November 2018

Warren Wilson College Stream Mitigation Site

Final Mitigation Plan

Prepared for the North Carolina Department of Environmental Quality, Division of Mitigation Services

FINAL MITIGATION PLAN

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, North Carolina

NCDMS Project ID No. 100019
Full Delivery Contract No. 7188
USACE Action ID No. SAW-2017-01557
RFP No. 16-006991

French Broad River Basin
Cataloging Unit 06010105

Prepared for:
North Carolina Department of Environmental Quality
Division of Mitigation Services
1652 Mail Service Center
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Prepared by:

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"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).
- North Carolina Department of Environmental Quality (NCDEQ) Division of Mitigation Services In-Lieu Fee Instrument signed and dated July 28, 2010

These documents govern NCDMS[1] operations and procedures for the delivery of compensatory mitigation."

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

[1] North Carolina Division of Mitigation Services

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

REPLY TO
ATTENTION OF:

December 21, 2018

Regulatory Division

Re: NCIRT Review and USACE Approval of the Warren Wilson College Mitigation Plan; SAW-2017-01557; NCDMS Project # 100019

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 Warren Wilson College Mitigation Plan, which closed on December 21, 2018. 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,

Kim Browning
Mitigation Specialist
for Henry Wicker

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List
Paul Wiesner – NCDMS

November 2, 2018

Paul Wiesner
Western Region Supervisor
North Carolina Department of Environmental Quality
Division of Mitigation Services
5 Ravenscroft Drive
Asheville, North Carolina 28801

Subject: Warren Wilson College Stream Mitigation Site
Mitigation Plan Comment Response Letter
DMS Contract No. 7188; DMS Project ID: 100019; RFP No. 16-006991

Dear Mr. Wiesner,

The following are responses to the IRT's Final Draft Warren Wilson College Stream Mitigation Plan comments.

Mac Haupt, North Carolina Division of Water Resources, August 23, 2018

1. Table 6- this table lists the soils on site and has a column for hydric status, please change the table and list the correct hydric status (non-hydric) for the following series: Biltmore, Dellwood-Reddies, Dillard, French loam, Iotla, Rosman, and Statler.

   1.1. Table 6 was updated accordingly.

2. Section 8.1- DWR does not recommend utilization of the Terracell in the case of the drop down for the UT8 reach to the Swannanoa River. DWR strongly recommends a rock step down in this case.

   2.1. TerraCell will be removed, and a drop structure constructed of stone and wood will be added to the construction plans. Section 8.1 (Drop Structures) was revised to read as follows: "One drop structure is proposed on UT-8. The drop structure may be constructed out of stone and wood as depicted in typical details of the construction plans. The structure should be constructed to resist erosive forces associated with hydraulic drops proposed at the Site."

3. Section 8.4.4- DWR likes the fact that groundwater gauges have been installed along the upper UT3 reach. DWR requests an instream transducer be placed as soon as possible in the lower portion (station 13+00) of UT3. DWR believes it is critical to document the increased overbank as well as increased wetland hydrology to justify moving the channel (upper UT3). At the post-contract visits there were extensive discussions regarding whether this channel needed to be moved at all. Upon reviewing the draft mitigation plan DWR decided, in addition to the COE, to visit this reach again before final comments for this plan. DWR and the COE visited the site on the afternoon of August 13th with the primary purpose of evaluating both upper and lower reaches of UT3 to determine the appropriate level of intervention for these reaches. DWR concurs with the approach for both the lower and upper reaches of UT3, however, for the upper reach of UT3 DWR would like to see metrics developed that documents functional uplift of both wetland hydrology and increased floodplain connection. DWR believes these metrics are necessary to justify the moving of a channel that currently not only possesses good channel bed form and limited lateral instability, but also does have some current connection to the floodplain (middle portion of upper UT3). In addition, these metrics would further support the objectives listed in Table 12B and discussion in Section 8.4.4.1.

    3.1. A crest gauge will be added to UT-3 (upper) to collect preconstruction overbank events for comparison to post-construction overbank events. The crest gauge will consist of an instream pressure transducer that will record measurements of stream surface water elevations. The gauge is proposed to be placed near station 15+00 of UT-3 (upper). DWR requested that the gauge be located near station 13+00; however, this reach is proposed to begin the drop-down to enhancement (level II) along UT-3 and may not characterize hydrologic modifications in wetland restoration areas along the majority of the UT-3 (upper) reach.

    3.2. Metrics for overbank flooding have been identified in Table 12 B for this reach using North Carolina Wetland Assessment Method (NC WAM) (Floodplain Access) and tied to goals for the Site (i.e., connect streams to functioning wetland systems).

4. Table 18- Monitoring Summary: This table should be modified to reflect the targeted monitoring metrics discussed in #3.

    4.1. Table 18 currently indicates we are tracking overbank events on UT-3 and wetland hydrology in wetlands adjacent to UT-3.

5. DWR recommends the removal of the crossing shown in on the upper UT3 design plans (since it is near the top of the project, can it be moved to the top?).

    5.1. The Dean of Land Resources has discussed with others at Warren Wilson College (WWC). They would prefer to leave the crossing in its proposed location due to the crossing's significant effect on current cattle operations on the property.

6. DWR recommends the installation of a wetland monitoring gauge stream right on lower UT1, stream left in the upper reach of UT6, and an additional gauge installed stream right on the lower section of the upper UT3 reach (station 13+00).

    6.1. Three groundwater gauges will be added to the Site in late winter 2018/2019 in the requested locations. Table 18 (Wetland Parameters) has been updated to read, "8 gauges in UT-1, UT-6, and UT-3 wetlands."

7. Design sheets- the lower stream profiles for lower UT3 are missing.

    7.1. The profile for the lower restoration section of UT-3 Lower has been added to the construction plans.

8. DWR requests that in the future the design sheets be no larger than 11x17. In addition, DWR requests that the stationing begin at the top of the reaches.

    8.1. Design sheets will be 11x17 in size for future submittals. We respectfully request to keep stream stationing as currently depicted in plan sheets and figures. Converting stream stationing may lead to unnecessary errors and provides no improvement to project documentation.

9. Design Typical- DWR recommends that vane arms have no more than a 7% slope, the vane typical for the log vanes shows a 5:1 slope or 20%. DWR did not see a typical for a rock cross vane. Are any of these being built? Also, DWR would like to see the typical for the rock step down structure recommended for UT8.

    9.1. Typical details will be updated to include maximum slopes of 7% for log vane arms. Rock cross vanes are not proposed. The detail for the drop structure in UT-8 has been added to the Typical Detail sheet.

Andrea Hughes, U.S. Army Corps of Engineers, October 12, 2018

1. Page 2 indicates that the provider intends to install fence posts in areas that will be utilized for livestock rotation. Since it is anticipated that these areas will be used for livestock, these areas must be fenced in order to generate stream credits.

    1.1. RS will work with the school's Dean of Land Resources and plans to install fencing in areas of current and future livestock use.

2. Section 7.1: Regarding the footpath adjacent to UT 3, please provide a photograph to demonstrate the existing condition of the footpath. Also, please ensure the landowner is aware that no maintenance or upgrades to the footpath will be allowed within the boundaries of the conservation easement.

    2.1. A photograph and related text has been added to Section 7.1.

3. Section 7.3: According to the most recent correspondence from SHPO dated March 27, 2018, the full report of the investigation at 31BN28 and monitoring at sections 4C and 4D, as well as updated archaeological site forms have been requested by SHPO. Please provide confirmation that the requested information will be provided as soon as it is available.

    3.1. RS will provide the IRT with the full archeological report and updated Site forms when they become available (post-construction).

4. Section 8.1: Regarding stream crossings, the provider should locate the proposed crossing on upper UT 3 to the edge of the easement or begin crediting just below the proposed crossing.

    4.1. The Dean of Land Resources has discussed with others at WWC. They would prefer to leave the crossing in its proposed location due to the crossing's significant effect on current cattle operations on the property.

5. Section 8.1: Marsh treatment areas: If these areas are located within a stream buffer we typically require a vegetation cover performance standard during the 7 year monitoring period. In addition, the document indicates that terracel will be used for the drop structures associated with the marsh treatment areas and UT 8. This has been discussed on previous sites and we do not believe terracel is an appropriate material to use on mitigation sites when more appropriate methods are available. Please revise the plan to address this issue.

    5.1. Terracell is not associated with marsh treatment areas. In addition, the only Terracell proposed for the project is located at the lower reaches of UT-8. This Terracell has been removed from the project and replaced with a rock step structure.

    5.2. Marsh treatment areas total approximately one hundredth of an acre in size and are intended to naturalize into the floodplain. The areas are slight depressions (0.5 to 1.5 feet in depth) that are designed to catch the first pulse of storm drainage prior to vegetation establishment. These are not stormwater best management practices (BMPs), which require maintenance to continue functioning. At this time, due to the small size and expectation of naturalization, we do not propose extensive monitoring beyond the standard vegetative monitoring protocols outlined in the IRT guidance.

6. Section 8.4.4.1: Regarding construction of UT3 through existing wetlands, you must demonstrate that the impacted wetlands have been replaced onsite by expansion or re-establishment of new wetlands. You must also document that existing wetlands adjacent to the stream channel demonstrate 10-20% improvement in post construction hydrology as compared to pre-construction hydrology.

    6.1. A paragraph has been added to Section 8.4.4.1 that states the following: "Stream channel excavation is expected to occur at the historic location of the stream channel in the lowest portion of the floodplain. The development of jurisdictional wetlands in this portion of the floodplain may result in the loss of wetlands in the design channel that is

expected to be negated by the development of in-channel wetlands throughout the Site and overall functional uplift and expansion of the remaining on-site wetlands."

6.2. In addition, Table 19 (Wetland Hydrology) has been updated to include the following success criteria: "Jurisdictional wetland adjacent to UT-3 will demonstrate a 10 to 20% increase in wetland hydrology as compared to pre-construction hydrology, under similar climactic conditions."

7. Section 9.1: Entrenchment Ratio for C/E streams should be >2.2.

7.1. The entrenchment ratio in Table 19 has been changed from a minimum of 1.4 to 2.2.

8. Section 9.1: Please revise to state 260 stems per acre at year 5.

8.1. The vegetation criteria in Table 19 has been changed to 260 stems per acre at year 5.

9. Design: Please provide profiles for all restoration reaches.

9.1. The profile for the lower restoration section of UT-3 Lower has been added to the construction plans.

10. Table B1: Proposed Bank Height Ratios should not exceed 1.2 (performance standard). Also, typically C/E channel design for MWR should be at least 3.5. Please explain the rationale for the proposed MWR range of 1.5 to 4.0 with an average of 3.0.

10.1. The performance standard for Bank Height Ratio is 1.2. The rationale for an MWR of 1.5 to 4.0 results from reference reach data that has meander width ratios ranging from 1.0 to 3.7. The lower MWR is due to steeper sloped streams associated with the Mountain Physiographic province, where B-type channel pattern (lower sinuosity, narrower pool-to-pool spacing) variables occur, even within C/E-type channels.

Todd Bowers, U.S. Environmental Protection Agency, August 6, 2018

1. Section 1.2/Page 1: Project Components and Structure
    a. Denote that the 10,227 Stream Mitigation Units are for cold-water credit in the text and in Table 1.

        i. Section 1.2 Project Components and Structure: The first paragraph and Table 1 have been updated to denote "cold-water" credit.

    b. Mention that there are power lines that will be moved to accommodate the project.

        i. Section 8.4.2 of the individual reach descriptions currently states that the project will include "relocation of the powerline outside the conservation easement."

2. Table 4/Page 6:
    a. USGS Hydrologic Unit 8 and 14-digit codes should be 8 and 14 digits.

        i. Table 4 was updated accordingly.

3. Table 8/Page 15:
    a. The design discharge velocity for the Proposed Restoration Reaches has a range of 3.7 to 4.2 ft/s. UT1 on Table 9 shows a velocity of 5.54 so the range should read: 3.7 to 5.5 ft/s.

        i. Table 8 (Proposed [Restoration Reaches]) Design Discharge Velocity was changed to "3.7–5.5 ft/s."

4. Section 3.6.1/Page 15:
    a. Recommend adding language that includes lack of riparian buffer vegetation as a stressor to site streams.

        i. Section 3.6.1 has been updated to read, "Site UTs are characterized by incised channels that receive extensive sediment and nutrient inputs, are eroded vertically and laterally, have been cleared of riparian vegetation, are dredged and straightened, and/or rerouted to the floodplain edge."

5. Table 12/Page 24:
    a. What does "ceasing current land use practices" refer to? Does this mean removing livestock and agriculture from uplands or just within the riparian zone? Nutrient inputs will likely continue as upland land practices remain so this statement is overly vague.

        i. Text in Table 12B has been changed to: "Remove livestock and cease agriculture practices within areas protected by the conservation easement."

    b. Recommend including "Adding LWD" to the list of objectives/actions to support Habitat goals.

        i. The recommended objective was added to Table 12B.

6. Section 8.1/Page 29:
    a. Recommend the sponsor consider alternatives to using TerraCell for drop structures (UT-8 and marsh treatment areas) as they are primarily made of polyethylene. This material is not biodegradable and therefore will remain in the ecosystem long after the stream outfall and the meander in the Swannanoa River have shifted from their current location and the device has long outlived its usefulness.

        i. TerraCell will be removed, and a drop structure constructed of stone and wood will be added to the construction plans. Section 8.1 (Drop Structures) was revised to read as follows: "One drop structure is proposed on UT-8. The

drop structure may be constructed out of stone and wood, as depicted in typical details of the construction plans. The structure should be constructed to resist erosive forces associated with hydraulic drops proposed at the Site."

7. Section 8.4/Pages 30 – 40:
    a. Recommend a heavy edit to the stream nomenclature to match Figures 7-7I. Every stream reach in Figures 7-7I has A-B-C nomenclature which is not consistent with the text of Section 8.4. For example, UT-1 (Upper) is called UT- 1A in Figure 7A and UT-1(Lower) is called UT-1B and C in Figure 7B.

        i. The text in Section 8.4 has been altered to match Figures 7 through 7I. Specifically, the headings of each individual stream reach were revised to include the nomenclature for Figures 7 through 7I. The reason for the discrepancy arises from multiple entities requiring or requesting specific nomenclature for each reach. For example, North Carolina Division of Mitigation Services requests the UT-1A, UT-1B, UT-1C nomenclature in order to match asset tables with figures. However, the college requests specific nomenclature to match fields and specific areas on the campus. Efforts have been made to make the document and figures clear for all parties. Headings for Section 8.4 were updated as follows:

            1. 8.4.1 UT-1 Upper (Swim Pond, UT-1A in Figure 7A)
            2. 8.4.2 UT-1 Lower (Hog Bottom, UT-1B and UT-1C in Figure 7B)
            3. 8.4.3 UT-2 (Lower Field/Pig Pond in Figure 7B)
            4. 8.4.4 UT-3 Upper (Little Berea/Clingman's, UT-3A, UT-3B, UT-3C in Figures 7C and 7D)
            5. 8.4.5 UT-3 Lower (Stokes Field, UT-3D, UT-3E, UT-3F, UT-3G in Figure 7E)
            6. 8.4.6 UT-4 (Clingman's, UT-4A and UT-4B in Figures 7C and 7D)
            7. 8.4.7 UT-5 (Ballfield, UT-5A and UT-5B in Figure 7F)
            8. 8.4.8 UT-6 (S-Field, UT-6A, UT-6B, UT-6C in Figures 7G and 7H)
            9. 8.4.9 UT-7 (Big Bottom Field, UT-7A in Figures 7G and 7I)
            10. 8.4.10 UT-8 (Forbat's Field, UT-8A in Figure 7I)

    b. Each stream reach description should reference the appropriate Figure (7A-7I) in Appendix A.

        i. See response to comment 7a above.

    c. UT-2 is not shown on any map. Recommend including it on Figure 7B to improve clarity.

        i. UT-2 has been added to Figures 4 and 7B.

d. Recommend adding description of footpath crossing in Reach UT-3B just below confluence of UT-3 and UT-4.

    i. Text has been added to clarify the current and future condition of the crossing in this location.

e. Recommend adding description of crossing of UT-4B shown in Figures 7C and 7D.

    i. Please see section 8.1 (Stream Restoration) for descriptions of piped channel crossings.

f. Recommend adding description of the 31-foot easement break in UT-5B and the 48 feet of EII work for UT-5A as show in Figure 7F.

    i. The 31-foot easement break is a power line crossing that is not permitted to be included in the conservation easement. Descriptions for EII work are provided in Section 8.3 (Stream Enhancement [Level II]).

g. For UT-6, I recommend referencing the appropriate reach (UT-6 A, B or C) and the level of work for each. UT-6B is Priority One restoration and UT-6A is Enhancement II work. Also recommend that conservation easement breaks due to roads and culverts are included in the description as well as the marsh treatment area in UT-6B. The description is in the discussion of UT-7

    i. Text has been added to clarify the reach work for UT-6A, UT-6B, and UT-6C. In addition, the following text was added to the UT-6 reach description: “Two easement breaks in the lower reaches of UT-6 are necessary to allow access for agriculture equipment. Both crossings will be piped channel crossings as described in Section 8.1. Agriculture ditches will be directed to a marsh treatment area that will be constructed as described in Section 8.1.”

h. Recommend clarifying the restoration approach for UT-7.

    i. Please see Section 8.4.9 for details concerning the restoration approach for UT-7.

i. Recommend adding discussion of powerlines and other easement breaks for UT-7 and UT-8.

    i. The following text was added to corresponding reach descriptions:

        1. “Two easement breaks in UT-7 are necessary to allow access for agriculture equipment and to accommodate a sewer line easement. The piped crossing will be constructed as described in Section 8.1.”
        2. “An easement break in UT-8 is necessary due to an existing sewer line easement.”

j. Add discussion of restoration priority type and the proposed drop structure or method for UT-8 tie in to the Swannanoa River.

    i. The restoration priority type (Priority 1) was added to the last paragraph of the reach description. The description of the proposed drop structure is included in Section 8.1.

8. Section 9.1/Page 46:
    a. State the goals and objectives assumed to be functionally elevated by restoration activities.

        i. Table 20 states the goals to be functionally elevated based on data collected at the Site and in reference reaches.

    b. Vegetation must be at a minimum of 260 stems per acre at Year 5, rather than Year 4 (Table 19).

        i. Table 19 has been updated accordingly.

9. Appendix A/Figure 4D: Recommend adding UT-2 to the figure to illustrate a potential stressor to function and water quality of UT-1.

    a. Figures have been updated to include UT-2.

Thank you for your time, please feel free to contact me if you have any questions.

Sincerely,

Worth Creech
Project Manager

TABLE OF CONTENTS

TABLES

APPENDICES

ABBREVIATIONS

BMPs	best management practices
col	colonies
College	Warren Wilson College
lbs/yr	pounds per year
NC SAM	North Carolina Stream Assessment Method
NC SFAT	NC Stream Functional Assessment Team
NC WAM	North Carolina Wetland Assessment Model
NCDEQ	North Carolina Department of Environmental Quality
NCDMS	North Carolina Division of Mitigation Services
NCDWR	North Carolina Division of Water Resources
NCEEP	North Carolina Ecosystem Enhancement Program
RBRP	River Basin Restoration Priorities
Site	Warren Wilson College Stream Mitigation Site
SMU	Stream Mitigation Unit
TLW	Targeted Local Watershed
tons/year	tons per year
USGS	United States Geological Survey
UT	unnamed tributary

1 Project Introduction

The Warren Wilson College Stream Mitigation Site (the Site), located entirely within the Warren Wilson College property, encompasses 23.9 acres (Figure 1, Appendix A). Warren Wilson College (the College) occupies approximately 1,200 acres (2% campus, 59% forest, and 39% agriculture). The Site is part of an actively managed farm and forest system on the Warren Wilson College property that includes livestock management areas, pastureland, agricultural row crops, and a sustainably managed forest.

The Site includes seven cold-water, unnamed tributaries (UTs) to the Swannanoa River that are proposed for mitigation, located in the French Broad River Basin 14-digit United States Geological Survey (USGS) Cataloging Unit and **Targeted Local Watershed 06010105070030** of the Tennessee Region (North Carolina Division of Water Resources [NCDWR] subbasin 04-03-02; Figure 2, Appendix A). The Site is located in the Broad Basins Ecoregion of the Blue Ridge Physiographic Province, approximately 2 miles west of Swannanoa and 5 miles east of Asheville in Buncombe County, North Carolina.

1.1 Directions to the Site

Directions to the Site from Raleigh, North Carolina:

- Take I-40 West from Raleigh and travel 229 miles.
- Take exit 59 towards Swannanoa and turn right onto Patton Cove Road.
- After 0.3 mile, turn left onto US-70 West.
- Travel 1.9 miles, then turn right onto Warren Wilson Road.
- After 1.4 miles, Riceville Road is on the left, and South Lane is on the right.
  - Site parcels can be accessed off Warren Wilson Road, Riceville Road, and South Lane.
  - Site latitude and longitude: 35.609817, -82.443540 (WGS84)

1.2 Project Components and Structure

The Site includes 10,164 linear feet (lf) of degraded stream channel (seven UTs to the Swannanoa River) that will be mitigated as part of the proposed project (Figures 4 and 4A through 4D, Appendix A). Proposed Site mitigation activities will result in the following (Table 1, Figures 7A through 7I, Appendix A):

- Provide 10,227 cold-water Stream Mitigation Units (SMUs).
  - Restore 9,381 lf of perennial stream channel by constructing stable streams in the historic floodplain location and elevation.
  - Enhance (Level I) 62 lf of stream by installing in-stream structures, providing proper channel dimension and appropriate floodplain width, reducing shear on eroding banks,

controlling invasive species within the riparian area, and planting with native riparian vegetation.
    - Enhance (Level II) 2,012 lf of stream channel by removing current land use practices, controlling invasive species within the riparian area, and planting native vegetation.
- Install four marsh treatment areas to treat stormwater runoff before it enters Site streams.
- Completely remove a partially breached in-line dam on UT-1 upper to restore unimpeded streamflow.
- Establish a minimum 30-foot-wide woody riparian buffer adjacent to Site streams.
- Fence the conservation easement boundaries in areas used for livestock management.
- Protect the Site in perpetuity with a conservation easement

Completed project activities, reporting history, completion dates, project contacts, and background information are summarized in Tables 1 through 4.

Table 1
Project Mitigation Assets and Components

Reach	Map Reach ID	Existing Footage	Stationing	Mitigation Plan Footage	Restoration Level*	Priority Level	Mitigation Ratio	Cold-Water Mitigation Credits	Notes/Comments
UT-1 Upper	UT-1A	189	0+09-4+92	483	Restoration	I	1:1	483.0	--
UT-1 Lower	UT-1B	13	1+09-1+22	13	EII	--	2.5:1	5.2	--
	UT-1C	554	1+22-7+06	584-20= 564	Restoration	I	1:1	564.0	20 lf is outside of the easement and therefore is non-credit-generating.
UT-3 Upper	UT-3A	45	0+05-0+50	45	EII	--	2.5:1	18.0	--
	UT-3B	1901	0+50-21+66	2116-20-5=2091	Restoration	I/II	1:1	2,091.0	20 lf is outside of the easement and 5 lf is located at a foot crossing within the easement; therefore, these are non-credit-generating.
	UT-3C	62	21+66-22+28	62	EI	--	1.5:1	41.3	--
UT-3 Lower	UT-3D	428	0+00-5+00	500	Restoration	I	1:1	500.0	--
	UT-3E	334	5+00-8+34	334	EII	--	2.5:1	133.6	--
	UT-3F	91	8+34-9+60	126	Restoration	I	1:1	126.0	--
	UT-3G	721	9+60-16+81	721-21=700	EII	--	2.5:1	280.0	21 lf is outside of the easement and therefore is non-credit-generating.
UT4	UT-4A	70	0+00-2+33	233	Restoration	I	1:1	233.0	--
	UT-4B	242	2+33-4+75	242-20=222	EII	--	2.5:1	88.8	20 lf is outside of the easement and therefore is non-credit-generating.
UT5	UT-5A	48	0+00-0+48	48	EII	--	2.5:1	19.2	--
	UT-5B	719	0+48-11+58	1,110-31=1,079	Restoration	I	1:1	1,079.0	31 lf is outside of the easement and therefore is non-credit-generating.

Reach	Map Reach ID	Existing Footage	Stationing	Mitigation Plan Footage	Restoration Level*	Priority Level	Mitigation Ratio	Cold-Water Mitigation Credits	Notes/Comments
UT6	UT-6A	155	0+08-1+63	155	EII	--	2.5:1	62.0	--
	UT-6B	713	2+16-16+48	1,432-20=1,412	Restoration	I/II	1:1	1,412	20 lf is outside of the easement and therefore is non-credit-generating.
	UT-6C	495	16+48-21+43	495	EII	--	2.5:1	198.0	--
UT-7	UT-7A	2426	0+00-19+85	1,985-36-20-45=1,884	Restoration	I	1:1	1,884	Three areas totaling 101 lf are outside of the easement and therefore are non-credit-generating.
UT-8	UT-8A	957	0+18-10+65	1,047-38=1,009	Restoration	II	1:1	1,009	38 lf is outside of the easement and therefore is non-credit-generating.

Note:
*EI: Enhancement (Level I), EII: Enhancement (Level II)

Table 1 (continued)
Length Summation by Mitigation Category and Overall Asset Summary

Restoration Level	Stream (linear footage)	Cold-Water Mitigation Credits
Restoration	9,616-235*=9,381	9,381.0
Enhancement (Level I)	62	41.3
Enhancement (Level II)	2,053-41*=2,012	804.8
Totals	**11,455 lf**	**10,227 SMUs**

Note:
*Areas located outside of the easement or at a foot path crossing within the easement and therefore are non-credit-generating.

Table 2
Project Activity and Reporting History

Activity or Deliverable	Data Collection Complete	Completion or Delivery
RFP No. 16-006991 Issuance Date	September 16, 2016	September 16, 2016
RFP No. 16-006991 Opening Date	February 15, 2017	February 15, 2017
DEQ Contract No. 7188 (Project Instituted)	--	May 22, 2017 (DEQ Contract Execution Date)
Mitigation Plan	March 2018	June 2018
Construction Plans	--	--

Note: NCDEQ: North Carolina Department of Environmental Quality

Table 3
Project Contacts

Full Delivery Provider	Restoration Systems 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 Worth Creech 919-755-9490
Designer	Anchor QEA of North Carolina, PLLC 231 Haywood Street Asheville, North Carolina 28801 Stuart Ryman 828-281-3350

Table 4
Project Attribute Table

Project Background Information							
Project Name	Warren Wilson College Stream Mitigation Site						
County	Buncombe County, North Carolina						
Project Area (acres)	23.9						
Project Coordinates (latitude and longitude)	35.609817, -82.443540						
Area of Planted Woody Stems (acres)	19.64						
Project Watershed Summary Information							
Physiographic Province	Blue Ridge						
River Basin	French Broad						
USGS Hydrologic Unit 8-digit	06010105	USGS Hydrologic Unit 14-digit	06010105070030				
DWR Sub-basin	04-03-02						
Project Drainage Area	0.08–1.28 square miles (49.9–822.3 acres)						
Project Drainage Area Percentage of Impervious Area	< 5%						
CGIA Land Use Classification	Cultivated, Managed Herbaceous Vegetation, Unmanaged Herbaceous Vegetation, Hardwood Swamp, Oak/Gum/Cypress						
Reach Summary Information							
Parameters	**UT-1**	**UT-3**	**UT-4**	**UT-5**	**UT-6**	**UT-7**	**UT-8**
Existing length of reach (linear feet)	756.7	3,581.6	312.3	768.6	1,362.6	2,425.5	957.1
Valley confinement (Confined, moderately confined, unconfined)	Moderately confined to somewhat unconfined (UT-3 & UT-5)						
Drainage area (Square Miles)	0.27	1.28	0.24	0.15	0.08	0.22	0.10
Perennial (P), Intermittent (I), Ephemeral €	P	P	P	P	I/P	P	P
DWR Water Quality Classification	C						
Thermal Regime	Cold Water						
Existing Morphological Description	Cg4	Eg4	G4	G3	G3	Gb4	Eg4
Proposed Morphological Description	Cb4	Ce4	C4	Ce4	Ce4	Eb4	C4
Evolutionary Trend	II/III (Channelized/Degraded)						
FEMA classification	NA	Zone AE	NA	NA	NA	NA	NA

Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs**
Water of the United States – Section 404	Yes	Yes	JD Package (Appendix D)
Water of the United States – Section 401	Yes	Yes	JD Package (Appendix D)
Endangered Species Act	Yes	Yes	CE Document (Appendix E) and NLEB Form (Appendix F)
Historic Preservation Act	Yes	No	CE Document (Appendix E) and Archaeology Report (Appendix G)
Coastal Zone Management Act (CZMA or CAMA)	NA	--	NA
FEMA Floodplain Compliance	Yes	No	Section 7.4
Essential Fisheries Habitat	NA	--	NA

2 Watershed Approach and Site Selection

Primary considerations for Site selection include the potential for protection/improvement of water quality within a region of North Carolina under heavy livestock, agricultural, and developmental pressure. More specifically, considerations include hydrologic conditions of the Site, compatibility with adjacent land uses, reasonably foreseeable effects the mitigation project will have on ecologically important aquatic and terrestrial resources, and potential development trends and land use changes.

2.1 Land Use/Development Trends

The Site is located in the French Broad River Basin 8-digit USGS Cataloging Unit 06010105, more specifically in the Middle Swannanoa River/Bull Creek/Beetree Creek 14-digit Targeted Local Watershed (TLW) 06010105070030. This 14-digit watershed is more forested (78%) and less developed (15%) than the other three Swannanoa subwatersheds, yet it retains some agricultural land (7%). However, approximately 35% of its streams lack a forested buffer, and development in this watershed is increasing, most notably with new construction of very large gated communities and golf courses on southern slopes within the watershed (North Carolina Ecosystem Enhancement Program [NCEEP] 2009).

The Site is located approximately 2 miles west of Swannanoa and 5 miles east of Asheville. According to United States census data, Asheville's population increased 17.3% between 2000 and 2010 and an additional 6.5% between 2010 and 2016 (USCB 2000, 2016). Much of this growth is attributed to the migration of people to the South for better climates and jobs, in addition to the migration of baby boomers in or near retirement. The population increase correlates with increased development pressures throughout the Asheville area with new construction of residential and commercial properties.

Table 5
Population Growth

Location	Population in 2000	Population 2010	% Change 2000 to 2010	Population in 2016	% Change 2010 to 2016
Asheville	68,889	83,344	17.3%	89,121	6.5%
Buncombe County	206,330	238,352	13.4%	256,088	6.9%

2.2 French Broad River Basin Restoration Priorities

Stressors documented in the *French Broad River Basin Restoration Priorities* (RBRP) report (NCEEP 2009) include habitat degradation, poor riparian buffers, nutrient enrichment, channelization, sedimentation, and toxicity primarily attributed to urban and residential runoff and development.

Within the Site, stressors can further be attributed to soil instability, increased runoff, and water quality impairments in the receiving watersheds. The project is not located in a Regional or Local Watershed Planning Area; however, the RBRP goals outlined below are addressed by project activities as follows (Site-specific information follows each RBRP goal in parentheses).

1. Reduce sediment inputs (based on the sediment model [Section 3.4], reducing approximately 228 tons per year [tons/year] of sediment resulting from streambank erosion, excessive fines from channel straightening, channel incision, lack of cobble substrate in disturbed reaches, and a narrow or absent riparian buffer)
2. Reduce nutrient inputs (based on the nutrient model [Section 3.5], reducing 657.4 pounds per year [lbs/yr] of nitrogen and 54.5 lbs/yr of phosphorus by installing marsh treatment areas, removing current land uses and livestock, and eliminating fertilizer application)
3. Restore riparian buffers (removing current land uses and livestock, controlling invasive species, and planting approximately 19.6 acres of woody riparian buffers adjacent to streams)
4. Stabilize streambanks (restoring stable channels at the historic floodplain elevation, and enhancing oversized and incised channels by raising the stream invert and using grade control/habitat structures)
5. Restore and/or protect aquatic habitat (restoring aquatic habitat in restoration and enhancement [Level I] reaches by installing grade control/habitat structures, coarsening channel bed materials, removing nutrient inputs, and planting woody riparian buffers to provide shade and organic matter to streams)
6. Reduce fecal coliform inputs (based on the nutrient model [Section 3.5], reducing 31.2×10^{11} colonies [col] of fecal coliform per day by removing current land uses and livestock and treating agricultural runoff with marsh treatment areas)
7. Implement agricultural best management practices (BMPs), such as fencing livestock from accessing the easement and installing marsh treatment areas.

Site-specific mitigation goals and objectives have been developed through the use of the North Carolina Stream Assessment Method (NC SAM) and are discussed further in Section 6 (Functional Uplift & Project Goals/Objectives).

3 Baseline and Existing Conditions

3.1 Physiography and Land Use

The Site is located in the Broad Basins Ecoregion of the Blue Ridge Physiographic Province within Buncombe County, North Carolina. Regional physiography is characterized by intermountain basins with low mountains, rolling foothills, moderately broad mountain valleys, and moderate gradient streams with mostly cobble and boulders and low-to-moderate-gradient rivers with sand and bedrock substrates (Griffith et al. 2002). On-site elevations range from a high of 2,180 feet to a low of approximately 2,120 feet National Geodetic Vertical Datum (USGS Oteen, North Carolina 7.5-minute topographic quadrangle; Figures 1 and 3, Appendix A).

The primary hydrologic features of the Site include seven UTs to the Swannanoa River. Site drainage areas range in size from 0.08 to 1.28 square miles (49.9 to 822.3 acres; Figure 3, Appendix A). The Site drainage areas are primarily composed of forest and agriculture land. Detailed GIS analysis of the upstream drainages indicates that less than 5% is impervious, including roads, driveways, and rooftops.

The Site, located within the Warren Wilson College property, consists of agricultural and managed forest land accessible to livestock. Site streams are currently part of an actively managed farm and forest system that includes livestock, pastureland, agricultural row crops, and sustainable forest management. Streams are eroded vertically and laterally, receive extensive sediment and nutrient inputs, and have been dredged and straightened and/or rerouted to the floodplain edge.

3.2 Water Quality

The Site is located within the French Broad River Basin in 14-digit USGS Cataloging Unit and Targeted Local Watershed 06010105070030 of the Tennessee Region (North Carolina Division of Water Resources [NCDWR] subbasin 04-03-02; Figure 2, Appendix A). Topographic features of the Site include first- and second-order UTs to the Swannanoa River. Site UTs drain to a reach of the Swannanoa River, which has been assigned Stream Index Number 6-78 and a Best Usage Classification of C (NCDWR 2016). Site tributaries and their immediate receiving waters are not listed on the final 2016 NC 303(d) list (NCDWR 2018); however, the Swannanoa River from its source to the North Fork Swannanoa River (Assessment Unit Number 6-78a), located approximately 5 miles upstream from the Site, is listed due to exceeding criteria for benthos.

3.3 Geology & Soils

Site UTs occur within an alluvial system with a floodplain composed of unconsolidated sedimentary deposits. Therefore, bedrock control is not expected within Site UTs as it would be on the Swannanoa River. Geologic probing on UT-8 revealed no bedrock.

Soils that occur within the Site, according to the *Web Soil Survey* (USDA 2016) are described in the following table.

Table 6
Web Soil Survey Soils Mapped within the Site

Soil Series	Hydric Status	Description
Biltmore loamy sand (BeA)	Nonhydric	This series consist of very deep, occasionally flooded, well-drained soils formed in recent alluvium found on floodplains in the Southern Appalachian Mountains and mesic areas of the Southern Piedmont. Permeability is rapid. Slopes are typically 0 to 3%.
Clifton clay loam and sandy loam (CkD2, CsC)	Nonhydric	This series consists of moderately eroded, very deep, well-drained, moderately permeable soils on ridges and side slopes of the Blue Ridge. Clifton soils formed in residuum weathered from intermediate and mafic igneous and high-grade metamorphic rocks that are high in ferromagnesium minerals. Slopes are 8 to 30%.
Dellwood-Reddies complex (DeA)	Nonhydric	This complex consists of occasionally flooded, moderately well-drained, moderately rapidly to very rapidly permeable soils formed in dominantly coarse-textured alluvium or in recent alluvium that is loamy in the upper part and is moderately deep to sandy strata containing more than 35% by volume gravel and/or cobbles. These soils are found on floodplains in the Southern Blue Ridge Mountains. Slopes are typically 0 to 3%.
Dillard loam (DrB)	Nonhydric	This series consists of rarely flooded, deep or very deep, moderately well-drained, moderately slow permeable soils that formed in loamy alluvium of the Holocene age and occur on narrow, nearly level to sloping stream terraces and toe slopes. Slopes are 1 to 5%.
Evard-Cowee complex (EwD, EwE)	Nonhydric	This series consist of stony, very deep, well-drained, moderately rapidly permeable soils found on mountain slopes, hillslopes, and ridges. Slopes are typically 15 to 50%.
French loam (FrA)	Nonhydric	This series consist of occasionally flooded, very deep, moderately well-drained to somewhat poorly drained, moderately rapidly permeable soils with contrasting textures formed in recent alluvial sediments and found on floodplains of small streams in the southern Appalachian and Blue Ridge Mountains. Slopes are typically 0 to 3%.
Hemphill loam (HpA)	Hydric	This series consists of rarely flooded, very poorly drained, slowly permeable soils that formed in alluvium, and found on nearly level, low stream terraces in the Southern Blue Ridge. The seasonal high-water tables are at a depth of 0 to 1 foot in winter and early spring, and 0.5 to 1.5 feet in summer and fall. Slopes are 0 to 3%.
Iotla loam (IoA)	Nonhydric	This series consists of very deep, somewhat poorly drained, moderately permeable soils formed in recently deposited, loamy alluvial materials found on nearly level floodplains of the southern Blue Ridge Mountains. These soils are occasionally to frequently flooded for brief durations. Slopes are 0 to 2%.

Nikwasi loam (NkA)	Hydric	This series consists of poorly to very poorly drained, moderately rapidly permeable soils formed in recent alluvium consisting of loamy material that is moderately deep to strata of sand, gravel, and/or cobbles. They are on nearly level, relatively narrow floodplains in the upper reaches of watersheds in the Blue Ridge. Slopes are 0 to 2%.
Pits gravel (Pg)	Nonhydric	This map unit consists of areas quarried for stone.
Rosman fine sandy loam (RsA)	Nonhydric	This series consists of occasionally flooded, very deep, well-drained to moderately well-drained, moderately rapidly permeable soils formed in loamy alluvium derived from igneous, high-grade metamorphic or low-grade metasedimentary geology. They are on nearly level flood plains in the Southern Appalachian Mountains. Slopes are 0 to 3%.
Statler loam (StB)	Nonhydric	This series consists of rarely flooded, very deep, well-drained soils formed in loamy alluvium. They are on level to sloping low terraces along streams in or flowing out of the Unaka Mountain Range. Slopes are 1 to 5%.
Tate loam (TaB, TaC, TkC, TkD)	Nonhydric	This series consists of very deep, well-drained, moderately permeable soils formed in colluvium weathered from felsic to mafic high-grade metamorphic rocks, which can be very stony. They are on benches, fans, and toe slopes in coves in the Blue Ridge. Slopes range from 2 to 30%.
Toxaway loam (TsA)	Hydric	This series consists of very deep, moderately permeable, and poorly to very poorly drained soils formed in loamy alluvial deposits on nearly level flood plains of mountain valleys. This series is subject to common, very brief floods. Slopes range from 0 to 2%.
Udorthents-Urban land (UhE)	Nonhydric	This series consists of deep or very deep, somewhat excessively drained to moderately well-drained, very rapidly to slowly permeable soils found on intermountain hills and low and intermediate mountains. Slopes range from 2 to 50%.

Jurisdictional wetlands were delineated and mapped by a licensed soil scientist in November 2017, and subsequently field-verified by the United State Army Corps of Engineers (USACE) regulatory agent, Amanda Jones Fuemmeler, on January 25, 2018; the Preliminary Jurisdictional Determination is included in Appendix D. Wetlands have been disturbed by livestock grazing, clearing of vegetation, stream channel incision, and/or relocation of stream channels to the floodplain margins.

3.4 Sediment Model

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

Streambank characteristics involve measurements of bank height, angles, materials, presence of layers, rooting depth, rooting density, and percentage of the bank protected by rocks, logs, roots, or

vegetation. Site reaches have been measured for each BEHI and NBS characteristic and predicted lateral erosion rate, height, and length to calculate a cubic volume of sediment contributed by the reach each year. Data forms for the analysis are available upon request and the data output is presented in Appendix B. Results of the model are summarized below.

Table 7
BEHI and NBS Modeling Summary

Stream Reach	Proposed Mitigation Treatment	Predicted Sediment Contribution (tons/year)
UT-1	Restoration/Enhancement (Level II)	11.65
UT-3 and 4	Restoration/Enhancement (Level I & II)	121.48
UT-5	Restoration/Enhancement (Level II)	32.93
UT-6 and 7	Restoration/Enhancement (Level II)	46.28
UT-8	Restoration/Enhancement (Level II)	15.53
Total Sediment Contribution (tons/year)		**227.87**

Results of the sediment model appear to match the prescribed mitigation treatment proposed for the Site. Site stream channels are contributing a significant amount of sediment to the downstream receiving waters. Based on this analysis, mitigation of impaired streams at the Site will reduce streambank erosion and subsequent sedimentation within receiving waters.

3.5 Nutrient Model

Nutrient modeling was conducted using a method developed by NCDMS (NCDMS 2016) to determine nutrient and fecal coliform reductions from exclusion of livestock from the buffer.

The equation for nutrient reduction for this model includes the following:

$$TN\ reduction\ \left(\frac{lbs}{yr}\right) = 51.04\left(\frac{\frac{lbs}{ac}}{yr}\right) x\ Area\ (ac)$$

$$TP\ reduction\ \left(\frac{lbs}{yr}\right) = 4.23\left(\frac{\frac{lbs}{ac}}{yr}\right) x\ Ara\ (ac)$$

Where:

TN = total nitrogen
TP = total phosphorus
ac = acres
Area = total area of restored riparian buffers inside of livestock exclusion fences

Equations for fecal coliform reduction for this model include the following.

$$Fecal\ coliform\ reduction\ (col) = 2.2\ x\ 10^{11} \left(\frac{\frac{col}{Au}}{day} \right) x\ AU\ x\ 0.085$$

Where:

Col	=	quantities of Fecal Coliform bacteria
AU	=	animal unit (1,000 lbs of livestock)

Results of the NCDMS analysis indicate approximately 657.4 lbs/yr of nitrogen, 54.5 lbs/yr of phosphorus, and 31.2 x 10^{11} col of fecal coliform/day may be reduced due to exclusion of livestock from the easement area.

3.6 Existing Stream Characteristics

Stream geometry and substrate data have been evaluated to classify existing stream conditions based on fluvial geomorphic principles (Rosgen 1996). This classification system characterizes stream reaches based on pattern, dimension, profile, and substrate. Primary components of the classification include degree of entrenchment, width-depth ratio, sinuosity, and channel slope. Locations of existing streams and cross-sections are depicted in Figures 4A through 4D (Appendix A). Stream geometry measurements under existing conditions are summarized in Table 8 (Essential Morphology Parameters) and Table B1 (Appendix B). Preliminary estimates of stable stream attributes are based primarily upon measurements of two reference reaches and regional curves.

Table 8
Essential Morphology Parameters

Parameter	Existing Condition (Restoration Reaches)	UT 4 Reference Condition	Chemtronics Reference Condition	Proposed (Restoration Reaches)
Valley Width (ft)	50-100	50	50	50–100
Contributing Drainage Area (mi^2)	0.08-1.09	0.21	1.04	0.08–1.09
Channel/Reach Classification	Cg4, Eg4, G3, Gb4	Eb4	B4	Cb4, Ce4, Eb4, C4
Design Discharge Width (ft)	2.6-19.3	6.8	14.0	6.1–17.1
Design Discharge Depth (ft)	0.4-1.6	0.9	1.2	0.4–1.2
Design Discharge Area (ft^2)	3.1-18.2	6.2	16.7	3.1–18.2
Design Discharge Velocity (ft/s)	3.7-8.7	4.8	4.2	3.7–5.5
Design Discharge (cfs)	11.5-75.8	29.6	69.5	11.5–75.8
Water Surface Slope	0.0039-0.0294	0.0226	0.0167	0.0034-0.0286
Sinuosity	1.01-1.06	1.16	1.03	1.05–1.15
Width/Depth Ratio	2.1-53.2	7.6	12	12–16
Bank Height Ratio	1.0-5.8	1.0	1.0	1.0–1.2
Entrenchment Ratio	1.2-21.2	2.9	1.4	1.3–13.7
Substrate	Cobble, Gravel	Gravel	Gravel	Cobble, Gravel

Notes:
ft: feet
mi^2: square miles
ft^2: square feet
ft/s: feet per second
cfs: cubic feet per second

3.6.1 Stream Morphology

Site UTs are characterized by incised channels that receive extensive sediment and nutrient inputs, are eroded vertically and laterally, have been cleared of riparian vegetation, have been dredged and straightened, and/or rerouted to the floodplain edge. Channel dredging has resulted in low sinuosity (1.01-1.06), little to no riffle-pool morphology, disturbed instream habitat, oversized channel cross-sectional areas (existing channels are 2 to 12 times the bankfull channel cross-sectional area), and limited or no access to Site floodplains during overbank events (bank-height ratios up to 5.8).

3.6.2 Discharge

Rainfall in the region is highly variable, with precipitation at the local Asheville airport averaging approximately 47 inches per year (USDA 2009). Site stream discharge is dominated by a combination of upstream basin catchment, groundwater flow, and precipitation. Based on indicators of bankfull at reference reaches, the designed channel will equal approximately 80% of the channel size indicated by Mountain regional curves (Harman et al. 2000); this is discussed in Section 3.8 (Bankfull

Verification). Therefore, based on reference measurements, the bankfull discharge for a 0.08- to 1.28-square-mile watershed is expected to average 11.5 to 85.1 cubic feet per second and occur approximately every 1.3 to 1.5 years (Rosgen 1996, Leopold 1994).

3.7 Channel Stability Assessment

Channel degradation or aggradation occurs when hydraulic forces exceed or do not approach the resisting forces in the channel. The amount of degradation or aggradation is a function of relative magnitude of these forces over time. The interaction of flow within the boundary of open channels is only imperfectly understood. Adequate analytical expressions describing this interaction have yet to be developed for conditions in natural channels. Thus, means of characterizing these processes rely heavily upon empirical formulas.

Traditional approaches for characterizing stability can be placed in one of two categories: 1) maximum permissible velocity and 2) tractive force, or stream power and shear stress. The former is advantageous in that velocity can be measured directly. Shear stress and stream power cannot be measured directly and must be computed from various flow parameters. However, stream power and shear stress are generally better measures of fluid force on the channel boundary than velocity.

Stream power and shear stress were estimated for 1) existing dredged and straightened reaches, 2) the reference reaches, and 3) proposed Site conditions. Important input values and output results (including stream power, shear stress, and per unit shear power and shear stress) are presented in Table 9.

Table 9
Stream Power (Ω) and Shear Stress (τ) Values

Reach	Bankfull Discharge (ft^3/s)	Water surface Slope (ft/ft)	Total Stream Power (Ω)	Ω/W	Hydraulic Radius	Shear Stress (τ)	Velocity (v)	τ v	τ_{max}
Existing Conditions									
UT-1	27.7	0.0294	50.82	4.66	4.16	7.63	0.55	4.20	11.44
UT-3 Upper	75.8	0.0146	69.06	5.71	3.31	3.02	1.52	4.57	4.53
UT-5	18.1	0.0140	15.81	2.59	8.70	7.60	0.27	2.05	11.40
UT-6	11.5	0.0039	2.80	0.51	4.34	1.06	0.40	0.42	1.59
UT-7	23.9	0.0202	30.13	4.07	1.69	2.13	1.57	3.35	3.19
UT-8	13.5	0.0046	3.88	0.57	3.91	1.12	0.44	0.50	1.68
Reference Conditions									
UT-4 Reference	29.6	0.0226	41.74	6.14	0.72	1.02	4.77	4.85	1.53
Chemtronics	69.5	0.0167	72.42	5.17	1.02	1.06	4.16	4.42	1.59
Proposed Conditions									
UT-1	27.7	0.0286	49.43	4.94	0.44	0.78	5.54	4.34	1.17
UT-3 Upper	75.8	0.0141	66.69	4.17	1.00	0.88	4.16	3.66	1.32
UT-5	18.1	0.0134	15.13	1.85	0.51	0.43	3.77	1.61	0.64
UT-6	11.5	0.0042	3.01	0.46	0.41	0.11	3.71	0.40	0.16
UT-7	23.9	0.0194	28.93	3.11	0.58	0.70	3.85	2.70	1.05
UT-8	13.5	0.0144	12.13	1.71	0.44	0.40	3.75	1.50	0.60

Notes:
ft^3/s: cubic feet per second
ft/ft: feet per foot

Existing Site streams are characterized by a wide range of water surface slopes and varying degrees of degradation. In general, stream power values of existing streams are slightly elevated as compared to proposed values, and shear stress values of existing streams are significantly elevated as compared to proposed and reference reach values. Proposed condition values are comparable to reference reach values when taking into consideration variations in water surface slope and drainage area; values for UT-5, UT-6, and UT-8 are lower than values for reference reaches as expected due to smaller drainage areas and lower water surface slopes. Proposed stream power and shear stress values appear adequate to mobilize and transport sediment through the Site, without aggradation of the channel or erosion on proposed streambanks while maintaining channel bed material characterized by gravel-sized particles.

3.8 Bankfull Verification

For this study, the bankfull channel is defined as the channel dimensions designed to support the "channel forming" or "dominant" discharge (Gordon et al. 1992). Discharge estimates for the Site utilize an assumed definition of "bankfull" and the return interval associated with that bankfull discharge. Therefore, two reference reaches were measured to determine the assumed bankfull; more information for each reference reach is included in Section 4.

For this analysis, field indicators of bankfull (primarily topographic breaks identified on the banks and riffle cross sections) were utilized to obtain an average bankfull cross-sectional area for the reference reaches. The Mountain regional curves were then utilized to plot the watershed area and discharge for the reference reach cross-sectional area. Field indicators of bankfull approximate an average discharge of 29.6 and 69.5 cfs, respectively for the UT-4 and Chemtronics Reference Reaches, respectively, which are 80 and 76% of that predicted by the regional curves; these are verified by the range approximated by the USGS regional regression equation (Appendix C). The following table summarizes this discharge analysis of the reference reaches.

Table 10
Reference Reach Bankfull Discharge Analysis

Method	Watershed Area (square miles)	Return Interval (years)	Discharge (cfs)
UT-4 Reference Reach			
Mountain Regional Curves (Harman et al. 2000)	0.21	1.3-1.5	37.0
Blue Ridge/Piedmont Regional Regression Model (USGS 2006)	0.21	1.3-1.5	26-32
Field Indicators of Bankfull	0.21	1.3-1.5	29.6
Chemtronics Reference Reach			
Mountain Regional Curves (Harman et al. 2000)	1.04	1.3-1.5	91.6
Blue Ridge/Piedmont Regional Regression Model (USGS 2006)	1.04	1.3-1.5	80-100
Field Indicators of Bankfull	1.04	1.3-1.5	69.5

Based on field indicators of bankfull on the UT-4 Reference Reach (80% of the curves), located upstream of the Site on an undisturbed reach of UT-4, the designed on-site channel restoration area will equal approximately 80% of the channel size indicated by Mountain regional curves.

4 Reference Streams

Two reference reaches were identified for the Site (Figure 1, Appendix A). The first (UT-4 Reference, Figures 5A-5C, Appendix A) is located upstream of the Site on an undisturbed reach of UT-4. The second (Chemtronics, Figures 6A-6C, Appendix A) is located less than 1.5 miles northeast of the Site on Gregg Branch. The two reference reaches were measured and classified by stream type (Rosgen 1996) (Table B1, Warren Wilson College Morphological Stream Characteristics, Appendix B). The reference reaches are relatively stable, undisturbed reaches, which offer variability in drainage areas, slopes, and sinuosity, which approximates variability of proposed restoration reaches located on the Site.

4.1 UT-4 Reference

Classification: The UT-4 Reference is characterized as an Eb-type stream channel dominated by gravel substrate.

Bankfull/Discharge: Field indicators of bankfull approximate an average discharge of 29.6 cfs, which is 80% of that predicted by Mountain regional curves.

Dimension: Data collected at the UT-4 Reference indicates averages for bankfull cross-sectional area of 6.2 square feet, bankfull width of 6.8 feet, bankfull depth of 0.9 feet, width-to-depth ratio of 7.6, and bank-height ratio of 1.0.

Pattern and Profile: In-field measurements yielded an average sinuosity of 1.16 (thalweg distance/straight-line distance). The valley slope is 0.0262 and the average water surface slope is 0.0226.

4.2 Chemtronics Reference

Classification: The Chemtronics Reference is characterized as a B-type stream channel dominated by gravel substrate.

Bankfull/Discharge: Field indicators of bankfull approximate an average discharge of 69.5 cfs, which is 76% of that predicted by Mountain regional curves.

Dimension: Data collected at the Chemtronics Reference indicates averages for bankfull cross-sectional area of 16.7 square feet, bankfull width of 14.0 feet, bankfull depth of 1.2 feet, width-to-depth ratio of 12.0, and bank-height ratio of 1.0.

Pattern and Profile: In-field measurements yielded an average sinuosity of 1.03 (thalweg distance/straight-line distance). The valley slope is 0.0172 and the average water surface slope is 0.0167.

5 Reference Forest Ecosystem

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

The RFE for this project is located on the UT-4 Reference, which is immediately upstream of the Site on a stable, relatively undisturbed reach, in addition to riparian areas adjacent to the lower reaches of UT-3 on the Site. The RFE supports plant community and landform characteristics that restoration efforts will attempt to emulate. Tree and shrub species identified within the reference forest (Table 11) will be used, in addition to other relevant species in appropriate Schafale and Weakley (1990) and Schafale (2012) community descriptions.

Table 11
Reference Forest Ecosystem

Montane Alluvial Forest	
red maple (*Acer rubrum*)	sourwood (*Oxydendrum arboreum*)
tag alder (*Alnus serrulata*)	white pine (*Pinus strobus*)
ironwood (*Carpinus caroliniana*)	American sycamore (*Platanus occidentalis*)
pignut hickory (*Carya glabra*)	black cherry (*Prunus serotina*)
green ash (*Fraxinus pennsylvanica*)	white oak (*Quercus alba*)
American holly (*Ilex opaca*)	Northern red oak (*Quercus rubra*)
eastern red cedar (*Juniperus virginiana*)	post oak (*Quercus stellata*)
black walnut (*Juglans nigra*)	oak (*Quercus* sp.)
tulip poplar (*Liriodendron tulipifera*)	Eastern hemlock (*Tsuga canadensis*)

6 Functional Uplift and Project Goals and Objectives

RBRP goals outlined below are addressed by project activities; see Section 2.2 for a more details on RBRP goals and project activities.

- Reduce sediment inputs
- Reduce nutrient inputs
- Restore riparian buffers
- Stabilize streambanks
- Restore and/or protect aquatic habitat
- Reduce fecal coliform inputs
- Implement agriculture BMPs

Site-specific mitigation goals and objectives have been developed using NC SAM analyses of existing impaired and reference streams at the Site (NC Stream Functional Assessment Team [NC SFAT] 2015). These methodologies rate functional metrics for streams as high, medium, or low, based on field data collected on forms and transferred into a rating calculator. Using Boolean logic, the rating calculator assigns a high, medium, or low value for each metric and overall function of the stream. Site functional assessment data forms are available upon request and model output is included in Appendix B.

Table 12A summarizes NC SAM metrics ratings; metrics targeted to meet the Site's goals and objectives are depicted in bold. NC SAM reaches are depicted on Figures 4A-4D (Appendix A).

Based on NC SAM output, all three primary stream functional metrics (Hydrology, Water Quality, and Habitat), as well as the majority of the sub-metrics are under-performing as exhibited by a LOW metric ratings. These same metrics measured in the stable, relatively undisturbed UT-4 Reference Reach (WWC-01) located upstream of the Site exhibit HIGH metric ratings. LOW performing metrics are to be targeted for functional uplift through mitigation activities, goals, and objectives, as well as monitoring and success criteria.

Table 12B outlines stream functions targeted for functional uplift, goals that are tied to the specific functions, and objectives to be completed to achieve the proposed goals. The proposed easement, existing conditions, and proposed mitigation activities are depicted in Figures 4, 4A-4D, and 7A-7I (Appendix A). The Site provides for restoration and protection of aquatic resources within a conservation easement and will result in net gains in hydrology, water quality, and habitat functions.

Table 12A
North Carolina Stream Assessment Method Summary

NC SAM Function Class Rating Summary	UT 4 (Upstream) WWC-1 Ref	UT 3 (Upstream) WWC-2	UT 3 (Downstream) WWC-3*	UT 5 WWC-04	UT 7 WWC-06	UT 6 WWC-07	UT 1 WWC-08
(1) Hydrology	HIGH	**LOW**	HIGH	**LOW**	MEDIUM	MEDIUM	MEDIUM
(2) Baseflow	HIGH	HIGH	HIGH	HIGH	MEDIUM	HIGH	HIGH
(2) Flood Flow	HIGH	**LOW**	HIGH	**LOW**	MEDIUM	MEDIUM	MEDIUM
(3) Streamside Area Attenuation	HIGH	**LOW**	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(4) Floodplain Access	HIGH	**LOW**	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(4) Wooded Riparian Buffer	HIGH	**LOW**	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(4) Microtopography	HIGH	**LOW**	**LOW**	**LOW**	**LOW**	**LOW**	**LOW**
(3) Stream Stability	HIGH	**LOW**	HIGH	**LOW**	HIGH	HIGH	HIGH
(4) Channel Stability	HIGH	MEDIUM	HIGH	**LOW**	HIGH	HIGH	HIGH
(4) Sediment Transport	HIGH	MEDIUM	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(4) Stream Geomorphology	HIGH	**LOW**	MEDIUM	**LOW**	HIGH	HIGH	HIGH
(1) Water Quality	HIGH	MEDIUM	MEDIUM	**LOW**	MEDIUM	MEDIUM	MEDIUM
(2) Baseflow	HIGH	HIGH	HIGH	MEDIUM	MEDIUM	HIGH	HIGH
(2) Stream-side Area Vegetation	HIGH	**LOW**	HIGH	HIGH	**LOW**	**LOW**	**LOW**
(3) Upland Pollutant Filtration	HIGH	**LOW**	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(3) Thermoregulation	HIGH	MEDIUM	MEDIUM	MEDIUM	**LOW**	**LOW**	**LOW**
(2) Indicators of Stressors	NO	NO	**YES**	**YES**	NO	NO	NO
(2) Aquatic Life Tolerance	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
(1) Habitat	HIGH	**LOW**	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(2) In-stream Habitat	HIGH	**LOW**	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(3) Baseflow	HIGH	HIGH	HIGH	HIGH	MEDIUM	HIGH	HIGH
(3) Substrate	HIGH	MEDIUM	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(3) Stream Stability	HIGH	MEDIUM	HIGH	**LOW**	HIGH	HIGH	HIGH

NC SAM Function Class Rating Summary	UT 4 (Upstream) WWC-1 Ref	UT 3 (Upstream) WWC-2	UT 3 (Downstream) WWC-3*	UT 5 WWC-04	UT 7 WWC-06	UT 6 WWC-07	UT 1 WWC-08
(3) In-Stream Habitat	HIGH	**LOW**	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(2) Stream-Side Habitat	HIGH	**LOW**	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(3) Stream-Side Habitat	HIGH	**LOW**	HIGH	**LOW**	**LOW**	**LOW**	**LOW**
(3) Thermoregulation	HIGH	**LOW**	HIGH	MEDIUM	**LOW**	**LOW**	**LOW**
Overall	HIGH	**LOW**	HIGH	**LOW**	MEDIUM	MEDIUM	MEDIUM

Note:
* UT-3 Downstream is proposed for enhancement (level II).

Table 12B
Stream Targeted Functions, Goals, and Objectives

Targeted Functions	Goals	Objectives
(1) HYDROLOGY		
(2) Flood Flow (Floodplain Access)	• Attenuate flood flow across the Site. • Minimize downstream flooding to the maximum extent possible. • Connect streams to functioning wetland systems.	• Construct new channel at historic floodplain elevation to restore overbank flows and enhance existing jurisdictional wetlands. • Plant woody riparian buffer. • Remove livestock and cease agriculture practices within areas protected by the conservation easement. • Deep rip floodplain soils to reduce compaction and increase soil surface roughness. • Protect riparian buffers with a perpetual conservation easement.
(3) Streamside Area Attenuation		
(4) Floodplain Access		
(4) Wooded Riparian Buffer		
(4) Microtopography		
(3) Stream Stability	• Increase stream stability within the Site so that channels are neither aggrading nor degrading.	• Construct channels with proper pattern, dimension, longitudinal profile, and substrate. • Remove livestock and cease agriculture practices within areas protected by the conservation easement. • Construct stable channels with gravel substrate. • Stabilize streambanks. • Plant woody riparian buffer.
(4) Channel Stability		
(4) Sediment Transport		
(4) Thermoregulation		
(4) Stream Geomorphology		
(1) WATER QUALITY		
(2) Streamside Area Vegetation	• Remove direct nutrient and pollutant inputs from the Site and reduce contributions to downstream waters.	• Remove livestock and reduce agricultural land/inputs. • Install marsh treatment areas. • Plant woody riparian buffer. • Enhance jurisdictional wetlands adjacent to Site streams. • Provide surface roughness and reduce compaction through deep ripping/plowing. • Restore overbank flooding by constructing channels at historic floodplain elevation.
(3) Upland Pollutant Filtration		
(2) Indicators of Stressors		
(1) HABITAT		
(2) In-stream Habitat	• Improve instream and stream-side habitat.	• Construct stable channels with gravel substrate. • Plant woody riparian buffer to provide organic matter and shade. • Construct new channel at historic floodplain elevation to restore overbank flows. • Protect riparian buffers with a perpetual conservation easement. • Enhance jurisdictional wetlands adjacent to Site streams. • Remove invasive plant species. • Add large woody debris to Site channels.
(3) Substrate		
(3) Stream Stability		
(3) In-Stream Habitat		
(2) Stream-side Habitat		
(3) Stream-side Habitat		
(3) Thermoregulation		

7 Site Design and Implementation Constraints

The presence of conditions or characteristics that have the potential to hinder restoration activities on the Site was evaluated. The evaluation focused primarily on the presence of hazardous materials, utilities and restrictive easements, federally protected species or critical habitats, and the potential for hydrologic trespass. Existing information regarding Site constraints was acquired and reviewed. In addition, Site conditions that have the potential to restrict the restoration design and implementation were documented during the field investigation. No known Site constraints, that may hinder proposed mitigation activities were identified during field surveys; however, archaeologists will be present to monitor any ground-disturbing activities in the vicinity of UT-1, UT-6, and UT-7 (see Section 7.3 Cultural Resources).

7.1 Existing Paths

Pedestrian trails are currently located within and adjacent to the Site. The trails are approximately 2 feet wide with three stream crossings on UT-3 and one crossing on UT-5 (Figures 4A & 4B, 7D, 7E, 7F, and Appendix A). The trails are low-impact, high-value assets to the College and local community. The pedestrian trail stream crossings will remain within the Site, will not hinder Site mitigation activities, and SMUs have been removed where the stream is bridged (Upper UT-3, Little Berea: Figure 7D). On Lower UT-3, Stokes Field (Figure 7E), the trail runs parallel to UT-3 but is under full mature forest canopy and a dense stand of rhododendron. The trail meanders within the easement in a few short sections and is never closer than 20 feet to UT-3 due to the severe topography of the left bank. No maintenance or upgrades will take place on the trail within the conservation easement, and Photograph 1 shows the existing condition of the trail. The trails will be located and included on the survey recorded at the Buncombe County Register of Deeds.

Photograph 1

7.2 Threatened & Endangered Species

Eleven federally protected species are listed as occurring in Buncombe County (USFWS 2016). A desktop analysis and field investigations were conducted to evaluate federally protected species potentially occurring in and around the Site. The online project review (known as IPaC) was performed via the USFWS Asheville Field Office Website and a letter was sent to USFWS biologist John Ellis on July 26, 2017 alerting them to the project activities for an informal Section 7 review.

Table 13 details species listed for Buncombe County, if habitat may occur within the Site, and a biological conclusion for each species. A summary follows.

- 10 of 11 federally protected species: No Effect
- Northern long-eared bat: The project area does not contain caves or suitable winter roosting areas for the Northern long-eared bat. Project activities involving cutting of suitable summer roosting tree species would be conducted between August and May, in accordance with USFWS guidance. In order to comply with the Northern long-eared Bat (NLEB) 4(d) streamlined rule for federal agencies, the appropriate consultation form was submitted. It was determined that the project "may affect the NLEB, but any incidental take of the NLEB is not prohibited by the final 4(d) rule." The signed NLEB 4(d) Rule Streamlined Consultation Form contains more detailed information (Appendix F).

Table 13
Federally Protected Species

Common Name (Threatened/Endangered)	Scientific Name	Habitat at Site	Biological Conclusion	Summary
Bog Turtle (Threatened due to Similarity of Appearance)	*Glyptemys muhlenbergii*	Yes	N/A	Species is not subject to section seven consultations requirements under the Endangered Species Act.
Carolina northern flying squirrel (Endangered)	*Glaucomys sabrinus coloratus*	No	No Effect	No habitat exists in or near the project boundaries.
Gray Bat (Endangered)	*Myotis grisescens*	No	No Effect	Foraging habitat present within the Site; however, no roosting habitat with the Site boundaries or near the Site. Foraging habitat will not be disturbed summer months.
Northern long-eared bat (Threatened)	*Myotis septentrionalis*	Yes	May Effect	(See attached Northern long eared Bat consultation form)
Spotfin chub (Threatened)	*Erimonax monachus*	No	No Effect	Historic record only, only known from four sites outside this watershed.

Appalachian elktoe (Endangered)	*Alasmidonta raveneliana*	No	No Effect	Historic record only, no known presence in or near the Site. Existing stream channels do not provide habitat due to sediment build ups
Spruce-fir moss spider (Endangered)	*Microhexura montivaga*	No	No Effect	No habitat exists in or near the project boundaries.
Tan riffleshell (Endangered)	*Epioblasma florentina walkeri*	No	No Effect	Historic record only, no known presence in or near the Site. Existing stream channels do not provide habitat due to sediment build ups.
Spreading avens (Endangered)	*Geum radiatum*	No	No Effect	No habitat exists in or near the project boundaries.
Virginia spiraea (Threatened)	*Spiraea virginiana*	No	No Effect	Historic record only, no known presence in or near the Site.
Rock gnome lichen (Endangered)	*Gymnoderma lineare*	No	No Effect	No habitat exists in or near the project boundaries.

7.3 Cultural Resources

In a letter dated September 27, 2017, the North Carolina Department of Natural and Cultural Resources, State Historic Preservation Office (SHPO) stated that there are several important archaeological sites located on the Warren Wilson College campus (this letter is included in the CE document found in Appendix E). Three of the sites could potentially be affected by the project; the following lists each site and gives SHPO's recommendations.

Table 14
Important Archaeological Sites

Archaeological Site	Location	SHPO Recommendation
31BN28	Adjacent to UT-5	Archaeological testing and evaluation by an experienced archaeologist was recommended to assess the significance of archaeological remains that may be damaged or destroyed by the proposed project.
31BN135	In the vicinity of UT-1, UT-6, and UT-7	Ground-disturbing activities should be monitored by a professional archaeologist during construction in these areas.
31BN145/491		

Restoration Systems retained TRC Solutions, Inc. (TRC) to perform field work for testing and site assessment of site 31BN28; in addition, to monitoring any ground-disturbing activities during

construction in the vicinity of the 31BN135 and 31BN145/491 sites to ensure no adverse impacts occur to the sites.

TRC completed fieldwork for archaeological testing and site assessment for site 31BN28 between January 4 and 14, 2018; the report is included as Appendix G. TRC concluded that "results suggest that construction will not impact any intact or significant deposits, and we recommend that the construction is allowed to proceed as presently designed. If design plans change, additional archaeological assessment would likely be necessary."

7.4 FEMA

Inspection of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map 3700967900J (DFIRM panel number 9679), effective January 6, 2010 indicates the Swannanoa River and Bull Creek are mapped hydrographic features with associated special flood hazard areas (SFHAs). These SFHAs include the regulated floodway boundary and Zone AE boundary. Therefore, floodplain permitting and a no-rise certification will be performed as a requirement of the Buncombe County Planning Department in cooperation with state and federal guidelines. A HEC-RAS analysis will be completed on the existing and proposed conditions of the Site where work is being proposed in the regulated floodway to assess hydraulic performance. It is unlikely that a Conditional Letter of Map Revisions (CLOMR) will be required for this Site. If final modeling and analysis or permitting guidance requires the submittal of the CLOMR, the additional permitting packages will be completed.

7.5 Utilities

Several utility crossings occur within the property including sewer lines and overhead powerlines. All utility crossings occur within breaks in the proposed conservation easement and no mitigation credit will be obtained within these breaks. An overhead powerline currently parallels the right bank of UT-1 upper; however, this powerline will be relocated outside of the conservation easement. Utility easements are not expected to hinder proposed mitigation activities.

7.6 Air Transport Facilities

No air transport facilities are located within 5 miles of the Site.

8 Design Approach and Mitigation Work Plan

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

8.1 Stream Restoration

Stream restoration efforts are designed to restore a stable stream that approximates hydrodynamics, stream geometry, and local microtopography relative to reference conditions. The majority of stream restoration at the Site will be Priority I; therefore, bankfull elevations will be raised to meet the adjacent valley floodplain elevation. UT-3 upper and the upper portion of UT-6 will include short reaches of Priority II to ensure that grades are suitable and to get the channel elevations up to the historic floodplain elevation to tie into Priority I channel restoration. Restoration of UT-8 will require grading the entire floodplain to restore historic elevations due to excessive amounts of fill being dumped and incorporated into the existing floodplain. More details for mitigation activities on each individual reach can be found in Section 8.4.

Stream restoration is expected to entail 1) belt-width preparation, 2) channel excavation, 3) spoil stockpiling, 4) channel stabilization, 5) channel diversion, and 6) channel backfill.

In-Stream Structures: The use of in-stream structures for grade control and habitat are essential for successful stream restoration. In-stream structures may be placed in the channel to elevate local water surface profiles in the channel, potentially flattening the water energy slope or gradient. The structures would likely consist of log/rock cross-vanes or log/rock j-hook vanes designed primarily to direct stream energy into the center of the channel and away from banks. In addition, the structures would be placed in relatively straight reaches to provide secondary (perpendicular) flow cells during bankfull events.

Piped Channel Crossings: Landowner constraints will necessitate the installation of piped channel crossings. Crossings will allow access to portions of the property isolated by stream restoration activities. The crossings will be constructed of properly sized pipes and hydraulically stable rip-rap or suitable rock. The crossings will be large enough to handle the weight of anticipated vehicular traffic. Approach grades to the crossing will be at an approximate 10:1 slope and constructed of hard, scour-resistant crushed rock or other permeable material, which is free of fines.

Drop Structures: One drop structure is proposed on UT-8. The drop structure may be constructed out of stone and wood, as depicted in typical details of the construction plans. The structures should be constructed to resist erosive forces associated with hydraulic drops proposed at the Site.

Marsh Treatment Areas: Shallow wetland marsh treatment areas will be excavated to intercept surface waters draining through agricultural areas prior to discharging into the restored streams. Marsh treatment areas are intended to improve the mitigation project and are not generating mitigation credit. Proposed marsh treatment areas will consist of shallow depressions that will provide treatment and attenuation of initial stormwater pulses. The outfall of each treatment area will be constructed of hydraulically stable rip-rap or other suitable material that will protect against headcut migration into the constructed depression. It is expected that the treatment areas will fill with sediment and organic matter over time.

8.2 Stream Enhancement (Level I)

Stream enhancement (Level I) activities will include the installation of in-stream structures, providing proper channel dimension and appropriate floodplain width, reducing shear on eroding banks, removing livestock and fencing streams, controlling invasive plant species, and planting with native woody vegetation.

8.3 Stream Enhancement (Level II)

Stream enhancement (Level II) activities include stabilizing streambanks (where necessary), removing livestock and fencing streams, controlling invasive plant species, and supplemental planting with riparian forest vegetation.

8.4 Individual Reach Mitigation Discussions

Mitigation strategies proposed for each UT are presented below (Figures 7A-7I, Appendix A).

8.4.1 UT-1 Upper (Swim Pond, UT-1A in Figure 7A)

UT-1 begins upstream of an impoundment that was intentionally breached for safety reasons. A small forebay/wetland utilized by the school for research projects constitutes the initiation point for UT-1. Unconsolidated sediments line the bottom of the drained impoundment, which UT-1 drains through from the forebay to the dam breach. UT-1 has formed a braided channel through the former pond sediment before coalescing at a ponded area behind remnants of the dam. The stream is constricted by the breached dam, which was manually breached and stabilized by rip-rap. The rip-rap forms an approximately 4-foot hydraulic drop to the historic stream bed.

Wetlands have developed within the remaining pond sediments due to extended saturation and hydrophytic vegetation is establishing, primarily soft rush (*Juncus effusus*).

Immediately downstream of the dam, streambanks are over-steepened and eroding. A parking lot encroaches on the right bank immediately downstream of the former dam. UT-1 (upper) outfalls into a culvert, which transports the stream under paved roads and a parking area.

Restoration will be performed on the entire length of UT-1 upper. The left side of the partially breached dam is to be completely removed to match the elevation of the floodplain and valley walls upstream and downstream of dam. The right side of the dam is to remain intact and Hemlocks growing on the dam remnants are to be protected during construction activities.

Stream restoration within the abandoned pond will include 1) removal of the dam to the elevation of the adjacent floodplain; 2) excavating sediment that is unsuitable for channel bank construction; 3) backfilling areas of sediment removed with soil suitable for channel construction (if necessary); 4) excavation of the design channel; 5) stabilization of the channel with coir matting, seed, and mulch; and 6) installation of structures.

The section of dam to be removed will be excavated and stockpiled and, if suitable, may be used as channel backfill for reaches of stream to be abandoned during stream restoration efforts. If additional backfill remains, the material will be stockpiled outside of the easement, or spread evenly across the adjacent property and seeded for stabilization. Erosion control measures, such as silt fence, seeding, and mulching will be implemented on all stockpiled or spread soil materials.

A determination on sediment quantity and quality within the abandoned pond will be made concerning the ability to work within, or to stabilize the sediment for stream construction. If sediment is deemed unsuitable for channel construction, the sediment will be removed from the vicinity of the design channel and spread along the outer margins of the pond. Subsequently, suitable soil material will be placed in the location of the design channel such that design channel banks will be stabilized without liquefaction. The removal of unsuitable material, installation of suitable material, and excavation of the design channel may occur simultaneously to reduce impacts of machinery on the pond bed.

The lower reach of stream, below the breached dam will be reconnected to its historic channel which was identified during field surveys. This section of stream was abandoned when the dam was constructed and the outfall structure was realigned adjacent to the stream channel. Approximately 45 feet of historic channel will be reconnected by dam removal and channel realignment.

Below the dam, multiple cross-vane (log or stone) structures will be installed to tie elevations of the design channel through the pond bottom to the historic channel bed. Currently, the pond bed is approximately 3 feet above the abandoned channel. Once the channel has been reconnected below the dam, the channel will be constructed to the proper dimension and profile as determined by reference studies. Structures will be installed to dissipate energy and reduce lateral erosion within the confined valley.

A marsh treatment feature will be constructed on the right bank just upstream of the former dam and within the Conservation Easement. A storm drainage channel will be directed toward the marsh treatment feature in order to address stormwater entering the project area.

8.4.2 UT-1 Lower (Hog Bottom, UT-1B and UT-1C in Figure 7B)

UT-1 lower begins approximately 550 feet downstream of UT-1 upper and is separated by parking and facilities associated with the College. This reach is currently encroached upon by agriculture research facilities including pig breeding and rearing lots, horse pasture, and dairy cattle fields/barns. UT-1 lower has been dredged in support of adjacent infrastructure. Powerlines run adjacent to the stream for the majority of its reach, which are cleared on a regular basis; however, vegetation is currently overgrown within the utility easement. Two wetlands discharge into the stream, one on each bank. Wetlands have sheet flow in the winter and spring seasons and are characterized by emergent vegetation in wetter areas. UT-1 lower drains to the Swannanoa River; however, the project easement is separated from the river by a sewer line easement.

Historically stormwater flows have been controlled by the upstream impoundment (recently breached), which will be removed during restoration of UT-1 upper. As a result, UT-1 lower has historically been characterized by attenuated stormwater flows and consequently, relatively low sediment contributions. If left in its current condition, this reach is expected to destabilize as the result of normal/unimpounded stormwater pulses. Therefore, restoration of this reach is an important project component.

Restoration of UT-1 lower will include 1) relocation of the powerline outside the conservation easement, 2) excavation of a sinuous channel connected to the adjacent wetlands, 3) installation of grade control/habitat structures, and 4) installation of marsh treatment areas.

UT-1 lower restoration will entail Priority I channel construction at the historic floodplain elevation to restore overbank flows to adjacent floodplains and jurisdictional wetlands. Currently, the channel adjacent to existing jurisdictional wetlands has elevated bank-height-ratios (approximately 1.3); however, incision of the channel gets significantly worse as the stream descends towards the Swannanoa River. Reduction of bank-height-ratio and reconnection with adjacent wetlands is a primary component of the restoration of this reach.

The installation of a marsh treatment areas is expected to reduce stormwater flows and treat agricultural runoff from these heavily used areas.

8.4.3 UT-2 (Lower Field/Pig Pond in Figure 7B)

UT-2 is a sediment-choked drainage located downstream of the confluence of two ditch systems that drain agriculture fields adjacent to the Site. UT-2 was deemed as a linear wetland and not a

jurisdictional stream by the US Army Corps of Engineers. The linear wetland is characterized by sheet flow of water for extended periods during the winter and early spring; however, it is not a defined by a bank-to-bank channel with an ordinary high-water mark. UT-2 receives stormwater runoff from livestock holding areas and likely contributes sediment, nutrients, and fecal coliform to UT-1 via stormwater runoff.

The main strategy for UT-2 is to direct stormwater runoff into a marsh treatment area constructed within the conservation easement. At this time, no stream mitigation credit is being pursued for this reach. Portions of UT-2 will be permanently fenced to exclude livestock.

8.4.4 UT-3 Upper (Little Berea/Clingman's, UT-3A, UT-3B, and UT-3C in Figures 7C and 7D)

The upper reaches of UT-3 (upstream of Riceville Road) have been dredged and straightened (sinuosity of approximately 1.03) and the stream channel (ditch) is currently oversized (2 to 3 times the bankfull cross-sectional area). The channel (ditch) is incised (bank-height-ratio of 1.8 to 2.4) well below its former floodplain elevation. The channel (ditch) appears to be scouring laterally and developing sinuosity within the oversized channel (ditch); however, dense thickets of invasive species (primarily Chinese privet [*Ligustrum sinense*]) have minimized erosion along the channel (ditch). The incised nature of the channel (ditch) is presumed to have effected groundwater table elevations, possibly draining or effecting the jurisdictional hydroperiod of wetlands adjacent to UT-3 upper. In an effort to measure the effect of channel incision on the groundwater table a series of groundwater monitoring gauges have been nested in three transects along UT-3 (Figure 4A, Appendix A). Data collection is ongoing and will be presented in as-built documentation. All of the restored sections of UT-3 will be permanently fenced to exclude livestock.

Photograph 2

The upper reaches of UT-3 have been dredged and straightened with the channel banks at a higher elevation than the adjacent abandoned floodplain (spoil from ditching the historic channel). Remnants of the relict channel are

evident within a section of floodplain; the location has been confirmed with historic aerial photographs. Mature hardwood trees are present throughout the historical floodplain and will be protected to the maximum extent possible during restoration activities. Trees greater than approximately 12 inches in diameter were located with GPS equipment (Trimble Geo7X, with reported sub-meter accuracy). Tree avoidance areas are depicted on Figures 7C and 7D (Appendix A) and were utilized during design channel layout.

Mitigation implementation of UT-3 upper is expected to entail 1) Stream Enhancement Level I in the upper reaches, 2) Stream Restoration in the middle reaches, and 3) Stream Enhancement Level II in the downstream reaches. Stream Enhancement Level I is proposed at the start of UT-3, where the channel enters the property and the channel bed elevation is fixed to avoid hydrologic trespass to adjacent properties. In this reach, bench excavation will occur to construct a channel at the proper dimension within the existing channel. This reach is expected to have relatively low slope, as the channel is brought up to the historic floodplain elevation. Mature trees will be left in place to the maximum extent possible and banks will be stabilized with erosion control matting, sodding, and seeding. Existing bed material will be harvested from the abandoned channel and reused as riffle bed material in the new channel.

Downstream from the Enhancement Level I reach; the floodplain begins to expand and is appropriate for stream restoration on new location. The primary restoration approach will be Priority 1; however, some short sections of Priority 2 restoration may be necessary to ensure bank-height-ratios will be less than 1.2, particularly as they tie to the existing channel being backfilled. Once the stream is on the historic floodplain, Priority 1 stream restoration will achieve the goal of connecting the stream and wetland complex interaction, as requested by the IRT; these wetlands are discussed further in the following section (Section 8.4.4.1).

Two crossings exist on UT-3 Upper (UT-3B in Figure 7D). Currently the footpath shown in Figure 7D is facilitated by a wooden bridge over the existing channel. When the channel is relocated, an armored riffle will be installed to continue the footpath across the channel. The existing crossing shown in Figure 7C will be relocated further upstream, and an easement break is shown for this area, since it will be a piped crossing used for agricultural purposes.

Before the stream reenters the existing channel upstream of Riceville Road, Priority 1 restoration will occur in relatively disturbed wooded areas as the channel ties back to the existing channel. Sections of relict channels were identified in wooded areas and were targeted for the new, design channel location. Any work done in existing wetlands will be done in a way to prevent any permanent damage. An eroding, tight meander bend in the existing channel will be relieved at the downstream end of the Restoration reach, where Priority 1 restoration ends on the downstream extent of UT-3 (before Riceville Road), the channel is characterized by Enhancement Level II and will include bank

stabilization, where necessary, invasive species control, and supplemental planting with native forest vegetation.

8.4.4.1 Overview of Wetland Areas Adjacent to Upper UT-3

Wetlands adjacent to upper UT-3 are characterized by the North Carolina Wetland Assessment Method (NC WAM) as Bottomland Hardwood Forest. Bottomland Hardwood Forest wetlands are found throughout the state in geomorphic floodplains of second-order and larger streams. These wetlands are generally intermittently to seasonally inundated. Overbank flooding is an important source of water as is groundwater and surface runoff. This wetland type is generally characterized by ground surface relief that provides good water storage. Bottomland Hardwood Forest corresponds to the HGM class Riverine (sub-classes Headwater Complex, Intermittent-Upper Perennial, and Lower Perennial). See the Jurisdictional Determination in Appendix D.

Priority 1 restoration of UT-3 upper is expected to enhance existing wetland conditions by reconnecting stream hydrology interactions with wetlands in the riparian area. Currently, wetlands along the stream corridor are located in maintained pasture land characterized by herbaceous vegetation, primarily planted fescue. The incised nature of the adjacent streams has reduced overbank hydrology to a minimum, only occurring during extreme rain/flooding events. In addition to the loss of overbank hydrology, it appears that channel incision has lowered the adjacent groundwater table, possibly effecting wetland hydrology. Groundwater gauges installed adjacent to UT-3 have been installed to monitor the groundwater table. Results of the data will be presented in as-built documentation and for comparison with gauges installed post-construction.

Stream channel excavation is expected to occur at the historic location of the stream channel in the lowest portion of the floodplain. The development of jurisdictional wetlands in this portion of the floodplain may result in the loss of wetlands in the proposed design channel. These losses are expected to be negated by the development of in-channel wetlands throughout the Site and overall functional uplift and expansion of the remaining on-site wetlands.

Wetland functions that NC WAM predict would be improved by removal of livestock, planting with forest vegetation, ripping floodplain soils, and reconnecting stream overbank flooding include the following.

1. Surface Storage and Retention (Hydrology)
    a. Inundation Duration – Evidence of short-duration inundation (<7 consecutive days)
    b. Water Storage/Surface Relief – Depressions able to pond water (6 inches in depth)
    c. Wetland Width – Increasing wetland width
    d. Vegetation Structure – Closed canopy with a dense mid-story/sapling, shrub, and herbaceous layer
    e. Hydrologic Connectivity – Restoring overbank and overland flow

2. Pathogen Change, Particulate Change, Soluble Change, Physical Change (Water Quality)
    a. Inundation Duration – Evidence of short-duration inundation (<7 consecutive days)
    b. Land Use – Elimination of pasture/agriculture land use
    c. Hydrologic Connectivity – Restoring overbank and overland flow
    d. Indicators of Deposition – Sediment deposition at natural levels
    e. Vegetation Structure – Closed canopy with a dense mid-story/sapling, shrub, and herbaceous layer
    f. Wetland Acting as a Vegetated Buffer – Vegetated wetland acting as a stream buffer
3. Physical Structure, Landscape Patch Structure, Vegetation Composition (Habitat)
    a. Vegetation Structure – Closed canopy with a dense mid-story/sapling, shrub, and herbaceous layer
    b. Diameter Class Distribution – Trees with majority of stems > 6 inches diameter at breast height (DBH) and few are >12 inches DBH
    c. Snags – Large snags (>12 inched DBH) present
    d. Large Woody Debris – Large logs (>12 inches DBH) present
    e. Surface Storage Capacity and Duration – Water storage capacity (>6 inches) and duration (>7 days) are present
    f. Ground Surface Condition – Ground surface not compacted by livestock
    g. Connectivity to other Natural Areas – Wetland well connected to naturally vegetated areas
    h. Vegetation Composition – Vegetation has species composition and proportions as comparable to reference conditions, with exotic species absent or sparse.

Although some factors of wetland functional uplift may not be achieved during the 7-year monitoring period (trees, snags, and logs >12 inches DBH), the majority of functions will be elevated immediately upon completion of proposed mitigation activities.

8.4.5 UT-3 Lower (Stokes Field, UT-3D, UT-3E, UT-3F, UT-3G in Figure 7E)

UT-3 lower (downstream of Riceville Road) is characterized by a channel that has been moved to the outer edge of the floodplain in support of cattle grazing. The channel appears to be oversized and is widening laterally to create a new floodplain at the current stream elevation. Valley walls on the left bank are steeply sloped and vegetated with mature forest, which prevents significant streambank erosion. Streambanks on the right bank are characterized by disturbed shrub-scrub vegetation with livestock pasture encroaching upon the streambanks. Streambanks are eroding and contributing significant amounts of sediment to the Swannanoa River at the immediate reach outfall.

Bankfull benches are prevalent along this reach, which make Enhancement Level II an attractive mitigation alternative. UT-3 lower was proposed at Enhancement Level II, with a 2.5:1 mitigation ratio. The IRT requested a discussion outlining mitigation treatments that warrant a 2.5:1 mitigation

ratio for a reach that has one bank fully vegetated and livestock fenced from the immediate streambanks. Detailed field surveys determined the following.

- Approximately 315 feet of streambank requires stabilization within the upper 724 feet of channel. This equates to approximately 44% of streambank that will be stabilized. Stabilization is expected to include bank sloping, matting and seeding, willow staking, toe protection, brush mattress installation, and the removal of trees that are overhanging the bank, or are otherwise potentially destabilizing the streambank.
- Livestock seeking shade along the fence line immediately adjacent to the channel contribute non-point sources of pollution to the reach. Soils along the fence line are exposed, heavily trampled, and devoid of stabilizing herbaceous vegetation. Surface water flows contribute sediment and agriculture pollutants to the stream.
- Two reaches of stream (one in the central portion and one at the lowest portion of UT-3 lower) are characterized by excessive sinuosity, with radii on outer bends that will not be stabilized by vegetative plantings alone. These reaches are proposed for restoration by excavating a new channel across the tight meander bends.

Stream mitigation efforts to be implemented along UT-3 lower include 1) bank stabilization, 2) removing livestock from the 30 feet stream buffer, 3) restoring channel in overly sinuous reaches with tight bends, 4) planting vegetation, and 5) maintaining existing footpaths along the southern forested streambank.

8.4.6 UT-4 (Clingman's, UT-4A and UT-4B in Figures 7C and 7D)

UT-4 is a headwater stream draining a largely forested watershed, with some light residential areas in its upper reach. The upper half of the reach is forested, with a forested buffer to the north (right bank) and agriculture fields encroaching within the easement to the south (left bank). The lower half of the reach has been dredged and straightened to direct water into the entrenched UT-3. The lower half of channel is approximately 4 feet in depth and has very low sinuosity. Historically this area was likely characterized by a stream/wetland complex, as evidenced by wetlands on both sides of the channel (see Photograph 2). However, the incised channel and disturbance with land conversion to agriculture has resulted in the loss of channel footage and drainage of adjacent wetlands.

Upstream wooded portions of the reach are proposed for Enhancement Level II, through the removal of livestock, treatment of invasive species, and connection to the floodplain at the lower reach in support of Priority 1 restoration. The lower portion of UT-4 will be restored to the historic floodplain elevation, thereby connecting the channel to wetlands in the floodplain. UT-4 will be permanently fenced to exclude livestock.

8.4.7 UT-5 (Ballfield, UT-5A and UT-5B in Figure 7F)

UT-5 is characterized by a piped stream that discharges into an excavated and straightened gully (G-type). The first 200 feet are included in an active pasture for various livestock. UT-5 is proposed to be restored by creating a new stable channel on the historic floodplain. This will entail eliminating approximately 200 feet of piped stream and conducting Priority 1 restoration for the entire stream reach. Immediately above this, the existing gully will be plugged and backfilled. The new channel will meander through a mature forest before re-entering the existing channel approximately 50 feet upstream of the Swannanoa River at a bedrock sill. The channel is aligned in a manner that preserves large, mature trees. Trees greater than 12 inches in diameter were located with GPS equipment and are depicted on Figure 7F (Appendix A) as a tree avoidance area. UT-5 will have posts set for future exclusion of livestock.

8.4.8 UT-6 (S-Field, UT-6A, UT-6B, and UT-6C in Figures 7G and 7H)

UT-6 originates at a small, spring-fed pond and traverses along the margins of the Swannanoa River floodplain. The pond is utilized as a wetland study area for multiple courses and at the request of the College, is located outside of the conservation easement. The pond is fenced to exclude livestock and a drinker has been located nearby to provide livestock an alternative water source.

The channel appears to have been excavated and manipulated by years of agriculture into a ditch system with no woody riparian vegetation. The upper reaches of UT-6 are flat, wide, and filled with sediment. As the channel progresses downstream, the stream becomes more entrenched as it nears the Swannanoa River. The lower reaches of the channel are characterized by dense thickets of river cane (Arundinaria gigantea).

UT-6 is characterized by Enhancement Level II in the upper and lower reaches (UT-6A and UT-6C). UT-6C is characterized by deep, unconsolidated sediments, dense herbaceous vegetation, surface water flows across a wide channel. Planting vegetation will provide shade and roots critical to the success of this reach.

As UT-6 traverses across the wide, flat Swannanoa floodplain, it will be necessary to excavate a bankfull bench to provide adequate slopes for channel development and maintenance. This reach (UT-6B) will be characterized as Priority 1 Restoration. The bankfull bench will be excavated to approximately 1 foot in maximum depth and will taper to the existing floodplain grade. Care will be taken to strip surficial soils prior to excavation of the bench, surficial soils will be stockpiled and redistributed across the bench once excavation is complete. To maintain proposed slopes, the piped outfall of UT-6 (Station 01+63 to 01+73) will be dropped approximately 0.6 feet with a resulting average water surface slope of 0.0042.

River cane is a natural vegetative feature of stream systems in the area and dense stands lead to the term canebreak, which were formerly widespread in the southern United States. Canebreaks have

widely been replaced by agriculture and the loss of this ecological niche has provided challenges to the survival of several species that have become critically endangered.

Planting river cane along streambanks will occur by sifting through excavated surficial soils and pruning active growing rhizome nodes to be replanted. It is expected that Warren Wilson College student labor will be utilized for harvesting rhizomes, with oversight from botany professors, or other school management. Cane reproduces asexually and rapidly, an adaption that allows them to persist quietly in forest soils until a disturbance disrupts the overstory. When a disturbance occurs, cane can quickly reoccupy the gaps.

Although there are not performance criteria established for river cane, the intrinsic value of the plant, including the historical use by native peoples in the Swannanoa River Valley, warrant the level of effort that will be required to transplant the cane and thereby establish new cane breaks.

Two easement breaks in the lower reaches of UT-6 are necessary to allow access for agriculture equipment. Both crossings will be piped channel crossings, as described in Section 8.1. Agriculture ditches will be directed to a marsh treatment area that will be constructed as described in Section 8.1. UT-6 will have posts set for future exclusion of livestock.

8.4.9 UT-7 (Big Bottom Field, UT-7A in Figures 7G and 7I)

UT-7 is a ditched channel that has been rerouted across the Swannanoa River floodplain. The upper reaches of UT-7 originate from a culvert that is perched approximately 3 feet above the channel bottom. The stream progresses through an entrenched ditch network towards the expansive Swannanoa River floodplain. Channel depths from the historic ground surface are approximately 4 to 6 feet and bank-height-ratios range from 1.4 to 2.6. The channel is contained within a deeply excavated ditch, which over time has scoured a B-type valley that remains stable due to dense thickets of river cane, Chinese privet, and multiflora rose (*Rosa multiflora*). The channel flows to the Swannanoa floodplain, where a ditch directs flow across the floodplain and away from agricultural fields, leaving the abandoned floodplain subject to intensive livestock grazing.

The middle reach of UT-7 was originally proposed for Enhancement Level II; however, discussions with IRT members and data compilation appear to necessitate a Restoration approach for the reach. Restoration allows for upstream pipe tie in and downstream channel relocation to the historic floodplain. In order to tie to the pipe and floodplain elevations, the channel invert will be raised by approximately 1.5 to 2 feet, thereby doubling the flood-prone area width and converting the channel from a G-type channel to a Cb-type channel. In order to stabilize channel backfill, log (or stone) cross-vanes will be installed at the bottom of each riffle, providing habitat and directing scour into the center of the channel and away from the banks.

The lower reaches of UT-7 will be restored into its historic valley and the abandoned ditch sufficiently backfilled. Channel plugs will be installed at the initiation point of new channel construction. Plugs will be constructed of suitable material to stop piping of water down the abandoned channel reach. The abandoned channel will require drain tile or a grass swale to ensure proper drainage of agriculture fields once UT-7 has been returned to its proper location within the floodplain. The drainage will be directed into a marsh treatment area prior to discharging into the lower reach of UT-6. UT-7 will be tied into UT-8 prior to discharging into the Swannanoa River and will have posts set for future exclusion of livestock. Two easement breaks in UT-7 are necessary to allow access for agriculture equipment and to accommodate a sewer line easement. The piped crossing will be constructed as described in Section 8.1.

8.4.10 UT-8 (Forbat's Field, UT-8A in Figure 7I)

UT-8 is a ditched and straightened channel characterized by low slope and sinuosity. The channel originates at an undersized culvert, which does not pass stormwater flows. The undersized culvert, combined with the low channel slope have resulted in flooding to adjacent properties that may be mitigated by the project. The low slope nature of the channel may be due to a significant amount of soil overburden that has been placed on the floodplain in the vicinity of UT-8. Based on topographic mapping and field measurements, it appears that fallow fields adjacent to UT-8 are 2- to 4-feet higher than adjacent fields along the Swannanoa floodplain. In addition, existing culvert elevations for UT-8 are approximately 4 feet higher than other culverts draining to the river. Soil borings were inconclusive as to the depth or nature of overburden; however, this is expected in an alluvial floodplain.

Mitigation activities at UT-8 are expected to include the following: 1) removal of the undersized culvert at the upper reaches, 2) excavation of floodplain overburden to the approximate elevation of the surrounding Swannanoa floodplain, 3) stockpiling and redistribution of topsoil within the floodplain, 4) Priority 1 excavation of a design channel, 5) removal of a culvert over the sewer line and replacement with an armored riffle, 6) planting with river cane and woody forest vegetation. UT-8 will have posts set for future exclusion of livestock on the western boundary. An easement break in UT-8 is necessary due to an existing sewer line easement.

8.5 Natural Plant Community Restoration

Restoration of floodplain forest and stream-side habitat allows for the establishment and expansion of characteristic species across the landscape. Ecotonal changes between community types contribute to diversity and provide secondary benefits, such as enhanced feeding and nesting opportunities for mammals, birds, amphibians, and other wildlife.

8.5.1 Natural Community Classification

Reference Forest Ecosystem (RFE) data, on-site observations, and community descriptions from the *Guide to the Natural Communities of North Carolina* (Schafale 2012) were used to determine the primary plant communities that will be promoted during restoration efforts.

The targeted natural community for the Site, which is part of a mid-elevation, south Appalachian ecosystem, is a Montane Alluvial Forest. Montane Alluvial Forests are found on mountain river floodplains characterized by a mixture of plants typical of cove forests and floodplains. Montane Alluvial Forests are distinguished by the presence of alluvial indicator species such as American sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), and tag alder (*Alnus serrulata*) coupled with evidence of flooding; flood-dispersed invasive plant species are often present where they are usually scarce in upland forests.

8.5.2 Planting Strategy

Stream-side trees and shrubs include species with high values for sediment stabilization, rapid growth rates, and the ability to withstand hydraulic forces associated with bankfull flows and overbank flood events. Stream-side trees and shrubs will be planted within 15 feet of the channel throughout the meander belt-width. Shrub elements will be planted along the reconstructed streambanks, concentrated along outer bends.

Bare-root seedlings appropriate to the Montane Alluvial Forest community will be planted at a density of approximately 680 stems per acre on 8-foot centers. Seedlings in the stream-side assemblage and Marsh Wetland Treatment Areas will be planted at a density of 2,720 stems per acre on 4-foot centers. In addition to planting seedlings, a seed mix will be spread within Marsh Treatment Wetland Areas (Table 15).

Table 16 depicts the total number of stems and species distribution within each vegetation association (Figures 10A-10E, Appendix A). Planting is expected to be performed between December 1 and March 15 to allow plants to stabilize during the dormant period and set root during the spring season.

Table 15
Seed Mix

Scientific Name	Common Name
Elymus virginicus	Virginia wildrye
Panicum virgatum	Switch grass
Andropogon gerardii	Big blue stem
Sorghastrum nutans	Indian grass
Dichanthelium clandestinum	Deer tongue

Table 16
Planting Plan

Vegetation Association	Montane Alluvial Forest*		Stream-side Assemblage**		Marsh Treatment Wetland**		TOTAL
Area (acres)	12.29		7.25		0.1		19.64
Species	# planted*	% of total	# planted**	% of total	# planted**	% of total	# planted
River birch (*Betula nigra*)	836	10	1,972	10	--	--	2,808
Ironwood (*Carpinus caroliniana*)	418	5	--	--	--	--	418
Buttonbush (*Cephalanthus occidentalis*)	--	--	--	--	54	20	54
Sweet pepperbush (*Clethra alnifolia*)	--	--	--	--	41	15	41
Silky dogwood (*Cornus amomum*)	836	10	2,958	15	54	20	3,848
Persimmon (*Diospyros virginiana*)	418	5	--	--	--	--	418
Green ash (*Fraxinus pennsylvanica*)	836	10	2,958	15	--	--	3,794
Tulip poplar (*Liriodendron tulipifera*)	836	10	--	--	--	--	836
Sycamore (*Platanus occidentalis*)	1,671	20	3,944	20	--	--	5,615
Black willow (*Salix nigra*)	--	--	1,972	10	27	10	1,999
White oak (*Quercus alba*)	1,254	15	2,958	15	--	--	4,212
Water oak (*Quercus nigra*)	1,254	15	2,958	15	--	--	4,212
Elderberry (*Sambucus canadensis*)	--	--	--	--	41	15	41
Blueberry (*Vaccinium corymbosum*)	--	--	--	--	27	10	27
Possumhaw (*Viburnum nudum*)	--	--	--	--	27	10	27
TOTAL	**8,357**	**100**	**19,720**	**100**	**272**	**100**	**28,349**

Note:
* Planted at a density of 680 stems/acre
** Planted at a density of 2,720 stems/acre

8.5.3 Nuisance Species Management

Prior to planting invasive species including Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), Russian olive (*Eleagnus angustifolium*), and tree-of-heaven (*Ailanthus altissima*) will be controlled, as necessary. Inspections for beaver and other potential nuisance species will occur throughout the course of the monitoring period. Appropriate actions may be taken to ameliorate any negative impacts regarding vegetation development and/or water management on an as-needed basis.

9 Performance Standards and Monitoring Plan

Monitoring requirements and success criteria outlined in this plan follow the October 24, 2016 NC *Interagency Review Team Wilmington District Stream and Wetland Compensatory Mitigation Update*. Monitoring will be conducted by Axiom Environmental, Inc. based on the schedule in Table 17. A summary of monitoring is outlined in Table 18 (Figures 11A – 11E, Appendix A). Annual monitoring reports of the data collected will be submitted to the NCDMS by Restoration Systems no later than December 31 of each monitoring year.

Table 17
Monitoring Schedule

Resource	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Streams	■	■	■		■		■
Wetland Hydrology	■	■	■	■	■	■	■
Vegetation	■	■	■		■		■
Visual Assessment	■	■	■	■	■	■	■
Report Submittal	■	■	■	■	■	■	■

Table 18
Monitoring Summary

Parameter	Method	Schedule/Frequency	Number/Extent	Data Collected/Reported
Stream Parameters				
Stream Profile	Full longitudinal survey	As-built (unless otherwise required)	All restored stream channels	Graphic and tabular data.
Stream Dimension	Cross-sections	Years 1, 2, 3, 5, and 7	Total of 50 cross-sections on restored channels	Graphic and tabular data.
Channel Stability	Visual Assessments	Yearly	All restored stream channels	Areas of concern will be depicted on a plan view figure with a written assessment and photograph of the area included in the report.
	Additional Cross-sections	Yearly	Only if instability is documented during monitoring	Graphic and tabular data.
Stream Hydrology	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	UT-3, UT-6, and UT-8	Surface water data for each monitoring period
Bankfull Events	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	UT-3, UT-6, and UT-8	Surface water data for each monitoring period
	Visual/Physical Evidence	Continuous through monitoring period	All restored stream channels	Visual evidence, photo documentation, and/or rain data.
Wetland Parameters				
Wetland Hydrology	Groundwater gauges	Pre-construction, As-built, Years 1-7	8 gauges in UT-1, UT-6, and UT-3 wetlands	Graphic and tabular data.
Vegetation Parameters				
Vegetation establishment and vigor	Permanent vegetation plots 0.0247 acre (100 square meters) in size; *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008)	As-built, Years 1, 2, 3, 5, and 7	25 plots spread across the Site	Species, height, planted vs. volunteer, stems/acre
	Annual random vegetation plots, 0.0247 acre (100 square meters) in size	As-built, Years 1, 2, 3, 5, and 7	5 plots randomly selected each year	Species and height

Note:
* Five groundwater monitoring gauges will be installed in jurisdictional wetland areas adjacent to UT-3 to take measurements before and after hydrological modifications are performed at the Site. Currently the upper reach of UT-3 is an incised Eg-type channel with bank-height-ratios ranging from 1.8-2.4. The majority of UT-3 upper is proposed for Priority I restoration with construction of channels at the historic floodplain elevation to restore overbank flows to adjacent wetlands. A crest gauge or staff gauge will be installed on UT-3 upper along with a trail camera to verify overbank events. Groundwater gauge data will be used to observe fluctuations in groundwater hydrology pre- and post-construction as the result of overbank events; however, no wetland mitigation credit is being acquired and there are no wetland hydrology success criteria proposed at this time.

9.1 Success Criteria

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

Table 19
Success Criteria

Streams
• All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05. • Continuous surface flow must be documented each year for at least 30 consecutive days. • Bank height ratio (BHR) cannot exceed 1.2 at any measured cross section. • Entrenchment ratio (ER) must be no less than 2.2 at any measured riffle cross section. • BHR and ER at any measure riffle cross section should not change by more than 10% from baseline condition. • The stream project shall remain stable and all other performance standards shall be met through four separate bankfull events, occurring in separate years, during the monitoring years 1-7.
Wetland Hydrology
• Groundwater gauge data will be used to observe fluctuations in groundwater hydrology pre- and post-construction as the result of overbank events; however, no wetland mitigation credit is being acquired and there are no wetland hydrology success criteria proposed at this time. • Jurisdictional wetland adjacent to UT-3 will demonstrate a 10 to 20% increase in wetland hydrology as compared to pre-construction hydrology, under similar climactic conditions.
Vegetation
• Within planted portions of the site, a minimum of 320 stems per acre must be present at year 3; a minimum of 260 stems per acre must be present at year 5; and a minimum of 210 stems per acre must be present at year 7. – Areas of dense river cane (canebrakes) are a natural niche habitat within the Swannanoa River floodplain that contribute native habitat for endangered species. River cane may outcompete woody seedlings during the initial establishment of vegetation. Within the Swannanoa floodplain (UT-6, UT-7, and UT-8), the presence of canebrakes may supersede the vegetative success criteria for planted stems per acre. • Trees must average 6 feet in height at year 5, and 8 feet in height at year 7. • Planted and volunteer stems are counted, provided they are included in the approved planting list for the site; natural recruits not on the planting list may be considered by the IRT on a case-by-case basis.

9.2 Contingency

In the event success criteria are not fulfilled, a mechanism for contingency will be implemented.

9.2.1 Stream Contingency

Stream contingency may include 1) structure repair and/or installation; 2) repair of dimension, pattern, and/or profile variables; and 3) bank stabilization. The method of contingency is expected to

be dependent upon stream variables that are not in compliance with success criteria. Primary concerns, which may jeopardize stream success, include 1) structure failure, 2) headcut migration through the Site, and/or 3) bank erosion.

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

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

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

9.2.2 Vegetation Contingency

If vegetation success criteria are not achieved, supplemental planting may be performed with tree species approved by regulatory agencies. Supplemental planting will be performed as needed until achievement of vegetation success criteria.

9.3 Compatibility with Project Goals

The following table outlines the compatibility of Site performance criteria described above to Site goals and objectives that will be utilized to evaluate whether Site goals and objectives are achieved.

Table 20
Compatibility of Performance Criteria to Project Goals and Objectives

Goals	Objectives	Success Criteria
(1) HYDROLOGY		
• Attenuate flood flow across the Site. • Minimize downstream flooding to the maximum extent possible. • Connect streams to functioning wetland systems.	• Construct new channel at historic floodplain elevation to restore overbank flows and enhance existing jurisdictional wetlands. • Plant woody riparian buffer. • Remove livestock and cease current land use practices. • Deep rip floodplain soils to reduce compaction and increase soil surface roughness. • Protect riparian buffers with a perpetual conservation easement.	• BHR not to exceed 1.2. • Document four overbank events in separate monitoring years. • Livestock excluded from the easement. • Attain Vegetation Success Criteria. • Conservation easement recorded.
• Increase stream stability within the Site so that channels are neither aggrading nor degrading.	• Construct channels with proper pattern, dimension, and longitudinal profile • Remove livestock from the Site • Construct stable channels with cobble/gravel substrate • Plant woody riparian buffer	• Cross-section measurements and visual assessments indicate stable channels and structures. • BHR not to exceed 1.2. • ER of 1.4 or greater. • < 10% change in BHR and ER. • Livestock excluded from the easement. • Attain Vegetation Success Criteria.
(1) WATER QUALITY		
• Remove direct nutrient and pollutant inputs from the Site and reduce contributions to downstream waters.	• Remove livestock and reduce agricultural land/inputs. • Install marsh treatment areas. • Plant woody riparian buffer. • Restore/enhance wetlands adjacent to Site streams.	• Livestock excluded from the easement • Attain Vegetation Success Criteria
(1) HABITAT		
• Increase stream stability within the Site so that channels are neither aggrading nor degrading.	• Construct channels with proper pattern, dimension, longitudinal profile, and substrate. • Remove livestock and cease current land use practices. • Construct stable channels with gravel substrate. • Stabilize streambanks. • Plant woody riparian buffer.	• Cross-section measurements and visual assessments indicate stable channels and structures • Attain Vegetation Success Criteria • Conservation Easement recorded

10 Adaptive Management Plan

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

11 Long-Term Management Plan

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

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

12 References

Gordon, N.D., T.A. McMahon, and B.L. Finlayson, 1992. *Stream Hydrology: an Introduction for Ecologists*. John Wiley & Sons, Ltd. West Sussex, England.

Griffith, G.E., J.M. Omernik, J.A. Comstock, M.P. Schafale, W.H. McNab, D.R. Lenat, T.F. MacPherson, J.B. Glover, and V.B. Shelbourne, 2002. *Ecoregions of North Carolina and South Carolina*. U.S. Geological Survey, Reston, Virginia.

Harman, W.A., D.E. Wise, M.A. Walker, R. Morris, M. A. Cantrell, M. Clemmons, G.D. Jennings, D. Clinton, and J. Patterson, 2000. *Bankfull Regional Curves for North Carolina Mountain Streams. In: AWRA Conference Proceedings*. D.L. Kane, editor. AWRA Specialty Conference on Water Resources in Extreme Environments. Anchorage, Alaska.

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth, 2008. *CVS-EEP Protocol for Recording Vegetation*. Version 4.2. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.

Leopold, L.B. 1994. *A View of the River. Harvard University Press*. Cambridge, MA. 298 pp.

North Carolina Division of Mitigation Services (NCDMS), 2016. *Quantifying Benefits to Water Quality from Livestock Exclusion and Riparian Buffer Establishment for Stream Restoration*. June 15, 2016. North Carolina Department of Environmental Quality, Raleigh, North Carolina.

North Carolina Division of Water Resources (NCDWR), 2016. *River Basin Classification Schedule (online)*. Available at https://deq.nc.gov/river-basin-classification-schedule [December 13, 2016]. North Carolina Department of Environment and Natural Resources, Raleigh.

North Carolina Division of Water Resources (NCDWR), 2018. *Final 2016 Category 5 Assessments - 303(d) List (online)*. Available at https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2016/2016_NC_Category_5_303d_list.pdf [April 11, 2018]. North Carolina Department of Environment and Natural Resources, Raleigh.

North Carolina Ecosystem Enhancement Program (NCEEP), 2009. *French Broad River Basin Restoration Priorities 2009 (online)*. Available at https://ncdenr.s3.amazonaws.com/s3fs-public/PublicFolder/Work%20With/Watershed%20Planners/French_Broad_RBRP_15july09.pdf [June 1, 2016]. North Carolina Department of Environment and Natural Resources, Raleigh.

North Carolina Stream Functional Assessment Team, 2015. *N.C. Stream Assessment Method (NC SAM) User Manual*. Version 2.1.

Rosgen, D., 1996. *Applied River Morphology*. Wildland Hydrology (Publisher). Pagosa Springs, Colorado.

Rosgen, D., 2009. *A Practical Method of Computing Streambank Erosion Rate (online)*. Available at http://www.u-s-c.org/html/documents/Erosionrates.pdf.

Rosgen, D., 2011. *Estimating Sediment Loads using the Bank Assessment of Non-Point Source Consequences of Sediment (BANCS*). Watershed Assessment of River Stability and Sediment Supply (WARSSS). Hagerstown , Maryland.

Schafale, M.P. and A.S. Weakley, 1990. *Classification of the Natural Communities of North Carolina: Third Approximation*. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

Schafale, M.P., 2012. *Guide to the Natural Communities of North Carolina: Fourth Approximation*. North Carolina Natural Heritage Program, North Carolina Department of Environment and Natural Resources. Raleigh, North Carolina.

United States Census Bureau (USCB), 2000. *Census 2000 Summary File*. Available at https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

United States Census Bureau (USCB), 2016. *Population estimates V.2016*. Available at https://www.census.gov/quickfacts/fact/table/ashevillecitynorthcarolina,NC/PST045217.

United States Department of Agriculture (USDA), 2009. *Soil Survey for Buncombe County North Carolina. US Department of Agriculture*. Available at: http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/north_carolina/buncombeNC2009/Buncombe_NC.pdf [June 7, 2016].

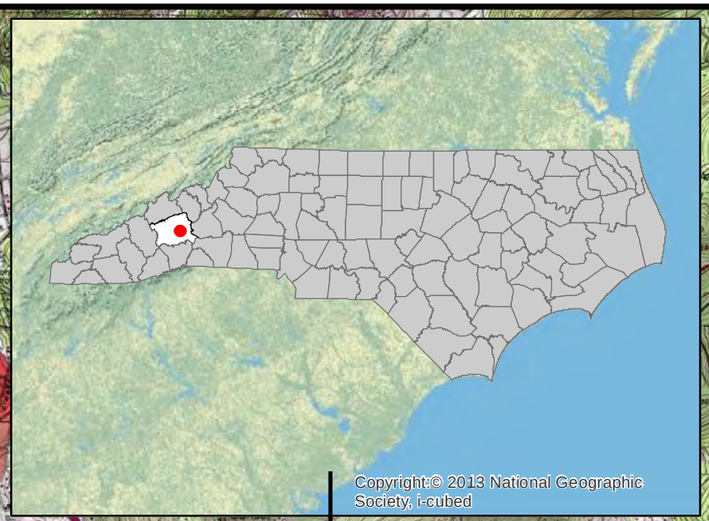
United States Department of Agriculture (USDA), 2016. Web Soil Survey (online). Available: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx [June 1, 2016].

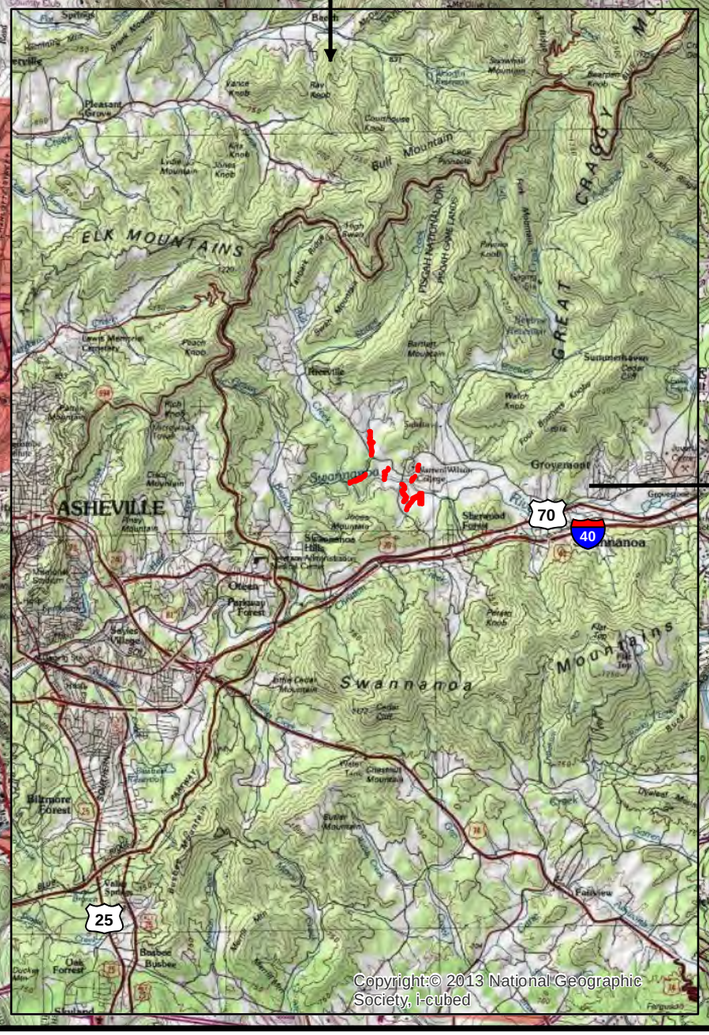
United States Fish and Wildlife Service (USFWS), 2016. Threatened and Endangered Species in North Carolina (online). Available: http://www.fws.gov/nc-es/es/countyfr.html. [April 17, 2016]. United States Fish and Wildlife Service, Raleigh, North Carolina.

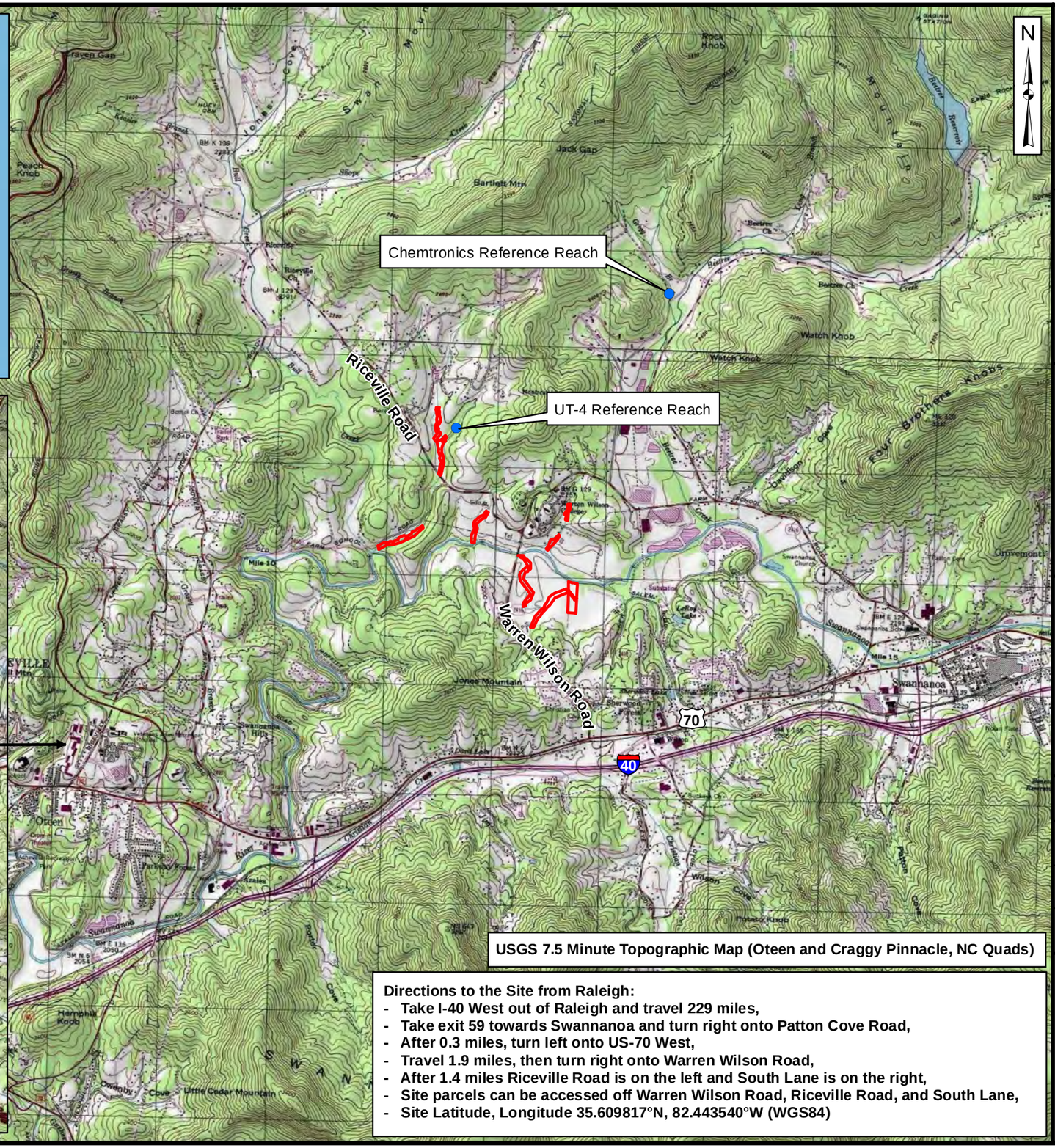
United States Geological Survey (USGS), 2006. *Estimating the Magnitude and Frequency of Floods in Rural Basins of North Carolina – Recompiled*. USGS Water-Resources Investigations Report 01-4207. Raleigh, North Carolina.

Appendix A
Figures

- Figure 1. Site Location
- Figure 2. Hydrologic Unit Map
- Figure 3. Topography and Drainage Area
- Figures 4, 4A through 4D. Existing Conditions and Soils
- Figure 5A. UT-4 Reference Drainage Area
- Figure 5B. UT-4 Reference Existing Conditions
- Figure 5C. UT-4 Reference Reach Dimension, Pattern, and Profile
- Figure 6A. Chemtronics Reference Drainage Area
- Figure 6B. Chemtronics Reference Existing Conditions
- Figure 6C. Chemtronics Reference Reach Dimension, Pattern, and Profile
- Figures 7A-7I. Restoration Plan
- Figure 8. Proposed Dimension, Pattern, and Profile
- Figures 9A-9B. Typical Structure Details
- Figures 10A-10E. Planting Plan
- Figures 11A-11E. Monitoring Plan







USGS 7.5 Minute Topographic Map (Oteen and Craggy Pinnacle, NC Quads)

Directions to the Site from Raleigh:
- **Take I-40 West out of Raleigh and travel 229 miles,**
- **Take exit 59 towards Swannanoa and turn right onto Patton Cove Road,**
- **After 0.3 miles, turn left onto US-70 West,**
- **Travel 1.9 miles, then turn right onto Warren Wilson Road,**
- **After 1.4 miles Riceville Road is on the left and South Lane is on the right,**
- **Site parcels can be accessed off Warren Wilson Road, Riceville Road, and South Lane,**
- **Site Latitude, Longitude 35.609817°N, 82.443540°W (WGS84)**

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

SITE LOCATION

Drawn by: KRJ

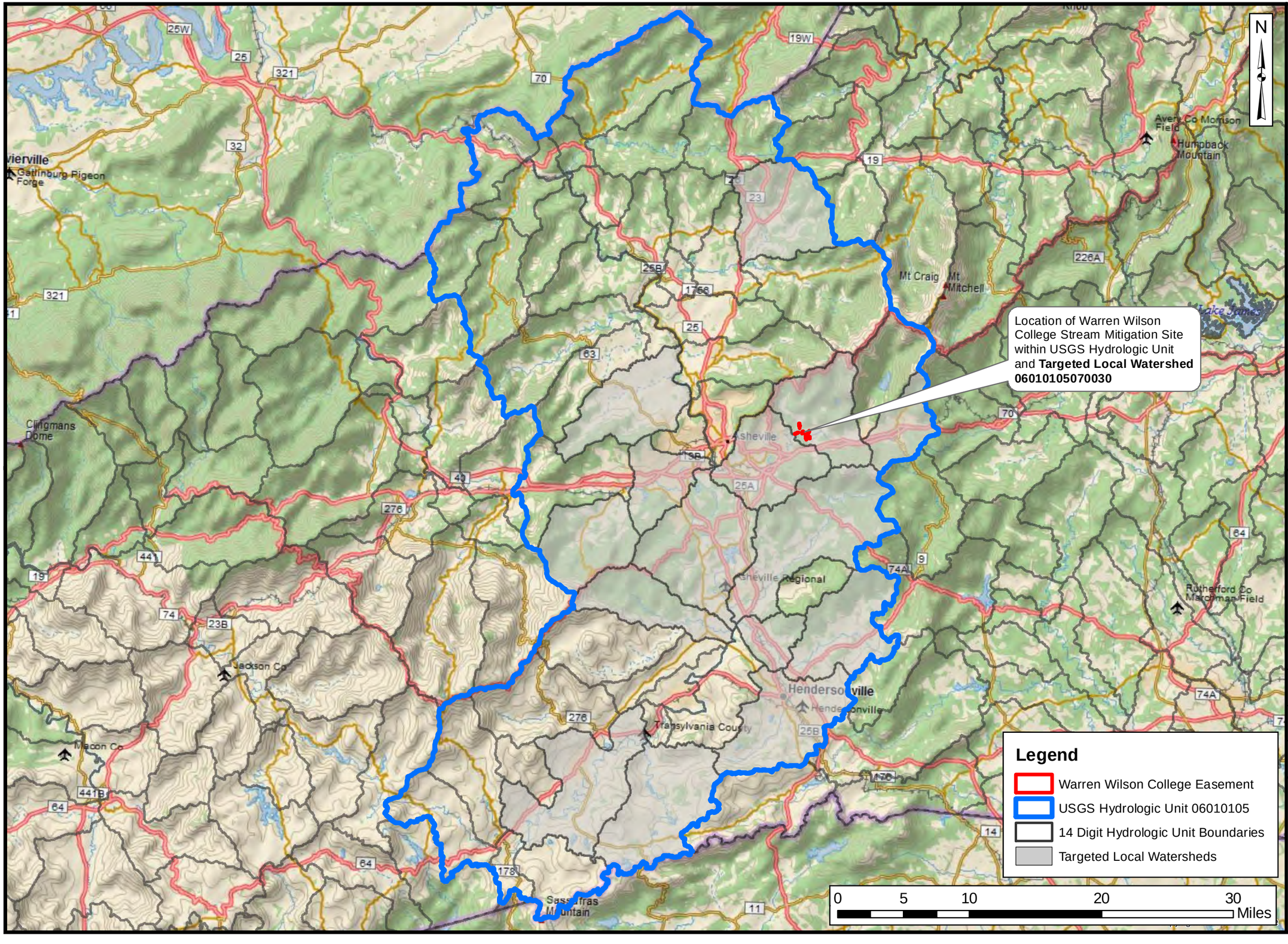
Date: May 2018

Scale: 1:40000

Project No.: 17-018

FIGURE

1



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RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

HYDROLOGIC UNIT MAP

Drawn by: KRJ

Date: May 2018

Scale: 1:435000

Project No.: 17-018

FIGURE

2

NOTE: Impervious surfaces account for less than 5% of the total Site drainage area.

N

Legend

- Conservation Easement = 25.57 ac
- UT-1 Drainage Area - 0.27 sq mi (171.3 ac)
- UT-3 Drainage Area - 1.28 sq mi (822.3 ac)
- UT-4 Drainage Area - 0.24 sq mi (153.9 ac)
- UT-5 Drainage Area - 0.15 sq mi (98.3 ac)
- UT-6 Drainage Area - 0.08 sq mi (49.9 ac)
- UT-7 Drainage Area - 0.22 sq mi (141.0 ac)
- UT-8 Drainage Area - 0.10 sq mi (64.4 ac)

0 1,000 2,000 4,000 6,000 8,000 Feet

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Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

TOPOGRAPHY AND DRAINAGE AREA

Drawn by: KRJ

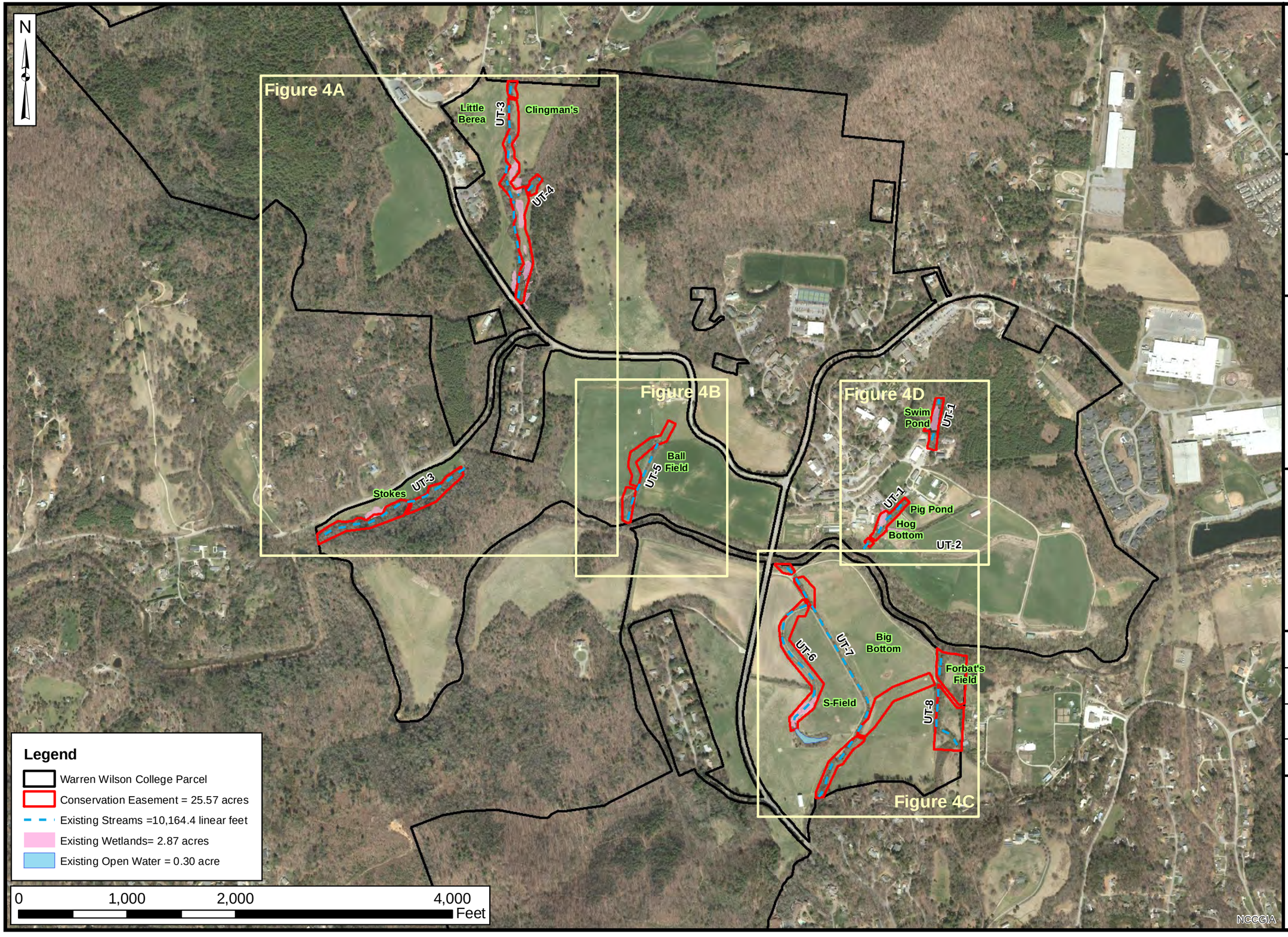
Date: May 2018

Scale: 1:20000

Project No.: 17-018

FIGURE

3



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

EXISTING CONDITIONS

Drawn by: KRJ

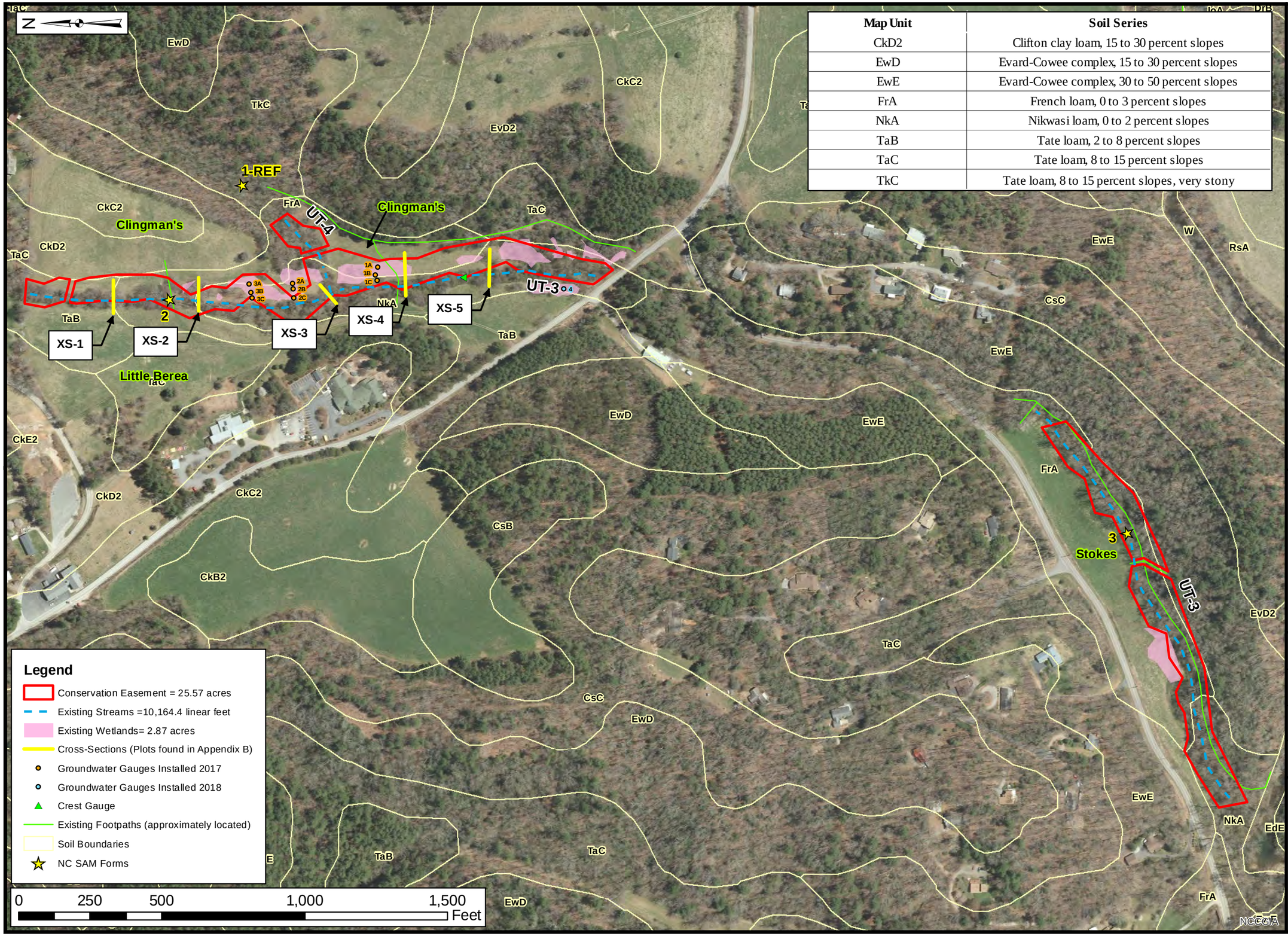
Date: Oct 2018

Scale: 1:10,000

Project No.: 17-018

FIGURE

4



Map Unit	Soil Series
CkD2	Clifton clay loam, 15 to 30 percent slopes
EwD	Evard-Cowee complex, 15 to 30 percent slopes
EwE	Evard-Cowee complex, 30 to 50 percent slopes
FrA	French loam, 0 to 3 percent slopes
NkA	Nikwasi loam, 0 to 2 percent slopes
TaB	Tate loam, 2 to 8 percent slopes
TaC	Tate loam, 8 to 15 percent slopes
TkC	Tate loam, 8 to 15 percent slopes, very stony

Legend

- Conservation Easement = 25.57 acres
- Existing Streams =10,164.4 linear feet
- Existing Wetlands= 2.87 acres
- Cross-Sections (Plots found in Appendix B)
- Groundwater Gauges Installed 2017
- Groundwater Gauges Installed 2018
- Crest Gauge
- Existing Footpaths (approximately located)
- Soil Boundaries
- NC SAM Forms

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

EXISTING CONDITIONS AND SOILS

Drawn by: KRJ

Date: Oct 2018

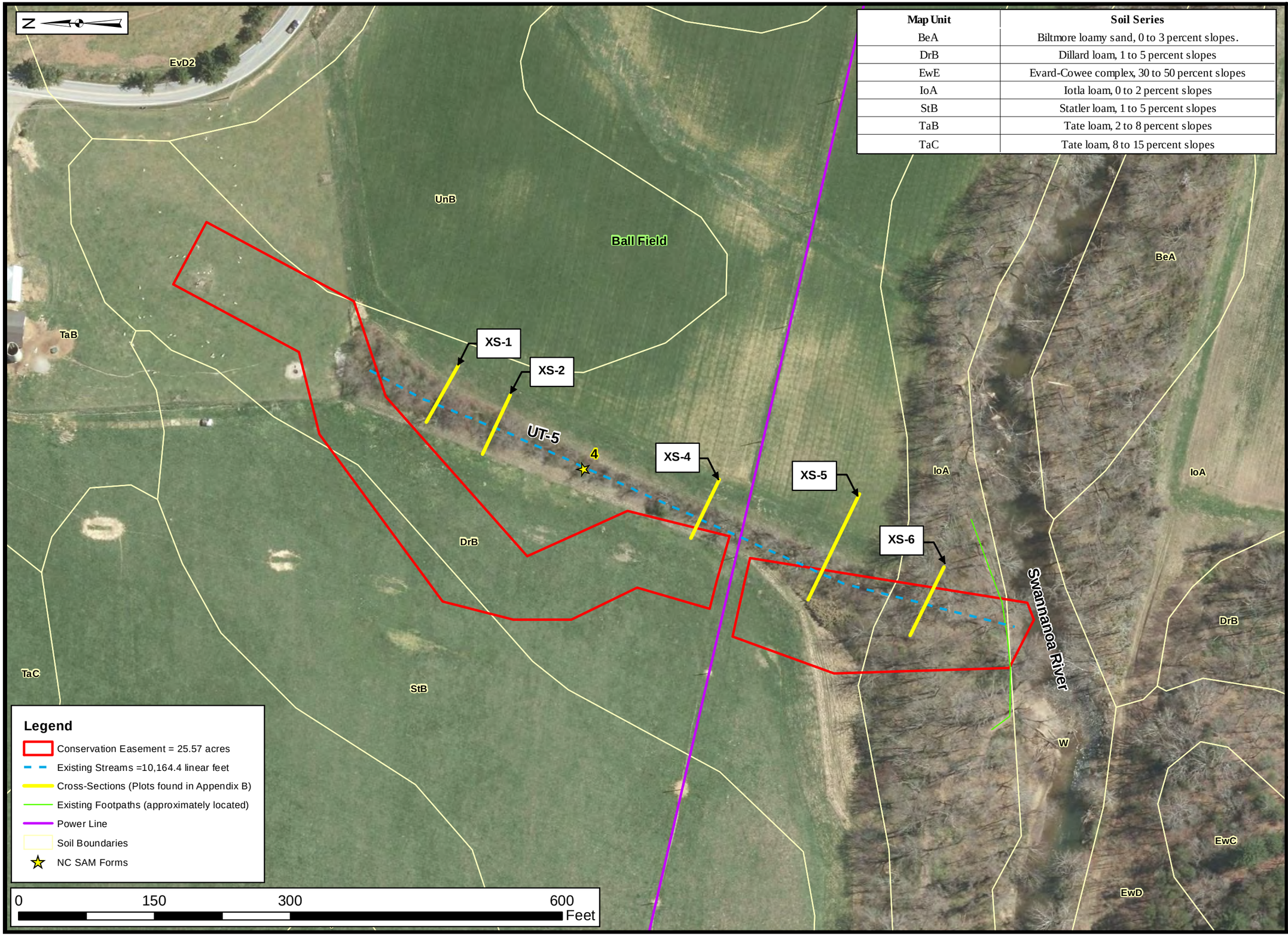
Scale: 1:3800

Project No.: 17-018

FIGURE

4A

Map Unit	Soil Series
BeA	Biltmore loamy sand, 0 to 3 percent slopes.
DrB	Dillard loam, 1 to 5 percent slopes
EwE	Evard-Cowee complex, 30 to 50 percent slopes
IoA	Iotla loam, 0 to 2 percent slopes
StB	Statler loam, 1 to 5 percent slopes
TaB	Tate loam, 2 to 8 percent slopes
TaC	Tate loam, 8 to 15 percent slopes



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Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

EXISTING CONDITIONS AND SOILS

Drawn by: KRJ

Date: May 2018

Scale: 1:1200

Project No.: 17-018

FIGURE

4B

Map Unit	Soil Series
BeA	Biltmore loamy sand, 0 to 3 percent slopes.
CsC	Clifton sandy loam, 8 to 15 percent slopes
DeA	Dellwood-Reddies complex, 0 to 3 percent slopes
DrB	Dillard loam, 1 to 5 percent slopes
EwD	Evard-Cowee complex, 15 to 30 percent slopes
HpA	Hemphill loam, 0 to 3 percent slopes
IoA	Iotla loam, 0 to 2 percent slopes
Pg	Pits gravel
RsA	Rosman fine sandy loam, 0 to 3 percent slopes
StB	Statler loam, 1 to 5 percent slopes
TaC	Tate loam, 8 to 15 percent slopes
TkC	Tate loam, 8 to 15 percent slopes, very stony
TsA	Toxaway loam, 0 to 2 percent slopes

Legend

- Conservation Easement = 25.57 acres
- Existing Streams =10,164.4 linear feet
- Existing Wetlands= 2.87 acres
- Existing Open Water = 0.30 acre
- Cross-Sections (Plots found in Appendix B)
- Groundwater Gauges Installed 2018
- Existing Footpaths (approximately located)
- Sewer Line
- Soil Boundaries
- NC SAM Forms

Forbat's Field
Big Bottom
S-Field
Swannanoa River
UT-8
UT-7
UT-6
XS-1
XS-2
XS-3
XS-4
XS-5
XS-6
DrB
Pg
RsA
HpA
DeA
BeA
StB
IoA
TsA
TaC
EwD
W
0 250 500 1,000 Feet

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

EXISTING CONDITIONS AND SOILS

Drawn by: KRJ

Date: Oct 2018

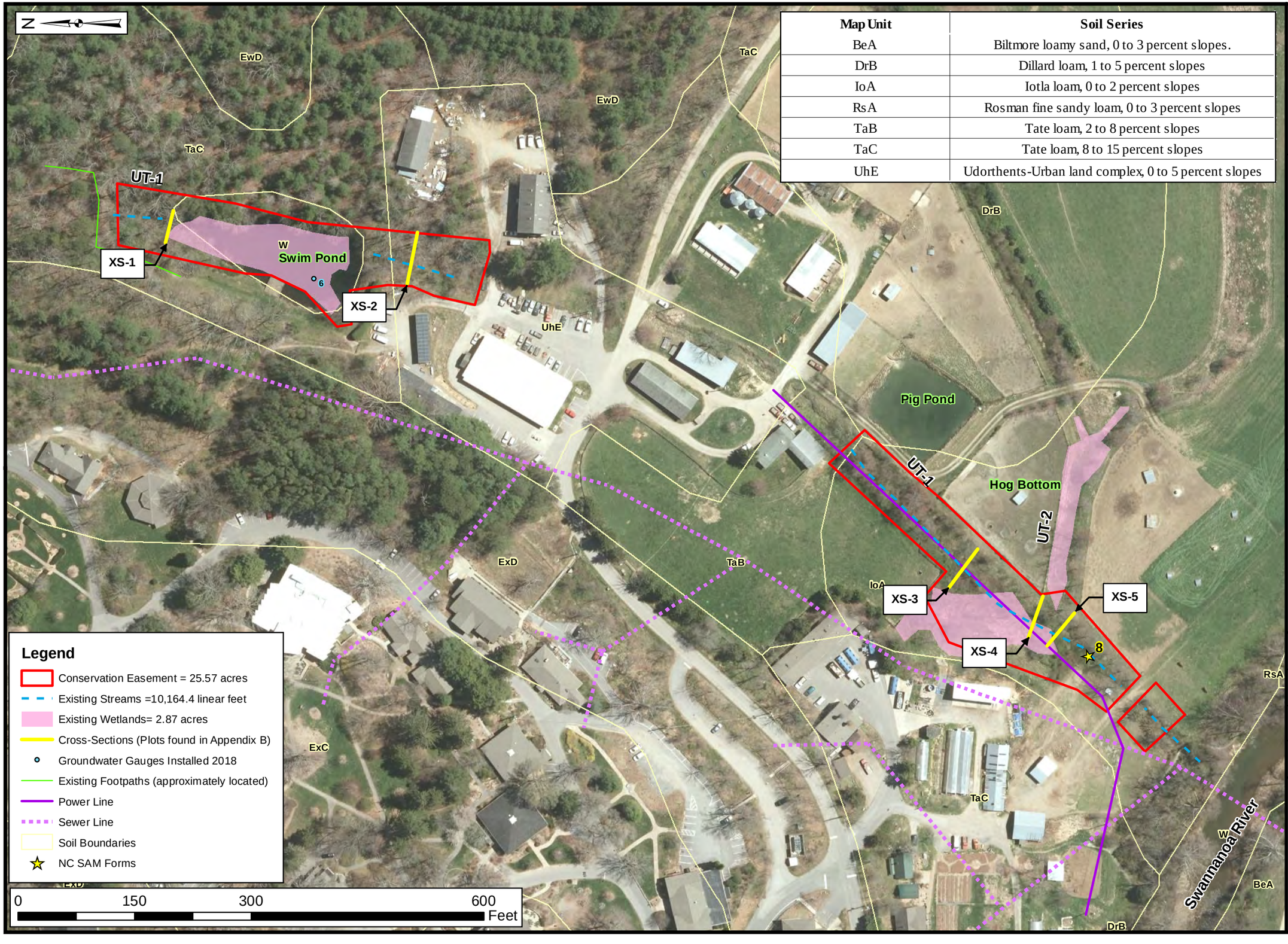
Scale: 1:2500

Project No.: 17-018

FIGURE

4C

Map Unit	Soil Series
BeA	Biltmore loamy sand, 0 to 3 percent slopes.
DrB	Dillard loam, 1 to 5 percent slopes
IoA	Iotla loam, 0 to 2 percent slopes
RsA	Rosman fine sandy loam, 0 to 3 percent slopes
TaB	Tate loam, 2 to 8 percent slopes
TaC	Tate loam, 8 to 15 percent slopes
UhE	Udorthents-Urban land complex, 0 to 5 percent slopes



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

EXISTING CONDITIONS AND SOILS

Drawn by: KRJ

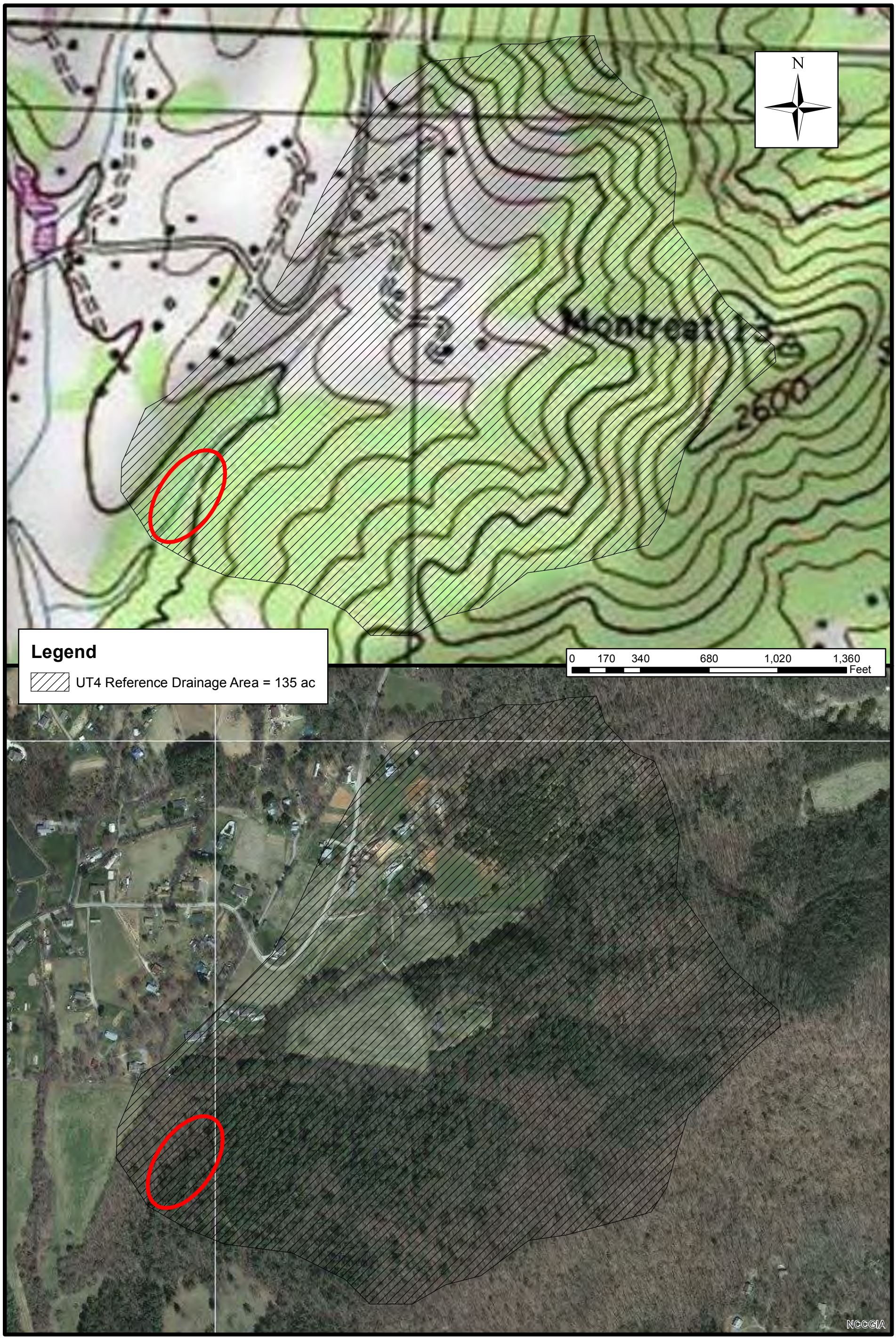
Date: Oct 2018

Scale: 1:1400

Project No.: 17-018

FIGURE

4D



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Axiom Environmental, Inc.

DRAINAGE AREA
UT 4 REFERENCE REACH
WARREN WILSON COLLEGE
STREAM AND WETLAND MITIGATION SITE
Buncombe County, North Carolina

Dwn. By: WGL	FIGURE
Date: Sept 2017	5A
Project: 17-014	

UT 4 Reference Site Location

N

Legend

4 ft Lidar Contour

0 20 40 80 120 160 Feet

NCCGIA

Axiom Environmental
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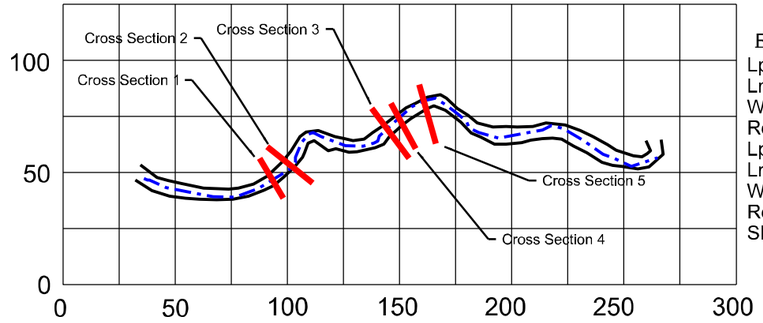
EXISTING CONDITIONS
UT 4 REFERENCE SITE
WARREN WILSON COLLEGE
STREAM AND WETLAND MITIGATION SITE
Buncombe County, North Carolina

Dwn. By: WGL
Date: Sept 2017
Project: 17-014

FIGURE
5B

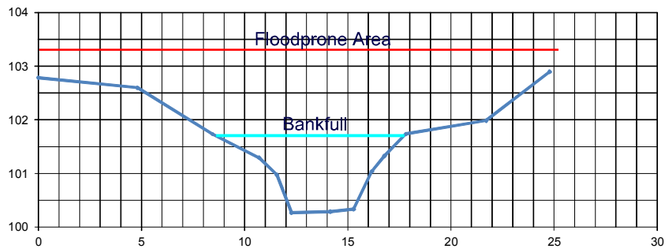


Pattern Legend

- Top of Bank
- Thalweg
- Cross Section

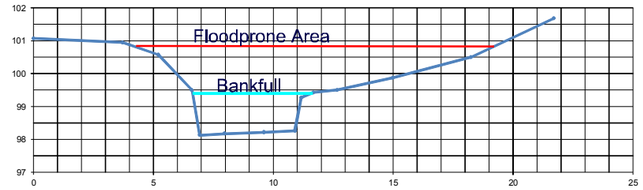
Reference Pattern

Lp-p = 37 (27 - 46) ft
Lm = 64 (57 - 76) ft
Wbelt = 19 (15 - 25) ft
Rc = 16 (9 - 29) ft
Lp-p/Wbkf = 5.5 (4.0 - 6.7)
Lm/Wbkf = 9.4 (8.3 - 11.2)
Wbelt/Wbkf = 2.8 (2.3 - 3.7)
Rc/Wbkf = 2.3 (1.3 - 4.3)
SIN = 1.16



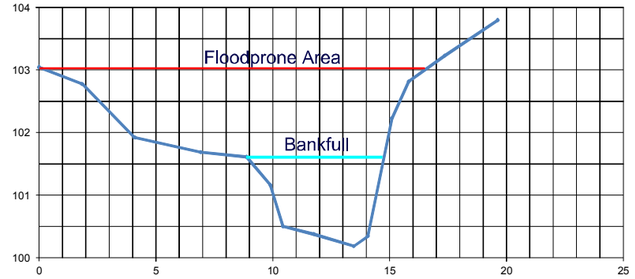
Cross Section 3 - Riffle

Abkf = 7.7 ft
Dave = 0.8 ft
Wbkf = 9.4 ft
Dmax = 1.5 ft
Bank Height = 1.5 ft
Bank Height Ratio = 1.0
W/D = 11.6
FPA = 28
ENT = 3.0
Stream Type = Eb



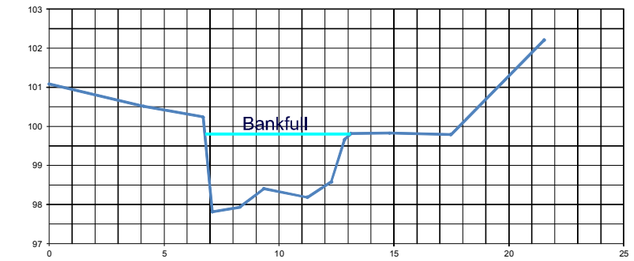
Cross Section 1 - Riffle

Abkf = 5.3 ft
Dave = 1.0 ft
Wbkf = 5.1 ft
Dmax = 1.3 ft
Bank Height = 1.3 ft
Bank Height Ratio = 1.0
W/D = 4.9
FPA = 15
ENT = 2.9
Stream Type = Eb



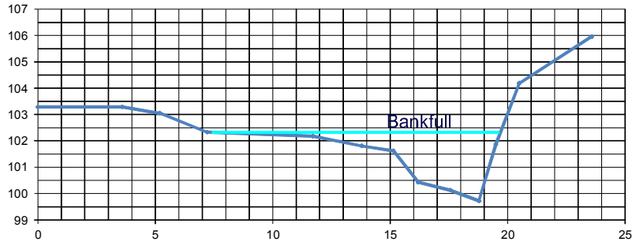
Cross Section 4 - Riffle

Abkf = 5.7 ft
Dave = 1.0 ft
Wbkf = 5.9 ft
Dmax = 1.4 ft
Bank Height = 1.4 ft
Bank Height Ratio = 1.0
W/D = 6.0
FPA = 16
ENT = 2.7
Stream Type = Eb



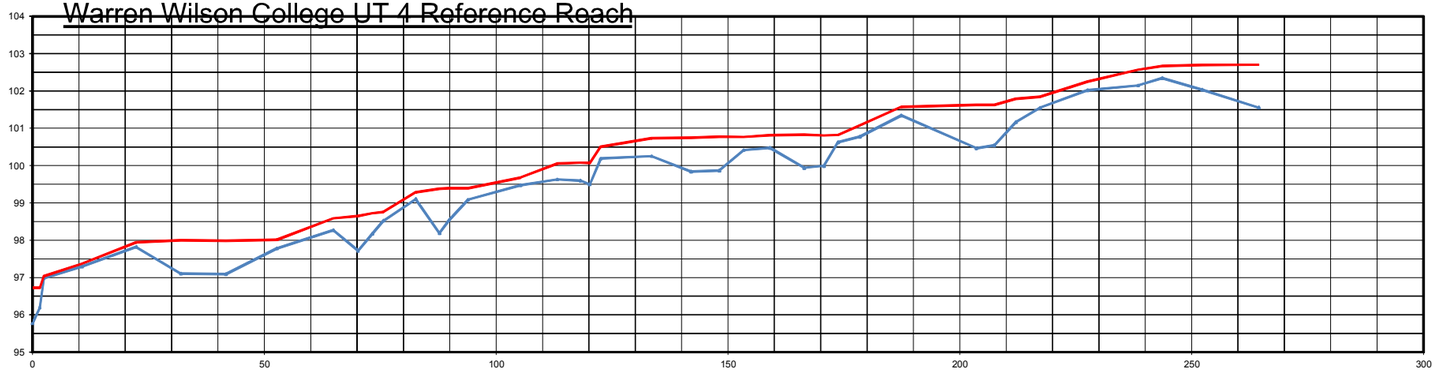
Cross Section 2 - Pool

Abkf = 9.2 ft
Wbkf = 6.4 ft
Dmax = 2.0 ft



Cross Section 5 - Pool

Abkf = 10.1 ft
Wbkf = 12.5 ft
Dmax = 2.6 ft



Profile (Reference Reach)

Save = 0.0226 rise/run
Svalley = 0.0262 rise/run
Sriffle = 0.0400 (0.0090 - 0.0754) rise/run
Spool = 0.0021 (0 - 0.0243) rise/run
Srun = 0.0075 (0 - 0.3661) rise/run
Sglide = 0.0032 (0.0016 - 0.0179) rise/run

- Water Surface
- Channel Bed

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

UT 4 Reference Reach Dimension, Pattern, and Profile

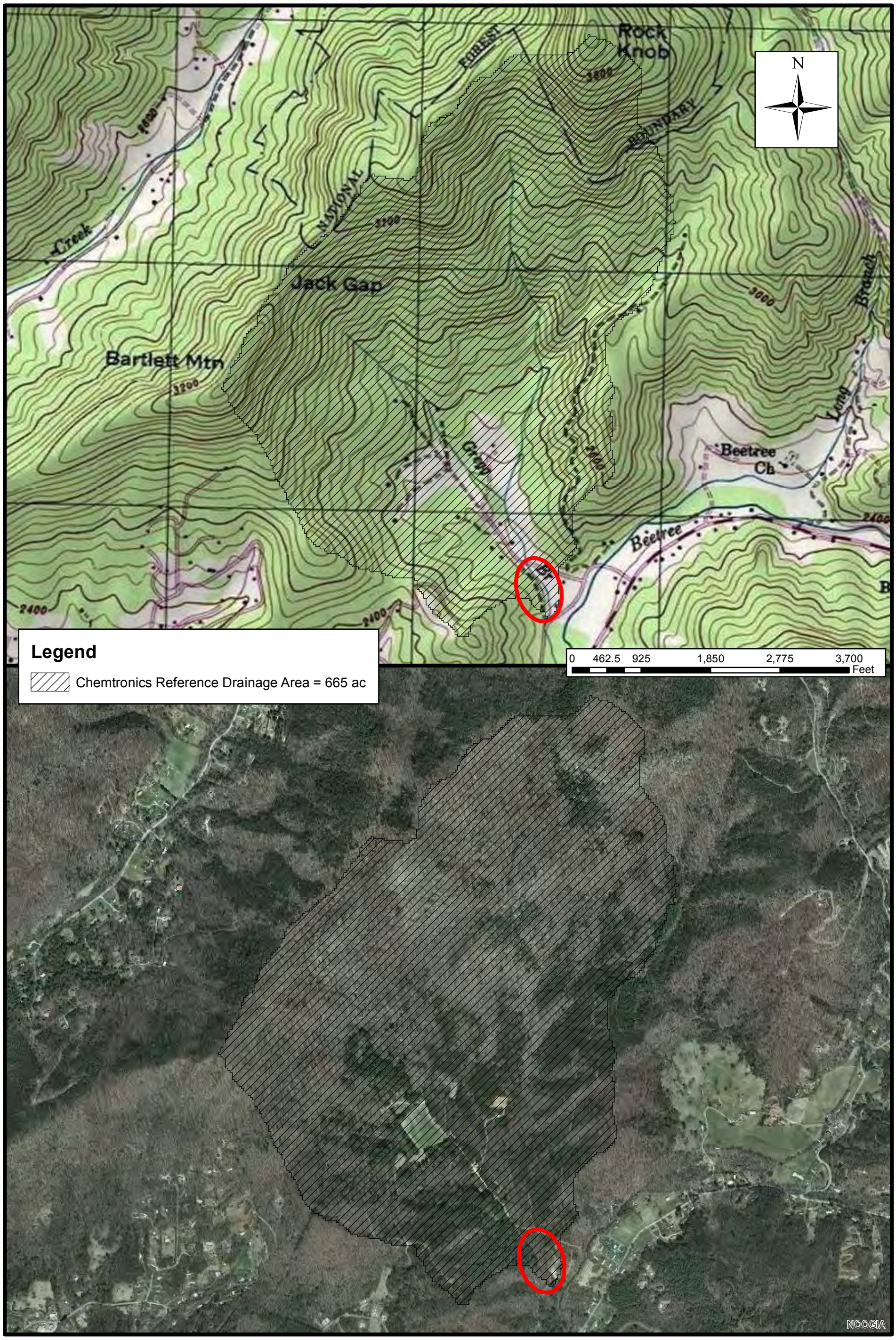
Scale: NA

Date: Nov 2017

Project No.: 17-008

FIGURE NO.

5C



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DRAINAGE AREA
CHEMTRONICS REFERENCE REACH
WARREN WILSON COLLEGE
STREAM AND WETLAND MITIGATION SITE
Buncombe County, North Carolina

Dwn. By: WGL
Date: Sept 2017
Project: 17-014

FIGURE
6A

Axiom Environmental
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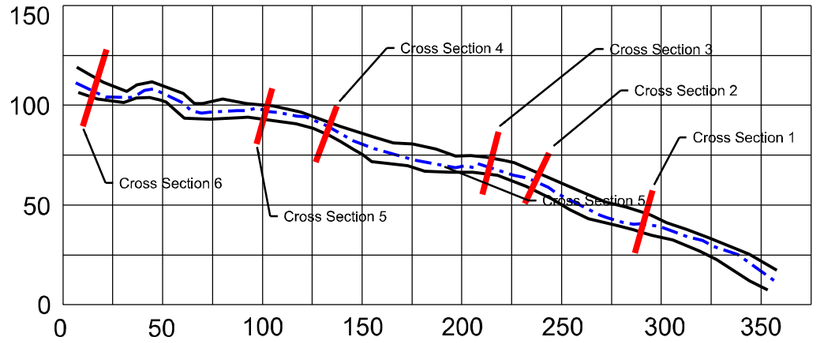
Axiom Environmental, Inc.

EXISTING CONDITIONS
CHEMTRONICS REFERENCE SITE
WARREN WILSON COLLEGE
STREAM AND WETLAND MITIGATION SITE
Buncombe County, North Carolina

Dwn. By: WGL
Date: Sept 2017
Project: 17-014

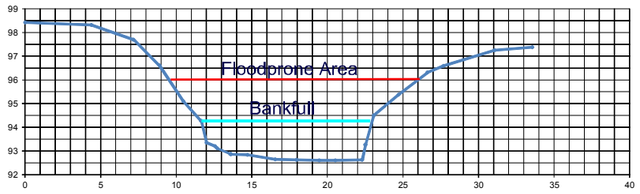
FIGURE
6B



Pattern Legend

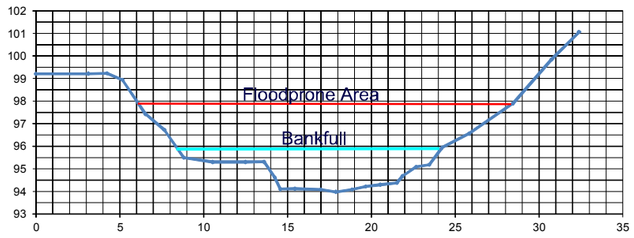
- Top of Bank
- Thalweg
- Cross Section

Reference Pattern
Lp-p = 51 (29 - 71) ft
Lm = 96 (60 - 117) ft
Wbelt = 15 (13 - 17) ft
Rc = 31 (11 - 46) ft
Lp-p/Wbkf = 3.6 (2.1 - 5.1)
Lm/Wbkf = 6.9 (4.3 - 8.4)
Wbelt/Wbkf = 1.1 (1.0 - 1.2)
Rc/Wbkf = 2.2 (0.8 - 3.3)
SIN = 1.03

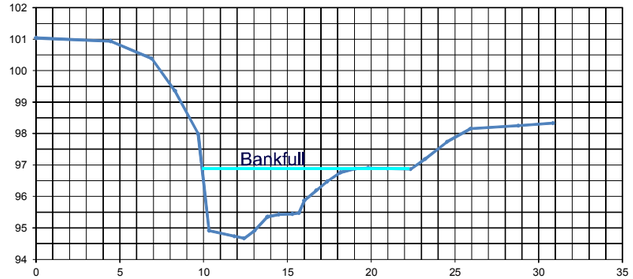


Cross Section 1 - Riffle
Abkf = 16.3 ft
Dave = 1.4 ft
Wbkf = 11.3 ft
Dmax = 1.7 ft
Bank Height = 1.7 ft
Bank Height Ratio = 1.0
W/D = 7.8
FPA = 16.5
ENT = 1.5
Stream Type = B

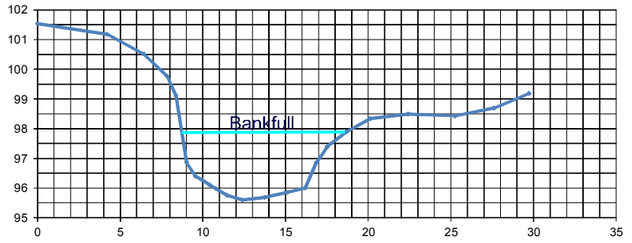
Cross Section 2 - Pool
Abkf = 13.3 ft
Wbkf = 10.1 ft
Dmax = 1.9 ft



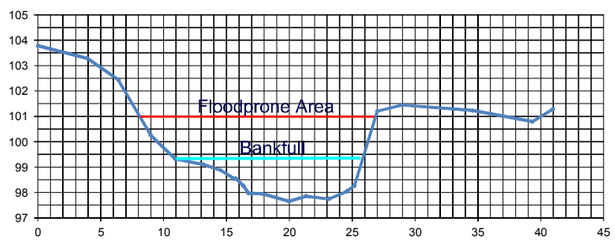
Cross Section 3 - Riffle
Abkf = 18.9 ft
Dave = 1.2 ft
Wbkf = 15.8 ft
Dmax = 2.0 ft
Bank Height = 2.0 ft
Bank Height Ratio = 1.0
W/D = 13.3
FPA = 22
ENT = 1.4
Stream Type = B



Cross Section 4 - Pool
Abkf = 11.6 ft
Wbkf = 9.0 ft
Dmax = 2.2 ft

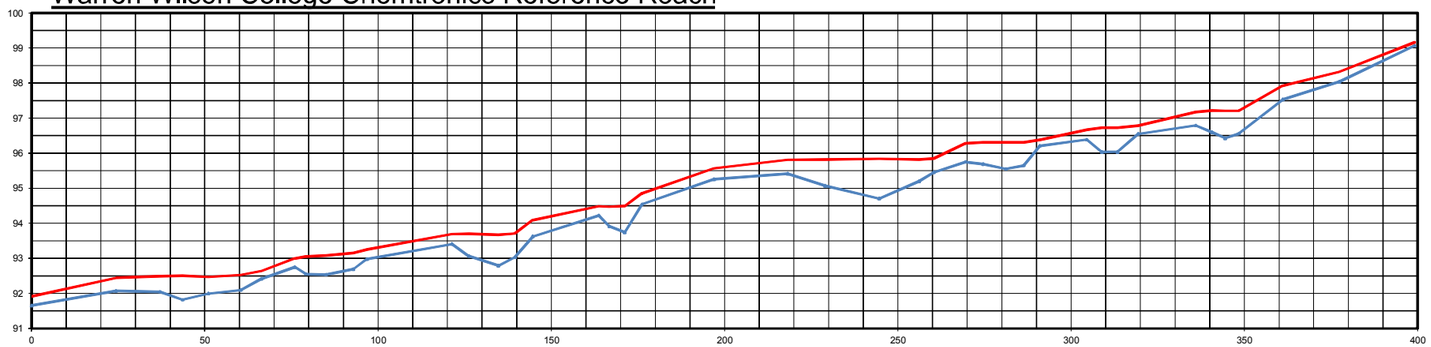


Cross Section 5 - Pool
Abkf = 16.2 ft
Wbkf = 10.0 ft
Dmax = 2.3 ft



Cross Section 6 - Riffle
Abkf = 15.0 ft
Dave = 1.0 ft
Wbkf = 14.8 ft
Dmax = 1.7 ft
Bank Height = 1.7 ft
Bank Height Ratio = 1.0
W/D = 14.7
FPA = 19
ENT = 1.3
Stream Type = Be

Warren Wilson College Chemtronics Reference Reach



Profile (Reference Reach)
Save = 0.0167 rise/run
Svalley = 0.0172 rise/run
Sriffle = 0.0228 (0.0156 - 0.0468) rise/run
Spool = 0.0006 (0 - 0.0080) rise/run
Srun = 0.0217 (0.008 - 0.0737) rise/run
Sglide = 0.0039 (0 - 0.0149) rise/run

- Water Surface
- Channel Bed

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:
Chemtronics Reference Reach Dimension, Pattern, and Profile

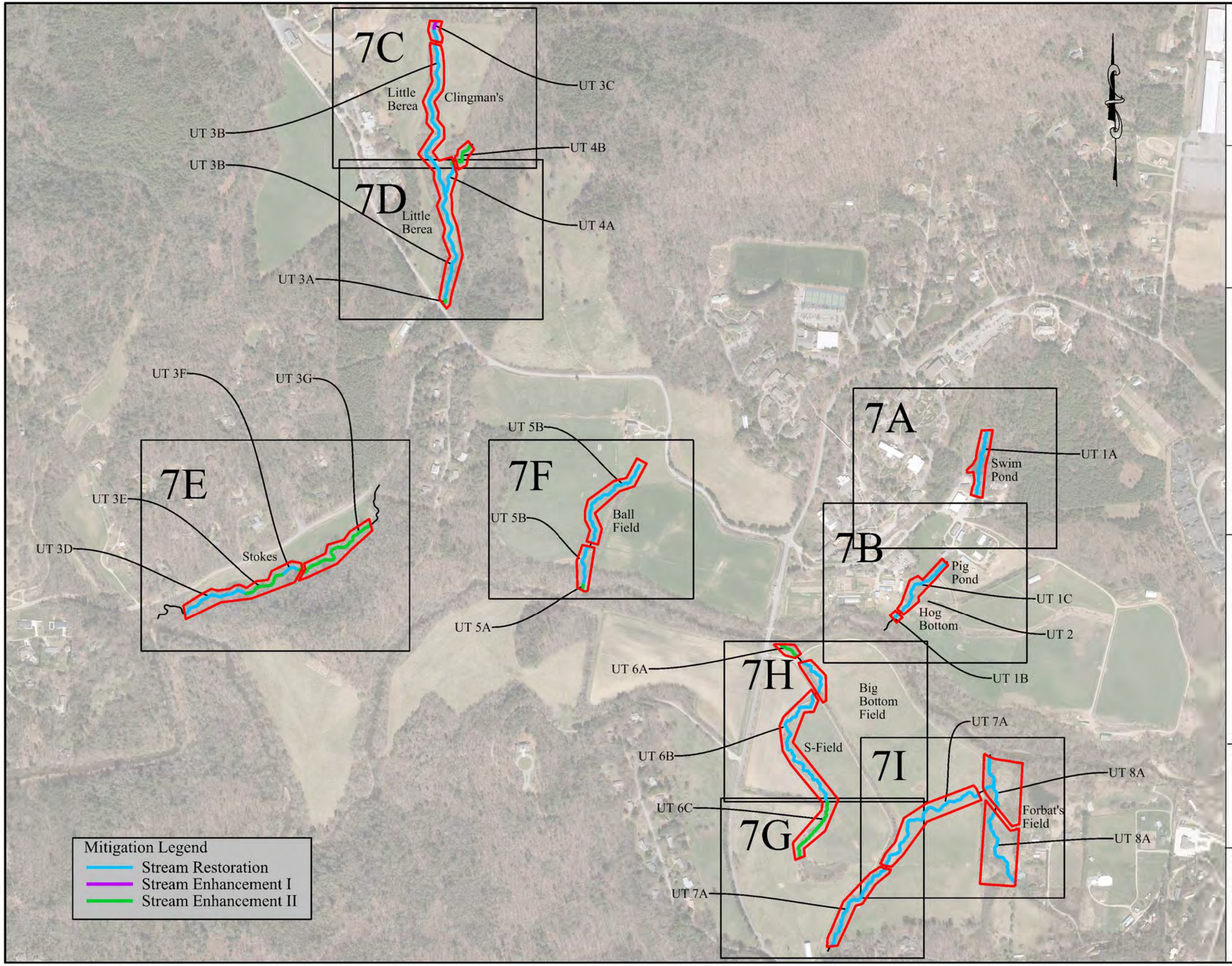
Scale: NA

Date: Nov 2017

Project No.: 17-008

FIGURE NO.

6C



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

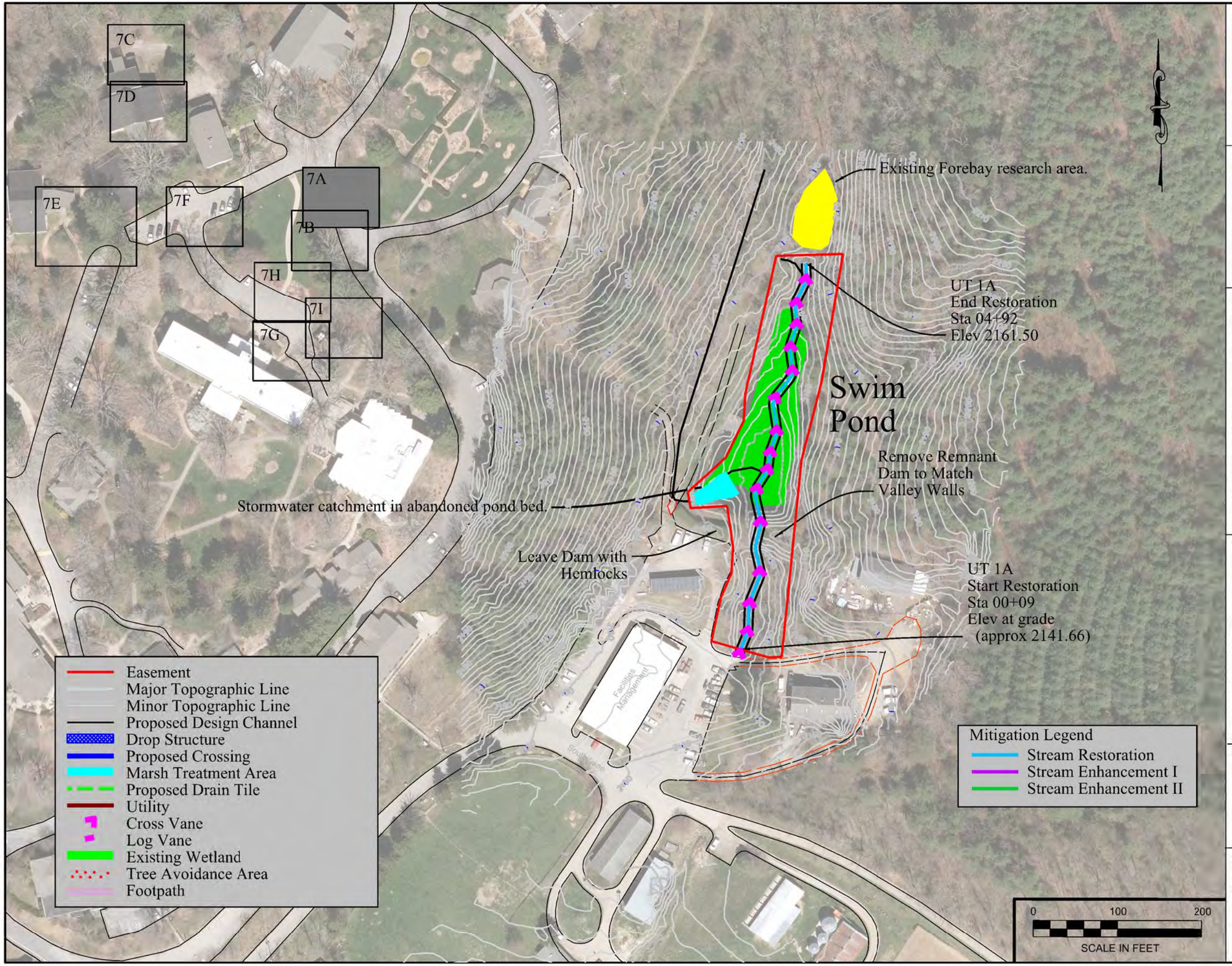
Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Restoration Plan

Scale: AS SHOWN	FIGURE NO. 7
Date: March 2018	
Project No.: 17-008	



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Restoration Plan

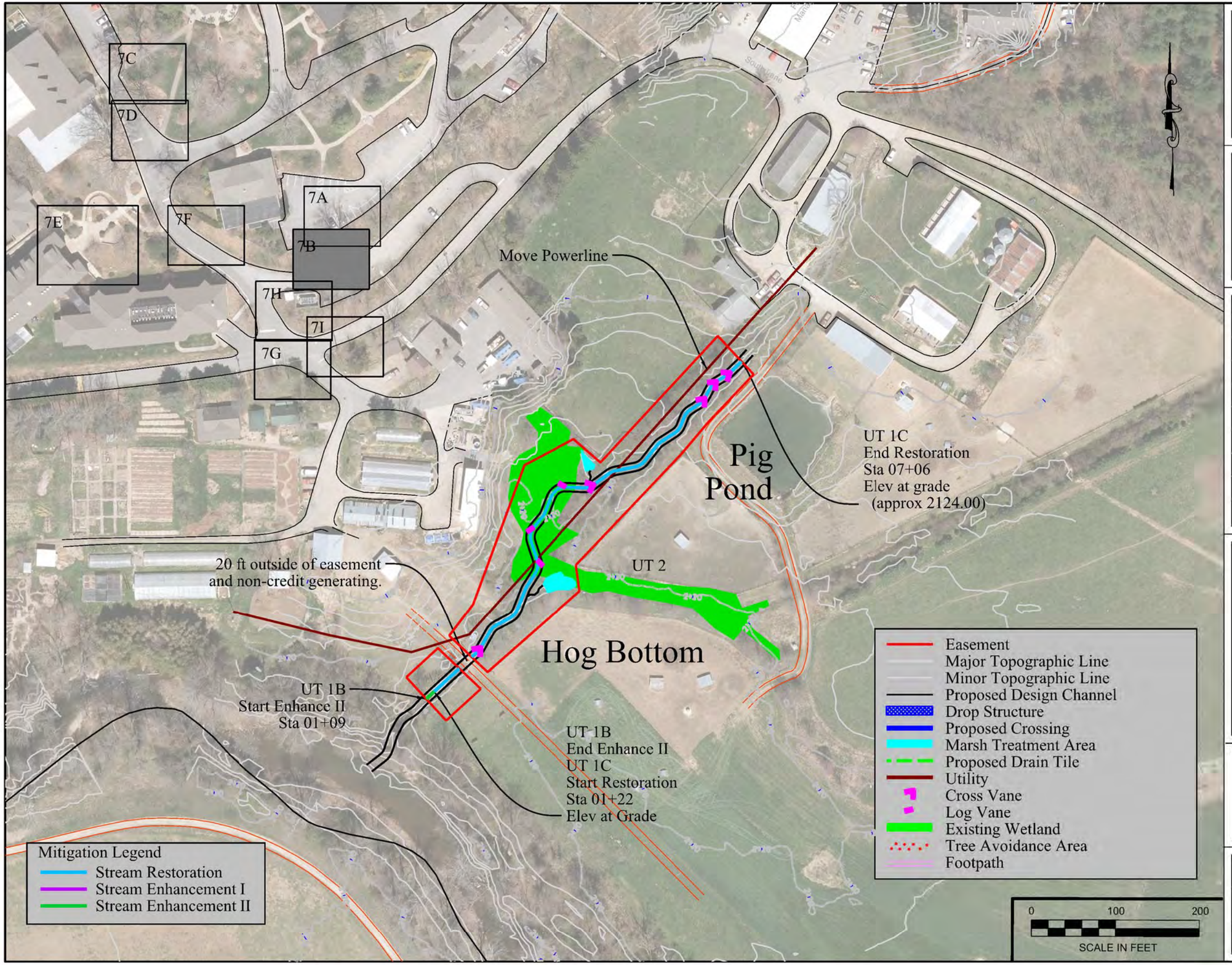
Scale: AS SHOWN

Date: March 2018

Project No.: 17-008

FIGURE NO.

7A



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Restoration Plan

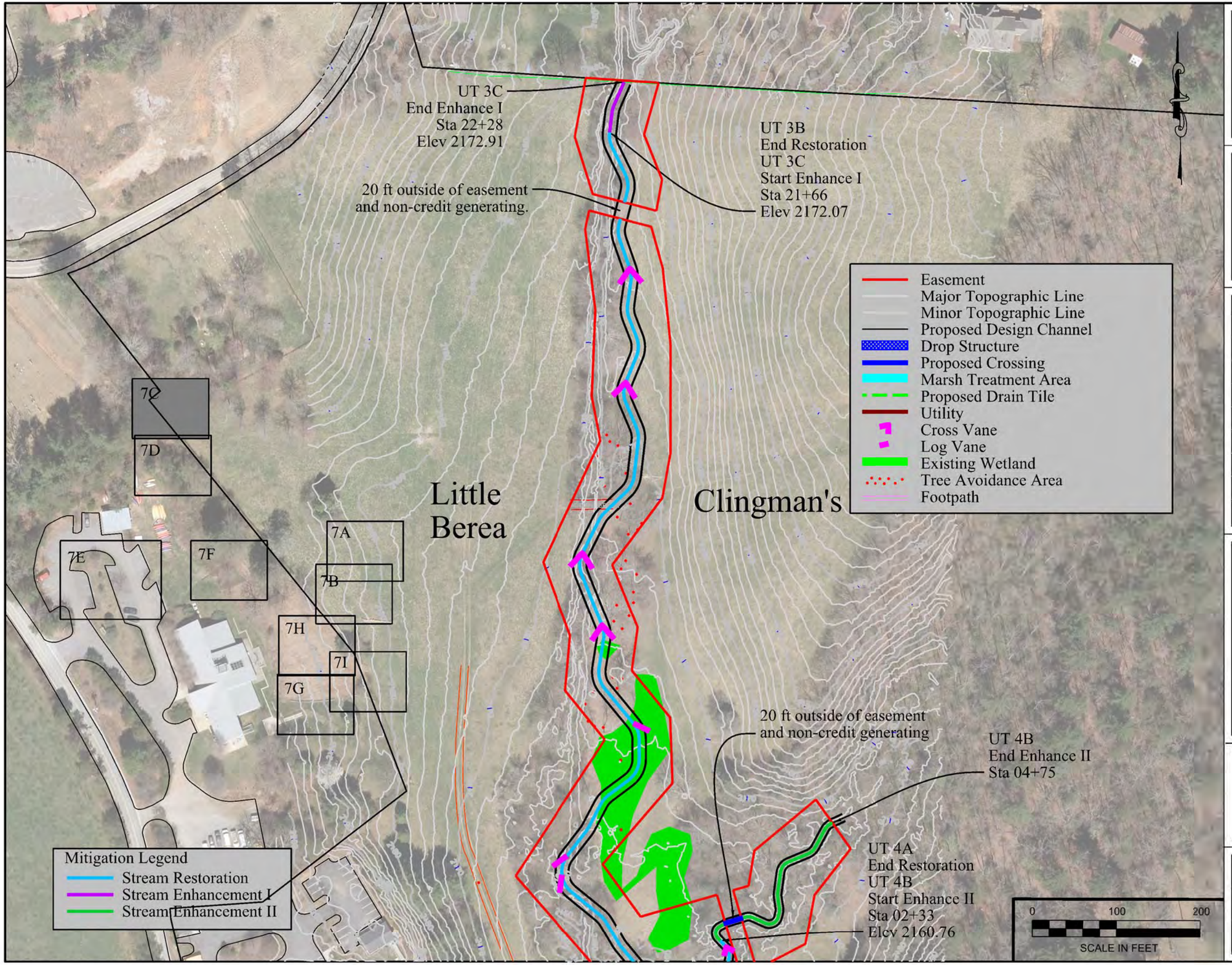
Scale: AS SHOWN

Date: March 2018

Project No.: 17-008

FIGURE NO.

7B



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Restoration Plan

Scale:	FIGURE NO.
AS SHOWN	7C
Date: March 2018	
Project No.: 17-008	

20 ft outside of easement
and non-credit generating

UT 4A
End Restoration
UT 4B
Start Enhance II
Sta 02+33
Elev 2160.76

UT 4A
Start Restoration
Sta 00+00
Elev 2153.99

Clingman's

Little
Berea

7C
7D
7E
7F
7A
7B
7H
7I
7G

Easement
Major Topographic Line
Minor Topographic Line
Proposed Design Channel
Drop Structure
Proposed Crossing
Marsh Treatment Area
Proposed Drain Tile
Utility
Cross Vane
Log Vane
Existing Wetland
Tree Avoidance Area
Footpath

UT 3A
End Enhance II
UT 3B
Start Restoration
Sta 00+50
Elev 2141.77

UT 3A
Start Enhance II
Sta 00+05

Mitigation Legend
Stream Restoration
Stream Enhancement I
Stream Enhancement II

0 100 200
SCALE IN FEET

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

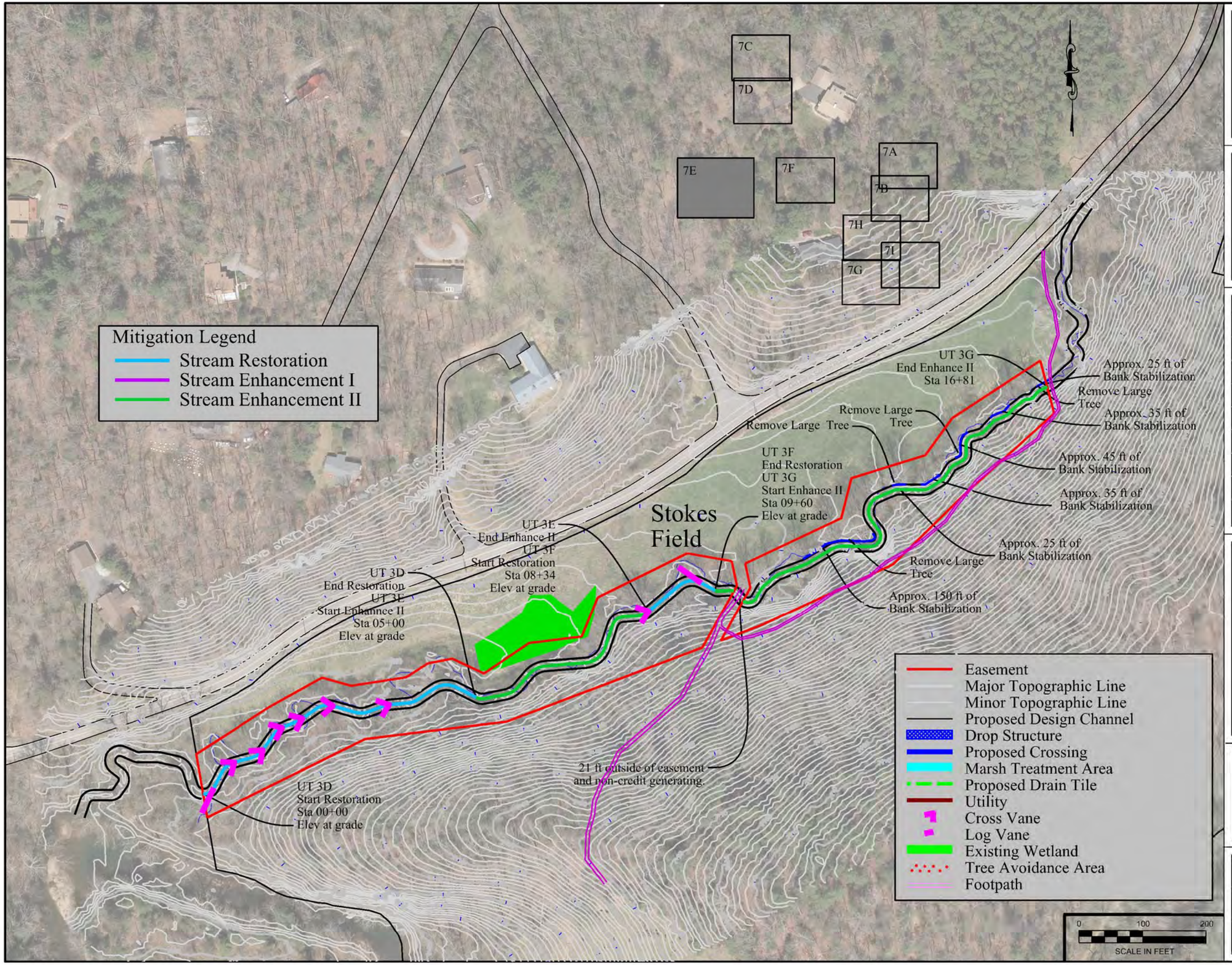
Buncombe County North Carolina

Title:

Restoration Plan

Scale: AS SHOWN
Date: March 2018
Project No.: 17-008

FIGURE NO.
7D



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

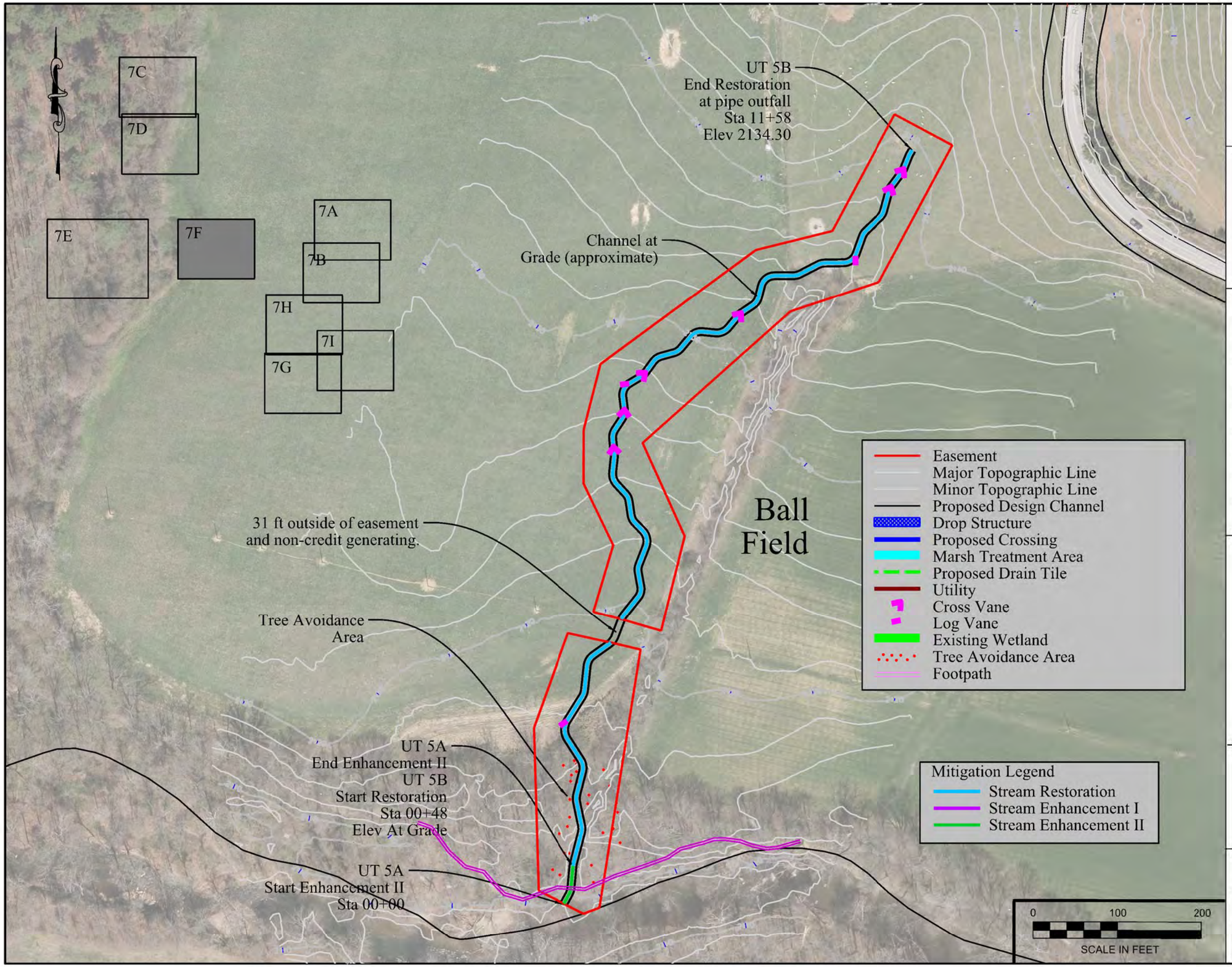
Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Restoration Plan

Scale:	FIGURE NO.
AS SHOWN	7E
Date: March 2018	
Project No.: 17-008	



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Restoration Plan

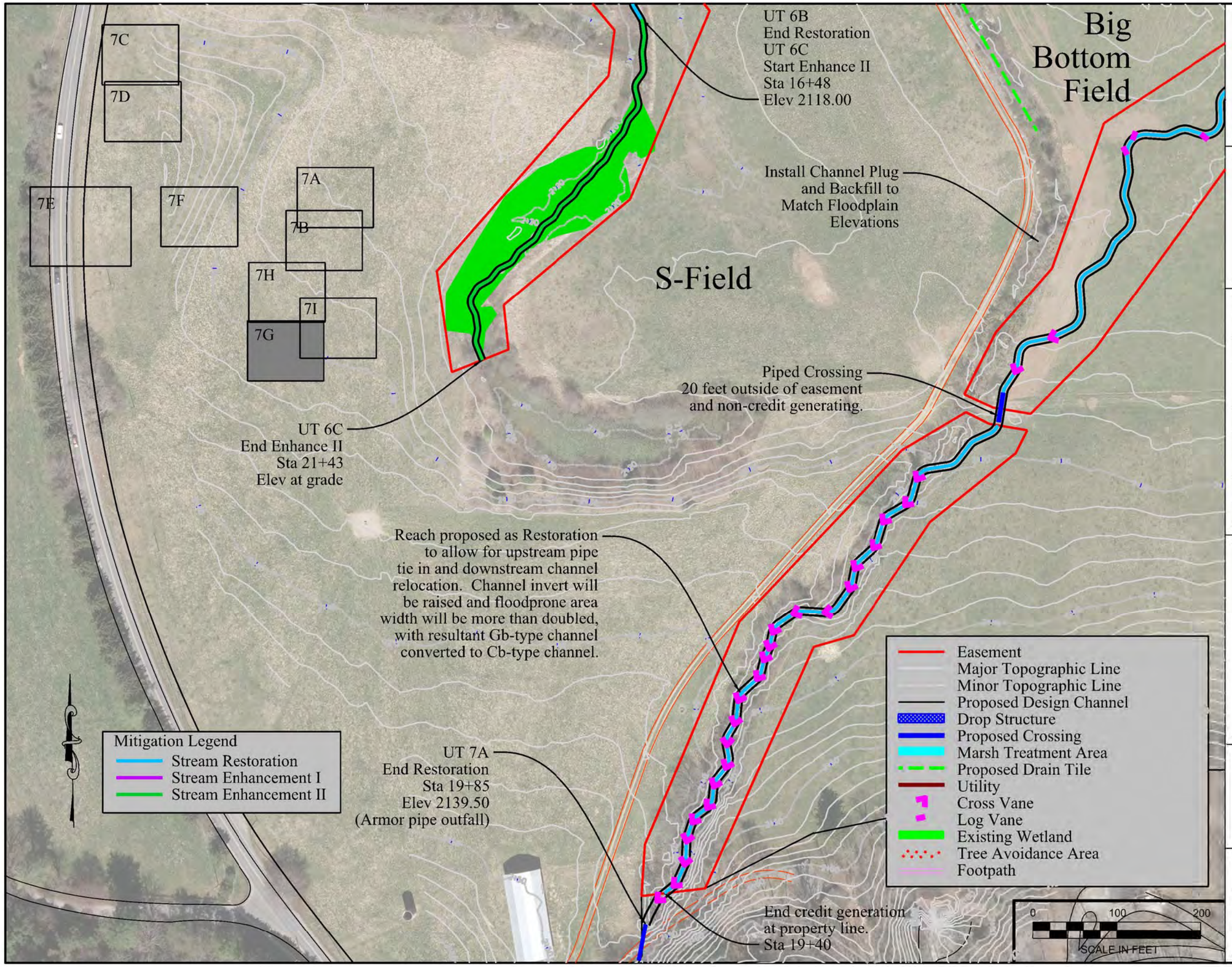
Scale: AS SHOWN

Date: March 2018

Project No.: 17-008

FIGURE NO.

7F



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

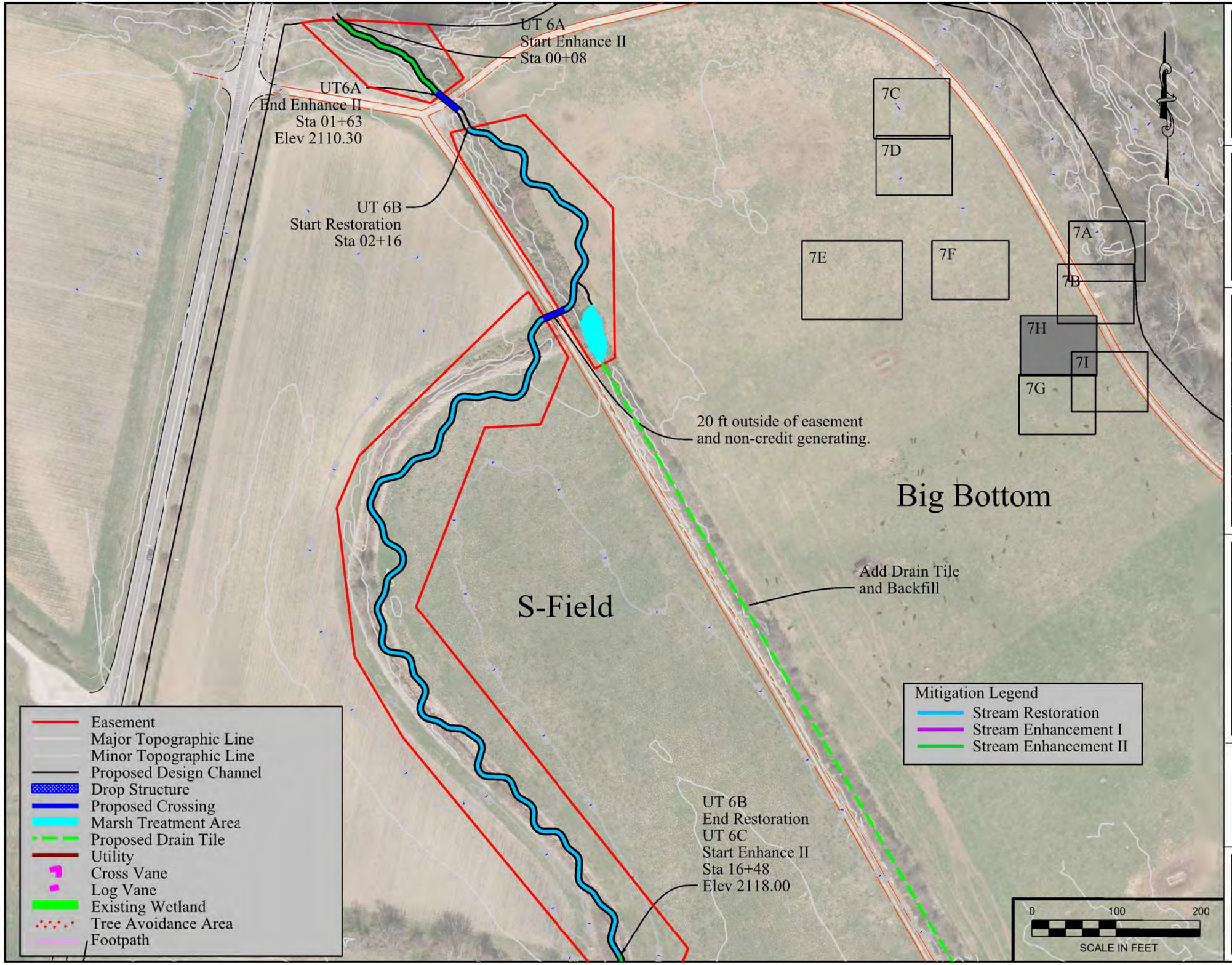
Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Restoration Plan

Scale:	FIGURE NO.
AS SHOWN	7G
Date: March 2018	
Project No.: 17-008	



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Restoration Plan

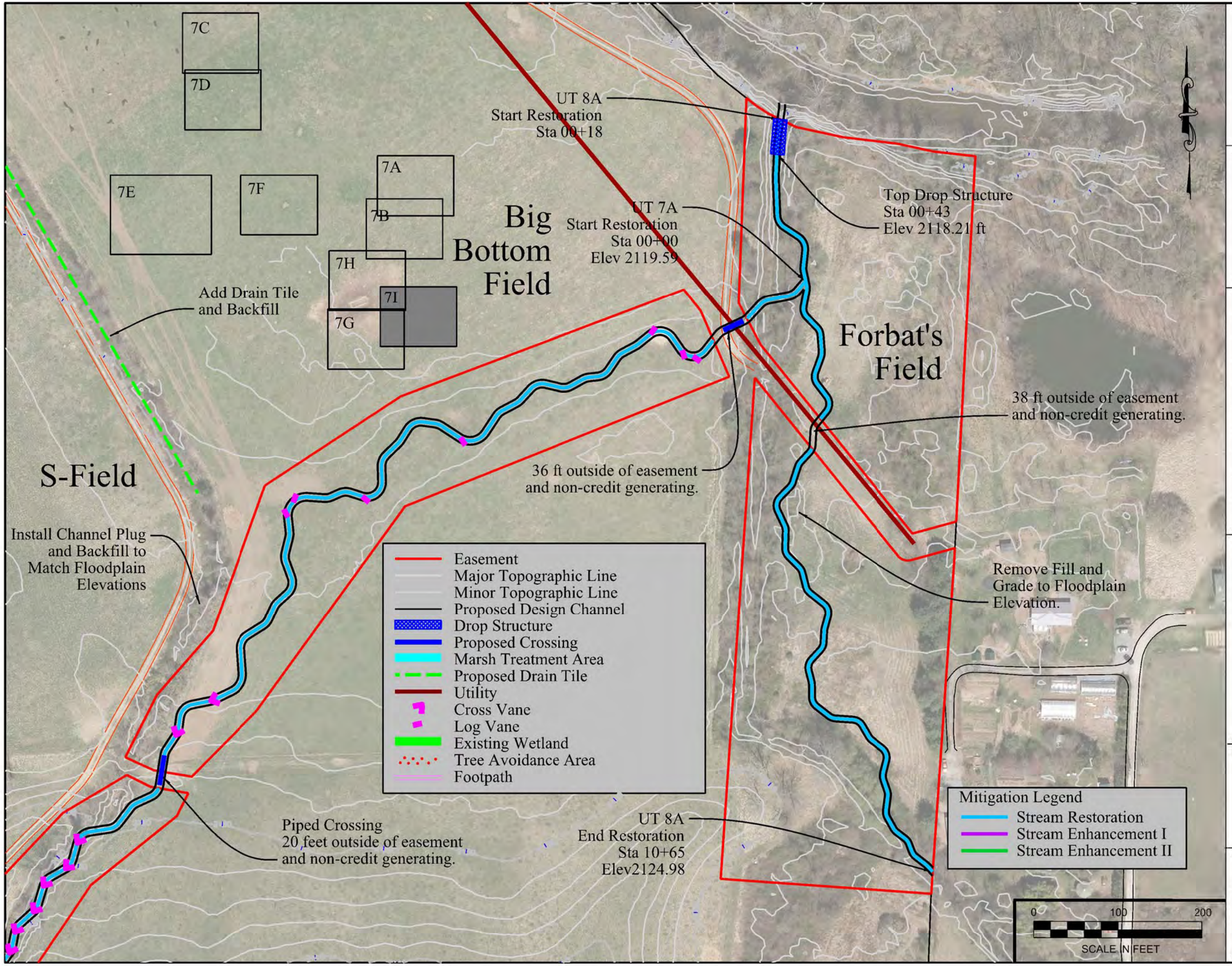
Scale: AS SHOWN

Date: March 2018

Project No.: 17-008

FIGURE NO.

7H



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Restoration Plan

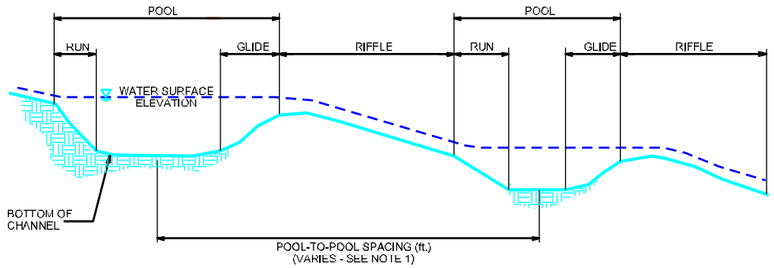
Scale: AS SHOWN

Date: March 2018

Project No.: 17-008

FIGURE NO.

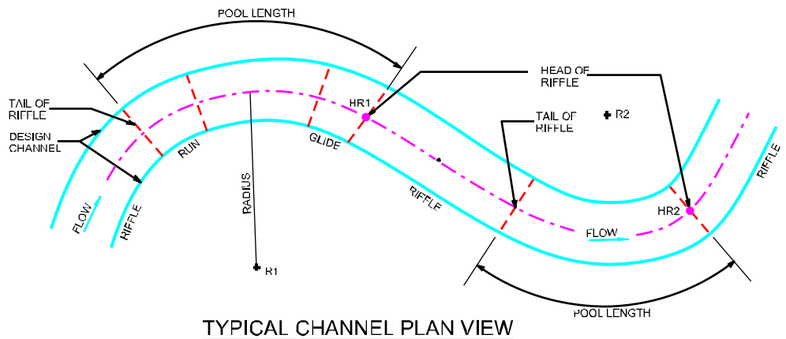
7I



TYPICAL CHANNEL PROFILE

NOTES:

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

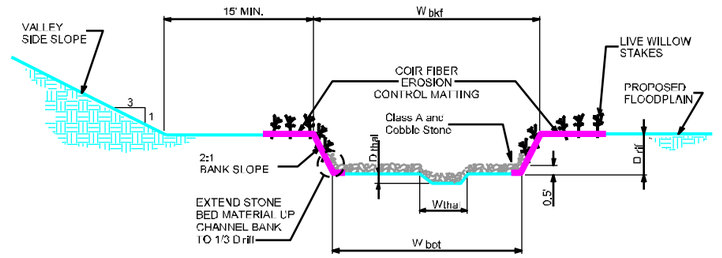


TYPICAL CHANNEL PLAN VIEW

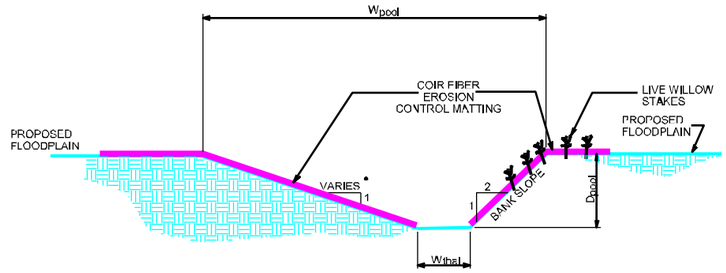
CHANNEL PLAN VIEW NOTES:

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

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



TYPICAL RIFFLE CROSS-SECTION



MAX. 1:1 SLOPE

TYPICAL POOL CROSS-SECTION

CHANNEL CONSTRUCTION NOTES:

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

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

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

CROSS-SECTION DIMENSIONS

REACH	Wbkf (ft.)	Wbot (ft.)	Driff (ft.)	Dthal (ft.)	Dpool (ft.)	Wpool (ft.)	Wthal (ft.)
UT 1	10.0	5.6	1.0	0.1	1.4	11.0	1.0
UT 3	16.0	9.2	1.6	0.1	2.2	17.6	1.0
UT 4 and 7	9.3	5.3	0.9	0.1	1.3	10.2	1.0
UT 5	8.2	4.6	0.8	0.1	1.1	9.0	1.0
UT 6	6.6	3.8	0.6	0.1	0.9	7.2	1.0
UT 8	7.1	3.9	0.7	0.1	1.0	7.8	1.0

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

PROPOSED DIMENSION, PATTERN, AND PROFILE

Scale: NA

Date: March 2018

Project No.: 17-008

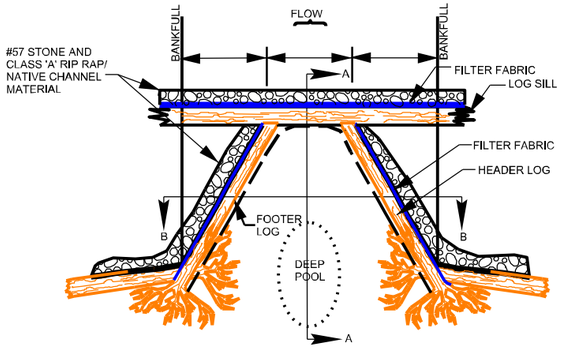
FIGURE NO.

8

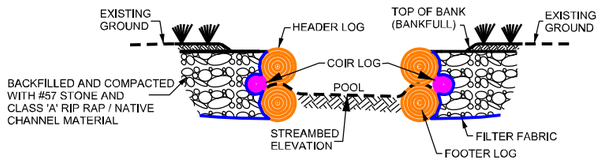
LOG CROSS VANE

SCALE:NTS

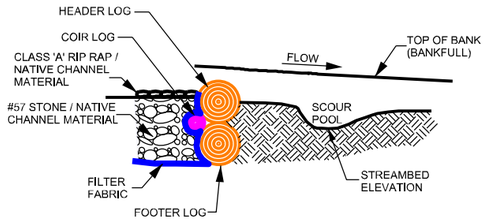
PLAN VIEW



NOTES:
1. HEADER AND FOOTER LOGS SHALL BE A MINIMUM OF 18" DIAMETER AND SHALL BE A HARDWOOD SPECIES, (FOOTER LOG MAY BE SUBSTITUTED WITH PINE)
2. A DOUBLE FOOTER LOG MAY BE REQUIRED IN SAND BED STREAMS.
3. ALL STONES ARE TO BE STRUCTURE STONES.
4. FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH LOG GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF THE STRUCTURE.
5. PERPENDICULAR ROOTWAD LOGS ARE REQUIRED IF THE LOG VANE ARM DOES NOT HAVE A ROOTBALL TO TIE INTO THE BANK.



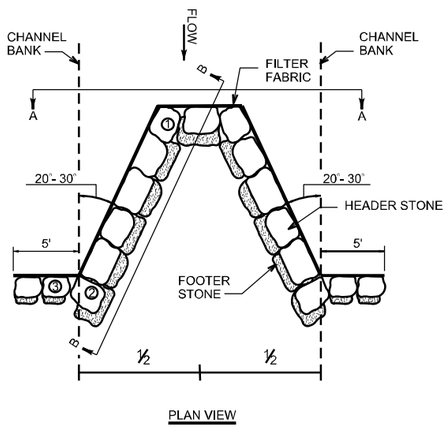
SECTION B-B



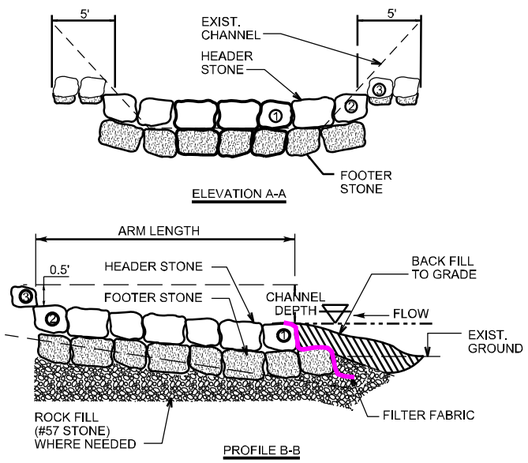
SECTION A-A

REACH	ARM LENGTH (FT.)	CHANNEL DEPTH (FT.)
UT 1 and 7	8	1.0 - 1.1
UT 5, 6, and 8	7	0.7 - 0.9
UT 3	12	1.7

NOTE:
HEADER AND FOOTER STONES ARE LARGE, ANGULAR BOULDERS MEASURING A MINIMUM OF 24" ALONG THE SHORTEST DIMENSION.



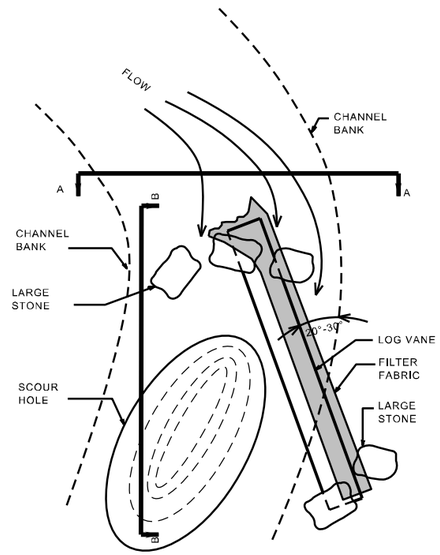
PLAN VIEW



ELEVATION A-A

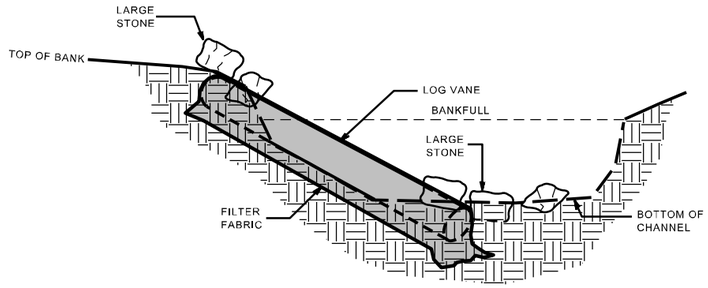
PROFILE B-B

TYPICAL CROSS-VANE

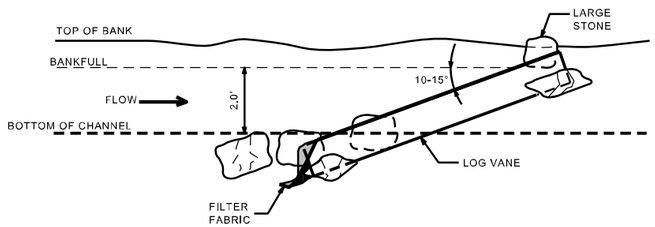


NOTE:
FILTER FABRIC TOED IN AND DRAPED ON UPSTREAM SIDE OF LOG VANE PRIOR TO BACKFILL.

PLAN VIEW
SCALE: N.T.S.



CROSS-SECTION A-A
SCALE: N.T.S.



PROFILE B-B
SCALE: N.T.S.

NOTE:
FILTER FABRIC TOED IN AND DRAPED ON UPSTREAM SIDE OF LOG VANE PRIOR TO BACKFILL.

TYPICAL LOG VANE

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

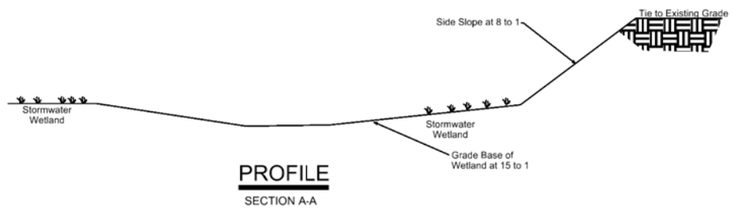
Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

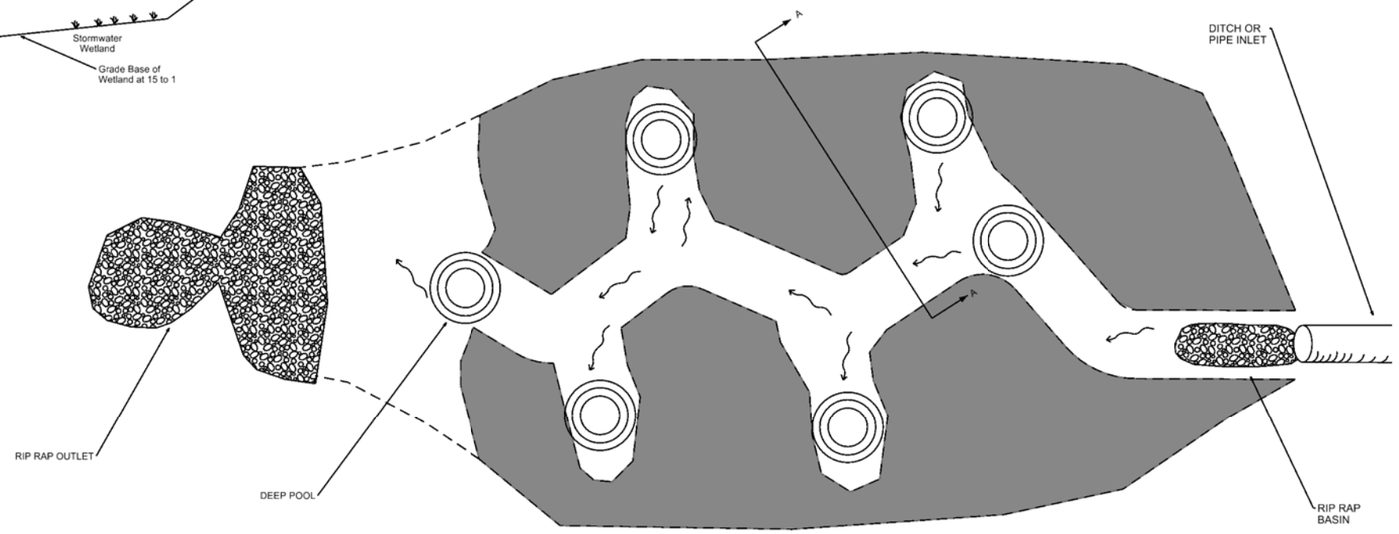
TYPICAL STRUCTURE DETAILS

Scale: NO SCALE	FIGURE NO. 9A
Date: March 2018	
Project No.: 17-008	



PROFILE

SECTION A-A



MARSH TREATMENT AREA

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

TYPICAL STRUCTURE DETAILS

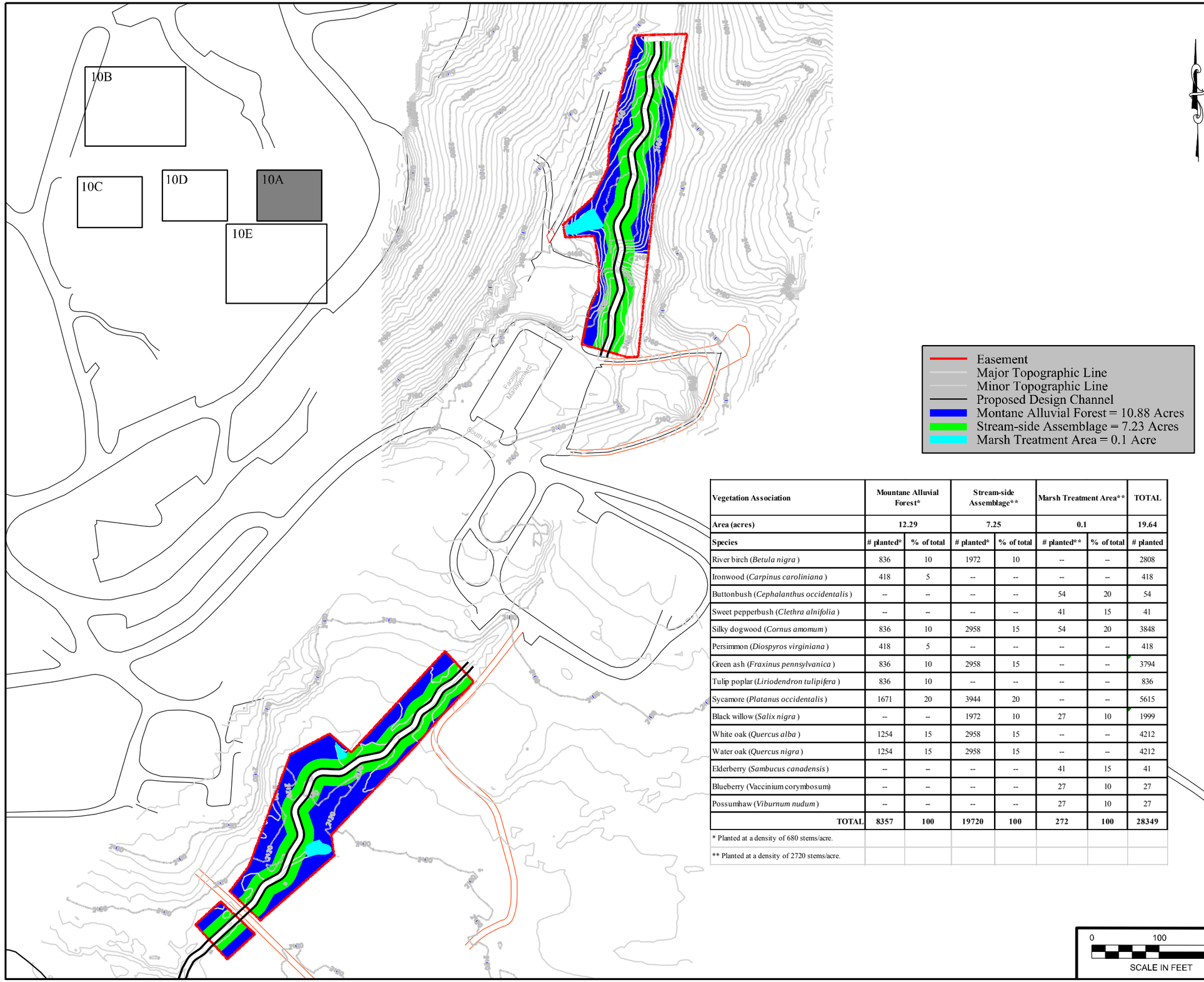
Scale: NO SCALE

Date: March 2018

Project No.: 17-008

FIGURE NO.

9B



Vegetation Association	Mountane Alluvial Forest*		Stream-side Assemblage**		Marsh Treatment Area**		TOTAL
Area (acres)	**12.29**		**7.25**		**0.1**		**19.64**
Species	**# planted***	**% of total**	**# planted***	**% of total**	**# planted****	**% of total**	**# planted**
River birch (*Betula nigra*)	836	10	1972	10	--	--	2808
Ironwood (*Carpinus caroliniana*)	418	5	--	--	--	--	418
Buttonbush (*Cephalanthus occidentalis*)	--	--	--	--	54	20	54
Sweet pepperbush (*Clethra alnifolia*)	--	--	--	--	41	15	41
Silky dogwood (*Cornus amomum*)	836	10	2958	15	54	20	3848
Persimmon (*Diospyros virginiana*)	418	5	--	--	--	--	418
Green ash (*Fraxinus pennsylvanica*)	836	10	2958	15	--	--	3794
Tulip poplar (*Liriodendron tulipifera*)	836	10	--	--	--	--	836
Sycamore (*Platanus occidentalis*)	1671	20	3944	20	--	--	5615
Black willow (*Salix nigra*)	--	--	1972	10	27	10	1999
White oak (*Quercus alba*)	1254	15	2958	15	--	--	4212
Water oak (*Quercus nigra*)	1254	15	2958	15	--	--	4212
Elderberry (*Sambucus canadensis*)	--	--	--	--	41	15	41
Blueberry (Vaccinium corymbosum)	--	--	--	--	27	10	27
Possumhaw (*Viburnum nudum*)	--	--	--	--	27	10	27
TOTAL	**8357**	**100**	**19720**	**100**	**272**	**100**	**28349**

* Planted at a density of 680 stems/acre.

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

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Planting Plan

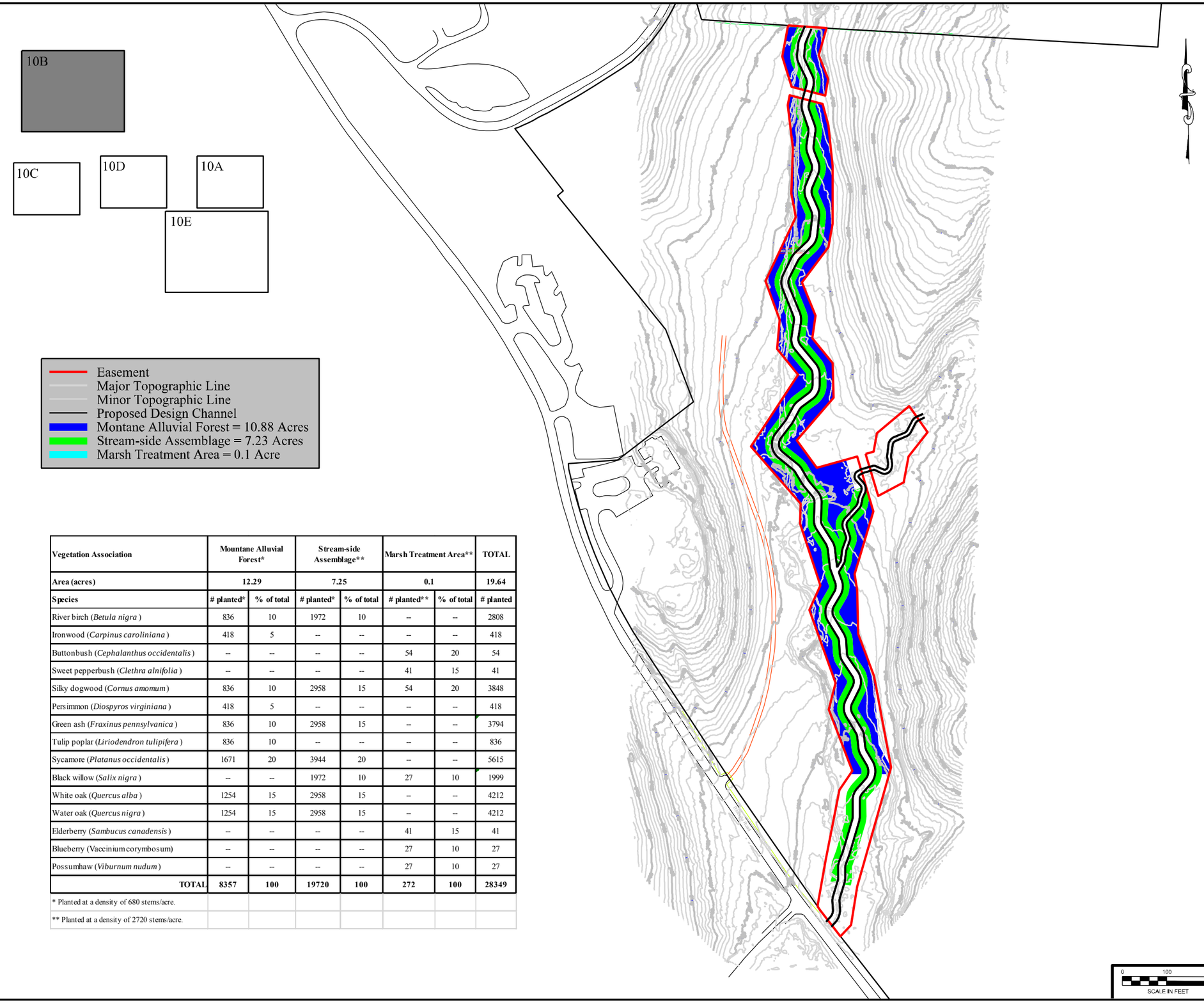
Scale: As Shown

Date: March 2018

Project No.: 17-008

FIGURE NO.

10A



Vegetation Association	Mountane Alluvial Forest*		Stream-side Assemblage**		Marsh Treatment Area**		TOTAL
Area (acres)	**12.29**		**7.25**		**0.1**		**19.64**
Species	**# planted***	**% of total**	**# planted***	**% of total**	**# planted****	**% of total**	**# planted**
River birch (*Betula nigra*)	836	10	1972	10	--	--	2808
Ironwood (*Carpinus caroliniana*)	418	5	--	--	--	--	418
Buttonbush (*Cephalanthus occidentalis*)	--	--	--	--	54	20	54
Sweet pepperbush (*Clethra alnifolia*)	--	--	--	--	41	15	41
Silky dogwood (*Cornus amomum*)	836	10	2958	15	54	20	3848
Persimmon (*Diospyros virginiana*)	418	5	--	--	--	--	418
Green ash (*Fraxinus pennsylvanica*)	836	10	2958	15	--	--	3794
Tulip poplar (*Liriodendron tulipifera*)	836	10	--	--	--	--	836
Sycamore (*Platanus occidentalis*)	1671	20	3944	20	--	--	5615
Black willow (*Salix nigra*)	--	--	1972	10	27	10	1999
White oak (*Quercus alba*)	1254	15	2958	15	--	--	4212
Water oak (*Quercus nigra*)	1254	15	2958	15	--	--	4212
Elderberry (*Sambucus canadensis*)	--	--	--	--	41	15	41
Blueberry (Vaccinium corymbosum)	--	--	--	--	27	10	27
Possumhaw (*Viburnum nudum*)	--	--	--	--	27	10	27
TOTAL	**8357**	**100**	**19720**	**100**	**272**	**100**	**28349**

* Planted at a density of 680 stems/acre.

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

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Planting Plan

Scale: As Shown

Date: March 2018

Project No.: 17-008

FIGURE NO.

10B

Vegetation Association	Mountane Alluvial Forest*		Stream-side Assemblage**		Marsh Treatment Area**		TOTAL
Area (acres)	**12.29**		**7.25**		**0.1**		**19.64**
Species	**# planted***	**% of total**	**# planted***	**% of total**	**# planted****	**% of total**	**# planted**
River birch (*Betula nigra*)	836	10	1972	10	--	--	2808
Ironwood (*Carpinus caroliniana*)	418	5	--	--	--	--	418
Buttonbush (*Cephalanthus occidentalis*)	--	--	--	--	54	20	54
Sweet pepperbush (*Clethra alnifolia*)	--	--	--	--	41	15	41
Silky dogwood (*Cornus amomum*)	836	10	2958	15	54	20	3848
Persimmon (*Diospyros virginiana*)	418	5	--	--	--	--	418
Green ash (*Fraxinus pennsylvanica*)	836	10	2958	15	--	--	3794
Tulip poplar (*Liriodendron tulipifera*)	836	10	--	--	--	--	836
Sycamore (*Platanus occidentalis*)	1671	20	3944	20	--	--	5615
Black willow (*Salix nigra*)	--	--	1972	10	27	10	1999
White oak (*Quercus alba*)	1254	15	2958	15	--	--	4212
Water oak (*Quercus nigra*)	1254	15	2958	15	--	--	4212
Elderberry (*Sambucus canadensis*)	--	--	--	--	41	15	41
Blueberry (Vaccinium corymbosum)	--	--	--	--	27	10	27
Possumhaw (*Viburnum nudum*)	--	--	--	--	27	10	27
TOTAL	**8357**	**100**	**19720**	**100**	**272**	**100**	**28349**
* Planted at a density of 680 stems/acre.							
** Planted at a density of 2720 stems/acre.							

Easement
Major Topographic Line
Minor Topographic Line
Proposed Design Channel
Montane Alluvial Forest = 10.88 Acres
Stream-side Assemblage = 7.23 Acres
Marsh Treatment Area = 0.1 Acre

Old Farm School Road

10B
10C
10D
10A
10E

0 100 200
SCALE IN FEET

Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

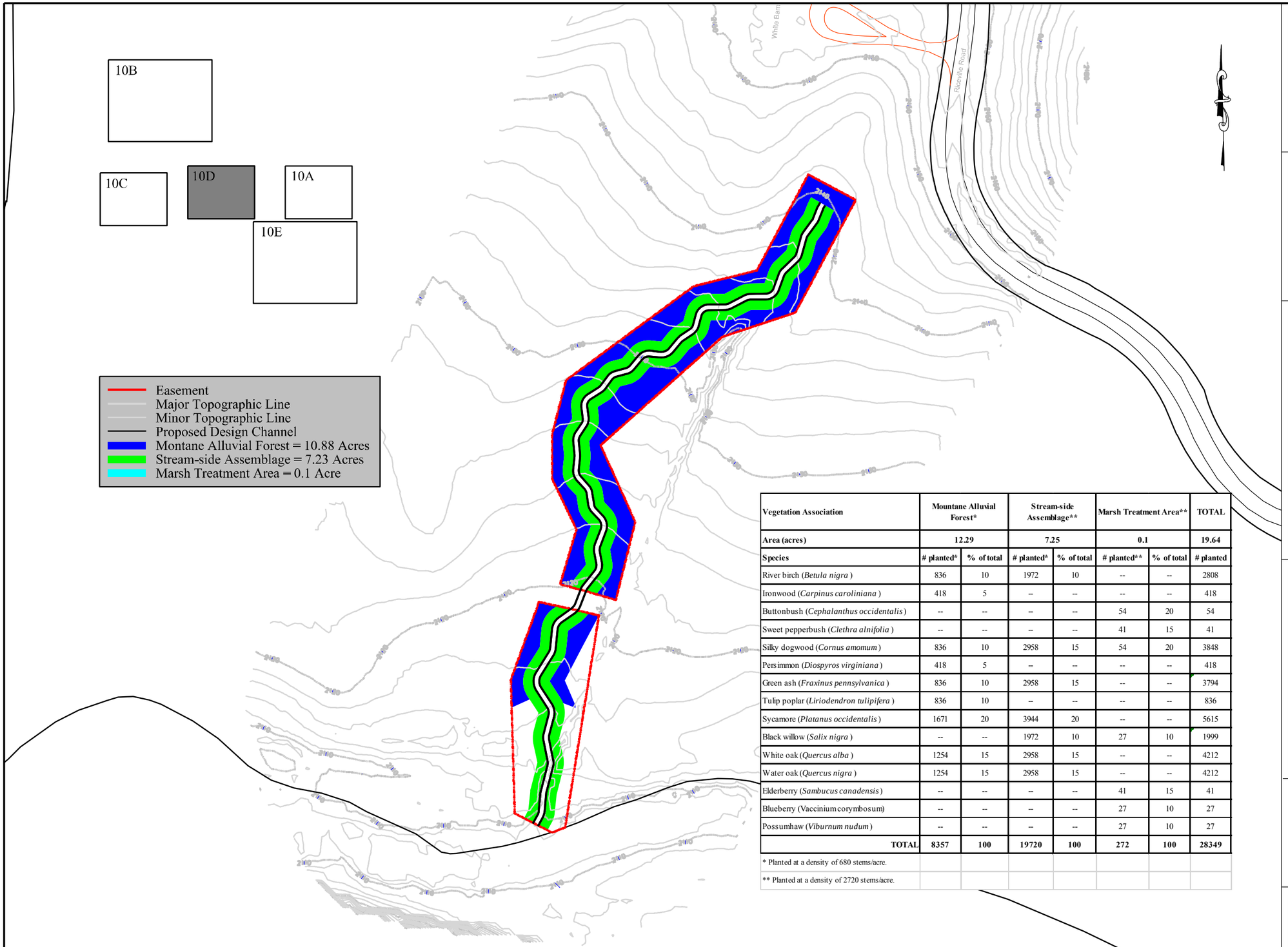
Buncombe County North Carolina

Title:

Planting Plan

Scale: As Shown
Date: March 2018
Project No.: 17-008

FIGURE NO.
10C



Vegetation Association	Mountane Alluvial Forest*		Stream-side Assemblage**		Marsh Treatment Area**		TOTAL
Area (acres)	12.29		7.25		0.1		19.64
Species	# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
River birch (*Betula nigra*)	836	10	1972	10	--	--	2808
Ironwood (*Carpinus caroliniana*)	418	5	--	--	--	--	418
Buttonbush (*Cephalanthus occidentalis*)	--	--	--	--	54	20	54
Sweet pepperbush (*Clethra alnifolia*)	--	--	--	--	41	15	41
Silky dogwood (*Cornus amomum*)	836	10	2958	15	54	20	3848
Persimmon (*Diospyros virginiana*)	418	5	--	--	--	--	418
Green ash (*Fraxinus pennsylvanica*)	836	10	2958	15	--	--	3794
Tulip poplar (*Liriodendron tulipifera*)	836	10	--	--	--	--	836
Sycamore (*Platanus occidentalis*)	1671	20	3944	20	--	--	5615
Black willow (*Salix nigra*)	--	--	1972	10	27	10	1999
White oak (*Quercus alba*)	1254	15	2958	15	--	--	4212
Water oak (*Quercus nigra*)	1254	15	2958	15	--	--	4212
Elderberry (*Sambucus canadensis*)	--	--	--	--	41	15	41
Blueberry (Vaccinium corymbosum)	--	--	--	--	27	10	27
Possumhaw (*Viburnum nudum*)	--	--	--	--	27	10	27
TOTAL	8357	100	19720	100	272	100	28349

* Planted at a density of 680 stems/acre.

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

Axiom Environmental, Inc.

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NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Planting Plan

Scale: As Shown

Date: March 2018

Project No.: 17-008

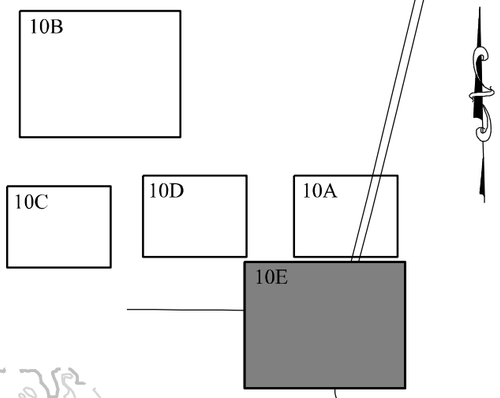
FIGURE NO.

10D

Vegetation Association	Mountane Alluvial Forest*		Stream-side Assemblage**		Marsh Treatment Area**		TOTAL
Area (acres)	**12.29**		**7.25**		**0.1**		**19.64**
Species	**# planted***	**% of total**	**# planted***	**% of total**	**# planted****	**% of total**	**# planted**
River birch (*Betula nigra*)	836	10	1972	10	--	--	2808
Ironwood (*Carpinus caroliniana*)	418	5	--	--	--	--	418
Buttonbush (*Cephalanthus occidentalis*)	--	--	--	--	54	20	54
Sweet pepperbush (*Clethra alnifolia*)	--	--	--	--	41	15	41
Silky dogwood (*Cornus amomum*)	836	10	2958	15	54	20	3848
Persimmon (*Diospyros virginiana*)	418	5	--	--	--	--	418
Green ash (*Fraxinus pennsylvanica*)	836	10	2958	15	--	--	3794
Tulip poplar (*Liriodendron tulipifera*)	836	10	--	--	--	--	836
Sycamore (*Platanus occidentalis*)	1671	20	3944	20	--	--	5615
Black willow (*Salix nigra*)	--	--	1972	10	27	10	1999
White oak (*Quercus alba*)	1254	15	2958	15	--	--	4212
Water oak (*Quercus nigra*)	1254	15	2958	15	--	--	4212
Elderberry (*Sambucus canadensis*)	--	--	--	--	41	15	41
Blueberry (Vaccinium corymbosum)	--	--	--	--	27	10	27
Possumhaw (*Viburnum nudum*)	--	--	--	--	27	10	27
TOTAL	**8357**	**100**	**19720**	**100**	**272**	**100**	**28349**

* Planted at a density of 680 stems/acre.

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



Easement
Major Topographic Line
Minor Topographic Line
Proposed Design Channel
Montane Alluvial Forest = 10.88 Acres
Stream-side Assemblage = 7.23 Acres
Marsh Treatment Area = 0.1 Acre

0 100 200
SCALE IN FEET

Axiom Environmental, Inc.

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NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Planting Plan

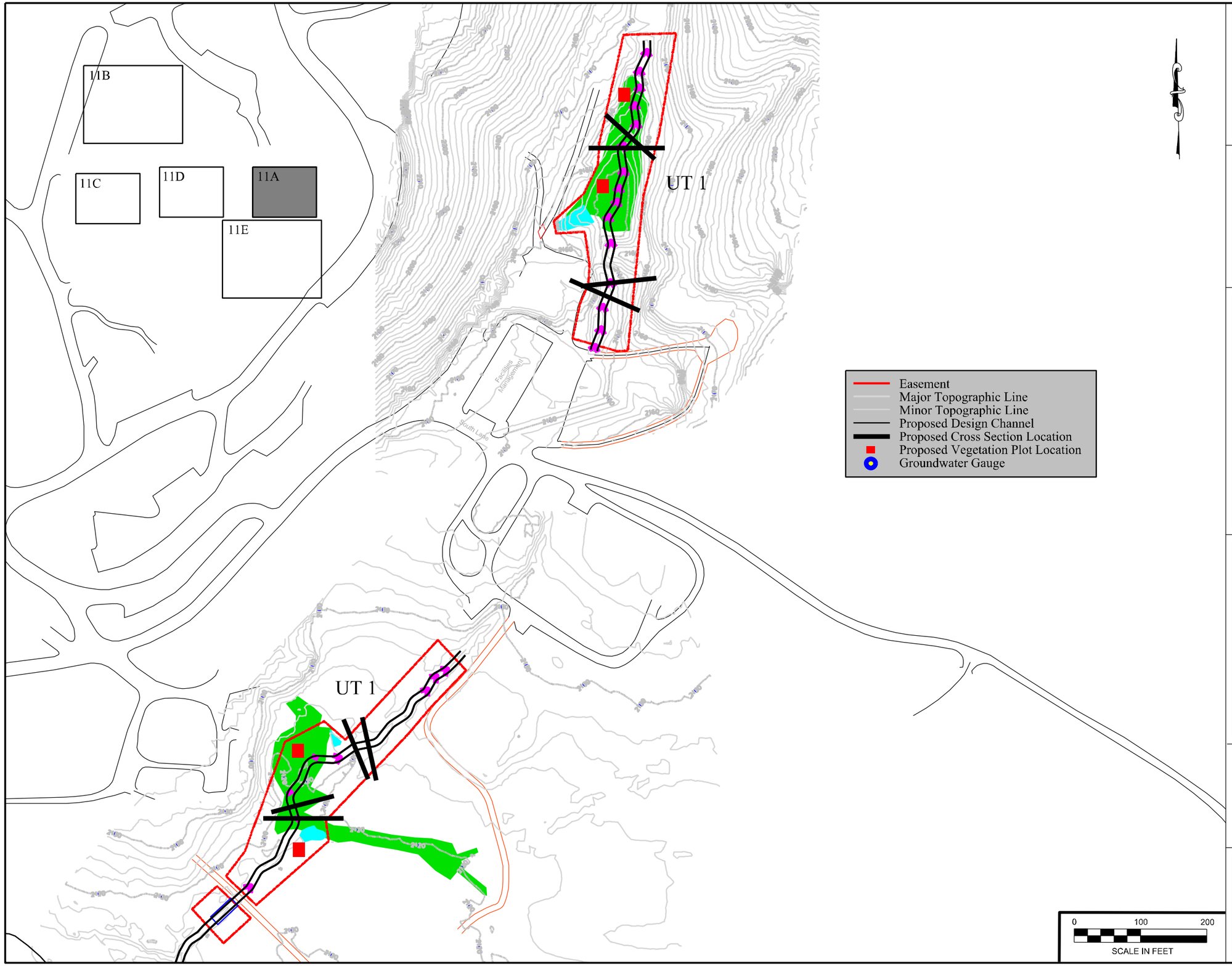
Scale: As Shown

Date: March 2018

Project No.: 17-008

FIGURE NO.

10E



Axiom Environmental, Inc.

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NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Monitoring Plan

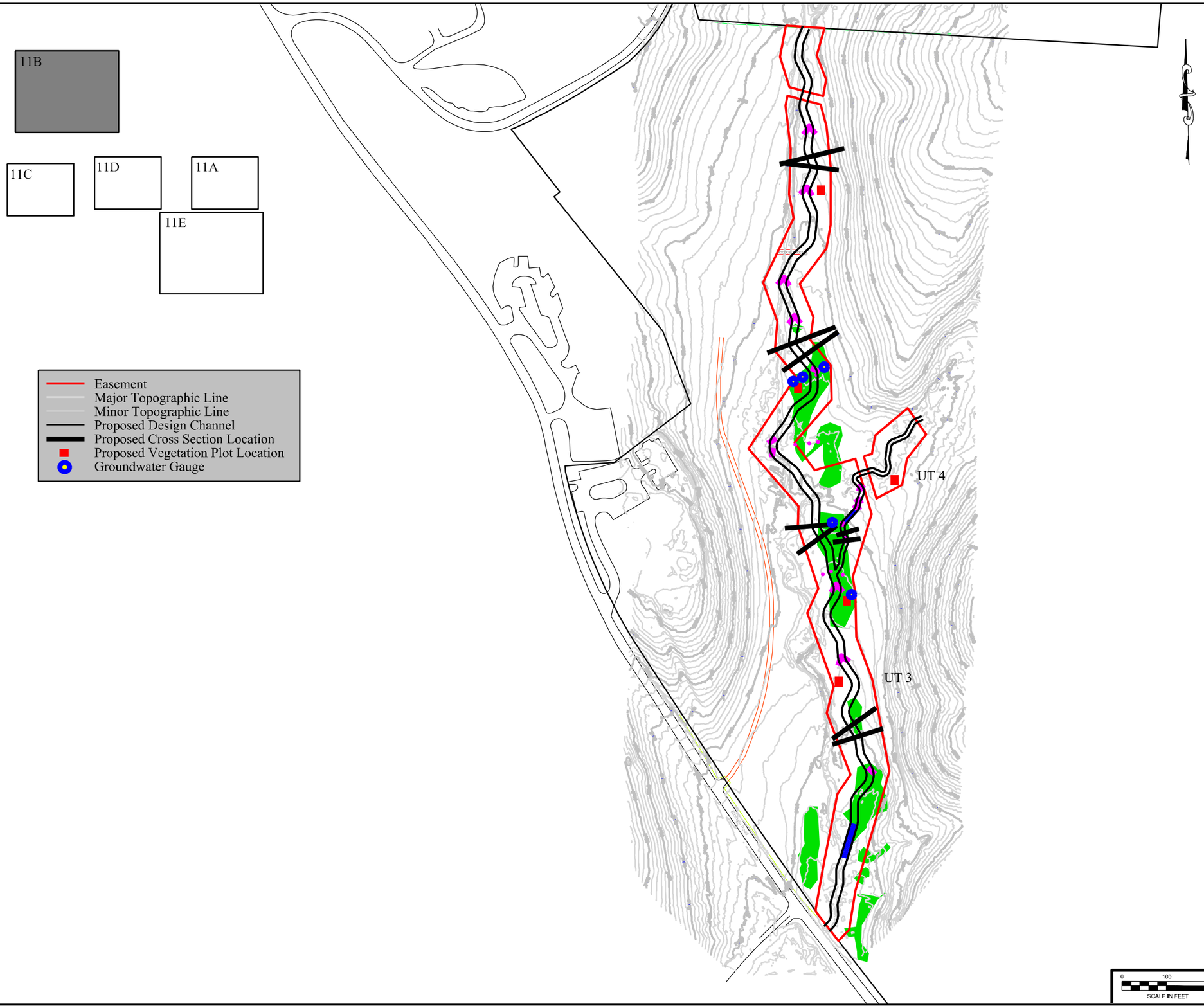
Scale: As Shown

Date: March 2018

Project No.: 17-008

FIGURE NO.

11A



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NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Monitoring Plan

Scale: As Shown

Date: March 2018

Project No.: 17-008

FIGURE NO.

11B

Easement
Major Topographic Line
Minor Topographic Line
Proposed Design Channel
Proposed Cross Section Location
Proposed Vegetation Plot Location
Groundwater Gauge

Old Farm School Road

UT 3

11B
11C
11D
11A
11E

0 100 200
SCALE IN FEET

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NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Monitoring Plan

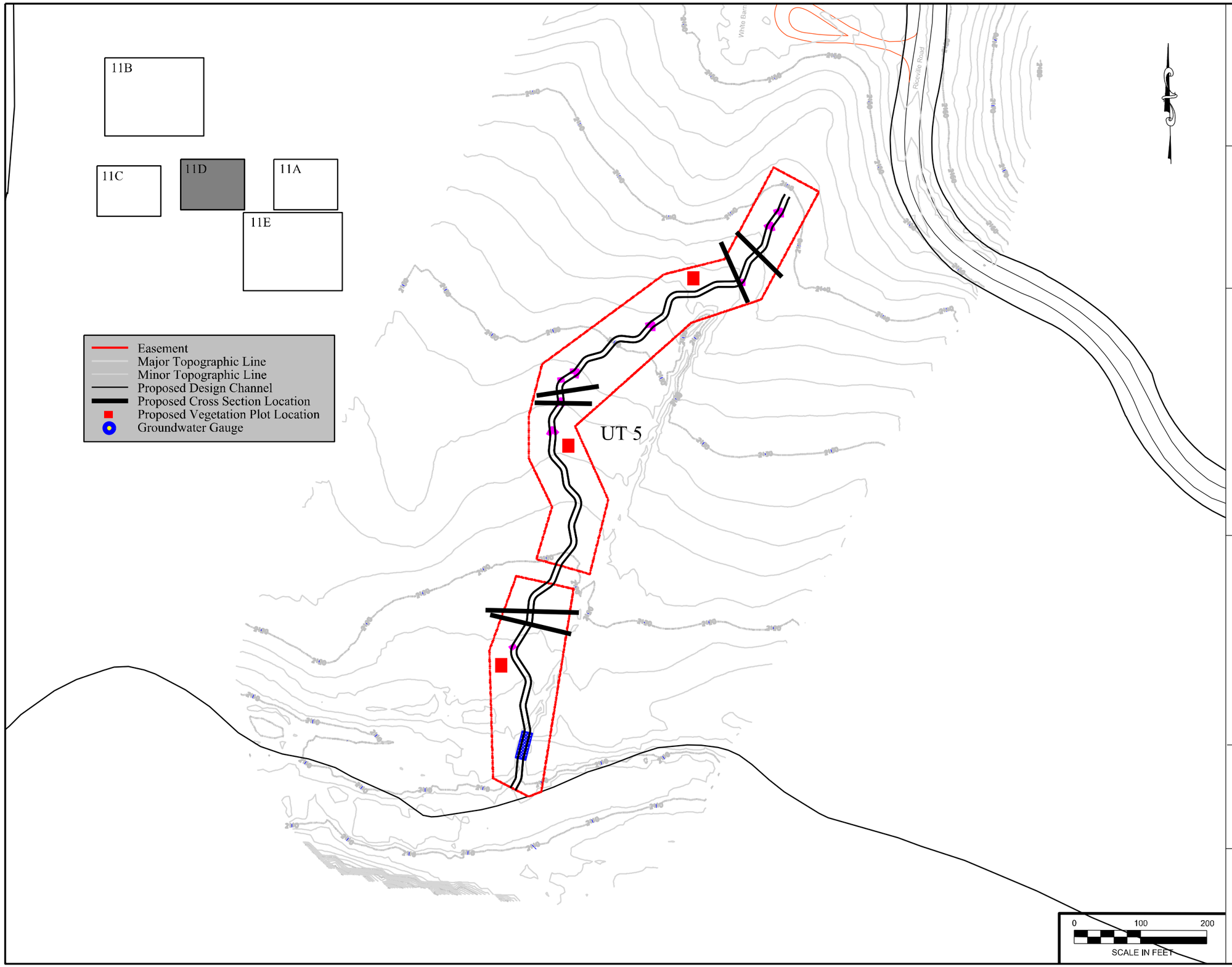
Scale: As Shown

Date: March 2018

Project No.: 17-008

FIGURE NO.

11C



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Monitoring Plan

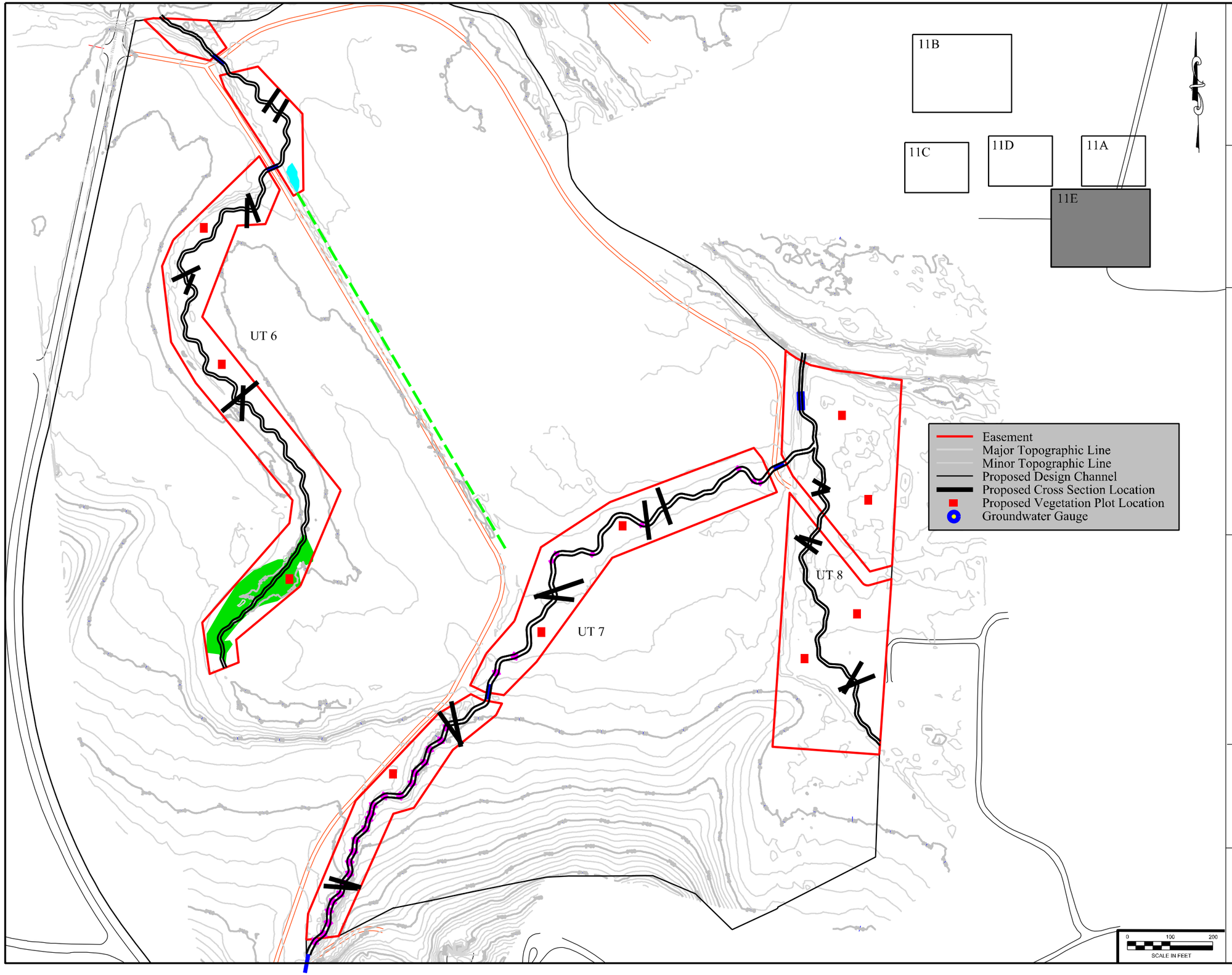
Scale: As Shown

Date: March 2018

Project No.: 17-008

FIGURE NO.

11D



Axiom Environmental, Inc.

RESTORATION SYSTEMS | LLC

NOTES/REVISIONS

Project:

Warren Wilson College Mitigation Site

Buncombe County North Carolina

Title:

Monitoring Plan

Scale: As Shown

Date: March 2018

Project No.: 17-008

FIGURE NO.

11E

Appendix B
Stream Data

- Table B1. Warren Wilson College Morphological Stream Characteristics
- Existing Stream Cross-section Data
- BEHI & NBS Data
- NC SAM Forms

Table B1. Warren Wilson College Morphological Stream Characteristics

Variables	UT 4 Reference	Chemtronics Ref	UT 1 Existing	UT 1 Proposed
Stream Type	Eb 4	B 4	Cg 4	Cb 4
Drainage Area (mi^2)	0.21	1.04	0.27	0.27
Bankfull Discharge (cfs)	29.6	69.5	27.7	27.7
Dimension Variables				
Bankfull Cross-Sectional Area (A_{bkf})	6.2	16.7	3.2 - 7.1	7.1
Existing Cross-Sectional Area at TOB ($A_{existing}$)	6.2	16.7	3.2 - 97.4	7.1
Bankfull Width (W_{bkf})	Mean: 6.8 Range: 5.1-9.4	Mean: 14.0 Range: 11.3 - 15.8	Mean: 10.9 Range: 2.6 to 19.3	Mean: 10.0 Range: 9.2 to 10.7
Bankfull Mean Depth (D_{bkf})	Mean: 0.9 Range: 0.8-1.0	Mean: 1.2 Range: 1.0 - 1.4	Mean: 0.6 Range: 0.4 to 1.2	Mean: 0.7 Range: 0.7 to 0.8
Bankfull Maximum Depth (D_{max})	Mean: 1.4 Range: 1.3-1.5	Mean: 1.8 Range: 1.7 - 2.0	Mean: 1.7 Range: 0.6 to 1.7	Mean: 1.1 Range: 0.9 to 1.3
Pool Width (W_{pool})	Mean: 9.5 Range: 6.4-12.5	Mean: 9.7 Range: 9.0 - 10.1	Mean: 12.7 Range: 8.8 to 16.5	Mean: 11.0 Range: 10.0 to 19.9
Maximum Pool Depth (D_{pool})	Mean: 2.3 Range: 2.0-2.6	Mean: 2.1 Range: 1.9 - 2.3	Mean: 1.8 Range: 1.8 to 1.8	Mean: 1.4 Range: 1.0 to 1.4
Width of Floodprone Area (W_{fpa})	Mean: 20 Range: 15-28	Mean: 19 Range: 16.5 - 22.0	Mean: 55 Range: 27 to 75	Mean: 55 Range: 25 to 75
Dimension Ratios				
Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean: 2.9 Range: 2.7-3.0	Mean: 1.4 Range: 1.3 - 1.5	Mean: 6.9 Range: 1.4 to 21.2	Mean: 2.9 Range: 1.3 to 3.0
Width / Depth Ratio (W_{bkf}/D_{bkf})	Mean: 7.6 Range: 5.1-11.8	Mean: 12.0 Range: 8.1 - 14.8	Mean: 17.0 Range: 2.1 to 53.2	Mean: 14.0 Range: 12.0 to 16.0
Max. D_{bkf} / D_{bkf} Ratio	Mean: 1.5 Range: 1.3-1.9	Mean: 1.5 Range: 1.2 - 1.7	Mean: 1.7 Range: 1.4 to 2.6	Mean: 1.5 Range: 1.2 to 1.7
Low Bank Height / Max. D_{bkf} Ratio	Mean: 1.0 Range:	Mean: 1.0 Range:	Mean: 1.8 Range: 1.0 to 5.7	Mean: 1.0 Range: 1.0 to 1.3
Maximum Pool Depth / Bankfull Mean Depth (D_{pool}/D_{bkf})	Mean: 2.5 Range: 2.1-2.8	Mean: 1.8 Range: 1.6 - 1.9	Mean: 2.8 Range: 2.8 to 2.8	Mean: 1.9 Range: 1.4 to 2.0
Pool Width / Bankfull Width (W_{pool}/W_{bkf})	Mean: 1.4 Range: 0.9-1.8	Mean: 0.7 Range: 0.6 - 0.7	Mean: 1.2 Range: 0.8 to 1.5	Mean: 1.1 Range: 1.0 to 2.0
Pool Area / Bankfull Cross Sectional Area	Mean: 1.5 Range: 1.5-1.6	Mean: 0.8 Range: 0.7 - 1.0	Mean: 0.9 Range: 0.8 to 1.0	Mean: 1.2 Range: 1.0 to 1.5

Variables	UT 4 Reference	Chemtronics Ref	UT 1 Existing	UT 1 Proposed
Pattern Variables				
Pool to Pool Spacing (L_{p-p})	Med: 37.1 Range: 27.3-45.8	Med: 50.7 Range: 28.8 - 70.7	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 39.9 Range: 29.9 to 69.8
Meander Length (L_m)	Med: 63.8 Range: 56.5-76.0	Med: 96.3 Range: 59.8 - 117.2		Med: 84.7 Range: 59.8 to 119.6
Belt Width (W_{belt})	Med: 19.0 Range: 15.4-25.2	Med: 14.7 Range: 13.4 - 16.6		Med: 29.9 Range: 15.0 to 39.9
Radius of Curvature (R_c)	Med: 15.8 Range: 8.7-29.4	Med: 30.9 Range: 10.7 - 46.1		Med: 29.9 Range: 19.9 to 39.9
Sinuosity (Sin)	1.16	1.03	1.02	1.05
Pattern Ratios				
Pool to Pool Spacing/ Bankfull Width (L_{p-p}/W_{bkf})	Med: 5.5 Range: 4.0-6.7	Med: 3.6 Range: 2.1 - 5.1	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 7.0
Meander Length/ Bankfull Width (L_m/W_{bkf})	Med: 9.4 Range: 8.3-11.2	Med: 6.9 Range: 4.3 - 8.4		Med: 8.5 Range: 6.0 to 12.0
Meander Width Ratio (W_{belt}/W_{bkf})	Med: 2.8 Range: 2.3-3.7	Med: 1.1 Range: 1.0 - 1.2		Med: 3.0 Range: 1.5 to 4.0
Radius of Curvature/ Bankfull Width (Rc/W_{bkf})	Med: 2.3 Range: 1.3-4.3	Med: 2.2 Range: 0.8 - 3.3		Med: 3.0 Range: 2.0 to 4.0

Variables	UT 4 Reference	Chemtronics Ref	UT 1 Existing	UT 1 Proposed
Profile Variables				
Average Water Surface Slope (S_{ave})	0.0226	0.0167	0.0294	0.0286
Valley Slope (S_{valley})	0.0262	0.0172	0.0300	0.0300
Riffle Slope (S_{riffle})	Mean: 0.0400 Range: 0.0090-0.0754	Mean: 0.0228 Range: 0.0156 - 0.0468	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 0.0457 Range: 0.0286 to 0.0857
Pool Slope (S_{pool})	Mean: 0.0021 Range: 0-0.0243	Mean: 0.0006 Range: 0 - 0.0080		Mean: 0.0029 Range: 0.0000 to 0.0200
Run Slope (S_{run})	Mean: 0.0075 Range: 0-0.3661	Mean: 0.0217 Range: 0.008 - 0.0737		Mean: 0.0371 Range: 0.0000 to 0.2000
Glide Slope (S_{glide})	Mean: 0.0032 Range: 0.0016-0.0179	Mean: 0.0039 Range: 0 - 0.0149		Mean: 0.0031 Range: 0.0000 to 0.0143
Profile Ratios				
Riffle Slope/ Water Surface Slope (S_{riffle}/S_{ave})	Mean: 1.8 Range: 0.4-3.3	Mean: 1.4 Range: 0.9 - 2.8	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.6 Range: 1.0 to 3.0
Pool Slope/Water Surface Slope (S_{pool}/S_{ave})	Mean: 0.1 Range: 0-1.1	Mean: 0.04 Range: 0 - 0.5		Mean: 0.10 Range: 0.0 to 0.7
Run Slope/Water Surface Slope (S_{run}/S_{ave})	Mean: 0.33 Range: 0-16.2	Mean: 1.30 Range: 0.5 - 4.4		Mean: 1.30 Range: 0.0 to 7.0
Glide Slope/Water Surface Slope (S_{glide}/S_{ave})	Mean: 0.14 Range: 0.07-0.8	Mean: 0.20 Range: 0 - 0.9		Mean: 0.11 Range: 0.0 to 0.5

Table B1. Warren Wilson College Morphological Stream Characteristics (continued)

Variables	UT 3 Upper Existing	UT 3 Upper Proposed	UT 5 Existing	UT 5 Proposed
Stream Type	Eg 4	Ce 4	G 3	Ce 4
Drainage Area (mi^2)	1.09	1.09	0.15	0.15
Bankfull Discharge (cfs)	75.8	75.8	18.1	18.1
Dimension Variables				
Bankfull Cross-Sectional Area (A_{bkf})	18.2	18.2	4.8	4.8
Existing Cross-Sectional Area at TOB ($A_{existing}$)	39.6 - 60.4	18.2	18.7 - 57.3	4.8
Bankfull Width (W_{bkf})	Mean: 12.1 Range: 11.5 to 14.1	Mean: 16.0 Range: 14.8 to 17.1	Mean: 6.1 Range: 5.6 to 7.6	Mean: 8.2 Range: 7.6 to 8.8
Bankfull Mean Depth (D_{bkf})	Mean: 1.5 Range: 1.3 to 1.6	Mean: 1.1 Range: 1.1 to 1.2	Mean: 0.8 Range: 0.6 to 0.9	Mean: 0.6 Range: 0.5 to 0.6
Bankfull Maximum Depth (D_{max})	Mean: 2.0 Range: 1.6 to 2.2	Mean: 1.7 Range: 1.4 to 2.1	Mean: 1.2 Range: 0.8 to 1.3	Mean: 0.9 Range: 0.7 to 1.1
Pool Width (W_{pool})	Mean: 16.4 Range: 13.9 to 18.9	Mean: 17.6 Range: 16.0 to 31.9	Mean: 6.6 Range: 5.6 to 7.5	Mean: 9.0 Range: 8.2 to 16.4
Maximum Pool Depth (D_{pool})	Mean: 1.9 Range: 1.9 to 1.9	Mean: 2.2 Range: 1.6 to 2.3	Mean: 1.1 Range: 1.0 to 1.2	Mean: 1.1 Range: 0.8 to 1.2
Width of Floodprone Area (W_{fpa})	Mean: 29 Range: 19 to 100	Mean: 100 Range: 80 to 120	Mean: 9 Range: 8 to 9	Mean: 100 Range: 80 to 120
Dimension Ratios				
Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean: 2.5 Range: 1.3 to 8.3	Mean: 6.3 Range: 5.4 to 7.0	Mean: 1.4 Range: 1.2 to 1.5	Mean: 12.2 Range: 10.5 to 13.7
Width / Depth Ratio (W_{bkf}/D_{bkf})	Mean: 8.0 Range: 7.3 to 10.9	Mean: 14.0 Range: 12.0 to 16.0	Mean: 7.8 Range: 6.5 to 12.0	Mean: 14.0 Range: 12.0 to 16.0
Max. D_{bkf} / D_{bkf} Ratio	Mean: 1.3 Range: 1.2 to 1.5	Mean: 1.5 Range: 1.2 to 1.7	Mean: 1.4 Range: 1.3 to 1.7	Mean: 1.5 Range: 1.2 to 1.7
Low Bank Height / Max. D_{bkf} Ratio	Mean: 2.0 Range: 1.8 to 2.4	Mean: 1.0 Range: 1.0 to 1.3	Mean: 4.8 Range: 2.4 to 5.8	Mean: 1.0 Range: 1.0 to 1.3
Maximum Pool Depth / Bankfull Mean Depth (D_{pool}/D_{bkf})	Mean: 1.3 Range: 1.3 to 1.3	Mean: 1.9 Range: 1.4 to 2.0	Mean: 1.4 Range: 1.3 to 1.5	Mean: 1.9 Range: 1.4 to 2.0
Pool Width / Bankfull Width (W_{pool}/W_{bkf})	Mean: 1.4 Range: 1.1 to 1.6	Mean: 1.1 Range: 1.0 to 2.0	Mean: 1.1 Range: 0.9 to 1.2	Mean: 1.1 Range: 1.0 to 2.0
Pool Area / Bankfull Cross Sectional Area	Mean: 1.0 Range: 1.0 to 1.0	Mean: 1.2 Range: 1.0 to 1.5	Mean: 1.0 Range: 1.0 to 1.0	Mean: 1.2 Range: 1.0 to 1.5

Variables	UT 3 Upper Existing	UT 3 Upper Proposed	UT 5 Existing	UT 5 Proposed
Pattern Variables				
Pool to Pool Spacing (L_{p-p})	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 63.8 Range: 47.9 to 111.7	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 32.8 Range: 24.6 to 57.4
Meander Length (L_m)		Med: 135.7 Range: 95.8 to 191.5		Med: 69.7 Range: 49.2 to 98.4
Belt Width (W_{belt})		Med: 47.9 Range: 23.9 to 63.8		Med: 24.6 Range: 12.3 to 32.8
Radius of Curvature (R_c)		Med: 47.9 Range: 31.9 to 63.8		Med: 24.6 Range: 16.4 to 32.8
Sinuosity (Sin)	1.06	1.10	1.05	1.10
Pattern Ratios				
Pool to Pool Spacing/ Bankfull Width (L_{p-p}/W_{bkf})	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 7.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 7.0
Meander Length/ Bankfull Width (L_m/W_{bkf})		Med: 8.5 Range: 6.0 to 12.0		Med: 8.5 Range: 6.0 to 12.0
Meander Width Ratio (W_{belt}/W_{bkf})		Med: 3.0 Range: 1.5 to 4.0		Med: 3.0 Range: 1.5 to 4.0
Radius of Curvature/ Bankfull Width (Rc/W_{bkf})		Med: 3.0 Range: 2.0 to 4.0		Med: 3.0 Range: 2.0 to 4.0

Profile Variables				
Average Water Surface Slope (S_{ave})	0.0146	0.0141	0.0140	0.0134
Valley Slope (S_{valley})	0.0155	0.0155	0.0147	0.0147
Riffle Slope (S_{riffle})	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 0.0225 Range: 0.0141 to 0.0423	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 0.0214 Range: 0.0134 to 0.0401
Pool Slope (S_{pool})		Mean: 0.0014 Range: 0.0000 to 0.0099		Mean: 0.0013 Range: 0.0000 to 0.0094
Run Slope (S_{run})		Mean: 0.0183 Range: 0.0000 to 0.0986		Mean: 0.0174 Range: 0.0000 to 0.0935
Glide Slope (S_{glide})		Mean: 0.0016 Range: 0.0000 to 0.0070		Mean: 0.0015 Range: 0.0000 to 0.0067
Profile Ratios				
Riffle Slope/ Water Surface Slope (S_{riffle}/S_{ave})	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.6 Range: 1.0 to 3.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.6 Range: 1.0 to 3.0
Pool Slope/Water Surface Slope (S_{pool}/S_{ave})		Mean: 0.10 Range: 0.0 to 0.7		Mean: 0.10 Range: 0.0 to 0.7
Run Slope/Water Surface Slope (S_{run}/S_{ave})		Mean: 1.30 Range: 0.0 to 7.0		Mean: 1.30 Range: 0.0 to 7.0
Glide Slope/Water Surface Slope (S_{glide}/S_{ave})		Mean: 0.11 Range: 0.0 to 0.5		Mean: 0.11 Range: 0.0 to 0.5

Table B1. Warren Wilson College Morphological Stream Characteristics (continued)

Variables	UT 6 Existing	UT 6 Proposed	UT 7 Existing	UT 7 Proposed
Stream Type	G 3	Ce 4	Gb 4	Eb 4
Drainage Area (mi^2)	0.08	0.08	0.22	0.22
Bankfull Discharge (cfs)	11.5	11.5	23.9	23.9
Dimension Variables				
Bankfull Cross-Sectional Area (A_{bkf})	3.1	3.1	6.2	6.2
Existing Cross-Sectional Area at TOB ($A_{existing}$)	23.5 - 34.6	3.1	10 - 20.8	6.2
Bankfull Width (W_{bkf})	Mean: 5.5 Range: 4.2 to 6.4	Mean: 6.6 Range: 6.1 to 7.0	Mean: 7.4 Range: 7.0 to 9.7	Mean: 9.3 Range: 8.6 to 10.0
Bankfull Mean Depth (D_{bkf})	Mean: 0.6 Range: 0.5 to 0.7	Mean: 0.5 Range: 0.4 to 0.5	Mean: 0.8 Range: 0.6 to 0.9	Mean: 0.7 Range: 0.6 to 0.7
Bankfull Maximum Depth (D_{max})	Mean: 1.0 Range: 0.6 to 1.3	Mean: 0.7 Range: 0.6 to 0.9	Mean: 1.1 Range: 0.9 to 1.3	Mean: 1.0 Range: 0.8 to 1.2
Pool Width (W_{pool})	Mean: 5.2 Range: 4.4 to 6.0	Mean: 7.2 Range: 6.6 to 13.2	Mean: 5.8 Range: 5.8 to 5.8	Mean: 10.2 Range: 9.3 to 18.6
Maximum Pool Depth (D_{pool})	Mean: 1.0 Range: 0.9 to 1.1	Mean: 0.9 Range: 0.7 to 0.9	Mean: 1.6 Range: 1.5 to 1.6	Mean: 1.3 Range: 0.9 to 1.3
Width of Floodprone Area (W_{fpa})	Mean: 9 Range: 8 to 9	Mean: 50 Range: 25 to 75	Mean: 13 Range: 10 to 17	Mean: 70 Range: 20 to 120
Dimension Ratios				
Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean: 1.5 Range: 1.4 to 2.1	Mean: 7.6 Range: 4.1 to 10.6	Mean: 1.5 Range: 1.4 to 2.4	Mean: 7.5 Range: 2.3 to 12.0
Width / Depth Ratio (W_{bkf}/D_{bkf})	Mean: 9.8 Range: 5.7 to 13.2	Mean: 14.0 Range: 12.0 to 16.0	Mean: 8.8 Range: 7.9 to 15.2	Mean: 14.0 Range: 12.0 to 16.0
Max. D_{bkf} / D_{bkf} Ratio	Mean: 1.8 Range: 1.2 to 1.8	Mean: 1.5 Range: 1.2 to 1.7	Mean: 1.4 Range: 1.1 to 1.5	Mean: 1.5 Range: 1.2 to 1.7
Low Bank Height / Max. D_{bkf} Ratio	Mean: 3.9 Range: 2.8 to 5.0	Mean: 1.0 Range: 1.0 to 1.3	Mean: 1.9 Range: 1.4 to 2.6	Mean: 1.0 Range: 1.0 to 1.3
Maximum Pool Depth / Bankfull Mean Depth (D_{pool}/D_{bkf})	Mean: 1.8 Range: 1.6 to 2.0	Mean: 1.9 Range: 1.4 to 2.0	Mean: 1.8 Range: 1.8 to 1.9	Mean: 1.9 Range: 1.4 to 2.0
Pool Width / Bankfull Width (W_{pool}/W_{bkf})	Mean: 0.9 Range: 0.8 to 1.1	Mean: 1.1 Range: 1.0 to 2.0	Mean: 0.8 Range: 0.8 to 0.8	Mean: 1.1 Range: 1.0 to 2.0
Pool Area / Bankfull Cross Sectional Area	Mean: 1.0 Range: 1.0 to 1.0	Mean: 1.2 Range: 1.0 to 1.5	Mean: 1.0 Range: 1.0 to 1.0	Mean: 1.2 Range: 1.0 to 1.5

Variables	UT 6 Existing	UT 6 Proposed	UT 7 Existing	UT 7 Proposed
Pattern Variables				
Pool to Pool Spacing (L_{p-p})	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 26.4 Range: 19.8 to 46.1	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 37.3 Range: 27.9 to 65.2
Meander Length (L_m)		Med: 56.0 Range: 39.5 to 79.1		Med: 79.2 Range: 55.9 to 111.8
Belt Width (W_{belt})		Med: 19.8 Range: 9.9 to 26.4		Med: 27.9 Range: 14.0 to 37.3
Radius of Curvature (R_c)		Med: 19.8 Range: 13.2 to 26.4		Med: 27.9 Range: 18.6 to 37.3
Sinuosity (Sin)	1.01	1.15	1.03	1.07
Pattern Ratios				
Pool to Pool Spacing/ Bankfull Width (L_{p-p}/W_{bkf})	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 7.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0 Range: 3.0 to 7.0
Meander Length/ Bankfull Width (L_m/W_{bkf})		Med: 8.5 Range: 6.0 to 12.0		Med: 8.5 Range: 6.0 to 12.0
Meander Width Ratio (W_{belt}/W_{bkf})		Med: 3.0 Range: 1.5 to 4.0		Med: 3.0 Range: 1.5 to 4.0
Radius of Curvature/ Bankfull Width (Rc/W_{bkf})		Med: 3.0 Range: 2.0 to 4.0		Med: 3.0 Range: 2.0 to 4.0
Profile Variables				
Average Water Surface Slope (S_{ave})	0.0039	0.0042	0.0202	0.0194
Valley Slope (S_{valley})	0.0039	0.0048	0.0208	0.0208
Riffle Slope (S_{riffle})	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 0.0067 Range: 0.0042 to 0.0125	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 0.0311 Range: 0.0194 to 0.0583
Pool Slope (S_{pool})		Mean: 0.0004 Range: 0.0000 to 0.0029		Mean: 0.0019 Range: 0.0000 to 0.0136
Run Slope (S_{run})		Mean: 0.0054 Range: 0.0000 to 0.0292		Mean: 0.0253 Range: 0.0000 to 0.1361
Glide Slope (S_{glide})		Mean: 0.0005 Range: 0.0000 to 0.0021		Mean: 0.0021 Range: 0.0000 to 0.0097
Profile Ratios				
Riffle Slope/ Water Surface Slope (S_{riffle}/S_{ave})	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.6 Range: 1.0 to 3.0	No distinct repetitive pattern of riffles and pools due to staightening activities	Mean: 1.6 Range: 1.0 to 3.0
Pool Slope/Water Surface Slope (S_{pool}/S_{ave})		Mean: 0.10 Range: 0.0 to 0.7		Mean: 0.10 Range: 0.0 to 0.7
Run Slope/Water Surface Slope (S_{run}/S_{ave})		Mean: 1.30 Range: 0.0 to 7.0		Mean: 1.30 Range: 0.0 to 7.0
Glide Slope/Water Surface Slope (S_{glide}/S_{ave})		Mean: 0.11 Range: 0.0 to 0.5		Mean: 0.11 Range: 0.0 to 0.5

Table B1. Warren Wilson College Morphological Stream Characteristics (continued)

Variables	UT 8 Existing	UT 8 Proposed
Stream Type	Eg 4	C 4
Drainage Area (mi^2)	0.10	0.10
Bankfull Discharge (cfs)	13.5	13.5

Dimension Variables								
Bankfull Cross-Sectional Area (A_{bkf})	3.6				3.6			
Existing Cross-Sectional Area at TOB ($A_{existing}$)	21.6 - 39.3				3.6			
Bankfull Width (W_{bkf})	Mean:		6.8		Mean:		7.1	
	Range:	5.6	to	9.4	Range:	6.6	to	7.6
Bankfull Mean Depth (D_{bkf})	Mean:		0.5		Mean:		0.5	
	Range:	0.4	to	0.6	Range:	0.5	to	0.5
Bankfull Maximum Depth (D_{max})	Mean:		1.0		Mean:		0.8	
	Range:	0.9	to	1.0	Range:	0.6	to	0.9
Pool Width (W_{pool})	Mean:		5.4		Mean:		0.0	
	Range:	4.8	to	6.0	Range:	7.1	to	14.2
Maximum Pool Depth (D_{pool})	Mean:		1.0		Mean:			
	Range:	0.9	to	1.0	Range:	0.7	to	1.0
Width of Floodprone Area (W_{fpa})	Mean:		12		Mean:		50	
	Range:	11	to	19	Range:	25	to	75

Dimension Variables								
Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean:		2.0		Mean:		7.0	
	Range:	1.8	to	2.0	Range:	3.8	to	9.9
Width / Depth Ratio (W_{bkf}/D_{bkf})	Mean:		12.8		Mean:		14.0	
	Range:	8.7	to	24.5	Range:	12.0	to	16.0
Max. D_{bkf} / D_{bkf} Ratio	Mean:		1.7		Mean:		1.5	
	Range:	1.6	to	2.6	Range:	1.2	to	1.7
Low Bank Height / Max. D_{bkf} Ratio	Mean:		2.7		Mean:		1.0	
	Range:	2.3	to	3.8	Range:	1.0	to	1.3
Maximum Pool Depth / Bankfull Mean Depth (D_{pool}/D_{bkf})	Mean:		1.8		Mean:		1.9	
	Range:	1.7	to	1.9	Range:	1.4	to	2.0
Pool Width / Bankfull Width (W_{pool}/W_{bkf})	Mean:		0.8		Mean:		1.1	
	Range:	0.7	to	0.9	Range:	1.0	to	2.0
Pool Area / Bankfull Cross Sectional Area	Mean:		1.0		Mean:		1.2	
	Range:	1.0	to	1.0	Range:	1.0	to	1.5

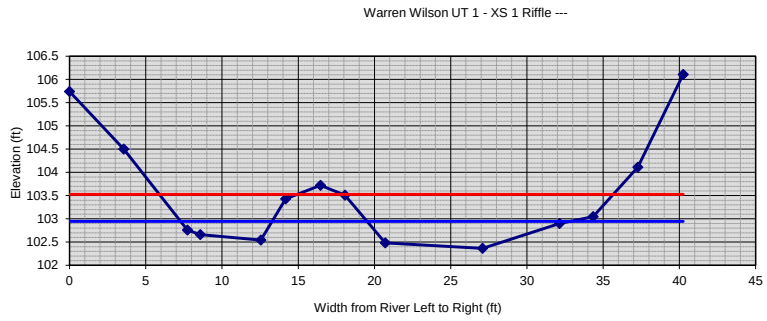
Variables	UT 8 Existing	UT 8 Proposed
Pattern Variables		
Pool to Pool Spacing (L_{p-p})	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 28.4; Range: 21.3 to 49.7
Meander Length (L_m)		Med: ; Range: 42.6 to 85.2
Belt Width (W_{belt})		Med: 21.3; Range: 10.6 to 28.4
Radius of Curvature (R_c)		Med: 21.3; Range: 14.2 to 28.4
Sinuosity (Sin)	1.02	1.15

Pattern Ratios		
Pool to Pool Spacing/ Bankfull Width (L_{p-p}/W_{bkf})	No distinct repetitive pattern of riffles and pools due to staightening activities	Med: 4.0; Range: 3.0 to 7.0
Meander Length/ Bankfull Width (L_m/W_{bkf})		Med: 8.5; Range: 6.0 to 12.0
Meander Width Ratio (W_{belt}/W_{bkf})		Med: 3.0; Range: 1.5 to 4.0
Radius of Curvature/ Bankfull Width (Rc/W_{bkf})		Med: 3.0; Range: 2.0 to 4.0

Profile Variables								
Average Water Surface Slope (S_{ave})	0.0046				0.0144			
Valley Slope (S_{valley})	0.0047				0.0166			
Riffle Slope (S_{riffle})	No distinct repetitive pattern of riffles and pools due to staightening activities				Mean:		0.0231	
					Range:	0.0144	to	0.0433
Pool Slope (S_{pool})					Mean:		0.0014	
					Range:	0.0000	to	0.0101
Run Slope (S_{run})					Mean:		0.0188	
					Range:	0.0000	to	0.1010
Glide Slope (S_{glide})					Mean:		0.0016	
					Range:	0.0000	to	0.0072

Profile Variables								
Riffle Slope/ Water Surface Slope (S_{riffle}/S_{ave})	No distinct repetitive pattern of riffles and pools due to staightening activities				Mean:		1.6	
					Range:	1.0	to	3.0
Pool Slope/Water Surface Slope (S_{pool}/S_{ave})					Mean:		0.10	
					Range:	0.0	to	0.7
Run Slope/Water Surface Slope (S_{run}/S_{ave})					Mean:		1.30	
					Range:	0.0	to	7.0
Glide Slope/Water Surface Slope (S_{glide}/S_{ave})					Mean:		0.11	
					Range:	0.0	to	0.5

Cross Section



section:	Warren Wilson UT 1 - XS 1
	Riffle

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description:	Warren Wilson UT 1 - XS 1
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	-5.7415	105.7415
	☐	3.555355	-4.50029	104.5003
	☐	7.729957	-2.76073	102.7607
	☐	8.576286	-2.66043	102.6604
	☐	12.54284	-2.54288	102.5429
	☐	14.17668	-3.43055	103.4305
	☐	16.45862	-3.72154	103.7215
	☐	18.06207	-3.50852	103.5085
	☐	20.70447	-2.48346	102.4835
	☐	27.09144	-2.36374	102.3637
	☐	32.13777	-2.89826	102.8983
	☐	34.34037	-3.04848	103.0485
	☐	37.26937	-4.11229	104.1123
	☐	40.2483	-6.10945	106.1095
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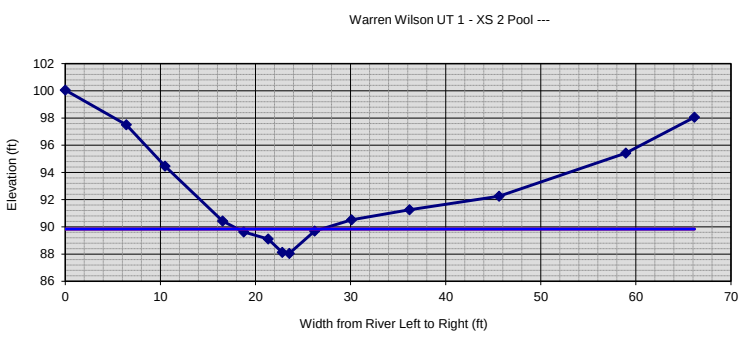
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
-2.945	-5.74	27.0		
102.945	105.74			

dimensions			
7.0	x-section area	0.4	d mean
19.3	width	19.6	wet P
0.6	d max	0.4	hyd radi
3.4	bank ht	53.6	w/d ratio
27.0	W flood prone area	1.4	ent ratio

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

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

Cross Section



section:	Warren Wilson UT 1 - XS 2
	Pool

	---
description:	Warren Wilson UT 1 - XS 2
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	-0.05262	100.0526
	☐	6.422292	2.490392	97.50961
	☐	10.49279	5.541728	94.45827
	☐	16.54843	9.569745	90.43026
	☐	18.75209	10.38	89.62001
	☐	21.33352	10.88693	89.11308
	☐	22.81788	11.87206	88.12794
	☐	23.55557	11.95401	88.04599
	☐	26.21206	10.31208	89.68792
	☐	30.09953	9.485252	90.51475
	☐	36.18931	8.742665	91.25734
	☐	45.61207	7.744249	92.25575
	☐	58.94489	4.572515	95.42749
	☐	66.1633	1.939657	98.06034
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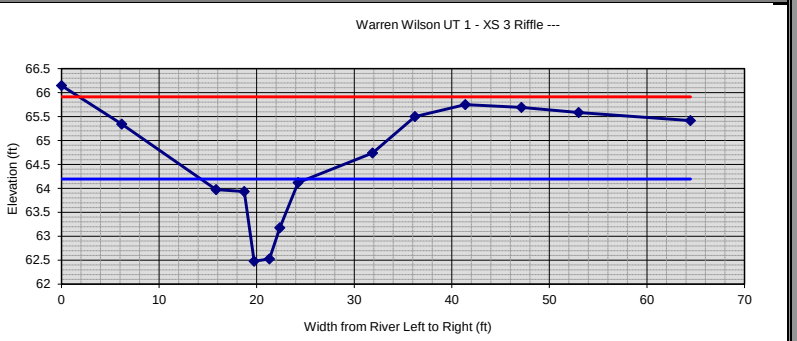
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
10.16	2.49			
89.84	97.51			

dimensions			
7.0	x-section area	0.8	d mean
8.8	width	9.6	wet P
1.8	d max	0.7	hyd radi
9.5	bank ht	~~10.9~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section:	Warren Wilson UT 1 - XS 3
	Riffle

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description:	Warren Wilson UT 1 - XS 3
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	33.85417	66.14583
	☐	6.182148	34.65903	65.34097
	☐	15.85087	36.02569	63.97431
	☐	18.73327	36.06526	63.93474
	☐	19.74979	37.52063	62.47937
	☐	21.30998	37.47219	62.52782
	☐	22.37771	36.82275	63.17725
	☐	24.25283	35.87971	64.12029
	☐	31.88606	35.26074	64.73926
	☐	36.22892	34.50254	65.49746
	☐	41.38657	34.25079	65.74921
	☐	47.13915	34.3099	65.6901
	☐	53.00162	34.41621	65.58379
	☐	64.46118	34.58417	65.41584

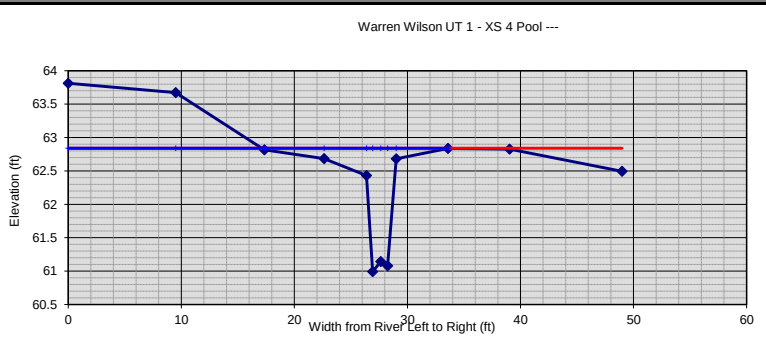
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
35.805	34.5	75.0		
64.195	65.5			

dimensions			
7.0	x-section area	0.6	d mean
10.9	width	12.1	wet P
1.7	d max	0.6	hyd radi
3.0	bank ht	16.9	w/d ratio
75.0	W flood prone area	6.9	ent ratio

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

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

Cross Section



section:	Warren Wilson UT 1 - XS 4
	Pool

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description:	Warren Wilson UT 1 - XS 4
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	36.18746	63.81254
	☐	9.508395	36.32766	63.67234
	☐	17.34472	37.18362	62.81638
	☐	22.62225	37.31601	62.68399
	☐	26.38468	37.56895	62.43106
	☐	26.92107	39.00776	60.99224
	☐	27.64594	38.85648	61.14352
	☐	28.2491	38.9203	61.07971
	☐	29.00636	37.31881	62.68119
	☐	33.58861	37.1641	62.8359
	☑	39.03936	37.17452	62.82548
	☑	48.98015	37.50526	62.49474

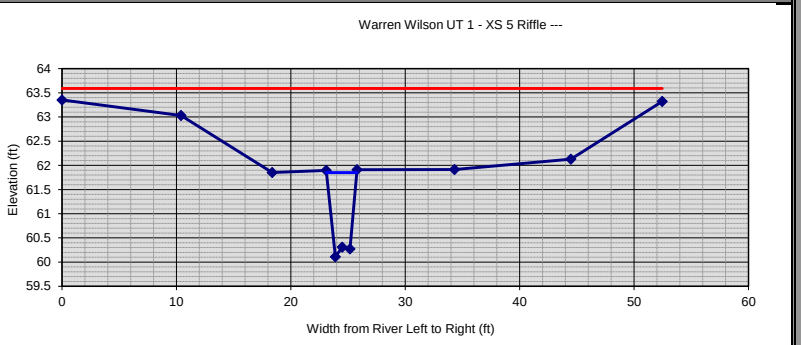
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
37.16	37.16			
62.84	62.84			

dimensions			
5.6	x-section area	0.3	d mean
16.5	width	18.5	wet P
1.8	d max	0.3	hyd radi
1.8	bank ht	~~48.6~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section: Warren Wilson UT 1 - XS 5

Riffle

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description: Warren Wilson UT 1 - XS 5

height of instrument (ft): 100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☑	0	36.64756	63.35244
	☑	10.40116	36.96849	63.03151
	☑	18.37852	38.14908	61.85092
	☐	23.09864	38.10539	61.89462
	☐	23.89437	39.88991	60.11009
	☐	24.49073	39.69074	60.30926
	☐	25.16894	39.72892	60.27108
	☐	25.77831	38.08945	61.91055
	☑	34.31054	38.08613	61.91387
	☑	44.4803	37.87272	62.12728
	☑	52.45703	36.67833	63.32167
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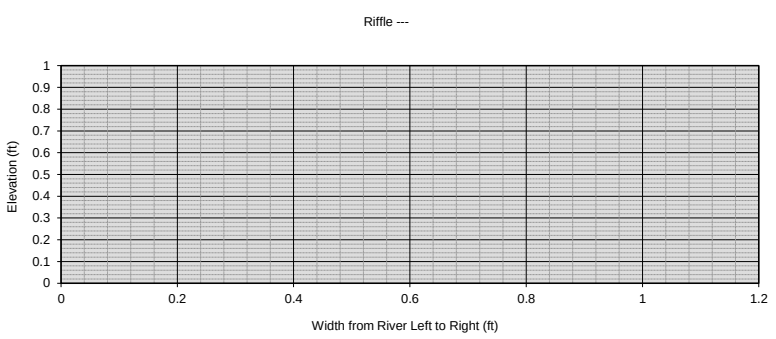
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
38.15	38.15	55.0		
61.85	61.85			

dimensions			
3.2	x-section area	1.2	d mean
2.6	width	4.9	wet P
1.7	d max	0.6	hyd radi
1.7	bank ht	2.2	w/d ratio
55.0	W flood prone area	20.9	ent ratio

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

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

Cross Section



section:

Riffle

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description:

height of instrument (ft):

notes	omit pt.	distance (ft)	FS (ft)	elevation
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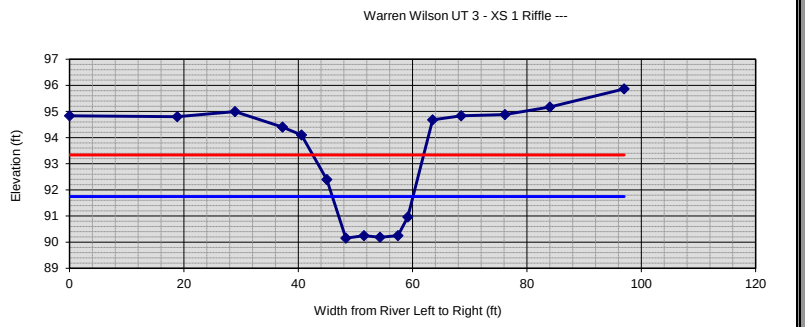
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
0	---			

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

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

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

Cross Section



section:	Warren Wilson UT 3 - XS 1
	Riffle

	---
description:	Warren Wilson UT 3 - XS 1
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	5.167277	94.83272
	☐	18.82963	5.201761	94.79824
	☐	28.91881	5.006874	94.99313
	☐	37.2407	5.594536	94.40546
	☐	40.56568	5.896918	94.10308
	☐	44.99691	7.606562	92.39344
	☐	48.32274	9.84732	90.15268
	☐	51.48264	9.751458	90.24854
	☐	54.28438	9.809324	90.19068
	☐	57.4361	9.752019	90.24798
	☐	59.17539	9.040552	90.95945
	☐	63.49683	5.323352	94.67665
	☐	68.49274	5.162471	94.83753
	☐	76.14848	5.120997	94.879
	☐	84.0026	4.826442	95.17356
	☐	97.00448	4.13667	95.86333
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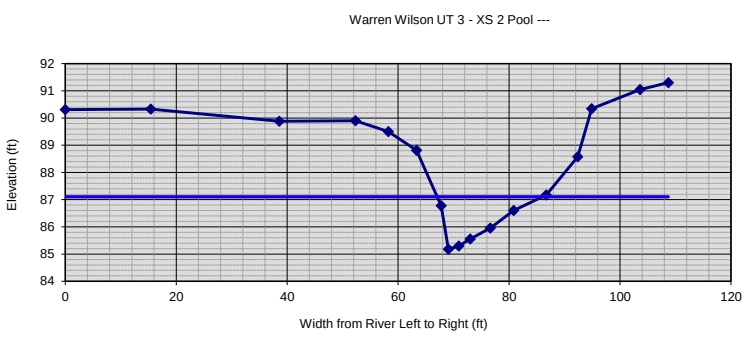
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
8.255	5.9	19.0		
91.745	94.1			

dimensions			
18.2	x-section area	1.3	d mean
14.1	width	15.0	wet P
1.6	d max	1.2	hyd radi
3.9	bank ht	11.0	w/d ratio
19.0	W flood prone area	1.3	ent ratio

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

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

Cross Section



section:	Warren Wilson UT 3 - XS 2
	Pool

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description:	Warren Wilson UT 3 - XS 2
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	9.690637	90.30936
	☐	15.42345	9.671287	90.32871
	☐	38.56093	10.12078	89.87922
	☐	52.30157	10.09725	89.90275
	☐	58.23579	10.49962	89.50038
	☐	63.30534	11.18777	88.81223
	☐	67.76617	13.22116	86.77884
	☐	69.06311	14.81814	85.18186
	☐	70.91902	14.70241	85.29759
	☐	72.98723	14.44796	85.55205
	☐	76.61201	14.04246	85.95754
	☐	80.83463	13.39554	86.60446
	☐	86.69047	12.82694	87.17307
	☐	92.38571	11.42642	88.57358
	☐	94.89719	9.660521	90.33948
	☐	103.603	8.953626	91.04637
	☐	108.7004	8.698997	91.301
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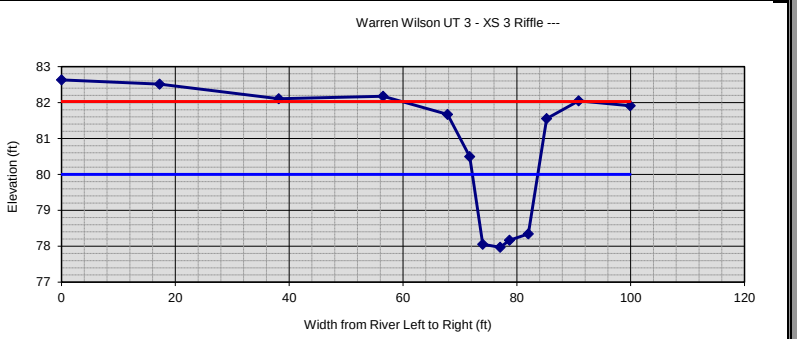
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
12.895	11.19			
87.105	88.81			

dimensions			
18.2	x-section area	1.0	d mean
18.9	width	19.9	wet P
1.9	d max	0.9	hyd radi
3.6	bank ht	~~19.7~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 3 - XS 3**
Riffle

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description: **Warren Wilson UT 3 - XS 3**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**17.36921**	82.63079
	☐	**17.24628**	**17.48797**	82.51203
	☐	**38.17137**	**17.89487**	82.10513
	☐	**56.51743**	**17.82454**	82.17546
	☐	**67.83942**	**18.32739**	81.67261
	☐	**71.72101**	**19.50768**	80.49232
	☐	**74.00504**	**21.94598**	78.05402
	☐	**77.07954**	**22.02903**	77.97097
	☐	**78.7208**	**21.83065**	78.16935
	☐	**82.00913**	**21.65404**	78.34597
	☐	**85.2312**	**18.44806**	81.55194
	☐	**90.86664**	**17.9533**	82.0467
	☐	**99.91886**	**18.09002**	81.90998
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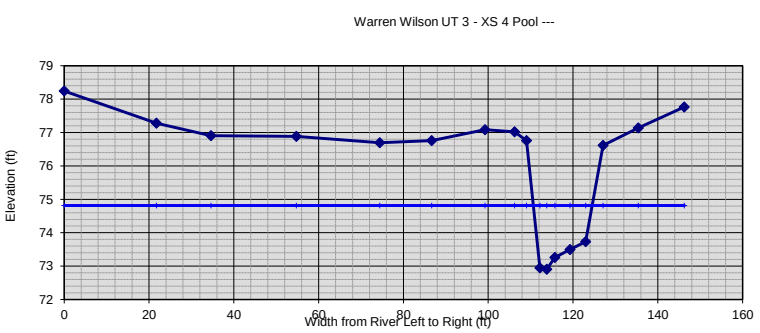
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
20	**18.45**	**29.0**		
80	81.55			

dimensions			
18.2	x-section area	1.6	d mean
11.5	width	13.0	wet P
2.0	d max	1.4	hyd radi
3.6	bank ht	7.3	w/d ratio
29.0	W flood prone area	2.5	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 3 - XS 4**
Pool

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description: **Warren Wilson UT 3 - XS 4**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**21.75752**	78.24248
	☐	**21.73536**	**22.72201**	77.27799
	☐	**34.58495**	**23.09382**	76.90618
	☐	**54.73488**	**23.11341**	76.88659
	☐	**74.40802**	**23.30629**	76.69371
	☐	**86.64423**	**23.23944**	76.76056
	☐	**99.24575**	**22.91448**	77.08552
	☐	**106.2232**	**22.97614**	77.02386
	☐	**109.0472**	**23.24402**	76.75598
	☐	**112.1743**	**27.05012**	72.94988
	☐	**113.797**	**27.09403**	72.90597
	☐	**115.7059**	**26.73868**	73.26132
	☐	**119.2855**	**26.50101**	73.499
	☐	**122.9814**	**26.26682**	73.73318
	☐	**127.1007**	**23.38231**	76.6177
	☐	**135.4029**	**22.86216**	77.13784
	☐	**146.2377**	**22.2347**	77.7653
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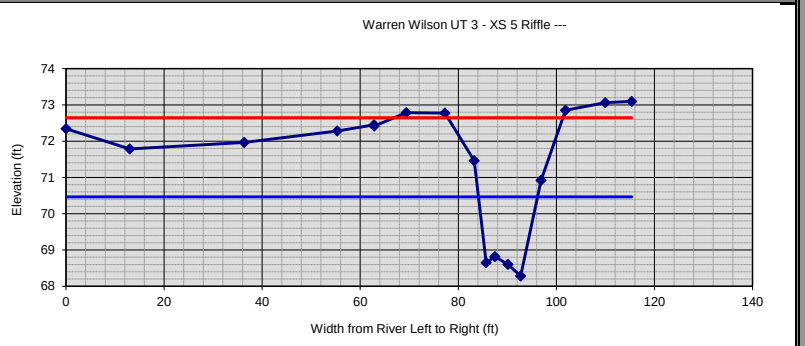
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
25.185	**23.38**			
74.815	76.62			

dimensions			
18.2	x-section area	1.3	d mean
13.9	width	15.2	wet P
1.9	d max	1.2	hyd radi
3.7	bank ht	~~10.6~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 3 - XS 5**

Riffle

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description: **Warren Wilson UT 3 - XS 5**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**27.65654**	72.34346
	☐	**12.9932**	**28.21506**	71.78494
	☐	**36.32**	**28.03592**	71.96408
	☐	**55.32246**	**27.71967**	72.28033
	☐	**62.83218**	**27.54855**	72.45145
	☐	**62.86134**	**27.58147**	72.41853
	☐	**69.39959**	**27.21369**	72.78632
	☐	**77.28089**	**27.226**	72.77401
	☐	**83.23551**	**28.53748**	71.46252
	☐	**85.67571**	**31.34988**	68.65012
	☐	**87.47055**	**31.18508**	68.81492
	☐	**90.13719**	**31.39854**	68.60146
	☐	**92.72871**	**31.71736**	68.28264
	☐	**96.87394**	**29.07896**	70.92104
	☐	**101.8631**	**27.14838**	72.85163
	☐	**109.9693**	**26.93924**	73.06076
	☐	**115.37**	**26.90326**	73.09674
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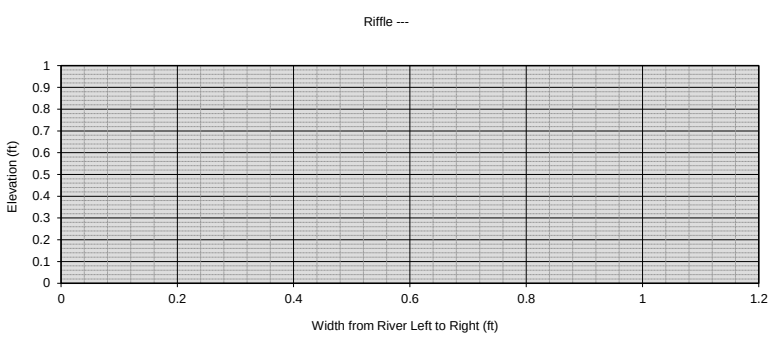
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
29.535	**27.23**	**100.0**		
70.465	72.77			

dimensions			
18.2	x-section area	1.5	d mean
12.1	width	13.6	wet P
2.2	d max	1.3	hyd radi
4.5	bank ht	8.0	w/d ratio
100.0	W flood prone area	8.3	ent ratio

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

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

Cross Section



section:

Riffle

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description:

height of instrument (ft):

notes	omit pt.	distance (ft)	FS (ft)	elevation
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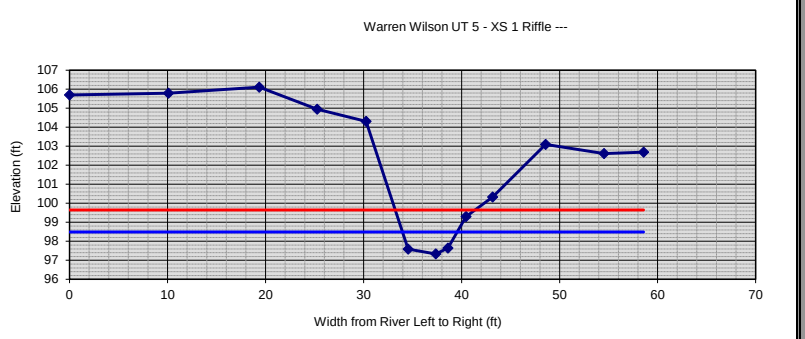
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
0	---			

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

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

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

Cross Section



section: **Warren Wilson UT 5 - XS 1**
Riffle

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description: **Warren Wilson UT 5 - XS 1**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**-5.6993**	105.6993
	☐	**10.082**	**-5.79588**	105.7959
	☐	**19.36051**	**-6.11013**	106.1101
	☐	**25.26502**	**-4.9521**	104.9521
	☐	**30.26207**	**-4.30749**	104.3075
	☐	**34.54153**	**2.411127**	97.58887
	☐	**37.3721**	**2.666269**	97.33373
	☐	**38.60709**	**2.354025**	97.64598
	☐	**40.45825**	**0.701837**	99.29816
	☐	**43.15799**	**-0.32996**	100.33
	☐	**48.56675**	**-3.09382**	103.0938
	☐	**54.53292**	**-2.61597**	102.616
	☐	**58.56605**	**-2.68649**	102.6865
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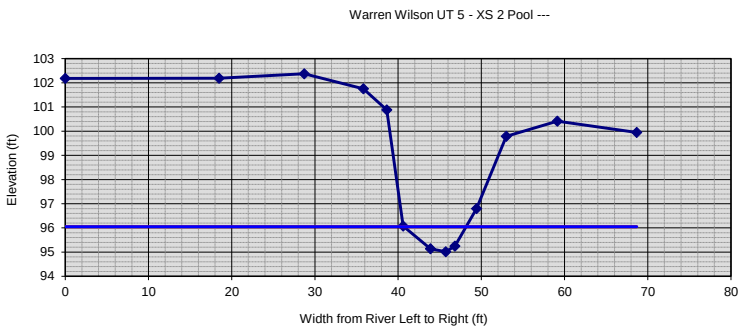
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
1.51	**-3.09**	**8.0**		
98.49	103.09			

dimensions			
4.8	x-section area	0.9	d mean
5.6	width	6.5	wet P
1.2	d max	0.7	hyd radi
5.8	bank ht	6.5	w/d ratio
8.0	W flood prone area	1.4	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 5 - XS 2**
Pool

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description: **Warren Wilson UT 5 - XS 2**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**-2.1806**	102.1806
	☐	**18.47142**	**-2.18613**	102.1861
	☐	**28.7223**	**-2.3736**	102.3736
	☐	**35.82255**	**-1.75427**	101.7543
	☐	**38.62913**	**-0.87661**	100.8766
	☐	**40.60982**	**3.925687**	96.07431
	☐	**43.88941**	**4.861286**	95.13871
	☐	**45.72997**	**4.984263**	95.01574
	☐	**46.82695**	**4.755446**	95.24455
	☐	**49.43302**	**3.201268**	96.79873
	☐	**52.99488**	**0.21585**	99.78415
	☐	**59.13723**	**-0.41105**	100.411
	☐	**68.67239**	**0.054791**	99.94521
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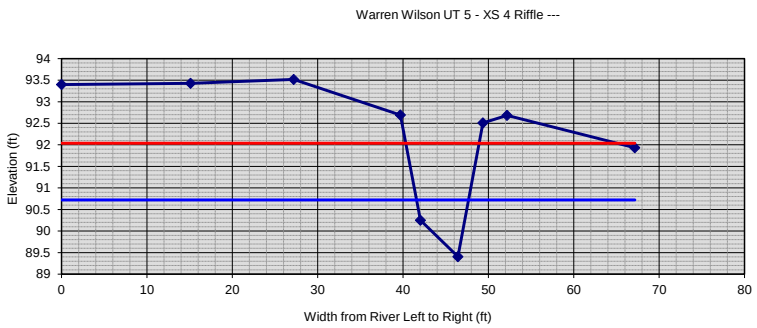
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
3.95	**0.22**			
96.05	99.78			

dimensions			
4.8	x-section area	0.6	d mean
7.5	width	7.9	wet P
1.0	d max	0.6	hyd radi
4.8	bank ht	~~11.7~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 5 - XS 4**
Riffle

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description: **Warren Wilson UT 5 - XS 4**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**6.603538**	93.39646
	☐	**15.1249**	**6.571615**	93.42839
	☐	**27.20761**	**6.482927**	93.51707
	☐	**39.68785**	**7.307664**	92.69234
	☐	**42.04503**	**9.749258**	90.25074
	☐	**46.42409**	**10.59365**	89.40635
	☐	**49.35379**	**7.492606**	92.50739
	☐	**52.18487**	**7.318284**	92.68172
	☐	**67.15717**	**8.067317**	91.93268

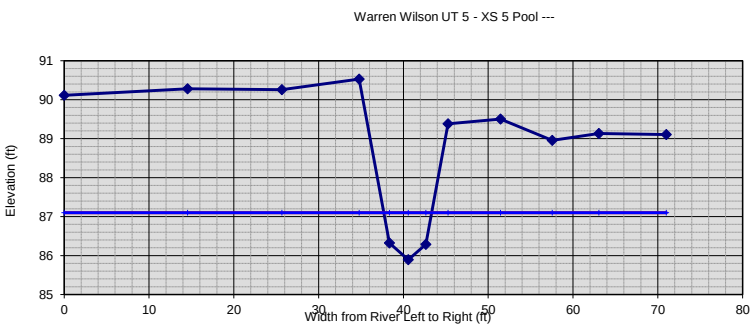
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
9.278	**7.5**	**9.0**		
90.722	92.5			

dimensions			
4.8	x-section area	0.8	d mean
6.1	width	6.9	wet P
1.3	d max	0.7	hyd radi
3.1	bank ht	7.6	w/d ratio
9.0	W flood prone area	1.5	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 5 - XS 5**
Pool

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description: **Warren Wilson UT 5 - XS 5**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**9.885236**	90.11476
	☐	**14.54861**	**9.719021**	90.28098
	☐	**25.66398**	**9.740917**	90.25908
	☐	**34.76846**	**9.470592**	90.52941
	☐	**38.34255**	**13.67472**	86.32528
	☐	**40.57821**	**14.10717**	85.89284
	☐	**42.63569**	**13.71342**	86.28658
	☐	**45.25006**	**10.61718**	89.38282
	☐	**51.43626**	**10.49588**	89.50412
	☐	**57.5376**	**11.04478**	88.95522
	☐	**63.0497**	**10.86862**	89.13138
	☐	**71.00703**	**10.89543**	89.10457

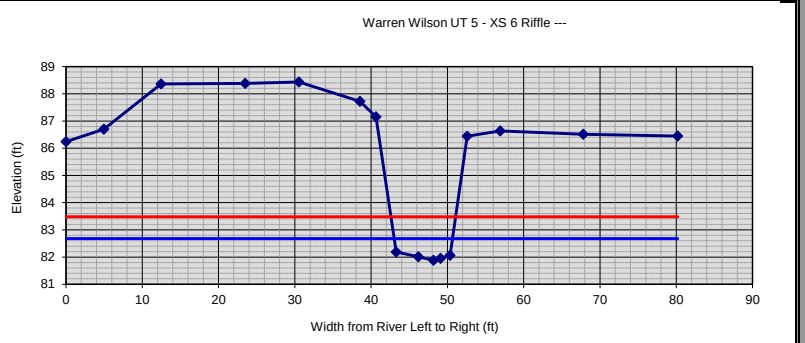
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
12.9	**10.62**			
87.1	89.38			

dimensions			
4.8	x-section area	0.9	d mean
5.6	width	6.5	wet P
1.2	d max	0.7	hyd radi
3.5	bank ht	~~6.6~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section:	**Warren Wilson UT 5 - XS 6**
	Riffle --- ---
description:	**Warren Wilson UT 5 - XS 6**
height of instrument (ft):	**100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**13.76027**	86.23973
	☐	**4.971821**	**13.30222**	86.69778
	☐	**12.45571**	**11.63857**	88.36143
	☐	**23.49458**	**11.61629**	88.38371
	☐	**30.53746**	**11.56511**	88.43489
	☐	**38.53531**	**12.276**	87.724
	☐	**40.63487**	**12.84354**	87.15646
	☐	**43.30217**	**17.81242**	82.18758
	☐	**46.19676**	**17.98667**	82.01333
	☐	**48.18066**	**18.12095**	81.87905
	☐	**49.11325**	**18.0468**	81.9532
	☐	**50.35934**	**17.93449**	82.06551
	☐	**52.58366**	**13.55516**	86.44484
	☐	**56.92033**	**13.36661**	86.63339
	☐	**67.81682**	**13.48485**	86.51515
	☐	**80.18751**	**13.55243**	86.44757
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	☐			

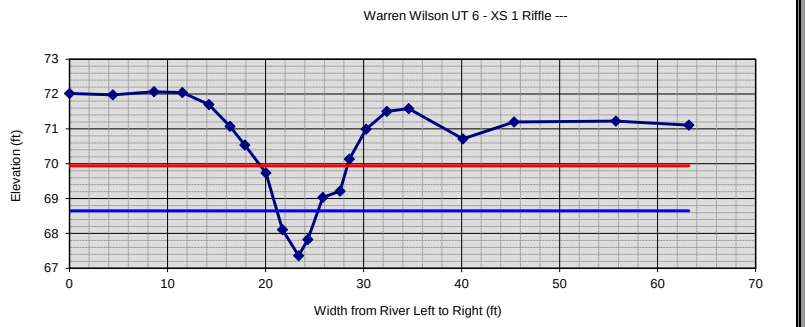
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
17.32	**13.56**	**9.0**		
82.68	86.44			

dimensions			
4.8	x-section area	0.6	d mean
7.6	width	8.3	wet P
0.8	d max	0.6	hyd radi
4.6	bank ht	12.0	w/d ratio
9.0	W flood prone area	1.2	ent ratio

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

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

Cross Section



section:	Warren Wilson UT 6 - XS 1
	Riffle

	---
description:	Warren Wilson UT 6 - XS 1
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	27.98129	72.01871
	☐	4.425004	28.02372	71.97628
	☐	8.612523	27.93325	72.06675
	☐	11.51225	27.95936	72.04064
	☐	14.21416	28.30211	71.69789
	☐	16.36971	28.92841	71.07159
	☐	17.87524	29.46	70.54
	☐	20.03471	30.26756	69.73244
	☐	21.732	31.8925	68.1075
	☐	23.38345	32.64041	67.35959
	☐	24.31559	32.17663	67.82337
	☐	25.8298	30.96596	69.03404
	☐	27.59405	30.78734	69.21266
	☐	28.55155	29.86731	70.13269
	☐	30.26231	29.00947	70.99053
	☐	32.38065	28.49678	71.50322
	☐	34.60125	28.41574	71.58427
	☐	40.12591	29.28439	70.71561
	☐	45.35448	28.79854	71.20146
	☐	55.73936	28.77414	71.22586
	☐	63.18392	28.89301	71.107
	☐			
	☐			
	☐			
	☐			

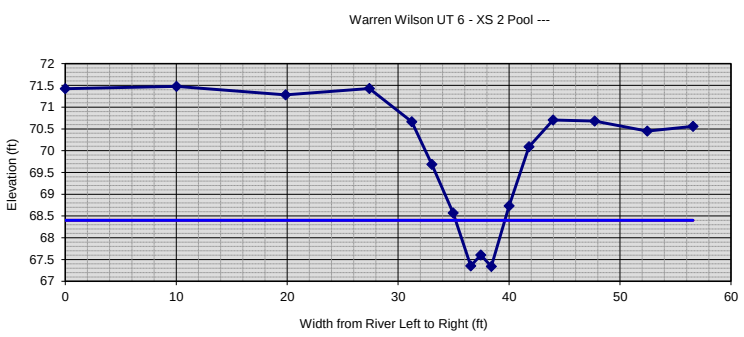
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
31.35	29	9.0		
68.65	71			

dimensions			
3.1	x-section area	0.7	d mean
4.2	width	5.0	wet P
1.3	d max	0.6	hyd radi
3.6	bank ht	5.7	w/d ratio
9.0	W flood prone area	2.2	ent ratio

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

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

Cross Section



section:	Warren Wilson UT 6 - XS 2
	Pool

	---
description:	Warren Wilson UT 6 - XS 2
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	28.57715	71.42285
	☐	10.01296	28.52316	71.47684
	☐	19.86277	28.71819	71.28181
	☐	27.40145	28.5724	71.42761
	☐	31.23515	29.33554	70.66446
	☐	33.0312	30.31271	69.68729
	☐	34.96361	31.42987	68.57013
	☐	36.54897	32.64837	67.35163
	☐	37.44785	32.39671	67.60329
	☐	38.39171	32.659	67.341
	☐	40.00373	31.26934	68.73066
	☐	41.79043	29.90949	70.09051
	☐	43.97398	29.29498	70.70502
	☐	47.71622	29.32091	70.67909
	☐	52.45272	29.552	70.448
	☐	56.57554	29.44006	70.55994
	☐			
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	☐			
	☐			
	☐			

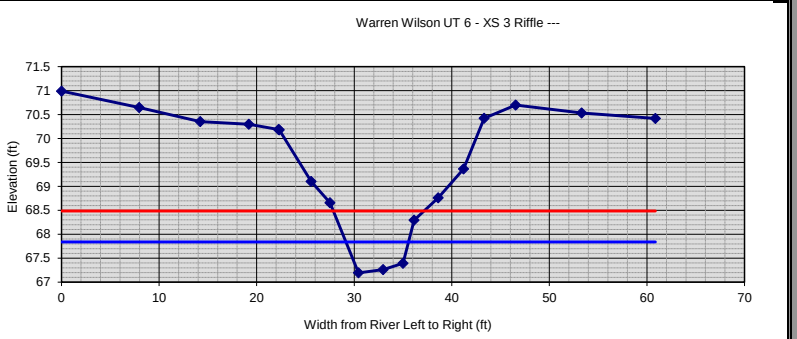
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
31.6	29.91			
68.4	70.09			

dimensions			
3.1	x-section area	0.7	d mean
4.4	width	5.3	wet P
1.1	d max	0.6	hyd radi
2.7	bank ht	~~6.4~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section:	Warren Wilson UT 6 - XS 3
	Riffle

	---
description:	Warren Wilson UT 6 - XS 3
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	29.01082	70.98918
	☐	7.960828	29.3529	70.6471
	☐	14.22417	29.64714	70.35286
	☐	19.20713	29.70395	70.29605
	☐	22.24741	29.81189	70.18811
	☐	22.32319	29.82137	70.17863
	☐	25.58364	30.89659	69.10341
	☐	27.51633	31.34038	68.65962
	☐	30.44312	32.80594	67.19406
	☐	32.95819	32.73843	67.26158
	☐	35.01071	32.60563	67.39437
	☐	36.14321	31.70578	68.29422
	☐	38.60116	31.23838	68.76162
	☐	41.20681	30.63788	69.36212
	☐	43.31432	29.57658	70.42342
	☐	46.54756	29.30328	70.69673
	☐	53.30458	29.46742	70.53258
	☐	60.86293	29.58006	70.41994
	☐			
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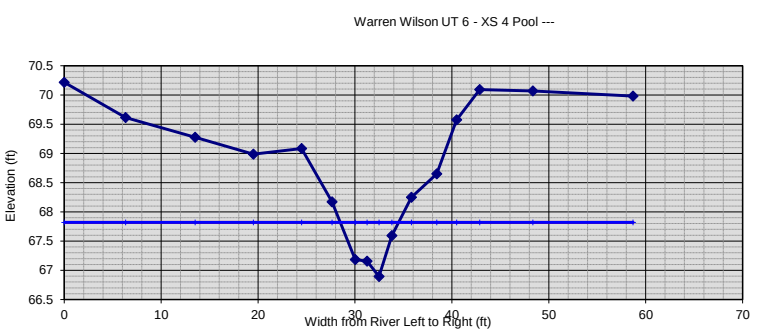
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
32.16	29.81	9.0		
67.84	70.19			

dimensions			
3.1	x-section area	0.5	d mean
6.4	width	6.7	wet P
0.6	d max	0.5	hyd radi
3.0	bank ht	13.2	w/d ratio
9.0	W flood prone area	1.4	ent ratio

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

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

Cross Section



section:	Warren Wilson UT 6 - XS 4
	Pool

	---
description:	Warren Wilson UT 6 - XS 4
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	29.78365	70.21635
	☐	6.322508	30.38774	69.61226
	☐	13.5043	30.7247	69.2753
	☐	19.51653	31.01243	68.98757
	☐	24.48501	30.91526	69.08475
	☐	27.63371	31.82784	68.17216
	☐	30.02628	32.81714	67.18286
	☐	31.23988	32.84241	67.15759
	☐	32.47869	33.1042	66.8958
	☐	33.81379	32.40625	67.59376
	☐	35.82641	31.75155	68.24845
	☐	38.43102	31.34915	68.65085
	☐	40.49288	30.42595	69.57405
	☐	42.8756	29.90704	70.09297
	☐	48.34937	29.93067	70.06933
	☐	58.69503	30.01797	69.98203
	☐			
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	☐			
	☐			

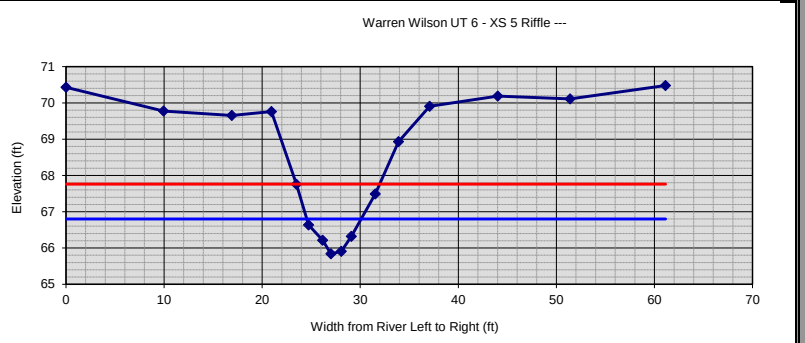
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
32.18	30.92			
67.82	69.08			

dimensions			
3.1	x-section area	0.5	d mean
6.0	width	6.4	wet P
0.9	d max	0.5	hyd radi
2.2	bank ht	~~11.7~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section:	**Warren Wilson UT 6 - XS 5**
	Riffle

	---
description:	**Warren Wilson UT 6 - XS 5**
height of instrument (ft):	**100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**29.56833**	70.43167
	☐	**9.952123**	**30.22361**	69.77639
	☐	**16.9073**	**30.346**	69.654
	☐	**20.94901**	**30.23984**	69.76016
	☐	**23.49385**	**32.24192**	67.75808
	☐	**24.73129**	**33.36393**	66.63607
	☐	**26.17248**	**33.78573**	66.21427
	☐	**27.00946**	**34.16107**	65.83893
	☐	**28.06963**	**34.09326**	65.90674
	☐	**29.08988**	**33.67989**	66.32012
	☐	**31.5423**	**32.51129**	67.48871
	☐	**33.906**	**31.07055**	68.92945
	☐	**37.07803**	**30.0927**	69.90731
	☐	**44.01894**	**29.81253**	70.18747
	☐	**51.404**	**29.88955**	70.11045
	☐	**61.13531**	**29.52118**	70.47882
	☐			
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	☐			

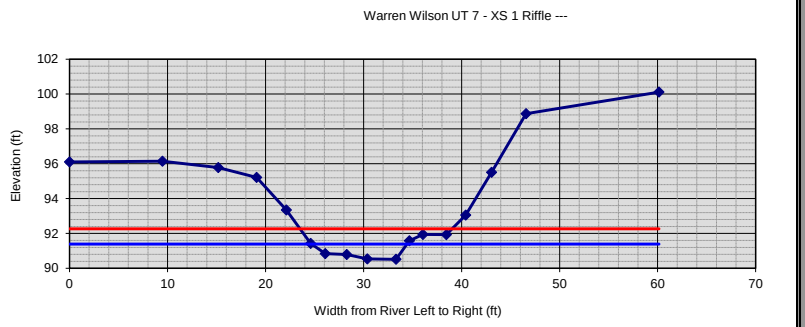
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
33.2	**30.24**	**8.0**		
66.8	69.76			

dimensions			
3.1	x-section area	0.6	d mean
5.5	width	5.9	wet P
1.0	d max	0.5	hyd radi
3.9	bank ht	9.8	w/d ratio
8.0	W flood prone area	1.4	ent ratio

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

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

Cross Section



section:	Warren Wilson UT 7 - XS 1
	Riffle

	---
description:	Warren Wilson UT 7 - XS 1
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	3.892587	96.10741
	☐	9.487454	3.85367	96.14633
	☐	15.17844	4.214243	95.78576
	☐	19.08884	4.787957	95.21204
	☐	22.12391	6.655447	93.34455
	☐	24.59664	8.573019	91.42698
	☐	26.0853	9.157681	90.84232
	☐	28.28486	9.209023	90.79098
	☐	30.3807	9.462789	90.53721
	☐	33.31086	9.485215	90.51479
	☐	34.68066	8.421899	91.5781
	☐	36.0597	8.058888	91.94111
	☐	38.4372	8.062182	91.93782
	☐	40.41181	6.945182	93.05482
	☐	43.05757	4.494793	95.50521
	☐	46.58451	1.127155	98.87285
	☐	60.14117	-0.11234	100.1123
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	☐			

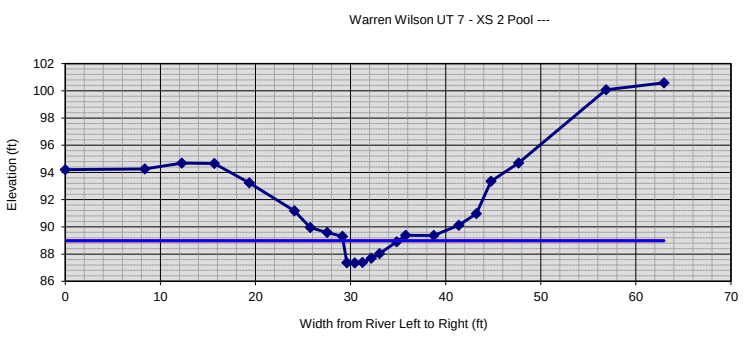
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
8.61	8.06	15.0		
91.39	91.94			

dimensions			
6.2	x-section area	0.6	d mean
9.7	width	10.2	wet P
0.9	d max	0.6	hyd radi
1.4	bank ht	15.4	w/d ratio
15.0	W flood prone area	1.5	ent ratio

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

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

Cross Section



section:	Warren Wilson UT 7 - XS 2
	Pool

	---
description:	Warren Wilson UT 7 - XS 2
height of instrument (ft):	100.00

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	0	5.79224	94.20776
	☐	8.350292	5.74854	94.25146
	☐	12.25314	5.313128	94.68687
	☐	15.66541	5.347552	94.65245
	☐	19.3456	6.75994	93.24006
	☐	24.08599	8.81967	91.18033
	☐	25.75949	10.05613	89.94387
	☐	27.52869	10.41876	89.58124
	☐	29.14781	10.70233	89.29767
	☐	29.61288	12.64178	87.35822
	☐	30.44615	12.65438	87.34562
	☐	31.26085	12.60668	87.39332
	☐	32.18112	12.30427	87.69573
	☐	33.05464	11.96404	88.03596
	☐	34.83951	11.1006	88.8994
	☐	35.78326	10.62496	89.37504
	☐	38.75253	10.63291	89.36709
	☐	41.37913	9.884709	90.11529
	☐	43.22701	9.025935	90.97407
	☐	44.76421	6.651413	93.34859
	☐	47.66564	5.305773	94.69423
	☐	56.86663	-0.073	100.073
	☐	62.94746	-0.58562	100.5856
	☐			
	☐			

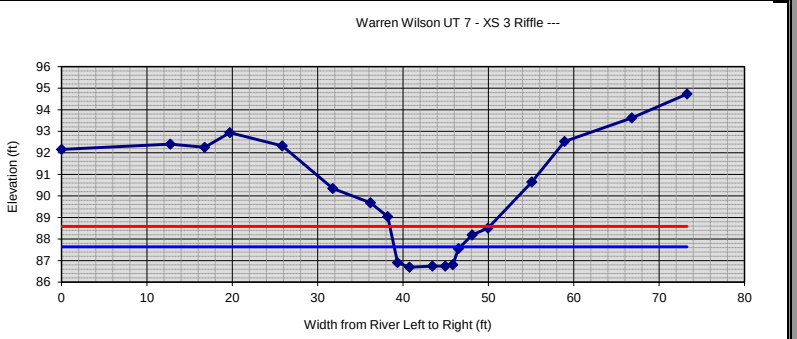
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
11.02	10.62			
88.98	89.38			

dimensions			
6.2	x-section area	1.1	d mean
5.8	width	7.4	wet P
1.6	d max	0.8	hyd radi
2.0	bank ht	~~5.4~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 7 - XS 3**
Riffle

---

description: **Warren Wilson UT 7 - XS 3**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**7.843715**	92.15629
	☐	**12.74193**	**7.600226**	92.39977
	☐	**16.77391**	**7.747085**	92.25292
	☐	**19.71991**	**7.06417**	92.93583
	☐	**25.85193**	**7.678309**	92.32169
	☐	**31.7831**	**9.657277**	90.34272
	☐	**36.18262**	**10.31483**	89.68517
	☐	**38.2185**	**10.95674**	89.04326
	☐	**39.35757**	**13.09061**	86.90939
	☐	**40.76808**	**13.30647**	86.69353
	☐	**43.44587**	**13.25554**	86.74446
	☐	**44.95955**	**13.25803**	86.74197
	☐	**45.83855**	**13.18863**	86.81137
	☐	**46.49429**	**12.44618**	87.55382
	☐	**48.09866**	**11.80706**	88.19294
	☐	**49.95438**	**11.48792**	88.51208
	☐	**55.092**	**9.35247**	90.64753
	☐	**58.92936**	**7.471821**	92.52818
	☐	**66.80121**	**6.379261**	93.62074
	☐	**73.26502**	**5.271871**	94.72813
	☐			
	☐			
	☐			
	☐			
	☐			

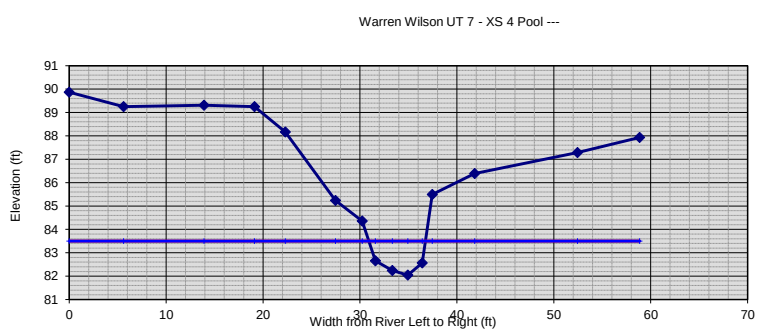
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
12.36	**10.96**	**11.0**		
87.64	89.04			

dimensions			
6.2	x-section area	0.8	d mean
7.7	width	8.6	wet P
0.9	d max	0.7	hyd radi
2.3	bank ht	9.6	w/d ratio
11.0	W flood prone area	1.4	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 7 - XS 4**
Pool

---

description: **Warren Wilson UT 7 - XS 4**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**10.13186**	89.86814
	☐	**5.608437**	**10.7489**	89.25111
	☐	**13.89854**	**10.68915**	89.31085
	☐	**19.12058**	**10.7464**	89.2536
	☐	**22.28752**	**11.83535**	88.16465
	☐	**27.46892**	**14.76224**	85.23776
	☐	**30.2279**	**15.64308**	84.35692
	☐	**31.60127**	**17.34171**	82.65829
	☐	**33.33791**	**17.75882**	82.24118
	☐	**34.93745**	**17.95674**	82.04326
	☐	**36.4309**	**17.43404**	82.56596
	☐	**37.45915**	**14.50706**	85.49294
	☐	**41.82757**	**13.61306**	86.38694
	☐	**52.44118**	**12.71417**	87.28583
	☐	**58.85609**	**12.06865**	87.93135
	☐			
	☐			
	☐			
	☐			
	☐			

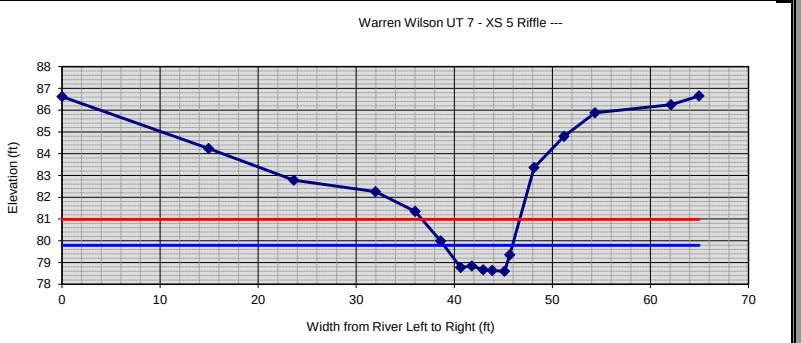
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
16.5	**14.5**			
83.5	85.5			

dimensions			
6.2	x-section area	1.1	d mean
5.8	width	7.1	wet P
1.5	d max	0.9	hyd radi
3.5	bank ht	~~5.5~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 7 - XS 5**
Riffle

---
description: **Warren Wilson UT 7 - XS 5**
height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**13.37691**	86.62309
	☐	**14.94781**	**15.76518**	84.23482
	☐	**23.63355**	**17.21827**	82.78173
	☐	**31.95986**	**17.74469**	82.25532
	☐	**36.00823**	**18.65314**	81.34686
	☐	**38.59929**	**20.00521**	79.99479
	☐	**40.65743**	**21.22762**	78.77238
	☐	**41.79235**	**21.15452**	78.84548
	☐	**42.95579**	**21.33274**	78.66726
	☐	**43.86556**	**21.36819**	78.63181
	☐	**45.11998**	**21.40217**	78.59783
	☐	**45.6656**	**20.6438**	79.35621
	☐	**48.13427**	**16.63296**	83.36704
	☐	**51.18827**	**15.20443**	84.79557
	☐	**54.35003**	**14.12422**	85.87579
	☐	**62.1002**	**13.75422**	86.24578
	☐	**64.95798**	**13.34928**	86.65072
	☐			
	☐			
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	☐			
	☐			

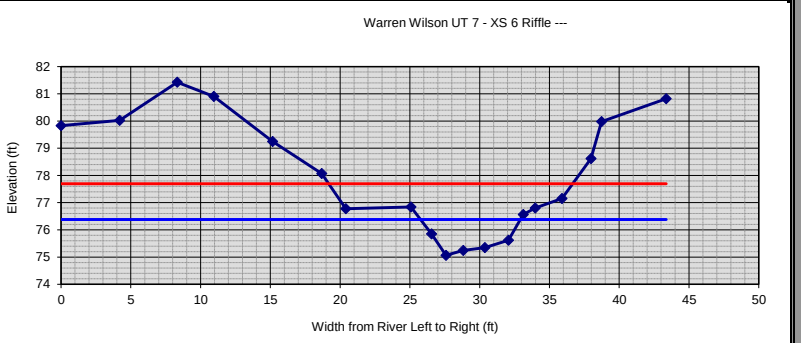
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
20.21	**18.65**	**10.0**		
79.79	81.35			

dimensions			
6.2	x-section area	0.9	d mean
7.0	width	7.9	wet P
1.2	d max	0.8	hyd radi
2.8	bank ht	7.9	w/d ratio
10.0	W flood prone area	1.4	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 7 - XS 6**
Riffle

---
description: **Warren Wilson UT 7 - XS 6**
height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**20.17244**	79.82756
	☐	**4.195472**	**19.97598**	80.02402
	☐	**8.32558**	**18.5746**	81.4254
	☐	**10.94594**	**19.09363**	80.90637
	☐	**15.1662**	**20.75156**	79.24844
	☐	**18.68181**	**21.92847**	78.07153
	☐	**20.41014**	**23.2213**	76.7787
	☐	**25.07832**	**23.15692**	76.84308
	☐	**26.54765**	**24.14823**	75.85177
	☐	**27.58514**	**24.93497**	75.06503
	☐	**28.81334**	**24.75852**	75.24149
	☐	**30.37652**	**24.65479**	75.34522
	☐	**32.06072**	**24.38403**	75.61597
	☐	**33.11579**	**23.4352**	76.5648
	☐	**33.97226**	**23.19844**	76.80156
	☐	**35.90126**	**22.84714**	77.15286
	☐	**37.97029**	**21.37692**	78.62308
	☐	**38.73877**	**20.01797**	79.98203
	☐	**43.36714**	**19.18082**	80.81918
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
23.62	**23.16**	**17.0**		
76.38	76.84			

dimensions			
6.2	x-section area	0.9	d mean
7.1	width	7.9	wet P
1.3	d max	0.8	hyd radi
1.8	bank ht	8.2	w/d ratio
17.0	W flood prone area	2.4	ent ratio

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

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

Cross Section

section: **Warren Wilson UT 8 - XS 1**

Riffle

---

description: **Warren Wilson UT 8 - XS 1**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**-0.79005**	100.7901
	☐	**7.902057**	**-1.49926**	101.4993
	☐	**12.34819**	**-1.5893**	101.5893
	☐	**15.76318**	**-1.10993**	101.1099
	☐	**17.44982**	**-0.67355**	100.6736
	☐	**19.35702**	**-0.12677**	100.1268
	☐	**21.20765**	**0.767339**	99.23266
	☐	**22.80451**	**0.909831**	99.09017
	☐	**23.95805**	**0.961888**	99.03811
	☐	**24.75198**	**1.559341**	98.44066
	☐	**25.56882**	**1.693062**	98.30694
	☐	**27.91167**	**0.995117**	99.00488
	☐	**32.94253**	**0.423094**	99.57691
	☐	**40.34955**	**-0.5634**	100.5634
	☐	**45.265**	**-0.88233**	100.8823
	☐	**50.51077**	**-1.24683**	101.2468
	☐	**54.9114**	**-0.8031**	100.8031
	☐			
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	☐			
	☐			
	☐			

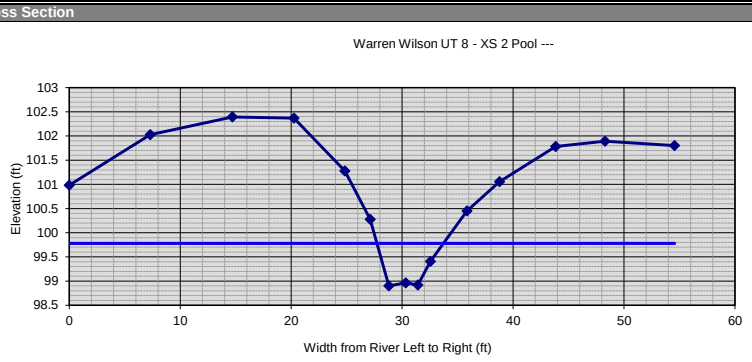
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
0.7	**-0.56**	**19.0**		
99.3	100.56			

dimensions			
3.6	x-section area	0.4	d mean
9.4	width	9.8	wet P
1.0	d max	0.4	hyd radi
2.3	bank ht	24.8	w/d ratio
19.0	W flood prone area	2.0	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 8 - XS 2**

Pool

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description: **Warren Wilson UT 8 - XS 2**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**-0.98171**	100.9817
	☐	**7.29674**	**-2.02709**	102.0271
	☐	**14.69667**	**-2.39289**	102.3929
	☐	**20.25342**	**-2.37028**	102.3703
	☐	**24.83036**	**-1.27773**	101.2777
	☐	**27.12338**	**-0.27492**	100.2749
	☐	**28.80811**	**1.098418**	98.90158
	☐	**30.32355**	**1.037651**	98.96235
	☐	**31.41237**	**1.081328**	98.91867
	☐	**32.5483**	**0.591692**	99.40831
	☐	**35.84821**	**-0.45265**	100.4526
	☐	**38.77628**	**-1.05406**	101.0541
	☐	**43.84647**	**-1.78288**	101.7829
	☐	**48.28633**	**-1.8914**	101.8914
	☐	**54.55196**	**-1.80292**	101.8029
	☐			
	☐			
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	☐			
	☐			
	☐			
	☐			
	☐			

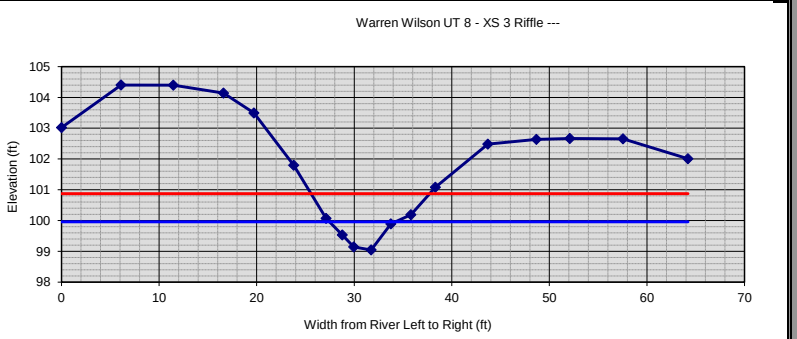
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
0.22	**-1.78**			
99.78	101.78			

dimensions			
3.6	x-section area	0.6	d mean
6.0	width	6.5	wet P
0.9	d max	0.6	hyd radi
2.9	bank ht	~~10.0~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 8 - XS 3**

Riffle

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description: **Warren Wilson UT 8 - XS 3**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**-3.02174**	103.0217
	☐	**6.105532**	**-4.4013**	104.4013
	☐	**11.45697**	**-4.39639**	104.3964
	☐	**16.59709**	**-4.13793**	104.1379
	☐	**19.7247**	**-3.49217**	103.4922
	☐	**23.79447**	**-1.79865**	101.7986
	☐	**27.12614**	**-0.06874**	100.0687
	☐	**28.78605**	**0.464201**	99.5358
	☐	**29.94227**	**0.856457**	99.14354
	☐	**31.73194**	**0.954131**	99.04587
	☐	**33.75559**	**0.108995**	99.89101
	☐	**35.81402**	**-0.18947**	100.1895
	☐	**38.31493**	**-1.08338**	101.0834
	☐	**43.70064**	**-2.48467**	102.4847
	☐	**48.68147**	**-2.63802**	102.638
	☐	**52.10669**	**-2.66739**	102.6674
	☐	**57.54812**	**-2.65583**	102.6558
	☐	**64.20767**	**-2.01023**	102.0102
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			

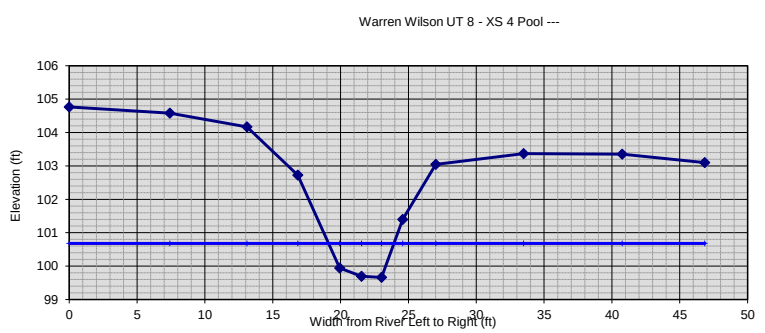
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
0.04	**-2.48**	**12.0**		
99.96	102.48			

dimensions			
3.6	x-section area	0.5	d mean
6.8	width	7.1	wet P
0.9	d max	0.5	hyd radi
3.4	bank ht	12.9	w/d ratio
12.0	W flood prone area	1.8	ent ratio

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

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

Cross Section



section: **Warren Wilson UT 8 - XS 4**

Pool

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description: **Warren Wilson UT 8 - XS 4**

height of instrument (ft): **100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**-4.76625**	104.7662
	☐	**7.415019**	**-4.58127**	104.5813
	☐	**13.09058**	**-4.17197**	104.172
	☐	**16.84191**	**-2.72748**	102.7275
	☐	**19.9282**	**0.055018**	99.94498
	☐	**21.54597**	**0.302685**	99.69732
	☐	**23.02358**	**0.337336**	99.66266
	☐	**24.58099**	**-1.39505**	101.3951
	☐	**27.01261**	**-3.04766**	103.0477
	☐	**33.48512**	**-3.36965**	103.3696
	☐	**40.74971**	**-3.35495**	103.3549
	☐	**46.84016**	**-3.09807**	103.0981
	☐			
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	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			

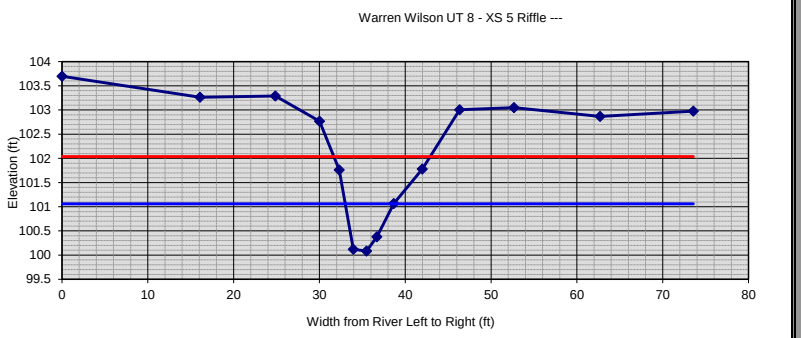
FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
-0.68	**-3.05**			
100.68	103.05			

dimensions			
3.6	x-section area	0.8	d mean
4.8	width	5.6	wet P
1.0	d max	0.7	hyd radi
3.4	bank ht	~~6.4~~	w/d ratio
~~0.0~~	W flood prone area	~~0.0~~	ent ratio

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

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

Cross Section



section:	**Warren Wilson UT 8 - XS 5**
	Riffle --- ---
description:	**Warren Wilson UT 8 - XS 5**
height of instrument (ft):	**100.00**

notes	omit pt.	distance (ft)	FS (ft)	elevation
	☐	**0**	**-3.69769**	103.6977
	☐	**16.09131**	**-3.26446**	103.2645
	☐	**24.85936**	**-3.28956**	103.2896
	☐	**30.00874**	**-2.7677**	102.7677
	☐	**32.31562**	**-1.76149**	101.7615
	☐	**33.953**	**-0.11872**	100.1187
	☐	**35.49143**	**-0.08383**	100.0838
	☐	**36.70138**	**-0.37637**	100.3764
	☐	**38.66492**	**-1.06413**	101.0641
	☐	**41.98066**	**-1.77796**	101.778
	☐	**46.33235**	**-3.00343**	103.0034
	☐	**52.6821**	**-3.0476**	103.0476
	☐	**62.70325**	**-2.86851**	102.8685
	☐	**73.56959**	**-2.9766**	102.9766
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			
	☐			

FS bankfull	FS top of bank	W fpa (ft)	channel slope (%)	Manning's "n"
-1.06	**-2.77**	**11.0**		
101.06	102.77			

dimensions			
3.6	x-section area	0.6	d mean
5.6	width	6.2	wet P
1.0	d max	0.6	hyd radi
2.7	bank ht	8.9	w/d ratio
11.0	W flood prone area	2.0	ent ratio

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

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

Appendix B

Warren Wilson College Bank Erosion Hazard Index

Waypoint	Bank Length (feet)	Near Bank Stress Conditions Ranking	Bank	BEHI	Bank Erosion Rate	Erosion Sub-Total (ft^3/yr)	Total Erosion/Trib (tons/yer)
UT 1							
D1	200	Low	6	Very Low	0.01	12	
D2	500	Low	3	Moderate	0.03	45	
D3	400	Low	6	Very Low	0.01	24	
D4	200	Low	4	Moderate	0.03	24	
D5	150	Low	4	Moderate	0.03	18	
D6	400	Low	3.5	Moderate	0.03	42	
D7	500	Low	2.5	Moderate	0.03	37.5	
D8	400	Low	2	Very Low	0.01	8	
D9	300	Low	3.5	Moderate	0.03	31.5	**11.65**
UT 3 & 4							
A1	200	High	6	Moderate	0.11	132	
A2	400	High	6.5	Moderate	0.11	286	
A3	200	Moderate to High	3.5	Moderate	0.08	56	
A4	600	Low	3	Moderate	0.03	54	
A5	300	Moderate to High	2.5	Moderate	0.08	60	
A7	500	High	6	Moderate	0.11	330	
A8	400	Moderate	2.5	Very Low	0.04	40	
A9	500	High	10	Moderate	0.11	550	
A10	400	Low	6	Moderate	0.03	72	
A11	500	Low to Moderate	4.5	Very Low	0.04	90	
A12	200	Moderate to High	4.5	Moderate	0.08	72	
A13	500	Moderate	5	Moderate	0.07	175	
A14	800	Low	4	Very Low	0.01	32	
A15	400	Moderate to High	4.5	Very Low	0.04	72	
A16	500	Low	4	Very Low	0.01	20	
A17	400	Low	3	Very Low	0.01	12	
A18	600	Moderate	4	Moderate	0.07	168	
A19	400	Low	6.5	Moderate	0.03	78	
A20	400	Low	4	Moderate	0.03	48	
A21	400	High	4	Moderate	0.11	176	**121.48**

Appendix B
Warren Wilson College Bank Erosion Hazard Index

Waypoint	Bank Length (feet)	Near Bank Stress Conditions Ranking	Bank	BEHI	Bank Erosion Rate	Erosion Sub-Total (ft^3/yr)	Total Erosion/Trib (tons/yer)
UT 5							
B1	400	High	6.5	Moderate	0.11	286	
B2	400	Moderate to High	4	Moderate	0.08	128	
B3	400	Moderate to High	5	Moderate	0.08	160	
B4	200	High	5	Moderate	0.11	110	**32.93**
UT 6 & 7							
C1	300	High	7	Moderate	0.11	231	
C2	150	Moderate	5.5	Moderate	0.07	57.75	
C3	700	Moderate	6	Moderate	0.07	294	
C4	300	Moderate	5.5	Moderate	0.07	115.5	
C5	100	High	4	Moderate	0.11	44	
C6	1000	Moderate	2	Moderate	0.07	140	
C7	200	Low	1	Very Low	0.01	2	
C8	1000	Low	2.5	Very Low	0.01	25	
C9	600	Low	3	Very Low	0.01	18	
C10	200	Low	3	Very Low	0.01	6	
C11	800	Low	1	Very Low	0.01	8	
C12	400	Low	5	Very Low	0.01	20	**46.28**
UT 8							
C13	500	Low	6.5	Very Low	0.01	32.5	
C14	800	Low	2.5	Very Low	0.01	20	
C15	400	High	6	Moderate	0.11	264	
C16	200	Low	3	Very Low	0.01	6	**15.53**

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

Total Erosion (ft^3/yr)	**4732.75**
Total Erosion (yd^3/yr)	**175.29**
Total Erosion (tons/yr)	**227.87**
Total Erosion (tons/yr/ft)	**0.011**

Draft NC SAM Stream Rating Sheet
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Stream Site Name	Warren Wilson College 1-Ref	Date of Assessment	06-01-2016
Stream Category	Ma2	Assessor Name/Organization	Lewis/Axiom

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

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

Draft NC SAM Stream Rating Sheet
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Stream Site Name	Warren Wilson College #2	Date of Assessment	06-01-2016
Stream Category	Ma3	Assessor Name/Organization	Lewis/Axiom

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

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

Draft NC SAM Stream Rating Sheet
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Stream Site Name	Warren Wilson College #3	Date of Assessment	06-01-2016
Stream Category	Ma3	Assessor Name/Organization	Lewis/Axiom

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

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

Draft NC SAM Stream Rating Sheet
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Stream Site Name	Warren Wilson College #4	Date of Assessment	06-01-2016
Stream Category	Ma2	Assessor Name/Organization	Lewis/Axiom

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

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

Draft NC SAM Stream Rating Sheet
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Stream Site Name	Warren Wilson College	Date of Assessment	06/01/2016
Stream Category	Ma1	Assessor Name/Organization	Lewis/Axiom

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

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

Draft NC SAM Stream Rating Sheet
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Stream Site Name	Warren Wilson College #6	Date of Assessment	06/02/2016
Stream Category	Ma2	Assessor Name/Organization	Lewis/Axiom

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

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

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.12

Stream Site Name	Warren Wilson College	Date of Assessment	06/02/2016
Stream Category	Ma1	Assessor Name/Organization	Lewis/Axiom

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

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

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.12

Stream Site Name	Warren Wilson College	Date of Assessment	06/02/2016
Stream Category	Ma2	Assessor Name/Organization	Axiom/Lewis

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

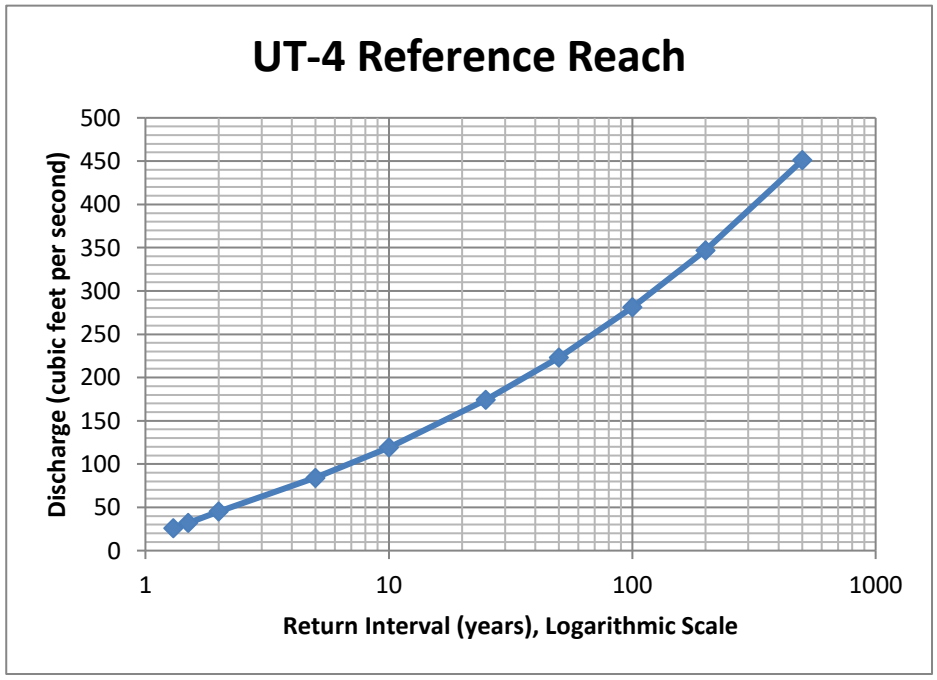
Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	**LOW**	
(2) Baseflow	**MEDIUM**	
(2) Flood Flow	**LOW**	
(3) Streamside Area Attenuation	**LOW**	
(4) Floodplain Access	**LOW**	
(4) Wooded Riparian Buffer	**LOW**	
(4) Microtopography	**LOW**	
(3) Stream Stability	**LOW**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

Appendix C
Regional Regression Model Data

Region: Blue Ridge/Piedmont

Return Interval (years)	Discharge (cfs)
1.3	**26**
1.5	**32**
2	45.1
5	84.1
10	119
25	174
50	223
100	281
200	347
500	451

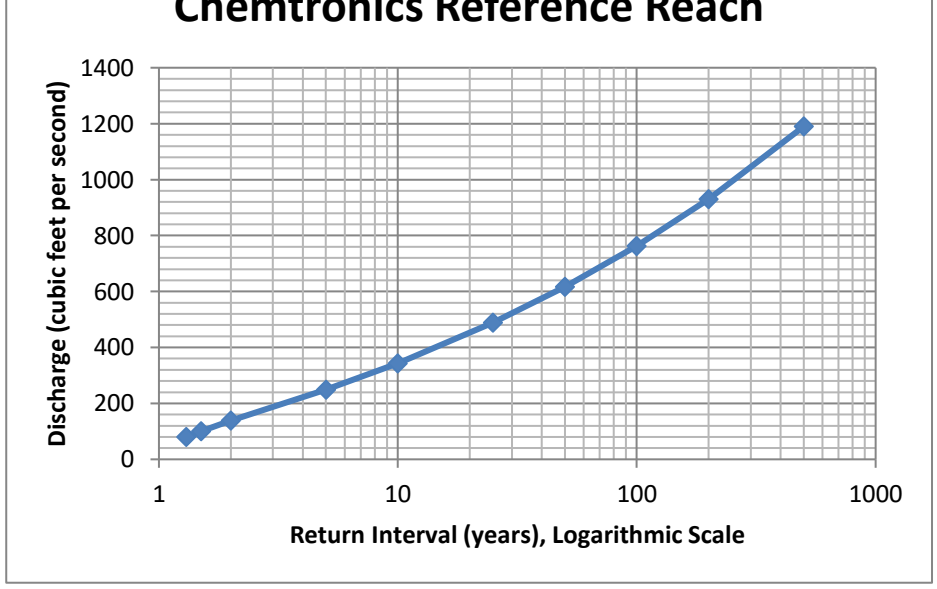
Bold indicates interpolated data.



Region: Blue Ridge/Piedmont

Return Interval (years)	Discharge (cfs)
1.3	**80**
1.5	**100**
2	139
5	249
10	343
25	488
50	617
100	763
200	930
500	1190

Bold indicates interpolated data.



Appendix D
Jurisdictional Determination

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID: **SAW-2017-01557** County: **Buncombe** U.S.G.S. Quad: **Oteen & Craggy**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner: **Warren Wilson College / Attn: Scott McKinney**
Address: **P.O. Box 9000**
Asheville, NC 28815
Telephone Number: **828-771-2056**

Size (acres): **43 acres**
Nearest Town: **Swannanoa**
Nearest Waterway: **Swannanoa River**
Coordinates: **35.609817 -82.443540**
River Basin/ HUC: **French Broad**

Location description: **The site is located in/around 701 Warren Wilson Road, in Swannanoa, NC.**

Indicate Which of the Following Apply:

A. Preliminary Determination

X There are waters, including wetlands, 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, including wetlands, 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 **Amanda Jones** at **828-271-7980**, **ext. 4225** or **amanda.jones@usace.army.mil**.

C. Basis for Determination:

See attached preliminary jurisdictional determination form.

The site contains wetlands as determined by the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Eastern Mountain and Piedmont Region (version 2.0). These wetlands are adjacent to stream channels located on the property that exhibit indicators of ordinary high water marks. The stream channels on the site are unnamed tributaries to the French Broad River which ultimately drains to the Gulf of Mexico.

D. Remarks:

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: FUEMMELER.AMANDA.JONES.1242835090 Digitally signed by FUEMMELER.AMANDA.JONES.1242835090 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=FUEMMELER.AMANDA.JONES.1242835090 Date: 2018.04.02 09:36:39 -04'00'

Amanda Jones

Issue Date of JD: **April 2, 2018** 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:
Axiom Environmental, Attn: Grant Lewis (via email)

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL		
Applicant: **Warren Wilson College / Attn: Scott McKinney**	File Number: **SAW-SAW-2017-01557**	Date: **April 2, 2018**

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: Amanda Jones** **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.: Amanda Jones, 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: April 2, 2018

B. **NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:**
Warren Wilson College / Attn: Scott McKinney
P.O. Box 9000
Asheville, NC 28815

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:
CESAW-RG-A, SAW-2017-01557,

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
The site is located in/around 701 Warren Wilson Road, in Swannanoa, NC.

State: **NC** County/parish/borough: **Buncombe** City: **Swannanoa**
Center coordinates of site (lat/long in degree decimal format): **35.609817 -82.443540**
Universal Transverse Mercator: **N/A**
Name of nearest waterbody: **Swannanoa River**

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date: **April 2, 2018**
☒ Field Determination. Date(s): **01/24/18**

Use the table below to document aquatic resources and/or aquatic resources at different sites

Site Name	Latitude	Longitude	Estimated amount of aquatic resource in review area	Type of aquatic resources	Geographic authority to which the aquatic resource "may be" subject
GA	35.6087	-82.4401	0.16 ac	Wetland	Section 404
GB	35.6089	-82.4405	0.27 ac	Wetland	Section 404
GC	35.6180	-82.4524	0.009 ac	Wetland	Section 404
GD	35.6175	-82.4523	0.42 ac	Wetland	Section 404
GE	35.6156	-82.4519	0.05 ac	Wetland	Section 404
GF	35.6151	-82.4518	0.22 ac	Wetland	Section 404
GG	35.6142	-82.4519	0.09 ac	Wetland	Section 404
GH	35.6146	-82.4518	0.02 ac	Wetland	Section 404
GJ	35.6147	-82.4518	0.04 ac	Wetland	Section 404
PA	35.6116	-82.4390	0.30 ac	Wetland	Section 404
PB	35.6041	-82.4428	0.51 ac	Wetland	Section 404
PC	35.6165	-82.4521	0.33 ac	Wetland	Section 404
PD	35.6087	-82.4562	0.30 ac	Wetland	Section 404
PX	35.6147	-82.4522	0.15 ac	Wetland	Section 404
AJF	35.6182	-82.4523	0.02 ac	Wetland	Section 404

UT1	35.6093	-82.4400	756.7 lf	Non-wetland	Section 404
UT3	35.6093	-82.4545	3581.6 lf	Non-wetland	Section 404
UT4	35.6170	-82.4518	312.3 lf	Non-wetland	Section 404
UT5	35.6090	-82.4484	768.6 lf	Non-wetland	Section 404
UT6	35.6057	-82.4433	1362.6 lf	Non-wetland	Section 404
UT7	35.6031	-82.4414	2425.5 lf	Non-wetland	Section 404
UT8	35.6036	-82.4382	957.1 lf	Non-wetland	Section 404
Open Water	35.6034	-82.4426	0.30 ac	Non-wetland	Section 404

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

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: **Oteen & Craggy.**
☒ Natural Resources Conservation Service (NRCS) Soil Survey.
  Citation: **Buncombe 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):
  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.

FUEMMELER.AMANDA.JONES.1242835090
Digitally signed by FUEMMELER.AMANDA.JONES.1242835090
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=FUEMMELER.AMANDA.JONES.1242835090
Date: 2018.04.02 09:37:07 -04'00'

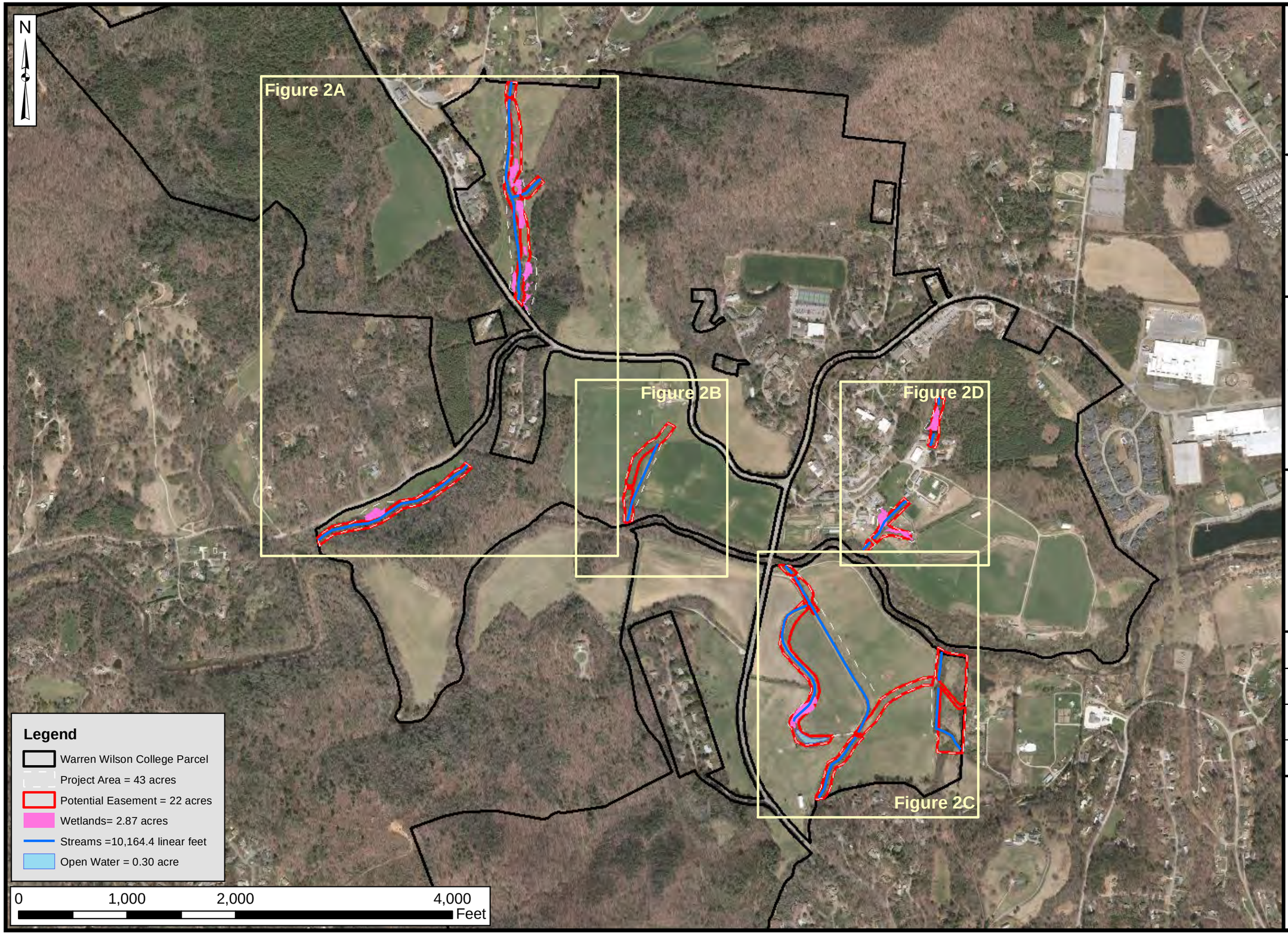
Amanda Jones, April 2, 2018
Signature and date of Regulatory staff member completing preliminary JD

Warren Wilson College / Attn: Scott McKinney
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.



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

OVERVIEW MAP

Drawn by: KRJ/CLF

Date: Jan 2018

Scale: 1:10,000

Project No.: 17-018

FIGURE

2

Map Unit	Soil Series
CkD2	Clifton clay loam, 15 to 30 percent slopes
EwD	Evard-Cowee complex, 15 to 30 percent slopes
EwE	Evard-Cowee complex, 30 to 50 percent slopes
FrA	French loam, 0 to 3 percent slopes
NkA	Nikwasi loam, 0 to 2 percent slopes
TaB	Tate loam, 2 to 8 percent slopes
TaC	Tate loam, 8 to 15 percent slopes
TkC	Tate loam, 8 to 15 percent slopes, very stony

Legend

- Warren Wilson College Parcel
- Project Area = 43 acres
- Potential Easement = 22 acres
- Wetlands= 2.87 acres
- Streams =10,164.4 linear feet
- Soil Boundaries
- USACE Wetland Dataforms
- NC SAM Forms

0 250 500 1,000 1,500 Feet

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

JURISDICTIONAL AREAS

Drawn by: KRJ/CLF

Date: Jan 2018

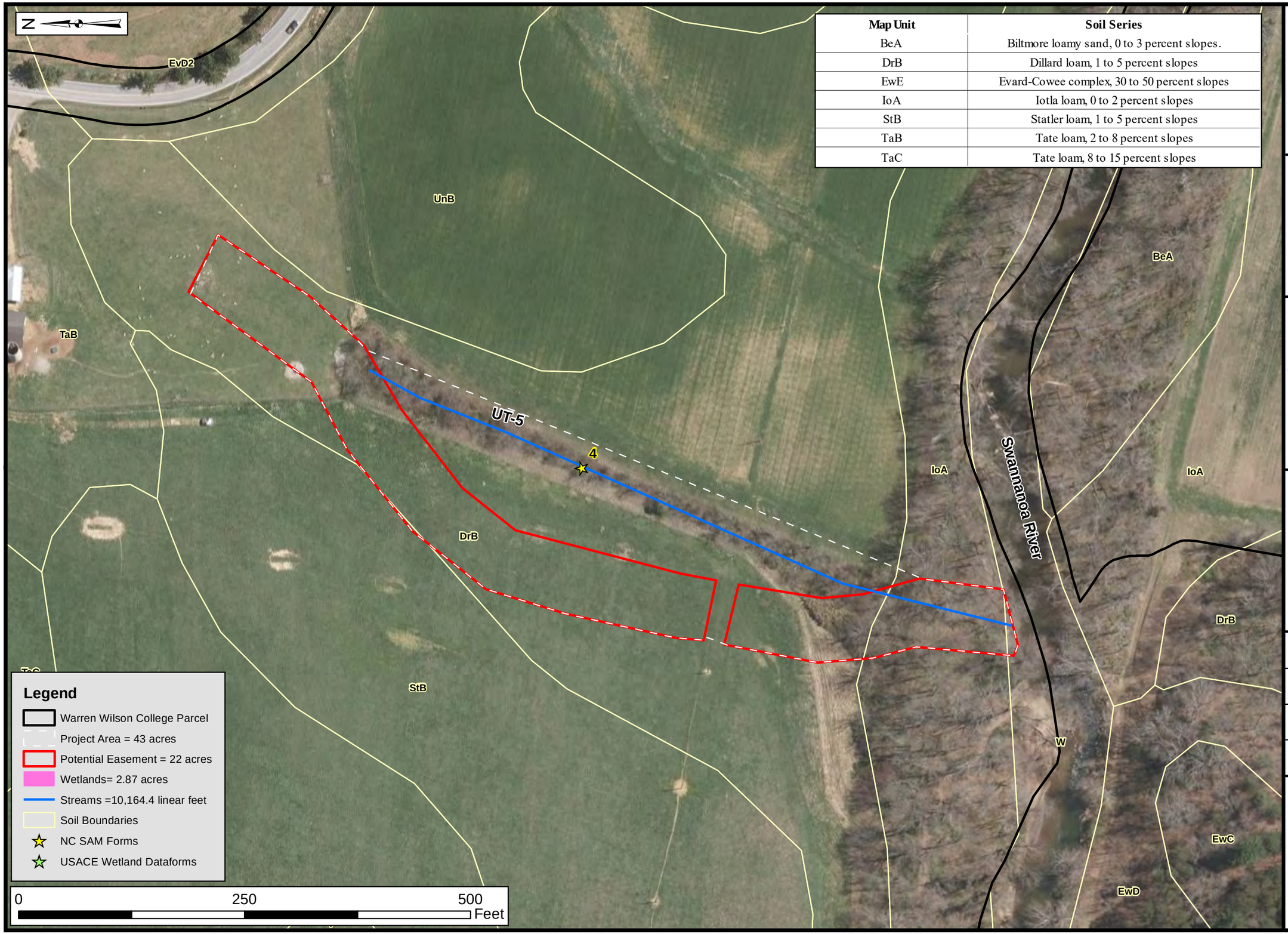
Scale: 1:3800

Project No.: 17-018

FIGURE

2A

Map Unit	Soil Series
BeA	Biltmore loamy sand, 0 to 3 percent slopes.
DrB	Dillard loam, 1 to 5 percent slopes
EwE	Evard-Cowee complex, 30 to 50 percent slopes
IoA	Iotla loam, 0 to 2 percent slopes
StB	Statler loam, 1 to 5 percent slopes
TaB	Tate loam, 2 to 8 percent slopes
TaC	Tate loam, 8 to 15 percent slopes



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

JURISDICTIONAL AREAS

Drawn by: KRJ/CLF

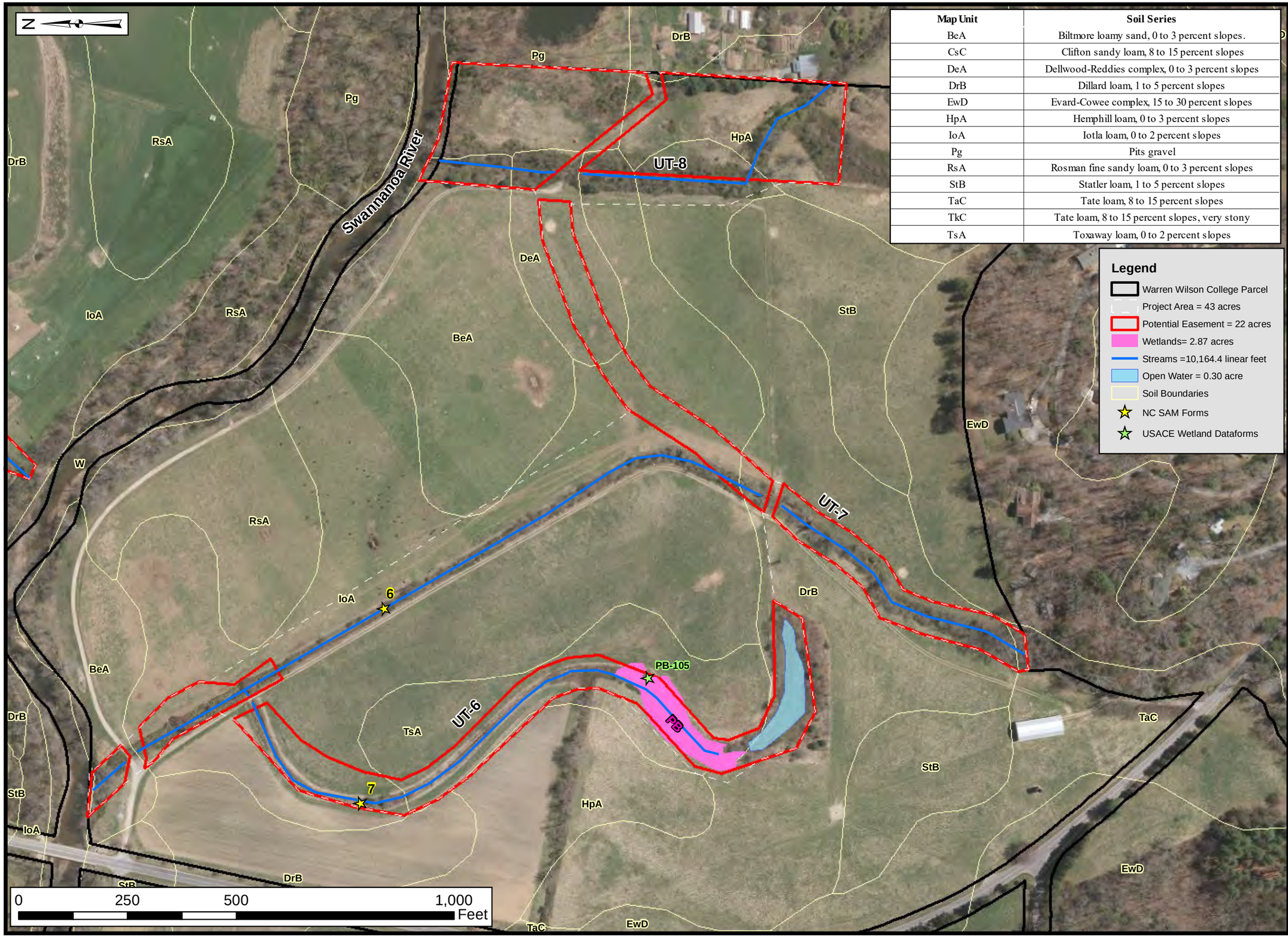
Date: Jan 2018

Scale: 1:1200

Project No.: 17-018

FIGURE

2B



Map Unit	Soil Series
BeA	Biltmore loamy sand, 0 to 3 percent slopes.
CsC	Clifton sandy loam, 8 to 15 percent slopes
DeA	Dellwood-Reddies complex, 0 to 3 percent slopes
DrB	Dillard loam, 1 to 5 percent slopes
EwD	Evard-Cowee complex, 15 to 30 percent slopes
HpA	Hemphill loam, 0 to 3 percent slopes
IoA	Iotla loam, 0 to 2 percent slopes
Pg	Pits gravel
RsA	Rosman fine sandy loam, 0 to 3 percent slopes
StB	Statler loam, 1 to 5 percent slopes
TaC	Tate loam, 8 to 15 percent slopes
TkC	Tate loam, 8 to 15 percent slopes, very stony
TsA	Toxaway loam, 0 to 2 percent slopes

Legend

- Warren Wilson College Parcel
- Project Area = 43 acres
- Potential Easement = 22 acres
- Wetlands= 2.87 acres
- Streams =10,164.4 linear feet
- Open Water = 0.30 acre
- Soil Boundaries
- NC SAM Forms
- USACE Wetland Dataforms

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

JURISDICTIONAL AREAS

Drawn by: KRJ/CLF

Date: Jan 2018

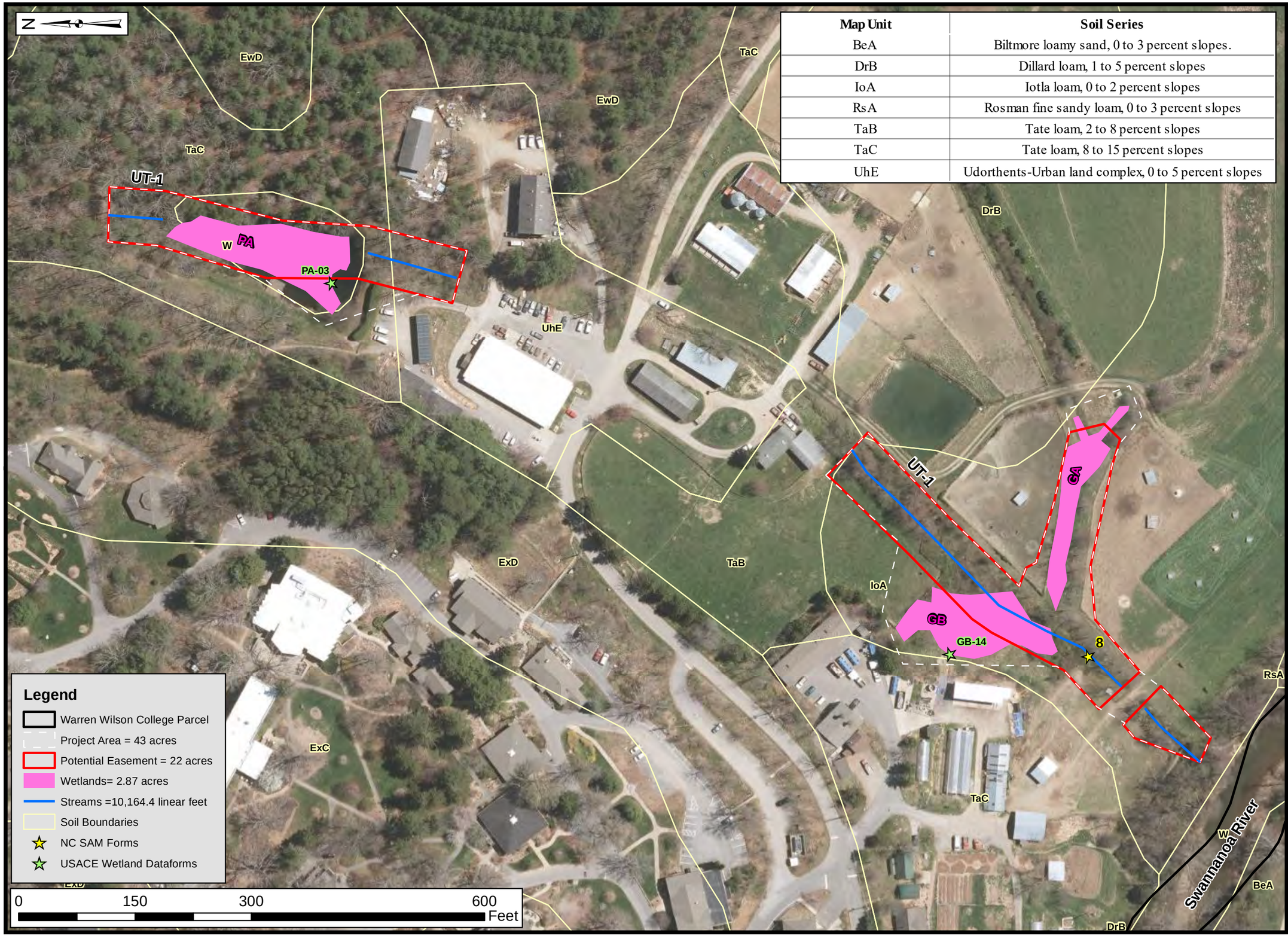
Scale: 1:2500

Project No.: 17-018

FIGURE

2C

Map Unit	Soil Series
BeA	Biltmore loamy sand, 0 to 3 percent slopes.
DrB	Dillard loam, 1 to 5 percent slopes
IoA	Iotla loam, 0 to 2 percent slopes
RsA	Rosman fine sandy loam, 0 to 3 percent slopes
TaB	Tate loam, 2 to 8 percent slopes
TaC	Tate loam, 8 to 15 percent slopes
UhE	Udorthents-Urban land complex, 0 to 5 percent slopes



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

JURISDICTIONAL AREAS

Drawn by: KRJ/CLF

Date: Jan 2018

Scale: 1:1400

Project No.: 17-018

FIGURE

2D

Appendix E
Categorical Exclusion Document

Warren Wilson College Stream Mitigation Site

Buncombe County, North Carolina

DMS Project No. 100019

Categorical Exclusion/ERTR

Prepared for:

North Carolina Department of Environmental Quality

Division of Mitigation Services

1652 Mail Service Center

Raleigh, NC 27699-1652

November 2017

TASK 1 b.) Categorical Exclusion Summary:

Part 1: General Project Information

(Attached) Part 2: All Projects

Regulation/Questions

Coastal Zone Management Act

Not applicable – project is not located within a CAMA county.

CERCLA

No issue within project boundaries – please see the attached Executive Summary from a Limited Phase 1 Site Assessment performed by Environmental Data Resources, Inc. (EDR) on October 26th, 2017. Three sites were reported within the target map boundaries of the EDR report, however, these sites are outside of the proposed project conservation easements of the Site. Restoration Systems discussed these sites with WWC faculty and the findings are summarized below.

Map ID A2, Tank ID A1: An existing 6,000-gallon gasoline underground storage tank (UST) is located at Warren Wilson College's Facilities and Maintenance Building. This tank provides fuel for WWC owned vehicles. This UST is outside of the proposed easement.

Map ID A2, Tank IDs 1-5: These various fuel tanks or USTs have been removed and were not located within the Site's proposed easements.

Map ID A1: WWC campus composting facility located outside of proposed conservation easements. Permit # 115-COMPOST-2009

National Historic Preservation Act (Section 106)

Updated- please see attached letter from Ramona M. Bartos- State of the Historic Preservation Office. Restoration Systems is now submitting a revised CE/ERTR to FHWA following the completion of work at archeological site 31BN28. When archeological site 31BN28 was evaluated and the proposed project was determined to not negatively impact the site, SHPO sent a concurrence letter for site 31BN28 that allows FHWA to fully approve the Categorical Exclusion. Construction Monitoring of sites 31BN135 and 31BN145/491 will take place during two weeks of construction which will likely occur Fall 2018.

Uniform Act

Please see the attached letter, sent to the landowner October 24, 2017.

Part 3: Ground-Disturbing Activates Regulation/Questions

American Indian Religious Freedom Act (AIRFA)

A coordination letter was sent to Holly Austin, the Federal Cultural Resource Law Liaison at the Tribal Historic Preservation Office since Buncombe County contains areas claimed as "territory" by the Eastern Band of Cherokee Indians.

Antiquities Act (AA)

Not applicable – project is not located on Federal land.

Archaeological Resources Protection Act (ARPA)

Not applicable – project is not located on federal or Indian lands.

Endangered Species Act (ESA)

A desktop analysis and field investigation were conducted to evaluate federally protected species potentially occurring in and around the Site. The online project review (known as IPaC) was performed via the USFWS Asheville Field Office Website. A letter was also sent to the USFWS's biologist John Ellis on July 26th, 2017 alerting them to the project activities for an informal Section 7 review. There are 11 known federally protected species (listed below) occurring in Buncombe County, NC. Our summary is that NO existing habitats exist within the project boundaries for 10 of the 11 species. Based on the absence of suitable habitat, and lack of observation during surveys for the listed species, it is reasonable to conclude implementation and monitoring of the project will have No Effect on the following listed species: Bog Turtle, Carolina northern flying squirrel, Gray Bat, Spotfin chub, Appalachian elktoe, Spruce-fir moss spider, Tan riffleshell, Spreading Avens, Virginia spiraea, and the Rock gnome lichen.

The Northern long-eared bat- The project area does not contain any caves or suitable winter roosting areas for the Northern long-eared bat. Any project activities involving tree cutting of suitable summer roosting tree species would be conducted between August 1st and May 31st, in accordance to USFWS guidance on the subject. In order to comply with the Northern long-eared Bat (NLEB) 4(d) streamlined rule for federal agencies form was submitted (attached below). It was determined that the project "may affect the NLEB, but any incidental take of the NLEB is not prohibited by the final 4(d) rule." Please see the NLEB 4(d) Rule Streamlined Consultation Form for detailed information.

Federally Protected Species

Common Name (Threatened/Endangered)	Scientific Name	Habitat at Site	Biological Conclusion	Summary
Bog Turtle (T)	Glyptemys muhlenbergii	Yes	N/A	Species is not subject to section seven consultations requirements under the Endangered Species Act.
Carolina northern flying squirrel (E)	Glaucomys sabrinus coloratus	No	No Effect	No habitat exists in or near the project boundaries.
Gray Bat (E)	Myotis grisescens	No	No Effect	Only foraging habitat present within the Site; however, no roosting habitat with the Site boundaries or near the Site. Foraging habitat will not be disturbed summer months.
Northern long-eared bat (T)	Myotis septentrionalis	Yes	May Effect	(See attached Northern long eared Bat consultation form)
Spotfin chub (T)	Erimonax monachus	No	No Effect	Historic record only, only known from four sites outside this watershed.

Appalachian elktoe (E)	Alasmidonta raveneliana	No	No Effect	Historic record only, no known presence in or near the Site. Existing stream channels do not provide habitat due to sediment build ups
Spruce-fir moss spider (E)	Microhexura montivaga	No	No Effect	No habitat exists in or near the project boundaries.
Tan riffleshell (E)	Epioblasma florentina walkeri	No	No Effect	Historic record only, no known presence in or near the Site. Existing stream channels do not provide habitat due to sediment build ups.
Spreading avens (E)	Geum radiatum	No	No Effect	No habitat exists in or near the project boundaries.
Virginia spiraea (T)	Spiraea virginiana	No	No Effect	Historic record only, no known presence in or near the Site.
Rock gnome lichen (E)	Gymnoderma lineare	No	No Effect	No habitat exists in or near the project boundaries.

Summary of Anticipated Effects

Project activates are not likely to affect habitat for Endangered or Threatened Species. The proposed project will occur in existing agricultural fields which are intensively managed for row crops and pasture for grazing and hay production. The likelihood of any habitat occurring on the project site is extremely low. Record searches from the Natural Heritage Program indicate that federally protected species have not been documented within a mile of the Site boundaries.

Executive Order 13007 (Indian Sacred Sites)

Not applicable – project is not located on federal lands.

Farmland Protection Policy Act (FPPA)

Please find the attached Form AD-1006 dated 8/30/2017 and letter from Milton Cortes of the NRCS.

Fish and Wildlife Coordination Act (FWCA)

Please find the attached Northern Long-Eared Bat Consultation Form.

Land & Water Conservation Fund Act (Section 6(f))

Not applicable

Magnuson-Stevens Fishery Conservation and management Act (Essential Fish Habitat)

Not applicable – project is not located within an estuarine system

Migratory Bird Treaty Act (MBTA)

USFWS has no recommendation with the project relative to the MBTA

Wilderness Act

Not applicable – the project is not located within a Wilderness area.

Appendix A

Categorical Exclusion Form for Ecosystem Enhancement 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:	Warren Wilson College Stream Mitigation Site
County Name:	Buncombe
EEP Number:	ID #: 100019 Contract #: 7188
Project Sponsor:	Restoration Systems, LLC
Project Contact Name:	Worth Creech
Project Contact Address:	1101 Haynes Street, Suite 211, Raleigh, NC 27604
Project Contact E-mail:	worth@restorationsystems.com
EEP Project Manager:	Paul Wiesner paul.wiesner@ncdenr.gov

Project Description

The site is located approximately 5 miles east of Asheville in Buncombe County, within the North Carolina Division of Water Resources [NCDWR] subbasin number 04-03-02 and DMS Targeted Local Watershed 06010105070030.

Restoration of riparian buffers and stream connectivity will involve 1) low flow channel construction, 2) ditch plug installation, 3) elevating existing channels to historic levels, and 4) re-vegetating stream buffer areas. These activities will restore riparian streams within 16 acres of conservation easement at the Site.

For Official Use Only

Reviewed By:

4/16/18
Date

EEP Project Manager

Conditional Approved By:

11-21-17
Date

For Division Administrator
FHWA

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

Final Approval By:

4-17-18
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 species and/or "likely to adversely modify" Designated Critical Habitat?	☐ Yes ☐ No ☑ N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?	☐ Yes ☐ No ☑ N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	☐ Yes ☐ No ☑ N/A

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

SHPO Coordination:

November 6, 2017

Paul Wiesner
Western Regional Supervisor
Division of Mitigation Services
5 Ravenscroft Drive
Suite 102
Asheville, N.C. 28801

SUBJECT: Warren Wilson Mitigation Site. DMS Project ID: 100019, Action Plan for the National Historic Preservation Act; Task 1: Categorical Exclusion.

Dear Mr. Wiesner,

Restoration Systems (RS) was awarded a contract for the Warren Wilson Mitigation Site (Contract #7188) on May 22, 2017, under RFP #16-006991. Task One of the RFP is to perform an environmental screening to identify/survey potential protected species, archaeological sites, historical architectural structures, contamination, etc. of the site. RS performed a screening for potential historical and archaeological sites and drafted a letter to the State Historic Preservation Office (SHPO) on July 26, 2017 (letter enclosed) with our findings and asking for concurrence. We received a letter (enclosed) back from Renee Gledhill-Earley of SHPO on September 27, 2017 identifying several documented archaeological sites either in our proposed conservation easements, or adjacent to our easements. These sites were not discovered in our cursory review.

The RS team contacted SHPO on 10/11/2017 to discuss our restoration work in or around these archeological sites listed in the SHPO letter, specifically site 31BN28 which UT-5 transects and whose NRHP eligibility needs to be determined. Sites 31BN135 and 31BN145/491 are in the vicinity of tributaries UT-1, UT-6, UT-7, and UT-8 and are not being surveyed for NRHP eligibility. Linda Hall, who is the SHPO Western Office Staff Archaeologist met with Worth Creech of Restoration Systems, Sara Stavinoha of AnchorQEA, and Tasha Benyshek of TRC Archaeological Consulting on site 10/25/2017 to see the existing conditions of the project, discuss the proposed work, and to strategize on how to allow the restoration project to move forward while performing archaeological work prescribed in the SHPO response letter. The RS team walked the potentially affected tributaries with Linda Hall who made recommendations with our archaeological consultant Tasha Benyshek.

Post on-site meeting, Tasha Benyshek coordinated with SHPO to approve a proposal to provide archaeological testing on site 31BN28, and construction monitoring of sites 31BN135 and 31BN145/491. The plan was approved by Linda Hall and sent to RS for signature. The details of the archaeological work to be performed on the site are in TRC's proposal dated October 27, 2017. Work performed under this proposal will determine the National Registry of Historic Places (NRHP) eligibility of 31BN28 and construction monitoring of 31BN135 and 31BN145/491 to ensure no impacts are made during construction.

Site 31BN28 Timeline:

RS has signed the proposal and TRC will begin surveying 31BN28 once the CE is "Conditionally Approved" and Mitigation Plan development is underway. Topographic surveys are being conducted mid-November which will allow the RS team to identify exactly where the easement for UT-5 will be located. We anticipate the field survey on site 31BN28 to be completed by 12/22/2017. Once field work is complete, TRC will develop a Site report by 1/12/2018. A response letter from SHPO on site 31BN28 is anticipated by 1/31/2018 which will determine the inclusion or removal of UT-5 into the project.

Sites 31BN135 and 31BN145/491 Timeline:

Construction Monitoring of sites 31BN135 and 31BN145/491 will take place during two weeks of construction which will likely occur Fall 2018.

Restoration Systems understands that a "Conditional Approved" Categorical Exclusion and subsequent approval and payment of Task 1 will obligate RS to complete all work prescribed in TRC's proposal and subsequent approval of the tasks outlined in the proposal by SHPO. Should any mitigation units be subtracted from the contract total due to CE issues, Restoration Systems is obligated to repay NCDMS for the value of lost units paid thus far, or accept a downward adjustment of the contract total for future tasks. Additionally, if an agreement with SHPO cannot be reached and RS makes the decision to drop the project and cancel contract 7188, then RS is obligated to fully reimburse NCDMS for the Task I. Additionally, NCDMS will not provide payment for Tasks II and III until Task I has been fully approved by FHWA.

Please let me know if you need any further information.

Sincerely,

Worth Creech
Restoration Systems

Enclosures:
RS_WWC_SHPO_7-26-17
WWC_SHPO_Response_9-27-17
TRC_WWC_Proposal

July 26th, 2017

Renee Gledhill-Earley,
Environmental Review Coordinator
North Carolina State Historic Preservation Office
109 East Jones Street
Raleigh, NC 27699-4617
Sent electronically to Environmental.Review@ncdcr.gov

Re: Warren Wilson College Stream Mitigation Project, Buncombe County, NC

Dear Renee,

The purpose of this letter is to request written concurrence from the State Historic Preservation Office (SHPO) for Warren Wilson College Stream Mitigation Project in Buncombe County, a Full-Delivery project for the N.C. Davison of Mitigation Services. Please review and comment on any possible issues that might emerge with respect to SHPO from a potential stream restoration project depicted on the attached mapping.

Project Name:	Warren Wilson College Stream Mitigation Project
Project Location:	701 Warren Wilson Rd, Swannanoa, NC 28778
Project Contact:	JD Hamby, Restoration Systems LLC, 1101 Haynes St. Suite 211, Raleigh, NC 27604

Project Description: The project has been identified for the purpose of providing in-kind mitigation for unavoidable stream channel and wetland impacts. Permits from the NC DWR and USACE will be obtained to restore waters of the US. Soil and erosion control permits will also be obtained. The project encompasses 22 acres of pasture and forested land. Approximately 12,060 l. ft. of stream will be enhanced or restored.

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

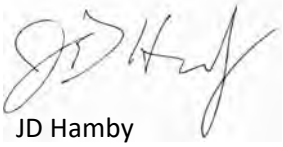
Field visits were conducted in late May and early June 2016 to conduct evaluations for presence of structures or features that may be eligible for the National Register of Historic Places. No structures were identified within the Site boundaries that may be eligible for the National Register. In addition to field reviews for historically relevant structures, a records search was conducted at the SHPO office to determine if documented occurrences of historic structures or artifacts occur within, or adjacent to the Site. The SHPO records identify one feature within the Site boundaries (Warren Wilson College Historic District), and two features within a 1.0 mile radius of the Site:

- Truss Bridge (BN 2494 #213) which is no longer standing, and
- Davidson House BNO352, located approximately 0.9 mile west of the Site.

Typical SHPO coordination will occur prior to construction activities to determine if any significant cultural resources are present; however, no constraints are expected at this time. We thank you in advance for your timely response and cooperation. Please feel free to contact me with any questions that you may have concerning the extent of site disturbance associated with this project.

Yours truly,

RESTORATION SYSTEMS, LLC



JD Hamby
Project Manager
jhamby@restorationsytems.com
919-755-9490

Attachments – USGS Map, Existing Conditions

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

September 27, 2017

JD Hamby jhamby@restorationsystems.com
Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, NC 27604

Re: Warren Wilson College Stream Mitigation Project, 701 Warren Wilson Road, Buncombe County, ER 17-1683

Dear Mr. Hamby:

Thank you for your letter of July 26, 2017, concerning the above project.

There are several important archaeological sites located at the campus of Warren Wilson College ranging in age from the Early Archaic through the Mississippian periods. Three of these sites, 31BN28, 31BN135, and 31BN145/491 could potentially be affected by the proposed project. The National Register eligibility of these sites has not been fully evaluated.

31BN28 is located within Figure 4B of the project area. We recommend that archaeological testing and evaluation be conducted at 31BN28 by an experienced archaeologist to assess the significance of archaeological remains that may be damaged or destroyed by the proposed project. Potential effects on unknown resources must be assessed prior to the initiation of construction activities.

31BN135 and 31BN145/491 are in close proximity to proposed restoration areas depicted in Figure 4C and the southern section of Figure 4D respectively. We recommend that ground disturbing activities be monitored by a professional archaeologist during construction in these areas.

Prior to initiating the archaeological fieldwork the consulting archaeologist should contact Western Office staff archaeologist, Linda Hall at 828/296-7230 or linda.hall@ncdcr.gov. Two copies of the resulting archaeological survey report, as well as two copies of the appropriate site forms, should be forwarded to us for review and comment as soon as they are available and well in advance of any construction activities.

A list of archaeological consultants who have conducted or expressed an interest in contract work in North Carolina is available at www.archaeology.ncdcr.gov/ncarch/resource/consultants.htm. The archaeologists listed, or any other experienced archaeologist, may be contacted to conduct the recommended survey.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Ramona Bartos

5 Dogwood Road
Asheville, NC 28806

828.667.3838 PHONE
828.667.3839 FAX

www.TRCsolutions.com

October 27, 2017

Mr. Worth Creech
Restoration Systems, LLC
1101 Haynes Street
Suite 211
Raleigh, North Carolina 27604

Re: Archaeological Testing and Site Assessment for 31BN28 and Archaeological Monitoring near Sites 31BN135 and 31BN145/491, Buncombe County, North Carolina

Dear Mr. Creech:

TRC Environmental Corporation (TRC) is pleased to provide this proposal for archaeological testing of 31BN28 and monitoring near sites 31BN135 and 31BN145/491 on the Warren Wilson College campus in Buncombe County, North Carolina, per the information that you have provided for the Warren Wilson Stream Restoration project. A full report is necessary per North Carolina State Historic Preservation Office/Office of State Archaeology (SHPO/OSA) standards.

The primary goals of the project include the assessment of 31BN28 within the project's impact area (UT-5 and adjacent artificial channel), and its evaluation through application of the National Register of Historic Places (NRHP) Criteria for Evaluation (36CFR 60.4). Project goals also include monitoring in other areas to ensure no impacts are made to sites 31BN135 (UT-6 and UT-7) and 31BN145/491 (UT-1 [southern portion]) (Figure 1).

RESEARCH METHODS

The project will include four tasks: (1) consultation and project management, (2) NRHP evaluation of 31BN28, (3) monitoring, (4) laboratory analysis and report preparation, including temporary artifact curation and updated site forms documenting the NRHP eligibility recommendations for any resources.

Task 1: Consultation and Project Management

The first task includes coordination, additional consultation with the SHPO/OSA and the EBCI THPO as needed, and overall Project Management. A review of the available archaeological and historical literature concerning the project has already been conducted. Additional research may be conducted as the project proceeds if needed.

Task 2: NRHP Evaluation of 31BN28

Preliminary research indicates that site 31BN28 is a large site (127,319 m^2) that contains Archaic, Middle Woodland, Mississippian, and Historic components. The site has been subjected to 15-m interval shovel testing, and artifacts were found from 10 to 85 cm below ground surface within 173 shovel tests. The site's NRHP eligibility has not been determined (Buchner et al. 2016). The current project's easement

within and adjacent to 31BN28 covers approximately 1.7 acres. In addition, trees are to be pulled along the artificial drainage within the 31BN28 boundaries.

The field survey will be conducted by a team consisting of a Field Director and from one to two Archaeological Technicians. Both subsurface and surface methods will be used as appropriate for the topography and ground cover, although it is anticipated that most work will involve subsurface testing. All work will occur within the easement boundary and adjacent to the current artificial drainage.

Surface Survey. Surface survey will be employed where possible to supplement shovel test data and to gather information on the site components, site boundaries, and to define concentrations of artifacts.

Subsurface Survey. The subsurface survey will include excavation of systematic shovel tests at 20-m (ca. 66-ft) intervals along the linear impact area, even in areas of good surface visibility. Shovel testing will also be conducted directly adjacent to the artificial drainage where trees are to be pulled; where possible the channel's cut bank will also be inspected. No shovel testing will occur in areas with standing water, hydric soils, visible and severe ground disturbance, or 15% or greater slope. (This interval will be reduced to 10-m as necessary to better define deposits within the impact area). Each shovel test will measure at least 30 cm in diameter and will be excavated to sterile subsoil or bedrock or a minimum depth of 100 cm. All removed soil will be screened through one-quarter-inch wire mesh to ensure uniform artifact recovery. Standard techniques will be used to describe each shovel test in terms of depth, stratigraphy, and artifact recovery, and soil texture and Munsell soil color will be recorded for all tests. Selected shovel tests will be augered to assess the potential for deeply buried deposits.

Standard procedures will be followed to gather data on integrity and cultural affiliation. In most cases, these procedures will include excavation of additional tests at 10-m intervals. All measurements will be recorded in metric with English equivalents. The site will be photographed, and notes will be taken concerning current conditions. Shovel test and test unit locations will be recorded in the field, along with other relevant features using a total station to permit the creation of GIS shape files; a sub-meter GPS will be used to establish site datums.

Test Units. Larger test units (generally 1 × 1 m in size) will be used as needed to evaluate deposits at 31BN28. The test units will be excavated in 10-cm levels within natural stratigraphy to a depth of at least 10 cm into sterile subsoil or to depths at which excavation does not exceed OSHA safety standards, and all soil will be screened through one-quarter-inch wire mesh. Detailed notes regarding soil texture, Munsell color, artifact recovery, and disturbance will be recorded for each level on standard forms. At least one wall profile will be photographed and drawn at the completion of each test unit. All test units will be backfilled and all areas will be restored to their previous condition as far as possible. Up to 10 test units are included in this Scope of Work.

Feature Excavations. No excavation of cultural features (e.g., hearths, refuse-filled pits, etc.) is anticipated under this Scope of Work.

Deep Testing. It is considered unlikely that mechanized deep testing (e.g., backhoe trenches, etc.) will be needed for this project in order to determine NRHP eligibility. In the event that we encounter areas that cannot be adequately tested by shovel testing and test unit excavation, however, TRC will conduct limited investigations with hand augers, and make recommendations concerning the potential need for deep testing of those areas.

Cemeteries. Any cemeteries identified within the APE will be recorded, but no probing or other subsurface investigations will be conducted. Any apparently abandoned cemeteries will be assigned archaeological site numbers, per OSA standards.

If unmarked human burials or skeletal remains are found, you will be notified immediately and the proper authorities will then be notified according to the provisions of North Carolina General Statute 70, Article 3, *the Unmarked Human Burial and Skeletal Remains Protection Act*.

Task 3: Monitoring

TRC will have an archaeologist on site whenever there are ground disturbing activities occurring at UT-1, UT-6, and UT-7, as these locations are near sites 31BN135 and 31BN145/491. This includes any time heavy equipment is being used in these areas, but does not including plantings (e.g. live stakes). This budget includes up to 10 (8 hour) monitoring days for one person.

Task 4: Laboratory Analysis and Report Preparation

Laboratory Analysis. The artifacts and other project materials will be returned to TRC's laboratory for processing. After washing, the artifacts will then be analyzed according to regionally appropriate typologies as follows:

Prehistoric ceramic fragments will first be separated into fragments greater and smaller than 2 cm; fragments smaller than 2 cm will be scanned for ceramics beads, pipe fragments, or similar artifacts; the remaining small sherds will be counted and weighed, but not otherwise analyzed.

All sherds larger than 2 cm will be subjected to detailed analysis. Each sherd will be characterized according to surface treatment and decoration (i.e., fabric impressed, plain, complicated stamped), temper type, and location of the extant fragment(s) in the original vessel (i.e., rim, neck, body, etc.). Aplastic (temper) type will be documented as crushed quartz, sand, etc., and temper size will be recorded as no apparent temper, fine-medium, or coarse, using the Wentworth scale. When possible, sherds will then be placed into previously recognized types. In other cases, sherds may be assigned to more descriptive categories. Following that analysis, rim sherds and other recognizable vessel fragments will be examined and when possible assigned to discrete vessels.

Lithic artifacts will first be sorted into a number of general categories, including chipped stone tools, chipped stone debitage, groundstone, and fire-cracked rock. Chipped stone tools will be described by general type (e.g. projectile point/hafted biface, biface, unifacial scraper, etc.) and assigned to specific types when possible. Raw material will be recorded.

Chipped stone debitage will be analyzed by raw material. In addition, the percentage of cortex will be recorded. In addition to recording basic raw material type (e.g., chert, quartz, and quartzite), raw materials will be sorted by meaningful, regionally recognized types or by other provisional types as much as possible. Groundstone artifacts will be analyzed individually and categorized according to morphology, the nature and extent of modification, raw material, and apparent function. Fire-cracked rock (FCR) and apparent unmodified rock fragments from all contexts will be counted and weighed and then discarded. This process may take place in the field.

Any recovered pre-modern historic artifacts will be classified according to material type and function. For example, historic ceramics will be classified according to recognized types (e.g., pearlware, whiteware),

and by decorative technique (e.g., hand-painted, transfer print) and vessel form. When possible, historic artifacts also will be analyzed to determine their date of manufacture.

Reporting. A Management Summary will be completed within 10 working days of the completion of fieldwork. Within a month of the completion of the fieldwork, TRC will provide two hard copies and one digital copy of an initial Draft Report detailing the project results. This report will be a fully documented report meeting SHPO/OSA and applicable federal and state standards and will include information on the environmental and cultural contexts for the project, an executive summary, a description of the project research goals and methods, maps, coordinate data, references, and a discussion of the results of the fieldwork and artifact and data analyses. TRC will provide two hard copies and a digital copy of the revised Final Report within 15 days of receipt of any comments.

CORPORATE AND STAFF QUALIFICATIONS

TRC is a full service cultural resources firm with regional offices in Chapel Hill, Asheville, Columbia, Atlanta, Baltimore, and Nashville. We have maintained an office in North Carolina since 1990 and have completed over 450 cultural resources projects in North Carolina.

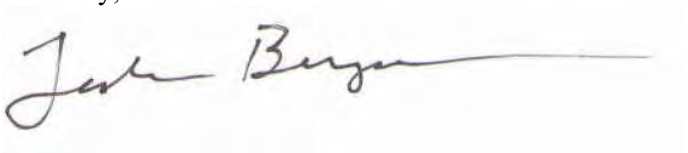
The Project Manager/Principal Investigator for this project will be Ms. Tasha Benyshek, Manager of our Asheville office. Mr. Bruce Idol, Archaeologist in the Chapel Hill office or Mr. Michael Nelson, Archaeologist in the Asheville office will serve as field director depending on availability. The GIS/Graphics Specialist will be Belinda Cox. Mr. Paul Webb, TRC's Cultural Resources Market Director, will review all deliverables.

TRC's proposed costs are shown on the attached spreadsheet and are provided on a time and materials, not to exceed basis.

We will work with you to identify a mutually acceptable schedule for completion of the work.

Thank you for the opportunity to provide this proposal. Please do not hesitate to contact me at (828) 230-4812, or via email at tbenyshek@trcsolutions.com, if you have any questions or comments.

Sincerely,

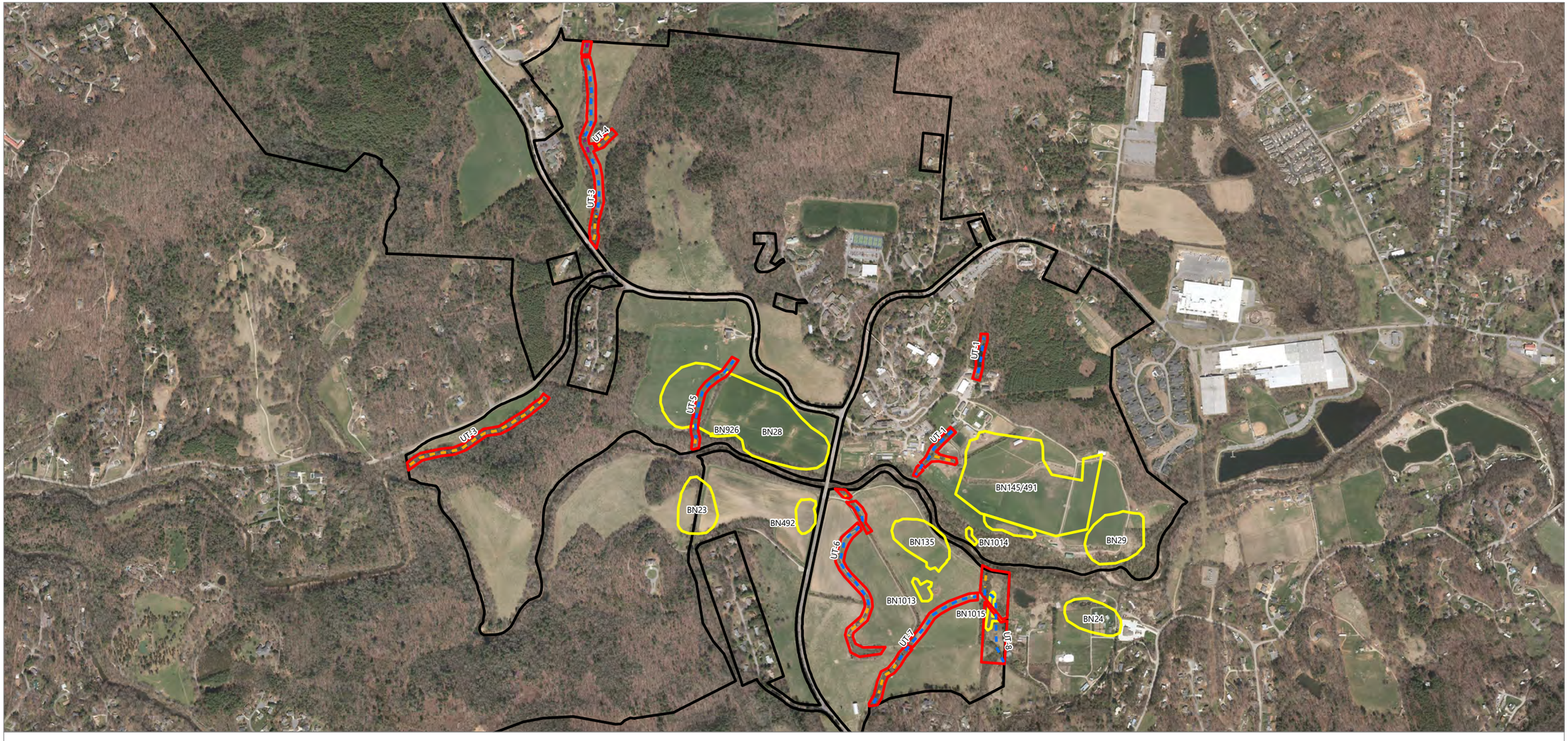


Tasha Benyshek
Manager/Senior Archaeologist, Asheville

Worth Creech
VP Southeast
Restoration Systems

REFERENCE

Buchner, C. Andrew, Karla Oesch, Chester Walker, and William Wilson
2016 *Archaeological Survey at Warren Wilson College for the Swannanoa River Valley Flood Risk Management Study, Buncombe County, NC*. Memphis, TN: Panamerican Consultants, Inc.



LEGEND:

- Easement
- Archaeology Sites
- Stream Enhancement (Level II - 2.5:1)
- Stream Enhancement (Level I - 1.5:1)
- Stream Restoration (1:1)
- Warren Wilson College Parcel

NOTE(S):
Orthoimagery - NC OneMap 2015
Parcel - Buncombe County GIS 2016

0 1,000
Feet

Publish Date: 2017/10/12, 4:09 PM | User: ecrute
Filepath: P:\Restoration Systems\Warren Wilson College Stream Mitigation\GIS\WWC_Easement\Figure X.mxd

ANCHOR QEA
Anchor QEA of North Carolina, PLLC

Figure 1
Proposed Conditions
Warren Wilson College Streatm Mitigation Site
Restoration Systems

July 26th, 2017

Shannon Deaton,
Habitat Conservation Program Manager
North Carolina Wildlife Resources Commission
1701 Mail Service Center
Raleigh, NC 27699-1701

Re: Warren Wilson College Stream Mitigation Project, Buncombe County, NC

Dear Ms. Deaton:

The purpose of this letter is to request concurrence from the North Carolina Wildlife Recourse Commission concerning a stream restoration project located in Buncombe County for the N.C. Division of Mitigation Services. The project will restore stream channels and associated riparian wetlands in mixture existing cattle pasture and forested areas. Please review and comment on any possible issues that might emerge with respect to the Fish and Wildlife Coordination Act from the potential stream restoration project. Attached is a USGS base map with the projects 22 acre footprint identified.

The Warren Wilson College Stream mitigation project site has been identified for the purpose of providing in-kind mitigation for unavoidable impacts to stream channels within watersheds of the French Broad River Basin, CU 06010105.

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

Yours truly,

Restoration Systems, LLC

JD Hamby
Project Manager
jhamby@restorationsytems.com
919-755-9490

Attachments: Location and USGS Map

North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

September 13, 2017

JD Hamby
Restoration Systems

SUBJECT: Warren Wilson College Stream Mitigation Project

Dear Mr. Hamby:

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) received your July 26, 2017 letter regarding plans for a stream restoration project on unnamed tributaries to the Swannanoa River in Buncombe County. You requested 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 degraded streams. This project should not impact wild trout resources. However, some of the tributaries drain to a reach of the Swannanoa River that hosts the Highland Shiner (*Notropis micropteryx*, NC Significantly Rare).

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 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

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 30, 2017

JD Hamby
Project Manager
1101 Haynes Street, Suite 211
Raleigh, North Carolina 27604

Dear JD Hamby:

Thank you for your letter dated June 20, 2017, Subject: Warren Wilson College Stream Mitigation Site, Buncombe County, 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 15, 2017
Name of Project Warren Wilson College Mitigation Site	Federal Agency Involved NC Division of Mitigation Services
Proposed Land Use Forested Conservation Easement	County and State Buncombe County, NC
PART II *(To be completed by NRCS)*	Date Request Received By NRCS August 25, 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: 67 acres
Major Crop(s): CORN	Farmable Land In Govt. Jurisdiction — Acres: 45.5 % 185,350 acres	Amount of Farmland As Defined in FPPA — Acres: 14.5 % 31,000 acres	
Name of Land Evaluation System Used: Buncombe Co, NC LESA	Name of State or Local Site Assessment System: N/A	Date Land Evaluation Returned by NRCS: August 30, 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	20.0			
B. Total Acres To Be Converted Indirectly	2.0			
C. Total Acres In Site	22.00			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	16.70			
B. Total Acres Statewide Important or Local Important Farmland	3.40			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.0648			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	31.70			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	50			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	15			
2. Perimeter In Non-urban Use	(10)	10			
3. Percent Of Site Being Farmed	(20)	15			
4. Protection Provided By State and Local Government	(20)	0			
5. Distance From Urban Built-up Area	(15)	15			
6. Distance To Urban Support Services	(15)	10			
7. Size Of Present Farm Unit Compared To Average	(10)	9			
8. Creation Of Non-farmable Farmland	(10)	9			
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	108	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	50	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	108	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	158	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.

11/27/2017

Attn: Holly Austin
Federal Cultural Resource Law Liaison
Tribal Historic Preservation Office
Eastern Band of the Cherokee Indians

Subject: DMS- Warren Wilson College Stream Restoration Full Delivery Project

Dear Mrs. Austin:

Restoration Systems, LLC (RS) has been awarded a contract by the North Carolina Division of Mitigation Services (DMS) to implement a stream restoration project in Buncombe County. As required by the contract, the DMS requests review and comment on any possible issues that might emerge with respect to archaeological or religious resources associated with a potential stream and wetland restoration project. Please review the attached maps for general project location and areas of ground disturbance for project implementation.

A similar letter has been sent to the North Carolina State Historic Preservation Office (SHPO) for compliance with Section 106 of the Historic Preservation Act.

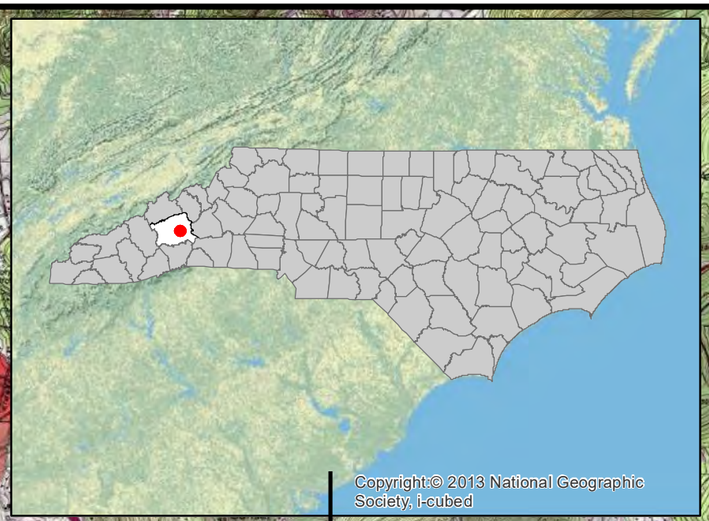
The Warren Wilson College Stream Restoration site has been identified for the purpose of providing in-kind mitigation for unavoidable stream channel & wetland impacts. We are currently conducting archeological surveys of the project area to determine the locations of any artifacts or structures that are deemed of historic and cultural value at the site under the supervision of SHPO. In addition, the majority of this site has already been disturbed due to agricultural purposes such as crop production and livestock grazing. The ground disturbance activities required to complete this project will only impact those areas that have previously been impacted due to these agricultural practices.
The project involves the approximately 10,433 linear feet of eight Unnamed Tributaries of the Swannanoa River. The project is located approximately 5 miles east of Asheville, North Carolina. The property is owned by Warren Wilson College.

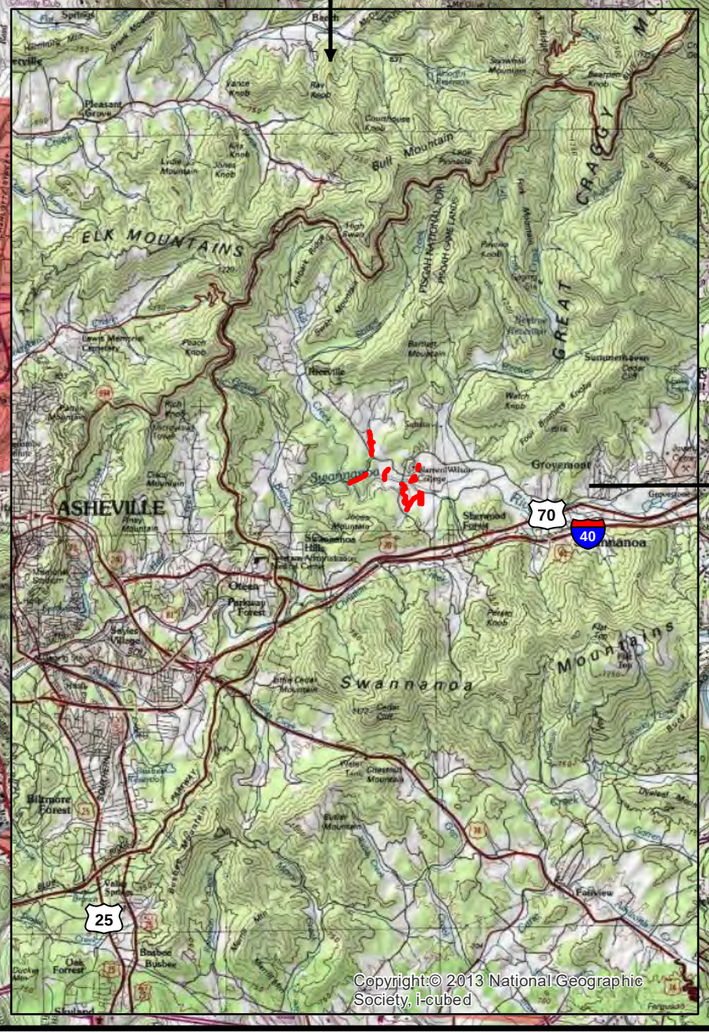
We ask that you review this site based on the attached information to determine if you know of any existing resources that need to be brought to our attention. In addition, please let us know the level your future involvement with this project needs to be (if any). You may contact me at the office (919) 755-9490 or email me at worth@restorationsystems.com

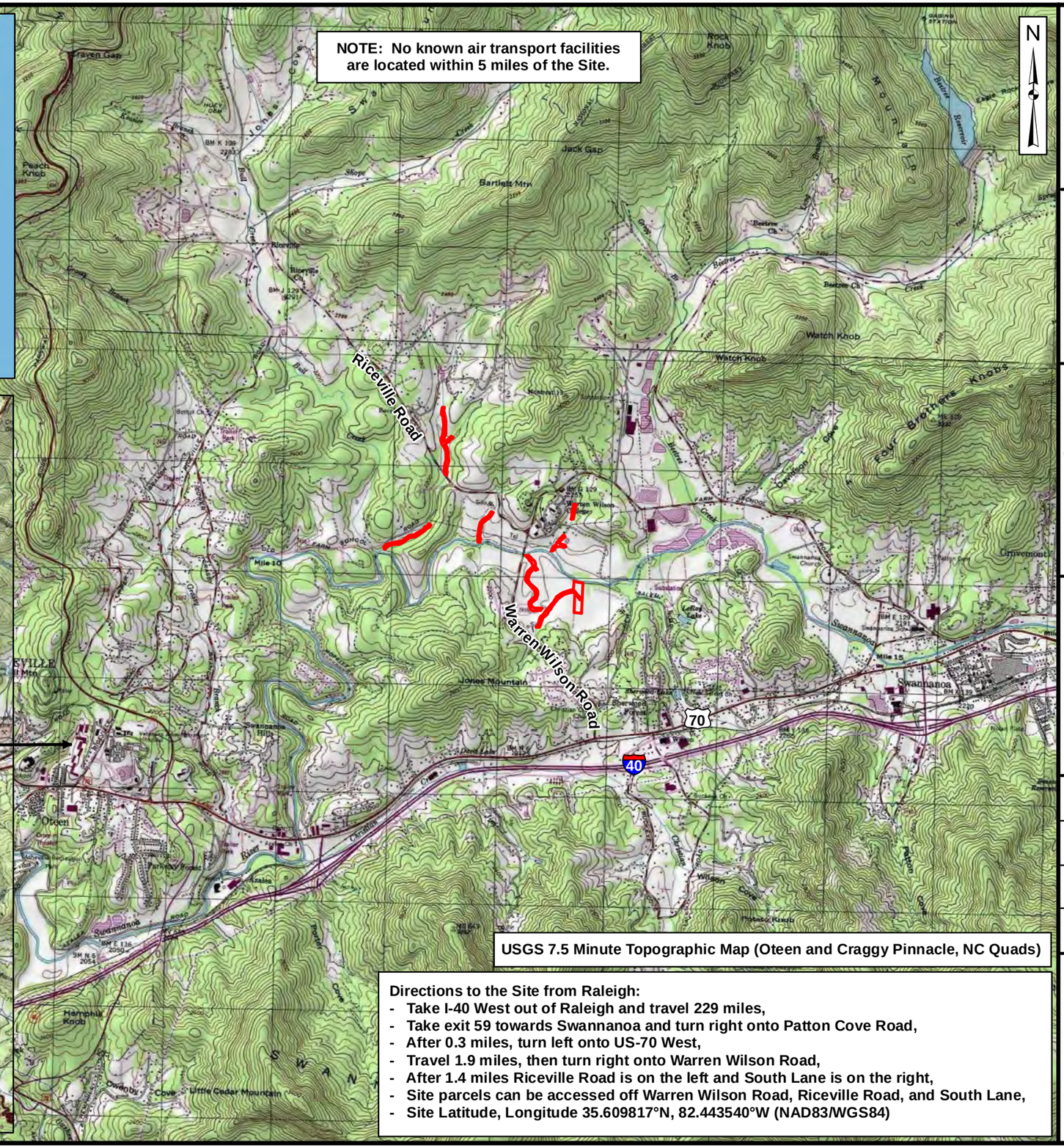
We thank you in advance for your timely response and cooperation. Please feel free to contact the DMS Project Manager (Paul Wiesner) with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,

Worth Creech
Senior Project Manager- Restoration Systems, LLC.







USGS 7.5 Minute Topographic Map (Oteen and Craggy Pinnacle, NC Quads)

Directions to the Site from Raleigh:

- Take I-40 West out of Raleigh and travel 229 miles,
- Take exit 59 towards Swannanoa and turn right onto Patton Cove Road,
- After 0.3 miles, turn left onto US-70 West,
- Travel 1.9 miles, then turn right onto Warren Wilson Road,
- After 1.4 miles Riceville Road is on the left and South Lane is on the right,
- Site parcels can be accessed off Warren Wilson Road, Riceville Road, and South Lane,
- Site Latitude, Longitude 35.609817°N, 82.443540°W (NAD83/WGS84)

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

SITE LOCATION

Drawn by: KRJ

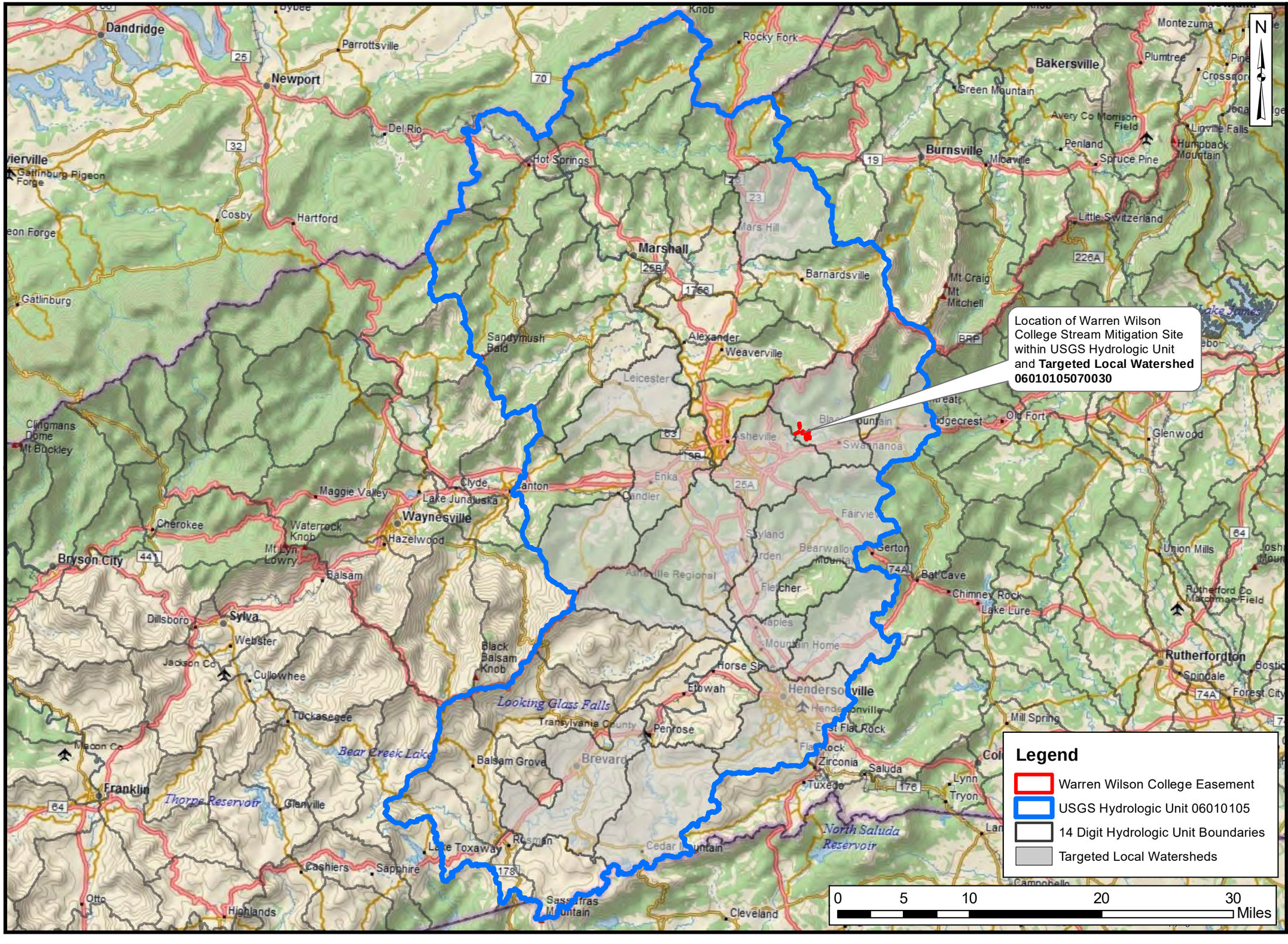
Date: DEC 2016

Scale: 1:40000

Project No.: 15-005

FIGURE

1



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

HYDROLOGIC UNIT MAP

Drawn by: KRJ

Date: DEC 2016

Scale: 1:435000

Project No.: 15-005

FIGURE

2

NOTE: Impervious surfaces account for less than 5% of the total Site drainage area.

N

Legend

- Conservation Easement - 22.0 ac
- UT-1 Drainage Area - 0.27 sq mi (171.3 ac)
- UT-2 Drainage Area - 0.09 sq mi (60.0 ac)
- UT-3 Drainage Area - 1.28 sq mi (822.3 ac)
- UT-4 Drainage Area - 0.24 sq mi (153.9 ac)
- UT-5 Drainage Area - 0.15 sq mi (98.3 ac)
- UT-6 Drainage Area - 0.08 sq mi (49.9 ac)
- UT-7 Drainage Area - 0.22 sq mi (141.0 ac)
- UT-8 Drainage Area - 0.10 sq mi (64.4 ac)

0 1,000 2,000 4,000 6,000 8,000 Feet

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

WARREN WILSON COLLEGE STREAM MITIGATION SITE

Buncombe County, NC

Title:

TOPOGRAPHY AND DRAINAGE AREA

Drawn by: KRJ

Date: DEC 2016

Scale: 1:20000

Project No.: 15-005

FIGURE

3

*The following letter to John Ellis contains a discrepancy between the biological conclusions presented in the letter and the conclusions presented in the summary above. This was due to a misinterpretation of the guidance and our initial conclusions were found to be too conservative for this site, and should have not been included in this letter regardless. Upon the further review and reexamination, the conclusions were changed due to better understanding of what was to be surveyed. Any questions about this discrepancy can be directed to jhamby@restorationsystems.com.

July 26th, 2017

U. S. Department of the Interior
USFWS Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636-3726

ATTN: John Ellis, Endangered Species Biologist

SUBJECT: Coordination with the U.S. Fish and Wildlife Service on behalf of Section 7 of the Endangered Species Act (ESA), the Fish & Wildlife Coordination Act & the Migratory Bird Treaty Act for the Warren Wilson College Stream Mitigation Site.

Dear Mr. Ellis,

On February 15, 2017, the North Carolina Department of Mitigation Services (DMS) issued a Request for Proposals for the stream restoration in the French Broad River Basin, Cataloging Unit 06010105. Restoration Systems, LLC (RS), of Raleigh, NC was awarded a contract by the DMS to provide 9,485 Stream Mitigation Units (SMUs) at the Warren Wilson College Stream Mitigation Site.

One of the earliest tasks to be performed by RS is completion of an environmental screening and preparation/submittal of a Categorical Exclusion (CE) document. This document is specifically required by the Federal Highway Administration (FHWA) to ensure compliance with various federal environmental laws and regulations. The DMS must demonstrate that its projects comply with federal mandates as a precondition to FHWA reimbursement of compensatory mitigation costs borne by the North Carolina Department of Transportation to offset its projects' unavoidable impacts to streams and wetlands.

Since financial support of certain DMS operational budgets derives, in part, from federal authorizations, it is necessary to conduct an informal Section 7 consultation with the U.S. Fish and Wildlife Service (Service). As well as coordinate with your office on behalf of the Fish and Wildlife Coordination Act (FWCA) & the Migratory Bird Treaty Act (MBTA).

This letter provides you with certain details about the Warren Wilson College Stream Mitigation Site, including the project's location, a general description of its physiography, hydrography and existing land uses, as well as the intended modifications to the site proposed by RS. In addition, should the project be located in a geographic area in which federally-listed species may be present (based on element occurrences, as reflected in Service listings), and if scientifically-sound practices have been used to confirm the presence of suitable habitat for any listed species within the project area, the results of appropriate surveys for each listed species and separate biological conclusions for each will be provided for your review and consideration. You are asked to review the information provided and determine if it is sufficient to enable you to concur with our biological conclusions.

Project Location & Description

The 22 acre Site is located five miles east of Asheville, NC within the Broad Basins Ecoregion of the Blue Ridge Physiographic Province in Buncombe County, North Carolina, and encompassed by 14-digit Cataloging Unit and Targeted Local Watershed 06010105070030. Regional physiography is characterized by intermountain basins with low mountains, rolling foothills, moderately broad mountain valleys, and moderate gradient streams with mostly cobble and boulders, and low to moderate gradient rivers with sand and bedrock substrates (Griffith et al. 2002). Onsite elevations range from a high of 2180 feet National Geodetic Vertical Datum (NGVD) to a low of approximately 2120 feet NGVD (United States Geological Survey [USGS] Oteen, North Carolina 7.5-minute topographic quadrangle) (Figures 1 and 3, Appendix A).

Site streams are currently part of an actively managed farm and forest system that includes livestock, pastureland, agricultural row crops, and sustainable forest management. Streams are eroded vertically and laterally, receive extensive sediment and nutrient inputs, have been dredged and straightened, and/or rerouted to the floodplain edge. In its current state, the Site includes 10,433 linear feet of degraded stream channel.

The primary hydrologic features of the Site consist of the Swannanoa River and UTs to the Swannanoa River. The Site drainage areas range in size from 0.08 - 1.28 square miles (Figure 3, Appendix A). The Site drainage area is primarily composed of forest and agriculture land. Detailed GIS analysis of the upstream drainage indicates that less than 5 percent of the drainage area is impervious including roads, driveways, and rooftops.

A query of the North Carolina Natural Heritage Program database indicates there are no records for rare species, important natural communities, natural areas, or conservation/managed areas within the proposed project boundary, or within a one-mile radius of the project boundary

Buncombe County Soils Associated with the Project Site

Soil Series	Hydric Status	Description
Biltmore loamy sand (BeA)	Hydric	This series consist of very deep, occasionally flooded, well-drained soils formed in recent alluvium found on floodplains in the Southern Appalachian Mountains and mesic areas of the Southern Piedmont. Permeability is rapid. Slopes are typically 0-3 percent.
Clifton clay loam and sandy loam (CkD2, CsC)	Nonhydric	This series consists of moderately eroded, very deep, well-drained, moderately permeable soils on ridges and side slopes of the Blue Ridge. Clifton soils formed in residuum weathered from intermediate and mafic igneous and high-grade metamorphic rocks that are high in ferromagnesium minerals. Slopes are 8 to 30 percent.

Dellwood-Reddies complex (DeA)	Hydric	This complex consists of occasionally flooded, moderately well-drained, moderately rapidly to very rapidly permeable soils formed in dominantly coarse-textured alluvium or in recent alluvium that is loamy in the upper part and is moderately deep to sandy strata containing more than 35 percent by volume gravel and/or cobbles. These soils are found on floodplains in the Southern Blue Ridge mountains. Slopes are typically 0-3 percent.
Dillard loam (DrB)	Hydric	This series consists of rarely flooded, deep or very deep, moderately well-drained, moderately slow permeable soils that formed in loamy alluvium of the Holocene age and occur on narrow, nearly level to sloping stream terraces and toe slopes. Slopes are 1-5 percent.
Evard-Cowee complex (EwD, EwE)	Nonhydric	This series consist of stony very deep, well-drained, moderately rapidly permeable soils found on mountain slopes, hillslopes, and ridges. Slopes are typically 15-50 percent.
French loam (FrA)	Hydric	This series consist of occasionally flooded, very deep, moderately well-drained to somewhat poorly drained, moderately rapidly permeable soils with contrasting textures formed in recent alluvial sediments and found on floodplains of small streams in the southern Appalachian and Blue Ridge Mountains. Slopes are typically 0-3 percent.
Hemphill loam (HpA)	Hydric	This series consists of rarely flooded, very poorly drained, slowly permeable soils that formed in alluvium, and found on nearly level, low stream terraces in the Southern Blue Ridge. The seasonal high water tables is at a depth of 0-1 foot in winter and early spring, and 0.5-1.5 feet in summer and fall. Slopes are 0-3 percent.
Iotla loam (IoA)	Hydric	This series consists of very deep, somewhat poorly drained, moderately permeable soils formed in recently deposited, loamy alluvial materials found on nearly level flood plains of the southern Blue Ridge Mountains. These soils are occasionally to frequently flooded for brief durations. Slopes are 0-2 percent.
Nikwasi loam (NkA)	Hydric	This series consists of poorly to very poorly drained, moderately rapidly permeable soils formed in recent alluvium consisting of loamy material that is moderately deep to strata of sand, gravel, and/or cobbles. They are on nearly level, relatively narrow flood plains in the upper reaches of watersheds in the Blue Ridge. Slopes are 0-2 percent.
Pits gravel (Pg)	Nonhydric	This map unit consists of areas quarried for stone.

Rosman fine sandy loam (RsA)	Hydric	This series consists of occasionally flooded, very deep, well-drained to moderately well-drained, moderately rapidly permeable soils formed in loamy alluvium derived from igneous, high-grade metamorphic or low-grade metasedimentary geology. They are on nearly level flood plains in the Southern Appalachian Mountains. Slopes are 0-3 percent.
Statler loam (StB)	Hydric	This series consists of rarely flooded, very deep, well-drained soils formed in loamy alluvium. They are on level to sloping low terraces along streams in or flowing out of the Unaka Mountain Range. Slopes are 1-5 percent.
Tate loam (TaB, TaC, TkC, TkD)	Nonhydric	This series consists of very deep, well-drained, moderately permeable soils formed in colluvium weathered from felsic to mafic high-grade metamorphic rocks, and can be very stony. They are on benches, fans, and toe slopes in coves in the Blue Ridge. Slopes range from 2-30 percent.
Toxaway loam (TsA)	Hydric	This series consists of very deep, moderately permeable, and poorly to very poorly drained soils formed in loamy alluvial deposits on nearly level flood plains of mountain valleys. This series is subject to common, very brief floods. Slopes range from 0-2 percent.
Udorthents-Urban land (UhE)	Nonhydric	This series consists of deep or very deep, somewhat excessively drained to moderately well-drained, very rapidly to slowly permeable soils found on intermountain hills and low and intermediate mountains. Slopes range from 2-50 percent.

Restoration Means & Methods

The Warren Wilson College Stream Mitigation Site has been identified for the purpose of providing in-kind mitigation for unavoidable stream impacts. The primary goals of this restoration project are on improving wildlife habitat and restoring vital riparian stream functions to an area that has been functioning as an agricultural area for decades. Restoration on the Site will focus on the restoration of riparian buffers, enhancing nutrient and sediment reduction from agricultural lands, improving aquatic quality and habitat and restoring connectivity to historic channels.

Stream restoration is expected to entail 1) belt-width preparation, 2) channel excavation, 3) spoil stockpiling, 4) channel stabilization, 5) channel diversion, and 6) channel backfill.

Belt-width corridor preparation will entail channel staking, floodplain clearing and grubbing, and any necessary grading prior to channel excavation. After the floodplain has been prepped, the proposed design channel will be staked and/or clearly marked to the design parameters. Spoil material excavated

during floodplain grading will be stockpiled adjacent to the existing channels. After construction of the new channel is complete, existing channels will be abandoned and backfilled with stockpiled soils.

Once belt-width corridor preparation is complete, the proposed channel will be excavated to the average width, depth, and cross-sectional area derived from reference reach studies and detailed measurements of the onsite reach. Stream banks and the belt-width area of constructed channels will be immediately planted with shrub and herbaceous vegetation. Root mats may also be selectively removed from adjacent areas and placed as erosion control features on channel banks.

Once the proposed design channel has been excavated and stabilized, abandoned channels will be backfilled utilizing spoil material stockpiled from channel excavation and/or from suitable material excavated from the Site or adjacent to the Site. Abandoned channels will be backfilled to the maximum extent feasible.

Summary of Anticipated Habitat Effects

Eleven federally protected species are listed in the table below as occurring in Buncombe County (USFWS 2016). The table depicts species listed for Buncombe County, if habitat may occur within the Site, and a biological conclusion for the species. Coordination with the US Fish and Wildlife Service (USFWS) will occur in support of the project, with surveys for protected species occurring prior to permitting of the project. Record searches from the Natural Heritage Program indicate that federally protected species have not been documented within a mile of the Site boundaries.

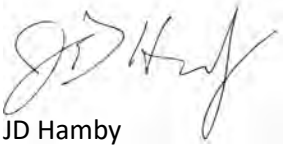
Common Name	Scientific Name	Habitat at Site	Biological Conclusion
Bog Turtle	Glyptemys muhlenbergii	Yes	NA
Carolina northern flying squirrel	Glaucomys sabrinus coloratus	No	No Effect
Gray Bat	Myotis grisescens	Yes *	May Effect, Not Likely to Adversely Effect
Northern long-eared bat	Myotis septentrionalis	Yes	May Effect
Spotfin chub	Erimonax monachus	Yes**	No Effect
Appalachian elktoe	Alasmidonta raveneliana	Yes	May Effect
Spruce-fir moss spider	Microhexura montivaga	No	No Effect
Tan riffleshell	Epioblasma florentina walkeri	Yes	May Effect
Spreading avens	Geum radiatum	No	No Effect
Virginia spiraea	Spiraea virginiana	Yes	May Effect
Rock gnome lichen	Gymnoderma lineare	No	No Effect

* Foraging habitat present within the Site; however, no roosting habitat with the Site boundaries.

** Historic record, only known from four sites outside this watershed.

Should you have any questions or if any additional information is needed to complete your review, please feel free to contact me at the office 919.755.9490. Your valuable time and cooperation are much appreciated.

RESTORATION SYSTEMS, LLC



JD Hamby
Project Manager
jhamby@restorationsytems.com
919-334-9111

Attachments

- Hydrologic Unit Map
- USGS Topography Map
- Soils Map
- Existing Conditions
- Proposed Conditions

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] Federal Highway Administration, Donnie Brew-Preconstruction & Environmental Engineer, 310 New Bern Ave, Suite 410, Raleigh, NC 27601 donnie.brew@dot.gov 919-747-7017

Project Name: Warren Wilson College Stream Restoration Site

Project Location: 35° 36' 37.64"N / 82° 26' 27.61"W

Basic Project Description:

The Warren Wilson College Stream Mitigation Site has been identified for the purpose of providing in-kind mitigation for unavoidable stream impacts. The primary goals of this restoration project are on improving wildlife habitat and restoring vital riparian stream functions to an area that has been

[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.

functioning as an agricultural area for decades. Restoration on the Site will focus on the restoration of riparian buffers, enhancing nutrient and sediment reduction from agricultural lands, improving aquatic quality and habitat and restoring connectivity to historic channels.

Stream restoration is expected to entail 1) belt-width preparation, 2) channel excavation, 3) spoil stockpiling, 4) channel stabilization, 5) channel diversion, and 6) channel backfill.

Belt-width corridor preparation will entail channel staking, floodplain clearing and grubbing, and any necessary grading prior to channel excavation. After the floodplain has been prepped, the proposed design channel will be staked and/or clearly marked to the design parameters. Spoil material excavated during floodplain grading will be stockpiled adjacent to the existing channels. After construction of the new channel is complete, existing channels will be abandoned and backfilled with stockpiled soils.

Once belt-width corridor preparation is complete, the proposed channel will be excavated to the average width, depth, and cross-sectional area derived from reference reach studies and detailed measurements of the onsite reach. Stream banks and the belt-width area of constructed channels will be immediately planted with shrub and herbaceous vegetation. Root mats may also be selectively removed from adjacent areas and placed as erosion control features on channel banks.

Once the proposed design channel has been excavated and stabilized, abandoned channels will be backfilled utilizing spoil material stockpiled from channel excavation and/or from suitable material excavated from the Site or adjacent to the Site. Abandoned channels will be backfilled to the maximum extent feasible.

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	.25	
If known, estimated acres[5] of forest conversion from April 1 to October 31	0	
If known, estimated acres of forest conversion from June 1 to July 31[6]	0	
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: _____

Warren Wilson College Stream Mitigation Site Buncombe County, North Carolina

Regulatory review

The IPaC regulatory review process helps evaluate the potential impacts of your project on resources managed by the U.S. Fish and Wildlife Service. It walks through regulations covering each protected resource, and offers suggestions and assistance in designing your project.

Endangered species

Endangered species are protected under the Endangered Species Act.

11 endangered species are known to occur or may be affected by activities in this location.

1. Request an official species list

   An official species list was generated 16 minutes ago.

2. Evaluate determination keys

   There was one determination key available for this project. You have evaluated it.

3. Make effect determinations

   For each listed species in the project area, a determination must be made regarding the potential effects of this project. Species that are not covered by determination keys must be evaluated manually.

   REVIEW SPECIES

Migratory birds

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

THERE ARE NO MIGRATORY BIRDS OF CONSERVATION CONCERN EXPECTED TO OCCUR AT THIS LOCATION.

Facilities

U.S. Fish and Wildlife Service facilities are protected under the National Wildlife Refuge System Administration Act and the National Fish Hatchery System.

THERE ARE NO U.S. FISH AND WILDLIFE SERVICE REFUGES OR FISH HATCHERIES AT THIS LOCATION.

Wetlands

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

THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

Warren Wilson College Mitigation Site
749 Warren Wilson Road
Asheville, NC 28805

Inquiry Number: 5086255.2s
October 24, 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

749 WARREN WILSON ROAD
ASHEVILLE, NC 28805

COORDINATES

Latitude (North):	35.6094760 - 35° 36' 34.11''
Longitude (West):	82.4455690 - 82° 26' 44.04''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	369067.4
UTM Y (Meters):	3941397.5
Elevation:	2127 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5948508 OTEEN, NC
Version Date:	2013
North Map:	5947755 CRAGGY PINNACLE, NC
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20141009
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
749 WARREN WILSON ROAD
ASHEVILLE, NC 28805

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
Reg	ASHEVILLE DYEING AND		NC HSDS	Same	2541, 0.481, ENE
Reg	CHEMTRONICS INC		NC HSDS	Same	1949, 0.369, NNE
Reg	CHEMTRONICS INC	180 OLD BEE TREE RD	NPL, SEMS, CORRACTS, RCRA-TSDF, RCRA-CESQG, US ENG...	Same	1738, 0.329, NNE
A1	WARREN WILSON COLLEG	701 WARREN WILSON RD	SWF/LF	Higher	1 ft.
A2	WARREN WILSON COLLEG	701 WARREN WILSON RD	UST	Higher	1 ft.
3	PRESTON HOUSE	107 NORTH LANE	LUST, LUST TRUST	Higher	17, 0.003, NE
4	MALTRY CONSTRUCTION	28 WYKLE RD	EDR Hist Auto	Lower	446, 0.084, West
5	WINSTON MILLS, INC.	WARREN WILSON COLLEG	UST, IMD	Higher	1090, 0.206, SSE
B6	WINSTON MILLS	850 WARREN WILSON RO	LUST, Financial Assurance	Higher	1143, 0.216, ENE
B7	OLD ASHEVILLE DYE AN	850 WARREN WILSON RO	SEMS-ARCHIVE, CORRACTS, RCRA-TSDF, RCRA NonGen /...	Higher	1143, 0.216, ENE
8	TDP ELECTRONICS	111 OLD BEE TREE RD	RCRA-CESQG, SHWS, LUST, BROWNFIELDS, IMD, UIC	Higher	1468, 0.278, NE
C9	CHARLES D. OWEN MANU	875 WARREN WILSON CO	BROWNFIELDS, NPDES	Higher	1620, 0.307, ENE
C10	NATIONAL WIPER ALLIA	875 WARREN WILSON RD	SWRCY	Higher	1620, 0.307, ENE
11	EVANS RESIDENCE	113 COLLEGE CIRCLE	LUST, LUST TRUST	Higher	1848, 0.350, SSE
12	CORDELL PROPERTY	439 ROWLAND ROAD	LUST, LUST TRUST	Higher	2040, 0.386, SE
13	BROWNING RENTAL PROP	124 CHRISTIAN CREEK	SHWS, LAST, UIC	Higher	4795, 0.908, 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

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

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 INST CONTROL ---------- Sites with Institutional Controls

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State and tribal landfill and/or solid waste disposal site lists

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

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
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

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
TSCA ---------- Toxic Substances Control Act
TRIS ---------- Toxic Chemical Release Inventory System
SSTS ---------- Section 7 Tracking Systems
RMP ---------- Risk Management Plans
RAATS ---------- RCRA Administrative Action Tracking System

EXECUTIVE SUMMARY

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
UXO ---- Unexploded Ordnance Sites
DOCKET HWC ---- Hazardous Waste Compliance Docket Listing
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 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.

EXECUTIVE SUMMARY

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the U.S. EPA.

A review of the NPL list, as provided by EDR, and dated 05/30/2017 has revealed that there is 1 NPL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CHEMTRONICS INC	***180 OLD BEE TREE RD***	***NNE 1/4 - 1/2 (0.329 mi.)***	***0***	***8***

Federal CERCLIS list

SEMS: 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.

A review of the SEMS list, as provided by EDR, and dated 07/11/2017 has revealed that there is 1 SEMS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CHEMTRONICS INC	***180 OLD BEE TREE RD***	***NNE 1/4 - 1/2 (0.329 mi.)***	***0***	***8***

Federal CERCLIS NFRAP site list

SEMS-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.

A review of the SEMS-ARCHIVE list, as provided by EDR, and dated 07/11/2017 has revealed that there is 1 SEMS-ARCHIVE site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
OLD ASHEVILLE DYE AN	***850 WARREN WILSON RO***	***ENE 1/8 - 1/4 (0.216 mi.)***	***B7***	***90***

EXECUTIVE SUMMARY

Federal RCRA CORRACTS facilities list

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 09/13/2017 has revealed that there are 2 CORRACTS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CHEMTRONICS INC	*180 OLD BEE TREE RD*	*NNE 1/4 - 1/2 (0.329 mi.)*	*0*	*8*
OLD ASHEVILLE DYE AN	*850 WARREN WILSON RO*	*ENE 1/8 - 1/4 (0.216 mi.)*	*B7*	*90*

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: 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.

A review of the RCRA-TSDF list, as provided by EDR, and dated 09/13/2017 has revealed that there are 2 RCRA-TSDF sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CHEMTRONICS INC	*180 OLD BEE TREE RD*	*NNE 1/4 - 1/2 (0.329 mi.)*	*0*	*8*
OLD ASHEVILLE DYE AN	*850 WARREN WILSON RO*	*ENE 1/8 - 1/4 (0.216 mi.)*	*B7*	*90*

Federal institutional controls / engineering controls registries

US ENG CONTROLS: A listing of sites with engineering controls in place.

A review of the US ENG CONTROLS list, as provided by EDR, and dated 08/10/2017 has revealed that there is 1 US ENG CONTROLS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CHEMTRONICS INC	*180 OLD BEE TREE RD*	*NNE 1/4 - 1/2 (0.329 mi.)*	*0*	*8*

State- and tribal - equivalent NPL

NC HSDS: The Hazardous Substance Disposal Sites list contains locations of uncontrolled and unregulated hazardous waste sites. The file contains sites on the national priority list as well as the state priority list. The data source is the North Carolina Center for Geographic Information and Analysis.

A review of the NC HSDS list, as provided by EDR, and dated 08/09/2011 has revealed that there are 2

NC HSDS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
ASHEVILLE DYEING AND		ENE 1/4 - 1/2 (0.481 mi.)	0	8
CHEMTRONICS INC		NNE 1/4 - 1/2 (0.369 mi.)	0	8

State- and tribal - equivalent CERCLIS

SHWS: The State Hazardous Waste Sites 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. The data come from the Department of Environment & Natural Resources' Inactive Hazardous Sites Program.

A review of the SHWS list, as provided by EDR, and dated 08/16/2017 has revealed that there are 2 SHWS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TDP ELECTRONICS	***111 OLD BEE TREE RD***	***NE 1/4 - 1/2 (0.278 mi.)***	***8***	***112***
Facility Id: NONCD0002361				
BROWNING RENTAL PROP	***124 CHRISTIAN CREEK***	***SSE 1/2 - 1 (0.908 mi.)***	***13***	***129***
Facility Id: NONCD0001890				

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Department of Environment & Natural Resources' List of Solid Waste Facility Contacts in Alpha Order.

A review of the SWF/LF list, as provided by EDR, and dated 09/28/2017 has revealed that there is 1 SWF/LF site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WARREN WILSON COLLEG	701 WARREN WILSON RD	0 - 1/8 (0.000 mi.)	A1	81
Facility Status: Open				
Permit Num: 1115-COMPOST-2009				

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 08/04/2017 has revealed that there are 6 LUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CHEMTRONICS INC	***180 OLD BEE TREE RD***	***NNE 1/4 - 1/2 (0.329 mi.)***	***0***	***8***

Incident Phase: Closed Out Incident Number: 15011 Incident Number: 6471 Current Status: File Located in Archives				
PRESTON HOUSE Incident Phase: Closed Out Incident Number: 28915 Current Status: File Located in Archives	***107 NORTH LANE***	***NE 0 - 1/8 (0.003 mi.)***	***3***	***84***
WINSTON MILLS Incident Phase: Closed Out Incident Number: 11750 Current Status: File Located in Archives	***850 WARREN WILSON RO***	***ENE 1/8 - 1/4 (0.216 mi.)***	***B6***	***89***
TDP ELECTRONICS Incident Phase: Closed Out Incident Number: 3790 Incident Number: 7409 Current Status: File Located in Archives	***111 OLD BEE TREE RD***	***NE 1/4 - 1/2 (0.278 mi.)***	***8***	***112***
EVANS RESIDENCE Incident Number: 41027 Current Status: File Located in House	***113 COLLEGE CIRCLE***	***SSE 1/4 - 1/2 (0.350 mi.)***	***11***	***125***
CORDELL PROPERTY Incident Phase: Closed Out Incident Number: 41291 Current Status: File Located in Archives	***439 ROWLAND ROAD***	***SE 1/4 - 1/2 (0.386 mi.)***	***12***	***127***

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 10/09/2017 has revealed that there are 3 LUST TRUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PRESTON HOUSE Site ID: 28915	***107 NORTH LANE***	***NE 0 - 1/8 (0.003 mi.)***	***3***	***84***
EVANS RESIDENCE Site ID: 41027	***113 COLLEGE CIRCLE***	***SSE 1/4 - 1/2 (0.350 mi.)***	***11***	***125***
CORDELL PROPERTY Site ID: 41291	***439 ROWLAND ROAD***	***SE 1/4 - 1/2 (0.386 mi.)***	***12***	***127***

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 10/06/2017 has revealed that there are 2 UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WARREN WILSON COLLEG Tank Status: Removed Tank Status: Current Facility Id: 00-0-0000004752	701 WARREN WILSON RD	0 - 1/8 (0.000 mi.)	A2	81
WINSTON MILLS, INC. Tank Status: Removed Tank Status: Current Facility Id: 00-0-0000004837	***WARREN WILSON COLLEG***	***SSE 1/8 - 1/4 (0.206 mi.)***	***5***	***86***

State and tribal Brownfields sites

BROWNFIELDS: 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 a brownfield agreement for cleanup and liabitliy control.

A review of the BROWNFIELDS list, as provided by EDR, and dated 09/01/2017 has revealed that there are 2 BROWNFIELDS sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TDP ELECTRONICS Project ID: 19068-15-11	***111 OLD BEE TREE RD***	***NE 1/4 - 1/2 (0.278 mi.)***	***8***	***112***
CHARLES D. OWEN MANU Project ID: 16046-12-11	***875 WARREN WILSON CO***	***ENE 1/4 - 1/2 (0.307 mi.)***	***C9***	***124***

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY: A listing of recycling center locations.

A review of the SWRCY list, as provided by EDR, and dated 08/18/2017 has revealed that there is 1 SWRCY site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
NATIONAL WIPER ALLIA	875 WARREN WILSON RD	ENE 1/4 - 1/2 (0.307 mi.)	C10	124

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 are 2 IMD sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WINSTON MILLS, INC. Facility Id: 11750	***WARREN WILSON COLLEG***	***SSE 1/8 - 1/4 (0.206 mi.)***	***5***	***86***
TDP ELECTRONICS Facility Id: 3790 Facility Id: 7409 Facility Id: 87235	***111 OLD BEE TREE RD***	***NE 1/4 - 1/2 (0.278 mi.)***	***8***	***112***

Other Ascertainable Records

RCRA NonGen / NLR: 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.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 09/13/2017 has revealed that there is 1 RCRA NonGen / NLR site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
OLD ASHEVILLE DYE AN	***850 WARREN WILSON RO***	***ENE 1/8 - 1/4 (0.216 mi.)***	***B7***	***90***

2020 COR ACTION: 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.

A review of the 2020 COR ACTION list, as provided by EDR, and dated 04/22/2013 has revealed that there is 1 2020 COR ACTION site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
OLD ASHEVILLE DYE AN	***850 WARREN WILSON RO***	***ENE 1/8 - 1/4 (0.216 mi.)***	***B7***	***90***

ROD: Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid the cleanup.

A review of the ROD list, as provided by EDR, and dated 09/27/2017 has revealed that there is 1 ROD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CHEMTRONICS INC	***180 OLD BEE TREE RD***	***NNE 1/4 - 1/2 (0.329 mi.)***	***0***	***8***

EXECUTIVE SUMMARY

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR Hist Auto: 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.

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there is 1 EDR Hist Auto site within approximately 0.125 miles of the target property.

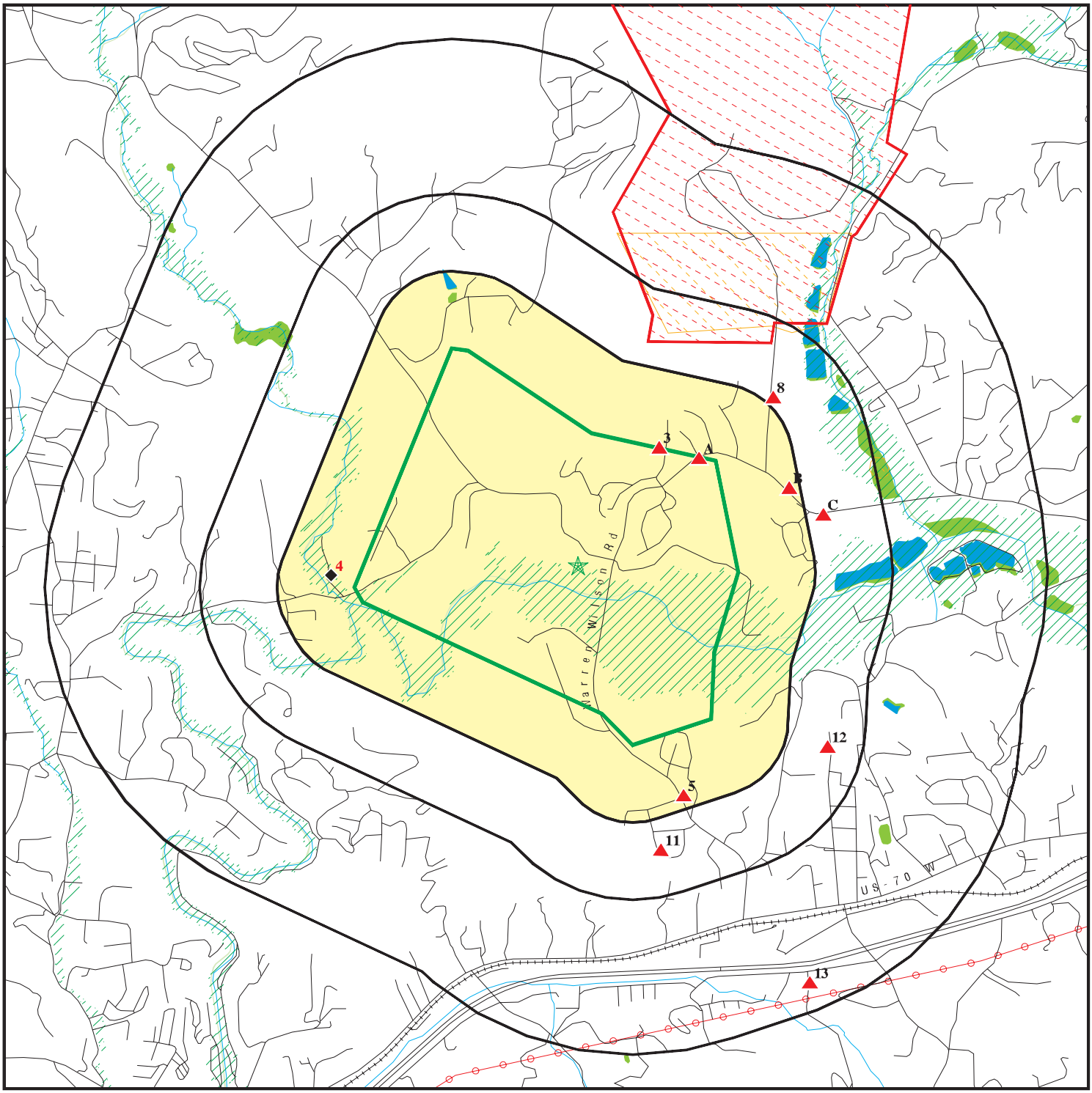
Lower Elevation	Address	Direction / Distance	Map ID	Page
MALTRY CONSTRUCTION	28 WYKLE RD	W 0 - 1/8 (0.084 mi.)	4	86

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 3 records.

Site Name	Database(s)
MONEY-WORTH, INC.	OLI
SWANNANOA LANDFILL	OLI
WARREN WILSON COLLEGE	RGA LUST

OVERVIEW MAP - 5086255.2S



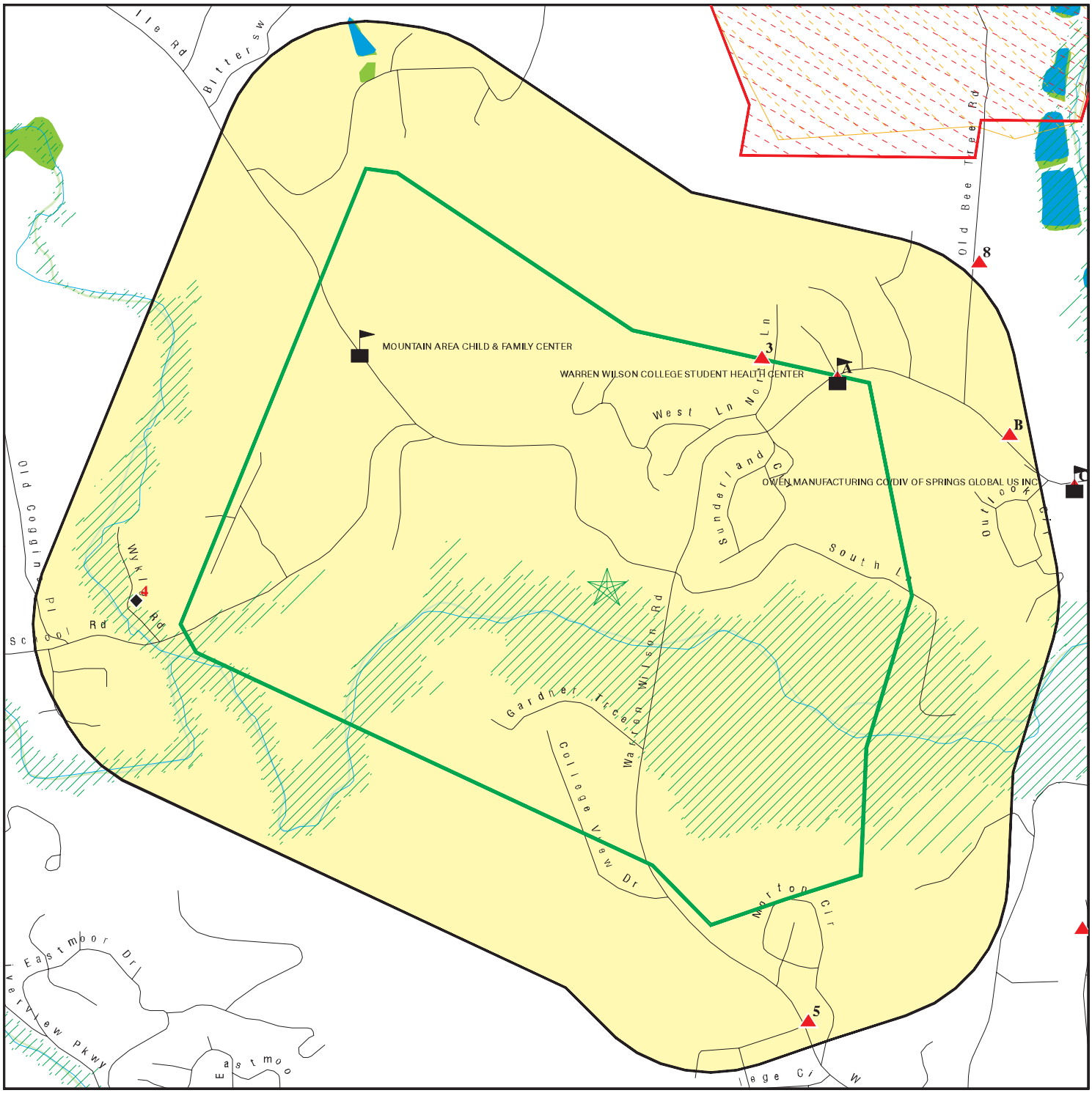
0 1/4 1/2 1 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Upgradient Area
- 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:	Warren Wilson College Mitigation Site	CLIENT:	Axiom Environmental
ADDRESS:	749 Warren Wilson Road Asheville NC 28805	CONTACT:	Kenan Jernigan
LAT/LONG:	35.609476 / 82.445569	INQUIRY #:	5086255.2s
		DATE:	October 24, 2017 5:40 pm

DETAIL MAP - 5086255.2S



0 1/8 1/4 1/2 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

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:	Warren Wilson College Mitigation Site	CLIENT:	Axiom Environmental
ADDRESS:	749 Warren Wilson Road Asheville NC 28805	CONTACT:	Kenan Jernigan
LAT/LONG:	35.609476 / 82.445569	INQUIRY #:	5086255.2s
		DATE:	October 24, 2017 5:43 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	1	0	NR	1
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	1	NR	NR	1
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	1	0	NR	NR	1
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	1	1	0	NR	2
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	1	1	NR	NR	2
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	1	NR	NR	1
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
NC HSDS	1.000		0	0	2	0	NR	2
State- and tribal - equivalent CERCLIS								
SHWS	1.000		0	0	1	1	NR	2
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		1	0	0	NR	NR	1
OLI	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LAST	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
LUST	0.500		1	1	4	NR	NR	6
INDIAN LUST	0.500		0	0	0	NR	NR	0
LUST TRUST	0.500		1	0	2	NR	NR	3
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		1	1	NR	NR	NR	2
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	2	NR	NR	2
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
HIST LF	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	1	NR	NR	1
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
IMD	0.500		0	1	1	NR	NR	2
SPILLS 90	TP		NR	NR	NR	NR	NR	0
SPILLS 80	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	1	NR	NR	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
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	1	NR	NR	NR	1
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	1	0	NR	1
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		1	NR	NR	NR	NR	1
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	TP		NR	NR	NR	NR	NR	0

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	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	5	8	19	1	0	33

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

HSDS **ASHEVILLE DYEING AND FINISHING** **NC HSDS** **S102442531**
Region **N/A**
ENE **, NC**
1/4-1/2
2541 ft.

HSDS:

Site Type:	Federal
Superfund ID:	070 619 663
Lat/Long:	35 36 50.691336 82 25 42.461464
Total area in coverage units:	8211.86425781
Total perimeter in coverage units:	334.79745483
X-value coordinate in feet:	981189.75
Y-value coordinate in feet:	696000.75
Sites designated as superfund cleanup sites:	408
Length of feature in internal units:	334.797522429
Area of feature in internal units squared:	8211.8654133

HSDS **CHEMTRONICS INC** **NC HSDS** **S102442527**
Region **N/A**
NNE **, NC**
1/4-1/2
1949 ft.

HSDS:

Site Type:	Federal
Superfund ID:	095 459 392
Lat/Long:	35 37 22.965277 82 26 11.192140
Total area in coverage units:	508600.875
Total perimeter in coverage units:	3124.26464843
X-value coordinate in feet:	978932.125
Y-value coordinate in feet:	699343.8125
Sites designated as superfund cleanup sites:	396
Length of feature in internal units:	3124.2646331
Area of feature in internal units squared:	508600.924068

NPL **CHEMTRONICS INC** **NPL** **1000303450**
Region **180 OLD BEE TREE RD** **SEMS** **NCD095459392**
NNE **SWANNANOA, NC 28778** **CORRACTS**
1/4-1/2 **RCRA-TSDF**
1738 ft. **RCRA-CESQG**
US ENG CONTROLS
LUST
UST
ROD
PRP

NPL:

EPA ID:	NCD095459392
Cerclis ID:	402957
EPA Region:	4
Federal:	N
Final Date:	1983-09-08 00:00:00
Site Score:	30.16
Latitude:	35.625
Longitude:	-82.434709999999995

CHEMTRONICS INC (Continued) **1000303450**

Category Details:
NPL Status: Currently on the Final NPL
Category Description: Depth To Aquifer-> 10 And <= 25 Feet
Category Value: 24

NPL Status: Currently on the Final NPL
Category Description: Distance To Nearest Population-> 0 And <= 1/4 Mile
Category Value: 10

Site Details:
Site Name: CHEMTRONICS, INC.
Site Status: Final
Site Zip: 28778
Site City: SWANNANOA
Site State: NC
Federal Site: No
Site County: BUNCOMBE
EPA Region: 04
Date Proposed: 12/30/82
Date Deleted: Not reported
Date Finalized: 09/08/83

Substance Details:
NPL Status: Currently on the Final NPL
Substance ID: Not reported
Substance: Not reported
CAS #: Not reported
Pathway: Not reported
Scoring: Not reported

NPL Status: Currently on the Final NPL
Substance ID: A020
Substance: CHROMIUM AND COMPOUNDS
CAS #: Not reported
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: A020
Substance: CHROMIUM AND COMPOUNDS
CAS #: Not reported
Pathway: NO PATHWAY INDICATED
Scoring: 1

NPL Status: Currently on the Final NPL
Substance ID: A020
Substance: CHROMIUM AND COMPOUNDS
CAS #: Not reported
Pathway: SURFACE WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: C090
Substance: NITROPHENOL
CAS #: 25154-55-6
Pathway: GROUND WATER PATHWAY

CHEMTRONICS INC (Continued) **1000303450**

Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: C163
Substance: BROMINE (ELEMENTAL - BR)
CAS #: 7726-95-6
Pathway: NO PATHWAY INDICATED
Scoring: 1

NPL Status: Currently on the Final NPL
Substance ID: C453
Substance: BROMOBENZENE
CAS #: 108-86-1
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: D005
Substance: BARIUM
CAS #: 7440-39-3
Pathway: SURFACE WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: D008
Substance: LEAD (PB)
CAS #: 7439-92-1
Pathway: SURFACE WATER PATHWAY
Scoring: 4

NPL Status: Currently on the Final NPL
Substance ID: U107
Substance: DI-N-OCTYL PHTHALATE
CAS #: 117-84-0
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: U188
Substance: PHENOL
CAS #: 108-95-2
Pathway: SURFACE WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: U225
Substance: TRIBROMOMETHANE
CAS #: 75-25-2
Pathway: GROUND WATER PATHWAY
Scoring: 4

NPL Status: Currently on the Final NPL
Substance ID: W003
Substance: ACID COMPOUNDS
CAS #: Not reported
Pathway: NO PATHWAY INDICATED
Scoring: 1

CHEMTRONICS INC (Continued) **1000303450**

Summary Details:

Conditions at listing December 1982): The Chemtronics, Inc., Site covers 10 acres in Swannanoa, North Carolina, in the Picrate Branch drainage basin. Two areas are involved. Number 1 consists of eight abandoned acid and organic wastepits used by Chemtronics and its predecessors. Number 2 consists of two lined basins for neutrali ation and equali ation of wastes prior to their discharge into the Metropolitan Sewage District collection facilities. The pits were closed in December 1979. Five were covered, and three holding liquids were left uncovered. All lie in the drainage basin of Gregg Branch. Two wells monitoring ground water near the pits were contaminated by numerous organic compounds and metals.One well monitoring leachate contained numerous organics, metals, and high dissolved solids. The leachate was also highly acidic. A monitoring well about 100 feet northeast of the site showed a dramatic increase in dissolved solids between April 1981 and March 1982. Lead, barium, cadmium, nitrates, and nitrites were found in excessive quantities, in addition to many identified and unidentified organic compounds. A basin liner in the second area failed in June 1979, discharging waste into ground water and possibly surface water. In 1980, the liner was replaced. During an inspection of the site, an organic odor was noted in holes drilled to determine the depth to the water table and the nature of the underlying material. Status July 1983): EPA is considering various alternatives for this site.

Site Status Details:

NPL Status:	Final
Proposed Date:	12/30/1982
Final Date:	09/08/1983
Deleted Date:	Not reported

Narratives Details:

NPL Name:	CHEMTRONICS, INC.
City:	SWANNANOA
State:	NC

SEMS:

Site ID:	402957
EPA ID:	NCD095459392
Federal Facility:	N
NPL:	Currently on the Final NPL
Non NPL Status:	Not reported

Following information was gathered from the prior CERCLIS update completed in 10/2013:

Site ID:	0402957
EPA ID:	NCD095459392
Facility County:	BUNCOMBE
Short Name:	CHEMTRONICS, INC.
Congressional District:	11
IFMS ID:	0468
SMSA Number:	0480
USGC Hydro Unit:	06010105
Federal Facility:	Not a Federal Facility
DMNSN Number:	10.00000
Site Orphan Flag:	N
RCRA ID:	Not reported
USGS Quadrangle:	Not reported

CHEMTRONICS INC (Continued) **1000303450**

Site Init By Prog:	Not reported
NFRAP Flag:	Not reported
Parent ID:	Not reported
RST Code:	Not reported
EPA Region:	04
Classification:	Pure Lagoons
Site Settings Code:	RU
NPL Status:	Currently on the Final NPL
DMNSN Unit Code:	ACRE
RBRAC Code:	Not reported
RResp Fed Agency Code:	Not reported
Non NPL Status:	Not reported
Non NPL Status Date:	/ /
Site Fips Code:	37021
CC Concurrence Date:	03/25/93
CC Concurrence FY:	1993
Alias EPA ID:	Not reported
Site FUDS Flag:	Not reported

CERCLIS Site Contact Name(s):

Contact ID:	4000084.00000
Contact Name:	Jon Borholm
Contact Tel:	(404) 562-8820
Contact Title:	Remedial Project Manager (RPM)
Contact Email:	bornholm.jon@epa.gov
Contact ID:	4270042.00000
Contact Name:	Phil Vorsatz
Contact Tel:	(404) 562-8789
Contact Title:	Remedial Project Manager (RPM)
Contact Email:	vorsatz.phillip@epa.gov
Contact ID:	4270039.00000
Contact Name:	Luis Flores
Contact Tel:	(404) 562-8807
Contact Title:	Remedial Project Manager (RPM)
Contact Email:	flores.luis@epa.gov
Contact ID:	4000312.00000
Contact Name:	Ken Mallary
Contact Tel:	(404) 562-8802
Contact Title:	Remedial Project Manager (RPM)
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Contact ID:	4000508.00000
Contact Name:	Michael Townsend
Contact Tel:	(404) 562-8813
Contact Title:	Remedial Project Manager (RPM)
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Contact ID:	4000533.00000
Contact Name:	Samantha UrquhartF
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Contact Title:	Remedial Project Manager (RPM)
Contact Email:	urquhart-foster.samantha@epa.gov
Contact ID:	4000308.00000

CHEMTRONICS INC (Continued) **1000303450**

Contact Name: Ken Lucas
Contact Tel: (404) 562-8953
Contact Title: Remedial Project Manager (RPM)
Contact Email: Not reported

Contact ID: 4000275.00000
Contact Name: William Joyner
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Contact Email: campbell.richard@epa.gov

Contact ID: 4272610.00000
Contact Name: Carolyn Callihan
Contact Tel: (404) 562-8913
Contact Title: Site Assessment Manager (SAM)
Contact Email: Carolyn Callihan/R4/USEPA/US,

CERCLIS Site Alias Name(s):
Alias ID: 101
Alias Name: CHEMTRONICS INC
Alias Address: Not reported
BUNCOMBE, NC
Alias ID: 201
Alias Name: AMCEL PROPULSION INC.(NCD980557995)
Alias Address: Not reported
BUNCOMBE, NC
Alias ID: 301
Alias Name: AMCEL PROPULSION INC
Alias Address: Not reported
BUNCOMBE, NC
Alias ID: 302
Alias Name: CHEMTRONICS, INC
Alias Address: OLD BEE TREE RD
SWANNANOA, NC 28778
Alias ID: 303
Alias Name: CHEMTRONICS, INC.
Alias Address: OLD BEE TREE RD
SWANNANOA, NC 28778
Alias Comments: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Site Description: The Chemtronics Site encompasses approximately 1,027 acres and is located at 180 Old Bee Tree Road in a rural area of Swannanoa, Buncombe County, approximately 8 miles east of Asheville, North Carolina. The Site is bounded on the east by Bee Tree Road and Bee Tree Creek. The area to the north and west of the Site is comprised of sparsely inhabited woodlands. Immediately to the south of the Site, there are several industrial facilities which lie on land that was once part of the original (Oerlikon) property. The topography of the Site is steep, ranging from 2,200 to 3,400 feet above mean sea level (amsl). The Site lies on the southeast side of Bartlett Mountain and is moderately to heavily vegetated. Surrounding mountains reach elevations of approximately 3,800 feet amsl. All surface water from the Site drains into small tributaries of Bee Tree Creek or directly into Bee Tree Creek. This creek flows into the Swannanoa River which ultimately empties into the French Broad River. The property comprising the Chemtronics Site was first developed as an industrial facility in 1952. The Site has been owned/operated by Oerlikon Tool and Arms Corporation of America (1952-1959), Celanese Corporation of America (Hoechst Celanese Corporation) (1959-1965), Northrop Carolina, Inc. (Northrop Corporation) (1965-1971), Chemtronics, Inc., as apart of Airtronics, Inc., (1971-1978), and Chemtronics, Inc. (1978 - present). The Site operated under the name of Amcel Propulsion, Inc. (1959-1965) under both Oerlikon and Celanese. The Site is currently occupied by an active facility owned and operated by Chemtronics Incorporated, a subsidiary of the Halliburton Company. Waste disposal occurred over a small portion (approximately less than ten acres) of the Site. Twenty-three individual on-site disposal areas were identified and described by reviewing existing records and through interviews with former and current Site employees. These 23 individual disposal areas (DAs) are grouped into 6 discrete disposal areas: DA-6, DA-7/8, DA-9, DA-10/11, DA-23, and the Acid Pit Area. The Site can also be divided into two geographical subsections; they will be referred to as the Front Valley and Gregg Valley. In the northwest corner of the Site is a group of disposal areas that are collectively referred to as the Acid Pit Area. The acid pit area includes Disposal Areas 1, 2, 3, 4, 5, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, and Trench 22. The acid pit area along with DA-6, DA-7/8 and DA-9 are located in Gregg Valley. Disposal areas DA-10/11 and DA-23 are located in the Front Valley. The acid pit area was first used as the burning grounds as described in the following pages. This area, as well as all of the other disposal areas, was used by more than one of the site owner/operators. In addition to investigating the on-site disposal areas for contamination, three off-site areas were also investigated. One disposal area, designated DA-24, lies on a tract of land that was once a part of the original acreage. This tract of land was sold in the 1970's and is now owned by another industry. The other two off-site areas investigated as part of the Remedial Investigation (RI) were local municipal landfills that were operated by the Buncombe County back in the 1970's. These two landfills, referred to as the Buckeye/Walnut Cove (B/WC) Landfill and the Tropigas Landfill, reportedly received waste from the Site as well as from other industrial facilities in the vicinity. Eight additional areas on-site were sampled since sufficient information was collected to indicate these areas as possible areas of contamination. Disposal practices prior to 1971 are not well defined. From 1952 to 1971, solid waste materials and possibly solvents were incinerated in pits dug in the burning ground. Chemical wastes were disposed of in trenches beside this burning ground. Waste materials generated in the production of the incapacitating, surety agent, 3-quinuclidinyl benzilate (BZ) and the tear gas agent, o-chlorobenzylidene malononitrile (CS), were placed in 55 gallon, rim-lid drums, reportedly covered with decontamination "kill" solution and then buried on-site in trench-type landfills. These kill solutions neutralized the BZ and CS compounds. These drums were disposed of in disposal areas DA-6, DA-7/8, DA-9, and DA-10/11. From 1971-1975, most of the liquid wastes

CHEMTRONICS INC (Continued) **1000303450**

generated on-site went to the Buncombe County Sewer System following some form of neutralization and equalization. Small volumes were disposed of in on-site pits/trenches. Solid wastes, rocket motors, explosive wastes, etc., were all burned in the burning ground. From 1975-1979, Chemtronics, Inc. constructed pits/trenches, as needed, for the disposal of spent acid and various organic wastes. These pits/trenches were constructed in the area that was once the burning ground, now referred to as the Acid Pit Area. In 1980, the State ordered Chemtronics to discontinue all discharges to these disposal pits/trenches. The pits have subsequently been back-filled. Consequently, in 1979, Chemtronics installed a 500,000 gallon lined lagoon for biotreatment of wastewaters on top of an abandoned leach field for the main production/processing building (Building 113). After the lagoon was filled, the lagoon lost its contents due to the incompatibility of the liner with the brominated waste initially introduced into the lagoon. Reconstruction of the biolagoon, with a different liner, was completed in August 1980 and was in use up to 1984 at which time the biolagoon was deactivated. This entire area, including the abandoned leach field and the biolagoon, has been designated as DA-23. The Site has been the subject of two previous Region IV, USEPA planned investigations, an investigation by the U.S. Army and an emergency response action by Region IV, USEPA. In June 1980, groundwater, surface water, sediment, and waste samples were collected for analysis. In April 1984, private water supply wells in the vicinity of the Site were sampled. In September 1984, the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) collected samples from two drums exposed at the surface in DA-10/11. These two drums were suspected of containing wastes from the production of the chemical warfare agent BZ. Although no BZ was found, in January 1985, an immediate removal of the same two exposed drums was initiated by EPA due to heightened public awareness/involvement with the Site. The drums were sampled and then transported to GSX, Pinewood facility, South Carolina. The Chemtronics Site was included on the first National Priorities List (NPL) in December 1982, and EPA assumed lead responsibility for the Site at that time. The Site has been operated as an industrial facility since 1952. An EPA contractor completed a Potentially Responsible Party (PRP) search in November 1983. Notice Letters were sent to the six identified PRPs. Three of the PRPs were found to be viable and EPA initiated negotiations with these three PRPs. Negotiations began in June 1984 and were concluded in October 1985 with two of the PRPs, Chemtronics, Inc. and Northrop Corporation, signing an Administrative Order of Consent to perform a Remedial Investigation/Feasibility Study (RI/FS). The third PRP, Hoechst Celanese Corporation declined to participate in the RI/FS process. A Record of Decision addressing Operable Unit 1 was completed in April 1988. Negotiation on a Remedial Design/Remedial Action was initiated in June 1988. Due to the inability of the three viable PRPs (Chemtronics, Inc., Hoechst-Celanese Corporation, and Northrop Corporation), the Agency issued the three PRPs a Unilateral Administrative Order. The effective date of the Administrative Order was March 22, 1989. The Site is an active facility with the majority of manufacturing activities occurring in the Front Valley. The property is presently being leased from Chemtronics, Inc. by Jet Research, Inc., another subsidiary of the Halliburton Company. A ROD Amendment addressing Operable Unit 1 was completed in April 1989.

CERCLIS Assessment History:

Action Code:	001
Action:	DISCOVERY
Date Started:	/ /
Date Completed:	03/01/80
Priority Level:	Not reported
Operable Unit:	SITEWIDE

CHEMTRONICS INC (Continued) **1000303450**

Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: SITE INSPECTION
Date Started: / /
Date Completed: 03/01/80
Priority Level: Higher priority for further assessment
Operable Unit: SITEWIDE
Primary Responsibility: EPA In-House
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: HAZARD RANKING SYSTEM PACKAGE
Date Started: / /
Date Completed: 12/01/82
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Alternate
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: PROPOSAL TO NATIONAL PRIORITIES LIST
Date Started: / /
Date Completed: 12/30/82
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Alternate
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: FINAL LISTING ON NATIONAL PRIORITIES LIST
Date Started: / /
Date Completed: 09/08/83
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Alternate
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: NATIONAL PRIORITIES LIST RESPONSIBLE PARTY SEARCH
Date Started: / /

CHEMTRONICS INC (Continued) **1000303450**

Date Completed: 11/15/83
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Alternate
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: Notice Letters Issued
Date Started: / /
Date Completed: 06/15/84
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: Notice Letters Issued
Date Started: / /
Date Completed: 09/25/84
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: REMOVAL
Date Started: 02/01/85
Date Completed: 02/05/85
Priority Level: Stabilized
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: PRELIMINARY ASSESSMENT
Date Started: / /
Date Completed: 03/01/85
Priority Level: Low priority for further assessment
Operable Unit: SITEWIDE
Primary Responsibility: State, Fund Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001

CHEMTRONICS INC (Continued) **1000303450**

Action:	REMEDIAL INVESTIGATION/FEASIBILITY STUDY NEGOTIATIONS
Date Started:	05/15/85
Date Completed:	08/15/85
Priority Level:	Not reported
Operable Unit:	SITEWIDE
Primary Responsibility:	Federal Enforcement
Planning Status:	Alternate
Urgency Indicator:	Not reported
Action Anomaly:	Not reported

Action Code:	001
Action:	ADMINISTRATIVE ORDER ON CONSENT
Date Started:	/ /
Date Completed:	09/30/85
Priority Level:	Not reported
Operable Unit:	SITEWIDE
Primary Responsibility:	Federal Enforcement
Planning Status:	Alternate
Urgency Indicator:	Not reported
Action Anomaly:	Not reported

Action Code:	001
Action:	COMBINED REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started:	01/02/85
Date Completed:	10/21/85
Priority Level:	Not reported
Operable Unit:	REMEDIAL DESIGN
Primary Responsibility:	EPA Fund-Financed
Planning Status:	Primary
Urgency Indicator:	Not reported
Action Anomaly:	Original Action Take Over

Action Code:	001
Action:	FORWARD PLANNING
Date Started:	09/24/84
Date Completed:	11/28/85
Priority Level:	Not reported
Operable Unit:	REMEDIAL DESIGN
Primary Responsibility:	EPA Fund-Financed
Planning Status:	Not reported
Urgency Indicator:	Not reported
Action Anomaly:	Not reported

Action Code:	001
Action:	POTENTIALLY RESPONSIBLE PARTY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started:	10/21/85
Date Completed:	04/05/88
Priority Level:	Not reported
Operable Unit:	REMEDIAL DESIGN
Primary Responsibility:	Responsible Party
Planning Status:	Primary
Urgency Indicator:	Not reported
Action Anomaly:	New Action Resulting from Take Over

CHEMTRONICS INC (Continued) **1000303450**

Action Code:	002
Action:	RECORD OF DECISION
Date Started:	/ /
Date Completed:	04/05/88
Priority Level:	Not reported
Operable Unit:	REMEDIAL DESIGN
Primary Responsibility:	Federal Enforcement
Planning Status:	Not reported
Urgency Indicator:	Not reported
Action Anomaly:	Not reported

Action Code:	001
Action:	REMEDIAL DESIGN/REMEDIAL ACTION NEGOTIATIONS
Date Started:	06/22/88
Date Completed:	03/22/89
Priority Level:	Not reported
Operable Unit:	SITEWIDE
Primary Responsibility:	Federal Enforcement
Planning Status:	Primary
Urgency Indicator:	Not reported
Action Anomaly:	Not reported

Action Code:	001
Action:	CONSENT AGREEMENT (ADMINISTRATIVE)
Date Started:	/ /
Date Completed:	03/22/89
Priority Level:	Not reported
Operable Unit:	SITEWIDE
Primary Responsibility:	Federal Enforcement
Planning Status:	Alternate
Urgency Indicator:	Not reported
Action Anomaly:	Not reported

Action Code:	001
Action:	UNILATERAL ADMIN ORDER
Date Started:	/ /
Date Completed:	03/22/89
Priority Level:	Not reported
Operable Unit:	SITEWIDE
Primary Responsibility:	Federal Enforcement
Planning Status:	Primary
Urgency Indicator:	Not reported
Action Anomaly:	Not reported

Action Code:	001
Action:	RECORD OF DECISION AMENDMENT
Date Started:	/ /
Date Completed:	04/26/89
Priority Level:	Final Remedy Selected at Site
Operable Unit:	REMEDIAL DESIGN
Primary Responsibility:	Federal Enforcement
Planning Status:	Not reported
Urgency Indicator:	Not reported

CHEMTRONICS INC (Continued) **1000303450**

Action Anomaly: Not reported

Action Code: 001
Action: ADMINISTRATIVE RECORDS
Date Started: 05/10/89
Date Completed: 05/10/89
Priority Level: Admin Record Compiled for a Remedial Event
Operable Unit: REMEDIAL DESIGN
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: SECTION 107 LITIGATION
Date Started: 03/31/89
Date Completed: 11/29/89
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: ADMINISTATIVE/VOLUNTARY COST RECOVERY
Date Started: / /
Date Completed: 11/29/89
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: POTENTIALLY RESPONSIBLE PARTY REMEDIAL DESIGN
Date Started: 03/23/89
Date Completed: 06/10/91
Priority Level: Not reported
Operable Unit: REMEDIAL DESIGN
Primary Responsibility: Responsible Party
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: REMOVAL ASSESSMENT
Date Started: 09/15/92
Date Completed: 09/15/92
Priority Level: Not reported
Operable Unit: SITEWIDE

CHEMTRONICS INC (Continued) **1000303450**

Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: TECHNICAL ASSISTANCE GRANT
Date Started: 09/01/89
Date Completed: 09/30/92
Priority Level: Not reported
Operable Unit: REMEDIAL DESIGN
Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: PRELIMINARY CLOSE-OUT REPORT PREPARED
Date Started: / /
Date Completed: 03/25/93
Priority Level: Not reported
Operable Unit: REMEDIAL DESIGN
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: ADMINISTATIVE/VOLUNTARY COST RECOVERY
Date Started: / /
Date Completed: 09/07/00
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: FIVE-YEAR REVIEW
Date Started: 03/01/97
Date Completed: 09/27/02
Priority Level: Not reported
Operable Unit: REMEDIAL DESIGN
Primary Responsibility: EPA Fund-Financed
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: FIVE-YEAR REVIEW
Date Started: 03/01/07
Date Completed: 09/27/07
Priority Level: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Operable Unit: REMEDIAL DESIGN
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: ADMINISTRATIVE ORDER ON CONSENT
Date Started: / /
Date Completed: 10/25/08
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: REMEDIAL INVESTIGATION/FEASIBILITY STUDY NEGOTIATIONS
Date Started: / /
Date Completed: 10/25/08
Priority Level: Not reported
Operable Unit: REMEDIAL DESIGN
Primary Responsibility: Federal Enforcement
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 003
Action: FIVE-YEAR REVIEW
Date Started: / /
Date Completed: 09/26/12
Priority Level: Not reported
Operable Unit: REMEDIAL DESIGN
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: POTENTIALLY RESPONSIBLE PARTY REMEDIAL ACTION
Date Started: 06/10/91
Date Completed: / /
Priority Level: Not reported
Operable Unit: REMEDIAL DESIGN
Primary Responsibility: Responsible Party
Planning Status: Alternate
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: POTENTIALLY RESPONSIBLE PARTY LONG-TERM RESPONSE ACTION
Date Started: 03/28/08
Date Completed: / /

CHEMTRONICS INC (Continued) **1000303450**

Priority Level: Not reported
Operable Unit: REMEDIAL DESIGN
Primary Responsibility: Responsible Party
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: POTENTIALLY RESPONSIBLE PARTY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 10/25/08
Date Completed: / /
Priority Level: Not reported
Operable Unit: REMEDIAL DESIGN
Primary Responsibility: Responsible Party
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Federal Register Details:
Fed Register Date: 09/08/83
Fed Register Volume: 48
Page Number: 40658

Fed Register Date: 12/30/82
Fed Register Volume: 47
Page Number: 58476

CORRACTS:

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20000601
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19980301
Action: CA100 - RFI Imposition
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

CHEMTRONICS INC (Continued) **1000303450**

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20020702
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20020603
Action: CA184
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030304
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030806
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20010606
Action: CA750NO - Migration of Contaminated Groundwater under Control, Unacceptable migration of contaminated groundwater is observed or expected
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing

CHEMTRONICS INC (Continued) **1000303450**

Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20010606
Action: CA725NO - Current Human Exposures Under Control, Current human exposures are NOT under control
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030306
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030506
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030807
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY

CHEMTRONICS INC (Continued) **1000303450**

Actual Date: 20070507
Action: CA210SF - CA Responsibility Referred To A Non-RCRA Federal Authority, Corrective Action at the facility or area referred to CERCLA
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20021107
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030808
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030708
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19990608
Action: CA140 - RFI Workplan Notice Of Deficiency Issued
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

CHEMTRONICS INC (Continued) **1000303450**

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030610
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030310
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030910
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030811
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030811
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing

CHEMTRONICS INC (Continued) **1000303450**

Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20010611
Action: CA186
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20010611
Action: CA186
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20050812
Action: CA140 - RFI Workplan Notice Of Deficiency Issued
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20000912
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20000912
Action: CA552
NAICS Code(s): 32592 32511 325188

CHEMTRONICS INC (Continued) **1000303450**

Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20011213
Action: CA150 - RFI Workplan Approved
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030513
Action: CA155 - RFI Supplemental Information Requested By Agency
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19980814
Action: CA108
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030214
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY

CHEMTRONICS INC (Continued) **1000303450**

Actual Date: 19980415
Action: CA107
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19990615
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20010817
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030617
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20050617
Action: CA110 - RFI Workplan Received
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

CHEMTRONICS INC (Continued) **1000303450**

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20020917
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19950718
Action: CA551
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19980619
Action: CA725NO - Current Human Exposures Under Control, Current human exposures are NOT under control
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19980619
Action: CA750IN - Migration of Contaminated Groundwater under Control, More information is needed to make a determination
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030220
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing

CHEMTRONICS INC (Continued) **1000303450**

Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19971121
Action: CA106
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030422
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20060322
Action: CA551
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19991122
Action: CA150 - RFI Workplan Approved
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20011022

CHEMTRONICS INC (Continued) **1000303450**

Action: CA190 - RFI Report Received
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20020123
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20000623
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030424
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19990727
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: 19990830
Schedule end date: Not reported

EPA ID: NCD095459392

CHEMTRONICS INC (Continued) **1000303450**

EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030327
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030528
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030829
Action: CA160 - RFI Supplemental Information Received
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19970829
Action: CA104
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19901029
Action: CA050PA - RFA Completed, Assessment was a PA-Plus
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20000929
Action: CA184
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030929
Action: CA725YE - Current Human Exposures Under Control, Yes, Current Human Exposures Under Control has been verified
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: 20030930
Schedule end date: 20030930

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030929
Action: CA750NO - Migration of Contaminated Groundwater under Control, Unacceptable migration of contaminated groundwater is observed or expected
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20010830
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19990830

CHEMTRONICS INC (Continued) **1000303450**

Action: CA110 - RFI Workplan Received
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030130
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20030130
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19981231
Action: CA110 - RFI Workplan Received
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19970131
Action: CA553
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392

CHEMTRONICS INC (Continued) **1000303450**

EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20020731
Action: CA552
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 19920331
Action: CA075HI - CA Prioritization, Facility or area was assigned a high corrective action priority
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD095459392
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20020531
Action: CA190 - RFI Report Received
NAICS Code(s): 32592 32511 325188
Explosives Manufacturing
Petrochemical Manufacturing
All Other Basic Inorganic Chemical Manufacturing
Original schedule date: Not reported
Schedule end date: Not reported

RCRA-TSDF:
Date form received by agency: 09/19/2007
Facility name: CHEMTRONICS INC
Facility address: 180 OLD BEE TREE RD
SWANNANOA, NC 28778
EPA ID: NCD095459392
Mailing address: BELLAIRE BLVD 91-1NE-25G
HOUSTON, TX 77072
Contact: MARK C SPENCER
Contact address: BELLAIRE BLVD 91-1NE-25G
HOUSTON, TX 77072
Contact country: US
Contact telephone: 281-575-4425
Contact email: Not reported
EPA Region: 04
Land type: Private
Classification: TSDF
Description: Handler is engaged in the treatment, storage or disposal of hazardous waste
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar

CHEMTRONICS INC (Continued) **1000303450**

month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name:	CHEMTRONICS INC
Owner/operator address:	BELLAIRE BLVD HOUSTON, TX 77072
Owner/operator country:	US
Owner/operator telephone:	713-676-7865
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	02/15/1980
Owner/Op end date:	Not reported

Owner/operator name:	CHEMTRONICS INC
Owner/operator address:	BELLAIRE BLVD HOUSTON, TX 77072
Owner/operator country:	US
Owner/operator telephone:	713-676-7865
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	02/15/1980
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No

CHEMTRONICS INC (Continued) **1000303450**

Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D003
. Waste name: REACTIVE WASTE

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: D039
. Waste name: TETRACHLOROETHYLENE

. Waste code: D040
. Waste name: TRICHLORETHYLENE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: K044
. Waste name: WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING AND PROCESSING OF EXPLOSIVES.

. Waste code: P009
. Waste name: AMMONIUM PICRATE (R) (OR) PHENOL, 2,4,6-TRINITRO-, AMMONIUM SALT (R)

. Waste code: P030
. Waste name: CYANIDES (SOLUBLE CYANIDE SALTS), NOT OTHERWISE SPECIFIED

CHEMTRONICS INC (Continued) **1000303450**

. Waste code: P048
. Waste name: 2,4-DINITROPHENOL (OR) PHENOL, 2,4-DINITRO-

. Waste code: P077
. Waste name: BENZENAMINE, 4-NITRO- (OR) P-NITROANILINE

. Waste code: P106
. Waste name: SODIUM CYANIDE (OR) SODIUM CYANIDE NA(CN)

. Waste code: U002
. Waste name: 2-PROPANONE (I) (OR) ACETONE (I)

. Waste code: U003
. Waste name: ACETONITRILE (I,T)

. Waste code: U031
. Waste name: 1-BUTANOL (I) (OR) N-BUTYL ALCOHOL (I)

. Waste code: U044
. Waste name: CHLOROFORM (OR) METHANE, TRICHLORO-

. Waste code: U056
. Waste name: BENZENE, HEXAHYDRO- (I) (OR) CYCLOHEXANE (I)

. Waste code: U077
. Waste name: ETHANE, 1,2-DICHLORO- (OR) ETHYLENE DICHLORIDE

. Waste code: U080
. Waste name: METHANE, DICHLORO- (OR) METHYLENE CHLORIDE

. Waste code: U103
. Waste name: DIMETHYL SULFATE (OR) SULFURIC ACID, DIMETHYL ESTER

. Waste code: U112
. Waste name: ACETIC ACID, ETHYL ESTER (I) (OR) ETHYL ACETATE (I)

. Waste code: U154
. Waste name: METHANOL (I) (OR) METHYL ALCOHOL (I)

. Waste code: U159
. Waste name: 2-BUTANONE (I,T) (OR) METHYL ETHYL KETONE (MEK) (I,T)

. Waste code: U170
. Waste name: P-NITROPHENOL (I,T) (OR) PHENOL, 4-NITRO-

. Waste code: U201
. Waste name: 1,3-BENZENEDIOL (OR) RESORCINOL

. Waste code: U213
. Waste name: FURAN, TETRAHYDRO-(I) (OR) TETRAHYDROFURAN (I)

. Waste code: U220
. Waste name: BENZENE, METHYL- (OR) TOLUENE

. Waste code: U239
. Waste name: BENZENE, DIMETHYL- (I,T) (OR) XYLENE (I)

CHEMTRONICS INC (Continued) **1000303450**

Historical Generators:
Date form received by agency: 05/28/2003
Site name: CHEMTRONICS INC
Classification: Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D003
. Waste name: REACTIVE WASTE

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: D039
. Waste name: TETRACHLOROETHYLENE

. Waste code: D040
. Waste name: TRICHLORETHYLENE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: K044
. Waste name: WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING AND PROCESSING OF EXPLOSIVES.

. Waste code: P009
. Waste name: AMMONIUM PICRATE (R) (OR) PHENOL, 2,4,6-TRINITRO-, AMMONIUM SALT (R)

CHEMTRONICS INC (Continued) **1000303450**

. Waste code: P030
. Waste name: CYANIDES (SOLUBLE CYANIDE SALTS), NOT OTHERWISE SPECIFIED

. Waste code: P048
. Waste name: 2,4-DINITROPHENOL (OR) PHENOL, 2,4-DINITRO-

. Waste code: P077
. Waste name: BENZENAMINE, 4-NITRO- (OR) P-NITROANILINE

. Waste code: P106
. Waste name: SODIUM CYANIDE (OR) SODIUM CYANIDE NA(CN)

. Waste code: U002
. Waste name: 2-PROPANONE (I) (OR) ACETONE (I)

. Waste code: U003
. Waste name: ACETONITRILE (I,T)

. Waste code: U031
. Waste name: 1-BUTANOL (I) (OR) N-BUTYL ALCOHOL (I)

. Waste code: U044
. Waste name: CHLOROFORM (OR) METHANE, TRICHLORO-

. Waste code: U056
. Waste name: BENZENE, HEXAHYDRO- (I) (OR) CYCLOHEXANE (I)

. Waste code: U077
. Waste name: ETHANE, 1,2-DICHLORO- (OR) ETHYLENE DICHLORIDE

. Waste code: U080
. Waste name: METHANE, DICHLORO- (OR) METHYLENE CHLORIDE

. Waste code: U103
. Waste name: DIMETHYL SULFATE (OR) SULFURIC ACID, DIMETHYL ESTER

. Waste code: U112
. Waste name: ACETIC ACID, ETHYL ESTER (I) (OR) ETHYL ACETATE (I)

. Waste code: U154
. Waste name: METHANOL (I) (OR) METHYL ALCOHOL (I)

. Waste code: U159
. Waste name: 2-BUTANONE (I,T) (OR) METHYL ETHYL KETONE (MEK) (I,T)

. Waste code: U170
. Waste name: P-NITROPHENOL (I,T) (OR) PHENOL, 4-NITRO-

. Waste code: U201
. Waste name: 1,3-BENZENEDIOL (OR) RESORCINOL

. Waste code: U213
. Waste name: FURAN, TETRAHYDRO-(I) (OR) TETRAHYDROFURAN (I)

. Waste code: U220
. Waste name: BENZENE, METHYL- (OR) TOLUENE

CHEMTRONICS INC (Continued) **1000303450**

. Waste code: U239
. Waste name: BENZENE, DIMETHYL- (I,T) (OR) XYLENE (I)

Date form received by agency: 01/09/2001
Site name: CHEMTRONICS INC
Classification: Conditionally Exempt Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D003
. Waste name: REACTIVE WASTE

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: D039
. Waste name: TETRACHLOROETHYLENE

. Waste code: D040
. Waste name: TRICHLORETHYLENE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: K044
. Waste name: WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING AND PROCESSING OF EXPLOSIVES.

. Waste code: P009
. Waste name: AMMONIUM PICRATE (R) (OR) PHENOL, 2,4,6-TRINITRO-, AMMONIUM SALT (R)

. Waste code: P030

CHEMTRONICS INC (Continued) **1000303450**

. Waste name: CYANIDES (SOLUBLE CYANIDE SALTS), NOT OTHERWISE SPECIFIED

. Waste code: P048
. Waste name: 2,4-DINITROPHENOL (OR) PHENOL, 2,4-DINITRO-

. Waste code: P077
. Waste name: BENZENAMINE, 4-NITRO- (OR) P-NITROANILINE

. Waste code: P106
. Waste name: SODIUM CYANIDE (OR) SODIUM CYANIDE NA(CN)

. Waste code: U002
. Waste name: 2-PROPANONE (I) (OR) ACETONE (I)

. Waste code: U003
. Waste name: ACETONITRILE (I,T)

. Waste code: U031
. Waste name: 1-BUTANOL (I) (OR) N-BUTYL ALCOHOL (I)

. Waste code: U044
. Waste name: CHLOROFORM (OR) METHANE, TRICHLORO-

. Waste code: U056
. Waste name: BENZENE, HEXAHYDRO- (I) (OR) CYCLOHEXANE (I)

. Waste code: U077
. Waste name: ETHANE, 1,2-DICHLORO- (OR) ETHYLENE DICHLORIDE

. Waste code: U080
. Waste name: METHANE, DICHLORO- (OR) METHYLENE CHLORIDE

. Waste code: U103
. Waste name: DIMETHYL SULFATE (OR) SULFURIC ACID, DIMETHYL ESTER

. Waste code: U112
. Waste name: ACETIC ACID, ETHYL ESTER (I) (OR) ETHYL ACETATE (I)

. Waste code: U154
. Waste name: METHANOL (I) (OR) METHYL ALCOHOL (I)

. Waste code: U159
. Waste name: 2-BUTANONE (I,T) (OR) METHYL ETHYL KETONE (MEK) (I,T)

. Waste code: U170
. Waste name: P-NITROPHENOL (I,T) (OR) PHENOL, 4-NITRO-

. Waste code: U201
. Waste name: 1,3-BENZENEDIOL (OR) RESORCINOL

. Waste code: U213
. Waste name: FURAN, TETRAHYDRO-(I) (OR) TETRAHYDROFURAN (I)

. Waste code: U220
. Waste name: BENZENE, METHYL- (OR) TOLUENE

. Waste code: U239

CHEMTRONICS INC (Continued) **1000303450**

. Waste name: BENZENE, DIMETHYL- (I,T) (OR) XYLENE (I)

Date form received by agency: 10/17/2000
Site name: CHEMTRONICS INC
Classification: Large Quantity Generator

Date form received by agency: 03/02/2000
Site name: JET RESEARCH CENTER
Classification: Small Quantity Generator

Date form received by agency: 09/23/1997
Site name: CHEMTRONICS INC
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 09/18/1997
Site name: CHEMTRONICS INC
Classification: Large Quantity Generator

. Waste code: D000
. Waste name: Not Defined

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D003
. Waste name: REACTIVE WASTE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: K044
. Waste name: WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING AND PROCESSING OF EXPLOSIVES.

. Waste code: P009
. Waste name: AMMONIUM PICRATE (R) (OR) PHENOL, 2,4,6-TRINITRO-, AMMONIUM SALT (R)

. Waste code: U002
. Waste name: 2-PROPANONE (I) (OR) ACETONE (I)

CHEMTRONICS INC (Continued) **1000303450**

. Waste code: U003
. Waste name: ACETONITRILE (I,T)

. Waste code: U031
. Waste name: 1-BUTANOL (I) (OR) N-BUTYL ALCOHOL (I)

. Waste code: U044
. Waste name: CHLOROFORM (OR) METHANE, TRICHLORO-

. Waste code: U056
. Waste name: BENZENE, HEXAHYDRO- (I) (OR) CYCLOHEXANE (I)

. Waste code: U077
. Waste name: ETHANE, 1,2-DICHLORO- (OR) ETHYLENE DICHLORIDE

. Waste code: U154
. Waste name: METHANOL (I) (OR) METHYL ALCOHOL (I)

. Waste code: U159
. Waste name: 2-BUTANONE (I,T) (OR) METHYL ETHYL KETONE (MEK) (I,T)

. Waste code: U170
. Waste name: P-NITROPHENOL (I,T) (OR) PHENOL, 4-NITRO-

. Waste code: U201
. Waste name: 1,3-BENZENEDIOL (OR) RESORCINOL

. Waste code: U213
. Waste name: FURAN, TETRAHYDRO-(I) (OR) TETRAHYDROFURAN (I)

. Waste code: U220
. Waste name: BENZENE, METHYL- (OR) TOLUENE

. Waste code: U239
. Waste name: BENZENE, DIMETHYL- (I,T) (OR) XYLENE (I)

Date form received by agency: 05/17/1994
Site name: CHEMTRONICS INC
Classification: Conditionally Exempt Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

Date form received by agency: 01/28/1994
Site name: JET RESEARCH CENTER, INC
Classification: Large Quantity Generator

Date form received by agency: 02/19/1992
Site name: JET RESEARCH CENTER, INC.
Classification: Large Quantity Generator

Date form received by agency: 03/01/1990
Site name: JET RESEARCH CENTER, INC.
Classification: Large Quantity Generator

Corrective Action Summary:
Event date: 07/10/1990

CHEMTRONICS INC (Continued) **1000303450**

Event:	RFA COMPLETED
Event date:	10/29/1990
Event:	RFA COMPLETED-ASSESSMENT WAS A PA-PLUS
Event date:	03/31/1992
Event:	CA PRIORITIZATION-HIGH CA PRIORITY
Event date:	09/29/1992
Event:	STABILIZATION MEASURES EVALUATION-FACILITY IS AMENABLE TO STABILIZATION
Event date:	03/29/1993
Event:	STABILIZATION/INTERIM MEASURES DECISION
Event date:	03/29/1993
Event:	REGION IV - RPS STABILIZATION CATEGORIES
Event date:	10/14/1993
Event:	STABILIZATION MEASURES EVALUATION-FURTHER INVESTIGATION NECESSARY
Event date:	07/18/1995
Event:	SITE VISIT
Event date:	01/31/1997
Event:	MEETING
Event date:	08/29/1997
Event:	CONFIRMATORY SAMPLING WORKPLAN RECEIVED
Event date:	11/21/1997
Event:	CONFIRMATORY SAMPLING WORKPLAN APPROVED
Event date:	03/01/1998
Event:	INVESTIGATION IMPOSITION
Event date:	04/15/1998
Event:	CONFIRMATORY SAMPLING REPORT RECEIVED
Event date:	06/19/1998
Event:	RELEASE TO GW CONTROLLED DETERMINATION-MORE INFORMATION NEEDED
Event date:	06/19/1998
Event:	HUMAN EXPOSURES CONTROLLED DETERMINATION-FACILITY DOES NOT MEET DEFINITION
Event date:	08/14/1998
Event:	CONFIRM. SAMPLING REPORT REVIEWED
Event date:	12/31/1998
Event:	INVESTIGATION WORKPLAN RECEIVED
Event date:	06/08/1999
Event:	INVESTIGATION WORKPLAN NOTICE OF DEFICIENCY ISSUED
Event date:	06/15/1999
Event:	CORRESPONDENCE

CHEMTRONICS INC (Continued) **1000303450**

Event date: 07/27/1999
Event: CORRESPONDENCE

Event date: 08/30/1999
Event: INVESTIGATION WORKPLAN RECEIVED

Event date: 11/22/1999
Event: INVESTIGATION WORKPLAN APPROVED

Event date: 06/01/2000
Event: CORRESPONDENCE

Event date: 06/23/2000
Event: MEETING

Event date: 09/12/2000
Event: CORRESPONDENCE

Event date: 09/12/2000
Event: CORRESPONDENCE

Event date: 09/29/2000
Event: DRAFT RFI REPORT RECEIVED

Event date: 06/06/2001
Event: HUMAN EXPOSURES CONTROLLED DETERMINATION-FACILITY DOES NOT MEET DEFINITION

Event date: 06/06/2001
Event: RELEASE TO GW CONTROLLED DETERMINATION-FACILITY DOES NOT MEET DEFINITION

Event date: 06/11/2001
Event: DRAFT RFI REPORT REVIEWED - NOTI ISSUED

Event date: 06/11/2001
Event: DRAFT RFI REPORT REVIEWED - NOTI ISSUED

Event date: 08/17/2001
Event: MEETING

Event date: 08/30/2001
Event: MEETING

Event date: 10/22/2001
Event: INVESTIGATION REPORT RECEIVED

Event date: 12/13/2001
Event: INVESTIGATION WORKPLAN APPROVED

Event date: 01/23/2002
Event: MEETING

Event date: 05/31/2002
Event: INVESTIGATION REPORT RECEIVED

Event date: 06/03/2002

CHEMTRONICS INC (Continued) **1000303450**

Event:	DRAFT RFI REPORT RECEIVED
Event date:	07/02/2002
Event:	MEETING
Event date:	07/31/2002
Event:	CORRESPONDENCE
Event date:	09/17/2002
Event:	MEETING
Event date:	11/07/2002
Event:	CORRESPONDENCE
Event date:	01/30/2003
Event:	MEETING
Event date:	01/30/2003
Event:	CORRESPONDENCE
Event date:	02/14/2003
Event:	CORRESPONDENCE
Event date:	02/20/2003
Event:	MEETING
Event date:	03/04/2003
Event:	CORRESPONDENCE
Event date:	03/06/2003
Event:	CORRESPONDENCE
Event date:	03/10/2003
Event:	CORRESPONDENCE
Event date:	03/27/2003
Event:	CORRESPONDENCE
Event date:	04/22/2003
Event:	CORRESPONDENCE
Event date:	04/24/2003
Event:	CORRESPONDENCE
Event date:	05/06/2003
Event:	CORRESPONDENCE
Event date:	05/13/2003
Event:	INVESTIGATION SUPPLEMENTAL INFO REQ BY AGENCY
Event date:	05/28/2003
Event:	MEETING
Event date:	06/10/2003
Event:	MEETING
Event date:	06/17/2003

CHEMTRONICS INC (Continued) **1000303450**

Event: MEETING

Event date: 07/08/2003
Event: MEETING

Event date: 08/06/2003
Event: CORRESPONDENCE

Event date: 08/07/2003
Event: MEETING

Event date: 08/08/2003
Event: CORRESPONDENCE

Event date: 08/11/2003
Event: CORRESPONDENCE

Event date: 08/11/2003
Event: CORRESPONDENCE

Event date: 08/29/2003
Event: INVESTIGATION SUPPLEMENTAL INFORMATION RECEIVED

Event date: 09/10/2003
Event: CORRESPONDENCE

Event date: 09/29/2003
Event: HUMAN EXPOSURES CONTROLLED DETERMINATION-YES, APPLICABLE AS OF THIS DATE

Event date: 09/29/2003
Event: RELEASE TO GW CONTROLLED DETERMINATION-FACILITY DOES NOT MEET DEFINITION

Event date: 06/17/2005
Event: INVESTIGATION WORKPLAN RECEIVED

Event date: 08/12/2005
Event: INVESTIGATION WORKPLAN NOTICE OF DEFICIENCY ISSUED

Event date: 03/22/2006
Event: SITE VISIT

Event date: 05/07/2007
Event: REFERRED TO A NON-RCRA AUTHORITY-REFERRED TO CERCLA

Facility Has Received Notices of Violations:
Regulation violated: SR - 262.41,265.75
Area of violation: Generators - General
Date violation determined: 04/12/1993
Date achieved compliance: 05/28/1993
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/12/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State

CHEMTRONICS INC (Continued) **1000303450**

Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: SR - 270.14(a)
Area of violation: Permits - Application
Date violation determined: 07/23/1992
Date achieved compliance: 09/23/1992
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 08/28/1997
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: SR - 270.14(a)
Area of violation: Permits - Application
Date violation determined: 07/23/1992
Date achieved compliance: 09/23/1992
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 07/31/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 5000
Final penalty amount: 2500
Paid penalty amount: 2500

Regulation violated: SR - 265.16(D)(4)
Area of violation: TSD - General Facility Standards
Date violation determined: 10/23/1991
Date achieved compliance: 12/13/1991
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/23/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD IS-Ground-Water Monitoring
Date violation determined: 03/26/1991
Date achieved compliance: 03/26/1991
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 265.31, 265.16
Area of violation: TSD - General Facility Standards
Date violation determined: 03/26/1991
Date achieved compliance: 03/26/1991
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 265.171, 265.173
Area of violation: TSD - Container Use and Management
Date violation determined: 03/26/1991
Date achieved compliance: 03/26/1991
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.11
Area of violation: Generators - General
Date violation determined: 03/26/1991
Date achieved compliance: 03/26/1991
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: SR - 262.11/26I.4
Area of violation: Generators - General
Date violation determined: 03/25/1991
Date achieved compliance: 10/23/1991
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/25/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 61499
Final penalty amount: 25000

CHEMTRONICS INC (Continued) **1000303450**

Paid penalty amount: Not reported

Regulation violated: SR - 265.16
Area of violation: TSD - General Facility Standards
Date violation determined: 03/25/1991
Date achieved compliance: 10/23/1991
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/25/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 61499
Final penalty amount: 25000
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD - Financial Requirements
Date violation determined: 03/25/1991
Date achieved compliance: 03/25/1991
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: SR - 262.11/26I.4
Area of violation: Generators - General
Date violation determined: 03/25/1991
Date achieved compliance: 10/23/1991
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 01/06/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 61499
Final penalty amount: 25000
Paid penalty amount: 25000

Regulation violated: Not reported
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 03/25/1991
Date achieved compliance: 03/25/1991
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Regulation violated: SR - 265.16
Area of violation: TSD - General Facility Standards
Date violation determined: 03/25/1991
Date achieved compliance: 10/23/1991
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 01/06/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 61499
Final penalty amount: 25000
Paid penalty amount: 25000

Regulation violated: Not reported
Area of violation: TSD - General
Date violation determined: 03/25/1991
Date achieved compliance: 03/25/1991
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD IS-Ground-Water Monitoring
Date violation determined: 03/25/1991
Date achieved compliance: 03/25/1991
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Formal Enforcement Agreement or Order
Date violation determined: 06/06/1990
Date achieved compliance: 12/31/1991
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 01/06/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 207492
Final penalty amount: 140000
Paid penalty amount: 140000

Regulation violated: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Area of violation: Formal Enforcement Agreement or Order
Date violation determined: 06/06/1990
Date achieved compliance: 12/31/1991
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 09/20/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 207492
Final penalty amount: 140000
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD - General
Date violation determined: 06/06/1990
Date achieved compliance: 12/31/1991
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 09/20/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 207492
Final penalty amount: 140000
Paid penalty amount: Not reported

Regulation violated: SR - 265.
Area of violation: TSD IS-Ground-Water Monitoring
Date violation determined: 06/06/1990
Date achieved compliance: 12/31/1991
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/25/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 61499
Final penalty amount: 25000
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Formal Enforcement Agreement or Order
Date violation determined: 06/06/1990
Date achieved compliance: 12/31/1991
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/25/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 61499
Final penalty amount: 25000
Paid penalty amount: Not reported

Regulation violated: SR - 265.
Area of violation: TSD IS-Ground-Water Monitoring

CHEMTRONICS INC (Continued) **1000303450**

Date violation determined: 06/06/1990
Date achieved compliance: 12/31/1991
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 01/06/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 207492
Final penalty amount: 140000
Paid penalty amount: 140000

Regulation violated: Not reported
Area of violation: TSD - General
Date violation determined: 06/06/1990
Date achieved compliance: 12/31/1991
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 01/06/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 207492
Final penalty amount: 140000
Paid penalty amount: 140000

Regulation violated: Not reported
Area of violation: TSD - General
Date violation determined: 06/06/1990
Date achieved compliance: 12/31/1991
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/25/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 61499
Final penalty amount: 25000
Paid penalty amount: Not reported

Regulation violated: SR - 265.
Area of violation: TSD IS-Ground-Water Monitoring
Date violation determined: 06/06/1990
Date achieved compliance: 12/31/1991
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 09/20/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 207492
Final penalty amount: 140000
Paid penalty amount: Not reported

Regulation violated: SR - 264.147
Area of violation: TSD - Financial Requirements
Date violation determined: 01/02/1990

CHEMTRONICS INC (Continued) **1000303450**

Date achieved compliance: 10/23/1991
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 09/20/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 207492
Final penalty amount: 140000
Paid penalty amount: Not reported

Regulation violated: SR - 264.147
Area of violation: TSD - Financial Requirements
Date violation determined: 12/04/1989
Date achieved compliance: 10/23/1991
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 05/02/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD - General
Date violation determined: 04/04/1989
Date achieved compliance: 10/23/1991
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD - General
Date violation determined: 04/04/1989
Date achieved compliance: 10/23/1991
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 05/02/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD - General
Date violation determined: 01/26/1989
Date achieved compliance: 01/26/1989

CHEMTRONICS INC (Continued) **1000303450**

Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 01/04/1989
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD - General
Date violation determined: 12/06/1988
Date achieved compliance: 01/26/1989
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 01/04/1989
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD IS-Ground-Water Monitoring
Date violation determined: 06/21/1988
Date achieved compliance: 04/06/1989
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 02/13/1989
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD - General
Date violation determined: 11/17/1987
Date achieved compliance: 12/11/1987
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/17/1987
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD IS-Ground-Water Monitoring
Date violation determined: 09/16/1985
Date achieved compliance: 07/01/1986
Violation lead agency: EPA

CHEMTRONICS INC (Continued) **1000303450**

Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:

Evaluation date: 09/10/2008
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/20/2006
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/26/2006
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/01/2006
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/19/2005
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/22/2005
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/27/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/02/2003
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

CHEMTRONICS INC (Continued) **1000303450**

Evaluation date: 04/23/2003
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/13/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/19/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/20/2002
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/29/2001
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/25/2001
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/05/2000
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/23/1999
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/01/1999
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/21/1999
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/16/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/11/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/09/1997
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/29/1997
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/19/1997
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/16/1996
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/04/1996
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/25/1995
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/18/1995
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

CHEMTRONICS INC (Continued) **1000303450**

Evaluation date: 05/24/1995
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/10/1995
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/09/1995
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/29/1994
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/13/1994
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/10/1994
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/19/1993
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/19/1993
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/18/1993
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/18/1993
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/28/1993
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/12/1993
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Generators - General
Date achieved compliance: 05/28/1993
Evaluation lead agency: State

Evaluation date: 03/08/1993
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/16/1992
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/07/1992
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/06/1992
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/05/1992
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/06/1992
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/05/1992
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

CHEMTRONICS INC (Continued) **1000303450**

Evaluation date: 09/23/1992
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/23/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/23/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Permits - Application
Date achieved compliance: 09/23/1992
Evaluation lead agency: State

Evaluation date: 01/03/1992
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/19/1991
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/13/1991
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: TSD - General Facility Standards
Date achieved compliance: 12/13/1991
Evaluation lead agency: State

Evaluation date: 10/23/1991
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Generators - General
Date achieved compliance: 10/23/1991
Evaluation lead agency: State

Evaluation date: 10/23/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/23/1991
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: TSD - General Facility Standards
Date achieved compliance: 10/23/1991
Evaluation lead agency: State

Evaluation date: 09/05/1991
Evaluation: GROUNDWATER MONITORING EVALUATION
Area of violation: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/08/1991
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/26/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Ground-Water Monitoring
Date achieved compliance: 03/26/1991
Evaluation lead agency: EPA

Evaluation date: 03/26/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General Facility Standards
Date achieved compliance: 03/26/1991
Evaluation lead agency: EPA

Evaluation date: 03/26/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - Container Use and Management
Date achieved compliance: 03/26/1991
Evaluation lead agency: EPA

Evaluation date: 03/26/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 03/26/1991
Evaluation lead agency: EPA

Evaluation date: 03/25/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Ground-Water Monitoring
Date achieved compliance: 12/31/1991
Evaluation lead agency: State

Evaluation date: 03/25/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Ground-Water Monitoring
Date achieved compliance: 03/25/1991
Evaluation lead agency: EPA

Evaluation date: 03/25/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - Financial Requirements
Date achieved compliance: 03/25/1991
Evaluation lead agency: EPA

Evaluation date: 03/25/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 12/31/1991
Evaluation lead agency: State

CHEMTRONICS INC (Continued) **1000303450**

Evaluation date: 03/25/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - Closure/Post-Closure
Date achieved compliance: 03/25/1991
Evaluation lead agency: EPA

Evaluation date: 03/25/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 10/23/1991
Evaluation lead agency: State

Evaluation date: 03/25/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General Facility Standards
Date achieved compliance: 10/23/1991
Evaluation lead agency: State

Evaluation date: 03/25/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 03/25/1991
Evaluation lead agency: EPA

Evaluation date: 03/25/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Formal Enforcement Agreement or Order
Date achieved compliance: 12/31/1991
Evaluation lead agency: State

Evaluation date: 01/25/1991
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/15/1991
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/01/1990
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: TSD - General
Date achieved compliance: 12/31/1991
Evaluation lead agency: State

Evaluation date: 11/01/1990
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: TSD IS-Ground-Water Monitoring
Date achieved compliance: 12/31/1991
Evaluation lead agency: State

Evaluation date: 11/01/1990
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Formal Enforcement Agreement or Order

CHEMTRONICS INC (Continued) **1000303450**

Date achieved compliance: 12/31/1991
Evaluation lead agency: State

Evaluation date: 10/24/1990
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/25/1990
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/06/1990
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Ground-Water Monitoring
Date achieved compliance: 12/31/1991
Evaluation lead agency: State

Evaluation date: 06/06/1990
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Formal Enforcement Agreement or Order
Date achieved compliance: 12/31/1991
Evaluation lead agency: State

Evaluation date: 06/06/1990
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 12/31/1991
Evaluation lead agency: State

Evaluation date: 06/05/1990
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/14/1990
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/29/1990
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/02/1990
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: TSD - Financial Requirements
Date achieved compliance: 10/23/1991
Evaluation lead agency: State

CHEMTRONICS INC (Continued) **1000303450**

Evaluation date: 12/04/1989
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: TSD - Financial Requirements
Date achieved compliance: 10/23/1991
Evaluation lead agency: State

Evaluation date: 06/12/1989
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/06/1989
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/05/1989
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/04/1989
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 10/23/1991
Evaluation lead agency: State

Evaluation date: 04/04/1989
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA-Initiated Oversight/Observation/Training Actions

Evaluation date: 01/30/1989
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/26/1989
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: TSD - General
Date achieved compliance: 01/26/1989
Evaluation lead agency: State

Evaluation date: 12/06/1988
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 01/26/1989
Evaluation lead agency: State

Evaluation date: 07/05/1988
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/21/1988
Evaluation: GROUNDWATER MONITORING EVALUATION
Area of violation: TSD IS-Ground-Water Monitoring
Date achieved compliance: 04/06/1989
Evaluation lead agency: State

Evaluation date: 05/10/1988
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/02/1988
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

Evaluation date: 01/06/1988
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/21/1987
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/18/1987
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/17/1987
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 12/11/1987
Evaluation lead agency: State

Evaluation date: 09/16/1985
Evaluation: GROUNDWATER MONITORING EVALUATION
Area of violation: TSD IS-Ground-Water Monitoring
Date achieved compliance: 07/01/1986
Evaluation lead agency: EPA

Evaluation date: 09/16/1985
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA-Initiated Oversight/Observation/Training Actions

CHEMTRONICS INC (Continued) **1000303450**

US ENG CONTROLS:
EPA ID: NCD095459392
Site ID: 0402957
Name: CHEMTRONICS, INC.
Address: OLD BEE TREE RD
SWANNANOA, NC 28778
EPA Region: 04
County: BUNCOMBE
Event Code: Not reported
Actual Date: 03/31/1988
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 04/05/1988
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Pump And Treat
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 04/05/1988
Operable Unit: 01
Contaminated Media : Sediment
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 04/05/1988
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 04/05/1988
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Solidification/Stabilization (Ex-Situ)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 04/05/1988

CHEMTRONICS INC (Continued) **1000303450**

Operable Unit: 01
Contaminated Media : Surface Water
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: ROD Amendment
Action Completion date: 04/26/1989
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Air Stripping
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: ROD Amendment
Action Completion date: 04/26/1989
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Bioreactors
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: ROD Amendment
Action Completion date: 04/26/1989
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Filtration
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: ROD Amendment
Action Completion date: 04/26/1989
Operable Unit: 01
Contaminated Media : Sediment
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: ROD Amendment
Action Completion date: 04/26/1989
Operable Unit: 01
Contaminated Media : Soil
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Action ID: 001
Action Name: ROD Amendment
Action Completion date: 04/26/1989
Operable Unit: 01
Contaminated Media : Surface Water
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

LUST:
Facility ID: Not reported
UST Number: AS-1407
Incident Number: 15011
Contamination Type: SL
Source Type: Leak-underground
Product Type: P
Date Reported: 02/01/1996
Date Occur: 08/07/1995
Cleanup: Not reported
Closure Request: Not reported
Close Out: 01/29/1996
Level Of Soil Cleanup Achieved: Not reported
Tank Regulated Status: N
Of Supply Wells: Not reported
Commercial/NonCommercial UST Site: NON COMMERCIAL
Risk Classification: L
Risk Class Based On Review: L
Corrective Action Plan Type: Not reported
NOV Issue Date: Not reported
NORR Issue Date: Not reported
Site Priority: Not reported
Phase Of LSA Req: Not reported
Site Risk Reason: Not reported
Land Use: Not reported
MTBE: Not reported
MTBE1: Unknown
Flag: No
Flag1: No
LUR Filed: Not reported
Release Detection: 0
Current Status: File Located in Archives
RBCA GW: Not reported
PETOPT: 4
RPL: False
CD Num: 8
Reel Num: 0
RPOW: False
RPOP: False
Error Flag: 0
Error Code: Not reported
Valid: False
Lat/Long Decimal: 35.6147 -82.4333
Testlat: Not reported
Regional Officer Project Mgr: MES
Region: ASH

CHEMTRONICS INC (Continued) **1000303450**

Company: Not reported
Contact Person: Not reported
Telephone: Not reported
RP Address: Not reported
RP City,St,Zip: Not reported
RP County: Not reported
Comments: CLOSED 1/29/96
5 Min Quad: Not reported

PIRF:
Facility Id: 15011
Date Occurred: 1995-08-07 00:00:00
Date Reported: 1996-02-01 00:00:00
Description Of Incident: MINOR SOIL CONTAMINATION CONFIRMED DURING UST REMOVAL.
Owner/Operator: MATT RATLIFF
Ownership: 4
Operation Type: 3
Type: 5
Location: Not reported
Site Priority: Not reported
Priority Update: Not reported
Wells Affected Y/N: Not reported
Samples Include: 0
7#5 Minute Quad: Not reported
5 Minute Quad: Not reported
Pirf/Min Soil: Not reported
Release Code: Not reported
Source Code: Min_Soil
Err Type: Not reported
Cause: Not reported
Source: Not reported
Ust Number: Not reported

Last Modified: 1996-03-13 00:00:00
Incident Phase: **Closed Out**
NOV Issued: Not reported
NORR Issued: Not reported
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: 1996-01-29 00:00:00

Facility ID: 00-0-000
UST Number: AS-421
Incident Number: 6471
Contamination Type: SL
Source Type: Leak-underground
Product Type: P
Date Reported: 03/14/1991
Date Occur: 03/07/1991
Cleanup: 03/07/1991
Closure Request: Not reported
Close Out: 08/04/1993
Level Of Soil Cleanup Achieved: Not reported

CHEMTRONICS INC (Continued) **1000303450**

Tank Regulated Status:		R
# Of Supply Wells:	Not reported	
Commercial/NonCommercial UST Site:		COMMERCIAL
Risk Classification:		L
Risk Class Based On Review:		L
Corrective Action Plan Type:		Not reported
NOV Issue Date:	Not reported	
NORR Issue Date:	Not reported	
Site Priority:	Not reported	
Phase Of LSA Req:	Not reported	
Site Risk Reason:	Not reported	
Land Use:	Not reported	
MTBE:	Not reported	
MTBE1:	Unknown	
Flag:	No	
Flag1:	No	
LUR Filed:	Not reported	
Release Detection:	0	
Current Status:	File Located in Archives	
RBCA GW:	Not reported	
PETOPT:	3	
RPL:	False	
CD Num:	9	
Reel Num:	0	
RPOW:	False	
RPOP:	False	
Error Flag:	0	
Error Code:	Not reported	
Valid:	False	
Lat/Long Decimal:	35.6208 -82.4347	
Testlat:	Not reported	
Regional Officer Project Mgr:		DRL
Region:		ASH
Company:		Not reported
Contact Person:		Not reported
Telephone:		Not reported
RP Address:		Not reported
RP City,St,Zip:		Not reported
RP County:		Not reported
Comments:	CLOSED 8/5/93	
5 Min Quad:	Not reported	

PIRF:

Facility Id:	6471
Date Occurred:	1991-03-07 00:00:00
Date Reported:	1991-03-14 00:00:00
Description Of Incident:	UPON REMOVAL OF 3 USTS, A SMALL HOLE WAS DISCOVERED IN VENT PIPE OF SMALL TANK.
Owner/Operator:	DARRELL CAMPBELL
Ownership:	4
Operation Type:	5
Type:	3
Location:	1
Site Priority:	80
Priority Update:	Not reported
Wells Affected Y/N:	N
Samples Include:	0
7#5 Minute Quad:	3

CHEMTRONICS INC (Continued) **1000303450**

5 Minute Quad:	2
Pirf/Min Soil:	Not reported
Release Code:	Not reported
Source Code:	Pirf
Err Type:	Not reported
Cause:	Not reported
Source:	Not reported
Ust Number:	Not reported
Last Modified:	1996-05-15 00:00:00
Incident Phase:	**Closed Out**
NOV Issued:	1995-08-17 00:00:00
NORR Issued:	Not reported
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:	1996-04-19 00:00:00

UST:

Facility Id:	00-0-0000004285
Contact:	JET RESEARCH CENTER
Contact Address1:	180 OLD BEE TREE RD-ATTN:HEDRICK
Contact Address2:	Not reported
Contact City/State/Zip:	SWANNANOA, NC 28778
FIPS County Desc:	Buncombe
Latitude:	0
Longitude:	0
Tank Id:	1
Tank Status:	Removed
Installed Date:	03/26/1966
Perm Close Date:	03/31/1995
Product Name:	Fuel Oil
Tank Capacity:	2000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown
Tank Id:	10
Tank Status:	Removed
Installed Date:	03/26/1966
Perm Close Date:	03/31/1995

CHEMTRONICS INC (Continued) **1000303450**

Product Name:	Fuel Oil
Tank Capacity:	1000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	No
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	11
Tank Status:	Removed
Installed Date:	03/26/1966
Perm Close Date:	03/31/1995
Product Name:	Fuel Oil
Tank Capacity:	1000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	No
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	12
Tank Status:	Removed
Installed Date:	03/26/1966
Perm Close Date:	12/31/1966
Product Name:	Fuel Oil
Tank Capacity:	9999
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

CHEMTRONICS INC (Continued) **1000303450**

Tank Id:	13
Tank Status:	Removed
Installed Date:	03/26/1971
Perm Close Date:	03/31/1991
Product Name:	Gasoline, Gas Mix
Tank Capacity:	3500
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	14
Tank Status:	Removed
Installed Date:	03/26/1971
Perm Close Date:	03/31/1991
Product Name:	Gasoline, Gas Mix
Tank Capacity:	2500
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	15
Tank Status:	Removed
Installed Date:	03/26/1991
Perm Close Date:	03/31/1991
Product Name:	Gasoline, Gas Mix
Tank Capacity:	2000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown

CHEMTRONICS INC (Continued) **1000303450**

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: 2
Tank Status: Removed
Installed Date: 03/26/1971
Perm Close Date: 03/31/1995
Product Name: Fuel Oil
Tank Capacity: 1000
Root Tank Id: Not reported
Main Tank: No
Compartment Tank: No
Manifold Tank: Not reported
Commercial: No
Regulated: No
Other CP Tank: Not reported
Overfill Protection Name: Unknown
Spill Protection Name: Unknown
Leak Detection Name: Unknown
Decode for TCONS_KEY: Single Wall Steel
Decode for PCONS_KEY: Single Wall Steel
Decode for PSYS_KEY: Unknown

Tank Id: 3
Tank Status: Removed
Installed Date: 03/26/1971
Perm Close Date: 03/31/1995
Product Name: Fuel Oil
Tank Capacity: 1000
Root Tank Id: Not reported
Main Tank: No
Compartment Tank: No
Manifold Tank: Not reported
Commercial: No
Regulated: No
Other CP Tank: Not reported
Overfill Protection Name: Unknown
Spill Protection Name: Unknown
Leak Detection Name: Unknown
Decode for TCONS_KEY: Single Wall Steel
Decode for PCONS_KEY: Single Wall Steel
Decode for PSYS_KEY: Unknown

Tank Id: 4
Tank Status: Removed
Installed Date: 03/26/1966
Perm Close Date: 03/31/1995
Product Name: Fuel Oil
Tank Capacity: 6000
Root Tank Id: Not reported
Main Tank: No
Compartment Tank: No

CHEMTRONICS INC (Continued) **1000303450**

Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	5
Tank Status:	Removed
Installed Date:	03/26/1966
Perm Close Date:	03/31/1995
Product Name:	Fuel Oil
Tank Capacity:	6000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	6
Tank Status:	Removed
Installed Date:	03/26/1966
Perm Close Date:	03/31/1995
Product Name:	Fuel Oil
Tank Capacity:	6000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	7
Tank Status:	Removed
Installed Date:	03/26/1966

CHEMTRONICS INC (Continued) **1000303450**

Perm Close Date:	03/31/1995
Product Name:	Fuel Oil
Tank Capacity:	3000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	8
Tank Status:	Removed
Installed Date:	03/26/1966
Perm Close Date:	03/31/1995
Product Name:	Fuel Oil
Tank Capacity:	6000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	9
Tank Status:	Removed
Installed Date:	03/26/1966
Perm Close Date:	03/31/1995
Product Name:	Fuel Oil
Tank Capacity:	3000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel

CHEMTRONICS INC (Continued) **1000303450**

Decode for PSYS_KEY: Unknown

ROD:

Full-text of USEPA Record of Decision(s) is available from EDR.

PRP:

PRP name:
CELANESE CORP.
CELANESE CORP.
CHEMTRONICS, INC.
CHEMTRONICS, INC.
CHEMTRONICS, INC.
HOECHST CELANESE CORPORATION
NORTHROP CORP.
NORTHROP CORP.
NORTHROP CORP.

A1 **WARREN WILSON COLLEGE** **SWF/LF** **S113906190**
701 WARREN WILSON RD **N/A**
< 1/8 **SWANNANOA, NC**
1 ft.

Site 1 of 2 in cluster A

Relative:
Higher

Actual:
2264 ft.

LF:

Permit Num:	1115-COMPOST-2009
Waste:	Type III
Activity:	Compost
Contact Name:	Ben Paulson
Contact Telephone:	(828) 771-2035
Facility Status:	Open
Mailing Address:	Not reported
Mailing City:	Not reported

A2 **WARREN WILSON COLLEGE** **UST** **U001189236**
701 WARREN WILSON RD **N/A**
< 1/8 **SWANNANOA, NC 28778**
1 ft.

Site 2 of 2 in cluster A

Relative:
Higher

Actual:
2264 ft.

UST:

Facility Id:	00-0-0000004752
Contact:	WARREN WILSON COLLEGE
Contact Address1:	701 WARREN WILSON RD/ BOX 6231
Contact Address2:	Not reported
Contact City/State/Zip:	SWANNANOA, NC 28778-2087
FIPS County Desc:	Buncombe
Latitude:	35.61249
Longitude:	-82.44047
Tank Id:	1
Tank Status:	Removed
Installed Date:	05/04/1964
Perm Close Date:	12/31/1988
Product Name:	Gasoline, Gas Mix
Tank Capacity:	6000
Root Tank Id:	Not reported

WARREN WILSON COLLEGE (Continued) **U001189236**

Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	2
Tank Status:	Removed
Installed Date:	05/04/1964
Perm Close Date:	12/31/1988
Product Name:	Gasoline, Gas Mix
Tank Capacity:	3000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	3
Tank Status:	Removed
Installed Date:	05/04/1964
Perm Close Date:	12/31/1988
Product Name:	Gasoline, Gas Mix
Tank Capacity:	1000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	4

WARREN WILSON COLLEGE (Continued) **U001189236**

Tank Status:	Removed
Installed Date:	05/04/1964
Perm Close Date:	05/31/1996
Product Name:	Diesel
Tank Capacity:	1000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	Yes
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	5
Tank Status:	Removed
Installed Date:	05/03/1969
Perm Close Date:	05/31/1996
Product Name:	Fuel Oil
Tank Capacity:	15000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	A1
Tank Status:	Current
Installed Date:	12/31/1988
Perm Close Date:	Not reported
Product Name:	Gasoline, Gas Mix
Tank Capacity:	6000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	0
Commercial:	Yes
Regulated:	Yes
Other CP Tank:	Not reported
Overfill Protection Name:	Ball Float Valve
Spill Protection Name:	Catchment Basin
Leak Detection Name:	Not reported

WARREN WILSON COLLEGE (Continued) **U001189236**

Decode for TCONS_KEY: Single Wall Steel
Decode for PCONS_KEY: Other
Decode for PSYS_KEY: Unknown

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3 **PRESTON HOUSE** **LUST** **S110776506**
NE **107 NORTH LANE** **LUST TRUST** **N/A**
< 1/8 **SWANNANOA, NC 28778**
0.003 mi.
17 ft.

Relative:
Higher

Actual:
2286 ft.

LUST:

Facility ID:	Not reported	
UST Number:	AS-3794	
Incident Number:	28915	
Contamination Type:		SL
Source Type:	Leak-underground	
Product Type:	P	
Date Reported:	03/14/2011	
Date Occur:	07/14/2010	
Cleanup:	Not reported	
Closure Request:	Not reported	
Close Out:	12/08/2011	
Level Of Soil Cleanup Achieved:		Soil to Groundwater
Tank Regulated Status:		N
# Of Supply Wells:	0	
Commercial/NonCommercial UST Site:		NON COMMERCIAL
Risk Classification:		L
Risk Class Based On Review:		L
Corrective Action Plan Type:		Not reported
NOV Issue Date:	Not reported	
NORR Issue Date:	Not reported	
Site Priority:	Not reported	
Phase Of LSA Req:	Not reported	
Site Risk Reason:	Not reported	
Land Use:	Not reported	
MTBE:	No	
MTBE1:	Unknown	
Flag:	Yes	
Flag1:	No	
LUR Filed:	Not reported	
Release Detection:	0	
Current Status:	File Located in Archives	
RBCA GW:	Cleanups to 2L.0202 standards	
PETOPT:	4	
RPL:	False	
CD Num:	538	
Reel Num:	0	
RPOW:	True	
RPOP:	False	
Error Flag:	0	
Error Code:	N	
Valid:	False	
Lat/Long Decimal:	35.6151 -82.4409	
Testlat:	Not reported	
Regional Officer Project Mgr:		JCA
Region:		ASH
Company:		WARREN WILSON COLLEGE
Contact Person:		WIN SOUTHWARD

PRESTON HOUSE (Continued) **S110776506**

Telephone: 8287715811
RP Address: P.O. BOX 9000
RP City,St,Zip: ASHEVILLE, NC 288159000
RP County: Not reported
Comments: Not reported
5 Min Quad: Not reported

PIRF:
Facility Id: 28915
Date Occurred: 2010-07-14 00:00:00
Date Reported: 2011-03-14 00:00:00
Description Of Incident: LEAK DISCOVERED FROM A HOMEHEATING OIL UST VIA SOIL SAMPLE
Owner/Operator: Not reported
Ownership: 4
Operation Type: 4
Type: 4
Location: 7
Site Priority: Not reported
Priority Update: Not reported
Wells Affected Y/N: N
Samples Include: Not reported
7#5 Minute Quad: N
5 Minute Quad: Not reported
Pirf/Min Soil: Not reported
Release Code: Not reported
Source Code: Not reported
Err Type: 9
Cause: 7
Source: G
Ust Number: P

Last Modified: 2011-12-08 00:00:00
Incident Phase: **Closed Out**
NOV Issued: Not reported
NORR Issued: Not reported
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

LUST TRUST:
Facility ID: Not reported
Site ID: 28915
Site Note: Noncommercial; 100% eligible; $0 deductible. Track this as a site that would have been 5K + 10% as this is receiving 100% because of Session Law 2010-154. [CGS 5/8/12]
Site Eligible?: True
Commercial Find: 100% Non-Commercial
Priority Rank: Not reported
Deductable Amount: 0
3rd Party Deductable Amt: 0
Sum 3rd Party Amt Applied: 0

4
West
< 1/8
0.084 mi.
446 ft.

MALTRY CONSTRUCTION & AUTO REP
28 WYKLE RD
ASHEVILLE, NC 28805

EDR Hist Auto **1020185363**
N/A

Relative:
Lower

Actual:
2113 ft.

EDR Hist Auto

Year:	Name:	Type:
2004	MALTRY CONSTRUCTION & AUTO REP	General Automotive Repair Shops
2005	MALTRY CONSTRUCTION & AUTO REP	General Automotive Repair Shops
2006	MALTRY CONSTRUCTION & AUTO REP	General Automotive Repair Shops
2007	MALTRY CONSTRUCTION & AUTO REP	General Automotive Repair Shops
2008	MALTRY CONSTRUCTION & AUTO REP	General Automotive Repair Shops

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5
SSE
1/8-1/4
0.206 mi.
1090 ft.

WINSTON MILLS, INC.
WARREN WILSON COLLEGE ROAD
SWANNANOA, NC 28778

UST **U001189296**
IMD **N/A**

Relative:
Higher

Actual:
2236 ft.

UST:

Facility Id:	00-0-0000004837
Contact:	WINSTON MILLS, INC.
Contact Address1:	WARREN WILSON ROAD
Contact Address2:	Not reported
Contact City/State/Zip:	SWANNANOA, NC 28778
FIPS County Desc:	Buncombe
Latitude:	0
Longitude:	0

Tank Id:	1
Tank Status:	Removed
Installed Date:	03/31/1970
Perm Close Date:	12/30/1993
Product Name:	Fuel Oil
Tank Capacity:	30000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	2
Tank Status:	Removed
Installed Date:	03/31/1970
Perm Close Date:	12/30/1993
Product Name:	Fuel Oil
Tank Capacity:	30000
Root Tank Id:	Not reported
Main Tank:	No

WINSTON MILLS, INC. (Continued) **U001189296**

Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	3
Tank Status:	Removed
Installed Date:	03/29/1976
Perm Close Date:	12/30/1993
Product Name:	Fuel Oil
Tank Capacity:	20000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	Yes
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Single Wall Steel
Decode for PCONS_KEY:	Single Wall Steel
Decode for PSYS_KEY:	Unknown

Tank Id:	4
Tank Status:	Current
Installed Date:	03/31/1970
Perm Close Date:	Not reported
Product Name:	Other, Non-Petroleum
Tank Capacity:	21000
Root Tank Id:	Not reported
Main Tank:	No
Compartment Tank:	No
Manifold Tank:	Not reported
Commercial:	No
Regulated:	No
Other CP Tank:	Not reported
Overfill Protection Name:	Unknown
Spill Protection Name:	Unknown
Leak Detection Name:	Unknown
Decode for TCONS_KEY:	Other
Decode for PCONS_KEY:	Unknown
Decode for PSYS_KEY:	Unknown

IMD:

Region:	ASH
Facility ID:	11750

WINSTON MILLS, INC. (Continued) **U001189296**

Date Occurred:	12/30/1993
Submit Date:	2/21/1994
GW Contam:	No Groundwater Contamination detected
Soil Contam:	Yes
Incident Desc:	RELEASE DETECTED DURING REMOVAL OF 3 USTS.
Operator:	Not reported
Contact Phone:	Not reported
Owner Company:	Not reported
Operator Address:	Not reported
Operator City:	Not reported
Oper City,St,Zip:	Not reported
Ownership:	Private
Operation:	Industrial
Material:	Not reported
Qty Lost 1:	Not reported
Qty Recovered 1:	Not reported
Source:	Leak-underground
Type:	Gasoline/diesel
Location:	Facility
Setting:	Rural
Risk Site:	L
Site Priority:	Not reported
Priority Code:	Not reported
Priority Update:	Not reported
Dem Contact:	JCA
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:	Not reported
Longitude:	Not reported
Latitude Number:	Not reported
Longitude Number:	Not reported
Latitude Decimal:	Not reported
Longitude Decimal:	Not reported
GPS:	NOD
Agency:	DWM
Facility ID:	11750
Last Modified:	3/29/1994
Incident Phase:	Closed Out
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:	2/16/1994

B6 **WINSTON MILLS** **LUST** **S110776658**
ENE **850 WARREN WILSON ROAD** **Financial Assurance** **N/A**
1/8-1/4 **SWANNANOA, NC 28778**
0.216 mi.
1143 ft. **Site 1 of 2 in cluster B**

Relative:
Higher

Actual:
2204 ft.

LUST:

Facility ID:	Not reported	
UST Number:	AS-1106	
Incident Number:	11750	
Contamination Type:		SL
Source Type:	Leak-underground	
Product Type:	P	
Date Reported:	02/07/1994	
Date Occur:	12/30/1993	
Cleanup:	12/30/1993	
Closure Request:	Not reported	
Close Out:	02/16/1994	
Level Of Soil Cleanup Achieved:		Not reported
Tank Regulated Status:		R
# Of Supply Wells:	Not reported	
Commercial/NonCommercial UST Site:		COMMERCIAL
Risk Classification:		L
Risk Class Based On Review:		L
Corrective Action Plan Type:		Not reported
NOV Issue Date:	Not reported	
NORR Issue Date:	Not reported	
Site Priority:	Not reported	
Phase Of LSA Req:	Not reported	
Site Risk Reason:	Not reported	
Land Use:	Not reported	
MTBE:	Not reported	
MTBE1:	Unknown	
Flag:	No	
Flag1:	No	
LUR Filed:	Not reported	
Release Detection:	0	
Current Status:	File Located in Archives	
RBCA GW:	Not reported	
PETOPT:	5	
RPL:	False	
CD Num:	8	
Reel Num:	0	
RPOW:	False	
RPOP:	False	
Error Flag:	0	
Error Code:	Not reported	
Valid:	False	
Lat/Long Decimal:	35.6168 -82.4340	
Testlat:	Not reported	
Regional Officer Project Mgr:		JCA
Region:		ASH
Company:		Not reported
Contact Person:		Not reported
Telephone:		Not reported
RP Address:		Not reported
RP City,St,Zip:		Not reported
RP County:		Not reported
Comments:	CLOSED 2/16/94	

WINSTON MILLS (Continued) **S110776658**

5 Min Quad: Not reported

PIRF:

Facility Id:	11750
Date Occurred:	1993-12-30 00:00:00
Date Reported:	1994-02-07 00:00:00
Description Of Incident:	RELEASE DETECTED DURING REMOVAL OF 3 USTS.
Owner/Operator:	STEVE PEGG
Ownership:	4
Operation Type:	5
Type:	5
Location:	1
Site Priority:	Not reported
Priority Update:	Not reported
Wells Affected Y/N:	N
Samples Include:	0
7#5 Minute Quad:	N
5 Minute Quad:	Not reported
Pirf/Min Soil:	Not reported
Release Code:	Not reported
Source Code:	Min_Soil
Err Type:	2
Cause:	7
Source:	G
Ust Number:	P
Last Modified:	1994-03-29 00:00:00
Incident Phase:	**Closed Out**
NOV Issued:	Not reported
NORR Issued:	Not reported
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:	1994-02-16 00:00:00

NC Financial Assurance 3:

EPA Id No#:	NCD070619663
Program Type:	HW
Financial Assurance:	Post-Closure
Liability:	N/A

B7 **OLD ASHEVILLE DYE AND FINISHING LOCATION** **SEMS-ARCHIVE** **1000224894**
ENE **850 WARREN WILSON ROAD** **CORRACTS** **NCD070619663**
1/8-1/4 **SWANNANOA, NC 28778** **RCRA-TSDF**
0.216 mi. **RCRA NonGen / NLR**
1143 ft. **Site 2 of 2 in cluster B** **US FIN ASSUR**
2020 COR ACTION

Relative:
Higher

Actual:
2204 ft.

SEMS-ARCHIVE:

Site ID:	402861
EPA ID:	NCD070619663
Federal Facility:	N
NPL:	Not on the NPL
Non NPL Status:	NFRAP-Site does not qualify for the NPL based on existing information

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Following information was gathered from the prior CERCLIS update completed in 10/2013:
Site ID: 0402861
Federal Facility: Not a Federal Facility
NPL Status: Not on the NPL
Non NPL Status: NFRAP-Site does not qualify for the NPL based on existing information

CERCLIS-NFRAP Site Contact Details:
Contact Sequence ID: 4309211.00000
Person ID: 4270042.00000

Contact Sequence ID: 4357084.00000
Person ID: 4000084.00000

Contact Sequence ID: 4368609.00000
Person ID: 4270039.00000

Contact Sequence ID: 4429113.00000
Person ID: 4000312.00000

Contact Sequence ID: 4430030.00000
Person ID: 4000508.00000

Contact Sequence ID: 4537864.00000
Person ID: 4000533.00000

Contact Sequence ID: 4702152.00000
Person ID: 4000308.00000

Contact Sequence ID: 4752005.00000
Person ID: 4000275.00000

Contact Sequence ID: 4777134.00000
Person ID: 13002428.00000

Contact Sequence ID: 4830703.00000
Person ID: 4270104.00000

Contact Sequence ID: 13093801.00000
Person ID: 4272610.00000

CERCLIS-NFRAP Site Alias Name(s):
Alias Name: ASHEVILLE DYEING & FINISHING
Alias Address: Not reported
BUNCOMBE, NC

CERCLIS-NFRAP Assessment History:
Action: DISCOVERY
Date Started: / /
Date Completed: 06/01/85
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: / /
Date Completed: 06/01/85
Priority Level: Low priority for further assessment

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Action: SITE INSPECTION
Date Started: / /
Date Completed: 06/30/86
Priority Level: NFRAP-Site does not qualify for the NPL based on existing information

Action: ARCHIVE SITE
Date Started: / /
Date Completed: 06/30/86
Priority Level: Not reported

CORRACTS:

EPA ID: NCD070619663
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20070405
Action: CA552
NAICS Code(s): 33271
Machine Shops
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD070619663
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20110408
Action: CA725YE - Current Human Exposures Under Control, Yes, Current Human Exposures Under Control has been verified
NAICS Code(s): 33271
Machine Shops
Original schedule date: 20110408
Schedule end date: Not reported

EPA ID: NCD070619663
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20110408
Action: CA750YE - Migration of Contaminated Groundwater under Control, Yes, Migration of Contaminated Groundwater Under Control has been verified
NAICS Code(s): 33271
Machine Shops
Original schedule date: 20110408
Schedule end date: Not reported

EPA ID: NCD070619663
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20050112
Action: CA050 - RFA Completed
NAICS Code(s): 33271
Machine Shops
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD070619663
EPA Region: 04

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Area Name: ENTIRE FACILITY
Actual Date: 20091222
Action: CA725IN - Current Human Exposures Under Control, More information is needed to make a determination
NAICS Code(s): 33271
Machine Shops
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD070619663
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20091222
Action: CA750IN - Migration of Contaminated Groundwater under Control, More information is needed to make a determination
NAICS Code(s): 33271
Machine Shops
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: NCD070619663
EPA Region: 04
Area Name: ENTIRE FACILITY
Actual Date: 20110131
Action: CA075ME - CA Prioritization, Facility or area was assigned a medium corrective action priority
NAICS Code(s): 33271
Machine Shops
Original schedule date: 20110131
Schedule end date: Not reported

RCRA-TSDF:
Date form received by agency: 10/17/2012
Facility name: OLD ASHEVILLE DYE AND FINISHING LOCATION
Facility address: 850 WARREN WILSON ROAD
SWANNANOA, NC 28778
EPA ID: NCD070619663
Mailing address: PO BOX 9855
ASHEVILLE, NC 28815-9855
Contact: DONALD G LEE
Contact address: PO BOX 9855
ASHEVILLE, NC 28815-9855
Contact country: US
Contact telephone: 828-298-1510
Telephone ext.: 4310
Contact email: DONLEE@BRISCOINC.COM
EPA Region: 04
Land type: Private
Classification: TSDF
Description: Handler is engaged in the treatment, storage or disposal of hazardous waste
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: LOREN K LANTER

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Owner/operator address: Not reported
Not reported
Owner/operator country: Not reported
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 12/01/2007
Owner/Op end date: Not reported

Owner/operator name: LOREN K LANTER
Owner/operator address: PO BOX 9855
ASHEVILLE, NC 28815
Owner/operator country: US
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 12/01/2007
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: Yes
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Historical Generators:
Date form received by agency: 04/27/2010
Site name: OLD ASHEVILLE DYE AND FINISHING LOCATION
Classification: Not a generator, verified

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

. Waste code: D040
. Waste name: TRICHLORETHYLENE

Date form received by agency: 09/23/2008
Site name: FORMER ASHEVILLE DYEING & FINISHING
Classification: Not a generator, verified

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Date form received by agency: 04/06/2006
Site name: FORMER ASHEVILLE DYEING & FINISHING
Classification: Not a generator, verified

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Date form received by agency: 02/22/2006
Site name: ASHEVILLE DYEING & FINISHING
Classification: Not a generator, verified

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Date form received by agency: 03/26/2004
Site name: ASHEVILLE DYEING & FINISHING
Classification: Not a generator, verified

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Date form received by agency: 10/20/2003
Site name: ASHEVILLE DYEING & FINISHING
Classification: Not a generator, verified

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Date form received by agency: 10/20/2003
Site name: ASHEVILLE DYEING & FINISHING
Classification: Not a generator, verified

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Date form received by agency: 01/03/2002
Site name: ASHEVILLE DYEING & FINISHING
Classification: Not a generator, verified

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Date form received by agency: 08/04/1999
Site name: ASHEVILLE DYEING & FINISHING
Classification: Not a generator, verified

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Date form received by agency: 01/01/1993
Site name: ASHEVILLE DYEING & FINISHING
Classification: Not a generator, verified

. Waste code: D001
. Waste name: IGNITABLE WASTE

Date form received by agency: 05/15/1991
Site name: ASHEVILLE DYEING & FINISHING
Classification: Not a generator, verified

Corrective Action Summary:
Event date: 01/12/2005
Event: RFA COMPLETED

Event date: 04/05/2007
Event: CORRESPONDENCE

Event date: 12/22/2009
Event: HUMAN EXPOSURES CONTROLLED DETERMINATION-MORE INFORMATION NEEDED

Event date: 12/22/2009
Event: RELEASE TO GW CONTROLLED DETERMINATION-MORE INFORMATION NEEDED

Event date: 01/31/2011
Event: CA PRIORITIZATION-MEDIUM CA PRIORITY

Event date: 04/08/2011
Event: RELEASE TO GW CONTROLLED DETERMINATION-YES, APPLICABLE AS OF THIS DATE

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Event date: 04/08/2011
Event: HUMAN EXPOSURES CONTROLLED DETERMINATION-YES, APPLICABLE AS OF THIS DATE

Event date: Not reported
Event: RFA COMPLETED

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: TSD IS-Financial Requirements
Date violation determined: 06/27/2006
Date achieved compliance: 08/18/2006
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 07/27/2006
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 08/18/2006
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - Pre-transport
Date violation determined: 06/27/2006
Date achieved compliance: 08/18/2006
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 07/27/2006
Enf. disposition status: Action Satisfied (Case Closed)
Enf. disp. status date: 08/18/2006
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD - Financial Requirements
Date violation determined: 10/21/2003
Date achieved compliance: 11/21/2003
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/2003
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: SR - 268.7(a)(7)
Area of violation: LDR - General
Date violation determined: 10/29/1992
Date achieved compliance: 10/29/1992
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/29/1992

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: SR - 262.40(a)(
Area of violation: Generators - Manifest
Date violation determined: 10/29/1992
Date achieved compliance: 10/29/1992
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/29/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: SR - 262.20
Area of violation: Generators - Manifest
Date violation determined: 03/10/1992
Date achieved compliance: 06/19/1992
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/10/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: SR - 265.52
Area of violation: TSD - Contingency Plan and Emergency Procedures
Date violation determined: 03/10/1992
Date achieved compliance: 06/19/1992
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/10/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 06/02/2017
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/12/2016

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/26/2016
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/09/2015
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/05/2015
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/02/2014
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/16/2014
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/16/2013
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/10/2013
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/06/2013
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/05/2013
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation lead agency: State

Evaluation date: 04/04/2013
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/12/2012
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/02/2012
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/03/2012
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/21/2011
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/27/2011
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/10/2011
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/31/2011
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/10/2010
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/15/2010

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/06/2010
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/13/2010
Evaluation: GROUNDWATER MONITORING EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/10/2010
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/12/2009
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/09/2009
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/13/2009
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/08/2009
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/10/2008
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/08/2008
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation lead agency: State

Evaluation date: 05/12/2008
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/19/2008
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/22/2007
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

Evaluation date: 08/21/2007
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/06/2007
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/05/2007
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/25/2007
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/24/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/10/2006
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/06/2006

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/18/2006
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/19/2006
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/27/2006
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Financial Requirements
Date achieved compliance: 08/18/2006
Evaluation lead agency: State

Evaluation date: 06/27/2006
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Pre-transport
Date achieved compliance: 08/18/2006
Evaluation lead agency: State

Evaluation date: 04/25/2006
Evaluation: GROUNDWATER MONITORING EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/31/2005
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/14/2005
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/18/2005
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/03/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation lead agency: State

Evaluation date: 02/06/2004
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/21/2003
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/21/2003
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: TSD - Financial Requirements
Date achieved compliance: 11/21/2003
Evaluation lead agency: State

Evaluation date: 02/28/2003
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/04/2002
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/18/2002
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/07/2001
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/28/2001
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/18/2000
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/19/2000

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/21/1999
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/13/1999
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/20/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/17/1998
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/19/1998
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/26/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/10/1997
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/21/1996
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/20/1996
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation lead agency: State

Evaluation date: 08/02/1996
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/13/1996
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/26/1996
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/19/1995
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 09/29/1995
Evaluation: GROUNDWATER MONITORING EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/15/1994
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/22/1994
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/26/1994
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/25/1994
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/22/1993

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/16/1993
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/29/1993
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/29/1993
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/17/1993
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/08/1993
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/12/1992
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/30/1992
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/29/1992
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: LDR - General
Date achieved compliance: 10/29/1992
Evaluation lead agency: State

Evaluation date: 10/29/1992
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Generators - Manifest
Date achieved compliance: 10/29/1992

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation lead agency: State

Evaluation date: 10/29/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/19/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 07/01/1992
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/19/1992
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: TSD - Contingency Plan and Emergency Procedures
Date achieved compliance: 06/19/1992
Evaluation lead agency: State

Evaluation date: 06/19/1992
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Generators - Manifest
Date achieved compliance: 06/19/1992
Evaluation lead agency: State

Evaluation date: 06/01/1992
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/29/1992
Evaluation: GROUNDWATER MONITORING EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 04/01/1992
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/10/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/29/1992

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/21/1991
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/06/1991
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 08/05/1991
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/08/1991
Evaluation: FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/13/1991
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/13/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/29/1991
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

US FIN ASSUR:
EPA ID: NCD070619663
Provider: WELLS FARGO BANK
EPA region: 4
County: Not reported
Mechanism type: STANDBY TRUST
Mechanism ID: 1477
Cost estimate: 443769.88
Face value: 0
Effective date: 2003-06-02 00:00:00

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

EPA ID: NCD070619663
Provider: SOCIETE GENERALE
EPA region: 4
County: Not reported
Mechanism type: LETTER OF CREDIT
Mechanism ID: 53869
Cost estimate: 443769.88
Face value: 443769.88
Effective date: 2003-06-02 00:00:00

EPA ID: NCD070619663
Provider: WELLS FARGO BANK
EPA region: 4
County: Not reported
Mechanism type: STANDBY TRUST
Mechanism ID: 1477
Cost estimate: 435923.26
Face value: 0
Effective date: 2003-06-02 00:00:00

EPA ID: NCD070619663
Provider: SOCIETE GENERALE
EPA region: 4
County: Not reported
Mechanism type: LETTER OF CREDIT
Mechanism ID: 53869
Cost estimate: 435923.26
Face value: 426957.16
Effective date: 2003-06-02 00:00:00

EPA ID: NCD070619663
Provider: SOCIETE GENERALE
EPA region: 4
County: Not reported
Mechanism type: LETTER OF CREDIT
Mechanism ID: 53869
Cost estimate: 417717.26
Face value: 417717.26
Effective date: 2003-06-02 00:00:00

EPA ID: NCD070619663
Provider: SOCIETE GENERALE
EPA region: 4
County: Not reported
Mechanism type: LETTER OF CREDIT
Mechanism ID: 53869
Cost estimate: 426957.16
Face value: 426957.16
Effective date: 2003-06-02 00:00:00

EPA ID: NCD070619663
Provider: WELLS FARGO BANK
EPA region: 4
County: Not reported
Mechanism type: STANDBY TRUST
Mechanism ID: 1477
Cost estimate: 422729.86

OLD ASHEVILLE DYE AND FINISHING LOCATION (Continued) **1000224894**

Face value: 0
Effective date: 2003-06-02 00:00:00

EPA ID: NCD070619663
Provider: SOCIETE GENERALE
EPA region: 4
County: Not reported
Mechanism type: LETTER OF CREDIT
Mechanism ID: 53869
Cost estimate: 422729.86
Face value: 422729.86
Effective date: 2003-06-02 00:00:00

EPA ID: NCD070619663
Provider: WELLS FARGO BANK
EPA region: 4
County: Not reported
Mechanism type: STANDBY TRUST
Mechanism ID: 1477
Cost estimate: 417717.26
Face value: 0
Effective date: 2003-06-02 00:00:00

EPA ID: NCD070619663
Provider: WELLS FARGO BANK
EPA region: 4
County: Not reported
Mechanism type: STANDBY TRUST
Mechanism ID: 1477
Cost estimate: 426957.16
Face value: 0
Effective date: 2003-06-02 00:00:00

2020 COR ACTION:
EPA ID: NCD070619663
Region: 4
Action: Not reported

8
NE
1/4-1/2
0.278 mi.
1468 ft.

Relative:
Higher

Actual:
2215 ft.

TDP ELECTRONICS
111 OLD BEE TREE RD
SWANNANOA, NC 28778

RCRA-CESQG **1000111796**
SHWS **NCD980709265**
LUST
BROWNFIELDS
IMD
UIC

RCRA-CESQG:
Date form received by agency: 08/14/1990
Facility name: TDP ELECTRONICS
Facility address: 111 OLD BEE TREE RD
SWANNANOA, NC 28778
EPA ID: NCD980709265
Mailing address: OLD BEE TREE RD
SWANNANOA, NC 28778
Contact: NORRIS MAX CLUBB
Contact address: 111 OLD BEE TREE RD
SWANNANOA, NC 28778
Contact country: US

TDP ELECTRONICS (Continued) **1000111796**

Contact telephone: 704-298-6990
Contact email: Not reported
EPA Region: 04
Land type: Private
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:
Owner/operator name: TANDY CORPORATION
Owner/operator address: Not reported
Not reported
Owner/operator country: Not reported
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: F006
. Waste name: WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS, EXCEPT FROM THE FOLLOWING PROCESSES: (1) SULFURIC ACID ANODIZING OF ALUMINUM; (2) TIN PLATING ON CARBON STEEL; (3) ZINC PLATING (SEGREGATED BASIS) ON CARBON STEEL; (4) ALUMINUM OR ZINC-ALUMINUM PLATING ON CARBON

TDP ELECTRONICS (Continued) **1000111796**

STEEL; (5) CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC, AND ALUMINUM PLATING ON CARBON STEEL; AND (6) CHEMICAL ETCHING AND MILLING OF ALUMINUM.

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 12/13/1985
Date achieved compliance: 02/01/1986
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/13/1985
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 08/21/1989
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/13/1985
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Generators - General
Date achieved compliance: 02/01/1986
Evaluation lead agency: State

SHWS:
EPAID: NONCD0002361
Lat/Longitude: 35.61901 / -82.43441
Geolocation Method: On Screen Placement On Georeferenced Map

LUST:
Facility ID: Not reported
UST Number: AS-247
Incident Number: 3790
Contamination Type: SL
Source Type: Leak-underground
Product Type: P
Date Reported: 11/04/1988
Date Occur: 10/28/1988
Cleanup: 10/28/1988
Closure Request: Not reported
Close Out: 12/27/1989
Level Of Soil Cleanup Achieved: Not reported
Tank Regulated Status: R
Of Supply Wells: Not reported
Commercial/NonCommercial UST Site: COMMERCIAL
Risk Classification: L
Risk Class Based On Review: L
Corrective Action Plan Type: Not reported

TDP ELECTRONICS (Continued) **1000111796**

NOV Issue Date: Not reported
NORR Issue Date: Not reported
Site Priority: Not reported
Phase Of LSA Req: Not reported
Site Risk Reason: Not reported
Land Use: Not reported
MTBE: Not reported
MTBE1: Unknown
Flag: No
Flag1: No
LUR Filed: Not reported
Release Detection: 0
Current Status: File Located in Archives
RBCA GW: Not reported
PETOPT: 4
RPL: False
CD Num: 9
Reel Num: 0
RPOW: True
RPOP: False
Error Flag: 0
Error Code: Not reported
Valid: False
Lat/Long Decimal: 35.6199 -82.4333
Testlat: Not reported
Regional Officer Project Mgr: DME
Region: ASH
Company: TDP ELECTRONICS
Contact Person: MAX CLUBB
Telephone: Not reported
RP Address: 111 OLD BEE TREE ROAD
RP City,St,Zip: SWANNANOA, NC 28778
RP County: Not reported
Comments: CLOSED 12/27/89
5 Min Quad: Not reported

PIRF:
Facility Id: 3790
Date Occurred: 1988-10-28 00:00:00
Date Reported: 1988-11-04 00:00:00
Description Of Incident: APPROX. 4,000-4,200 GALS. OF FUEL WERE LOST WHEN FUEL WAS ACCIDENTELY TRANSFERRED TO A FULL TANK.
Owner/Operator: Not reported
Ownership: 4
Operation Type: 5
Type: 5
Location: 1
Site Priority: Not reported
Priority Update: Not reported
Wells Affected Y/N: N
Samples Include: 0
7#5 Minute Quad: 5
5 Minute Quad: Not reported
Pirf/Min Soil: Not reported
Release Code: Not reported
Source Code: Pirf
Err Type: Not reported
Cause: Not reported

TDP ELECTRONICS (Continued) **1000111796**

Source:	Not reported
Ust Number:	Not reported
Last Modified:	1991-08-07 00:00:00
Incident Phase:	**Closed Out**
NOV Issued:	1988-11-04 00:00:00
NORR Issued:	Not reported
45 Day Report:	1988-12-07 00:00:00
Public Meeting Held:	Not reported
Corrective Action Planned:	1988-12-07 00:00:00
SOC Signed:	Not reported
Reclassification Report:	Not reported
RS Designation:	Not reported
Closure Request Date:	Not reported
Close-out Report:	1991-05-21 00:00:00

Facility ID:	Not reported
UST Number:	AS-601
Incident Number:	7409
Contamination Type:	SL
Source Type:	Leak-underground
Product Type:	P
Date Reported:	01/03/1990
Date Occur:	Not reported
Cleanup:	04/16/1990
Closure Request:	Not reported
Close Out:	05/16/1990
Level Of Soil Cleanup Achieved:	Not reported
Tank Regulated Status:	R
# Of Supply Wells:	Not reported
Commercial/NonCommercial UST Site:	COMMERCIAL
Risk Classification:	Not reported
Risk Class Based On Review:	L
Corrective Action Plan Type:	Not reported
NOV Issue Date:	Not reported
NORR Issue Date:	Not reported
Site Priority:	Not reported
Phase Of LSA Req:	Not reported
Site Risk Reason:	Not reported
Land Use:	Not reported
MTBE:	Not reported
MTBE1:	Unknown
Flag:	No
Flag1:	No
LUR Filed:	Not reported
Release Detection:	0
Current Status:	File Located in Archives
RBCA GW:	Not reported
PETOPT:	4
RPL:	False
CD Num:	6
Reel Num:	0
RPOW:	False
RPOP:	False
Error Flag:	0
Error Code:	Not reported
Valid:	False

TDP ELECTRONICS (Continued) **1000111796**

Lat/Long Decimal: 35.6030 -82.4028
Testlat: Not reported
Regional Officer Project Mgr: DRL
Region: ASH
Company: Not reported
Contact Person: Not reported
Telephone: Not reported
RP Address: Not reported
RP City,St,Zip: Not reported
RP County: Not reported
Comments: CLOSED 5/16/90
5 Min Quad: Not reported

PIRF:
Facility Id: 7409
Date Occurred: 1990-01-03 00:00:00
Date Reported: 1990-01-03 00:00:00
Description Of Incident: UST RELEASE
Owner/Operator: Not reported
Ownership: Not reported
Operation Type: Not reported
Type: Not reported
Location: Not reported
Site Priority: Not reported
Priority Update: Not reported
Wells Affected Y/N: Not reported
Samples Include: 0
7#5 Minute Quad: Not reported
5 Minute Quad: Not reported
Pirf/Min Soil: Not reported
Release Code: Not reported
Source Code: Min_Soil
Err Type: Not reported
Cause: Not reported
Source: Not reported
Ust Number: Not reported

Last Modified: 1993-02-03 00:00:00
Incident Phase: **Closed Out**
NOV Issued: Not reported
NORR Issued: Not reported
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: 1990-05-16 00:00:00

BROWNFIELDS:
Project Type: ACTIVE ELIGIBLE PROJECTS
Project ID: 19068-15-11

IMD:
Region: ASH
Facility ID: 3790

TDP ELECTRONICS (Continued) **1000111796**

Date Occurred: 10/28/1988
Submit Date: 11/4/1988
GW Contam: No Groundwater Contamination detected
Soil Contam: Yes
Incident Desc: APPROX. 4,000-4,200 GALS. OF FUEL WERE LOST WHEN FUEL WAS ACCIDENTELY TRANSFERRED TO A FULL TANK.
Operator: MAX CLUBB
Contact Phone: Not reported
Owner Company: TDP ELECTRONICS
Operator Address: 111 OLD BEE TREE ROAD
Operator City: SWANNANOA
Oper City,St,Zip: SWANNANOA, NC 28778
Ownership: Private
Operation: Industrial
Material: # 2 FUEL OIL
Qty Lost 1: 4,200 GALS.
Qty Recovered 1: UNK
Source: Leak-underground
Type: Gasoline/diesel
Location: Facility
Setting: Industrial
Risk Site: L
Site Priority: Not reported
Priority Code: Not reported
Priority Update: Not reported
Dem Contact: DME
Wells Affected: No
Num Affected: 0
Wells Contam: Not reported
Sampled By: None
Samples Include: Not reported
7.5 Min Quad: Not reported
5 Min Quad: Not reported
Latitude: 35.62
Longitude: -82.43333333
Latitude Number: 353712
Longitude Number: 822600
Latitude Decimal: 35.62
Longitude Decimal: 82.4333333333333
GPS: NOD
Agency: DWM
Facility ID: 3790
Last Modified: 8/7/1991
Incident Phase: Closed Out
NOV Issued: 11/4/1988
NORR Issued: Not reported
45 Day Report: 12/7/1988
Public Meeting Held: Not reported
Corrective Action Planned: 12/7/1988
SOC Sighned: Not reported
Reclassification Report: Not reported
RS Designation: Not reported
Closure Request Date: Not reported
Close-out Report: 5/21/1991

Region: ASH

TDP ELECTRONICS (Continued) **1000111796**

Facility ID:	7409
Date Occurred:	Not reported
Submit Date:	3/26/1992
GW Contam:	No Groundwater Contamination detected
Soil Contam:	Yes
Incident Desc:	UST RELEASE
Operator:	Not reported
Contact Phone:	Not reported
Owner Company:	Not reported
Operator Address:	Not reported
Operator City:	Not reported
Oper City,St,Zip:	Not reported
Ownership:	Not reported
Operation:	Not reported
Material:	Not reported
Qty Lost 1:	Not reported
Qty Recovered 1:	Not reported
Source:	Leak-underground
Type:	Gasoline/diesel
Location:	Not reported
Setting:	Not reported
Risk Site:	Not reported
Site Priority:	Not reported
Priority Code:	Not reported
Priority Update:	Not reported
Dem Contact:	DRL
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:	Not reported
Longitude:	Not reported
Latitude Number:	Not reported
Longitude Number:	Not reported
Latitude Decimal:	Not reported
Longitude Decimal:	Not reported
GPS:	NOD
Agency:	DWM
Facility ID:	7409
Last Modified:	2/3/1993
Incident Phase:	Closed Out
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:	5/16/1990

Region: ASH

TDP ELECTRONICS (Continued) **1000111796**

Facility ID:	87235
Date Occurred:	1/10/2005
Submit Date:	1/14/2005
GW Contam:	Yes, Groundwater Contamination has been detected
Soil Contam:	Not reported
Incident Desc:	Petroleum hydrocarbons and chlorinated solvents were detected in the GW samples.
Operator:	McCampbell, Judy
Contact Phone:	817-415-3042
Owner Company:	RadioShack
Operator Address:	300 RadioShack Circle
Operator City:	Fort Worth
Oper City,St,Zip:	Fort Worth, TX 817-415-3042
Ownership:	Federal
Operation:	Mining
Material:	Not reported
Qty Lost 1:	Not reported
Qty Recovered 1:	Not reported
Source:	Spill-surface
Type:	Other inorganics
Location:	Not reported
Setting:	Not reported
Risk Site:	Not reported
Site Priority:	20
Priority Code:	E
Priority Update:	Not reported
Dem Contact:	QQ
Wells Affected:	No
Num Affected:	Not reported
Wells Contam:	Not reported
Sampled By:	Not reported
Samples Include:	Not reported
7.5 Min Quad:	Not reported
5 Min Quad:	Not reported
Latitude:	35.61972
Longitude:	-82.43333
Latitude Number:	Not reported
Longitude Number:	Not reported
Latitude Decimal:	Not reported
Longitude Decimal:	Not reported
GPS:	NOD
Agency:	DWQ
Facility ID:	87235
Last Modified:	1/14/2005
Incident Phase:	Assessment
NOV Issued:	1/15/2005
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

TDP ELECTRONICS (Continued) **1000111796**

UIC:

Permit Num:	WI0100250
Permit Type:	Injection Deemed Air Well
Environmental Interest Number:	BIMS033735
Env Interest Status:	Active
Latitude:	35.6197
Longitude:	-82.4333

Permit Num:	WI0100250
Permit Type:	Injection Deemed Air Well
Environmental Interest Number:	BIMS033738
Env Interest Status:	Active
Latitude:	35.6197
Longitude:	-82.4333

Permit Num:	WI0100250
Permit Type:	Injection Deemed Air Well
Environmental Interest Number:	BIMS034999
Env Interest Status:	Active
Latitude:	35.6197
Longitude:	-82.4333

Permit Num:	WI0100250
Permit Type:	Injection Deemed Air Well
Environmental Interest Number:	BIMS035945
Env Interest Status:	Active
Latitude:	35.6197
Longitude:	-82.4333

Permit Num:	WI0100250
Permit Type:	Injection Deemed Air Well
Environmental Interest Number:	BIMS035946
Env Interest Status:	Active
Latitude:	35.6197
Longitude:	-82.4333

Permit Num:	WI0100250
Permit Type:	Injection Deemed Air Well
Environmental Interest Number:	BIMS035947
Env Interest Status:	Active
Latitude:	35.6197
Longitude:	-82.4333

Permit Num:	WI0100250
Permit Type:	Injection Deemed Air Well
Environmental Interest Number:	BIMS035948
Env Interest Status:	Active
Latitude:	35.6197
Longitude:	-82.4333

Permit Num:	WI0100250
Permit Type:	Injection Deemed Air Well
Environmental Interest Number:	BIMS035949
Env Interest Status:	Active
Latitude:	35.6197
Longitude:	-82.4333

TDP ELECTRONICS (Continued) **1000111796**

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035950
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035951
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035952
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035953
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035954
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035955
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035956
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035957
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250

TDP ELECTRONICS (Continued) **1000111796**

Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035958
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035959
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035960
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035961
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035962
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035963
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

Permit Num: WI0100250
Permit Type: Injection Deemed Air Well
Environmental Interest Number: BIMS035964
Env Interest Status: Active
Latitude: 35.6197
Longitude: -82.4333

C9 **CHARLES D. OWEN MANUFACTURING COMPANY** **BROWNFIELDS** **S108491749**
ENE **875 WARREN WILSON COLLEGE RD** **NPDES** **N/A**
1/4-1/2 **SWANNANOA, NC 28778**
0.307 mi.
1620 ft. **Site 1 of 2 in cluster C**

Relative:
Higher

Actual:
2171 ft.

BROWNFIELDS:

Project Type:	FINALIZED BROWNFIELD AGREEMENTS
Project ID:	16046-12-11

NPDES:

Permit Number:	NCG500624
Permit Status:	Not reported
Permit Type:	Non-contact Cooling, Boiler Blowdown Wastewater Discharge COC
Issue Date:	04/15/2005
Region:	Asheville
Owner Name:	Springs Global US Inc
Class:	Not reported
Applied:	Not reported
Drafted:	Not reported
Expires:	Not reported
Subbasin:	Not reported
Receiving Stream:	Not reported
Comments:	Not reported
As-Built Flow (GPD):	Not reported
Domestic %:	Not reported
Industrial %:	100
stormwtr %:	Not reported
As Of:	05/12/2011
Permitted Flow (GPD):	Not reported
Program Category:	Not reported
Project Type:	Not reported
Is Major Permit:	Not reported
Date Assigned:	Not reported
Organization Name:	Not reported
Outfall:	Not reported
Discharge Via:	Not reported
Stream Classification:	Not reported
Regulated Activity:	Not reported
Owner Type:	Not reported
Effective Date:	Not reported
Basin Name:	Not reported

C10 **NATIONAL WIPER ALLIANCE, INC.** **SWRCY** **S114040070**
ENE **875 WARREN WILSON RD** **N/A**
1/4-1/2 **SWANNANOA, NC 28778**
0.307 mi.
1620 ft. **Site 2 of 2 in cluster C**

Relative:
Higher

Actual:
2171 ft.

SWRCY:

Mailing Address:	P.O. Box 367
Mailing City:	Swannanoa
Mailing State:	NC
Mailing Zip:	28778
Company Type:	- End User - Processor - Exporter
Company Service Area:	- International

11
SSE
1/4-1/2
0.350 mi.
1848 ft.

EVANS RESIDENCE
113 COLLEGE CIRCLE
SWANNANOA, NC 28778

LUST **S111826002**
LUST TRUST **N/A**

Relative:
Higher

Actual:
2318 ft.

LUST:

Facility ID:	Not reported	
UST Number:	AS-3887	
Incident Number:	41027	
Contamination Type:		SL
Source Type:	Leak-underground	
Product Type:	P	
Date Reported:	01/31/2012	
Date Occur:	01/19/2012	
Cleanup:	Not reported	
Closure Request:	Not reported	
Close Out:	Not reported	
Level Of Soil Cleanup Achieved:		Not reported
Tank Regulated Status:		N
# Of Supply Wells:	0	
Commercial/NonCommercial UST Site:		NON COMMERCIAL
Risk Classification:		L
Risk Class Based On Review:		L
Corrective Action Plan Type:		Not reported
NOV Issue Date:	Not reported	
NORR Issue Date:	Not reported	
Site Priority:	Not reported	
Phase Of LSA Req:	Not reported	
Site Risk Reason:	Not reported	
Land Use:	Residential	
MTBE:	No	
MTBE1:	Unknown	
Flag:	No	
Flag1:	No	
LUR Filed:	Not reported	
Release Detection:	0	
Current Status:	File Located in House	
RBCA GW:	Not reported	
PETOPT:	4	
RPL:	True	
CD Num:	0	
Reel Num:	0	
RPOW:	True	
RPOP:	False	
Error Flag:	0	
Error Code:	N	
Valid:	False	
Lat/Long Decimal:	35.5961 -82.4408	
Testlat:	Not reported	
Regional Officer Project Mgr:		kmh
Region:		ASH
Company:		Not reported
Contact Person:		barton evans
Telephone:		8285457912
RP Address:		113 college circle
RP City,St,Zip:		swannanoa, NC 28778
RP County:		Not reported
Comments:	THIS SITE WAS PREVIOUSLY LISTED AS INCIDENT #29003, BUT WAS A REPEAT	

EVANS RESIDENCE (Continued) **S111826002**

NUMBER FROM A DIFFERENT REGIONAL OFFICE SO WAS CHANGED IN 08/12. LSA dated 12/2/14 received in ARO on 12/5/2014. Soils above MSCCs and GW above 2L standards for C9-C22 Aromatics. Sent a notice of receipt letter for LSA with instructions on NRP and NRP Memo.

5 Min Quad: Not reported

PIRF:

Facility Id:	41027
Date Occurred:	2012-01-19 00:00:00
Date Reported:	2012-01-31 00:00:00
Description Of Incident:	550 gallon heating oil tank release
Owner/Operator:	Not reported
Ownership:	4
Operation Type:	3
Type:	4
Location:	7
Site Priority:	Not reported
Priority Update:	Not reported
Wells Affected Y/N:	N
Samples Include:	Not reported
7#5 Minute Quad:	N
5 Minute Quad:	Not reported
Pirf/Min Soil:	Not reported
Release Code:	Not reported
Source Code:	Not reported
Err Type:	2
Cause:	3
Source:	B
Ust Number:	P
Last Modified:	Not reported
Incident Phase:	**Not reported**
NOV Issued:	Not reported
NORR Issued:	Not reported
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

LUST TRUST:

Facility ID:	Not reported
Site ID:	41027
Site Note:	Noncommercial; 100% eligible; $0 deductible. Track this as a site that would have been 5K + 10% as this is receiving 100% because of Session Law 2010-154. [CGS 6/5/12] NOTE: This site was previously assigned Incident #29003 which turned out to be a duplicate number, so in August 2012, the ARO issued a new Incident # of #41027.
Site Eligible?:	True
Commercial Find:	100% Non-Commercial
Priority Rank:	Not reported
Deductable Amount:	0
3rd Party Deductable Amt:	0
Sum 3rd Party Amt Applied:	0

12
SE
1/4-1/2
0.386 mi.
2040 ft.

CORDELL PROPERTY
439 ROWLAND ROAD
SWANNANOA, NC 28778

LUST
LUST TRUST

S117411777
N/A

Relative:
Higher

Actual:
2244 ft.

LUST:

Facility ID:	Not reported	
UST Number:	AS-4206	
Incident Number:	41291	
Contamination Type:		SL
Source Type:	Leak-underground	
Product Type:	P	
Date Reported:	12/22/2014	
Date Occur:	12/08/2014	
Cleanup:	Not reported	
Closure Request:	Not reported	
Close Out:	02/03/2015	
Level Of Soil Cleanup Achieved:		Soil to Groundwater
Tank Regulated Status:		N
# Of Supply Wells:	0	
Commercial/NonCommercial UST Site:		NON COMMERCIAL
Risk Classification:		L
Risk Class Based On Review:		L
Corrective Action Plan Type:		Not reported
NOV Issue Date:	Not reported	
NORR Issue Date:	Not reported	
Site Priority:	Not reported	
Phase Of LSA Req:	Not reported	
Site Risk Reason:	Not reported	
Land Use:	Residential	
MTBE:	No	
MTBE1:	Unknown	
Flag:	No	
Flag1:	No	
LUR Filed:	Not reported	
Release Detection:	0	
Current Status:	File Located in Archives	
RBCA GW:	Not reported	
PETOPT:	4	
RPL:	True	
CD Num:	658	
Reel Num:	0	
RPOW:	True	
RPOP:	False	
Error Flag:	0	
Error Code:	N	
Valid:	False	
Lat/Long Decimal:	35.6011 -82.4314	
Testlat:	Not reported	
Regional Officer Project Mgr:		KMH
Region:		ASH
Company:		don cordell
Contact Person:		don cordell
Telephone:		9196086778
RP Address:		8340 riley hill road
RP City,St,Zip:		zebulon, NC 27597
RP County:		Not reported
Comments:	UST-61 received 12/22/2014. 550 gal Ust removed on 12/8/14 and found	

CORDELL PROPERTY (Continued) **S117411777**

to be leaking. 16.52 tons of soils excavated and disposed of off-site. Soil samples pending. Volume of release unknown. 1-30-15: 20-day RPT submitted: Soils > TPH @ 24800 mg/kg DRO and 398 GRO. Total of 22.71 tons of soil excavated from site and disposed at off-site facility. 1-30-15: IAA RPT sumbitted: Alll post excavation samples collected were below cleanup criteria. NFA granted on 2-3-15.

5 Min Quad: Not reported

PIRF:

Facility Id:	41291
Date Occurred:	2014-12-08 00:00:00
Date Reported:	2014-12-22 00:00:00
Description Of Incident:	55 gal UST removed. 16.52 tons soil removed. Post excavation soil sample results pending.
Owner/Operator:	Not reported
Ownership:	4
Operation Type:	3
Type:	4
Location:	7
Site Priority:	Not reported
Priority Update:	Not reported
Wells Affected Y/N:	N
Samples Include:	Not reported
7#5 Minute Quad:	Y
5 Minute Quad:	Not reported
Pirf/Min Soil:	Not reported
Release Code:	Not reported
Source Code:	Not reported
Err Type:	3
Cause:	3
Source:	A
Ust Number:	P
Last Modified:	2015-02-03 00:00:00
Incident Phase:	**Closed Out**
NOV Issued:	Not reported
NORR Issued:	Not reported
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

LUST TRUST:

Facility ID:	Not reported
Site ID:	41291
Site Note:	Noncommercial; first apply a $1,000 deductible then reimburse 90% of subsequent approved costs until a maximum deductible of $2,000 is reached. Then reimburse at 100%. [CGS 3/3/15]
Site Eligible?:	True
Commercial Find:	100% Non-Commercial
Priority Rank:	Not reported
Deductable Amount:	2000
3rd Party Deductable Amt:	0

CORDELL PROPERTY (Continued) **S117411777**

Sum 3rd Party Amt Applied: 0

13
SSE
1/2-1
0.908 mi.
4795 ft.

BROWNING RENTAL PROPERTY
124 CHRISTIAN CREEK ROAD
SWANNANOA, NC 28778

SHWS **S110629134**
LAST **N/A**
UIC

Relative:
Higher

Actual:
2196 ft.

SHWS:

EPAID:	NONCD0001890
Lat/Longitude:	35.58982 / -82.43241
Geolocation Method:	On Screen Placement On Georeferenced Map

LAST:

Facility ID:	Not reported	
UST Number:	AS-88219	
Incident Number:	89058	
Contamination Type:		SL
Source Type:	14	
Product Type:	P	
Date Reported:	05/18/2009	
Date Occur:	05/16/2009	
Cleanup:	Not reported	
Closure Request:	Not reported	
Close Out:	Not reported	
Level Of Soil Cleanup Achieved:		Not reported
Tank Regulated Status:		N
# Of Supply Wells:	0	
Commercial/NonCommercial UST Site:		N
Risk Classification:		L
Risk Class Based On Review:		L
Corrective Action Plan Type:		Not reported
NOV Issue Date:	Not reported	
NORR Issue Date:	Not reported	
Site Priority:	Not reported	
Phase Of LSA Req:	2	
Site Risk Reason:	Not reported	
Land Use:	Not reported	
MTBE:	No	
MTBE1:	No	
Flag:	Yes	
Flag1:	No	
LUR Filed:	Not reported	
Release Detection:	0	
Current Status:	C	
RBCA GW:	Not reported	
PETOPT:	4	
RPL:	True	
CD Num:	0	
Reel Num:	0	
RPOW:	True	
RPOP:	True	
Error Flag:	0	
Error Code:	N	
Valid:	False	
Lat/Long:	35 35 20.64 82 25 55.8	
Lat/Long Decimal:	35.58908 -82.43218	

BROWNING RENTAL PROPERTY (Continued) **S110629134**

Testlat:	Not reported
Regional Officer Project Mgr:	mes
Region:	ASH
Company:	Not reported
Contact Person:	Carol Browining
Telephone:	8282987925
RP Address:	274 Christian Creek Road
RP City,St,Zip:	Swannanoa, NC 28788
RP County:	Not reported
Comments:	Lightning strike in May 2009 caused heating oil spill from AST at residence. Heating oil flowed into basement and contaminated soil beneath concrete pad. Basement cleaned up and no apparent risk to environment downgradient of house exists. However, petroleum contamination remains in soil beneath basement pad causing strong odor in the residence. Sampling of on site water supply well by Chris Singleton in June 2010 indicated PCE contamination above 2L standards (results emailed to ARO by Adam Tripp with Altamont Environmental April 5, 2012). On July 19, 2011, Ben Pucket,, Job Manager with Z Environmental and Construction, obtained a permit from the NCDENR, DWQ, Aquifer Protection Section to inject hydrogen peroxide into the subsurface to remediate soil and groundwater contamination. Post hydrogen peroxide injection soil sampling in November 2011 indicated residual TPH-diesel soil contamination as high as 2710 ppm (from Interim Report on Remediation Progress at 124 Christian Creek Road, Swannanoa, NC by Ben Pucket with Z environmental and construction submitted to ARO via email on March 8, 2012 by Billy Clarke with Roberts and Stevens Attorneys at Law representing insurance company).
5 Min Quad:	Not reported

PIRF:

Facility Id:	89058
Date Occurred:	5/16/2009
Date Reported:	5/18/2009
Description Of Incident:	Lightening srike caused heating oil spill from AST. Flowed into basement.
Owner/Operator:	Not reported
Ownership:	4
Operation Type:	5
Type:	4
Location:	7
Site Priority:	Not reported
Priority Update:	Not reported
Wells Affected Y/N:	n
Wells Affected Number:	Not reported
Samples Taken By:	s
Samples Include:	Not reported
7#5 Min Quad:	Not reported
5 Min Quad:	Not reported
Pirf/Min Soil:	Not reported
Release Code:	4
Cause:	Not reported
Source:	Not reported
Source Type:	Not reported
Last Modified:	Not reported
Incident Phase:	**Not reported**
NOV Issued:	Not reported
NORR Issued:	Not reported

BROWNING RENTAL PROPERTY (Continued) **S110629134**

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

UIC:

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS012889
Env Interest Status:	Active
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013016
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013017
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013018
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013019
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013020
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013021
Env Interest Status:	Proposed
Latitude:	35.5883

BROWNING RENTAL PROPERTY (Continued) **S110629134**

Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013022
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013023
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013024
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013025
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013026
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013027
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013028
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013029
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

BROWNING RENTAL PROPERTY (Continued) **S110629134**

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013030
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013031
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013032
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013033
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013034
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013035
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013036
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS013037
Env Interest Status: Proposed
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110

BROWNING RENTAL PROPERTY (Continued) **S110629134**

Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013038
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013039
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013040
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013041
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013042
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013043
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS013044
Env Interest Status:	Proposed
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well
Environmental Interest Number:	BIMS018721
Env Interest Status:	Active
Latitude:	35.5883
Longitude:	-82.4322

Permit Num:	WI0100110
Permit Type:	Injection In situ Groundwater Remediation Well

BROWNING RENTAL PROPERTY (Continued) **S110629134**

Environmental Interest Number: BIMS018722
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018723
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018724
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018725
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018726
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018727
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018728
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018729
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018730

BROWNING RENTAL PROPERTY (Continued) **S110629134**

Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018731
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018732
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018733
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018734
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018735
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018736
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018737
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018738
Env Interest Status: Active

BROWNING RENTAL PROPERTY (Continued) **S110629134**

Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018739
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018740
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018741
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018742
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018743
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Permit Num: WI0100110
Permit Type: Injection In situ Groundwater Remediation Well
Environmental Interest Number: BIMS018744
Env Interest Status: Active
Latitude: 35.5883
Longitude: -82.4322

Count: 3 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
ASHEVILLE	S115649424	WARREN WILSON COLLEGE	RICEVILLE ROAD		RGA LUST
SWANNANOA	S110630318	MONEY-WORTH, INC.	FROM SWANNANOA, NORTH ON ASHEV		OLI
SWANNANOA	S106521445	SWANNANOA LANDFILL	AT THE SOUTHEAST QUADRANT OF T		OLI

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: 05/30/2017
Date Data Arrived at EDR: 06/08/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 99

Source: EPA
Telephone: N/A
Last EDR Contact: 10/05/2017
Next Scheduled EDR Contact: 01/15/2018
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: 05/30/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 98

Source: EPA
Telephone: N/A
Last EDR Contact: 10/05/2017
Next Scheduled EDR Contact: 01/15/2018
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: 05/30/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 98

Source: EPA
Telephone: N/A
Last EDR Contact: 10/05/2017
Next Scheduled EDR Contact: 01/15/2018
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: 10/06/2017
Next Scheduled EDR Contact: 01/15/2018
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 07/11/2017
Date Data Arrived at EDR: 07/21/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 77

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 10/20/2017
Next Scheduled EDR Contact: 01/29/2018
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 07/11/2017
Date Data Arrived at EDR: 07/28/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 70

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 10/20/2017
Next Scheduled EDR Contact: 01/29/2018
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: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
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: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
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: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
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: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
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: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/22/2017
Date Data Arrived at EDR: 06/13/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 94

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 08/10/2017
Next Scheduled EDR Contact: 11/27/2017
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: 08/10/2017
Date Data Arrived at EDR: 08/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
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: 08/10/2017
Date Data Arrived at EDR: 08/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
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: 09/18/2017
Date Data Arrived at EDR: 09/21/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 22

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 09/21/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Quarterly

State- and tribal - equivalent NPL

HSDS: Hazardous Substance Disposal Site

Locations of uncontrolled and unregulated hazardous waste sites. The file includes sites on the National Priority List as well as those on the state priority list.

Date of Government Version: 08/09/2011
Date Data Arrived at EDR: 11/08/2011
Date Made Active in Reports: 12/05/2011
Number of Days to Update: 27

Source: North Carolina Center for Geographic Information and Analysis
Telephone: 919-754-6580
Last EDR Contact: 09/21/2017
Next Scheduled EDR Contact: 11/08/2017
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: 08/16/2017
Date Data Arrived at EDR: 09/13/2017
Date Made Active in Reports: 09/22/2017
Number of Days to Update: 9

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 09/13/2017
Next Scheduled EDR Contact: 12/25/2017
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: 09/28/2017
Date Data Arrived at EDR: 09/28/2017
Date Made Active in Reports: 10/19/2017
Number of Days to Update: 21

Source: Department of Environment and Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 09/28/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Varies

OLI: Old Landfill Inventory

Old landfill inventory location information. (Does not include no further action sites and other agency lead sites).

Date of Government Version: 08/08/2016
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: 10/10/2017
Next Scheduled EDR Contact: 01/22/2018
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LAST: Leaking Aboveground Storage Tanks
A listing of leaking aboveground storage tank site locations.

Date of Government Version: 08/04/2017
Date Data Arrived at EDR: 08/10/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 46
Source: Department of Environment & Natural Resources
Telephone: 877-623-6748
Last EDR Contact: 08/10/2017
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Quarterly

LUST: Regional UST Database
This database contains information obtained from the Regional Offices. It provides a more detailed explanation of current and historic activity for individual sites, as well as what was previously found in the Incident Management Database. Sites in this database with Incident Numbers are considered LUSTs.

Date of Government Version: 08/04/2017
Date Data Arrived at EDR: 08/10/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 46
Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 08/10/2017
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Quarterly

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 04/24/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 04/14/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/01/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
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: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
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: 04/14/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/26/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 04/13/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
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: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

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: 10/09/2017
Date Data Arrived at EDR: 10/10/2017
Date Made Active in Reports: 10/10/2017
Number of Days to Update: 0

Source: Department of Environment and Natural Resources
Telephone: 919-733-1315
Last EDR Contact: 10/10/2017
Next Scheduled EDR Contact: 01/22/2018
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 05/15/2017
Date Data Arrived at EDR: 05/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 136

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 10/13/2017
Next Scheduled EDR Contact: 01/22/2018
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: 10/06/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 10/11/2017
Number of Days to Update: 0
Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 10/11/2017
Next Scheduled EDR Contact: 11/20/2017
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: 08/24/2017
Date Data Arrived at EDR: 09/19/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 6
Source: Department of Environment and Natural Resources
Telephone: 919-715-6183
Last EDR Contact: 09/18/2017
Next Scheduled EDR Contact: 01/01/2018
Data Release Frequency: Semi-Annually

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: 05/01/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78
Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 04/13/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78
Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 04/14/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71
Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
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: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/26/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 05/02/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 04/25/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 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: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Semi-Annually

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: 08/16/2017
Date Data Arrived at EDR: 09/13/2017
Date Made Active in Reports: 09/22/2017
Number of Days to Update: 9

Source: Department of Environment, Health and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 09/13/2017
Next Scheduled EDR Contact: 12/25/2017
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 09/25/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Varies

VCP: Responsible Party Voluntary Action Sites
Responsible Party Voluntary Action site locations.

Date of Government Version: 08/16/2017
Date Data Arrived at EDR: 09/13/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 12

Source: Department of Environment and Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 09/13/2017
Next Scheduled EDR Contact: 12/25/2017
Data Release Frequency: Semi-Annually

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: 09/01/2017
Date Data Arrived at EDR: 09/21/2017
Date Made Active in Reports: 09/22/2017
Number of Days to Update: 1

Source: Department of Environment and Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 09/21/2017
Next Scheduled EDR Contact: 01/15/2018
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: 06/19/2017
Date Data Arrived at EDR: 06/20/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 09/20/2017
Next Scheduled EDR Contact: 01/01/2018
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: 08/18/2017
Date Data Arrived at EDR: 08/22/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 34

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: 08/01/2017
Next Scheduled EDR Contact: 11/13/2017
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: 10/20/2017
Next Scheduled EDR Contact: 02/05/2018
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: 08/29/2017
Next Scheduled EDR Contact: 11/13/2017
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: 07/13/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 30

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
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: 07/13/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 30

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
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: 07/11/2017
Date Data Arrived at EDR: 07/26/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 07/26/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 09/21/2017
Date Data Arrived at EDR: 09/21/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 22

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 09/21/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Quarterly

SPILLS: Spills Incident Listing

A listing spills, hazardous material releases, sanitary sewer overflows, wastewater treatment plant bypasses and upsets, citizen complaints, and any other environmental emergency calls reported to the agency.

Date of Government Version: 09/14/2017
Date Data Arrived at EDR: 09/19/2017
Date Made Active in Reports: 09/22/2017
Number of Days to Update: 3

Source: Department of Environment & Natural Resources
Telephone: 919-807-6308
Last EDR Contact: 09/08/2017
Next Scheduled EDR Contact: 12/25/2017
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: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 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: 08/25/2017
Next Scheduled EDR Contact: 12/04/2017
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: 10/13/2017
Next Scheduled EDR Contact: 01/22/2018
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: 10/11/2017
Next Scheduled EDR Contact: 01/22/2018
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: 08/18/2017
Next Scheduled EDR Contact: 11/27/2017
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: 05/10/2017
Date Data Arrived at EDR: 05/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 121

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
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: 08/07/2017
Next Scheduled EDR Contact: 11/20/2017
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: 08/24/2017
Next Scheduled EDR Contact: 11/20/2017
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: 09/22/2017
Next Scheduled EDR Contact: 01/01/2018
Data Release Frequency: Every 4 Years

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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: 08/23/2017
Next Scheduled EDR Contact: 12/04/2017
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: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
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: 09/27/2017
Date Data Arrived at EDR: 10/12/2017
Date Made Active in Reports: 10/20/2017
Number of Days to Update: 8

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 09/08/2017
Next Scheduled EDR Contact: 12/18/2017
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: 10/23/2017
Next Scheduled EDR Contact: 02/05/2018
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: 08/08/2017
Next Scheduled EDR Contact: 11/20/2017
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: 06/01/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 126
Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 10/13/2017
Next Scheduled EDR Contact: 01/22/2018
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 10/11/2017
Next Scheduled EDR Contact: 01/22/2018
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: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/2016
Date Data Arrived at EDR: 09/08/2016
Date Made Active in Reports: 10/21/2016
Number of Days to Update: 43
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 10/16/2017
Next Scheduled EDR Contact: 11/20/2017
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: 10/03/2017
Next Scheduled EDR Contact: 12/18/2017
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: 09/08/2017
Next Scheduled EDR Contact: 12/18/2017
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: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
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: 10/02/2017
Date Data Arrived at EDR: 10/05/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 8
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 10/05/2017
Next Scheduled EDR Contact: 01/15/2018
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: 08/01/2017
Next Scheduled EDR Contact: 11/13/2017
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: 06/30/2017
Date Data Arrived at EDR: 08/03/2017
Date Made Active in Reports: 10/20/2017
Number of Days to Update: 78

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 09/25/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 09/21/2017
Next Scheduled EDR Contact: 12/04/2017
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: 10/11/2017
Next Scheduled EDR Contact: 01/22/2018
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: 08/03/2017
Next Scheduled EDR Contact: 11/20/2017
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: 10/10/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 05/30/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 98

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 10/05/2017
Next Scheduled EDR Contact: 01/15/2018
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 07/31/2017
Date Data Arrived at EDR: 08/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 44

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
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: 09/01/2017
Next Scheduled EDR Contact: 12/11/2017
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: 09/01/2017
Next Scheduled EDR Contact: 12/11/2017
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: 09/25/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/20/2017
Number of Days to Update: 24

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 09/25/2017
Next Scheduled EDR Contact: 12/25/2017
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: 07/23/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 9

Source: EPA
Telephone: (404) 562-9900
Last EDR Contact: 09/06/2017
Next Scheduled EDR Contact: 12/18/2017
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: 09/02/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 10/20/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 09/06/2017
Next Scheduled EDR Contact: 12/18/2017
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: 09/21/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 10/25/2016
Date Data Arrived at EDR: 06/02/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 133

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 10/16/2017
Next Scheduled EDR Contact: 01/29/2018
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 08/17/2017
Date Data Arrived at EDR: 08/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 29

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 08/17/2017
Next Scheduled EDR Contact: 12/04/2017
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: 07/31/2017
Next Scheduled EDR Contact: 11/13/2017
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: 04/04/2017
Date Data Arrived at EDR: 06/20/2017
Date Made Active in Reports: 08/10/2017
Number of Days to Update: 51

Source: Department of Environment & Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 09/22/2017
Next Scheduled EDR Contact: 01/01/2018
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: 10/06/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 10/11/2017
Number of Days to Update: 0

Source: Department of Environment & Natural Resources
Telephone: 919-733-1322
Last EDR Contact: 10/11/2017
Next Scheduled EDR Contact: 11/20/2017
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: 09/25/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Varies

Financial Assurance 3: Financial Assurance Information
Hazardous waste financial assurance information.

Date of Government Version: 09/11/2017
Date Data Arrived at EDR: 09/12/2017
Date Made Active in Reports: 10/11/2017
Number of Days to Update: 29

Source: Department of Environment & Natural Resources
Telephone: 919-707-8222
Last EDR Contact: 09/08/2017
Next Scheduled EDR Contact: 12/25/2017
Data Release Frequency: Varies

NPDES: NPDES Facility Location Listing
General information regarding NPDES(National Pollutant Discharge Elimination System) permits.

Date of Government Version: 07/03/2017
Date Data Arrived at EDR: 08/03/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 64

Source: Department of Environment & Natural Resources
Telephone: 919-733-7015
Last EDR Contact: 08/03/2017
Next Scheduled EDR Contact: 11/13/2017
Data Release Frequency: Varies

UIC: Underground Injection Wells Listing
A listing of uncerground injection wells locations.

Date of Government Version: 09/01/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 30

Source: Department of Environment & Natural Resources
Telephone: 919-807-6412
Last EDR Contact: 08/31/2017
Next Scheduled EDR Contact: 12/18/2017
Data Release Frequency: Quarterly

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 Auto Stations
EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive 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: 08/18/2017
Next Scheduled EDR Contact: 11/27/2017
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 04/11/2017
Date Made Active in Reports: 07/27/2017
Number of Days to Update: 107

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 10/05/2017
Next Scheduled EDR Contact: 01/22/2018
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: 07/31/2017
Date Data Arrived at EDR: 08/03/2017
Date Made Active in Reports: 10/12/2017
Number of Days to Update: 70

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 08/03/2017
Next Scheduled EDR Contact: 11/13/2017
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 07/25/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 62

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 10/16/2017
Next Scheduled EDR Contact: 01/29/2018
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: 08/21/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Annually

WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 04/13/2017
Date Made Active in Reports: 07/14/2017
Number of Days to Update: 92

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 09/11/2017
Next Scheduled EDR Contact: 12/25/2017
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

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.

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

WARREN WILSON COLLEGE MITIGATION SITE
749 WARREN WILSON ROAD
ASHEVILLE, NC 28805

TARGET PROPERTY COORDINATES

Latitude (North):	35.609476 - 35° 36' 34.11''
Longitude (West):	82.445569 - 82° 26' 44.05''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	369067.4
UTM Y (Meters):	3941397.5
Elevation:	2127 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5948508 OTEEN, NC
Version Date:	2013
North Map:	5947755 CRAGGY PINNACLE, 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).

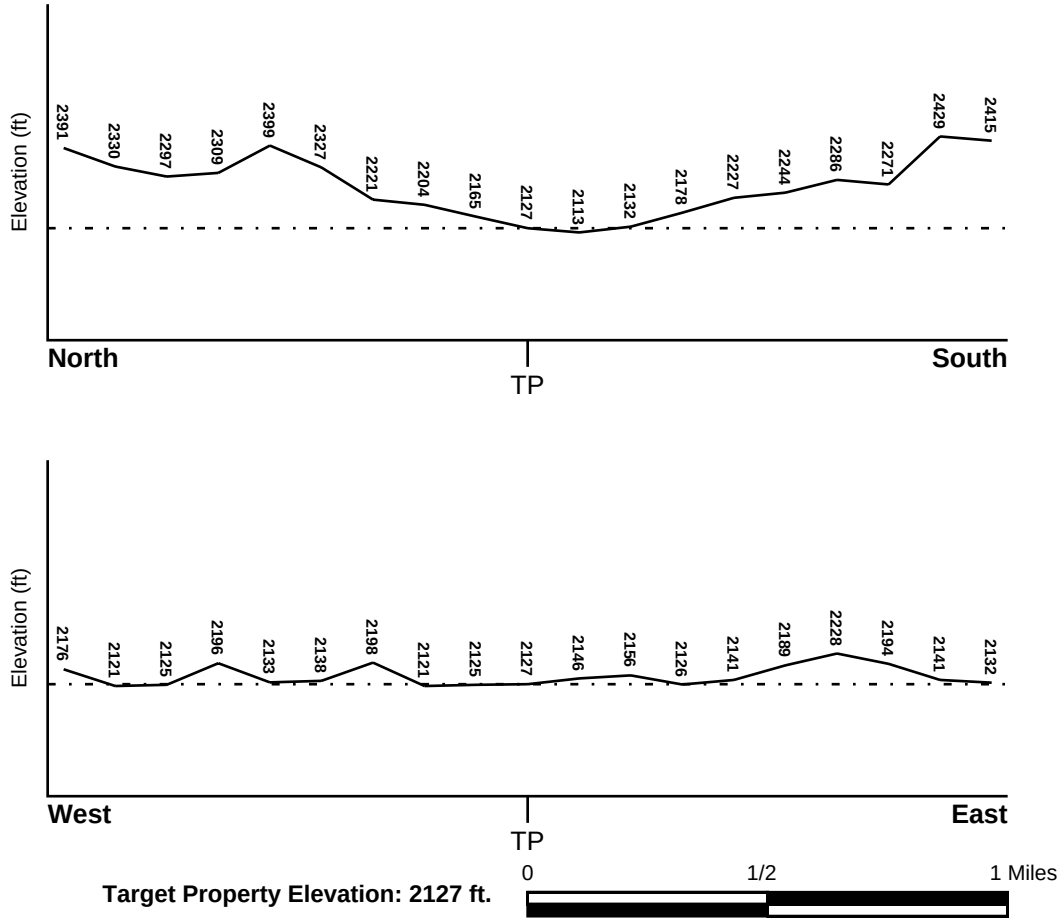
TOPOGRAPHIC INFORMATION

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 SSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Target Property Elevation: 2127 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
3700967900J	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
3700968900J	FEMA FIRM Flood data
3700967800J	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
OTEEN	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:	Permian
Series:	Ultramafic rocks
Code:	uM *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Plutonic and Intrusive Rocks

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:	BRADDOCK
Soil Surface Texture:	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	9 inches	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: 6.00 Min: 0.60	Max: 5.50 Min: 3.60
2	9 inches	48 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 2.00 Min: 0.60	Max: 5.50 Min: 3.60
3	48 inches	85 inches	loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 6.00 Min: 0.60	Max: 5.50 Min: 3.60

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: gravelly - loam

Surficial Soil Types: gravelly - loam

Shallow Soil Types: loam

Deeper Soil Types: sandy loam
very gravelly - loam
fine sandy loam
stratified

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

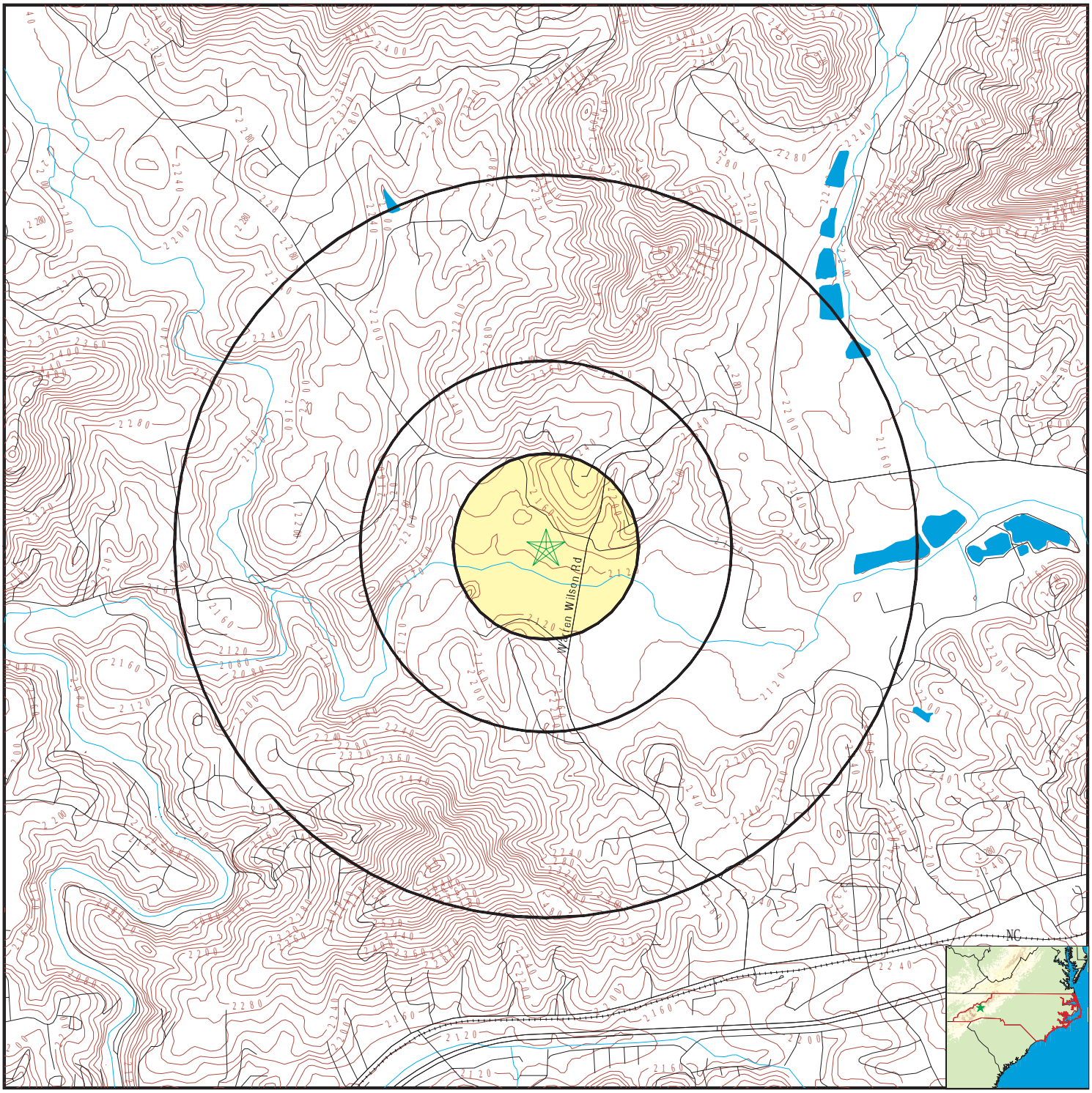
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 5086255.2s



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

N

SITE NAME:	Warren Wilson College Mitigation Site	CLIENT:	Axiom Environmental
ADDRESS:	749 Warren Wilson Road Asheville NC 28805	CONTACT:	Kenan Jernigan
LAT/LONG:	35.609476 / 82.445569	INQUIRY #:	5086255.2s
		DATE:	October 24, 2017 5:43 pm

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
179	4.16	0.5	9.9
14	5.78	0.3	6.1
1	2.30	2.3	2.3
1	5.90	5.9	5.9
1	9.70	9.7	9.7
1	0.80	0.8	0.8
1	2.20	2.2	2.2

Federal EPA Radon Zone for BUNCOMBE County: 1

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: 28805

Number of sites tested: 3

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	2.150 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	3.600 pCi/L	67%	33%	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

Appendix F
Northern Long-Eared Bat (NLEB) 4(d) Rule 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] Federal Highway Administration, Donnie Brew-Preconstruction & Environmental Engineer, 310 New Bern Ave, Suite 410, Raleigh, NC 27601 donnie.brew@dot.gov 919-747-7017

Project Name: Warren Wilson College Stream Restoration Site

Project Location: 35° 36' 37.64"N / 82° 26' 27.61"W

Basic Project Description:

The Warren Wilson College Stream Mitigation Site has been identified for the purpose of providing in-kind mitigation for unavoidable stream impacts. The primary goals of this restoration project are on improving wildlife habitat and restoring vital riparian stream functions to an area that has been

[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.

functioning as an agricultural area for decades. Restoration on the Site will focus on the restoration of riparian buffers, enhancing nutrient and sediment reduction from agricultural lands, improving aquatic quality and habitat and restoring connectivity to historic channels.

Stream restoration is expected to entail 1) belt-width preparation, 2) channel excavation, 3) spoil stockpiling, 4) channel stabilization, 5) channel diversion, and 6) channel backfill.

Belt-width corridor preparation will entail channel staking, floodplain clearing and grubbing, and any necessary grading prior to channel excavation. After the floodplain has been prepped, the proposed design channel will be staked and/or clearly marked to the design parameters. Spoil material excavated during floodplain grading will be stockpiled adjacent to the existing channels. After construction of the new channel is complete, existing channels will be abandoned and backfilled with stockpiled soils.

Once belt-width corridor preparation is complete, the proposed channel will be excavated to the average width, depth, and cross-sectional area derived from reference reach studies and detailed measurements of the onsite reach. Stream banks and the belt-width area of constructed channels will be immediately planted with shrub and herbaceous vegetation. Root mats may also be selectively removed from adjacent areas and placed as erosion control features on channel banks.

Once the proposed design channel has been excavated and stabilized, abandoned channels will be backfilled utilizing spoil material stockpiled from channel excavation and/or from suitable material excavated from the Site or adjacent to the Site. Abandoned channels will be backfilled to the maximum extent feasible.

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	.25	
If known, estimated acres[5] of forest conversion from April 1 to October 31	0	
If known, estimated acres of forest conversion from June 1 to July 31[6]	0	
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: 11-30-17

Wiesner, Paul

From: Brew, Donnie (FHWA) <Donnie.Brew@dot.gov>
Sent: Thursday, November 30, 2017 3:46 PM
To: Marella_Buncick@fws.gov
Cc: Wiesner, Paul; Worth Creech; John Hamby
Subject: [External] Warren Wilson College mitigation site NLEB 4(d) rule consultation
Attachments: Warren Wilson _NLEB (4D) Form_113017 signed.pdf

Good afternoon Marella,

The purpose of this message is to notify your office that FHWA will use the streamlined consultation framework for the Warren Wilson College Mitigation Site in Buncombe County, NC.

Attached is a completed NLEB 4(d) Rule Streamlined Consultation form, including site maps.

Thank you and have a great afternoon,

Donnie

Notifying the Service Under the Framework

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies (or designated non-federal representatives) should use the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation form to notify the Service of their project and meet the requirements of the framework.

Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form (Word document)

Information requested in the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form serves to

(1) notify the field office that an action agency will use the streamlined framework;

(2) describe the project with sufficient detail to support the required determination; and

(3) enable the USFWS to track effects and determine if reinitiation of consultation for the 4(d) rule is required. This form requests the minimum amount of information required for the Service to be able to track this information.

Providing information in the Streamlined Consultation Form does not address section 7(a)(2) compliance for any other listed species.

Donnie Brew

Preconstruction & Environment Engineer
Federal Highway Administration
310 New Bern Ave, Suite 410
Raleigh, NC 27601
donnie.brew@dot.gov
919-747-7017

Please consider the environment before printing this email.

Appendix G
Archeological Testing and Site Assessment for 31BN28

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

March 27, 2018

Sara Stavinoha
Anchor QEA of North Carolina
231 Haywood Street
Asheville, NC 28801

Re: Warren Wilson College Stream Mitigation Project, Buncombe County, ER 17-1683

Dear Ms. Stavinoha:

Thank you for your letter of March 8, 2018, transmitting the management summary by Tasha Benyshek, TRC Environmental, for archaeological testing at 31BN28 for the above project.

During the course of the testing, no significant archaeological resources were identified within the project APE. Ms. Benyshek recommends that no further archaeological work be undertaken at 31BN28 in connection with the current project, and that if project plans are altered, additional archaeological work is required. We concur with these recommendations and have no objection to construction proceeding as presently designed.

We look forward to receiving the full report of the investigation at 31BN28 and monitoring at sections 4C and 4D, as well as updated archaeological site forms.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona M. Bartos

cc: Worth Creech, Restoration Systems, LLC
Tasha Benyshek, TRC Environmental

5 Dogwood Road
Asheville, NC 28806

828.667.3838 PHONE
828.667.3839 FAX

www.TRCsolutions.com

February 2, 2018

Mr. Worth Creech
Restoration Systems, LLC
1101 Haynes Street
Suite 211
Raleigh, North Carolina 27604

Re: Management Summary, Archaeological Testing and Site Assessment for 31BN28, Buncombe County, North Carolina

Dear Mr. Creech:

TRC Environmental Corporation (TRC) has completed the fieldwork for the archaeological testing and site assessment for 31BN28 in Buncombe County, North Carolina for a proposed stream restoration project on the Warren Wilson campus. The project will impact a portion of site 31BN28, an extensive, multicomponent site first recorded in 1964 (Egloff 1964) and systematically investigated in 2016 (Buchner et al. 2016). The site's National Register of Historic Places (NRHP) eligibility has not been determined (Buchner et al. 2016). (Additional archaeological monitoring near two other archaeological sites [31BN135 and 31BN145/491] will be performed at a later date.)

The project includes construction of a new stream channel within a meandering, linear easement measuring ca. 1,008 ft (307 m) in length and 68 ft (21 m) in width that extends northward from a wooded area adjacent to the Swannanoa River into a fallow agricultural field on the west side of an existing artificial drainage (Figures 1–4). From there, the construction easement extends to a buried culvert situated in a pasture south of Riceville Road. The project also includes the removal of trees on both sides of the existing drainage. All of these proposed impacts are situated within the boundaries of 31BN28.

FIELD METHODS

The fieldwork for this project was conducted over a period extending from January 4–14, 2018. All fieldwork was directed by Bruce Idol and followed the procedures outlined in TRC's technical proposal for the project (TRC 2017). The project boundaries were identified in the field using maps and a digital GIS shapefile provided by Sara Stavinoha of Anchor QEA of North Carolina, PLLC. Shovel tests were excavated within the boundaries of the stream easement (which was marked in the field using the provided boundary coordinates) and along both sides of the existing artificial drainage.

The subsurface survey included systematic shovel testing at 10-m (ca. 33 ft.) intervals except for areas of standing water. The shovel tests measured at least 30 cm in diameter and were excavated to sterile subsoil, hydric soils, or impenetrable fill (along and over the culvert at the head of the existing artificial drainage). Augering was accomplished at the bases of some shovel tests to assess deeper alluvial deposits. Two 1 × 1 m test units (TUs) were also excavated as part of the investigation.

All soil was screened through ¼ inch mesh for uniform artifact recovery, and all of the excavations were backfilled at the conclusion of the work. The locations of all shovel tests and test units were recorded with a GPS unit for mapping. Representative photographs were also taken of the project area.

All recovered artifacts were returned to TRC's Asheville office for washing, analysis, and curation preparation. Although formal artifact analysis is pending, at least two precontact period Native American components have been identified based on field inspection.

RESULTS AND RECOMMENDATIONS

Results

The assessment included mapping and excavation of 122 shovel tests and two 1 × 1 m test units. These excavations encountered varied stratigraphic sequences on the alluvial terrace east and west of the artificial drainage, which are consistent with the mapped soil types (Hudson 2009; NRCS 2013).

The only shovel test (ST 1) situated on the lower terrace adjacent to the river produced no artifacts and encountered coarse sand to over 80 cmbs, overlying finer sediment. Excavations on the broad, higher terrace to the north encountered varied sequences; in general, the area east of the drainage appeared slightly higher and was somewhat better drained. Most shovel tests at the edge of the pasture there encountered a plowzone overlying dark grayish brown (10YR 4/2) clay loam (flecked with oxidized manganese concretions, and clearly related to hydric or semi-hydric conditions) or brownish yellow (10YR 6/6 or 6/8) clay loam with gray (10YR 5/1) clay bands. A few tests (notably ST 23 and the adjacent test unit [TU 1]) situated east of the drainage encountered a much thicker A horizon. In TU 1, the 59–66 cm thick upper layer (dark yellowish brown sandy loam) appeared to represent superimposed disturbed deposits resulting from the construction of the artificial drainage and continuous plowing. This overlay a loamier, slightly darker deposit that was up to 17 cm thick (but not continuous across the test unit) that appeared to have accumulated in a low-lying slump on the terrace (and does not appear to be part of any extensive buried A horizon). Up to four non-diagnostic lithic artifacts were found in this deposit, and artifacts were entirely absent in the underlying B horizon clay.

With the exception of one shovel test (ST 64) located on the edge of the second terrace (in the wooded area toward the river), which encountered a 60+ cm thick A horizon overlying dark grayish brown sandy clay loam (see Figure 2), nearly all shovel tests west of the drainage encountered a 27 to 38 cm thick plowzone overlying light brownish gray (10YR 6/2) clay loam, very dark gray (10YR 3/1) clay loam, or brownish yellow (10YR 6/8) clay loam with gray clay bands. A few shovel tests west of the drainage in the southern corner of the field encountered standing water and/or hydric soils at or near the surface (this part of the field is drained by a shallow ditch extending to the artificial drainage). Isolated seeps and sizeable areas of poorly drained soil are consistent with Dillard loam, the mapped soil type (Hudson 2009:145–146).

All of the shovel tests situated in the pasture at the head of the artificial drainage encountered strong brown, rock-filled clayey subsoil or similar impenetrable fill associated with the buried cement drainpipe. There is no potential for intact deposits in that area.

Twenty-one of the 122 shovel tests produced Native American artifacts, including eight (STs 2, 8, 21, 23, 64, 89, 90, and 95) that generated small numbers of ceramic sherds (see Figure 2). With the exception of a residual sherd obtained from the top of the hydric B horizon in TU 2, all ceramic sherds were found in the plowzone or the upper A horizon. Identifiable sherds include those of the Middle Woodland (Connestee series) and Mississippian period (Pisgah series) types. A few identifiable plain-surfaced sherds are likely

attributable to one or both of those types. Lithic artifacts were found in 18 shovel tests; diagnostic artifacts are limited to five triangular projectile points (including unfinished examples) that were found in the thick A horizon (ca. 0–60 cmbs) in TU 1. No lithic artifacts were found in B horizon contexts, although a few such non-diagnostic artifacts were found in the lower A horizon deposit in TU 1. A few non-diagnostic lithic artifacts were collected within the easement from the surface of the plowed field, and a few clearly modern artifacts (e.g., clear or green bottle glass, plastic) were encountered in plowed soils.

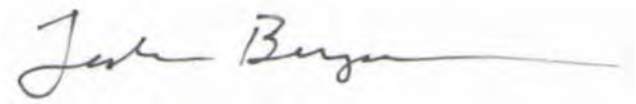
SUMMARY AND RECOMMENDATIONS

In summary, that part of 31BN28 situated within the construction easement (including the areas that will be affected by tree removal) is represented by small numbers of lithic and ceramic artifacts, including artifacts diagnostic of Middle Woodland and Mississippian period occupation. Most of these were found in plowed or relatively shallow A horizon contexts, and those few deeper artifacts appear attributable to bioturbation moving artifacts downward (and appear intrusive). No artifacts were found in underlying B horizon contexts, and most of the soil sequences encountered suggest a less than favorable environment for habitation. There are no buried deposits or evidence for cultural stratification, and local soil conditions along with low artifact density, suggest that Woodland or Mississippian features are unlikely to be present.

These investigations are not sufficient to characterize the site in its entirety, and it is very likely that meaningful artifact distributions and cultural features (especially those associated with Woodland to Mississippian period occupations) are present on the broad terrace outside the construction easement. Further assessment would certainly appear necessary to define the prehistoric occupation of the site in those locations. Although the eligibility status of 31BN28 remains undetermined, the present results suggest that construction will not impact any intact or significant deposits, and we recommend that the construction be allowed to proceed as presently designed. If design plans change, additional archaeological assessment would likely be necessary.

We hope that this summary is useful in the planning process. Please do not hesitate to contact us at (828) 230-4812 or via email at tbenyshek@trcsolutions.com or bidol@trcsolutions.com if you have any questions or comments about this information, or if you need any additional information prior to submittal of the draft report.

Sincerely,



Tasha Benyshek
Senior Archaeologist/Manager
Asheville

Bruce Idol
Senior Archaeologist
Chapel Hill

REFERENCES

Buchner, C. Andrew, Karla Oesch, Chester Walker, and William Wilson
2016 *Archaeological Survey at Warren Wilson College for the Swannanoa River Valley Flood Risk Management Study, Buncombe County, North Carolina.* Panamerican Consultants, Inc., Memphis, Tennessee. Report prepared for U.S. Army Corps of Engineers CELRN-RC-N, Nashville, Tennessee.

Egloff, Brian J.
1964 31BN28. North Carolina State Site Form. On file, Office of State Archaeology, Raleigh.

Hudson, Mark S.
2009 *Soil Survey of Buncombe County, North Carolina*. U.S. Department of Agriculture, Washington.

Natural Resources Conservation Service (NRCS)
2013 Web Soil Survey. Electronic document, http://websoilsurvey.nrcs.usda.gov/app/, accessed 16 January 2018.

TRC Environmental Corporation
2017 Proposal, Archaeological Testing and Site Assessment for 31BN28 and Monitoring Near Sites 31BN135 and 31BN145/491 for the Warren Wilson Stream Restoration Project, Buncombe County, North Carolina. TRC Environmental Corporation, Asheville. Technical proposal submitted to Stream Restoration Systems, LLC, Raleigh.

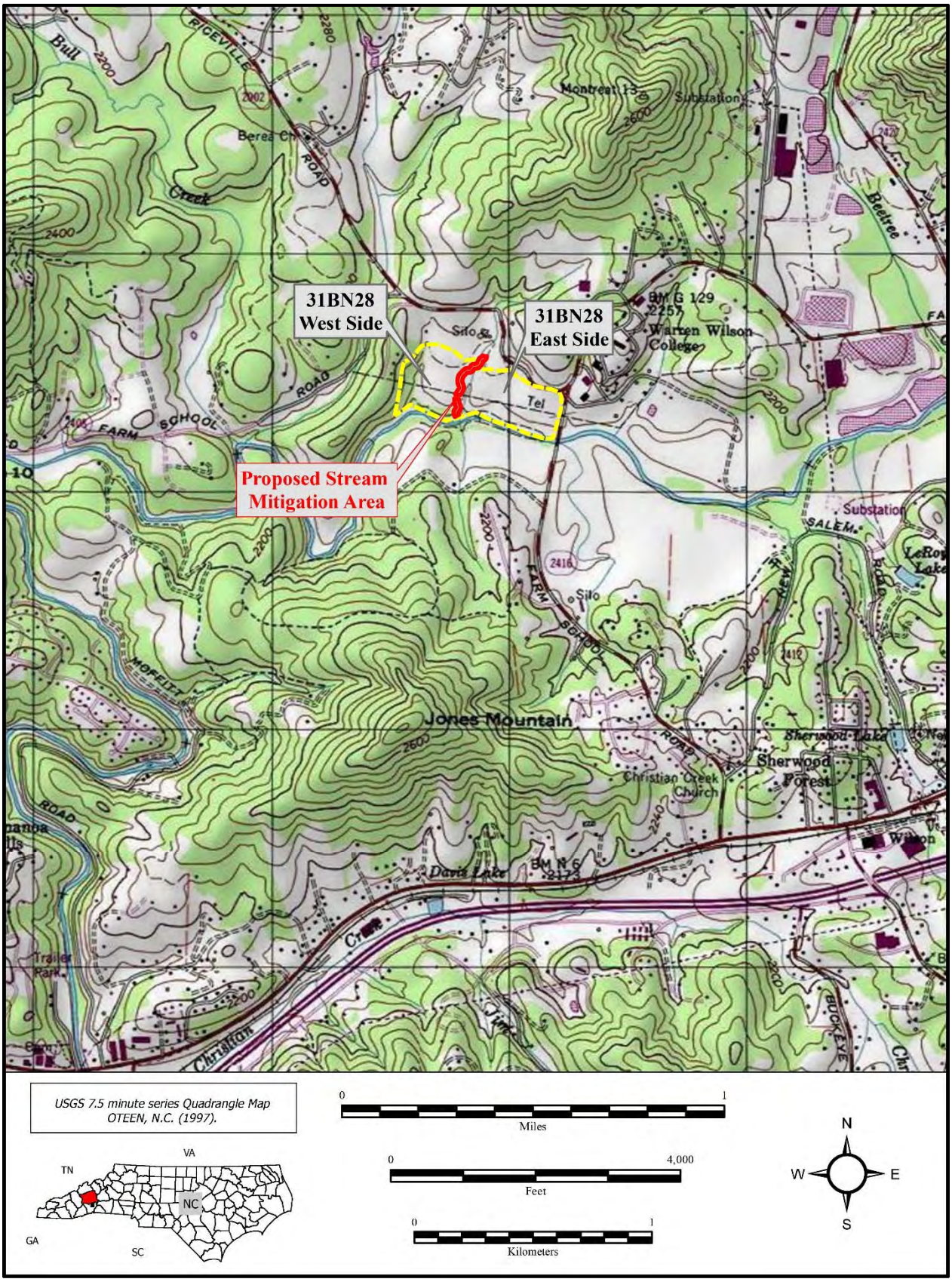


Figure 1. Project Area Location.

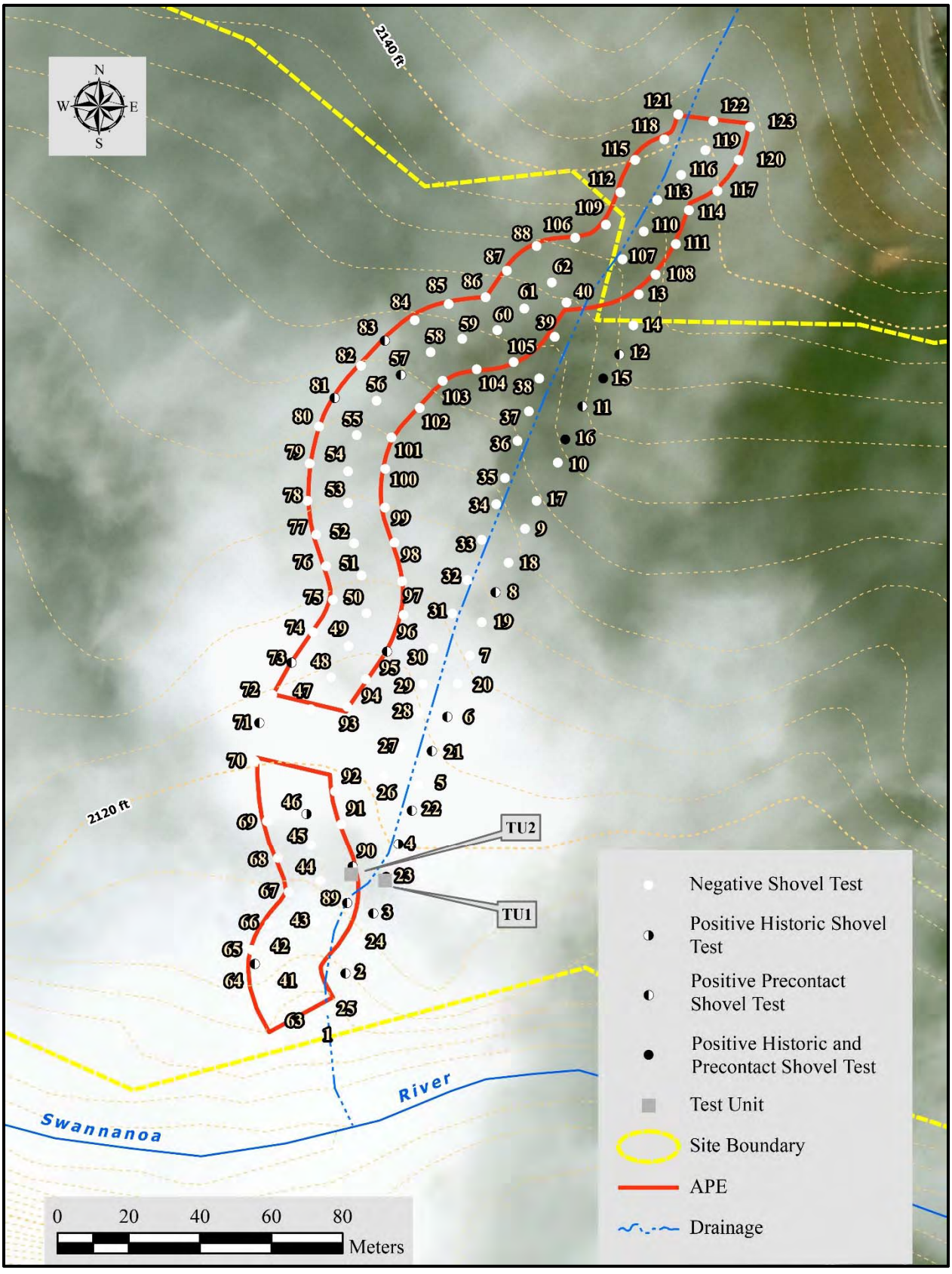


Figure 2. Project Area Map Showing Shovel Tests and Test Units.

Figure 3. Project area, view to south.

Figure 4. Project area west of channelized stream, view to north.

Appendix H
Financial Assurance

Pursuant to Section IV H and Appendix III of the NCDEQ DMS (formerly Ecosystem Enhancement Program) In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environmental Quality (NCDEQ) has provided the USACE-Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by NCDEQ DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.

Appendix I
Site Protection Instrument

STATE OF NORTH CAROLINA

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

_____ COUNTY

SPO File Number:
DMS Project Number:

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

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

WITNESSETH:

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

protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

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

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

WHEREAS, the Department of Environment and Natural Resources and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Understanding, (MOU) duly executed by all parties on November 4, 1998. This MOU recognized that the Wetlands Restoration Program was to provide effective compensatory mitigation for authorized impacts to wetlands, streams and other aquatic resources by restoring, enhancing and preserving the wetland and riparian areas of the State; and

WHEREAS, the Department of Environment and Natural Resources, the North Carolina Department of Transportation and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Agreement, (MOA) duly executed by all parties in Greensboro, NC on July 22, 2003, which recognizes that the Division of Mitigation Services (formerly Ecosystem Enhancement Program) is to provide for compensatory mitigation by effective protection of the land, water and natural resources of the State by restoring, enhancing and preserving ecosystem functions; and

WHEREAS, the Department of Environment and Natural Resources, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the North Carolina Wildlife Resources Commission, the North Carolina Division of Water Quality, the North Carolina Division of Coastal Management, and the National Marine Fisheries Service entered into an agreement to continue the In-Lieu Fee operations of the North Carolina Department of Natural Resources' Division of Mitigation Services (formerly Ecosystem Enhancement Program) with an effective date of 28 July, 2010, which supersedes and replaces the previously effective MOA and MOU referenced above; and

WHEREAS, the acceptance of this instrument for and on behalf of the State of North Carolina was granted to the Department of Administration by resolution as approved by the Governor and Council of State adopted at a meeting held in the City of Raleigh, North Carolina, on the 8th day of February 2000; and

WHEREAS, the Division of Mitigation Services in the Department of Environmental Quality, which has been delegated the authority authorized by the Governor and Council of State to the Department of Administration, has approved acceptance of this instrument; and

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in _____ Township, _____ County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately _____ acres and being conveyed to the Grantor by deed as recorded in **Deed Book _____ at Page ____** of the _____ County Registry, North Carolina; and

WHEREAS, Grantor is willing to grant a Conservation Easement and Right of Access over the herein described areas of the Property, thereby restricting and limiting the use of the areas of the Property subject to the Conservation Easement to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept said Easement and Access Rights. The Conservation Easement shall be for the protection and benefit of the waters of ***if known, insert name of stream, branch, river or waterway here***.

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement along with a general Right of Access.

The Conservation Easement Area consists of the following:

Tracts Number _____ containing a total of _____ **acres** as shown on the plats of survey entitled "Final Plat, Conservation Easement for North Carolina Division of Mitigation Services, Project Name: _____, SPO File No._____, EEP Site No. _____, Property of _____," dated _____, 20__ by *name of surveyor*, PLS Number _____ and recorded in the _____ County, North Carolina Register of Deeds at **Plat Book _____ Pages _____.**

See attached "**Exhibit A**", Legal Description of area of the Property hereinafter referred to as the "Conservation Easement Area"

The purposes of this Conservation Easement are to maintain, restore, enhance, construct, create and preserve wetland and/or riparian resources in the Conservation Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Conservation Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

Pursuant to law, including the above referenced statutes, this Conservation Easement and Right of Access shall be perpetual and it shall run with, and be a continuing restriction upon the use of, the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees.

II. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Conservation Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Conservation Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly reserved hereunder by the Grantor have been acquired by the Grantee. Any rights not expressly reserved hereunder by the Grantor, including the rights to all mitigation credits, including, but not limited to, stream, wetland, and riparian buffer mitigation units, derived from each site within the area of the Conservation Easement, are conveyed to and belong to the Grantee. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. Recreational Uses. Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Conservation Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Motorized vehicle use in the Conservation Easement Area is prohibited except within a Crossing Area(s) or Road or Trail as shown on the recorded survey plat**.**

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Conservation Easement Area not inconsistent with this Conservation Easement, and the right of access to the Conservation Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the property shall not alter vegetation, hydrology or topography of the site.

D. **Damage to Vegetation.** Except within Crossing Area(s) as shown on the recorded survey plat and as related to the removal of non-native plants, diseased or damaged trees, or vegetation that destabilizes or renders unsafe the Conservation Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Conservation Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Conservation Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the Conservation Easement Area including any use for cropland, waste lagoons, or pastureland.

G. New Construction. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Conservation Easement Area.

H. **Roads and Trails.** There shall be no construction or maintenance of new roads, trails, walkways, or paving in the Conservation Easement.

All existing roads, trails and crossings within the Conservation Easement Area shall be shown on the recorded survey plat.

I. Signs. No signs shall be permitted in the Conservation Easement Area except interpretive signs describing restoration activities and the conservation values of the Conservation Easement Area, signs identifying the owner of the Property and the holder of the Conservation Easement, signs giving directions, or signs prescribing rules and regulations for the use of the Conservation Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or any other material in the Conservation Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, hydraulic fracturing; removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water in the Conservation Easement Area. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides in the Conservation Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Conservation Easement Area may temporarily be withdrawn for good cause shown as needed for the survival of livestock on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no further subdivision, partitioning, or dividing of the Conservation Easement Area portion of the Property owned by the Grantor in fee simple ("fee") that is subject to this Conservation Easement is allowed. Any future transfer of the Property shall be subject to this Conservation Easement and Right of Access and to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Conservation Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Conservation Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the Conservation Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is not inconsistent with the purposes of this Conservation Easement, and the Grantor obtains advance written approval from the Division of Mitigation Services, 1652 Mail Services Center, Raleigh, NC 27699-1652.

III. GRANTEE RESERVED USES

A. Right of Access, Construction, and Inspection. The Grantee, its employees and agents, successors and assigns, receive a perpetual Right of Access to the Conservation Easement Area over the Property at reasonable times to undertake any activities on the property to restore, construct, manage, maintain, enhance, protect, and monitor the stream, wetland and any other riparian resources in the Conservation Easement Area, in accordance with restoration activities or a long-term management plan. Unless otherwise specifically set forth in this Conservation Easement, the rights granted herein do not include or establish for the public any access rights.

B. Restoration Activities. These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. Signs. The Grantee, its employees and agents, successors or assigns, shall be permitted to place signs and witness posts on the Property to include any or all of the following: describe the project, prohibited activities within the Conservation Easement, or identify the project boundaries and the holder of the Conservation Easement.

D. Fences. Conservation Easements are purchased to protect the investments by the State (Grantee) in natural resources. Livestock within conservations easements damages the investment and can result in reductions in natural resource value and mitigation credits which would cause financial harm to the State. Therefore, Landowners (Grantor) with livestock are required to restrict livestock access to the Conservation Easement area. Repeated failure to do so may result in the State (Grantee) repairing or installing livestock exclusion devices (fences) within the conservation area for the purpose of restricting livestock access. In such cases, the landowner (Grantor) must provide access to the State (Grantee) to make repairs.

E. Crossing Area(s). The Grantee is not responsible for maintenance of crossing area(s), however, the Grantee, its employees and agents, successors or assigns, reserve the right to repair crossing area(s), at its sole discretion and to recover the cost of such repairs from the Grantor if such repairs are needed as a result of activities of the Grantor, his successors or assigns.

IV. ENFORCEMENT AND REMEDIES

A. Enforcement. To accomplish the purposes of this Conservation Easement, Grantee is allowed to prevent any activity within the Conservation Easement Area that is inconsistent with the purposes of this Conservation Easement and to require the restoration of such areas or features in the Conservation Easement Area that may have been damaged by such unauthorized activity or use. Upon any breach of the terms of this Conservation Easement by Grantor, the Grantee shall, except as provided below, notify the Grantor in writing of such breach and the Grantor shall have ninety (90) days after receipt of such notice to correct the damage caused by such breach. If the breach and damage remains uncured after ninety (90) days, the Grantee may enforce this Conservation Easement by bringing appropriate legal proceedings including an action to recover damages, as well as injunctive and other relief. The Grantee shall also have the

power and authority, consistent with its statutory authority: (a) to prevent any impairment of the Conservation Easement Area by acts which may be unlawful or in violation of this Conservation Easement; (b) to otherwise preserve or protect its interest in the Property; or (c) to seek damages from any appropriate person or entity. Notwithstanding the foregoing, the Grantee reserves the immediate right, without notice, to obtain a temporary restraining order, injunctive or other appropriate relief, if the breach is or would irreversibly or otherwise materially impair the benefits to be derived from this Conservation Easement, and the Grantor and Grantee acknowledge that the damage would be irreparable and remedies at law inadequate. The rights and remedies of the Grantee provided hereunder shall be in addition to, and not in lieu of, all other rights and remedies available to Grantee in connection with this Conservation Easement.

B. Inspection. The Grantee, its employees and agents, successors and assigns, have the right, with reasonable notice, to enter the Conservation Easement Area over the Property at reasonable times for the purpose of inspection to determine whether the Grantor is complying with the terms, conditions and restrictions of this Conservation Easement.

C. Acts Beyond Grantor's Control. Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury or change in the Conservation Easement Area caused by third parties, resulting from causes beyond the Grantor's control, including, without limitation, fire, flood, storm, and earth movement, or from any prudent action taken in good faith by the Grantor under emergency conditions to prevent, abate, or mitigate significant injury to life or damage to the Property resulting from such causes.

D. Costs of Enforcement. Beyond regular and typical monitoring expenses, any costs incurred by Grantee in enforcing the terms of this Conservation Easement against Grantor, including, without limitation, any costs of restoration necessitated by Grantor's acts or omissions in violation of the terms of this Conservation Easement, shall be borne by Grantor.

E. No Waiver. Enforcement of this Easement shall be at the discretion of the Grantee and any forbearance, delay or omission by Grantee to exercise its rights hereunder in the event of any breach of any term set forth herein shall not be construed to be a waiver by Grantee.

V. MISCELLANEOUS

A. This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be invalid, the remainder of the provisions of the Conservation Easement, and the application of such provision to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

B. Grantor is responsible for any real estate taxes, assessments, fees, or charges levied upon the Property. Grantee shall not be responsible for any costs or liability of any kind related to the ownership, operation, insurance, upkeep, or maintenance of the Property, except as expressly provided herein. Upkeep of any constructed bridges, fences, or other amenities on the Property are the sole responsibility of the Grantor. Nothing herein shall relieve the Grantor of the

obligation to comply with federal, state or local laws, regulations and permits that may apply to the exercise of the Reserved Rights.

C. Any notices shall be sent by registered or certified mail, return receipt requested to the parties at their addresses shown herein or to other addresses as either party establishes in writing upon notification to the other.

D. Grantor shall notify Grantee in writing of the name and address and any party to whom the Property or any part thereof is to be transferred at or prior to the time said transfer is made. Grantor further agrees that any subsequent lease, deed, or other legal instrument by which any interest in the Property is conveyed is subject to the Conservation Easement herein created.

E. The Grantor and Grantee agree that the terms of this Conservation Easement shall survive any merger of the fee and easement interests in the Property or any portion thereof.

F. This Conservation Easement and Right of Access may be amended, but only in writing signed by all parties hereto, or their successors or assigns, if such amendment does not affect the qualification of this Conservation Easement or the status of the Grantee under any applicable laws, and is consistent with the purposes of the Conservation Easement. The owner of the Property shall notify the State Property Office and the U.S. Army Corps of Engineers in writing sixty (60) days prior to the initiation of any transfer of all or any part of the Property or of any request to void or modify this Conservation Easement. Such notifications and modification requests shall be addressed to:

Division of Mitigation Services Program Manager
NC State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

and

General Counsel
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403

G. The parties recognize and agree that the benefits of this Conservation Easement are in gross and assignable provided, however, that the Grantee hereby covenants and agrees, that in the event it transfers or assigns this Conservation Easement, the organization receiving the interest will be a qualified holder under N.C. Gen. Stat. § 121-34 et seq. and § 170(h) of the Internal Revenue Code, and the Grantee further covenants and agrees that the terms of the transfer or assignment will be such that the transferee or assignee will be required to continue in perpetuity the conservation purposes described in this document.

VI. QUIET ENJOYMENT

Grantor reserves all remaining rights accruing from ownership of the Property, including the right to engage in or permit or invite others to engage in only those uses of the Conservation Easement Area that are expressly reserved herein, not prohibited or restricted herein, and are not inconsistent with the purposes of this Conservation Easement. Without limiting the generality of the foregoing, the Grantor expressly reserves to the Grantor, and the Grantor's invitees and licensees, the right of access to the Conservation Easement Area, and the right of quiet enjoyment of the Conservation Easement Area,

TO HAVE AND TO HOLD, the said rights and easements perpetually unto the State of North Carolina for the aforesaid purposes,

AND Grantor covenants that Grantor is seized of said premises in fee and has the right to convey the permanent Conservation Easement herein granted; that the same is free from encumbrances and that Grantor will warrant and defend title to the same against the claims of all persons whomsoever.

IN TESTIMONY WHEREOF, the Grantor has hereunto set his hand and seal, the day and year first above written.

_____ (SEAL)

NORTH CAROLINA
COUNTY OF _____

I, _____, a Notary Public in and for the County and State aforesaid, do hereby certify that _____, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the _____ day of _____, 20__.

_____
Notary Public

My commission expires:

_____

Appendix J
Credit Release Schedule

CREDIT RELEASE SCHEDULE

All credit releases will be based on the total credit generated as reported in the approved final mitigation plan, unless there are major discrepancies and then a mitigation plan addendum will be submitted. Under no circumstances shall any mitigation project be debited until the necessary Department of the Army (DA) authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the IRT, will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to be restarted or be extended, depending on the extent to which the site fails to meet the specified performance standard. The release of project credits will be subject to the criteria described as follows in **Table D1**.

Table D1. Stream Credit Release Schedule

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

**Please note that vegetation data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the IRT.*

***10% reserve of credits to be held back until the bankfull event performance standard has been met.*

Initial Allocation of Released Credits

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

1) Approval of the final Mitigation Plan.
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.
3) Completion of project construction (the initial physical and biological improvements to the mitigation site) pursuant to the mitigation plan; per the DMS Instrument, construction means that a mitigation site has been constructed in its entirety, to include planting, and an as-built report has been produced. As-built reports must be sealed by an engineer prior to project closeout, if appropriate but not prior to the initial allocation of released credits.

4) Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

Subsequent Credit Releases

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

Appendix K
Maintenance Plan

Maintenance Plan

The Site shall be monitored on a regular basis and a physical inspection of the site shall be conducted a minimum of once per year throughout the post-construction monitoring period until performance standards are met. These site inspections may identify site components and features that require routine maintenance. Routine maintenance should be expected most often in the first two years following site construction and may include the following:

Component/Feature	**Maintenance through project close-out**
Stream	Routine channel maintenance and repair activities may include securing of loose coir matting and supplemental installations of live stakes and other target vegetation along the channel. Areas where stormwater and floodplain flows intercept the channel may also require maintenance to prevent bank failures and head-cutting.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Exotic invasive plant species shall be controlled by mechanical and/or chemical methods. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.
Beaver	Beaver and associated dams are to be removed as they colonize and until the project is closed.
Site Boundary	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries may be identified by fence, marker, bollard, post, tree- blazing, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as needed basis.
Road Crossing	Road crossings within the site may be maintained only as allowed by Conservation Easement or existing easement, deed restrictions, rights of way, or corridor agreements.
Terracell Drop Structure	Routine maintenance and repair activities may include removal of debris and supplemental installation of live stakes and other target vegetation along the channel. Undermining of the structure may require repair or replacement.

Appendix L
Post-IRT Site Visit Notes

MEMORANDUM
September 1, 2017

RE: Warren Wilson Mitigation Site
Post-IRT Site Visit Notes
DMS Project ID: 100019

Attendees:

USACE: Todd Tugwell, Kim Browning
NCDWR: Mac Haupt, Zan Price
NCWRC: Andrea Leslie
USFWS: Marella Buncick
NCDMS: Paul Wiesner, Matthew Reed, Kelly Phillips
AXE: Grant Lewis
AES: Craig Straub
AQ: Stu Ryman, Ryan Davis
RS: JD Hamby, Worth Creech

On Monday August 28, 2017, representatives of the Interagency Review Team (IRT) met with representatives from North Carolina Division of Mitigation Services (NCDMS), Restoration Systems (RS), and Axiom Environmental (AXE), Applied Ecological Services (AES), Anchor QEA of NC (AQ) at Warren Wilson Mitigation Site to review proposed site mitigation features and approaches. Below is a summary of what was discussed onsite and how those comments will be addressed as the mitigation plan moves forward. Much of the post field meeting summary is reflected in the comments below. This proposal will be further refined in the development of the Mitigation Plan.

The mitigation reaches are discussed in the same order as the field visit.

UT-7:

- There was discussion of Restoration throughout the entire tributary rather than Enhancement 2 in one section as originally proposed. This approach will be further evaluated and justified in the Mitigation Plan if pursued.
- The viability of replacing the upstream culvert to a more appropriate size and slope was discussed. This will be further investigated and may become part of the project if necessary and obtainable.

UT-8:

- The overall Restoration approach of this reach was accepted.
- There were concerns regarding the sewer line crossing of the stream channel. It is expected that consultation will occur with the utilities company about removal of the culverted crossing.
- The location of the channel will be determined in the Mitigation Plan.

UT-6:

- There was a group discussion regarding River Cane (*Arundinaria gigantean*) and how it may be incorporated into the buffers. It was decided that it should be included in the project and there could be some flexibility as to how it was incorporated into the success criteria. WRC gave several ideas involving canebrakes and suggested an expert to contact regarding the matter. Proposed success criteria will be detailed in the Mitigation Plan.
- Lack of flow is a concern in the upper reach and flow data should be closely monitored to prove there is stream function, rather than wetland. Design criteria, including slope and grade will be imperative for the function of this systems as a stream.
- Flow gauges will be incorporated into the success criteria.

UT-5:

- The overall Restoration approach of this reach was accepted.
- Damage or removal of mature trees will be avoided in the Swannanoa River buffer.

UT-4:

- The Mitigation Plan should describe specific treatments on the upper portion of this reach to justify Enhancement Level 2. Without justification, a lower credit ratio may be assigned to the upper end of this reach.
- An E1 to Restoration approach was discussed along the bottom portion of UT4 at the approach to the confluence with UT 3. This will be detailed in the Mitigation Plan.

UT-3:

(Upper)

- There was much discussion of what kind of treatment is appropriate for this reach. It was agreed that the Mitigation Plan will have to strongly justify restoring this reach as a stream/wetland complex in order to obtain Restoration credit.
- It was agreed that wetland monitoring (wells, overbank flow, etc.) would need to be added to success criteria for this reach.

(Lower)

- Enhancement Level 2 being accepted here would depend on how much bank work would occur, with 6-8 spots or several hundreds of feet being needed to justify it at the standard ratio. If that much bank work is not done/necessary then a reduced ratio would be given (mentioned 1:5) since only one side of the buffer would be extended to the full 30 feet, with several feet of buffer already existing. Given this information, we could propose a ratio in the Mitigation Plan to discuss. (1:3, 1:5, etc.)

UT-1:
(Upper)

- The channel below the breached dam could justify Restoration as proposed and will need to be supported in the Mitigation Plan.
- A braided stream would not be acceptable for credit in the old pond bed.
- There is value in the existing wetland habitat that has established in the former pond area, however, everyone acknowledged that the dam was recently breached and could be rebuilt by the landowner thereby impacting the emerging wetlands.
- Newly formed emergent wetlands in the old impoundment will be preserved as much as possible in the stream restoration design.
- The remaining dam structure on river left will be removed to match floodplain grade.
- The dam on river right will remain as needed to support the mature hemlock stand.

UT-1:
(Lower)

- The overall Restoration approach of this reach was accepted.
- Assure the new channel does not disrupt the existing wetlands.

UT-2:

- A jurisdictional determination should be done on this reach to justify any stream credit.
- A BMP will be installed upstream of the confluence of UT-2 and UT-1 regardless of credit generation on UT-2.
- Do not discharge hog lagoon waters into UT-2.

Thank you,

Worth Creech
Restoration Systems

From:	Tugwell, Todd J CIV USARMY CESAW (US)
To:	Wiesner, Paul; Haupt, Mac; Browning, Kimberly D CIV USARMY CESAW (US); Leslie, Andrea J; Buncick, Marella; Price, Zan (George)
Cc:	Stu Ryman; Grant Lewis; John Hamby; Craig A. Straub; Reid, Matthew; Worth Creech; Phillips, Kelly D
Subject:	RE: Warren Wilson College_100019_IRT Meeting Minutes - Aug. 2017
Date:	Wednesday, September 06, 2017 10:53:27 AM

Paul, my only comment on this is that I also did have some concerns on the short reach of channel immediately below the pond on UT 1 lower. This section appeared to be relatively stable and not in need of much work or buffer planting. Other than that, I'm OK with the notes.
Thanks,
Todd

-----Original Message-----
From: Wiesner, Paul [mailto:paul.wiesner@ncdenr.gov]
Sent: Tuesday, September 05, 2017 9:29 AM
To: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.Tugwell@usace.army.mil>; Haupt, Mac <mac.haupt@ncdenr.gov>; Browning, Kimberly D CIV USARMY CESAW (US) <Kimberly.D.Browning@usace.army.mil>; Leslie, Andrea J <andrea.leslie@ncwildlife.org>; Buncick, Marella <marella_buncick@fws.gov>; Price, Zan (George) <Zan.Price@ncdenr.gov>
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Subject: [EXTERNAL] Warren Wilson College_100019_IRT Meeting Minutes - Aug. 2017

All,

Please find the meeting minutes from the Warren Wilson College Post Contract IRT site visit attached.

Let us know if you have any additional comments.

Thanks

Paul Wiesner

Western Regional Supervisor

North Carolina Department of Environmental Quality

Division of Mitigation Services

828-273-1673 Mobile

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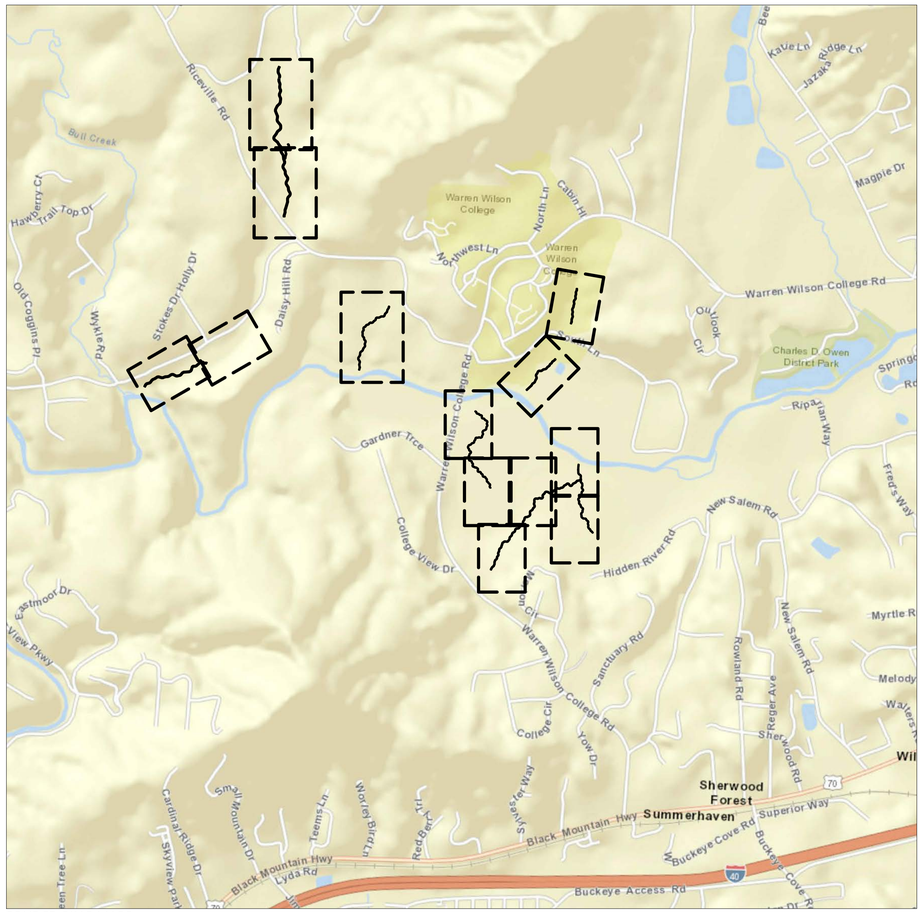
WARREN WILSON COLLEGE STREAM MITIGATION SITE

SWANNANOA, BUNCOMBE COUNTY, NC



SOURCE: BING MAPS

VICINITY MAP

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C-1.1	UT-1 LOWER PROFILE AND SECTIONS
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DATA BLOCK

PROPERTY OWNER:
WARREN WILSON COLLEGE
WWC 6362
PO BOX 9000
ASHEVILLE, NC 28815-9000
CONTACT PERSON:
DESIGN PROFESSIONAL:
ANCHOR QEA OF NORTH CAROLINA, PLLC
231 HAYWOOD STREET
ASHEVILLE, NC 28801
CONTACT: STU RYMAN
(828) 281-3350
PROJECT NAME:
WARREN WILSON COLLEGE STREAM MITIGATION SITE
PIN #: 9679-54-4937
ZONING DISTRICT:
RIVER BASIN: FRENCH BROAD
PROPERTY SIZE: 1005.5 ACRES
TOTAL DISTURBED AREA:

DESIGNED BY: A. BREW/M. GIESCHEN
DRAWN BY: T. GRIGAS/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: OCTOBER 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

COVER SHEET

WARREN WILSON COLLEGE STREAM MITIGATION SITE SWANNANOA, NORTH CAROLINA

G-1

PROJ. #: C71672-01.01

GENERAL NOTES (APPLICABLE TO ALL SHEETS):

1. TOPOGRAPHIC SURVEY PROVIDED BY HAYES JAMES AND SIGNED AND SEALED ON 12/19/2017.
2. PROJECT TO BE CONSTRUCTED IN ONE PHASE.
3. ALL IMPROVEMENTS, MATERIALS, AND METHODS SHALL CONFORM TO THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT) STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION LATEST EDITION UNLESS OTHERWISE NOTED ON THE PLANS OR SUPERSEDED BY ANOTHER JURISDICTION HAVING AUTHORITY (JHA).
4. ALL TRAFFIC CONTROL SIGNS SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES STANDARDS, LATEST EDITION.
5. THE CONTRACTOR SHALL PROTECT EXISTING PROPERTY MONUMENTATION AND PRIMARY CONTROL. ANY SUCH POINTS WHICH THE CONTRACTOR BELIEVES WILL BE DESTROYED SHALL HAVE OFFSET POINTS ESTABLISHED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY MONUMENTATION DESTROYED BY THE CONTRACTOR SHALL BE REESTABLISHED AT HIS EXPENSE.
6. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO: A.) PREVENT ANY DAMAGE TO PRIVATE PROPERTY AND PROPERTY OWNER'S POLES, FENCES, SHRUBS, ETC. B.) PROTECT ALL UNDERGROUND UTILITIES. C.) NOTIFY ALL UTILITY COMPANIES AND FIELD VERIFY HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES PRIOR TO START OF CONSTRUCTION. NOTIFY OWNER OF ANY POTENTIAL CONFLICTS WHICH MAY EXIST BETWEEN THE EXISTING UTILITIES AND CONSTRUCTION PLANS.
7. BARRICADING AND TRAFFIC CONTROL DURING CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL CONFORM TO THE NCDOT APPROVED LIST FOR TRAFFIC CONTROL DEVICES IN WORK ZONES. PEDESTRIAN AND VEHICULAR TRAFFIC FLOW SHALL BE MAINTAINED DURING ALL PHASES OF THE CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING TRAFFIC SAFETY MEASURES FOR WORK ON PROJECT.
8. CONTRACTOR SHALL MAINTAIN DRAINAGE AT ALL TIMES DURING CONSTRUCTION. PONDING OF WATER IN STREETS, DRIVES, TRUCK COURTS, TRENCHES, ETC. WILL NOT BE ACCEPTABLE.
9. ANY DAMAGES THAT MAY OCCUR TO REAL PROPERTY OR EXISTING IMPROVEMENTS SHALL BE RESTORED BY THE CONTRACTOR TO AT LEAST THE SAME CONDITION THAT THE REAL PROPERTY OR EXISTING IMPROVEMENTS WERE IN PRIOR TO THE DAMAGES. THIS RESTORATION SHALL BE SUBJECT TO THE OWNER'S APPROVAL; MOREOVER, THIS RESTORATION SHALL NOT BE A BASIS FOR ADDITIONAL COMPENSATION TO THE CONTRACTOR. RESTORATION SHALL INCLUDE, BUT NOT BE LIMITED TO, REGRASSING, REVEGETATION, REPLACING FENCES, REPLACING TREES, ETC.
10. WHERE PRESENT, CONTRACTOR SHALL MAINTAIN EXISTING SANITARY SEWER AND WATER SERVICE AT ALL TIMES DURING CONSTRUCTION.
11. CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL STORM WATER POLLUTION PREVENTION LAWS AND ORDINANCES.
12. PAVEMENT REMOVAL AND REPAIR SHALL CONFORM TO NCDOT REQUIREMENTS. ALL SAWCUTS SHALL BE FULL DEPTH CUTS. CONTRACTOR SHALL MAKE EFFORTS TO PROTECT CONCRETE EDGES. ANY LARGE SPALLED OR BROKEN EDGES SHALL BE REMOVED BY SAWCUTTING PAVEMENT PRIOR TO REPLACEMENT.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION CONTROL MEASURES THROUGH THE COMPLETION OF THE PROJECT AND THROUGH THE ESTABLISHMENT OF VEGETATION SUFFICIENT TO PROVIDE EROSION PROTECTION. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL TEMPORARY EROSION CONTROL MEASURES PRIOR TO PROJECT CLOSE-OUT.
14. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THAT ALL REQUIRED PERMITS AND APPROVALS HAVE BEEN OBTAINED FROM ALL REGULATORY AUTHORITIES.
15. ALL DISTURBED AREAS ARE TO BE STABILIZED AND SEEDED WITHIN 14 DAYS OF DISTURBANCE UNLESS OTHERWISE NOTED.
16. TESTING: SUBGRADE MOISTURE DENSITY TESTING SHALL BE PROVIDED AT ONE TEST PER SOIL TYPE AND COMPACTION TESTING AT ONE TEST PER 400 SF. ABC TESTING SHALL INCLUDE 1 MOISTURE-DENSITY TEST PER SOURCE AND COMPACTION TESTING AT ONE TEST PER 400 SF.

GRADING NOTES (APPLICABLE TO ALL SHEETS):

1. UNLESS OTHERWISE NOTED IN THESE PLANS, SITE GRADING SHALL BE PERFORMED IN ACCORDANCE WITH APPENDIX J OF THE NC BUILDING CODE.
2. THE SURFACE OF AREAS TO BE GRADED SHALL BE PREPARED TO RECEIVE FILL BY REMOVING VEGETATION, TOPSOIL, AND OTHER UNSUITABLE MATERIALS, AND SCARIFYING THE GROUND TO PROVIDE A BOND WITH THE FILL MATERIAL. ALL CUT AND FILL SLOPES PROPOSED BY THESE PLANS SHALL BE 2:1 (HORIZONTAL:VERTICAL) OR FLATTER.
3. CUT AND FILL SLOPES (EMBANKMENTS) SHALL BE CONSTRUCTED IN ACCORDANCE WITH NCDOT CONSTRUCTION MANUAL (2004). AT A MINIMUM, ALL FILL SLOPES SHALL BE PLACED IN 10-INCH MAXIMUM LIFTS COMPACTED TO NOT LESS THAN 95 PERCENT DENSITY (STANDARD PROCTOR). CONTRACTOR SHALL ARRANGE FOR INDEPENDENT COMPACTION TESTING RESULTS TO BE PAID FOR BY THE OWNER.
4. FINE GRADING AND SEEDING SHALL OCCUR AT ALL AREAS DISTURBED BY THE WORK OF THE PROJECT.
5. FINE GRADING SHALL INCLUDE REMOVAL OF ALL DEBRIS (ROOTS, ROCKS, TRASH, AND OTHER FOREIGN MATERIAL) LARGER THAN 2 INCHES IN ANY DIMENSION AND THE APPLICATION OF 2-3 INCHES OF TOPSOIL. FINE GRADING SHALL ACHIEVE POSITIVE DRAINAGE AWAY FROM BUILDINGS AND IN GENERAL ACCORDANCE WITH THE DRAINAGE PLANS. LANDSCAPE AREAS SHALL NOT BE SLOPED LESS THAN 2%.
6. GROUND COVER REQUIREMENTS: ALL DISTURBED AREAS SHALL BE PLANTED WITH AN APPROVED GROUND COVER WITHIN 14 CALENDAR DAYS. ALL PERIMETER DIKES, SWALES, DITCHES, PERIMETER SLOPES, AND ALL SLOPES STEEPER THAN 3:1 MUST BE STABILIZED IN 7 DAYS. SLOPES 50' OR GREATER IN LENGTH MUST BE STABILIZED WITHIN 7 DAYS EXCEPT WHEN THE SLOPE IS FLATTER THAN 4:1. SLOPES LESS THAN 50' MUST BE STABILIZED IN 14 DAYS EXCEPT WHEN THE SLOPE IS STEEPER THAN 3:1, THEN THE 7 DAY REQUIREMENT APPLIES. INSTALL TEMPORARY SEEDING ON ALL AREAS THAT WILL BE LEFT IDLE FOR MORE THAN 14 DAYS. HARDWOOD MULCH IS AN ACCEPTABLE TEMPORARY COVER BUT MAY NOT BE BLENDED INTO THE SUBGRADE AND WILL BE REQUIRED TO BE REMOVED PRIOR TO CONTINUATION OF THE WORK.

EROSION CONTROL NOTES (APPLICABLE TO ALL SHEETS):

1. STRAW MULCH AND TALL FESCUE SHOULD NOT BE USED IN RIPARIAN AREAS.
2. IF CONCRETE IS USED (EG. HEADWALLS), A DRY WORK AREA MUST BE MAINTAINED TO PREVENT DIRECT CONTACT BETWEEN CURING CONCRETE AND STREAM WATER. WATER THAT INADVERTENTLY CONTACTS LIVE CONCRETE MUST NOT BE DISCHARGED TO SURFACE WATERS DUE TO THE POTENTIAL FOR WATER CHEMISTRY CHANGE AND FISH KILLS.
3. SANDBAGS, FLEXIBLE PIPE, OR OTHER DIVERSION STRUCTURES SHOULD BE USED TO AVOID EXCAVATING IN FLOWING WATER. ANY DIVERSION CHANNELS MUST BE LINED WITH FILTER FABRIC AND/OR ROCK.
4. RIPARIAN VEGETATION ESPECIALLY TREES AND SHRUBS, SHOULD BE PRESERVED AS MUCH AS POSSIBLE. NATIVE WOODY VEGETATION (EG. RHODODENDRON, DOG HOBBLE, SILKY DOGWOOD, SYCAMORE, RIVER BIRCH, RED MAPLE) SHOULD BE REESTABLISHED TO PROVIDE BANK STABILITY AND SHADING. THE USE OF NATIVE PLANTS THAT MUST BE REMOVED FROM PERMANENTLY DISTURBED AREAS IS ENCOURAGED.
5. ALL MECHANIZED EQUIPMENT OPERATED NEAR SURFACE WATERS SHOULD BE INSPECTED AND MAINTAINED REGULARLY TO PREVENT CONTAMINATION OF LAKE WATERS FROM FUELS, LUBRICANTS, HYDRAULIC FLUIDS AND OTHER TOXIC MATERIALS.
6. DISCHARGING HYDROSEED MIXTURES AND WASHING OUT HYDROSEEDERS AND OTHER EQUIPMENT IN OR ADJACENT TO SURFACE WATERS IS PROHIBITED.
7. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED DAILY AND AFTER ANY RAINFALL. DEFICIENCIES SHALL BE CORRECTED IMMEDIATELY. A DAILY RECORD SHALL BE MAINTAINED ON THE SITE BY THE CONTRACTOR. PROJECT SITE CONDITIONS MAY REQUIRE INSTALLATION OF ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES. EROSION CONTROL MEASURES AND MAINTENANCE SHALL BE IN ACCORDANCE WITH THE SOUTH CAROLINA DHEC BMP HANDBOOK.
8. DUST CONTROL: CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING DUST GENERATED BY THE WORK OF THE PROJECT. INSTALL TEMPORARY OR PERMANENT SURFACE STABILIZATION MEASURES IMMEDIATELY AFTER COMPLETING LAND DISTURBANCE. LANDSCAPE AREAS SHALL BE PLANTED AND STABILIZED WITH MULCH OR GROUNDCOVER AS SOON AS POSSIBLE. AREAS SUBJECT TO TRAFFIC SHALL BE STABILIZED WITH THE APPLICATION OF WATER (SPRINKLING), SPRAY-ON ADHESIVES (E.G. ASPHALT EMULSION, ETC.), CALCIUM CHLORIDE, OR STONE. DUST CONTROL SHALL INCLUDE THAT CAUSED BY SAW-CUTTING AND SIMILAR DUST GENERATING ACTIVITIES. WIND FENCE OR SIMILAR BARRIERS MAY BE REQUIRED DURING PARTICULARLY WINDY, DRY CONDITIONS. TILLAGE (I.E. DEEP PLOWING TO BRING CLODS TO THE SURFACE) MAY BE USED AS AN EMERGENCY MEASURE FOR LARGE OPEN AREAS. DUST CONTROL MEASURES SHALL BE MAINTAINED BY THE CONTRACTOR THROUGHOUT THE DRY WEATHER UNTIL ALL DISTURBED AREAS ARE STABILIZED.

SEEDING NOTES (APPLICABLE TO ALL SHEETS):

1. SEED SHALL BE PLACED ON DISTURBED SOIL AS SOON AS POSSIBLE OR WITHIN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IS COMPLETE WITH THE GOAL OF PROVIDING A PERMANENT COVER OF NATIVE GRASSES AS QUICKLY AS POSSIBLE.
2. FERTILIZING: PRIOR TO PLANTING, SOIL SHALL BE PREPARED WITH THE FOLLOWING:
   GROUND LIMESTONE: 75 LB/1000 SF.
   N-P-K TURF-GRADE FERTILIZER APPLIED AT A RATE OF 1 LB NITROGEN/1000 SF.
   THE FERTILIZER SHALL HAVE A 3-1-2 OR 4-1-2 ANALYSIS. CONTRACTOR SHALL PROVIDE LABELS FOR THE FERTILIZER TO THE ENGINEER FOR APPROVAL PRIOR TO APPLICATION.
3. COVER ALL SEEDED AREA WITH MULCH IMMEDIATELY UPON COMPLETION OF THE SEEDING APPLICATION. SPECIFIED EROSION CONTROL FABRIC SHALL BE CONSIDERED MULCH. IN AREAS WHERE NO EROSION CONTROL FABRIC IS SPECIFIED, MULCH SHALL CONSIST OF WEED FREE STRAW. STRAW SHALL BE APPLIED AT A RATE OF 90LBS/ACRE.
4. WATERING: CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING A CONTINUOUS, CLOSE STAND OF GRASS WITH NO GAPS OR BARE SPOTS EXCEEDING A HAND'S BREADTH. WHEN REQUIRED TO GERMINATE OR SUSTAIN THE GRASS UNTIL THE PROJECT IS COMPLETE, LAKE WATER SHALL BE USED TO GENTLY WET THE SEEDED AREA IN THE MORNING HOURS A MINIMUM OF THREE TIMES PER WEEK THROUGHOUT THE PROJECT DURATION.
5. INSPECT PERMANENTLY SEEDED AREAS FOR FAILURE, MAKE NECESSARY REPAIRS AND RE-SEED OR OVERSEED WITHIN THE SAME GROWING SEASON IF POSSIBLE. IF THE GRASS COVER IS SPARSE OR PATCHY, RE-EVALUATE THE CHOICE OF GRASS AND QUANTITIES OF LIME AND FERTILIZER APPLIED. FINAL STABILIZATION BY PERMANENT SEEDING OF THE SITE REQUIRES THAT IT BE COVERED BY A 70% COVERAGE RATE.

PLANTING NOTES (APPLICABLE TO ALL SHEETS):

1. APPLICABLE STANDARDS: ALL MATERIALS SHALL BE SUBJECT TO APPROVAL BY THE LANDSCAPE ARCHITECT. THE OWNER SHALL RECEIVE TAGS FROM EACH PLANT SPECIES AND A LIST OF PLANT SUPPLIERS. WHERE ANY REQUIREMENTS ARE OMITTED FROM THE PLANT LIST, THE PLANTS FURNISHED SHALL MEET THE NORMAL REQUIREMENTS FOR THE VARIETY OR CULTIVAR PER THE AMERICAN STANDARD FOR NURSERY STOCK, LATEST EDITION PUBLISHED BY THE AMERICANHORT.
2. SUBSTITUTIONS: NO SUBSTITUTIONS OF PRODUCTS, PLANT TYPES OR SIZES SHALL BE MADE WITHOUT THE APPROVAL OF THE OWNER, LANDSCAPE ARCHITECT AND LOCAL/STATE JHA, IF APPLICABLE. REQUESTS FOR SUBSTITUTIONS SHALL STATE THE REASONS FOR THE SUBSTITUTION REQUEST, THE SUGGESTED ALTERNATE, AND THE CHANGES IN COST.
3. QUANTITIES: QUANTITIES OF PLANTS AS SHOWN BY PLANT SYMBOL ON THE PLAN SHALL GOVERN OVER THE QUANTITIES SHOWN IN THE PLANT LIST. THE CONTRACTOR IS TO VERIFY PLANT LIST TOTALS WITH QUANTITIES SHOWN ON PLAN.
4. WARRANTY: WARRANT EACH PLANT TO REMAIN ALIVE AND BE IN HEALTHY, VIGOROUS CONDITION FOR A PERIOD OF 1 YEAR AFTER COMPLETION AND ACCEPTANCE OF THE PLANT MATERIAL AND INSTALLATION. INSPECTION OF PLANTS WILL BE MADE BY THE LANDSCAPE ARCHITECT OR ENGINEER AT THE EXPIRATION OF THE ONE YEAR WARRANTY PERIOD. ALL PLANTS THAT ARE MISSING OR NOT IN A LIVE, HEALTHY GROWING CONDITION SHALL BE LISTED AND THE CONTRACTOR SHALL BE HELD LIABLE FOR REPLACEMENT WITH EQUIVALENT PLANTS OF SAME SPECIES AND SIZE.
5. ESTABLISHMENT PERIOD: THE PLANT ESTABLISHMENT PERIOD SHALL BE THE PERIOD OF TIME FROM THE BEGINNING OF THE CONTRACT TO THE END OF THE PLANT MATERIAL WARRANTY AND FINAL ACCEPTANCE BY THE LANDSCAPE ARCHITECT.
6. MAINTENANCE: THE CONTRACTOR SHALL CARE FOR ALL PLANTS DURING THE PLANT ESTABLISHMENT PERIOD AS MAY BE NECESSARY TO KEEP PLANTS IN A LIVE, HEALTHY GROWING CONDITION. THESE DUTIES SHALL INCLUDE :
   A. PRUNING, CULTIVATING, REMOVAL OF WEEDS FROM PLANTING BEDS AND MULCH AREAS; REMOVE ALL WEEDS PRIOR TO REVIEW FOR COMPLETION.
   B. LAKE WATER SHALL BE USED TO WATER PLANT MATERIAL IN THE MORNING HOURS A MINIMUM OF THREE TIMES PER WEEK TO ENHANCE EARLY ROOT GROWTH.
   C. ADJUSTMENT OF STAKES AND TIES TO MAINTAIN PLANT IN UPRIGHT AND PLUMB CONDITION.
   D. RE-SET SETTLED PLANTS TO PROPER GRADES AND POSITION. RESTORE PLANTING SAUCER AND MULCH; ADDING PLANTING SOIL AND MULCH AS MAY BE REQUIRED.
7. PLANT CONDITION: ALL PLANTS SHALL BE IN A LIVE, HEALTHY, AND GROWING CONDITION BOTH AT THE DATE OF COMPLETION BEFORE ACCEPTANCE OF THE PROJECT BY THE OWNER AND/OR LANDSCAPE ARCHITECT AND AT THE END OF THE PLANT ESTABLISHMENT PERIOD.

MATERIALS:

1. PLANTS: ALL PLANTS SHALL BE NURSERY GROWN. THEY SHALL BE TYPICAL OF THEIR SPECIES, CULTIVAR OR VARIETY. THEY SHALL BE SOUND, HEALTHY AND VIGOROUS AND SHALL BE FREE OF DISEASE AND ANY EVIDENCE OF INSECTS. IF IN LEAF, THEY SHALL BE DENSELY FOLIATED, WITHOUT LEAF SPOTS, DISCOLORATION, CURL, WILTING, CHLOROSIS OR DAMAGE. THEY SHALL HAVE HEALTHY, WELL-DEVELOPED ROOT SYSTEMS.
2. MINIMUM SIZES: SIZES SPECIFIED IN THE PLANT LIST ARE THE MINIMUM SIZES TO WHICH THE PLANTS ARE TO BE JUDGED. MEASUREMENTS ARE NOT TO INCLUDE ANY TERMINAL GROWTH.
3. PLANT HARDINESS: THE SUPPLIER OF ALL PLANTS SHALL CERTIFY THAT THE ORIGIN OF THE PLANTS IS FROM HARDINESS ZONE 6 THROUGH 8 ONLY.
4. MULCH IS TO BE DOUBLE SHREDDED HARDWOOD BARK MULCH FOR TREES AND SHRUBS.
5. TOPSOIL: ACCEPTABLE TOPSOIL SHALL BE FERTILE, WEED FREE, FRIABLE NATURAL LOAM, UNIFORM IN COMPOSITION, FREE OF STONES, LIMBS, PLANTS AND THEIR ROOTS, DEBRIS AND OTHER EXTRANEOUS MATTER OVER 2" IN DIAMETER. THE SOIL SHALL BE CAPABLE OF SUSTAINED PLANT GROWTH AND HAVE A 5% MINIMUM ORGANIC CONTENT. IN SITUATIONS REQUIRING A CUSTOM MIX OR STRUCTURAL SOIL, SPECIFICATIONS WILL BE PROVIDED BY THE LANDSCAPE ARCHITECT.
6. SOIL TESTING: PRIOR TO PLANTING, EXISTING SOILS AND TOPSOILS TO BE SPREAD SHALL BE TESTED BY AN APPROVED SOIL TESTING LABORATORY OR AGRICULTURAL EXTENSION SERVICE LABORATORY. TESTS SHALL INCLUDE MECHANICAL AND CHEMICAL ANALYSIS. A SOILS REPORT SHALL INCLUDE RECOMMENDATIONS FOR THE ADDITION OF FERTILIZER AND ADJUSTMENTS TO PH OR OTHER AMENDMENTS AND INDICATE THE AMOUNT OF ORGANIC MATTER. A WRITTEN REVIEW OF THE ANALYSIS IS REQUIRED TO BE SUBMITTED TO THE OWNER AND/OR LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

INSTALLATION:

1. VERIFY GRADES: PRIOR TO PLANTING, THE CONTRACTOR SHALL VERIFY THAT CONSTRUCTED GRADES ARE AS INDICATED ON THE PLANS. THE CONTRACTOR SHALL NOTIFY THE OWNER AND LANDSCAPE ARCHITECT IF ADJUSTMENT TO PLANT MATERIAL IS REQUIRED.
2. STAKE PLANT LOCATIONS: PRIOR TO PLANTING, THE CONTRACTOR SHALL LAY OUT THE EXTENT OF THE PLANT BEDS AND THE PROPOSED LOCATION FOR B&B MATERIAL FOR REVIEW.
3. FIELD ADJUSTMENTS: THE CONTRACTOR IS TO FINELY ADJUST PLANT LOCATIONS IN THE FIELD AS NECESSARY TO BE CLEAR OF OBSTACLES. FINISHED PLANTING AREAS SHALL BE GRADED SO AS NOT TO IMPEDE DRAINAGE.
4. PLANTING: BACKFILL THE PLANTING HOLES WITH IN-SITU SOIL REMOVED FOR PLANTING PIT. FOLLOWING BACKFILL, WATER TO THE POINT OF SATURATION AND TAMP TO COMPACT BACKFILL. ADD EXISTING SOIL TO BRING THE FINAL GRADE OF THE PLANTING HOLE TO THE SURROUNDING SOIL SURFACE. RAKE THE UNUSED SOIL OUTSIDE OF THE PLANTING HOLE TO EVENLY DISTRIBUTE EXCESS THROUGHOUT THE BED, TAKING CARE NOT TO CREATE A SOIL MOUND OR TO ALTER THE EXISTING GRADE.
5. PROPOSED TREES INDICATED ON THE LANDSCAPE PLAN LOCATED BELOW THE PROPOSED TOE OF BANK ARE GENERALLY AROUND THE 796 CONTOUR. THESE AREAS MAY BE INUNDATED DEPENDING ON LAKE LEVELS. LAKE LEVELS VARY FROM DAY TO DAY AND CAN BE MONITORED FROM THE FOLLOWING WEBSITE (HTTPS://LAKES.DUKE-ENERGY.COM/#/LAKES). PLANTING SHOULD OCCUR WHEN THE LAKE LEVELS ARE BELOW THE 796 MARK AND GROUND SURFACE AT THESE LOCATIONS IS ABOVE THE WATER LINE.
6. SLOPES: SHRUBS, GROUNDCOVERS AND PERENNIALS PLANTED ON SLOPES GREATER THAN 3:1 SHALL HAVE A NATURAL FIBER GEOTEXTILE WOVEN MESH MATERIAL PINNED TO THE GROUND PER MANUFACTURER'S SPECIFICATIONS. GROUNDCOVER BEDS SHALL HAVE 2" OF GROUND LEAF COMPOST SPREAD ONTO SLOPE PRIOR TO PLACING MESH. EXCAVATE PLANT PITS THROUGH MESH.

90% DESIGN SUBMITTAL

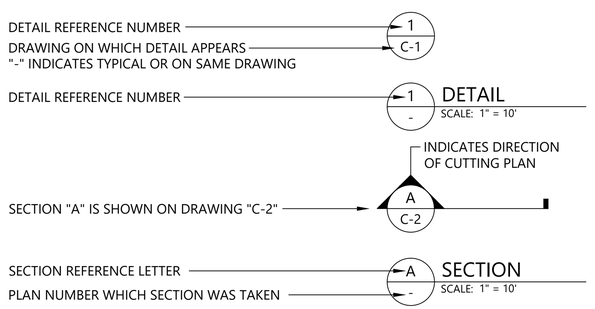
ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's **below.** **Call** before you dig.

ABBREVIATIONS

ABBRV	ABBREVIATION
AQ	ANCHOR QEA
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
BLDG	BUILDING
CB	CATCH BASIN
CONC	CONCRETE
CONT	CONTINUED OR CONTINUOUS
CMP	CORRUGATED METAL PIPE
COP	CITY OF PORTLAND VERTICAL DATUM
CP	CONTROL POINT (SURVEYED)
CPE	CORRUGATED POLYETHYLENE
CY	CUBIC YARD
DGPS	DIFFERENTIAL GLOBAL POSITIONING SYSTEM
DI	DUCTILE IRON
DIA	DIAMETER
DWG	DRAWING
E	EAST
EA	EACH
EL, ELEV	ELEVATION
ESC	EROSION AND SEDIMENT CONTROL
EX	EXISTING
FT	FOOT OR FEET
FS	FINISHED SURFACE
FTG	FOOTING
IE	INVERT ELEVATION
IN	INCH OR INCHES
LS	LUMP SUM
MAX	MAXIMUM
MH	MANHOLE, MAINTENANCE HOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
N	NORTH
NAD	NORTH AMERICAN DATUM
NPDES	NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
OC	ON CENTER
PE	PROFESSIONAL ENGINEER, POLYETHYLENE
PVC	POLYVINYL CHLORIDE
RCP	REINFORCED CONCRETE PIPE
S	SOUTH
SD	STORM DRAIN
SF	SQUARE FOOT OR FEET
SPEC	SPECIFICATION
STA	STATION
STD	STANDARD
STRUCT	STRUCTURE, STRUCTURAL
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TYP	TYPICAL
W	WEST

DETAIL AND SECTION REFERENCING



PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGAS,S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APPD	DESCRIPTION

GENERAL NOTES AND ABBREVIATIONS

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

G-2

SHEET NO. 2 OF XX
PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL

G-3

SHEET NO. 3 OF XX

PROJ. #: C71672-01.01

SHEET INDEX

WARREN WILSON COLLEGE STREAM MITIGATION SITE
SWANNANOA, NC

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

ANCHOR QEA

Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

DESIGNED BY: S. STAVINOHA
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

PRELIMINARY NOT FOR CONSTRUCTION

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ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's **below.** **Call** before you dig.

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 30 60
SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GIESCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
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(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

PRIVATELY MAINTAINED SEWER MAIN (LOCATION APPROXIMATE)
30' MSD SEWER EASEMENT (LOCATION APPROXIMATE)
MSD MAINTAINED SEWER MAIN (LOCATION APPROXIMATE)
EXISTING TRAIL
PROPERTY BOUNDARY (NOT SURVEYED)
STA 11+09 BEGIN UT-1 LOWER ENHANCEMENT II
STA 11+22 END UT-1 LOWER ENHANCEMENT II BEGIN RESTORATION
INSTALL PERMANENT CROSSING WITH CULVERT BURIED 12"
STREAM CHANNEL CENTERLINE
APPROXIMATE BANKFULL WIDTH THROUGH RIFFLES (WIDTH VARIES, SEE DWG C-1.1)
PROPOSED CONSERVATION EASEMENT BOUNDARY
MARSH TREATMENT AREA
EXISTING OVERHEAD UTILITY LINE (LOCATION APPROXIMATE) TO BE RELOCATED OUT OF CONSERVATION EASEMENT
STA 17+06 END UT-1 LOWER RESTORATION
EXISTING WETLAND DELINEATION BOUNDARY
UT-2
HOG BOTTOM
LOWER FIELD

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	17+20		Riffle Typical	13+86
Pool Typical	16+67		Pool Typical	13+64
Pool-Riffle Transition	16+62		Pool-Riffle Transition	13+59
Riffle Typical	16+57		Riffle Typical	13+54
Pool Typical	15+99		Pool Typical	13+22
Pool-Riffle Transition	15+94		Pool-Riffle Transition	13+17
Riffle Typical	15+89		Riffle Typical	13+12
Pool Typical	15+34		Pool Typical	12+63
Pool-Riffle Transition	15+29		Pool-Riffle Transition	12+58
Riffle Typical	15+24		Riffle Typical	12+53
Pool Typical	14+69		Pool Typical	12+32
Pool-Riffle Transition	14+64		Pool-Riffle Transition	12+27
Riffle Typical	14+59		Riffle Typical	12+22
Pool Typical	14+30		Pool Typical	12+03
Pool-Riffle Transition	14+25		Pool-Riffle Transition	11+98
Riffle Typical	14+20		Riffle Typical	11+93
Pool Typical	13+96		Pool Typical	11+32
Pool-Riffle Transition	13+91		Pool-Riffle Transition	11+27

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

STRUCTURE LOCATIONS

LABEL	DETAIL	STATION
LV-1	Log Vane	16+67
LV-2	Log Vane	15+99
LV-3	Log Vane	15+34
LV-4	Log Vane	14+69
LV-5	Log Vane	14+30
LV-6	Log Vane	13+96
LV-7	Log Vane	13+64
LV-8	Log Vane	13+22
LV-9	Log Vane	12+63
LV-10	Log Vane	12+32
LV-11	Log Vane	12+03
LV-12	Log Vane	11+32

UT-1 LOWER LAYOUT AND STRUCTURES PLAN

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-1.0

SHEET NO. 4 OF XX
PROJ. #: C71672-01.01

Jun 19, 2018 8:3 1am sstavinoha \\asheville1\asheville\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-Design-UT1.dwg 4 C-1.0

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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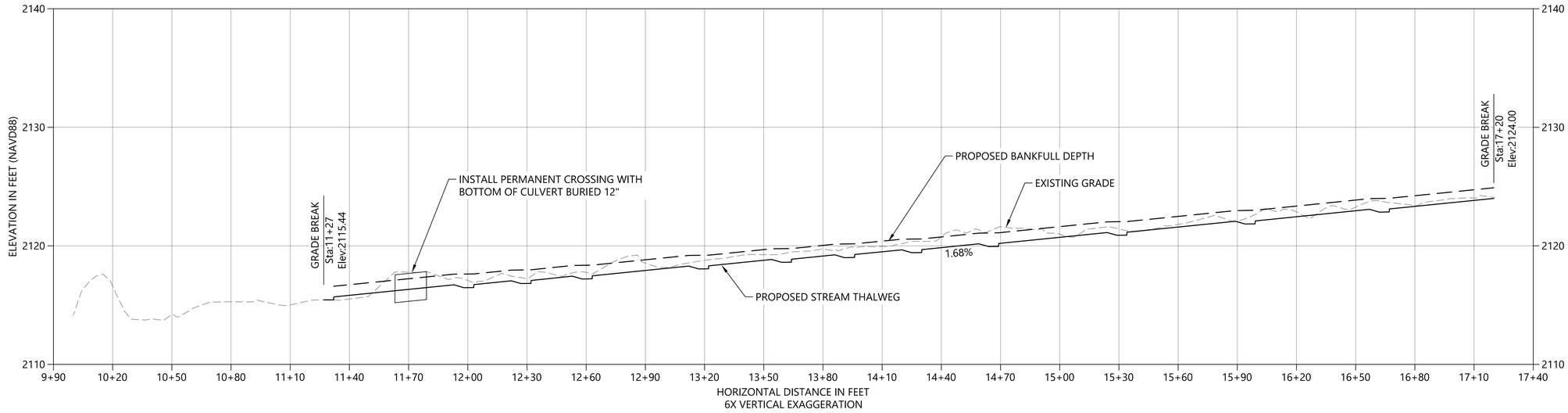

1 / - STREAM PROFILE
HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 5'

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE CROSS SECTION PARAMETERS							
REACH ID	STA BEG	STA END	RIFFLE SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-1 LOWER - ALL	11+10	17+20	1.68%	4.5	0.90	3:1	13.5

POOL CROSS SECTION PARAMETERS								
REACH ID	STA BEG	STA END	POOL SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	INSIDE OF BEND CHANNEL BANK SLOPES	OUTSIDE OF BEND CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-1 UPPER - ALL	11+10	17+20	0.25%	4.5	1.15	10:1	3:1	17.0

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S. STAVINOHA
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-1 LOWER PROFILE AND SECTIONS

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-1.1

SHEET NO. 5 OF XX
PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

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NORTH

0 30 60
SCALE IN FEET

MARSH TREATMENT AREA

INTERCEPT EXISTING STORMWATER CONVEYANCE SWALE AND CONSTRUCT NEW SWALE TO MARSH TREATMENT AREA

SWIM POND

STA 14+92
END UT 1 UPPER RESTORATION

STA 10+09
BEGIN UT-1 RESTORATION

STREAM CHANNEL CENTERLINE

APPROXIMATE BANKFULL WIDTH THROUGH RIFFLES (WIDTH VARIES, SEE DWG C-2.1)

EXISTING WETLAND DELINEATION BOUNDARY

PROPOSED CONSERVATION EASEMENT BOUNDARY

Facilities Management

South Lane

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	14+92
Pool Typical	14+46
Pool-Riffle Transition	14+41
Riffle Typical	14+36
Pool Typical	13+93
Pool-Riffle Transition	13+88
Riffle Typical	13+83
Pool Typical	13+64
Pool-Riffle Transition	13+59
Riffle Typical	13+54
Pool Typical	13+25
Pool-Riffle Transition	13+20
Riffle Typical	13+15
Pool Typical	12+85
Pool-Riffle Transition	12+80
Riffle Typical	12+75
Pool Typical	12+39
Pool-Riffle Transition	12+34
Riffle Typical	12+29
Pool Typical	12+11
Pool-Riffle Transition	12+06
Riffle Typical	12+01
Pool Typical	11+71
Pool-Riffle Transition	11+66
Riffle Typical	11+61
Pool Typical	11+10
Pool-Riffle Transition	11+05
Riffle Typical	11+00
Pool Typical	10+73
Pool-Riffle Transition	10+68
Riffle Typical	10+63

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

STRUCTURE LOCATIONS

LABEL	DETAIL	STATION
CS-1	Cross Vane	14+46
CS-2	Cross Vane	13+93
CS-3	Cross Vane	13+64
CS-4	Cross Vane	13+25
CS-5	Cross Vane	12+85
LV-1	Log Vane	12+39
LV-2	Log Vane	12+11
LV-3	Log Vane	11+71
LV-4	Log Vane	11+10
LV-5	Log Vane	10+73

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGA/S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-1 UPPER LAYOUT AND STRUCTURES PLAN

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-2.0

SHEET NO. 6 OF XX
PROJ. #: C71672-01.01

ONE INCH
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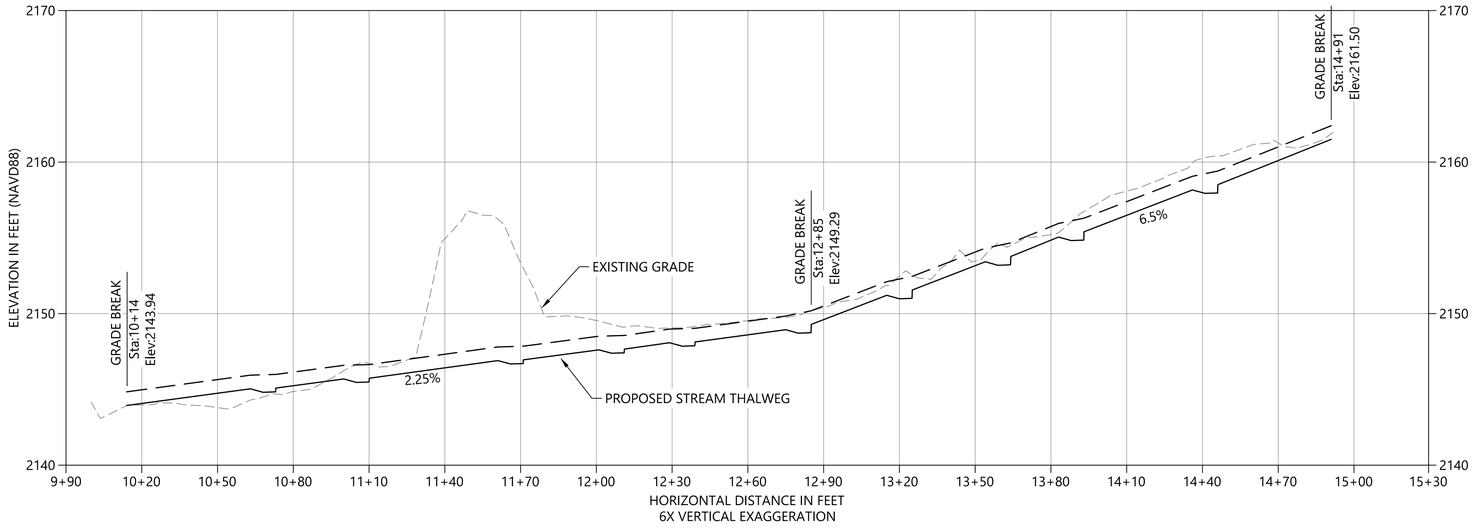

1 / - STREAM PROFILE
HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 5'

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	RIFFLE SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-1 UPPER - SHALLOW	10+14	12+85	2.25%	4.0	0.90	3:1	13.0
UT-1 UPPER - STEEP	12+85	14+92	6.50%	1.0	0.90	3:1	11.0

POOL CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	POOL SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	INSIDE OF BEND CHANNEL BANK SLOPES	OUTSIDE OF BEND CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-1 UPPER - ALL	10+14	14+92	0.50%	1.0	1.15	8:1	3:1	15.5

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGA/S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APPD	DESCRIPTION

UT-1 UPPER PROFILE AND SECTIONS

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-2.1

SHEET NO. 7 OF XX
PROJ. #: C71672-01.01

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DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

STOKES FIELD

Old Farm School Road

PROPOSED STREAM CHANNEL CENTERLINE

STA 15+00
END UT-3 LOWER RESTORATION
BEGIN UT-3 LOWER ENHANCEMENT II

EXISTING WETLAND DELINEATION BOUNDARY

PROPOSED CONSERVATION EASEMENT BOUNDARY

STA 10+00
BEGIN UT-3 LOWER RESTORATION

STA 18+34
END UT-3 LOWER ENHANCEMENT II
BEGIN UT-3 LOWER RESTORATION

MATCHLINE - SEE DWG C-3.1

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 30 60
SCALE IN FEET

UT-3 LOWER LAYOUT AND STRUCTURES PLAN 1

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-3.0

SHEET NO. 8 OF XX

PROJ. #: C71672-01.01

Jun 19, 2018 8:59am sstavinoha \\asheville1\asheville\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-Design-UT3_UT4.dwg 8 C-3.0

90% DESIGN SUBMITTAL

ONE INCH
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PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGAS/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE AS NOTED
DATE JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

OLD FARM SCHOOL RD

STOKES FIELD

MATCHLINE - SEE DWG C-3.0

STA 19+60
END UT-3 LOWER RESTORATION
BEGIN UT-3 LOWER ENHANCEMENT II

APPROXIMATELY 150' OF BANK STABILIZATION SEE DETAIL 2, DWG C-8.1

REMOVE LARGE TREE

APPROXIMATELY 25' OF BANK STABILIZATION SEE DETAIL 2, DWG C-8.1

REMOVE LARGE TREE

APPROXIMATELY 35' OF BANK STABILIZATION SEE DETAIL 2, DWG C-8.1

REMOVE LARGE TREE

APPROXIMATELY 45' OF BANK STABILIZATION SEE DETAIL 2, DWG C-8.1

APPROXIMATELY 35' OF BANK STABILIZATION SEE DETAIL 2, DWG C-8.1

REMOVE LARGE TREE

APPROXIMATELY 25' OF BANK STABILIZATION SEE DETAIL 2, DWG C-8.1

STA 26+81
END UT-3 LOWER ENHANCMENT II

EXISTING PATH

20+00 21+00 22+00 23+00 24+00 25+00 26+00 26+81

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 30 60
SCALE IN FEET

UT-3 LOWER LAYOUT AND STRUCTURES PLAN 2

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-3.1

SHEET NO. 9 OF XX
PROJ. #: C71672-01.01

Jun 19, 2018 8:59am sstavinoha \\asheville1\asheville\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-Design-UT3_UT4.dwg 9 C-3.1

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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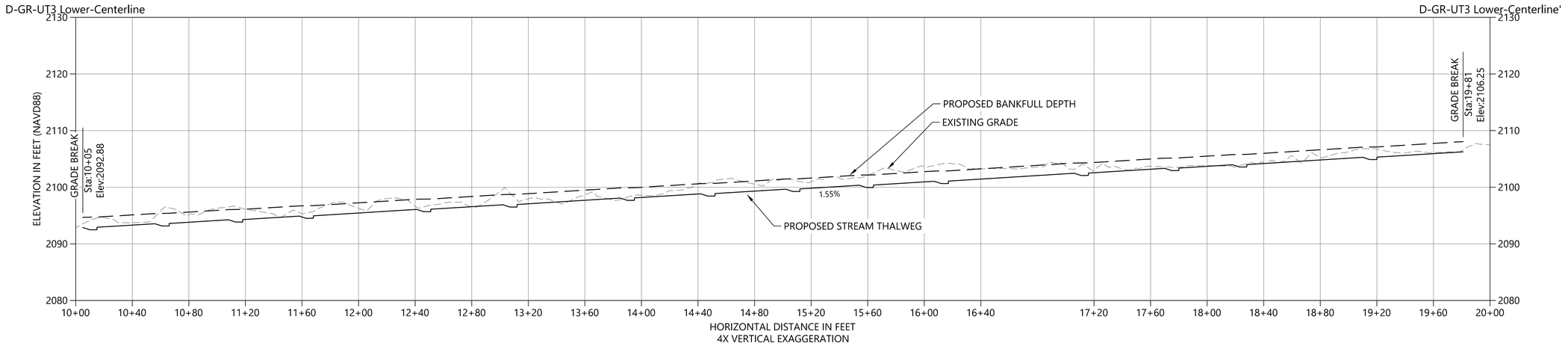

1 / - STREAM PROFILE
HORIZ. SCALE: 1" = 40'
VERT. SCALE: 1" = 10'

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE CROSS SECTION PARAMETERS							
REACH ID	STA BEG	STA END	RIFFLE SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-3 LOWER	10+05	19+81	1.55%	5.5	1.8	3:1	24.5

POOL CROSS SECTION PARAMETERS								
REACH ID	STA BEG	STA END	POOL SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	INSIDE OF BEND CHANNEL BANK SLOPES	OUTSIDE OF BEND CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-3 LOWER	10+05	19+81	0.14%	6.5	2.2	6:1	3:1	40.0

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: OCTOBER 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-3 LOWER PROFILE

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NORTH CAROLINA

C-3.2

10

PROJ. #: C71672-01.01

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ONE INCH
AT FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY

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DRAWN BY: T. GRIGAS/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
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231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APPD	DESCRIPTION

MATCHLINE - SEE DWG C-4.1

PROPERTY BOUNDARY (NOT SURVEYED)

STA 10+05
BEGIN UT-3 UPPER ENHANCEMENT II

STA 10+50
END UT-3 UPPER ENHANCEMENT II
BEGIN UT-3 UPPER RESTORATION

EXISTING WETLAND DELINEATION BOUNDARY

STREAM CHANNEL CENTERLINE

APPROXIMATE BANKFULL WIDTH THROUGH RIFFLES (WIDTH VARIES, SEE DWG C-4.2)

EXISTING FOOTBRIDGE TO BE RELOCATED IN ORDER TO PROVIDE PEDESTRIAN CROSSING OVER NEW CHANNEL AND MAINTAIN EXISTING PATHWAY.

FILL EXISTING CHANNEL

CONFLUENCE OF UT-3 UPPER AND UT-4
UT-4 STA 10+00 / UT-3 UPPER STA 18+56
BEGIN UT-4 RESTORATION

PROPOSED CONSERVATION EASEMENT BOUNDARY

EXISTING TREE AND VEGETATION (TYP.)

Riceville Road

LITTLE BEREA

CLINGMAN'S

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

UT-3 UPPER RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	31+66	Pool Typical	25+32	Pool Typical	18+28
Pool Typical	31+62	Pool-Riffle Transition	25+27	Pool-Riffle Transition	18+23
Pool-Riffle Transition	31+57	Riffle Typical	25+22	Riffle Typical	18+18
Riffle Typical	31+52	Pool Typical	24+76	Pool Typical	17+67
Pool Typical	31+06	Pool-Riffle Transition	24+71	Pool-Riffle Transition	17+62
Pool-Riffle Transition	31+01	Riffle Typical	24+66	Riffle Typical	17+57
Riffle Typical	30+96	Pool Typical	23+98	Pool Typical	17+01
Pool Typical	30+46	Pool-Riffle Transition	23+93	Pool-Riffle Transition	16+96
Pool-Riffle Transition	30+41	Riffle Typical	23+88	Riffle Typical	16+91
Riffle Typical	30+36	Pool Typical	23+50	Pool Typical	15+96
Pool Typical	29+93	Pool-Riffle Transition	23+45	Pool-Riffle Transition	15+91
Pool-Riffle Transition	29+88	Riffle Typical	23+40	Riffle Typical	15+86
Riffle Typical	29+83	Pool Typical	22+99	Pool Typical	15+28
Pool Typical	29+04	Pool-Riffle Transition	22+94	Pool-Riffle Transition	15+23
Pool-Riffle Transition	28+99	Riffle Typical	22+89	Riffle Typical	15+18
Riffle Typical	28+94	Pool Typical	21+94	Pool Typical	14+65
Pool Typical	28+47	Pool-Riffle Transition	21+89	Pool-Riffle Transition	14+60
Pool-Riffle Transition	28+42	Riffle Typical	21+84	Riffle Typical	14+55
Riffle Typical	28+37	Pool Typical	21+21	Pool Typical	13+70
Pool Typical	27+94	Pool-Riffle Transition	21+16	Pool-Riffle Transition	13+65
Pool-Riffle Transition	27+89	Riffle Typical	21+11	Riffle Typical	13+60
Riffle Typical	27+84	Pool Typical	20+40	Pool Typical	13+09
Pool Typical	27+34	Pool-Riffle Transition	20+35	Pool-Riffle Transition	13+04
Pool-Riffle Transition	27+29	Riffle Typical	20+30	Riffle Typical	12+99
Riffle Typical	27+24	Pool Typical	19+83	Pool Typical	12+56
Pool Typical	26+81	Pool-Riffle Transition	19+78	Pool-Riffle Transition	12+51
Pool-Riffle Transition	26+76	Riffle Typical	19+73	Riffle Typical	12+46
Riffle Typical	26+71	Pool Typical	19+25	Pool Typical	11+46
Pool Typical	26+19	Pool-Riffle Transition	19+20	Pool-Riffle Transition	11+41
Pool-Riffle Transition	26+14	Riffle Typical	19+15	Riffle Typical	11+36
Riffle Typical	26+09	Riffle Typical	18+56		

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

UT-3 UPPER STRUCTURE LOCATIONS

LABEL	DETAIL	STATION		LABEL	DETAIL	STATION
LS-1	Log Vane	31+62		LS-16	Log Vane	21+94
LS-2	Log Vane	31+06		LS-17	Log Vane	21+21
LS-3	Log Vane	30+46		LS-18	Log Vane	20+40
LS-4	Log Vane	29+93		LS-19	Log Vane	19+83
LS-5	Log Vane	29+04		LS-20	Log Vane	19+25
LS-6	Log Vane	28+47		LS-22	Log Vane	18+28
LS-7	Log Vane	27+94		LS-23	Log Vane	17+67
LS-8	Log Vane	27+34		LS-24	Log Vane	17+01
LS-9	Log Vane	26+81		LS-25	Log Vane	15+96
LS-10	Log Vane	26+19		LS-26	Log Vane	15+28
LS-11	Log Vane	25+32		LS-27	Log Vane	14+65
LS-12	Log Vane	24+76		LS-28	Log Vane	13+70
LS-13	Log Vane	23+98		LS-29	Log Vane	13+09
LS-14	Log Vane	23+50		LS-30	Log Vane	12+56
LS-15	Log Vane	22+99		LS-31	Log Vane	11+46

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

UT-4 RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	12+33
Pool Typical	12+20
Pool-Riffle Transition	12+15
Riffle Typical	12+10
Pool Typical	11+77
Pool-Riffle Transition	11+72
Riffle Typical	11+67
Pool Typical	11+32
Pool-Riffle Transition	11+27
Riffle Typical	11+22
Pool Typical	10+91
Pool-Riffle Transition	10+86
Riffle Typical	10+81
Pool Typical	10+63
Pool-Riffle Transition	10+58
Riffle Typical	10+53
Pool Typical	10+35
Pool-Riffle Transition	10+30
Riffle Typical	10+25
Confluence with UT-3	10+00

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

UT-4 STRUCTURE LOCATIONS

LABEL	DETAIL	STATION
CS-1	Cross Vane	12+20
CS-2	Cross Vane	11+77
CS-3	Cross Vane	11+32
CS-4	Cross Vane	10+91
CS-5	Cross Vane	10+63
CS-6	Cross Vane	10+35

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 40 80
SCALE IN FEET

UT-3 UPPER & UT-4 LAYOUT AND STRUCTURES PLAN 1

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-4.0

SHEET NO. 10 OF XX
PROJ. #: C71672-01.01

Jun 19, 2018 8:59am sstavinoha \\asheville\projects\Restoration System\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-Design-UT3_UT4.dwg 10 C-4.0

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY

Know what's below. Call before you dig.

PRELIMINARY NOT FOR CONSTRUCTION

PROPOSED CONSERVATION EASEMENT BOUNDARY
STREAM CHANNEL CENTERLINE
APPROXIMATE BANKFULL WIDTH THROUGH RIFFLES (WIDTH VARIES, SEE DWG C-4.2)
EXISTING WETLAND DELINEATION BOUNDARY
LITTLE BEREA
RELOCATE EXISTING WATER LINE TO NEW CROSSING (WORK PERFORMED BY OTHERS)
STA 31+66
END UT-3 UPPER RESTORATION
BEGIN UT-3 UPPER ENHANCEMENT I
EXISTING WOODEN BRIDGE TO BE REMOVED. CONTRACTOR TO DETERMINE ELIGIBILITY FOR RE-USE ON-SITE.
CLINGMAN'S
INSTALL PERMANENT CROSSING WITH CULVERT BURIED 12"
STA 32+28
END UT-3 UPPER ENHANCEMENT I
STA 12+33
END UT-4 RESTORATION
BEGIN UT-4 ENHANCEMENT II
INSTALL PERMANENT CROSSING WITH CULVERT BURIED 12"
MATCHLINE - SEE DWG C-4.0
STA 14+75
END UT-4 ENHANCEMENT II

LEGEND:

- EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 40 80
SCALE IN FEET

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

UT-4 RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	12+33
Pool Typical	12+20
Pool-Riffle Transition	12+15
Riffle Typical	12+10
Pool Typical	11+77
Pool-Riffle Transition	11+72
Riffle Typical	11+67
Pool Typical	11+32
Pool-Riffle Transition	11+27
Riffle Typical	11+22
Pool Typical	10+91
Pool-Riffle Transition	10+86
Riffle Typical	10+81
Pool Typical	10+63
Pool-Riffle Transition	10+58
Riffle Typical	10+53
Pool Typical	10+35
Pool-Riffle Transition	10+30
Riffle Typical	10+25
Confluence with UT-3	10+00

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

UT-4 STRUCTURE LOCATIONS

LABEL	DETAIL	STATION
CS-1	Cross Vane	12+20
CS-2	Cross Vane	11+77
CS-3	Cross Vane	11+32
CS-4	Cross Vane	10+91
CS-5	Cross Vane	10+63
CS-6	Cross Vane	10+35

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

UT-3 UPPER STRUCTURE LOCATIONS

LABEL	DETAIL	STATION	LABEL	DETAIL	STATION
LS-1	Log Vane	31+62	LS-16	Log Vane	21+94
LS-2	Log Vane	31+06	LS-17	Log Vane	21+21
LS-3	Log Vane	30+46	LS-18	Log Vane	20+40
LS-4	Log Vane	29+93	LS-19	Log Vane	19+83
LS-5	Log Vane	29+04	LS-20	Log Vane	19+25
LS-6	Log Vane	28+47	LS-22	Log Vane	18+28
LS-7	Log Vane	27+94	LS-23	Log Vane	17+67
LS-8	Log Vane	27+34	LS-24	Log Vane	17+01
LS-9	Log Vane	26+81	LS-25	Log Vane	15+96
LS-10	Log Vane	26+19	LS-26	Log Vane	15+28
LS-11	Log Vane	25+32	LS-27	Log Vane	14+65
LS-12	Log Vane	24+76	LS-28	Log Vane	13+70
LS-13	Log Vane	23+98	LS-29	Log Vane	13+09
LS-14	Log Vane	23+50	LS-30	Log Vane	12+56
LS-15	Log Vane	22+99	LS-31	Log Vane	11+46

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

UT-3 UPPER RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	31+66	Pool Typical	25+32	Pool Typical	18+28
Pool Typical	31+62	Pool-Riffle Transition	25+27	Pool-Riffle Transition	18+23
Pool-Riffle Transition	31+57	Riffle Typical	25+22	Riffle Typical	18+18
Riffle Typical	31+52	Pool Typical	24+76	Pool Typical	17+67
Pool Typical	31+06	Pool-Riffle Transition	24+71	Pool-Riffle Transition	17+62
Pool-Riffle Transition	31+01	Riffle Typical	24+66	Riffle Typical	17+57
Riffle Typical	30+96	Pool Typical	23+98	Pool Typical	17+01
Pool Typical	30+46	Pool-Riffle Transition	23+93	Pool-Riffle Transition	16+96
Pool-Riffle Transition	30+41	Riffle Typical	23+88	Riffle Typical	16+91
Riffle Typical	30+36	Pool Typical	23+50	Pool Typical	15+96
Pool Typical	29+93	Pool-Riffle Transition	23+45	Pool-Riffle Transition	15+91
Pool-Riffle Transition	29+88	Riffle Typical	23+40	Riffle Typical	15+86
Riffle Typical	29+83	Pool Typical	22+99	Pool Typical	15+28
Pool Typical	29+04	Pool-Riffle Transition	22+94	Pool-Riffle Transition	15+23
Pool-Riffle Transition	28+99	Riffle Typical	22+89	Riffle Typical	15+18
Riffle Typical	28+94	Pool Typical	21+94	Pool Typical	14+65
Pool Typical	28+47	Pool-Riffle Transition	21+89	Pool-Riffle Transition	14+60
Pool-Riffle Transition	28+42	Riffle Typical	21+84	Riffle Typical	14+55
Riffle Typical	28+37	Pool Typical	21+21	Pool Typical	13+70
Pool Typical	27+94	Pool-Riffle Transition	21+16	Pool-Riffle Transition	13+65
Pool-Riffle Transition	27+89	Riffle Typical	21+11	Riffle Typical	13+60
Riffle Typical	27+84	Pool Typical	20+40	Pool Typical	13+09
Pool Typical	27+34	Pool-Riffle Transition	20+35	Pool-Riffle Transition	13+04
Pool-Riffle Transition	27+29	Riffle Typical	20+30	Riffle Typical	12+99
Riffle Typical	27+24	Pool Typical	19+83	Pool Typical	12+56
Pool Typical	26+81	Pool-Riffle Transition	19+78	Pool-Riffle Transition	12+51
Pool-Riffle Transition	26+76	Riffle Typical	19+73	Riffle Typical	12+46
Riffle Typical	26+71	Pool Typical	19+25	Pool Typical	11+46
Pool Typical	26+19	Pool-Riffle Transition	19+20	Pool-Riffle Transition	11+41
Pool-Riffle Transition	26+14	Riffle Typical	19+15	Riffle Typical	11+36
Riffle Typical	26+09	Riffle Typical	18+56		

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGAS/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE AS NOTED
DATE JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REV	DATE	BY	APP'D	DESCRIPTION

UT-3 UPPER & UT-4 LAYOUT AND STRUCTURES PLAN 2

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-4.1

SHEET NO. 11 OF XX
PROJ. #: C71672-01.01

Jun 19, 2018 9:00am sstavinoha \\asheville\ashevillel\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-Design-UT3_UT4.dwg 11 C-4.1

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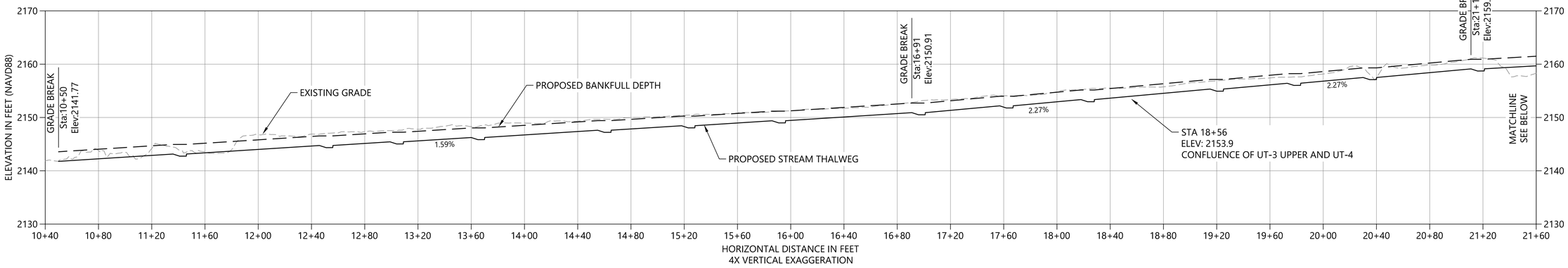

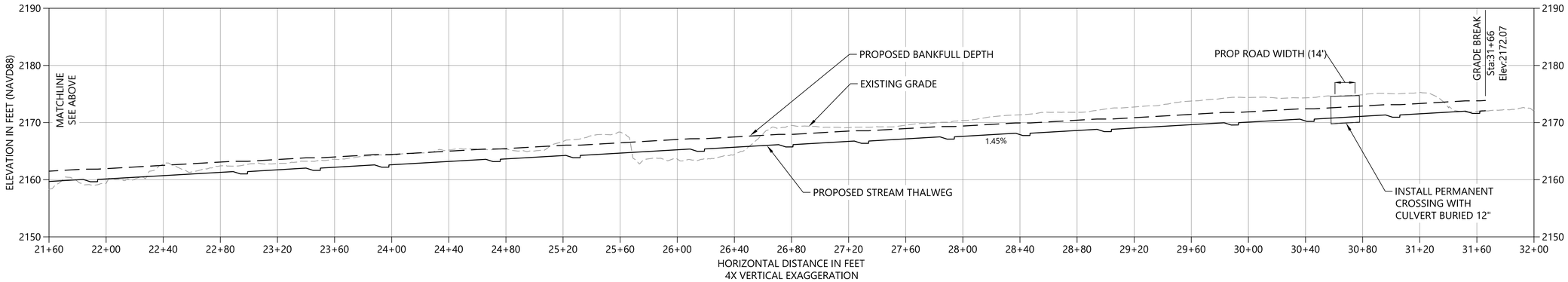

1 / - STREAM PROFILE
HORIZ. SCALE: 1" = 40'
VERT. SCALE: 1" = 10'

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	RIFFLE SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-3 UPPER - A	10+50	16+91	1.58%	5.5	1.8	3:1	24.5
UT-3 UPPER - B	16+91	18+56	2.27%	4.5	1.8	3:1	23.5
UT-3 UPPER - C	18+56	21+11	2.27%	2.5	1.8	3:1	21.0
UT-3 UPPER - D	21+11	31+66	1.45%	4.0	1.8	3:1	23.0

POOL CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	POOL SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	INSIDE OF BEND CHANNEL BANK SLOPES	OUTSIDE OF BEND CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-3 UPPER A-B	10+50	18+56	0.14%	6.5	2.2	6:1	3:1	40.0
UT-3 UPPER C-D	18+56	31+66	0.14%	4.0	2.2	5:1	3:1	37.0

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGA/S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
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Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-3 UPPER PROFILE AND SECTIONS

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-4.2

SHEET NO. 12 OF XX
PROJ. #: C71672-01.01

Jun 19, 2018 9:00am sstavinoha \\asheville\asheville\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-Design-UT3_UT4.dwg 12 C-4.2

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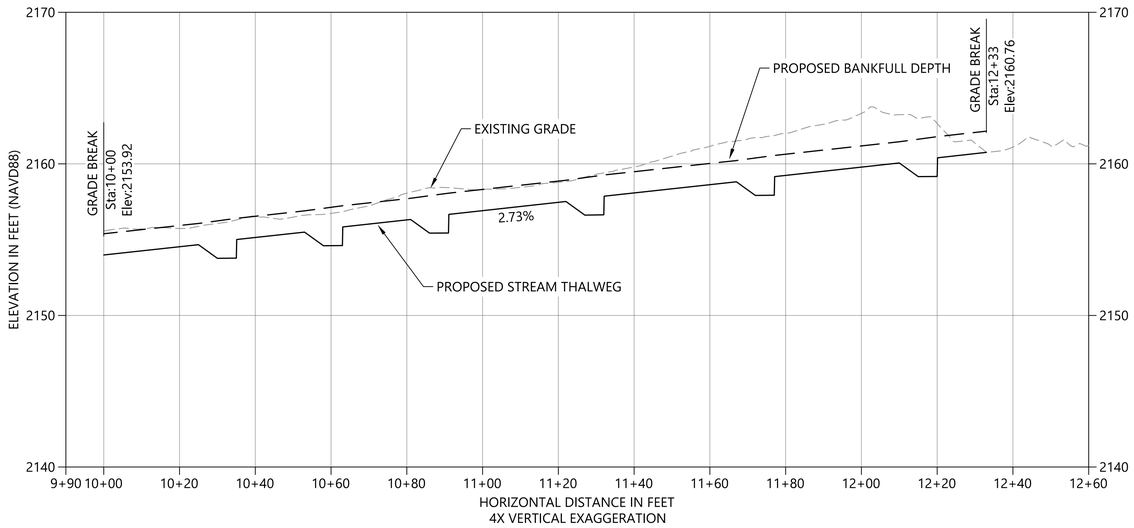

A / -

STREAM PROFILE

HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 5'

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	RIFFLE SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-4 ALL	10+00	12+33	2.73%	1.5	1.4	2:1	14.0

POOL CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	POOL SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	INSIDE OF BEND CHANNEL BANK SLOPES	OUTSIDE OF BEND CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-4 ALL	10+00	12+33	0.21%	1.5	2.3	2:1	2:1	22.5

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGAS,S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-4 UPPER PROFILE AND SECTIONS

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-4.3

SHEET NO. 13 OF XX
PROJ. #: C71672-01.01

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Know what's **below.** **Call** before you dig.

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL WIDTH (APPROXIMATE)
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 40 80
SCALE IN FEET

STA 10+00
BEGIN UT-5 ENHANCMENT II

STA 10+48
END UT-5 ENHANCEMENT II
BEGIN UT-5 RESTORATION

STA 10+84
TIE IN TO EXISTING IN-STREAM BEDROCK

PROPOSED CONSERVATION EASEMENT BOUNDARY

STA 13+42 TO 13+72
BREAK IN EASEMENT DUE TO EXISTING OVERHEAD UTILITY (LOCATION APPROXIMATE)

DAIRY BARN

FILL EXISTING CHANNEL

BALL FIELD

EX VEGETATION AND TREELINE (LOCATION APPROXIMATE)

EX LIVESTOCK WATERER TO REMAIN (LOCATION APPROXIMATE)

REMOVE EX CMP CULVERT

STREAM CHANNEL CENTERLINE

APPROXIMATE BANKFULL WIDTH THROUGH RIFFLES (WIDTH VARIES, SEE DWG C-5.1)

STA 21+58
END UT-5 RESTORATION

REMOVE EX DROP INLET AND INSTALL CONCRETE HEADWALL ON DOWNSTREAM END OF EX CMP.

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	21+59		Pool Typical	18+21		Pool-Riffle Transition	14+40
Pool Typical	21+11		Pool-Riffle Transition	18+16		Riffle Typical	14+35
Pool-Riffle Transition	21+06		Riffle Typical	18+11		Pool Typical	14+17
Riffle Typical	21+01		Pool Typical	17+89		Pool-Riffle Transition	14+12
Pool Typical	20+79		Pool-Riffle Transition	17+84		Riffle Typical	14+07
Pool-Riffle Transition	20+74		Riffle Typical	17+79		Pool Typical	13+80
Riffle Typical	20+69		Pool Typical	17+58		Pool-Riffle Transition	13+75
Pool Typical	20+47		Pool-Riffle Transition	17+53		Riffle Typical	13+70
Pool-Riffle Transition	20+42		Riffle Typical	17+48		Pool Typical	13+49
Riffle Typical	20+37		Pool Typical	17+07		Pool-Riffle Transition	13+44
Pool Typical	20+12		Pool-Riffle Transition	17+02		Riffle Typical	13+39
Pool-Riffle Transition	20+07		Riffle Typical	16+97		Pool Typical	13+13
Riffle Typical	20+02		Pool Typical	16+77		Pool-Riffle Transition	13+08
Pool Typical	19+76		Pool-Riffle Transition	16+72		Riffle Typical	13+03
Pool-Riffle Transition	19+71		Riffle Typical	16+67		Pool Typical	12+72
Riffle Typical	19+66		Pool Typical	16+20		Pool-Riffle Transition	12+67
Pool Typical	19+43		Pool-Riffle Transition	16+15		Riffle Typical	12+62
Pool-Riffle Transition	19+38		Riffle Typical	16+10		Pool Typical	12+23
Riffle Typical	19+33		Pool Typical	15+67		Pool-Riffle Transition	12+18
Pool Typical	19+06		Pool-Riffle Transition	15+62		Riffle Typical	12+13
Pool-Riffle Transition	19+01		Riffle Typical	15+57		Pool Typical	11+75
Riffle Typical	18+96		Pool Typical	15+12		Pool-Riffle Transition	11+70
Pool Typical	18+76		Pool-Riffle Transition	15+07		Riffle Typical	11+65
Pool-Riffle Transition	18+71		Riffle Typical	15+02		Pool Typical	11+35
Riffle Typical	18+66		Pool Typical	14+83		Pool-Riffle Transition	11+30
Pool Typical	18+50		Pool-Riffle Transition	14+78		Riffle Typical	11+25
Pool-Riffle Transition	18+45		Riffle Typical	14+73			
Riffle Typical	18+40		Pool Typical	14+45			

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

STRUCTURE LOCATIONS

LABEL	DETAIL	STATION		LABEL	DETAIL	STATION
CS-1	Cross Vane	21+11		CS-15	Cross Vane	16+20
CS-2	Cross Vane	20+79		CS-16	Cross Vane	15+67
CS-3	Cross Vane	20+47		CS-17	Cross Vane	15+12
CS-4	Cross Vane	20+12		CS-18	Cross Vane	14+83
CS-5	Cross Vane	19+76		CS-19	Cross Vane	14+45
CS-6	Cross Vane	19+43		CS-20	Cross Vane	14+17
CS-7	Cross Vane	19+06		CS-21	Cross Vane	13+80
CS-8	Cross Vane	18+76		CS-22	Cross Vane	13+49
CS-9	Cross Vane	18+50		CS-23	Cross Vane	13+13
CS-10	Cross Vane	18+21		CS-24	Cross Vane	12+72
CS-11	Cross Vane	17+89		CS-25	Cross Vane	12+23
CS-12	Cross Vane	17+58		CS-26	Cross Vane	11+75
CS-13	Cross Vane	17+07		CS-27	Cross Vane	11+35
CS-14	Cross Vane	16+77				

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGA/S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
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Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-5 LAYOUT AND STRUCTURES PLAN

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-5.0

SHEET NO. 14 OF XX
PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL

ONE INCH
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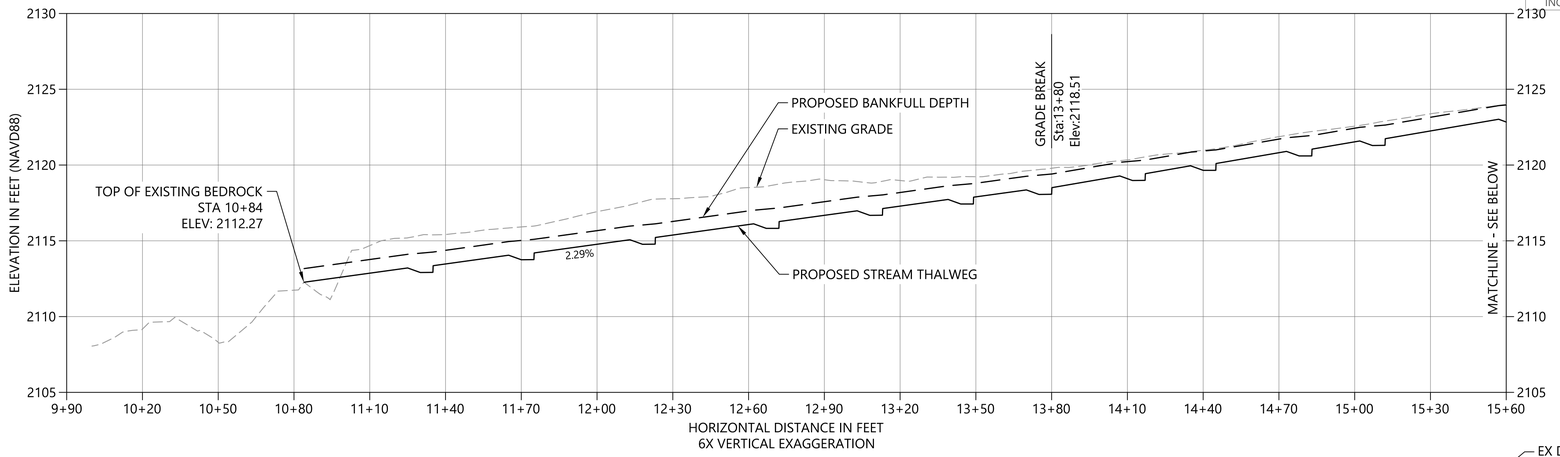
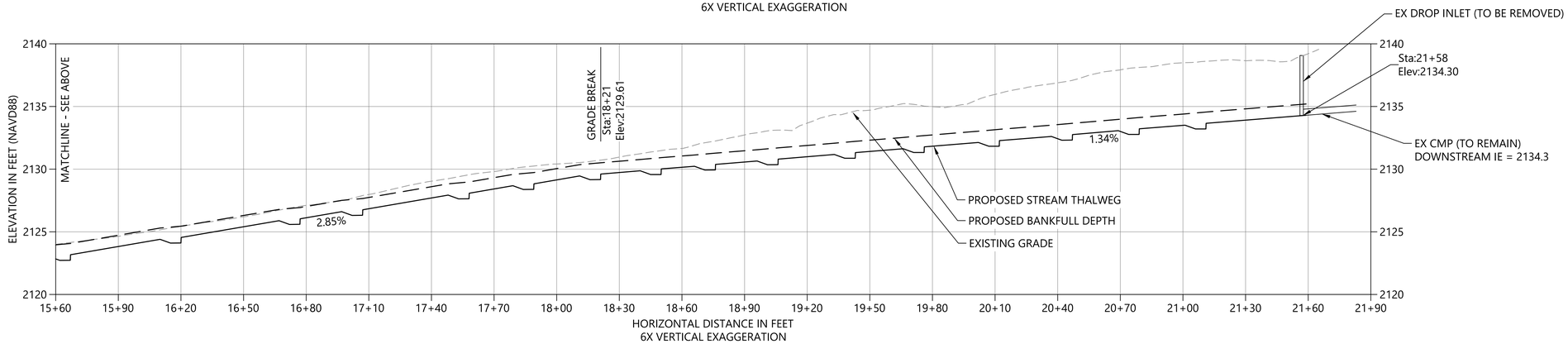




A
-
STREAM PROFILE
HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 5'

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	RIFFLE SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-5 LOWER	10+84	13+80	2.29%	2.5	0.9	3:1	12.0
UT-5 MIDDLE	13+80	18+21	2.85%	2.0	0.9	3:1	11.5
UT-5 UPPER	18+21	21+58	1.34%	3.5	0.9	3:1	13.0

POOL CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	POOL SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	INSIDE OF BEND CHANNEL BANK SLOPES	OUTSIDE OF BEND CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-5	10+84	21+58	0.13%	4.0	1.2	5:1	3:1	21.5

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGA/S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-5 PROFILE AND SECTIONS

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-5.1

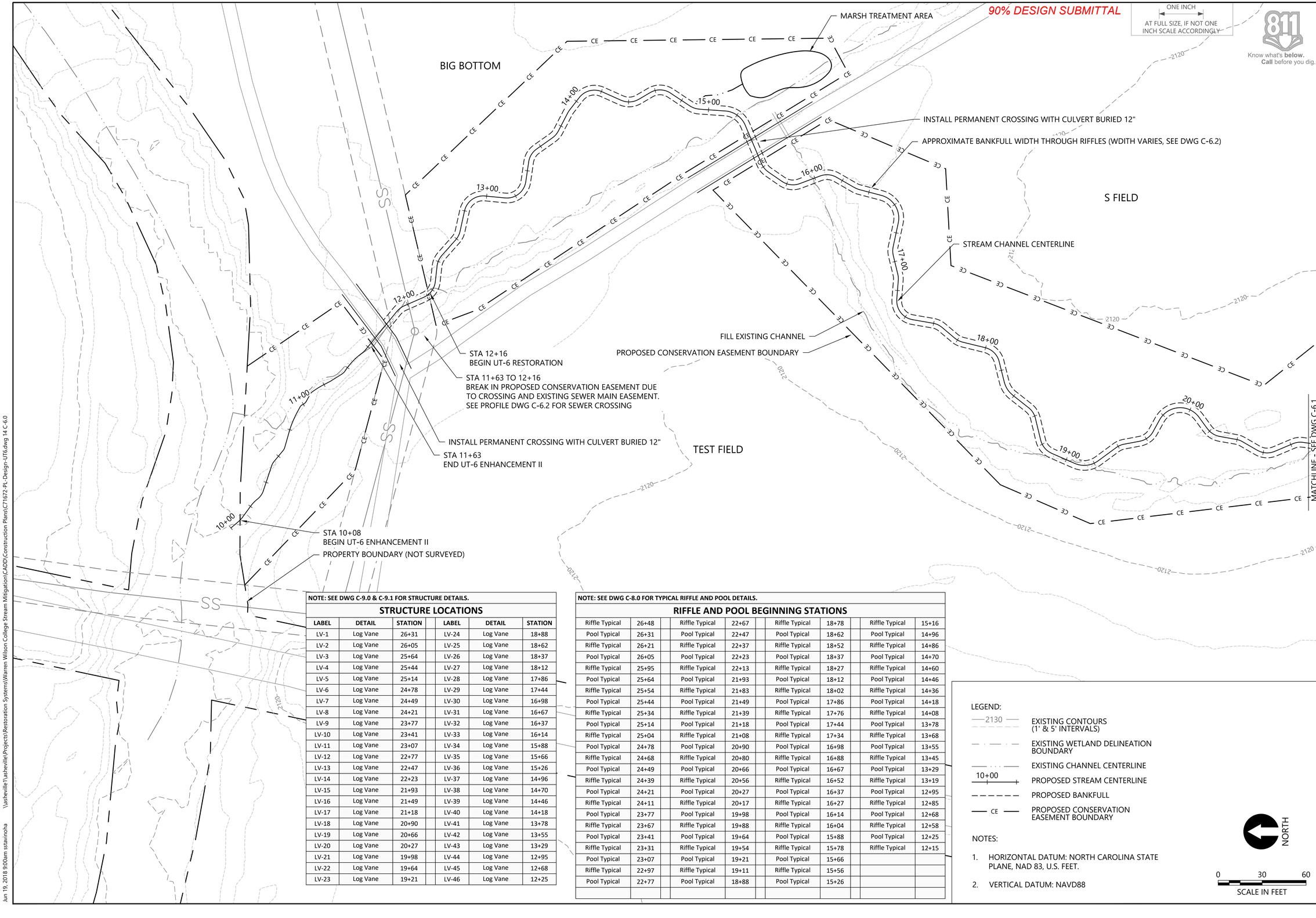
SHEET NO. 15 OF XX
PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's **below.** **Call** before you dig.

PRELIMINARY NOT FOR CONSTRUCTION



NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

STRUCTURE LOCATIONS

LABEL	DETAIL	STATION	LABEL	DETAIL	STATION
LV-1	Log Vane	26+31	LV-24	Log Vane	18+88
LV-2	Log Vane	26+05	LV-25	Log Vane	18+62
LV-3	Log Vane	25+64	LV-26	Log Vane	18+37
LV-4	Log Vane	25+44	LV-27	Log Vane	18+12
LV-5	Log Vane	25+14	LV-28	Log Vane	17+86
LV-6	Log Vane	24+78	LV-29	Log Vane	17+44
LV-7	Log Vane	24+49	LV-30	Log Vane	16+98
LV-8	Log Vane	24+21	LV-31	Log Vane	16+67
LV-9	Log Vane	23+77	LV-32	Log Vane	16+37
LV-10	Log Vane	23+41	LV-33	Log Vane	16+14
LV-11	Log Vane	23+07	LV-34	Log Vane	15+88
LV-12	Log Vane	22+77	LV-35	Log Vane	15+66
LV-13	Log Vane	22+47	LV-36	Log Vane	15+26
LV-14	Log Vane	22+23	LV-37	Log Vane	14+96
LV-15	Log Vane	21+93	LV-38	Log Vane	14+70
LV-16	Log Vane	21+49	LV-39	Log Vane	14+46
LV-17	Log Vane	21+18	LV-40	Log Vane	14+18
LV-18	Log Vane	20+90	LV-41	Log Vane	13+78
LV-19	Log Vane	20+66	LV-42	Log Vane	13+55
LV-20	Log Vane	20+27	LV-43	Log Vane	13+29
LV-21	Log Vane	19+98	LV-44	Log Vane	12+95
LV-22	Log Vane	19+64	LV-45	Log Vane	12+68
LV-23	Log Vane	19+21	LV-46	Log Vane	12+25

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	26+48	Riffle Typical	22+67	Riffle Typical	18+78	Riffle Typical	15+16
Pool Typical	26+31	Pool Typical	22+47	Pool Typical	18+62	Pool Typical	14+96
Riffle Typical	26+21	Riffle Typical	22+37	Riffle Typical	18+52	Riffle Typical	14+86
Pool Typical	26+05	Pool Typical	22+23	Pool Typical	18+37	Pool Typical	14+70
Riffle Typical	25+95	Riffle Typical	22+13	Riffle Typical	18+27	Riffle Typical	14+60
Pool Typical	25+64	Pool Typical	21+93	Pool Typical	18+12	Pool Typical	14+46
Riffle Typical	25+54	Riffle Typical	21+83	Riffle Typical	18+02	Riffle Typical	14+36
Pool Typical	25+44	Pool Typical	21+49	Pool Typical	17+86	Pool Typical	14+18
Riffle Typical	25+34	Riffle Typical	21+39	Riffle Typical	17+76	Riffle Typical	14+08
Pool Typical	25+14	Pool Typical	21+18	Pool Typical	17+44	Pool Typical	13+78
Riffle Typical	25+04	Riffle Typical	21+08	Riffle Typical	17+34	Riffle Typical	13+68
Pool Typical	24+78	Pool Typical	20+90	Pool Typical	16+98	Pool Typical	13+55
Riffle Typical	24+68	Riffle Typical	20+80	Riffle Typical	16+88	Riffle Typical	13+45
Pool Typical	24+49	Pool Typical	20+66	Pool Typical	16+67	Pool Typical	13+29
Riffle Typical	24+39	Riffle Typical	20+56	Riffle Typical	16+52	Riffle Typical	13+19
Pool Typical	24+21	Pool Typical	20+27	Pool Typical	16+37	Pool Typical	12+95
Riffle Typical	24+11	Riffle Typical	20+17	Riffle Typical	16+27	Riffle Typical	12+85
Pool Typical	23+77	Pool Typical	19+98	Pool Typical	16+14	Pool Typical	12+68
Riffle Typical	23+67	Riffle Typical	19+88	Riffle Typical	16+04	Riffle Typical	12+58
Pool Typical	23+41	Pool Typical	19+64	Pool Typical	15+88	Pool Typical	12+25
Riffle Typical	23+31	Riffle Typical	19+54	Riffle Typical	15+78	Riffle Typical	12+15
Pool Typical	23+07	Pool Typical	19+21	Pool Typical	15+66		
Riffle Typical	22+97	Riffle Typical	19+11	Riffle Typical	15+56		
Pool Typical	22+77	Pool Typical	18+88	Pool Typical	15+26		

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 30 60
SCALE IN FEET

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGA/S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REV	DATE	BY	APP'D	DESCRIPTION

UT-6 LAYOUT AND STRUCTURES PLAN 1

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-6.0

SHEET NO. 16 OF XX
PROJ. #: C71672-01.01

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	26+48		Riffle Typical	22+67		Riffle Typical	18+78		Riffle Typical	15+16
Pool Typical	26+31		Pool Typical	22+47		Pool Typical	18+62		Pool Typical	14+96
Riffle Typical	26+21		Riffle Typical	22+37		Riffle Typical	18+52		Riffle Typical	14+86
Pool Typical	26+05		Pool Typical	22+23		Pool Typical	18+37		Pool Typical	14+70
Riffle Typical	25+95		Riffle Typical	22+13		Riffle Typical	18+27		Riffle Typical	14+60
Pool Typical	25+64		Pool Typical	21+93		Pool Typical	18+12		Pool Typical	14+46
Riffle Typical	25+54		Riffle Typical	21+83		Riffle Typical	18+02		Riffle Typical	14+36
Pool Typical	25+44		Pool Typical	21+49		Pool Typical	17+86		Pool Typical	14+18
Riffle Typical	25+34		Riffle Typical	21+39		Riffle Typical	17+76		Riffle Typical	14+08
Pool Typical	25+14		Pool Typical	21+18		Pool Typical	17+44		Pool Typical	13+78
Riffle Typical	25+04		Riffle Typical	21+08		Riffle Typical	17+34		Riffle Typical	13+68
Pool Typical	24+78		Pool Typical	20+90		Pool Typical	16+98		Pool Typical	13+55
Riffle Typical	24+68		Riffle Typical	20+80		Riffle Typical	16+88		Riffle Typical	13+45
Pool Typical	24+49		Pool Typical	20+66		Pool Typical	16+67		Pool Typical	13+29
Riffle Typical	24+39		Riffle Typical	20+56		Riffle Typical	16+52		Riffle Typical	13+19
Pool Typical	24+21		Pool Typical	20+27		Pool Typical	16+37		Pool Typical	12+95
Riffle Typical	24+11		Riffle Typical	20+17		Riffle Typical	16+27		Riffle Typical	12+85
Pool Typical	23+77		Pool Typical	19+98		Pool Typical	16+14		Pool Typical	12+68
Riffle Typical	23+67		Riffle Typical	19+88		Riffle Typical	16+04		Riffle Typical	12+58
Pool Typical	23+41		Pool Typical	19+64		Pool Typical	15+88		Pool Typical	12+25
Riffle Typical	23+31		Riffle Typical	19+54		Riffle Typical	15+78		Riffle Typical	12+15
Pool Typical	23+07		Pool Typical	19+21		Pool Typical	15+66			
Riffle Typical	22+97		Riffle Typical	19+11		Riffle Typical	15+56			
Pool Typical	22+77		Pool Typical	18+88		Pool Typical	15+26			

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

STRUCTURE LOCATIONS

LABEL	DETAIL	STATION	LABEL	DETAIL	STATION
LV-1	Log Vane	26+31	LV-24	Log Vane	18+88
LV-2	Log Vane	26+05	LV-25	Log Vane	18+62
LV-3	Log Vane	25+64	LV-26	Log Vane	18+37
LV-4	Log Vane	25+44	LV-27	Log Vane	18+12
LV-5	Log Vane	25+14	LV-28	Log Vane	17+86
LV-6	Log Vane	24+78	LV-29	Log Vane	17+44
LV-7	Log Vane	24+49	LV-30	Log Vane	16+98
LV-8	Log Vane	24+21	LV-31	Log Vane	16+67
LV-9	Log Vane	23+77	LV-32	Log Vane	16+37
LV-10	Log Vane	23+41	LV-33	Log Vane	16+14
LV-11	Log Vane	23+07	LV-34	Log Vane	15+88
LV-12	Log Vane	22+77	LV-35	Log Vane	15+66
LV-13	Log Vane	22+47	LV-36	Log Vane	15+26
LV-14	Log Vane	22+23	LV-37	Log Vane	14+96
LV-15	Log Vane	21+93	LV-38	Log Vane	14+70
LV-16	Log Vane	21+49	LV-39	Log Vane	14+46
LV-17	Log Vane	21+18	LV-40	Log Vane	14+18
LV-18	Log Vane	20+90	LV-41	Log Vane	13+78
LV-19	Log Vane	20+66	LV-42	Log Vane	13+55
LV-20	Log Vane	20+27	LV-43	Log Vane	13+29
LV-21	Log Vane	19+98	LV-44	Log Vane	12+95
LV-22	Log Vane	19+64	LV-45	Log Vane	12+68
LV-23	Log Vane	19+21	LV-46	Log Vane	12+25

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 30 60
SCALE IN FEET

811 Know what's **below.** **Call** before you dig.

STA 26+48
END UT-6 RESTORATION
BEGIN UT-6 ENHANCEMENT II

STREAM CHANNEL CENTERLINE

APPROXIMATE BANKFULL WIDTH THROUGH RIFFLES (WIDTH VARIES, SEE DWG C-6.2)

MATCHLINE - SEE DWG C-6.1

EXISTING WETLAND DELINEATION BOUNDARY

PROPOSED CONSERVATION EASEMENT BOUNDARY

S FIELD

TEST FIELD

STA 31+43
END UT-6 ENHANCEMENT II

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGA/S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE AS NOTED
DATE JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-6 LAYOUT AND STRUCTURES PLAN 2

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

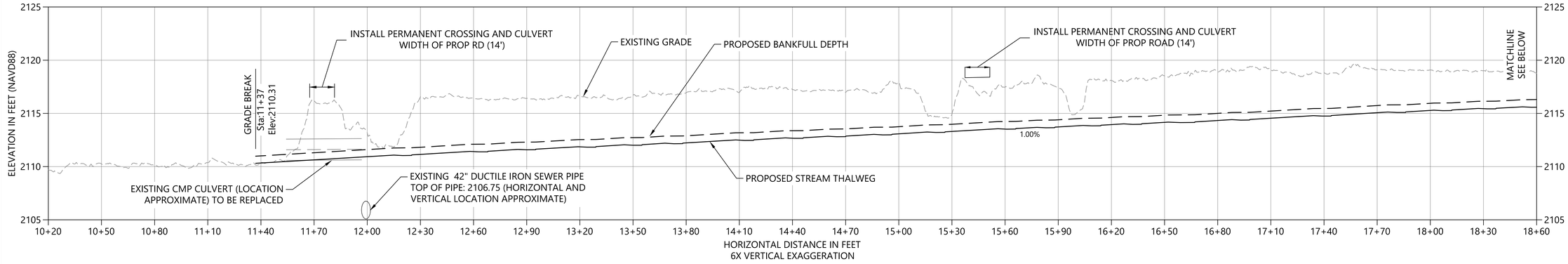
C-6.1

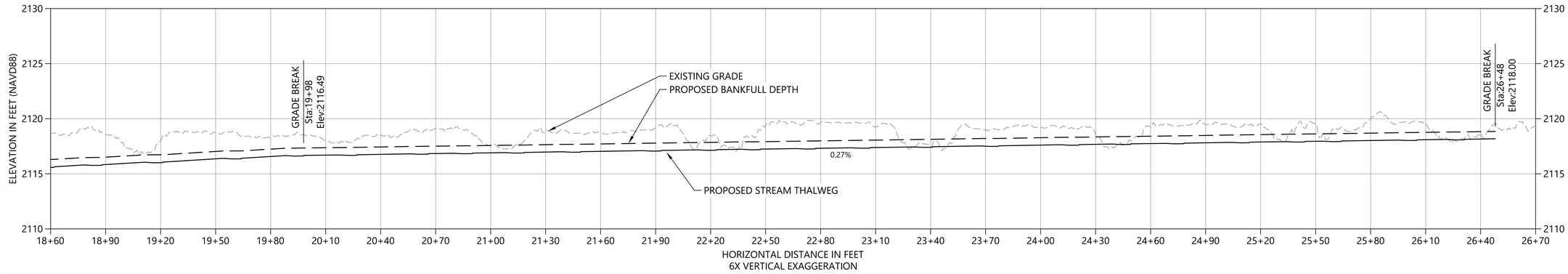
SHEET NO. 17 OF XX
PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

Know what's **below.** **Call** before you dig.





1 / - STREAM PROFILE
HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 5'

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

RIFFLE CROSS SECTION PARAMETERS							
REACH ID	**STA BEG**	**STA END**	**RIFFLE SLOPE**	**CHANNEL BOTTOM WIDTH (FT)**	**CHANNEL DEPTH (FT)**	**CHANNEL BANK SLOPES**	**MIN. FLOODPLAIN WIDTH (FT)**
UT-6 - STEEP	11+37	19+98	1.00%	2.0	0.85	3:1	7.75
UT-6 - SHALLOW	19+98	26+48	0.27%	5.5	0.85	3:1	12.0

POOL CROSS SECTION PARAMETERS								
REACH ID	**STA BEG**	**STA END**	**POOL SLOPE**	**CHANNEL BOTTOM WIDTH (FT)**	**CHANNEL DEPTH (FT)**	**INSIDE OF BEND CHANNEL BANK SLOPES**	**OUTSIDE OF BEND CHANNEL BANK SLOPES**	**MIN. FLOODPLAIN WIDTH (FT)**
UT-6 - ALL	11+37	26+48	0.15%	5.0	0.9	6:1	3:1	18.5

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GIESCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE AS NOTED
DATE JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-6 PROFILE AND SECTIONS

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-6.2

SHEET NO. 18 OF XX
PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 30 60
SCALE IN FEET

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's **below.** **Call** before you dig.

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

UT-7 STRUCTURE LOCATIONS

LABEL	DETAIL	STATION	LABEL	DETAIL	STATION
LV-1	Log Vane	29+57	LV-22	Log Vane	20+26
LV-2	Log Vane	29+03	LV-23	Log Vane	19+75
LV-3	Log Vane	28+48	LV-24	Log Vane	19+36
LV-4	Log Vane	27+96	LV-25	Log Vane	18+84
LV-5	Log Vane	27+40	LV-26	Log Vane	18+46
LV-6	Log Vane	26+85	LV-27	Log Vane	17+93
LV-7	Log Vane	26+50	LV-28	Log Vane	17+36
LV-8	Log Vane	25+92	LV-29	Log Vane	16+87
LV-9	Log Vane	25+57	LV-30	Log Vane	16+35
LV-10	Log Vane	25+16	LV-31	Log Vane	15+76
LV-11	Log Vane	24+52	LV-32	Log Vane	15+46
LV-12	Log Vane	24+18	LV-33	Log Vane	15+09
LV-13	Log Vane	23+85	LV-34	Log Vane	14+52
LV-14	Log Vane	23+50	LV-35	Log Vane	13+96
LV-15	Log Vane	23+13	LV-36	Log Vane	13+61
LV-16	Log Vane	22+72	LV-37	Log Vane	13+13
LV-17	Log Vane	22+37	LV-38	Log Vane	12+82
LV-18	Log Vane	22+06	LV-39	Log Vane	12+32
LV-19	Log Vane	21+57	LV-40	Log Vane	11+84
LV-20	Log Vane	21+01	LV-41	Log Vane	11+28
LV-21	Log Vane	20+65	LV-42	Log Vane	10+63

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

UT-8 STRUCTURE LOCATIONS

LABEL	DETAIL	STATION	LABEL	DETAIL	STATION
LV-1	Log Vane	20+41	LV-17	Log Vane	15+33
LV-2	Log Vane	20+05	LV-18	Log Vane	14+99
LV-3	Log Vane	19+82	LV-19	Log Vane	14+51
LV-4	Log Vane	19+36	LV-20	Log Vane	14+26
LV-5	Log Vane	19+11	LV-21	Log Vane	13+96
LV-6	Log Vane	18+83	LV-22	Log Vane	13+58
LV-7	Log Vane	18+58	LV-23	Log Vane	13+27
LV-8	Log Vane	18+25	LV-24	Log Vane	12+98
LV-9	Log Vane	17+96	LV-25	Log Vane	12+70
LV-10	Log Vane	17+52	CS-1	Cross Vane	12+41
LV-11	Log Vane	17+22	LV-27	Log Vane	12+19
LV-12	Log Vane	16+80	LV-28	Log Vane	11+90
LV-13	Log Vane	16+44	LV-29	Log Vane	11+43
LV-14	Log Vane	16+19	LV-30	Log Vane	10+97
LV-15	Log Vane	15+91	DS-1	Drop Structure	10+43
LV-16	Log Vane	15+63			

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

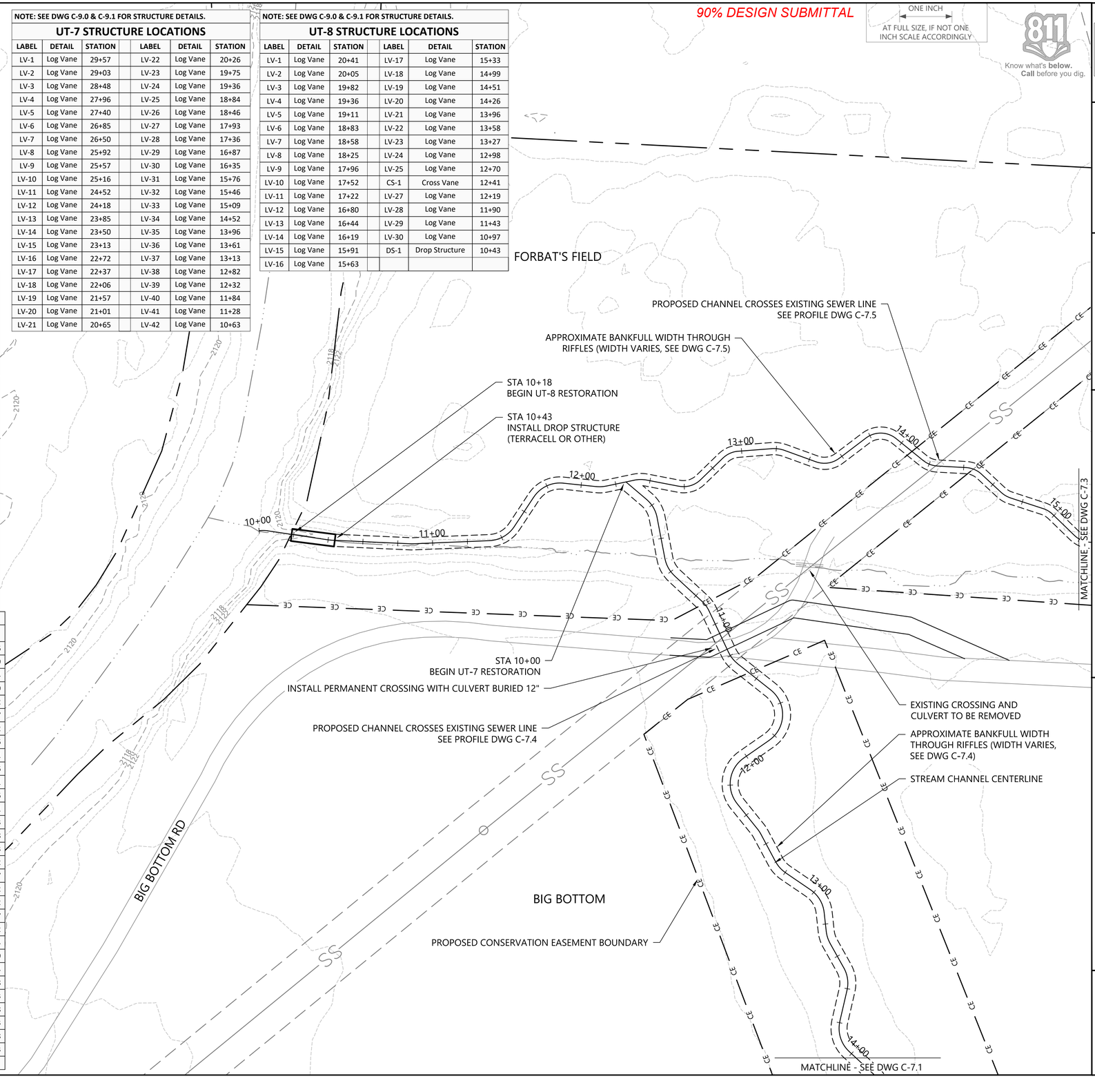
UT-8 RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	20+76	Pool-Riffle Transition	18+20	Pool Typical	15+63	Riffle Typical	13+17
Pool Typical	20+41	Riffle Typical	18+15	Pool-Riffle Transition	15+58	Pool Typical	12+98
Pool-Riffle Transition	20+36	Pool Typical	17+96	Riffle Typical	15+53	Pool-Riffle Transition	12+93
Riffle Typical	20+31	Pool-Riffle Transition	17+91	Pool Typical	15+33	Riffle Typical	12+88
Pool Typical	20+05	Riffle Typical	17+86	Pool-Riffle Transition	15+28	Pool Typical	12+70
Pool-Riffle Transition	20+00	Pool Typical	17+52	Riffle Typical	15+23	Pool-Riffle Transition	12+65
Riffle Typical	19+95	Pool-Riffle Transition	17+47	Pool Typical	14+99	Riffle Typical	12+60
Pool Typical	19+82	Riffle Typical	17+42	Pool-Riffle Transition	14+94	Pool Typical	12+41
Pool-Riffle Transition	19+77	Pool Typical	17+22	Riffle Typical	14+89	Pool-Riffle Transition	12+36
Riffle Typical	19+72	Pool-Riffle Transition	17+17	Pool Typical	14+51	Riffle Typical	12+31
Pool Typical	19+36	Riffle Typical	17+12	Pool-Riffle Transition	14+46	Pool Typical	12+19
Pool-Riffle Transition	19+31	Pool Typical	16+80	Riffle Typical	14+41	Pool-Riffle Transition	12+14
Riffle Typical	19+26	Pool-Riffle Transition	16+75	Pool Typical	14+26	Riffle Typical	12+09
Pool Typical	19+11	Riffle Typical	16+70	Pool-Riffle Transition	14+21	Pool Typical	11+90
Pool-Riffle Transition	19+06	Pool Typical	16+44	Riffle Typical	14+16	Pool-Riffle Transition	11+85
Riffle Typical	19+01	Pool-Riffle Transition	16+39	Pool Typical	13+96	Riffle Typical	11+80
Pool Typical	18+83	Riffle Typical	16+34	Pool-Riffle Transition	13+91	Pool Typical	11+43
Pool-Riffle Transition	18+78	Pool Typical	16+19	Riffle Typical	13+86	Pool-Riffle Transition	11+38
Riffle Typical	18+73	Pool-Riffle Transition	16+14	Pool Typical	13+58	Riffle Typical	11+33
Pool Typical	18+58	Riffle Typical	16+09	Pool-Riffle Transition	13+53	Pool Typical	10+97
Pool-Riffle Transition	18+53	Pool Typical	15+91	Riffle Typical	13+48	Pool-Riffle Transition	10+92
Riffle Typical	18+48	Pool-Riffle Transition	15+86	Pool Typical	13+27	Riffle Typical	10+87
Pool Typical	18+25	Riffle Typical	15+81	Pool-Riffle Transition	13+22		

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

UT-7 RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	29+85	Pool-Riffle Transition	24+47	Pool Typical	20+26	Riffle Typical	15+36
Pool Typical	29+57	Riffle Typical	24+42	Pool-Riffle Transition	20+21	Pool Typical	15+09
Pool-Riffle Transition	29+52	Pool Typical	24+18	Riffle Typical	20+16	Pool-Riffle Transition	15+04
Riffle Typical	29+47	Pool-Riffle Transition	24+13	Pool Typical	19+75	Riffle Typical	14+99
Pool Typical	29+03	Riffle Typical	24+08	Pool-Riffle Transition	19+70	Pool Typical	14+52
Pool-Riffle Transition	28+98	Pool Typical	23+85	Riffle Typical	19+65	Pool-Riffle Transition	14+47
Riffle Typical	28+93	Pool-Riffle Transition	23+80	Pool Typical	19+36	Riffle Typical	14+42
Pool Typical	28+48	Riffle Typical	23+75	Pool-Riffle Transition	19+31	Pool Typical	13+96
Pool-Riffle Transition	28+43	Pool Typical	23+50	Riffle Typical	19+26	Pool-Riffle Transition	13+91
Riffle Typical	28+38	Pool-Riffle Transition	23+45	Pool Typical	18+84	Riffle Typical	13+86
Pool Typical	27+96	Riffle Typical	23+40	Pool-Riffle Transition	18+79	Pool Typical	13+61
Pool-Riffle Transition	27+91	Pool Typical	23+13	Riffle Typical	18+74	Pool-Riffle Transition	13+56
Riffle Typical	27+86	Pool-Riffle Transition	23+08	Pool Typical	18+46	Riffle Typical	13+51
Pool Typical	27+40	Riffle Typical	23+03	Pool-Riffle Transition	18+41	Pool Typical	13+13
Pool-Riffle Transition	27+35	Pool Typical	22+72	Riffle Typical	18+36	Pool-Riffle Transition	13+08
Riffle Typical	27+30	Pool-Riffle Transition	22+67	Pool Typical	17+93	Riffle Typical	13+03
Pool Typical	26+85	Riffle Typical	22+62	Pool-Riffle Transition	17+88	Pool Typical	12+82
Pool-Riffle Transition	26+80	Pool Typical	22+37	Riffle Typical	17+83	Pool-Riffle Transition	12+77
Riffle Typical	26+75	Pool-Riffle Transition	22+32	Pool Typical	17+36	Riffle Typical	12+72
Pool Typical	26+50	Riffle Typical	22+27	Pool-Riffle Transition	17+31	Pool Typical	12+32
Pool-Riffle Transition	26+45	Pool Typical	22+06	Riffle Typical	17+26	Pool-Riffle Transition	12+27
Riffle Typical	26+40	Pool-Riffle Transition	22+01	Pool Typical	16+87	Riffle Typical	12+22
Pool Typical	25+92	Riffle Typical	21+96	Pool-Riffle Transition	16+82	Pool Typical	11+84
Pool-Riffle Transition	25+87	Pool Typical	21+57	Riffle Typical	16+77	Pool-Riffle Transition	11+79
Riffle Typical	25+82	Pool-Riffle Transition	21+52	Pool Typical	16+35	Riffle Typical	11+74
Pool Typical	25+57	Riffle Typical	21+47	Pool-Riffle Transition	16+30	Pool Typical	11+28
Pool-Riffle Transition	25+52	Pool Typical	21+01	Riffle Typical	16+25	Pool-Riffle Transition	11+23
Riffle Typical	25+47	Pool-Riffle Transition	20+96	Pool Typical	15+76	Riffle Typical	11+18
Pool Typical	25+16	Riffle Typical	20+91	Pool-Riffle Transition	15+71	Pool Typical	10+63
Pool-Riffle Transition	25+11	Pool Typical	20+65	Riffle Typical	15+66	Pool-Riffle Transition	10+58
Riffle Typical	25+06	Pool-Riffle Transition	20+60	Pool Typical	15+46	Riffle Typical	10+53
Pool Typical	24+52	Riffle Typical	20+55	Pool-Riffle Transition	15+41		



PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REV	DATE	BY	APP'D	DESCRIPTION

REVISIONS

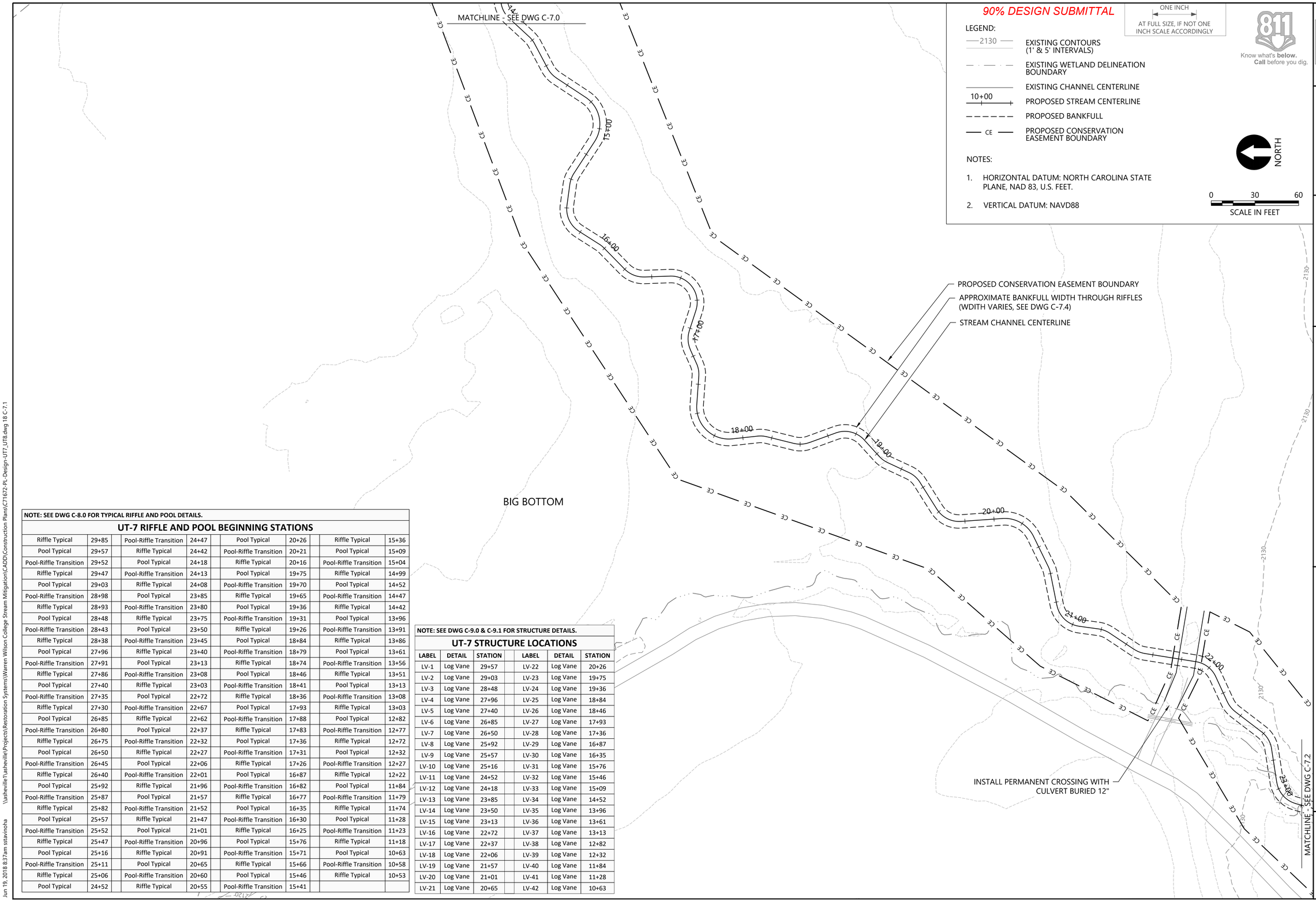
UT-7 & UT-8 LAYOUT AND STRUCTURES PLAN 1

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-7.0

SHEET NO. 19 OF XX
PROJ. #: C71672-01.01

Jun 19, 2018 8:36am sstavinoha \\asheville1\asheville\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-Design-UT7_UT8.dwg 17 C-7.0



NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

UT-7 RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	29+85		Pool-Riffle Transition	24+47		Pool Typical	20+26		Riffle Typical	15+36
Pool Typical	29+57		Riffle Typical	24+42		Pool-Riffle Transition	20+21		Pool Typical	15+09
Pool-Riffle Transition	29+52		Pool Typical	24+18		Riffle Typical	20+16		Pool-Riffle Transition	15+04
Riffle Typical	29+47		Pool-Riffle Transition	24+13		Pool Typical	19+75		Riffle Typical	14+99
Pool Typical	29+03		Riffle Typical	24+08		Pool-Riffle Transition	19+70		Pool Typical	14+52
Pool-Riffle Transition	28+98		Pool Typical	23+85		Riffle Typical	19+65		Pool-Riffle Transition	14+47
Riffle Typical	28+93		Pool-Riffle Transition	23+80		Pool Typical	19+36		Riffle Typical	14+42
Pool Typical	28+48		Riffle Typical	23+75		Pool-Riffle Transition	19+31		Pool Typical	13+96
Pool-Riffle Transition	28+43		Pool Typical	23+50		Riffle Typical	19+26		Pool-Riffle Transition	13+91
Riffle Typical	28+38		Pool-Riffle Transition	23+45		Pool Typical	18+84		Riffle Typical	13+86
Pool Typical	27+96		Riffle Typical	23+40		Pool-Riffle Transition	18+79		Pool Typical	13+61
Pool-Riffle Transition	27+91		Pool Typical	23+13		Riffle Typical	18+74		Pool-Riffle Transition	13+56
Riffle Typical	27+86		Pool-Riffle Transition	23+08		Pool Typical	18+46		Riffle Typical	13+51
Pool Typical	27+40		Riffle Typical	23+03		Pool-Riffle Transition	18+41		Pool Typical	13+13
Pool-Riffle Transition	27+35		Pool Typical	22+72		Riffle Typical	18+36		Pool-Riffle Transition	13+08
Riffle Typical	27+30		Pool-Riffle Transition	22+67		Pool Typical	17+93		Riffle Typical	13+03
Pool Typical	26+85		Riffle Typical	22+62		Pool-Riffle Transition	17+88		Pool Typical	12+82
Pool-Riffle Transition	26+80		Pool Typical	22+37		Riffle Typical	17+83		Pool-Riffle Transition	12+77
Riffle Typical	26+75		Pool-Riffle Transition	22+32		Pool Typical	17+36		Riffle Typical	12+72
Pool Typical	26+50		Riffle Typical	22+27		Pool-Riffle Transition	17+31		Pool Typical	12+32
Pool-Riffle Transition	26+45		Pool Typical	22+06		Riffle Typical	17+26		Pool-Riffle Transition	12+27
Riffle Typical	26+40		Pool-Riffle Transition	22+01		Pool Typical	16+87		Riffle Typical	12+22
Pool Typical	25+92		Riffle Typical	21+96		Pool-Riffle Transition	16+82		Pool Typical	11+84
Pool-Riffle Transition	25+87		Pool Typical	21+57		Riffle Typical	16+77		Pool-Riffle Transition	11+79
Riffle Typical	25+82		Pool-Riffle Transition	21+52		Pool Typical	16+35		Riffle Typical	11+74
Pool Typical	25+57		Riffle Typical	21+47		Pool-Riffle Transition	16+30		Pool Typical	11+28
Pool-Riffle Transition	25+52		Pool Typical	21+01		Riffle Typical	16+25		Pool-Riffle Transition	11+23
Riffle Typical	25+47		Pool-Riffle Transition	20+96		Pool Typical	15+76		Riffle Typical	11+18
Pool Typical	25+16		Riffle Typical	20+91		Pool-Riffle Transition	15+71		Pool Typical	10+63
Pool-Riffle Transition	25+11		Pool Typical	20+65		Riffle Typical	15+66		Pool-Riffle Transition	10+58
Riffle Typical	25+06		Pool-Riffle Transition	20+60		Pool Typical	15+46		Riffle Typical	10+53
Pool Typical	24+52		Riffle Typical	20+55		Pool-Riffle Transition	15+41			

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

UT-7 STRUCTURE LOCATIONS

LABEL	DETAIL	STATION	LABEL	DETAIL	STATION
LV-1	Log Vane	29+57	LV-22	Log Vane	20+26
LV-2	Log Vane	29+03	LV-23	Log Vane	19+75
LV-3	Log Vane	28+48	LV-24	Log Vane	19+36
LV-4	Log Vane	27+96	LV-25	Log Vane	18+84
LV-5	Log Vane	27+40	LV-26	Log Vane	18+46
LV-6	Log Vane	26+85	LV-27	Log Vane	17+93
LV-7	Log Vane	26+50	LV-28	Log Vane	17+36
LV-8	Log Vane	25+92	LV-29	Log Vane	16+87
LV-9	Log Vane	25+57	LV-30	Log Vane	16+35
LV-10	Log Vane	25+16	LV-31	Log Vane	15+76
LV-11	Log Vane	24+52	LV-32	Log Vane	15+46
LV-12	Log Vane	24+18	LV-33	Log Vane	15+09
LV-13	Log Vane	23+85	LV-34	Log Vane	14+52
LV-14	Log Vane	23+50	LV-35	Log Vane	13+96
LV-15	Log Vane	23+13	LV-36	Log Vane	13+61
LV-16	Log Vane	22+72	LV-37	Log Vane	13+13
LV-17	Log Vane	22+37	LV-38	Log Vane	12+82
LV-18	Log Vane	22+06	LV-39	Log Vane	12+32
LV-19	Log Vane	21+57	LV-40	Log Vane	11+84
LV-20	Log Vane	21+01	LV-41	Log Vane	11+28
LV-21	Log Vane	20+65	LV-42	Log Vane	10+63

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
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Asheville, North Carolina 28801
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REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-7 LAYOUT AND STRUCTURES PLAN 2

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-7.1

SHEET NO. 19 OF XX
PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's **below.** **Call** before you dig.

PRELIMINARY NOT FOR CONSTRUCTION

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 30 60
SCALE IN FEET

MATCHLINE - SEE DWG C-7.1

PROPOSED CONSERVATION EASEMENT BOUNDARY

APPROXIMATE BANKFULL WIDTH THROUGH RIFFLES (WIDTH VARIES, SEE DWG C-7.4)

STREAM CHANNEL CENTERLINE

PROPERTY BOUNDARY (NOT SURVEYED)

24+00 25+00 26+00 27+00 28+00 29+00 29+85

STA 29+85
END UT-7 RESTORATION

CHARLIE'S

RED BARN

WARREN WILSON RD

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

UT-7 RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	29+85	Pool-Riffle Transition	24+47	Pool Typical	20+26	Riffle Typical	15+36
Pool Typical	29+57	Riffle Typical	24+42	Pool-Riffle Transition	20+21	Pool Typical	15+09
Pool-Riffle Transition	29+52	Pool Typical	24+18	Riffle Typical	20+16	Pool-Riffle Transition	15+04
Riffle Typical	29+47	Pool-Riffle Transition	24+13	Pool Typical	19+75	Riffle Typical	14+99
Pool Typical	29+03	Riffle Typical	24+08	Pool-Riffle Transition	19+70	Pool Typical	14+52
Pool-Riffle Transition	28+98	Pool Typical	23+85	Riffle Typical	19+65	Pool-Riffle Transition	14+47
Riffle Typical	28+93	Pool-Riffle Transition	23+80	Pool Typical	19+36	Riffle Typical	14+42
Pool Typical	28+48	Riffle Typical	23+75	Pool-Riffle Transition	19+31	Pool Typical	13+96
Pool-Riffle Transition	28+43	Pool Typical	23+50	Riffle Typical	19+26	Pool-Riffle Transition	13+91
Riffle Typical	28+38	Pool-Riffle Transition	23+45	Pool Typical	18+84	Riffle Typical	13+86
Pool Typical	27+96	Riffle Typical	23+40	Pool-Riffle Transition	18+79	Pool Typical	13+61
Pool-Riffle Transition	27+91	Pool Typical	23+13	Riffle Typical	18+74	Pool-Riffle Transition	13+56
Riffle Typical	27+86	Pool-Riffle Transition	23+08	Pool Typical	18+46	Riffle Typical	13+51
Pool Typical	27+40	Riffle Typical	23+03	Pool-Riffle Transition	18+41	Pool Typical	13+13
Pool-Riffle Transition	27+35	Pool Typical	22+72	Riffle Typical	18+36	Pool-Riffle Transition	13+08
Riffle Typical	27+30	Pool-Riffle Transition	22+67	Pool Typical	17+93	Riffle Typical	13+03
Pool Typical	26+85	Riffle Typical	22+62	Pool-Riffle Transition	17+88	Pool Typical	12+82
Pool-Riffle Transition	26+80	Pool Typical	22+37	Riffle Typical	17+83	Pool-Riffle Transition	12+77
Riffle Typical	26+75	Pool-Riffle Transition	22+32	Pool Typical	17+36	Riffle Typical	12+72
Pool Typical	26+50	Riffle Typical	22+27	Pool-Riffle Transition	17+31	Pool Typical	12+32
Pool-Riffle Transition	26+45	Pool Typical	22+06	Riffle Typical	17+26	Pool-Riffle Transition	12+27
Riffle Typical	26+40	Pool-Riffle Transition	22+01	Pool Typical	16+87	Riffle Typical	12+22
Pool Typical	25+92	Riffle Typical	21+96	Pool-Riffle Transition	16+82	Pool Typical	11+84
Pool-Riffle Transition	25+87	Pool Typical	21+57	Riffle Typical	16+77	Pool-Riffle Transition	11+79
Riffle Typical	25+82	Pool-Riffle Transition	21+52	Pool Typical	16+35	Riffle Typical	11+74
Pool Typical	25+57	Riffle Typical	21+47	Pool-Riffle Transition	16+30	Pool Typical	11+28
Pool-Riffle Transition	25+52	Pool Typical	21+01	Riffle Typical	16+25	Pool-Riffle Transition	11+23
Riffle Typical	25+47	Pool-Riffle Transition	20+96	Pool Typical	15+76	Riffle Typical	11+18
Pool Typical	25+16	Riffle Typical	20+91	Pool-Riffle Transition	15+71	Pool Typical	10+63
Pool-Riffle Transition	25+11	Pool Typical	20+65	Riffle Typical	15+66	Pool-Riffle Transition	10+58
Riffle Typical	25+06	Pool-Riffle Transition	20+60	Pool Typical	15+46	Riffle Typical	10+53
Pool Typical	24+52	Riffle Typical	20+55	Pool-Riffle Transition	15+41		

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

UT-7 STRUCTURE LOCATIONS

LABEL	DETAIL	STATION	LABEL	DETAIL	STATION
LV-1	Log Vane	29+57	LV-22	Log Vane	20+26
LV-2	Log Vane	29+03	LV-23	Log Vane	19+75
LV-3	Log Vane	28+48	LV-24	Log Vane	19+36
LV-4	Log Vane	27+96	LV-25	Log Vane	18+84
LV-5	Log Vane	27+40	LV-26	Log Vane	18+46
LV-6	Log Vane	26+85	LV-27	Log Vane	17+93
LV-7	Log Vane	26+50	LV-28	Log Vane	17+36
LV-8	Log Vane	25+92	LV-29	Log Vane	16+87
LV-9	Log Vane	25+57	LV-30	Log Vane	16+35
LV-10	Log Vane	25+16	LV-31	Log Vane	15+76
LV-11	Log Vane	24+52	LV-32	Log Vane	15+46
LV-12	Log Vane	24+18	LV-33	Log Vane	15+09
LV-13	Log Vane	23+85	LV-34	Log Vane	14+52
LV-14	Log Vane	23+50	LV-35	Log Vane	13+96
LV-15	Log Vane	23+13	LV-36	Log Vane	13+61
LV-16	Log Vane	22+72	LV-37	Log Vane	13+13
LV-17	Log Vane	22+37	LV-38	Log Vane	12+82
LV-18	Log Vane	22+06	LV-39	Log Vane	12+32
LV-19	Log Vane	21+57	LV-40	Log Vane	11+84
LV-20	Log Vane	21+01	LV-41	Log Vane	11+28
LV-21	Log Vane	20+65	LV-42	Log Vane	10+63

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE AS NOTED
DATE JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APPD	DESCRIPTION

UT-7 LAYOUT AND STRUCTURES PLAN 3

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-7.1

SHEET NO. 19 OF XX
PROJ. #: C71672-01.01

Jun 19, 2018 8:37am sstavinoha \\ashleville1\ashleville\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-Design-UT7_UT8.dwg 19 C-7.2

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's **below.** **Call** before you dig.

PRELIMINARY NOT FOR CONSTRUCTION

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- EXISTING WETLAND DELINEATION BOUNDARY
- EXISTING CHANNEL CENTERLINE
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL
- CE — PROPOSED CONSERVATION EASEMENT BOUNDARY

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 30 60
SCALE IN FEET

STA 20+65
END UT-8 RESTORATION

20+76

APPROXIMATE BANKFULL WIDTH THROUGH RIFFLES (WIDTH VARIES, SEE DWG C-7.5)

19+00

20+00

17+00

18+00

16+00

MATCHLINE - SEE DWG C-7.0

FILL EXISTING CHANNEL

PROPERTY BOUNDARY (NOT SURVEYED)

EXISTING CROSSING AND CULVERT TO BE REMOVED

PROPOSED CONSERVATION EASEMENT BOUNDARY

2130 2140

NOTE: SEE DWG C-9.0 & C-9.1 FOR STRUCTURE DETAILS.

UT-8 STRUCTURE LOCATIONS

LABEL	DETAIL	STATION	LABEL	DETAIL	STATION
LV-1	Log Vane	20+41	LV-17	Log Vane	15+33
LV-2	Log Vane	20+05	LV-18	Log Vane	14+99
LV-3	Log Vane	19+82	LV-19	Log Vane	14+51
LV-4	Log Vane	19+36	LV-20	Log Vane	14+26
LV-5	Log Vane	19+11	LV-21	Log Vane	13+96
LV-6	Log Vane	18+83	LV-22	Log Vane	13+58
LV-7	Log Vane	18+58	LV-23	Log Vane	13+27
LV-8	Log Vane	18+25	LV-24	Log Vane	12+98
LV-9	Log Vane	17+96	LV-25	Log Vane	12+70
LV-10	Log Vane	17+52	CS-1	Cross Vane	12+41
LV-11	Log Vane	17+22	LV-27	Log Vane	12+19
LV-12	Log Vane	16+80	LV-28	Log Vane	11+90
LV-13	Log Vane	16+44	LV-29	Log Vane	11+43
LV-14	Log Vane	16+19	LV-30	Log Vane	10+97
LV-15	Log Vane	15+91	DS-1	Drop Structure	10+43
LV-16	Log Vane	15+63			

NOTE: SEE DWG C-8.0 FOR TYPICAL RIFFLE AND POOL DETAILS.

UT-8 RIFFLE AND POOL BEGINNING STATIONS

Riffle Typical	20+76	Pool-Riffle Transition	18+20	Pool Typical	15+63	Riffle Typical	13+17
Pool Typical	20+41	Riffle Typical	18+15	Pool-Riffle Transition	15+58	Pool Typical	12+98
Pool-Riffle Transition	20+36	Pool Typical	17+96	Riffle Typical	15+53	Pool-Riffle Transition	12+93
Riffle Typical	20+31	Pool-Riffle Transition	17+91	Pool Typical	15+33	Riffle Typical	12+88
Pool Typical	20+05	Riffle Typical	17+86	Pool-Riffle Transition	15+28	Pool Typical	12+70
Pool-Riffle Transition	20+00	Pool Typical	17+52	Riffle Typical	15+23	Pool-Riffle Transition	12+65
Riffle Typical	19+95	Pool-Riffle Transition	17+47	Pool Typical	14+99	Riffle Typical	12+60
Pool Typical	19+82	Riffle Typical	17+42	Pool-Riffle Transition	14+94	Pool Typical	12+41
Pool-Riffle Transition	19+77	Pool Typical	17+22	Riffle Typical	14+89	Pool-Riffle Transition	12+36
Riffle Typical	19+72	Pool-Riffle Transition	17+17	Pool Typical	14+51	Riffle Typical	12+31
Pool Typical	19+36	Riffle Typical	17+12	Pool-Riffle Transition	14+46	Pool Typical	12+19
Pool-Riffle Transition	19+31	Pool Typical	16+80	Riffle Typical	14+41	Pool-Riffle Transition	12+14
Riffle Typical	19+26	Pool-Riffle Transition	16+75	Pool Typical	14+26	Riffle Typical	12+09
Pool Typical	19+11	Riffle Typical	16+70	Pool-Riffle Transition	14+21	Pool Typical	11+90
Pool-Riffle Transition	19+06	Pool Typical	16+44	Riffle Typical	14+16	Pool-Riffle Transition	11+85
Riffle Typical	19+01	Pool-Riffle Transition	16+39	Pool Typical	13+96	Riffle Typical	11+80
Pool Typical	18+83	Riffle Typical	16+34	Pool-Riffle Transition	13+91	Pool Typical	11+43
Pool-Riffle Transition	18+78	Pool Typical	16+19	Riffle Typical	13+86	Pool-Riffle Transition	11+38
Riffle Typical	18+73	Pool-Riffle Transition	16+14	Pool Typical	13+58	Riffle Typical	11+33
Pool Typical	18+58	Riffle Typical	16+09	Pool-Riffle Transition	13+53	Pool Typical	10+97
Pool-Riffle Transition	18+53	Pool Typical	15+91	Riffle Typical	13+48	Pool-Riffle Transition	10+92
Riffle Typical	18+48	Pool-Riffle Transition	15+86	Pool Typical	13+27	Riffle Typical	10+87
Pool Typical	18+25	Riffle Typical	15+81	Pool-Riffle Transition	13+22		

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
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Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-8 LAYOUT AND STRUCTURES PLAN 2

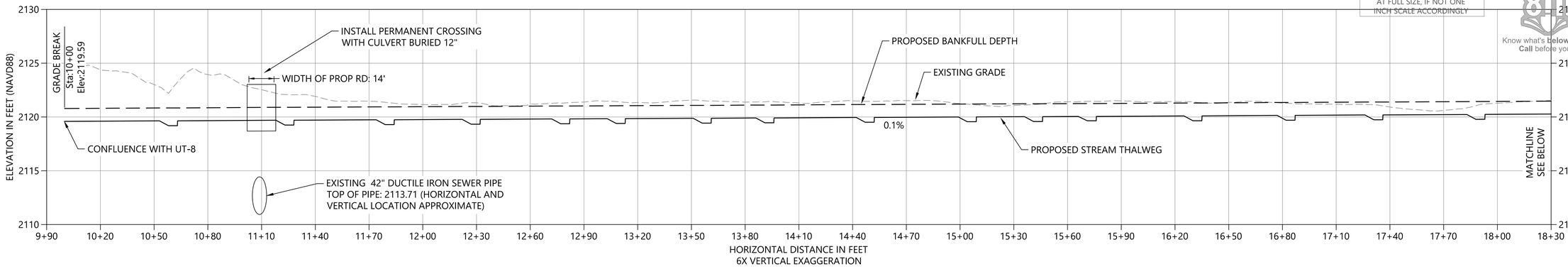
WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

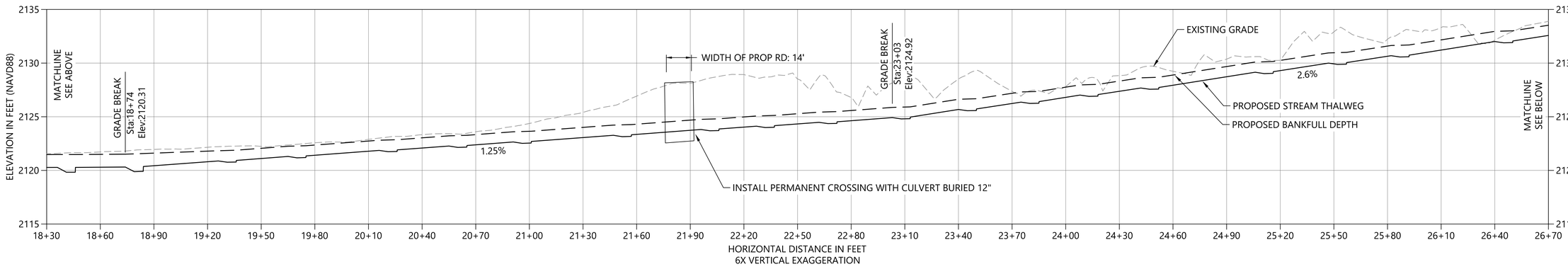
C-7.3

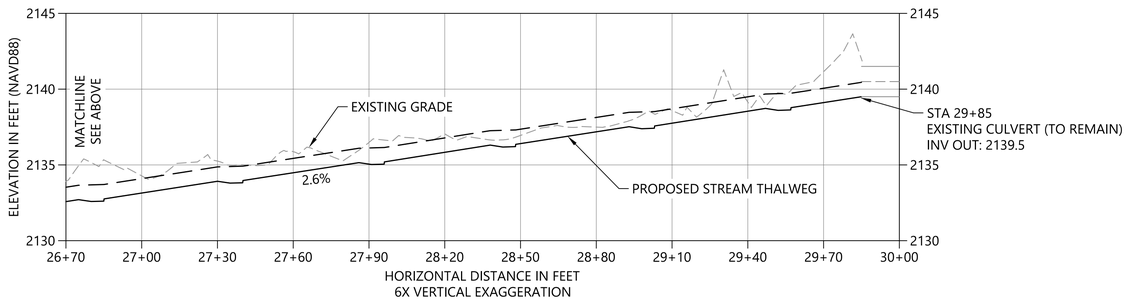
SHEET NO. 22 OF XX

PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL







1 - STREAM PROFILE
HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 5'

NOTE: SEE DWG C-8.0 FOR TYPICAL POOL AND RIFFLE DETAILS.

RIFFLE CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	RIFFLE SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-7 - LOWER	10+00	18+74	0.10%	12.0	1.20	3:1	19.50
UT-7 - MIDDLE	18+74	23+03	1.25%	4.0	0.95	3:1	13.0
UT-7 - UPPER	23+03	29+85	2.60%	2.0	0.95	3:1	12.0

POOL CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	POOL SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	INSIDE OF BEND CHANNEL BANK SLOPES	OUTSIDE OF BEND CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-7 - LOWER	10+00	18+74	0.01%	15.0	1.65	10:1	3:1	26.5
UT-7 - MIDDLE	18+74	23+03	0.50%	2.0	1.1	6:1	3:1	12.5
UT-7 - UPPER	23+03	29+85	0.50%	2.0	1.1	6:1	3:1	12.5

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's below. Call before you dig.

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-7 PROFILE AND SECTIONS

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

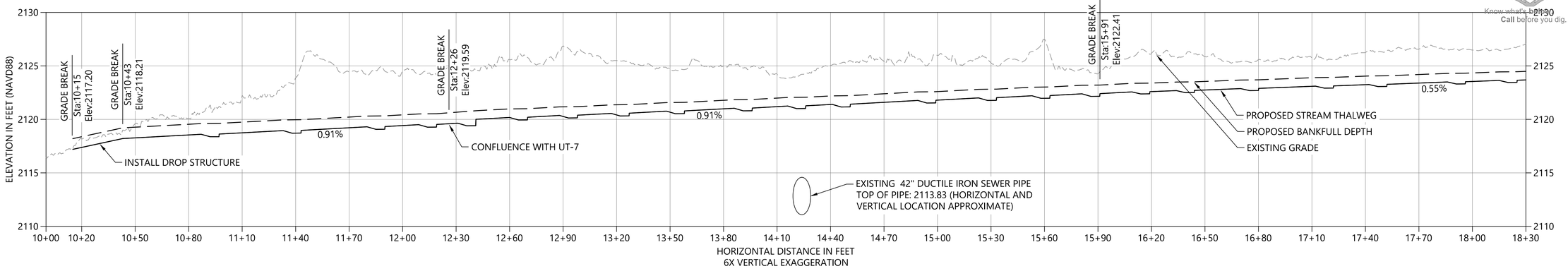
C-7.4

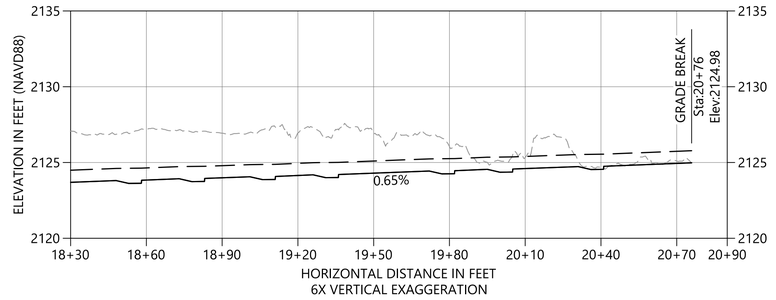
SHEET NO. 23 OF XX
PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's below. Call before you dig.





1 / - STREAM PROFILE
HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 5'

NOTE: SEE DWG C-8.0 FOR TYPICAL POOL AND RIFFLE DETAILS.

RIFFLE CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	RIFFLE SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-8 - LOWER	10+00	12+26	0.91%	8.0	1.00	3:1	16.00
UT-8 - MIDDLE	12+26	15+91	0.91%	4.0	0.75	3:1	11.5
UT-8 - UPPER	15+91	20+76	0.65%	4.5	0.80	3:1	12.5

POOL CROSS SECTION PARAMETERS

REACH ID	STA BEG	STA END	POOL SLOPE	CHANNEL BOTTOM WIDTH (FT)	CHANNEL DEPTH (FT)	INSIDE OF BEND CHANNEL BANK SLOPES	OUTSIDE OF BEND CHANNEL BANK SLOPES	MIN. FLOODPLAIN WIDTH (FT)
UT-8 - LOWER	10+00	12+26	0.20%	6.0	1.25	10:1	3:1	19.0
UT-8 - MIDDLE	12+26	15+91	0.20%	2.0	1.0	8:1	3:1	14.0
UT-8 - UPPER	15+91	20+76	0.20%	2.0	1.0	8:1	3:1	14.0

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGAS/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

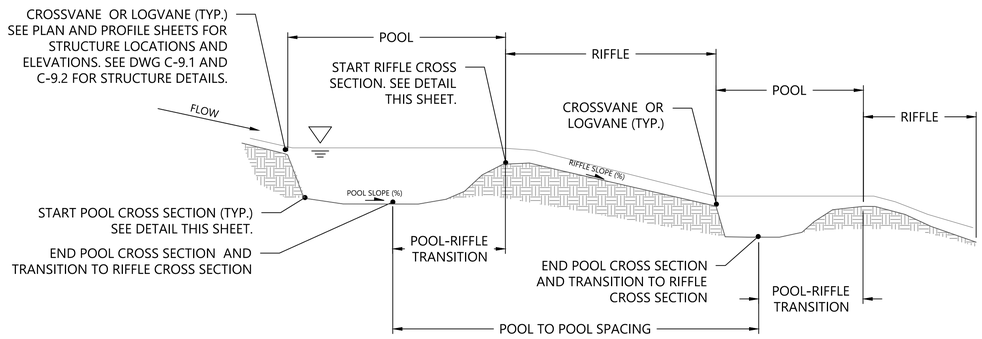
REV	DATE	BY	APP'D	DESCRIPTION

UT-8 PROFILE AND SECTIONS

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-7.5

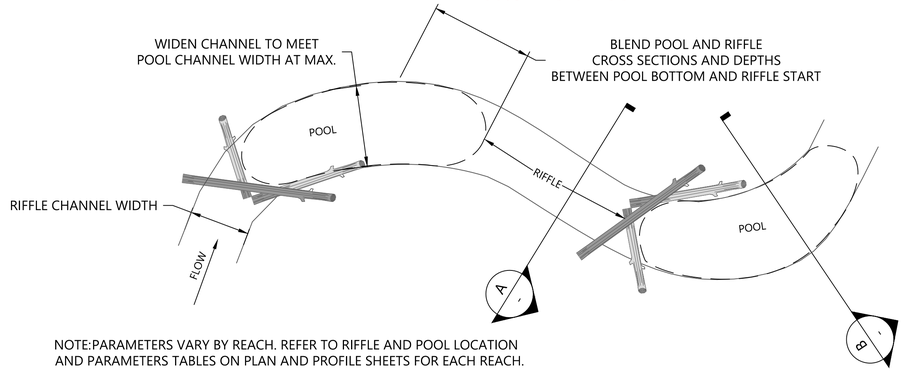
SHEET NO. 24 OF XX
PROJ. #: C71672-01.01



NOTE: PARAMETERS VARY BY REACH. REFER TO RIFFLE AND POOL LOCATION AND PARAMETERS TABLE ON PLAN AND PROFILE SHEETS FOR EACH REACH.

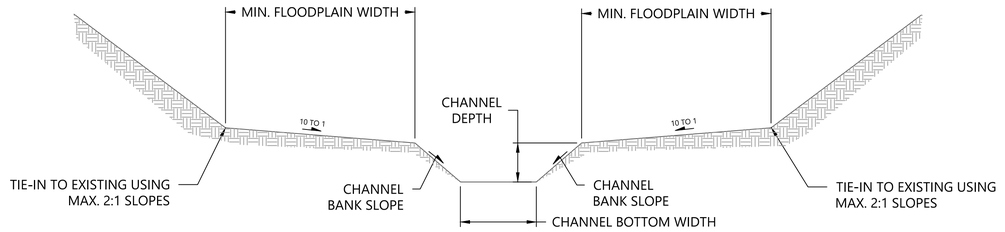
1 / - TYPICAL POOL AND RIFFLE SEQUENCE PROFILE
NOT TO SCALE

90% DESIGN SUBMITTAL

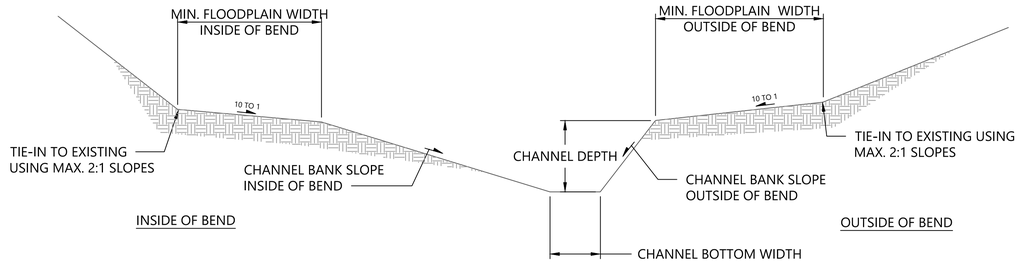


NOTE:PARAMETERS VARY BY REACH. REFER TO RIFFLE AND POOL LOCATION AND PARAMETERS TABLES ON PLAN AND PROFILE SHEETS FOR EACH REACH.

2 / - TYPICAL POOL AND RIFFLE SEQUENCE PLAN
NOT TO SCALE



A / - TYPICAL RIFFLE CROSS SECTION
NOT TO SCALE



B / - TYPICAL POOL CROSS SECTION
NOT TO SCALE

Know what's **below.** **Call** before you dig.

PRELIMINARY
NOT FOR
CONSTRUCTION

DESIGNED BY: A. BREW/M. GIESCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: MAY 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

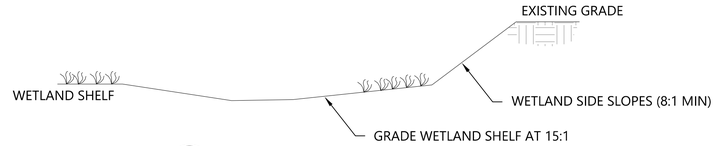
TYPICAL DETAILS

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

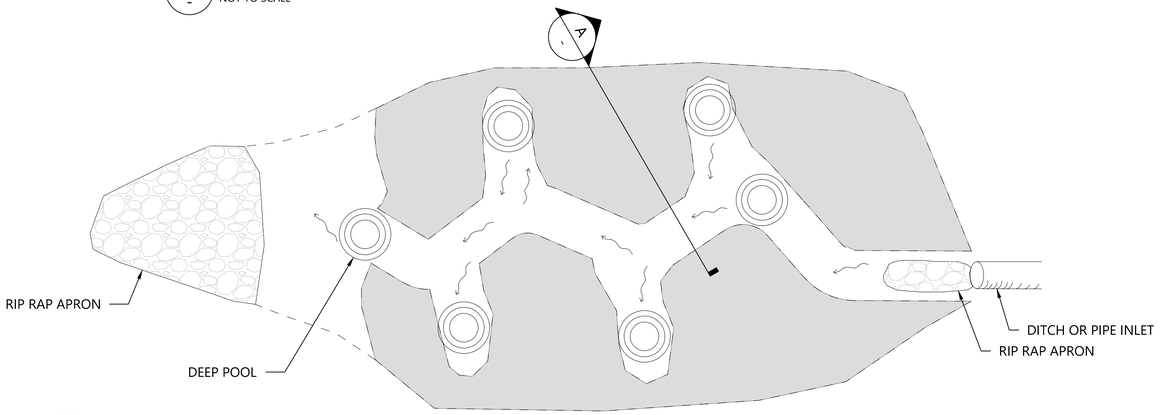
C-8.0

SHEET NO. 25 OF XX
PROJ. #: C71672-01.01

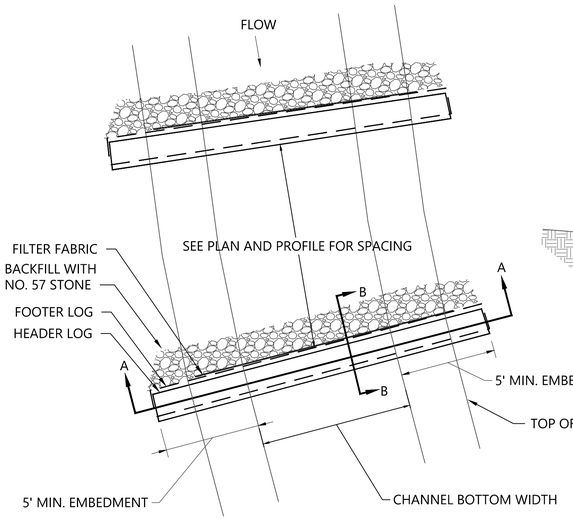
90% DESIGN SUBMITTAL



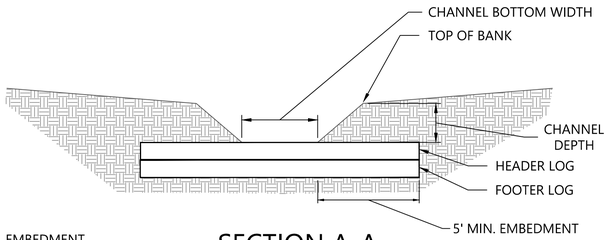
A / - SECTION VIEW
NOT TO SCALE



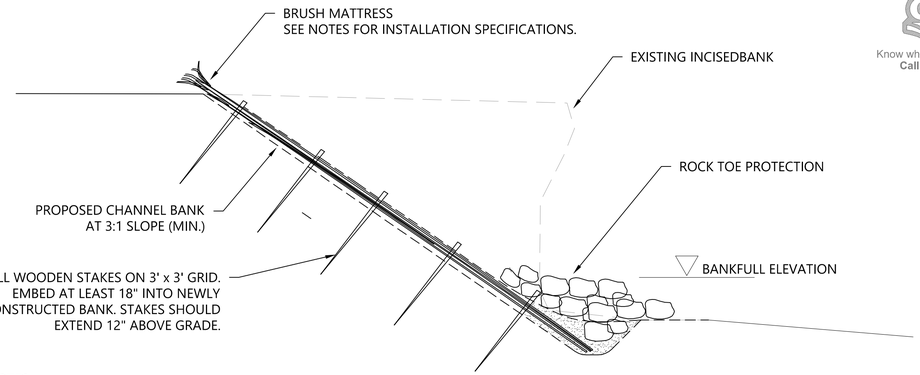
1 / - MARSH TREATMENT AREA
NOT TO SCALE



PLAN VIEW

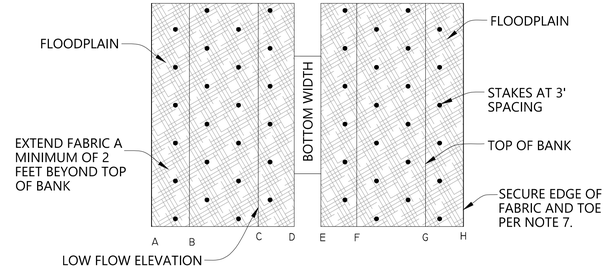


SECTION A-A



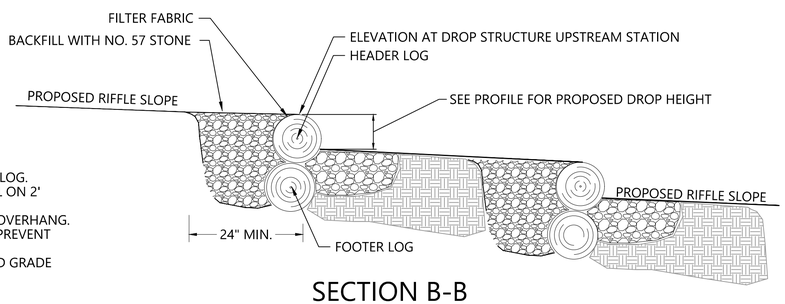
NOTES:
1. REMOVE LOOSE MATERIAL AND GRADE BANK TO A STABLE SLOPE (3:1 MIN). EXCAVATE A TRENCH AT THE TOE OF THE SLOPE.
2. INSTALL STAKES INTO THE SLOPE ON A 3' x 3' GRID SO THEY EXTEND APPROXIMATELY 12" ABOVE GRADE. PLACE BRANCHES (½" TO 1" DIAMETER) ON THE SLOPE AT A DENSITY OF APPROXIMATELY 15 TO 20 BRANCHES PER FOOT WITH THE CUT END IN THE TRENCH, BELOW THE LOW FLOW WATER SURFACE ELEVATION. SECURE BRANCHES WITH STRING AND TIE TO STAKES.
3. BACKFILL TRENCH AND INSTALL ROCK TOE PROTECTION.

2 / - BRUSH MATTRESS
NOT TO SCALE



4 / - COIR MATTING ON STREAM BANK
NOT TO SCALE

NOTES:
1. PREPARE SOIL, SOW SEED AND PLACE STRAW WHERE FABRIC IS TO BE INSTALLED PRIOR TO INSTALLING EROSION CONTROL FABRIC.
2. EROSION CONTROL FABRIC SHALL CONSIST OF 600 GRAM/SQUARE METER WOVEN COIR FABRIC OR APPROVED EQUIVALENT.
3. FASTENERS SHALL BE 12 INCH ECO-STAKE BY NORTH AMERICAN GREEN OR APPROVED EQUIVALENT, INSTALLED AT A RATE OF 3.4 STAKES PER SQUARE YARD. NOMINAL SPACING IS 20 INCHES PERPENDICULAR TO FLOW AND 24 INCHES PARALLEL TO FLOW.
4. FABRIC SHALL BE SECURED TO THE GROUND SUCH THAT FABRIC DOES NOT SEPARATE FROM GROUND MORE THAN 1 INCH WITH A REASONABLE TUG. ADDITIONAL FASTENERS WILL BE REQUIRED IF FABRIC FAILS THIS PULL TEST.
5. OVERLAP BETWEEN ADJACENT RUNS OF FABRIC SHALL BE A MINIMUM OF 6 INCHES. FABRIC SHALL OVERLAP IN THE DOWNSTREAM DIRECTION PARALLEL TO FLOW AND DOWN-SLOPE PERPENDICULAR TO FLOW.
6. FABRIC SHALL EXTEND A MINIMUM OF 2 FEET BEYOND TOP OF BANK. FABRIC SHALL EXTEND BELOW LOW FLOW SURFACE 1 FOOT OR TO CHANNEL BOTTOM, WHICH EVER IS LESS.
7. TERMINAL ENDS OF FABRIC SHALL BE BURIED IN A 6 INCH DEEP TRENCH AND SECURED BY 18 INCH HARDWOOD 2"X2" STAKES SPACED 3 FEET APART. TOE OF FABRIC SHALL BE SECURED WITH 18 INCH HARDWOOD 2"X2" STAKES SPACED 3 FEET APART.
8. INSTALL A ROOFING NAIL TO THE END OF THE 18 INCH STAKES TO HELP SECURE THE MATTING.



SECTION B-B

NOTES:
1. SILL LOGS SHALL HAVE A MINIMUM TRUNK DIAMETER OF 12".
2. LOG SILL SHALL BE CONSTRUCTED WITH AT LEAST ONE FOOTER LOG AND ONE HEADER LOG.
3. NAIL FILTER FABRIC ON TOP OF FOOTER LOG USING 3" 10d GALVANIZED COMMON NAIL ON 2' SPACING ALONG THE LOG.
4. PLACE HEADER LOG SLIGHTLY FORWARD ON TOP OF THE FOOTER LOG ALLOWING FOR OVERHANG.
5. FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE VANE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH BOULDER GAPS.
6. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER LOG TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF THE STRUCTURE.

3 / - DROP STRUCTURE
NOT TO SCALE

Know what's **below.** **Call** before you dig.

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: OCTOBER 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS	DESCRIPTION	DATE	BY	APP'D
REV				

TYPICAL DETAILS 2

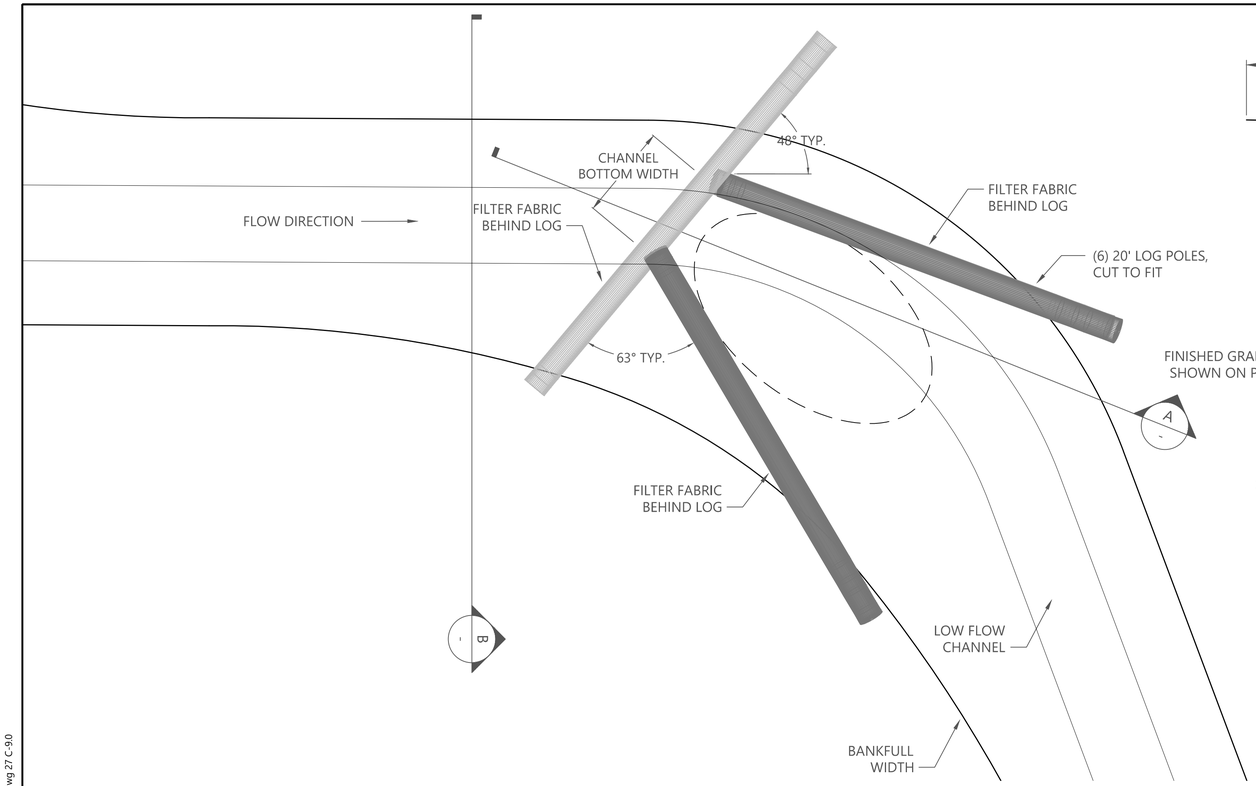
WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NORTH CAROLINA

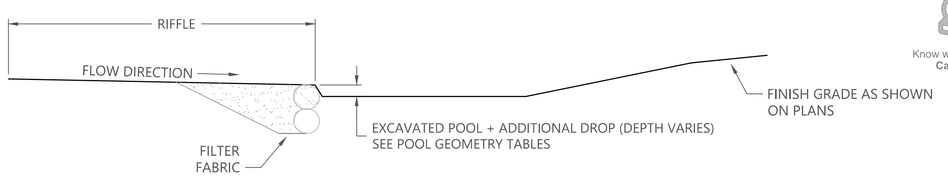
C-8.1

PROJ. #: C71672-01.01

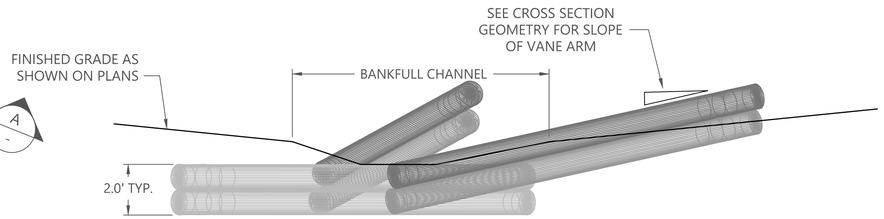
Nov 05, 2018 6:26pm sstavinoha \\asheville\asheville\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-Details.dwg 27 C-8.1

90% DESIGN SUBMITTAL





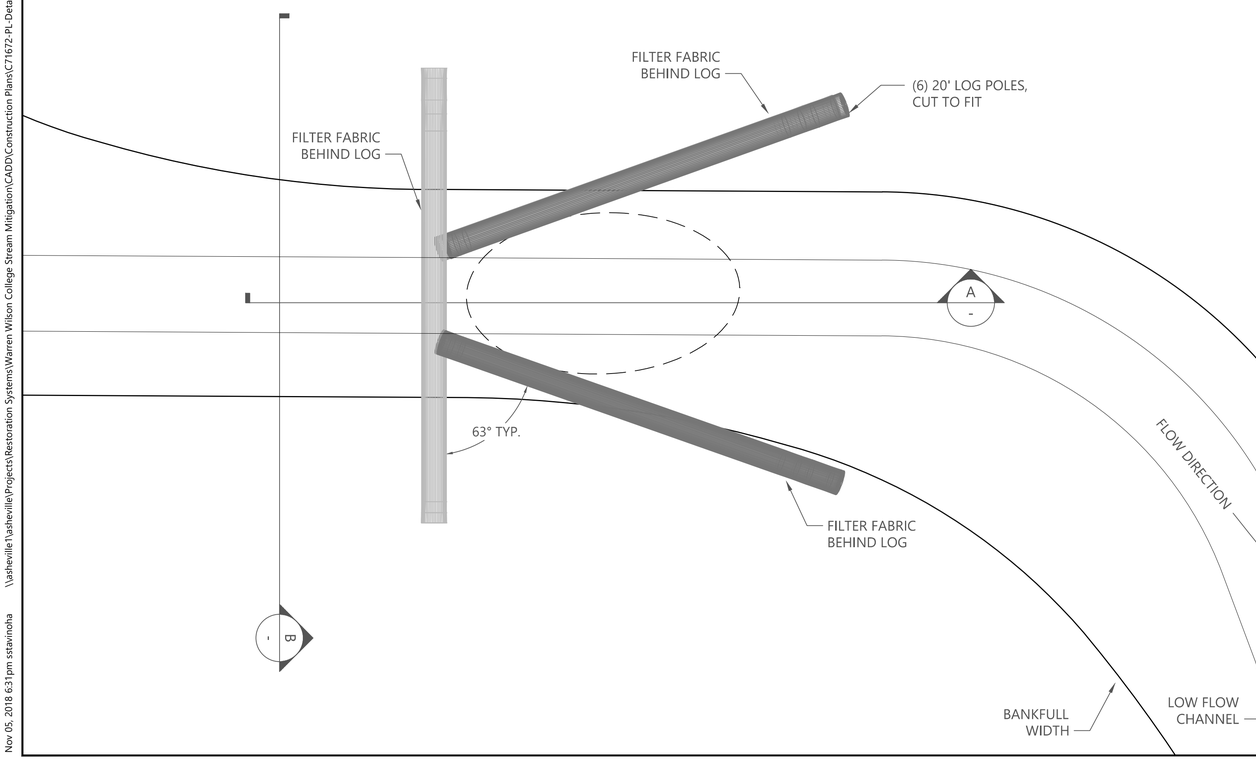
A - SECTION
SCALE:N.T.S.



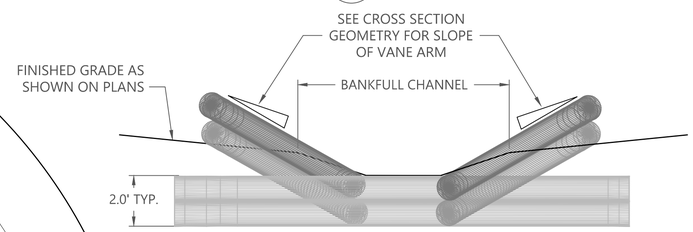
B - SECTION
SCALE:N.T.S.

NOTES:
1. HEADER AND FOOTER LOGS SHALL BE A MINIMUM OF 12" DIAMETER AND SHALL BE A HARDWOOD SPECIES. THE FOOTER LOG MAY BE SUBSTITUTED WITH PINE.
2. FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH THE LOG GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF THE STRUCTURE.

1 - CROSS VANE - BEND
SCALE:N.T.S.



A - SECTION
SCALE:N.T.S.



B - SECTION
SCALE:N.T.S.

NOTES:
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2 - CROSS VANE - STRAIGHT
SCALE:N.T.S.

Know what's **below.** **Call** before you dig.

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GIESCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: OCTOBER 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

STRUCTURE DETAILS

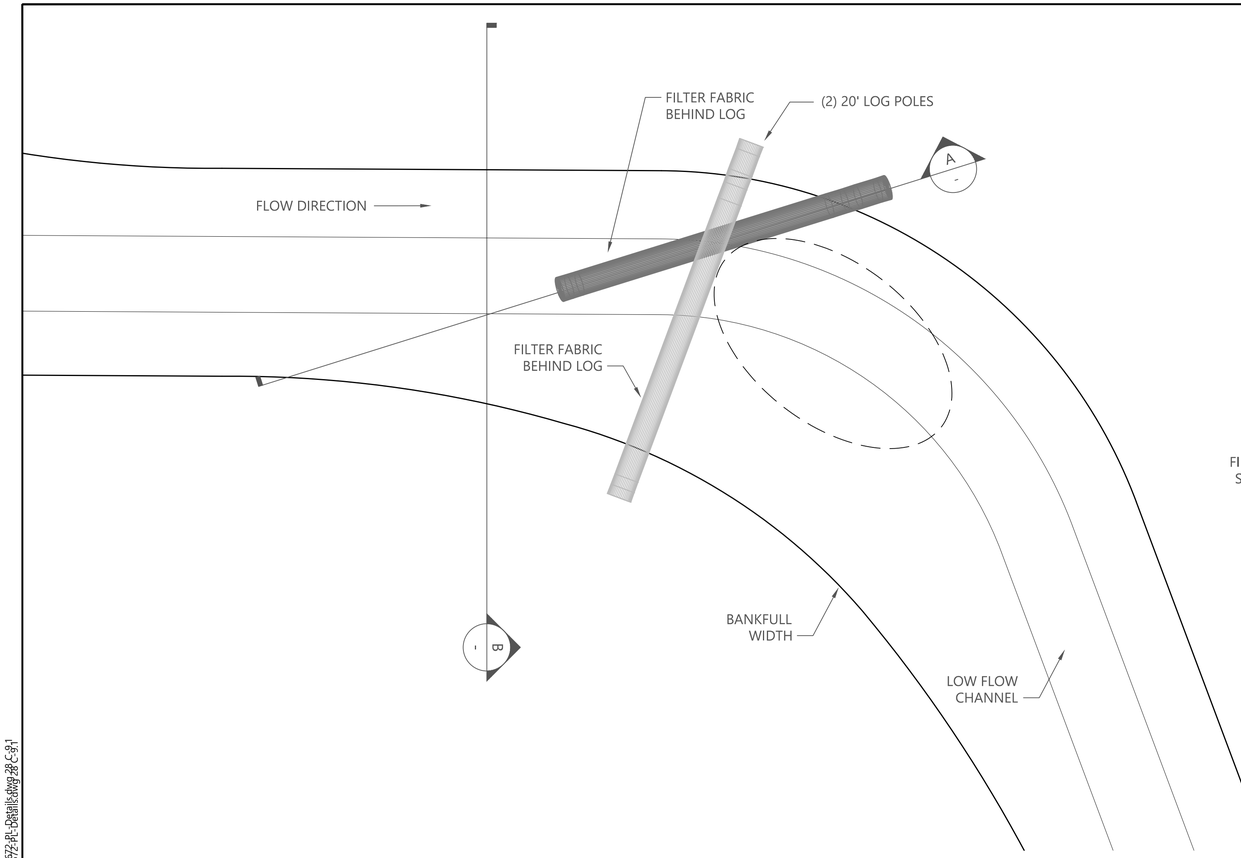
WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NORTH CAROLINA

C-9.0

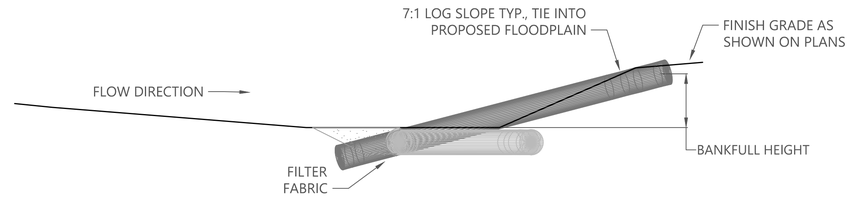
27

PROJ. #: C71672-01.01

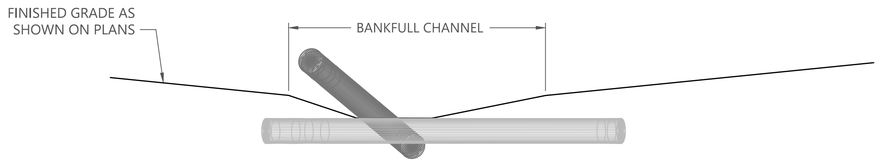
90% DESIGN SUBMITTAL



1 - LOG VANE
SCALE:N.T.S.



A - SECTION
SCALE:N.T.S.



B - SECTION
SCALE:N.T.S.

NOTES:
1. FILTER FABRIC SHALL BE TOED IN AND DRAPED ON UPSTREAM SIDE OF THE LOG VANE PRIOR TO BACKFILL.

Know what's **below.** **Call** before you dig.

PRELIMINARY
NOT FOR
CONSTRUCTION

DESIGNED BY: A. BREW/M. GIESCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

STRUCTURE DETAILS 2

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

C-9.1

SHEET NO. 28 OF XX
PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- PROPOSED LIMITS OF DISTURBANCE
- PROPOSED SILT FENCE
- PROPOSED STAGING AREA
- 10+00 PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL WIDTH

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

811 Know what's **below.** **Call** before you dig.

NORTH

0 30 60
SCALE IN FEET

EXISTING WETLAND DELINEATION BOUNDARY (TYP)

LIMITS OF DISTURBANCE (TYP)

APPROXIMATE BANKFULL WIDTH (TYP)

HAUL/ACCESS ROAD (TYP)

STAGING AREA (1,080 SF)

STAGING AREA (8,090 SF)

HAUL ROAD/ ACCESS

HOG BOTTOM

LOWER FIELD

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 17+20

2120 2130 SS

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S. STAVINOHA
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-1 LOWER ESC PLAN

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

ESC-1.0

SHEET NO. 29 OF XX
PROJ. #: C71672-01.01

Jun 19, 2018 10:11am sstavinoha \\asheville1\asheville\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-ESC.dwg ESC 1.0

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- PROPOSED LIMITS OF DISTURBANCE
- PROPOSED SILT FENCE
- PROPOSED STAGING AREA
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL WIDTH

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

Know what's **below.** **Call** before you dig.

NORTH

0 30 60

SCALE IN FEET

CONFIRM CONDITION OF BRIDGE IS ADEQUATE BEFORE USING FOR EQUIPMENT ACCESS

STAGING AREA (1,572 SF)

STAGING AREA (1,368 SF)

HAUL/ ACCESS ROAD (TYP)

LIMIT OF DISTURBANCE (TYP)

APPROXIMATE BANKFULL WIDTH (TYP)

HAUL ROAD/ ACCESS

SWIM POND

10+00 11+00 12+00 13+00 14+00 14+97

South Lane

Facilities Management

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S. STAVINOHA
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-1 UPPER ESC PLAN

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

ESC-2.0

SHEET NO. 30 OF XX
PROJ. #: C71672-01.01

Jun 19, 2018 10:11am sstavinoha \\asheville1\asheville\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-ESC.dwg ESC 2.0

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's **below.** **Call** before you dig.

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

STOKES FIELD

Old Farm School Road

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- PROPOSED LIMITS OF DISTURBANCE
- PROPOSED SILT FENCE
- PROPOSED STAGING AREA
- 10+00 PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL WIDTH

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 30 60
SCALE IN FEET

UT-3 LOWER ESC PLAN 1

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

ESC-3.0

SHEET NO. 31 OF XX

PROJ. #: C71672-01.01

Jun 19, 2018 10:11am sstavinoha \\asheville1\asheville\Projects\Restoration Systems\Warren Wilson College Stream Mitigation\CADD\Construction Plans\C71672-PL-ESC.dwg ESC 3.0

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's **below.** **Call** before you dig.

PRELIMINARY NOT FOR CONSTRUCTION

OLD FARM SCHOOL RD

STOKES FIELD

19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 27+29

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- PROPOSED LIMITS OF DISTURBANCE
- PROPOSED SILT FENCE
- PROPOSED STAGING AREA
- 10+00 PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL WIDTH

NOTES:

1. HORIZONTAL DATUM: NORTH CAROLINA STATE PLANE, NAD 83, U.S. FEET.
2. VERTICAL DATUM: NAVD88

NORTH

0 30 60
SCALE IN FEET

DESIGNED BY: S. STAVINOHA
DRAWN BY: T. GRIGAS/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

ANCHOR QEA
Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
(828) 281-3350

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

UT-3 LOWER ESC PLAN 2

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

ESC-3.1

SHEET NO. 32 OF XX
PROJ. #: C71672-01.01

90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's **below.** **Call** before you dig.

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: A. BREW/M. GERSCHEN
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

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REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

MATCHLINE - SEE BELOW

MATCHLINE - SEE ABOVE

Riceville Road

HAUL ROAD/ ACCESS

LITTLE BEREA

STAGING AREA (8,102 SF)

CLINGMAN'S

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- PROPOSED LIMITS OF DISTURBANCE
- PROPOSED SILT FENCE
- PROPOSED STAGING AREA
- 10+00 PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL WIDTH

NOTES:

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NORTH

0 40 80
SCALE IN FEET

ESC-4.0

UT-3 UPPER & UT-4 ESC PLAN 1

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

SHEET NO. 33 OF XX
PROJ. #: C71672-01.01

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REVISIONS

REV	DATE	BY	APPD	DESCRIPTION

HAUL ROAD/ ACCESS
LITTLE BEREA
STAGING AREA (13,480 SF)
CLINGMAN'S STAGING AREA (3,355 SF)
STAGING AREA (6,374 SF)
PROPOSED CROSSING
WOODEN BRIDGE
MATCHLINE - SEE BELOW
MATCHLINE - SEE ABOVE
10+00 (22+00, 21+00, 23+00, 24+00, 25+00, 26+00, 27+00, 28+00, 29+00, 30+00, 31+00, 32+00, 32+28, 12+00, 13+00, 14+00, 14+90)

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- PROPOSED LIMITS OF DISTURBANCE
- PROPOSED SILT FENCE
- PROPOSED STAGING AREA
- 10+00 — PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL WIDTH

NOTES:

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NORTH

0 40 80
SCALE IN FEET

ESC-4.1

UT-3 UPPER & UT-4 ESC PLAN 2

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

SHEET NO. 34 OF XX
PROJ. #: C71672-01.01

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NORTH
0 50 100
SCALE IN FEET

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGA/S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE: AS NOTED
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DAIRY BARN

STAGING AREA (6,193 SF)

APPROXIMATE BANKFULL WIDTH (TYP)

HAUL/ACCESS ROAD (TYP)

STAGING AREA (5,014 SF)

LIMITS OF DISTURBANCE (TYP)

INSTALL SAFETY FENCING AROUND EXISTING LIVESTOCK WATERER

BALL FIELD

White Barn

Riceville Road

HAUL ROAD/ ACCESS

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 21+65

UT-5 ESC PLAN

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

ESC-5.0

SHEET NO. 35 OF XX

PROJ. #: C71672-01.01

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Asheville, North Carolina 28801
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REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

BIG BOTTOM

S FIELD

TEST FIELD

HAUL ROAD/ ACCESS

STAGING AREA (5,333 SF)

PROPOSED CROSSING

STAGING AREA (1,813 SF)

EXISTING CROSSING TO BE IMPROVED

STAGING AREA (5,058 SF)

STAGING AREA (2,098 SF)

STAGING AREA (2,978 SF)

STAGING AREA (629 SF)

Warren Wilson Road

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00

2120

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- PROPOSED LIMITS OF DISTURBANCE
- PROPOSED SILT FENCE
- PROPOSED STAGING AREA
- 10+00 PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL WIDTH

NOTES:

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2. VERTICAL DATUM: NAVD88

NORTH

0 40 80
SCALE IN FEET

UT-6 ESC PLAN 1

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

ESC-6.0

SHEET NO. 36 OF XX

PROJ. #: C71672-01.01

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90% DESIGN SUBMITTAL

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's **below.** **Call** before you dig.

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- PROPOSED LIMITS OF DISTURBANCE
- PROPOSED SILT FENCE
- PROPOSED STAGING AREA
- 10+00 PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL WIDTH

NOTES:

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2. VERTICAL DATUM: NAVD88

NORTH

0 40 80
SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: S_STAVINOHA
DRAWN BY: T_GRIGA/S_STAVINOHA
CHECKED BY: S_STAVINOHA
APPROVED BY: T_DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

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UT-6 & UT-7 ESC PLAN 2

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

ESC-6.1

SHEET NO. 37 OF XX
PROJ. #: C71672-01.01

BIG BOTTOM
HAUL ROAD/ ACCESS
18+00
19+00
20+00
21+00
22+00
23+00
24+00
25+00
EXISTING TREE
EXISTING FENCE
STAGING AREA (16,147 SF)
CHARLIE'S
S FIELD
26+00
27+00
28+00
29+00
29+85
STAGING AREA (10,550 SF)
RED BARN
STAGING AREA (5,439 SF)
30+00
31+00
31+43
TEST FIELD

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90% DESIGN SUBMITTAL

ONE INCH
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FORBAT'S FIELD

BIG BOTTOM

BIG BOTTOM RD

STAGING AREA (5,821 SF)

PROPOSED CROSSING

STAGING AREA (4,511 SF)

STAGING AREA (4,782 SF)

HAUL ROAD/ ACCESS

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 20+76

12+00 13+00 14+00 15+00 16+00 17+00

SS

2120 2118 2130 2140

LEGEND:

- 2130 — EXISTING CONTOURS (1' & 5' INTERVALS)
- PROPOSED LIMITS OF DISTURBANCE
- PROPOSED SILT FENCE
- PROPOSED STAGING AREA
- 10+00 PROPOSED STREAM CENTERLINE
- PROPOSED BANKFULL WIDTH

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DATE: JUNE 2018

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REVISIONS

REV	DATE	BY	APPD	DESCRIPTION

UT-7 & UT-8 ESC PLAN 3

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

ESC-6.2

SHEET NO. 38 OF XX
PROJ. #: C71672-01.01

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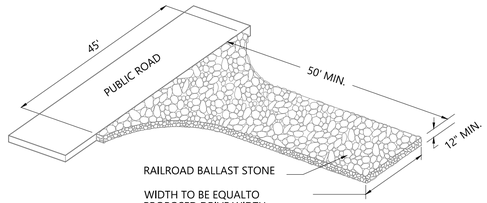
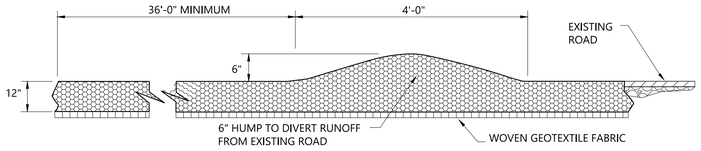
90% DESIGN SUBMITTAL





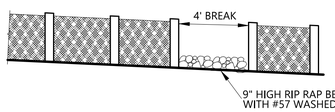
NOTES:
1. A STABILIZED PAD OF CRUSHED STONE SHALL BE LOCATED WHERE TRAFFIC WILL BE ENTERING OR LEAVING A CONSTRUCTION SITE TO OR FROM A PUBLIC STREET. STONE TO BE RAILROAD TYPE BALLAST.
2. FILTER FABRIC SHALL BE PLACED UNDER THE ENTRANCE/EXIT AND SHALL BE MIRAFI 500 OR EQUAL.

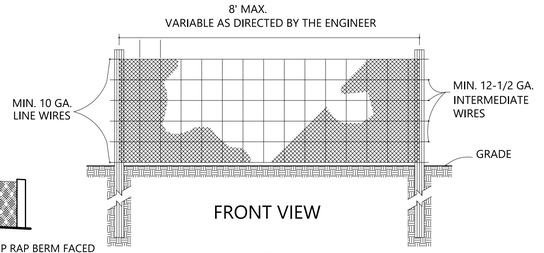
MAINTENANCE:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC STREETS OR EXISTING PAVEMENT. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC STREETS MUST BE REMOVED IMMEDIATELY.
3. WHEELS MUST BE CLEAN PRIOR TO ENTERING A PUBLIC STREET. WHEN WASHING OF WHEELS IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT BASIN.

1 CONSTRUCTION ENTRANCE

NOT TO SCALE

MAINTENANCE:
1. INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL.
2. REPLACE COMPONENTS OF THE SILT FENCE IF AREAS ARE TORN, COLLAPSED, OR OTHERWISE INEFFECTIVE.
3. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME AND TO REDUCE PRESSURE OF THE FENCE FABRIC. AVOID UNDERMINING THE FENCE DURING CLEANOUT ACTIVITIES.





FRONT VIEW

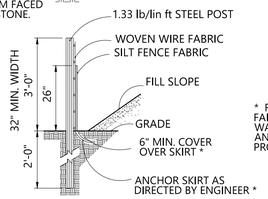
NOTE:
1. USE SILT FENCE ONLY WHEN DRAINAGE AREA DOES NOT EXCEED 1/4 ACRE per 100LF AND NEVER IN AREAS OF CONCENTRATED FLOW.
2. PROVIDE SILT FENCE BREAKS EVERY 200 FEET OF FENCING OR AT LOW POINTS.

STEEL POSTS:
- 5' LONG W/ANCHOR PLT.
- ~1 1/2" WIDE
- MIN. WT. 1.25LB/FT
- ANCHOR PLATE MIN AREA= 14SQ"

WIRE STAPLES:
- 1 1/2" LENGTH MIN.
- NO. 9 STAPLE

SILTFENCE FABRIC:
- NCDOT CLASS B

WOVEN WIRE:
- TOP & BOTTOM WIRES: 10 GAGE MIN.
- INTERMEDIATE WIRES: 12 1/2 GAGE MIN.
- MAXIMUM MESH SPACING: 6 INCHES

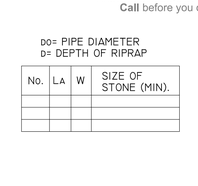


SIDE VIEW

* FOR REPAIR OF SILT FENCE FAILURES, USE No. 57 WASHED STONE. AS AN ANCHOR WHEN SILT FENCE IS PROTECTING CATCH BASIN.

2 SILT FENCE

NOT TO SCALE



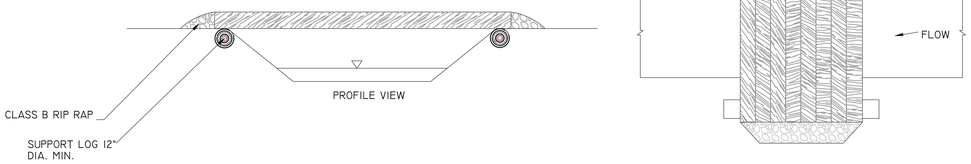
Do= PIPE DIAMETER
D= DEPTH OF RIPRAP

No.	La	W	SIZE OF STONE (MIN).

GENERAL NOTES:
1. La IS THE LENGTH OF THE RIP RAP APRON.
2. D = 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NOT LESS THAN 18"
3. IN A WELL-DEFINED CHANNEL EXTEND THE APRON UP THE CHANNEL BANKS TO AN ELEVATION OF 6" ABOVE THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE BANK, WHICHEVER IS LESS.
4. A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIP RAP AND SOIL FOUNDATION.
5. COMPACT ANY REQUIRED FILL TO DENSITY OF SURROUNDING UNDISTURBED MATERIAL.
6. RIP RAP MAY BE FIELDSTONE OR ROUGH QUARRY STONE AND SHALL BE HARD, ANGULAR AND WELL-GRADED.
7. CONSTRUCT APRON AT ZERO GRADE. TOP OF RIP RAP SHALL BE LEVEL WITH THE RECEIVING CHANNEL OR SLIGHTLY LOWER.
8. ALIGN APRON WITH RECEIVING CHANNEL OR STREAM. ASSURE APRON IS STRAIGHT THROUGHOUT ITS LENGTH.
9. END WIDTH OF APRON TO BE EQUAL TO WIDTH OF RECEIVING CHANNEL.

3 RIP RAP APRON

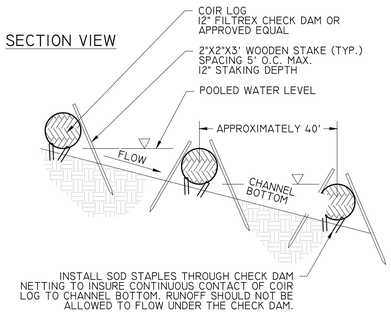
NOT TO SCALE

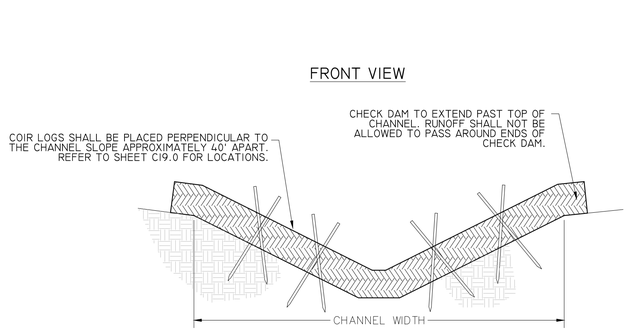


NOTES:
1. CONSTRUCT STREAM CROSSING WHEN FLOW IS AT NORMAL BASEFLOW.
2. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM.
3. INSTALL STREAM CROSSING PERPENDICULAR TO THE FLOW.
4. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL.
5. STABILIZE AN ACCESS RAMP OF CLASS B RIP RAP TO EDGE OF THE MUD MAT.
6. CONTRACTOR SHALL DETERMINE AN APPROPRPRIATE RAMP ANGLE ACCORDING TO EQUIPEMENT UTILIZED.

4 TEMPORARY STREAM CROSSING - MUD MAT DETAIL

NOT TO SCALE



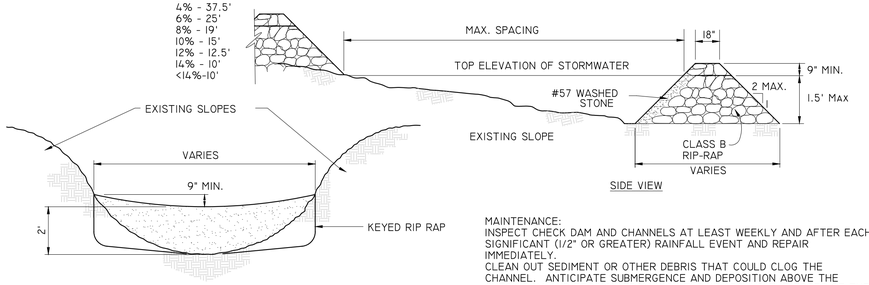


6 COIR LOG CHECK DAM

NOT TO SCALE

CHANNEL SLOPE AND
SPACING BETWEEN
DAMS (MAX)

2% - 75'
4% - 37.5'
6% - 25'
8% - 19'
10% - 15'
12% - 12.5'
14% - 10'
<14%-10'



NOTES:
WIDTH DETERMINED BY EXISTING TOPOGRAPHY AND SEDIMENT STORAGE REQUIRED.
KEY RIP RAP INTO THE DAM FOR STABILIZATION.

MAINTENANCE:
INSPECT CHECK DAM AND CHANNELS AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1/2" OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY.
CLEAN OUT SEDIMENT OR OTHER DEBRIS THAT COULD CLOG THE CHANNEL. ANTICIPATE SUBMERGENCE AND DEPOSITION ABOVE THE CHECK DAM AND EROSION FROM HIGH FLOWS AROUND THE EDGES OF THE DAM.
CORRECT ALL DAMAGE IMMEDIATELY. REMOVE ALL SEDIMENT ACCUMULATED BEHIND THE DAMS AS NEEDED TO PREVENT DAMAGE TO CHANNEL VEGETATION, ALLOW THE CHANNEL TO DRAIN THROUGH THE CHECK DAM,
AND PREVENT LARGE FLOWS FROM CARRYING SEDIMENT OVER THE DAM.
ADD STONES AS NEEDED TO MAINTAIN DESIGN HEIGHT AND CROSS SECTION.

5 ROCK CHECK DAM

NOT TO SCALE

Know what's **below.** **Call** before you dig.

PRELIMINARY
NOT FOR
CONSTRUCTION

DESIGNED BY: S. STAVINOHA
DRAWN BY: T. GRIGA/S. STAVINOHA
CHECKED BY: S. STAVINOHA
APPROVED BY: T. DRUCY
SCALE: AS NOTED
DATE: JUNE 2018

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Anchor QEA of North Carolina, PLLC
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(828) 281-3350

REV	DATE	BY	APP'D	DESCRIPTION

EROSION CONTROL DETAILS 1

WARREN WILSON COLLEGE
STREAM MITIGATION SITE
SWANNANOA, NC

ESC-7.0

SHEET NO. 39 OF XX
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