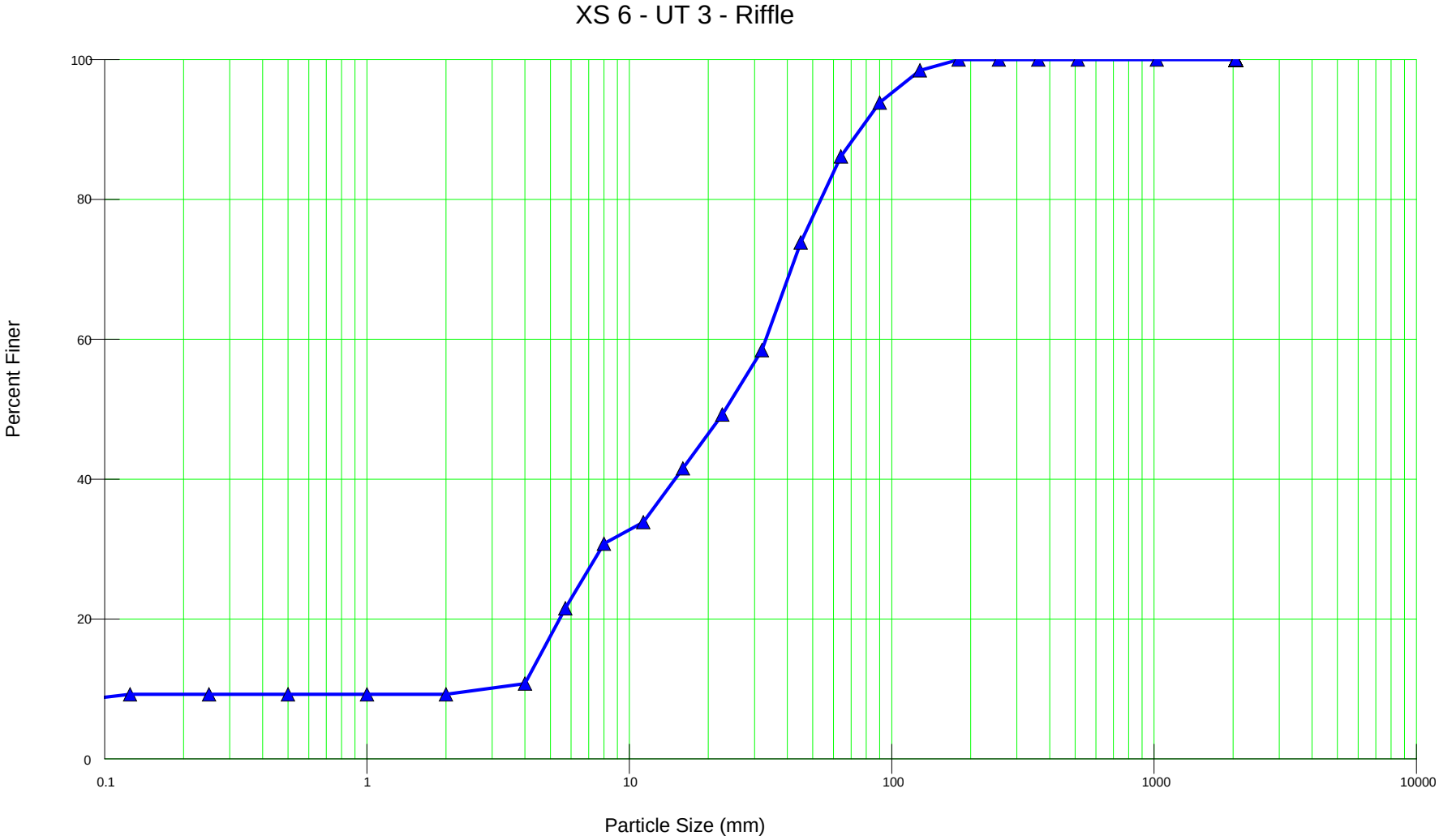
RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 5 - UT 2 - Riffle
Survey Date: 10/18/2018

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	0	0.00	0.00
0.50 - 1.0	1	1.43	1.43
1.0 - 2.0	5	7.14	8.57
2.0 - 4.0	19	27.14	35.71
4.0 - 5.7	12	17.14	52.86
5.7 - 8.0	16	22.86	75.71
8.0 - 11.3	8	11.43	87.14
11.3 - 16.0	4	5.71	92.86
16.0 - 22.6	3	4.29	97.14
22.6 - 32.0	1	1.43	98.57
32 - 45	1	1.43	100.00
45 - 64	0	0.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	2.55
D35 (mm)	3.95
D50 (mm)	5.42
D84 (mm)	10.39
D95 (mm)	19.3
D100 (mm)	45
Silt/Clay (%)	0
Sand (%)	8.57
Gravel (%)	91.43
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total Particles = 70.


XS 6 - UT 3 - Riffle
Percent Finer
100
80
60
40
20
0
0.1
1
10
100
1000
10000
Particle Size (mm)

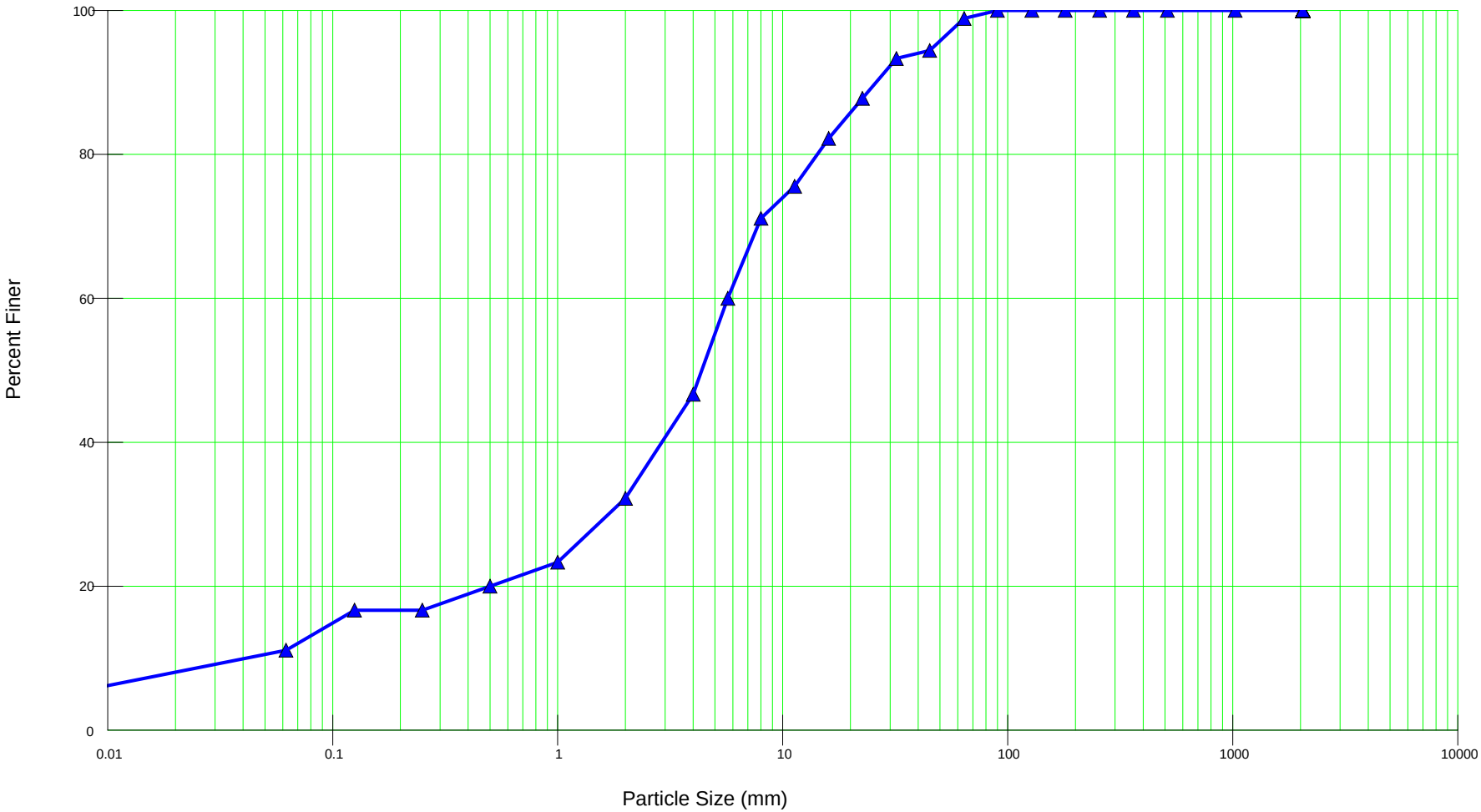
RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 6 - UT 3 - Riffle
Survey Date: 10/18/2018

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	6	9.23	9.23
0.125 - 0.25	0	0.00	9.23
0.25 - 0.50	0	0.00	9.23
0.50 - 1.0	0	0.00	9.23
1.0 - 2.0	0	0.00	9.23
2.0 - 4.0	1	1.54	10.77
4.0 - 5.7	7	10.77	21.54
5.7 - 8.0	6	9.23	30.77
8.0 - 11.3	2	3.08	33.85
11.3 - 16.0	5	7.69	41.54
16.0 - 22.6	5	7.69	49.23
22.6 - 32.0	6	9.23	58.46
32 - 45	10	15.38	73.85
45 - 64	8	12.31	86.15
64 - 90	5	7.69	93.85
90 - 128	3	4.62	98.46
128 - 180	1	1.54	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	4.83
D35 (mm)	12
D50 (mm)	23.38
D84 (mm)	60.68
D95 (mm)	99.48
D100 (mm)	180
Silt/Clay (%)	0
Sand (%)	9.23
Gravel (%)	76.92
Cobble (%)	13.85
Boulder (%)	0
Bedrock (%)	0

Total Particles = 65.


XS 7 - UT 3 - Riffle
Percent Finer
100
80
60
40
20
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)

RIVERMORPH PARTICLE SUMMARY

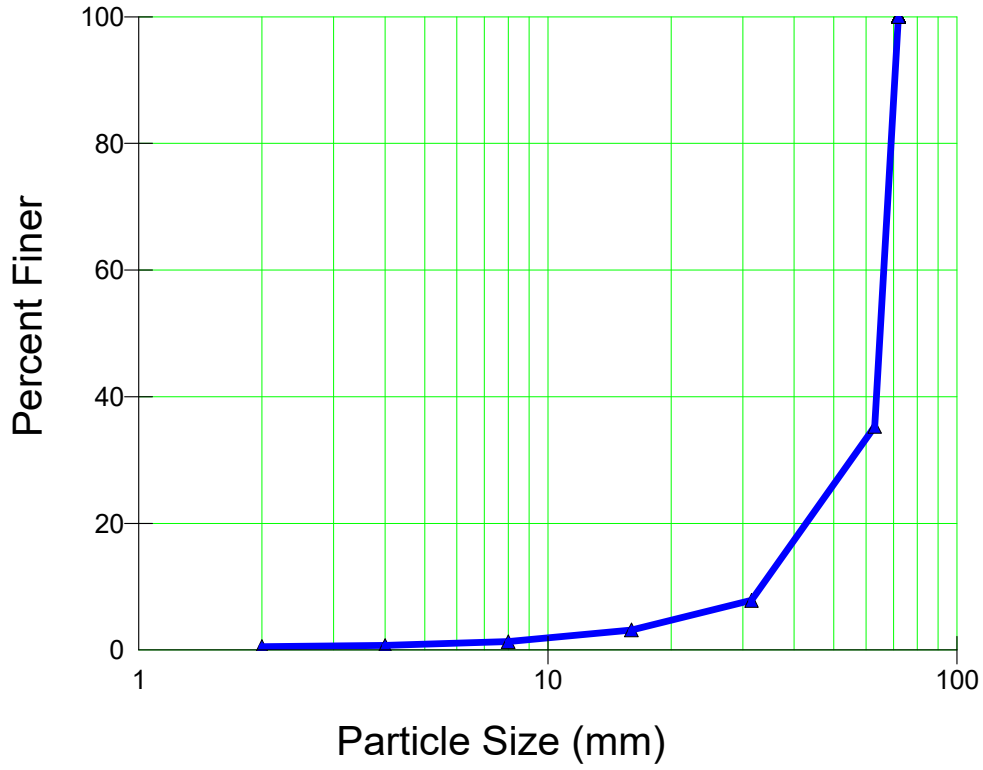
River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 7 - UT 3 - Riffle
Survey Date: 10/18/2018

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	10	11.11	11.11
0.062 - 0.125	5	5.56	16.67
0.125 - 0.25	0	0.00	16.67
0.25 - 0.50	3	3.33	20.00
0.50 - 1.0	3	3.33	23.33
1.0 - 2.0	8	8.89	32.22
2.0 - 4.0	13	14.44	46.67
4.0 - 5.7	12	13.33	60.00
5.7 - 8.0	10	11.11	71.11
8.0 - 11.3	4	4.44	75.56
11.3 - 16.0	6	6.67	82.22
16.0 - 22.6	5	5.56	87.78
22.6 - 32.0	5	5.56	93.33
32 - 45	1	1.11	94.44
45 - 64	4	4.44	98.89
64 - 90	1	1.11	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	0.12
D35 (mm)	2.38
D50 (mm)	4.42
D84 (mm)	18.11
D95 (mm)	47.39
D100 (mm)	90
Silt/Clay (%)	11.11
Sand (%)	21.11
Gravel (%)	66.67
Cobble (%)	1.11
Boulder (%)	0
Bedrock (%)	0

Total Particles = 90.

XS 4 - UT 1 - Pavement



RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 4 - UT 1 - Pavement
Survey Date: 10/18/2018

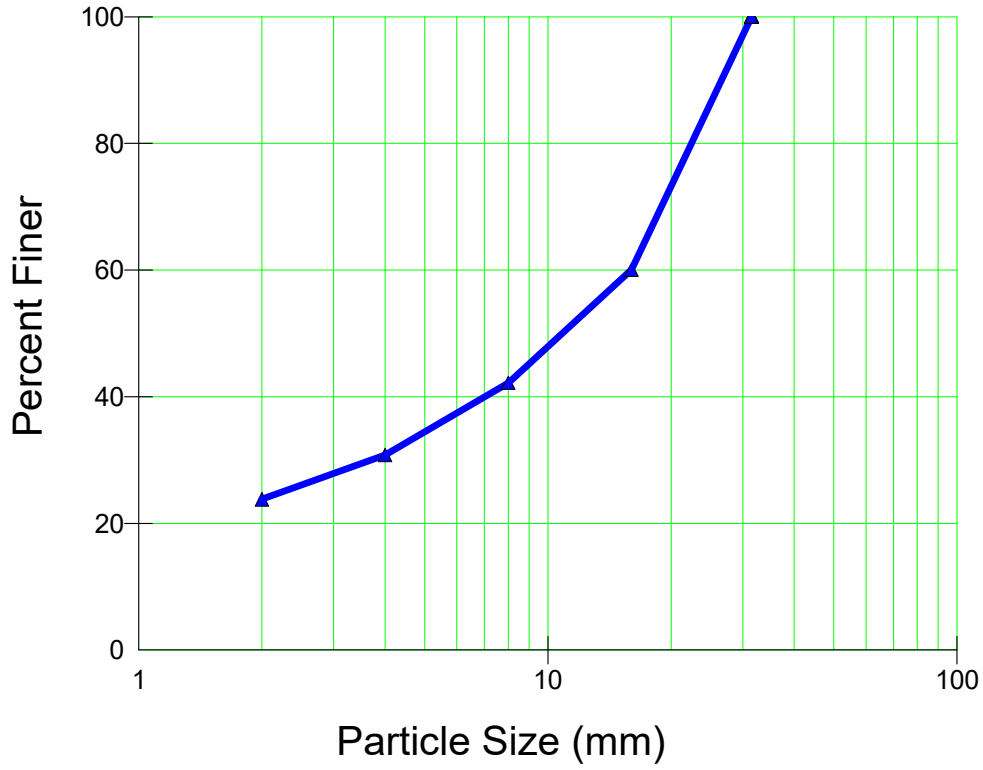
SIEVE (mm)	NET WT
63	2.44
31.5	1.47
16	0.25
8	0.1
4	0.03
2	0.01
PAN	0.03
D16 (mm)	40.88
D35 (mm)	62.7
D50 (mm)	65.05
D84 (mm)	69.78
D95 (mm)	71.3
D100 (mm)	72
Silt/Clay (%)	0
Sand (%)	0.56
Gravel (%)	42.34
Cobble (%)	57.1
Boulder (%)	0
Bedrock (%)	0

Total Weight = 5.3600.

Largest Surface Particles:

	Size(mm)	Weight
Particle 1:	72	0.5
Particle 2:	60	0.53

XS 4 - UT 1 - Sub-pavement



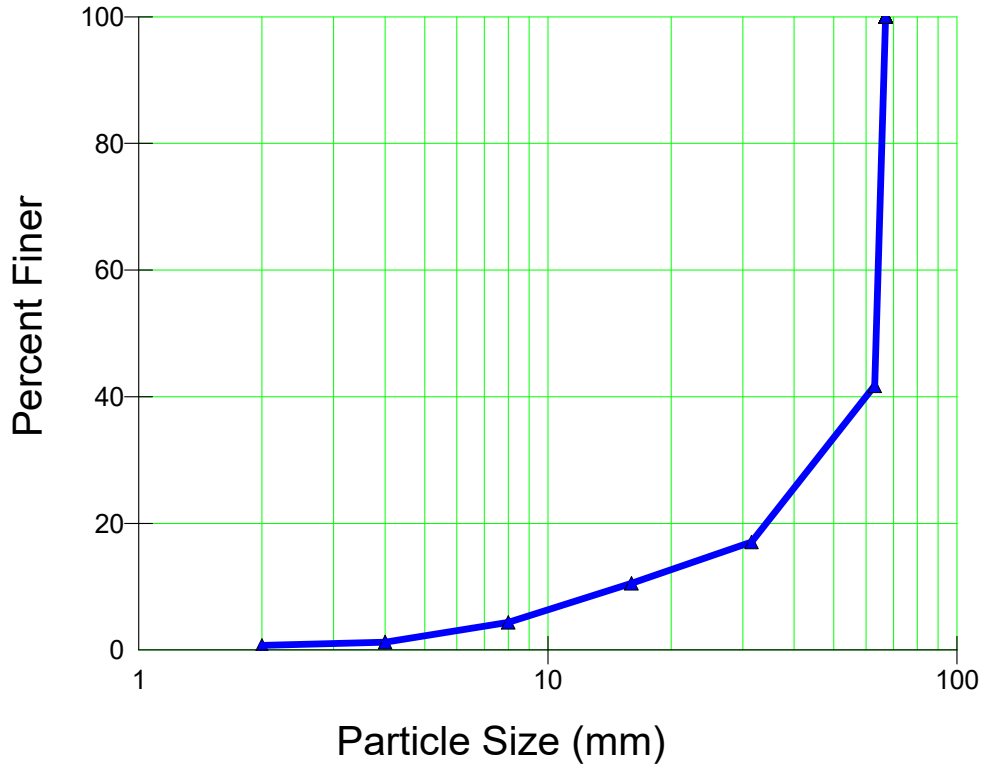
RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 4 - UT 1 - Sub-pavement
Survey Date: 10/18/2018

SIEVE (mm)	NET WT
16	3.84
8	2.71
4	1.73
2	1.06
PAN	3.61
D16 (mm)	0
D35 (mm)	5.48
D50 (mm)	11.5
D84 (mm)	25.29
D95 (mm)	29.56
D100 (mm)	31.5
Silt/Clay (%)	0
Sand (%)	23.8
Gravel (%)	76.2
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total Weight = 15.1700.

XS 2 - UT 2 - Pavement



RIVERMORPH PARTICLE SUMMARY

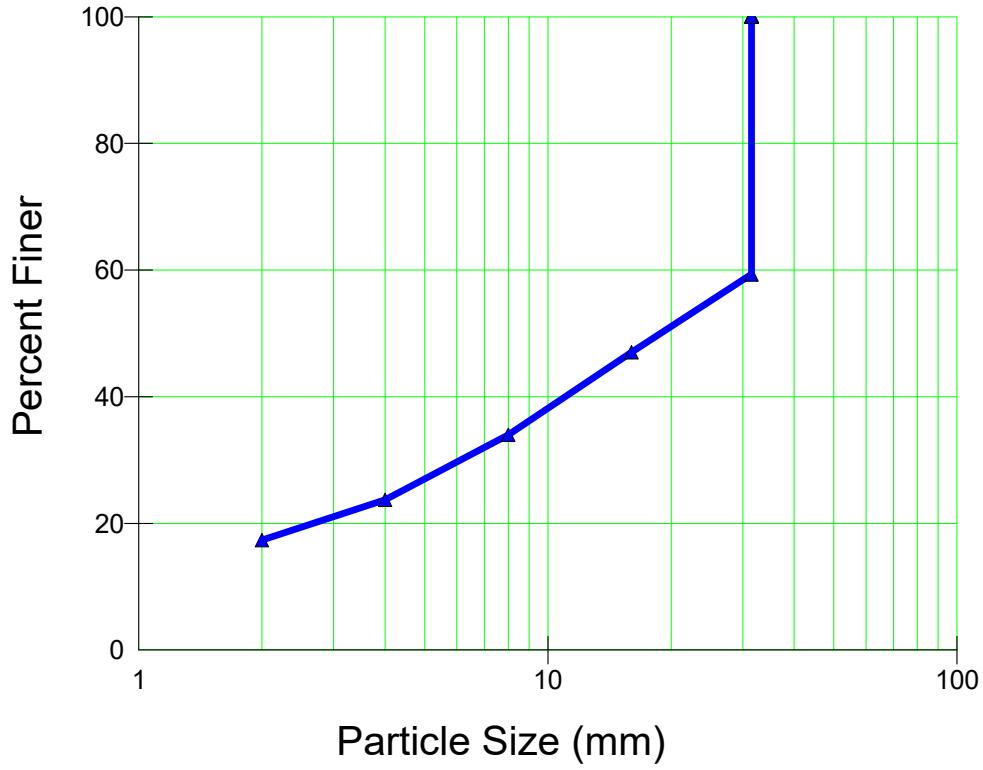
River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 2 - UT 2 - Pavement
Survey Date: 10/18/2018

SIEVE (mm)	NET WT
63	1.67
31.5	1.36
16	0.36
8	0.34
4	0.17
2	0.03
PAN	0.04

D16 (mm)	28.99
D35 (mm)	54.4
D50 (mm)	63.57
D84 (mm)	65.9
D95 (mm)	66.66
D100 (mm)	67
Silt/Clay (%)	0
Sand (%)	0.73
Gravel (%)	55.92
Cobble (%)	43.35
Boulder (%)	0
Bedrock (%)	0

Total Weight = 5.5100.

XS 2 - UT 2 - Sub-pavement



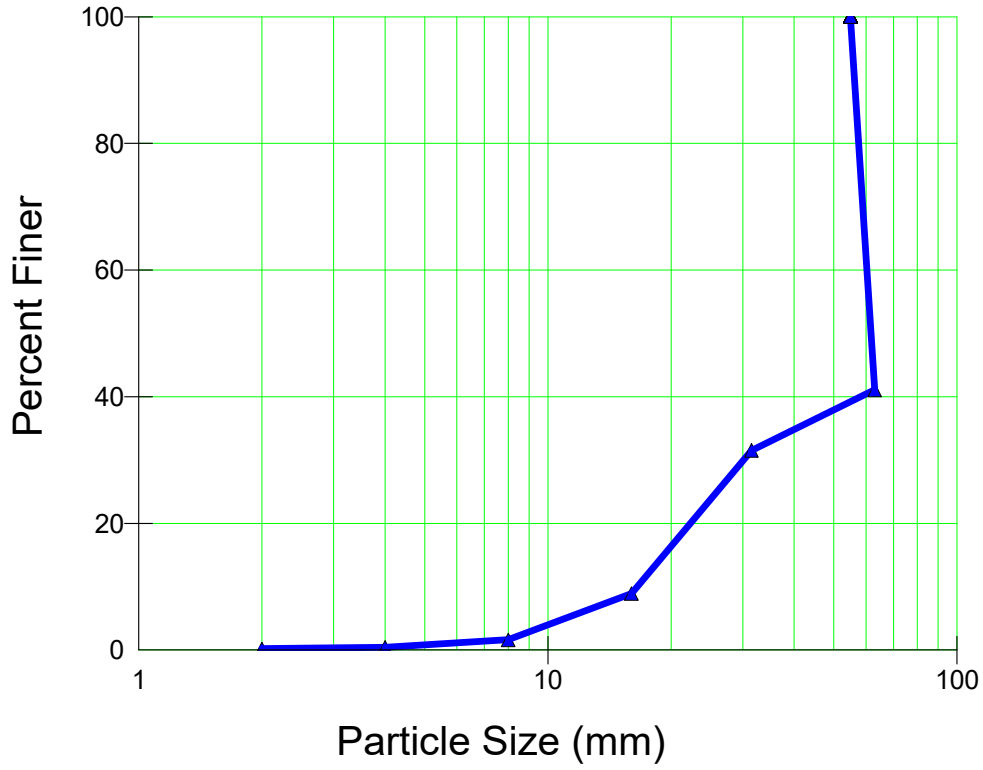
RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 2 - UT 2 - Sub-pavement
Survey Date: 10/18/2018

SIEVE (mm)	NET WT
31.5	2.78
16	1.68
8	1.78
4	1.4
2	0.87
PAN	2.37
D16 (mm)	0
D35 (mm)	8.63
D50 (mm)	19.78
D84 (mm)	31.5
D95 (mm)	31.5
D100 (mm)	31.5
Silt/Clay (%)	0
Sand (%)	17.35
Gravel (%)	82.65
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total Weight = 13.6600.

XS 7 - UT 3 - Pavement



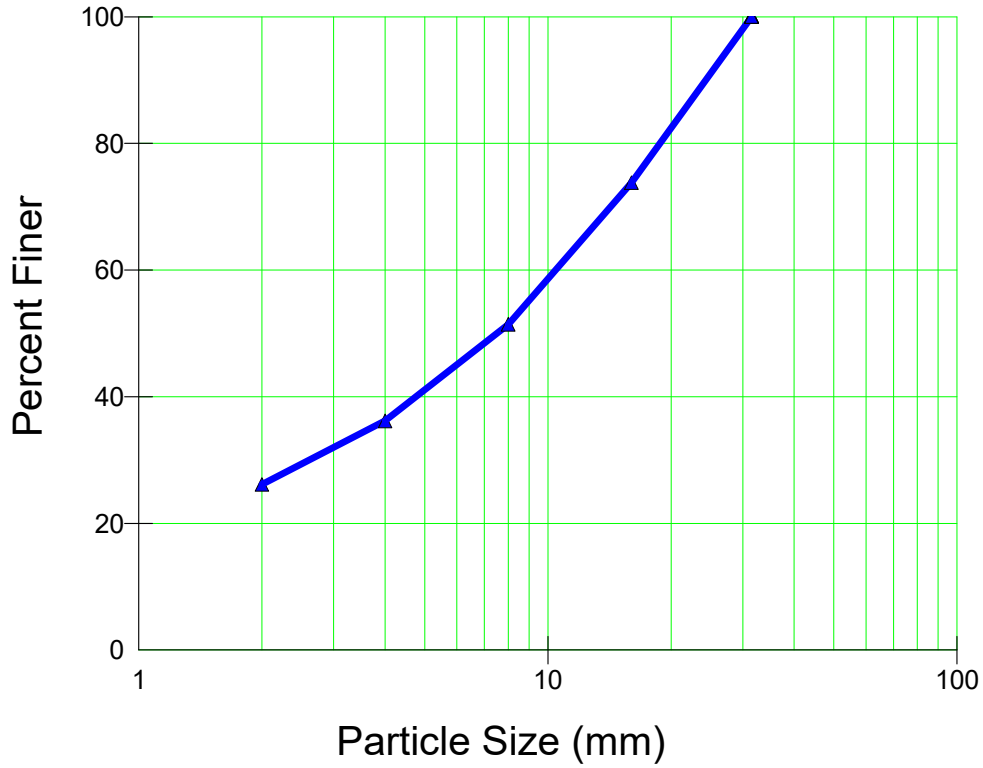
RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 7 - UT 3 - Pavement
Survey Date: 10/18/2018

SIEVE (mm)	NET WT
63	1.65
31.5	0.42
16	0.99
8	0.32
4	0.05
2	0.01
PAN	0.01
D16 (mm)	20.87
D35 (mm)	42.98
D50 (mm)	61.79
D84 (mm)	57.17
D95 (mm)	55.68
D100 (mm)	62
Silt/Clay (%)	0
Sand (%)	0.23
Gravel (%)	99.77
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total Weight = 4.3800.

XS 7 - UT 3 - Sub-pavement



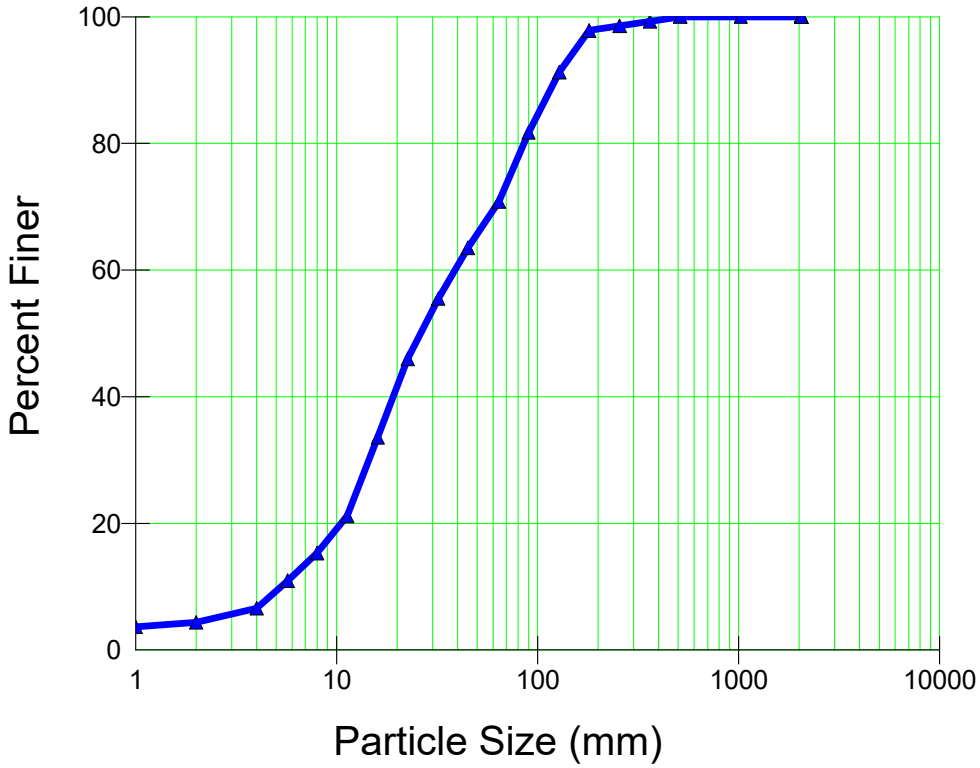
RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: UTs
Sample Name: XS 7 - UT 3 - Sub-pavement
Survey Date: 10/18/2018

SIEVE (mm)	NET WT
16	3.32
8	3.96
4	2.7
2	1.78
PAN	4.63
D16 (mm)	0
D35 (mm)	3.76
D50 (mm)	7.62
D84 (mm)	22.03
D95 (mm)	28.54
D100 (mm)	31.5
Silt/Clay (%)	0
Sand (%)	26.14
Gravel (%)	73.86
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total Weight = 17.7100.

XS 2 - Moores Fork - Riffle



RIVERMORPH PARTICLE SUMMARY

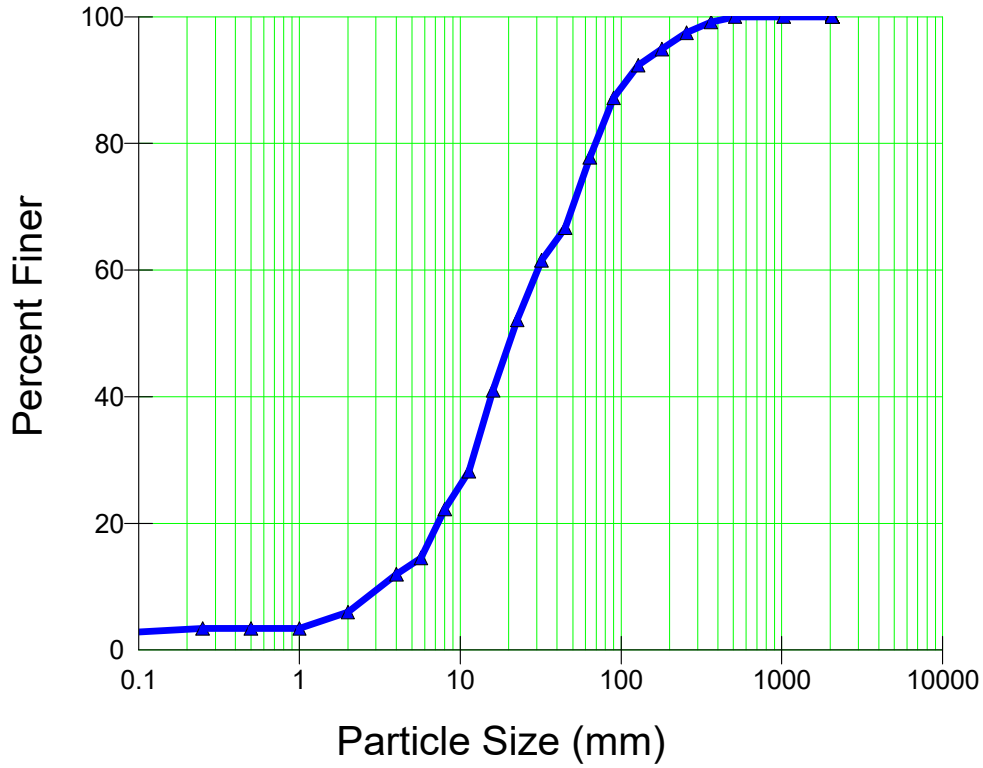
River Name: UTs to Stewarts Creek
Reach Name: Moores Forks
Sample Name: XS 2 - Moores Fork - Riffle
Survey Date: 10/18/2018

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	0	0.00	0.00
0.50 - 1.0	5	3.65	3.65
1.0 - 2.0	1	0.73	4.38
2.0 - 4.0	3	2.19	6.57
4.0 - 5.7	6	4.38	10.95
5.7 - 8.0	6	4.38	15.33
8.0 - 11.3	8	5.84	21.17
11.3 - 16.0	17	12.41	33.58
16.0 - 22.6	17	12.41	45.99
22.6 - 32.0	13	9.49	55.47
32 - 45	11	8.03	63.50
45 - 64	10	7.30	70.80
64 - 90	15	10.95	81.75
90 - 128	13	9.49	91.24
128 - 180	9	6.57	97.81
180 - 256	1	0.73	98.54
256 - 362	1	0.73	99.27
362 - 512	1	0.73	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	8.38
D35 (mm)	16.76
D50 (mm)	26.58
D84 (mm)	99.01
D95 (mm)	157.76
D100 (mm)	511.98
Silt/Clay (%)	0
Sand (%)	4.38
Gravel (%)	66.42
Cobble (%)	27.74
Boulder (%)	1.46
Bedrock (%)	0

Total Particles = 137.

XS 3 - Moores Fork - Riffle



RIVERMORPH PARTICLE SUMMARY

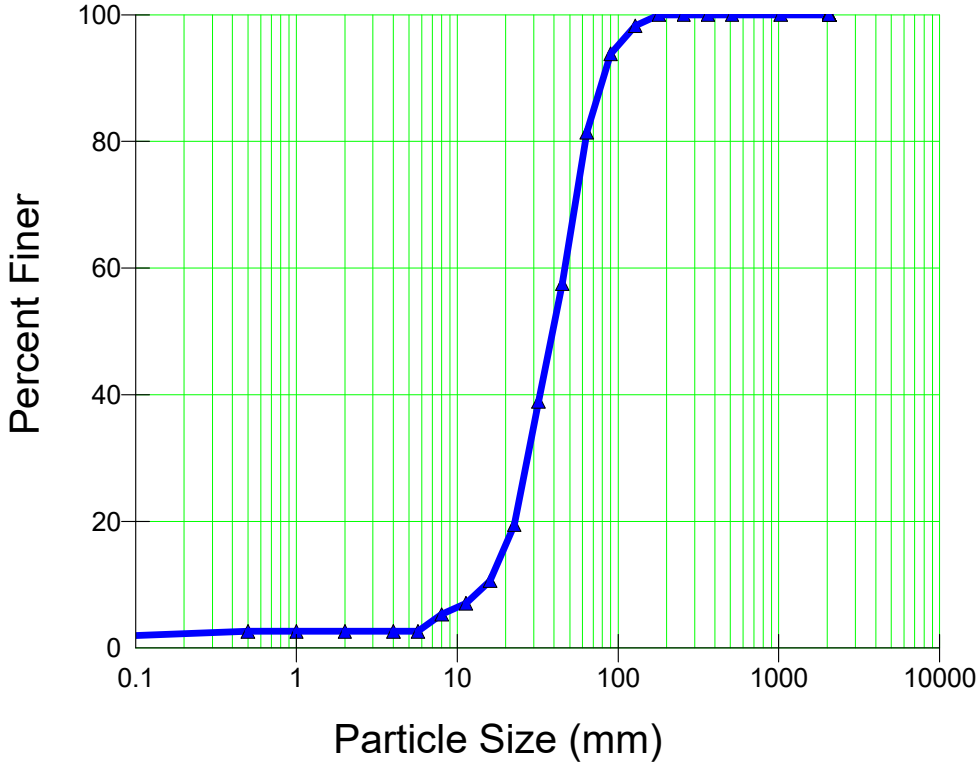
River Name: UTs to Stewarts Creek
Reach Name: Moores Forks
Sample Name: XS 3 - Moores Fork - Riffle
Survey Date: 10/18/2018

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	4	3.42	3.42
0.25 - 0.50	0	0.00	3.42
0.50 - 1.0	0	0.00	3.42
1.0 - 2.0	3	2.56	5.98
2.0 - 4.0	7	5.98	11.97
4.0 - 5.7	3	2.56	14.53
5.7 - 8.0	9	7.69	22.22
8.0 - 11.3	7	5.98	28.21
11.3 - 16.0	15	12.82	41.03
16.0 - 22.6	13	11.11	52.14
22.6 - 32.0	11	9.40	61.54
32 - 45	6	5.13	66.67
45 - 64	13	11.11	77.78
64 - 90	11	9.40	87.18
90 - 128	6	5.13	92.31
128 - 180	3	2.56	94.87
180 - 256	3	2.56	97.44
256 - 362	2	1.71	99.15
362 - 512	1	0.85	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	6.14
D35 (mm)	13.79
D50 (mm)	21.33
D84 (mm)	81.2
D95 (mm)	183.84
D100 (mm)	511.98
Silt/Clay (%)	0
Sand (%)	5.98
Gravel (%)	71.8
Cobble (%)	19.66
Boulder (%)	2.56
Bedrock (%)	0

Total Particles = 117.

XS 4 - Moores Fork - Riffle



RIVERMORPH PARTICLE SUMMARY

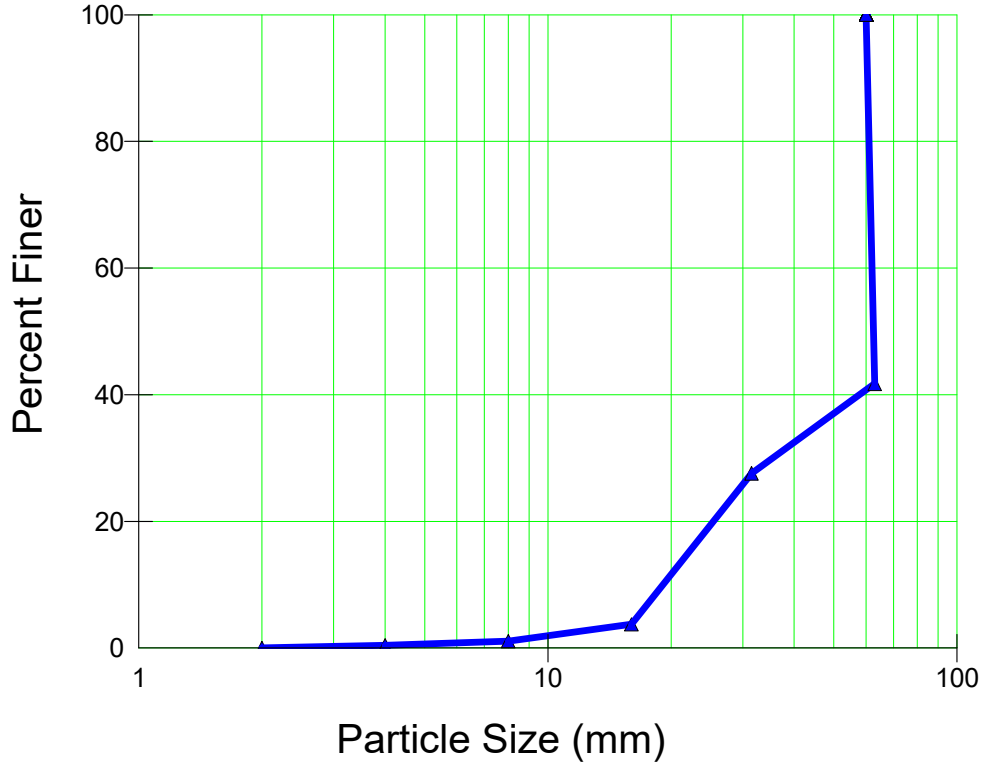
River Name: UTs to Stewarts Creek
Reach Name: Moores Forks
Sample Name: XS 4 - Moores Fork - Riffle
Survey Date: 10/18/2018

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	0	0.00	0.00
0.25 - 0.50	3	2.65	2.65
0.50 - 1.0	0	0.00	2.65
1.0 - 2.0	0	0.00	2.65
2.0 - 4.0	0	0.00	2.65
4.0 - 5.7	0	0.00	2.65
5.7 - 8.0	3	2.65	5.31
8.0 - 11.3	2	1.77	7.08
11.3 - 16.0	4	3.54	10.62
16.0 - 22.6	10	8.85	19.47
22.6 - 32.0	22	19.47	38.94
32 - 45	21	18.58	57.52
45 - 64	27	23.89	81.42
64 - 90	14	12.39	93.81
90 - 128	5	4.42	98.23
128 - 180	2	1.77	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00

D16 (mm)	20.01
D35 (mm)	30.1
D50 (mm)	39.74
D84 (mm)	69.41
D95 (mm)	100.23
D100 (mm)	180
Silt/Clay (%)	0
Sand (%)	2.65
Gravel (%)	78.77
Cobble (%)	18.58
Boulder (%)	0
Bedrock (%)	0

Total Particles = 113.

XS 1 - Moores Fork - Pavement



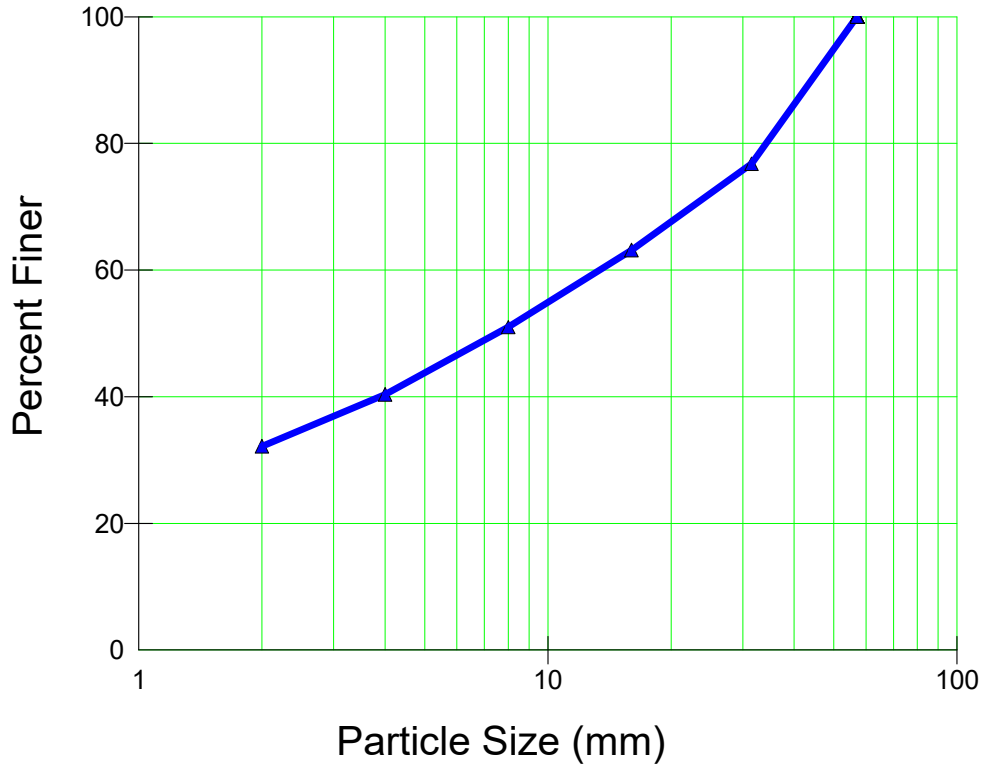
RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: Moores Forks
Sample Name: XS 1 - Moores Fork - Pavement
Survey Date: 10/18/2018

SIEVE (mm)	NET WT
63	1.99
31.5	0.64
16	1.08
8	0.12
4	0.03
2	0.02
PAN	0
D16 (mm)	23.96
D35 (mm)	48.01
D50 (mm)	62.57
D84 (mm)	60.82
D95 (mm)	60.26
D100 (mm)	61
Silt/Clay (%)	0
Sand (%)	0
Gravel (%)	100
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total Weight = 4.5300.

XS 1 - Moores Fork - Sub-pavement



RIVERMORPH PARTICLE SUMMARY

River Name: UTs to Stewarts Creek
Reach Name: Moores Forks
Sample Name: XS 1 - Moores Fork - Sub-pavement
Survey Date: 10/18/2018

SIEVE (mm)	NET WT
31.5	0.85
16	2.71
8	2.42
4	2.11
2	1.63
PAN	6.4
D16 (mm)	0
D35 (mm)	2.69
D50 (mm)	7.63
D84 (mm)	39.43
D95 (mm)	51.51
D100 (mm)	90
Silt/Clay (%)	0
Sand (%)	32.18
Gravel (%)	67.82
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total Weight = 19.8900.

SEDIMENT ENTRAINMENT CALCULATIONS
STEWARTS CREEK TRIBUTARIES STREAM RESTORATION PROJECT

	Stream Reach	Slope (ft/ft)	Bankfull Area (SF)	Hydraulic Radius (ft)	Design Discharge (CFS)	Shear (lb/SF)	Power (lb/s)	Velocity (ft/s)	Unit Power (lb/ft-s)	Particle Size Entrained (mm)	Riffle d84 (mm)	Pavement Max (mm)
Existing	UT 1	0.0210	2.5	0.45	8	0.66	10	3.2	2.1	42-99	37	72
	UT 2	0.0260	2.2	0.49	8	1.10	13	3.7	4.1	66-136	10	67
	UT 3 R1	0.0160	3.0	0.50	9	0.58	9	3.0	1.7	29-77	61	62
	UT 3 R2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Moores Fork	0.0040	47.9	1.50	150	0.40	37	3.1	1.2	36-90	75	90
Proposed	UT 1	0.018	3.2	0.50	8	0.56	9	2.5	1.4	42.7 - 99.5	37	72
	UT 2	0.02	2.2	0.41	8	0.50	10	3.6	1.8	37.8 - 91.2	10	67
	UT 3 R1	0.02	3.2	0.50	9	0.62	11	2.8	1.8	47.7 - 107.5	61	62
	UT 3 R2	0.0067	4.4	0.58	17	0.25	7	3.9	1.0	22.2 - 62.6/39	61	62
	Moores Fork	0.0037	47.8	1.92	150	0.46	35	3.1	1.4	39.8 - 94.5	75	90

Table 11a. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - UT 1 (2742 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	4	7	4.6	4.3	5.0	5.1	5.7	0.6	4	5.6	6.1		6.6			5.6	6.1	6.6						
Floodprone Width (ft)				5.7	7.3	7.0	9.7	1.9	4	13.4	18.9		24.4			13.4	18.9	24.4						
Bankfull Mean Depth (ft)	0.5	0.8	0.7	0.5	0.5	0.5	0.6	0.1	4	0.4	0.6		0.7			0.4	0.5	0.7						
[1]Bankfull Max Depth (ft)				0.7	0.7	0.7	0.8	0.1	4	1.2	1.3		1.4			0.6	0.7	0.8						
Bankfull Cross Sectional Area (ft^2)	3.1	4.8	3.1	2.0	2.6	2.7	3.1	0.5	4	2.2	3.4		4.6			3.2	3.2	3.2						
Width/Depth Ratio				8.5	10.0	9.7	12.0	1.5	4	10.0	12.0		14			10.0	12.0	14.0						
Entrenchment Ratio				1.2	1.5	1.4	1.9	0.3	4	2.2	3.1		4.0			2.2	3.1	4.0						
[1]Bank Height Ratio				5.6	8.4	7.7	12.5	3.1	4	1.0	1.0		1			1.0	1.05	1.1						
Profile																								
Riffle Length (ft)				5.0	26.2	20.7	94.4	23.0	13	Total riffle length 60-70% of reach length						5.0	29.0	41.0						
Riffle Slope (ft/ft)				0.012	0.044	0.038	0.084	0.025	13							0.009	0.024	0.075						
Pool Length (ft)				5.8	11.3	9.5	22.0	4.6	13	Total pool length 30-40% of reach length						3.0	11.0	16.0						
Pool Max depth (ft)				0.8	1.0	1.0	1.4	0.1	4	0.8	1.6		2.5			1.1	1.2	1.9						
Pool Spacing (ft)				9.6	24.00	20.3	59.9	12.7	25	18	33.5		49			18.0	33.5	49.0						
Pattern																								
Channel Beltwidth (ft)				6.2	16.9	16.5	34.1	7.5	18	18.3	27.5		36.6			18.3	27.5	36.6						
Radius of Curvature (ft)				5.3	11.1	12.3	18.3	3.6	20	12.2	16.8		21.4			12.2	16.8	21.4						
Rc:Bankfull width (ft/ft)				1.1	2.2	2.4	3.6	0.7	20	2.0	2.8		3.5			2.0	2.8	3.5						
Meander Wavelength (ft)				24.3	45.7	41.8	79.0	14.2	18	42.7	58.0		73.2			30.5	51.9	73.2						
Meander Width Ratio				4.8	9.1	8.3	15.7	14.2	18	3.0	4.5		6.0			5.0	8.5	12.0						
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				0.66												0.56								
Max part size (mm) mobilized at bankfull				72												72								
Stream Power (transport capacity) lb/s				10												9								
Additional Reach Parameters																								
Rosgen Classification				G4->F4						C4						Cb4								
Bankfull Velocity (fps)	1.0	10.8	5.8	3.2												2.5								
Bankfull Discharge (cfs)	4	40	18.1	8 to 16												8								
Valley length (ft)				1840												2158								
Channel Thalweg length (ft)				2373												2805								
Sinuosity (ft)				1.29						1.2-1.4						1.3								
Water Surface Slope (Channel) (ft/ft)				0.021												0.018								
BF slope (ft/ft)				0.021												0.018								
[3]Bankfull Floodplain Area (acres)				0.310												0.9								
[4]% of Reach with Eroding Banks				80%																				
Channel Stability or Habitat Metric				0.58																				
Biological or Other																								

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11b. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - UT 2 (1009 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	4	7	3.8	2.5	3.5	3.5	4.5	1.4	2	4.7	5.1		5.5			4.7	5.1	5.5						
Floodprone Width (ft)				6.5	9.3	9.3	12.0	3.9	2	11.2	15.8		20.4			11.2	15.8	20.4						
Bankfull Mean Depth (ft)	0.5	0.8	0.6	0.5	0.7	0.7	0.9	0.3	2	0.3	0.5		0.6			0.3	0.4	0.6						
[1]Bankfull Max Depth (ft)				0.7	0.9	0.9	1.0	0.2	2	1.1	1.8		2.4			0.5	0.6	0.7						
Bankfull Cross Sectional Area (ft^2)	2	3	2.2	2.1	2.2	2.2	2.3	0.1	2	1.4	2.4		3.3			11.2	15.8	20.4						
Width/Depth Ratio				2.8	6.2	6.2	9.5	4.7	2	10.0	12.0		14			10.0	12.0	14.0						
Entrenchment Ratio				1.5	3.2	3.2	4.8	2.3	2	2.2	3.1		4.0			2.2	3.1	4.0						
[1]Bank Height Ratio				4.0	7.5	7.5	10.9	4.9	2	1.0	1.0		1			1.0	1.0	1.1						
Profile																								
Riffle Length (ft)				6.6	19.3	14.0	35.9	11.8	7	Total riffle length 60-70% of reach length						22.0	25.0	32.0						
Riffle Slope (ft/ft)				0.015	0.027	0.023	0.047	0.011	7							0.011	0.027	0.045						
Pool Length (ft)				7.1	10.6	8.5	20.3	4.7	8	Total pool length 30-40% of reach length						6.0	10.0	21.0						
Pool Max depth (ft)				0.7	0.8	0.8	1.5	0.3	2	0.6	1.4		2.1			0.9	1.0	1.6						
Pool Spacing (ft)				13.3	23.6	18.9	44.8	10.3	15	20.4	28.1		35.7			15.3	28.1	40.8						
Pattern																								
Channel Beltwidth (ft)				4.8	7.9	7.3	12.3	2.2	15	15.3	23.0		30.6			15.3	23.0	30.6						
Radius of Curvature (ft)				4.8	8.0	7.8	13.8	2.1	16	10.2	14.0		17.9			10.2	14.1	17.9						
Rc:Bankfull width (ft/ft)				1.4	2.3	2.2	3.9	0.6	16	2.0	2.8		3.5			2.0	2.8	3.5						
Meander Wavelength (ft)				13.6	37.4	37.0	68.3	18.7	15	35.7	48.5		61.2			25.5	43.4	61.2						
Meander Width Ratio				3.9	10.7	10.6	19.5	18.7	15	3.0	4.5		6.0			5.0	8.5	12.0						
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				1.1												0.5								
Max part size (mm) mobilized at bankfull				67												67								
Stream Power (transport capacity) lb/s				13												10								
Additional Reach Parameters																								
Rosgen Classification				Channelized E4						Cb						Cb4								
Bankfull Velocity (fps)	1.0	10.8	5.9	3.7												3.6								
Bankfull Discharge (cfs)	4	40	13.0	8												8								
Valley length (ft)				374												1358								
Channel Thalweg length (ft)				397												1060								
Sinuosity (ft)				1.06						1.2 to 1.4						1.34								
Water Surface Slope (Channel) (ft/ft)				0.026												0.022								
BF slope (ft/ft)				0.026												0.022								
[3]Bankfull Floodplain Area (acres)				0.1												0.5								
[4]% of Reach with Eroding Banks				70%																				
Channel Stability or Habitat Metric				0.24																				
Biological or Other																								

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11c. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - UT 3 R1 (994 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	4	7	4.6	4.1	4.9	4.9	5.8	0.9	3	4.7	5.1		5.5			5.6	6.1	6.6						
Floodprone Width (ft)				5.8	11.4	7.6	20.7	8.1	3	11.2	15.8		20.4			13.4	18.9	24.4						
Bankfull Mean Depth (ft)	0.5	0.8	0.7	0.4	0.6	0.7	0.7	0.2	3	0.3	0.5		0.6			0.4	0.5	0.7						
[1]Bankfull Max Depth (ft)				0.6	1.0	1.0	1.4	0.4	3	1.1	1.8		2.4			0.6	0.7	0.8						
Bankfull Cross Sectional Area (ft^2)	3.1	4.8	3.1	2.3	3.0	2.9	3.7	0.7	3	1.4	2.4		3.3			3.2	3.2	3.2						
Width/Depth Ratio				5.9	9.0	6.6	14.4	4.7	3	10.0	12.0		14			10.0	12.0	14.0						
Entrenchment Ratio				1.0	2.5	1.6	5.0	2.2	3	2.2	3.1		4.0			2.2	3.1	4.0						
[1]Bank Height Ratio				2.7	4.2	4.0	5.8	1.6	3	1.0	1.0		1			1.0	1.05	1.1						
Profile																								
Riffle Length (ft)				9.1	34.4	32.4	89.8	25.6	10	Total riffle length 60-70% of reach length						11.0	31.0	46.0						
Riffle Slope (ft/ft)				0.001	0.029	0.030	0.051	0.015	10							0.016	0.027	0.064						
Pool Length (ft)				7.7	17.9	16.3	29.8	7.5	10	Total pool length 30-40% of reach length						7.0	11.0	18.0						
Pool Max depth (ft)				0.9	1.0	1.0	1.0	0.2	3	0.6	1.4		2.1			1.1	1.2	1.9						
Pool Spacing (ft)				14.5	27.2	22.8	55.6	12.2	23	20.4	28.1		35.7			18.0	33.5	49.0						
Pattern																								
Channel Beltwidth (ft)				6.0	12.8	8.7	37.0	8.6	21	15.3	23.0		30.6			18.3	27.5	36.6						
Radius of Curvature (ft)				5.7	11.0	11.7	22.7	4.1	27	10.2	14.0		17.9			12.2	16.8	21.4						
Rc:Bankfull width (ft/ft)				1.2	2.2	2.4	4.6	0.8	27	2.0	2.8		3.5			2.0	2.8	3.5						
Meander Wavelength (ft)				16.7	34.9	31.7	68.3	14.7	23	35.7	48.5		61.2			30.5	51.9	73.2						
Meander Width Ratio				3.4	7.1	6.4	13.8	14.7	23	3.0	4.5		6.0			5.0	8.5	12.0						
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				0.58												0.62								
Max part size (mm) mobilized at bankfull				62												62								
Stream Power (transport capacity) lb/s				9												11								
Additional Reach Parameters																								
Rosgen Classification				F4						Cb						Cb4								
Bankfull Velocity (fps)	1.0	10.8	4.2	3												2.8								
Bankfull Discharge (cfs)	4	40	13.0	9												9								
Valley length (ft)				1385												802								
Channel Thalweg length (ft)				1814												994								
Sinuosity (ft)				1.31						1.2 to 1.4						1.24								
Water Surface Slope (Channel) (ft/ft)				0.016												0.02								
BF slope (ft/ft)				0.016												0.02								
[3]Bankfull Floodplain Area (acres)				0.4												0.3								
[4]% of Reach with Eroding Banks				60%																				
Channel Stability or Habitat Metric				0.55																				
Biological or Other																								

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11d. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - UT 3 R2 (2457 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	5	9	5.7							4.7	5.1		5.5			6.8	7.3	7.8						
Floodprone Width (ft)										11.2	15.8		20.4			16.1	22.6	29.2						
Bankfull Mean Depth (ft)	0.8	1.2	0.9							0.3	0.5		0.6			0.5	0.6	0.8						
[1]Bankfull Max Depth (ft)										1.1	1.8		2.4			0.7	0.8	0.9						
Bankfull Cross Sectional Area (ft^2)	4	5	4.4							1.4	2.4		3.3			4.4	4.4	4.4						
Width/Depth Ratio										10.0	12.0		14			10.0	12.0	14.0						
Entrenchment Ratio										2.2	3.1		4.0			2.2	3.1	4.0						
[1]Bank Height Ratio										1.0	1.0		1			1.0	1.05	1.1						
Profile																								
Riffle Length (ft)										Total riffle length 60-70% of reach length						12.0	41.0	57.0						
Riffle Slope (ft/ft)																0.004	0.01	0.018						
Pool Length (ft)										Total pool length 30-40% of reach length						8.0	15.0	22.0						
Pool Max depth (ft)										0.6	1.4		2.1			1.3	1.4	2.2						
Pool Spacing (ft)										20.4	28.1		35.7			29.2	86.0	58.4						
Pattern																								
Channel Beltwidth (ft)										15.3	23.0		30.6			25.6	42	58.4						
Radius of Curvature (ft)										10.2	14.0		17.9			14.6	20.1	25.6						
Rc:Bankfull width (ft/ft)										2.0	2.8		3.5			2.0	2.8	3.5						
Meander Wavelength (ft)										35.7	48.5		61.2			51.1	69.4	87.6						
Meander Width Ratio										3.0	4.5		6.0			7.0	9.5	12.0						
Transport parameters																								
Reach Shear Stress (competency) lb/f^2																0.25								
Max part size (mm) mobilized at bankfull																62								
Stream Power (transport capacity) lb/s																7								
Additional Reach Parameters																								
Rosgen Classification										C4						C4								
Bankfull Velocity (fps)	2.3	22.5	5.9													3.9								
Bankfull Discharge (cfs)	9	90	25.8													17								
Valley length (ft)																1802								
Channel Thalweg length (ft)																2523								
Sinuosity (ft)										1.2 to 1.4						1.4								
Water Surface Slope (Channel) (ft/ft)																0.0067								
BF slope (ft/ft)																0.0067								
[3]Bankfull Floodplain Area (acres)																0.9								
[4]% of Reach with Eroding Banks																								
Channel Stability or Habitat Metric																								
Biological or Other																								

No Existing Stream

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11e. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - Moores Fork R1 (1573 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	20	30	22.5	30.7	30.7	30.7	30.7		1	21.9	23.9		25.9			21.9	23.9	25.9						
Floodprone Width (ft)				35.0	35.0	35.0	35.0		1	52.6	74.1		95.6			52.6	74.1	95.6						
Bankfull Mean Depth (ft)	1.8	3	2.4	1.7	1.7	1.7	1.7		1	1.6	2.1		2.6			1.6	2.1	2.6						
[1]Bankfull Max Depth (ft)				2.7	2.7	2.7	2.7		1	1.2	1.3		1.4			2.3	3.0	3.8						
Bankfull Cross Sectional Area (ft^2)	40	50	47.8	51.6	51.6	51.6	51.6		1	35.0	51.2		67.3			47.7	47.7	47.7						
Width/Depth Ratio				18.2	18.2	18.2	18.2		1	10.0	12.0		14			10.0	12.0	14.0						
Entrenchment Ratio				1.1	1.1	1.1	1.1		1	2.2	3.1		4.0			2.2	3.1	4.0						
[1]Bank Height Ratio				3.2	3.2	3.2	3.2		1	1.0	1.0		1			1.0	1.05	1.1						
Profile																								
Riffle Length (ft)				20.3	48.1	32.0	126.8	36.5	8	Total riffle length 60-70% of reach length						20.3	32.0	126.8						
Riffle Slope (ft/ft)				0.002	0.013	0.013	0.025	0.007	8							0.002	0.013	0.025						
Pool Length (ft)				30.9	61.8	55.4	98.0	20.8	8	Total pool length 30-40% of reach length						30.9	55.4	98.0						
Pool Max depth (ft)				0.8	3.4	3.4	1.4		1	3.2	6.2		9.1			0.8	3.4	1.4						
Pool Spacing (ft)				16.3	76.5	64.6	199.2	41.0	21	95.6	131.5		167.3			16.3	64.6	199.2						
Pattern																								
Channel Beltwidth (ft)				31.2	37.9	35.5	85.1	8.1	44	83.7	137.4		191.2			31.2	35.5	85.1						
Radius of Curvature (ft)				18.1	32.0	26.6	85.1	15.9	47	47.8	65.7		83.7			18.1	26.6	85.1						
Rc:Bankfull width (ft/ft)				0.6	1.0	0.9	2.8	0.5	47	2.0	2.8		3.5			0.6	0.9	2.8						
Meander Wavelength (ft)				14.8	76.4	52.6	281.1	66.0	45	167.3	227.1		286.8			14.8	52.6	281.1						
Meander Width Ratio				0.5	2.5	1.7	9.2	2.1	45	3.5	5.8		8.0			0.5	1.7	9.2						
Transport parameters																								
Reach Shear Stress (competency) lb/ft^2				0.4												0.46								
Max part size (mm) mobilized at bankfull				90												90								
Stream Power (transport capacity) lb/s				37												35								
Additional Reach Parameters																								
Rosgen Classification				F4						C4						C4								
Bankfull Velocity (fps)	2.5	20.0	5.4	3.1												3.1								
Bankfull Discharge (cfs)	100	800	259.8	150												150								
Valley length (ft)				1470												1470								
Channel Thalweg length (ft)				1573												1573								
Sinuosity (ft)				1.07						1.2 to 1.4						1.07								
Water Surface Slope (Channel) (ft/ft)				0.003												0.003								
BF slope (ft/ft)				0.003												0.003								
[3]Bankfull Floodplain Area (acres)				1.2												2.5								
[4]% of Reach with Eroding Banks				33%																				
Channel Stability or Habitat Metric				0.20																				
Biological or Other																								

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11f. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - Moores Fork R2 (1998 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	20	30	22.5	28.5	30.8	30.8	33.0	3.2	2	21.9	23.9		25.9			21.9	23.9	25.9						
Floodprone Width (ft)				45.0	45.5	45.5	46.0	0.7	2	52.6	74.1		95.6			52.6	74.1	95.6						
Bankfull Mean Depth (ft)	1.8	3	2.4	1.4	1.6	1.6	1.7	0.2	2	1.6	2.1		2.6			1.6	2.1	2.6						
[1]Bankfull Max Depth (ft)				2.1	2.3	2.3	2.5	0.3	2	1.2	1.3		1.4			2.3	3.0	3.8						
Bankfull Cross Sectional Area (ft^2)	40	50	47.8	47.0	47.9	47.9	48.8	1.3	2	35.0	51.2		67.3			47.7	47.7	47.7						
Width/Depth Ratio				16.6	19.9	19.9	23.2	4.7	2	10.0	12.0		14			10.0	12.0	14.0						
Entrenchment Ratio				1.4	1.5	1.5	1.6	0.1	2	2.2	3.1		4.0			2.2	3.1	4.0						
[1]Bank Height Ratio				2.7	2.9	2.9	3.0	0.2	2	1.0	1.0		1			1.0	1.05	1.1						
Profile																								
Riffle Length (ft)				15.3	66.6	53.7	179.0	50.1	9	Total riffle length 60-70% of reach length						29.0	121.0	167.0						
Riffle Slope (ft/ft)				0.006	0.011	0.007	0.024	0.007	9							0.004	0.005	0.007						
Pool Length (ft)				15.3	71.2	71.6	147.0	38.6	9	Total pool length 30-40% of reach length						26.0	45.0	67.0						
Pool Max depth (ft)				0.8	3.1	3.1	1.4	0.2	2	3.2	6.2		9.1			4.2	4.6	7.3						
Pool Spacing (ft)				54.0	122.7	89.1	287.6	70.2	13	95.6	131.5		167.3			96.0	143.5	191.0						
Pattern																								
Channel Beltwidth (ft)				47.4	85.9	75.3	174.1	40.2	9	83.7	137.4		191.2			83.7	137.5	191.2						
Radius of Curvature (ft)				33.7	86.3	88.7	159.1	37.1	9	47.8	65.7		83.7			47.8	65.8	83.7						
Rc:Bankfull width (ft/ft)				1.1	2.8	2.9	5.2	1.2	9	2.0	2.8		3.5			2.0	2.8	3.5						
Meander Wavelength (ft)				214.5	296.9	303.9	414.1	75.2	9	167.3	227.1		286.8			167.3	138.1	286.8						
Meander Width Ratio				7.0	9.7	9.9	13.5	2.4	9	3.5	5.8		8.0			7.0	5.8	12.0						
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				0.4												0.46								
Max part size (mm) mobilized at bankfull				90												90								
Stream Power (transport capacity) lb/s				37												35								
Additional Reach Parameters																								
Rosgen Classification				F4						C4						C4								
Bankfull Velocity (fps)	2.5	20.0	5.4	3.1												3.1								
Bankfull Discharge (cfs)	100	800	259.8	150												150								
Valley length (ft)				1808												1700								
Channel Thalweg length (ft)				2007												2176								
Sinuosity (ft)				1.11						1.2 to 1.4						1.28								
Water Surface Slope (Channel) (ft/ft)				0.004												0.0037								
BF slope (ft/ft)				0.004												0.0037								
[3]Bankfull Floodplain Area (acres)				1.9												2.9								
[4]% of Reach with Eroding Banks				30%																				
Channel Stability or Habitat Metric				0.26																				
Biological or Other																								

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11g. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - Moores Fork R3 (384 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	20	30	22.5	22.8	22.8	22.8	22.8		1	21.9	23.9		25.9			21.9	23.9	25.9						
Floodprone Width (ft)				144.4	144.4	144.4	144.4		1	52.6	74.1		95.6			52.6	74.1	95.6						
Bankfull Mean Depth (ft)	1.8	3	2.4	2.3	2.3	2.3	2.3		1	1.6	2.1		2.6			1.6	2.1	2.6						
[1]Bankfull Max Depth (ft)				3.2	3.2	3.2	3.2		1	1.2	1.3		1.4			2.3	3.0	3.8						
Bankfull Cross Sectional Area (ft^2)	40	50	47.8	52.4	52.4	52.4	52.4		1	35.0	51.2		67.3			47.7	47.7	47.7						
Width/Depth Ratio				9.9	9.9	9.9	9.9		1	10.0	12.0		14			10.0	12.0	14.0						
Entrenchment Ratio				6.3	6.3	6.3	6.3		1	2.2	3.1		4.0			2.2	3.1	4.0						
[1]Bank Height Ratio				1.4	1.4	1.4	1.4		1	1.0	1.0		1			1.0	1.05	1.1						
Profile																								
Riffle Length (ft)				24.5	45.0	44.1	67.2	21.3	4	Total riffle length 60-70% of reach length						99.0	114.4	129.8						
Riffle Slope (ft/ft)				0.003	0.009	0.008	0.016	0.006	4							0.003	0.004	0.004						
Pool Length (ft)				16.4	41.4	33.6	92.0	30.0	5	Total pool length 30-40% of reach length						13.0	16.0	22.2						
Pool Max depth (ft)				0.8	4.6	4.6	1.4	0.0	1	3.2	6.2		9.1			4.2	4.6	7.3						
Pool Spacing (ft)				21.6	67.1	70.2	101.5	30.6	8	95.6	131.5		167.3			96.0	143.5	191.0						
Pattern																								
Channel Beltwidth (ft)				23.2	30.8	28.1	53.7	8.9	10	83.7	137.4		191.2			83.7	137.5	191.2						
Radius of Curvature (ft)				17.0	26.5	26.5	47.1	7.5	13	47.8	65.7		83.7			47.8	65.8	83.7						
Rc:Bankfull width (ft/ft)				0.7	1.2	1.2	2.1	0.3	13	2.0	2.8		3.5			2.0	2.8	3.5						
Meander Wavelength (ft)				18.0	82.0	84.2	139.5	36.6	12	167.3	227.1		286.8			167.3	138.1	286.8						
Meander Width Ratio				0.8	3.6	3.7	6.1	1.6	12	3.5	5.8		8.0			7.0	5.8	12.0						
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				0.4												0.46								
Max part size (mm) mobilized at bankfull				90												90								
Stream Power (transport capacity) lb/s				37												35								
Additional Reach Parameters																								
Rosgen Classification				F4						C4						C4								
Bankfull Velocity (fps)	2.5	20.0	5.4	3.1												3.1								
Bankfull Discharge (cfs)	100	800	259.8	150												150								
Valley length (ft)				373												373								
Channel Thalweg length (ft)				380												384								
Sinuosity (ft)				1.02						1.2 to 1.4						1.03								
Water Surface Slope (Channel) (ft/ft)				0.0076												0.0037								
BF slope (ft/ft)				0.0076												0.0037								
[3]Bankfull Floodplain Area (acres)				1.2												0.6								
[4]% of Reach with Eroding Banks				25%																				
Channel Stability or Habitat Metric				0.14																				
Biological or Other																								

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Appendix 3

SITE PROTECTION INSTRUMENT

MOORES FORK SITE

I, ELISABETH G. TURNER, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED IN BOOK AS , PAGE SHOWN); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION SHOWN ON THE FACE OF THIS MAP; THAT THE POSITIONAL ACCURACY DOES NOT EXCEED 0.10 USFT AT THE 95% CONFIDENCE LEVEL; AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THE GPS SURVEY:

(1) CLASS OF SURVEY: CLASS A
(2) POSITIONAL ACCURACY AT 95% CONFIDENCE LEVEL: HORIZONTAL= 0.069 USFT, VERTICAL= 0.085 USFT
(3) TYPE OF GPS FIELD PROCEDURE: REAL-TIME KINEMATIC/VRS
(4) DATES OF SURVEY: SEPT.-DEC. 2017
(5) DATUM/EPOCH: NAD83 (2011) / 2017
(6) PUBLISHED/FIXED-CONTROL USE: GPS SITE CONTROL POINT #3 NORTHING=1,007,147.41 USFT, EASTING=1,501,707.64 USFT, ELEV=1,088.33 USFT
(7) GEOID MODEL: GEOID 12
(8) COMBINED GRID FACTOR: 1.00007105
(9) UNITS: US FEET

THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 29th DAY OF OCTOBER, 2018.

ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

TRIBUTARIES SITE

I, ELISABETH G. TURNER, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED IN BOOK AS , PAGE SHOWN); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION SHOWN ON THE FACE OF THIS MAP; THAT THE POSITIONAL ACCURACY DOES NOT EXCEED 0.05 USFT AT THE 95% CONFIDENCE LEVEL; AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THE GPS SURVEY:

(1) CLASS OF SURVEY: CLASS AA
(2) POSITIONAL ACCURACY AT 95% CONFIDENCE LEVEL: HORIZONTAL= 0.033 USFT, VERTICAL= 0.039 USFT
(3) TYPE OF GPS FIELD PROCEDURE: REAL-TIME KINEMATIC/VRS
(4) DATES OF SURVEY: NOV. 2017-FEB. 2018
(5) DATUM/EPOCH: NAD83 (2011) / 2017
(6) PUBLISHED/FIXED-CONTROL USE: GPS SITE CONTROL POINT #1 NORTHING=1,010,840.14 USFT, EASTING=1,502,274.74 USFT, ELEV=1,096.95 USFT
(7) GEOID MODEL: GEOID 12
(8) COMBINED GRID FACTOR: 1.00006319
(9) UNITS: US FEET

THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 29th DAY OF OCTOBER, 2018.

ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

I, ELISABETH G. TURNER, PROFESSIONAL LAND SURVEYOR # L-4440, CERTIFY TO ONE OR MORE OF THE FOLLOWING AS INDICATED:

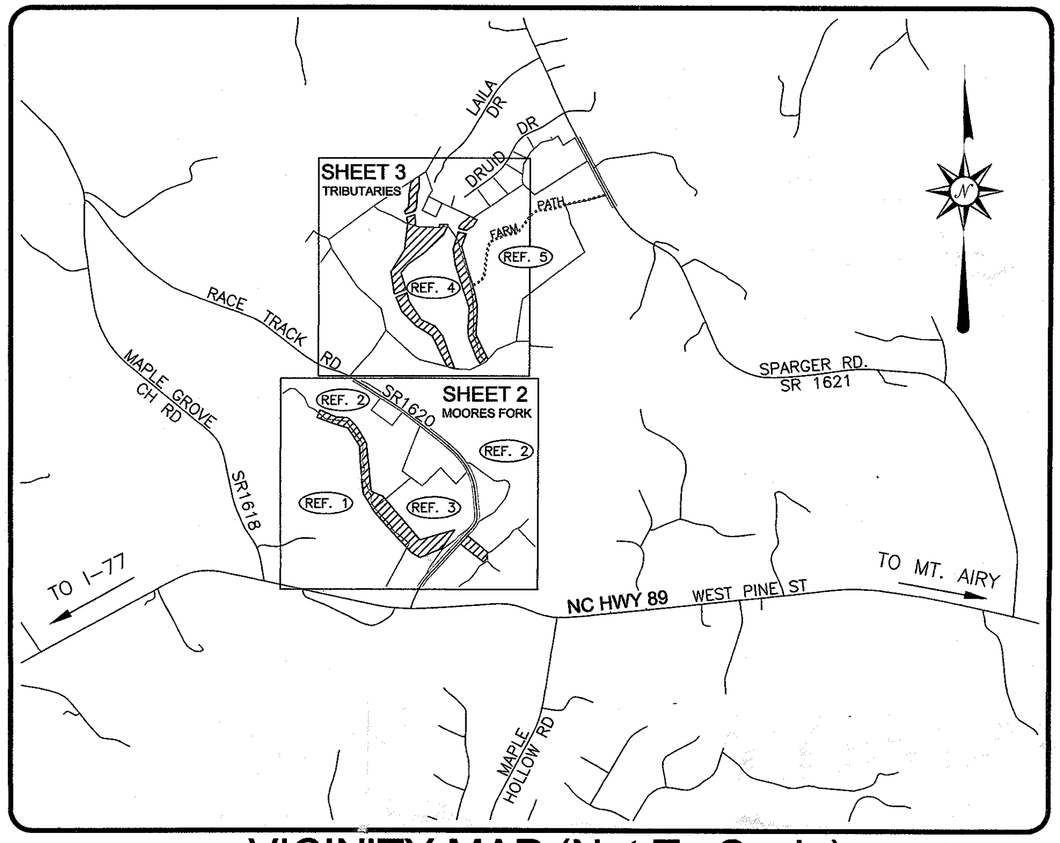
X d. [GS 47-30f (11)d] THAT THIS PLAT IS OF A SURVEY OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT ORDERED SURVEY, OR OTHER EXCEPTION TO THE DEFINITION OF SUBDIVISION.

ELISABETH G. TURNER, P.L.S. #L-4440

GENERAL NOTES:

1. ALL DISTANCES SHOWN ARE HORIZONTAL GROUND DISTANCES UNLESS OTHERWISE NOTED.
2. THE BASIS OF BEARINGS IS NCGS STATE PLANE GRID COORDINATES NAD83(2011) DATUM.
3. THE AREA SHOWN HEREON WAS COMPUTED USING THE COORDINATE COMPUTATION METHOD.
4. THE PURPOSE OF THIS PLAT IS TO SERVE AS A REFERENCE FOR THE CREATION OF A CONSERVATION EASEMENT. THIS PLAT IS NOT A BOUNDARY SURVEY. THE LAND PARCELS AND THEIR BOUNDARIES AFFECTED BY THIS CONSERVATION EASEMENT ARE NOT CHANGED BY THIS PLAT.
5. EASEMENT CORNERS MONUMENTED WITH 5/8" REBAR AND CAPPED WITH 3-1/4" ALUMINUM CAPS.
6. LINES NOT SURVEYED ARE SHOWN AS A DASHED LINETYPE AND WERE TAKEN FROM INFORMATION REFERENCED ON THE FACE OF THIS PLAT.
7. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT AND THEREFORE MAY NOT SHOW ALL ENCUMBRANCES UPON THE SUBJECT PROPERTY. A LICENSED ATTORNEY-AT-LAW SHOULD BE CONSULTED REGARDING CORRECT OWNERSHIP, WIDTH, AND LOCATION OF EASEMENTS AND OTHER TITLE QUESTIONS REVEALED BY A TITLE EXAMINATION. THE SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR ENCUMBERANCES, RESTRICTIVE COVENANTS, EASEMENTS OF RECORD, OWNERSHIP, TITLE EVIDENCE, OR OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE EXAMINATION MAY DISCLOSE.
8. SUBJECT TO ALL EASEMENTS, RIGHT OF WAYS, AND/OR ENCUMBRANCES THAT MAY AFFECT THE PROPERTY(S).
9. A PORTION OF THE SUBJECT PROPERTY IS LOCATED IN A DESIGNATED FEMA FLOOD HAZARD ZONE PER FIRM MAP #3711500000J REVISED DATE AUGUST 18, 2009.
10. ENVIRONMENTAL AND SUBSURFACE CONDITIONS WERE NOT EXAMINED AS PART OF THIS SURVEY.
11. THE EXISTENCE OR NON-EXISTENCE OF WETLANDS ON THE SUBJECT PROPERTY HAS NOT BEEN DETERMINED BY THIS SURVEY.
12. UTILITIES ARE SHOWN WHERE ABOVE GROUND APPURTENANCES WERE VISIBLE AND ADJACENT TO CONSERVATION EASEMENT.
13. THE STATE OF NORTH CAROLINA, ITS EMPLOYEES AND AGENTS, SUCCESSORS AND ASSIGNS, ARE GRANTED AND CONVEYED A PERPETUAL RIGHT OF ACCESS TO THE EASEMENT AREA OVER THE PROPERTY AT REASONABLE TIMES TO UNDERTAKE ANY ACTIVITIES TO RESTORE, CONSTRUCT, MANAGE, MAINTAIN, ENHANCE, AND MONITOR THE STREAM, WETLAND AND ANY OTHER RIPARIAN RESOURCES IN THE EASEMENT AREA, IN ACCORDANCE WITH THE RESTORATION ACTIVITIES OR A LONG-TERM MANAGEMENT PLAN AS DESCRIBED IN SECTION III-A OF THE DEED RECORDED CONTEMPORANEOUSLY WITH THIS PLAT. PREFERRED ACCESS ROUTES ARE SHOWN HEREON IN APPROXIMATE LOCATIONS.

RECORDED IN PLAT BOOK 35, PAGE 145.



VICINITY MAP (Not To Scale)

MOORES FORK SITE (SHEET 2)

PROPERTY	CE	CE AREA (ACRES)
REF. 1 HOWARD W. HULL, widower and BRENT SHELTON HULL and wife, ANITA HULL PIN: 5000-00-07-1655	A-1	1.246
	A-2	1.213
REF. 2 CHARLIE W. HULL and wife, NANNIE J. HULL (both deceased) PIN: 5000-01-38-3884	B-1	3.035
	B-2	1.328
REF. 3 CHARLIE W. HULL and wife, NANNIE J. HULL (both deceased) PIN: 5000-00-17-9554	C	5.668
MOORES FORK SITE CE TOTAL		12.490

TRIBUTARIES SITE (SHEET 3)

PROPERTY	CE	CE AREA (ACRES)
REF. 4 CHARLIE W. HULL and wife NANNIE HULL (both deceased) PIN: 5001-03-10-6735	D-1	3.678
	D-2	5.989
	D-3	3.644
REF. 5 HOWARD (BILL) W. HULL, Jr. and wife, CATHY HULL PIN: 5001-03-21-8380	E-1	0.330
	E-2	1.257
	E-3	0.090
	E-4	0.607
	E-5	1.891
TRIBUTARIES SITE CE TOTAL		17.486

TOTAL CONSERVATION EASEMENT AREA: 29.976 ACRES

(REF. 1)
N/F
HOWARD W. HULL, widower and
BRENT SHELTON HULL
and wife, ANITA HULL
D.B. 1134, PG. 391
D.B. 584, PG. 204
PIN: 5000-00-07-1655
OWNER ADDRESS:
579 Maple Hollow Rd.
Mt. Airy, NC 27030

(REF. 2)
N/F
CHARLIE W. HULL and
wife, NANNIE J. HULL
(both deceased)
D.B. 1094, PG. 197
D.B. 197, PG. 229
D.B. 308, PG. 740
D.B. 245, PG.32
D.B. 199, PG. 719
PIN: 5000-01-38-3884
OWNER ADDRESS:
453 Race Track Rd.
Mt. Airy, NC 27030

(REF. 3)
N/F
CHARLIE W. HULL and
wife, NANNIE J. HULL
(both deceased)
D.B. 656, PG. 987
D.B. 176, PG. 643
D.B. 163, PG. 89
PIN: 5000-00-17-9554
OWNER ADDRESS:
453 Race Track Rd.
Mt. Airy, NC 27030

(REF. 4)
N/F
CHARLIE W. HULL and
wife, NANNIE J. HULL
(both deceased)
D.B. 1094, PG. 197
D.B. 307, PG. 480
PIN: 5001-03-10-6735
OWNER ADDRESS:
453 Race Track Rd.
Mt. Airy, NC 27030

(REF. 5)
N/F
HOWARD BILL W. HULL, Jr.
and wife, CATHY HULL
D.B. 1427, PG. 460 & 462
D.B. 584, PG. 208
PIN: 5001-03-21-8380
OWNER ADDRESS:
1081 Sparger Rd.
Mt. Airy, NC 27030

CERTIFICATE OF OWNERSHIP AND DEDICATION

I (WE) HEREBY CERTIFY THAT I (WE) ARE THE OWNER(S) OF THE PROPERTY AS SHOWN AND DESCRIBED HEREON. I (WE) HEREBY ACCEPT AND ADOPT THIS RECORDED PLAT AND CONSERVATION EASEMENT WITH MY (OUR) FREE CONSENT AND DEDICATE, GRANT, AND CONVEY ALL EASEMENTS, RIGHT-OF-WAYS, AND ACCESS ROADS TO PUBLIC AND/OR PRIVATE USE AS NOTED HEREIN.

Bradley H Hull 11/13/18
BRADLEY H. HULL, Trustee of the Charlie W. Hull Revocable Trust, UAD, Sept. 13, 1996 — DATE

Gail N. Hiatt 11/13/18
GAIL H. HIATT, Executor of the Estate of Charlie Woltz Hull — DATE

Bradley H Hull 11/13/18
BRADLEY H. HULL, Executor of the Estate of Charlie Woltz Hull — DATE

Howard W. Hull Sr. (Widowed) — DATE

Brent Shelton Hull 11-13-18
BRENT SHELTON HULL — DATE

Anita Hull 11-13-18
ANITA HULL — DATE

Howard W. Hull Jr. 11/13/18
HOWARD BILL W. HULL, Jr. — DATE

Cathy Hull 11/13/18
CATHY HULL — DATE

REVIEW OFFICER CERTIFICATION

STATE OF NORTH CAROLINA
COUNTY OF SURRY

I, Adrienne Gardner, REVIEW OFFICER OF SURRY COUNTY, CERTIFY THAT THIS MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED, MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING FOR WHICH THE REVIEW OFFICER HAS RESPONSIBILITY AS PROVIDED BY LAW.

Adrienne Gardner 11/14/2018
REVIEW OFFICER — DATE

State of North Carolina
County of Surry

Filed for registration this 14 day of November, 2018 at 10:34 A.m. and duly recorded in the office of Register of Deeds of Surry County, NC.

Carolyn M. Comer - Register of Deeds

BY Jennifer R. White
Deputy, Assistant

TURNER LAND SURVEYING
P.O. BOX 148
SWANNANOA, NC 28778
P-0702 (919)-827-0745
www.turnerlandsurveying.com
Certified DBE/WBE

SURVEY: SEPT. 2017-FEB. 2018	DRAWN BY: DST/EGT	TLS PROJ.: 17-020
SURVEYED BY: DST	REVIEWED BY: EGT	PLAT DATE: 10/29/2018

CONSERVATION EASEMENT PLAT FOR
THE STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES
(SPO FILE# 86-BD, 86-BE, 86-BF; DMS PROJECT # 100023)

TRIBUTARIES TO STEWARTS CREEK MITIGATION PROJECT
PARCEL IDENTIFICATION NUMBER (P.I.N.): 5000-00-07-1655, 5000-01-38-3884, 5000-00-17-9554, 5001-03-10-6735 and 5001-03-21-8380
STEWARTS CREEK TOWNSHIP SURRY COUNTY NORTH CAROLINA

CAD FILE: MOORES FORK_CE_F
SCALE: AS SHOWN
SHEET 1 of 3

MOORES FORK SITE

I, ELISABETH G. TURNER, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED IN BOOK AS , PAGE SHOWN); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION SHOWN ON THE FACE OF THIS MAP; THAT THE POSITIONAL ACCURACY DOES NOT EXCEED 0.10 USFT AT THE 95% CONFIDENCE LEVEL; AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THE GPS SURVEY:

(1) CLASS OF SURVEY: CLASS A
(2) POSITIONAL ACCURACY AT 95% CONFIDENCE LEVEL: HORIZONTAL= 0.069 USFT, VERTICAL= 0.085 USFT
(3) TYPE OF GPS FIELD PROCEDURE: REAL-TIME KINEMATIC/VRS
(4) DATES OF SURVEY: SEPT.-DEC. 2017
(5) DATUM/EPOCH: NAD83 (2011) / 2017
(6) PUBLISHED/FIXED-CONTROL USE: GPS SITE CONTROL POINT #3 NORTHING=1,007,147.41 USFT, EASTING=1,501,707.64 USFT, ELEV=1,088.33 USFT
(7) GEOID MODEL: GEOID 12
(8) COMBINED GRID FACTOR: 1.00007105
(9) UNITS: US FEET

THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 29th DAY OF OCTOBER, 2018.

ELISABETH G. TURNER, P.L.S. #L-4440

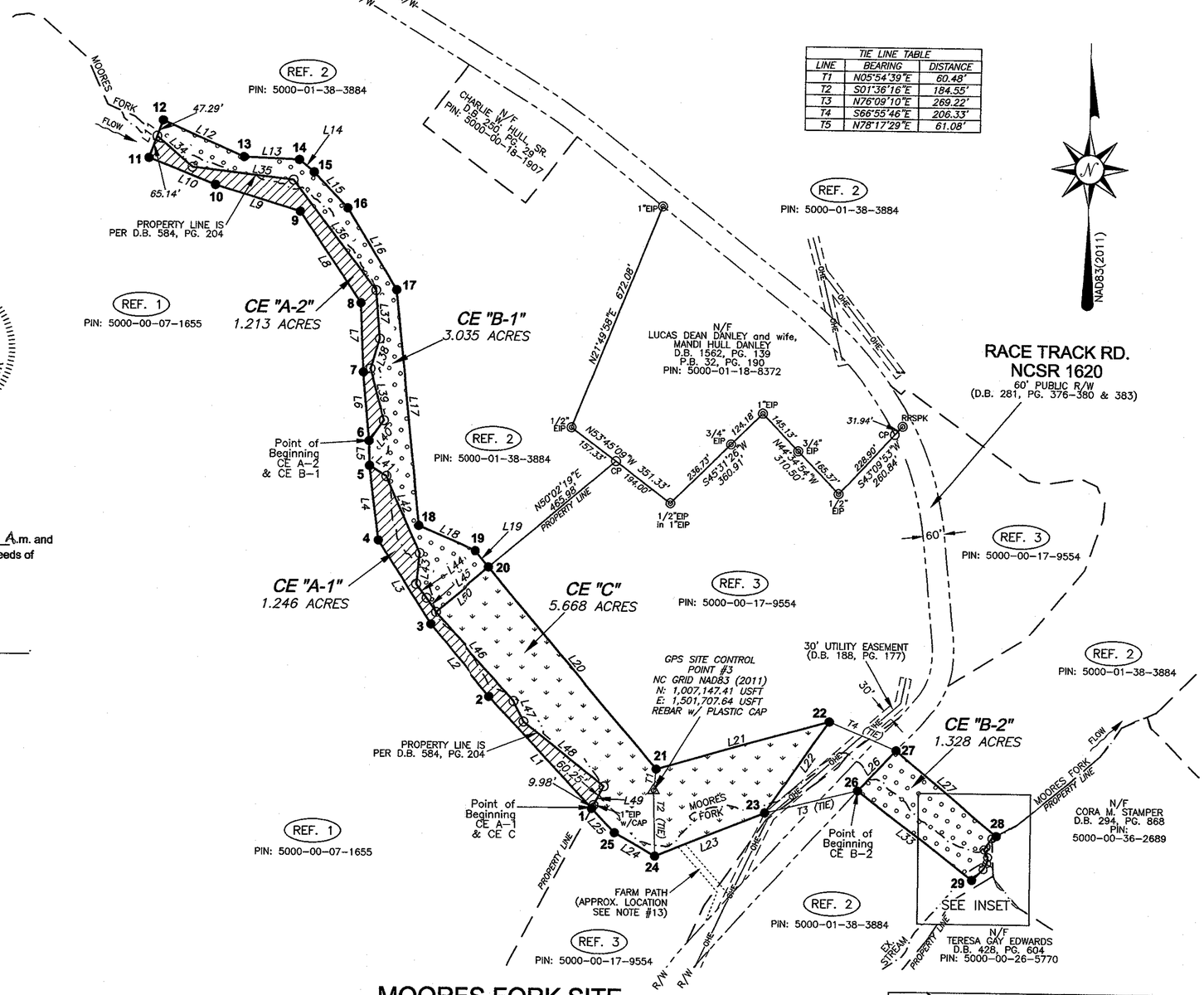
NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

State of North Carolina
County of Surry

Filed for registration this 14 day of NOVEMBER, 2018 at 10:34 A.m. and duly recorded in the office of Register of Deeds of Surry County, NC.

Carolyn M. Comer - Register of Deeds

BY Jennifer R. White
Deputy, Assistant



TIE LINE TABLE		
LINE	BEARING	DISTANCE
T1	N05°54'39"E	60.48'
T2	S01°36'16"E	184.55'
T3	N76°09'10"E	269.22'
T4	S66°55'46"E	206.33'
T5	N78°17'29"E	61.08'

LINE TABLE		
LINE	BEARING	DISTANCE
L1	N43°28'46"W	429.24'
L2	N40°35'14"W	265.98'
L3	N32°53'11"W	278.56'
L4	N07°33'35"W	209.62'
L5	N01°04'43"W	69.33'
L6	N05°43'32"W	192.55'
L7	N02°25'12"W	194.34'
L8	N34°10'15"W	309.44'
L9	N73°09'58"W	251.57'
L10	N68°36'24"W	203.20'
L11	N20°40'21"E	112.42'
L12	S66°18'10"E	250.50'
L13	S87°30'22"E	156.43'
L14	S50°53'29"E	54.23'
L15	S44°00'08"E	138.83'
L16	S31°32'47"E	269.05'
L17	S06°02'03"E	661.80'
L18	S67°00'27"E	177.98'
L19	S40°41'37"E	59.48'
L20	S40°41'37"E	742.00'
L21	N74°04'54"E	507.43'
L22	S34°35'27"W	315.05'
L23	S68°08'17"W	334.21'
L24	N60°50'07"W	132.01'
L25	N43°28'46"W	93.80'
L26	N43°14'43"E	156.60'
L27	S50°12'03"E	372.43'
L28	S35°30'44"W	37.61'
L29	S26°35'14"E	23.97'
L30	S07°28'55"W	17.20'
L31	S31°25'57"W	20.09'
L32	S46°21'38"W	43.96'
L33	N52°48'46"W	409.41'
L34	S49°13'19"E	132.14'
L35	S83°24'00"E	288.58'
L36	S37°28'48"E	389.11'
L37	S05°00'57"E	136.29'
L38	S17°11'31"W	87.94'
L39	S15°30'18"E	150.50'
L40	S36°12'08"W	70.18'
L41	S58°49'26"E	56.17'
L42	S24°18'55"E	234.83'
L43	S06°07'26"W	86.60'
L44	S37°27'28"E	49.07'
L45	S34°31'35"E	47.86'
L46	S42°42'15"E	338.04'
L47	S26°42'30"E	64.39'
L48	S51°57'22"E	291.79'
L49	S28°15'35"W	70.23'
L50	S50°02'19"W	198.09'
L51	S60°33'18"W	13.34'

CORNER COORDINATES (US FT)		
PT#	NORTHING	EASTING
1	1,007,095.32	1,501,533.00
2	1,007,406.79	1,501,237.64
3	1,007,608.77	1,501,064.59
4	1,007,842.69	1,500,913.34
5	1,008,050.49	1,500,885.76
6	1,008,119.81	1,500,884.46
7	1,008,311.40	1,500,865.25
8	1,008,505.57	1,500,857.04
9	1,008,761.59	1,500,683.24
10	1,008,834.44	1,500,442.45
11	1,008,908.56	1,500,253.26
12	1,009,013.74	1,500,292.95
13	1,008,913.07	1,500,522.32
14	1,008,906.26	1,500,678.60
15	1,008,872.06	1,500,720.68
16	1,008,772.20	1,500,817.12
17	1,008,542.91	1,500,957.88
18	1,007,884.78	1,501,027.45
19	1,007,815.26	1,501,191.29
20	1,007,770.16	1,501,230.08
21	1,007,207.57	1,501,713.87
22	1,007,346.74	1,502,201.84
23	1,007,087.38	1,502,022.98
24	1,006,962.93	1,501,712.81
25	1,007,027.26	1,501,597.54
26	1,007,151.81	1,502,284.38
27	1,007,265.89	1,502,391.67
28	1,007,027.49	1,502,677.80
29	1,006,904.35	1,502,610.54

LEGEND:
- CONSERVATION EASEMENT
- PROPERTY LINE NOT SURVEYED
- RIGHT OF WAY (R/W)
- EXISTING STREAM
- EX. EASEMENT
- OHE — OVERHEAD UTILITY LINES
- FARM PATH
- #● CONSERVATION EASEMENT CORNER
- ◎ PROPERTY CORNER (FOUND & DESCRIBED)
- ○ CALCULATED POINT (CP)
- EIP EXISTING IRON PIPE
- RRSPK RAILROAD SPIKE
- N/F NOW OR FORMERLY

REF. 1
N/F
HOWARD W. HULL, widower and BRENT SHELTON HULL and wife, ANITA HULL
D.B. 1134, PG. 391
D.B. 584, PG. 204
PIN: 5000-00-07-1655
OWNER ADDRESS:
579 Maple Hollow Rd.
Mt. Airy, NC 27030

REF. 2
N/F
CHARLIE W. HULL and wife, NANNIE J. HULL (both deceased)
D.B. 1094, PG. 197
D.B. 197, PG. 229
D.B. 308, PG. 740
D.B. 245, PG.32
D.B. 199, PG. 719
PIN: 5000-01-38-3884
OWNER ADDRESS:
453 Race Track Rd.
Mt. Airy, NC 27030

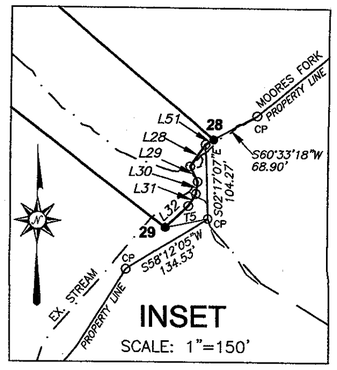
REF. 3
N/F
CHARLIE W. HULL and wife, NANNIE J. HULL (both deceased)
D.B. 656, PG. 987
D.B. 176, PG. 643
D.B. 163, PG. 89
PIN: 5000-00-17-9554
OWNER ADDRESS:
453 Race Track Rd.
Mt. Airy, NC 27030

Additional Deed/Plat References Not Listed Above:
DB 191, Pg 384; DB 195, Pg 414; DB 250, Pg 29; DB 252, Pg 533; DB 266, Pg 78; DB 294, Pg 868; DB 329, Pg 163; DB 384, Pg 610; DB 416, Pg 1174; DB 416, Pg 1346; DB 428, Pg 604; DB 550, Pg 249; DB 1076, Pg 1093; DB 1452, Pg 356; PB 6, Pg 59; PB 9, Pg 176; PB 32, Pg 190; NCDOT Project 8.1769301 – Unrecorded map entitled "State of North Carolina Department of Transportation vs Charlie W. Hull, et ux, et al" by NCDOT recieved by Right of Way Branch Division 11 on Dec. 20, 1984

MOORES FORK SITE

CONSERVATION EASEMENT AREA SUMMARY

	PROPERTY	CE	CE AREA (ACRES)
	REF. 1 HOWARD W. HULL, widower and BRENT SHELTON HULL and wife, ANITA HULL PIN: 5000-00-07-1655	A-1	1.246
		A-2	1.213
	REF. 2 CHARLIE W. HULL and wife, NANNIE J. HULL (both deceased) PIN: 5000-01-38-3884	B-1	3.035
		B-2	1.328
	REF. 3 CHARLIE W. HULL and wife, NANNIE J. HULL (both deceased) PIN: 5000-00-17-9554	C	5.668
CONSERVATION EASEMENT TOTAL			12.490



NOTES:
1. SEE SHEET 1 OF 3 FOR GENERAL NOTES.

250' 0' 250' 500'
SCALE: 1 inch = 250 feet

RECORDED IN PLAT BOOK 35, PAGE 146.

TURNER LAND SURVEYING
P.O. BOX 148
SWANNANOA, NC 28778
P-0702 (919)-827-0745
www.turnerlandsurveying.com
Certified DBE/WBE

SURVEY: SEPT. 2017-FEB. 2018 | DRAWN BY: DST/EGT | TLS PROJ.: 17-020
SURVEYED BY: DST | REVIEWED BY: EGT | PLAT DATE: 10/29/2018

CONSERVATION EASEMENT PLAT FOR
THE STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES
(SPO FILE# 86-BD, 86-BE, 86-BF; DMS PROJECT # 100023)

TRIBUTARIES TO STEWARTS CREEK MITIGATION PROJECT
P.I.N.: 5000-00-07-1655, 5000-01-38-3884, and 5000-00-17-9554 (MOORES FORK SITE)
STEWARTS CREEK TOWNSHIP SURRY COUNTY NORTH CAROLINA

CAD FILE: MOORES FORK_ CE_F
SCALE: 1"=250'
SHEET 2 of 3

TRIBUTARIES SITE

I, ELISABETH G. TURNER, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED IN BOOK AS , PAGE SHOWN); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION SHOWN ON THE FACE OF THIS MAP; THAT THE POSITIONAL ACCURACY DOES NOT EXCEED 0.05 USFT. AT THE 95% CONFIDENCE LEVEL; AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THE GPS SURVEY:

(1) CLASS OF SURVEY: CLASS AA
(2) POSITIONAL ACCURACY AT 95% CONFIDENCE LEVEL: HORIZONTAL= 0.033 USFT, VERTICAL= 0.039 USFT
(3) TYPE OF GPS FIELD PROCEDURE: REAL-TIME KINEMATIC/VRS
(4) DATES OF SURVEY: NOV. 2017-FEB. 2018
(5) DATUM/EPOCH: NAD83 (2011) / 2017
(6) PUBLISHED/FIXED-CONTROL USE: GPS SITE CONTROL POINT #1 NORTHING=1,010,840.14 USFT, EASTING=1,502,274.74 USFT, ELEV=1,096.95 USFT
(7) GEOID MODEL: GEOID 12
(8) COMBINED GRID FACTOR: 1.00006319
(9) UNITS: US FEET

THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 29th DAY OF OCTOBER, 2018.

ELISABETH G. TURNER, P.L.S. #L-4440

NORTH CAROLINA PROFESSIONAL SEAL L-4440 LAND SURVEYOR ELISABETH G. TURNER

State of North Carolina
County of Surry

Filed for registration this 14 day of NOVEMBER, 2018 at 10:34 Am. and duly recorded in the office of Register of Deeds of Surry County, NC.

Carolyn M. Comer - Register of Deeds

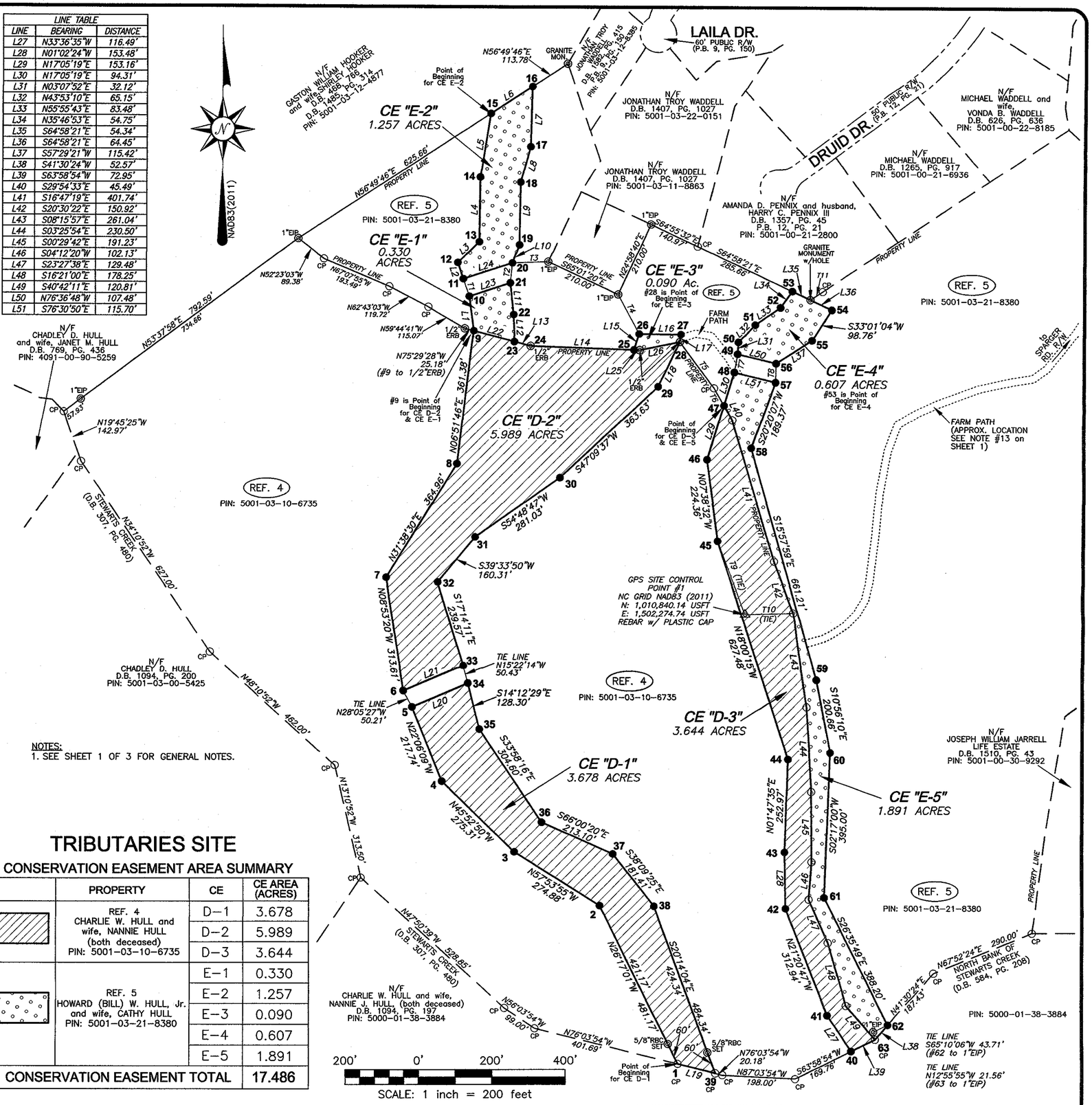
BY Jennifer R. White
Deputy, Assistant

LINE TABLE		
LINE	BEARING	DISTANCE
L1	N07°25'40"W	94.13'
L2	N18°56'11"W	46.87'
L3	N45°35'53"E	80.57'
L4	N00°46'43"E	176.45'
L5	N09°12'07"E	175.71'
L6	N56°49'46"E	134.67'
L7	S01°19'22"W	164.01'
L8	S15°25'01"W	100.47'
L9	S01°00'20"W	170.64'
L10	S20°23'03"W	52.49'
L11	S06°09'26"E	86.02'
L12	S02°09'13"E	73.26'
L13	S75°29'28"E	45.86'
L14	S87°55'41"E	281.47'
L15	N17°02'02"E	45.10'
L16	S89°17'43"E	114.79'
L17	S06°56'25"W	20.29'
L18	S26°08'34"W	133.82'
L19	N76°03'54"W	106.12'
L20	N67°09'05"E	165.52'
L21	S67°09'05"W	176.67'
L22	S75°29'28"E	115.47'
L23	N71°57'57"E	117.76'
L24	S71°56'23"W	140.74'
L25	S87°55'41"E	15.64'
L26	N78°36'56"E	112.12'

LINE TABLE		
LINE	BEARING	DISTANCE
L27	N33°36'35"W	116.49'
L28	N01°02'24"W	153.48'
L29	N17°05'19"E	153.16'
L30	N17°05'19"E	94.31'
L31	N03°07'52"E	32.12'
L32	N43°53'10"E	65.15'
L33	N55°55'43"E	83.48'
L34	N35°46'53"E	54.75'
L35	S64°58'21"E	54.34'
L36	S64°58'21"E	64.45'
L37	S57°29'21"W	115.42'
L38	S41°30'24"W	52.57'
L39	S63°58'54"W	72.95'
L40	S29°54'33"E	45.49'
L41	S16°47'19"E	401.74'
L42	S20°30'22"E	150.92'
L43	S08°15'57"E	261.04'
L44	S03°25'54"E	230.50'
L45	S00°29'42"E	191.23'
L46	S04°12'20"W	102.13'
L47	S23°27'38"E	129.48'
L48	S16°21'00"E	178.25'
L49	S40°42'11"E	120.81'
L50	N76°36'48"W	107.48'
L51	S76°30'50"E	115.70'

TIE LINE TABLE		
LINE	BEARING	DISTANCE
T1	N18°56'11"W	50.00'
T2	S05°52'00"W	54.78'
T3	N87°48'40"E	97.75'
T4	S28°11'21"E	121.18'
T5	S37°02'33"E	155.35'
T6	S29°54'33"E	54.57'
T7	N10°26'45"E	49.90'
T8	S01°13'30"W	51.18'
T9	N20°44'13"W	214.00'
T10	N88°28'13"E	131.03'
T11	N56°21'29"E	40.00'

LEGEND:
- CONSERVATION EASEMENT
- PROPERTY LINE NOT SURVEYED
- RIGHT OF WAY (R/W)
- FARM PATH
- #● CONSERVATION EASEMENT CORNER
- ◎ PROPERTY CORNER (FOUND & DESCRIBED)
- ○ CALCULATED POINT (CP)
- EIP EXISTING IRON PIPE
- ERB EXISTING REBAR
- N/F NOW OR FORMERLY



NOTES:
1. SEE SHEET 1 OF 3 FOR GENERAL NOTES.

TRIBUTARIES SITE

CONSERVATION EASEMENT AREA SUMMARY

	PROPERTY	CE	CE AREA (ACRES)
	REF. 4 CHARLIE W. HULL and wife, NANNIE HULL (both deceased) PIN: 5001-03-10-6735	D-1	3.678
		D-2	5.989
		D-3	3.644
	REF. 5 HOWARD (BILL) W. HULL, Jr. and wife, CATHY HULL PIN: 5001-03-21-8380	E-1	0.330
		E-2	1.257
		E-3	0.090
		E-4	0.607
		E-5	1.891
CONSERVATION EASEMENT TOTAL			17.486

CORNER COORDINATES (US FT)		
PT#	NORTHING	EASTING
1	1,009,614.83	1,502,093.29
2	1,010,046.25	1,501,880.22
3	1,010,192.33	1,501,647.36
4	1,010,383.99	1,501,449.72
5	1,010,585.73	1,501,367.79
6	1,010,630.03	1,501,344.14
7	1,010,939.88	1,501,295.68
8	1,011,250.58	1,501,487.14
9	1,011,609.37	1,501,530.33
10	1,011,702.72	1,501,518.16
11	1,011,750.01	1,501,501.93
12	1,011,794.35	1,501,486.72
13	1,011,850.72	1,501,544.28
14	1,012,027.15	1,501,546.68
15	1,012,200.60	1,501,574.78
16	1,012,274.29	1,501,687.51
17	1,012,110.32	1,501,683.72
18	1,012,013.47	1,501,657.01
19	1,011,842.85	1,501,654.02
20	1,011,793.65	1,501,635.73
21	1,011,739.17	1,501,630.14

CORNER COORDINATES (US FT)		
PT#	NORTHING	EASTING
22	1,011,653.65	1,501,639.36
23	1,011,580.44	1,501,642.12
24	1,011,568.95	1,501,686.52
25	1,011,558.78	1,501,967.80
26	1,011,601.90	1,501,981.01
27	1,011,600.49	1,502,095.80
28	1,011,580.34	1,502,093.35
29	1,011,460.21	1,502,034.38
30	1,011,212.97	1,501,767.75
31	1,011,051.02	1,501,538.07
32	1,010,927.44	1,501,435.96
33	1,010,698.63	1,501,506.95
34	1,010,650.00	1,501,520.32
35	1,010,525.63	1,501,551.81
36	1,010,273.02	1,501,722.01
37	1,010,186.36	1,501,916.70
38	1,010,043.72	1,502,028.77
39	1,009,589.27	1,502,196.29
40	1,009,648.74	1,502,566.17
41	1,009,745.75	1,502,501.69
42	1,010,037.22	1,502,387.78

CORNER COORDINATES (US FT)		
PT#	NORTHING	EASTING
43	1,010,190.68	1,502,385.00
44	1,010,443.53	1,502,392.91
45	1,011,040.28	1,502,198.97
46	1,011,262.64	1,502,169.13
47	1,011,409.04	1,502,214.14
48	1,011,499.19	1,502,241.85
49	1,011,548.26	1,502,250.90
50	1,011,580.33	1,502,252.65
51	1,011,627.29	1,502,297.82
52	1,011,674.05	1,502,366.96
53	1,011,718.47	1,502,398.97
54	1,011,668.22	1,502,506.60
55	1,011,585.41	1,502,452.79
56	1,011,523.37	1,502,355.46
57	1,011,472.20	1,502,354.36
58	1,011,294.63	1,502,288.55
59	1,010,658.93	1,502,470.43
60	1,010,461.92	1,502,508.50
61	1,010,067.23	1,502,492.76
62	1,009,720.11	1,502,666.57
63	1,009,680.74	1,502,631.72

REF. 4
N/F
CHARLIE W. HULL and wife,NANNIE J. HULL (both deceased)
D.B. 1094, PG. 197
D.B. 307, PG. 480
PIN: 5001-03-10-6735
OWNER ADDRESS:
453 Race Track Rd.
Mt. Airy, NC 27030

REF. 5
N/F
HOWARD (BILL) W. HULL, Jr. and wife, CATHY HULL
D.B. 1427, PG. 460 & 462
D.B. 584, PG. 208
PIN: 5001-03-21-8380
OWNER ADDRESS:
1081 Sparger Rd.
Mt. Airy, NC 27030

Additional Deed/Plat References Not Listed Above:
DB 191, Pg 384; DB 199, Pg 719; DB 255, Pg 533; DB 363, Pg 884; DB 363, Pg 888; DB 379, Pg 700; DB 468, Pg 766; DB 626, Pg 636; DB 769, Pg 436; DB 1094, Pg 197; DB 1265, Pg 917; DB 1357, Pg 45; DB 1370, Pg 1050; DB 1407, Pg 1027; DB 1485, Pg 314; DB 1510, Pg 43; DB 1609, Pg 121; PB 1, Pg 206; PB 6, Pg 148; PB 9, Pg 150; PB 12, Pg 6; PB 12, Pg 21;
Unrecorded map entitled "Boundary and Division Survey for The Estate of Charles F. Smith" by Reif-Hiatt Surveying and Mapping Company dated April 27, 1981 and signed by Robert E. Reif, NC PLS-1516;
Unrecorded map entitled "Survey for Howard (Bill) W. Hull, Jr., Stewarts Creek Twsp., Surry Co., NC" by Cooke Land Surveying, Mt. Airy, NC dated November 29, 2012 and signed digitally by Joe L. Cooke, NC PLS-2970 on February 14, 2018.

RECORDED IN PLAT BOOK 35, PAGE 147.

TURNER LAND SURVEYING
P.O. BOX 148
SWANNANOA, NC 28778
P-0702 (919)-827-0745
www.turnerlandsurveying.com
Certified DBE/WBE

SURVEY: SEPT. 2017-FEB. 2018	DRAWN BY: DST/EGT	TLS PROJ.: 17-020
SURVEYED BY: DST	REVIEWED BY: EGT	PLAT DATE: 10/29/2018

CONSERVATION EASEMENT PLAT FOR
THE STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES
(SPO FILE# 86-BD, 86-BE, 86-BF; DMS PROJECT # 100023)

TRIBUTARIES TO STEWARTS CREEK MITIGATION PROJECT

P.I.N.: 5001-03-10-6735 and 5001-03-21-8380 (TRIBUTARIES SITE)

STEWARTS CREEK TOWNSHIP SURRY COUNTY NORTH CAROLINA

CAD FILE: STEWARTS CREEK TRIBS_CE_F

SCALE: 1"=200'

SHEET 3 of 3

Appendix 4

CREDIT RELEASE SCHEDULE

CREDIT RELEASE SCHEDULE

All credit releases will be based on the total credit generated as reported by the as-built survey of the mitigation site. Under no circumstances shall any mitigation project be debited until the necessary DA authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the Interagency Review Team (IRT), will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to restart or be extended, depending on the extent to which the site fails to meet the specified performance standards. The release of project credits will be subject to the criteria described as follows:

Stream Credit Release Schedule – 7-year Timeframe			
Monitoring Year	**Credit Release Activity**	**Interim Release**	**Total Released**
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50%
3	Third year monitoring report demonstrates performance standards are being met	10%	60%
4	Fourth year monitoring report demonstrates performance standards are being met	5%	65% (75%*)
5	Fifth year monitoring report demonstrates performance standards are being met	10%	75% (85%*)
6	Sixth year monitoring report demonstrates performance standards are being met	5%	80% (90%*)
7	Seventh year monitoring report demonstrates performance standards are being met and project has received closeout approval	10%	90% (100%)

***Subsequent Credit Releases**

Initial Allocation of Released Credits

The initial allocation of released credits, as specified in the mitigation plan can be released by the NCDMS without prior written approval of the DE upon satisfactory completion of the following activities:

a. Approval of the final Mitigation Plan
b. Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.
c. Completion of project construction (the initial physical and biological improvements to the mitigation site) pursuant to the mitigation plan; Per the NCDMS Instrument, construction means that a mitigation site has been constructed in its entirety, to include planting, and an as-built report has been produced. As-built reports must be sealed by an engineer prior to project closeout, if appropriate but not prior to the initial allocation of released credits.
d. Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

*** Subsequent Credit Releases**

All subsequent credit releases must be approved by the DE, in consultation with the IRT, based on a determination that required performance standards have been achieved. For stream projects a reserve of 10% of a site's total stream credits shall be released after four bank-full events have occurred, in separate years, provided the channel is stable and all other performance standards are met. The reserve will be 10% for 7-year monitoring timeframes. In the event that less than four bank-full events occur during the monitoring period, release of these reserve credits shall be at the discretion of the IRT. As projects approach milestones associated with credit release, the NCDMS will submit a request for credit release to the DE along with documentation substantiating achievement of criteria required for the release to occur. This documentation will be included with the annual monitoring report.

Appendix 5

FINANCIAL ASSURANCES

FINANCIAL ASSURANCES

Pursuant to Section IV H and Appendix III of the Division of Mitigation Services' In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environmental Quality has provided the U.S. Army Corps of Engineers Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.

Appendix 6

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 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.
Farm Road Crossing	Farm road crossings are located outside the conservation easement. These crossings may be maintained only as allowed by Conservation Easement or existing easement, deed restrictions, rights of way, or corridor agreements.

Appendix 7

NCDWR STREAM IDENTIFICATION FORMS

UT 1

NC DWQ Stream Identification Form Version 4.11

Date: 1/26/17	**Project/Site:** Stewarts Creek Trib	**Latitude:** 36.515484
Evaluator: RSL	**County:** Surry	**Longitude:** -80.653089
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 39	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** Mount Airy *e.g. Quad Name:*

A. Geomorphology (Subtotal = 20)	Absent	Weak	Moderate	Strong
1[a] Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	1	2	(3)
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	(3)
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 10)				
12. Presence of Baseflow	0	1	2	(3)
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	0.5	1	(1.5)
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 9)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. 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: Crane fly, stonefly, mayfly, minnows in pools

Sketch:

UT2

NC DWQ Stream Identification Form Version 4.11

Date: 1/26/17	**Project/Site:** Stewarts Creek Trib 5	**Latitude:** 36.517229
Evaluator: RSL	**County:** Surry	**Longitude:** -80.653881
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 38	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** Mount Airy *e.g. Quad Name:*

A. Geomorphology (Subtotal = 19)	Absent	Weak	Moderate	Strong
1[a] Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 10)				
12. Presence of Baseflow	0	1	2	(3)
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	0.5	1	(1.5)
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 9)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. 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: Crayfish, stone fly, mayfly, minnows in pools

Sketch:

UT3

NC DWQ Stream Identification Form Version 4.11

Date: 1/26/17	**Project/Site:** Stewart Creek Trib 5	**Latitude:** 36.517779
Evaluator: RSL	**County:** Surry	**Longitude:** -80.696518
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 37	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** Mount Airy *e.g. Quad Name:*

A. Geomorphology (Subtotal = 18)	Absent	Weak	Moderate	Strong
1[a] Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	1	2	(3)
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	1	(2)	3
9. Grade control	0	0.5	(1)	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 10)				
12. Presence of Baseflow	0	1	2	(3)
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	0.5	1	(1.5)
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 9)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. 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: Cranefly, stonefly, mayfly minnows in pools

Sketch:

Moores Fork

NC DWQ Stream Identification Form Version 4.11

Date: 2/1/17	**Project/Site:** Stewart Creek Trib5	**Latitude:** 36.506709
Evaluator: RSL	**County:** Surry	**Longitude:** -80.696888
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 47	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** Mount Airy *e.g. Quad Name:*

A. Geomorphology (Subtotal = 28)	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 = 10)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	(3)
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	0	0.5	(1)	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 (Other = 0)			

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

Notes: Many caddis, stone and may flies

Sketch:

Appendix 8

USACE WILMINGTON DISTRICT STREAM QUALITY ASSESSMENT FORMS

AND PJD NOTIFICATION

UT3 woods

USACE AID# ____________ DWQ # ____________ Site # ____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Ecosystem Planning & Restore **2.** Evaluator's name: R. Lepsic

3. Date of evaluation: 2/1/18 **4.** Time of evaluation: 12:30 PM

5. Name of stream: UT3 UT to Stewarts **6.** River basin: Yadkin 03040101

7. Approximate drainage area: 0.11 sq. mi **8.** Stream order: 1st

9. Length of reach evaluated: 100' **10.** County: Surry

11. Site coordinates (if known): prefer in decimal degrees. **12.** Subdivision name (if any): NA

Latitude (ex. 34.872312): 36.512279 Longitude (ex. –77.556611): -80.696518

Method location determined (circle): (GPS) Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other____

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): 4.5 Mile west of Mt Airy West of Spencer Road and Druid Road intersection at end of Druid Road

14. Proposed channel work (if any): Stream Restoration

15. Recent weather conditions: Cold rain/snow

16. Site conditions at time of visit: Partly sunny cool

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters X Water Supply Watershed IV (I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:____

19. Does channel appear on USGS quad map? (YES) NO **20.** Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: 10 % Residential ___% Commercial ___% Industrial 10 % Agricultural

80 % Forested ___% Cleared / Logged ___% Other (____)

22. Bankfull width: 3-4' **23**. Bank height (from bed to top of bank): 2-3'

24. Channel slope down center of stream: X Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: X Straight ___Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 48 **Comments:** Section of UT3 through woods. Section is straight and appears channelized. Good canopy cover and wide buffer. Mostly riffle. Cobble beds. Incised and some erosion. No bugs.

Evaluator's Signature [signature] **Date** 2/1/18

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UT3 woods

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	5
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	0
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	4
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	5
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						48

* These characteristics are not assessed in coastal streams.

UT 2

USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Ecosystem Planning + Restoration
2. Evaluator's name: R. Lapsis
3. Date of evaluation: 2/1/18
4. Time of evaluation: 12:00 PM
5. Name of stream: UT 2 UT to Stewarts Cr
6. River basin: Yadkin 03040101
7. Approximate drainage area: 0.07 sq mi
8. Stream order: 1st
9. Length of reach evaluated: 100'
10. County: Surry
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 36.517229 Longitude (ex. -77.556611): -80.653881

Method location determined (circle): (GPS) Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other_____

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): 4.5 mile West of Mt Airy West of Spanger Road and Druid Road intersection at the end of Druid Road

14. Proposed channel work (if any): Stream Restoration

15. Recent weather conditions: Cold rain / snow

16. Site conditions at time of visit: Partly sunny cool

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters X Water Supply Watershed IV (I-IV)

18. Is there a pond or lake located upstream of the evaluation point? (YES) NO If yes, estimate the water surface area: ~1 acre

19. Does channel appear on USGS quad map? (YES) NO

20. Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: 40% Residential ___% Commercial ___% Industrial 10% Agricultural 30% Forested 20% Cleared / Logged ___% Other (_____)

22. Bankfull width: 2-4'

23. Bank height (from bed to top of bank): 2-8'

24. Channel slope down center of stream: ___Flat (0 to 2%) X Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: ___Straight X Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 29 **Comments:** Adjacent to ag field. Left bank good riparian buffer, only right bank with trees. Outside of TOB all Ag field. Stream straight and channelized. Few small head cuts. No bugs Poor habitat

Evaluator's Signature _____ **Date** 2/1/18

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ST2

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	0
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	0
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	1
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	1
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	1
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						29

* These characteristics are not assessed in coastal streams.

UT1 field

USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Ecosystem Planning + Restore. 2. Evaluator's name: R. Lapsis
3. Date of evaluation: 2/1/18 4. Time of evaluation: 11:30 AM
5. Name of stream: UT1 UT to Stewarts Cr 6. River basin: Yadkin 03040101
7. Approximate drainage area: 0.11 sq mi 8. Stream order: 2nd
9. Length of reach evaluated: 500' 10. County: Surry
11. Site coordinates (if known): prefer in decimal degrees. 12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 36.515484 Longitude (ex. -77.556611): -80.653085

Method location determined (circle): (GPS) Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other_____

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): 4.5 West of Mt Airy
West of Sprager Road and David Road intersection at the end of David Rd.

14. Proposed channel work (if any): Stream Restoration
15. Recent weather conditions: cold rain/snow
16. Site conditions at time of visit: Partly sunny cool

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat
___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters X Water Supply Watershed IV (I-IV)

18. Is there a pond or lake located upstream of the evaluation point? (YES) NO If yes, estimate the water surface area: 1/2 acre

19. Does channel appear on USGS quad map? (YES) NO 20. Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: 20% Residential ___% Commercial ___% Industrial 40% Agricultural
40% Forested ___% Cleared / Logged ___% Other (3-10 ft)

22. Bankfull width: 2-4' 23. Bank height (from bed to top of bank):_____

24. Channel slope down center of stream: ___Flat (0 to 2%) X Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: X Straight ___Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse):_____ **Comments:** Section of UT1 located adjacent to agricultural field. Left bank good buffer. Right bank vegetation only on bank. Outside of bank only 4ft. Channel straight and channelized. Extremely incised. Moderate bank erosion. Low channel diversity + habitat. No bugs.

Evaluator's Signature Robert Lapsis **Date** 2/1/18

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GTI Field

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	5
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	0
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	0
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	1
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						26

* These characteristics are not assessed in coastal streams.

UT1 woods

USACE AID#____________ DWQ #____________ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Ecosystem Planning + Restoration **2.** Evaluator's name: R. Lepsik

3. Date of evaluation: 2/1/18 **4.** Time of evaluation: 11:00 AM

5. Name of stream: UT1 UT to Stewarts Cr **6.** River basin: Yadkin 03040101

7. Approximate drainage area: 0.11 sq mi **8.** Stream order: 1st

9. Length of reach evaluated: 200' **10.** County: Surry

11. Site coordinates (if known): prefer in decimal degrees. **12.** Subdivision name (if any): NA

Latitude (ex. 34.872312): 36.515484 Longitude (ex. –77.556611): -80.693089

Method location determined (circle): (GPS) Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other____

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): 4.5 mile West of Mt. Airy West of Sparger Road and Druid Road intersection at the end of Druid Road

14. Proposed channel work (if any): Stream Restoration

15. Recent weather conditions: Cold rain / snow

16. Site conditions at time of visit: Partly sunny cool

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters _X_ Water Supply Watershed _IV_ (I-IV)

18. Is there a pond or lake located upstream of the evaluation point? (YES) NO If yes, estimate the water surface area: 1/2 acre

19. Does channel appear on USGS quad map? (YES) NO **20.** Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: _20_% Residential ___% Commercial ___% Industrial _40_% Agricultural _40_% Forested ___% Cleared / Logged ___% Other (____________)

22. Bankfull width: 2-4' **23.** Bank height (from bed to top of bank): 2-5'

24. Channel slope down center of stream: ___Flat (0 to 2%) _X_ Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: ___Straight ___Occasional bends _X_ Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 43 **Comments:** Section of UT1 located in woods. Woods have been logged 5-10 yrs. Woods also cattle pasture. Significant meanders. Incised and extreme erosion in areas. Good pools and riffles. No bugs. Good canopy coverage. Cattle do not have access to stream.

Evaluator's Signature [signature] **Date** 2/1/18

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UT / woods

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	4
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	0
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	1
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	4
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						43

* These characteristics are not assessed in coastal streams.

UT3 field

USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Ecosystem Planning & Restore **2.** Evaluator's name: R. Lapsis

3. Date of evaluation: 2/1/18 **4.** Time of evaluation: 1:30 PM

5. Name of stream: UT3 UT to Stewarts **6.** River basin: Yadkin 03040101

7. Approximate drainage area: 0.11 sq. mi **8.** Stream order: 1st

9. Length of reach evaluated: 500' **10.** County: Surry

11. Site coordinates (if known): prefer in decimal degrees. **12.** Subdivision name (if any): NA

Latitude (ex. 34.872312): 36.517229 Longitude (ex. -77.556611): -80.696518

Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other Approximately 4 mile west of Mount Airy

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): West of Spencer Road and Druid Road intersection at end of Druid Road

14. Proposed channel work (if any): Stream Restoration

15. Recent weather conditions: Cold rain/snow

16. Site conditions at time of visit: Partly Sunny cool

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters X Water Supply Watershed N/A (I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:_____

19. Does channel appear on USGS quad map? (YES) NO **20.** Does channel appear on USDA Soil Survey? YES NO

21. Estimated watershed land use: 10% Residential ___% Commercial ___% Industrial 50% Agricultural 40% Forested ___% Cleared / Logged ___% Other (_____)

22. Bankfull width: 3-5' **23.** Bank height (from bed to top of bank): 2-8'

24. Channel slope down center of stream: X Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: X Straight ___Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 29 **Comments:** Section of UT3 adjacent to sg field. Little to no buffer on left bank. Right bank wide to maintain, straight & channelized. Incised and some bank erosion. No bug. Poor habitat.

Evaluator's Signature _____ **Date** 2/1/18

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

UT3 field

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	1
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	1
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						29

* These characteristics are not assessed in coastal streams.

Moores Fork

USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Ecosystem Planning + Restoration **2.** Evaluator's name: R. Lepsic

3. Date of evaluation: 2/1/18 **4.** Time of evaluation: 4:15PM

5. Name of stream: Moores Fork **6.** River basin: Yadkin 03040101

7. Approximate drainage area: 4.4 sq mi **8.** Stream order: 3rd

9. Length of reach evaluated: 1000' **10.** County: Surry

11. Site coordinates (if known): prefer in decimal degrees. **12.** Subdivision name (if any): NA

Latitude (ex. 34.872312): 36.506209 Longitude (ex. -77.556611): -80.656588

Method location determined (circle): (GPS) Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other_____

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):

Approximately 5 miles west of Mount Airy upstream of RaceTrack Road

14. Proposed channel work (if any): Stream Restoration

15. Recent weather conditions: Cold rain/snow

16. Site conditions at time of visit: Partly sunny cool

17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat

___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters X Water Supply Watershed IV (I-IV)

18. Is there a pond or lake located upstream of the evaluation point? (YES) NO If yes, estimate the water surface area: +5 acres

19. Does channel appear on USGS quad map? (YES) NO **20.** Does channel appear on USDA Soil Survey? (YES) NO

21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 35 % Agricultural

45 % Forested 15 % Cleared / Logged ___% Other (_____)

22. Bankfull width: 20-30 ft **23.** Bank height (from bed to top of bank): 3-8 ft

24. Channel slope down center of stream: X Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)

25. Channel sinuosity: ___Straight X Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 44 **Comments:** Moores Fork flows through pasture and agricultural fields. Cattle have direct access to stream. Very narrow to no buffer. Very little canopy cover. Incised with significant bank erosion. Significant bedrock. Riffle-pool complex. Few minnows. Many caddis fly & mayflies.

Evaluator's Signature _____ **Date** 2/1/18

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

Mountain Fork

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	5
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	1
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	5
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	0
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	6
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	1
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						44

* These characteristics are not assessed in coastal streams.

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID: **SAW-2017-01508** County: **Surry** U.S.G.S. Quad: **Cana**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner: **Kevin Tweedy**
Address: **559 Jones Franklin Road, Suite 150**
Raleigh, NC 27606
Telephone Number: **919-388-0787**

Size (acres): **30 acres** Nearest Town: **Mt Airy**
Nearest Waterway: **Stewarts Creek** Coordinates: **36.505533, -80.694492**
River Basin/ HUC: **Upper Yadkin**

Location description: **The site is located approximately five miles west of Mount Airy, North of NC89, and along Race Track Road.**

Indicate Which of the Following Apply:

A. Preliminary Determination

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

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

B. Approved Determination

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

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

_ We recommend you have the waters of the U.S. on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

_ The waters of the U.S. including wetlands on your project area have been delineated and the delineation has been verified by the Corps. If you wish to have the delineation surveyed, the Corps can review and verify the survey upon completion. Once verified, this survey will provide an accurate depiction of all areas subject to CWA and/or RHA

jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

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

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

_ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management to determine their requirements.

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **William Elliott** at **828-271-7980**, **ext. 4225** or **amanda.jones@usace.army.mil**.

C. Basis for Determination:

See attached preliminary jurisdictional determination form.

The stream channel on the property is known as Moore's Fork and unnamed tributaries (UT) to" **Stewarts Creek** which flows into the **Upper Yadkin** River.

D. Remarks:

The potential waters of the U.S., at this site, were verified on-site by the Corps on November 7, 2018 and are as approximately depicted on the attached Potential Wetland/Waters Map

E. Attention USDA Program Participants

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

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

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

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

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

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

Corps Regulatory Official: ELLIOTT.WILLIAM.ANTHONY.1048694604 Digitally signed by ELLIOTT.WILLIAM.ANTHONY.1048694604 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ELLIOTT.WILLIAM.ANTHONY.1048694604 Date: 2019.03.19 15:53:37 -04'00'

William Elliott

Issue Date of JD: **March 19, 2019** Expiration Date: N/A Preliminary JD

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete our Customer Satisfaction Survey, located online at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0.

Copy furnished:

Gail H. Hiatt 453 Race Track Rd., Mount Airy, NC 27030,

Brent Hull 579 Maple Hollow Rd. Mount Airy, NC 27030

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL		
Applicant: **Kevin Tweedy**	File Number: **SAW-SAW-2017-01508**	Date: **March 19, 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 http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx or Corps regulations at 33 CFR Part 331.

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

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

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

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

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

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

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

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

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT		
REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)		
ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.		
POINT OF CONTACT FOR QUESTIONS OR INFORMATION:		
If you have questions regarding this decision and/or the appeal process you may contact: **District Engineer, Wilmington Regulatory Division,** **Attn: William Elliott** **151 Patton Avenue, Room 208** **Asheville, North Carolina 28801-5006** **828-271-7980, ext. 4232**	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.: William Elliott, 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 (JD) FORM
U.S. Army Corps of Engineers

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PRELIMINARY JD: March 19, 2019

B. **NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:**
Kevin Tweedy
559 Jones Franklin Road, Suite 150
Raleigh, NC 27606

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:
CESAW-RG-A, SAW-2017-01508,

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
The site is located approximately five miles west of Mount Airy, North of NC89, and along Race Track Road.

State: **NC** County/parish/borough: **Surry** City: **Mt Airy**
Center coordinates of site (lat/long in degree decimal format): **36.505533, -80.694492**
Universal Transverse Mercator: **N/A**
Name of nearest waterbody: **Stewarts Creek**

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date: **March 19, 2019**
☒ Field Determination. Date(s): **11/7/2018**

Use the table below to document aquatic resources and/or aquatic resources at different sites

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

Site Number	Centered Coordinates (decimal degrees) Latitude	Longitude	Estimated Amount of Aquatic Resource in Review Area (linear feet or acre)	Type of Aquatic Resources	Geographic Authority to Which Aquatic Resource "May Be" Subject
Moore's Fork	36.5071	-80.6977	3605 lf	☐ Wetland ☒ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
UT1	36.5160	-80.6934	2247 lf	☐ Wetland ☒ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
UT2	36.5175	-80.6941	78 lf	☐ Wetland ☒ Non-wetland Waters	☒ Section 404 ☐ Section 10/404
UT3	36.5180	-80.6972	912 lf	☐ Wetland ☒ Non-wetland Waters	☐ Section 404 ☒ Section 10/404
				☐ Wetland ☐ Non-wetland Waters	☐ Section 404 ☐ Section 10/404
				☐ Wetland ☐ Non-wetland Waters	☐ Section 404 ☐ Section 10/404
				☐ Wetland ☐ Non-wetland Waters	☐ Section 404 ☐ Section 10/404
				☐ Wetland ☐ Non-wetland Waters	☐ Section 404 ☐ Section 10/404

1. The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

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

SUPPORTING DATA

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

☒ Maps, plans, plots or plat submitted by or on behalf of preliminary JD requester:
☒ Data sheets prepared/submitted by or on behalf of preliminary JD requester.
  ☒ Office concurs with data sheets/delineation report.
  ☐ Office does not concur with data sheets/delineation report. Rational:
☐ Data sheets prepared by the Corps:
☐ Corps navigable waters' study:
☐ U.S. Geological Survey (USGS) Hydrologic Atlas:
  ☐ USGS NHD data.
  ☐ USGS 8 and 12 digit HUC maps.
☒ USGS map(s). Cite scale & quad name: **Cana.**
☒ Natural Resources Conservation Service (NRCS) Soil Survey.
  Citation: **Surry County, NC**
☐ National wetlands inventory (NWI) map(s). Cite name:
☐ State/Local wetland inventory map(s):
☐ Federal Emergency Management Agency (FEMA) / Flood Insurance Rate Map (FIRM) maps:
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): **NC 2014 Statewide Aerial Photography**
  or ☐ Other (Name & Date):
☐ Previous determination(s). File no. and date of response letter:
☐ Applicable/supporting scientific literature:
☐ Other information (please specify):

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

ELLIOTT.WILLIAM.ANTHONY.1048694604
Digitally signed by ELLIOTT.WILLIAM.ANTHONY.1048694604
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ELLIOTT.WILLIAM.ANTHONY.1048694604
Date: 2019.03.19 15:54:20 -04'00'

William Elliott, March 19, 2019
Signature and date of Regulatory staff member completing preliminary JD

Signature on File

Kevin Tweedy
Signature and date of person requesting preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

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

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

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

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

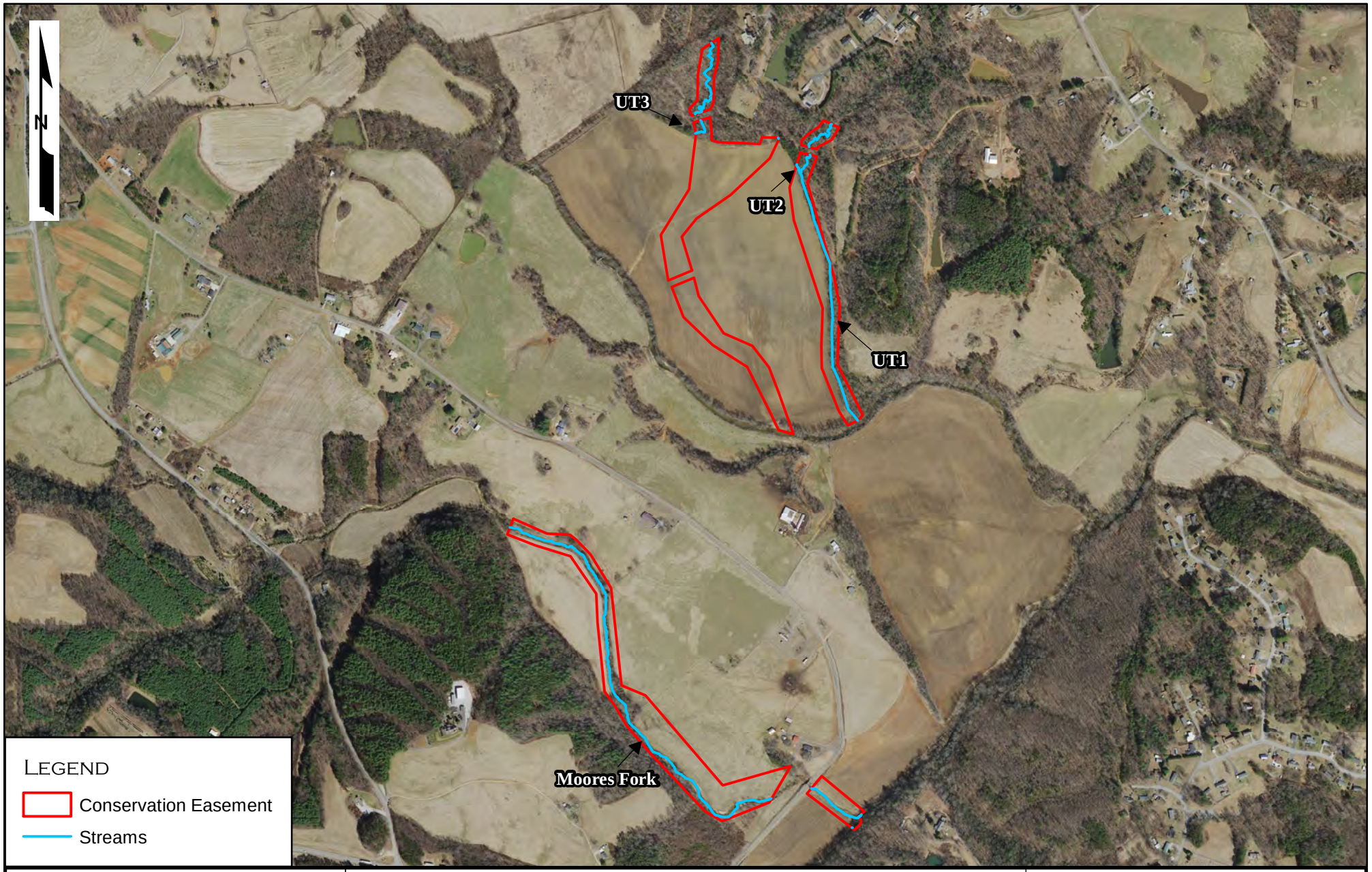
Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- [x] Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
  Map: Vicinity Map.
- [ ] 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.
- [x] U.S. Geological Survey map(s). Cite scale & quad name: Cana 1:24,000 USGS Quadrangle Map.
- [x] Natural Resources Conservation Service Soil Survey. Citation: USDA Web Soil Survey.
- [ ] National wetlands inventory map(s). Cite name: _____.
- [ ] State/local wetland inventory map(s): _____.
- [ ] FEMA/FIRM maps: _____.
- [ ] 100-year Floodplain Elevation is: _____.(National Geodetic Vertical Datum of 1929)
- [x] Photographs: [x] Aerial (Name & Date): NC 2014 Statewide Aerial Photography.
  or [ ] Other (Name & Date): _____.
- [ ] Previous determination(s). File no. and date of response letter: _____.
- [ ] Other information (please specify): _____.

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

_____	Kevin Tweedy Digitally signed by Kevin Tweedy Date: 2018.07.09 14:45:04 -04'00'
Signature and date of Regulatory staff member completing PJD	Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable)[1]

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



0 750 1,500 Feet

STEWARTS CREEK TRIBUTARIES STREAM RESTORATION PROJECT

JURISDICTIONAL FEATURES (OVERVIEW)

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION

FIGURE 3

SURRY COUNTY, NC

DATE:
NOVEMBER 2018

Appendix 9

INVASIVE SPECIES

INVASIVE SPECIES CONTROL PLAN

Invasive species vegetation identified at the Site prior to construction was sparse and confined to the stream channel corridor. Common invasive species vegetation found at the Site include Chinese privet (*Ligustrum sinense*), mulitiflora rose (*Rosa multiflora*), and Japanese honeysuckle (*Lonicerea japonica*). During construction, the existing invasive vegetation species will be controlled using mechanical methods.

During the monitoring period, the Site will be reviewed annually to locate and to quantify any residual invasive species vegetation. If invasive species are identified at the Site during the monitoring period, their location and extent will be shown on the current condition plan view (CCPV). A corresponding discussion will be included in the annual monitoring report outlining the proposed management plan. Invasive species vegetation will be managed and reviewed on an annual basis to minimize its long-term impact to planted native species. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.

Invasive species will be managed and controlled using a combination of chemical and/or mechanical methods to ensure that these species comprise less than 5% of the total easement acreage. Management and control will continue throughout the project until this percentage is achieved.

Appendix 10

APPROVED FHWA CATEGORICAL EXCLUSION FORMS

Ecosystem Planning and Restoration, LLC
559 Jones Franklin Road, Suite 150
Raleigh, NC 27606

Phone: (919) 388-0787
www.eprusa.net

September 28, 2017

Paul Wiesner
Western Regional Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services (NCDMS)
Western DMS Field Office
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

RE: Stewarts Creek Tributaries Stream Restoration
Surry County, North Carolina
NCDMS Project # 100023

Dear Mr. Wiesner,

Attached is the Categorical Exclusion Form for NCDMS Projects (Version 1.4) and associated supporting documentation. The following is a brief discussion of applicable regulations and associated coordination with the subject agencies, as appropriate.

Comprehensive Environmental Resources, Compensation and Liability Act

The June 2, 2017 EDR report did not identify any known or potential hazardous waste sites within or adjacent to the project area.

National Historic Preservation Act (Section 106)

The North Carolina Department of Natural and Cultural Resources, State Historic Preservation Office (NCSHPO) did not identify historic resources that would be affected by the project. The July 19, 2017 correspondence from NCSHPO is attached.

Uniform Relocation Assistance and Real Property Acquisition Policies Act

Page 1 Paragraph 5 of the attached executed Option to Purchase Conservation Easement informed the property owners that the acquiring entity does not have condemnation authority and that fair market value is being offered for the easement.

Endangered Species Act, Fish and Wildlife Coordination Act, and Migratory Bird Treaty Act

The US Fish and Wildlife Service was contacted June 22, 2017 requesting a response within 45 days (correspondence attached). No response was received. The biological conclusion for NLEB in the June 22 letter was given as “May Affect, Not Likely to Adversely Affect.” Our understanding is that the correct biological conclusion for the NLEB should be termed “May Affect,” and so we have revised the biological conclusion accordingly. A Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form and figures are attached for the FHWA to send to the US Fish and Wildlife Service.

The North Carolina Wildlife Resources Commission (NCWRC) did not identify any federally or state protected species within or adjacent to the project area. NCWRC recommends establishing a native riparian buffer and minimizing sedimentation from construction practices. These recommendations will be incorporated in the project design. The July 24, 2017 correspondence from NCWRC is attached.

Farmland Protection Policy Act

The completed NRCS Form AD-1006 is attached.

Please contact me at the above phone number or address with any questions.

Sincerely,

Kevin Tweedy, PE

Appendix A

Categorical Exclusion Form for Division of Mitigation Services Program Projects
Version 1.4

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

Part 1: General Project Information	
Project Name:	Stewarts Creek Tributaries
County Name:	Surry County
NCDMS Number:	100023
Project Sponsor:	Ecosystem Planning and Restoration, PLLC
Project Contact Name:	Kevin Tweedy, PE
Project Contact Address:	559 Jones Franklin Road, Suite 150, Raleigh NC 27606
Project Contact E-mail:	ktweedy@eprusa.net
NCDMS Project Manager:	Paul Wiesner

Project Description

The project involves the restoration and enhancement of over 11,000 linear feet of perennial tributaries to Stewarts Creek. Restoration practices will involve raising the streambeds of the smaller tributaries and restoring them to their historic locations. Larger stream reaches will consist of both restoration and enhancement.

For Official Use Only

Reviewed By:

10/2/2017
Date

NCDMS Project Manager

Conditional Approved By:

Date

For Division Administrator FHWA

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

Final Approval By:

9-29-17
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

EDR REPORT

Stewarts Creek
Race Track Road
Mount Airy, NC 27030

Inquiry Number: 4954878.9s
June 02, 2017

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) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

RACE TRACK ROAD
MOUNT AIRY, NC 27030

COORDINATES

Latitude (North):	36.5100630 - 36˚ 30' 36.22''
Longitude (West):	80.6953900 - 80˚ 41' 43.40''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	527276.6
UTM Y (Meters):	4040365.5
Elevation:	1156 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5949922 CANA, VA
Version Date:	2013
South Map:	5947705 DOBSON, NC
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140524
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
RACE TRACK ROAD
MOUNT AIRY, NC 27030

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
1	SLI SERVICE CENTER	3030 W. PINE STREET	UST	Lower	2554, 0.484, South
2	MOUNTAIN LUMBER COMP	2971 W. PINE ST.	LUST	Higher	2686, 0.509, SSE
A3	MOUNTAIN LUMBER COMP	2871 WEST PINE STREE	LUST TRUST	Higher	2960, 0.561, SSE
A4	MOUNTAIN LUMBER CO.	2871 WEST PINE ST.	IMD	Higher	2960, 0.561, SSE

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

State and tribal leaking storage tank lists

LAST..... Leaking Aboveground Storage Tanks
INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing
AST..... AST Database
INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL..... No Further Action Sites With Land Use Restrictions Monitoring

State and tribal voluntary cleanup sites

INDIAN VCP..... Voluntary Cleanup Priority Listing
VCP..... Responsible Party Voluntary Action Sites

State and tribal Brownfields sites

BROWNFIELDS..... Brownfields Projects Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

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

Local Lists of Landfill / Solid Waste Disposal Sites

HIST LF..... Solid Waste Facility Listing
SWRCY..... Recycling Center Listing
INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands

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
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
DOCKET HWC Hazardous Waste Compliance Docket Listing
UXO Unexploded Ordnance Sites
ECHO Enforcement & Compliance History Information
FUELS PROGRAM EPA Fuels Program Registered Listing
COAL ASH Coal Ash Disposal Sites
DRYCLEANERS Drycleaning Sites
Financial Assurance Financial Assurance Information Listing
NPDES NPDES Facility Location Listing
UIC Underground Injection Wells Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP EDR Proprietary Manufactured Gas Plants
EDR Hist Auto EDR Exclusive Historic Gas Stations
EDR Hist Cleaner EDR Exclusive Historic Dry Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

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

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incidents Management Database contains an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environment, & Natural Resources' Incidents by Address.

A review of the LUST list, as provided by EDR, and dated 11/07/2016 has revealed that there is 1 LUST site within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MOUNTAIN LUMBER COMP Incident Phase: Response Incident Number: 7530 Current Status: File Located in House	2971 W. PINE ST.	SSE 1/2 - 1 (0.509 mi.)	2	11

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

A review of the LUST TRUST list, as provided by EDR, and dated 01/06/2017 has revealed that there is 1 LUST TRUST site within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MOUNTAIN LUMBER COMP Facility Id: 0-008619 Site ID: 7530	2871 WEST PINE STREE	SSE 1/2 - 1 (0.561 mi.)	A3	13

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environment & Natural Resources' Petroleum Underground Storage Tank Database.

A review of the UST list, as provided by EDR, and dated 09/30/2016 has revealed that there is 1 UST site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
SLI SERVICE CENTER Tank Status: Removed Facility Id: 00-2-0000009404 Facility Id: 00-0-0000009404	3030 W. PINE STREET	S 1/4 - 1/2 (0.484 mi.)	1	8

ADDITIONAL ENVIRONMENTAL RECORDS

Records of Emergency Release Reports

IMD: Incident Management Database.

A review of the IMD list, as provided by EDR, and dated 07/21/2006 has revealed that there is 1 IMD site within approximately 0.75 miles of the target property.

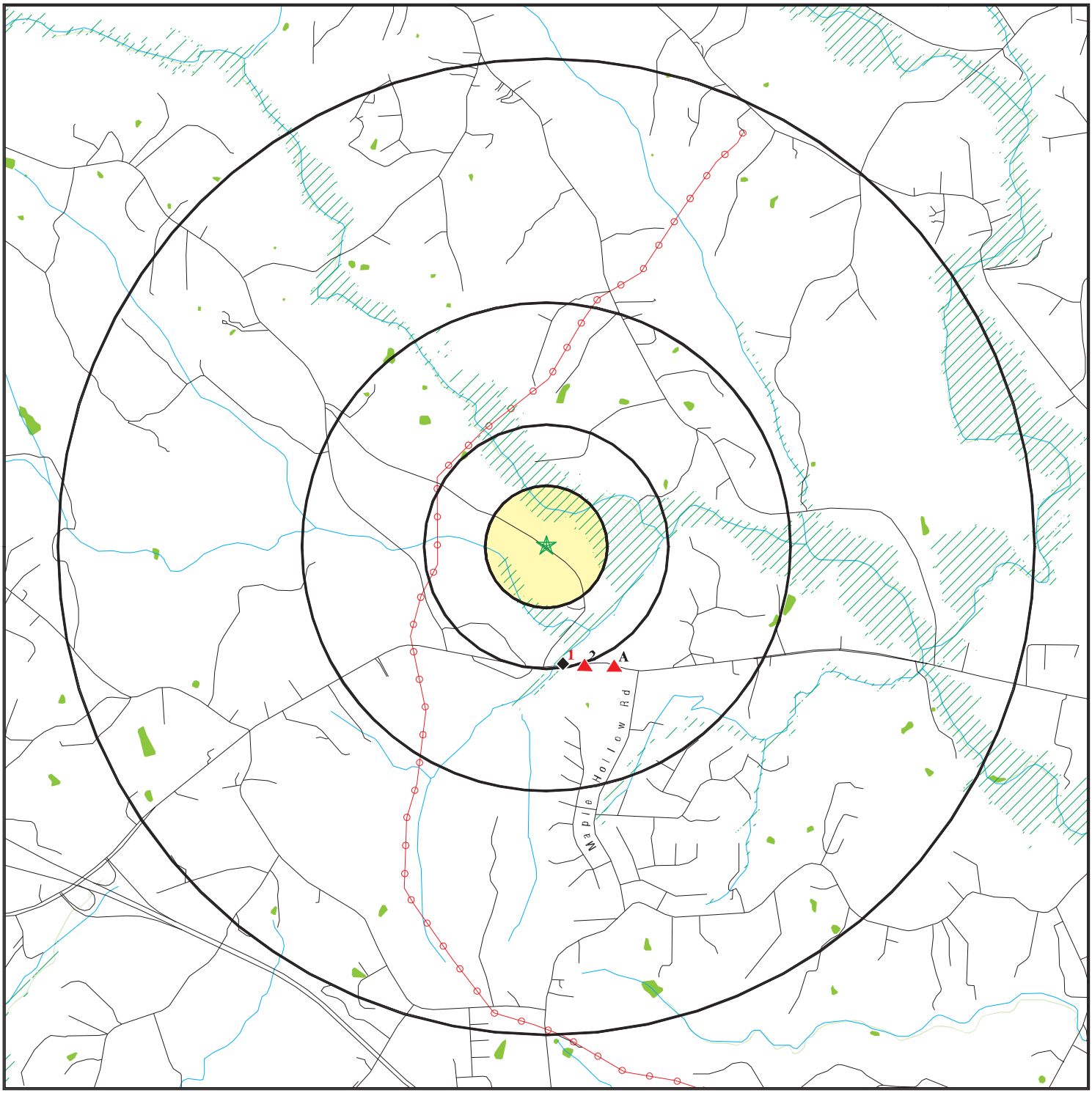
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MOUNTAIN LUMBER CO. Facility Id: 7530	2871 WEST PINE ST.	SSE 1/2 - 1 (0.561 mi.)	A4	13

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 3 records.

Site Name	Database(s)
PUCKETT'S GROCERY	LUST
SURRY PLAZA	LUST
PUCKETT'S GROCERY	LUST TRUST

OVERVIEW MAP - 4954878.9S

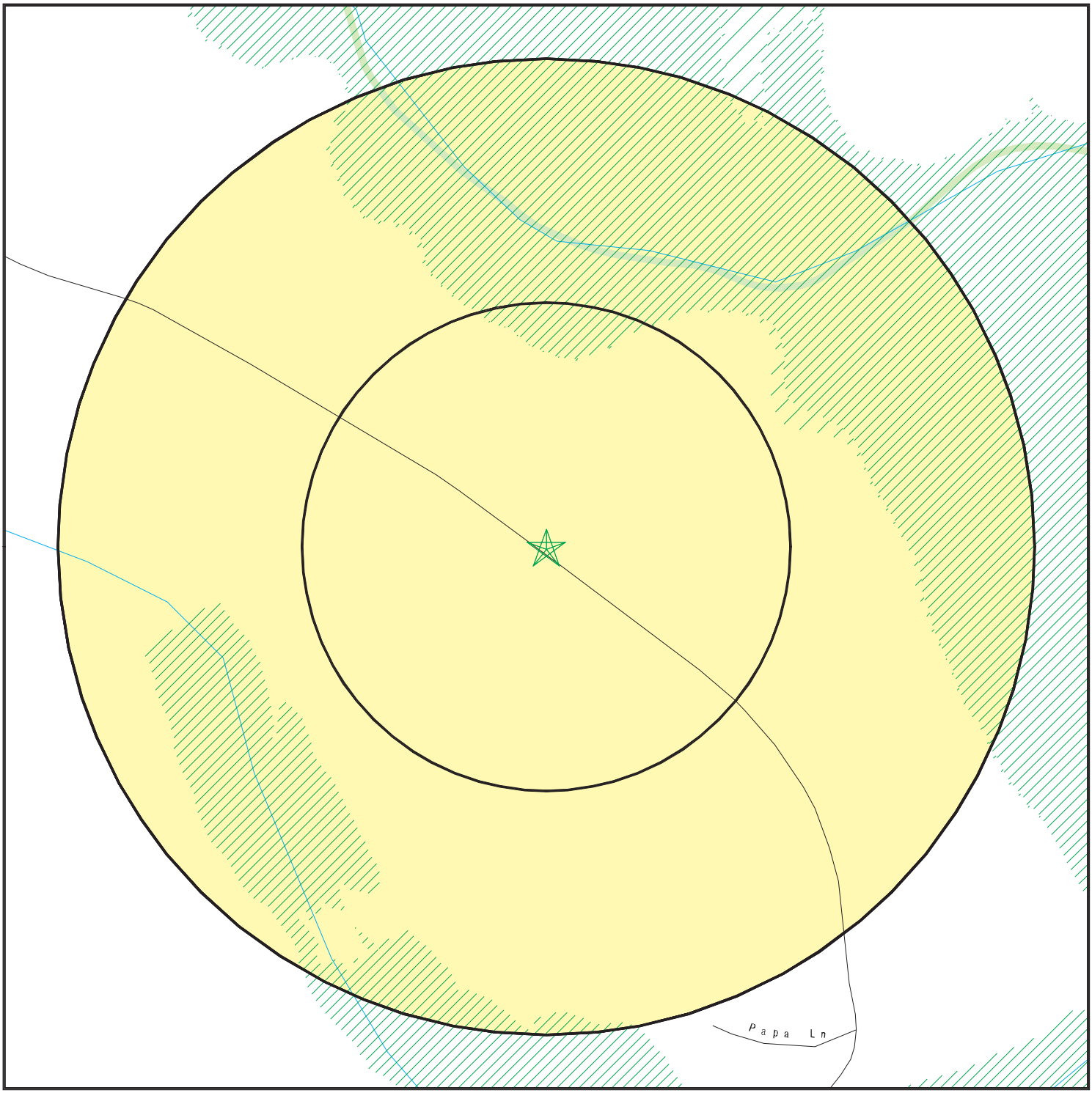


- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year 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: Stewarts Creek ADDRESS: Race Track Road Mount Airy NC 27030 LAT/LONG: 36.510063 / 80.69539	CLIENT: Ecosystem Planning and Restoration CONTACT: Robert Lepsic INQUIRY #: 4954878.9s DATE: June 02, 2017 11:11 am

DETAIL MAP - 4954878.9S



0 1/16 1/8 1/4 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- 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: Stewarts Creek ADDRESS: Race Track Road Mount Airy NC 27030 LAT/LONG: 36.510063 / 80.69539	CLIENT: Ecosystem Planning and Restoration CONTACT: Robert Lepsic INQUIRY #: 4954878.9s DATE: June 02, 2017 11:14 am

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.250		0	0	0	0	0	0
Proposed NPL	1.250		0	0	0	0	0	0
NPL LIENS	0.250		0	0	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.250		0	0	0	0	0	0
Federal CERCLIS list								
FEDERAL FACILITY	0.750		0	0	0	0	NR	0
SEMS	0.750		0	0	0	0	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.750		0	0	0	0	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.250		0	0	0	0	0	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.750		0	0	0	0	NR	0
Federal RCRA generators list								
RCRA-LQG	0.500		0	0	0	NR	NR	0
RCRA-SQG	0.500		0	0	0	NR	NR	0
RCRA-CESQG	0.500		0	0	0	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.750		0	0	0	0	NR	0
US ENG CONTROLS	0.750		0	0	0	0	NR	0
US INST CONTROL	0.750		0	0	0	0	NR	0
Federal ERNS list								
ERNS	0.250		0	0	NR	NR	NR	0
State- and tribal - equivalent NPL								
NC HSDS	1.250		0	0	0	0	0	0
State- and tribal - equivalent CERCLIS								
SHWS	1.250		0	0	0	0	0	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.750		0	0	0	0	NR	0
OLI	0.750		0	0	0	0	NR	0
State and tribal leaking storage tank lists								
LUST	0.750		0	0	0	1	NR	1

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
LAST	0.750		0	0	0	0	NR	0
INDIAN LUST	0.750		0	0	0	0	NR	0
LUST TRUST	0.750		0	0	0	1	NR	1
State and tribal registered storage tank lists								
FEMA UST	0.500		0	0	0	NR	NR	0
UST	0.500		0	0	1	NR	NR	1
AST	0.500		0	0	0	NR	NR	0
INDIAN UST	0.500		0	0	0	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.750		0	0	0	0	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.750		0	0	0	0	NR	0
VCP	0.750		0	0	0	0	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.750		0	0	0	0	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.750		0	0	0	0	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
HIST LF	0.750		0	0	0	0	NR	0
SWRCY	0.750		0	0	0	0	NR	0
INDIAN ODI	0.750		0	0	0	0	NR	0
DEBRIS REGION 9	0.750		0	0	0	0	NR	0
ODI	0.750		0	0	0	0	NR	0
IHS OPEN DUMPS	0.750		0	0	0	0	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.250		0	0	NR	NR	NR	0
US CDL	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS 2	0.250		0	0	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.250		0	0	NR	NR	NR	0
SPILLS	0.250		0	0	NR	NR	NR	0
IMD	0.750		0	0	0	1	NR	1
SPILLS 90	0.250		0	0	NR	NR	NR	0
SPILLS 80	0.250		0	0	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	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
FUDS	1.250		0	0	0	0	0	0
DOD	1.250		0	0	0	0	0	0
SCRD DRYCLEANERS	0.750		0	0	0	0	NR	0
US FIN ASSUR	0.250		0	0	NR	NR	NR	0
EPA WATCH LIST	0.250		0	0	NR	NR	NR	0
2020 COR ACTION	0.500		0	0	0	NR	NR	0
TSCA	0.250		0	0	NR	NR	NR	0
TRIS	0.250		0	0	NR	NR	NR	0
SSTS	0.250		0	0	NR	NR	NR	0
ROD	1.250		0	0	0	0	0	0
RMP	0.250		0	0	NR	NR	NR	0
RAATS	0.250		0	0	NR	NR	NR	0
PRP	0.250		0	0	NR	NR	NR	0
PADS	0.250		0	0	NR	NR	NR	0
ICIS	0.250		0	0	NR	NR	NR	0
FTTS	0.250		0	0	NR	NR	NR	0
MLTS	0.250		0	0	NR	NR	NR	0
COAL ASH DOE	0.250		0	0	NR	NR	NR	0
COAL ASH EPA	0.750		0	0	0	0	NR	0
PCB TRANSFORMER	0.250		0	0	NR	NR	NR	0
RADINFO	0.250		0	0	NR	NR	NR	0
HIST FTTS	0.250		0	0	NR	NR	NR	0
DOT OPS	0.250		0	0	NR	NR	NR	0
CONSENT	1.250		0	0	0	0	0	0
INDIAN RESERV	1.250		0	0	0	0	0	0
FUSRAP	1.250		0	0	0	0	0	0
UMTRA	0.750		0	0	0	0	NR	0
LEAD SMELTERS	0.250		0	0	NR	NR	NR	0
US AIRS	0.250		0	0	NR	NR	NR	0
US MINES	0.500		0	0	0	NR	NR	0
ABANDONED MINES	0.500		0	0	0	NR	NR	0
FINDS	0.250		0	0	NR	NR	NR	0
DOCKET HWC	0.250		0	0	NR	NR	NR	0
UXO	1.250		0	0	0	0	0	0
ECHO	0.250		0	0	NR	NR	NR	0
FUELS PROGRAM	0.500		0	0	0	NR	NR	0
COAL ASH	0.750		0	0	0	0	NR	0
DRYCLEANERS	0.500		0	0	0	NR	NR	0
Financial Assurance	0.250		0	0	NR	NR	NR	0
NPDES	0.250		0	0	NR	NR	NR	0
UIC	0.250		0	0	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.250		0	0	0	0	0	0
EDR Hist Auto	0.375		0	0	0	NR	NR	0
EDR Hist Cleaner	0.375		0	0	0	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
RGA LF	0.250		0	0	NR	NR	NR	0
RGA LUST	0.250		0	0	NR	NR	NR	0
- Totals --		0	0	0	1	3	0	4

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1
South
1/4-1/2
0.484 mi.
2554 ft.

SLI SERVICE CENTER
3030 W. PINE STREET
MOUNT AIRY, NC 27030

UST **U001191967**
N/A

Relative:
Lower

Actual:
1118 ft.

UST:

Facility Id:	00-2-0000009404
Contact:	G&B OIL CO DBA PIEDMONT COAL/OIL
Contact Address1:	410 E. 2ND STREET
Contact Address2:	Not reported
Contact City/State/Zip:	WINSTON-SALEM, NC 27101
FIPS County Desc:	Surry
Latitude:	0
Longitude:	0

Tank Id:	1
Tank Status:	Removed
Installed Date:	01/01/1990
Perm Close Date:	09/25/1991
Product Key:	1
Product Name:	Diesel
Tank Capacity:	4000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Tank Construction:	Single Wall Steel
Piping Construction:	Other
Piping System Key:	Unknown
Other CP Tank:	Not reported
Overfill Protection Key:	1
Overfill Protection Name:	Unknown
Spill Protection Key:	1
Spill Protection Name:	Unknown
Leak Detection Key:	-1
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	other
Decode for PSYS_KEY:	Unknown

Tank Id:	2
Tank Status:	Removed
Installed Date:	01/01/1990
Perm Close Date:	09/25/1991
Product Key:	8
Product Name:	Kerosene, Kero Mix
Tank Capacity:	2000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Tank Construction:	Double Wall Steel
Piping Construction:	Other

SLI SERVICE CENTER (Continued) **U001191967**

Piping System Key:	Unknown
Other CP Tank:	Not reported
Overfill Protection Key:	1
Overfill Protection Name:	Unknown
Spill Protection Key:	1
Spill Protection Name:	Unknown
Leak Detection Key:	-1
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Double Wall Steel
Decode for PCONS_KEY:	other
Decode for PSYS_KEY:	Unknown

Tank Id:	35-001
Tank Status:	Removed
Installed Date:	05/14/1958
Perm Close Date:	02/28/1999
Product Key:	8
Product Name:	Kerosene, Kero Mix
Tank Capacity:	550
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Tank Construction:	Single Wall Steel
Piping Construction:	Single Wall Steel
Piping System Key:	Unknown
Other CP Tank:	Not reported
Overfill Protection Key:	1
Overfill Protection Name:	Unknown
Spill Protection Key:	1
Spill Protection Name:	Unknown
Leak Detection Key:	-1
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	59-006
Tank Status:	Removed
Installed Date:	05/08/1958
Perm Close Date:	02/28/1999
Product Key:	1
Product Name:	Diesel
Tank Capacity:	550
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Tank Construction:	Single Wall Steel
Piping Construction:	Single Wall Steel
Piping System Key:	Unknown

SLI SERVICE CENTER (Continued) **U001191967**

Other CP Tank:	Not reported
Overfill Protection Key:	1
Overfill Protection Name:	Unknown
Spill Protection Key:	1
Spill Protection Name:	Unknown
Leak Detection Key:	-1
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	61-005
Tank Status:	Removed
Installed Date:	05/07/1960
Perm Close Date:	02/28/1999
Product Key:	3
Product Name:	Gasoline, Gas Mix
Tank Capacity:	4000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Tank Construction:	Single Wall Steel
Piping Construction:	Single Wall Steel
Piping System Key:	Unknown
Other CP Tank:	Not reported
Overfill Protection Key:	1
Overfill Protection Name:	Unknown
Spill Protection Key:	1
Spill Protection Name:	Unknown
Leak Detection Key:	-1
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	61-006
Tank Status:	Removed
Installed Date:	05/07/1960
Perm Close Date:	02/28/1999
Product Key:	3
Product Name:	Gasoline, Gas Mix
Tank Capacity:	8000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Tank Construction:	Single Wall Steel
Piping Construction:	Single Wall Steel
Piping System Key:	Unknown
Other CP Tank:	Not reported

SLI SERVICE CENTER (Continued) **U001191967**

Overfill Protection Key:	1
Overfill Protection Name:	Unknown
Spill Protection Key:	1
Spill Protection Name:	Unknown
Leak Detection Key:	-1
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	62-002
Tank Status:	Removed
Installed Date:	05/07/1962
Perm Close Date:	02/28/1999
Product Key:	3
Product Name:	Gasoline, Gas Mix
Tank Capacity:	8000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Tank Construction:	Single Wall Steel
Piping Construction:	Single Wall Steel
Piping System Key:	Unknown
Other CP Tank:	Not reported
Overfill Protection Key:	1
Overfill Protection Name:	Unknown
Spill Protection Key:	1
Spill Protection Name:	Unknown
Leak Detection Key:	-1
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

2
SSE
1/2-1
0.509 mi.
2686 ft.

MOUNTAIN LUMBER COMPANY **LUST** **1005540680**
2971 W. PINE ST. **N/A**
MOUNT AIRY, NC 27030

Relative:
Higher

Actual:
1156 ft.

LUST:

Facility ID:	00-0-000	
UST Number:	WS-2906	
Incident Number:	7530	
Contamination Type:		GW
Source Type:	Leak-underground	
Product Type:	P	
Date Reported:	03/12/1992	
Date Occur:	05/16/1990	
Cleanup:	09/30/2001	
Closure Request:	Not reported	
Close Out:	Not reported	
Level Of Soil Cleanup Achieved:		Not reported
Tank Regulated Status:		R

MOUNTAIN LUMBER COMPANY (Continued) **1005540680**

# Of Supply Wells:	0
Commercial/NonCommercial UST Site:	COMMERCIAL
Risk Classification:	L
Risk Class Based On Review:	H
Corrective Action Plan Type:	natural attenuation (not an L-CAP
NOV Issue Date:	Not reported
NORR Issue Date:	06/13/2002
Site Priority:	C025
Phase Of LSA Req:	2
Site Risk Reason:	Not reported
Land Use:	Industrial/commercial
MTBE:	No
MTBE1:	No
Flag:	No
Flag1:	No
LUR Filed:	Not reported
Release Detection:	0
Current Status:	File Located in House
RBCA GW:	Not reported
PETOPT:	3
RPL:	False
CD Num:	0
Reel Num:	0
RPOW:	True
RPOP:	False
Error Flag:	0
Error Code:	N
Valid:	False
Lat/Long Decimal:	36.5008 -80.7133
Testlat:	Not reported
Regional Officer Project Mgr:	SBW
Region:	WS
Company:	HARRELL OIL COMPANY
Contact Person:	J. K. HARRELL
Telephone:	Not reported
RP Address:	PO BOX 1947
RP City,St,Zip:	MT. AIRY, NC 27030
RP County:	Not reported
Comments:	Funding resumed issued 10/20/2008, Requested receptor survey and sampling event of potable wells and monitoring wells
5 Min Quad:	Not reported
Last Modified:	Not reported
Incident Phase:	**Response**
NOV Issued:	Not reported
NORR Issued:	2008-10-20 00:00:00
45 Day Report:	Not reported
Public Meeting Held:	Not reported
Corrective Action Planned:	Not reported
SOC Signed:	Not reported
Reclassification Report:	Not reported
RS Designation:	Not reported
Closure Request Date:	Not reported
Close-out Report:	Not reported

A3 **MOUNTAIN LUMBER COMPANY** **LUST TRUST** **S117692160**
SSE **2871 WEST PINE STREET** **N/A**
1/2-1 **MOUNT AIRY, NC**
0.561 mi.
2960 ft. **Site 1 of 2 in cluster A**

Relative:
Higher

Actual:
1210 ft.

LUST TRUST:

Facility ID:	0-008619
Site ID:	7530
Site Note:	Not reported
Site Eligible?:	True
Commercial Find:	100% Commercial
Priority Rank:	Not reported
Deductable Amount:	50000
3rd Party Deductable Amt:	0
Sum 3rd Party Amt Applied:	0

A4 **MOUNTAIN LUMBER CO.** **IMD** **S105119773**
SSE **2871 WEST PINE ST.** **N/A**
1/2-1 **MT. AIRY, NC**
0.561 mi.
2960 ft. **Site 2 of 2 in cluster A**

Relative:
Higher

Actual:
1210 ft.

IMD:

Region:	WS
Facility ID:	7530
Date Occurred:	3/2/1992
Submit Date:	4/21/1992
GW Contam:	Not reported
Soil Contam:	Yes
Incident Desc:	UPON REMOVAL OF UST, SOIL CONTAMINATION WAS DISCOVERED.
Operator:	J. K. HARRELL
Contact Phone:	Not reported
Owner Company:	HARRELL OIL
Operator Address:	814-16 FORREST DR.
Operator City:	MT. AIRY
Oper City,St,Zip:	MT. AIRY, NC 27030
Ownership:	Private
Operation:	Commercial
Material:	DIESEL
Qty Lost 1:	Not reported
Qty Recovered 1:	NONE
Source:	Leak-underground
Type:	Gasoline/diesel
Location:	Facility
Setting:	Urban
Risk Site:	Yes
Site Priority:	025C
Priority Code:	L
Priority Update:	5/30/1998
Dem Contact:	Not reported
Wells Affected:	Not reported
Num Affected:	0
Wells Contam:	Not reported
Sampled By:	Not reported
Samples Include:	Not reported
7.5 Min Quad:	Not reported
5 Min Quad:	Not reported
Latitude:	36.5032
Longitude:	-80.6991

MOUNTAIN LUMBER CO. (Continued) **S105119773**

Latitude Number:	Not reported
Longitude Number:	Not reported
Latitude Decimal:	Not reported
Longitude Decimal:	Not reported
GPS:	CALC
Agency:	Not reported
Facility ID:	7530
Last Modified:	Not reported
Incident Phase:	RE
NOV Issued:	Not reported
NORR Issued:	Not reported
45 Day Report:	Not reported
Public Meeting Held:	Not reported
Corrective Action Planned:	Not reported
SOC Sighned:	Not reported
Reclassification Report:	Not reported
RS Designation:	Not reported
Closure Request Date:	Not reported
Close-out Report:	Not reported

Count: 3 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
MOUNT AIRY	S105217973	PUCKETT'S GROCERY	HWY 52 & HWY 89, WEST PINE ST		LUST TRUST
MOUNT AIRY	S105766475	PUCKETT'S GROCERY	W. PINE ST. & HWY 52	27030	LUST
MT. AIRY	S118756028	SURRY PLAZA	1128 PINE STREET	27030	LUST

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: 04/05/2017
Date Data Arrived at EDR: 04/21/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 21

Source: EPA
Telephone: N/A
Last EDR Contact: 04/21/2017
Next Scheduled EDR Contact: 07/17/2017
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

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

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

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

Date of Government Version: 04/05/2017
Date Data Arrived at EDR: 04/21/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 21

Source: EPA
Telephone: N/A
Last EDR Contact: 04/21/2017
Next Scheduled EDR Contact: 07/17/2017
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

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 04/05/2017
Date Data Arrived at EDR: 04/21/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 21

Source: EPA
Telephone: N/A
Last EDR Contact: 04/21/2017
Next Scheduled EDR Contact: 07/17/2017
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

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

Date of Government Version: 11/07/2016
Date Data Arrived at EDR: 01/05/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 92

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/07/2017
Next Scheduled EDR Contact: 07/17/2017
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: 02/07/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 16

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/21/2017
Next Scheduled EDR Contact: 07/31/2017
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: 02/07/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 16

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/25/2017
Next Scheduled EDR Contact: 07/31/2017
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 05/02/2017
Next Scheduled EDR Contact: 04/10/2017
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

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

Date of Government Version: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 05/02/2017
Next Scheduled EDR Contact: 04/10/2017
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

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

Date of Government Version: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 05/02/2017
Next Scheduled EDR Contact: 04/10/2017
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: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 05/02/2017
Next Scheduled EDR Contact: 04/10/2017
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

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

Date of Government Version: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 05/02/2017
Next Scheduled EDR Contact: 04/10/2017
Data Release Frequency: Varies

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: 12/28/2016
Date Data Arrived at EDR: 01/04/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 93

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 05/15/2017
Next Scheduled EDR Contact: 08/28/2017
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

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

Date of Government Version: 11/15/2016
Date Data Arrived at EDR: 11/29/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 66

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/31/2017
Next Scheduled EDR Contact: 09/11/2017
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

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

Date of Government Version: 11/15/2016
Date Data Arrived at EDR: 11/29/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 66

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/31/2017
Next Scheduled EDR Contact: 09/11/2017
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: 09/26/2016
Date Data Arrived at EDR: 09/29/2016
Date Made Active in Reports: 11/11/2016
Number of Days to Update: 43

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 03/29/2017
Next Scheduled EDR Contact: 07/10/2017
Data Release Frequency: Annually

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: 04/27/2017
Next Scheduled EDR Contact: 08/07/2017
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: 10/07/2016
Date Data Arrived at EDR: 12/15/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 81

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 03/15/2017
Next Scheduled EDR Contact: 06/26/2017
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: 11/17/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 70

Source: Department of Environment and Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 03/31/2017
Next Scheduled EDR Contact: 07/10/2017
Data Release Frequency: Semi-Annually

OLI: Old Landfill Inventory

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

Date of Government Version: 08/08/2016
Date Data Arrived at EDR: 01/17/2017
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 50

Source: Department of Environment & Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 04/14/2017
Next Scheduled EDR Contact: 07/24/2017
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LUST: Regional UST Database

This database contains information obtained from the Regional Offices. It provides a more detailed explanation of current and historic activity for individual sites, as well as what was previously found in the Incident Management Database. Sites in this database with Incident Numbers are considered LUSTs.

Date of Government Version: 11/07/2016
Date Data Arrived at EDR: 11/09/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 117

Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 05/10/2017
Next Scheduled EDR Contact: 08/21/2017
Data Release Frequency: Quarterly

LAST: Leaking Aboveground Storage Tanks

A listing of leaking aboveground storage tank site locations.

Date of Government Version: 10/07/2016
Date Data Arrived at EDR: 11/09/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 117

Source: Department of Environment & Natural Resources
Telephone: 877-623-6748
Last EDR Contact: 05/10/2017
Next Scheduled EDR Contact: 08/21/2017
Data Release Frequency: Quarterly

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: 11/14/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
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: 10/07/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Quarterly

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: 10/06/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Quarterly

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: 10/17/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 09/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Varies

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

Date of Government Version: 10/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
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: 10/14/2016
Date Data Arrived at EDR: 01/27/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 98

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Semi-Annually

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

Date of Government Version: 11/14/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
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: 01/06/2017
Date Data Arrived at EDR: 01/12/2017
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 53

Source: Department of Environment and Natural Resources
Telephone: 919-733-1315
Last EDR Contact: 04/12/2017
Next Scheduled EDR Contact: 07/31/2017
Data Release Frequency: Semi-Annually

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: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/11/2017
Next Scheduled EDR Contact: 07/24/2017
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: 09/30/2016
Date Data Arrived at EDR: 11/09/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 117

Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 05/10/2017
Next Scheduled EDR Contact: 08/21/2017
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: 09/26/2016
Date Data Arrived at EDR: 12/30/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 66

Source: Department of Environment and Natural Resources
Telephone: 919-715-6183
Last EDR Contact: 03/20/2017
Next Scheduled EDR Contact: 07/03/2017
Data Release Frequency: Semi-Annually

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: 10/07/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Quarterly

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: 10/06/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Quarterly

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: 10/17/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Quarterly

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: 09/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
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: 01/14/2017
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 10/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Semi-Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 10/14/2016
Date Data Arrived at EDR: 01/27/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 98

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 11/14/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
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: 10/07/2016
Date Data Arrived at EDR: 12/15/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 81

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 03/15/2017
Next Scheduled EDR Contact: 06/26/2017
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: 10/07/2016
Date Data Arrived at EDR: 12/15/2016
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 83

Source: Department of Environment and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 03/15/2017
Next Scheduled EDR Contact: 06/26/2017
Data Release Frequency: Semi-Annually

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: 03/27/2017
Next Scheduled EDR Contact: 07/10/2017
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: 01/03/2017
Date Data Arrived at EDR: 01/06/2017
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 59

Source: Department of Environment and Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 04/05/2017
Next Scheduled EDR Contact: 07/17/2017
Data Release Frequency: Varies

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: 03/02/2017
Date Data Arrived at EDR: 03/02/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/02/2017
Next Scheduled EDR Contact: 07/03/2017
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: 11/30/2016
Date Data Arrived at EDR: 12/05/2016
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 93

Source: Department of Environment & Natural Resources
Telephone: 919-707-8137
Last EDR Contact: 05/01/2017
Next Scheduled EDR Contact: 08/14/2017
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: 05/01/2017
Next Scheduled EDR Contact: 08/14/2017
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: 04/24/2017
Next Scheduled EDR Contact: 08/07/2017
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: 05/05/2017
Next Scheduled EDR Contact: 08/14/2017
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: 09/30/2016
Date Data Arrived at EDR: 01/05/2017
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 36

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/28/2017
Next Scheduled EDR Contact: 06/12/2017
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: 09/30/2016
Date Data Arrived at EDR: 12/05/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 67

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/31/2017
Next Scheduled EDR Contact: 09/11/2017
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: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 04/21/2017
Next Scheduled EDR Contact: 08/07/2017
Data Release Frequency: Varies

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: 12/28/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 37

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 03/29/2017
Next Scheduled EDR Contact: 07/10/2017
Data Release Frequency: Annually

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: 12/14/2016
Date Data Arrived at EDR: 12/16/2016
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 82

Source: Department of Environment & Natural Resources
Telephone: 919-807-6308
Last EDR Contact: 03/13/2017
Next Scheduled EDR Contact: 06/26/2017
Data Release Frequency: Varies

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: 919-733-3221
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: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 05/02/2017
Next Scheduled EDR Contact: 04/10/2017
Data Release Frequency: Varies

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 02/24/2017
Next Scheduled EDR Contact: 06/05/2017
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: 04/14/2017
Next Scheduled EDR Contact: 07/24/2017
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: 04/14/2017
Next Scheduled EDR Contact: 07/24/2017
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: 05/19/2017
Next Scheduled EDR Contact: 08/28/2017
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: 02/13/2017
Date Data Arrived at EDR: 02/15/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 05/17/2017
Next Scheduled EDR Contact: 08/28/2017
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: 05/08/2017
Next Scheduled EDR Contact: 08/21/2017
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 05/05/2017
Next Scheduled EDR Contact: 08/21/2017
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/15/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 14

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/24/2017
Next Scheduled EDR Contact: 07/03/2017
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: 12/31/2014
Date Data Arrived at EDR: 11/24/2015
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 133

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/26/2017
Next Scheduled EDR Contact: 09/04/2017
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: 04/26/2017
Next Scheduled EDR Contact: 08/07/2017
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: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 03/06/2017
Next Scheduled EDR Contact: 06/19/2017
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: 02/01/2017
Date Data Arrived at EDR: 02/09/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 57

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 04/21/2017
Next Scheduled EDR Contact: 08/07/2017
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: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3
Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 05/09/2017
Next Scheduled EDR Contact: 08/21/2017
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: 01/20/2016
Date Data Arrived at EDR: 04/28/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 127
Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/10/2017
Next Scheduled EDR Contact: 07/24/2017
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: 04/10/2017
Next Scheduled EDR Contact: 07/24/2017
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
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: 05/19/2017
Next Scheduled EDR Contact: 09/04/2017
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: 05/19/2017
Next Scheduled EDR Contact: 09/04/2017
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: 05/08/2017
Next Scheduled EDR Contact: 08/21/2017
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: 03/06/2017
Next Scheduled EDR Contact: 06/19/2017
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: 03/06/2017
Next Scheduled EDR Contact: 06/19/2017
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: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 04/28/2017
Next Scheduled EDR Contact: 08/07/2017
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: 01/04/2017
Date Data Arrived at EDR: 01/06/2017
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 35
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/06/2017
Next Scheduled EDR Contact: 07/17/2017
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: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 05/02/2017
Next Scheduled EDR Contact: 08/14/2017
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 09/30/2016
Date Data Arrived at EDR: 11/18/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 77

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 03/27/2017
Next Scheduled EDR Contact: 07/10/2017
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: 12/31/2013
Date Data Arrived at EDR: 02/24/2015
Date Made Active in Reports: 09/30/2015
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 05/26/2017
Next Scheduled EDR Contact: 09/04/2017
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: 04/14/2017
Next Scheduled EDR Contact: 07/24/2017
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 12/23/2016
Date Data Arrived at EDR: 12/27/2016
Date Made Active in Reports: 02/17/2017
Number of Days to Update: 52

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 05/05/2017
Next Scheduled EDR Contact: 08/21/2017
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: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 05/22/2017
Next Scheduled EDR Contact: 09/04/2017
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 12/05/2016
Date Data Arrived at EDR: 01/05/2017
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 04/21/2017
Next Scheduled EDR Contact: 07/17/2017
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: 03/07/2017
Next Scheduled EDR Contact: 07/10/2017
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: 03/07/2017
Next Scheduled EDR Contact: 04/10/2017
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: 02/08/2017
Date Data Arrived at EDR: 02/28/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 38

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 05/31/2017
Next Scheduled EDR Contact: 09/11/2017
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: 05/31/2017
Next Scheduled EDR Contact: 09/11/2017
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 03/03/2017
Next Scheduled EDR Contact: 06/12/2017
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: 03/14/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 21

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 03/13/2017
Next Scheduled EDR Contact: 06/26/2017
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: 04/04/2017
Date Data Arrived at EDR: 04/07/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 35

Source: EPA
Telephone: (404) 562-9900
Last EDR Contact: 04/07/2017
Next Scheduled EDR Contact: 06/19/2017
Data Release Frequency: Quarterly

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 03/19/2017
Date Data Arrived at EDR: 03/21/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 03/21/2017
Next Scheduled EDR Contact: 07/03/2017
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 91

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 05/24/2017
Next Scheduled EDR Contact: 09/11/2017
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites
A listing of unexploded ordnance site locations

Date of Government Version: 10/25/2015
Date Data Arrived at EDR: 01/29/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 67

Source: Department of Defense
Telephone: 571-373-0407
Last EDR Contact: 05/22/2017
Next Scheduled EDR Contact: 07/31/2017
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing
This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 02/22/2017
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 79

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 05/24/2017
Next Scheduled EDR Contact: 09/04/2017
Data Release Frequency: Quarterly

COAL ASH: Coal Ash Disposal Sites
A listing of coal combustion products distribution permits issued by the Division for the treatment, storage, transportation, use and disposal of coal combustion products.

Date of Government Version: 12/14/2015
Date Data Arrived at EDR: 02/23/2016
Date Made Active in Reports: 05/18/2016
Number of Days to Update: 85

Source: Department of Environment & Natural Resources
Telephone: 919-807-6359
Last EDR Contact: 05/15/2017
Next Scheduled EDR Contact: 08/14/2017
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: 06/07/2016
Date Data Arrived at EDR: 06/22/2016
Date Made Active in Reports: 09/01/2016
Number of Days to Update: 71

Source: Department of Environment & Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 03/24/2017
Next Scheduled EDR Contact: 07/03/2017
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: 09/30/2016
Date Data Arrived at EDR: 11/09/2016
Date Made Active in Reports: 03/06/2017
Number of Days to Update: 117

Source: Department of Environment & Natural Resources
Telephone: 919-733-1322
Last EDR Contact: 05/10/2017
Next Scheduled EDR Contact: 08/21/2017
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: 03/27/2017
Next Scheduled EDR Contact: 07/10/2017
Data Release Frequency: Varies

Financial Assurance 3: Financial Assurance Information
Hazardous waste financial assurance information.

Date of Government Version: 09/14/2016
Date Data Arrived at EDR: 09/16/2016
Date Made Active in Reports: 10/05/2016
Number of Days to Update: 19

Source: Department of Environment & Natural Resources
Telephone: 919-707-8222
Last EDR Contact: 03/13/2017
Next Scheduled EDR Contact: 06/26/2017
Data Release Frequency: Varies

NPDES: NPDES Facility Location Listing
General information regarding NPDES(National Pollutant Discharge Elimination System) permits.

Date of Government Version: 02/17/2016
Date Data Arrived at EDR: 02/19/2016
Date Made Active in Reports: 05/03/2016
Number of Days to Update: 74

Source: Department of Environment & Natural Resources
Telephone: 919-733-7015
Last EDR Contact: 05/29/2017
Next Scheduled EDR Contact: 08/14/2017
Data Release Frequency: Varies

UIC: Underground Injection Wells Listing
A listing of uncerground injection wells locations.

Date of Government Version: 12/07/2016
Date Data Arrived at EDR: 12/09/2016
Date Made Active in Reports: 03/08/2017
Number of Days to Update: 89

Source: Department of Environment & Natural Resources
Telephone: 919-807-6412
Last EDR Contact: 03/06/2017
Next Scheduled EDR Contact: 06/19/2017
Data Release Frequency: Varies

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 Historic Gas 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 Historic Dry 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: 07/30/2013
Date Data Arrived at EDR: 08/19/2013
Date Made Active in Reports: 10/03/2013
Number of Days to Update: 45

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 05/15/2017
Next Scheduled EDR Contact: 08/28/2017
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 09/29/2016
Date Made Active in Reports: 01/03/2017
Number of Days to Update: 96

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 04/11/2017
Next Scheduled EDR Contact: 07/24/2017
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: 01/30/2017
Date Data Arrived at EDR: 02/01/2017
Date Made Active in Reports: 02/13/2017
Number of Days to Update: 12

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/03/2017
Next Scheduled EDR Contact: 08/14/2017
Data Release Frequency: Annually

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 07/22/2016
Date Made Active in Reports: 11/22/2016
Number of Days to Update: 123

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 04/18/2017
Next Scheduled EDR Contact: 07/31/2017
Data Release Frequency: Annually

RI MANIFEST: Manifest information

Hazardous waste manifest information

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 06/19/2015
Date Made Active in Reports: 07/15/2015
Number of Days to Update: 26

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 05/22/2017
Next Scheduled EDR Contact: 09/04/2017
Data Release Frequency: Annually

WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 04/14/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 50

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 03/13/2017
Next Scheduled EDR Contact: 06/26/2017
Data Release Frequency: Annually

Oil/Gas Pipelines

Source: PennWell Corporation

Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data

Source: PennWell Corporation

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GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Facility List
Source: Department of Health & Human Services
Telephone: 919-662-4499

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: US Fish & Wildlife Service
Telephone: 703-358-2171

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

STEWARTS CREEK
RACE TRACK ROAD
MOUNT AIRY, NC 27030

TARGET PROPERTY COORDINATES

Latitude (North):	36.510063 - 36˚ 30’ 36.23’’
Longitude (West):	80.69539 - 80˚ 41’ 43.40’’
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	527276.6
UTM Y (Meters):	4040365.5
Elevation:	1156 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5949922 CANA, VA
Version Date:	2013
South Map:	5947705 DOBSON, 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 principal 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).

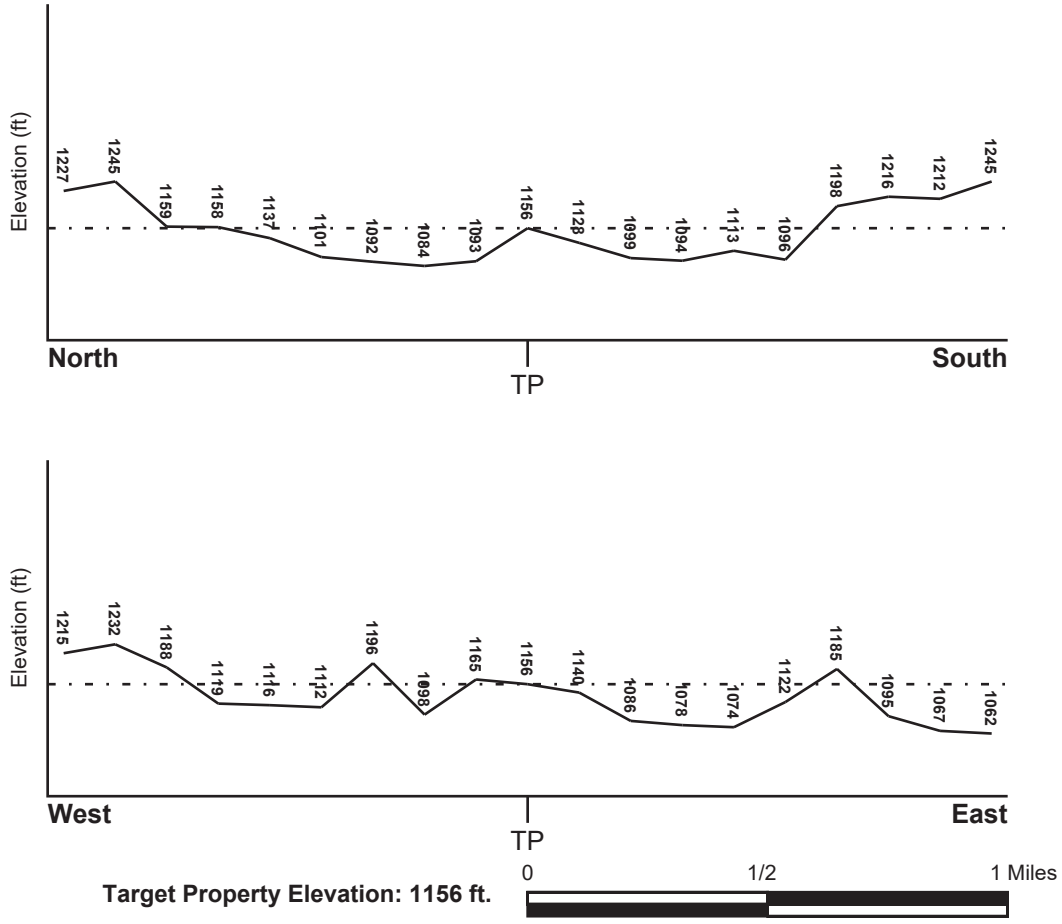
TOPOGRAPHIC INFORMATION

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 ENE

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
51035C0425C	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
3711500000J	FEMA FIRM Flood data
3711408000J	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
CANA	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).

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. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name:	PACOLET
Soil Surface Texture:	fine sandy 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. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 60 inches

Depth to Bedrock Max: > 60 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	3 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 6.00 Min: 2.00	Max: 6.50 Min: 4.50
2	3 inches	29 inches	sandy 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: 2.00 Min: 0.60	Max: 6.00 Min: 4.50
3	29 inches	52 inches	clay loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 2.00 Min: 0.60	Max: 6.00 Min: 4.50
4	52 inches	70 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 2.00 Min: 0.60	Max: 6.00 Min: 4.50

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: clay loam
gravelly - sandy loam
sandy loam
loam

Surficial Soil Types: clay loam
gravelly - sandy loam
sandy loam
loam

Shallow Soil Types: clay
sandy clay loam
silt loam
clay loam
silty clay loam

Deeper Soil Types: fine sandy loam
weathered bedrock

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

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
1	USGS40000897568	1/4 - 1/2 Mile SSE
5	USGS40000897555	1/2 - 1 Mile SE
A7	USGS40000897570	1/2 - 1 Mile ESE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

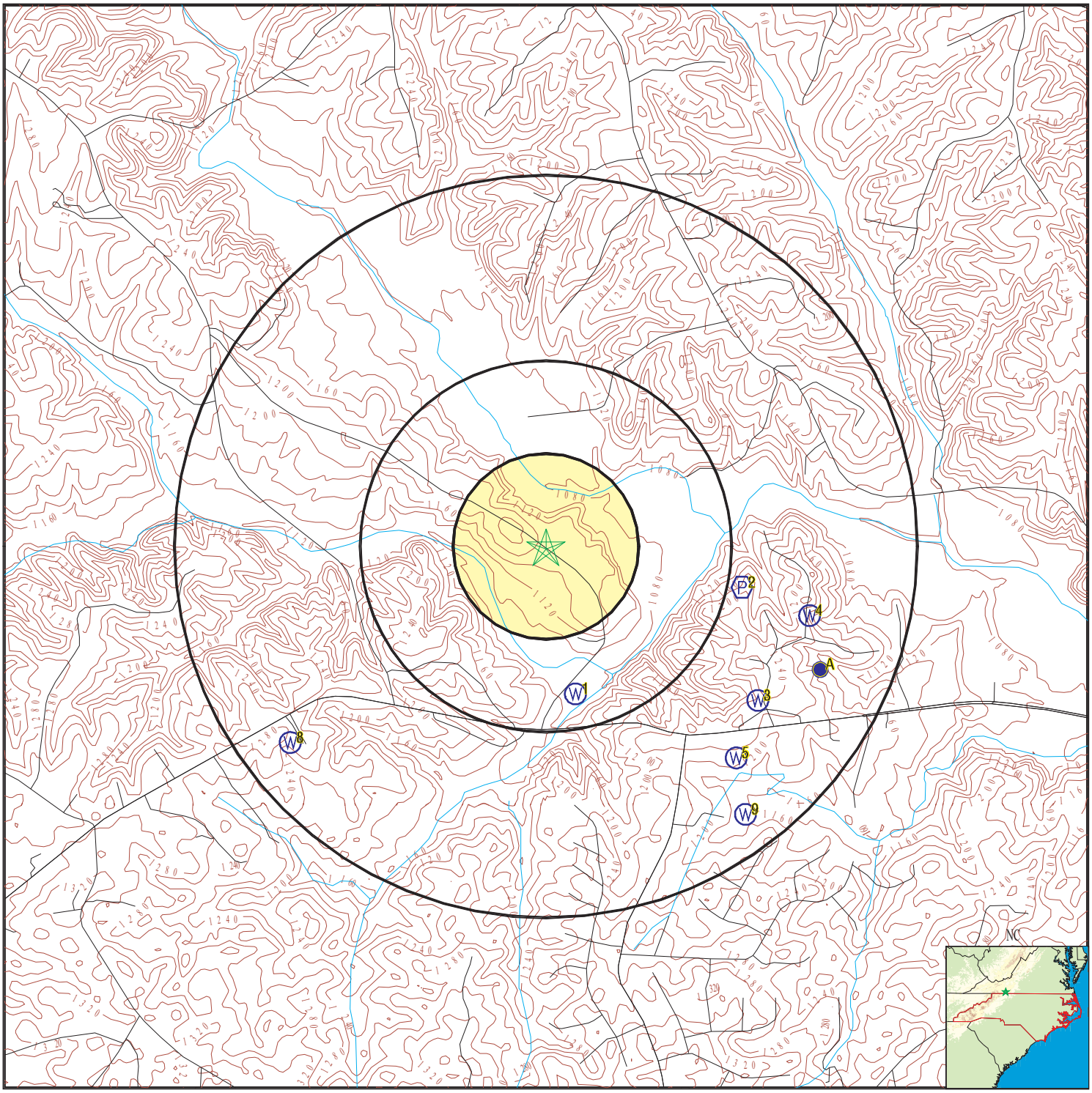
MAP ID	WELL ID	LOCATION FROM TP
2	NC0286113	1/2 - 1 Mile ESE

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
3	NC2000000009976	1/2 - 1 Mile SE
4	NC2000000009984	1/2 - 1 Mile ESE
A6	NC2000000009980	1/2 - 1 Mile ESE
8	NC2000000009970	1/2 - 1 Mile SW
9	NC2000000009952	1/2 - 1 Mile SE

PHYSICAL SETTING SOURCE MAP - 4954878.9s



0 1/4 1/2 1 Miles

- 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:	Stewarts Creek	CLIENT:	Ecosystem Planning and Restoration
ADDRESS:	Race Track Road Mount Airy NC 27030	CONTACT:	Robert Lepsic
LAT/LONG:	36.510063 / 80.69539	INQUIRY #:	4954878.9s
		DATE:	June 02, 2017 11:15 am

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

1
SSE | **FED USGS** | **USGS40000897568**
1/4 - 1/2 Mile
Lower

Org. Identifier:	USGS-NC		
Formal name:	USGS North Carolina Water Science Center		
Monloc Identifier:	USGS-363015080413901		
Monloc name:	SU-B64V-1		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.5042989
Longitude:	-80.6939557	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Piedmont and Blue Ridge crystalline-rock aquifers		
Formation type:	Felsic Gneiss		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	138
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

2
ESE | **FRDS PWS** | **NC0286113**
1/2 - 1 Mile
Higher

Epa region:	04	State:	NC
Pwsid:	NC0286113		
Pwsname:	PINE LAKES S/D		
City served:	Not Reported	State served:	NC
Zip served:	Not Reported	Fips county:	37171
Status:	Active	Pop srvd:	142
Pwssvcconn:	56	Source:	Groundwater
Pws type:	CWS	Owner:	Private
Contact:	ISON, LAURIE T		
Contactor gname:	ISON, LAURIE T		
Contact phone:	704-489-9404	Contact address1:	4163 SINCLAIR ST
Contact address2:	Not Reported	Contact city:	DENVER
Contact state:	NC	Contact zip:	28037
Activity code:	A		

Facid:	4592		
Facname:	TREATMENT_PLT_WELL #1		
Facility type:	Treatment_plant	Activity code:	A
Treatment obj:	corrosion control	Treatment process:	inhibitor, polyphosphate

Treatment obj:	corrosion control	Treatment process:	ph adjustment
Treatment obj:	disinfection	Treatment process:	hypochlorination, post
Facid:	4593		
Facname:	TREATMENT_PLT_WELL #2		
Facility type:	Treatment_plant	Activity code:	A
Treatment obj:	corrosion control	Treatment process:	ph adjustment
Treatment obj:	disinfection	Treatment process:	hypochlorination, post
Treatment obj:	iron removal	Treatment process:	filtration, greensand
Treatment obj:	manganese removal	Treatment process:	filtration, greensand
Location Information:			
Name:	PINE LAKES S/D		
Pwstypcd:	CWS	Primsrccd:	GW
Popserved:	142		
Add1:	4163 SINCLAIR ST		
Add2:	Not Reported		
City:	DENVER	State:	NC
Zip:	28037	Phone:	704-489-9404
Cityserv:	MT AIRY	Cntyserv:	Surry
Stateserv:	NC	Zipserv:	Not Reported
Enforcement Information:			
Violation id:	310712	Orig cd:	S
Enf fy:	2009	Enf act date:	02/25/2009
Enf act detail:	St Public Notif requested	Enf act cat:	Informal
Enforcement Information:			
Violation id:	310712	Orig cd:	S
Enf fy:	2009	Enf act date:	02/25/2009
Enf act detail:	St Formal NOV issued	Enf act cat:	Informal
Enforcement Information:			
Violation id:	310712	Orig cd:	S
Enf fy:	2009	Enf act date:	05/28/2009
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving
Enforcement Information:			
Violation id:	310712	Orig cd:	S
Enf fy:	2009	Enf act date:	03/27/2009
Enf act detail:	St Public Notif received	Enf act cat:	Informal
Enforcement Information:			
Violation id:	310711	Orig cd:	S
Enf fy:	2010	Enf act date:	09/15/2010
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving
Enforcement Information:			
Violation id:	310711	Orig cd:	S
Enf fy:	2010	Enf act date:	09/15/2010
Enf act detail:	St Intentional no-action	Enf act cat:	Resolving
Enforcement Information:			
Violation id:	310708	Orig cd:	S
Enf fy:	2010	Enf act date:	08/30/2010
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	310708	Orig cd:	S
Enf fy:	2007	Enf act date:	08/22/2007
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	310708	Orig cd:	S
Enf fy:	2007	Enf act date:	08/22/2007
Enf act detail:	St Formal NOV issued	Enf act cat:	Informal

Enforcement Information:

Violation id:	310707	Orig cd:	S
Enf fy:	2009	Enf act date:	05/28/2009
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	1903	Orig cd:	S
Enf fy:	2003	Enf act date:	10/18/2002
Enf act detail:	St Formal NOV issued	Enf act cat:	Informal

Enforcement Information:

Violation id:	1903	Orig cd:	S
Enf fy:	2003	Enf act date:	10/18/2002
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	1903	Orig cd:	S
Enf fy:	2006	Enf act date:	08/01/2006
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	1801	Orig cd:	S
Enf fy:	2002	Enf act date:	04/02/2002
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	1801	Orig cd:	S
Enf fy:	2001	Enf act date:	08/24/2001
Enf act detail:	St Formal NOV issued	Enf act cat:	Informal

Enforcement Information:

Violation id:	1801	Orig cd:	S
Enf fy:	2001	Enf act date:	09/17/2001
Enf act detail:	St Public Notif received	Enf act cat:	Informal

Enforcement Information:

Violation id:	1801	Orig cd:	S
Enf fy:	2001	Enf act date:	08/24/2001
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	1494	Orig cd:	S
Enf fy:	2006	Enf act date:	05/15/2006
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	1394	Orig cd:	S
Enf fy:	2010	Enf act date:	07/15/2010
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	1394	Orig cd:	S
Enf fy:	2010	Enf act date:	07/15/2010
Enf act detail:	St Intentional no-action	Enf act cat:	Informal

Violations Information:

Violation id:	310712	Orig cd:	S
State:	NC	Viol fy:	2008
Contamcd:	5000		
Contamnm:	Lead and Copper Rule		
Viol code:	57		
Viol name:	OCCT/SOWT Study/Recommendation		
Rule code:	350		
Rule name:	LCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	11/29/2008
Cmpedt:	Not Reported		

Violations Information:

Violation id:	310711	Orig cd:	S
State:	NC	Viol fy:	2007
Contamcd:	7500		
Contamnm:	Public Notice		
Viol code:	75		
Viol name:	PN Violation for NPDWR Violation		
Rule code:	410		
Rule name:	PN rule		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	09/15/2007
Cmpedt:	Not Reported		

Violations Information:

Violation id:	310708	Orig cd:	S
State:	NC	Viol fy:	2007
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	22		
Viol name:	MCL, Monthly (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	08/01/2007
Cmpedt:	08/31/2007		

Violations Information:

Violation id:	310707	Orig cd:	S
State:	NC	Viol fy:	2006
Contamcd:	5000		
Contamnm:	Lead and Copper Rule		
Viol code:	57		
Viol name:	OCCT/SOWT Study/Recommendation		
Rule code:	350		
Rule name:	LCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported

State mcl:	Not Reported	Cmpbdt:	07/01/2006
Cmpedt:	Not Reported		

Violations Information:

Violation id:	1903	Orig cd:	S
State:	NC	Viol fy:	2002
Contamcd:	7000		
Contamnm:	Consumer Confidence Rule		
Viol code:	71		
Viol name:	CCR Complete Failure to Report		
Rule code:	420		
Rule name:	CCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	07/01/2002
Cmpedt:	Not Reported		

Violations Information:

Violation id:	1801	Orig cd:	S
State:	NC	Viol fy:	2000
Contamcd:	5000		
Contamnm:	Lead and Copper Rule		
Viol code:	57		
Viol name:	OCCT/SOWT Study/Recommendation		
Rule code:	350		
Rule name:	LCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2000
Cmpedt:	Not Reported		

Violations Information:

Violation id:	1394	Orig cd:	S
State:	NC	Viol fy:	1993
Contamcd:	5000		
Contamnm:	Lead and Copper Rule		
Viol code:	51		
Viol name:	Initial Tap Sampling for Pb and Cu		
Rule code:	350		
Rule name:	LCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	07/01/1993
Cmpedt:	Not Reported		

PWS ID: NC0286113
Date Initiated: Not Reported Date Deactivated: Not Reported
PWS Name: PINE LAKES S/D
MT AIRY, NC 27030

Addressee / Facility: System Owner/Responsible Party
T CARROLL WEBER OR MANAGER NOW
PO BOX 127
SHERRILLS FORD, NC 28673

Addressee / Facility: System Owner/Responsible Party
SURRY WATER COMPANY INC
PO BOX 127
SHERRILLS FORD, NC 28673

Facility Latitude:	36 30 30.0000	Facility Longitude:	80 41 10.0000
Facility Latitude:	36 30 20.0000	Facility Longitude:	80 41 5.0000
City Served:	MT AIRY		
Treatment Class:	Treated	Population:	145

PWS currently has or had major violation(s) or enforcement: YES

VIOLATIONS INFORMATION:

Violation ID:	9408921	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	PH				
Vio. Awareness Date:	060194				

Violation ID:	9408920	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	THALLIUM, TOTAL				
Vio. Awareness Date:	060194				

Violation ID:	9408919	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	BERYLLIUM, TOTAL				
Vio. Awareness Date:	060194				

Violation ID:	9408918	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	ANTIMONY, TOTAL				
Vio. Awareness Date:	060194				

Violation ID:	9408917	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	SULFATE				
Vio. Awareness Date:	060194				

Violation ID:	9408916	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	SODIUM				
Vio. Awareness Date:	060194				

Violation ID:	9408915	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	SELENIUM				
Vio. Awareness Date:	060194				

Violation ID:	9408914	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	NICKEL				
Vio. Awareness Date:	060194				

Violation ID:	9408913	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	MERCURY				
Vio. Awareness Date:	060194				

Violation ID:	9408912	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	MANGANESE				
Vio. Awareness Date:	060194				

Violation ID:	9408911	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	IRON				
Vio. Awareness Date:	060194				

Violation ID:	9408910	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	FLUORIDE				
Vio. Awareness Date:	060194				

Violation ID:	9408909	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	CYANIDE				
Vio. Awareness Date:	060194				

Violation ID:	9408908	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	CHROMIUM				
Vio. Awareness Date:	060194				

Violation ID:	9408907	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	CADMIUM				
Vio. Awareness Date:	060194				

Violation ID:	9408906	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	BARIUM				
Vio. Awareness Date:	060194				

Violation ID:	9408905	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/91	Vio. end Date:	12/31/93	Vio. Period:	036 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	ARSENIC				
Vio. Awareness Date:	060194				

Violation ID:	9408904	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/90	Vio. end Date:	12/31/93	Vio. Period:	048 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	GROSS ALPHA, EXCL. RADON & U				
Vio. Awareness Date:	060194				

Violation ID:	9408903	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/93	Vio. end Date:	12/31/93	Vio. Period:	012 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	NITRATE				
Vio. Awareness Date:	060194				

Violation ID:	9408902	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	07/01/90	Vio. end Date:	06/30/94	Vio. Period:	048 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	GROSS ALPHA, EXCL. RADON & U				
Vio. Awareness Date:	071594				

Violation ID:	9413401	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	07/01/93	Vio. end Date:	12/31/93	Vio. Period:	006 Months
Num required Samples:	Not Reported	Number of Samples Taken:		Not Reported	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Initial Tap Sampling for Pb and Cu				
Contaminant:	LEAD & COPPER RULE				
Vio. Awareness Date:	Not Reported				

Violation ID:	9401538	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	10/01/93	Vio. end Date:	12/31/93	Vio. Period:	003 Months
Num required Samples:	000	Number of Samples Taken:		000	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	TTHM				
Vio. Awareness Date:	020994				

ENFORCEMENT INFORMATION:

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	1801	Contaminant:	LEAD & COPPER RULE
Viol. Type:	OCCT Study Recommendation		
Complperbe:	1/1/2000 0:00:00		
Complperen:	4/2/2002 0:00:00	Enfdate:	4/2/2002 0:00:00
Enf action:	State Compliance Achieved		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	1801	Contaminant:	LEAD & COPPER RULE
Viol. Type:	OCCT Study Recommendation		
Complperbe:	1/1/2000 0:00:00		
Complperen:	4/2/2002 0:00:00	Enfdate:	8/24/2001 0:00:00
Enf action:	State Formal NOV Issued		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	1801	Contaminant:	LEAD & COPPER RULE
Viol. Type:	OCCT Study Recommendation		
Complperbe:	1/1/2000 0:00:00		
Complperen:	4/2/2002 0:00:00	Enfdate:	8/24/2001 0:00:00
Enf action:	State Public Notif Requested		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	1801	Contaminant:	LEAD & COPPER RULE
Viol. Type:	OCCT Study Recommendation		
Complperbe:	1/1/2000 0:00:00		
Complperen:	4/2/2002 0:00:00	Enfdate:	9/17/2001 0:00:00
Enf action:	State Public Notif Received		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	1903	Contaminant:	7000
Viol. Type:	CCR Complete Failure to Report		
Complperbe:	7/1/2002 0:00:00		
Complperen:	8/1/2006 0:00:00	Enfdate:	10/18/2002 0:00:00
Enf action:	State Formal NOV Issued		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	1903	Contaminant:	7000
Viol. Type:	CCR Complete Failure to Report		
Complperbe:	7/1/2002 0:00:00		
Complperen:	8/1/2006 0:00:00	Enfdate:	10/18/2002 0:00:00
Enf action:	State Public Notif Requested		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	1903	Contaminant:	7000
Viol. Type:	CCR Complete Failure to Report		
Complperbe:	7/1/2002 0:00:00		
Complperen:	8/1/2006 0:00:00	Enfdate:	8/1/2006 0:00:00
Enf action:	State Compliance Achieved		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	310707	Contaminant:	LEAD & COPPER RULE
Viol. Type:	OCCT Study Recommendation		
Complperbe:	7/1/2006 0:00:00		
Complperen:	12/31/2025 0:00:00	Enfdate:	No Enf Action as of
Enf action:	7/8/2009 0:00:00		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	310708	Contaminant:	COLIFORM (TCR)
Viol. Type:	MCL, Monthly (TCR)		
Complperbe:	8/1/2007 0:00:00		
Complperen:	8/31/2007 0:00:00	Enfdate:	8/22/2007 0:00:00
Enf action:	State Formal NOV Issued		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	310708	Contaminant:	COLIFORM (TCR)
Viol. Type:	MCL, Monthly (TCR)		
Complperbe:	8/1/2007 0:00:00		
Complperen:	8/31/2007 0:00:00	Enfdate:	8/22/2007 0:00:00
Enf action:	State Public Notif Requested		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NC0286113
Pwsname:	PINE LAKES S/D		
Retpopsrvd:	142	Pwstypecod:	C
Vioid:	310711	Contaminant:	7500
Viol. Type:	PN Violation for NPDWR Violation		
Complperbe:	9/15/2007 0:00:00		
Complperen:	12/31/2025 0:00:00	Enfdate:	No Enf Action as of
Enf action:	7/8/2009 0:00:00		
Violmeasur:	Not Reported		

System Name:	PINE LAKES S/D		
Violation Type:	OCCT Study Recommendation		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1/1/2000 0:00:00 - 4/2/2002 0:00:00		
Violation ID:	1801		
Enforcement Date:	4/2/2002 0:00:00	Enf. Action:	State Compliance Achieved

System Name:	PINE LAKES S/D		
Violation Type:	OCCT Study Recommendation		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1/1/2000 0:00:00 - 4/2/2002 0:00:00		
Violation ID:	1801		
Enforcement Date:	8/24/2001 0:00:00	Enf. Action:	State Formal NOV Issued

System Name:	PINE LAKES S/D		
Violation Type:	OCCT Study Recommendation		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1/1/2000 0:00:00 - 4/2/2002 0:00:00		
Violation ID:	1801		
Enforcement Date:	9/17/2001 0:00:00	Enf. Action:	State Public Notif Received

ENFORCEMENT INFORMATION:

System Name:	PINE LAKES S/D		
Violation Type:	OCCT Study Recommendation		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1/1/2000 0:00:00 - 4/2/2002 0:00:00		
Violation ID:	1801		
Enforcement Date:	8/24/2001 0:00:00	Enf. Action:	State Public Notif Requested
System Name:	PINE LAKES S/D		
Violation Type:	OCCT Study Recommendation		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1/1/2000 0:00:00 - 4/2/2002 0:00:00		
Violation ID:	1801		
Enforcement Date:	8/24/2001 0:00:00	Enf. Action:	State Formal NOV Issued
System Name:	PINE LAKES S/D		
Violation Type:	OCCT Study Recommendation		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1/1/2000 0:00:00 - 4/2/2002 0:00:00		
Violation ID:	1801		
Enforcement Date:	4/2/2002 0:00:00	Enf. Action:	State Compliance Achieved
System Name:	PINE LAKES S/D		
Violation Type:	OCCT Study Recommendation		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1/1/2000 0:00:00 - 4/2/2002 0:00:00		
Violation ID:	1801		
Enforcement Date:	9/17/2001 0:00:00	Enf. Action:	State Public Notif Received
System Name:	PINE LAKES S/D		
Violation Type:	OCCT Study Recommendation		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1/1/2000 0:00:00 - 4/2/2002 0:00:00		
Violation ID:	1801		
Enforcement Date:	8/24/2001 0:00:00	Enf. Action:	State Public Notif Requested
System Name:	PINE LAKES S/D		
Violation Type:	CCR Complete Failure to Report		
Contaminant:	7000		
Compliance Period:	7/1/2002 0:00:00 - 8/1/2006 0:00:00		
Violation ID:	1903		
Enforcement Date:	10/18/2002 0:00:00	Enf. Action:	State Public Notif Requested
System Name:	PINE LAKES S/D		
Violation Type:	CCR Complete Failure to Report		
Contaminant:	7000		
Compliance Period:	7/1/2002 0:00:00 - 8/1/2006 0:00:00		
Violation ID:	1903		
Enforcement Date:	10/18/2002 0:00:00	Enf. Action:	State Formal NOV Issued
System Name:	PINE LAKES S/D		
Violation Type:	CCR Complete Failure to Report		
Contaminant:	7000		
Compliance Period:	7/1/2002 0:00:00 - 12/31/2025 0:00:00		
Violation ID:	1903		
Enforcement Date:	10/18/2002 0:00:00	Enf. Action:	State Public Notif Requested
System Name:	PINE LAKES S/D		
Violation Type:	CCR Complete Failure to Report		
Contaminant:	7000		
Compliance Period:	7/1/2002 0:00:00 - 12/31/2025 0:00:00		
Violation ID:	1903		
Enforcement Date:	10/18/2002 0:00:00	Enf. Action:	State Formal NOV Issued

ENFORCEMENT INFORMATION:

System Name:	PINE LAKES S/D		
Violation Type:	CCR Complete Failure to Report		
Contaminant:	7000		
Compliance Period:	7/1/2002 0:00:00 - 8/1/2006 0:00:00		
Violation ID:	1903		
Enforcement Date:	8/1/2006 0:00:00	Enf. Action:	State Compliance Achieved
System Name:	PINE LAKES S/D		
Violation Type:	OCCT Study Recommendation		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	7/1/2006 0:00:00 - 12/31/2025 0:00:00		
Violation ID:	310707		
Enforcement Date:	4/12/2007 0:00:00	Enf. Action:	Not Reported
System Name:	PINE LAKES S/D		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	9413401		
Enforcement Date:	1994-07-25	Enf. Action:	Fed Public Notif Requested
System Name:	PINE LAKES S/D		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	9413401		
Enforcement Date:	1994-07-25	Enf. Action:	Fed Formal NOV Issued
System Name:	PINE LAKES S/D		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	9413401		
Enforcement Date:	1994-08-25	Enf. Action:	Fed Show-cause Hearing
System Name:	PINE LAKES S/D		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	9413401		
Enforcement Date:	1994-12-08	Enf. Action:	Fed Compliance Achieved
System Name:	PINE LAKES S/D		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	9413401		
Enforcement Date:	1994-10-26	Enf. Action:	Fed PAO Issued
System Name:	PINE LAKES S/D		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	9413401		
Enforcement Date:	1994-12-20	Enf. Action:	Fed Public Notif Requested
System Name:	PINE LAKES S/D		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	9413401		
Enforcement Date:	1994-12-20	Enf. Action:	Fed FAO Issued

ENFORCEMENT INFORMATION:

System Name:	PINE LAKES S/D		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	9413401		
Enforcement Date:	1994-10-26	Enf. Action:	Fed Public Notif Requested
System Name:	PINE LAKES S/D		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	9413401		
Enforcement Date:	1994-10-31	Enf. Action:	Fed Public Notif Received
System Name:	PINE LAKES S/D		
Violation Type:	Monitoring, Regular		
Contaminant:	GROSS ALPHA, EXCL. RADON & U		
Compliance Period:	1994-10-01 - 1994-12-31		
Violation ID:	9544648		
Enforcement Date:	1995-07-14	Enf. Action:	State Formal NOV Issued
System Name:	PINE LAKES S/D		
Violation Type:	Monitoring, Regular		
Contaminant:	GROSS ALPHA, EXCL. RADON & U		
Compliance Period:	1994-10-01 - 1994-12-31		
Violation ID:	9544648		
Enforcement Date:	1995-07-14	Enf. Action:	State Public Notif Requested
System Name:	PINE LAKES S/D		
Violation Type:	Monitoring, Regular		
Contaminant:	GROSS ALPHA, EXCL. RADON & U		
Compliance Period:	1994-10-01 - 1994-12-31		
Violation ID:	9544648		
Enforcement Date:	1995-06-06	Enf. Action:	State Compliance Achieved
System Name:	PINE LAKES S/D		
Violation Type:	Monitoring, Regular		
Contaminant:	GROSS ALPHA, EXCL. RADON & U		
Compliance Period:	1995-01-01 - 1995-03-31		
Violation ID:	9544649		
Enforcement Date:	1995-07-14	Enf. Action:	State Formal NOV Issued
System Name:	PINE LAKES S/D		
Violation Type:	Monitoring, Regular		
Contaminant:	GROSS ALPHA, EXCL. RADON & U		
Compliance Period:	1995-01-01 - 1995-03-31		
Violation ID:	9544649		
Enforcement Date:	1995-07-14	Enf. Action:	State Public Notif Requested
System Name:	PINE LAKES S/D		
Violation Type:	Monitoring, Regular		
Contaminant:	GROSS ALPHA, EXCL. RADON & U		
Compliance Period:	1995-01-01 - 1995-03-31		
Violation ID:	9544649		
Enforcement Date:	1995-06-06	Enf. Action:	State Compliance Achieved

CONTACT INFORMATION:

Name:	PINE LAKES S/D	Population:	142
Contact:	MOSELEY, GARY	Phone:	Not Reported
Address:	4163 SINCLAIR ST		
Address 2:	DENVER		
	NC, 28 704-4		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
3 **SE** **1/2 - 1 Mile** **Higher**	**NC WELLS**	**NC2000000009976**

Pwsidentif:	NC3086019
System nam:	ANTIOCH BAPTIST CHURCH
Pws type:	NC
County:	SURRY
City:	MT AIRY
Primary so:	GW
Water type:	GW
Facility n:	WELL #1
Facility a:	S01
Latitude m:	36.504045
Longitude :	-80.68513
Availavili:	A
Well depth:	0
Well dep 1:	Not Reported
Owner name:	ANTIOCH BAPTIST CHURCH_3086019
Site id:	NC2000000009976

	Database	EDR ID Number
4 **ESE** **1/2 - 1 Mile** **Higher**	**NC WELLS**	**NC2000000009984**

Pwsidentif:	NC0286113
System nam:	PINE LAKES S/D
Pws type:	C
County:	SURRY
City:	MT AIRY
Primary so:	GW
Water type:	GW
Facility n:	WELL #2
Facility a:	WE2
Latitude m:	36.507359
Longitude :	-80.682629
Availavili:	A
Well depth:	265
Well dep 1:	FT
Owner name:	AQUA NORTH CAROLINA INC
Site id:	NC2000000009984

	Database	EDR ID Number
5 **SE** **1/2 - 1 Mile** **Higher**	**FED USGS**	**USGS40000897555**

Org. Identifier:	USGS-NC		
Formal name:	USGS North Carolina Water Science Center		
Monloc Identifier:	USGS-363006080411101		
Monloc name:	SU-B64V-2		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.5017991
Longitude:	-80.6861776	Sourcemap scale:	Not Reported

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Piedmont and Blue Ridge crystalline-rock aquifers		
Formation type:	Felsic Gneiss		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	101
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

A6
ESE
1/2 - 1 Mile
Higher

NC WELLS **NC2000000009980**

Pwsidentif:	NC0286113
System nam:	PINE LAKES S/D
Pws type:	C
County:	SURRY
City:	MT AIRY
Primary so:	GW
Water type:	GW
Facility n:	WELL #1
Facility a:	WE1
Latitude m:	36.505652
Longitude :	-80.682505
Availavili:	A
Well depth:	300
Well dep 1:	FT
Owner name:	AQUA NORTH CAROLINA INC
Site id:	NC2000000009980

A7
ESE
1/2 - 1 Mile
Higher

FED USGS **USGS40000897570**

Org. Identifier:	USGS-NC		
Formal name:	USGS North Carolina Water Science Center		
Monloc Identifier:	USGS-363017080405501		
Monloc name:	SU-B64U-1		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.5048547
Longitude:	-80.6817331	Sourcemap scale:	Not Reported

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Piedmont and Blue Ridge crystalline-rock aquifers		
Formation type:	Felsic Gneiss		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	250
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

8
SW
1/2 - 1 Mile
Higher

NC WELLS **NC2000000009970**

Pwsidentif:	NC3086020
System nam:	THUNDER ROAD MUSEUM
Pws type:	NC
County:	SURRY
City:	MOUNT AIRY
Primary so:	GW
Water type:	GW
Facility n:	WELL #1
Facility a:	S01
Latitude m:	36.502399
Longitude :	-80.707752
Availavili:	A
Well depth:	220
Well dep 1:	FT
Owner name:	GOLDING, H W
Site id:	NC2000000009970

9
SE
1/2 - 1 Mile
Higher

NC WELLS **NC2000000009952**

Pwsidentif:	NC0286146
System nam:	HOLLOWS WATER SYSTEM (THE)
Pws type:	C
County:	SURRY
City:	MT AIRY
Primary so:	GW
Water type:	GW
Facility n:	WELL #2
Facility a:	WE2
Latitude m:	36.499593

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Longitude :	-80.685729
Availavili:	A
Well depth:	437
Well dep 1:	FT
Owner name:	AQUA NORTH CAROLINA INC
Site id:	NC2000000009952

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: NC Radon

Radon Test Results

Num Results	Avg pCi/L	Min pCi/L	Max pCi/L
12	3.48	0.9	6.8
18	3.63	0.3	7.1

Federal EPA Radon Zone for SURRY County: 2

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 Zip Code: 27030

Number of sites tested: 13

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	1.008 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	4.575 pCi/L	50%	50%	0%

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

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 hight quality natural communities, or other important ecological features.

NC Game Lands: Wildlife Resources Commission 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: 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).

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

Stewarts Creek

Race Track Road

Mount Airy, NC 27030

Inquiry Number: 4954878.10

June 02, 2017

Certified Sanborn® Map Report

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

Certified Sanborn® Map Report

06/02/17

Site Name:

Stewarts Creek
Race Track Road
Mount Airy, NC 27030
EDR Inquiry # 4954878.10

Client Name:

Ecosystem Planning and Restoration
559 Jones Franklin Rd Ste 150
RALEIGH, NC 27606
Contact: Robert Lepsic

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Ecosystem Planning and Restoration were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # 3C9C-419A-8A74

PO # NA

Project Stewart s Creek

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results

Certification #: 3C9C-419A-8A74

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

Limited Permission To Make Copies

Ecosystem Planning and Restoration (the client) is permitted to make up to FIVE photocopies of this Sanborn Map transmittal and each fire insurance map accompanying this report solely for the limited use of its customer. No one other than the client is authorized to make copies. Upon request made directly to an EDR Account Executive, the client may be permitted to make a limited number of additional photocopies. This permission is conditioned upon compliance by the client, its customer and their agents with EDR's copyright policy; a copy of which is available upon request.

NCSHPO RESPONSE

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

July 19, 2017

Mr. Kevin Tweedy
Ecosystem Planning and Restoration, LLC
559 Jones Franklin Road, Suite 150
Raleigh, NC 27606
ktweedy@eprusa.net

Re: Stewarts Creek Tributaries Stream Restoration, Surry County, ER 17-1232

Dear Mr. Tweedy:

Thank you for your letter of June 22, 2017, 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, please contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or renee.gledhill-earley@ncdcr.gov. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

RGledhill-Earley

Ramona M. Bartos

OPTION TO PURCHASE CONSERVATION EASEMENT

OPTION TO PURCHASE CONSERVATION EASEMENT

THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option") is made and entered into this 10th day of February, 2017 (the "Effective Date"), by and among Howard Hull and Brent S. Hull & Anita Hull (wife) (the "Grantor"), and **ECOSYSTEM PLANNING AND RESTORATION, LLC,** a limited liability company with offices at 559 Jones Franklin Road, Suite 150, Raleigh, North Carolina 27606 ("EPR").

WITNESSETH:

WHEREAS, Grantor is the owner of that certain real property located in Surry County, North Carolina, containing 97.23 acres, more or less, having Parcel No. 500000071655 and being more particularly described on Exhibit A attached hereto and incorporated herein by reference, together with the improvements thereon and all appurtenances thereto belonging and appertaining, and all creeks, streams, rights-of-way, roads, streets and ways bounding said real property (collectively the "Property"); and

WHEREAS, Grantor has agreed to convey to EPR, an exclusive right and option to acquire a conservation easement, as more particularly described on the attached Exhibit B (the "Easement"), over the Property in accordance with the terms of this Option; and

WHEREAS, EPR is interested in acquiring the Easement in order to develop and construct a full delivery wetland and/or stream mitigation project over the lands covered by the Easement (the "Work") in conjunction with requests for proposals issued by the Division of Mitigation Services within the North Carolina Department of Environmental Quality ("DEQ"), and EPR has agreed to undertake such Work with respect to the Easement in accordance with the scope of work set forth in Exhibit C, attached hereto; and

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, EPR hereby notifies Grantor that: (i) EPR believes the fair market value of the Easement is the purchase price, pursuant to Paragraph 5(a) together with the value of the environmental improvements to be made to the Easement by EPR in performing the Work on the Easement; and (ii) EPR does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of One Hundred Dollars ($100.00) (the "Option Deposit") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

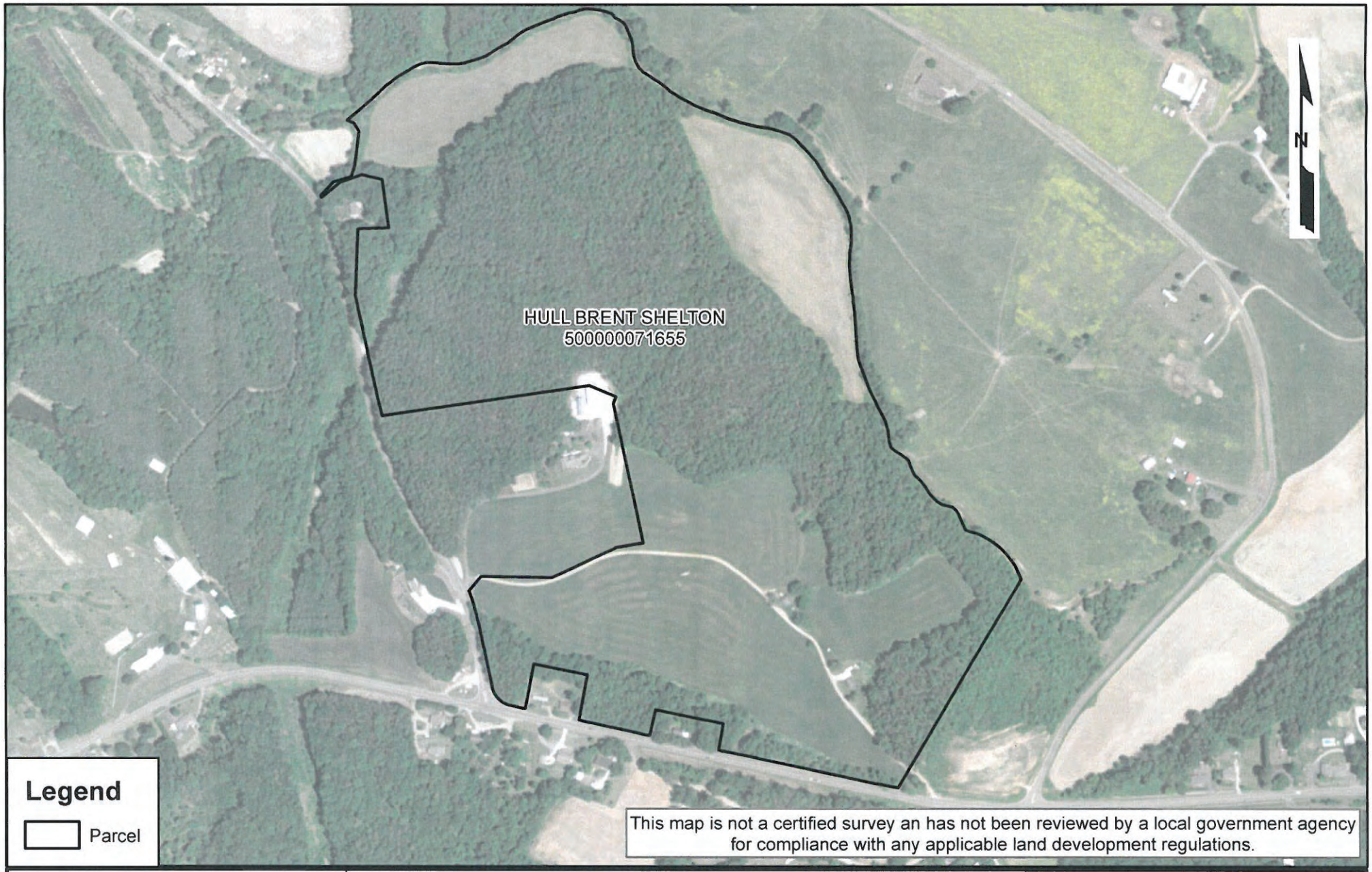
1. Grant of Option. Grantor hereby grants unto EPR, its successors and assigns, including a third-party designated by EPR qualified to be the grantee of a conservation easement under N.C.G.S. §121-35, the exclusive right and option to purchase the Easement in accordance with and subject to the terms and conditions set forth in this Option.

2. Term. The term of this Option shall commence on the Effective Date and shall expire eighteen (18) months after the Effective Date (the "Term"), unless extended by the parties, in writing.

EXHIBIT A

DESCRIPTION OF PROPERTY

INSERT EXHIBIT THAT GRAPHICALLY SHOWS THE PARENT PARCEL THAT CONTAINS THE EASEMENT, ALONG WITH THE PARCEL PIN NUMBER.

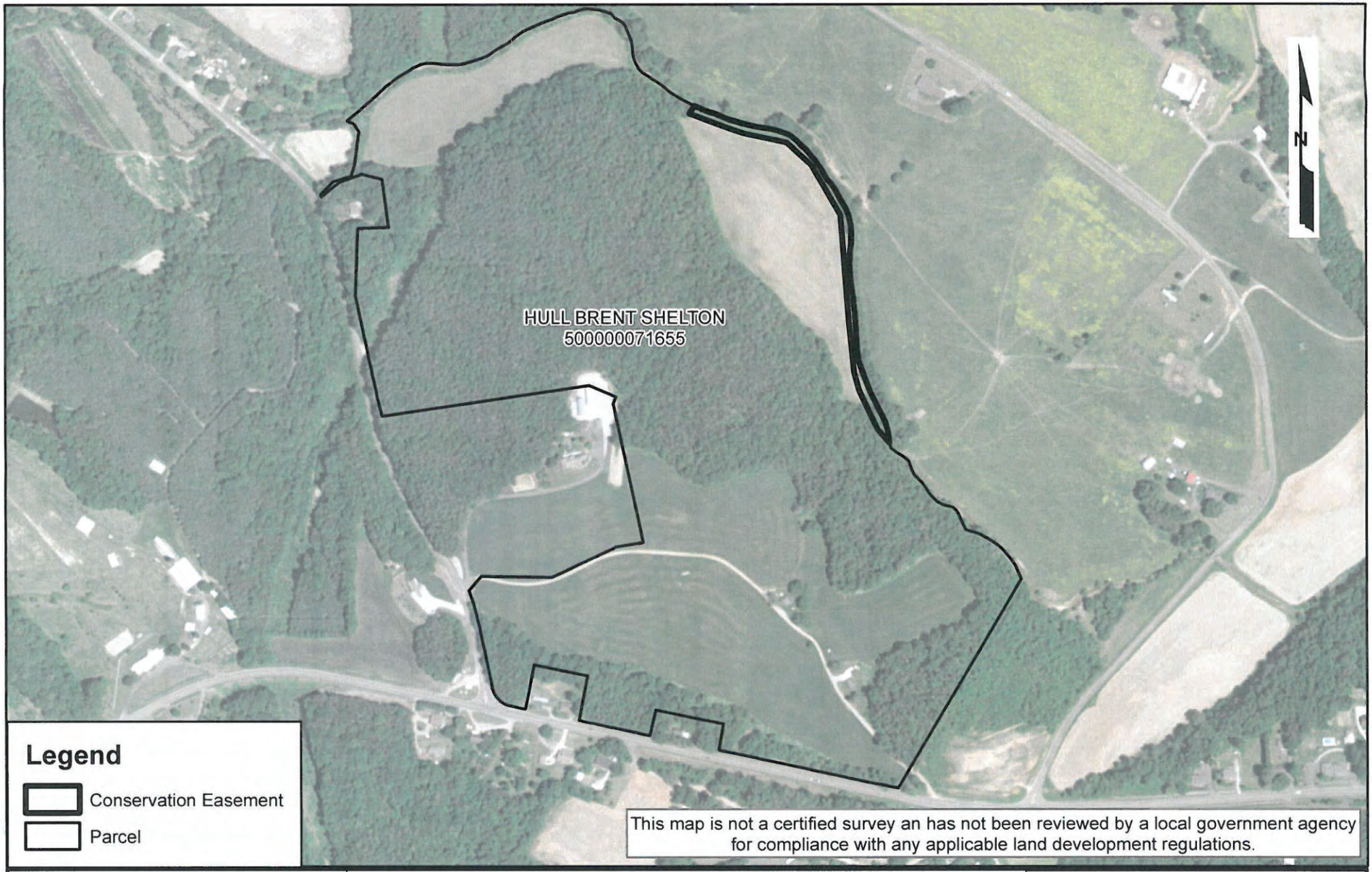


0 250 500 Feet	HULL PROPERTY PROPERTY MAP	PREPARED BY: EPR Ecosystem Planning & Restoration
EXHIBIT A	SURRY COUNTY, NC	DATE: FEBRUARY 2017

EXHIBIT B

DESCRIPTION OF EASEMENT

INSERT EXHIBIT THAT GRAPHICALLY SHOWS THE PROPOSED EASEMENT BOUNDARIES.



0 250 500 Feet

HULL PROPERTY

PROPERTY MAP

PREPARED BY:
ECOSYSTEM PLANNING & RESTORATION

EXHIBIT B

SURRY COUNTY, NC

DATE:
FEBRUARY 2017

EXHIBIT C

SCOPE OF WORK

Property:	**Brent Hull**
County:	**Surry**
Type of Work Proposed:	**Stream Restoration**

EPR will provide the following services as part of the proposed work:

Task 1 - EPR will conduct an environmental screening to identify/survey potential protected species, archaeological sites, historical architecture structures, contamination, etc. of the site.

Task 2 - EPR will develop a surveyed plat of the proposed conservation easement, and will execute and record the easement with the Grantor.

Task 3 – EPR will develop a site-specific restoration and/or mitigation plan for the project, including design plans that describe the work to be performed. Required permits from local, state, and federal agencies will be obtained.

Task 4 – EPR will secure a contractor to construct the restoration/mitigation project as designed.

Task 5 – EPR will secure a contractor to plant the site to native vegetation species, and will install any necessary monitoring devices, plots, or other required monitoring equipment.

Tasks 6 – EPR will develop a baseline monitoring report that describes and documents the condition of the site after construction.

Tasks 7 through 13 – EPR will conduct annual monitoring activities to document the condition of the site and to ensure the site is performing as designed and planned. Maintenance activities will be performed on an as-needed basis to ensure compliance.

EXHIBIT D

Memorandum Recording

BK 1584 PG 719 - 724 (6)

This document presented and filed:
02/15/2017 08:21:20 AM
Fee $26.00

642701

Surry County North Carolina
CAROLYN M. COMER, Register of Deeds

Prepared by and Return:
WARD EHS
ECOSYSTEM PLANNING + RESTORATION
559 JONES FRANKLIN RD
RALEIGH, NC 27606

nbe

MEMORANDUM OF OPTION TO PURCHASE CONSERVATION EASEMENT

THIS MEMORANDUM FOR OPTION TO PURCHASE CONSERVATION EASEMENT ("Memorandum") is made and entered into this 10th day of February, 2017, by and between HOWARD HULL, BRENT HULL + ANITA HULL (WIFE) (the "Grantor") and **ECOSYSTEM PLANNING AND RESTORATION, LLC,** a limited liability corporation with offices at 559 Jones Franklin Road, Raleigh, NC 27606 ("EPR").

WHEREAS, Grantor and EPR have entered into a certain Option to Purchase Conservation Easement (the "Option") dated FEB 10th, 2017, pursuant to which Grantor granted to EPR, its successors and assigns, an option to purchase a conservation easement (the "Easement") over certain real property located in Surry County, North Carolina, which property is more particularly described on the attached Exhibit B (the "Property"); and

WHEREAS, The parties enter into this Memorandum for the purpose of setting forth certain terms and conditions of the Option and to provide constructive notice of the Option;

NOW, THEREFORE, in consideration of the foregoing, the parties hereby agree as follows.

1. The term of the Option commenced on FEB 10th 2017 and shall expire on AUG 10th 2018.

2. All of the provisions set forth in the Option are incorporated in this Memorandum by reference.

3. The Option shall be binding upon and inure to the benefit of the parties and their respective heirs, successors and assigns.

[SIGNATURES AND NOTARY ACKNOWLEDGMENTS APPEAR ON FOLLOWING PAGES]

26
6

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: Brent Hull

Print Name: Brent Hull

Title: Landowner

STATE OF NC

COUNTY OF Surry

I, a Notary Public of the County and State aforesaid, certify that Brent Hull personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: NC Drivers License

This the 10th day of February 2017.

LuAnn Boyer
Official Signature of Notary Public

LuAnn Boyer
Printed or Typed Name of Notary

My Commission Expires: 11/12/18

[AFFIX NOTARIAL STAMP-SEAL]

LUANN BOYER
NOTARY PUBLIC
SURRY COUNTY, NC

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: Howard Hall Sr

Print Name: HOWARD Hall

Title: Land Owner

STATE OF NC

COUNTY OF Surry

I, a Notary Public of the County and State aforesaid, certify that Howard Hull Sr. personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: NC Drivers License

This the 10th day of February, 2017.

Official Signature of Notary Public

LeAnn Boyer

Printed or Typed Name of Notary

My Commission Expires: 11/12/18

[AFFIX NOTARIAL STAMP-SEAL]

LUANN BOYER
NOTARY PUBLIC
SURRY COUNTY, NC

LUANN BOYER
NOTARY PUBLIC
SURRY COUNTY, NC

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: Anita Hull

Print Name: Anita Hull

Title: Land Owner

STATE OF NC

COUNTY OF Surry

I, a Notary Public of the County and State aforesaid, certify that Anita Hull personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: NC Drivers License

This the 10th day of February 2017.

Official Signature of Notary Public

LuAnn Boyer

Printed or Typed Name of Notary

My Commission Expires: 11/12/18

[AFFIX NOTARIAL STAMP-SEAL]

LUANN BOYER
NOTARY PUBLIC
SURRY COUNTY, NC

5

ECOSYSTEM PLANNING AND RESTORATION, LLC, a limited liability company

By: _____

Print Name: Kevin Tweedy

Title: Vice President

STATE OF North Carolina

COUNTY OF Wake

I, Christa E Morrison, the undersigned Notary Public of the County and State aforesaid, certify that Kevin L Tweedy personally appeared before me this day, acknowledging to me that he is Vice President of Ecosystem Planning and Restoration, LLC, a limited liability company and that he acknowledged to me that he voluntarily signed the foregoing document for the purposes therein expressed and in the representative capacity so stated. I have received satisfactory evidence of the principal's identity in the form of drivers license.

This the 8th day of February, 2017.

CHRISTA E MORRISON NOTARY PUBLIC WAKE COUNTY, NC My Comm. Exp. 03-31-2021

Christa E Morrison

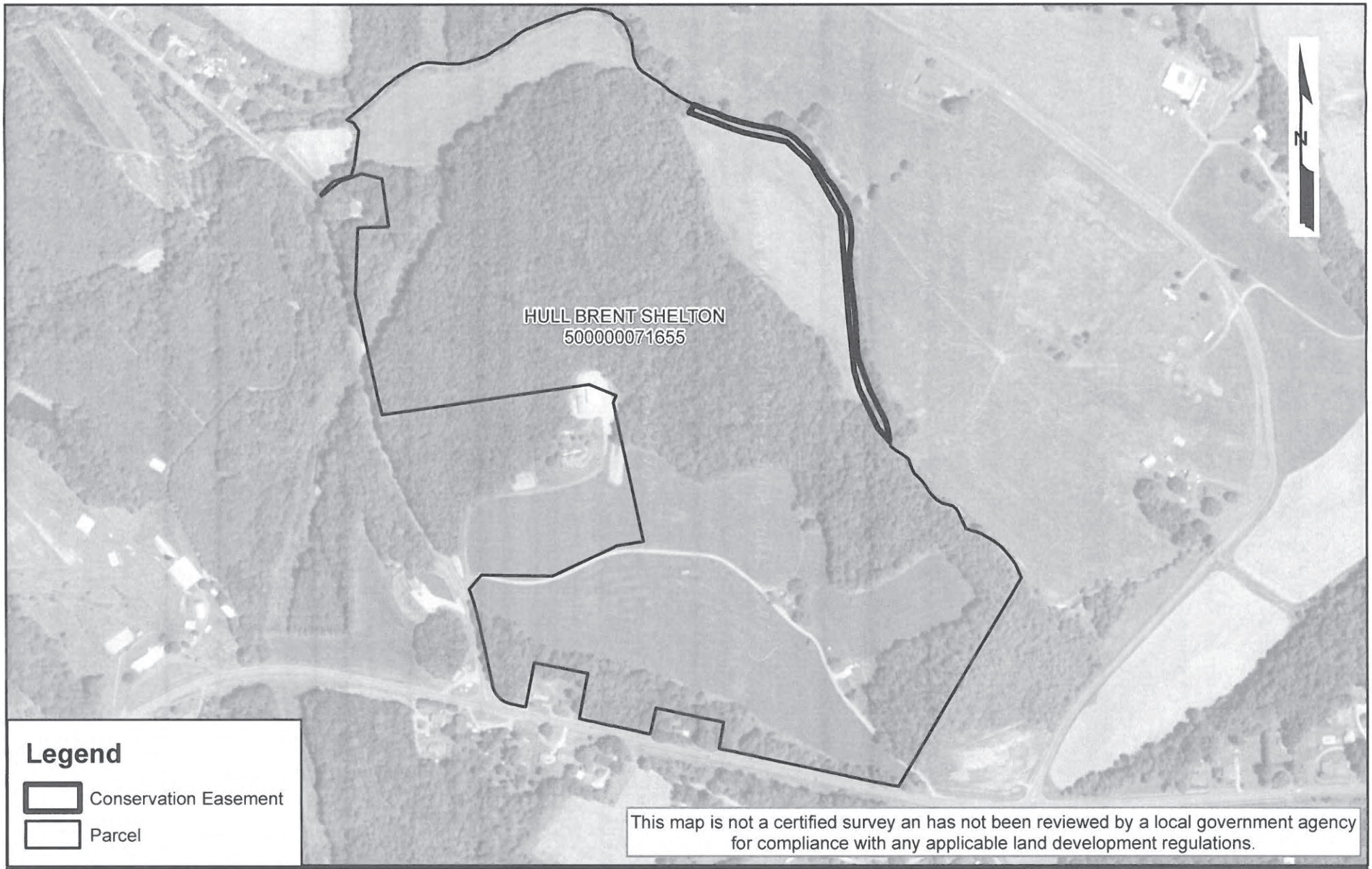
Official Signature Notary Public

Christa E Morrison

Printed or Typed Name of Notary

My Commission Expires: 3-31-21

[AFFIX NOTARIAL STAMP-SEAL]



0 250 500 Feet	HULL PROPERTY PROPERTY MAP	PREPARED BY: ECOSYSTEM PLANNING & RESTORATION
EXHIBIT B	SURRY COUNTY, NC	DATE: FEBRUARY 2017

OPTION TO PURCHASE CONSERVATION EASEMENT

THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option") is made and entered into this 10th day of February, 2017 (the "Effective Date"), by and among CHARLIE HULL + GAIL HULL HIATT (DAUGHTER + POA) (the "Grantor"), and **ECOSYSTEM PLANNING AND RESTORATION, LLC,** a limited liability company with offices at 559 Jones Franklin Road, Suite 150, Raleigh, North Carolina 27606 ("EPR").

WITNESSETH:

WHEREAS, Grantor is the owner of that certain real property located in Surry County, North Carolina, containing 63.9 acres, more or less, having Parcel No. 500001383884, 500000179554, and 500001383884 and being more particularly described on Exhibit A attached hereto and incorporated herein by reference, together with the improvements thereon and all appurtenances thereto belonging and appertaining, and all creeks, streams, rights-of-way, roads, streets and ways bounding said real property (collectively the "Property"); and

WHEREAS, Grantor has agreed to convey to EPR, an exclusive right and option to acquire a conservation easement, as more particularly described on the attached Exhibit B (the "Easement"), over the Property in accordance with the terms of this Option; and

WHEREAS, EPR is interested in acquiring the Easement in order to develop and construct a full delivery wetland and/or stream mitigation project over the lands covered by the Easement (the "Work") in conjunction with requests for proposals issued by the Division of Mitigation Services within the North Carolina Department of Environmental Quality ("DEQ"), and EPR has agreed to undertake such Work with respect to the Easement in accordance with the scope of work set forth in Exhibit C, attached hereto; and

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, EPR hereby notifies Grantor that: (i) EPR believes the fair market value of the Easement is the purchase price, pursuant to Paragraph 5(a) together with the value of the environmental improvements to be made to the Easement by EPR in performing the Work on the Easement; and (ii) EPR does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of One Hundred Dollars ($100.00) (the "Option Deposit") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

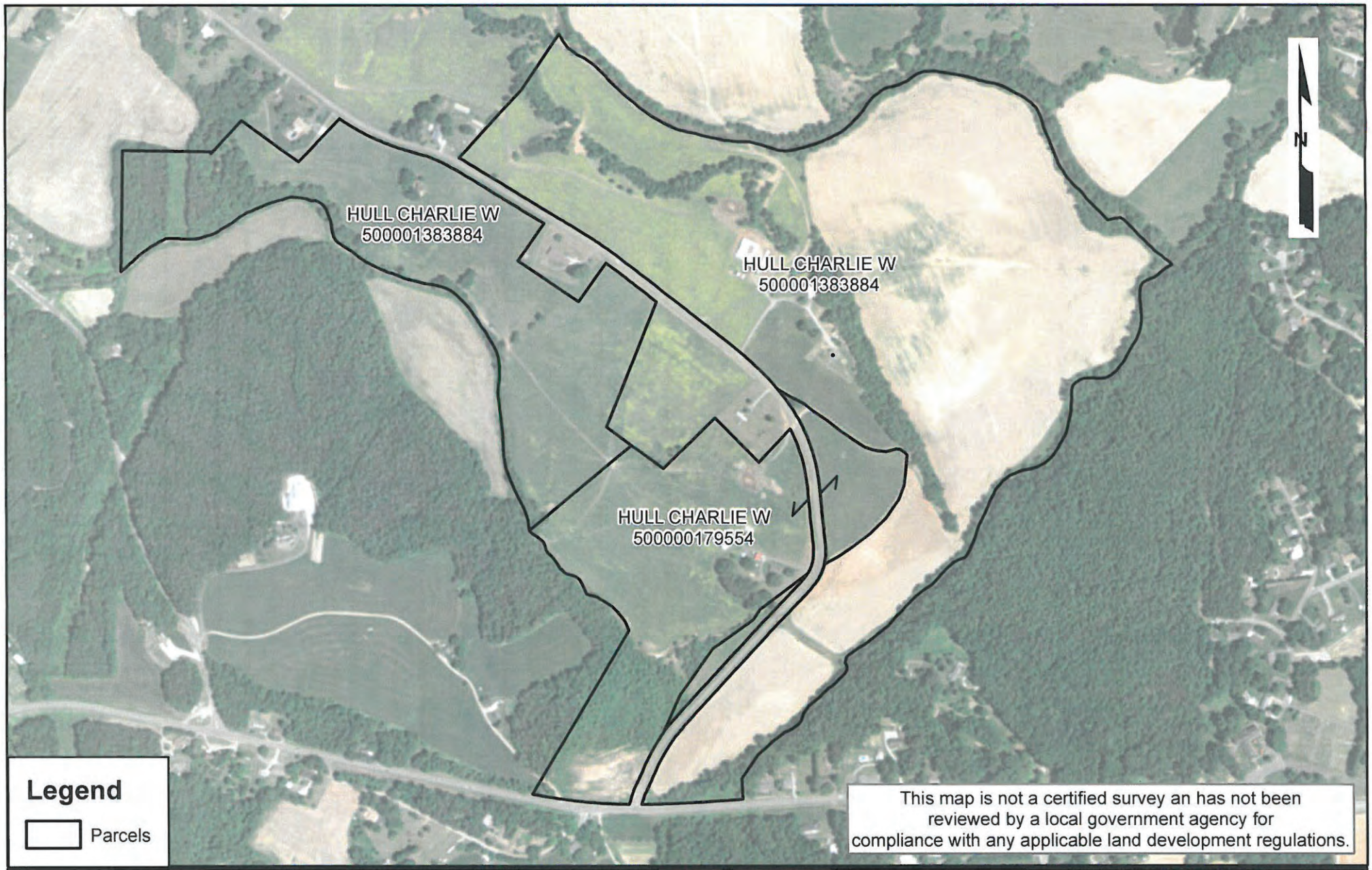
1. Grant of Option. Grantor hereby grants unto EPR, its successors and assigns, including a third-party designated by EPR qualified to be the grantee of a conservation easement under N.C.G.S. §121-35, the exclusive right and option to purchase the Easement in accordance with and subject to the terms and conditions set forth in this Option.

2. Term. The term of this Option shall commence on the Effective Date and shall expire eighteen (18) months after the Effective Date (the "Term"), unless extended by the parties, in writing.

EXHIBIT A

DESCRIPTION OF PROPERTY

INSERT EXHIBIT THAT GRAPHICALLY SHOWS THE PARENT PARCEL THAT CONTAINS THE EASEMENT, ALONG WITH THE PARCEL PIN NUMBER.



0 325 650 Feet

HULL PROPERTY

PROPERTY MAP

PREPARED BY:
ECOSYSTEM PLANNING & RESTORATION

EXHIBIT A

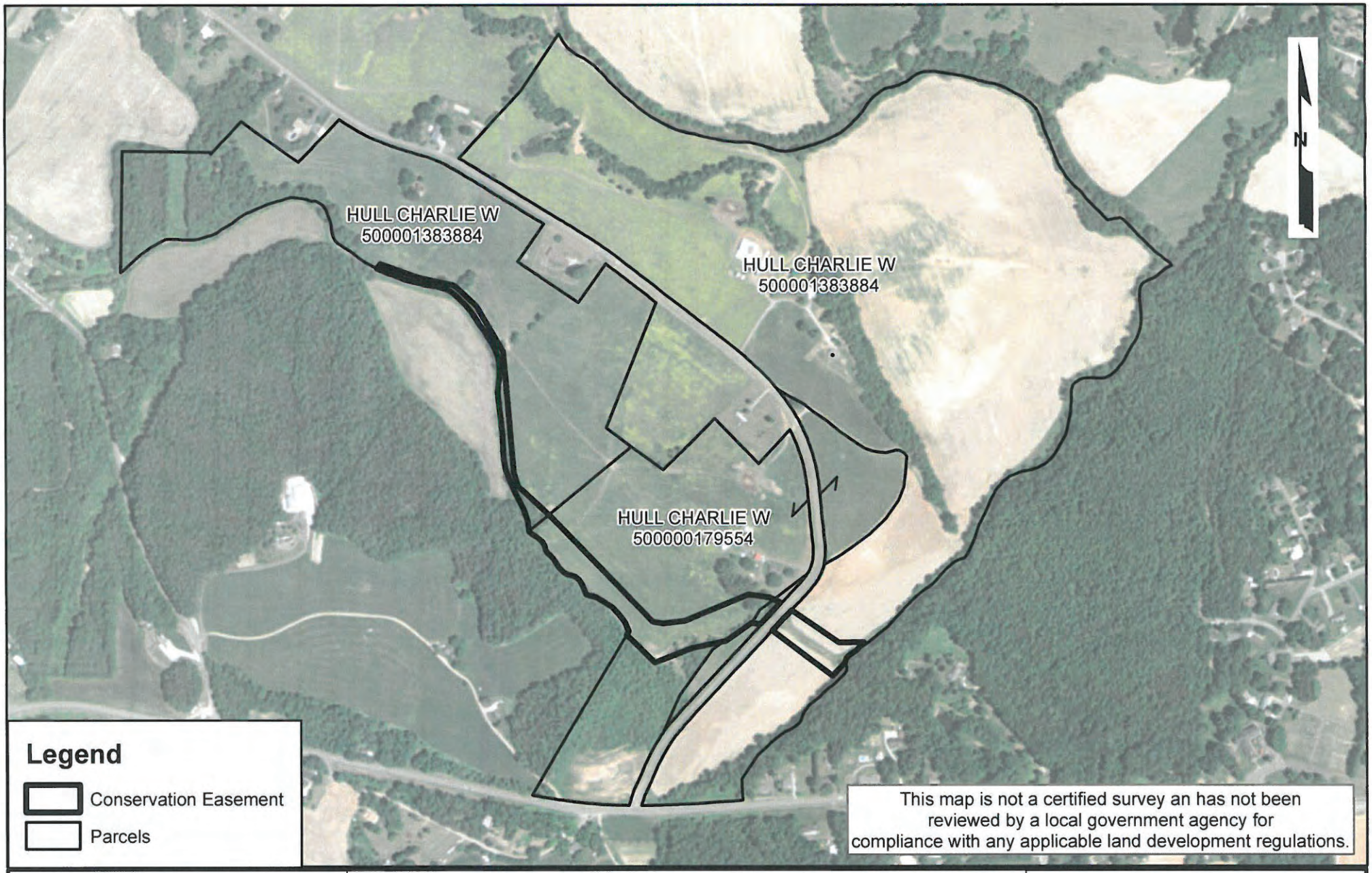
SURRY COUNTY, NC

DATE:
FEBRUARY 2017

EXHIBIT B

DESCRIPTION OF EASEMENT

INSERT EXHIBIT THAT GRAPHICALLY SHOWS THE PROPOSED EASEMENT BOUNDARIES.



0 325 650
Feet

HULL PROPERTY

PROPERTY MAP

PREPARED BY:
ECOSYSTEM PLANNING & RESTORATION

EXHIBIT B

SURRY COUNTY, NC

DATE:
FEBRUARY 2017

EXHIBIT C

SCOPE OF WORK

Property:	**Charlie Hull**
County:	**Surry**
Type of Work Proposed:	**Stream Restoration**

EPR will provide the following services as part of the proposed work:

Task 1 - EPR will conduct an environmental screening to identify/survey potential protected species, archaeological sites, historical architecture structures, contamination, etc. of the site.

Task 2 - EPR will develop a surveyed plat of the proposed conservation easement, and will execute and record the easement with the Grantor.

Task 3 – EPR will develop a site-specific restoration and/or mitigation plan for the project, including design plans that describe the work to be performed. Required permits from local, state, and federal agencies will be obtained.

Task 4 – EPR will secure a contractor to construct the restoration/mitigation project as designed.

Task 5 – EPR will secure a contractor to plant the site to native vegetation species, and will install any necessary monitoring devices, plots, or other required monitoring equipment.

Tasks 6 – EPR will develop a baseline monitoring report that describes and documents the condition of the site after construction.

Tasks 7 through 13 – EPR will conduct annual monitoring activities to document the condition of the site and to ensure the site is performing as designed and planned. Maintenance activities will be performed on an as-needed basis to ensure compliance.

EXHIBIT D

Memorandum Recording

BK 1584 PG 704 - 708 (5)

This document presented and filed:
02/15/2017 08:21:17 AM
Fee $26.00

642698

Surry County North Carolina
CAROLYN M. COMER, Register of Deeds

rbe

Prepared by and Return:
WARD ELLS
ECOSYSTEM PLANNING + RESTORATION
559 JONES FRANKLIN RD
RALEIGH, NC 27606

MEMORANDUM OF OPTION TO PURCHASE CONSERVATION EASEMENT

THIS MEMORANDUM FOR OPTION TO PURCHASE CONSERVATION EASEMENT ("Memorandum") is made and entered into this 10th day of February, 2017, by and between CHARLIE HULL, GAIL HULL MINTT (DAUGHTER+ AOH) (the "Grantor") and **ECOSYSTEM PLANNING AND RESTORATION, LLC,** a limited liability corporation with offices at 559 Jones Franklin Road, Raleigh, NC 27606 ("EPR").

WHEREAS, Grantor and EPR have entered into a certain Option to Purchase Conservation Easement (the "Option") dated FEB 10th, 2017, pursuant to which Grantor granted to EPR, its successors and assigns, an option to purchase a conservation easement (the "Easement") over certain real property located in Surry County, North Carolina, which property is more particularly described on the attached Exhibit B (the "Property"); and

WHEREAS, The parties enter into this Memorandum for the purpose of setting forth certain terms and conditions of the Option and to provide constructive notice of the Option;

NOW, THEREFORE, in consideration of the foregoing, the parties hereby agree as follows.

1. The term of the Option commenced on FEB 10th 2017 and shall expire on AUG 10th 2018.

2. All of the provisions set forth in the Option are incorporated in this Memorandum by reference.

3. The Option shall be binding upon and inure to the benefit of the parties and their respective heirs, successors and assigns.

[SIGNATURES AND NOTARY ACKNOWLEDGMENTS APPEAR ON FOLLOWING PAGES]

26
5

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: Charlie Hull

Print Name: Charlie Hull

Title: Landowner

STATE OF NC

COUNTY OF Surry

I, a Notary Public of the County and State aforesaid, certify that Charlie Hull personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: NC License

This the 10th day of February, 2017.

LuAnn Boyer
Official Signature of Notary Public

LuAnn Boyer
Printed or Typed Name of Notary

My Commission Expires: 11/12/18

[AFFIX NOTARIAL STAMP-SEAL]

LUANN BOYER
NOTARY PUBLIC
SURRY COUNTY, NC

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: Gail H. Hiatt

Print Name: Gail H. Hiatt

Title: Daughter

STATE OF NC

COUNTY OF Surry

I, a Notary Public of the County and State aforesaid, certify that Gail H. Hiatt personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: NC License

This the 10th day of February, 2017.

Official Signature of Notary Public

LuAnn Boyer

Printed or Typed Name of Notary

My Commission Expires: 11/12/18

[AFFIX NOTARIAL STAMP-SEAL]

LUANN BOYER
NOTARY PUBLIC
SURRY COUNTY, NC

ECOSYSTEM PLANNING AND RESTORATION, LLC, a limited liability company

By: _____

Print Name: Kevin Tweedy

Title: Vice President

STATE OF North Carolina

COUNTY OF Wake

I, Christa E Morrison, the undersigned Notary Public of the County and State aforesaid, certify that Kevin L Tweedy personally appeared before me this day, acknowledging to me that he is Vice President of Ecosystem Planning and Restoration, LLC, a limited liability company and that he acknowledged to me that he voluntarily signed the foregoing document for the purposes therein expressed and in the representative capacity so stated. I have received satisfactory evidence of the principal's identity in the form of drivers license.

This the 8 day of February, 2017.

CHRISTA E MORRISON NOTARY PUBLIC WAKE COUNTY, NC My Comm. Exp. 03-31-2021

Christa E Morrison

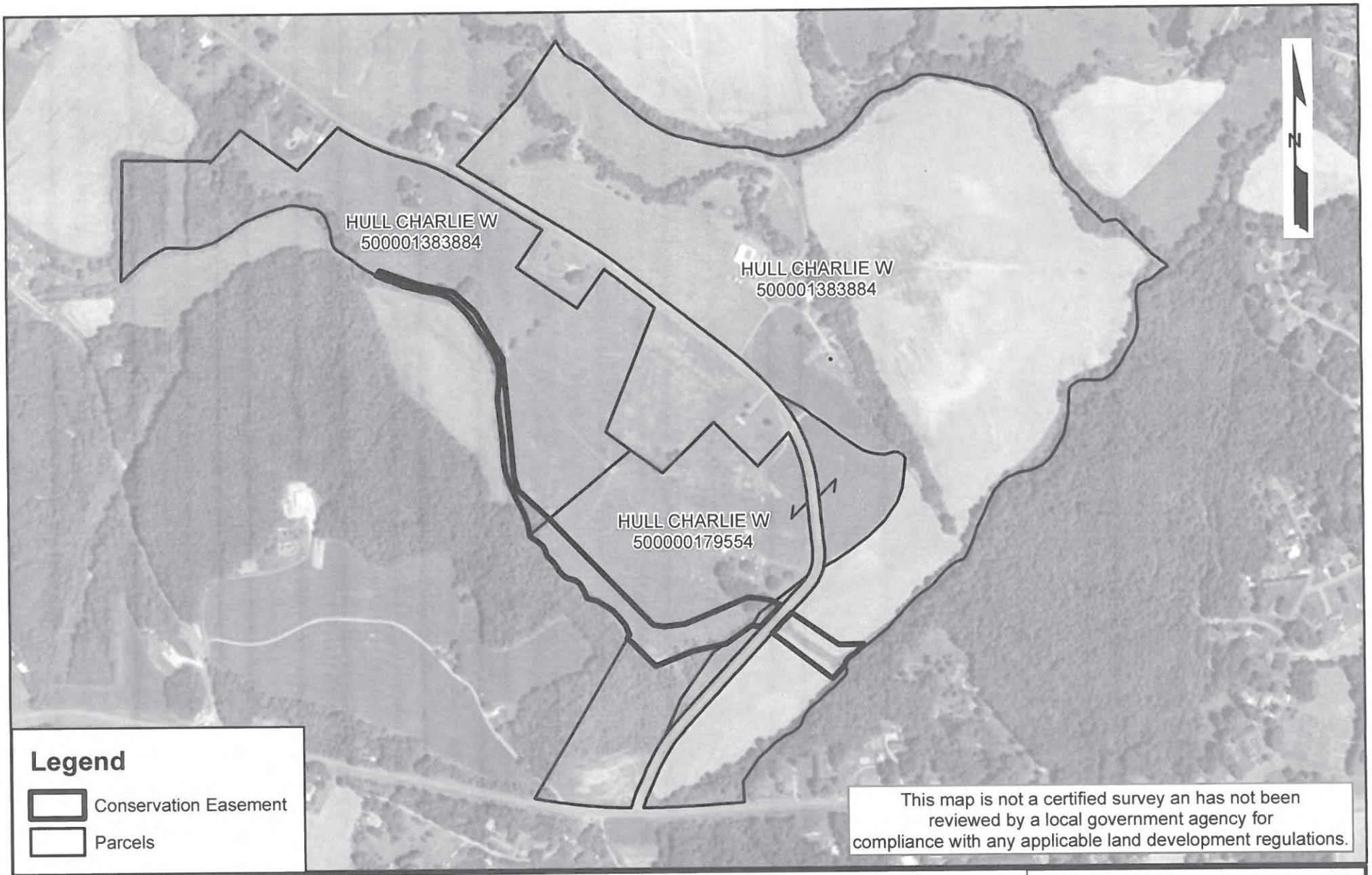
Official Signature Notary Public

Christa E Morrison

Printed or Typed Name of Notary

My Commission Expires: 3-31-21

[AFFIX NOTARIAL STAMP-SEAL]



0 325 650 Feet

HULL PROPERTY

PROPERTY MAP

PREPARED BY:
ECOSYSTEM PLANNING & RESTORATION

EXHIBIT B

SURRY COUNTY, NC

DATE:
FEBRUARY 2017

OPTION TO PURCHASE CONSERVATION EASEMENT

THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option") is made and entered into this 10th day of February, 2017 (the "Effective Date"), by and among CHARLIE HULL + GAIL HULL HYATT (DAUGHTER + POA) (the "Grantor"), and **ECOSYSTEM PLANNING AND RESTORATION, LLC,** a limited liability company with offices at 559 Jones Franklin Road, Suite 150, Raleigh, North Carolina 27606 ("EPR").

WITNESSETH:

WHEREAS, Grantor is the owner of that certain real property located in Surry County, North Carolina, containing 63.9 acres, more or less, having Parcel No. 500103106735 and being more particularly described on Exhibit A attached hereto and incorporated herein by reference, together with the improvements thereon and all appurtenances thereto belonging and appertaining, and all creeks, streams, rights-of-way, roads, streets and ways bounding said real property (collectively the "Property"); and

WHEREAS, Grantor has agreed to convey to EPR, an exclusive right and option to acquire a conservation easement, as more particularly described on the attached Exhibit B (the "Easement"), over the Property in accordance with the terms of this Option; and

WHEREAS, EPR is interested in acquiring the Easement in order to develop and construct a full delivery wetland and/or stream mitigation project over the lands covered by the Easement (the "Work") in conjunction with requests for proposals issued by the Division of Mitigation Services within the North Carolina Department of Environmental Quality ("DEQ"), and EPR has agreed to undertake such Work with respect to the Easement in accordance with the scope of work set forth in Exhibit C, attached hereto; and

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, EPR hereby notifies Grantor that: (i) EPR believes the fair market value of the Easement is the purchase price, pursuant to Paragraph 5(a) together with the value of the environmental improvements to be made to the Easement by EPR in performing the Work on the Easement; and (ii) EPR does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of Fifty Dollars ($100.00) (the "Option Deposit") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. Grant of Option. Grantor hereby grants unto EPR, its successors and assigns, including a third-party designated by EPR qualified to be the grantee of a conservation easement under N.C.G.S. §121-35, the exclusive right and option to purchase the Easement in accordance with and subject to the terms and conditions set forth in this Option.

2. Term. The term of this Option shall commence on the Effective Date and shall expire eighteen (18) months after the Effective Date (the "Term"), unless extended by the parties, in writing.

EXHIBIT A

DESCRIPTION OF PROPERTY

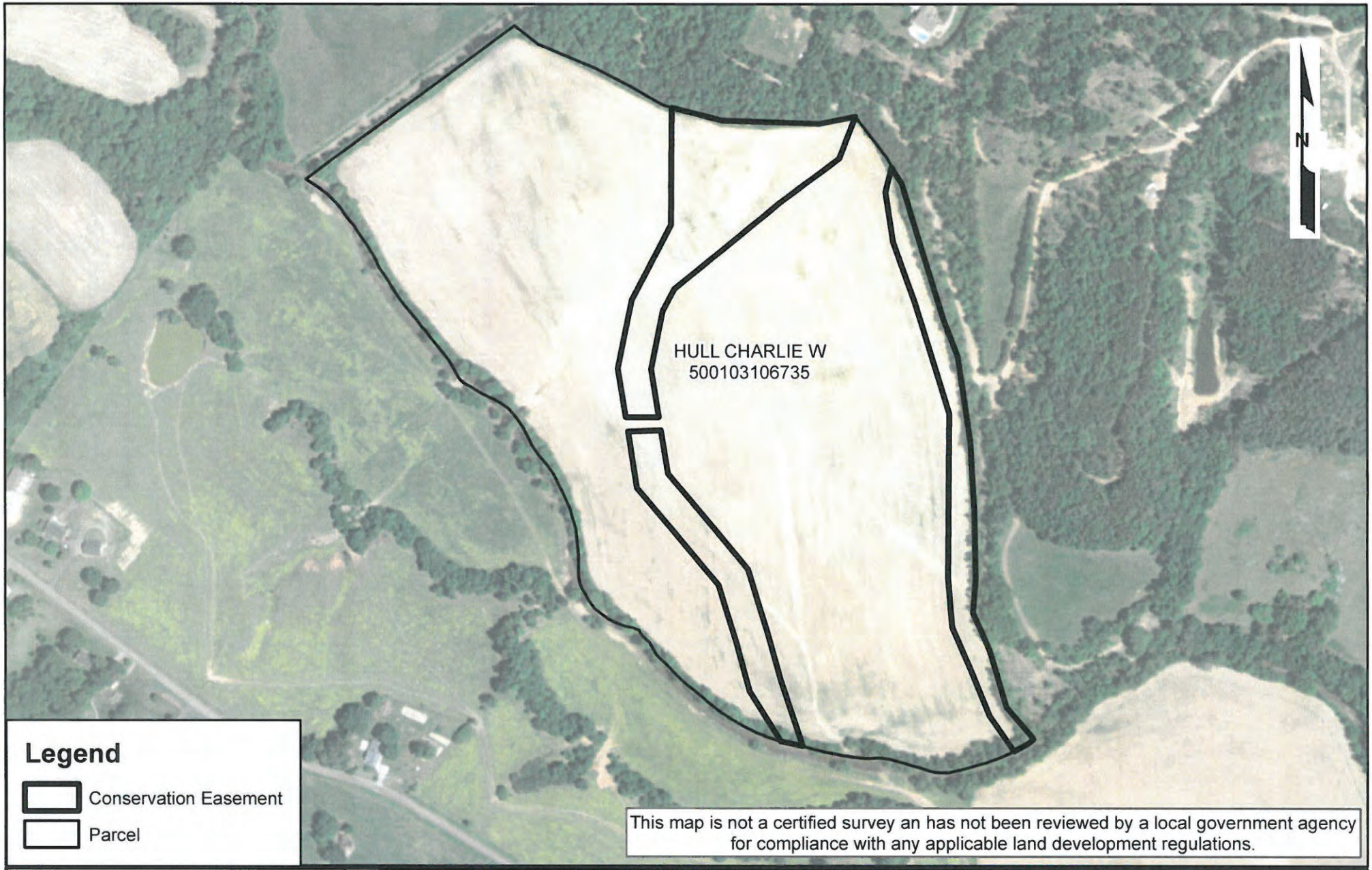
INSERT EXHIBIT THAT GRAPHICALLY SHOWS THE PARENT PARCEL THAT CONTAINS THE EASEMENT, ALONG WITH THE PARCEL PIN NUMBER.

0 200 400 Feet	HULL PROPERTY PROPERTY MAP	PREPARED BY: EPR Ecosystem Planning & Restoration
EXHIBIT A	SURRY COUNTY, NC	DATE: FEBRUARY 2017

EXHIBIT B

DESCRIPTION OF EASEMENT

INSERT EXHIBIT THAT GRAPHICALLY SHOWS THE PROPOSED EASEMENT BOUNDARIES.



0 200 400 Feet

HULL PROPERTY

PROPERTY MAP

PREPARED BY:
ECOSYSTEM PLANNING & RESTORATION

EXHIBIT B

SURRY COUNTY, NC

DATE:
FEBRUARY 2017

EXHIBIT C

SCOPE OF WORK

Property:	**Charlie Hull**
County:	**Surry**
Type of Work Proposed:	**Stream Restoration**

EPR will provide the following services as part of the proposed work:

Task 1 - EPR will conduct an environmental screening to identify/survey potential protected species, archaeological sites, historical architecture structures, contamination, etc. of the site.

Task 2 - EPR will develop a surveyed plat of the proposed conservation easement, and will execute and record the easement with the Grantor.

Task 3 – EPR will develop a site-specific restoration and/or mitigation plan for the project, including design plans that describe the work to be performed. Required permits from local, state, and federal agencies will be obtained.

Task 4 – EPR will secure a contractor to construct the restoration/mitigation project as designed.

Task 5 – EPR will secure a contractor to plant the site to native vegetation species, and will install any necessary monitoring devices, plots, or other required monitoring equipment.

Tasks 6 – EPR will develop a baseline monitoring report that describes and documents the condition of the site after construction.

Tasks 7 through 13 – EPR will conduct annual monitoring activities to document the condition of the site and to ensure the site is performing as designed and planned. Maintenance activities will be performed on an as-needed basis to ensure compliance.

EXHIBIT D

Memorandum Recording

BK 1584 PG 709 - 713 (5)

This document presented and filed:
02/15/2017 08:21:18 AM
Fee $26.00

642699

Surry County North Carolina
CAROLYN M. COMER, Register of Deeds

rbe

Prepared by and Return:
WARD ELLS
ECOSYSTEM PLANNING + RESTORATION
559 JONES FRANKLIN RD
RALEIGH, NC 27606

MEMORANDUM OF OPTION TO PURCHASE CONSERVATION EASEMENT

THIS MEMORANDUM FOR OPTION TO PURCHASE CONSERVATION EASEMENT ("Memorandum") is made and entered into this 10th day of February, 2017, by and between CHARLIE HULL, GAIL HULL HIATT (DAUGHTER + ADA) (the "Grantor") and **ECOSYSTEM PLANNING AND RESTORATION, LLC,** a limited liability corporation with offices at 559 Jones Franklin Road, Raleigh, NC 27606 ("EPR").

WHEREAS, Grantor and EPR have entered into a certain Option to Purchase Conservation Easement (the "Option") dated FEB 10th, 2017, pursuant to which Grantor granted to EPR, its successors and assigns, an option to purchase a conservation easement (the "Easement") over certain real property located in Surry County, North Carolina, which property is more particularly described on the attached Exhibit B (the "Property"); and

WHEREAS, The parties enter into this Memorandum for the purpose of setting forth certain terms and conditions of the Option and to provide constructive notice of the Option;

NOW, THEREFORE, in consideration of the foregoing, the parties hereby agree as follows.

1. The term of the Option commenced on FEB 10th 2017 and shall expire on AUG 10th 2018.

2. All of the provisions set forth in the Option are incorporated in this Memorandum by reference.

3. The Option shall be binding upon and inure to the benefit of the parties and their respective heirs, successors and assigns.

[SIGNATURES AND NOTARY ACKNOWLEDGMENTS APPEAR ON FOLLOWING PAGES]

26/5

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: Charlie Hull

Print Name: Charlie Hull

Title: Landowner

STATE OF NC

COUNTY OF Surry

I, a Notary Public of the County and State aforesaid, certify that Charlie Hull personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: NC License

This the 10th day of February, 2017.

Official Signature of Notary Public

LuAnn Bayer

Printed or Typed Name of Notary

My Commission Expires: 11/12/18

[AFFIX NOTARIAL STAMP-SEAL]

LUANN BOYER
NOTARY PUBLIC
SURRY COUNTY, NC

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: Gail H. Hiatt

Print Name: Gail H. Hiatt

Title: Daughter

STATE OF NC

COUNTY OF Surry

I, a Notary Public of the County and State aforesaid, certify that Gail H. Hiatt personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: NC License

This the 10th day of February, 2017.

Official Signature of Notary Public

LuAnn Boyer

Printed or Typed Name of Notary

My Commission Expires: 11/12/18

[AFFIX NOTARIAL STAMP-SEAL]

LUANN BOYER
NOTARY PUBLIC
SURRY COUNTY, NC

ECOSYSTEM PLANNING AND RESTORATION, LLC, a limited liability company

By: _____

Print Name: Kevin Tweedy

Title: Vice President

STATE OF North Carolina

COUNTY OF Wake

I, Christa E Morrison, the undersigned Notary Public of the County and State aforesaid, certify that Kevin L Tweedy personally appeared before me this day, acknowledging to me that he is Vice President of Ecosystem Planning and Restoration, LLC, a limited liability company and that he acknowledged to me that he voluntarily signed the foregoing document for the purposes therein expressed and in the representative capacity so stated. I have received satisfactory evidence of the principal's identity in the form of drivers license.

This the 8 day of February, 2017.

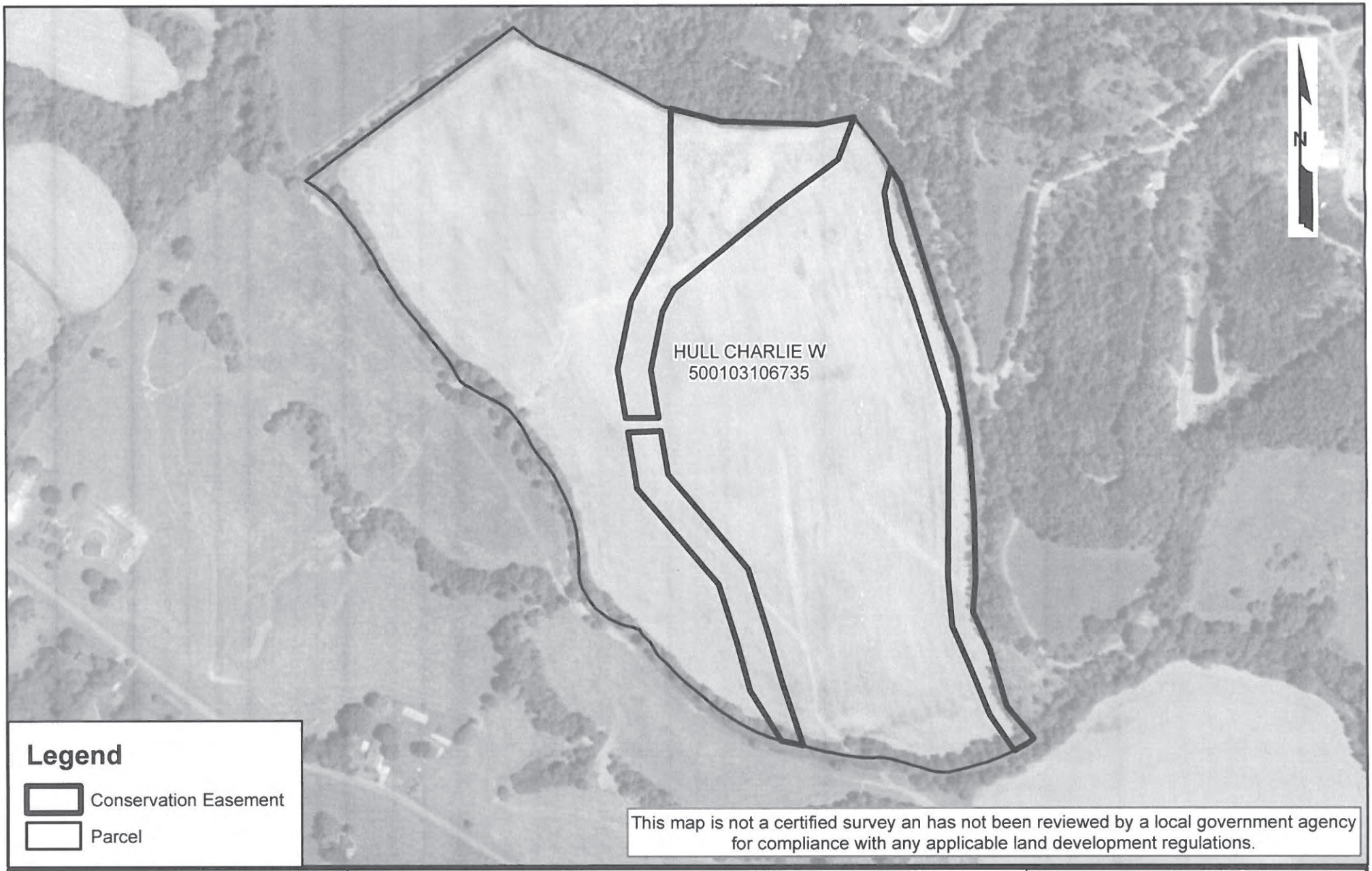
CHRISTA E MORRISON NOTARY PUBLIC WAKE COUNTY, N C My Comm. Exp. 03-31-2021

Christa E Morrison
Official Signature Notary Public

Christa E Morrison
Printed or Typed Name of Notary

My Commission Expires: 3-31-21

[AFFIX NOTARIAL STAMP-SEAL]



0 200 400 Feet

HULL PROPERTY

PROPERTY MAP

PREPARED BY:
ECOSYSTEM PLANNING & RESTORATION

EXHIBIT B

SURRY COUNTY, NC

DATE:
FEBRUARY 2017

OPTION TO PURCHASE CONSERVATION EASEMENT

THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option") is made and entered into this 10th day of February, 2017 (the "Effective Date"), by and among H. WILLIAM HULL JR & CATHY HULL (WIFE) (the "Grantor"), and **ECOSYSTEM PLANNING AND RESTORATION, LLC,** a limited liability company with offices at 559 Jones Franklin Road, Suite 150, Raleigh, North Carolina 27606 ("EPR").

WITNESSETH:

WHEREAS, Grantor is the owner of that certain real property located in Surry County, North Carolina, containing 70.6 acres, more or less, having Parcel No. 500103218380 and being more particularly described on Exhibit A attached hereto and incorporated herein by reference, together with the improvements thereon and all appurtenances thereto belonging and appertaining, and all creeks, streams, rights-of-way, roads, streets and ways bounding said real property (collectively the "Property"); and

WHEREAS, Grantor has agreed to convey to EPR, an exclusive right and option to acquire a conservation easement, as more particularly described on the attached Exhibit B (the "Easement"), over the Property in accordance with the terms of this Option; and

WHEREAS, EPR is interested in acquiring the Easement in order to develop and construct a full delivery wetland and/or stream mitigation project over the lands covered by the Easement (the "Work") in conjunction with requests for proposals issued by the Division of Mitigation Services within the North Carolina Department of Environmental Quality ("DEQ"), and EPR has agreed to undertake such Work with respect to the Easement in accordance with the scope of work set forth in Exhibit C, attached hereto; and

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, EPR hereby notifies Grantor that: (i) EPR believes the fair market value of the Easement is the purchase price, pursuant to Paragraph 5(a) together with the value of the environmental improvements to be made to the Easement by EPR in performing the Work on the Easement; and (ii) EPR does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of One Hundred Dollars ($100.00) (the "Option Deposit") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. Grant of Option. Grantor hereby grants unto EPR, its successors and assigns, including a third-party designated by EPR qualified to be the grantee of a conservation easement under N.C.G.S. §121-35, the exclusive right and option to purchase the Easement in accordance with and subject to the terms and conditions set forth in this Option.

2. Term. The term of this Option shall commence on the Effective Date and shall expire eighteen (18) months after the Effective Date (the "Term"), unless extended by the parties, in writing.

EXHIBIT A

DESCRIPTION OF PROPERTY

INSERT EXHIBIT THAT GRAPHICALLY SHOWS THE PARENT PARCEL THAT CONTAINS THE EASEMENT, ALONG WITH THE PARCEL PIN NUMBER.

0 225 450 Feet

HULL PROPERTY

PROPERTY MAP

PREPARED BY:
ECOSYSTEM PLANNING & RESTORATION

EXHIBIT A

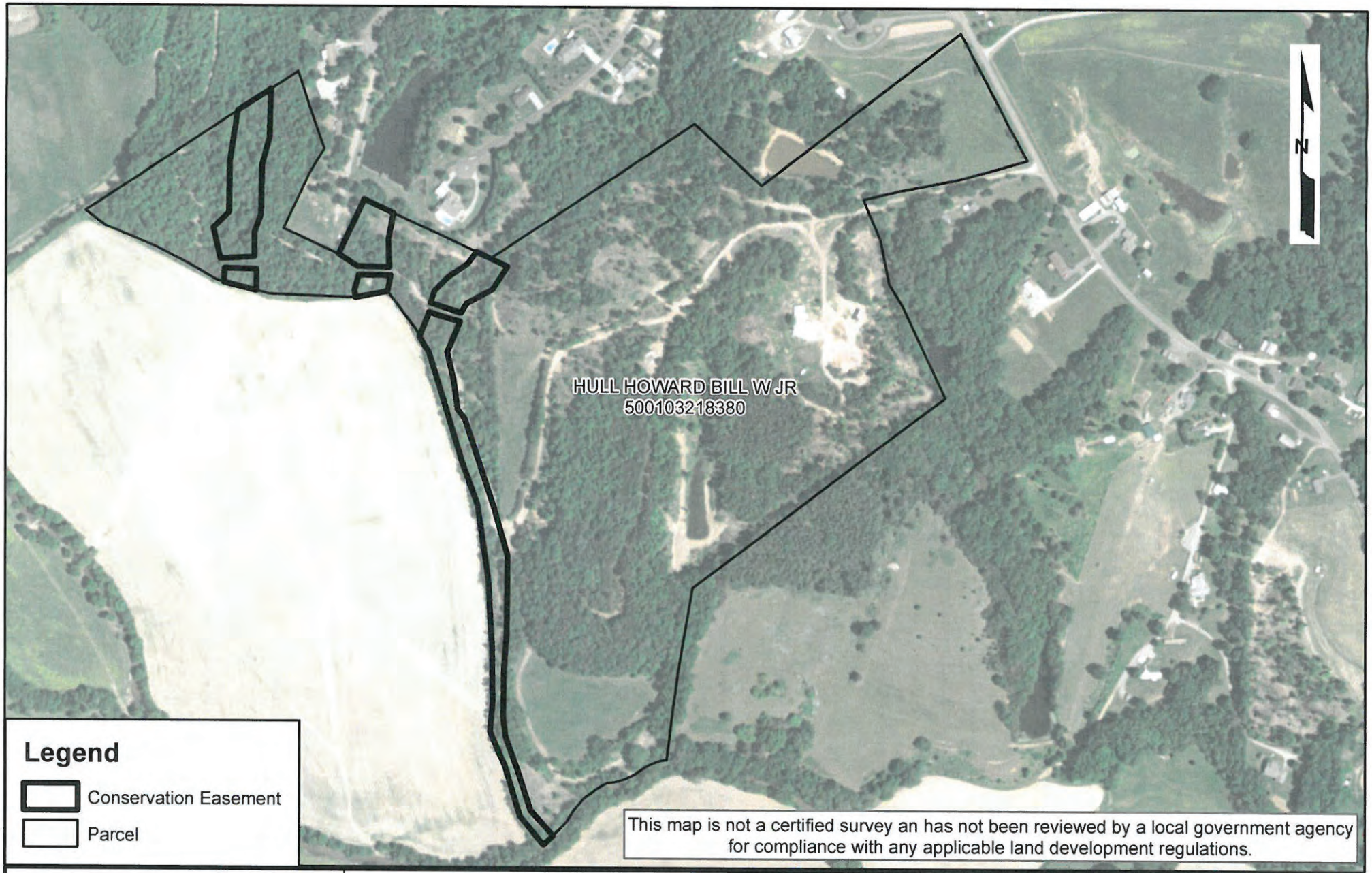
SURRY COUNTY, NC

DATE:
FEBRUARY 2017

EXHIBIT B

DESCRIPTION OF EASEMENT

INSERT EXHIBIT THAT GRAPHICALLY SHOWS THE PROPOSED EASEMENT BOUNDARIES.



0 225 450 Feet	HULL PROPERTY PROPERTY MAP	PREPARED BY: EPR Ecosystem Planning & Restoration
EXHIBIT B	SURRY COUNTY, NC	DATE: FEBRUARY 2017

EXHIBIT C

SCOPE OF WORK

Property:	**Bill Hull**
County:	**Surry**
Type of Work Proposed:	**Stream Restoration**

EPR will provide the following services as part of the proposed work:

Task 1 - EPR will conduct an environmental screening to identify/survey potential protected species, archaeological sites, historical architecture structures, contamination, etc. of the site.

Task 2 - EPR will develop a surveyed plat of the proposed conservation easement, and will execute and record the easement with the Grantor.

Task 3 – EPR will develop a site-specific restoration and/or mitigation plan for the project, including design plans that describe the work to be performed. Required permits from local, state, and federal agencies will be obtained.

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Task 5 – EPR will secure a contractor to plant the site to native vegetation species, and will install any necessary monitoring devices, plots, or other required monitoring equipment.

Tasks 6 – EPR will develop a baseline monitoring report that describes and documents the condition of the site after construction.

Tasks 7 through 13 – EPR will conduct annual monitoring activities to document the condition of the site and to ensure the site is performing as designed and planned. Maintenance activities will be performed on an as-needed basis to ensure compliance.

EXHIBIT D

Memorandum Recording

BK 1584 PG 714 - 718 (5)
This document presented and filed:
02/15/2017 08:21:19 AM
Fee $26.00
642700
Surry County North Carolina
CAROLYN M. COMER, Register of Deeds

rbe

Prepared by and Return:
WARD ELIS
ECOSYSTEM PLANNING + RESTORATION
559 JONES FRANKLIN RD
RALEIGH, NC 27606

MEMORANDUM OF OPTION TO PURCHASE CONSERVATION EASEMENT

THIS MEMORANDUM FOR OPTION TO PURCHASE CONSERVATION EASEMENT ("Memorandum") is made and entered into this 10th day of February, 2017, by and between HOWARD WILLIAM HULL SR + CATHY HULL (WIFE) (the "Grantor") and **ECOSYSTEM PLANNING AND RESTORATION, LLC,** a limited liability corporation with offices at 559 Jones Franklin Road, Raleigh, NC 27606 ("EPR").

WHEREAS, Grantor and EPR have entered into a certain Option to Purchase Conservation Easement (the "Option") dated FEB 10th, 2017, pursuant to which Grantor granted to EPR, its successors and assigns, an option to purchase a conservation easement (the "Easement") over certain real property located in Surry County, North Carolina, which property is more particularly described on the attached Exhibit B (the "Property"); and

WHEREAS, The parties enter into this Memorandum for the purpose of setting forth certain terms and conditions of the Option and to provide constructive notice of the Option;

NOW, THEREFORE, in consideration of the foregoing, the parties hereby agree as follows.

1. The term of the Option commenced on FEB 10th 2017 and shall expire on AUG 10th 2018.

2. All of the provisions set forth in the Option are incorporated in this Memorandum by reference.

3. The Option shall be binding upon and inure to the benefit of the parties and their respective heirs, successors and assigns.

[SIGNATURES AND NOTARY ACKNOWLEDGMENTS APPEAR ON FOLLOWING PAGES]

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: H. William Hull Jr.

Print Name: H. William Hull JR.

Title: OWNER

STATE OF NC

COUNTY OF Surry

I, a Notary Public of the County and State aforesaid, certify that H. William Hull Jr. personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: NC License

This the 10th day of February, 2017.

Official Signature of Notary Public

LuAnn Boyer

Printed or Typed Name of Notary

My Commission Expires: 11/12/18

[AFFIX NOTARIAL STAMP-SEAL]

LUANN BOYER
NOTARY PUBLIC
SURRY COUNTY, NC

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: Cathy Hull

Print Name: Cathy Hull

Title: Owner

STATE OF NC

COUNTY OF Surry

I, a Notary Public of the County and State aforesaid, certify that Cathy Hull personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: NC License

This the 10th day of February, 2017.

LuAnn Boyer

Official Signature of Notary Public

LuAnn Boyer

Printed or Typed Name of Notary

My Commission Expires: 11/12/18

[AFFIX NOTARIAL STAMP-SEAL]

LUANN BOYER
NOTARY PUBLIC
SURRY COUNTY, NC

ECOSYSTEM PLANNING AND RESTORATION, LLC, a limited liability company

By: _____

Print Name: Kevin Tweedy

Title: Vice President

STATE OF North Carolina

COUNTY OF Wake

I, Christa E Morrison, the undersigned Notary Public of the County and State aforesaid, certify that Kevin L Tweedy personally appeared before me this day, acknowledging to me that he is Vice President of Ecosystem Planning and Restoration, LLC, a limited liability company and that he acknowledged to me that he voluntarily signed the foregoing document for the purposes therein expressed and in the representative capacity so stated. I have received satisfactory evidence of the principal's identity in the form of drivers License.

This the 8 day of February, 2017.

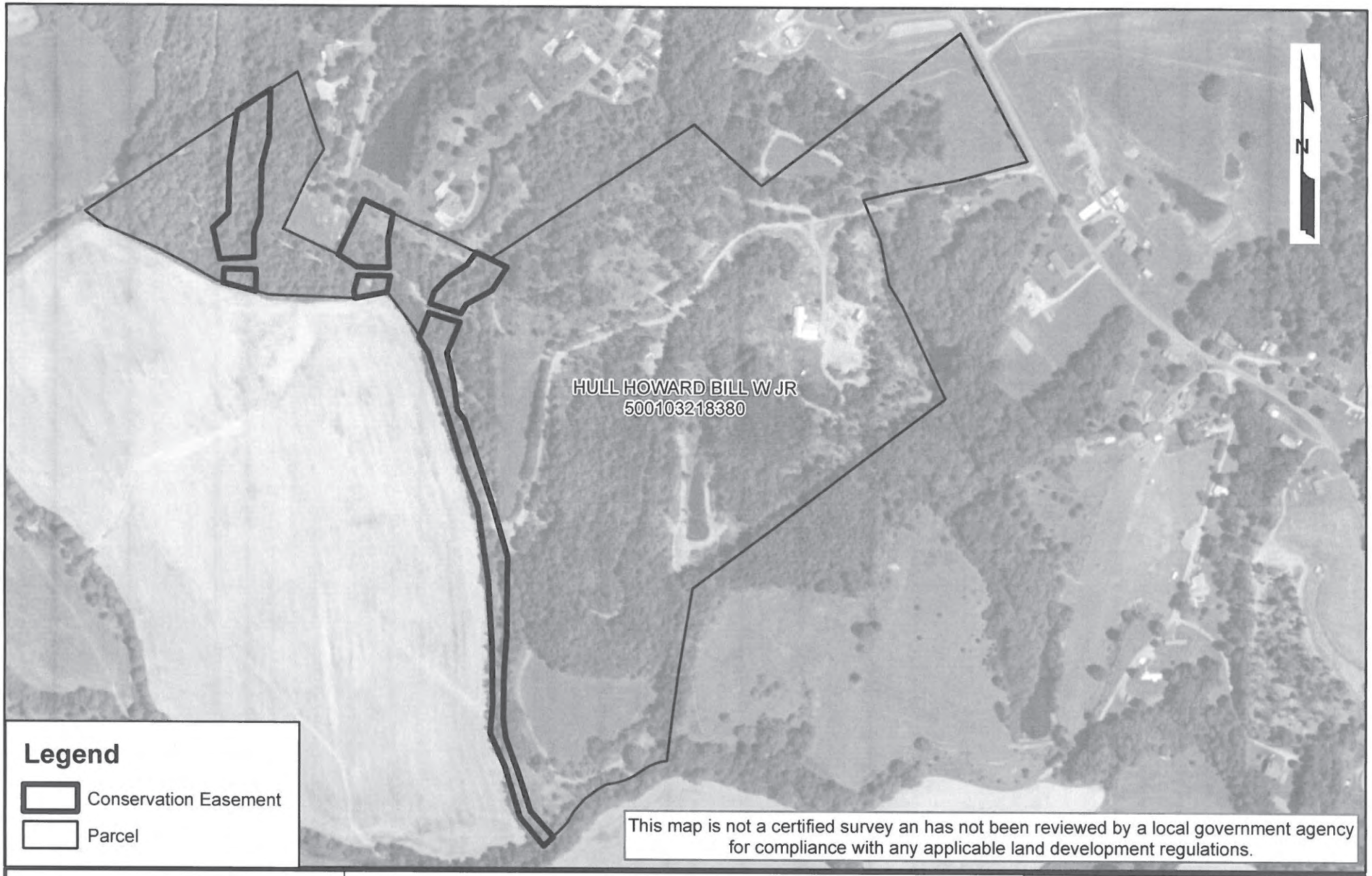
CHRISTA E MORRISON NOTARY PUBLIC WAKE COUNTY, NC My Comm. Exp. 03-31-2021

Christa E Morrison
Official Signature Notary Public

Christa E Morrison
Printed or Typed Name of Notary

My Commission Expires: 3-31-21

[AFFIX NOTARIAL STAMP-SEAL]



0 225 450 Feet	HULL PROPERTY PROPERTY MAP	PREPARED BY: ECOSYSTEM PLANNING & RESTORATION
EXHIBIT B	SURRY COUNTY, NC	DATE: FEBRUARY 2017

USFWS CORRESPONDENCE

Ecosystem Planning and Restoration, LLC
559 Jones Franklin Road, Suite 150
Raleigh, NC 27606

Phone: (919) 388-0787
www.eprusa.net

June 22, 2017

Marella Buncick, Endangered Species Biologist
USFWS Asheville Field Office
160 Zillicoa Street
Asheville NC 28801

RE: Stewarts Creek Tributaries Stream Restoration, NCDEQ DMS Full-Delivery Yadkin River Basin, Cataloging Unit 03040101, Surry County, NC

Dear Ms. Buncick,

Ecosystem Planning and Restoration (EPR) respectfully requests review and comment from the United States Fish and Wildlife Service (USFWS) regarding the implementation of the subject project. This request is to comply with the Nationwide Permit general conditions and to develop the environmental documentation required by the proposed action. Project details are presented below.

The project is comprised of multiple parcels in the vicinity of Race Track Road, approximately 2.5 miles east of Interstate 77 and four miles west of the City of Mount Airy in Surry County, North Carolina. Figure 1 depicts the project on the United States Geological Survey (USGS) Cana, Virginia - North Carolina 7.5-minute topographic map at 36.512650 N and -80.698388 E and is comprised of five parcels, here indicated by the following Parcel ID Nos.: 500103105735, 500103218380, 500001383884, 500000179554, and 500000071655.

The Stewarts Creek Tributaries site was identified to provide in-kind mitigation for unavoidable stream and/or wetland impacts. Segments of this stream network have been identified as incised, eroding, and no longer connected to their floodplains. In total, almost 12,000 linear feet will be restored through the relocation of streams to their approximate historic locations and reconnection with the historic floodplain. To that end, new channels will be constructed within the existing crop- and pasture-land with excavation depths ranging from 1-8 feet. All work will take place within a 28-acre conservation easements shown on the attached Figure 2.

Construction activities will take place within jurisdictional waterbodies requiring Section 401 and 404 permits from the NC Department of Environmental Quality (DEQ) and the US Army Corps of Engineers. Grading activities will require a Sediment and Erosion Control permit from the NC Division of Land Quality. Portions of the site are located within a mapped FEMA floodplain and will require coordination with Surry County Floodplain Administrators.

As of June 1, 2017, the USFWS lists four federally protected species and three federal species of concern for Surry County (Table 1). A brief description of the federally protected species habitat requirements follows, along with the Biological Conclusion rendered based on field assessments of the project area. Habitat requirements are based on the current best available information.

Table 1. Federally listed species for Surry County

Common Name	Scientific Name	Federal Status	Habitat Present	Biological Conclusion
Bog turtle	*Glyptemys muhlenbergii*	T (S/A)	No	Not Required
Northern long-eared bat	*Myotis septentrionalis*	T	Yes	MA-NLAA
Robust redhorse	*Moxostoma robustum*	FSC	Yes	N/A
Brook floater	*Alasmidonta varicose*	FSC	Yes	N/A
Carolina hemlock	*Tsuga caroliniana*	FSC	No	N/A
Schweinitz's sunflower	*Helianthus schweinitzii*	E	Yes	No Effect
Small whorled pogonia	*Isotria medeoloides*	T	Yes	No Effect

T = threatened. A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."
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. 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.
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.
N/A – Not applicable to FSC
MA-NLAA – May Affect-Not Likely to Adversely Affect

Bog turtle

USFWS Recommended Survey Window: April 1 – October 1 (visual surveys); April 1- June 15 (optimal for breeding/nesting); May 1-June 30 (trapping surveys)

Habitat Description: Bog turtle habitat consists of open, groundwater supplied (spring fed), graminoid dominated wetlands along riparian corridors or on seepage slopes. These habitats are designated as mountain bogs by the North Carolina Natural Heritage Program, but they are technically poor, moderate, or rich fens that may be associated with wet pastures and old drainage ditches that have saturated muddy substrates with open canopies. These habitats, found between 700 and 4,500 feet above mean sea level in the western Piedmont and mountain counties of North Carolina, often support sphagnum moss and may contain carnivorous plants. Soil types (poorly drained silt loams) from which bog turtle habitats have been found include Arkaqua, Chewacla, Dellwood, Codorus complex, Hatboro, Nikwasi, Potomac – Iotla complex, Reddies, Rosman, Tate – Cullowhee complex, Toxaway, Tuckasegee – Cullasaja complex, Tusquitee, Watauga, and Wehadkee.

Biological Conclusion: Not Required

Species listed as threatened due to similarity of appearance do not require Section 7 consultation with the USFWS. However, this project is not expected to affect the bog turtle because no suitable habitat is present within the project area. While small wetlands occur at the site, they are located in woody areas under thick canopy. In addition, a review of NC Natural Heritage Program (NCNHP) records indicates no known bog turtle occurrences within 1.0 mile of the study area.

Northern long-eared bat
USFWS Recommended Survey Window: June 1 – August 15

Habitat Description: In North Carolina, the Northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern North Carolina. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically ≥3 inches dbh). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat has also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

Biological Conclusion: May Affect, Not Likely to Adversely Affect
Forested areas suitable as roosting habitat for the NLEB exist in the study area. However, as of June 7, 2016, the USFWS does not indicate that Surry County contains any confirmed hibernation or maternity sites for the NLEB. Therefore, this project will not require incidental take and is exempted under the final 4(d) rule guidelines. In addition, a review of NCNHP records indicates no known NLEB occurrences within 1.0 mile of the study area.

Schweinitz's sunflower
USFWS Optimal Survey Window: late August-October

Habitat Description: Endemic to the Piedmont of North and South Carolina, the few sites where this rhizomatous perennial herb occurs in relatively natural vegetation are found in Xeric Hardpan Forests. The species is also 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, including Badin, Cecil, Cid, Enon, Gaston, Georgeville, Iredell, Mecklenburg, Misenheimer, Secrest, Tatum, Uwharrie, and Zion, among others. 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.

Biological Conclusion: No Effect

Suitable habitat for Schweinitz's sunflower exists in a small area of old pasture located adjacent to one of the tributaries to Stewarts Creek. No excavation or fill is proposed for this area. The only work that will occur is selective invasive species control and planting of native vegetation. In addition, a review of NCNHP records indicates no known occurrences of the sunflower within 1.0 mile of the study area.

Small whorled pogonia

USFWS Optimal Survey Window: mid-May - early July

Habitat Description: Small whorled pogonia occurs in young as well as maturing (second to third successional growth) mixed-deciduous or mixed-deciduous/coniferous forests. It does not appear to exhibit strong affinities for a particular aspect, soil type, or underlying geologic substrate. In North Carolina, the perennial orchid is typically found in open, dry deciduous woods and is often associated with white pine and rhododendron. The species may also be found on dry, rocky, wooded slopes; moist slopes; ravines lacking stream channels; or slope bases near braided channels of vernal streams. The orchid, often limited by shade, requires small light gaps or canopy breaks, and typically grows under canopies that are relatively open or near features like logging roads or streams that create long-persisting breaks in the forest canopy.

Biological Conclusion: No Effect

The wooded hillsides near the Stewarts Creek tributaries headwaters provide habitat for small whorled pogonia. However, all restoration work will occur within the floodplain, and the hillsides will not be impacted. In addition, a review of NCNHP records indicates no known occurrences of the pogonia within 1.0 mile of the study area.

If EPR has not received response from you within 45 days, we will assume that the USFWS does not have any comment or information relevant to the implementation of this project at the current time. We thank you in advance for your timely response, input, and cooperation. Please contact me at the above phone number or address with any question.

Sincerely,

Kevin Tweedy, PE
Vice President

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org. (Accessed: June 8, 2017).

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[NCWRC] North Carolina Wildlife Resources Commission. 2006. Bog Turtle Fact Sheet.http://www.ncwildlife.org/Portals/0/Conserving/documents/nongame_bogturtle_hires.pdf. (Accessed: June 8, 2017).

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. Natural Heritage Program, Division of Parks and Recreation, N.C. Department of Environment, Health, and Natural Resources. Raleigh, NC. 325 pp.

[USFWS] U.S. Fish and Wildlife Service. 2016. NC County NLEB consultation areas. https://www.fws.gov/asheville/htmls/project_review/NLEB_in_WNC.html (Accessed June 8, 2017)

[USFWS] U.S. Fish and Wildlife Service. 2016. Small-whorled Pogonia Fact Sheet. https://www.fws.gov/midwest/endangered/plants/smallwhorledpogoniafs.html. (Accessed: June 8, 2017).

[USFWS] U.S. Fish and Wildlife Service. 2015. NLEB Fact Sheet. https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/NLEBFactSheet01April2015.pdf. (Accessed: May 31, 2017.)

[USFWS] U.S. Fish and Wildlife Service. 2014. Northern Long-Eared Bat (NLEB) Interim Conference and Planning Guidance. USFWS Regions 2, 3, 4, 5 & 6. https://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf. (Accessed: May 31, 2017.)

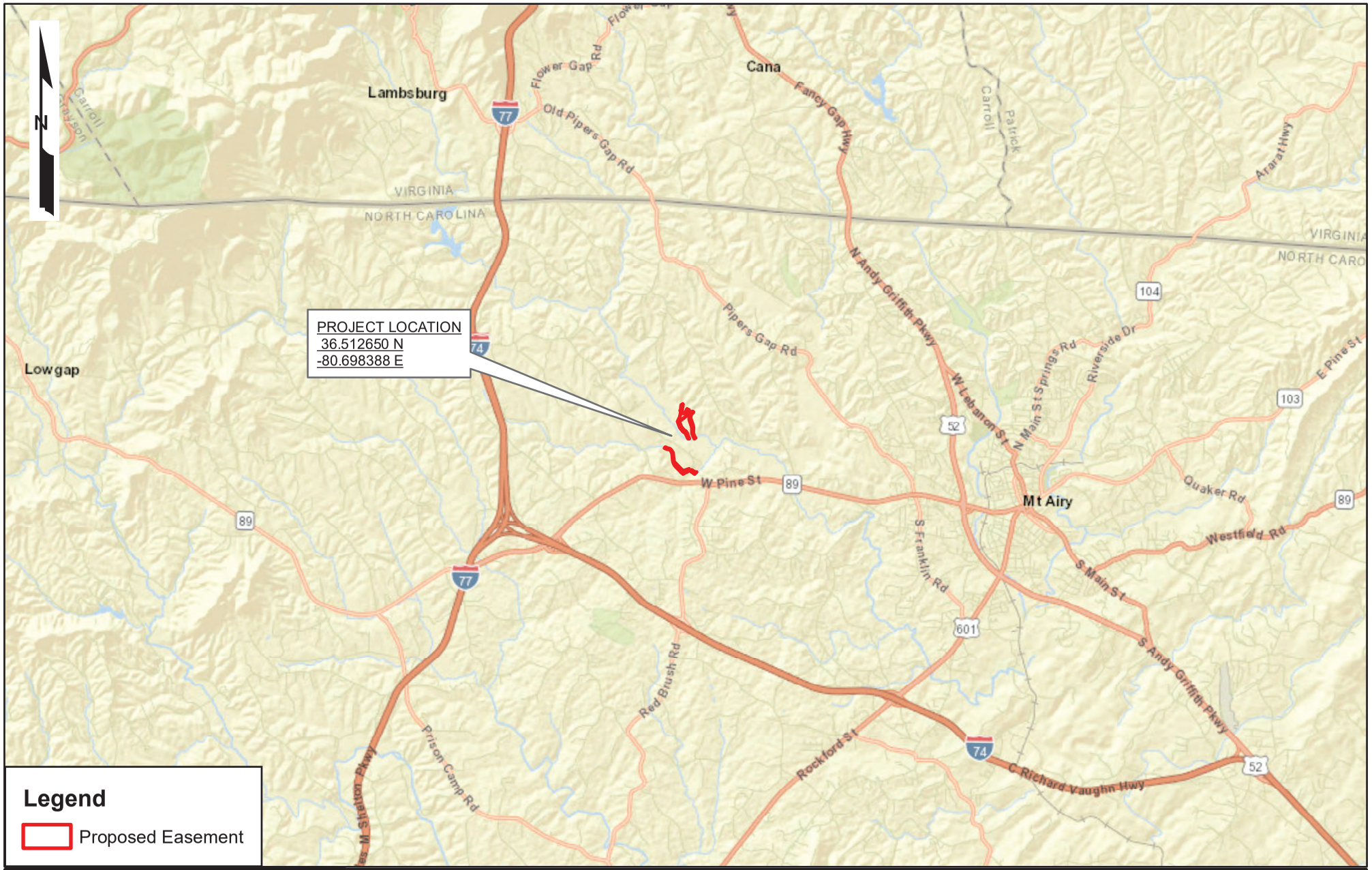
[USFWS] U.S. Fish and Wildlife Service. 2011. Schweinitz's Sunflower (*Helianthus schweinitzii*).https://www.fws.gov/raleigh/species/es_schweinitz_sunflower.html. (Accessed: June 8, 2017).

[USFWS] United States Fish and Wildlife Service. Asheville Ecological Services Field Office. 2011. Bog Turtle (*Glyptemys muhlenbergii*).https://www.fws.gov/asheville/htmls/listed_species/bog_turtle.html. (Accessed: June 8, 2017).

[USFWS] U.S. Fish and Wildlife Service. 2006. Optimal Survey Windows for North Carolina's Federally Threatened and Endangered Plant Species.https://www.fws.gov/raleigh/pdfs/survey_window_for_plants.pdf. (Accessed: June 8, 2017).

[USFWS] U.S. Fish and Wildlife Service. 1994. Schweinitz's Sunflower Recovery Plan. Atlanta, GA. 28 pp.

[USFWS] U.S. Fish and Wildlife Service. 1992. Small Whorled Pogonia (*Isotria medeoloides*) Recovery Plan, First Revision. Newton Corner, Massachusetts. 75 pp.



0 1 2 Miles

STEWARTS CREEK TRIBUTARIES

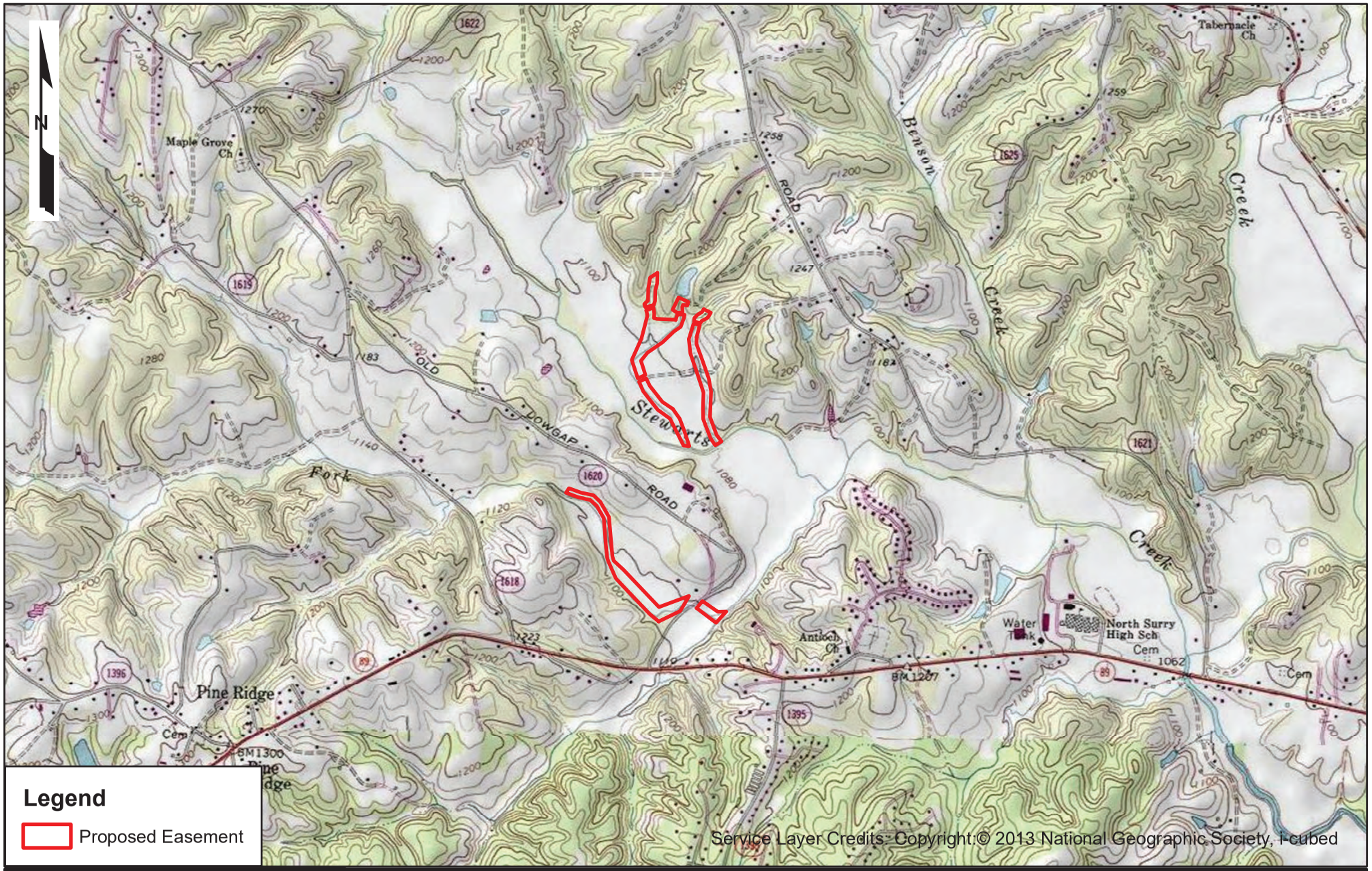
VICINITY MAP

PREPARED FOR:
NCDEQ
DIVISION OF
MITIGATION SERVICES

FIGURE 1

SURRY COUNTY, NC

PREPARED BY:
Ecosystem Planning & Restoration



0 1,000 2,000 4,000 Feet

STEWARTS CREEK TRIBUTARIES

USGS TOPOGRAPHIC MAP

PREPARED FOR:

NCDEQ
DIVISION OF
MITIGATION SERVICES

FIGURE 2

SURRY COUNTY, NC

PREPARED BY:

Ecosystem Planning & Restoration

Typical wooded area at tributary headwaters.

Typical wooded area at tributary headwaters.

Typical wooded area at tributary headwaters.

Typical wooded area at tributary headwaters.

Narrow buffer along Moores Fork

Typical narrow buffer along Moores Fork

Pastureland adjacent to Moores Fork

NORTHERN LONG-EARED BAT
STREAMLINED CONSULTATION FORM

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies should use this form for the optional streamlined consultation framework for the northern long-eared bat (NLEB). This framework allows federal agencies to rely upon the U.S. Fish and Wildlife Service's (USFWS) January 5, 2016, intra-Service Programmatic Biological Opinion (BO) on the final 4(d) rule for the NLEB for section 7(a)(2) compliance by: (1) notifying the USFWS that an action agency will use the streamlined framework; (2) describing the project with sufficient detail to support the required determination; and (3) enabling the USFWS to track effects and determine if reinitiation of consultation is required per 50 CFR 402.16.

This form is not necessary if an agency determines that a proposed action will have no effect to the NLEB or if the USFWS has concurred in writing with an agency's determination that a proposed action may affect, but is not likely to adversely affect the NLEB (i.e., the standard informal consultation process). Actions that may cause prohibited incidental take require separate formal consultation. Providing this information does not address section 7(a)(2) compliance for any other listed species.

Information to Determine 4(d) Rule Compliance:	**YES**	**NO**
1. Does the project occur wholly outside of the WNS Zone[1]?	☐	☒
2. Have you contacted the appropriate agency[2] to determine if your project is near known hibernacula or maternity roost trees?	☒	☐
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	☐	☒
4. Could the project alter the entrance or interior environment of a known hibernaculum?	☐	☒
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	☐	☒
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	☐	☒

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the BO.

Agency and Applicant[3] (Name, Email, Phone No.):

Agency:
Federal Highway Administration (FHWA)
Donnie Brew, donnie.brew@dot.gov, (919) 747-7017

Agency Representative:
Ecosystem Planning and Restoration, LLC
Kevin Tweedy, PE, ktweedy@eprusa.net, (919) 388-1787

[1] http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf
[2] See http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html
[3] If applicable - only needed for federal actions with applicants (e.g., for a permit, etc.) who are party to the consultation.

Project Name: Stewarts Creek Tributaries Stream Restoration

Project Location (include coordinates if known):

The project is comprised of multiple parcels in the vicinity of Race Track Road, approximately 2.5 miles east of Interstate 77 and four miles west of the City of Mount Airy in Surry County, North Carolina. Figure 1 depicts the project on the United States Geological Survey (USGS) Cana, Virginia - North Carolina 7.5-minute topographic map at 36.512650 N and -80.698388 E and is comprised of five parcels, here indicated by the following Parcel ID Nos.: 500103105735, 500103218380, 500001383884, 500000179554, and 500000071655.

Basic Project Description (provide narrative below or attach additional information):

The Stewarts Creek Tributaries site was identified to provide in-kind mitigation for unavoidable stream and/or wetland impacts. Segments of this stream network have been identified as incised, eroding, and no longer connected to their floodplains. In total, almost 12,000 linear feet will be restored through the relocation of streams to their approximate historic locations and reconnection with the historic floodplain. To that end, new channels will be constructed within the existing crop- and pasture-land with excavation depths ranging from 1-8 feet. All work will take place within a 28-acre conservation easement shown on the attached Figure 2.

General Project Information	**YES**	**NO**
Does the project occur within 0.25 miles of a known hibernaculum?	☐	☒
Does the project occur within 150 feet of a known maternity roost tree?	☐	☒
Does the project include forest conversion[4]? (if yes, report acreage below)	☒	☐
Estimated total acres of forest conversion	1.6	
If known, estimated acres[5] of forest conversion from April 1 to October 31		
If known, estimated acres of forest conversion from June 1 to July 31[6]		
Does the project include timber harvest? (if yes, report acreage below)	☐	☒
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	☐	☒
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	☐	☒
Estimated wind capacity (MW)		

[4] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the BO).
[5] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[6] If the activity includes tree clearing in June and July, also include those acreage in April to October.

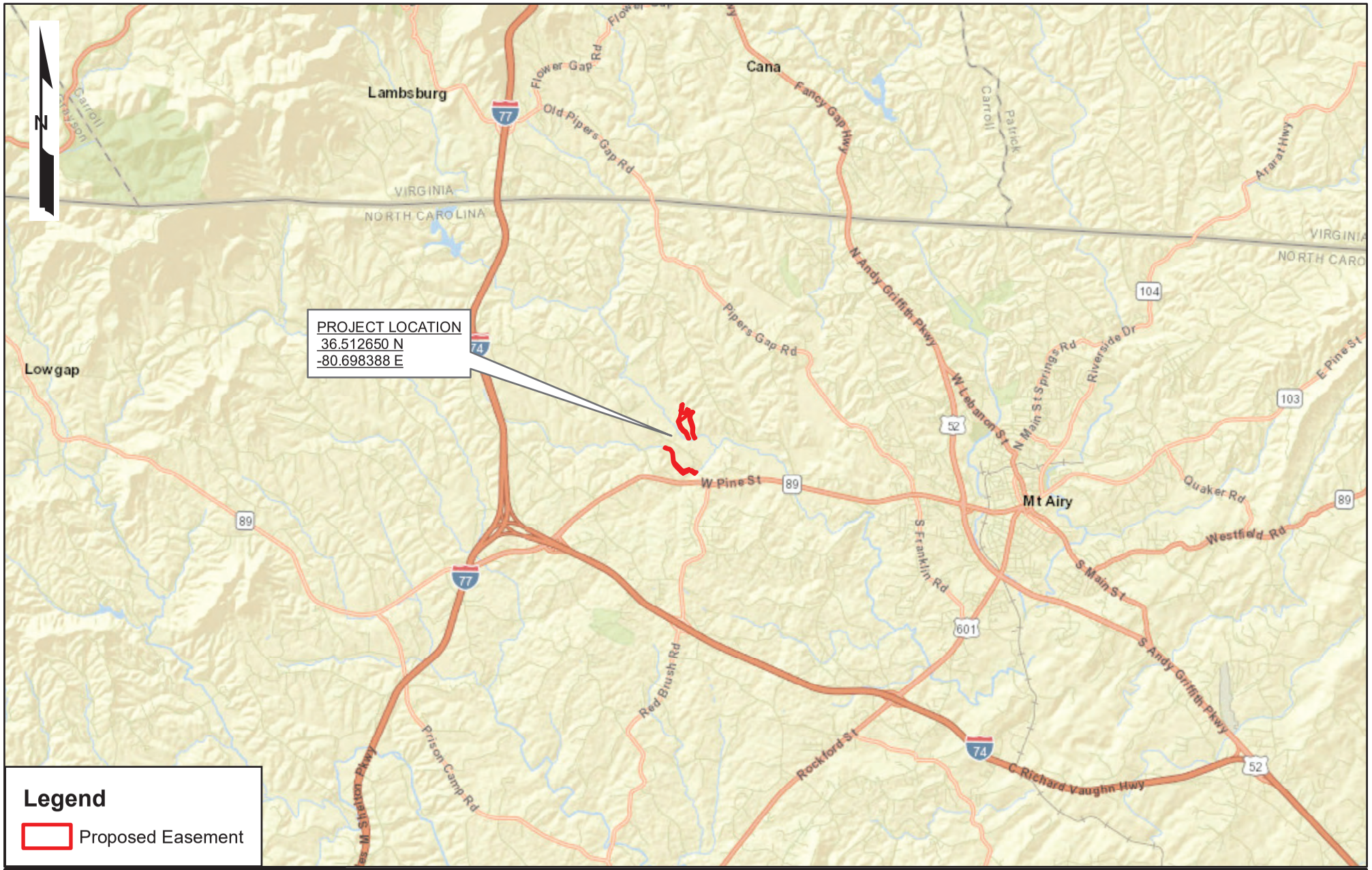
Agency Determination:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.

Signature: _____ Date Submitted: _____



0 1 2 Miles

STEWARTS CREEK TRIBUTARIES

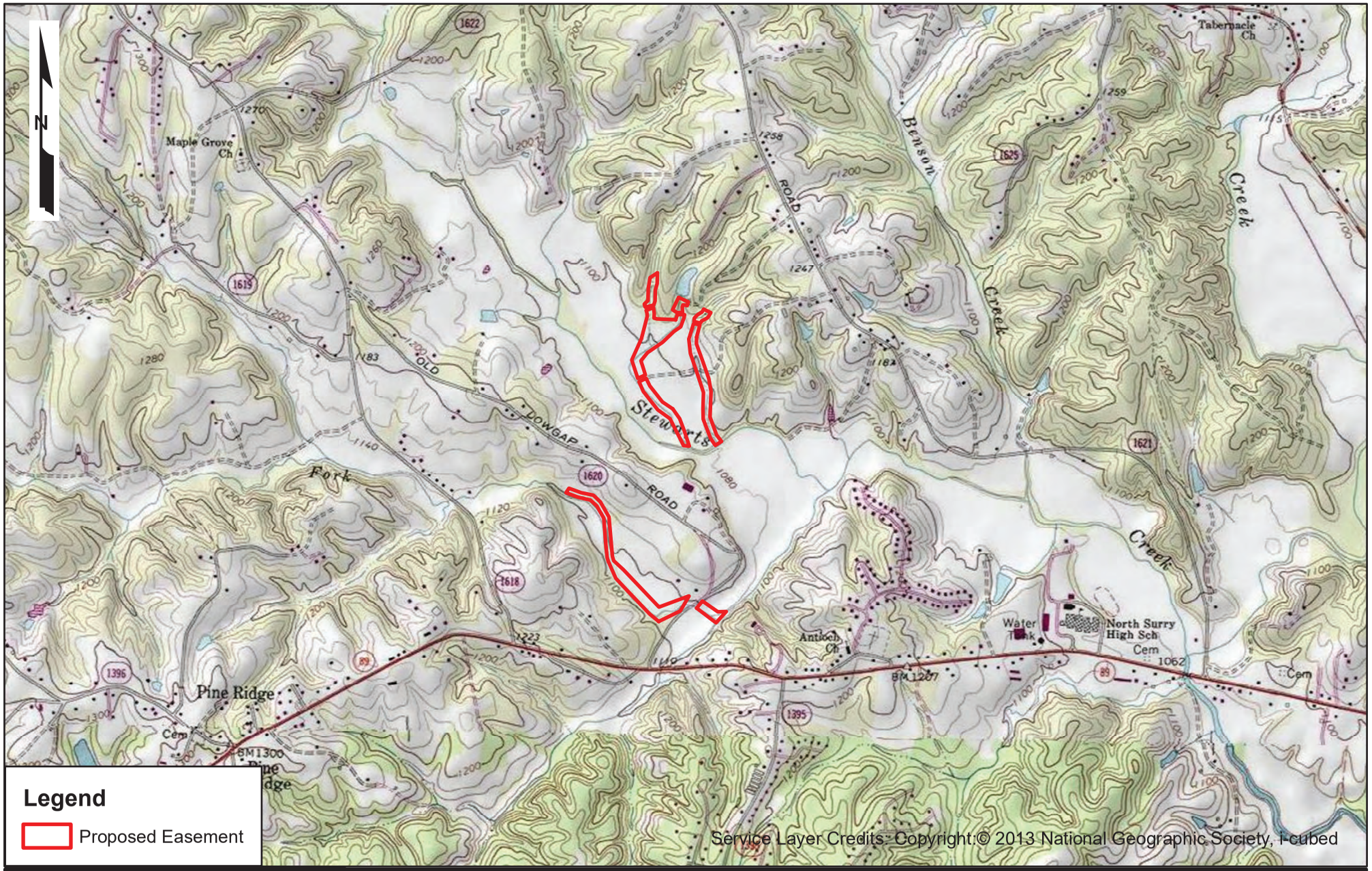
VICINITY MAP

PREPARED FOR:
NCDEQ
DIVISION OF
MITIGATION SERVICES

FIGURE 1

SURRY COUNTY, NC

PREPARED BY:
Ecosystem Planning & Restoration



0 1,000 2,000 4,000 Feet

STEWARTS CREEK TRIBUTARIES

USGS TOPOGRAPHIC MAP

PREPARED FOR:

NCDEQ
DIVISION OF
MITIGATION SERVICES

FIGURE 2

SURRY COUNTY, NC

PREPARED BY:

Ecosystem Planning & Restoration

Typical wooded area at tributary headwaters.

Typical wooded area at tributary headwaters.

Typical wooded area at tributary headwaters.

Typical wooded area at tributary headwaters.

Narrow buffer along Moores Fork

Typical narrow buffer along Moores Fork

Pastureland adjacent to Moores Fork

NCWRC RESPONSE

North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

July 24, 2017

Kevin Tweedy
Ecosystem Planning and Restoration
559 Jones Franklin Road, Suite 150
Raleigh, NC 27606

SUBJECT: Stewarts Creek Tributaries Stream Restoration

Dear Mr. Tweedy:

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) received your June 22, 2017 letter regarding plans for stream restoration projects on unnamed tributaries to Stewarts Creekin Surry County. You review and comment on the project. Our comments on this project are offered for your consideration under provisions of the Clean Water Act of 1977 (33 U.S.C. 466 et. seq.) and Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

The project will involve the restoration of approximately 12,000 feet of eroding and incised streams through relocation to their approximate historic locations and reconnection with the historical floodplain.
This project should not impact wild trout resources or other known significant aquatic resources.

We recommend that riparian buffers that are to be reestablished be as wide as possible, given site constraints and landowner needs. NCWRC generally recommends a woody buffer of 100 feet on perennial streams in order to maximize the benefits of buffers, including bank stability, stream shading, treatment of overland runoff, and wildlife habitat.

Thank you for the opportunity to review and comment on this project. Please contact me at (828) 558-6011 if you have any questions about these comments.

Sincerely,

Andrea Leslie
Mountain Region Coordinator
Habitat Conservation Program

Mailing Address: Habitat Conservation • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

NRCS CORRESPONDENCE

USDA
United States Department of Agriculture

Natural Resources
Conservation Service

North Carolina
State Office

4407 Bland Road
Suite 117
Raleigh, NC 27609
Voice 919-873-2171
Fax (844) 325-2156

August 14, 2017

Robert Leipsic, PWS
Ecosystem Planning and Restoration, LLC
559 Jones Franklin Road, Suite 150
Raleigh, NC 27606

Dear Mr. Lepsic:

Thank you for your letter dated August 11, 2017, Subject: proposing Stewarts Creek Tributaries Stream Restoration Project, Surry Co., NC. The following guidance is provided for your information.

Projects are subject to the Farmland Protection Policy Act (FPPA) requirements if they may irreversibly convert farmland (directly or indirectly) to non-agricultural use and are completed by a federal agency or with assistance from a federal agency. Farmland means prime or unique farmlands as defined in section 1540(c)(1) of the FPPA or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the Secretary of Agriculture to be farmland of statewide local importance.

For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forestland, pastureland, cropland, or other land, but not water or urban built-up land.

Farmland does not include land already in or committed to urban development or water storage. Farmland *already in* urban development or water storage includes all such land with a density of 30 structures per 40-acre area. Farmland already in urban development also includes lands identified as *urbanized area* (UA) on the Census Bureau Map, or as urban area mapped with a *tint overprint* on the United States Geological Survey (USGS) topographical maps, or as *urban-built-up* on the United States Department of Agriculture (USDA) Important Farmland Maps.

The area in question meets one or more of the above criteria for Farmland. Farmland area will be affected or converted. Enclosed is the Farmland Conversion Impact Rating form AD1006 with PARTS II, IV and V completed by NRCS. The corresponding agency will need to complete the evaluation, according to the Code of Federal Regulation 7CFR 658, Farmland Protection Policy Act.

If you have any questions, please contact Milton Cortes, Assistant State Soil Scientist at 919-873-2171 or by email: milton.cortes@nc.usda.gov.

Again, thank you for inquiry. If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

Milton Cortes

Milton Cortes
Assistant State Soil Scientist

cc:
Kent Clary, State Soil Scientist, NRCS, Raleigh, NC

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request August 4, 2017
Name of Project Stewarts Creek Tributaries	Federal Agency Involved US Army Corps of Engineers
Proposed Land Use Stream Mitigation	County and State Surry County, North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS August 11, 2017 / Person Completing Form: Milton Cortes NRCS NC

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES	NO	Acres Irrigated	Average Farm Size
	☑	☐	None	101 acres

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount of Farmland As Defined in FPPA
CORN	Acres: 187, 236 acres 54 %	Acres: 155,337 acres 44.8 %

Name of Land Evaluation System Used	Name of State or Local Site Assessment System	Date Land Evaluation Returned by NRCS
Surry Co., NC LESA	None	August 14, 2017 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	20.5			
B. Total Acres To Be Converted Indirectly	7.3			
C. Total Acres In Site	27.8			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	24.5a			
B. Total Acres Statewide Important or Local Important Farmland	0.10			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.0158			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	7%			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	81			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)				
2. Perimeter In Non-urban Use	(10)				
3. Percent Of Site Being Farmed	(20)				
4. Protection Provided By State and Local Government	(20)				
5. Distance From Urban Built-up Area	(15)				
6. Distance To Urban Support Services	(15)				
7. Size Of Present Farm Unit Compared To Average	(10)				
8. Creation Of Non-farmable Farmland	(10)				
9. Availability Of Farm Support Services	(5)				
10. On-Farm Investments	(20)				
11. Effects Of Conversion On Farm Support Services	(10)				
12. Compatibility With Existing Agricultural Use	(10)				
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	81	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	0	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	81	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form:	Date:

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map**,** or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

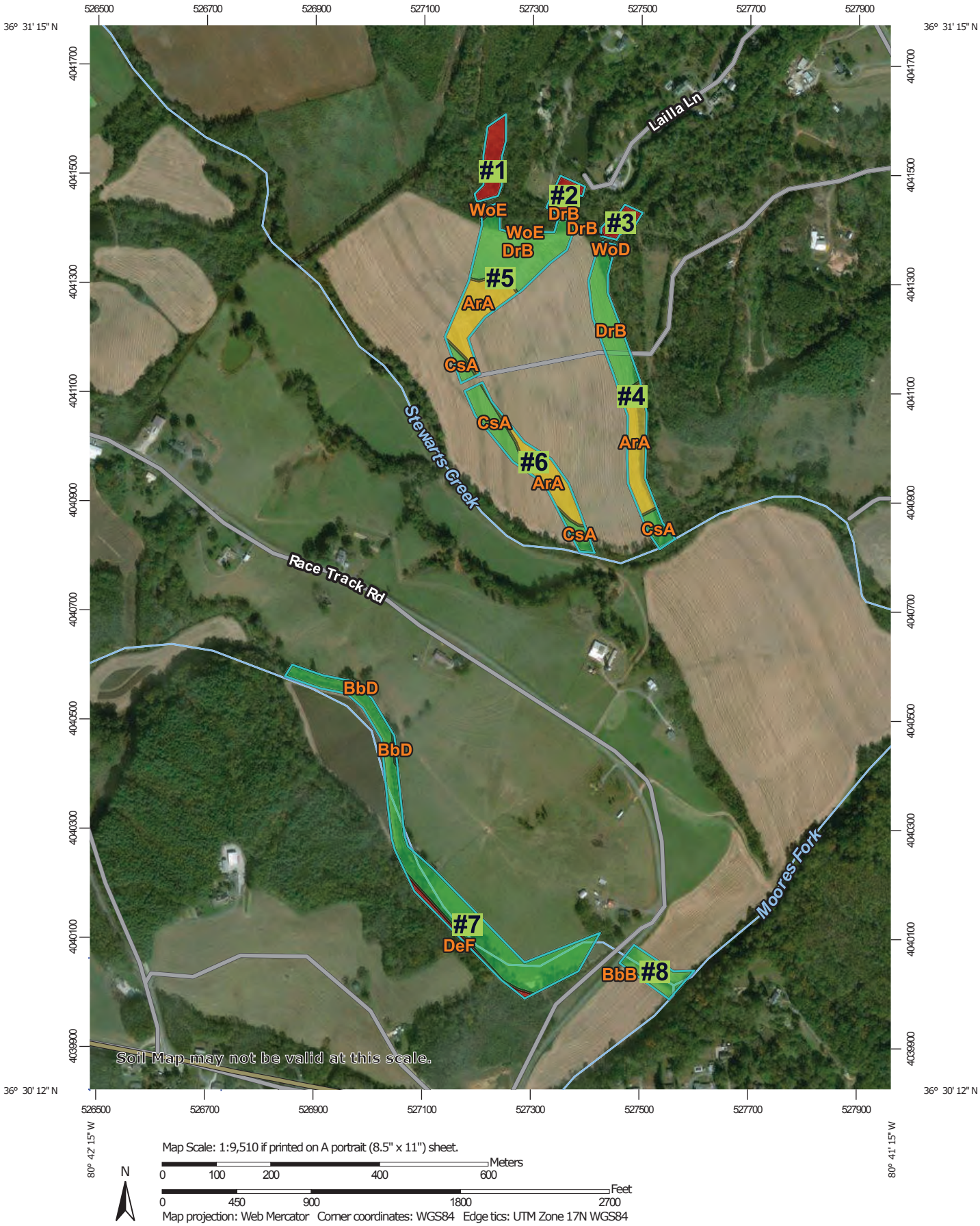
Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \text{ X } 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

Farmland Classification—Surry County, North Carolina
(STEWARTS CREEK TRIBUTARIES)



Map Scale: 1:9,510 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 450 900 1800 2700

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
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- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Surry County, North Carolina
Survey Area Data: Version 20, Sep 20, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 22, 2012—Mar 15, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — #1, Surry County, North Carolina (NC171)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
WoE	Woolwine-Fairview-Westfield complex, 25 to 45 percent slopes, stony	Not prime farmland	1.3	4.6%
Subtotals for #1			**1.3**	**4.6%**
Totals for Area of Interest			**27.8**	**100.0%**

Farmland Classification— Summary by Map Unit — #2, Surry County, North Carolina (NC171)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
DrB	Dillard fine sandy loam, 2 to 8 percent slopes, rarely flooded	All areas are prime farmland	0.0	0.1%
WoE	Woolwine-Fairview-Westfield complex, 25 to 45 percent slopes, stony	Not prime farmland	0.7	2.3%
Subtotals for #2			**0.7**	**2.5%**
Totals for Area of Interest			**27.8**	**100.0%**

Farmland Classification— Summary by Map Unit — #3, Surry County, North Carolina (NC171)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
DrB	Dillard fine sandy loam, 2 to 8 percent slopes, rarely flooded	All areas are prime farmland	0.0	0.0%
WoD	Woolwine-Fairview-Westfield complex, 15 to 25 percent slopes, stony	Not prime farmland	0.6	2.3%
Subtotals for #3			**0.6**	**2.3%**
Totals for Area of Interest			**27.8**	**100.0%**

Farmland Classification— Summary by Map Unit — #4, Surry County, North Carolina (NC171)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
ArA	Arkaqua loam, 0 to 2 percent slopes, frequently flooded	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	2.0	7.2%
CsA	Colvard and Suches soils, 0 to 3 percent slopes, occasionally flooded	All areas are prime farmland	0.6	2.0%

Farmland Classification— Summary by Map Unit — #4, Surry County, North Carolina (NC171)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
DrB	Dillard fine sandy loam, 2 to 8 percent slopes, rarely flooded	All areas are prime farmland	2.6	9.2%
WoD	Woolwine-Fairview-Westfield complex, 15 to 25 percent slopes, stony	Not prime farmland	0.1	0.3%
Subtotals for #4			**5.2**	**18.7%**
Totals for Area of Interest			**27.8**	**100.0%**

Farmland Classification— Summary by Map Unit — #5, Surry County, North Carolina (NC171)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
ArA	Arkaqua loam, 0 to 2 percent slopes, frequently flooded	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	2.3	8.3%
CsA	Colvard and Suches soils, 0 to 3 percent slopes, occasionally flooded	All areas are prime farmland	0.4	1.4%
DrB	Dillard fine sandy loam, 2 to 8 percent slopes, rarely flooded	All areas are prime farmland	3.9	13.9%
WoE	Woolwine-Fairview-Westfield complex, 25 to 45 percent slopes, stony	Not prime farmland	0.1	0.4%
Subtotals for #5			**6.7**	**24.0%**
Totals for Area of Interest			**27.8**	**100.0%**

Farmland Classification— Summary by Map Unit — #6, Surry County, North Carolina (NC171)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
ArA	Arkaqua loam, 0 to 2 percent slopes, frequently flooded	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	1.8	6.3%
CsA	Colvard and Suches soils, 0 to 3 percent slopes, occasionally flooded	All areas are prime farmland	1.7	6.2%
Subtotals for #6			**3.5**	**12.5%**
Totals for Area of Interest			**27.8**	**100.0%**

Farmland Classification— Summary by Map Unit — #7, Surry County, North Carolina (NC171)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
BbD	Braddock fine sandy loam, 15 to 25 percent slopes	Farmland of local importance	0.1	0.2%
CsA	Colvard and Suches soils, 0 to 3 percent slopes, occasionally flooded	All areas are prime farmland	8.0	28.8%
DeF	Devotion-Rhodhiss-Bannertown complex, 40 to 95 percent slopes, very rocky	Not prime farmland	0.4	1.6%
Subtotals for #7			**8.5**	**30.6%**
Totals for Area of Interest			**27.8**	**100.0%**

Farmland Classification— Summary by Map Unit — #8, Surry County, North Carolina (NC171)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
BbB	Braddock fine sandy loam, 2 to 8 percent slopes	All areas are prime farmland	0.0	0.0%
CsA	Colvard and Suches soils, 0 to 3 percent slopes, occasionally flooded	All areas are prime farmland	1.3	4.8%
Subtotals for #8			**1.3**	**4.9%**
Totals for Area of Interest			**27.8**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Erin Bennett

From: Erin Bennett
Sent: Friday, September 8, 2017 1:26 PM
To: 'milton.cortes@nc.usda.gov'
Cc: Robert Lepsic; 'kent.clary@nc.usda.gov'
Subject: Stewarts Creek Tributaries Restoration Project , FPPA
Attachments: AD-1006_SCStreamRestoration_EPR.pdf; SC_NRCS_Packet.pdf; StewartsCreekTributaries_Farmland_Classification.pdf

Mr. Cortes,

Attached is the AD-1006 form for the Stewart Creek Tributaries Restoration Project with Parts VI and VII completed. The original request from Ecosystem Planning and Restoration and the Farmland Classification sheet are attached as well. Please contact me if you have any questions.

Thank you for all you time and help,

Erin Bennett, PE
Water Resources Engineer

Ecosystem Planning and Restoration
559 Jones Franklin Road, Suite 150
Raleigh, NC 27606

(O): 919-388-0787
(F): 919-388-0789
(M): 828-735-1083

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request August 4, 2017
Name of Project Stewarts Creek Tributaries	Federal Agency Involved Federal Highway Adminstration (FHWA)
Proposed Land Use Stream Mitigation	County and State Surry County, North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS August 11, 2017 / Person Completing Form: Milton Cortes NRCS NC

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 101 acres
Major Crop(s) CORN	Farmable Land In Govt. Jurisdiction Acres: 187, 236 acres 54 %	Amount of Farmland As Defined in FPPA Acres: 155,337 acres 44.8 %	
Name of Land Evaluation System Used Surry Co., NC LESA	Name of State or Local Site Assessment System None	Date Land Evaluation Returned by NRCS August 14, 2017 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	20.5			
B. Total Acres To Be Converted Indirectly	7.3			
C. Total Acres In Site	27.8			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	24.5a			
B. Total Acres Statewide Important or Local Important Farmland	0.10			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.0158			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	7%			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	81			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	12			
2. Perimeter In Non-urban Use	(10)	9			
3. Percent Of Site Being Farmed	(20)	12			
4. Protection Provided By State and Local Government	(20)	0			
5. Distance From Urban Built-up Area	(15)	10			
6. Distance To Urban Support Services	(15)	0			
7. Size Of Present Farm Unit Compared To Average	(10)	0			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	5			
10. On-Farm Investments	(20)	20			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	68	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	81	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	68	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	149	0	0	0

Site Selected: Yes	Date Of Selection 9/8/2017	Was A Local Site Assessment Used? YES ☐ NO ☑

Reason For Selection:

The site scored less than 160 and "need not be given further consideration for protection". (7 CFR 658.4).

Name of Federal agency representative completing this form: Ecosystem Planning and Restoration	Date: 9/8/2017

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map, or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \times 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

Appendix 11

DMS FLOODPLAIN REQUIREMENTS CHECKLIST

NCDMS Floodplain Requirements Checklist

This form was developed by the National Flood Insurance program and NC Floodplain Mapping program to be filled out for all NCDMS 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 NCDMS.

Project Location

Name of project:	Stewarts Creek Tributaries Stream Restoration Project
Name of stream or feature:	Moores Fork and Stewarts Creek
County:	Surry
Name of river basin:	Yadkin
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Surry County (CID 370364)
DFIRM panel number for entire site:	3711500000J Effective 8/18/2009
Consultant name:	Ecosystem Planning and Restoration
Phone number:	919.388.0787
Address:	559 Jones Franklin Road Suite 150 Raleigh NC 27606

Design Information

Provide a general description of project (one paragraph). Include project limits on a reference orthophotograph at a scale of 1" = 500".

The Stewarts Creek Tributaries Stream Restoration Project consists of instituting stream restoration practices following natural channel design techniques along Moores Fork and 3 unnamed tributaries to Stewarts Creek.

Summarize stream reaches or wetland areas according to their restoration priority.

Reach	Length	Priority
Moores Fork	*2,559'*	*One and Two (Restoration)*
Moores Fork	*1,660'*	*Two (Enhancement)*
UT 1 to Stewarts Creek	*800'*	*One and Two (Restoration)*
UT 3 to Stewarts Creek	*4520'*	*One and Two (Restoration)*

Floodplain Information

Is project located in a Special Flood Hazard Area (SFHA)?

(•) Yes ( ) No

If project is located in a SFHA, check how it was determined:

- [ ] Redelineation
- [x] Detailed Study
- [x] Limited Detail Study
- [ ] Approximate Study
- [ ] Don't know

List flood zone designation:

Check if applies:

- [x] AE Zone
  - (•) Floodway
  - (•) Non-Encroachment
  - ( ) None
- [ ] A Zone
  - ( ) Local Setbacks Required
  - ( ) No Local Setbacks Required

If local setbacks are required, list how many feet: N/A

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: Kim Bates
Email: batesk@co.surry.nc.us
Phone Number: (336) 401 – 8350

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

Floodplain development permit.

Comments:
CLOMR package is currently being prepared to submit for work on Moores Fork. No-rise package is being prepared to submit for work on the UTs to Stewarts Creek.

Name: Erin Bennett Signature:

Title: Water Resources Engineer Date: 11/28/18

Erin Bennett

From: Erin Bennett
Sent: Wednesday, November 28, 2018 4:39 PM
To: 'Kim Bates'; 'Dan.Brubaker@ncdps.gove'
Cc: 'Wiesner, Paul'; LeeAnne Lutz
Subject: Stewarts Creek Tributaries Stream Restoration Project - DMS Project No. 100023
Attachments: Stewarts Creek Tribs Figures_FEMAFloodplainChecklist.pdf; Stewarts Creek Tributaries_NCDMS_Floodplain_Checklist.pdf

Mr. Brubaker and Mr. Bates,

My name in Erin Bennett and I work with Ecosystem Planning and Restoration. We are currently working for NC DMS on a full delivery stream restoration project in Surry County. The Project consists of two work areas. The work on Moores Fork will require a CLOMR while the work on three unnamed tributaries to Stewarts Creek will fall under a no-rise. Moores Fork is mapped using limited detail study methods and has encroachment widths defined in the FIS while Stewarts Creek is mapped using detailed study methods and has a regulated floodway. The work on the tributaries in the floodplain of Stewarts Creek will not alter the hydraulics or hydrology of Stewarts Creek, no fill will be placed in the regulated floodway, and no structures will be impacted. EPR will apply for a floodplain development permit for the project work once the CLOMR for the work on Moores Fork has been received. The floodplain development permit application will include hydraulic analysis to justify a no-rise for the other work area. Attached is a completed and signed NC DMS Floodplain Checklist and figures including the vicinity map and the work areas.

Mr.Bates, I will be in contact in the next few weeks with a draft CLOMR for you to review before we submit it to FEMA.

Please let me know if you have any questions or if you would like a hard copy of this letter mailed to you.

Thank you,

ECOSYSTEM PLANNING & RESTORATION
EPR

Erin Bennett, PE
Water Resources Engineer

Ecosystem Planning and Restoration
559 Jones Franklin Road, Suite 150
Raleigh, NC 27606

(O): 919-388-0787
(F): 919-388-0789
(M): 828-735-1083

Appendix 12

WILMINGTON DISTRICT STREAM BUFFER CREDIT CALCULATOR

Wilmington District Stream Buffer Credit Calculator

Site Name:	Stewarts Creek Tributaries Stream Restoration Project
USACE Action ID:	
NCDWR Project Number:	100023
Sponsor:	NCDMS
County:	Surry
Minimum Required Buffer Width[1]:	30

Mitigation Type	Mitigation Ratio Multiplier[2]	Creditable Stream Length[3]	Baseline Stream Credit
Restoration (1:1)	1	9498	9498.00
Enhancement I (1.5:1)	1.5		
Enhancement II (2.5:1)	2.5	1573	629.20
Preservation (5:1)	5		
Other (7.5:1)	7.5		
Other (10:1)	10		
Custom Ratio 1			
Custom Ratio 2			
Custom Ratio 3			
Custom Ratio 4			
Custom Ratio 5			
Totals		**11071.00**	**10127.20**

	Buffer Width Zone (feet from Ordinary High Water Mark)								
Buffer Zones	**less than 15 feet**	**>15 to 20 feet**	**>20 to 25 feet**	**>25 to 30 feet**	**>30 to 50 feet**	**>50 to 75 feet**	**>75 to 100 feet**	**>100 to 125 feet**	**>125 to 150 feet**
Max Possible Buffer (square feet)[4]	332130	110710	110710	110710	442840	553550	553550	553550	553550
Ideal Buffer (square feet)[5]	328741	109162	107683	105931	415476	515534	518343	518417	510905
Actual Buffer (square feet)[6]	321205	104398	101748	99410	295631	134587	43328	15101	7065
Zone Multiplier	50%	20%	15%	15%	9%	7%	6%	5%	3%
Buffer Credit Equivalent	5063.60	2025.44	1519.08	1519.08	911.45	708.90	607.63	506.36	303.82
Percent of Ideal Buffer	98%	96%	94%	94%	71%	26%	8%	3%	1%
Credit Adjustment	-116.08	-88.39	-83.72	-93.51	648.54	185.07	50.79	14.75	4.20

Total Baseline Credit	Credit Loss in Required Buffer	Credit Gain for Additional Buffer	Net Change in Credit from Buffers	Total Credit
10127.20	**-381.71**	**903.35**	**521.64**	**10648.84**

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

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

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

[4]This amount is the maximum buffer area possible based on the linear footage of stream length if channel were perfectly straight with full buffer width. This number is not used in calculations, but is provided as a reference.

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

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

Appendix 13

SITE PHOTOGRAPHS

UT 1 – cross section 1 in wooded area at tributary headwaters with high BHR and low ER.

UT 1 – bank erosion and mass wasting.

UT 1 – cross section 4 adjacent to agricultural row crops.

UT 2- cross section 2 in wooded area with high BHR and low ER.

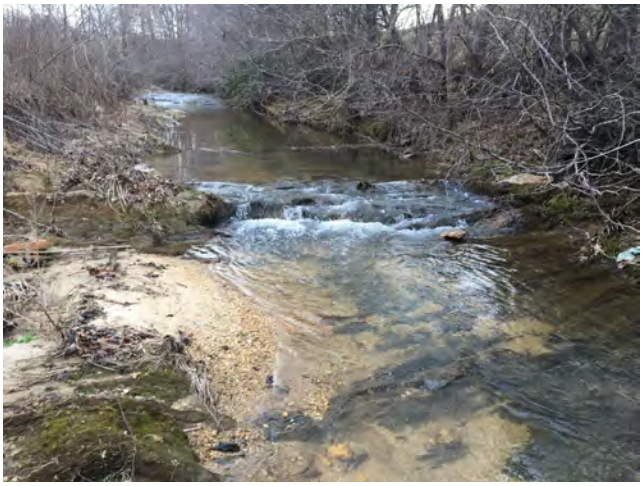
UT 2 substrate.

Field with divide that UT 2 and UT 3 will be re-meandered to reconnect to their original floodplain.

UT 3 – cross section 6 in the wooded area at tributary headwaters high BHR and low ER. .

UT 3 – cross section 7 adjacent to agricultural row crops.

UT 3 - tortuous bends and bank erosion in wooded area.



Moores Fork – Reach 1 bedrock area.

Moores Fork – Reach 1 headcut at field drainage ditch.

Moores Fork – Reach 1 downstream with mass wasting.

Moores Fork – Reach 2 with adjacent pasture land.

Moores Fork – Reach 2 with bank erosion from cattle access.

Moores Fork – Reach 2 cross section 3 adjacent to pasture land.

Moores Fork – Reach 3 looking upstream at Race Track Road with agricultural fields on both sides.

Appendix 14

MEETING MINUTES FROM IRT ON-SITE MEETING

September 1, 2017

TO: Mr. Paul Wiesner – Project Manager
NCDMS

FROM: Kevin Tweedy, PE – Project Manager
Ecosystem Planning and Restoration, PLLC

SUBJECT: Meeting Minutes from IRT On-Site Meeting - August 16, 2017
Stewarts Creek Tributaries Full Delivery Project

Attendees: Todd Tugwell, US Army Corps of Engineers, Wilmington District
Kim Browning, US Army Corps of Engineers, Wilmington District
Mac Haupt, NC Department of Environmental Quality
Olivia Munzer, NC Wildlife Resources Commission
Paul Wiesner, NC Division of Mitigation Services
Harry Tsomides, NC Division of Mitigation Services
Kirsten Ullman, NC Division of Mitigation Services
Kevin Tweedy, Ecosystem Planning and Restoration, PLLC (Provider)

The meeting started at approximately 9:00AM at the Moore's Fork portion of the Stewarts Creek Tributaries Project, located in Surry County, NC. The group walked approximately 60% (downstream portion) of the Moore's Fork reach currently proposed as Enhancement Level II. No concerns were voiced about the proposed approaches or the mitigation crediting.

The group then walked the entire downstream reach proposed for restoration, down to the bridge at Race Track Road. There was discussion about the condition of the upper portion of the reach, and whether full restoration was needed. Group agreed that the downstream area was more unstable and needed restoration. Todd and Mac said that there would need to be detailed information in the mitigation plan justifying restoration for the upper section, primarily in terms of functional lift to be attained.

The group then drove over to the Unnamed Tributaries portion of the project. Group began walking at the upstream end of UT1 in the woods. There was discussion about whether full restoration was appropriate for the wooded portion of the reach above the crossing. Kevin discussed how the profile needed to be raised in this section to achieve a Priority I restoration for the downstream reaches below the crossing, and pointed out the degraded condition of the existing channel. IRT members noted that detailed data would be beneficial to assessing the existing condition and evaluating how much channel would need to be impacted, and to what degree. The mitigation plan will need to justify the need for restoration along this upper portion of UT1.

The group then moved to the head of UT2 and inspected the area below the pond dam. Due to the potential for disturbance in the area around the dam, Todd recommended that the short piece proposed for restoration credit above the crossing be excluded from project. The IRT was OK with doing

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Phone: (919) 388-0787
www.eprusa.net

work above the crossing, but generally agreed that work done above the crossing should be excluded from the easement and crediting.

The group then moved to UT3 and walked the wooded section. No concerns were raised about restoration of the lower reach up to the crossing. There was discussion about the proposed Enhancement section above the crossing. Todd and Mac both expressed concerns that the current condition of the channel would not warrant Enhancement work, or if work was done, it should be done very minimally and would not be appropriate for 2.5:1 credit. A preservation ratio of 10:1 was suggested if it were to be included in the project. A 5:1 preservation ratio was discussed but the IRT indicated that the existing reach was not worthy of 5:1 preservation credit. Kevin expressed concern about the condition of the reach worsening over time and sediment potentially jeopardizing the downstream restoration reach. Todd's opinion was to not do any work on the reach, but that including it in an easement would allow the option of addressing issues later. Kevin said that EPR would need to review the options for the reach and decide if it would ultimately be included as part of the project.

The group did not walk the restoration reaches through the farm field sections downstream, because the farm fields are planted in nearly mature corn, and therefore impossible to see land features.

Meeting concluded around 12:00PM.