FINAL MITIGATION PLAN

Alliance Headwaters Mitigation Site

Johnston County, North Carolina

NCDEQ Contract No. 6832
DWR ID No. 20160405
DMS ID No. 97086
USACE Action ID No. SAW-2016-00882
RFP No. 16-006477

Neuse River Basin
HUC 03020201

Prepared for:

Mitigation Services
ENVIRONMENTAL QUALITY

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

October 2018

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

October 12, 2018

Regulatory Division

Re: NCIRT Review and USACE Approval of the Alliance Headwaters Mitigation Plan; SAW-2016-00882; NCDMS Project # 97086

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

Dear Mr. Baumgartner:

The purpose of this letter is to provide the North Carolina Division of Mitigation Services (NCDMS) with all comments generated by the North Carolina Interagency Review Team (NCIRT) during the 30-day comment period for the Alliance Headwaters Mitigation Plan, which closed on August 27, 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.

Sincerely,

Todd Tugwell
Mitigation Project Manager

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List
Jeff Schaffer, NCDMS
Lindsay Crocker, NCDMS

DRAFT MITIGATION PLAN

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Neuse River Basin
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Prepared for:

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Grant Lewis, PWS – Axiom Environmental

October 05, 2018

Cover Letter

To: Interagency Review Team

Subject: Alliance Headwaters Stream & Riparian Riverine Wetland Mitigation Site, Final Mitigation Plan Submittal with Permits (USACE AID#: SAW-2016-00882, NCDMS #: 97086)

Dear Interagency Review Team Members,

Responses to comments provided by the IRT on August 27th, 2018 from the review of Alliance Headwaters Draft Mitigation Plan are provided below.

Mac Haupt, NCDWR, 6 August, 2018:

1. For the potential wetland credit areas identified, DWR recommends a gauge in each wetland area/polygon, in addition to the gauge data, DWR would want to know what hydric indicator is present at closeout.
   Additional gauges have been added to each potential wetland credit area (Figure 11). All wetland areas within the project easement are proposed to have consistent monitoring and success criteria, including 10% wetland hydroperiod and vegetation indicative of a jurisdictional wetland as defined by USACE guidelines. In addition, potential wetland restoration areas would be required to develop hydric soil indicators such as depletions/concretions within the soil matrix. Hydric soil indicators will be described by a licensed soil scientist and will be consistent with descriptions for hydric soils as outlined in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plan Region (Version 2.0). Wetland hydroperiod will be monitored by continuously recording groundwater gauges and will be presented in annual monitoring reports. Areas that do not exhibit sufficient hydroperiod and/or hydric soil indicators will be not be added to wetland restoration credit upon completion of the monitoring period. (Section 7.1.2 Target Wetland Types)

2. There are three wetland potential (and wetland creation) areas identified that do not have a gauge. DWR recommends a gauge be installed in these areas/polygons (WC1, PWR1, WC2).
   Monitoring gauges have been added to these areas (Figure 11).

3. For Section 8.0, DWR would prefer, in the future, there be a separate sub-section for wetland hydrology as well, not just listed as in Table 13.
   Understood. In the future, we will make sure to provide a separate wetland sub-section.

4. DWR concurs with the wetland performance criterion of a 10% hydroperiod during the growing season. Thank you.

5. DWR does not believe bank pins is an effective method to assess instability for these type of streams.
   Bank pins have been removed from the document.

6. For measuring soil temperature, DWR will require measurement be carried through until the end of April, and as is stated in the Plan, reported (location and temperature) in each monitoring report.
   Understood.

7. DWR noted a few areas in the design sheets where EPR is calling for constructed riffles with stone. DWR would prefer that these riffles would be a mix of smaller Class A and 57 stone rather than the proposed Class A and B mix.
   EPR engineers have specified and approved a mixture of Class A, B, and No. 57 Stone.

8. DWR noted the summary letter of issues, June 21, 2018, that was sent with the Mitigation Plan. While this letter was sufficient and covered the major topics, typically the IRT receives a letter which responds to each agencies comments. This letter is extremely helpful making sure all the prior agency comments were covered.
   Understood.

Todd Tugwell, USACE, 27 August 2018:

1. Concur with the comment regarding the gauge placement mentioned by DWR.

2. Be sure to account for impacts to existing wetlands in the permit application for NWP 27, including specifying if the impacts are temporary or permanent.
   The permit application has been written with this in mind.

3. The “potential wetland” proposed for the project are identified separately in the mitigation plan because these areas are underlain with Lynchburg soils, which as you note are non-hydric soil with hydric inclusions. Because these soils are not comprised primarily of hydric soil, we are concerned that areas underlain by Lynchburg soils may not become wetland. Section 7.1.2 of the mitigation plan states that these areas currently do not display indicators indicative of a Class A hydric soil. The plan also states that they will not be counted unless groundwater gauge data is provided that shows jurisdictional wetland hydrology during the annual monitoring period; however, groundwater gauge data must show jurisdictional wetland hydrology on all proposed wetland restoration areas on the site, so it is not clear why these areas are differentiated. Additionally, this statement causes confusion by suggesting that these areas are successful if they only have “jurisdictional wetland hydrology”, not necessarily the 10% that is required for all wetlands on the site. What differentiates these areas from the other restoration areas is that they do not currently have hydric soil indicators, so if the intent is to claim wetland credit within these potential wetland areas, additional performance standards should be included to demonstrate

that hydric soil characteristics are developing within potential wetland areas (consistent with DWR comment 1). Additionally, all potential wetland cells must be monitored with groundwater gauges, which should be positioned closer to the proposed wetland/upland boundary than shown in the current monitoring map. If areas do not develop hydric soil characteristics during monitoring, they may not be approved to provide wetland credit.

Section 7.1.2 Target Wetland Types has been updated with the following language to include the language identified in Mr. Haupt's fist comment.

4. Recent monitoring reviews of existing mitigation sites indicates that groundwater gauges are often not installed properly or maintained appropriately to ensure accurate readings. All groundwater gauges must be installed and maintained in accordance with the USACE document entitled "Technical Standard for Water-Table Monitoring of Potential Wetland Sites" (ERDC TN-WRAP-05-2, June 2005), available on the Wilmington District's Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) website. In particular, bentonite seals must be installed and properly maintained on all wells. Please include a groundwater gauge maintenance log in the annual monitoring report to document gauge maintenance.
   Understood.

5. It appears on the monitoring map (Fig 11) that the flow gauge for UT1A is very close to the confluence with UT1, which will likely cause the gauge to register flow events due to backwater from UT1. Additionally, because the drainage for this reach is so small (21 acres), the gauge should be relocated to the top of this reach. Please note that streams on site must also display evidence of OHWM formation in order to receive credit per current guidance.
   The flow gauge for UT1A on Figure 11 has been moved to reflect this comment.

6. The flow gauge on UT1-R2 should be moved upstream near the upper end of the channel, or another gauge should be added in this area. The intent of these gauges is to demonstrate flow, and the reaches most likely to have questionable flow are near the upper end of the channel.
   The flow gauge for UT1-R2 on Figure 11 has been moved to reflect this comment.

7. In section 7.2.2, there is discussion of modifications to the existing drainage network to address concerns of hydrologic trespass. Be sure to include any such modifications in a map included in the final mitigation plan so that potential impact on restored or existing resources can be determined.
   EPR prepared two additional figures showing the existing and proposed drainage networks (Figures 4B and 9B). Figures were also updated to show the new conservation easement and to correspond to the mitigation plan document (sequential order).

8. In Section 12.0, Determination of Credits, the plan states "Upon completion of construction, the project components and credit data will be adjusted, if necessary, to be consistent with the as-built condition, and any changes will be described in the As-Built Monitoring Report". Please note that credits should generally not change from the proposed credit amounts in the approved mitigation final plan. Per District guidance (see Credit Reporting Memo, available on the RIBITS website and attached for reference), any change in the approved credit amount is considered a modification to the approved mitigation plan and must be done according to the procedures outlined in the Mitigation Rule. Please adjust Section 12.0 to reflect this requirement.

EPR has updated Section 12 in response to this comment. The Section now includes the following language. "*Although not expected, if site conditions such as unidentified bedrock, utility easements, discovery of cultural resources, etc., are encountered during construction of stream channels that result in significant deviations from the approved plan or credit amount (i.e. more than would typically result from measurement variations), the as-built report must clearly identify the difference in the length and associated credit amount and explain how project design and construction were altered, to include updated plan sheets. These changes, including the revised credit totals, should be submitted to the District for approval as a project modification.*

For projects that include wetland mitigation, restored wetland boundaries are not surveyed because wetland areas must still be monitored before they are determined to meet hydrology standards, so wetland credit amounts should not change at as-built unless project limits are altered during construction (e.g. property is removed or added to a project, planned hydrologic alterations are not carried out, etc.)."

Sincerely,

Raymond Holz
Project Manager – Restoration Systems

EXECUTIVE SUMMARY

The Alliance Headwaters Full Delivery Mitigation Project (Project; Site) is located in the Hannah Creek watershed of the Neuse River Basin, in NCDENR subbasin 03-04-04 and NCDMS targeted local watershed 03020201-150020. The Project is located in Johnston County, approximately six miles southeast of Four Oaks and one mile east of US 701, and will involve the restoration of channelized streams, the preservation of existing headwater streams and jurisdictional riparian riverine wetlands; the restoration riparian riverine wetlands as the result of stream restoration and ditch plugging; the creation of wetlands in areas requiring bench excavation; and the restoration of stream, wetland, and riparian buffer functions on four unnamed tributaries (UTs) systems to Hannah Creek. Hannah Creek is listed by the NCDWR as a class "C; NSW" water, indicating that it and its tributaries support aquatic life and secondary recreational uses. These waters also carry the nutrient sensitive waters (NSW) designation, meaning that such waters are subject to excessive growth of microscopic or macroscopic vegetation. Due to this NSW classification, the restoration of the proposed streams, adjacent wetlands, and riparian buffers, as well as their permanent conservation, will ensure the protection of the stream and wetland systems from future growth and development in the Neuse River basin.

The project area encompasses land that consists of drained agricultural fields and natural, mixed hardwood timber land. The area has been drained by the installation of ditches and the channelization of streams and headwater wetlands. By restoring and preserving these headwater streams as well as their associated riparian riverine wetlands, the Project will improve the water quality of receiving waters and improve habitat for biota.

The plan for the Alliance Headwaters Mitigation Project involves the restoration of headwater stream and wetlands on four UT systems. The proposed mitigation activities for this Project will provide an estimated 6,029 SMUs and up to 39.4 riparian riverine WMUs within a 71.7-acre conservation easement. The headwater streams and wetlands proposed for restoration have been impacted by channelization, ditching, the removal of native, forest vegetation, and intensive agricultural production practices.

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

- Federal rule for compensatory mitigation project sites as described in the Federal Register Title 33 Navigation and Navigable Waters Volume 3 Chapter 2 Section § 332.8 paragraphs (c)(2) through (c)(14).

- NCDEQ Division of Mitigation Services In-Lieu Fee Instrument signed and dated July 28, 2010.

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

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1.0 Project Introduction

The Alliance Headwaters Mitigation Site (Site) is in Johnston County, approximately six miles southeast of Four Oaks and one mile east of US 701 (Figure 1). The project is located within NC Division of Mitigation Services (DMS) targeted watershed for the Neuse River Basin Hydrologic Unit (HU) 03020201150020 and the NC Division of Water Resources (NCDWR) subbasin 03-04-04.

The Site was selected to provide stream and riparian riverine wetland mitigation units (SMUs and WMUs) in the Neuse River Basin 03020201 (Neuse 01). The project includes three existing unnamed tributaries to Hannah Creek and two existing wetlands; the distinct naming conventions for these stream reaches are shown on Figure 2. Site mitigation activities, which will provide an estimated 6,029 SMUs and 39.4 riparian riverine WMUs within a 71.7-acre conservation easement includes the following.

- Restoration of 6,529 linear feet of stream channels that have been straightened and channelized for agricultural purposes
- Restoration of 32.6 acres of drained hydric soil to riparian riverine wetlands as the result of stream restoration activities and ditch plugging
- Areas of potential wetland riparian riverine restoration total approximately 7.0 acres of drained soils with hydric inclusions
- Enhancement of 0.38 acres of jurisdictional riparian headwater forest through stream realignment activities and supplemental wetland plantings
- Creation of 1.99 acres of riparian riverine wetlands in areas of drained hydric soil requiring bench excavation
- Preservation of 16.39 acres of jurisdictional riparian riverine wetlands located within forested headwater systems

Table 1. General Project Information.

Project Information	
Project Name	Alliance Headwaters Mitigation Site
County	Johnston
Easement Area (acres)	71.7
Project Coordinates (latitude and longitude)	35˚ 22' 19.30" N, 78˚ 20' 25.85" W
Planted Acreage (acres of woody stems planted)	49.5 acres

1.1 Site Directions

From Raleigh: Take I-40 East to Exit 328B for I-95 North, then take Exit 87 for Four Oaks, NC. Turn right onto Keen Road southeast until you reach US 701. Turn right onto US 701 and travel south approximately 2.5 miles and turn left (east) onto Peach Orchard Road. Travel approximately 1.7 miles until you reach the intersection with Joyner Bridge Road. Turn right (south) onto Joyner Bridge Road and travel approximately 0.7 miles. The farm entrance road will be on your left.

1.2 Property Ownership and Boundary

The property is held by William Frank Lee. A perpetual conservation easement will be prepared that incorporates the results of this Mitigation Plan (template provided in Appendix 1). The conservation easement will be depicted on a recordable plat, signed by the owner, and recorded in the Johnston County Register of Deeds. The conservation easement boundary will be marked with monuments at every corner and every 200 feet along straight portions of the easement. Adjacent land use will not require the installation of fencing.

1.3 Utilities

There are no underground or overhead utilities within the conservation easement boundary and are therefore not considered a constraint for this project. There is an existing culvert under a state-maintained road (Joyner Bridge Road) on UT1. The project will not affect this culvert, which will remain in place in its current configuration once the project is complete.

1.4 Site Access

All portions of the conservation easement which do not abut state-maintained roads will have a permanent, 20-foot ingress, egress, and regress easements granted to the easement holder to provide perpetual access. These access easements will be shown on the conservation easement plat and recorded at the Johnston County Register of Deeds. The portion of the conservation easement located along UT1 is broken by Joyner Bridge Road and a 60-ft wide access easement. All other stream reaches within the conservation easement have contiguous boundaries and no internal easement breaks.

2.0 Watershed Approach and Site Selection

The Site was selected for its ability to provide numerous water quality and ecological benefits within the Hannah Creek and Neuse River watersheds. As described in the Neuse River Basin Restoration Priorities (RBRP) document developed by NCDMS (2010), a major goal for the entire Neuse River Basin is to reduce nutrient and sediment inputs from agricultural areas by restoring and preserving wetlands, streams, and riparian buffers. In both the 2010 RBRP and the 2015 RBRP Update, Project HUC 03020201-150020 (Hannah Creek) is identified as a targeted local watershed, with threats to water quality from agricultural lands, animal operations, and disturbed buffers. In the 2010 RBRP, the Hannah Creek watershed is described as 54% agricultural land use, with 44 permitted animal operations (cattle and swine), and an estimated 42% of stream miles without forested buffers. Buffer and wetland restoration projects were considered a high priority for this watershed.

In addition, the Neuse River Basinwide Water Quality Plan (NCDWQ, 2009) recommends the implementation of conservation practices on agricultural lands along Hannah Creek, from NC 96 to its confluence with Mill Creek (the reach where the Project is located). This segment of Hannah Creek is also designated as a Significant Natural Heritage Area (SNHA) by the NC Natural Heritage Program. Hannah Creek contains a mature swamp forest that extends approximately 12 miles and represents one of the few remaining swamp forests of any significant length in the County.

3.0 Baseline and Existing Conditions

The project area consists of drained agricultural fields and natural, mixed hardwood timber land. The area has been drained by the installation of ditches and the channelization of streams and headwater wetlands. The Site has been in row crop production for the last 18 to 20 years.

The existing watersheds were delineated using a variety of information, including USGS 7.5-minute topographic quadrangles (Figure 3), field investigations to determine ditch flow paths, site-specific topographic survey data, Johnston County GIS data, and USGS StreamStats. Land use and watershed areas for each stream reach is shown in Table 2, existing watershed boundaries are illustrated in Figure 4A, and the existing drainage network is depicted on Figure 4B.

Table 2. Project Land Use and Watershed Characteristics.

Land Use and Watershed Characteristics				
Physiographic Province	Coastal Plain			
Level III, IV Ecoregions	Southeastern Plains, Rolling Coastal Plain			
River Basin	Neuse			
USGS Hydrologic Units 8-digit, 14-digit	03020201, 03020201150020			
DWR Sub-basin	03-04-04			
Reaches	**UT1**	**UT2**	**UT3 ^**	**UT4**
Drainage area (acres)*	546	147	354	132
Drainage area (sq. miles)*	0.85	0.23	0.55	0.21
NCCGIA Land Cover Classification				
Agriculture	52%	48%	37%	44%
Forested/Scrubland	38%	37%	59%	55%
Residential	9%	13%	4%	<1%
Impervious Area	1%	2%	<1%	<1%

* Represents the most downstream portion of the existing reach.
^ - Since there is no jurisdictional feature for UT3, this column provides the watershed information for area occupied by what will be UT3-R1 and UT3-R2.

3.1 Landscape Characteristics

3.1.1 Physiography, Topography, and Soils

The Site lies within the inner portion of the Coastal Plain physiographic province and the Level III Southeastern Plains ecoregion. This area is characterized by broad interstream divides with gentle to steep side slopes dissected by numerous small, low to moderate gradient sandy bottomed streams. The annual average rainfall ranges from 44 to 51 inches (locally 48 inches), with most of the precipitation falling during early spring and mid-summer. Sediments are typically unconsolidated clay, silt, sand, and small gravel. Soils found within this area are generally comprised of Ultisols, which are intensely weathered with an appreciable clay component and are slightly acidic. The soil moisture regime is typical of humid regions where the amount of stored moisture plus rainfall is approximately equal to, or exceeds, the amount of evapotranspiration (udic). Typical, undisturbed vegetation might include mesic pine flatwoods, oak-hickory forest, and mesic mixed hardwood forest. Soil mapping units are based on the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Soil Survey for Johnston County. Soil types within the project area mapped by the NRCS Web Soil Survey are described below in Table 3 and depicted in Figure 5A.

Table 3. Project Soil Types and Descriptions.

Soil Name	Description	Hydric Status
Dogue fine sandy loam, 0 to 2 % slopes	Dogue fine sandy loam is a moderately well drained soil located on stream terraces. It has a moderately high-water capacity and is occasionally flooded for brief periods.	Non-hydric
Goldsboro sandy loam, 0 to 2 % slopes	Goldsboro sandy loam is a moderately well drained soil located on flats and broad, interstream divides on marine terraces. It has a moderately high to high water capacity and is not subject to flooding.	Hydric B (Rains inclusions)
Leaf silt loam, 0 to 2 % slopes	Leaf silt loam is a poorly drained soil located on flats on broad, interstream divides. It has a very low to moderately low water capacity and is not subject to flooding.	Hydric A
Lynchburg sandy loam, 0 to 2 % slopes	Lynchburg sandy loam is a somewhat poorly drained soil located on flats and broad, interstream divides on marine terraces. It has a moderately high to high water capacity and is not subject to flooding.	Hydric B (Grantham, Rains, and Toisnot inclusions)
Norfolk loamy sand, 0 to 2 % slopes	Norfolk loamy sand is a well-drained soil located on flats and broad, interstream divides on marine terraces. It has a moderately high to high water capacity and is not subject to flooding.	Non-hydric

Hydric soils were delineated by a licensed soil scientist (NC LSS # 1233) during January 2017; results of the delineation are depicted on Figure 5B. Hydric soils within the Site include ditched and drained soils within agricultural fields proposed for wetland restoration or creation, and jurisdictional wetlands within headwater forest systems proposed for wetland preservation.

3.1.2 Land Use and Land Cover

A review of historic aerials of the site and adjacent parcels from 1939, 1965, 1971, 1988 and 2005 (Figures 6A through 6E) reveal that while agriculture has been the prevalent land use in the area likely since before 1939, much of the site itself was not converted to agricultural uses until after 1997/1998. Additional aerial photographs from Google Earth show that the project site has been manipulated for agricultural production numerous times. The channelization of perimeter ditches to carry stream flow served to undermine the hydrologic connection between the headwaters of UT3 and UT4 (located in the forested sections of the Project) from their downstream channels. In addition, two small impoundments were excavated on the historical flow paths of UT1 and UT3 during this time. The Site has existed in its current condition since approximately 2005.

Current land use near the Site is predominately agriculture (crop and livestock production) and silviculture. While the Site is near (< 6 miles) to two major interstates (I-95 and I-40), there are no foreseeable signs of impending land use changes or development pressure that would impact the Project's watershed. The conservation easement will eliminate the potential for future development and/or agricultural use in the floodplain areas of the restored streams.

3.2 Existing Vegetation

Existing vegetation within the conservation easement is separated into two distinct subsets, agricultural cropland and forest. Common plant species that are found in these two areas are described below. Photographs of these areas can be found in Appendix 2.

Agricultural Cropland

Plant species found within the agricultural fields are the result of intensive agricultural production methods that include annual herbicide applications, irrigation, mowing, and drainage ditch maintenance. The most common crop grown at the Site is soybeans (*Glycine max*), potatoes (*Solanum tuberosum*) sweet potatoes (*Ipomoea batatas*), and tobacco (*Nicotiana tabacum*).

Species found within and immediately adjacent to the existing stream channels (UT1, UT2, and parts of UT3) are generally low growing species that have been maintained through mechanical and chemical means. Herbaceous species found generally include dogfennel (*Eupatorium capillifolium*), ragweed (*Ambrosia artemisifolia*), pokeweed (*Phytolacca americana*), soft rush (*Juncus effusus*), poison ivy (*Toxicodendron radicans*), woolgrass (*Scripus cyperinus*), Japanese stilt grass (*Microstegium vimineum*), cattail (*Typha latifolia*), tall fescue (*Schedonorus phoenix*), Chinese lespedeza (*Lespedeza cuneata*), greenbrier (*Smilax rotundifolia*), goldenrod (*Solidago* sp.), tearthumb (*Polygonum sagittatum*), jewelweed (*Impatiens capensis*), elderberry (*Sambucus canadensis*), broomsedge (*Andropogon virginicus*), and dock (*Rumex* sp.). Trees and shrubs within these areas include red maple (*Acer rubrum*), titi (*Cyrilla racemiflora*), and black willow (*Salix nigra*).

Forest

The headwaters of UT3 and UT4 remain wooded, with a canopy and mid-story composed of loblolly pine (*Pinus taeda*), sweet bay (*Magnolia virginiana*), red maple (*Acer rubrum*), American holly (*Ilex opaca*), Northern spicebush (Lindera benzoin), red bay (*Persea palustris*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), laurel oak (*Quercus laurif*olia) and persimmon (*Diospyros virginiana*). Shrubs present include titi, sweet pepperbush (*Clethra alnifolia*), inkberry (*Ilex glabra*), and giant cane (*Arundinaria gigantea*), with greenbrier and grape (*Vitis rotundifolia*) in the vine layer.

3.3 Project Resources

Axiom Environmental, Inc. (Axiom) conducted investigations for jurisdictional waters of the U.S. on January 26, 2017, February 7, 2017, and February 23, 2017. Wetlands were assessed using the U.S. Army Corps of Engineers (USACE) Routine On-site Determination Method. This method is defined by the 1987 Corps of Engineers Wetland Delineation Manual and the Atlantic and Gulf Coastal Plain Regional Supplement. Potential jurisdictional wetlands were assessed using the USACE Wetland Determination Data Form and the NC Wetland Assessment Method (NCWAM). Streams were assessed using the NCDWR Stream Identification Form and the USACE Stream Quality Assessment Worksheet. Six potential jurisdictional streams and two wetlands were delineated during the on-site investigations by Axiom (Tables 4A and 4B). A Preliminary Jurisdictional Determination (PJD) package was submitted to the USACE on March 16, 2017. An initial Site visit with the USACE to confirm jurisdictional waters was conducted on June 1, 2017 and was attended by Samantha J. Dailey, CIV USARMY CESAW (US) (Samantha.J.Dailey@usace.army.mil). Verbal confirmation of existing wetland areas was given at the conclusion of the site visit; however, it was determined and agreed to by Restoration Systems and Samantha Daily that final confirmation of UT-3 and UT-4 within the forested areas of the Site would require an additional review by IRT members given their ephemeral/intermittent nature and location

within the watershed (headwater streams). A follow-up site visit was conducted on October 24th, 2017. During this site visit, it was determined that tributaries originally included in the PJD (UT3A, UT3B, and UT3C within the existing wooded wetland) were not jurisdictional. A revised PJD package was resubmitted to Samantha Dailey (USACE). The notification of jurisdictional determination (SAW-2016-00882) was received on September 4th, 2018 and can be found in Appendix 3.

Table 4A. Jurisdictional Resources Within the Proposed Conservation Easement Boundary.

Existing Jurisdictional Stream Features			
Reach	**UT-1**	**UT-2**	**UT-4**
Existing Length (LF)	4,761	<1	1,142
EPR - NCDWR Stream Score	Blue line	Blue line	27.25
Perennial or Intermittent	P	P	I
NCDWR Classification	C; NSW		
Rosgen Classification of Existing Conditions	Incised Bc 5/6	G5/6	Incised Bc 5/6
Simon Evolutionary Stage	II	II	II
FEMA Zone Classification	X	X	---

Table 4B. Jurisdictional Resources Within the Proposed Conservation Easement Boundary.

Wetland Summary		
Wetland	**No. 1**	**No. 2**
Size of Wetland	16.39	0.38
Wetland Type (non-riparian, riparian riverine, or riparian non-riverine)	Riparian riverine	Riparian riverine
NRCS Mapped Soil Series	Leaf/Lynchburg	Goldsboro/Norfolk
Drainage Class	Poorly drained/somewhat poorly drained	Well drained/moderately well drained
Soil Hydric Status	Hydric A/ Hydric B (Grantham, Rains, Toisnot inclusions)	Hydric B (Rains inclusions)/ Non-hydric
Source of Hydrology	Surface/Groundwater	Groundwater
Hydrologic Impairment	NA	Lack of overbank flooding
Native Vegetation Community	Headwater Forest	Headwater Forest
% Exotic Invasive Vegetation	<2%	<2%

4.0 Functional and Ecological Uplift

Based on field evaluations of the project stream reaches and the proposed mitigation practices described in this document, functional ratings were developed for the existing and proposed conditions of the project reaches (Table 5A), following the methodology and definitions described in Harman, et al., 2012.

This information is provided to assist in communicating project goals and objectives related to functional lift but is not proposed for use in setting performance standards. Performance standards are specifically discussed in Section 8 and follow guidance provided by the NCDMS and USACE Wilmington District.

Of the impairments present on the site, past stream channelization and clearing of riparian vegetation are the most severe, resulting in channel instability and erosion, lack of bedform diversity, increased nutrient and sediment loading, and loss of wetland function. Ecological uplift will come from restoring the project streams to a stable, functioning condition, restoring wetland connections and natural vegetation, and reconnecting restoration areas with remnant headwater streams. In-stream structures will ensure channel stability and improve aquatic habitats while the restored system matures. Restored riparian buffers will: 1) provide woody debris and detritus for aquatic organisms; 2) provide shading and reduce water temperatures; 3) increase dissolved oxygen concentrations; and 4) provide a diversity of aquatic and terrestrial habitats appropriate for the ecoregion and landscape setting. Approximately 58 acres of riparian buffer will be restored and/or protected as part of the proposed project.

Table 5A. Summary of Existing and Proposed Functional Ratings for the Project Reaches.

Functional Category	Stream Reaches							
	UT1		UT2		UT3		UT4	
	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.
Hydrology [1]	FAR	FAR	FAR	FAR	FAR	F	FAR	F
Hydraulics [2]	NF	F	NF	F	NF	F	NF	F
Geomorphology [3]	NF	F	NF	F	NF	F	NF	F
Physiochemical [4]	Not Assessed		Not Assessed		Not Assessed		Not Assessed	
Biology [5]	Not Assessed		Not Assessed		Not Assessed		Not Assessed	

Note 1: *Hydrology – all reaches are listed as Functioning At-Risk (FAR) in their existing condition. The hydrology of UT1 and UT2 will remain FAR after restoration because of modifications to their watersheds above the project site. UT3 and UT4 are predicted to go from FAR to Functioning (F) after restoration, because the restoration reaches will connect with historic channel features that are functioning.*

Note 2: *Hydraulics – all restoration reaches are incised and channelized and are no longer connected to their adjacent floodplains and are therefore listed as Not Functioning (NF). Restoration practices will restore proper floodplain connection and channel hydraulics. Groundwater and surface water connections will also be restored.*

Note 3: *Geomorphology – all reaches exhibit significantly larger and deeper channels than would naturally occur. Channel instability is apparent in all reaches to varying degrees, therefore all reaches are listed as Not Functioning (NF). Restoration practices will restore stable headwater stream/wetland systems that are self-sustaining over time.*

Site specific wetland mitigation goals and objectives have been developed through the use of North Carolina Wetland Assessment Method (NC WAM) analyses of degraded and reference systems (NC WFAT 2010). This method rates functional metrics for wetlands as high, medium, or low based on field data collected on forms and transferred into a rating calculator. Using Boolean logic, the rating calculator

assigns a high, medium, or low value for each metric and overall function. Table 5B summarizes NC WAM model output for forested wetlands on the Site proposed for preservation (Wetland 1) and a disturbed wetland located upstream of UT2 within the agricultural fields (Wetland 2).

Table 5B. NC WAM Summary

NC WAM Sub-function Rating Summary	Wetland 1 (Onsite Reference located in forested headwater system)	Wetland 2 (Disturbed, located upstream of UT2 in agricultural fields)
Wetland Type	Headwater Forest	Headwater Forest
(1) HYDROLOGY	HIGH	LOW
(2) Surface Storage & Retention	HIGH	LOW
(2) Sub-surface Storage and Retention	HIGH	LOW
(1) WATER QUALITY	HIGH	LOW
(2) Pathogen change	HIGH	LOW
(2) Particulate Change	HIGH	LOW
(2) Soluble change	MEDIUM	LOW
(2) Physical Change	HIGH	LOW
(1) HABITAT	HIGH	LOW
(2) Physical Structure	HIGH	LOW
(2) Landscape Patch Structure	HIGH	LOW
(2) Vegetative Composition	HIGH	LOW
OVERALL	HIGH	LOW

Based on the above NCWAM analysis, in areas proposed for wetland restoration and creation, all metrics are being targeted for functional improvements. Table 5C provides an overview of the Sites wetland functional improvement objectives and the specific actions proposed to accomplish them.

Table 5C. Wetland Work Plan Components and Functional Objectives

Functional Improvement Objectives	Proposed Actions
Hydrology	
Surface Storage and Retention	Cessation of agricultural plowing followed by ditch backfilling, deep ripping, and planting native forest vegetation.
Sub-surface Storage and Retention	

Table 5C. Wetland Work Plan Components and Functional Objectives (Continued)

Water Quality	
Pathogen Change	Conversion of agriculture fields to native forest vegetation, treating surface runoff from adjacent agriculture fields and roadside ditches, backfilling adjacent ditches, and restoring ditched streams.
Particulate Change	
Soluble Change	
Physical Change	
Habitat	
Physical Structure	Plant native forest vegetation that connects with natural areas up and downstream of the Site.
Landscape Patch Structure	
Vegetation Composition	

5.0 Regulatory Considerations

Regulatory considerations for the Site are shown in Table 6 and described in the following sections.

Table 6. Summary of Regulatory Considerations.

Regulatory Parameter	Applicable?	Resolved?	Supporting Docs.
Water of the United States - Section 404	Yes	No	Appendix 3
Water of the United States - Section 401	Yes	No	Appendix 3
Endangered Species Act	Yes	Yes	Appendix 4
Historic Preservation Act	Yes	Yes	Appendix 4
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	Appendix 5
Essential Fisheries Habitat	No	N/A	N/A

5.1 401/404

Wetlands within the Site easement have been delineated and verified (Figure 2 and Table 4B). There will be minor impacts (less than 0.05 acre) to the headwater wetland system of UT3 and UT4 due to reconnection of a channel feature between the preservation reaches and downstream restoration reaches. Onsite stream channels that are impacted will be due to restoration activities and relocation of the restored channels to their historic alignments.

5.2 Categorical Exclusion for Biological and Historical Resources

A Categorical Exclusion (CE) document for the Alliance Headwaters Site was originally approved by the Federal Highway Administration (FHWA) on February 24, 2017 (Appendix 4). Due to changes in the project, the CE document was resubmitted and was re-approved on May 11, 2018 (Appendix 4). The CE

document investigates the presence of threatened and endangered species and any historical resources that may occur within the Site.

5.2.1 Biological Resources

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

RS requested review and comment from the U.S. Fish and Wildlife Service (USFWS) on December 16, 2016, regarding the project's potential impacts to threatened or endangered species. The USFWS responded via letter on January 12, 2017 and stated that the proposed project is "not likely to adversely affect any federally-listed endangered or threatened species, their formally designated critical habitat, or species currently proposed for listing" and that the requirements of Section 7 (a)(2) of the Endangered Species Act "have been satisfied" for the project. The USFWS letter is included in the Categorical Exclusion document found in Appendix 4.

Since the approval of the Categorical Exclusion document on February 24, 2017, the yellow lance mussel (*Elliptio lanceolata*) has become proposed for future listing in Johnston County. The yellow lance is a sand-loving species often found buried deep in clean, coarse to medium sand substrates and sometimes gravel substrates. The yellow lance depends on clean, moderately flowing water with high dissolved oxygen, and is found in smaller streams to medium-sized rivers (USFWS 2017). Intensive agricultural production coupled with the annual maintenance of the stream channels and riparian vegetation has resulted in low quality stream habitat on the Site. Because of these ongoing activities, no habitat is present for the yellow lance at the Site. RS and the Division of Mitigation Services exchanged email correspondence with Donnie Brew (preconstruction & environmental engineer with the Federal Highway Administration) in September of 2017 discussing the yellow lance mussel. This correspondence can be found at the end of Appendix 4.

5.2.2 Historical Resources

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

RS sent an email to the North Carolina State Historic Preservation Office (SHPO) on December 16, 2016, requesting review and comment for the potential of cultural resources potentially affected by the project. Following a review of the project, SHPO responded with a letter on December 29, 2016, and stated that "they were aware of no historic resources which would be affected by the project". All correspondence with SHPO is included in the Categorical Exclusion document found in Appendix 4.

5.3 FEMA Floodplain Compliance and Hydrologic Trespass

Upon review of the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program's Digital Flood Insurance Rate Mapping (DFIRM) panel 3720158800J, effective December 2, 2005, the downstream terminus of both UT1 and UT2 exists within the 0.2 Percent Chance Annual Flooding Zone (Zone X) associated with Hannah Creek (Figure 7). Therefore, under the current regulations, work

associated with this project would not be regulated nor would the work influence the flood elevations associated with this zone.

However, pending map revisions are being considered and review of the preliminary DFIRM panel 3720158800K, dated April 30, 2014, indicates the downstream terminus of UT1 and UT2 will be within the 1.0 Percent Chance Annual Flooding Zone (Zone AE) of Hannah Creek. Upon this mapping becoming effective, the project would be regulated, and the grading of the project would influence the mapping of Zone AE and Zone X. However, the elevations of these zones would be established from Hannah Creek, which is outside the Site's boundaries; therefore, the project will not influence the determination of the flooding elevations, just the topographic extents of the zones themselves.

The local floodplain manager for Johnston County was contacted on August 24, 2017. The floodplain manager concurred with the finding that UT1 and UT2 occurred within the Zone X under the current regulations and the project would not require any additional review from FEMA. The completed NCDMS Floodplain Requirements Checklist can be found in Appendix 5.

6.0 Mitigation Site Goals and Objectives

Project goals and associated objectives are summarized in Table 7 below:

Table 7. Summary of Goals and Objectives for the Alliance Headwaters Mitigation Project

Goals	Objectives	Current Functional Status	Proposed Functional Status
Goals Specific to the Neuse River and Hannah Creek Watershed Discussed in the RBRP (NCDMS, 2010 and 2015) and Neuse River Basinwide Plan (NCDWQ, 2009)			
Remove Direct Nutrient Inputs from Agricultural Lands	• Restoration and enhancement of minimum 50-foot riparian buffers along all project reaches. • Protection of riparian buffers with a perpetual conservation easement. • Reducing the amount of land in active row crop agriculture. • Decreasing drainage to restore wetlands, promoting higher water table conditions, and denitrification.	Not Functioning	Functioning
Remove Direct Sediment Inputs from Agricultural Lands	• Restoration of stabilized headwater stream systems. • Restoration of wetlands and riparian buffers to filter runoff. • Increase distance between active farming operations and receiving waters. • Stabilization of gullies and ditches.	Not Functioning	Functioning

Additional Benefits to Hannah Creek Significant Natural Heritage Area			
Improved Aquatic Habitats	• Restoration of appropriate bed form diversity, headwater stream/wetland form, and in-stream structures to provide appropriate habitat. • Restoration of self-sustaining stream/wetland headwaters. • Restoration of riparian buffer vegetation to provide organic matter and shade.	Not Functioning	Functioning
Improved Connectivity	• Restore connectivity to historic remnant channel features. • Improved aquatic connectivity to Hannah Creek.	Not Functioning	Functioning

7.0 Design Approach and Mitigation Work Plan

7.1 Target Stream and Wetland Types

7.1.1 Target Stream Types

A design approach was developed that will return Coastal Plain headwater stream functions to a stable state, as described in the guidance document entitled "*Information Regarding Stream Restoration in the Outer Coastal Plain of North Carolina*" (USACE, DWQ 2005). Existing condition assessments were used to assess the current functional condition of the site and set functional uplift goals, as described in Sections 4.0 and 6.0. Data sources used in these assessments included existing hydrogeomorphic conditions, historical aerials and LiDAR (Light Detection and Ranging) mapping, detailed site topographic mapping, evaluation of stable reference reaches, and a comparison of results from similar past projects in Coastal Plain headwater systems.

After examining the assessment data collected at the site (Appendix 6) and exploring the potential for restoration, a mitigation approach was developed that would address restoration of both stream and wetland functions within the project area. On-site topography and soils indicate that the project area most likely functioned in the past as a headwater tributary stream system with associated wetlands, eventually flowing downstream into the larger Hannah Creek system. Assigning an appropriate stream type for the corresponding valley that accommodates existing and future hydrologic conditions and sediment supply was considered prior to selecting the proposed design approach. The stream type assignment was primarily based on the range of the reference reach data available and the desired performance of the site. A Rosgen "C" type channel was selected as the design stream type for all reaches. The expectation is that the design channels will narrow to form "E" or lower width-to-depth ratio "C" channels within the first few years after restoration, due to herbaceous vegetation establishment along the banks, and the associated deposition of sediment. As canopy becomes established over the site at 10 to 15 years post-restoration, herbaceous vegetation will become less dense and channels often evolve to wider width-to-depth ratios that approximate the design and reference conditions.

7.1.2 Target Wetland Types

The restoration approach of the riparian and wetland areas intends to mimic the conditions of a "Coastal Plain Small Stream Swamp" (Blackwater subtype), as described by Schafale and Weakley (1990). Hydrology of this system will be palustrine, and "intermittently, temporarily, or seasonally flooded", as the restored channel is designed to carry the bankfull flow, and to flood (flow out of its banks) at discharges greater than bankfull. Areas proposed for restoration, enhancement, and creation are comprised of the Leaf soil series, which is listed as a Hydric A soil in Johnston County.

Areas of the site considered for "potential" wetland restoration are underlain by the Lynchburg soil series, which is listed as a Hydric B soil in Johnston County (non-hydric soils with hydric inclusion - Grantham, Rains, and Toisnot soil series - and are currently not characterized by hydric soil indicators). As such, these areas are not classified as wetland restoration areas; however, the areas are likely to support wetlands upon completion of the project. Soils underlying Areas of Potential Wetland Restoration do not display hydric soil indicators indicative of a Class A hydric soil due to 1) anthropogenic manipulation (plowing, spoil overburden, excavation, or disruption of hydric soil indicators), 2) position on the margins of hydric inclusions which may develop hydric soil indicators, and/or 3) soil properties supporting jurisdictional hydrologic regime without fully displaying hydric soil indicators. Potential wetland restoration areas currently do not exhibit hydric soil indicators but have a reasonable expectation of developing hydric soil indicators upon implementation of the restoration project.

Areas of Potential Wetland Restoration will not be counted towards wetland mitigation credit unless groundwater gauge data is provided that shows jurisdictional wetland hydrology during the annual monitoring period and consultation with the IRT has occurred.

All wetland areas within the project easement are proposed to have consistent monitoring and success criteria, including 10% wetland hydroperiod and vegetation indicative of a jurisdictional wetland as defined by USACE guidelines. In addition, potential wetland restoration areas would be required to develop hydric soil indicators such as depletions/concretions within the soil matrix. Hydric soil indicators will be described by a licensed soil scientist and will be consistent with descriptions for hydric soils as outlined in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plan Region (Version 2.0). Wetland hydroperiod will be monitored by continuously recording groundwater gauges and will be presented in annual monitoring reports. Areas that do not exhibit sufficient hydroperiod and/or hydric soil indicators will be not be added to wetland restoration credit upon completion of the monitoring period.

The goal of the wetland design component of the project is to restore functions in areas where evidence of hydric soil conditions is present. Four main activities will be employed to restore on-site wetlands:

- Fill existing ditches and raise stream bed elevations of the restored reaches;
- Minor grading to remove overburden and spoil piles from buried hydric soil layers, where present;
- Plant native wetland species to establish buffer vegetation; and
- Restore the overbank flooding regime by connecting channels to their relic floodplains.

As a result of these activities, significant hydrologic lift will occur across the project area, raising the local water table and restoring wetland hydrology to drained hydric soils adjacent to the restored streams.

7.2 Design Analysis and Parameters

Selection of design criteria is based on a combination of approaches, including review of reference reach data, regime equations, evaluation of monitoring results from past projects, and best professional judgment. Evaluating data from reference reach surveys and monitoring results from multiple Coastal Plain headwater stream and wetland projects provided pertinent background information to determine the appropriate design parameters given the existing conditions and overall site potential. The design parameters for the Site also considered guidelines from the USACE and NCDEQ guidance document entitled "*Information Regarding Stream Restoration in the Outer Coastal Plain of North Carolina*." (USACE, DWQ 2005).

The restoration activities and structural elements are justified for the following reasons:

1. Site streams have been channelized or otherwise manipulated during the conversion of the surrounding area for agricultural use. Re-establishing historic stream and wetland conditions will reduce bank erosion, improve floodplain connectivity, and improve wetland hydrology;

2. Site streams are incised and function more as drainage ditches and canals rather than headwater stream systems;

3. Past agricultural activities have resulted in erosion and sedimentation, silt-clogged stream channels, and the loss of woody vegetation within the riparian zone;

4. Some restored stream segments will connect with less impacted wooded reaches upstream and downstream; and

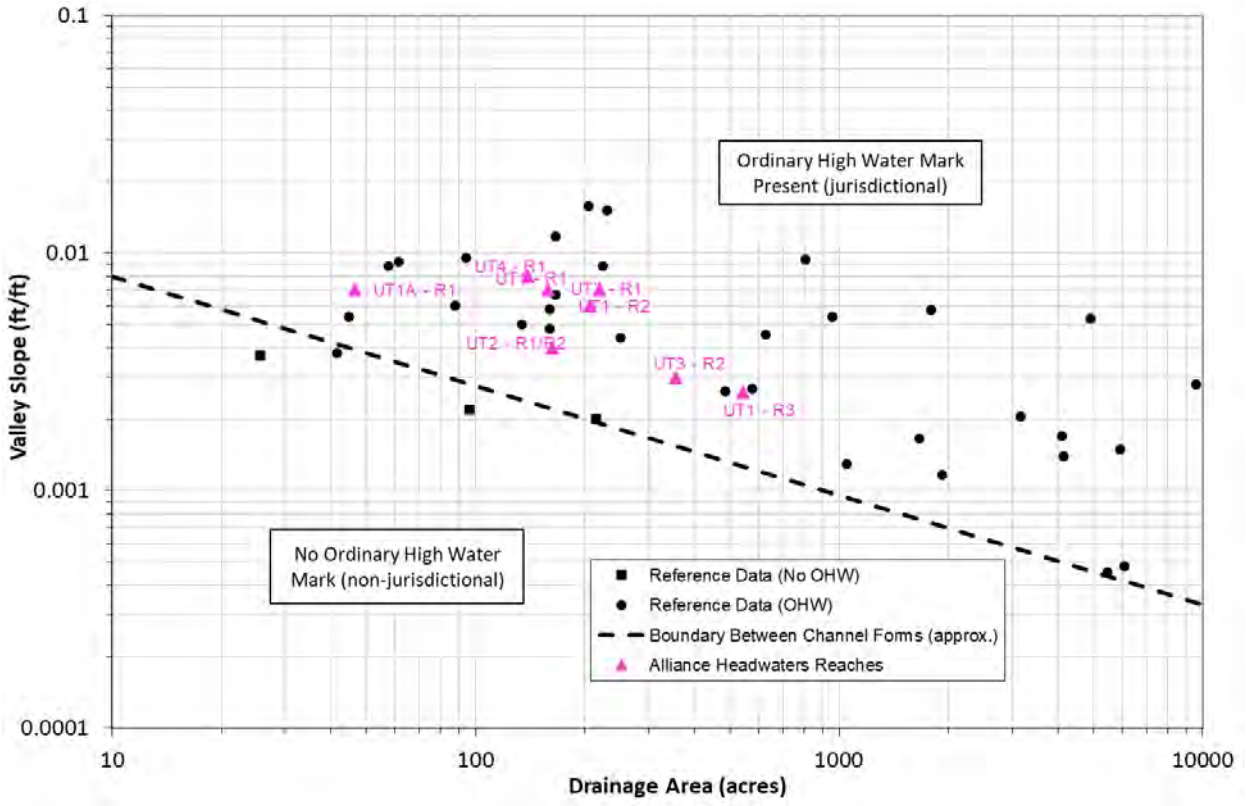
5. Enhancement or preservation measures would not achieve the highest possible level of restoration or functional lift for the degraded stream and wetland system.

For design purposes, the project was divided into five main reaches (UT1, UT1A, UT2, UT3, and UT4). Full restoration of the streams on the site was chosen as the preferred method to provide the maximum functional uplift, due to the disturbed and manipulated condition of the site, lack of existing function, and the relative lack of constraints.

An analysis was performed regarding the likely channel forms that would have been present through the site, prior to its conversion to agriculture. EPR has collected data on headwater stream systems in the Coastal Plain of the Southeastern U.S., and found a strong relationship between channel form, drainage area, and valley slope (Tweedy, 2008). As drainage area and valley slope increase, drainages tend to form more defined stream channels. EPR has used this tool successfully to evaluate the proper design form for Coastal Plain restoration projects. Topography data for the Site were used to evaluate both drainage area and valley slope for the project streams. Data from the evaluated project reaches are presented in Graph 1, where reach drainage areas are plotted against the estimated design valley slope.

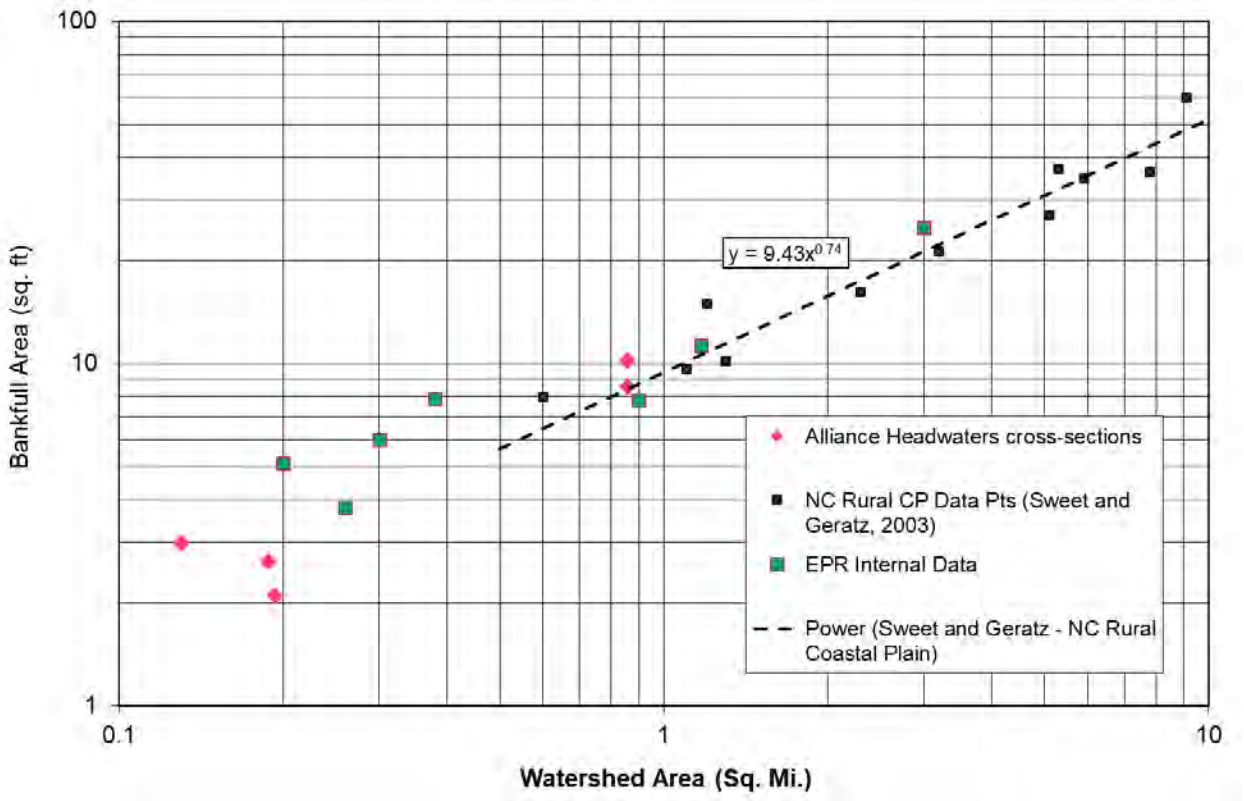
The results of this analysis indicate that all proposed design reaches would be expected to have a moderately to well-defined channel form under natural conditions, with a visible ordinary high- water mark (OHW). Therefore, the stream reaches were designed using Natural Channel Design (NCD), which has been used successfully in the past for small Coastal Plain streams.

Graph 1. Expected Channel Form Assessment.



Since a NCD approach using moderately to well-defined channels was selected as the appropriate design approach, regional curve and reference reach analyses were performed to develop specific channel design criteria. The regional curve analysis involved identifying stream reaches on the site with stable, visible bankfull indicators. Since all the streams within the agricultural fields have been channelized and maintained in the past, wooded reaches were assessed to identify visible bankfull indicators. In total, five stable cross-sections were located for this assessment, and were located on reaches UT1 (downstream of the project limits), UT4 (in the wooded preservation section), and a non-project stream located in the adjacent woods less than 0.25 mile from the site. The cross sections were plotted on the NC Coastal Plain Curve (Sweet and Geratz, 2003), along with internal reference reach data points developed by EPR staff within the upper and middle Coastal Plain of North Carolina and were found to agree well with the regional curve relationship (Graph 2). It should be noted that EPR has worked on other Coastal Plain streams in the area over the years and has usually found good agreement with the NC Coastal Plain Curve. Therefore, the regional curve regression relationship was used to determine the appropriate cross-sectional area of the design reaches.

Graph 2. Regional Curve Information for Alliance Headwaters Site.



For all the project stream reaches, restoration activities will focus on reconnecting the streams to their historic floodplain elevations whenever feasible. This approach will provide optimal functional uplift and will also allow for restoration of adjacent riparian wetlands by raising the local water table. In some locations, such as tie-ins to existing culverts, floodplain benches will be constructed to allow active floodplain access and reduce energies placed on streambanks.

The designs will use NCD techniques to restore a meandering Rosgen C5 channel type, generally with a width-to-depth ratio of between 10 and 14. A C stream type allows for lower channel depths, promoting higher water table conditions in the surrounding floodplain and aiding in the restoration of wetland hydrology. Rosgen C stream types are also common for Coastal Plain reference systems with similar drainage areas and slope. Woody structures such as woody riffles and log vanes, along with bioengineering practices, will be used to stabilize the outside meander bends and other areas of higher bank stress. Grade control and instream riffle habitat will be enhanced with the use of constructed riffles and woody debris that promote stability and provide refugia for aquatic organisms. Design plan form is based on reference reach information collected from similar sites in the past, and on the past performance of implemented projects with similar characteristics, with design sinuosities typically ranging from 1.2 to 1.4.

The ditches within the project area will be plugged and partially to completely filled, depending on the availability of fill material and the location. Fill material will be developed from channel grading, bench excavation, and removal of spoil piles in several locations of the site. Three ponds located along the design reaches of UT1, UT2, and UT3, will be filled to match the approximate natural ground and floodplain elevation. These ponds are relatively small and do not contain large amounts accumulated sediment. Two of the ponds are excavation ponds, which will be partially to completely filled as part of the proposed

work, while the third pond has a small earthen dam to form the impoundment. The water in this third pond will be pumped down and the dam then removed. Any excess sediment will be removed, and the valley will be reformed to approximate historic valley elevations. No excess sediment will be discharged downstream as a result of these methods. Other reach considerations are summarized in Table 8 below. Existing stream morphology for all project reaches can be found in Tables 9A and 9B, while existing watersheds, the existing drainage network, jurisdictional features and cross section locations are shown on Figures 4A, 4B, and 8. Proposed project reach watersheds and the proposed drainage network are shown on Figures 9A and 9B, respectively.

Table 8. Project Design Stream Types and Information.

Reach	Proposed Stream Type	Approach/Considerations
UT1	C	Restoration: Split into sub-reaches UT1-R1, UT1-R2, and UT1-R3, based on changes in drainage area. Benching will be required at the top of UT1-R1, the bottom of UT1-R2, and the top of UT1-R3, due to tie-in with ditches/culverts. The restoration of UT1-R2 will require filling a farm pond to restore the floodplain topography. A farm road that crosses the lower end of UT1-R3 will be relocated to reduce easement breaks. The reach ends at the confluence with UT2.
UT1A	C	Restoration: Short restoration reach that will intercept and route flows from the southwest portion of the site to UT1.
UT2	C	Restoration: Restoration reach will start below a culvert for the relocated farm road. Near the end of the design reach, a small pond will be filled to restore the floodplain topography and wetlands that have been converted to pond habitat. The reach ends at the wood line, where it will tie to an existing channel that is relatively stable.
UT3	C	Restoration: The restoration will begin in the woods to restore a short section of wooded stream that has been lost due to spoil material and drainage. The reach will begin at the historic floodplain elevation and continue through the farm field. Near the top of the reach, the ditch and farm road along the wood line will be filled and graded back to floodplain elevation. At the low end, a pond will be filled to form the restored floodplain of UT3 before it flows into a newly culverted farm road crossing at the end of the project.
UT4	C	Restoration: Like UT3, the restoration will begin in the woods to restore a short section of wooded stream that has been lost. The ditch and farm road at the wood line will be removed to reform the historic floodplain. The reach ends at its confluence with UT3.

Table 9A. Morphology Table for Project Streams.

Parameter	Existing				Reference Condition+	Proposed			
Reach	UT1A *	UT1 – R1*	UT1 – R2*	UT1 – R3		UT1A	UT1 – R1	UT1 – R2	UT1 – R3
Valley Width (ft)	5 – 7			13	---	35	66	52	66
Contributing Drainage Area (acres)	26 - 45			546	166 - 640	21	183	219	543
Channel/Reach Classification	Incised B5c			Incised B5c	C5 / E5	C5	C5	C5	C5
Design Discharge Width (ft)	2.5 – 4.8			7.4	6.5 – 9.7	5.3	6.5	7.5	9.9
Design Discharge Max Depth (ft)	0.6 – 0.8			1.6	0.75 -1.00	0.51	0.60	0.71	0.93
Design Discharge Area (ft^2)	1.0 – 2.5			7.5	3.8 – 8.0	2.0	3.0	4.0	7.0
Design Discharge Velocity (ft/s)	----^			----^	1.3 – 2.0	1.7	1.4	2.1	1.5
Design Discharge (cfs)	----^			----^	8.0 – 11.0	3.4	4.2	8.4	10.7
Water Surface Slope	0.0070			0.026	0.0027-0.0088	0.0090	0.0026	0.0049	0.0018
Sinuosity	1.0			1.0	1.22 – 1.59	1.0	1.26	1.29	1.35
Width/Depth Ratio	6.6 – 10.6			7.3	9.0 – 12.0	14	14	14	14
Bank Height Ratio	3.3 – 2.7			2.4	1.0 – 1.2	1.0	1.0	1.0	1.0
Entrenchment Ratio	1.3 – 2.0			1.7	> 3.0	6.6	10.2	6.9	6.7
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	sand			sand	sand	sand	sand	sand	sand

** Reaches UT1-R1, UT1-R2, and UT1A are currently part of a single ditch system that flows through the project area; therefore, the same existing morphological data is provided for all three reaches.*

^ Existing discharge and velocity not calculated since existing system is not representative of design.

+ Reference stream information can be found in Section 7.3.1 and Figure 10.

Table 9B. Morphology Table for Project Streams.

Parameter	Existing				Reference Condition+	Proposed			
Reach	UT2	UT3 – R1*	UT3 – R2*	UT4^		UT2	UT3 – R1	UT3 – R2	UT4
Valley Width (ft)	9.3	14		N/A	---	42	40	40	40
Contributing Drainage Area (acres)	147	354			166 - 640	162	201	354	133
Channel/Reach Classification	G5	Incised B5c			C5 / E5	C5	C5	C5	C5
Design Discharge Width (ft)	5.8	8.0			6.5 – 9.7	7.5	7.5	9.2	6.5
Design Discharge Max Depth (ft)	1.3	1.6			0.75 -1.00	0.7	0.7	0.86	0.61
Design Discharge Area (ft^2)	5.0	9.3			3.8 – 8.0	4.0	4.0	6.0	3.0
Design Discharge Velocity (ft/s)	-----#	----#			1.3 – 2.0	2.1	1.9	2.6	2.1
Design Discharge (cfs)	-----#	-----#			8.0 – 11.0	8.4	7.5	15.4	6.2
Water Surface Slope	0.0040	0.0030			0.0027-0.0088	0.0049	0.0038	0.0040	0.0057
Sinuosity	1.0	1.0			1.22 – 1.59	1.22	1.38	1.21	1.36
Width/Depth Ratio	6.7	6.8			9.0 – 12.0	14.0	14	14	14
Bank Height Ratio	3.6	1.8			1.0 – 1.2	1.0	1.0	1.0	1.0
Entrenchment Ratio	1.6	1.8			> 3.0	5.6	5.3	4.3	6.2
d16 / d35 / d50 / d84 / d95 / dip / disp (mm)	sand	sand			sand	sand	sand	sand	sand

** Reaches UT3-R1 and UT3-R2 are part of the same ditch system in their existing condition, and therefore one surveyed cross-section was used to assess the reach.*

^ In its existing condition, UT4 flows from the preservation reach (stable), directly into the UT3 channelized system; therefore, there is no existing UT4 channel to assess.

 # Existing discharge and velocity not calculated since existing system is not representative of design.

+ Reference stream information can be found in Section 7.3.1 and Figure 10.

7.2.1 Sediment Transport Analyses

The purpose of a sediment transport analysis is to ensure that the stream restoration design creates a stable channel that does not aggrade or degrade over time. In Coastal Plain sand-bed systems, all particle sizes are mobile during bankfull flows; therefore, there is no need to determine the competency or maximum particle size that the stream can transport. However, comparing the design shear stress and stream power values for a project reach to those computed for sand-bed reference reaches is useful to

evaluate whether the values predicted for the design channels are within the range of those found in stable systems. Empirical relationships from stable Coastal Plain sand-bed channels in North Carolina are used in this analysis. The shear stress and stream power values for the design reaches were calculated and compared with stable reference stream data. The design shear stress and stream power values were somewhat lower than the reference streams when using a design width-to-depth ratio of 14, with stream power generally ranging from 1.5 to 8.5 W/m2 and shear stresses ranging from 0.2 to 0.7 lbs/ft2. In past projects that a similar, we have seen design channels narrow over the first few years as a result of herbaceous vegetation growth on the channel banks and subsequent sediment deposition that tends to lower the width-to-depth ratio of the restored channels. When the sediment transport relationships are re-evaluated for width-to-depth ratios between 8 and 10, the shear stress and stream power relationships closely match those observed in reference systems, with stream power generally ranging from 2 to 12 W/m2, and shear stress ranging from 0.08 to 0.23 lbs/ft2. It should also be noted that sediment supply for the restored reaches is expected to be low, since most of the upstream watershed and drainages are relatively stable. Woody and constructed riffles are being incorporated the design to protect against scour during larger than bankfull storm events, with the frequency of woody/constructed riffles increasing as stream slope increases (i.e. areas of greater shear stress). This analysis provides evidence that the stresses predicted for the design channels will be within the range of stable values calculated for the reference reaches.

7.2.2 Project Risks and Uncertainties

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

- Hydrologic Trespass: Since the project streams are going to be restored by raising the bed elevations and reconnecting to historic floodplains, drainage will be decreased to the adjacent streams. The existing watersheds and drainage networks are shown on Figures 4A and 4B and the proposed watersheds and drainage networks are shown on Figures 9A and 9B to document these changes. The proposed Site changes will ultimately provide greater on-site water storage capacity which will help attenuate stream flows to areas outside the proposed project limits.

  This concern was expressed by an adjacent landowner in a letter dated May 26, 2017 to the USACE in response to the public comment period for the project. The landowner expressed concern that additional water would be discharged onto their property as a result of the project.

  - Methods to Address: Low-lying areas adjacent to the proposed stream buffers that may experience increased wetness after project implementation will be purchased by Restoration Systems. Drainage for other areas outside of the project limits are being carefully evaluated and modifications to the existing drainage network are being designed to eliminate the potential for adverse impacts to the restored resources.

    In regard to the concern expressed by the adjacent landowner, there is no increase in drainage area proposed at the outlets of the project. Since the project areas will be restored with adjacent wetlands, it is likely that discharge from the project site to adjacent parcels will actually be decreased somewhat as a result of greater surface storage and plant uptake on the project site.

- Land use development: There is potential for increased land development around the site in the future that could lead to additional runoff and changes to watershed hydrology.

    - Methods to Address: The project area has seen little development in recent years and it is unlikely that development will threaten the site in the foreseeable future. Restoration of the site to reconnect streams to their floodplains will reduce the likelihood of future degradation from watershed changes, as increased flows will spread over a wider floodplain. There is also little elevational fall across the site, so the risk of channel instability is low once vegetation is established.

- Easement Encroachment: There is potential for landowner encroachment into the permanent conservation easement.

    - Methods to Address: Restoration Systems has had considerable discussions with the landowner regarding the project requirements and limitations of easement access and is confident that the landowner fully understands and will maintain the easement protections. The easement boundaries will also be clearly marked per NCDMS requirements. Any encroachments that do occur will be remedied by Restoration Systems or the long-term steward to remedy any damage and provide any other corrections required by NCDMS and/or the IRT.

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

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

- Channel Formation: Since the project involves headwater systems, flow duration and channel formation performance standards may not be met.

    - Methods to Address: The design team is confident that the headwater stream systems will form as designed. This conclusion is based on observations of upstream and downstream wooded reaches, site wetness condition, soils, topography, and watershed sizes. Flow gauges will be installed, and observations of channel formation and ordinary high-water mark features will be recorded. In the first few years, channels may become obscured by dense herbaceous vegetation. Over time as trees grow and provide shade, the herbaceous species will be reduced, and the channels will typically become more defined and pronounced.

7.3 Stream Reference Sites

Stream reference reach information for the project was collected from two sources. First, as described in Section 7.2, five stable cross-sections were located near the Site, and were located on reaches UT1 (downstream of the project limits), UT4 (in the wooded preservation section), and a non-project stream located in the adjacent woods less than 0.25 mile from the site (Figure 8). These surveyed cross sections were used to evaluate channel dimension (specifically cross-sectional area and discharge) regional curve relationships within the project watershed. While the cross-section locations surveyed were considered

stable and well-connected to the adjacent floodplains, the reaches themselves exhibited evidence of past disturbance, such as spoil piles, re-alignments, and immature vegetation. Therefore, these reaches were not used as stream pattern references.

Vegetation communities along these reaches were documented. While the sites were not considered true reference reaches with mature, reference quality vegetation, the sites did contain several native species that apparently grow well in the area soils and climate. Canopy species include tulip poplar (*Liriodendron tulipifera*), green ash (*Fraxinus pennsylvanica*), river birch (*Betula nigra*), water oak, American holly, and sweetgum (*Liquidambar styraciflua*), with titi, possumhaw (*Viburnum nudum*), buttonbush (*Cephalanthus occidentalis*), sweet bay, giant cane, and elderberry in the shrub layer. Herbs and vines include Japanese stilt grass, lizard tail (*Saururus cernuus*), violets (*Viola* spp.), trumpet creeper (*Campsis radicans*), laurel-leaf greenbrier (*Smilax laurifolia*), grape, and greenbrier.

7.3.1 Reference Streams

EPR reviewed internal reference reach database information collected over time from the region near the Alliance Headwaters Mitigation Site. These reference reaches were surveyed in the past to establish the range of conditions observed in the region for reference quality streams, particularly small, headwater, single-thread, Coastal Plain streams. The reference information collected was used for the Alliance Headwaters Site to evaluate appropriate ranges of sinuosity, pattern ratios, and sediment transport relationships (as described in Section 7.2). The locations of the reference streams are provided in Figure 10, and summary information is provided in Table 10.

Table 10. Summary of Stream Reference Reach Information.

Parameter	Reference Reach		
	Johanna Creek	**Still Creek**	**Cole Property**
County	Johnston	Wayne	Wayne
Distance from Site (mi)	3.7	28	28
Stream Type	C5/E5	E5	E5/C5
Drainage Area (sq mi)	1.0	0.35	0.26
W/D Ratio	12.0	9.0	10.0
Bankfull Area (ft^2)	8.0	6.1	3.8
Bankfull Width (ft)	9.7	7.4	6.5
Bankfull Mean Depth (ft)	0.80	0.82	0.60
Valley Slope (ft/ft)	0.0027	0.0088	0.0059
Sinuosity	1.22	1.33	1.59
Meander Length Ratio	5.2	5.9 – 11.5	9.8
Radius of Curvature Ratio	1.5 – 2.8	2.9 – 6.4	1.2 – 2.3
Meander Width Ratio	1.4 – 2.1	2.1 – 6.6	5.4 – 8.2

7.4 Wetland Reference Sites

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 forested ecosystem as it likely existed prior to human disturbances. Data describing plant community composition and structure were collected at the RFEs and subsequently applied as reference data in an attempt to emulate a natural climax community.

7.4.1 Reference Wetlands

Reference vegetative communities for the Site were identified in the upstream wetland preservation area of the Site. Tree and shrub species identified in this area are listed in Table 11 and were utilized, in addition to other relevant species, to supplement community descriptions for the Coastal Plain Small Stream Swamp (Blackwater Subtype) (Schafale & Weakley 1990).

Table 11. Species Identified within the Reference Forest Ecosystems.

Scientific Name	Common Name	Wetland Indicator Status
Acer rubrum	Red maple	FAC
Betula nigra	River Birch	FACW
Diospryos virginiana	Persimmon	FAC
Ilex opaca	American Holly	FAC
Juniperus virginiana	Eastern Red Cedar	FACU
Liquidambar styraciflua	Sweetgum	FAC
Liriodendron tulipifera	Tulip Poplar	FACU
Magnolia virginiana	Sweet Bay	FACW
Nyssa sylvatica	Black Gum	FAC
Persea palustris	Red Bay	FACW
Pinus palustris	Longleaf Pine	FACU
Pinus serotina	Pond Pine	FACW
Pinus taeda	Loblolly Pine	FAC
Quercus alba	White Oak	FACU
Quercus nigra	Water Oak	FAC
Quercus laurifolia	Laurel Oak	FACW
Quercus nigra	Water Oak	FAC
Quercus phellos	Willow Oak	FACW

7.5 Vegetation and Planting Plan

The 71.7-acre conservation easement will provide extensive protection for the restored stream channels because of the surrounding restored, enhanced, and created wetlands. Approximately 50 acres of newly forested areas will be established within the conservation easement with buffer widths ranging from 50-feet to 500-feet.

Species selection for re-vegetation of the conservation easement will generally follow those suggested by Schafale and Weakley (1990) for the Coastal Plain Small Stream Swamp (Blackwater subtype) and the Mesic Mixed Hardwood Forest and wetness tolerances cited in *WRP Technical Note VN-RS-4.1* (WRP

1997). Vegetative planting will be based on topography and hydrologic soil conditions and designated by planting zones.

Tree species selected for planting across the Site are shown in Table 12 and Appendix 7. These species will be planted as bare-root seedlings at a density of 680 stems per acre. Species will be planted during the dormant season (November 15 – March 15) following the handling and installation procedures outlined on the plan sheets to achieve the vegetative success criteria outlined in Section 8.2.

Table 12. Tree Species and Planting Zones.

Scientific Name	Common Name	Wetland Indicator Status [A]
Zone 1 – Stream Banks [B]		
Cephalanthus occidentalis	Buttonbush	OBL
Cornus amomum	Silky Dogwood	FACW
Salix nigra	Silky Dogwood	OBL
Sambucus canadensis	Elderberry	FAC
Zone 2 – Riparian and Wetland Buffer [B]		
Betula nigra	River Birch	FACW
Carpinus caroliniana	Ironwood	FAC
Liriodendron tulipifera	Tulip Poplar	FACU
Magnolia virginiana	Sweet Bay	FACW
Nyssa biflora	Swamp Black Gum	OBL
Persea palustris	Red Bay	FACW
Quercus laurifolia	Laurel Oak	FACW
Quercus lyrata	Overcup Oak	OBL
Quercus michauxii	Swamp Chestnut Oak	FACW
Taxodium distichum	Bald Cypress	OBL
Ulmus americana	American Elm	FAC
Zone 3 – Upland Buffer [C]		
Acer saccharum	Sugar Maple	FACU
Diospryos virginiana	Persimmon	FAC
Liriodendron tulipifera	Tulip Poplar	FACU
Nyssa sylvatica	Black Gum	FAC
Prunus serotina	Black Cherry	FACU
Quercus alba	White Oak	FACU
Quercus michauxii	Swamp Chestnut Oak	FACW
Quercus pagoda	Cherrybark Oak	FACW

[A] – National Wetland Plant List (Atlantic Gulf Coastal Plain) (Lichvar et al. 2016)
[B] – Species are representative of the Coastal Plain Small Stream Swamp - Blackwater subtype
[C] – Species are representative of the Mesic Mixed Hardwood Forest

Stream banks will be live staked in specific areas using species shown on the plan sheets (see Plan Sheets). Temporary and permanent seed mixtures will be applied to all disturbed areas (see Plan Sheets).

8.0 Performance Standards

Performance criteria outlined in the *NCDMS Mitigation Plan Template* (ver. 10/2015), and *U.S. Army Corps of Engineers – Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District* (October 24, 2016), will be followed and are briefly outlined below. Monitoring data collected on the site will include reference photos, plant survival analyses, channel stability analyses, wetland hydrological analysis, and biological data if specifically required by permit conditions.

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

8.1 Restored Stream Channels

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

- 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 for a majority of measured cross sections on a given reach.
- Entrenchment ratio (ER) must be 2.2 or above for a majority of measured riffle cross-sections on a given reach.
- BHR and ER should not change by more than 10% in any given year for a majority of a given reach.
- Must document occurrence of at least 4 bankfull events in separate years during the monitoring period.

8.2 Riparian Vegetation

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

- Within planted portions of the site, a minimum of 320 stems per acre must be present at year 3; a minimum of 260 stems per acre must be present at year 5; and a minimum of 210 stems per acre must be present at year 7.
- Trees must average 7 feet in height at year 5, and 10 feet in height at year 7.
- Planted and volunteer stems are counted, provided they are included in the approved planting list for the site.
- Any single species can only account for 50% of the required stems per monitoring plot.

8.3 Compatibility with Project Goals

The performance criteria described above allow evaluation of whether the project goals have been met after the site has been completed. In Table 13, the Project goals and objectives are listed, along with the performance criteria that will allow documentation of whether the goals have been achieved.

Table 13. Project Goals and Associated Performance Criteria.

Goals	Objectives	Performance Criteria
Goals Specific to the Neuse River and Hannah Creek Watershed Discussed in the RBRP (NCDMS, 2010 and 2015) and Neuse River Basinwide Plan (NCDWQ, 2009)		
Remove Direct Nutrient Inputs from Agricultural Lands	Restoration and enhancement of minimum 50-foot riparian buffers along all project reaches.	• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.
	Restoration of wetlands. Decreased water table depths and increased saturation to promote denitrification.	• Geomorphic cross sections indicate stable sections (shallow channels) over the monitoring period. • Water table gauges and wells document appropriate stream flow and extended saturated conditions. • Wetland hydrology success criteria of saturation or inundation for 10 percent of the growing season.
	Protection of riparian buffers with a perpetual conservation easement.	• Recordation of a conservation easement meeting NCDMS guidelines.
Remove Direct Sediment Inputs from Agricultural Lands	Restoration of appropriate aquatic in-stream habitat.	• Geomorphic cross sections indicate stable channels and differences between pools and riffles. • Visual documentation of stable channel condition and in-stream structures.
	Restoration of wetlands and riparian buffer communities.	• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7. • Wetland hydrology success criteria of saturation or inundation for 10 percent of the growing season.
	Reduce sediment loads to downstream receiving waters from bank erosion	• Geomorphic cross sections indicate stable sections over the monitoring period.
Additional Benefits to Hannah Creek Significant Natural Heritage Area		
Improved Aquatic Habitats	Restoration of appropriate channel and bed form diversity and in-stream structures to provide appropriate habitat.	• Geomorphic cross sections that document a variety of channel depths and forms. • Visual documentation of in-stream structure stability during annual monitoring.
	Restoration of self-sustaining headwater stream/wetland systems.	• Geomorphic cross sections indicate stable sections over the monitoring period. • Water table gauges and wells document high water table conditions. • Wetland hydrology success criteria of saturation or inundation for 10 percent of the growing season.
	Restoration of riparian buffer vegetation to provide organic matter and shade.	• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7. • Recordation of a conservation easement meeting NCDMS guidelines.
Improved Connectivity	Reconnecting restoration reaches with remnant headwater channels.	• Geomorphic cross sections indicate stable sections over the monitoring period.
	Restoration and protection of riparian buffers that connect to existing wooded areas.	• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7. • Recordation of a conservation easement meeting NCDMS guidelines.

9.0 Monitoring Plan

The monitoring plan for the Site will follow the guidance outlined in the *NCDMS Mitigation Plan Template* (ver. 10/2015), and *U.S. Army Corps of Engineers – Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District* (October 24, 2016). Monitoring data collected on the site will include reference photos, plant survival analyses, channel stability analyses, wetland hydrological analyses, and biological data if specifically required by permit conditions.

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

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

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

Wetland hydrology is proposed to be monitored annually for a period of seven years (years 1 - 7). Stream morphology and riparian vegetation is proposed to be monitored for a period of seven years with measurements completed in years 1, 2, 3, 5, and 7. Additionally, in years 4 and 6, a brief narrative of site developments, a representative photo log, and a Current Condition Plan View (CCPV) will be submitted, barring any need for supplemental reporting.

9.1 Stream Monitoring

Stream monitoring will include monitoring of the hydrologic and geomorphic functions of UT1, UT1A, UT2, UT3, and UT4. Monitored parameters, methods, schedule/frequency, and extent are summarized in Table 14. Monitoring parameters follow USACE guidance but will also allow monitoring of parameters to document site performance related to the project goals listed in Section 6. The proposed locations of monitored cross sections are shown in Figure 11.

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Table 14. Stream Monitoring Summary.

Parameter	Method	Schedule/ Frequency	Number/ Extent
Stream Profile	Full longitudinal survey	As-built, (unless otherwise required)	All restored stream channels
Stream Dimension	Cross sections	Years 1, 2, 3, 5, and 7	Two per 1,000 ft of restored channel
Channel Stability	Visual Assessment	Yearly	All restored stream channels
	Additional Cross sections	Yearly	Only if instability is documented during monitoring
Stream Hydrology	Continuous monitoring water level gages	Continuous recording through monitoring period	One flow gauge on UT1 – R2, UT1 – R3, UT1A, UT2, UT3 – R1, UT3 – R2, and UT4

9.2 Wetland Monitoring

Groundwater monitoring gauges will be installed to take measurements after hydrological modifications are performed at the Site. Hydrological sampling will continue throughout the growing season at intervals necessary to satisfy the jurisdictional hydrology success criteria within each wetland restoration area (USEPA 1990). According to the Soil Survey of Johnston County, the growing season is from March 21-November 4 (USDA 1994). However, for purposes of this project gauge hydrologic success will be determined using data from March 1-November 4 to more accurately represent the period of biological activity. Based on growing season information outlined in the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region* (USACE 2010) and *Wilmington District Stream and Wetland Compensatory Mitigation Update* (IRT 2016), this will be confirmed annually by soil temperatures exceeding 41 degrees Fahrenheit at 20 inches depth and/or bud burst.

A March 1 start of the growing season is proposed to allow for extending the growing season during critical portions of the year for wetland ecology. Specifically, soil biological activity during saturated conditions is the driving force behind the development of hydric soils and/or hydrophytic vegetation. An extension of the growing season at the beginning of the year, if early growing season indicators are present, more accurately depicts actual growing season length at the Site.

Soil temperatures will be collected in late February/early March of each monitoring year and will be reported in the annual monitoring report. Monitored parameters, methods, schedule/frequency, and extent are summarized in Table 15. The proposed locations for groundwater gauges are shown in Figure 11.

Table 15. Wetland Monitoring Summary.

Parameter	Method	Schedule/ Frequency	Number/ Extent	Data Collected
Wetland restoration	Groundwater gauges	As-built, Years 1, 2, 3, 4, 5, 6, and 7	26 gauges spread throughout restored and created wetlands	Soil temperatures at the beginning of each monitoring period, groundwater and rain data for each monitored period.

9.3 Riparian Vegetation Monitoring

Vegetation monitoring will evaluate the establishment of planted and volunteer vegetation across the site. Monitored parameters, methods, schedule/frequency, and extent are summarized in Table 16. Monitoring parameters follow USACE guidance but will also allow monitoring of parameters to document site performance related to the project goals listed in Section 6.

Table 16. Riparian Vegetation Monitoring Summary.

Parameter	Method	Schedule/ Frequency	Number/ Extent	Data Collected
Vegetation establishment and vigor	Permanent vegetation plots, 0.02 acre in size (minimum)	As-built, Years 1, 2, 3, 5, and 7	32 plots spread across site	Species, height, location, grid location, planted vs. volunteer, and age
	Annual random vegetation plots, 0.02 acre in size (minimum)	As-built, Years 1, 2, 3, 5, and 7	18 plots randomly selected each year	Species, and height

During quantitative vegetation sampling, sample plots (100 square meters, or 0.02 acre) will be installed within the site as per guidelines established by the Level 1 and 2 protocols in *CVS-DMS Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph. The proposed locations of permanent vegetation plots are shown in Figure 11.

9.4 Visual Assessment Monitoring

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

10.0 Long-Term Management Plan

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

The Site Protection Instrument will be recorded once the mitigation plan has been approved.

11.0 Adaptive Management Plan

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

A maintenance plan is provided in Appendix 8, summarizing the types of issues that may arise during monitoring and how those issues would be addressed.

12.0 Determination of Credits

Mitigation credits presented in Table 17A and 17B are projections based upon site design.

Although not expected, if site conditions such as unidentified bedrock, utility easements, discovery of cultural resources, etc., are encountered during construction of stream channels that result in significant deviations from the approved plan or credit amount (i.e. more than would typically result from measurement variations), the as-built report must clearly identify the difference in the length and associated credit amount and explain how project design and construction were altered, to include updated plan sheets. These changes, including the revised credit totals, should be submitted to the District for approval as a project modification.

For projects that include wetland mitigation, restored wetland boundaries are not surveyed because wetland areas must still be monitored before they are determined to meet hydrology standards, so wetland credit amounts should not change at as-built unless project limits are altered during construction (e.g. property is removed or added to a project, planned hydrologic alterations are not carried out, etc.)

Upon completion of site construction, the project components and credit data will be adjusted, if necessary, to be consistent with the as-built condition, and any changes will be described in the As-built Monitoring Report. The project proposes to provide stream credits derived from stream restoration activities, as shown in the Mitigation Plan Conceptual Map (Figure 12). A description of the stream restoration ratios are presented below. The proposed credit release schedule is provided in Appendix 9.

12.1 Restoration and Creation Ratios

12.1.1 (West of Joyner Bridge Road)

The proposed ratios for streams and riparian wetlands on the west side of Joyner Bridge Road will be 1:1 for all proposed and potential restoration areas and 10:1 for creation based on the following:

1. Per USACE discussions during the post-award, initial site evaluation conducted in the spring of 2016.

12.1.2 (East of Joyner Bridge Road)

The proposed ratios for streams and riparian wetlands on the east side of Joyner Bridge Road will be 1.3:1 for all proposed and potential restoration areas and 13:1 for creation based on the following:

1. Per USACE discussions during the post-award, initial site evaluation conducted in the spring of 2016 and subsequent conversations. The Tract of land East of Joyner Bridge Road was subject to land-use change in 1997/98. At the time, the Tract was not owned by the current landowner. Discussions were held between the Sponsor and Todd Tugwell, Special Projects Manager with the Wilmington District, US Army Corps of Engineers during the initial vetting of the Alliance Headwaters project. The Sponsor was unable to located NRCS or FSA paperwork regarding the land-use change though a timber lease between Weyerhaeuser and the previous landowner was located. As a result of mutual agreement, all mitigation credit being derived on the subject Tract will receive a 30% reduction (i.e. restoration based mitigation ratio would go from 1:1 to 1.3:1). Correspondence between Restoration Systems (Sponsor) and Todd Tugwell detailing the reduction is attached for reference in Appendix 10.

12.2 Enhancement Ratio

12.2.2 (East of Joyner Bridge Road)

The proposed ratios for riparian wetlands on the east side of Joyner Bridge Road will be 3.25:1 for enhancement based on the following:

1. Per USACE discussions during the post-award, initial site evaluation conducted in the spring of 2016 and subsequent conversations. The Tract of land East of Joyner Bridge Road was subject to land-use change in 1997/98. At the time, the Tract was not owned by the current landowner. Discussions were held between the Sponsor and Todd Tugwell, Special Projects Manager with the Wilmington District, US Army Corps of Engineers during the initial vetting of the Alliance Headwaters project. The Sponsor was unable to located NRCS or FSA paperwork regarding the land-use change though a timber lease between Weyerhaeuser and the previous landowner was located. As a result of mutual agreement, all mitigation credit being derived on the subject Tract will receive a 30% reduction (i.e. enhancement-based mitigation ratio would go from 2.5:1 to 3.25:1). Correspondence between Restoration Systems (Sponsor) and Todd Tugwell detailing the reduction is attached for reference in Appendix 10.

12.3 Wetland Preservation Ratio

The proposed ratio for wetland preservation on the project is 10:1 based on the following:

1. The approved jurisdictional delineation of existing forested wetlands.
    a. Wetlands specifically proposed for preservation are located up valley and adjacent to the start of UT3 and UT4 restoration.

Table 17A. Determination of Stream Mitigation Credits.

Project Components								
Reach ID	**Existing Footage [A]**	**Stationing/ Location**	**Restored/ Preserved Footage**	**Creditable Footage**	**Restoration Level**	**Approach (P1, P2, etc.)**	**Mitigation Ratio**	**Mitigation Credits**
UT1A	--	10+00 – 10+87	87	87	R	P1	1:1	87
UT1 – R1	4,761	10+00 – 14+33	433	433	R	P2	1:1	433
		14+33 – 16+71	238	238	R	P1	1:1	238
UT1 – R2		16+71 – 21+10	439	439	R	P1	1:1	439
		21+10 – 22+34	124	124	R	P2	1:1	124
		22+34 – 29+44	710	710	R	P1	1:1	710
		29+44 – 30+18	74	19	R	P2	1:1	19
		30+18 – 30+33	15	0	R	P1	1:1	0
UT1 – R3		10+00 – 22+56	1,256	1,107	R	P2	1.3:1	852
		22+56 – 24+63	207	207	R	P1	1.3:1	159
UT2	<1	10+00 – 10+88	88	0	R	P1	1.3:1	0
		10+88 – 15+29	441	383	R	P2	1.3:1	295
		15+29 – 15+95	66	66	R	P1	1.3:1	51
		15+95 – 16+52	57	57	R	P2	1.3:1	44
		16+52 – 19+97	345	345	R	P1	1.3:1	265
UT3 – R1	3,313	10+00 – 16+39	186	186	R	P1	1:1	186
		11+86 – 12+49	63	63	R	P2	1:1	63
		12+49 – 16+39	390	390	R	P1	1:1	390
UT3 – R2		16+39 – 23+27	688	688	R	P1	1:1	688
		23+27 – 26+53	326	326	R	P2	1:1	326
		26+53 – 27+88	135	130	R	P1	1:1	130
		27+88 – 29+15	127	0	R	P2/P1	1:1	0
UT4	1,142	10+00 – 11+73	173	173	R	P1	1:1	173
		11+73 – 12+38	65	65	R	P2	1:1	65
		12+38 – 15+31	293	293	R	P1	1:1	293
Totals	**~9,217**		**7,026**	**6,529**				**6,029 ***

[A] A PJD package was resubmitted to Samantha Dailey (USACE) and is currently under review for the existing stream channels.

* Restoration Systems is under contract with the Division of Mitigation Services to provide 6,657 Stream Mitigation Credits.

Table 17B. Determination of Riparian Riverine Wetland Mitigation Credits

Project Component	Wetland Mitigation Type	Type	Acreage	Mitigation Ratio*	WMUs
WR1	Restoration	Riparian Riverine	7.11	1:1	7.11
WR2	Restoration *	Riparian Riverine	6.97	1.3:1	5.36
WR3	Restoration	Riparian Riverine	18.47	1:1	18.47
WE1	Enhancement *	Riparian Riverine	0.38	3.25:1	0.12
WC1	Creation	Riparian Riverine	0.54	10:1	0.05
WC2	Creation *	Riparian Riverine	0.55	13:1	0.04
WC3	Creation	Riparian Riverine	0.90	10:1	0.09
WP1	Preservation	Riparian Riverine	16.39	10:1	1.64
		Totals	**51.31**		**32.88**

* The Tract of land East of Joyner Bridge Road was subject to land-use change in 1997/98. At the time, the Tract was not owned by the current landowner. Discussions were held between the Sponsor and Todd Tugwell, Special Projects Manager with the Wilmington District, US Army Corps of Engineers during the initial vetting of the Alliance Headwaters project. The Sponsor was unable to located NRCS or FSA paperwork regarding the land-use change though a timber lease between Weyerhaeuser and the previous landowner was located. As a result of mutual agreement, all mitigation credit being derived on the subject Tract will receive a 30% reduction (i.e. restoration based mitigation ratio would go from 1:1 to 1.3:1). Correspondence between Restoration Systems (Sponsor) and Todd Tugwell detailing the reduction is attached for reference in Appendix 10.

Table 17C. Determination of Riparian Riverine Wetland Mitigation Credits for Areas of Potential Wetland Restoration

Project Component	Wetland Mitigation Type	Type	Acreage	Mitigation Ratio*	WMUs
PWR1	Potential Restoration [A]	Riparian Riverine	0.29	1:1	0.29
PWR2	Potential Restoration [A]	Riparian Riverine	0.95	1:1	0.95
PWR3	Potential Restoration [A]	Riparian Riverine	0.90	1:1	0.90
PWR4	Potential Restoration [A]	Riparian Riverine	0.28	1:1	0.28
PWR5	Potential Restoration [A] *	Riparian Riverine	1.47	1.3:1	1.13
PWR6	Potential Restoration [A] *	Riparian Riverine	0.87	1.3:1	0.67
PWR7	Potential Restoration [A]	Riparian Riverine	1.11	1:1	1.11
PWR8	Potential Restoration [A]	Riparian Riverine	0.97	1:1	0.97
PWR9	Potential Restoration [A]	Riparian Riverine	0.17	1:1	0.17
		Totals	**7.01**		**6.47**

[A] These areas may become wet after the project has been constructed. Monitoring will be conducted in these areas to determine if they meet the requirements of a restored wetland.

* The Tract of land East of Joyner Bridge Road was subject to land-use change in 1997/98. At the time, the Tract was not owned by the current landowner. Discussions were held between the Sponsor and Todd Tugwell, Special Projects Manager with the Wilmington District, US Army Corps of Engineers during the initial vetting of the Alliance Headwaters project. The Sponsor was unable to located NRCS or FSA paperwork regarding the land-use change though a timber lease between Weyerhaeuser and the previous landowner was located. As a result of mutual agreement, all mitigation credit being derived on the subject Tract will receive a 30% reduction (i.e. restoration based mitigation ratio would go from 1:1 to 1.3:1). Correspondence between Restoration Systems (Sponsor) and Todd Tugwell detailing the reduction is attached for reference in Appendix 10.

Alliance Headwaters

DMS Project 97086

Asset Summary: Mitigation Plan

	Stream			Riparian Wetland		
	lf	ratio	credit	ac	ratio	credit
Restoration	4,364	1.000	4,364	30.250	1.000	30.250
R special Ratio	2,165	1.3	1,665	9.310	1.300	7.162
EI/Enhancement				0.380	3.250	0.117
EII						
Creation				1.440	10.000	0.144
C Special Ratio				0.550	13.000	0.042
Preservation				16.390	10.000	1.639
TOTAL	**6,529**		**6,029**	**58.320**		**39.354**

13.0 Financial Assurances

A statement regarding the financial assurances for the project can be found in Appendix 11.

14.0 References

Harman, W., R. Starr, M. Carter, K. Tweedy, M. Clemmons, K. Suggs, and C. Miller. 2012. A Function-Based Framework for Stream Assessment and Restoration Projects. US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC EPA 843-K-12-006.

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Tweedy, K.L. 2008. A Methodology for Predicting Channel Form in Coastal Plain Headwater Systems. Conference Proceedings: Stream Restoration in the Southeast: Advancing the Science and Practice. November 3 - 6, 2008, Asheville, NC.

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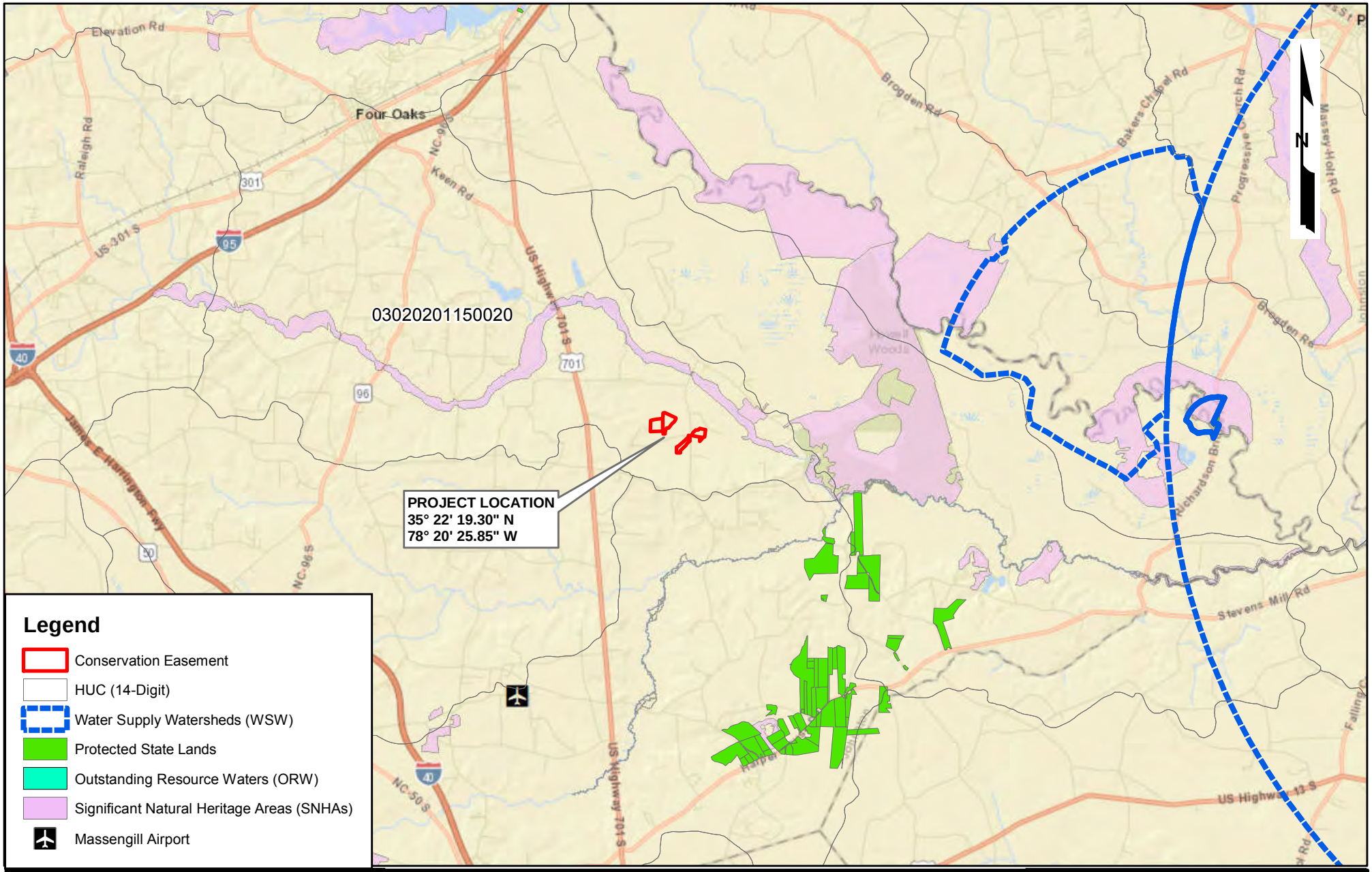
Figures



ALLIANCE HEADWATERS

VICINITY MAP

PREPARED FOR:

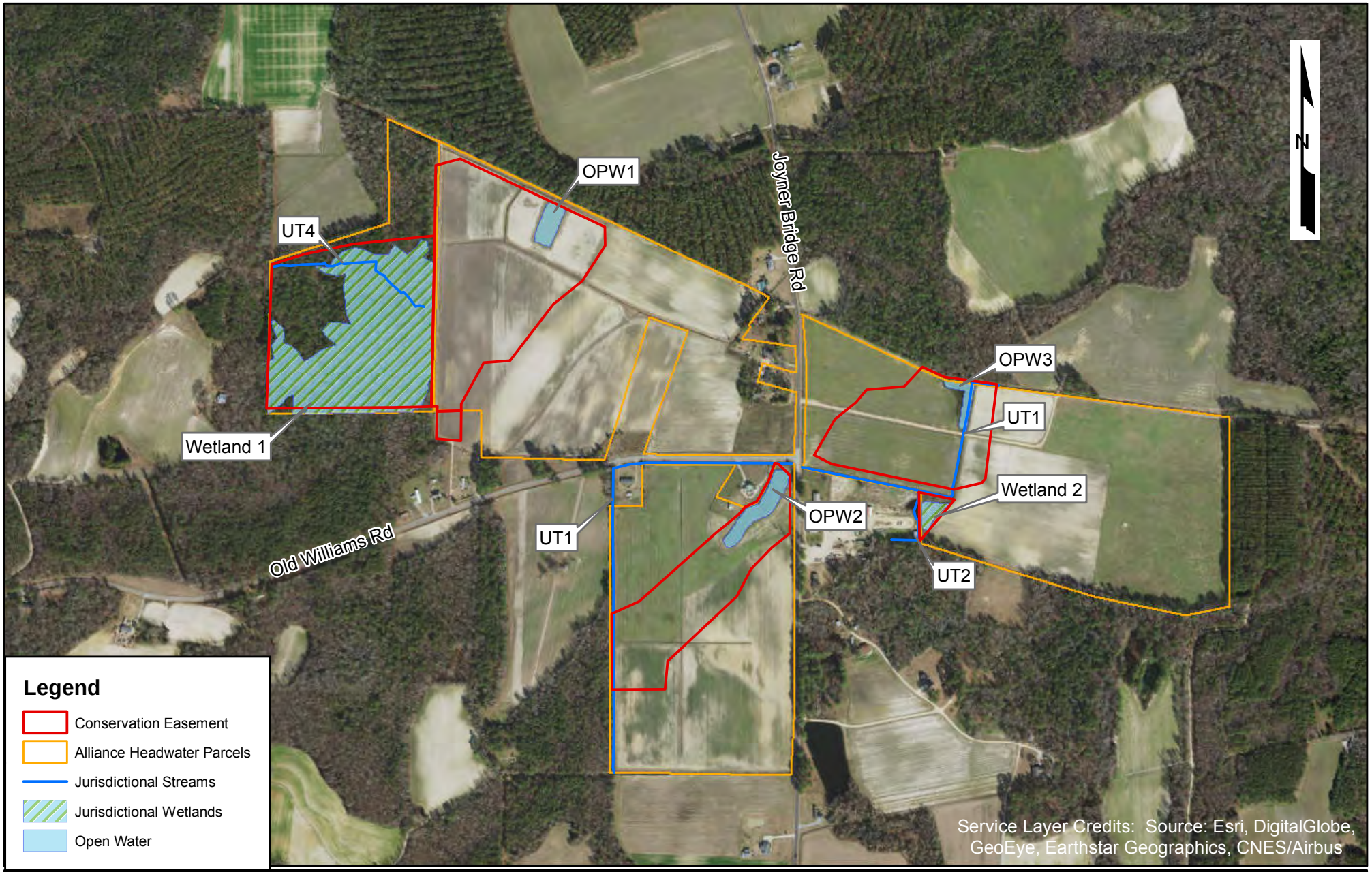
RESTORATION SYSTEMS LLC

FIGURE 1

JOHNSTON COUNTY, NC

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION



0 400 800 Feet

ALLIANCE HEADWATERS

EXISTING CONDITIONS MAP

PREPARED FOR:

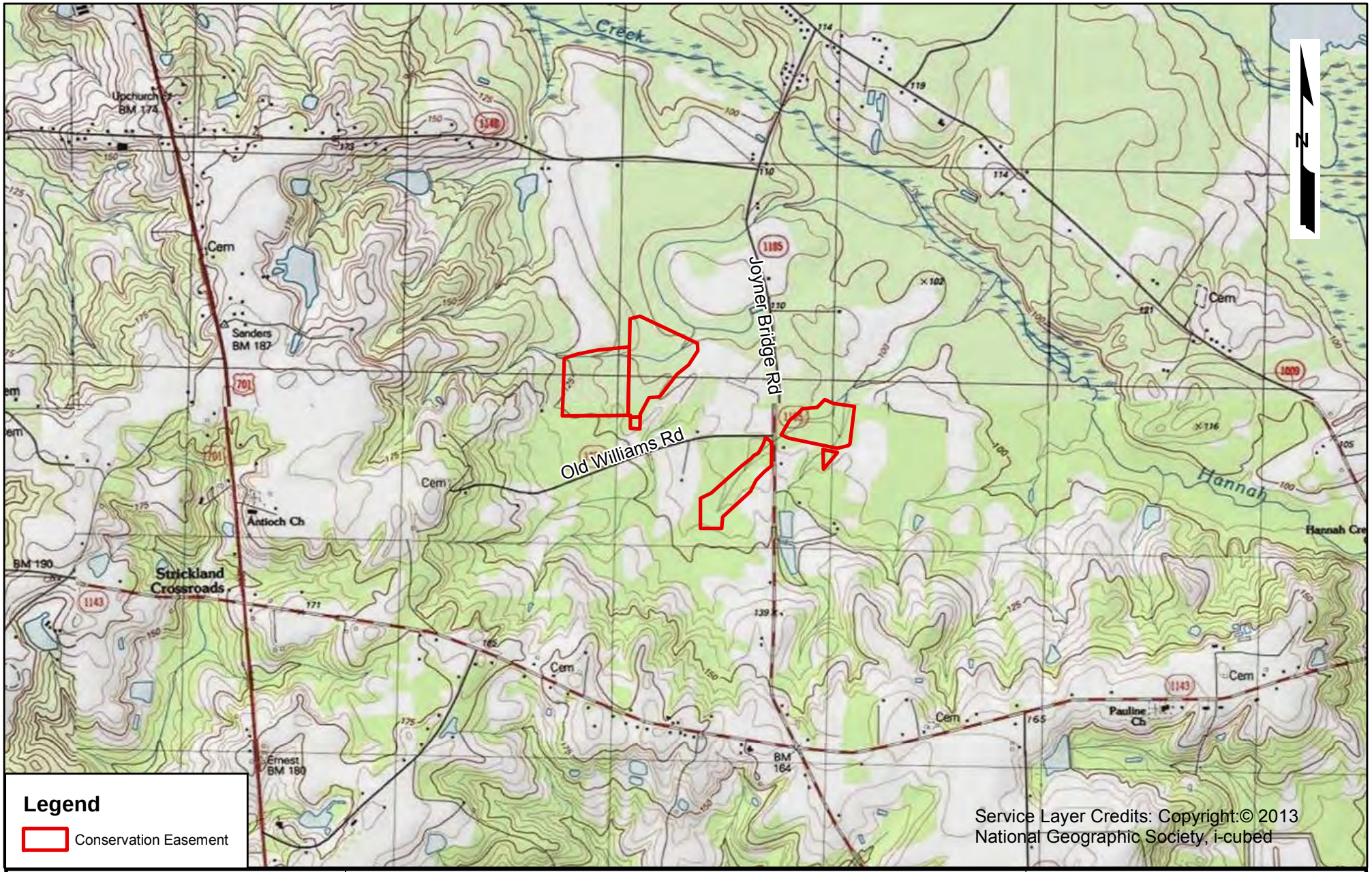
RESTORATION SYSTEMS LLC

FIGURE 2

JOHNSTON COUNTY, NC

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION



0 1,000 2,000 Feet

ALLIANCE HEADWATERS

TOPOGRAPHIC MAP

PREPARED FOR:

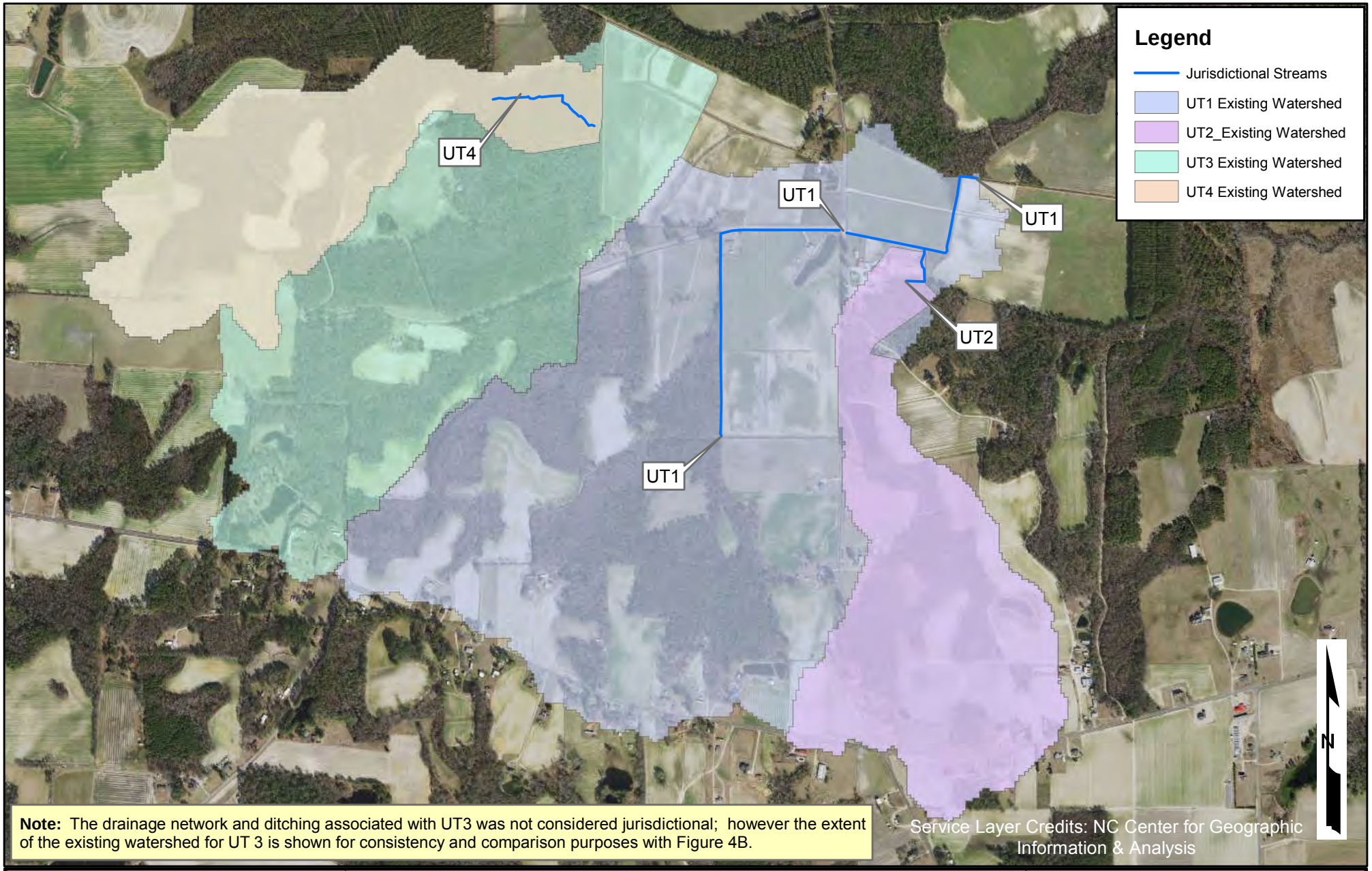
RESTORATION SYSTEMS | LLC

FIGURE 3

JOHNSTON COUNTY, NC

PREPARED BY:

EPR ECOSYSTEM PLANNING & RESTORATION



0 600 1,200 2,400 Feet

ALLIANCE HEADWATERS

EXISTING WATERSHED MAP

PREPARED FOR:

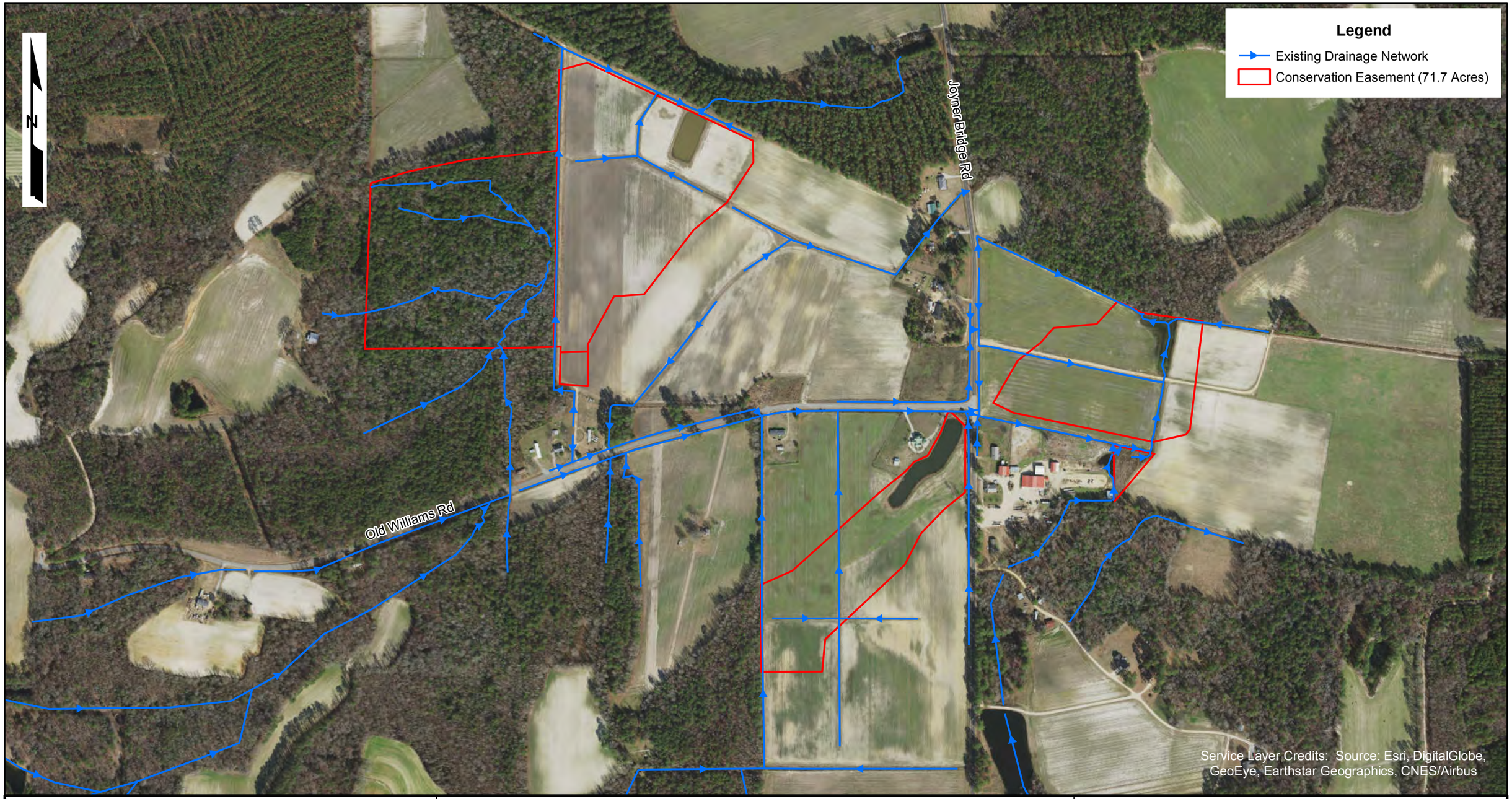
RESTORATION SYSTEMS | LLC

FIGURE 4A

JOHNSTON COUNTY, NC

PREPARED BY:

EPR ECOSYSTEM PLANNING & RESTORATION



0 250 500 1,000 1,500 Feet

ALLIANCE HEADWATERS

EXISTING DRAINAGE NETWORK MAP

PREPARED FOR:

RESTORATION SYSTEMS | LLC

FIGURE 4B

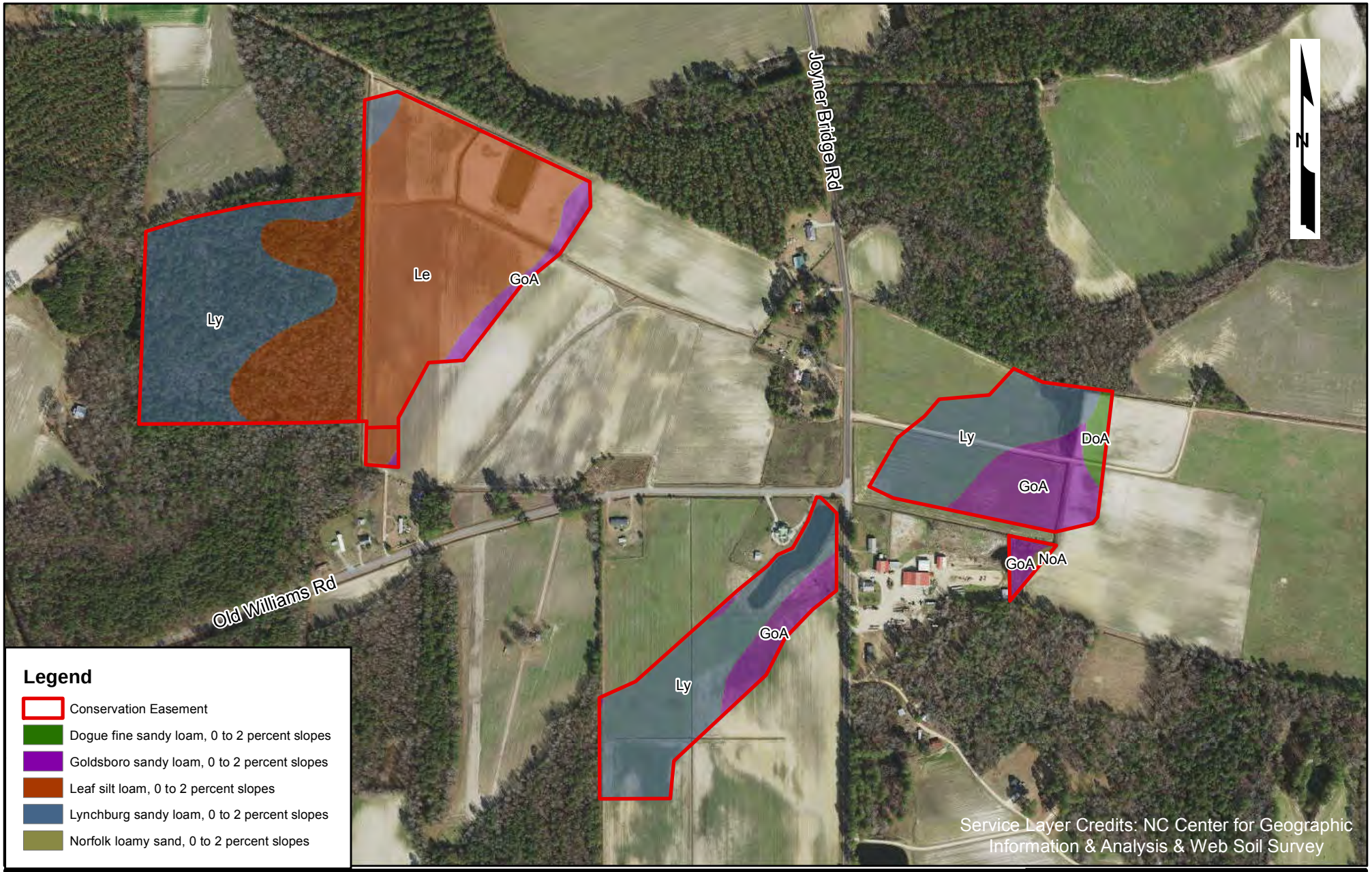
JOHNSTON COUNTY, NC

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION

DATE:

SEPT. 2018



0 300 600 1,200 Feet

ALLIANCE HEADWATERS

NRCS SOILS MAP

PREPARED FOR:

RESTORATION SYSTEMS | LLC

FIGURE 5A

JOHNSTON COUNTY, NC

PREPARED BY:

EPR ECOSYSTEM PLANNING & RESTORATION

0 300 600 1,200 Feet

ALLIANCE HEADWATERS

HYDRIC SOILS MAP

PREPARED FOR:

RESTORATION SYSTEMS | LLC

FIGURE 5B

JOHNSTON COUNTY, NC

PREPARED BY:

EPR Ecosystem Planning & Restoration

0 300 600 1,200 Feet

ALLIANCE HEADWATERS

HISTORICAL AERIAL MAP (1939)

PREPARED FOR:

RESTORATION SYSTEMS | LLC

FIGURE 6A

JOHNSTON COUNTY, NC

PREPARED BY:

EPR ECOSYSTEM PLANNING & RESTORATION

0 300 600 Feet

ALLIANCE HEADWATERS

HISTORICAL AERIAL MAP (1965)

PREPARED FOR:

RESTORATION SYSTEMS | LLC

FIGURE 6B

JOHNSTON COUNTY, NC

PREPARED BY:

EPR Ecosystem Planning & Restoration

0 300 600 1,200 Feet

ALLIANCE HEADWATERS

HISTORICAL AERIAL MAP (1971)

PREPARED FOR:

RESTORATION SYSTEMS | LLC

FIGURE 6C

JOHNSTON COUNTY, NC

PREPARED BY:

EPR ECOSYSTEM PLANNING & RESTORATION

0 300 600 1,200 Feet

ALLIANCE HEADWATERS

HISTORICAL AERIAL MAP (1988)

PREPARED FOR:

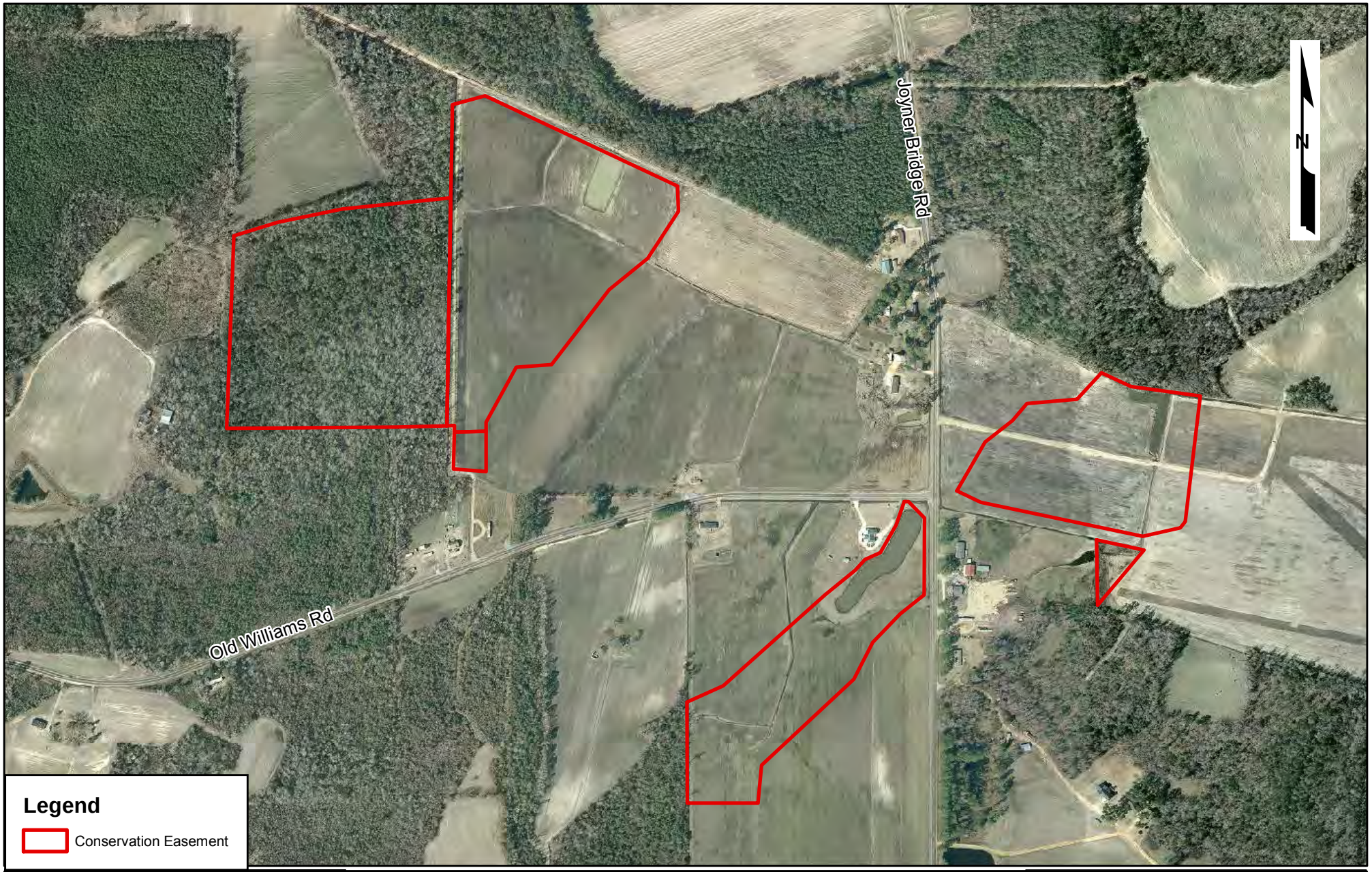
RESTORATION SYSTEMS | LLC

FIGURE 6D

JOHNSTON COUNTY, NC

PREPARED BY:

EPR ECOSYSTEM PLANNING & RESTORATION



0 300 600 1,200 Feet

ALLIANCE HEADWATERS

HISTORICAL AERIAL MAP (2005)

PREPARED FOR:

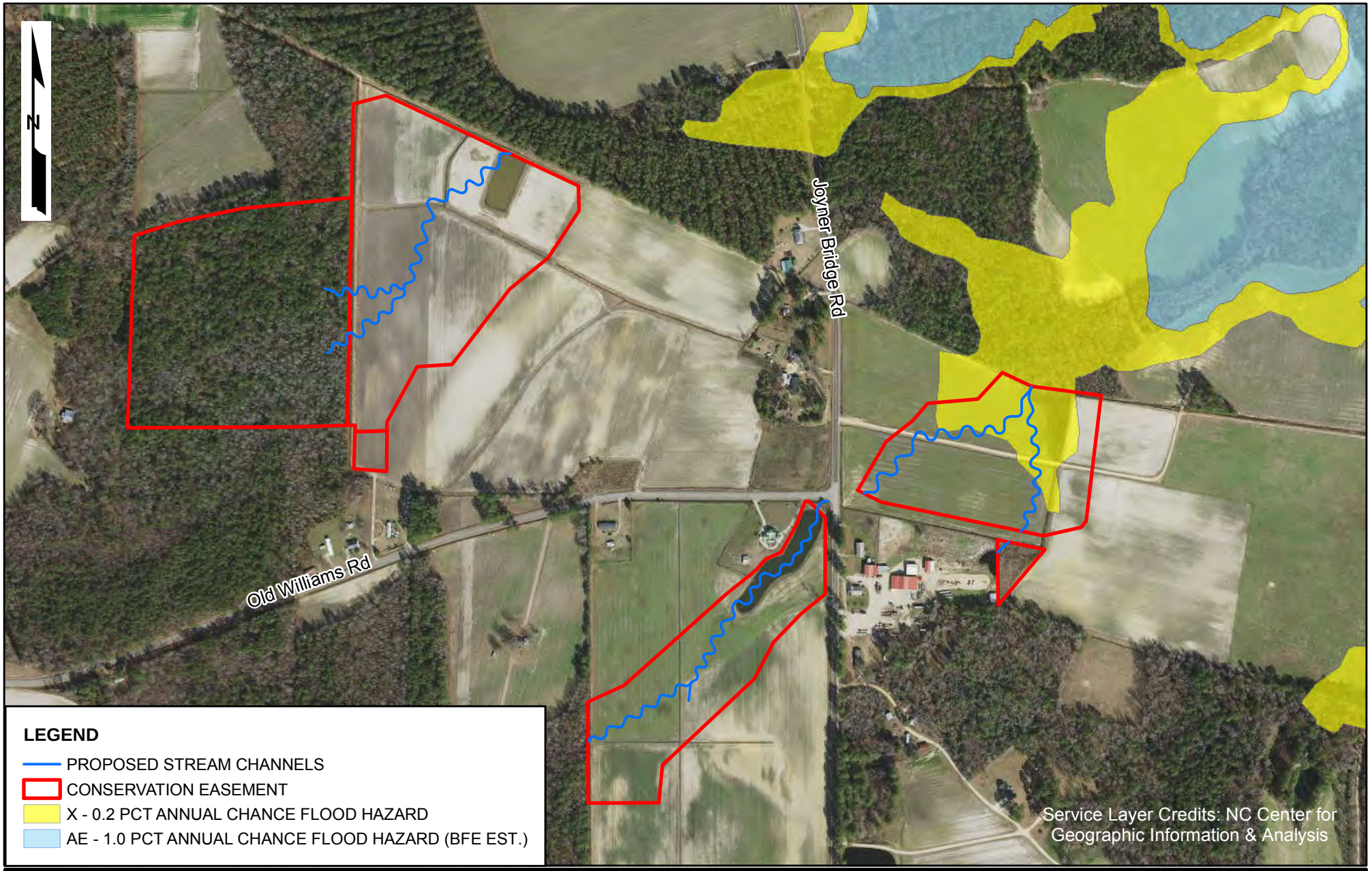
RESTORATION SYSTEMS | LLC

FIGURE 6E

JOHNSTON COUNTY, NC

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION



0 300 600 Feet

ALLIANCE HEADWATERS

FEMA FLOODPLAIN MAP

PREPARED FOR:

RESTORATION SYSTEMS | LLC

FIGURE 7

JOHNSTON COUNTY, NC

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION

0 300 600 1,200 Feet

ALLIANCE HEADWATERS

EXISTING HYDROLOGIC FEATURES MAP

PREPARED FOR:

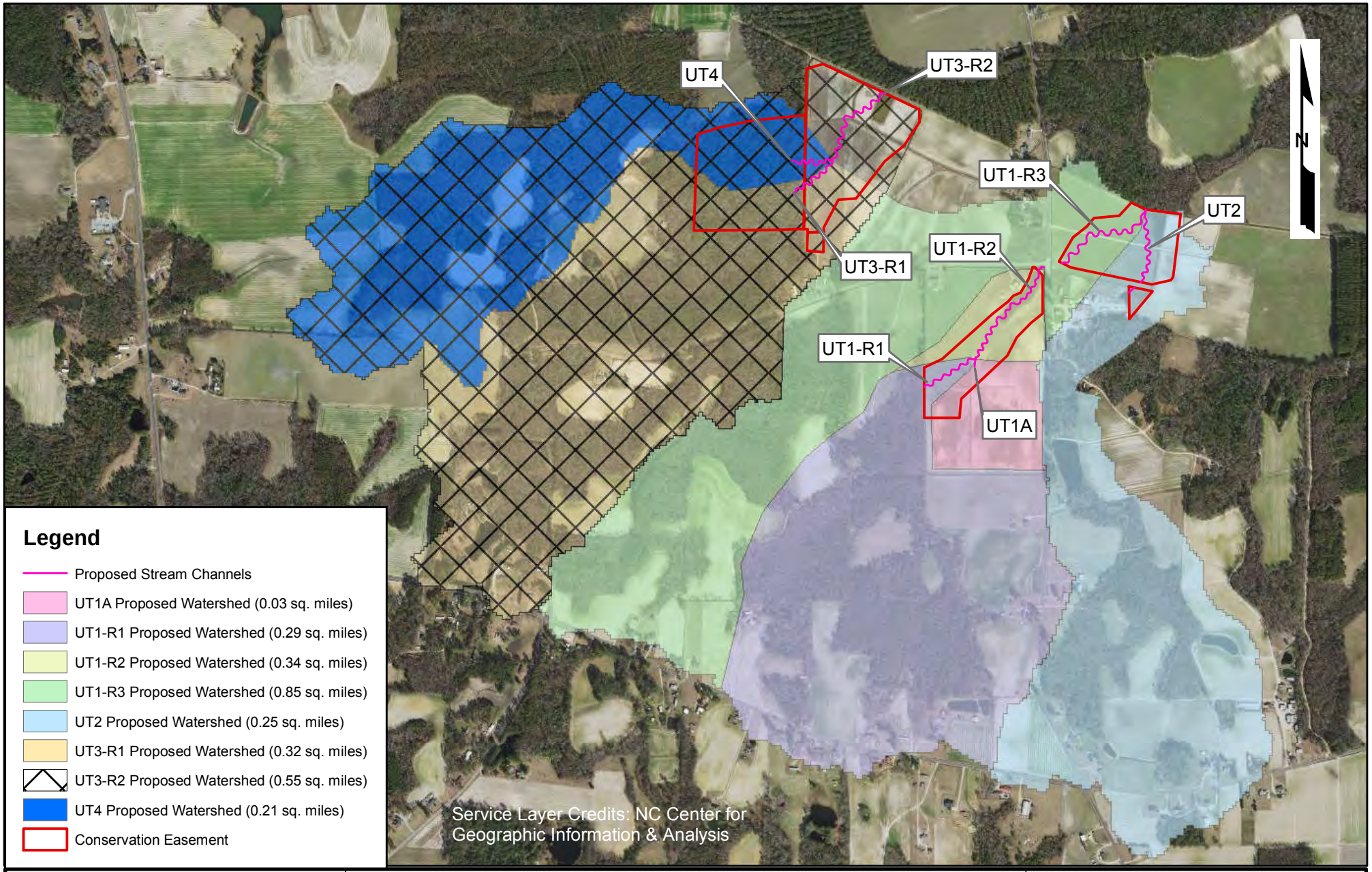
RESTORATION SYSTEMS | LLC

FIGURE 8

JOHNSTON COUNTY, NC

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION



0 600 1,200 2,400 Feet

ALLIANCE HEADWATERS

PROPOSED WATERSHED MAP

PREPARED FOR:

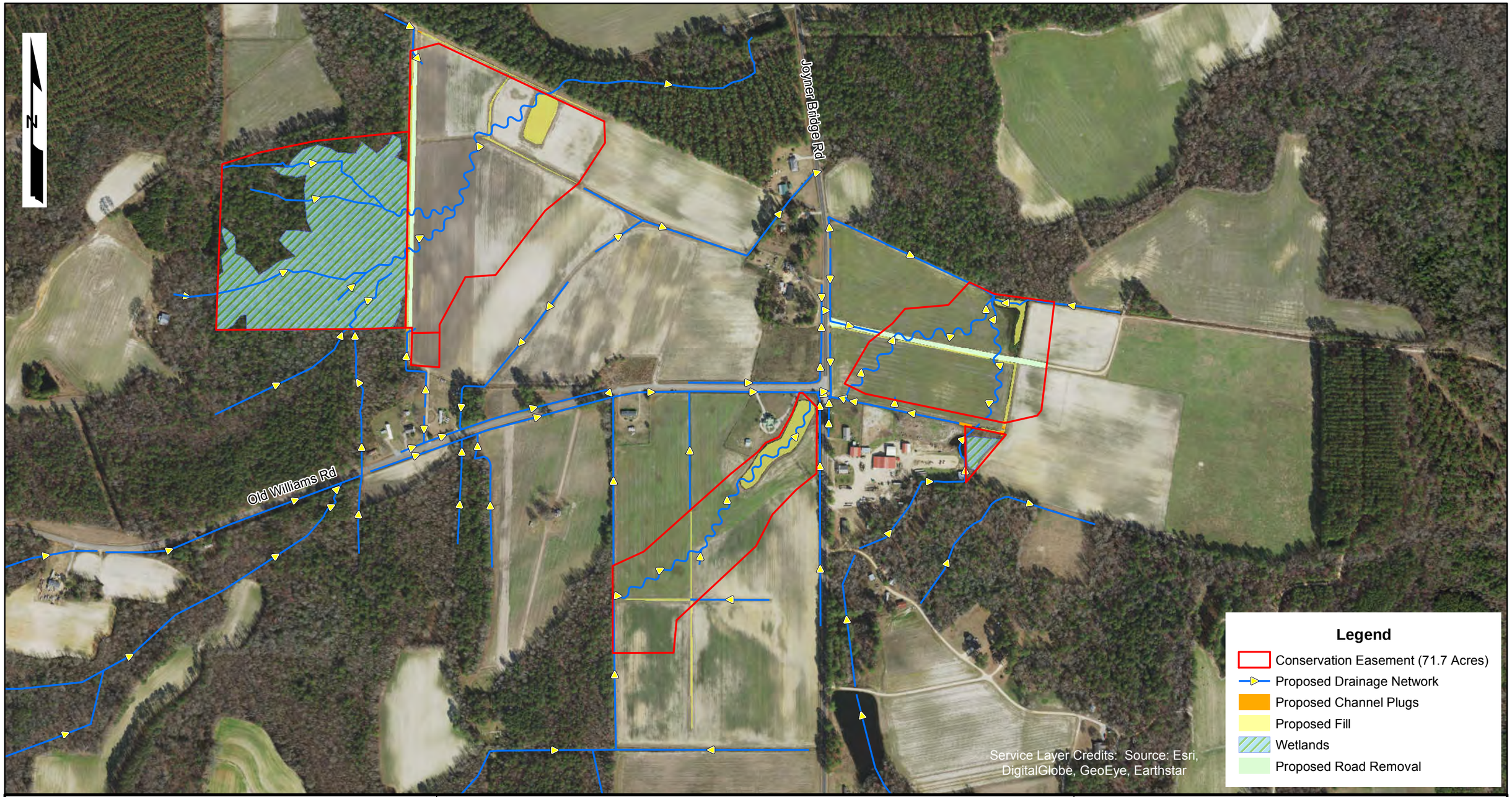
RESTORATION SYSTEMS | LLC

FIGURE 9A

JOHNSTON COUNTY, NC

PREPARED BY:

EPR Ecosystem Planning & Restoration



0 250 500 1,000 1,500 Feet

ALLIANCE HEADWATERS

PROPOSED DRAINAGE NETWORK MAP

PREPARED FOR:

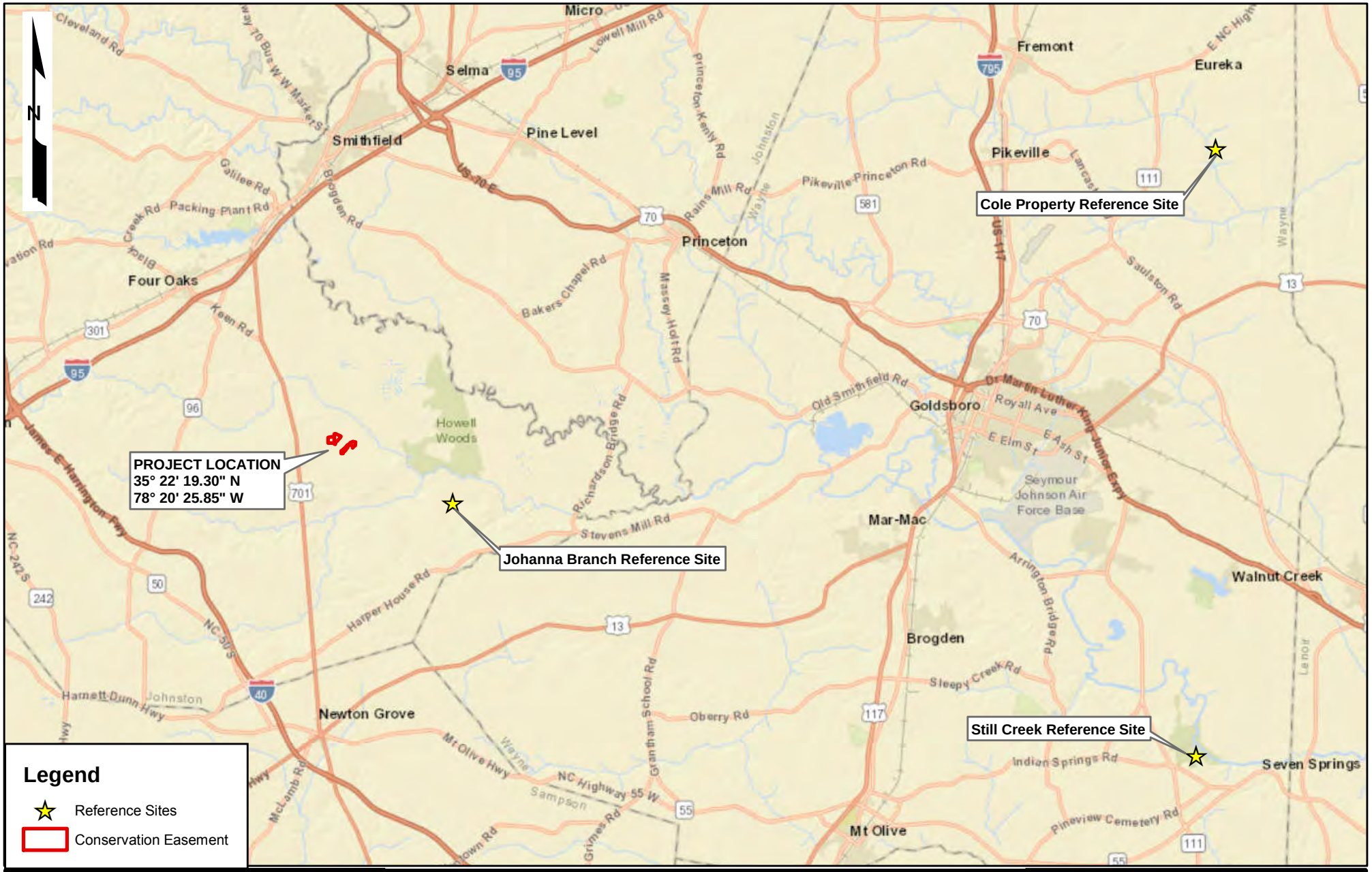
RS RESTORATION SYSTEMS LLC

FIGURE 9B

JOHNSTON COUNTY, NC

PREPARED BY: EPR ECOSYSTEM PLANNING & RESTORATION

DATE: SEPT. 2018



ALLIANCE HEADWATERS

REFERENCE SITES MAP

FIGURE 10

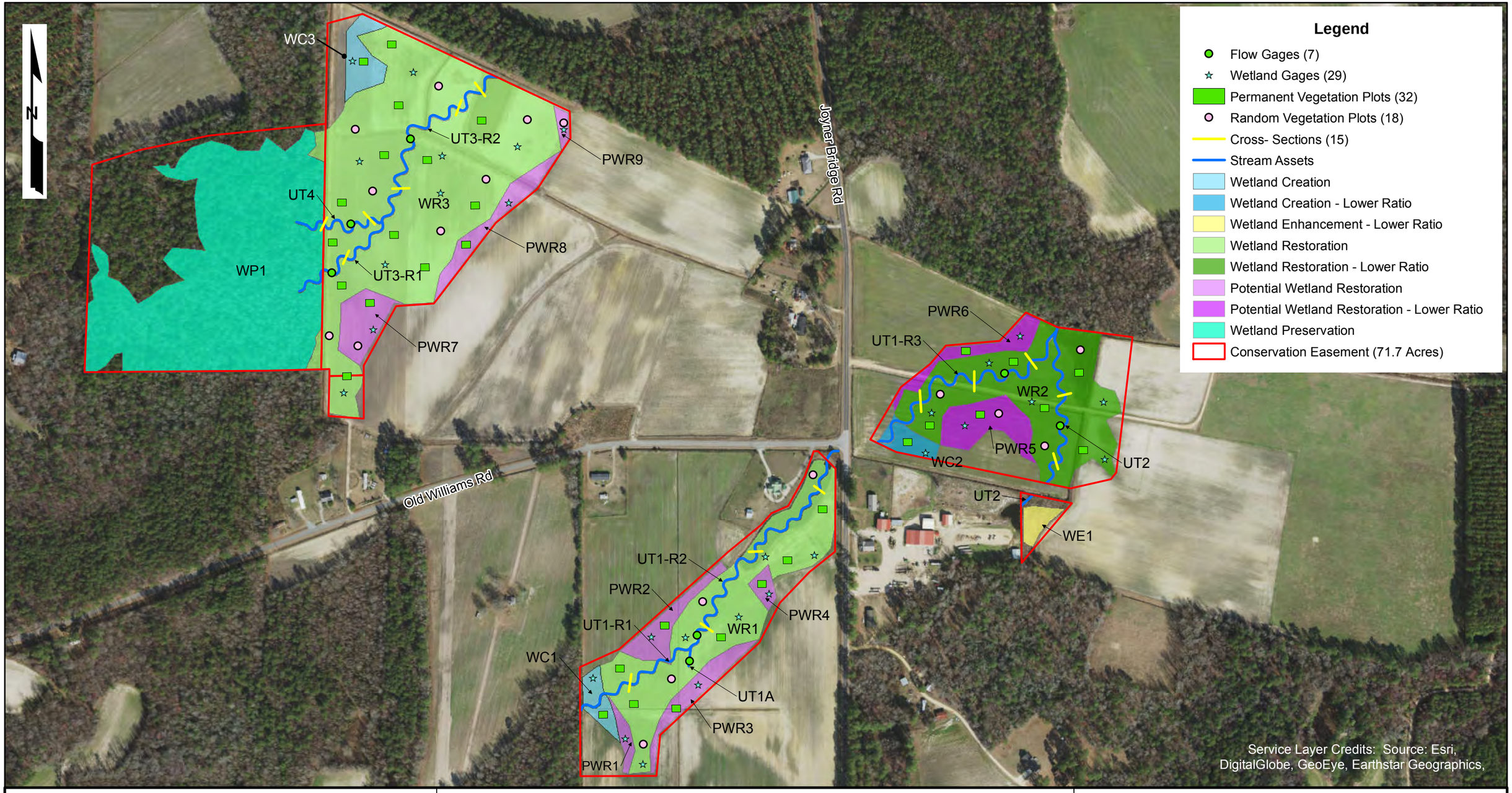
JOHNSTON COUNTY, NC

PREPARED FOR:

RESTORATION SYSTEMS | LLC

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION



0 200 400 800 1,200 Feet

ALLIANCE HEADWATERS
MONITORING MAP

PREPARED FOR:

RS RESTORATION SYSTEMS | LLC

FIGURE 11

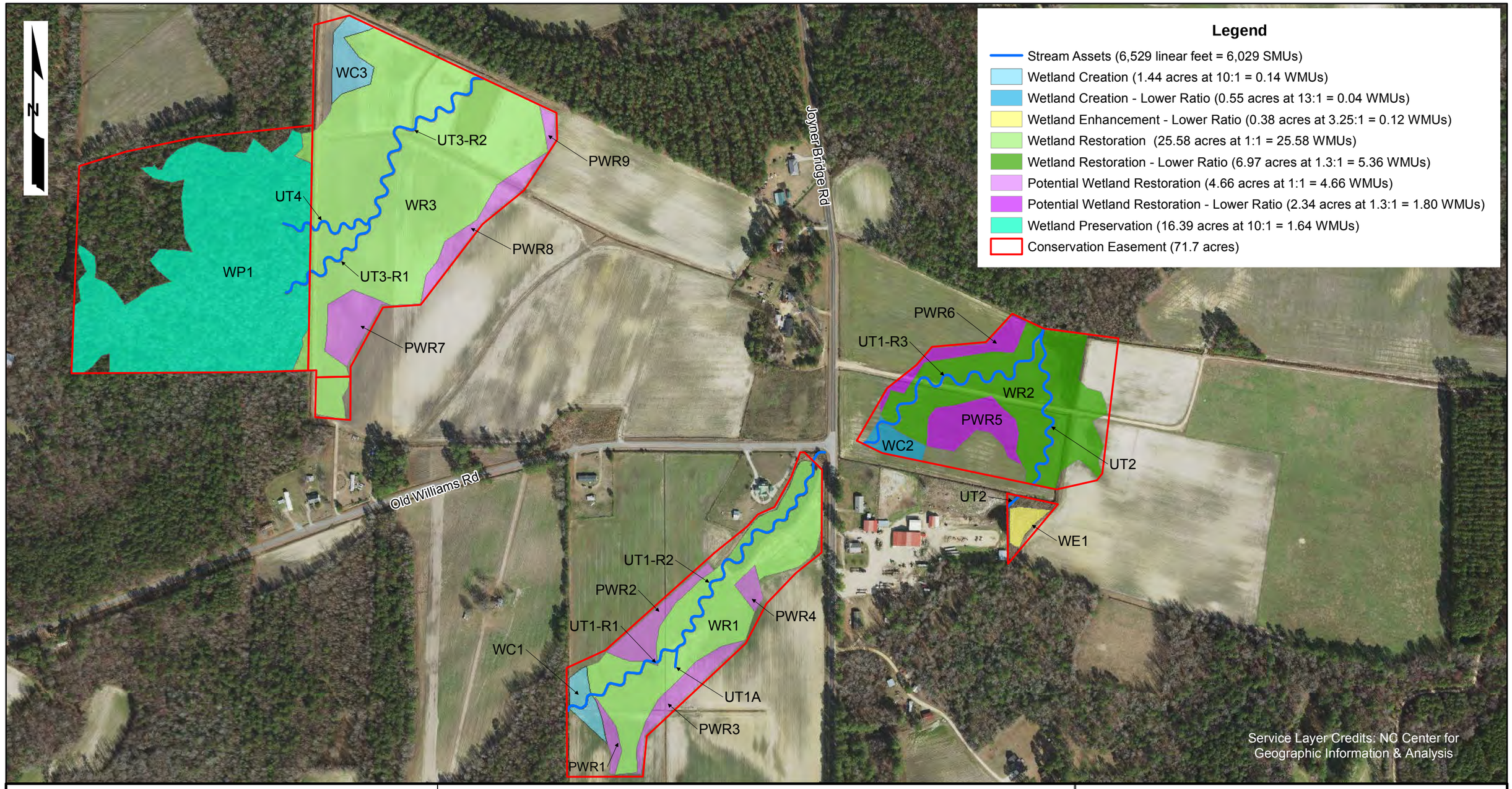
JOHNSTON COUNTY, NC

PREPARED BY:

EPR ECOSYSTEM PLANNING & RESTORATION

DATE:

SEPT. 2018



0 200 400 800 1,200 Feet

ALLIANCE HEADWATERS

MITIGATION POTENTIAL MAP

PREPARED FOR:

RESTORATION SYSTEMS LLC

FIGURE 12

JOHNSTON COUNTY, NC

PREPARED BY:

ECOSYSTEM PLANNING & RESTORATION

DATE:

SEPT. 2018

Appendix 1

Site Protection Instrument

STATE OF NORTH CAROLINA

DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS PROVIDED PURSUANT TO FULL DELIVERY MITIGATION CONTRACT

JOHNSTON COUNTY

SPO File Number: 51-CQ
DMS Project Number: 97086

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 _____, 2018, by *William Frank Lee, Managing Member of M & B LEE, LLC*, ("**Grantor**"), whose mailing address is PO Box 148 Smithfield, NC 27577, to the State of North Carolina, ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

WHEREAS, pursuant to the provisions of N.C. Gen. Stat. § 143-214.8 et seq., the State of North Carolina has established the Division of Mitigation Services (formerly known as the Ecosystem Enhancement Program and Wetlands Restoration Program) within the Department of Environment and Natural Resources for the purposes of acquiring, maintaining, restoring, enhancing, creating and preserving wetland and riparian resources that contribute to the

protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between Restoration Systems, LLC 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 6832.

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 Bentonville Township, Johnston County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately 109 and 63.82 acres and being conveyed to the Grantor by deed as recorded in **Deed Book 3507 at Page 60** of the Johnston 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 ***Hannah Creek***.

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 Easement Areas Two (2), Four (4), Five (5), and Six (6) containing a total of 22.34 acres, 12.58 acres 12.87 acres, and 0.75 acres, respectively, as shown on the plats of survey entitled "Final Plat, Conservation Easement for North Carolina Division of Mitigation Services, Project Name: Alliance Headwaters, SPO File No. 51-CQ, DMS Site No. 95017, Property of M and B LEE, LLC," dated _____, 2018 by *John Rudolph of K2 Design Group*, PLS Number L-4194 and recorded in the Johnston 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.

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)
William Frank Lee, Managing Member of M & B Lee, LLC

NORTH CAROLINA
COUNTY OF *JOHNSTON*

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:

_____

Exhibit A

CONSERVATION EASEMENT AREA 2

All of the Conservation Easement Area 2 of the Alliance Headwater Restoration Site lying and being situated in Bentonville Township, Johnston County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 1 and being a Southwestern corner of the Conservation Easement Area 2 and being located North 85°52'16" West 3,733.45 feet from an iron stake (Point No. 234) with N.C. Grid Coordinates N=591,642.1501', E=2,198,576.8332' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 1), thence North 01°02'11" East 1045.25' to an iron stake; thence North 01°02'11" East 428.45' to an iron stake; thence North 75°06'37" East 154.72' to an iron stake; thence South 64°50'21" East 975.12' to an iron stake; thence South 01°37'16" East 114.62' to an iron stake; thence South 33°09'19" West 257.92' to an iron stake; thence South 50°47'14" West 228.27' to an iron stake; thence South 37°32'45" West 433.28' to an iron stake; thence South 85°59'53" West 161.70' to an iron stake; thence South 28°31'04" West 288.20' to an iron stake; thence South 00°12'59" West 41.01' to an iron stake; thence South 88°29'01" West 146.56' to an iron stake; thence North 01°20'55" East 30.08' to an iron stake; thence South 88°28'04" West 35.21' to an iron stake, which is the Point of Beginning (Point No. 1), having an area of 22.34 acres.

CONSERVATION EASEMENT AREA 4

All of the Conservation Easement Area 4 of the Alliance Headwater Restoration Site lying and being situated in Bentonville Township, Johnston County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 29 and being a Northeastern corner of the Conservation Easement Area 4 and being located South 84°16'44" West 1,540.72 feet from an iron stake (Point No. 234) with N.C. Grid Coordinates N=591,642.1501', E=2,198,576.8332' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 29), thence South 00°14'58" West 352.98' to an iron stake; thence South 51°20'17" West 140.04' to an iron stake; thence South 43°56'14" West 181.68' to an iron stake; thence South 27°20'24" West 190.14' to an iron stake; thence South 46°57'48" West 578.25' to an iron stake; thence South 05°22'39" West 173.93' to an iron stake; thence South 89°46'24" West 323.72' to an iron stake; thence North 00°12'57" West 463.53' to an iron stake; thence North 65°29'39" East 183.15' to an iron stake; thence North 48°11'13" East 625.25' to an iron stake; thence North 44°16'34" East 193.01' to an iron stake; thence North 63°28'05" East 54.39' to an iron stake; thence North 66°08'43" East 77.02' to an iron stake; thence North 29°20'05" East 144.82' to an iron stake; thence North 19°52'17" East 113.64' to an iron stake; thence North 89°34'31" East 18.49' to an iron stake; thence South 45°03'18" East 104.72' to an iron stake, which is the Point of Beginning (Point No. 29), having an area of 12.58 acres.

CONSERVATION EASEMENT AREA 5

All of the Conservation Easement Area 5 of the Alliance Headwater Restoration Site lying and being situated in Bentonville Township, Johnston County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 44 and being a Southeastern corner of the Conservation Easement Area 5 and being located South 63°15'05" West 377.93 feet from an iron stake (Point No. 234) with N.C. Grid Coordinates N=591,642.1501', E=2,198,576.8332' (NAD '83, 2011).

Thence from the Point of Beginning (Point No.44), thence South 38°22'05" West 36.41' to an iron stake; thence South 77°04'19" West 176.92' to an iron stake; thence North 78°11'46" West 758.95' to an iron stake; thence North 63°59'03" West 121.47' to an iron stake; thence North 30°05'05" East 257.74' to an iron stake; thence North 51°37'25" East 159.65' to an iron stake; thence North 40°47'05" East 102.40' to an iron stake; thence North 84°59'13" East 230.22' to an iron stake; thence North 42°53'29" East 165.04' to an iron stake; thence South 64°53'46" East 148.28' to an iron stake; thence South 82°27'05" East 322.01' to an iron stake; thence South 06°51'44" West 580.04' to an iron stake, which is the Point of Beginning (Point No. 44), having an area of 12.87 acres.

CONSERVATION EASEMENT AREA 6

All of the Conservation Easement Area 6 of the Alliance Headwater Restoration Site lying and being situated in Bentonville Township, Johnston County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 48 and being a Northeastern corner of the Conservation Easement Area 6 and being located South 60°14'05" West 606.04 feet from an iron stake (Point No. 234) with N.C. Grid Coordinates N=591,642.1501', E=2,198,576.8332' (NAD '83, 2011).

Thence from the Point of Beginning (Point No.48), thence South 40°01'42" West 332.33' to an iron pipe; thence North 00°44'13" West 299.97' to an iron pipe; thence South 78°11'46" East 222.30' to an iron stake, which is the Point of Beginning (Point No. 48), having an area of 0.75 acres.

STATE OF NORTH CAROLINA | **DEED OF CONSERVATION EASEMENT AND RIGHT OF ACCESS PROVIDED PURSUANT TO FULL DELIVERY MITIGATION CONTRACT**

JOHNSTON COUNTY

SPO File Number: 51-CR
DMS Project Number: 97086

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 _____, 2018, by *William Frank Lee*, ("**Grantor**"), whose mailing address is 922 Peach Orcjard Road, Four Oaks, NC 27524, to the State of North Carolina, ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations of Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

WHEREAS, pursuant to the provisions of N.C. Gen. Stat. § 143-214.8 et seq., the State of North Carolina has established the Division of Mitigation Services (formerly known as the Ecosystem Enhancement Program and Wetlands Restoration Program) within the Department of Environment and Natural Resources for the purposes of acquiring, maintaining, restoring, enhancing, creating and preserving wetland and riparian resources that contribute to the

protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided for as a condition of a full delivery contract between Restoration Systems, LLC 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 6832.

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 Bentonville Township, Johnston County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately 29.646 acres and 2.79 acres and being conveyed to the Grantor by deed as recorded in **Deed Book 2019 at Page 418** and **Deed Book 3538 at Page 685**, respectively, of the Johnston 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 ***Hannah Creek***.

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 Easement Area One (1) and Three (3) containing a total of 22.65 **acres** and 0.60 **acres**, respectively, as shown on the plats of survey entitled "Final Plat, Conservation Easement for North Carolina Division of Mitigation Services, Project Name: Alliance Headwaters, SPO File No. 51-CR, DMS Site No. 95017, Property of William Frank Lee," dated _____, 2018 by *John Rudolph of K2 Design Group*, PLS Number L-4194 and recorded in the Johnston 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.

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)
William Frank Lee

NORTH CAROLINA
COUNTY OF *JOHNSTON*

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:

_____

Exhibit A

CONSERVATION EASEMENT AREA 1

All of the Conservation Easement Area 1 of the Alliance Headwater Restoration Site lying and being situated in Bentonville Township, Johnston County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):

Beginning at an iron stake (Point of Beginning) labeled as Point No. 1 and being the Southeastern most corner of the Conservation Easement Area 1 and being located North 85°52'16" West 3,733.45 feet from an iron stake (Point No. 234) with N.C. Grid Coordinates N=591,642.1501', E=2,198,576.8332' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 1), thence South 88°28'04" West 40.00' to an iron stake; thence South 88°28'04" West 192.73' to an iron stake; thence South 89°33'57" West 775.69' to an iron stake; thence North 02°05'04" East 883.51' to an iron stake; thence North 72°43'26" East 209.64' to an iron stake; thence North 78°17'01" East 303.82' to an iron stake; thence North 84°13'33" East 499.95' to an iron stake; thence South 01°02'11" West 1045.25' to an iron stake, which is the Point of Beginning (Point No. 1), having an area of 22.65 acres.

CONSERVATION EASEMENT AREA 3

All of the Conservation Easement Area 3 of the Alliance Headwater Restoration Site lying and being situated in Bentonville Township, Johnston County, North Carolina and particularly described as follows (all distances are ground distances unless otherwise noted):
Beginning at an iron stake (Point of Beginning) labeled as Point No. 18 and being the Southeastern most corner of the Conservation Easement Area 3 and being located North 86°04'02" West 3,551.13 feet from an iron stake (Point No. 234) with N.C. Grid Coordinates N=591,642.1501', E=2,198,576.8332' (NAD '83, 2011).

Thence from the Point of Beginning (Point No. 18), thence South 00°12'59" West 185.02' to an iron stake; thence North 85°33'27" West 150.25' to an iron stake; thence North 01°20'55" East 169.55' to an iron stake; thence North 88°29'01" East 146.56' to an iron stake, which is the Point of Beginning (Point No. 18), having an area of 0.60 acres.

Appendix 2

Site Photographs

UT 1: Upstream portion of ditched network facing South.

UT1: Upstream portion of ditched network facing North.

UT1: Downstream portion below Joyner Bridge Road.

UT1: Downstream portion upstream of existing farm road crossing.

UT2: Near where the stream enters the property. Channelized along the property line.

UT3: Upstream forested reach (preservation) – March 2017.

UT3: Upstream forested reach (preservation) – Sept. 2015.

UT3: Ditched section near outlet of the project site.

UT3: Severe erosion in northwest corner.

UT4: Upstream forested reach (preservation) – March 2017.

UT3: Upstream forested reach (preservation) – March 2017.

UT4: Upstream forested reach (preservation) – March 2017.

UT1: Wooded section downstream of the project site (off-site). Cross-sections surveyed for reference stream dimension.

Off-site channel surveyed for reference stream dimension.

Appendix 3

Preliminary Jurisdictional Determination Package

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2016-00882** County: **JOHNSTON** U.S.G.S. Quad: **NEWTON GROVE NORTH**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner/Applicant: **Mr. William Lee**
Address: **Post Office Box 148**
Smithfield, North Carolina 27577

Authorized Agent: **Restoration Systems, LLC**
Mr. Raymond Holz
Address: **1101 Haynes Street, Suite 211**
Raleigh, North Carolina 27604

Size (acres)	**202**	Nearest Town	**Four Oaks**
Nearest Waterway	**Hannah Creek**	River Basin	**Upper Neuse River**
USGS HUC	**03020201**	Coordinates	Latitude: **35.373455**
			Longitude: **-78.337891**

Location description: **The Leaf Swamp Wetland Mitigation Site is identified as an approximate 202 acre tract of land, located on Johnston County, North Carolina Parcels: 159900529471, 159900423303, and 159900814225. These parcel are located at 1080 Joyner Bridge Road, Four Oaks, Johnston County, North Carolina.**

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 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 project area 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. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

_ The waters 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 in Morehead City, NC, at (252) 808-2808 to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Ms. Samantha Dailey at 919-554-4884, ext. 22 or by email at Samantha.J.Dailey@usace.army.mil**.

C. Basis For Determination: N/A. An Approved JD has not been completed.

D. Remarks: Refer to the enclosed Preliminary JD Form and Figure 1 (dated October 2017) for a detailed evaluation of the Leaf Swamp Wetland Mitigation Site.

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 for Approved Jurisdiction Determinations (as indicated in Section B. above)

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:

SAW-2016-00882 LEAF SWAMP WETLAND MITIGATION SITE

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**.
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: DAILEY.SAMANTHA.J.1387567948 Digitally signed by DAILEY.SAMANTHA.J.1387567948 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=DAILEY.SAMANTHA.J.1387567948 Date: 2018.09.04 09:22:53 -04'00'

Date: **September 4, 2018** Expiration Date: **N/A**

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.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Requestor: **Restoration Systems, LLC** **Mr. Raymond Holz**	File Number: **SAW-2016-00882**	Date: **September 4, 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 division 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** **Raleigh Regulatory Field Office** **Attn: Samantha Dailey** **3331 Heritage Trade Drive, Suite 105** **Wake Forest, North Carolina 27587**	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: #PM_FULLNAME#, 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

APPENDIX 2

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD): September 4, 2018.

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

Property Owner/Applicant: **Mr. William Lee**
Address: **Post Office Box 148**
Smithfield, North Carolina 27577

Authorized Agent: **Restoration Systems, LLC**
Mr. Raymond Holz
Address: **1101 Haynes Street, Suite 211**
Raleigh, North Carolina 27604

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: Wilmington, Leaf Swamp Wetland Mitigation Site, Restoration Systems, LLC, Johnston County, SAW-2016-00882

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)
State: **NC** County/parish/borough: **Johnston County** City: **Four Oaks**
Center coordinates of site (lat/long in degree decimal format): Lat. **35.373455°N**, Long. **-78.337891° W**.
Universal Transverse Mercator:
Name of nearest water body: **Hannah Creek**

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLIES):
☒ Office (Desk) Determination. Date: **September 4, 2018**
☒ Field Determination. Date(s): **June 15, 2017**

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

Site Number	Latitude (°N)	Latitude (°W)	Estimated Amount of Aquatic Resources in Review Area		Type of aquatic resource (i.e. wetland vs. non-wetland)	Geographic authority to which the aquatic resource "may be" subject (i.e. Section 404 or Section 10/404)
			Linear Feet	Acres		
Wetland 1	35.375485	-78.346730		16.84	Wetland	Section 404
Wetland 2	35.372973	-78.336046		0.39	Wetland	Section 404
UT1	35.372836	-78.342624	4761		Non-Wetland	Section 404
UT2	35.372477	-78.336353	484		Non-Wetland	Section 404
UT4	35.377040	-78.347911	1142		Non-Wetland	Section 404
OPW1	35.377685	-78.343901		0.68	Non-Wetland	Section 404
OPW2	35.372892	-78.339642		1.20	Non-Wetland	Section 404
OPW3	35.374679	-78.335438		0.48	Non-Wetland	Section 404

1. The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7)whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there *"may be"* waters of the U.S. and/or that there *"may be"* navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for 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 the PJD requestor: **Axiom Environmental, Inc., submitted a jurisdictional determination to our office on March 16, 2017, with revisions received on October 30, 2017.**
☒ Data sheets prepared/submitted by or on behalf of the PJD requestor.
  ☒ Office concurs with data sheets/delineation report.
  ☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
  ☐ USGS NHD data.
  ☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: **1:24K, NC-Newton Grove North**
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: **Web Soil Survey: June 2017**.
☒ National wetlands inventory map(s). Cite name: **Corps of Engineers SimSuite – June 2017**.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): .
  or ☐ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .
☐ Other information (please specify): .

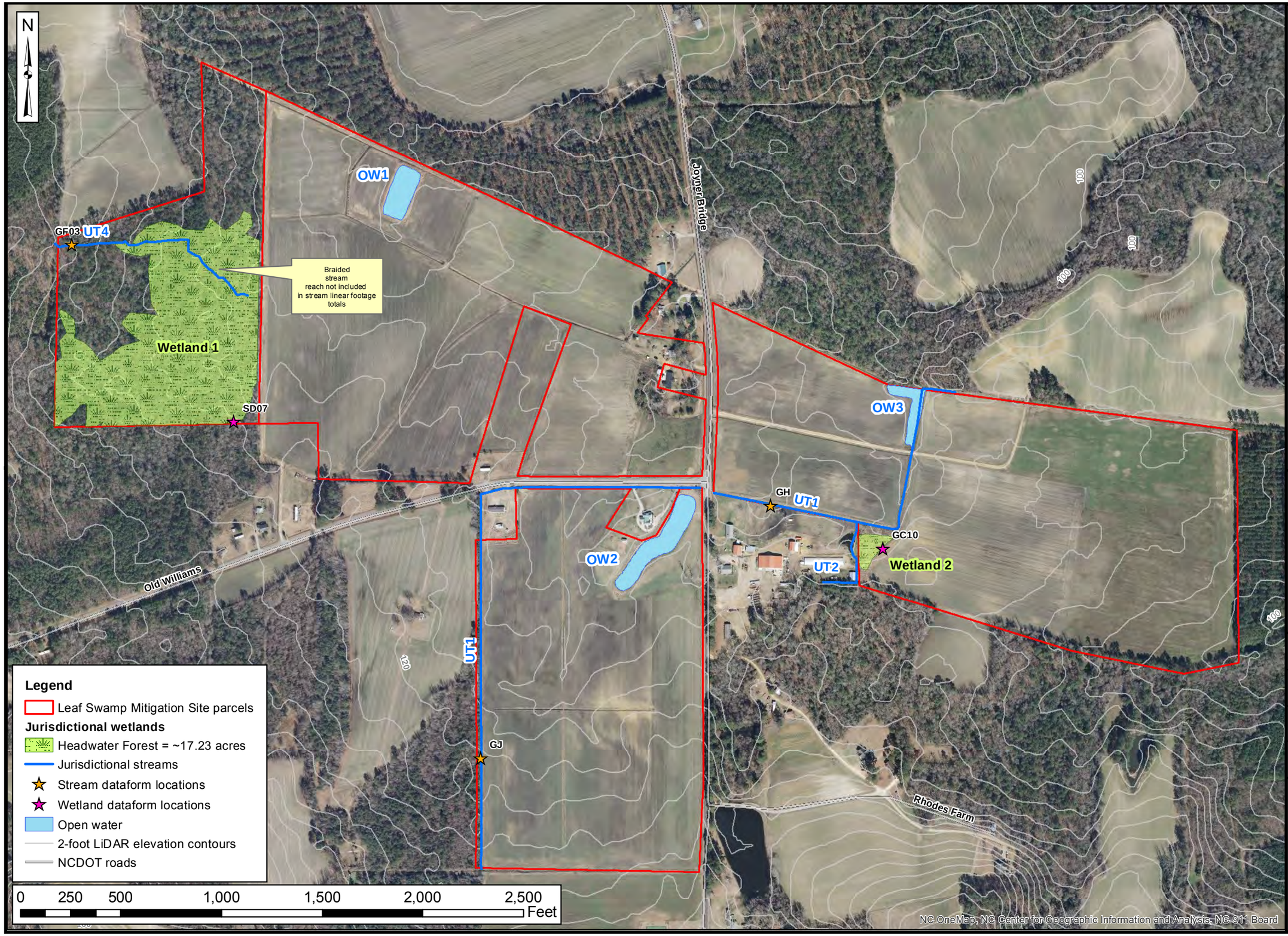
IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

DAILEY.SAMANTHA.J.1387567948
Digitally signed by DAILEY.SAMANTHA.J.1387567948
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=DAILEY.SAMANTHA.J.1387567948
Date: 2018.09.04 09:36:44 -04'00'

Signature and date of Regulatory Project Manager (REQUIRED)

Signature and date of person requesting preliminary JD (REQUIRED, unless obtaining the signature is Impracticable)

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



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

LEAF SWAMP WETLAND MITIGATION SITE

Johnston County, NC

Title:

JURISDICTIONAL AREAS

Drawn by: KRJ/CLF

Date: OCT 2017

Scale: 1:5400

Project No.: 17-002

FIGURE

3

ATTACHMENT

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD):

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:
Restoration Systems
1101 Haynes Street, Suite 211
Raleigh, NC 27604

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
In Johnston County approximately 8 miles south of Smithfield and 1.5 miles northeast of Strickland Crossroads.

(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: North Carolina County/parish/borough: Johnston County
Center coordinates of site (lat/long in degree decimal format):
Lat. 35.375485°, Long. -78.346730°

Name of nearest waterbody: Hannah Creek

Identify (estimate) amount of waters in the review area:
Non-wetland waters: 10,491 linear feet: 3-6 width (ft)
Cowardin Class: R4SB4/5, R3UB2/3
Stream Flow: Intermittent/Perennial
Wetlands: 17.23 acres
Cowardin Class: PFO1/4

Name of any water bodies on the site that have been identified as Section 10 waters:
Tidal: 0
Non-Tidal: 0

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

☐ Office (Desk) Determination. Date:

☐ Field Determination. Date(s):

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

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 approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that 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) that 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) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (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 preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes 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 approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, 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, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.
This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site 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 case file and, where checked and requested, appropriately reference sources below):

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: please see attached Figures 1-3.

☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.

☐ Office concurs with data sheets/delineation report.

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

☐ Data sheets prepared by the Corps: .

☐ Corps navigable waters' study: .

☐ U.S. Geological Survey Hydrologic Atlas: .

☐ USGS NHD data.

☐ USGS 8 and 12 digit HUC maps.

☒ U.S. Geological Survey map(s). Cite scale & quad name: Four Oaks NE, NC (1997) and Newton Grove North, NC (1997) 7.5-minute quadrangles.

☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Web Soil Survey (online at http://websoilsurvey.nrcs.usda.gov), and Soil Survey of Johnston County (1994).

☐ National wetlands inventory map(s). Cite name: Online mapping tool at

☐ State/Local wetland inventory map(s): .

☐ FEMA/FIRM maps: .

☐ 100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)

☒ Photographs: ☒ Aerial (Name & Date): NC OneMap 2013 Orthoimagery.
or ☐ Other (Name & Date): .

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

☐ Other information (please specify): .

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

_____	_____
Signature and date of Regulatory Project Manager (REQUIRED)	Signature and date of person requesting preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

Site number	Latitude	Longitude	Cowardin Class	Estimated amount of aquatic resource in review area	Class of aquatic resource
1. Wetland 1	35.375485	-78.346730	PFO1/4	16.84 acres	non-section 10 – wetland
2. Wetland 2	35.372973	-78.336046	PFO1/4	0.39 acre	non-section 10 – wetland
3. UT1	35.372836	-78.342624	R4SB4/5, R3UB2/3	4761 linear feet	non-section 10 – non-wetland
4. UT2	35.372477	-78.336353	R4SB4/5	484 linear feet	non-section 10 – non-wetland
5. UT4	35.377040	-78.347911	R4SB4/5	1142 linear feet	non-section 10 – non-wetland
6. OW1	35.377685	-78.343901	R3UB2/3	0.68 acres	non-section 10 – non-wetland
7. OW2	35.372892	-78.339642	R3UB2/3	1.20 acres	non-section 10 – non-wetland
8. OW3	35.374679	-78.335438	R3UB2/3	0.48 acres	non-section 10 – non-wetland

NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM
LANDOWNER AUTHORIZATION FORM

PROPERTY LEGAL DESCRITION:

Deed Book: 03507 **Page:** 0060 **County:** JOHNSTON

Parcel ID Number: 159900-52-9471 + 159900-42-3303 + 159900814225

Street Address: 1080 SOUTHER BRIDGE RD
FOUR OAKS, NC 27524

Property Owner (please print): WILLIAM "FRANK" LEE

Property Owner (please print): M+B LEE

The undersigned, registered property owner(s) of the above property, do hereby authorize Restoration Systems, LLC, the NC Department of Environment and Natural Resources, and the US Army Corps of Engineers, their employees, agents or assigns to have reasonable access to the above referenced property for the evaluation of the property as a potential stream, wetland and/or riparian buffer mitigation project, including conducting stream and/or wetland determinations and delineations, as well as issuance and acceptance of any required permit(s) or certification(s).

Property Owners(s) Address: 922 PEACH ORCHARD RD
(if different from above) FOUR OAKS, NC 27524

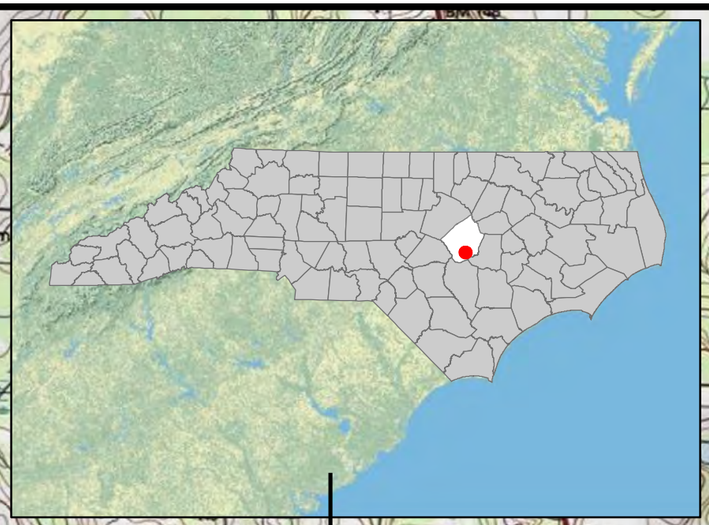
Property Owner Telephone Number: 919-631-9005

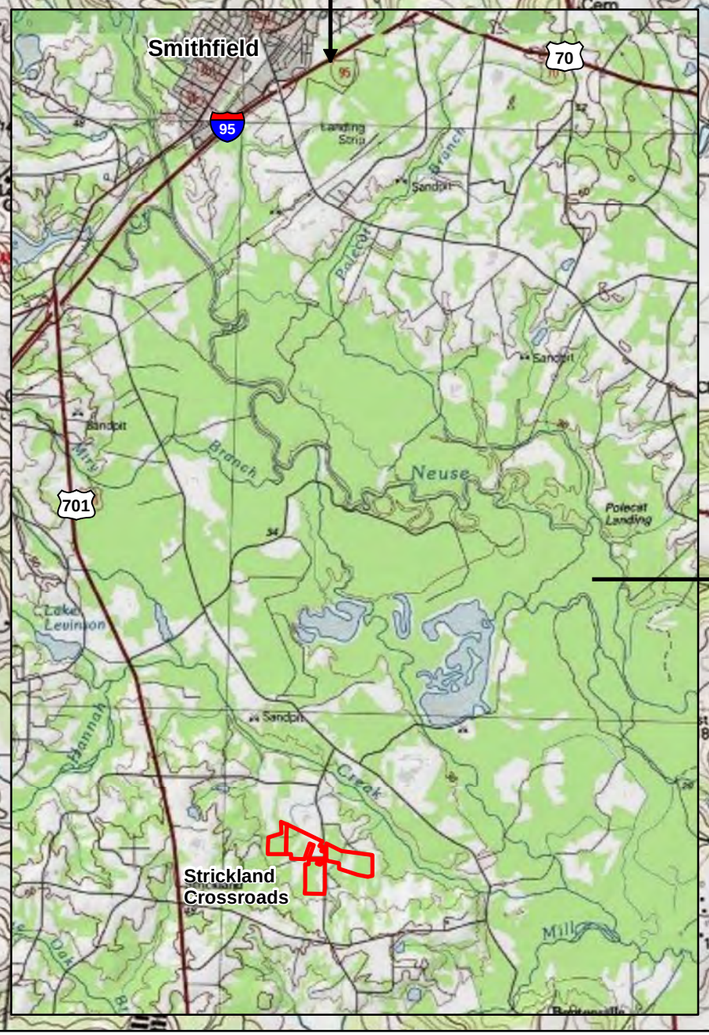
Property Owner Telephone Number: _____

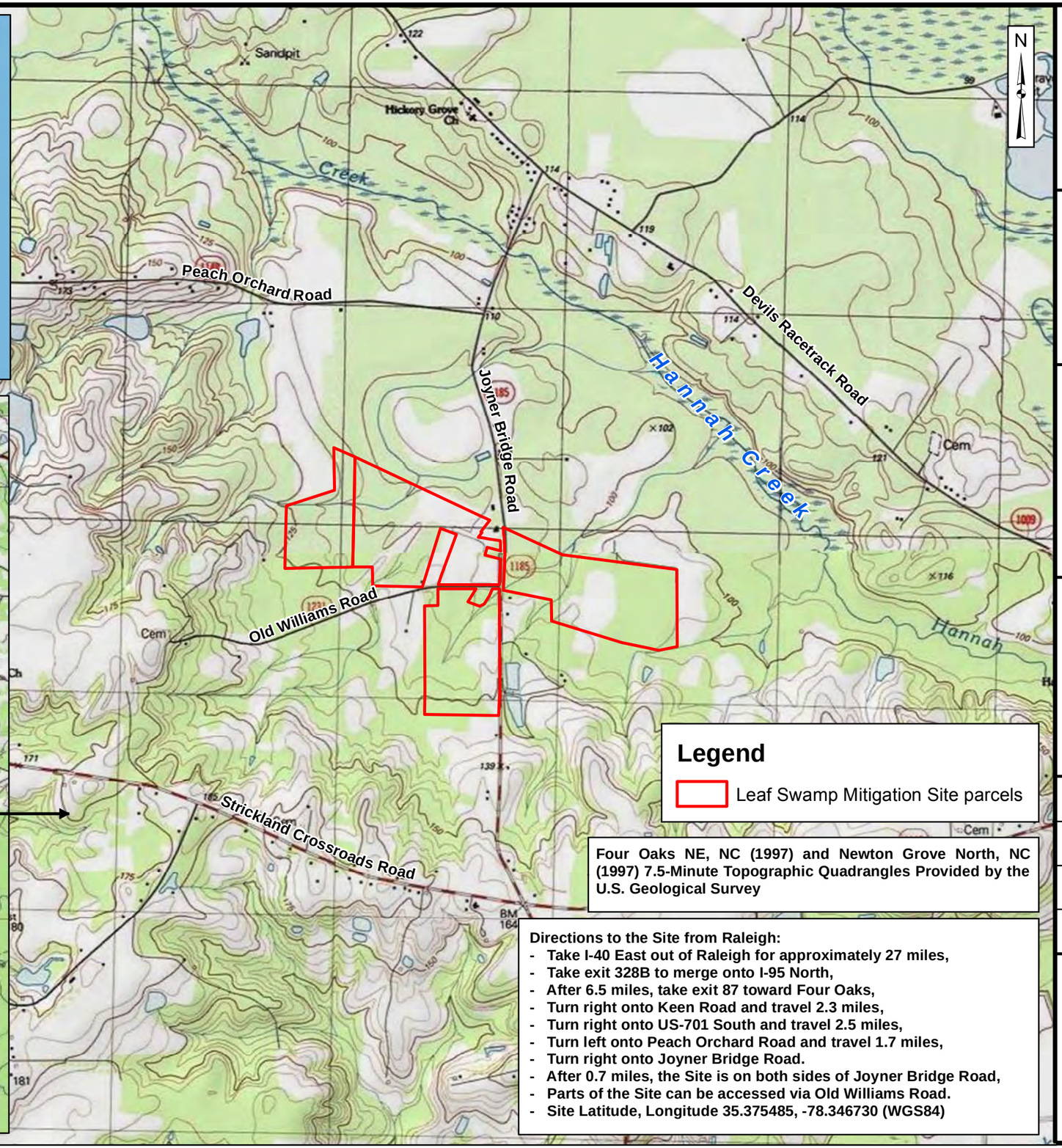
I/We hereby certify the above information to be true and accurate to the best of my/our knowledge.

_____ 10/02/15
(Property Owner Authorized Signature) **(Date)**

_____
(Property Owner Authorized Signature) **(Date)**







Legend

Leaf Swamp Mitigation Site parcels

Four Oaks NE, NC (1997) and Newton Grove North, NC (1997) 7.5-Minute Topographic Quadrangles Provided by the U.S. Geological Survey

Directions to the Site from Raleigh:

- Take I-40 East out of Raleigh for approximately 27 miles,
- Take exit 328B to merge onto I-95 North,
- After 6.5 miles, take exit 87 toward Four Oaks,
- Turn right onto Keen Road and travel 2.3 miles,
- Turn right onto US-701 South and travel 2.5 miles,
- Turn left onto Peach Orchard Road and travel 1.7 miles,
- Turn right onto Joyner Bridge Road.
- After 0.7 miles, the Site is on both sides of Joyner Bridge Road,
- Parts of the Site can be accessed via Old Williams Road.
- Site Latitude, Longitude 35.375485, -78.346730 (WGS84)

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

LEAF SWAMP WETLAND MITIGATION SITE

Johnston County, NC

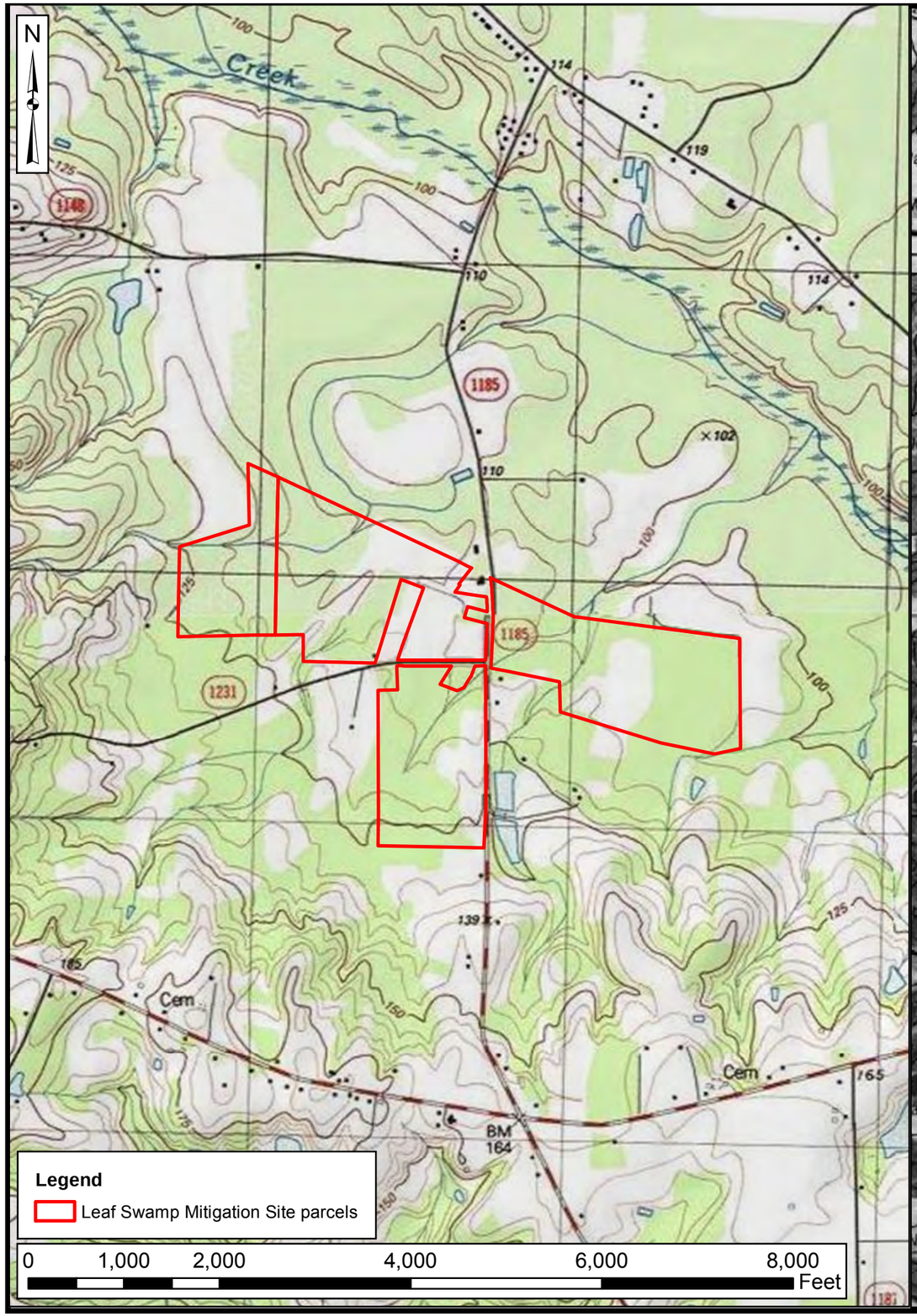
Title:

SITE LOCATION

Drawn by:	KRJ/CLF
Date:	MAR 2017
Scale:	1:20,000
Project No.:	17-002

FIGURE

1



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

LEAF SWAMP WETLAND MITIGATION SITE

Johnston County, NC

Title:

PROJECT MAPPING

Drawn by: KRJ/CLF

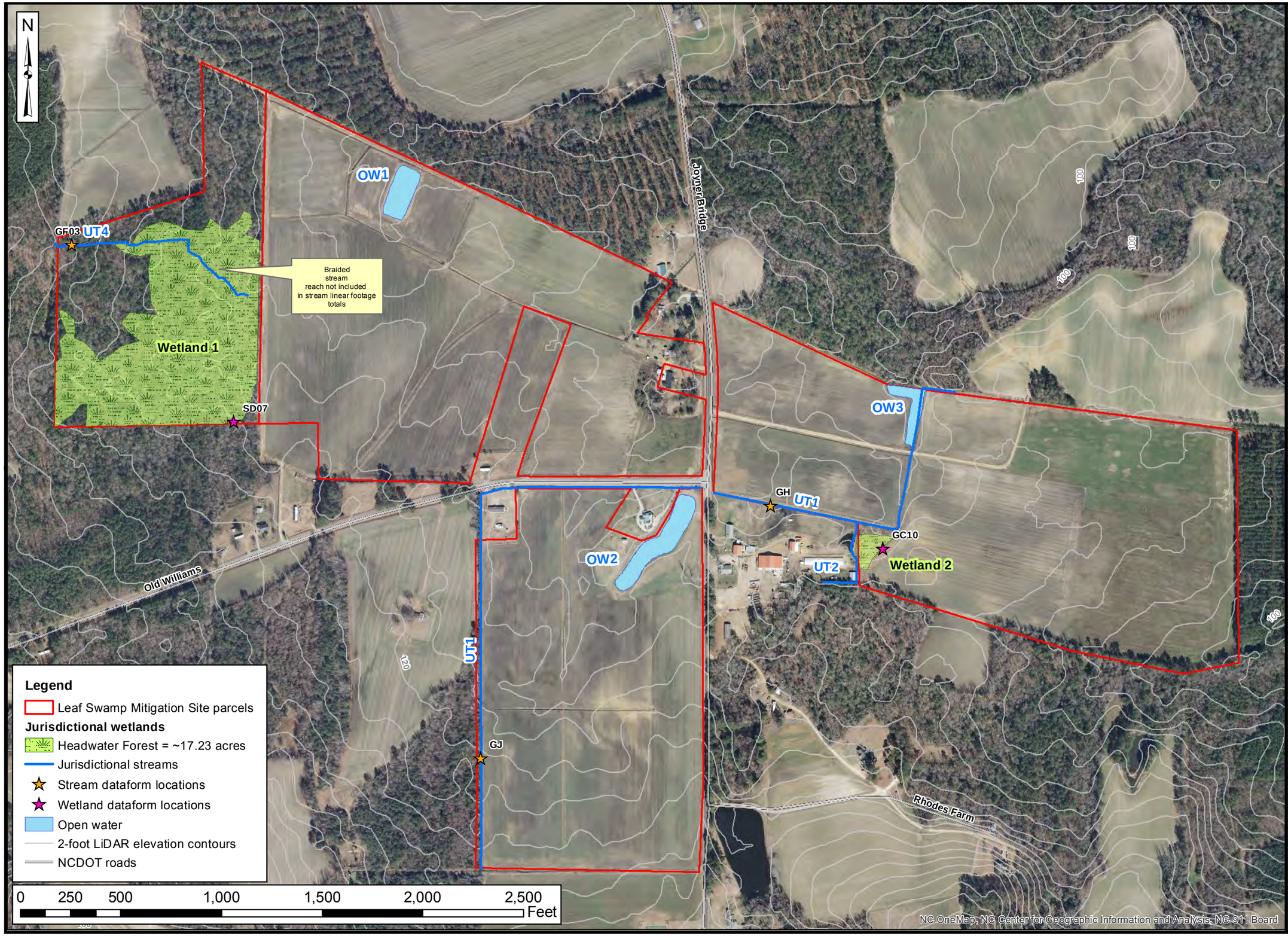
Date: FEB 2017

Scale: 1:16,000

Project No.: 17-002

FIGURE

2



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

LEAF SWAMP WETLAND MITIGATION SITE

Johnston County, NC

Title:

JURISDICTIONAL AREAS

Drawn by: KRJ/CLF

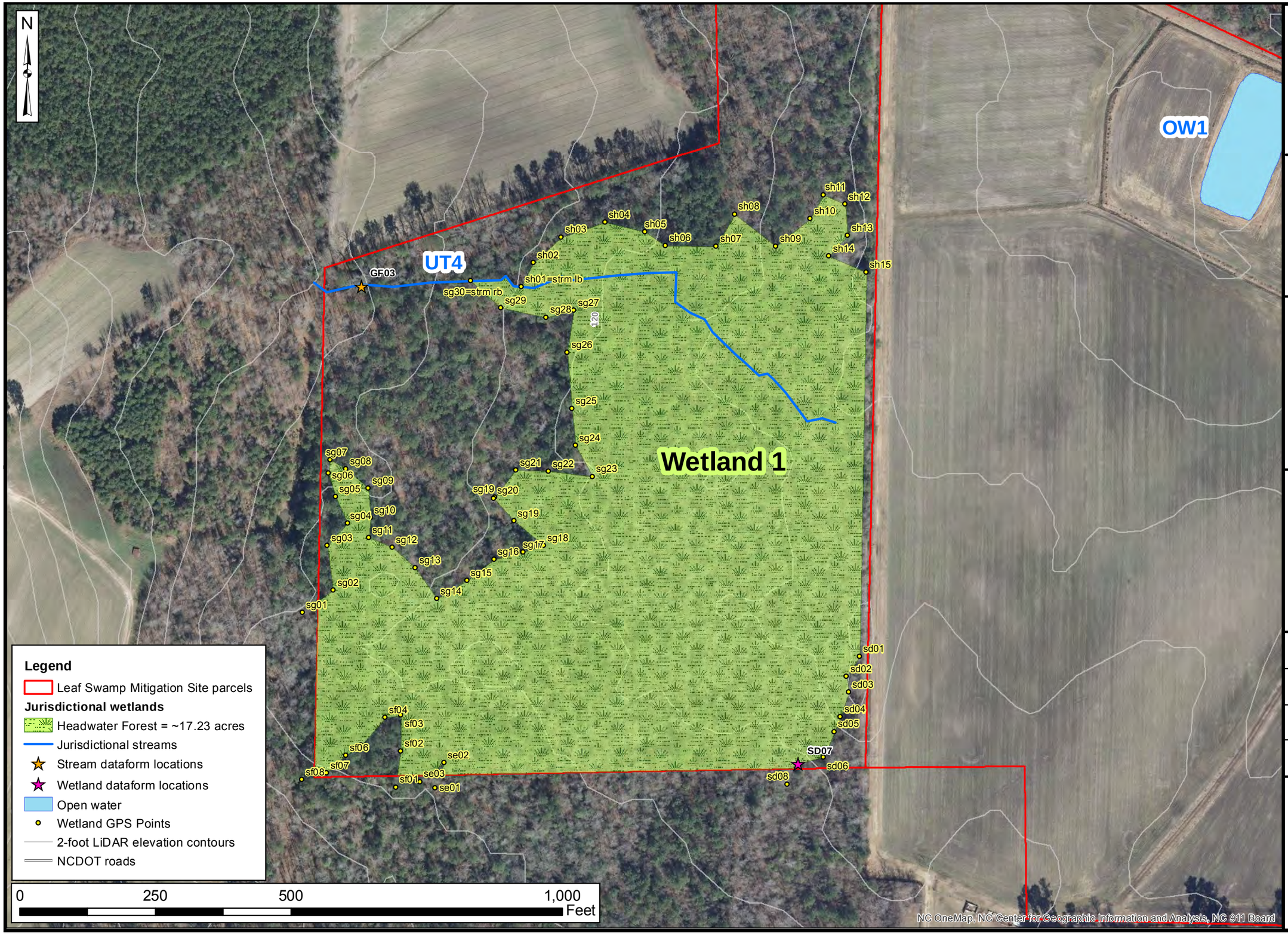
Date: OCT 2017

Scale: 1:5400

Project No.: 17-002

FIGURE

3



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

LEAF SWAMP WETLAND MITIGATION SITE

Johnston County, NC

Title:

JURISDICTIONAL AREAS

WETLAND DETAIL

Drawn by: KRJ/CLF

Date: OCT 2017

Scale: 1:2000

Project No.: 17-002

FIGURE

4

GCWET

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Levi Swamp City/County: Bladen County Sampling Date: 2-7

Applicant/Owner: Restoration Systems State: NC Sampling Point: GC10

Investigator(s): Lewis Ashton Section, Township, Range: Bladenboro

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): P-133 Lat: 35.312973 Long: -78.336046 Datum: WGS84

Soil Map Unit Name: Goldsboro Sandy Loam NWI classification: PUF

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 10

Wetland Hydrology Present? Yes X No ____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: GCWET

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (Plot size:)			
1. Salix Nigra	20	Y	OBL
2. Rubus Cuneifolius	5	N	UPL
3. Liquidambar Styraciflua	7	Y	FAC
4.			
5.			
6.			
7.			
8.			
	32 = Total Cover		
50% of total cover: 16	20% of total cover: 6.4		
Herb Stratum (Plot size:)			
1. Juncus effusus	25	Y	OBL
2. Rubus Argutus	10	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35 = Total Cover		
50% of total cover: 17.5	20% of total cover: 7		
Woody Vine Stratum (Plot size:)			
1. Lonicera Japonica	10	Y	FACU
2.			
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

__ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

WET

SOIL

Sampling Point: GC-10

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 5/1	97	10YR 5/6	3	D	M	SL	depletion @ 5
7+	10YR 5/1	100					SC	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes Y No _____

Remarks:

GC 4

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Leaf Swamp City/County: Bentonville Johnston Sampling Date: 2-7

Applicant/Owner: Restoration Systems State: NC Sampling Point: GC-10

Investigator(s): Lewis Akers Section, Township, Range: Bentonville

Landform (hillslope, terrace, etc.): Fld Local relief (concave, convex, none): Convex Slope (%): 1

Subregion (LRR or MLRA): P-133 Lat: 35.372973 Long: -78.336046 Datum: WGS84

Soil Map Unit Name: Goldsboro Sandy Loam NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): ____

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

Wetland Hydrology Present? Yes ____ No X

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

Remarks:

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

Sampling Point: GC4p

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (Plot size: 15)			
1. Liquidambar Styraciflua	10	Y	FAC
2. Acer rubrum	15	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	25 = Total Cover		
50% of total cover: 12.5	20% of total cover: 5		
Herb Stratum (Plot size: 5)			
1. Andropogon Virginicus	25	Y	FAC
2. Allium vineale	5	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30 = Total Cover		
50% of total cover: 17.5	20% of total cover: 6		
Woody Vine Stratum (Plot size: 30)			
1. Lonicera Japonica	25	Y	FACU
2.			
3.			
4.			
5.			
	25 = Total Cover		
50% of total cover: 12.5	20% of total cover: 5		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species 35	x 3 = 105
FACU species 30	x 4 = 120
UPL species 15	x 5 = 75
Column Totals: 80 (A)	300 (B)

Prevalence Index = B/A = 3.75

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes __ No X

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: SC-4

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/2	96					SL	
10+	10YR 3/1	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Leaf Swamp City/County: Johnston Sampling Date: 1/26/17

Applicant/Owner: Restoration Systems State: NC Sampling Point: SD-[illegible]

Investigator(s): S. Smith + A. Keith / Axiom Section, Township, Range: BENTONVILLE

Landform (hillslope, terrace, etc.): hyporheic accumulation Local relief (concave, convex, none): concave Slope (%): <2

Subregion (LRR or MLRA): LRR P Lat: 35.374572 Long: -78.346718 Datum: WGS84

Soil Map Unit Name: Leaf silt loam NWI classification: Headwater Forest

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- X Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 2

Water Table Present? Yes ✓ No ___ Depth (inches): 6

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

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

Remarks:

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

Sampling Point: SD #7 ref

Tree Stratum (Plot size: 30-ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	50	Y	FAC
2. Diospyros virginica	20	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	70 = Total Cover		
50% of total cover: 35	20% of total cover: 14		

Sapling/Shrub Stratum (Plot size: 30 ft radius)			
1. Acer rubrum	20	Y	FAC
2. Ilex opaca	20	Y	FAC
3. Magnolia virginica	20	Y	FACW
4.			
5.			
6.			
7.			
8.			
	60 = Total Cover		
50% of total cover: 30	20% of total cover: 12		

Herb Stratum (Plot size: 30 ft radius)			
1. M. virginica	5	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Woody Vine Stratum (Plot size: 30 ft radius)			
1. Smilax rotundifolia	5	Y	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75D (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: SD-117 ref

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/1						loamy sand	
8-16+	10YR 6/1	90	10YR 5/4	10	D	M	loamy sand	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- X Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Leaf Swamp City/County: Johnston Sampling Date: 1/26/17

Applicant/Owner: Restoration Systems State: NC Sampling Point: SB-07 upl

Investigator(s): S. Smith & A. Keith / Axiom Section, Township, Range: BENTONVILLE

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): flat Slope (%): <2

Subregion (LRR or MLRA): LRR P Lat: 35.374572 Long: -78.346718 Datum: WGS84

Soil Map Unit Name: Leaf silt loam NWI classification: NA NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

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

Wetland Hydrology Present? Yes ____ No X

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

Remarks:

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

Sampling Point: SM-07

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Diospyros virginiana	40	Y	FAC
2. Acer rubrum	20	Y	FAC
3. Quercus nigra	20	Y	FAC
4.			
5.			
6.			
7.			
8.			
	80 = Total Cover		
50% of total cover: 40	20% of total cover: 20		
Sapling/Shrub Stratum (Plot size:)			
1. Ilex opaca	60	Y	FAC
2. Persea borbonia	10	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	70 = Total Cover		
50% of total cover: 35	20% of total cover: 14		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1. Smilax rotundifolia	5	Y	FAC
2. Muscadinia rotundifolia	5	Y	FAC
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

__ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: SD-67 14

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1						Sandy L	
4-19	10YR 4/3		10YR 5/4				"	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No N

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Leaf Swamp City/County: Johnston Sampling Date: 1/26/17

Applicant/Owner: Restoration Systems State: NC Sampling Point: SB-M wet

Investigator(s): S.Smith + A.Keith/Axiom Section, Township, Range: Bentonville

Landform (hillslope, terrace, etc.): topo crenulation Local relief (concave, convex, none): concave Slope (%): <2

Subregion (LRR or MLRA): LRR P Lat: 35.375912 Long: -78.348461 Datum: WGS84

Soil Map Unit Name: Lynchburg sandy loam NWI classification: Headwater Forest

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- X Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___ No X	Depth (inches): ___
Water Table Present?	Yes ✓ No ___	Depth (inches): 12
Saturation Present? (includes capillary fringe)	Yes ✓ No ___	Depth (inches): 4

Wetland Hydrology Present? Yes ✓ No ___

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

Remarks:

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

Sampling Point: SS-YM wet

Tree Stratum (Plot size: 30 Ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	100	Y	FAC
2. Quercus alba	10	N	FACU
3. Liquidambar styraciflua	10	N	FAC
4.			
5.			
6.			
7.			
8.			
	120 = Total Cover		
50% of total cover: 60	20% of total cover: 16		

Sapling/Shrub Stratum (Plot size: 30 Ft radius)			
1. A. rubrum	20	Y	FAC
2. Ilex opaca	20	Y	FAC
3. Gaylussacia frondosa	10	Y	FACW
4.			
5.			
6.			
7.			
8.			
	50 = Total Cover		
50% of total cover: 25	20% of total cover: 10		

Herb Stratum (Plot size: 30 Ft radius)			
1. Ilex opaca	5	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Woody Vine Stratum (Plot size: 30 Ft radius)			
1. Smilax rotundifolia	5	Y	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: >50 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

__ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: SB-11 Wet

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10 YR 3/1						LS	70% coated
5-18	10 YR 6/1	90	10 YR 5/7	10	D	M	SL	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- X Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Lost Swamp City/County: Johnston Sampling Date: 1/26/17

Applicant/Owner: Restoration Systems State: NC Sampling Point: SG-R up

Investigator(s): S. Smith + A. Keith / Axiom Section, Township, Range: BENTONVILLE

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

Subregion (LRR or MLRA): LRR P Lat: 35.375812 Long: -78.346461 Datum: NAD84

Soil Map Unit Name: Lynchburg sandy loam NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

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

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

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

Wetland Hydrology Present? Yes ____ No X

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

Remarks:

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

Sampling Point: S&I9 wp

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus taeda	60	Y	FAC
2. Quercus alba	20	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	80 = Total Cover		
50% of total cover: 40	20% of total cover: 16		

Sapling/Shrub Stratum (Plot size: 30 ft radius)			
1. Magnolia virginica	20	Y	FACW
2. Ilex opaca	10	Y	FACW
3. Ilex opaca	10	Y	FAC
4.			
5.			
6.			
7.			
8.			
	40 = Total Cover		
50% of total cover: 20	20% of total cover: 8		

Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Woody Vine Stratum (Plot size: 30 ft radius)			
1. Smilax rotundifolia	10	Y	FAC
2.			
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

__ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: SS-14 WP

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1						LS	
3-12+	10YR 5/3	90	10YR 6/4	10	D	M	SL	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

NC WAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Leaf Swamp Wetland Mitigation Site	Date of Evaluation	February 7, 2017
Applicant/Owner Name	Restoration Systems	Wetland Site Name	Leaf Swamp WMS Wetland 2
Wetland Type	Headwater Forest	Assessor Name/Organization	Smith/Axiom
Level III Ecoregion	Southeastern Plains	Nearest Named Water Body	Hannah Creek
River Basin	Neuse	USGS 8-Digit Catalogue Unit	03020201
County	Johnston	NCDWR Region	Raleigh
☐ Yes ☒ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.37287, -078.33603

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

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

Is the assessment area intensively managed? ☒ Yes ☐ No

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

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

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

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

Is the assessment area on a coastal island? ☐ Yes ☒ No

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

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

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

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

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

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

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

Surf	Sub	
☐A	☐A	Water storage capacity and duration are not altered.
☒B	☐B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☒C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

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

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

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☒C	☒C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

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

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

4a.
- ☐A Sandy soil
- ☒B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☒A Soil ribbon < 1 inch
- ☐B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

Surf	Sub	
☐A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☒B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

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

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

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

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

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☒A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☒Yes ☐No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

WT	WC	
☒A	☒A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☐E	☐E	☐E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☒I	☒I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☒K	< 0.01 acre or assessment area is clear-cut

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

Well	Loosely	
☐A	☒A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☐D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

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

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

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

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

☐A 0
☐B 1 to 4
☒C 5 to 8

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

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

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

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

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

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

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

	AA	WT	
Canopy	☐A	☐A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☒C	☒C	Canopy sparse or absent
Mid-Story	☐A	☐A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☒C	☒C	Mid-story/sapling layer sparse or absent
Shrub	☒A	☒A	Dense shrub layer
	☐B	☐B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☒A	☒A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☐C	☐C	Herb layer sparse or absent

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

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

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

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

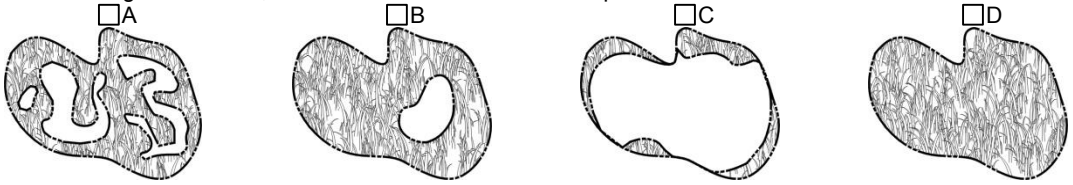
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☐A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☒B Not A

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

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

☐A ☐B ☐C ☐D



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☐A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☒D Both overbank and overland flow are severely altered in the assessment area.

Notes
Streams at the upper end of the wetland are ditched; not so from the middle down. The lower portion of the wetland is bounded by a field ditch, which likely lowers local surficial groundwater.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Leaf Swamp WMS Wetland 2	Date of Assessment	February 7, 2017
Wetland Type	Headwater Forest	Assessor Name/Organization	Smith/Axiom

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

Sub-function Rating Summary

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

Function Rating Summary

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

Overall Wetland Rating **LOW**

NC WAM FIELD ASSESSMENT RESULTS
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Leaf Swamp Wetland Mitigation Site	Date of Evaluation	January 26, 2017
Applicant/Owner Name	Restoration Systems	Wetland Site Name	Leaf Swamp WMS Wetland 1
Wetland Type	Headwater Forest	Assessor Name/Organization	Smith/Axiom
Level III Ecoregion	Southeastern Plains	Nearest Named Water Body	Hannah Creek
River Basin	Neuse	USGS 8-Digit Catalogue Unit	03020201
County	Johnston	NCDWR Region	Raleigh
☒ Yes ☐ No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.37587, -078.34652

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

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

Is the assessment area intensively managed? ☐ Yes ☒ No

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

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

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

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

Is the assessment area on a coastal island? ☐ Yes ☒ No

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

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

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

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

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

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

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

Surf	Sub	
☒A	☐A	Water storage capacity and duration are not altered.
☐B	☒B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
☐C	☐C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

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

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

	AA	WT	
3a.	☐A	☐A	Majority of wetland with depressions able to pond water > 1 deep
	☐B	☐B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	☒C	☒C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	☐D	☐D	Depressions able to pond water < 3 inches deep

3b. ☐A Evidence that maximum depth of inundation is greater than 2 feet
☐B Evidence that maximum depth of inundation is between 1 and 2 feet
☒C Evidence that maximum depth of inundation is less than 1 foot

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

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

4a.
- ☒A Sandy soil
- ☐B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- ☐C Loamy or clayey soils not exhibiting redoximorphic features
- ☐D Loamy or clayey gleyed soil
- ☐E Histosol or histic epipedon

4b.
- ☒A Soil ribbon < 1 inch
- ☐B Soil ribbon ≥ 1 inch

4c.
- ☒A No peat or muck presence
- ☐B A peat or muck presence

5. Discharge into Wetland – opportunity metric

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

Surf	Sub	
☒A	☒A	Little or no evidence of pollutants or discharges entering the assessment area
☐B	☐B	Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
☐C	☐C	Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

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

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

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

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

7a. Is assessment area within 50 feet of a tributary or other open water?
☒Yes ☐No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
- ☒A ≥ 50 feet
- ☐B From 30 to < 50 feet
- ☐C From 15 to < 30 feet
- ☐D From 5 to < 15 feet
- ☐E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
☒≤ 15-feet wide ☐> 15-feet wide ☐ Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
☒Yes ☐No

7e. Is stream or other open water sheltered or exposed?
☒Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
☐Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

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

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

WT	WC	
☐A	☒A	≥ 100 feet
☐B	☐B	From 80 to < 100 feet
☐C	☐C	From 50 to < 80 feet
☐D	☐D	From 40 to < 50 feet
☐E	☐E	From 30 to < 40 feet
☐F	☐F	From 15 to < 30 feet
☐G	☐G	From 5 to < 15 feet
☐H	☐H	< 5 feet

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

Answer for assessment area dominant landform.

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

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

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

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

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

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

WT	WC	FW (if applicable)	
☐A	☐A	☐A	≥ 500 acres
☐B	☐B	☐B	From 100 to < 500 acres
☐C	☐C	☐C	From 50 to < 100 acres
☐D	☐D	☐D	From 25 to < 50 acres
☒E	☒E	☒E	From 10 to < 25 acres
☐F	☐F	☐F	From 5 to < 10 acres
☐G	☐G	☐G	From 1 to < 5 acres
☐H	☐H	☐H	From 0.5 to < 1 acre
☐I	☐I	☐I	From 0.1 to < 0.5 acre
☐J	☐J	☐J	From 0.01 to < 0.1 acre
☐K	☐K	☐K	< 0.01 acre or assessment area is clear-cut

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

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

13. Connectivity to Other Natural Areas – landscape condition metric

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

Well	Loosely	
☐A	☒A	≥ 500 acres
☐B	☐B	From 100 to < 500 acres
☐C	☐C	From 50 to < 100 acres
☒D	☐D	From 10 to < 50 acres
☐E	☐E	< 10 acres
☐F	☐F	Wetland type has a poor or no connection to other natural habitats

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

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

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

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

☐A 0
☐B 1 to 4
☒C 5 to 8

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

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

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

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

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

17a. Is vegetation present?
☒Yes ☐No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.
☐A ≥ 25% coverage of vegetation
☐B < 25% coverage of vegetation

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

	AA	WT	
Canopy	☒A	☒A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	☐B	☐B	Canopy present, but opened more than natural gaps
	☐C	☐C	Canopy sparse or absent
Mid-Story	☒A	☒A	Dense mid-story/sapling layer
	☐B	☐B	Moderate density mid-story/sapling layer
	☐C	☐C	Mid-story/sapling layer sparse or absent
Shrub	☐A	☐A	Dense shrub layer
	☒B	☒B	Moderate density shrub layer
	☐C	☐C	Shrub layer sparse or absent
Herb	☐A	☐A	Dense herb layer
	☐B	☐B	Moderate density herb layer
	☒C	☒C	Herb layer sparse or absent

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

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

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

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

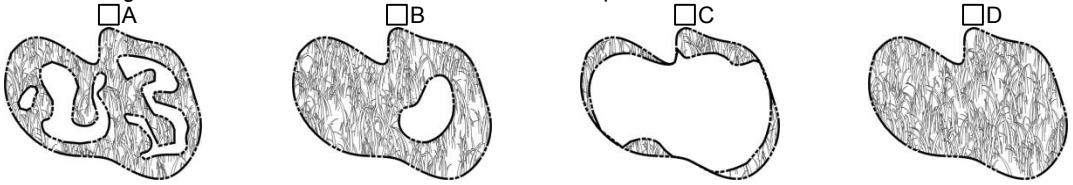
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.
☒A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
☐B Not A

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

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

☐A ☐B ☐C ☐D



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

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.
☒A Overbank and overland flow are not severely altered in the assessment area.
☐B Overbank flow is severely altered in the assessment area.
☐C Overland flow is severely altered in the assessment area.
☐D Both overbank and overland flow are severely altered in the assessment area.

Notes
Streams at the upper end of the wetland are ditched; not so from the middle down. The lower portion of the wetland is bounded by a field ditch, which likely lowers local surficial groundwater.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0

Wetland Site Name	Leaf Swamp WMS Wetland 1	Date of Assessment	January 26, 2017
Wetland Type	Headwater Forest	Assessor Name/Organization	Smith/Axiom

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

Sub-function Rating Summary

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

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	**HIGH**
Water Quality	Condition	**HIGH**
	Condition/Opportunity	**HIGH**
	Opportunity Presence (Y/N)	**YES**
Habitat	Condition	**HIGH**

Overall Wetland Rating **HIGH**

GA8

NC Division of Water Quality –Methodology for Identification of Intermittent and Perennial Streams and Their Origins v. 4.11

NC DWQ Stream Identification Form Version 4.11

Date: 2/23/17	**Project/Site:** Alliance Headwater	**Latitude:** 35.375526
Evaluator: WGL	**County:** Johnston	**Longitude:** -78.346844
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 23.75	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** Newton Grove N *e.g. Quad Name:*

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

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

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

C. Biology (Subtotal = 4.75)				
18. Fibrous roots in streambed	3	(2)	1	0
19. Rooted upland plants in streambed	3	(2)	1	0
20. Macrobenthos (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	(FACW = 0.75); OBL = 1.5 Other = 0			

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

Notes:

Sketch:

GC3

NC Division of Water Quality –Methodology for Identification of Intermittent and Perennial Streams and Their Origins v. 4.11

NC DWQ Stream Identification Form Version 4.11

Date: 2/23/17	**Project/Site:** Alliance Headwaters	**Latitude:** 35.374381
Evaluator: WGL	**County:** Johnston	**Longitude:** -78.347228
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 24.75	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** Newton Grove N *e.g. Quad Name:*

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

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

B. Hydrology (Subtotal = 9)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	(1)	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 5.75)				
18. Fibrous roots in streambed	3	(2)	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75 OBL = 1.5 Other = 0			

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

Notes:

Sketch:

GBG

NC DWQ Stream Identification Form Version 4.11

Date: 2/23/17	**Project/Site:** Alliance Headwaters	**Latitude:** 35.374665
Evaluator: WGL	**County:** Johnston	**Longitude:** -78.347332
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 22.25	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** Newton Grove N. *e.g. Quad Name:*

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

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

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

C. Biology (Subtotal = 6.75)				
18. Fibrous roots in streambed	3	(2)	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = (0.75) OBL = 1.5 Other = 0			

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

Notes:

Sketch:

GE/D

NC Division of Water Quality –Methodology for Identification of Intermittent and Perennial Streams and Their Origins v. 4.11

NC DWQ Stream Identification Form Version 4.11

Date: 2/23/17	**Project/Site:** Alliance Headwaters	**Latitude:** 35.375453
Evaluator: WGL	**County:** Johnston	**Longitude:** -78.348011
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 17.25	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** Newton Grove N, *e.g. Quad Name:*

A. Geomorphology (Subtotal = 5.5)	Absent	Weak	Moderate	Strong
1[a] Continuity of channel bed and bank	0	(1)	2	3
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	(0)	1	2	3
4. Particle size of stream substrate	0	(1)	2	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	(0)	1	2	3
8. Headcuts	(0)	1	2	3
9. Grade control	(0)	0.5	1	1.5
10. Natural valley	0	(0.5)	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

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

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

C. Biology (Subtotal = 3.75)				
18. Fibrous roots in streambed	3	(2)	1	0
19. Rooted upland plants in streambed	3	2	(1)	0
20. Macrobenthos (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = (0.75) OBL = 1.5 Other = 0			

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

Notes:

Sketch:

GE20

NC Division of Water Quality –Methodology for Identification of Intermittent and Perennial Streams and Their Origins v. 4.11

NC DWQ Stream Identification Form Version 4.11

Date: 2/23/17	**Project/Site:** Alliance Headwaters	**Latitude:** 35.375184
Evaluator: WGL	**County:** Johnston	**Longitude:** -78.349081
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 23.25	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** Newton Grove N. *e.g. Quad Name:*

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

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

B. Hydrology (Subtotal = 9)				
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	(1)	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 7.25)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	3	(2)	1	0
20. Macrobenthos (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	0	(0.5)	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = (0.75) OBL = 1.5 Other = 0			

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

Notes:

Sketch:

GF3

NC Division of Water Quality –Methodology for Identification of Intermittent and Perennial Streams and Their Origins v. 4.11

NC DWQ Stream Identification Form Version 4.11

Date: 2/23/17	**Project/Site:** Alliance Headwaters	**Latitude:** 35.377009
Evaluator: WMJ	**County:** Johnston	**Longitude:** -78.349398
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 27.25	**Stream Determination (circle one)** Ephemeral (Intermittent) Perennial	**Other** Newton Grove N *e.g. Quad Name:*

A. Geomorphology (Subtotal = 10.5)	Absent	Weak	Moderate	Strong
1[a] Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	(0)	1	2	3
8. Headcuts	0	1	(2)	3
9. Grade control	(0)	0.5	1	1.5
10. Natural valley	0	(0.5)	1	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

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

B. Hydrology (Subtotal = 9)				
12. Presence of Baseflow	0	1	2	(3)
13. Iron oxidizing bacteria	0	(1)	2	3
14. Leaf litter	(1.5)	1	0.5	0
15. Sediment on plants or debris	(0)	0.5	1	1.5
16. Organic debris lines or piles	(0)	(0.5)	1	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 7.75)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

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

Notes:

Sketch:

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

GAB

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Restoration Systems
2. Evaluator's name: WGL
3. Date of evaluation: 2/23/17
4. Time of evaluation: 9:20 AM
5. Name of stream: GAB
6. River basin: Neuse 03-04-04
7. Approximate drainage area: 46 ac (0.07 mi^2)
8. Stream order: 1st
9. Length of reach evaluated: 55 ft
10. County: Johnston
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 35.375526 Longitude (ex. -77.556611): -78.346844

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

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

14. Proposed channel work (if any): Preservation
15. Recent weather conditions: Abnormally Dry
16. Site conditions at time of visit: Warm, & sunny
17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___Nutrient Sensitive Waters ___Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:_____
19. Does channel appear on USGS quad map? YES (NO)
20. Does channel appear on USDA Soil Survey? YES (NO)
21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 30 % Agricultural 65 % Forested ___% Cleared / Logged ___% Other (_____)
22. Bankfull width: 3 ft
23. Bank height (from bed to top of bank): 0.3 ft
24. Channel slope down center of stream: ✓ Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)
25. Channel sinuosity: ___Straight ___Occasional bends ✓ Frequent meander ___Very sinuous ✓ Braided channel

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

Total Score (from reverse): 79 **Comments:**_____

Evaluator's Signature W Grant Jr **Date** 2/23/17

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

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	5
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4 6
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	4 5
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	4 3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	4
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	5
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	6
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	4
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	5
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	/
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	5
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	5
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	5
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	/
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						79

* These characteristics are not assessed in coastal streams.

GC3

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

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Restoration Systems
2. Evaluator's name: W GL
3. Date of evaluation: 2/23/17
4. Time of evaluation: 9:53 AM
5. Name of stream: GC3
6. River basin: Neuse 03-04-04
7. Approximate drainage area: 37ac (0.06mi²)
8. Stream order: 1st
9. Length of reach evaluated: 50 ft
10. County: Johnston
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 35.374381 Longitude (ex. -77.556611): -78.347228

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

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

14. Proposed channel work (if any): Preservation
15. Recent weather conditions: Abnormally Dry
16. Site conditions at time of visit: Warm + Sunny
17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___Nutrient Sensitive Waters ___Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:_____
19. Does channel appear on USGS quad map? YES (NO)
20. Does channel appear on USDA Soil Survey? YES (NO)
21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 30 % Agricultural 65 % Forested ___% Cleared / Logged ___% Other (_____)
22. Bankfull width: 4
23. Bank height (from bed to top of bank): 0.5
24. Channel slope down center of stream: ✓ Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)
25. Channel sinuosity: ___Straight ✓ Occasional bends ___Frequent meander ___Very sinuous ✓ Braided channel

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

Total Score (from reverse): 68 **Comments:**_____

Evaluator's Signature W Grant Lewis **Date** 2/23/17

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

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	6
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	5
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	5
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	6
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	5
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	5
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	5
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	1
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						68

* These characteristics are not assessed in coastal streams.

GB6

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

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Restoration Systems
2. Evaluator's name: WGL
3. Date of evaluation: 2/23/17
4. Time of evaluation: 10:15 AM
5. Name of stream: GB6
6. River basin: Neuse 03-04-04
7. Approximate drainage area: 37 ac (0.06 mi²)
8. Stream order: 1st
9. Length of reach evaluated: 55 ft
10. County: Johnston
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 35.374665 Longitude (ex. -77.556611): -78.347332

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

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

14. Proposed channel work (if any): Preservation
15. Recent weather conditions: Abnormally Dry
16. Site conditions at time of visit: Sunny & warm
17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:_____
19. Does channel appear on USGS quad map? YES (NO)
20. Does channel appear on USDA Soil Survey? YES (NO)
21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 30 % Agricultural 65 % Forested ___% Cleared / Logged ___% Other (_____)
22. Bankfull width: 3
23. Bank height (from bed to top of bank): 0.3
24. Channel slope down center of stream: ✓Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)
25. Channel sinuosity: ____Straight ___Occasional bends ✓Frequent meander ___Very sinuous ✓Braided channel

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

Total Score (from reverse): 74 **Comments:**_____

Evaluator's Signature W Grant Lewis **Date** 2/23/17

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STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	6
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	5
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	5
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	6
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	4
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	5
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	/
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	5
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	5
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	/
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						74

* These characteristics are not assessed in coastal streams.

GE10

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

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Restoration Systems
2. Evaluator's name: WGL
3. Date of evaluation: 2/23/17
4. Time of evaluation: 10:37 AM
5. Name of stream: GE10
6. River basin: Neuse 03-04-04
7. Approximate drainage area: 46 ac (0.07 mi²)
8. Stream order: 1st
9. Length of reach evaluated: 50 ft
10. County: Johnston
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 35.375453 Longitude (ex. -77.556611): -78.348011

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

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

14. Proposed channel work (if any): Preservation
15. Recent weather conditions: Abnormally Dry
16. Site conditions at time of visit: Sunny & warm
17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___Nutrient Sensitive Waters ___Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:_____
19. Does channel appear on USGS quad map? YES (NO)
20. Does channel appear on USDA Soil Survey? YES (NO)
21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 30 % Agricultural 65 % Forested ___% Cleared / Logged ___% Other (_____)
22. Bankfull width: 15 ft
23. Bank height (from bed to top of bank): 0.2 ft
24. Channel slope down center of stream: ✓Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)
25. Channel sinuosity: ___Straight ___Occasional bends ✓Frequent meander ___Very sinuous ✓Braided channel

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

Total Score (from reverse): 69 **Comments:**_____

Evaluator's Signature W Grant Lewis **Date** 2/23/17

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STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	6
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	6
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	5
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	5
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	6
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	5
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	5
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	5
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	4
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	1
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	1
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						69

* These characteristics are not assessed in coastal streams.

GE20

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

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Restoration Systems
2. Evaluator's name: WGL
3. Date of evaluation: 2/23/17
4. Time of evaluation: 11:12 AM
5. Name of stream: GE20
6. River basin: Neuse 03-04-04
7. Approximate drainage area: 41 ac (0.06 mi^2)
8. Stream order: 1st
9. Length of reach evaluated: 50 ft
10. County: Johnston
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 35.375184 Longitude (ex. -77.556611): -78.349081

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

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

14. Proposed channel work (if any): Preservation
15. Recent weather conditions: Abnormally Dry
16. Site conditions at time of visit: Warm + Sunny
17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:_____
19. Does channel appear on USGS quad map? YES (NO) 20. Does channel appear on USDA Soil Survey? YES (NO)
21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 30 % Agricultural 65 % Forested ___% Cleared / Logged ___% Other (_____)
22. Bankfull width: 5 ft 23. Bank height (from bed to top of bank): 0.3 ft
24. Channel slope down center of stream: ✓ Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)
25. Channel sinuosity: ____Straight ___Occasional bends ✓ Frequent meander ___Very sinuous ✓ Braided channel

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

Total Score (from reverse): 76 **Comments:**_____

Evaluator's Signature W Grant Lewis **Date** 2/23/17

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STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	6
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	6
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	5
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	5
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	6
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	4
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	5
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	5
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	5
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	5
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	1
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						76

* These characteristics are not assessed in coastal streams.

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

STREAM QUALITY ASSESSMENT WORKSHEET

GF3

Provide the following information for the stream reach under assessment:

1. Applicant's name: Restoration Systems
2. Evaluator's name: WGL
3. Date of evaluation: 2/23/17
4. Time of evaluation: 11:48 AM
5. Name of stream: GF3
6. River basin: Neuse 03-04-04
7. Approximate drainage area: 0.2 mi^2
8. Stream order: 1st
9. Length of reach evaluated: 50 ft
10. County: Johnston
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 35.377009 Longitude (ex. –77.556611): -78.349398

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

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

14. Proposed channel work (if any): Preservation
15. Recent weather conditions: Abnormally Dry
16. Site conditions at time of visit: Sunny + Warm
17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___Nutrient Sensitive Waters ___Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:_____
19. Does channel appear on USGS quad map? (YES) NO
20. Does channel appear on USDA Soil Survey? (YES) NO
21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 30 % Agricultural 65 % Forested ___% Cleared / Logged ___% Other (_____)
22. Bankfull width: 5 ft
23. Bank height (from bed to top of bank): 3.5 ft
24. Channel slope down center of stream: ✓ Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)
25. Channel sinuosity: ✓ Straight ___Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

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

Total Score (from reverse): 36 **Comments:**_____

Evaluator's Signature W Grant Lewis **Date** 2/23/17

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STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	5
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	0
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	/
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	1
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	/
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						36

* These characteristics are not assessed in coastal streams.

GG

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

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Restoration Systems
2. Evaluator's name: WGL
3. Date of evaluation: 2/23/17
4. Time of evaluation: 12:20
5. Name of stream: GG
6. River basin: Neuse 03-04-04
7. Approximate drainage area: 0.4 mi^2
8. Stream order: 1st
9. Length of reach evaluated: 100 ft
10. County: Johnston
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 35.377557 Longitude (ex. -77.556611): -78.346203

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

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

14. Proposed channel work (if any): Restoration
15. Recent weather conditions: Abnormally Dry
16. Site conditions at time of visit: Sunny & Warm
17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:
19. Does channel appear on USGS quad map? (YES) NO
20. Does channel appear on USDA Soil Survey? (YES) NO
21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 30 % Agricultural 65 % Forested ___% Cleared / Logged ___% Other (_____)
22. Bankfull width: 6 ft
23. Bank height (from bed to top of bank): 3.5 ft
24. Channel slope down center of stream: ✓Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)
25. Channel sinuosity: ✓Straight ___Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

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

Total Score (from reverse): 37 **Comments:** Ditched and chanelized stream.

Evaluator's Signature W Grant Lee **Date** 2/23/17

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

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	0
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	0
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	/
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	1
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	/
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						37

* These characteristics are not assessed in coastal streams.

GH

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

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Restoration Systems
2. Evaluator's name: WJ2
3. Date of evaluation: 2/23/17
4. Time of evaluation: 12:45
5. Name of stream: GH
6. River basin: Neuse 03-04-04
7. Approximate drainage area: 0.36 Mi^2
8. Stream order: 1st
9. Length of reach evaluated: 60 ft
10. County: Johnston
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 35.373449 Longitude (ex. -77.556611): -78.337899

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

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

14. Proposed channel work (if any): Restoration
15. Recent weather conditions: Abnormally Dry
16. Site conditions at time of visit: Sunny + Warm
17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:_____
19. Does channel appear on USGS quad map? (YES) NO
20. Does channel appear on USDA Soil Survey? (YES) NO
21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 65 % Agricultural 30 % Forested ___% Cleared / Logged ___% Other (_____)
22. Bankfull width: 6 ft
23. Bank height (from bed to top of bank): 3 ft
24. Channel slope down center of stream: ✓ Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)
25. Channel sinuosity: ✓ Straight ___Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

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

Total Score (from reverse): 24 **Comments:**_____

Evaluator's Signature W Grant Lewis **Date** 2/23/17

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STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	0
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	0
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	/
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	1
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	0
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	/
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						24

* These characteristics are not assessed in coastal streams.

GJ

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

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: Restoration Systems
2. Evaluator's name: WGL
3. Date of evaluation: 2/23/17
4. Time of evaluation: 12:57
5. Name of stream: GJ
6. River basin: Neuse 03-04-04
7. Approximate drainage area: 0.23 mi^2
8. Stream order: 1st
9. Length of reach evaluated: 30 ft
10. County: Johnston
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any): NA

Latitude (ex. 34.872312): 35.369308 Longitude (ex. -77.556611): -78.342657

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

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

14. Proposed channel work (if any): Restoration
15. Recent weather conditions: Abnormally Dry
16. Site conditions at time of visit: Warm & sunny
17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ___Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area:_____
19. Does channel appear on USGS quad map? YES (NO)
20. Does channel appear on USDA Soil Survey? (YES) NO
21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 65 % Agricultural 30 % Forested ___% Cleared / Logged ___% Other (_____)
22. Bankfull width: 5 ft
23. Bank height (from bed to top of bank): 2.5 ft
24. Channel slope down center of stream: ✓Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)
25. Channel sinuosity: ✓Straight ___Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

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

Total Score (from reverse): 37 **Comments:**_____

Evaluator's Signature W Grant Jr **Date** 2/23/17

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

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	0
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	1
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	0
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	1
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	1
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						37

* These characteristics are not assessed in coastal streams.

Appendix 4

Approved FHWA Categorical Exclusion

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:	Alliance Headwaters Stream Mitigation Site
County Name:	Johnston
EEP Number:	ID #: 95017 Contract #: 6832
Project Sponsor:	Restoration Systems, LLC
Project Contact Name:	Raymond Holz
Project Contact Address:	1101 Haynes Street, Suite 211, Raleigh, NC 27604
Project Contact E-mail:	rholz@restorationsystems.com
EEP Project Manager:	Crocker, Lindsay Lindsay.Crocker@ncdenr.gov

Project Description

The Site is located approximately six miles southeast of Four Oaks, NC and one mile east of US-701 with a Latitude approximately of 35.3745 Longitude -79.3426 (NAD 83/WGS 84). Regional physiography is characterized by drained agricultural fields and natural mixed hardwood timber land.

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:

2-24-2017
Date

LAGrocker
EEP Project Manager

Conditional Approved By:

Date

For Division Administrator FHWA

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

Final Approval By:

5-11-18 DWB
2-24-17
Date

For Division Administrator FHWA

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 – please see the attached Executive Summary from a Limited Phase 1 Site Assessment performed by Environmental Data Resources, Inc on May 31st, 2016.

National Historic Preservation Act (Section 106)
No Issue – please see attached letter from Renee Gledhill-Earley State of the Historic Preservation Office.

Uniform Act
Please see the attached letter, sent to the landowner April 1th 2016.

Part 3: Ground-Disturbing Activates Regulation/Questions

American Indian Religious Freedom Act (AIRFA)
Not applicable – project is not located in a county 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)
Below is a summary of federally protected species for Johnston County, NC and our summary of NO anticipated effects do to the project. A letter was sent to USFWS Raleigh Field Office on 12/16/2016. RS received a letter of concurrence on 1/12/2017. All documents are attached

Federally Protected Species for Johnston County

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
Alasmidonta heterodon	Dwarf wedgemussel	E	No	No effect
Elliptio steinstansana	Tar River spinymussel	E	No	No effect
Picoides borealis	Red-cockaded woodpecker	E	No	No effect
Rhus michauxii	Michaux's sumac	E	No	No effect

Notes: E – Endangered denotes a species in danger of extinction throughout all or a significant portion of its range.
T – Threatened denotes a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Summary of Anticipated Effects

No potential habitat is known to exist on the project site. The proposed project will occur in existing agricultural fields which are intensively managed for soybeans and other crops. The likelihood of any habitat occurring on the project site is extremely low.

Executive Order 13007 (Indian Sacred Sites)

Not applicable – project is not located in a county claimed as "territory" by the Eastern Band of Cherokee Indians.

Farmland Protection Policy Act (FPPA)

Please find the attached Form AD-1006 dated 00/00/0000.

Fish and Wildlife Coordination Act (FWCA)

Please find the attached letter from Pete Benjamin USFWS Field Supervisor indicated the project is "not likely to adversely affect any federally-listed endangered or threatened species."

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:	Alliance Headwaters Stream Mitigation Site
County Name:	Johnston
EEP Number:	ID #: 95017 Contract #: 6832
Project Sponsor:	Restoration Systems, LLC
Project Contact Name:	Raymond Holz
Project Contact Address:	1101 Haynes Street, Suite 211, Raleigh, NC 27604
Project Contact E-mail:	rholz@restorationsystems.com
EEP Project Manager:	Crocker, Lindsay Lindsay.Crocker@ncdenr.gov

Project Description

The Site is located approximately six miles southeast of Four Oaks, NC and one mile east of US-701 with a Latitude approximately of 35.3745 Longitude -79.3426 (NAD 83/WGS 84). Regional physiography is characterized by drained agricultural fields and natural mixed hardwood timber land.

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:

2-24-2017
Date

LA Crocker
EEP Project Manager

Conditional Approved By:

Date

For Division Administrator FHWA

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

Final Approval By:

2-24-17
Date

For Division Administrator FHWA

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

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

April 1, 2016

Mr. William F. Lee
922 Peach Orchard Road
Four Oaks, NC 27524

Dear Mr. Lee –

The purpose of this letter is to notify you that Restoration Systems, LLC, in offering to purchase your property in Johnston County, North Carolina, does not have the power to acquire it by eminent domain. Also, Restoration Systems' offer to purchase your property is based on what we believe to be its fair market value.

If you have any questions, please feel free to call me at 919-755-9490.

Sincerely,

Raymond Holz
Project Manager

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh ES Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

January 12, 2017

Raymond Holz
Restoration Systems, LLC
1101 Haynes St., Suite 211
Raleigh, NC 27604

Re: Alliance Headwaters Stream Mitigation Site – Johnston County, NC

Dear Mr. Holz:

This letter is to inform you that a list of all federally-protected endangered and threatened species with known occurrences in North Carolina is now available on the U.S. Fish and Wildlife Service's (Service) web page at http://www.fws.gov/raleigh. Therefore, if you have projects that occur within the Raleigh Field Office's area of responsibility (see attached county list), you no longer need to contact the Raleigh Field Office for a list of federally-protected species.

Our web page contains a complete and frequently updated list of all endangered and threatened species protected by the provisions of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)(Act), and a list of federal species of concern[1] that are known to occur in each county in North Carolina.

Section 7 of the Act requires that all federal agencies (or their designated non-federal representative), in consultation with the Service, insure that any action federally authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species. A biological assessment or evaluation may be prepared to fulfill that requirement and in determining whether additional consultation with the Service is necessary. In addition to the federally-protected species list, information on the species' life histories and habitats and information on completing a biological assessment or evaluation and can be found on our web page at http://www.fws.gov/raleigh. Please check the web site often for updated information or changes.

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[1] The term "federal species of concern" refers to those species which the Service believes might be in need of concentrated conservation actions. Federal species of concern receive no legal protection and their designation does not necessarily imply that the species will eventually be proposed for listing as a federally endangered or threatened species. However, we recommend that all practicable measures be taken to avoid or minimize adverse impacts to federal species of concern.

If your project contains suitable habitat for any of the federally-listed species known to be present within the county where your project occurs, the proposed action has the potential to adversely affect those species. As such, we recommend that surveys be conducted to determine the species' presence or absence within the project area. The use of North Carolina Natural Heritage program data should not be substituted for actual field surveys.

If you determine that the proposed action may affect (i.e., likely to adversely affect or not likely to adversely affect) a federally-protected species, you should notify this office with your determination, the results of your surveys, survey methodologies, and an analysis of the effects of the action on listed species, including consideration of direct, indirect, and cumulative effects, before conducting any activities that might affect the species. If you determine that the proposed action will have no effect (i.e., no beneficial or adverse, direct or indirect effect) on federally listed species, then you are not required to contact our office for concurrence (unless an Environmental Impact Statement is prepared). However, you should maintain a complete record of the assessment, including steps leading to your determination of effect, the qualified personnel conducting the assessment, habitat conditions, site photographs, and any other related articles.

With regard to the above-referenced project, we offer the following remarks. Our comments are submitted pursuant to, and in accordance with, provisions of the Endangered Species Act.

Based on the information provided and other information available, it appears that the proposed action is not likely to adversely affect any federally-listed endangered or threatened species, their formally designated critical habitat, or species currently proposed for listing under the Act at these sites. We believe that the requirements of section 7(a)(2) of the Act have been satisfied for your project. Please remember that obligations under section 7 consultation must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered; (2) this action is subsequently modified in a manner that was not considered in this review; or, (3) a new species is listed or critical habitat determined that may be affected by the identified action.

However, the Service is concerned about the potential impacts the proposed action might have on aquatic species. Aquatic resources are highly susceptible to sedimentation. Therefore, we recommend that all practicable measures be taken to avoid adverse impacts to aquatic species, including implementing directional boring methods and stringent sediment and erosion control measures. An erosion and sedimentation control plan should be submitted to and approved by the North Carolina Division of Land Resources, Land Quality Section prior to construction. Erosion and sedimentation controls should be installed and maintained between the construction site and any nearby down-gradient surface waters. In addition, we recommend maintaining natural, vegetated buffers on all streams and creeks adjacent to the project site.

The North Carolina Wildlife Resources Commission has developed a Guidance Memorandum (a copy can be found on our website at (http://www.fws.gov/raleigh) to address and mitigate secondary and cumulative impacts to aquatic and terrestrial wildlife resources and water quality. We recommend that you consider this document in the development of your projects and in completing an initiation package for consultation (if necessary).

We hope you find our web page useful and informative and that following the process described above will reduce the time required, and eliminate the need, for general correspondence for species' lists. If you have any questions or comments, please contact John Ellis of this office at (919) 856-4520 ext. 26.

Sincerely,

Pete Benjamin
Field Supervisor

List of Counties in the Service's Raleigh Field Office Area of Responsibility

Alamance
Beaufort
Bertie
Bladen
Brunswick
Camden
Carteret
Caswell
Chatham
Chowan
Columbus
Craven
Cumberland
Currituck
Dare
Duplin
Durham
Edgecombe
Franklin
Gates
Granville
Greene
Guilford
Halifax
Harnett
Hertford
Hoke
Hyde
Johnston
Jones
Lee
Lenoir
Martin
Montgomery
Moore
Nash
New Hanover
Northampton
Onslow
Orange
Pamlico
Pasquotank
Pender
Perquimans
Person
Pitt
Randolph
Richmond
Robeson
Rockingham
Sampson
Scotland
Tyrrell
Vance
Wake
Warren
Washington
Wayne
Wilson

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Pat McCrory
Secretary Susan Kluttz

Office of Archives and History
Deputy Secretary Kevin Cherry

December 29, 2016

Raymond Holz
Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, NC 27604

Re: Alliance Headwaters Stream Mitigation Site, 61 Old Williams Road, Four Oaks, Johnston County, ER 16-2347

Dear Mr. Holz:

Thank you for your email of December 16, 2016, concerning the above project.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

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

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

Sincerely,

Renee Gledhill-Earley

for Ramona M. Bartos

North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

January 18, 2017

Mr. Raymond Holz
Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, NC 27604

Subject: Request for Environmental Information for the Alliance Headwaters Stream Restoration Site, Johnston County, North Carolina.

Dear Mr. Holz,

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) have reviewed the proposed project description. Comments are provided in accordance with certain provisions of the Clean Water Act of 1977 (as amended), Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e) and North Carolina General Statutes (G.S. 113-131 et seq.).

Restorations Systems, LLC proposes to complete a stream restoration project for the North Carolina Division of Mitigation Services. The subject site, referred to as the Alliance Headwater Stream Restoration Site, is located at the intersection of Joyner Bridge and Old Williams Roads, southeast of Four Oaks, in the Neuse River Basin USGS HUC 02020201. The proposed work will restore headwater stream channels through degraded cropland.

Stream restoration projects often improve water quality and aquatic habitat. Establishing native, forested buffers in riparian areas will help protect water quality, improve aquatic and terrestrial habitats and provide a travel corridor for wildlife species. The NCWRC recommends the use of biodegradable and wildlife-friendly sediment and erosion control devices. Silt fencing, fiber rolls and/or other products should have loose-weave netting that is made of natural fiber materials with movable joints between the vertical and horizontal twines. Silt fencing and similar products that have been reinforced with plastic or metal mesh should be avoided as they impede the movement of terrestrial wildlife species. Excessive silt and sediment loads can have detrimental effects on aquatic resources including destruction of spawning habitat, suffocation of eggs and clogging of gills. Any invasive plant species that are found onsite should be removed.

Mailing Address: Habitat Conservation • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

Thank you for the opportunity to review and comment on this project. If I can be of further assistance, please contact me at (910) 409-7350 or gabriela.garrison@ncwildlife.org.

Sincerely,

Gabriela Garrison
Eastern Piedmont Habitat Conservation Coordinator
Habitat Conservation Program

Natural Resources
Conservation Service

North Carolina
State Office

4407 Bland Road
Suite 117
Raleigh, NC 27609
Voice 919-873-2171
Fax (844) 325-2156

February 21, 2017

Raymond Holz
Senior Project Manager
Restoration Systems, LLC
1101 Haynes St., Suite 211
Raleigh, NC 27604

Dear Mr. Holz:

Thank you for your letter dated February 6, 2017, Subject: Request for Comments – Alliance Headwaters Stream Mitigation Site, Johnston 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.

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 02/06/2017
Name of Project Alliance Headwaters	Federal Agency Involved N.C. Division of Mitigation Services
Proposed Land Use Forested Conservation Easement	County and State Johnston County, NC
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 02/06/2016 / 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: 166 acres
Major Crop(s): CORN	Farmable Land In Govt. Jurisdiction Acres: 76% % 390,735 acres	Amount of Farmland As Defined in FPPA Acres: 74% % 379,107 acres	
Name of Land Evaluation System Used: Johnston Co., NC LESA	Name of State or Local Site Assessment System: none	Date Land Evaluation Returned by NRCS: 02/21/2017 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	9.66			
B. Total Acres To Be Converted Indirectly	6.34			
C. Total Acres In Site	16.00			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	9.20			
B. Total Acres Statewide Important or Local Important Farmland	6.80			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.0042			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	39			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	82			

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)	20			
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)	15			
7. Size Of Present Farm Unit Compared To Average	(10)	10			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	5			
10. On-Farm Investments	(20)	5			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	85	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	82	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	85	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	167	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.

Appendix 5

DMS Floodplain Requirements Checklist

EEP Floodplain Requirements Checklist

This form was developed by the National Flood Insurance program, NC Floodplain Mapping program and Ecosystem Enhancement Program to be filled for all EEP projects. The form is intended to summarize the floodplain requirements during the design phase of the projects. The form should be submitted to the Local Floodplain Administrator with three copies submitted to NFIP (attn. State NFIP Engineer), NC Floodplain Mapping Unit (attn. State NFIP Coordinator) and NC Ecosystem Enhancement Program.

Project Location

Name of project:	Alliance Headwaters
Name if stream or feature:	UT to Hannah Creek
County:	Johnston
Name of river basin:	Neuse
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Johnston County, Unincorporated Areas
DFIRM panel number for entire site:	3720158800J
Consultant name:	Erin Bennett, Ecosystem Planning and Restoration
Phone number:	919.388.0787
Address:	559 Jones Franklin Rd Suite 150 Raleigh, NC 27606

Design Information

Provide a general description of project (one paragraph). Include project limits on a reference orthophotograph at a scale of 1" = 500".

Restoration of a headwater system in Johnston County. The downstream terminus of the project exists within the 500 year floodplain (Zone X) of Hannah Creek. The project will have no effect on the existing floodplain mapping.

Summarize stream reaches or wetland areas according to their restoration priority.

Alliance Headwaters Reach Summary Table

Reach	Length (linear feet)	Priority
UT 1A	87	One (Restoration)
UT 1	3,263	One/Two (Restoration)
UT 2	865	One/Two (Restoration)
UT3	1,973	One/Two (Restoration)
UT 3A	977	Preservation
UT 3B	431	Preservation
UT 3C	2	Preservation
UT 4	1,090	One/Two (Restoration)
UT 4	1,080	Preservation

Floodplain Information

Is project located in a Special Flood Hazard Area (SFHA)?

○ Yes ◉ No

If project is located in a SFHA, check how it was determined:

☐ Redelineation

☐ Detailed Study

☐ Limited Detail Study

☐ Approximate Study

☐ Don't know

List flood zone designation: Zone X

Check if applies:

☐ AE Zone

○ Floodway

○ Non-Encroachment

◉ None ☐ A Zone ◯ Local Setbacks Required ◯ No Local Setbacks Required
If local setbacks are required, list how many feet:
Does proposed channel boundary encroach outside floodway/non-encroachment/setbacks? ◯ Yes ◉ No
Land Acquisition (Check) ☐ State owned (fee simple) ☐ Conservation easment (Design Bid Build) ☑ Conservation Easement (Full Delivery Project) Note: if the project property is state-owned, then all requirements should be addressed to the Department of Administration, State Construction Office (attn: Herbert Neily, (919) 807-4101)
Is community/county participating in the NFIP program? ◉ Yes ◯ No Note: if community is not participating, then all requirements should be addressed to NFIP (attn: State NFIP Engineer, (919) 715-8000)
Name of Local Floodplain Administrator: Berry Gray Phone Number: 919.989.5150 Email: berry.gray@johnstonnc.com

Floodplain Requirements

This section to be filled by designer/applicant following verification with the LFPA

☑ No Action

☐ No Rise

☐ Letter of Map Revision

☑ Conditional Letter of Map Revision (CLOMR)

☐ Other Requirements

List other requirements:
None

Comments: Ecosystem Planning and Restoration contacted Berry Gray on August 24, 2017 by email. Mr. Gray confirmed that since the Mitigation Site is in Zone X and does not include a critical facility, there are no minimum design and construction requirements because it is outside the Special Flood Hazard Area (SFHA) and will not require a subsequent Conditional Letter or Map Revisions (CLOMR) and a Letter of Map Revision (LOMR).

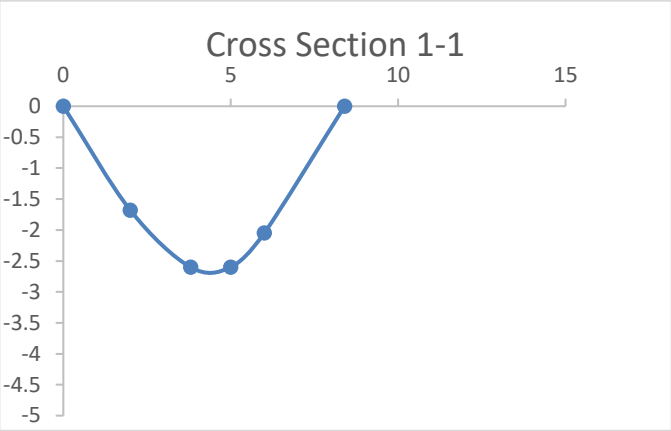
Name: Erin Bennett Signature:

Title: Water Resources Engineer Date: 08/24/17

Appendix 6

Assessment Data

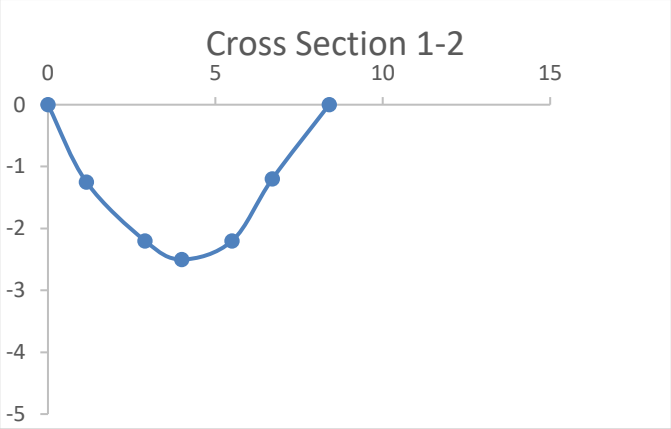
UT 1 Cross Section Summary



Ditch Dimensions

Area = 13.4 ft^2
Width = 8.4 ft
Mean Depth = 1.6 ft

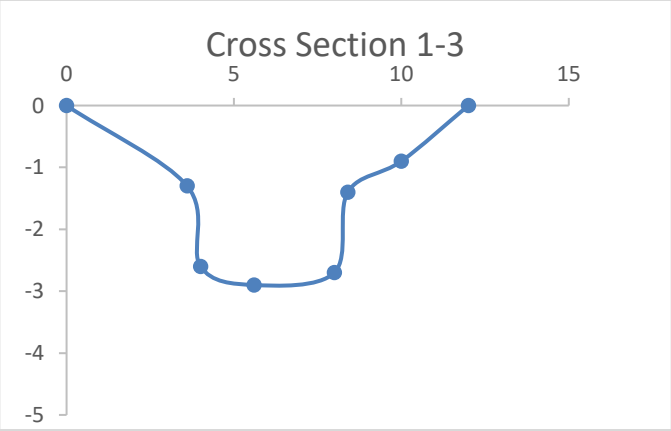
Cross Section 1-1
View facing south toward the start of the ditch



Ditch Dimensions

Area = 12.9 ft^2
Width = 8.4 ft
Mean Depth = 1.54 ft

Cross Section 1-2
View facing north toward the start of the ditch

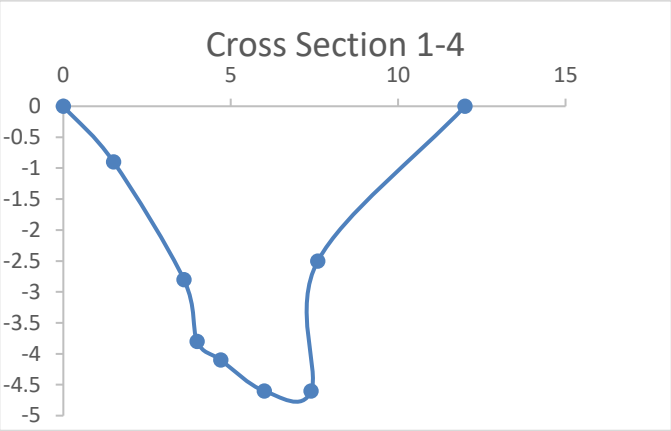


Ditch Dimensions

Area = 17.8 ft^2
Width = 12.0 ft
Mean Depth = 1.48 ft

Cross Section 1-3
View upstream toward Joyner Bridge Road

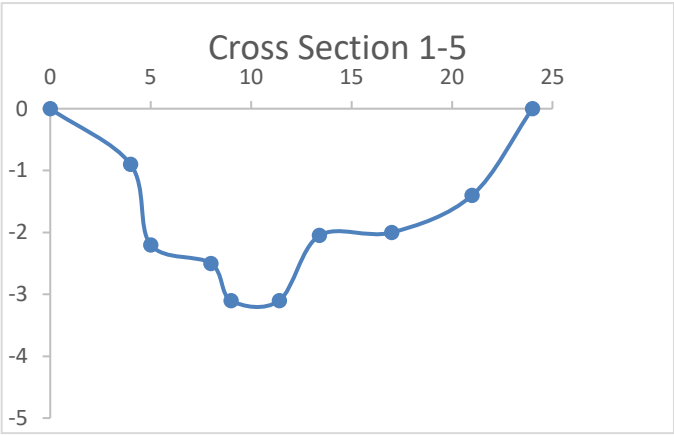
UT 1 Cross Section Summary



Ditch Dimensions

Area = 27.0 ft^2
Width = 12.0 ft
Mean Depth = 2.25 ft

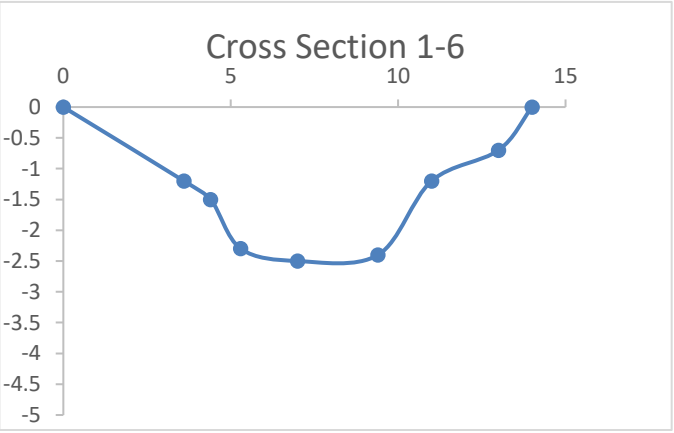
Cross Section 1-4
View upstream toward Joyner Bridge Road



Ditch Dimensions

Area = 42.0 ft^2
Width = 24.0 ft
Mean Depth = 1.75 ft

Cross Section 1-5
View downstream toward farm road and culvert

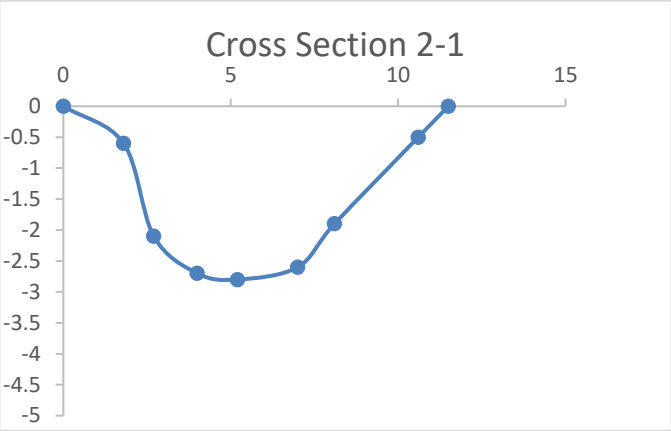


Ditch Dimensions

Area = 20.0 ft^2
Width = 14.0 ft
Mean Depth = 1.43 ft

Cross Section 1-6
View downstream toward farm road and culvert

UT 2 Cross Section Summary

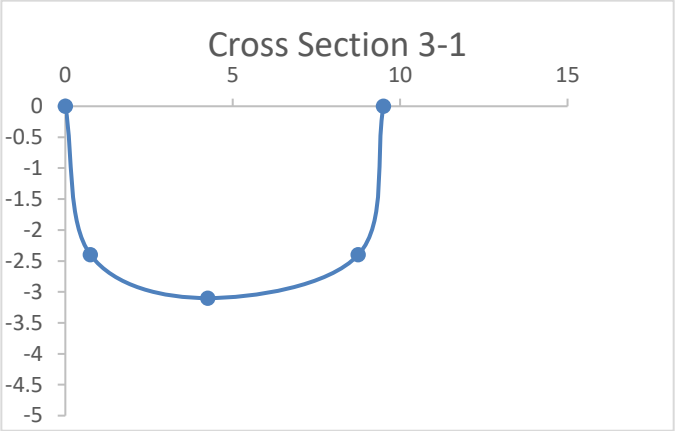


Ditch Dimensions

Area = 18.7 ft^2
Width = 11.5 ft
Mean Depth = 1.63 ft

Upstream of Cross Section 2-1
View downstream along ditch channel and upstream of pond and cross section 2-1

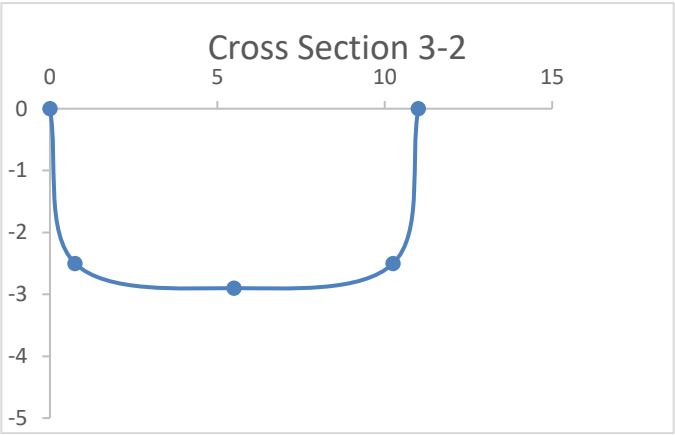
UT 3 Cross Section Summary



Ditch Dimensions

Area = 23.8 ft^2
Width = 9.5 ft
Mean Depth = 2.51 ft

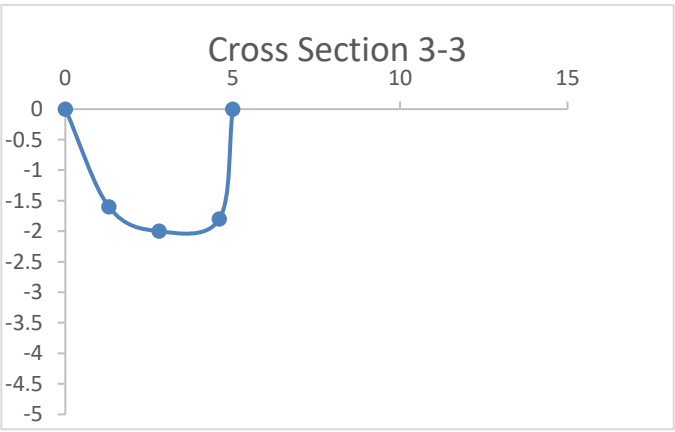
Cross Section 3-1
View north along ditch channel



Ditch Dimensions

Area = 27.5 ft^2
Width = 11.0 ft
Mean Depth = 2.50 ft

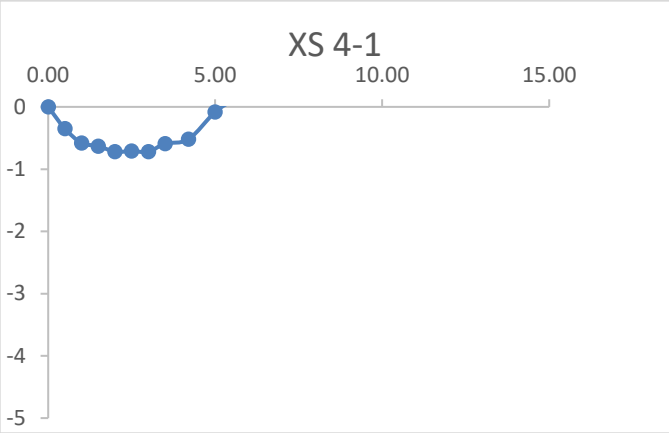
Cross Section 3-2



Ditch Dimensions

Area = 7.5 ft^2
Width = 5.0 ft
Mean Depth = 1.5 ft

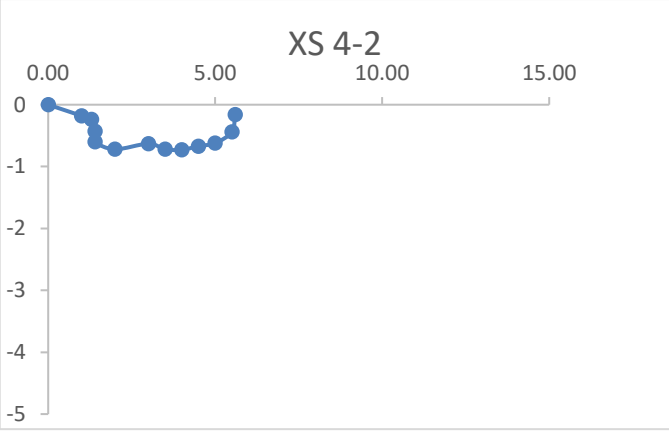
Cross Section 3-3
View northeast along channel near pond



Bankfull Dimensions

Area = 2.6 ft^2
Width = 5.2 ft
Mean Depth = 0.5 ft

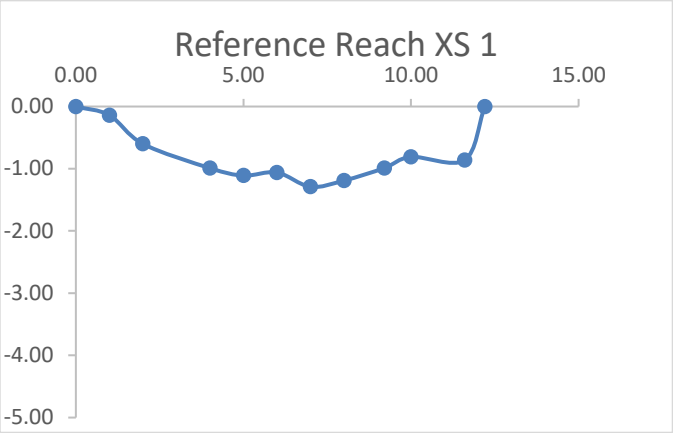
Cross Section 4-1
View downstream



Bankfull Dimensions

Area = 2.1 ft^2
Width = 4.2 ft
Mean Depth = 0.45 ft

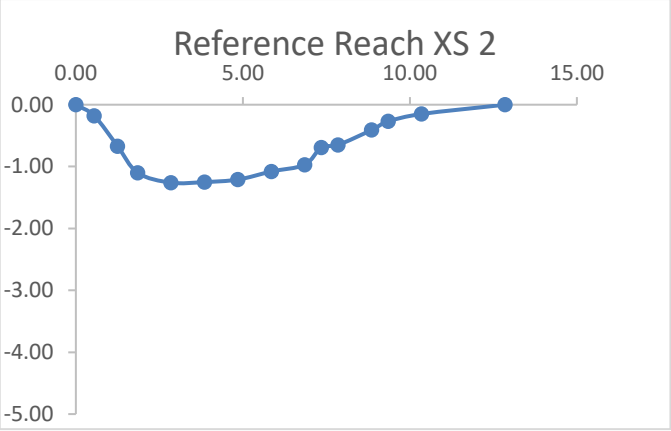
Cross Section 4-2
View downstream



Bankfull Dimensions

Area = 10.2 ft^2
Width = 12.2 ft
Mean Depth = 0.84 ft

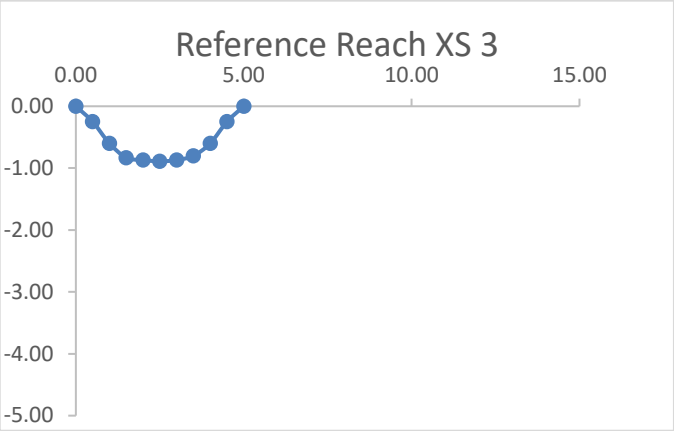
Cross Section 1-Riffle
View downstream



Bankfull Dimensions

Area = 8.6 ft^2
Width = 12.8 ft
Mean Depth = 0.67 ft

Cross Section 2 - Run/Riffle
View downstream



Bankfull Dimensions

Area = 3.0 ft^2
Width = 5.0 ft
Mean Depth = 0.6 ft

Cross Section 3-Riffle
View downstream

Appendix 7

Plan Sheets

Appendix 8

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.

Appendix 9

Credit Release Schedule

Credit Release Schedule

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

Stream Credit Release Schedule and Milestones – 7-year Timeframe			
Monitoring Year	**Credit Release Activity**	**Interim Release**	**Total Released**
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50% (60%*)
3	Third year monitoring report demonstrates performance standards are being met	10%	60% (70%*)
4	Fourth year monitoring report demonstrates performance standards are being met	5%	65% (75%*)
5	Fifth year monitoring report demonstrates performance standards are being met	10%	75% (85%*)
6	Sixth year monitoring report demonstrates performance standards are being met	5%	80% (90%*)
7	Seventh year monitoring report demonstrates performance standards are being met and project has received closeout approval	10%	90% (100%)

***Subsequent Credit Releases**

Wetland Credit Release Schedule and Milestones – 7-year Timeframe			
Monitoring Year	**Credit Release Activity**	**Interim Release**	**Total Released**
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50%
3	Third year monitoring report demonstrates performance standards are being met	15%	65%
4 [A]	Fourth year monitoring report demonstrates performance standards are being met	5%	70%
5	Fifth year monitoring report demonstrates performance standards are being met	15%	85%
6 [A]	Sixth year monitoring report demonstrates performance standards are being met	5%	90%
7	Seventh year monitoring report demonstrates performance standards are being met and project has received closeout approval	10%	100%

[A] – Please note that vegetation plot data may not be required with monitoring reports submitted during these monitoring years unless otherwise required by the Mitigation Plan or directed by the NCIRT.

Initial Allocation of Released Credits

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

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

* Subsequent Credit Releases

All subsequent credit releases must be approved by the DE, in consultation with the IRT, based on a determination that required performance standards have been achieved. For stream projects a reserve of 15% of a site's total stream credits shall be released after two bank-full

events have occurred, in separate years, provided the channel is stable and all other performance standards are met. The reserve will be 10% for 7-year monitoring timeframes. In the event that less than two bank-full events occur during the monitoring period, release of these reserve credits shall be at the discretion of the IRT. As projects approach milestones associated with credit release, the NCEEP 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.

Initial Allocation of Released Credits

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

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

*** Subsequent Credit Releases**

All subsequent credit releases must be approved by the DE, in consultation with the IRT, based on a determination that required performance standards have been achieved. For stream projects a reserve of 15% of a site's total stream credits shall be released after two bank-full events have occurred, in separate years, provided the channel is stable and all other performance standards are met. The reserve will be 10% for 7 year monitoring timeframes. In the event that less than two bank-full events occur during the monitoring period, release of these reserve credits shall be at the discretion of the IRT. As projects approach milestones associated with credit release, the NCEEP 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 10

Land Use Communication between RS and the USACE

Raymond Holz

From: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.Tugwell@usace.army.mil>
Sent: Friday, December 09, 2016 5:23 PM
To: Raymond Holz
Cc: Tim Baumgartner (tim.baumgartner@ncdenr.gov); Crocker, Lindsay; John Preyer
Subject: RE: Alliance Headwaters DMS

Raymond,

After reviewing the information you presented and the technical information from the original proposal, we can agree to the approach you've described, with a few caveats. I would like it to be clear that the total stream credit provided by the streams to the east of Joyner Bridge Road (UT 1&2), which will be credited at a 1.3:1 ratio, cannot result in additional credit beyond the contract amount once sinuosity has been calculated into the project. Additionally, the proposed changes to UT 3 & 4 still need to be reviewed to determine if the channels are present on the site and appropriate for preservation credit.

You also mentioned that RS may be pursuing wetland credit adjacent to the DMS project. This would be a separate proposal that we would need to consider, and as you indicated, we may again have concerns regarding past activities on the site with any new proposal. Lastly, keep in mind that there are a number of issues that come up anytime you have two adjacent projects like this that have different sponsors. Concerns come up about potential conflicts such as responsibility for performance failures, financial assurances, and long-term management of the sites. Just something to keep in mind moving forward.

Please let me know if you have any other questions.

Todd Tugwell
Special Projects Manager
Wilmington District, US Army Corps of Engineers
3331 Heritage Trade Drive
Suite 105
Wake Forest, North Carolina 27587
Office: 919-554-4884 ext 58

-----Original Message-----
From: Raymond Holz [mailto:rholz@restorationsystems.com]
Sent: Tuesday, November 29, 2016 3:40 PM
To: Tugwell, Todd J CIV USARMY CESAW (US) <Todd.Tugwell@usace.army.mil>
Subject: [EXTERNAL] RE: Alliance Headwaters DMS

Todd -

Following up on a voicemail I left you before the break, I had EPR pull together two figures relevant to your questions below, a project map w/ existing ditch flow direction and a LiDAR map of the upper portion of UT-2 (see attached). When you have a chance, please give me a call on my cell and we can discuss the questions raised in your last e-mail - 919-604-9314.

Thank you for time,

Raymond H.

----- ------ ------
Raymond J. Holz | Restoration Systems, LLC
1101 Haynes St. Suite 211 | Raleigh, NC 27604
tel: 919.334.9122 | cell: 919.604.9314 | fax: 919.755.9492
email: rholz@restorationsystems.com

-----Original Message-----
From: Tugwell, Todd J CIV USARMY CESAW (US) [mailto:Todd.Tugwell@usace.army.mil]
Sent: Wednesday, November 09, 2016 3:50 PM
To: Raymond Holz <rholz@restorationsystems.com>
Cc: John Preyer <jpreyer@restorationsystems.com>; Baumgartner, Tim <tim.baumgartner@ncdenr.gov>; Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>
Subject: RE: Alliance Headwaters DMS

Raymond,
I have taken a look at the information you submitted. The addition of easement on the western tract seems to be independent to the issues related to the stream credit within areas that are potentially in violation. Were acquiring these a requirement of reaching a settlement with the landowner? Also, can you give an estimate of how much additional mitigation credit you would propose for preserving the headwater features?

With regard to the ratios on UT's 1 & 2, east of Joyner Road, it appears that the location of the proposed easement for UT 2 has totally shifted from what was presented in the original submittal. What is the reason behind this? Would this increase the creditable length of stream restoration in this area? How did you get to the 453 SMU reduction?

Thanks,
Todd

-----Original Message-----
From: Raymond Holz [mailto:rholz@restorationsystems.com]
Sent: Monday, November 07, 2016 12:22 PM
To: Tugwell, Todd SAW <Todd.Tugwell@usace.army.mil>
Cc: John Preyer <jpreyer@restorationsystems.com>; Baumgartner, Tim <tim.baumgartner@ncdenr.gov>; Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>
Subject: [EXTERNAL] RE: Alliance Headwaters DMS

Todd -

Please find attached two maps overviewing alterations to the proposed conservation easement at Alliance Headwaters. RS has been able to negotiate with the landowner on expanding the preservation portion of the easement from 3.6 acres to 10 acres, preserving all headwater features on-site. RS had EPR preform additional survey work to insure we were including all features and adjacent wetlands. Credit for these preserved streams, is contingent on an IRT site visit during the mitigation plan review as discussed at the 5-24 meeting and detailed in the attached notes. Regardless of credit approval, the proposed preservation acreage will remain a part of the project.

In conjuncture with the added preservation acreage attributed to the project (6.4 acres), RS proposes a 1.3:1 mitigation ratio on UT's 1 and 2, east of Joyner Bridge Road as a resolution to any violation concern on the property. Using the attached design, this would equate to a 453 SMU reduction. We appreciate your review and consideration of our proposal to resolve this issue. If you have any questions, please do not hesitate to contact me directly at 919-604-9314.

Sincerely,
Raymond H.

--- ------ ------
Raymond J. Holz | Restoration Systems, LLC
1101 Haynes St. Suite 211 | Raleigh, NC 27604
tel: 919.334.9122 | cell: 919.604.9314 | fax: 919.755.9492
email: rholz@restorationsystems.com

-----Original Message-----
From: Tugwell, Todd SAW [mailto:Todd.Tugwell@usace.army.mil]
Sent: Thursday, September 29, 2016 11:14 AM
To: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Raymond Holz <rholz@restorationsystems.com>
Cc: Baumgartner, Tim <tim.baumgartner@ncdenr.gov>; John Preyer <jpreyer@restorationsystems.com>; Hughes, Andrea W SAW <Andrea.W.Hughes@usace.army.mil>; Wicker, Henry M JR SAW <Henry.M.Wicker.JR@usace.army.mil>
Subject: RE: Alliance Headwaters DMS

Lindsay/Raymond,
I apologize for the delay in this. We spoke internally today about this site, and the situation in general. As you know, our main concern is approving a site for mitigation where the activity that led to the degradation in the first place was in violation with Clean Water Act regulations in place at the time of the activity. There are obviously many factors that make each circumstance unique, but to the extent that we can, we try to apply the same standards to all situations.

In the case of Alliance, we have already concurred that tract 1226 can move forward based on the information you submitted that included a non-wetland determination made by USDA, which we agreed to at the time (even though it appears that the site did contain wetlands at the time). As for tract 4344, located east of Joyner Bridge Road, we have no evidence that such a determination was made by USDA, though they did provide a letter stating that they currently consider the tract to be in full compliance. Unfortunately this does not address our regulations, and a review of aerial photographs indicates that there were definitely streams on the property and almost certainly wetlands, that were ditched and filled without receiving required permit authorizations. We also note that this was probably done by the prior owner of the land, most likely just before the land was purchased by Mr. Lee, the current owner. This is obviously very concerning for us.

In trying to decide how to proceed in this circumstance, I have considered what potential actions we may take on the property if it were not used for a mitigation site. In some past cases, we have pursued enforcement actions instead of allowing the site to be used for mitigation, but this is a bit different because the facts are less clear, USDA has indicated they would not pursue any violation, and the property ownership has changed. We have also had situations where we have set up agreements with the sponsor where the mitigation work conducted within the area where the violation occurred was approved, but at lower credit value to account for the fact that the activity that led to the property being a potential mitigation site in the first place was not in compliance with our regulations. In this case, I think the easiest way we will see the site restored is by allowing the mitigation to go forward, which would probably lead to the best environmental outcome. That said, would DMS and RS consider a slightly reduced mitigation ratio for the restoration work conducted on Tract 4344? I believe the streams in the that tract are proposed for restoration at a 1:1 ratio. If we agree to a 1.5:1 ratio instead, which would also resolve any concern with the violation, would that be acceptable?

Thanks,

Todd Tugwell
Special Projects Manager
Wilmington District, US Army Corps of Engineers
3331 Heritage Trade Drive

Suite 105
Wake Forest, North Carolina 27587
Office: 919-554-4884 ext 58

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-----Original Message-----
From: Crocker, Lindsay [mailto:Lindsay.Crocker@ncdenr.gov]
Sent: Tuesday, September 27, 2016 2:56 PM
To: Raymond Holz <rholz@restorationsystems.com>; Tugwell, Todd SAW <Todd.Tugwell@usace.army.mil>
Cc: Baumgartner, Tim <tim.baumgartner@ncdenr.gov>; John Preyer <jpreyer@restorationsystems.com>; Hughes, Andrea W SAW <Andrea.W.Hughes@usace.army.mil>; Wicker, Henry M JR SAW <Henry.M.Wicker.JR@usace.army.mil>
Subject: [EXTERNAL] RE: Alliance Headwaters DMS

Todd,

I left you a vm, but just checking back in on this. We are currently past a number of contract deadlines, and need your decision to move this one forward.

Please advise.

Hope you are well,
LC

Lindsay Crocker
NC DEQ Division of Mitigation Services
217 West Jones St.
Raleigh, NC 27603
Office 919.707.8944
Cell 919.594.3910
lindsay.crocker@ncdenr.gov

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties unless the content is exempt by statute or other regulation.

-----Original Message-----
From: Raymond Holz [mailto:rholz@restorationsystems.com]
Sent: Monday, August 29, 2016 12:59 PM
To: Tugwell, Todd SAW <Todd.Tugwell@usace.army.mil>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Baumgartner, Tim <tim.baumgartner@ncdenr.gov>; John Preyer <jpreyer@restorationsystems.com>; Hughes, Andrea W SAW <Andrea.W.Hughes@usace.army.mil>; Wicker, Henry M JR SAW <Henry.M.Wicker.JR@usace.army.mil>
Subject: RE: Alliance Headwaters DMS

Todd -

Thank you for the update. I have one last piece of information I would like to pass along regarding the timeline of ownership and the clearing.

Attached is a June -1997 Timber Deed between Massengill Jr. and the Weyerhaeuser Company. Attachment A of the Deed is a sketch of the "Sale Area" which aligns with the area of question and reflects that the clearing of the land occurred prior to the purchase by Mr. Lee. The Attachment A sketch is a little difficult to orient but the corner of SR - 1188 and SR. 1231 is the corner of today's Joyner Bridge Rd. and Old Williams Rd.

Again, just passing along everything I have uncovered. Look forward to hearing back from you by the end of the week. Thanks for the time,

Raymond H.

--- --- ---

Raymond J. Holz | Restoration Systems, LLC
1101 Haynes St. Suite 211 | Raleigh, NC 27604
tel: 919.334.9122 | cell: 919.604.9314 | fax: 919.755.9492
email: rholz@restorationsystems.com

-----Original Message-----
From: Tugwell, Todd SAW [mailto:Todd.Tugwell@usace.army.mil]
Sent: Friday, August 26, 2016 1:50 PM
To: Raymond Holz <rholz@restorationsystems.com>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Tim Baumgartner (tim.baumgartner@ncdenr.gov) <tim.baumgartner@ncdenr.gov>; John Preyer <jpreyer@restorationsystems.com>; Hughes, Andrea W SAW <Andrea.W.Hughes@usace.army.mil>; Wicker, Henry M JR SAW <Henry.M.Wicker.JR@usace.army.mil>
Subject: RE: Alliance Headwaters DMS

Raymond,

I have looked over the information, including the letter from the FSA office. To me the letter is clear that the USDA does not consider the tract in question to be in violation. Nevertheless, I am still trying to deal with the fact that the available historic aerials still show that there were clearly jurisdictional areas, including streams and wetlands, that were in the process of being ditched/filled as late as February 21, 1999. It is not clear if the work was complete when Mr. Lee purchased the land five months later on July 6, 1999. Regardless, the regulations in place at the time would have required a permit authorization for these activities. The fact that FSA does not consider this to be a violation now (as there was no decision on this at the time) does not change the fact that permits were required for these actions.

I am going to bring this up with Henry & Scott and see how they would like to move forward. I am concerned about approving any site as a mitigation site that is a past (potentially on-going) violation, regardless of whether we end up pursuing a violation on the site or not. I don't feel it's appropriate for landowners to benefit from past violations of our own rules, and doing so could also incentivize such actions in the future.

I'll bring this up ASAP and let you know by the end of next week.

Todd Tugwell
Special Projects Manager
Wilmington District, US Army Corps of Engineers
3331 Heritage Trade Drive
Suite 105
Wake Forest, North Carolina 27587
Office: 919-554-4884 ext 58

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-----Original Message-----
From: Raymond Holz [mailto:rholz@restorationsystems.com]
Sent: Thursday, August 11, 2016 4:38 PM
To: Tugwell, Todd SAW <Todd.Tugwell@usace.army.mil>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Tim Baumgartner (tim.baumgartner@ncdenr.gov) <tim.baumgartner@ncdenr.gov>; John Preyer <jpreyer@restorationsystems.com>
Subject: [EXTERNAL] RE: Alliance Headwaters DMS

Todd -

As discussed on the phone earlier today, I have additional information and correspondence from the Johnston County FSA regarding the eastern parcel of land of our proposed Alliance Headwaters Mitigation Site (Johnston County FSA Farm Number 22612, Tract 4344). As detailed below, current owner Frank Lee was not the owner of Tract 4344 at the time of timbering and clearing.

When we met on May 24th, it was agreed that RS would work with the landowner and the Johnston County NRCS and FSA offices to provide a letter re: Tract 4344 currently being in and having been in regulatory compliance; and providing assurance that the timbering and clearing of the parcel for agricultural purposes between February 1993 and March of 1998 had been done with proper regulatory approval.

At our May meeting, RS had located and provided paperwork dated November 18 1997 from Mr. York, the Johnston County District Conservationist, regarding the western parcel of our proposed project which was also logged during the same time period (Johnston County FSA Farm Number 12610, Tract 1226). The paperwork from Mr. York stated, "The wooded area noted in blue is non-wetland and has no restrictions for agricultural use." It was our assumption at the time of our May meeting that Mr. Lee owned both Tracts of land during the clearing (since he owns them both now), and that he requested a delineation be performed on Tract 4344 as he had on Tract 1226, and the paperwork from Tract 4344 had been lost.

Since then, further research has determined that Mr. Lee was not the owner of Tract 4344 during the time of timbering and clearing. Attachment D, is the Warranty Deed from the sale of the parcel from Raymond A Massengill, Jr. to William Frank Lee on July 6th 1999. I have gone back to both the Johnston County FSA and NRCS office to have them re-search their records for correspondence with Mr. Massengill but as suspected, this paperwork could still not be found. This did not surprise FSA and NRCS staff as their records are organized by tract number and not name. Both FSA and NRCS have told me the paperwork on this parcel is simply lost.

Although historical written documentation could not be located, The Johnston County FSA office was able to provide Mr. Lee with a letter which definitively states that the subject tract is in full compliance and no violations are known - Attachment C. If prior or current violations existed, FSA would not make such a statement.

Feel free to call me at 919-604-9314 to discuss further. I appreciate the time and talk soon,

Raymond Holz

Attachments
A.) Figures
- Overview
- Current Ownership Map

B.) Historical Aerial Imagery Overview 1993, 1998, & 1999

C.) Letter from Johnston County FSA Office Regarding Tract 4344
D.) Warranty Deed Regarding Sale of Western Parcel - Tract 4344
E.) Johnston County FSA Farm Number 12610, Tract 1226 Paperwork from Mr. York

--- ------ ------
Raymond J. Holz | Restoration Systems, LLC
1101 Haynes St. Suite 211 | Raleigh, NC 27604
tel: 919.334.9122 | cell: 919.604.9314 | fax: 919.755.9492
email: rholz@restorationsystems.com

-----Original Message-----
From: Raymond Holz
Sent: Thursday, July 07, 2016 1:50 PM
To: 'Tugwell, Todd SAW' <Todd.Tugwell@usace.army.mil>; Tim Baumgartner (tim.baumgartner@ncdenr.gov) <tim.baumgartner@ncdenr.gov>
Cc: Mac Haupt (mac.haupt@ncdenr.gov) <mac.haupt@ncdenr.gov>; Jeff Schaffer (jeff.schaffer@ncdenr.gov) <jeff.schaffer@ncdenr.gov>; Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>
Subject: RE: Martin Dairy & Alliance Headwaters

Todd - your recollection of our May 24th meeting is correct and RS along with Mr. Lee (property owner) are in the process of getting a letter from NRCS/FSA. Attached are the notes not only from our May 24th meeting but the post award site visit on April 8th. Please feel free to add to them as you or anyone on the IRT see fit. I can be reached at 919.604.9314 if there are any questions.

Thanks,
Raymond H.

--- ------ ------
Raymond J. Holz | Restoration Systems, LLC
1101 Haynes St. Suite 211 | Raleigh, NC 27604
tel: 919.334.9122 | cell: 919.604.9314 | fax: 919.755.9492
email: rholz@restorationsystems.com

-----Original Message-----
From: Tugwell, Todd SAW [mailto:Todd.Tugwell@usace.army.mil]
Sent: Thursday, July 07, 2016 12:37 PM
To: Tim Baumgartner (tim.baumgartner@ncdenr.gov) <tim.baumgartner@ncdenr.gov>
Cc: Mac Haupt (mac.haupt@ncdenr.gov) <mac.haupt@ncdenr.gov>; Jeff Schaffer (jeff.schaffer@ncdenr.gov) <jeff.schaffer@ncdenr.gov>; Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Raymond Holz <rholz@restorationsystems.com>
Subject: Martin Dairy & Alliance Headwaters

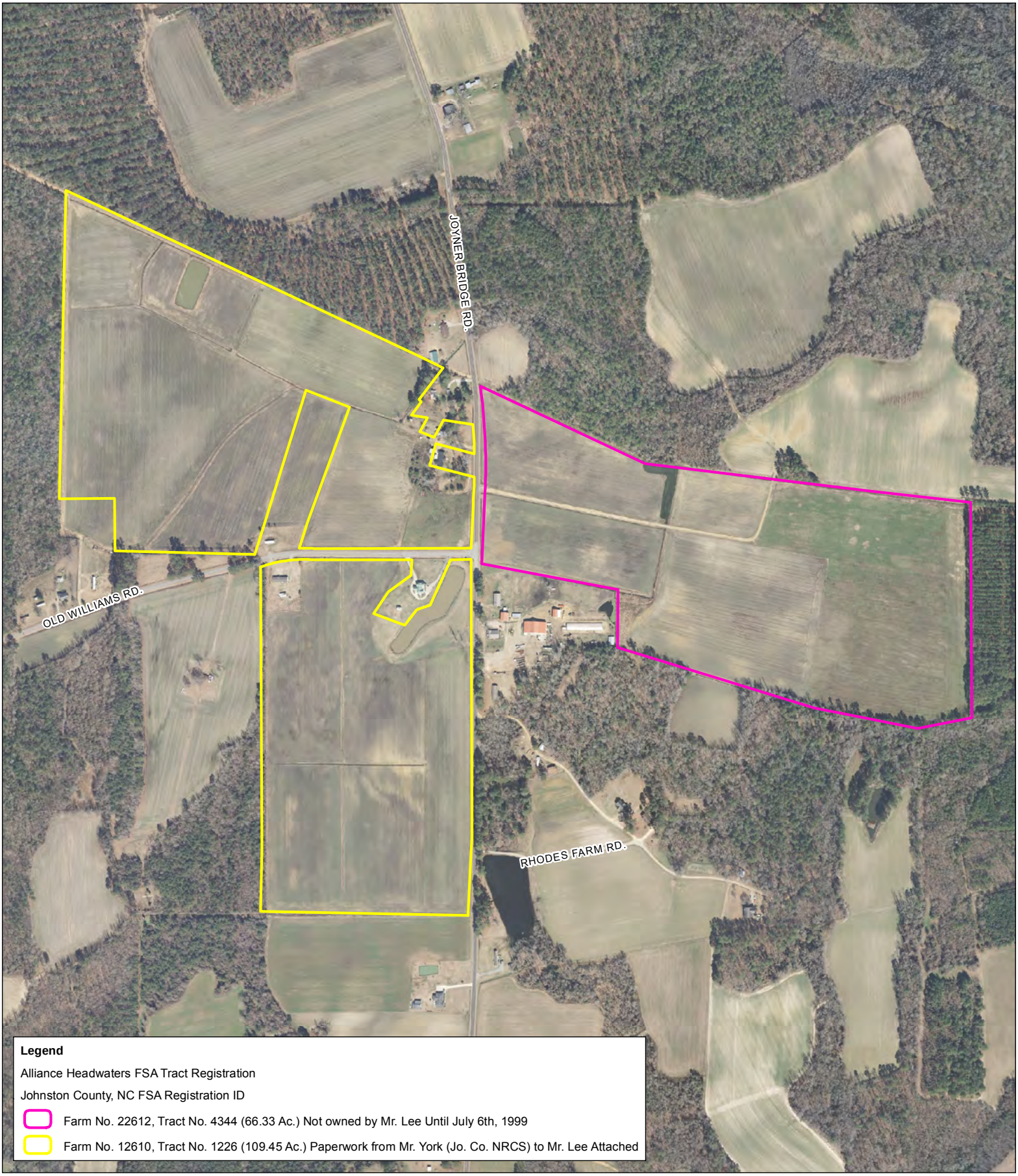
Tim,
Also to follow up on the other Neuse 01 sites not covered in my last email, we met to discuss Alliance Headwaters on May 24th, and as I recall, RS is trying to track down more info from NRCS for the stream on the east side of Joyner Bridge Road, but we concurred with the NRCS determination for the remainder of the site. Let me know if your recollections are different.

Lastly, for Martin Dairy, we received the notes and had no further comment on those.

Thanks,

Todd Tugwell
Special Projects Manager
Wilmington District, US Army Corps of Engineers
3331 Heritage Trade Drive
Suite 105
Wake Forest, North Carolina 27587
Office: 919-554-4884 ext 58

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at our website at BlockedBlockedBlockedBlockedhttp://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0 to complete the survey online.



Legend

Alliance Headwaters FSA Tract Registration

Johnston County, NC FSA Registration ID

Farm No. 22612, Tract No. 4344 (66.33 Ac.) Not owned by Mr. Lee Until July 6th, 1999

Farm No. 12610, Tract No. 1226 (109.45 Ac.) Paperwork from Mr. York (Jo. Co. NRCS) to Mr. Lee Attached

RESTORATION SYSTEMS, LLC
1101 HAYNES ST, SUITE 211
RALEIGH, NC 27604
PHONE : 919.755.9490
FAX : 919.755.9492

SCALE: 1 in = 667 ft

DATE: 9 - 2017

SITE: R-04 004

ATTACHMENT A - OVERVIEW FIGURE

Feet
0 150 300 600 900 1,200

Aerial Imagery: (c) ESRI
Coordinate System:
NAD_1983_SP_NC_FIPS_3200_Ft.

USDA

United States Department of Agriculture

Farm
Service
Agency

Johnston County
FSA Office

2736 NC Highway
210 Suite C
Smithfield, NC 27577
Ph. 919-934-7156 Ext. 2

July 6, 2016

William Frank Lee
M&B Lee LLC
PO BOX 148
Smithfield, NC 27577

Dear Mr. Lee

This letter is in response to your request concerning Farm # 22612 Tract # 4344 that is administered by the Johnston County FSA Office . Our records indicate that the tract is owned by M & B Lee LLC. Our records show that Tract # 4344 is currently in compliance and has no violations that we are aware of.

Sincerely,

Matthew Brandon Ellis
County Executive Director
Johnston County Farm Service Agency

Tract 477 Continued ...

NOTES

Tract Number : 4344

Description : M14/1B
BIA Unit Range Number :
HEL Status : HEL determinations not completed for all fields on the tract
Wetland Status : Tract does not contain a wetland
WL Violations : None
Owners : M & B LEE LLC
Other Producers : LEWIS BRIAN LEE, CHRISTOPHER MARCUS LEE

FAV/WR History : Yes

Tract Land Data

Farm Land	Cropland	DCP Cropland	WBP	WRP	CRP	GRP	Sugarcane
67.55	63.21	63.21	0.00	0.00	0.00	0.00	0.00

State Conservation	Other Conservation	Effective DCP Cropland	Double Cropped	MPL	EWP	DCP Ag. Related Activity
0.00	0.00	63.21	0.00	0.00	0.00	0.00

DCP Crop Data

Crop Name	Base Acres	CCC-505 CRP Reduction Acres	CTAP Yield	PLC Yield
Wheat	4.20	0.00	0	35
Corn	5.10	0.00	0	66
Soybeans	7.70	0.00	0	29
TOTAL	17.00	0.00		

NOTES

Tract Number : 15333

Description : M14/1B
BIA Unit Range Number :
HEL Status : HEL determinations not completed for all fields on the tract
Wetland Status : Tract contains a wetland or farmed wetland
WL Violations : None
Owners : WILLIAM FRANK LEE
Other Producers : CHRISTOPHER MARCUS LEE, LEWIS BRIAN LEE

FAV/WR History : Yes

Tract Land Data

Farm Land	Cropland	DCP Cropland	WBP	WRP	CRP	GRP	Sugarcane
2.45	1.99	1.99	0.00	0.00	0.00	0.00	0.00

State Conservation	Other Conservation	Effective DCP Cropland	Double Cropped	MPL	EWP	DCP Ag. Related Activity
0.00	0.00	1.99	0.00	0.00	0.00	0.00

DCP Crop Data

Crop Name	Base Acres	CCC-505 CRP Reduction Acres	CTAP Yield	PLC Yield

Warranty Deed Massengill, Jr. to William Frank Lee:. 7-6-99

BOOK 1847 PAGE 559

20755

JOHNSTON COUNTY NC 07/09/1999
$140.00
STATE OF NORTH CAROLINA
Real Estate Excise Tax

State of North Carolina, Johnston Co.
Filed for Registration at 3:20P M.
July 9 1999 in the
Register of Deeds Office
Recorded in Book 1847 Page 559
Phyllis N. Wall
Register of Deeds
By Donna B. Stallings Deputy

Excise Tax $ 140.00

Recording Time, Book and Page

Tax Lot No. Parcel Identifier No. 02K15024
Verified by County on the day of
by

Mail after recording to Grantee

This instrument was prepared by Hinton, Hewett & Wood, P.A., 1329 C-1 N. Brightleaf Blvd., Smithfield, NC 27577

Brief description for the Index 66.33 acres Bentonville township

NORTH CAROLINA GENERAL WARRANTY DEED

THIS DEED made this 6th day of July, 1999, by and between

GRANTOR	GRANTEE
Raymond A. Massengill, Jr. and wife, Jean B. Massengill	William Frank Lee, individually 104 East Wilson Street Smithfield, NC 27577

Enter in appropriate block for each party: name, address, and, if appropriate, character of entity, e.g. corporation or partnership.

The designation 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, that the Grantor, for a valuable consideration paid by the Grantee, the receipt of which is hereby acknowledged, has and by these presents does grant, bargain, sell and convey unto the Grantee in fee simple, all that certain lot or parcel of land situated in the City of , Bentonville Township, Johnston County, North Carolina and more particularly described as follows:

See Exhibit "A" attached hereto and incorporated herein by reference as if fully set forth herein.

The property hereinabove described was acquired by Grantor by instrument recorded in .....

.....

A map showing the above described property is recorded in Plat Book ..... page.....

TO HAVE AND TO HOLD the aforesaid lot or parcel of land and all privileges and appurtenances thereto belonging to the Grantee in fee simple.

And the Grantor covenants with the Grantee, that Grantor is seized of the premises in fee simple, has the right to convey the same in fee simple, that title is marketable and free and clear of all encumbrances, and that Grantor will warrant and defend the title against the lawful claims of all persons whomsoever except for the exceptions hereinafter stated.
Title to the property hereinabove described is subject to the following exceptions:
General utility easements, restrictions and right of ways of record.

IN WITNESS WHEREOF, the Grantor has hereunto set his hand and seal, or if corporate, has caused this instrument to be signed in its corporate name by its duly authorized officers and its seal to be hereunto affixed by authority of its Board of Directors, the day and year first above written.

(Corporate Name)

By: ----------

----------President

ATTEST:

----------Secretary (Corporate Seal)

USE BLACK INK ONLY

Raymond A. Massengill, Jr. ----------(SEAL)

Jean B. Massengill ----------(SEAL)

----------(SEAL)

----------(SEAL)

SEAL-STAMP

TRACY H. PERRY NOTARY PUBLIC JOHNSTON COUNTY, N.C.

Use Black Ink

NORTH CAROLINA, Johnston County.

I, a Notary Public of the County and State aforesaid, certify that Raymond A. Massengill, Jr. and wife, Jean B. Massengill ---------- Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument. Witness my hand and official stamp or seal, this 6th day of July 1999.

My commission expires: 8-2-2000 Tracy H. Perry Notary Public

SEAL-STAMP

Use Black Ink

NORTH CAROLINA, ----------County.

I, a Notary Public of the County and State aforesaid, certify that ----------, personally came before me this day and acknowledged that ---- he is ---------- Secretary of ---------- a North Carolina corporation, and that by authority duly given and as the act of the corporation, the foregoing instrument was signed in its name by its ---------- President, sealed with its corporate seal and attested by ---------- as its ---------- Secretary. Witness my hand and official stamp or seal, this ----------day of ----------.

My commission expires: ---------- ---------- Notary Public

The foregoing Certificate(s) of Tracy H. Perry NP

---

is/are certified to be correct. This instrument and this certificate are duly registered at the date and time and in the Book and Page shown on the first page hereof.

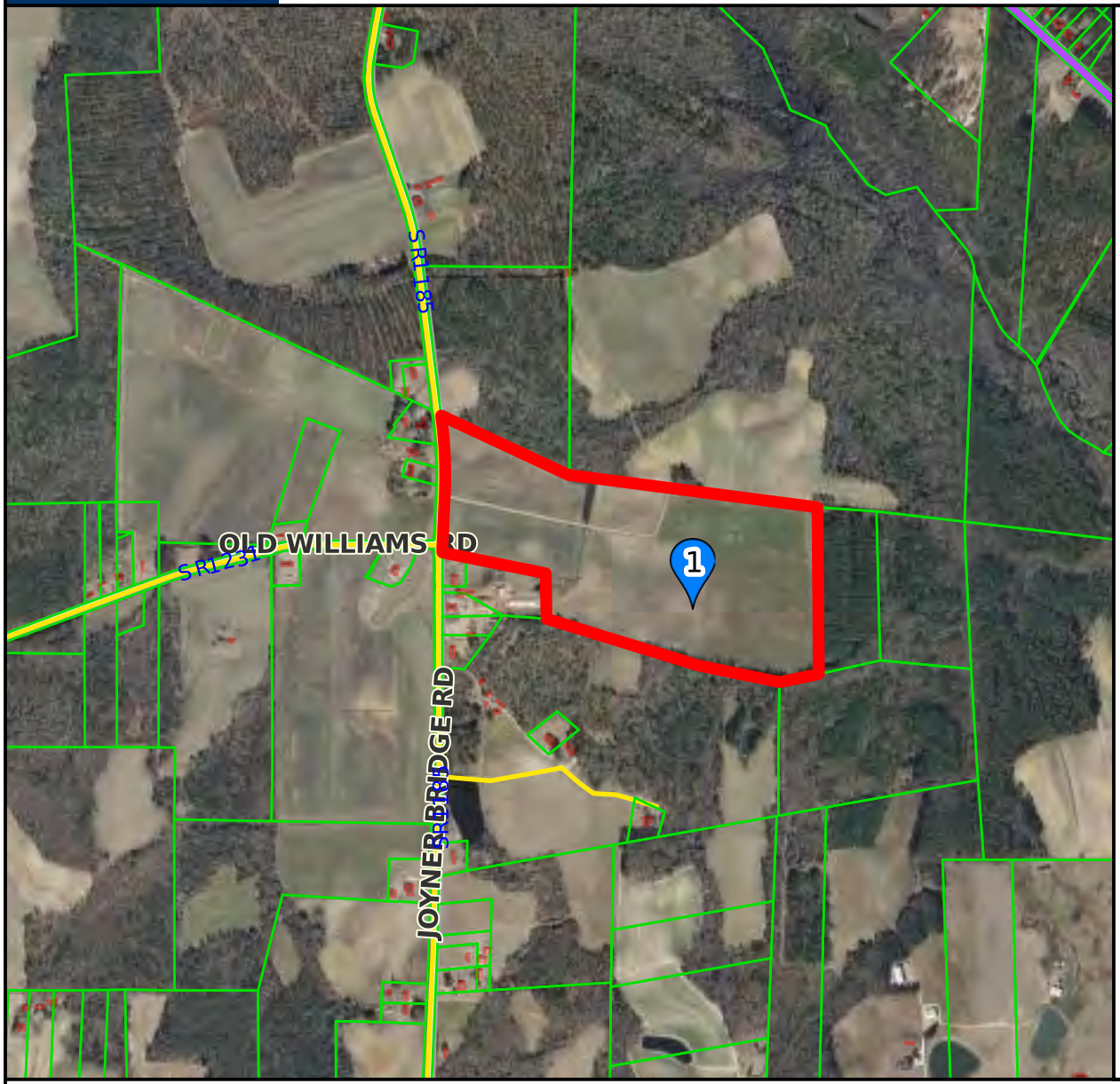
Phyllis N. Wall ----------REGISTER OF DEEDS FOR Johnston ----------COUNTY

By Sonia S. Stallings ----------Deputy ~~Assistant~~ Register of Deeds

Prc. $ 2.00
Reg. $ 10.00
Stamp $ 140.00

***** DISCLAIMER *****

Johnston County assumes no legal responsibility for the information represented here.



Result 1

id:	02K15024
Tag:	02K15024
Tax Unique Id:	4337608
NCPin:	159900-81-4425
Mapsheet No:	1599
Owner Name 1:	M AND B LEE LLC
Owner Name 2:	
Mail Address 1:	
Mail Address 2:	P O BOX 148
Mail Address 3:	SMITHFIELD, NC 27577-0000
Site Address 1:	
Site Address 2:	
Book:	03507
Page:	0060
Market Value:	208750
Assessed Acreage:	63.82
Calc. Acreage:	63.82
Sales Price:	0
Sale Date:	2008-03-06

Scale: 1:14171 - 1 in. = 1180.94 feet

(The scale is only accurate when printed landscape on a 8 1/2 x 11 size sheet with no page scaling.)

Johnston County GIS
August 11, 2016

Timber Deed: 06-10-1997 Between Weyerhaeuser & Massengill, Jr.

BOOK 1607 PAGE 408

13057

STATE OF NORTH CAROLINA

COUNTY OF JOHNSTON

THIS TIMBER DEED, Made and entered into this 10 day of June, 1997, by and between Raymond A. Massengill, Jr. and wife, Jean B. Massengill, parties of the first part, and Weyerhaeuser Company, a corporation of the State of Washington, and duly authorized to do business in the State of North Carolina, whose address is Post Office Box 1391, New Bern, North Carolina 28560, party of the second part;

W I T N E S S E T H:

That the said parties of the first part, for and in consideration of the sum of TEN AND NO/100 ($10.00) DOLLARS, and other good and valuable considerations to them in hand paid, by the party of the second part, the receipt of which is hereby acknowledged, have agreed as set out hereinafter, bargained and sold and by these presents do agree as set out hereinafter, bargain, sell and convey to the party of the second part, its successors and assigns, all trees and timber as hereinafter defined, lying or standing upon those certain tracts or parcels of land lying and being in Bentonville Township, Johnston County, State of North Carolina, and being more particularly described as follows:

Mail to:
PREPARED BY:
T. R. THOMPSON, JR.
ATTORNEY AT LAW
AURORA, NORTH CAROLINA
PO Box 308
27806

The trees and timber conveyed by this timber deed are located on a portion of the following described property:

BEGINNING at an iron stake in the centerline of NCSR 1185, said iron stake cornering with property owned by the Bizzell heirs, thence leaving said NCSR 1185 and along the line of the Bizzell Heirs South 62 degrees 30 minutes East 990 feet to a stake in the run of a branch cornering with

the property of Hattie Massengill; thence along the Massengill line South 79 degrees 10 minutes East 1,733 feet to a stake at the bend of a ditch in the property line of Gerald Rhodes; thence along the Rhodes line South 04 degrees West 1,162 feet to a stake in a ditch, a corner with Lloyd Rhodes, thence along the Rhodes line South 83 degrees West 278 feet; thence North 76 degrees 30 minutes West 573 feet; thence along property owned now or formerly by Wadsworth North 70 degrees West 1,100 feet to a stake in pointers; thence North 02 degrees 30 minutes East 300 feet to a stake on the north side of a branch; thence North 75 degrees West 760 feet to a point in the centerline of NCSR 1885, thence with the centerline North 03 degrees 445 feet to an iron stake; thence continuing North 02 degrees East 503.25 feet to the point and place of BEGINNING, containing 66.33 acres, more or less, and being Tracts 10 and 11 of the Land Division for Raymond A. Massengill, according to plat prepared by Dennis R. Blackmon, RLS, dated January 6, 1988, reference to the same being herein made for a more complete and accurate description.

The property heretofore described was devised to Raymond A. Massengill, Jr. by Raymond A. Massengill.

The trees and timber conveyed by this timber deed are all of the trees and timber located within the Sale Area as shown on the attached sketch. The attached sketch is identified as Exhibit "A".

This conveyance is made subject to and together with the following provisions:

This deed shall cover and include all trees and timber of every sort, kind or character, now standing or lying upon said land, but shall not include any shade trees within six (6') feet of any dwelling house upon said property, or any shade trees marked with white paint around any outdwellings.

All trees and timber which are cut and removed from said land shall be cut and removed therefrom on or before June 18, 1998.

Party of the second part shall have the right to remove from said land all of the laps, tops and slabs of the timber cut

PREPARED BY:
T. R. THOMPSON, JR.
ATTORNEY AT LAW
AURORA, NORTH CAROLINA

by it, provided the same are removed from said land on or before June 18. 1998.

For the purpose of cutting, milling, and removing said timber, party of the second part shall have the right at such locations as it may elect, to erect and maintain upon said lands saw mills, stables, and other buildings which it may consider necessary and shall have the right to remove the same at any time on or before ninety (90) days after the date of expiration of the term of this deed or any extension thereof.

For the purpose of cutting, milling and removing said timber, party of the second part shall have the right at such location as it may elect to open and maintain roadways leading to the public highway, but shall so far as is reasonably convenient use for such purposes, roadways already opened. The parties of the first part do hereby grant to the party of the second part a thirty (30') foot easement around the edges of the cleared land for the purposes of fulfilling the purposes of this timber deed.

All roads, ditches, drainways, or fences as now located on the premises herein described will be left in as good or better condition at the end of this contract as they were upon the date of the execution of same if damaged by the party of the second part, its servants, agents, employees, contractors or assigns.

The parties of the first part agree that the party of the second part shall have no ad valorem tax liability hereby.

The party of the second part and its employees shall at all times exercise reasonable care to minimize and reduce the hazard of fire.

PREPARED BY:
T. R. THOMPSON, JR.
ATTORNEY AT LAW
AURORA, NORTH CAROLINA

The parties of the first part agree that the boundary lines of the property on which said trees and timber is to be cut have been shown to the agents of the party of the second part; and, should any dispute arise concerning timber and trees cut under this timber deed within the area defined and described hereinabove, or should any dispute involving access, either in general or across any specific rights-of-way herein described or described on the sketch attached hereto, upon demand by the party of the second part, the parties of the first part agree that they will in each and every respect defend any disputed cutting of timber and trees as set out herein or access rights at their sole cost and expense, and will undertake to settle any dispute in the most expeditious manner, and that such defense will be made upon the demand of the party of the second part. The period of time from any such dispute arising until such dispute is resolved shall be added to the length of time given to cut the trees and timber pursuant to the provisions of this timber deed so that the party of the second part can cut the timber and trees after the dispute has been resolved. Further, if the dispute has not been resolved to the satisfaction of the party of the second part within six (6) months, the party of the second part, at its option, may demand the refund of the purchase price. The parties of the first part agree to refund to the party of the second part the value of the trees, timber, and pulpwood, located within the disputed area. The values will be those used by the party of the second part in purchasing the trees, timber, and pulpwood and the refund will be paid to the party of the second part within ten (10) days

PREPARED BY:
T. R. THOMPSON, JR.
ATTORNEY AT LAW
AURORA, NORTH CAROLINA

following written notice. The amount to be paid may be determined by an Arbitration Board as hereinafter provided.

In the event the logging operations of the party of the second part are prevented on all of the premises due to governmental regulation of any type, then, in such event, the parties of the first part shall refund to the party of the second part, in cash, the purchase price of the timber, trees and pulpwood. In the event the logging operations of the party of the second part are prevented on a portion of the premises for such reason, then, in such event the parties of the first part shall immediately refund to the party of the second part a portion of the purchase price of the timber, trees and pulpwood. The amount to be refunded shall be based upon the portion of the timber, trees and pulpwood which cannot be cut for such reason and shall be paid in cash. The amount to be paid shall be determined by an arbitration board constituted as hereinafter provided.

The arbitration board shall consist of three members. Each party shall select an arbitrator and a third arbitrator shall be selected by the first two arbitrators. The two arbitrators must be selected by the parties within thirty days after either party has requested arbitration. The arbitrators must reach an agreement within thirty days after the appointment of an arbitrator by the two parties. Arbitration shall be performed in accordance with Article 45A of Chapter 1 of the General Statutes of North Carolina and the cost of arbitration shall be equally divided between the parties.

PREPARED BY:
T. R. THOMPSON, JR.
ATTORNEY AT LAW
AURORA, NORTH CAROLINA

TO HAVE AND TO HOLD the said trees and timber, together with the rights and privileges hereinabove set out to it, the said party of the second part, and its successors and assigns, in fee simple forever.

And the said parties of the first part, do covenant to and with the said party of the second part, its successors and assigns, that they are seized of said timber and the lands upon which it is situated in fee simple, and have the right to convey the same, that the same is free and clear of all encumbrances and that they will warrant and defend the title herein conveyed against the lawful claims of all persons whomsoever.

IN TESTIMONY WHEREOF, the said parties of the first part, have hereunto set their hands and have adopted as their seals the typewritten word "SEAL" appearing beside their names, this the day and year first above written.

Raymond A. Massengill, Jr. (SEAL)

Jean B. Massengill (SEAL)

PREPARED BY:
T. R. THOMPSON, JR.
ATTORNEY AT LAW
AURORA, NORTH CAROLINA

STATE OF North Carolina

COUNTY OF Johnston

I, Nadine W. Rhodes, a Notary Public, do hereby certify that Raymond A. Massengill, Jr. personally appeared before me this day and acknowledged the due execution of the foregoing instrument for the uses and purposes therein expressed.

Witness my hand and notarial seal, this 10th day of June, 1997.

Nadine W. Rhodes
Notary Public

NADINE W. RHODES NOTARY PUBLIC (SEAL) JOHNSON COUNTY, N.C.

My Commission Expires:

March 8, 2002

PREPARED BY:
T. R. THOMPSON, JR.
ATTORNEY AT LAW
AURORA, NORTH CAROLINA

STATE OF North Carolina

COUNTY OF Johnston

I, Nadine W. Rhodes, a Notary Public, do hereby certify that Jean B. Massengill personally appeared before me this day and acknowledged the due execution of the foregoing instrument for the uses and purposes therein expressed.

Witness my hand and notarial seal, this 10th day of June, 1997.

Nadine W. Rhodes
Notary Public

My Commission Expires:
March 8, 2002

NADINE W. RHODES NOTARY PUBLIC JOHNSON COUNTY, N.C. (SEAL)

State of North Carolina-Johnston County
The foregoing certificate(s) of Nadine W Rhodes
Notary(Notaries) Public is(are) certified to be correct.
This instrument was presented for registration and recorded
in Book 1607 Page 408
This June 10 1997 at 3:50 pm
Phyllis N. Wall Register of Deeds
by Donna S Stallings Deputy Register of Deeds

PREPARED BY:
T. R. THOMPSON, JR.
ATTORNEY AT LAW
AURORA, NORTH CAROLINA

BOOK 1607 PAGE 416

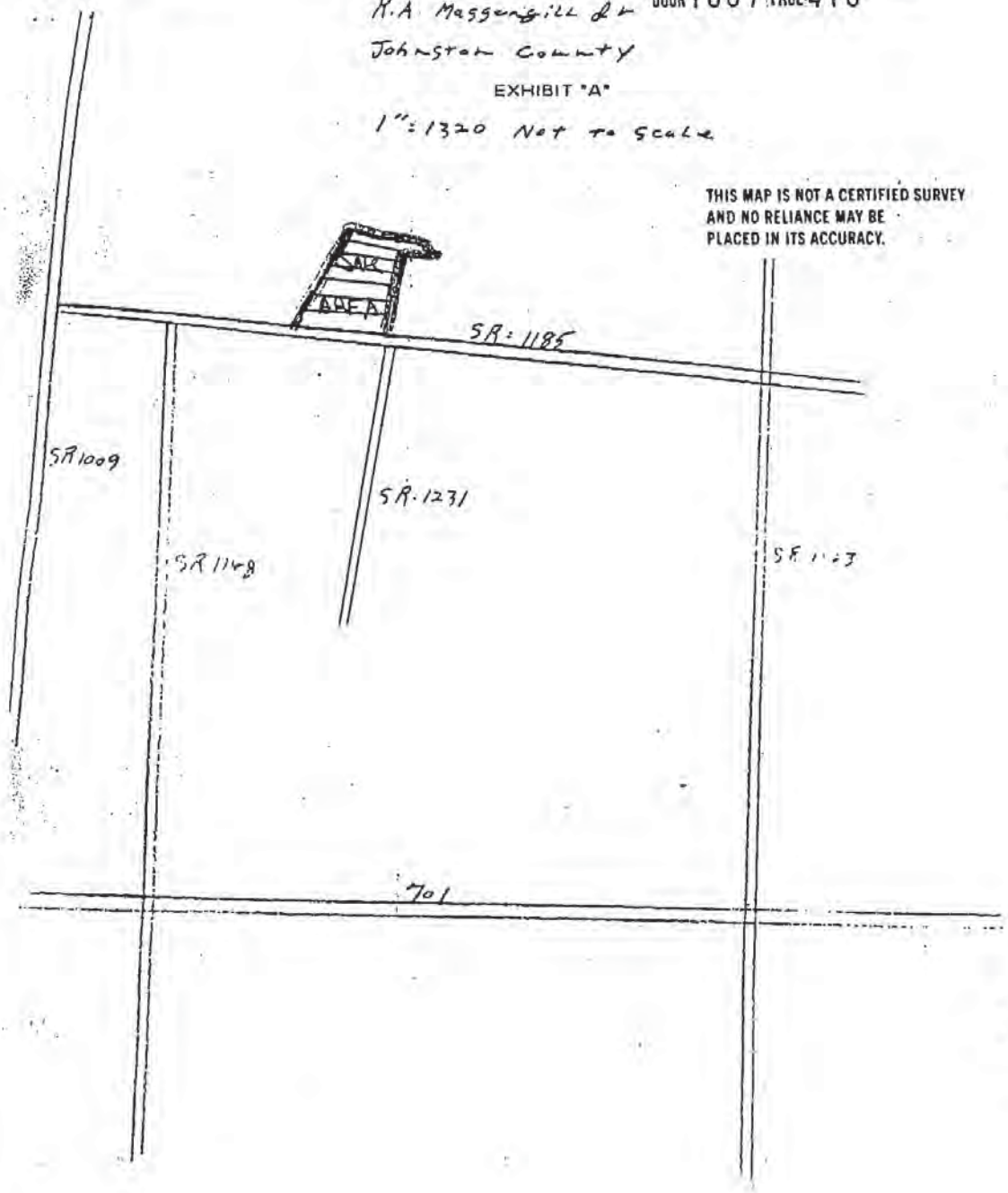
R.A Maggengill et al

Johnston County

EXHIBIT "A"

1" = 1320 Not to Scale

THIS MAP IS NOT A CERTIFIED SURVEY AND NO RELIANCE MAY BE PLACED IN ITS ACCURACY.



USDA
NATURAL RESOURCES CONSERVATION SERVICE
806 NORTH STREET
SMITHFIELD, NC 27577-9998
TELEPHONE 919-989-5381

November 18, 1997

Jean Manuele
US Army Corps of Engineers
6508 Falls of the Neuse Rd.
Suite 120
Raleigh, NC 27615-6846

Dear Jean:

Enclosed is a concurrence form, AD-1026, aerial photo, USGS topo maps, soil maps and wetland data forms for tract 1226 owned by William Frank Lee.

The tract is shown partly on the Four Oaks NE Quad and partly on the Newton Grove North Quad. Drainage is into two unnamed tributaries of Hannah Creek.

Mr. Lee plans to clear this land for pasture and/or row crops.

The majority of the tract is mapped as Lynchburg and Goldsboro. One area of Leaf that I checked looked more like Lynchburg than Leaf.

Please review. If you agree with this determination, please sign and return the concurrence form.

If you have any questions, please call me at 919-989-5381.

Thanks.

Kenneth C. York

Kenneth C. York
District Conservationist

enclosure

USDA
NATURAL RESOURCES CONSERVATION SERVICE
806 NORTH STREET
SMITHFIELD, NC 27577-9998
TELEPHONE 919-989-5381

NRCS Correspondence on Tract 1226

February 20, 1998

Mr. Frank Lee
104 East Wilson Street
Smithfield, NC 27577

Dear Frank:

Hers is your copy of the wetland determination for tract 1226.

All of the wooded area noted in blue is non-wetland and has no restrictions for agricultural use.

I'm sorry it has taken so long to get official documents, but I am required to send all wetland determinations to the US Army Corps of Engineers for their concurrence. If they do not send me a signed form within 45 days, my determination is considered certified.

In this case, they did not respond. If you have any questions, please call me at 919/989-5381.

Sincerely,

Kenneth C. York

Kenneth C. York
District Conservationist

enclosure

REQUEST FOR CERTIFIED WETLAND DETERMINATION/DELINEATION

(use when the client requests a certified determination/delineation)

OWNER	AGENT - (OPERATOR)
Name: FRANK LEE	Name:
Address: 104 E. WILSON STREET	Address:
SMITHFIELD, NC 27577	
Phone: 919-934-4932	Phone:

Are you a USDA program Participant? (If yes, AD-1026 should be on file.) ☑ Yes ☐ No

Have you previously received a wetland determination or delineation on this tract from the Natural Resources Conservation Service *(formerly Soil Conservation Service)* or the Corps of Engineers? ☐ Yes ☑ No

Location of property (description): FARM IS LOCATED ON SR 1185 APPROXIMATELY 1.5 MILES OFF US 701 S.

County: JOHNSTON State: NC

Farm No.: 12610 Tract No.: 1226 Acres in tract 100 ☑ Map or aerial photo with the tract/area outlined

PURPOSE OF REQUEST FOR DETERMINATION/DELINEATION *(Check one and explain)*

☑ Agricultural purpose(s): CLEAR FOR PASTURE
(Such as: clearing for cropland, drainage, farm buildings, etc.)

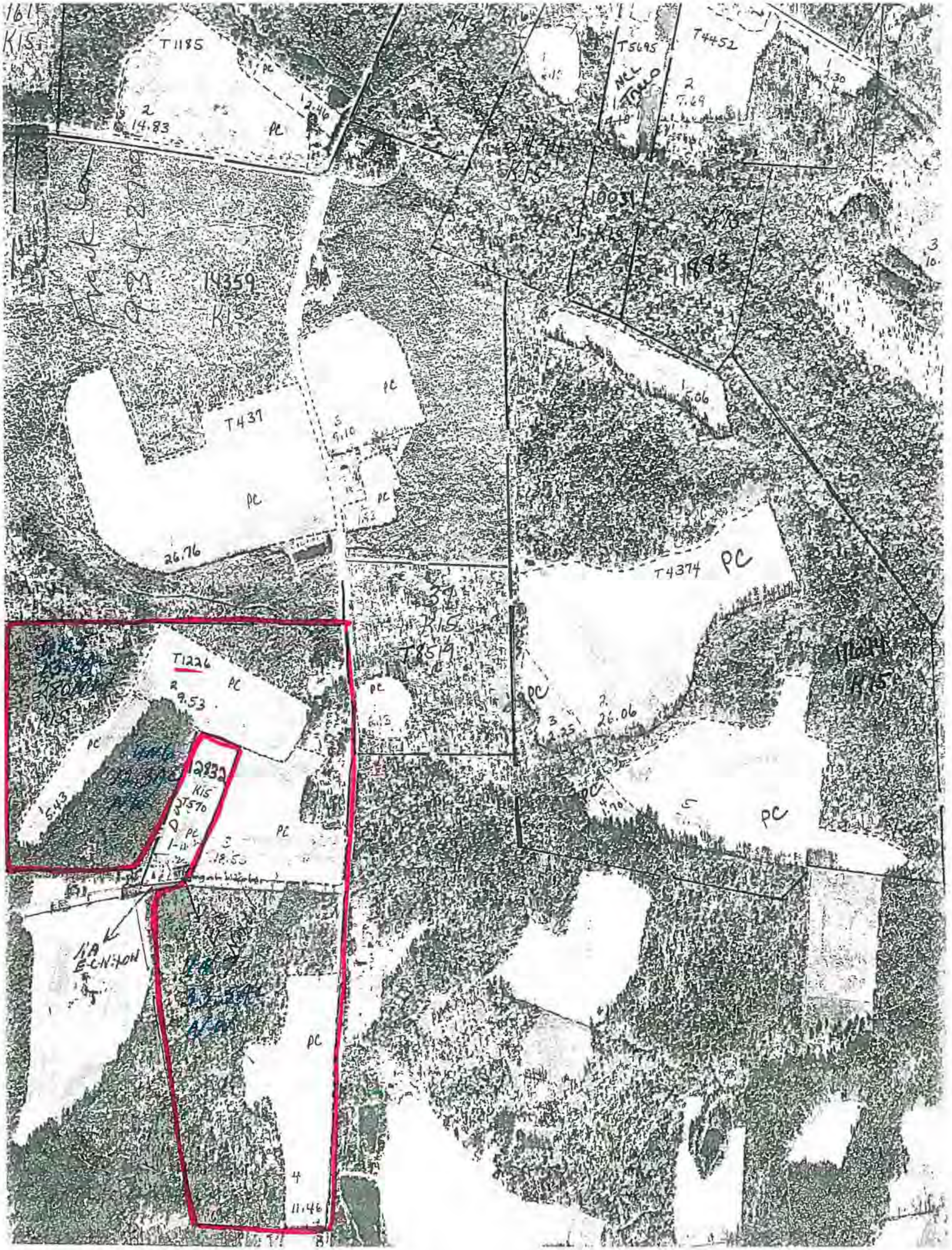
☐ Non-Agricultural purpose(s): _____
(Such as: commercial development, subdivisions, etc.)

☐ Informational purpose(s): _____

- I certify that I am the owner or agent of the owner for the property previously described.
- I grant the Natural Resources Conservation Service *(or their designated agents)* the right to enter the property previously described to ascertain the extent of wetlands on said property.
- I understand that the information collected and the certified wetland determination/delineation is public information and may be released to the public or utilized in any of the agencies' data bases, or published on official wetland maps.

Signature of Owner:	Date:
X W. Lee	11-6-97
Signature of Agent: *(As authorized by the owner)*	Date:

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.



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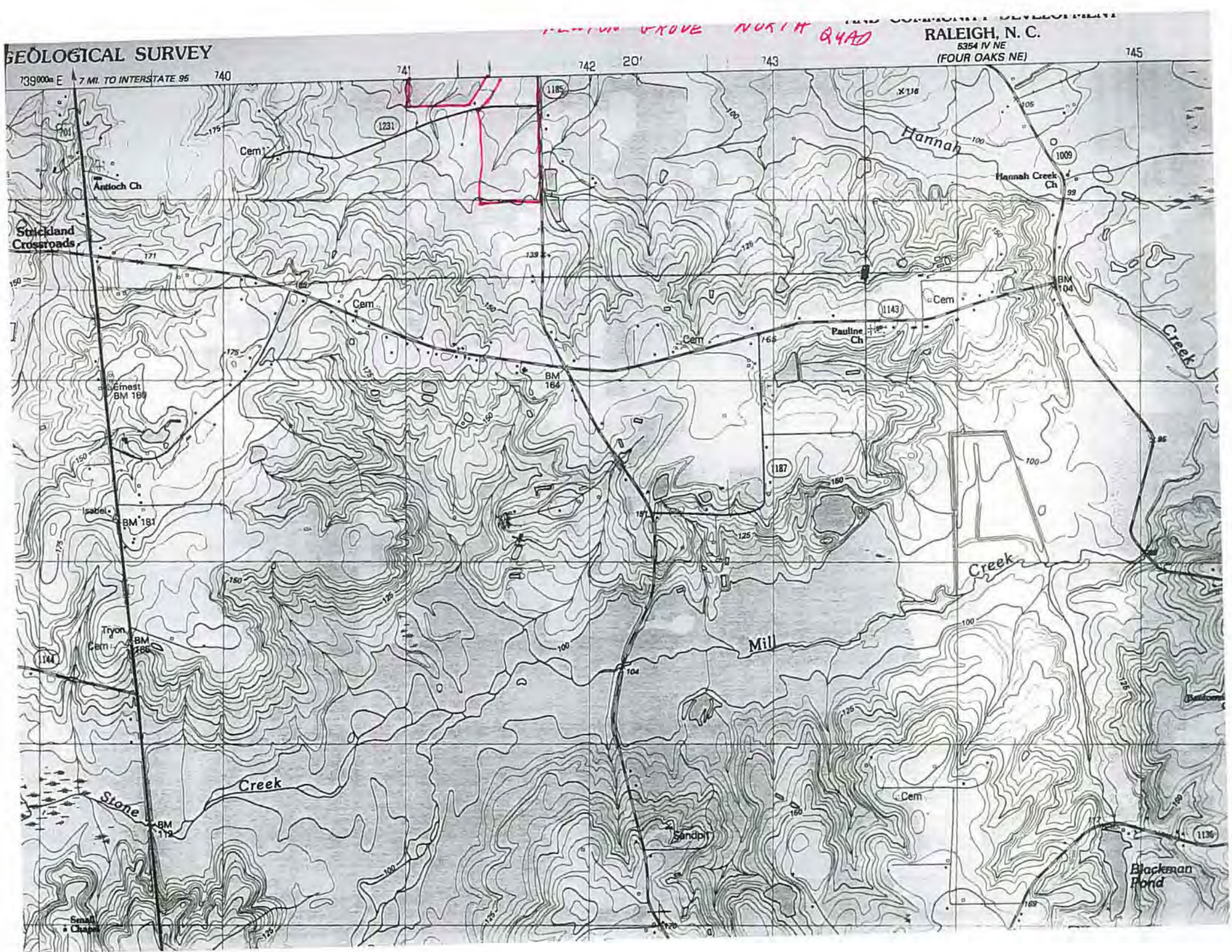
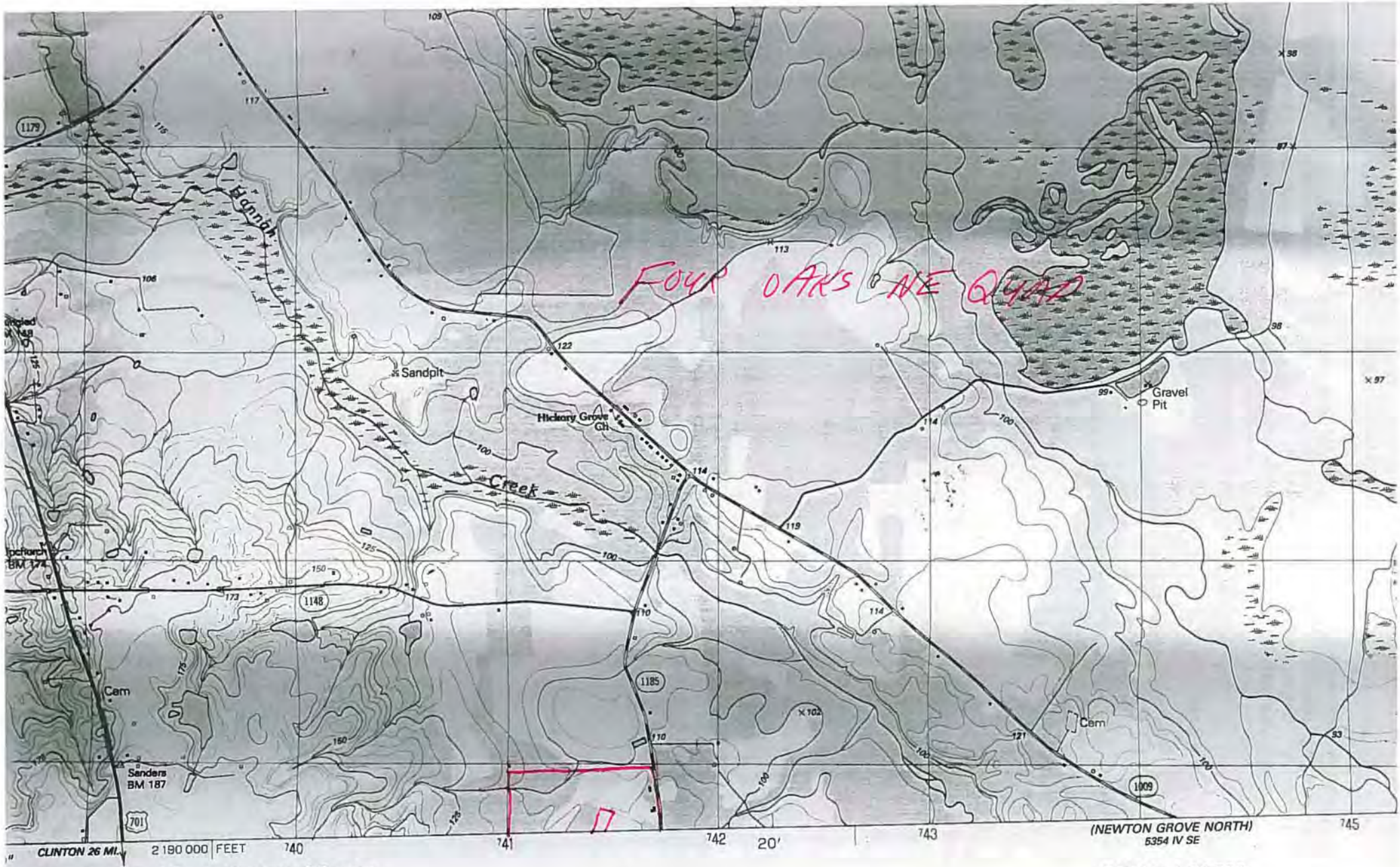

GEOLOGICAL SURVEY
RALEIGH, N. C.
5354 IV NE
(FOUR OAKS NE)
7 MI. TO INTERSTATE 95
Antioch Ch
Strickland Crossroads
Cem
Ernest BM 189
BM 164
Pauline Ch
Hannah Creek Ch
Hannah Creek
BM 104
Isabel
BM 181
Tryon Cem
BM 185
Mill Creek
Stone Creek
BM 172
Sandpit
Small Chapel
Blackman Pond



duced by the United States Geological Survey
ooperation with North Carolina Department of
ural Resources and Community Development
rol by USGS, NOS/NOAA, and USCE
graphy by photogrammetric methods from aerial photographs
n 1981. Field checked 1982. Map edited 1986
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MN GN
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1000 0 METERS 1000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Site 1, Tract 1226 Applicant/Owner: William Frank Lee Investigator: Kenneth C. York	Date: 11/17/97 County: Johnston State: North Carolina
Do Normal Circumstances exist on the site? (x)Yes ( ) No Is the site significantly disturbed (Atypical Situation)? ( )Yes (x) No Is the area a potential Problem Area? ( )Yes (x) No (If needed, explain on reverse.)	Community ID: Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.Liquidambar Styraciflua	Tree	FAC+	9.Athyrium Filix-femia	Herb	FAC
2.Quercus Nigra	Tree	FAC	10.		
3.Acer Rubrum	Tree	FACW	11.		
4.Persea Borbonia	Shrub	FACW	12.		
5.Liquidambar Styraciflua	Shrub	FAC+	13.		
6.Quercus Nigra	Shrub	FAC	14.		
7.Panicum Amarum	Herb	FAC	15.		
8.Smilax Rotundifolia	Herb	FAC	16		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 9/9=100%

Remarks:

HYDROLOGY

___Recorded Data (Describe in Remarks): ___Stream, Lake or Tide Gauge ___Aerial Photographs ___Other _x_No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: ___Inundated ___Saturated in Upper 12 Inches ___Water Marks ___Drift Lines ___Sediment Deposits ___Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ___Oxidized Root Channels in Upper 12 Inches ___Water-Stained Leaves _x_Local Soil Survey Data ___FAC-Neutral Test ___Other (explain in Remarks)
Field Observations: Depth of Surface Water: _____(in.) Depth to Free Water in Pit: _____(in.) Depth to Saturated Soil: _____(in.)	

Remarks: Some pockets of water were standing in stump holes and depressions but soil was not saturated at 12 inch depth. Determination was made on the third day after a 2 inch rain.

SOILS

Map Unit Name
(Series and Phase): Lynchburg
Drainage Class: Somewhat Poorly Drained

Taxonomy (Subgroup): ~~Paleaquults~~ AERIC PALEAQUULTS

Field Observations
Confirm Mapped Type? (x) Yes (_) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-6	A	10YR/3/1			Sandy Loam
6-15	B	10YR/5/4	10YR/6/2	Comm/Dist	Sandy Clay Loam

Hydric Soil Indicators:

___Histosol
___Histic Epipedon
___Sulfidic Odor
___Aquic Moisture Regime
___Reducing Conditions
___Gleyed or Lo-Chroma Colors
___Concretions
___High Organic Content in Surface Layer in Sandy Soils
___Organic Streaking in Sandy Soils
_x_Listed on Local Hydric Soils List
___Listed on National Hydric Soils List
___Other (Explain in Remarks)

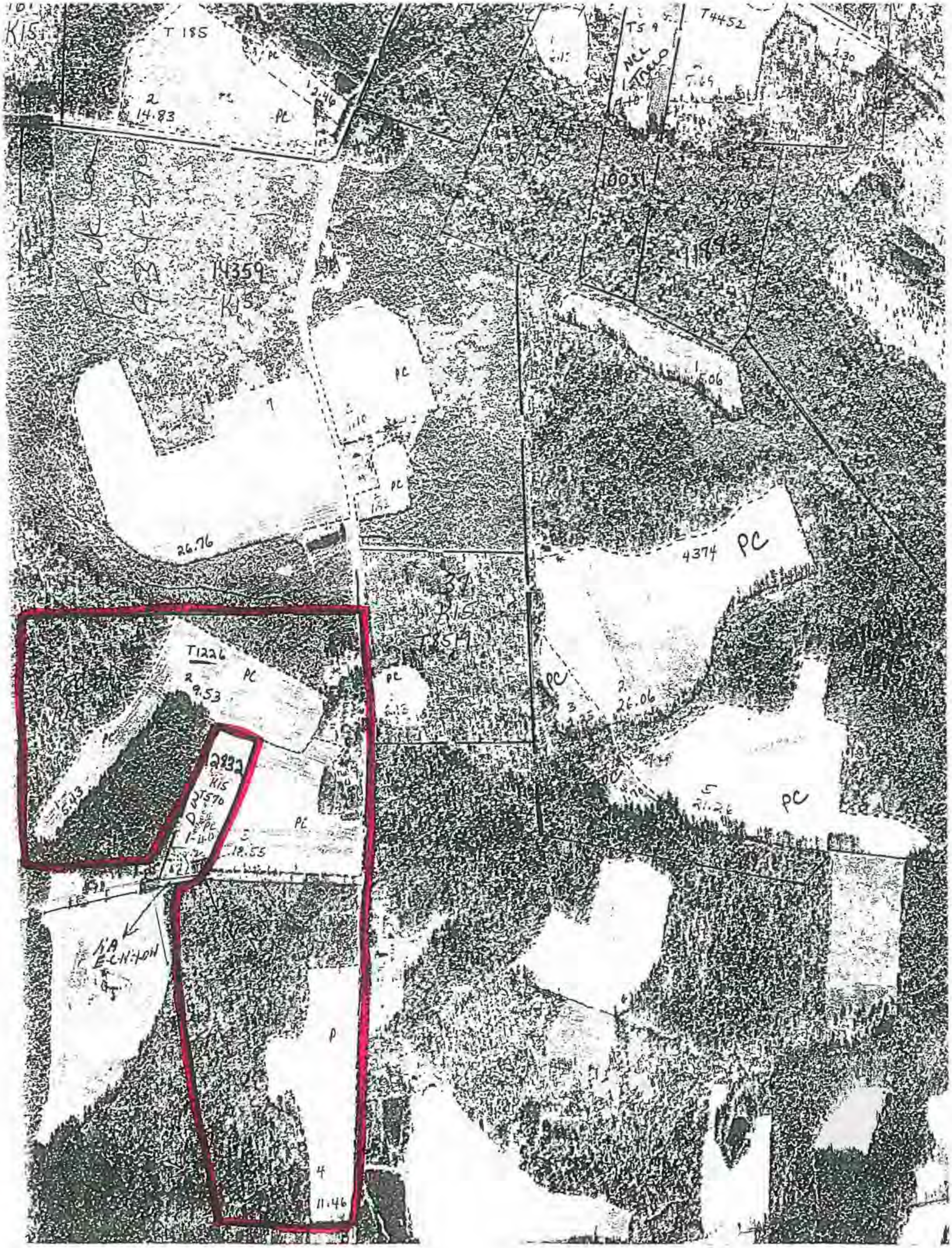
Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (x) Yes (_) No (Circle)
Wetland Hydrology Present? (_) Yes (x) No
Hydric Soils Present? (_) Yes (x) No

(Circle)
Is this Sampling Point Within a Wetland?
(_)Yes (x)No

Remarks:



T 185
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4374 PC
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PC
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KIS
19.55
2
26.06
5
21.26
PC
4
11.46

May 26, 2017

Corps Action ID# SAW-2016-00882

Ms. Browning,

I am an adjacent land owner of one of the mitigation sites off Joyner Bridge Road in Johnston County. It appears that my property will be greatly affected by the amount of water discharged onto my property. This letter is advising that I would like a set of construction plans showing width, depth and potential CFS of water discharged onto my property.

I am sure if this project is approved there will be other concerns pertaining to my property.

Sincerely,

JC Rhodes

Appendix 11

Financial Assurance

Financial Assurances

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

As required by RFP # 16-006476, upon approval by the DMS of the 'Final Draft' Mitigation Plan, Restoration Systems will provide financial assurance in one of the following forms:

1. **Performance Bonding** – The contractor must provide security in the form of acceptable performance bonds as described in the following paragraph to guarantee delivery of the maximum number of originally contracted credits. The performance bonds must be obtained from a company licensed in North Carolina as shown in the Federal Treasury Listing of Approved Sureties (Circular 570). The maximum allowable amount provided by a surety may not exceed the "underwriting limitation" for the surety as identified in the Federal Treasury Listing. Although this RFP is a request for mitigation and not construction, the performance bonds shall follow the prescribed wording provided in N.C.G.S. § 44A-33. The contractor must provide two performance bonds.

   The first bond must be for 100% of the total value of the contract and must be in effect and submitted with the Task 3 deliverable before NCDMS will authorize payment for that deliverable. The bond must remain in effect until the contractor has received written notification from the NCDMS that the requirements of Task 6 (submittal of baseline monitoring report) have been met **(the financial assurance document must indicate that it is in effect through approval of task 6 and must include the NCDENR contract number)**. After the successful completion of Task 6, the bond can be retired and a second bond, the Monitoring Phase Performance Bond (MPPB) must be substituted for the first. The second bond must be for 25% of the value of the contract, which covers the monitoring period. The MPPB can be reduced yearly concurrent with the payment schedule once the yearly deliverable is approved by NCDMS. Therefore, the MPPB can be reduced to 20% of the contract value AFTER release of the mitigation credit for monitoring year 1, to 18% of the contract value AFTER release of the mitigation credit for monitoring year 2, continuing with a reduction of the MPPB by 2% of the contract value through monitoring year 6. A MPPB of 10% of the contract value MUST be maintained through monitoring year 7 AND project close-out (including final determination/release of mitigation credits) by the IRT.

2. **Letters of Credit-** LOCs must be drawn from a reputable bank identified by the FDIC as "Well Capitalized" or "Adequately Capitalized" and follow the submittal timing, contract amounts and schedules for reduction as those described above for the performance bonds. Evergreen or irrevocable LOCs shall be required to provide a 120 day notice of cancellation, termination or non-renewal.

3. **Casualty Insurance** on underlying performance of credits of mitigation, must follow the same submittal timing, contract amounts and reduction schedules as those described above in performance bonds. The insurance must contain the following information: a. The "NCDENR" must be named as the "Regulatory Body". NCDENR shall have the sole right to place a claim against the policy. NCDENR shall have the sole right and obligation as the responsible "regulatory body" to approve any claim settlement, Initial insurance must be for a 10 year period.

PERFORMANCE BOND

Travelers Casualty and Surety Company of America
One Tower Square, Hartford, CT 06183

Bond No. 106807894

KNOW ALL MEN BY THESE PRESENTS, that we, **Restoration Systems, LLC** as Principal, and **Travelers Casualty and Surety Company of America**, licensed to do business in the State of, **North Carolina** as Surety, are held and firmly bound unto **North Carolina Department of Environmental Quality – Division of Mitigation Services** (Obligee), in the penal sum of **Three Million Three Hundred Twelve Thousand Two Hundred Thirty & no/100** Dollars **($3,312,230.00)**, lawful money of the United States of America, for the payment of which sum, well and truly to be made, the Principal and Surety do bind themselves, their heirs, executors, administrators, and successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the above bounden Principal has entered into certain written **Contract No. 6832** with the above named Obligee, effective the **15** day of **March**, **2016** for **Alliance Headwaters Stream Mitigation Site, Option A to include Amendment No. 1 dated 8/22/2017 in the Neuse River Basin, Cataloging Unit 03020201** and more fully described in said Contract, a copy of which is attached, which Contract is made a part hereof and incorporated herein by reference, except that nothing said therein shall alter, enlarge, expand or otherwise modify the term of the bond as set out below.

NOW, THEREFORE, if Principal, its executors, administrators, successors and assigns shall promptly and faithfully perform the Contract, according to the terms, stipulations or conditions thereof, then this obligation shall become null and void, otherwise to remain in full force and effect. This bond is executed by the Surety and accepted by the Obligee subject to the following express condition:

Notwithstanding the provisions of the Contract, this bond will commence on the date of approval of the **Alliance Headwaters Stream Mitigation Site, Option A** Mitigation Plan and will remain in effect until the Principal has received written notification from the North Carolina Department of Environmental Quality – Division of Mitigation Services that the requirements of Task 6 (Submittal of Baseline Monitoring Report) have been met, but may be extended by the Surety at its sole option by Continuation Certificate. However, neither nonrenewal by the Surety, nor the failure or inability of the Principal to file a replacement bond in the event of nonrenewal, shall itself constitute a loss to the Obligee recoverable under this bond or any renewal or continuation thereof. The liability of the Surety under this bond and all Continuation Certificates issued in connection therewith shall not be cumulative and shall in no event exceed the amount as set forth in this bond or in any additions, riders, or endorsements properly issued by the Surety as supplements thereto.

Sealed with our seals and dated this **14** day of **November**, **2017**.

Witness

RESTORATION SYSTEMS, LLC
Principal

Witness

Travelers Casualty and Surety Company of America
Phoebe C. Honeycutt, Attorney-in-Fact
BB&T Insurance Services
4309 Emperor Blvd Suite 300
Durham, NC 27709

Agreed and acknowledged this ___ day of _____, **2017**

By: _____
Obligee

S-5025 (08-99)

TRAVELERS

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 230519 **Certificate No.** 007414061

KNOW ALL MEN BY THESE PRESENTS: That Farmington Casualty Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company are corporations duly organized under the laws of the State of Connecticut, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

Angela B. Britt, Richard V. Haar Jr., Phoebe C. Honeycutt, Kenneth J. Peeples, Heather Burroughs, Neil B. Biller, Bobbi D. Pendleton, Christopher A. Lydick, Julia C. McElligott, Adam Pfanmiller, and Jason Lee Sayers

of the City of Durham, State of North Carolina, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 18th day of October, 2017.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: _____
Robert L. Raney, Senior Vice President

On this the 18th day of October, 2017, before me personally appeared Robert L. Raney, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2021.

MARIE C. TETREAULT NOTARY PUBLIC CONNECTICUT

Marie C. Tetreault
Marie C. Tetreault, Notary Public

58440-5-16 Printed in U.S.A.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kevin E. Hughes, the undersigned, Assistant Secretary, of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 14 day of November, 20 17.

Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.travelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

PROJECT: ALLIANCE HEADWATERS DMS PRJ. NO.: 97086

RESTORATION SYSTEMS, LLC

JOHNSTON COUNTY

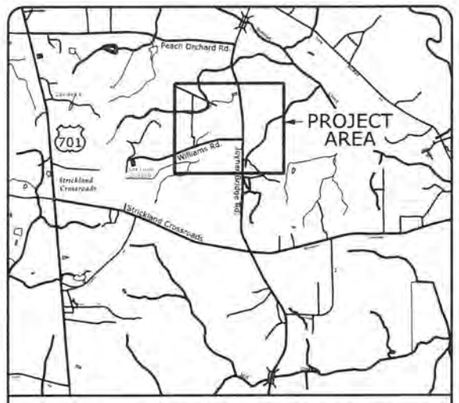
LOCATION: JOHNSTON COUNTY, NC

TYPE OF WORK: STREAM RESTORATION

STATE	PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	074	1	38

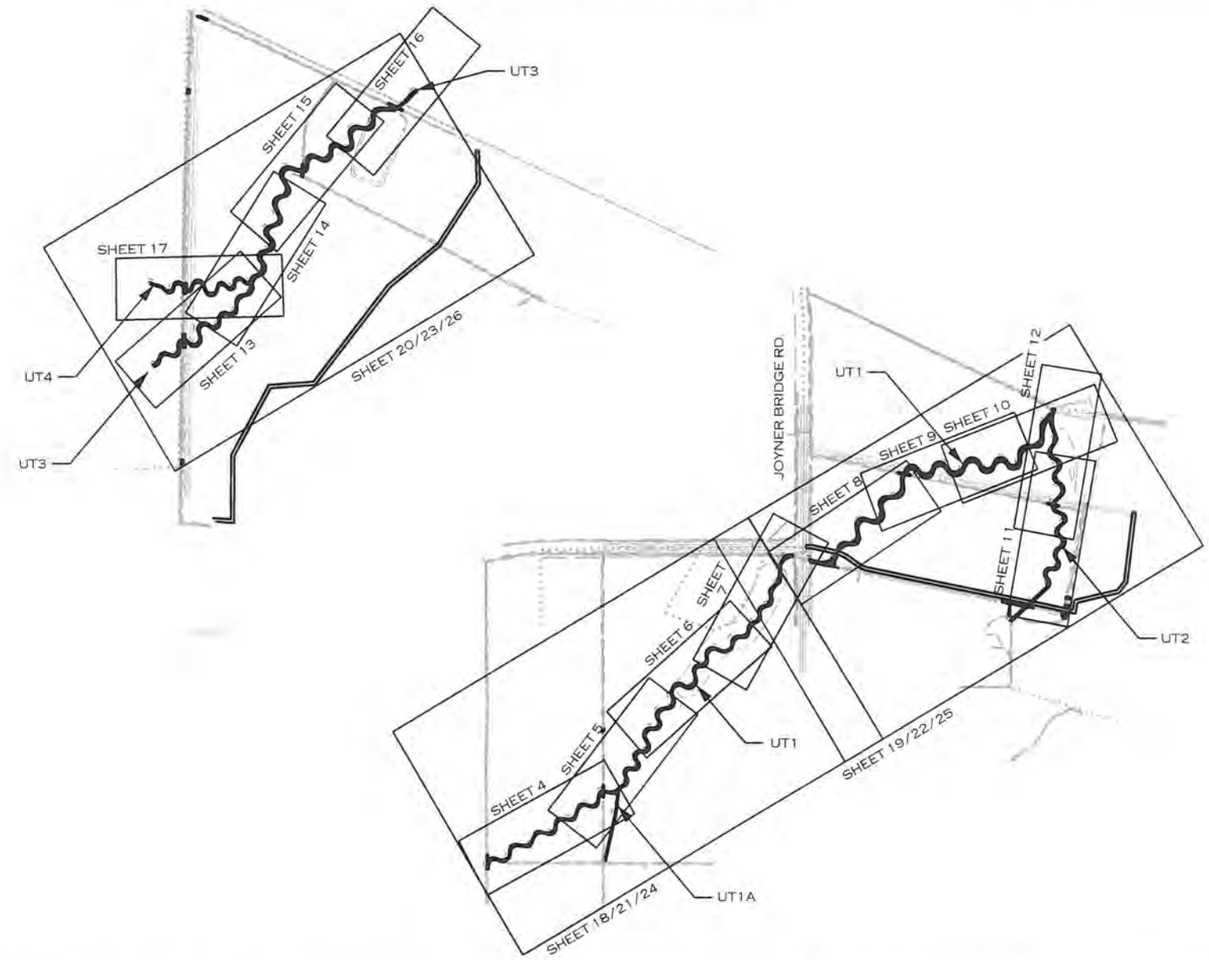
DESIGN DATA

	UT1	UT1A	UT2	UT3	UT4
DESIGN STREAM TYPE	C5	C5	C5	C5	C5
DESIGN REACH LENGTH	3495.3	86.6	996.7	1914.8	530.9
BANKFULL XSC AREA	3.0 - 7.0	2.0	4.0	4.0 - 6.0	3.0
BANKFULL WIDTH	6.5 - 9.9	5.3	7.5	7.5 - 9.2	6.5
BANKFULL MEAN DEPTH	0.5 - 0.7	0.4	0.6	0.6 - 0.7	0.5
W/D RATIO	14	14	14	14	14

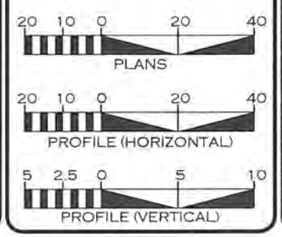


VICINITY MAP

INDEX OF SHEETS



GRAPHIC SCALES



REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	KLT	EMP	9/13/17
2	REVISED 70% MITIGATION PLAN	KLT	EMP	6/13/18
3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:

RESTORATION SYSTEMS, LLC
1101 HAYNES ST.
RALEIGH, NC 27604
(919) 755-9490

RAYMOND HOLZ
PROJECT MANAGER

PREPARED IN THE OFFICE OF:

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

FALL 2018
LETTING DATE:

EMMETT PERDUE, PE
PROJECT ENGINEER

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE

SIGNATURE: P.E.

PROJECT # 074 | SHEET NO. 1A

SYMBOLOGY / NOTES

STREAM CONVENTIONAL SYMBOLS

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

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

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

GENERAL NOTES

1. THE CONTRACTOR IS REQUIRED TO INSTALL INSTREAM STRUCTURES USING A TRACK HOE WITH A HYDRAULIC THUMB OF SUFFICIENT SIZE TO PLACE BOULDERS, AND STRUCTURES.
2. WORK IS BEING PERFORMED AS AN ENVIRONMENTAL RESTORATION PLAN. THE CONTRACTOR SHOULD MAKE ALL REASONABLE EFFORTS TO REDUCE SEDIMENT LOSS AND MINIMIZE DISTURBANCE OF THE SITE WHILE PERFORMING THE CONSTRUCTION WORK.
3. CONSTRUCTION IS SCHEDULED TO BEGIN FALL 2018.

CONSTRUCTION SEQUENCE

PHASE 1

MOBILIZATION AND ESTABLISHMENT OF GENERAL EROSION CONTROL MEASURES

1. Limits of Disturbance is 57.1 acres.
2. Identify and locate staging areas, stockpile areas, construction entrances, stream crossings required for construction access; limits of silt fencing, limits of tree protection fencing, and construction access and haul roads as shown on plans.
2. Install construction entrances.
3. Install stream crossings required for construction access.
4. Stockpile materials in designated staging areas.
5. Install silt fencing to the limits shown on the plans and at any other locations as directed by the Engineer. Silt fencing will be installed around the limits of all staging and stockpile areas.
6. Install tree protection fencing as shown on the plans and at all other locations as directed by the Engineer. Flag all vegetation to be transplanted.
7. Emergency Contact for Erosion and Sedimentation Control is Ecosystem Planning and Restoration, Emmett Perdue, 919-388-0787.

NOTE: With approval from the Engineer, the Contractor may complete Phases 2 through 4 in any sequence, dependent upon weather and/or site conditions. Regardless of the sequencing of the phases, each phase will be completed prior to beginning work on another phase. Upon the completion of each phase, the Contractor shall schedule an inspection of the phase by the Engineer. The Contractor must have written approval from the Engineer that the phase has been completed to satisfactory standards before beginning another phase.

PHASE 2

DEWATERING OF OPEN WATER AREAS (PONDS)

1. Prior to conducting any work in Phases 2-4, the Contractor shall identify with the Engineer the three (3) open water areas (ponds) at the Site and listed below:

   General Locations along the Proposed Channel
   OPW1 – SHEET No. 26 (UT3 R2 27+00)
   OPW2 – SHEET No. 24 (UT1 R1 22+00 – 29+50)
   OPW3 – SHEET No. 12 (UT2 17+00 – 19+50)

2. The Contractor shall dewater the open water areas (ponds) using appropriate means and methods.
3. Prior to grading activities near these open water areas, the Contractor shall receive approval from the Engineer.
4. The Contractor can only utilize soil material to fill these open water areas, no other material may be utilized.
5. Grade these open water areas according to the proposed grading plans.
6. The Contractor shall utilize stockpiled topsoil to tie back into natural ground during the final grading.

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	KLT	EMP	9/13/17
2	REVISED 70% MITIGATION PLAN	KLT	EMP	6/13/18
3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:
RESTORATION SYSTEMS LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

PROJECT ENGINEER:
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE
10/02/18

10/5/2018
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jbooth

NOTES

CONSTRUCTION SEQUENCE (CONTINUED)

PHASES 3 - 5

PHASE 3 – UT1 R1 10+00.00 to UT1 R2 30+32.61 and UT1A 10+00.00 to 10+86.64
PHASE 4 – UT1 R3 10+00.00 to UT1 R3 24+50.90 and UT2 10+00.00 to 19+96.72
PHASE 5 – UT3 R1 10+00.00 to UT3 R2 29+14.86 and UT4 10+00.00 to 15+30.95

1. Perform construction staking.

2. Begin pump-around operation at upstream end of specified reach. Install an impervious dike at upstream and downstream ends of the proposed limit of the area of active construction in order to isolate all work from stream flow. Pump-around operation should be conducted in accordance with the typical pump-around operation detail as shown on the plans. Turbid water between impervious dikes must be pumped with a separate pump into sediment bags to be discharged downstream of the impervious dikes in accordance with the typical pump-around operation detail as shown on the plans. After the pump-around operation is properly initiated and approved by the Engineer, proceed with construction in the sequence noted below:

   a. Remove all vegetation transplants, including individual specimens and vegetated mats, stockpile and maintain in accordance with the project specifications.

   b. Perform required removal and treatment of exotic vegetation within and adjacent to the specified reach limits. All required removal and treatment (initial treatment) of exotic vegetation should be completed prior to proceeding with the remaining activities in this phase.

   c. Perform required clearing and grubbing, including specified removal of dead mature trees and/or dead specimen trees.

   d. Segregate and stockpile topsoil and other soil material in accordance with the project specifications.

   e. Beginning at the upstream end of the area of active construction, proceed in the downstream direction with the in-stream structure construction and repairs as specified on the plans.

   f. Perform all topsoil replacement, vegetation transplanting, seeding (temporary and permanent), soil amendment, mulching, and installation of all erosion control matting as specified on the plans and the project specifications. Associated repaired or disturbed stream banks will have permanent and temporary seed, soil amendments, mulch, and erosion control matting applied to them as work progresses and by the end of each day. Erosion control matting will be installed on top of the seeded, amended, and mulched stream banks according to the project specifications. All disturbed areas associated with the work in and around the stream channel must be stabilized within 7 days. If the temporary and permanent seed applied during the work does not show signs of germination, then other permanent controls will be required as directed by the Engineer.

   g. Complete all work within the limit of the given pump-around operation before beginning additional work at other locations. After completing all work within the limit of the current pump-around operation, proceed with the next downstream segment of construction.

   h. Relocate pump-around operation to next location downstream if numerous pump-around operations are required for the reach. Where numerous pump-around operations are required in sequence along a reach, leave impervious dike that was located at the downstream end of the previous pump-around operation in place to serve as the impervious dike at the upstream end of the new pump-around operation. Install an impervious dike at the downstream end of the new pump-around operation. After the new pump-around operation is properly initiated, repeat steps a. through f. along the entire reach until the construction of the reach is completed.

3. Remove and dispose of all unused vegetation materials.

4. All excavated soil materials not utilized will be stockpiled and maintained according to the project specifications. While onsite, unused material must be located in designated stockpile locations and must be provided temporary or permanent stabilization within 14 days of placement. After the completion of construction, all unused soil materials shall be spread on site in designated areas on the properties owned and operated by Frank Lee at the direction of the Engineer and the said property owner. Spread soil to be stabilized using seeding per the project specifications within 14 days of placement. If any excavated soil materials need to be, are specified to, and actually are disposed of off site by the Contractor, the Contractor is responsible for disposal of such soil materials in a permitted area, as well as for providing and implementing an erosion and sedimentation control plan and permit, or any other required permit(s), for the location(s) off site where such materials are disposed.

5. All remaining disturbed areas are to be amended, seeded, matted and/or mulched according to the project specifications and at a minimum within 14 days of disturbance.

6. Upon the completion of each phase, the Contractor shall schedule an inspection of the phase by the Engineer. The Contractor must have written approval from the Engineer that the phase has been completed to satisfactory standards before beginning another phase.

PHASE 6

DEMOBILIZATION AND PLANTING

1. Complete remaining minor grading and site planting preparation work, including ripping and/or discing, as specified in the project specifications.

2. All remaining disturbed areas, including areas that have been ripped and/or disced after temporary and/or permanent seeding activities, are to be amended, seeded, matted and/or mulched according to the project specifications and at a minimum within 14 days of disturbance.

3. After all construction requiring heavy equipment is completed, remove silt fence and restore construction access roads, staging areas, and stockpile areas. Immediately regrade, replace topsoil, and seed, amend, and mulch as specified in the project specifications and at a minimum within 14 days of disturbance.

4. Remove temporary construction entrances. Immediately regrade, seed, amend, and mulch as specified in the project specifications and at a minimum within 14 days of disturbance.

5. Remove all tree protection fencing.

6. Complete all remaining proposed permanent vegetation planting, including the specimen tree replacement plantings, per the plans and project specifications.

7. Remove and dispose of all trash, metal, and debris from the site according to local, state and federal regulations.

REVISIONS				
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3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:
RS
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE

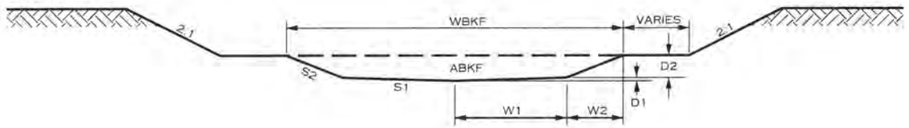
10/5/2018
R:\PROJECTS\RDU\074_RS_ALLIANCEHEADWATERS\CADD\PLANS\AHW_PSH_1B.DGN
MKOCH

PROJECT # 074 | SHEET NO. 2

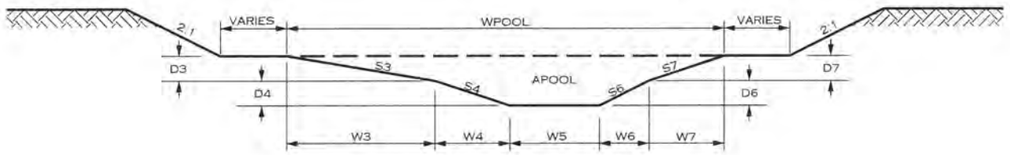
DETAILS

TYPICAL SECTIONS

"C" TYPE CHANNELS



TYPICAL RIFFLE CROSS SECTION



TYPICAL POOL RIGHT CROSS SECTION

C STREAM TYPE TYPICAL CROSS SECTION DIMENSIONS

		RIFFLES								POOLS												
Stream	Station	ABKF	WBKF	W1	W2	D1	D2	S1	S2	APool	WPool	W3	W4	W5	W6	W7	D3/D7	D4/D6	S3	S4	S6	S7
UT1 R1	10+00 - 16+71	3.0	6.5	1.30	1.95	0.05	0.65	26:1	3:1	7.7	11.0	4.80	1.60	0.60	1.60	2.40	0.80	0.80	6:1	2:1	2:1	3:1
UT1 R2	16+71 - 30+33	4.0	7.5	1.50	2.24	0.05	0.75	28:1	3:1	9.6	12.0	4.80	2.20	0.40	2.20	2.40	0.80	1.10	6:1	2:1	2:1	3:1
UT1 R3	10+00 - 24+63	7.0	9.9	1.98	2.97	0.07	0.99	28:1	3:1	18.0	17.0	7.00	3.00	1.00	3.00	3.00	1.00	1.50	7:1	2:1	2:1	3:1
UT1A	10+00 - 10+87	2.0	5.3	1.06	1.59	0.04	0.53	28:1	3:1	5.9	8.0	1.59	1.54	1.74	1.54	1.59	0.53	0.77	3:1	2:1	2:1	3:1
UT2	10+00 - 19+97	4.0	7.5	1.50	2.24	0.05	0.75	28:1	3:1	9.6	12.0	4.80	2.20	0.40	2.20	2.40	0.80	1.10	6:1	2:1	2:1	3:1
UT3 R1	10+00 - 16+39	4.0	7.5	1.50	2.24	0.05	0.75	28:1	3:1	9.6	12.0	4.80	2.20	0.40	2.20	2.40	0.80	1.10	6:1	2:1	2:1	3:1
UT3 R2	16+39 - 29+15	6.0	9.2	1.83	2.75	0.07	0.92	28:1	3:1	14.9	15.0	6.00	2.60	0.80	2.60	3.00	1.00	1.30	6:1	2:1	2:1	3:1
UT4	10+00 - 15+31	3.0	6.5	1.30	1.94	0.05	0.65	28:1	3:1	7.7	11.0	4.80	1.60	0.60	1.60	2.40	0.80	0.80	6:1	2:1	2:1	3:1

REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	KLT	EMP	9/13/17
2	REVISED 70% MITIGATION PLAN	KLT	EMP	6/13/18
3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:
RESTORATION SYSTEMS, LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

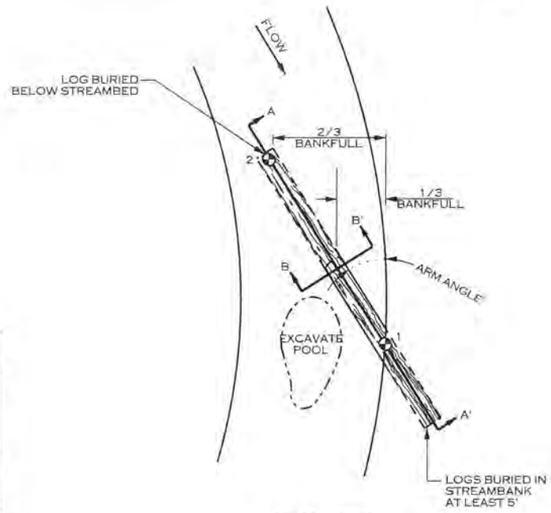
PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE
10/6/18

10/5/2018
R:\PROJECTS\RDU0074_RS\ALLIANCEHEADWATERS\CADD\PLANS\AHW_PSH_02.DGN
MOON

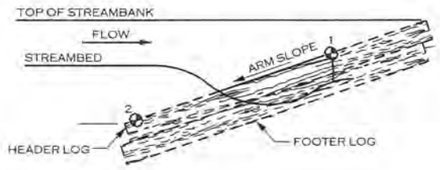
PROJECT # 074 | SHEET NO. 2A

DETAILS

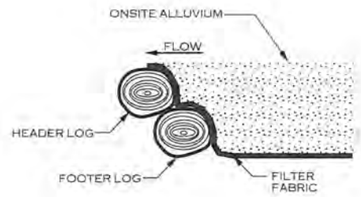
LOG VANE (LV)



PLAN VIEW



PROFILE VIEW A - A'



SECTION B - B'

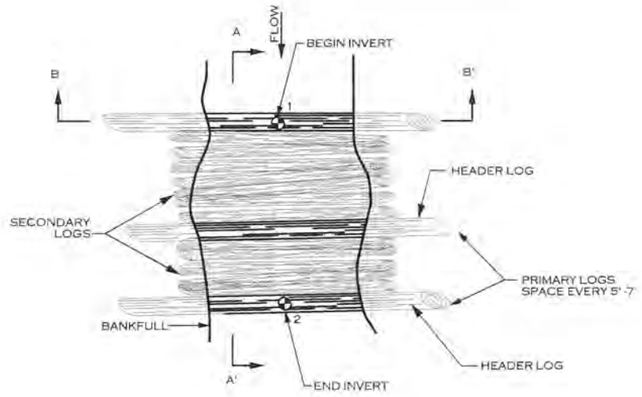
⊕ - ELEVATION POINT (SEE STRUCTURES TABLE)

LOG VANE SPECIFICATIONS		
MATERIALS:	SPECIFICATIONS:	
LOGS	TYPE: SIZE: NUMBER OF HEADER LOGS: NUMBER OF FOOTER LOGS:	HARDWOOD 10 INCH Ø MIN. 1 1
FILTER FABRIC	TYPE: WIDTH UPSTREAM	TYPE 2 NON-WOVEN 6 FT MINIMUM

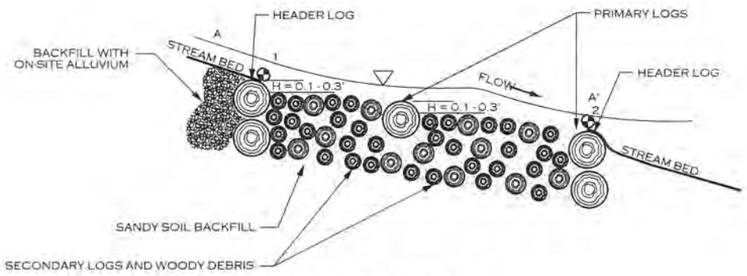
NOTES FOR LOG VANE STRUCTURES:

1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURES TABLE SHEET.
2. LOGS SHOULD BE STRAIGHT, HARDWOOD, AND NOT ROTTEN.
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
4. GEOTEXTILE FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.

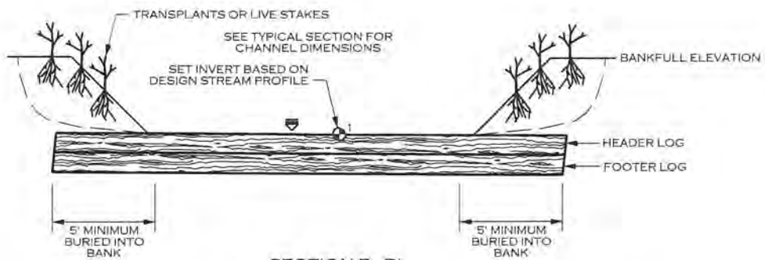
GRADE CONTROL WOODY RIFFLE (WR)



PLAN VIEW



SECTION A - A'



SECTION B - B'

NOTES:

1. PRIMARY LOGS SHOULD BE AT LEAST 10" OR MORE IN DIAMETER, RELATIVELY STRAIGHT, AND RECENTLY HARVESTED AND EXTENDING INTO THE BANK 5' ON EACH SIDE.
2. SECONDARY LOGS SHOULD BE AT LEAST 1" IN DIAMETER AND NO LARGER THAN 6", AND EXTEND INTO THE BANK 2 FEET ON EACH SIDE. WOOD MATERIAL SHALL BE VARYING DIAMETER TO ALLOW MATERIAL TO BE COMPACTED.
3. COIR FIBER MATTING CAN BE USED INSTEAD OF TRANSPLANTS OR LIVE STAKES, PER DIRECTION OF ENGINEER.
4. AFTER TRENCH HAS BEEN EXCAVATED A LAYER OF SECONDARY LOGS AND WOODY DEBRIS SHOULD BE PLACED WITH MINIMAL GAPS. A LAYER OF ON-SITE ALLUVIUM SHOULD BE APPLIED TO FILL VOIDS BETWEEN SECONDARY LOGS BEFORE ADDITIONAL LAYERS ARE PLACED.

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	KLT	EMP	9/13/17
2	REVISED 70% MITIGATION PLAN	KLT	EMP	6/13/18
3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:
RS RESTORATION SYSTEMS, LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036254 ENGINEER EMMETT PERDUE 10/05/18

10/5/2018
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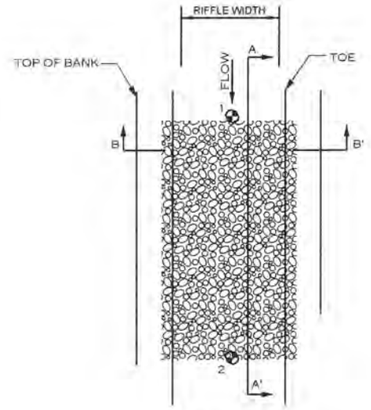
MRONY

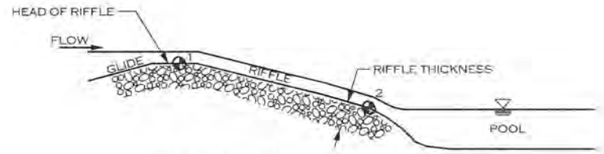
PROJECT # 074 | SHEET NO. 2B

DETAILS

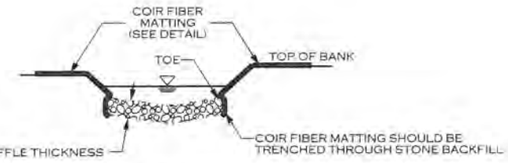
CONSTRUCTED RIFFLE (CR)



PLAN VIEW



PROFILE A - A'



SECTION B - B'

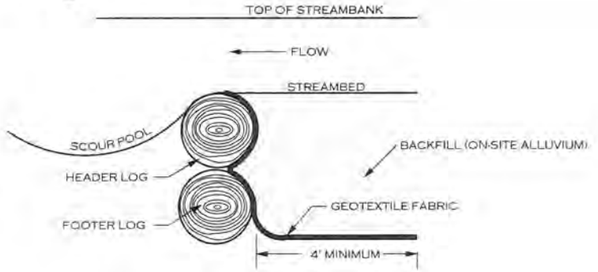
● - ELEVATION POINT (SEE STRUCTURES TABLE)

CONSTRUCTED RIFFLE SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
STONE BACKFILL	TYPE: GRANITE OR COMPARABLE SIZE: MIX OF CLASS A, CLASS B AND #57 STONE THICKNESS: 16 INCHES MIN
COIR FIBER MATTING	SEE MATTING DETAIL

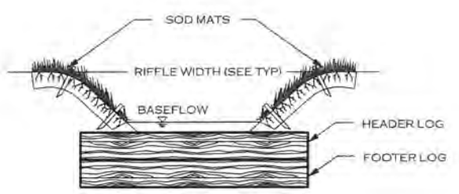
NOTES FOR CONSTRUCTED RIFFLE STRUCTURES:

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

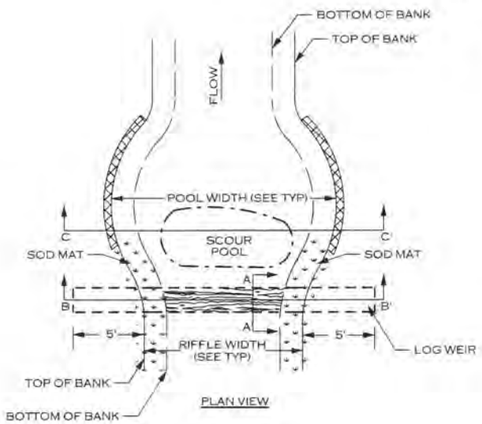
LOG STEP (LS)



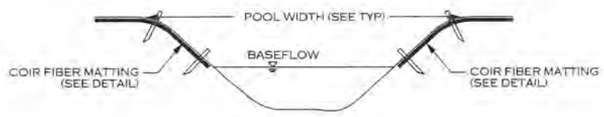
SECTION A-A'



SECTION B-B'



PLAN VIEW



SECTION C-C'

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

NOTES FOR LOG STEP STRUCTURES:

1. LOGS SHOULD BE AT LEAST 12 INCHES IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. LOGS >24 INCHES IN DIAMETER MAY BE USED ALONE WITHOUT AN ADDITIONAL LOG. GEOTEXTILE FABRIC SHOULD STILL BE USED TO SEAL AROUND LOG.
3. PLACE FOOTER LOGS FIRST AND THEN HEADER (TOP) LOG. SET HEADER LOG AT THE INVERT ELEVATION STATED IN THE STRUCTURE TABLE.
4. USE GEOTEXTILE FABRIC TO SEAL GAPS BETWEEN LOGS.
5. PLACE TRANSPLANTS FROM TOE OF STREAMBANK TO TOP OF STREAMBANK.
6. SOD MAT CAN BE SUBSTITUTED WITH COIR FIBER MATTING AT THE DIRECTION OF THE ENGINEER.

REVISIONS				
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3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:
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RESTORATION SYSTEMS, LLC
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ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE
10/5/2018

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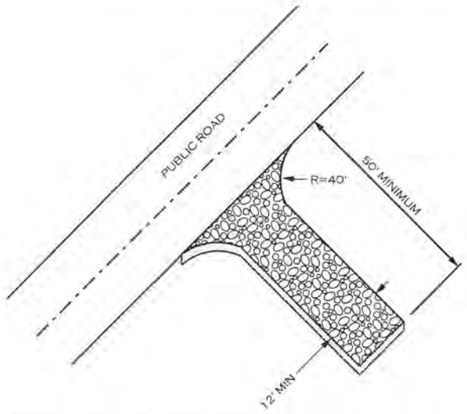
MKOON

PROJECT # 074 | SHEET NO. 2C

DETAILS

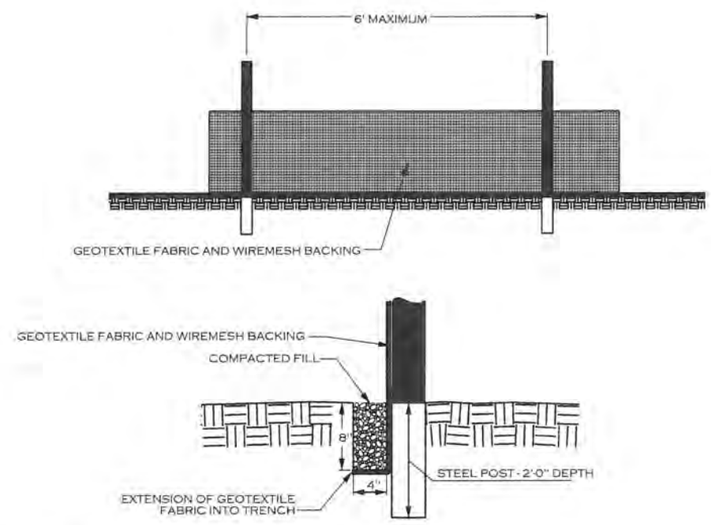
TEMPORARY GRAVEL CONSTRUCTION ENTRANCE



NOTES:

1. PROVIDE TURNING RADIUS SUFFICIENT TO ACCOMMODATE EXPECTED EQUIPMENT.
2. LOCAL ENTRANCES TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
3. MUST BE MAINTAINED IN THE CONDITION WHICH WILL PREVENT TRACKING OR DIRECT MUD INTO STREETS.
4. AND MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED UP IMMEDIATELY.
5. LOCAL GRAVEL CONSTRUCTION ENTRANCE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. PROVIDE FREQUENT CHECKS TO THE ENTRANCE AND TIMELY MAINTENANCE.
6. NUMBER AND LOCATION OF CONSTRUCTION ENTRANCES AS SHOWN ON PLANS, OR AS DIRECTED BY THE ENGINEER.
7. USE CLASS "A" STONE OR OTHER COURSE AGGREGATE APPROVED BY THE ENGINEER.
8. INSTALL CONSTRUCTION ENTRANCES IN A WAY TO PREVENT VEHICLES LEAVING THE PROJECT SITE FROM BYPASSING CONSTRUCTION ENTRANCES.

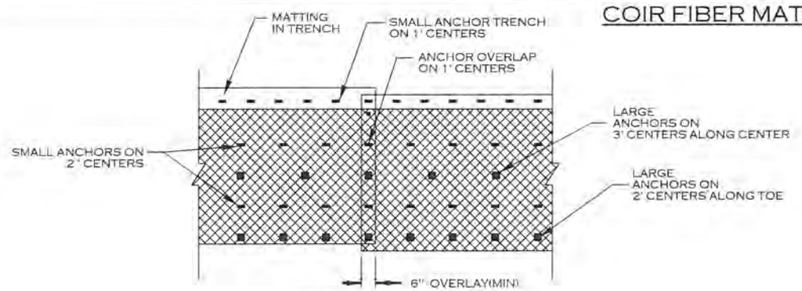
TEMPORARY SILT FENCE



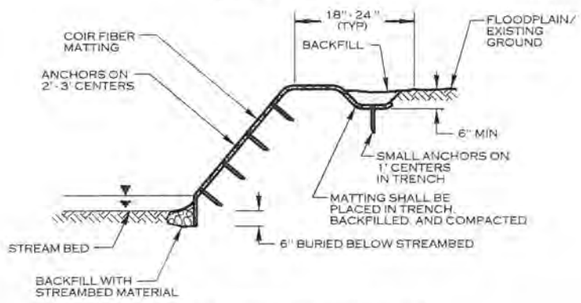
NOTES:

1. USE GEOTEXTILE FABRIC A MINIMUM OF 36" IN WIDTH AND FASTEN ADEQUATELY TO THE STEEL POSTS.
2. PROVIDE 5' STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE.
3. REMOVE ONCE AREA IS STABLE.

COIR FIBER MATTING



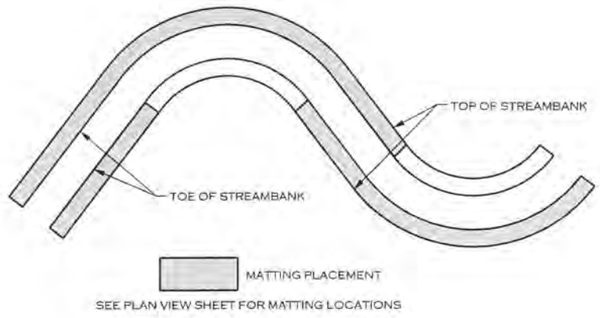
PLAN VIEW



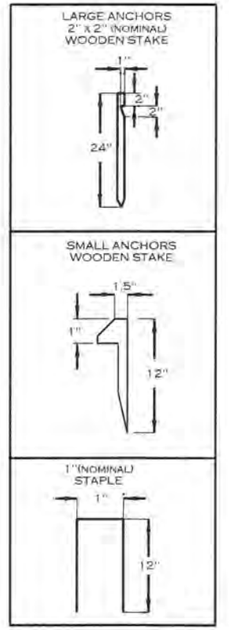
NOTES:

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

TYPICAL CROSS SECTION



TYPICAL MATTING PLAN VIEW



ANCHOR OPTIONS

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	KLT	EMP	9/13/17
2	REVISED 70% MITIGATION PLAN	KLT	EMP	6/13/18
3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:
RS RESTORATION SYSTEMS, LLC
1101 HAYNES ST.
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036254 10/04/18 ENGINEER EMMETT PERDUE

10/5/2018
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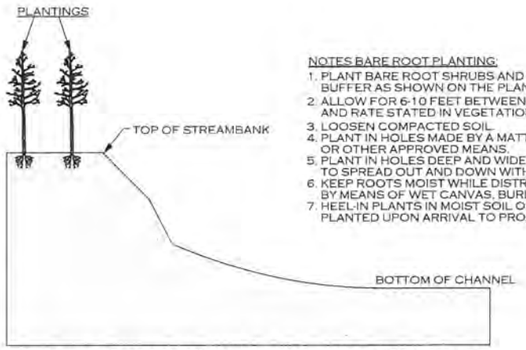
PROJECT # 074 | SHEET NO. 2D

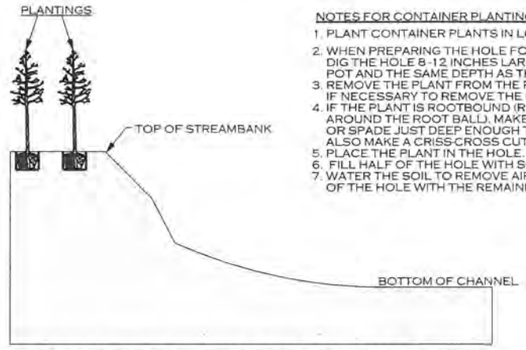
DETAILS

PLANTING SPECIFICATIONS



NOTES BARE ROOT PLANTING:
1. PLANT BARE ROOT SHRUBS AND TREES TO THE WIDTH OF THE BUFFER AS SHOWN ON THE PLANS.
2. ALLOW FOR 6-10 FEET BETWEEN PLANTINGS, DEPENDING ON SIZE AND RATE STATED IN VEGETATION SELECTION.
3. LOOSEN COMPACTED SOIL.
4. PLANT IN HOLES MADE BY A MATTOCK, DIBBLE, PLANTING BAR, OR OTHER APPROVED MEANS.
5. PLANT IN HOLES DEEP AND WIDE ENOUGH TO ALLOW THE ROOTS TO SPREAD OUT AND DOWN WITHOUT J-ROOTING.
6. KEEP ROOTS MOIST WHILE DISTRIBUTING OR WAITING TO PLANT BY MEANS OF WET CANVAS, BURLAP, OR STRAW.
7. HEEL-IN PLANTS IN MOIST SOIL OR SAWDUST IF NOT PROMPTLY PLANTED UPON ARRIVAL TO PROJECT SITE.

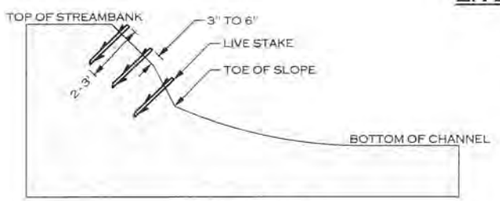
CROSS SECTION VIEW OF BARE ROOT PLANTING



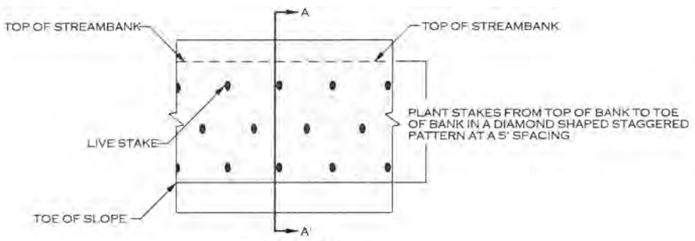
NOTES FOR CONTAINER PLANTING:
1. PLANT CONTAINER PLANTS IN LOCATIONS INDICATED ON PLANS.
2. WHEN PREPARING THE HOLE FOR A POTTED PLANT OR SHRUB, DIG THE HOLE 8-12 INCHES LARGER THAN THE DIAMETER OF THE POT AND THE SAME DEPTH AS THE POT.
3. REMOVE THE PLANT FROM THE POT. LAY THE PLANT ON ITS SIDE IF NECESSARY TO REMOVE THE POT.
4. IF THE PLANT IS ROOTBOUND (ROOTS GROWING IN A SPIRAL AROUND THE ROOT BALL), MAKE VERTICAL CUTS WITH A KNIFE OR SPADE JUST DEEP ENOUGH TO CUT THE NET OF ROOTS. ALSO MAKE A CRISS-CROSS CUT ACROSS THE BOTTOM OF THE BALL.
5. PLACE THE PLANT IN THE HOLE.
6. FILL HALF OF THE HOLE WITH SOIL (SAME SOIL REMOVED FOR BACKFILL).
7. WATER THE SOIL TO REMOVE AIR POCKETS AND FILL THE REST OF THE HOLE WITH THE REMAINING SOIL.

CROSS SECTION VIEW OF CONTAINER PLANTING

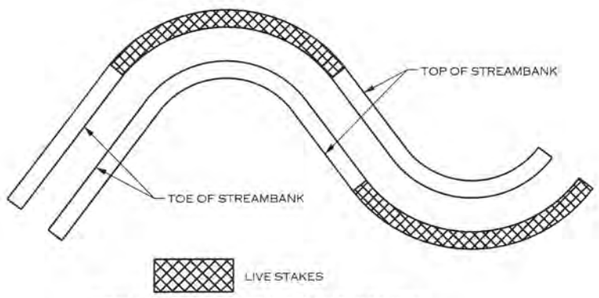
LIVE STAKING



SECTION A - A'

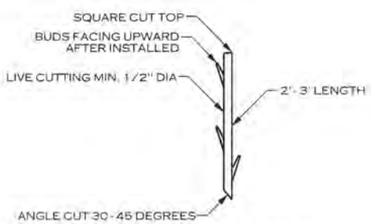


PLAN VIEW



SEE PLAN VIEW SHEET FOR LIVE STAKING LOCATIONS

TYPICAL LIVE STAKING AREA PLAN VIEW



LIVE STAKE DETAIL

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

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
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3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:
RESTORATION SYSTEMS, LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036254 ENGINEER EMMETT PERDUE 10/05/18

10/5/2018
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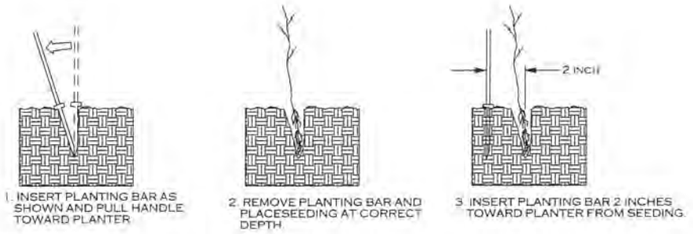
PROJECT # 074 | SHEET NO. 2E

DETAILS

DIBBLE PLANTING METHOD USING THE KBC PLANTING BAR



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

PLANTING NOTES:

PLANTING BAG

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

KBC PLANTING BAR

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

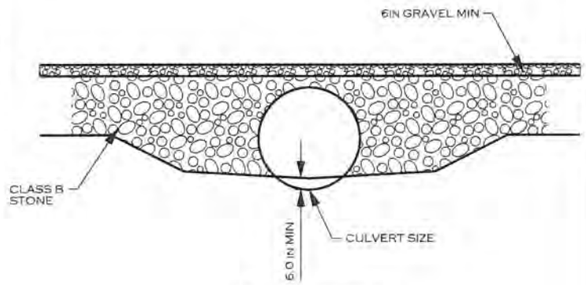
ROOT PRUNING

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

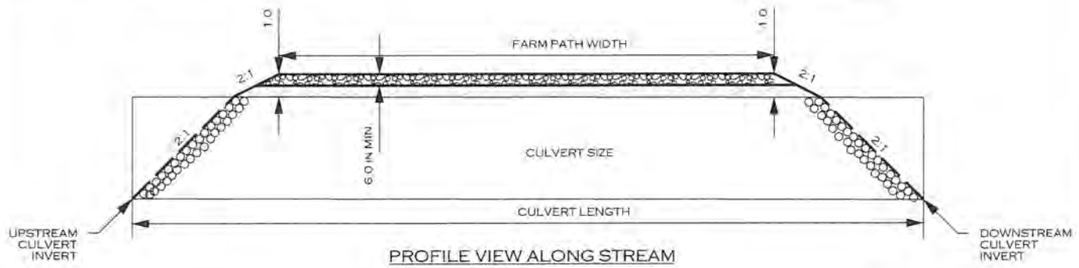
CULVERT DETAIL

Variable	Culvert 1	Culvert 2	Culvert 3	Culvert Floodplain
Culvert Size (in.)	2 @ 36	2 @ 30	3 @ 24	1 @ 12
Culvert Material	RCP	RCP	RCP	HDPE
Min. Culvert Length (ft.)	30	30	30	20
Minumum Pipe Class	Class III	Class III	Class III	-
Upstream Invert Sta.	1108.0	1083.0	2817.0	-
Upstream Invert Ele. (ft.)	104.84	106.02	108.18	108.50
Downstream Invert Sta.	1138.0	1113.0	2847.0	-
Downstream Invert Ele. (ft.)	104.77	105.97	108.10	108.25
Embedment Depth (in.)	6.0	6.0	6.0	0.0
Required Cover Depth (ft.)	1.0	1.0	1.0	1.0
Farm Path Elevation (ft.)	109.0	109.5	111.5	110.5
Farm Path Width (ft.)	12.0	15.0	16.0	12.0

NOTES:
1. TYPE 4 BEDDING, POSITIVE EMBANKMENT CONDITION.
2. STABILIZE FILL AROUND CULVERTS WITH CLASS B STONE. STABILIZE REMAINING ROAD SIDE SLOPES WITH EROSION MATTING ACCORDING TO SPECIFICATIONS.

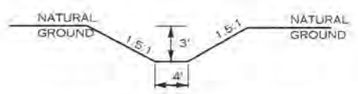


CROSS SECTION

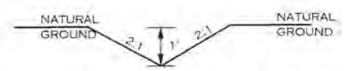


PROFILE VIEW ALONG STREAM

STANDARD DITCH



STANDARD BASE DITCH (TYPE A)



STANDARD 'V' DITCH (TYPE B)

NOTES:
1. BANKS OF TYPE A DITCHES PROTECTED WITH GEOTEXTILE FABRIC (SEE SPECIFICATIONS)
2. BANKS OF TYPE B DITCHES PROTECTED WITH STRAW, TEMPORARY AND PERMANENT SEEDING.
3. TYPE B DITCHES TO BE CONSTRUCTED WITH A MAXIMUM SLOPE OF 0.005
4. SPOIL FROM DITCHES TO BE USED IN FILLING OLD CHANNEL, CONSTRUCTION OF LEVEES, OR SPREAD EVENLY OVER UPSLOPE AREAS.

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036254 ENGINEER EMMETT PERDUE 10/oc/18

10/5/2018
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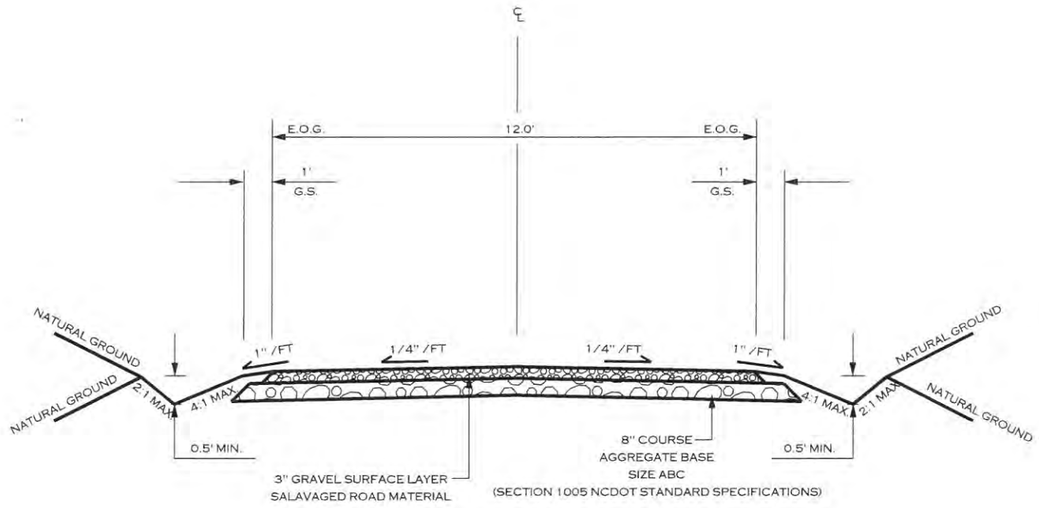
PERDUE

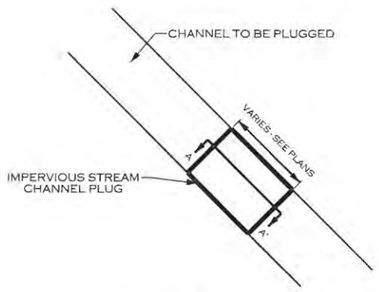
PROJECT # 074 | SHEET NO. 2F

DETAILS

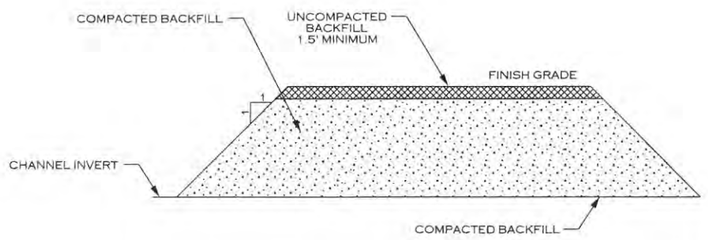
PERMANENT ROAD



IMPERVIOUS STREAM CHANNEL PLUG



PLAN VIEW



SECTION A - A'

NOTES:

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

REVISIONS				
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PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE
10/5/18

10/5/2018
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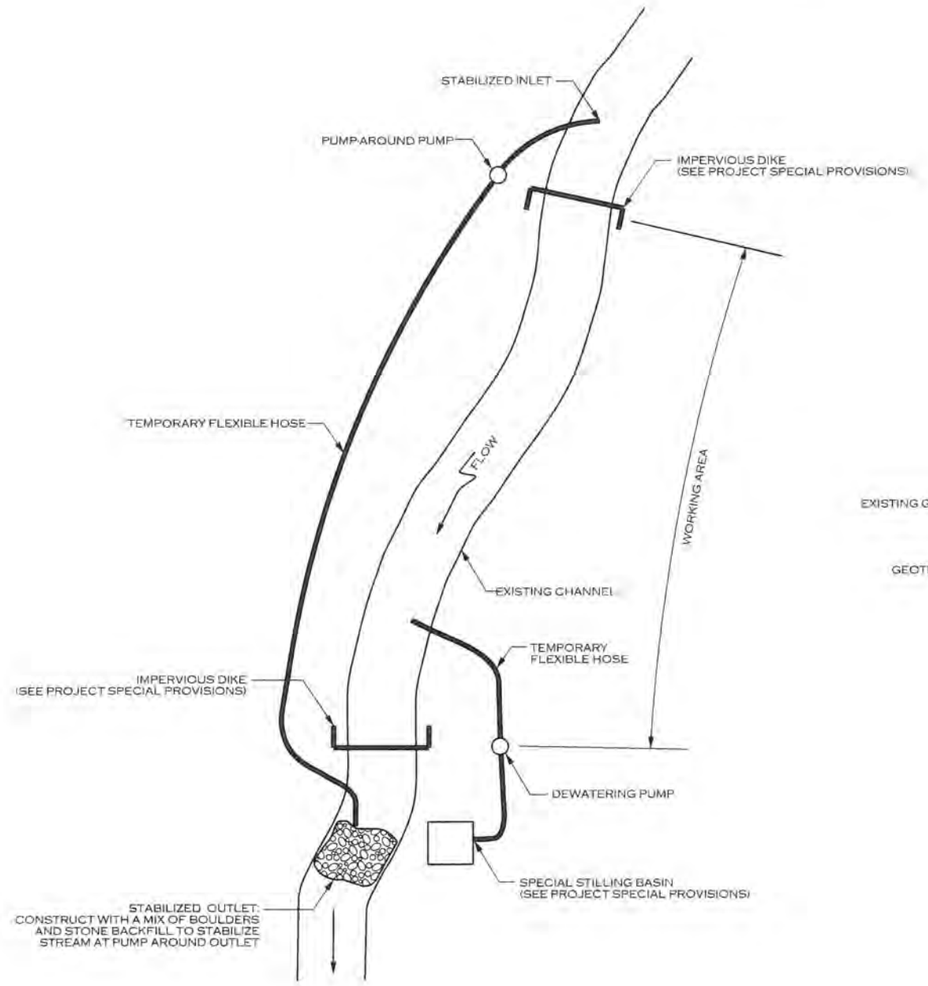
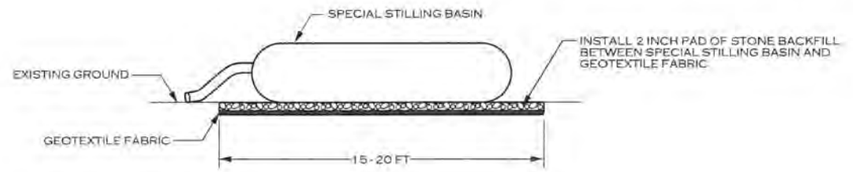
TYPICAL PUMP - AROUND OPERATION



NOTES:

1. EXCAVATION SHALL BE PERFORMED IN ONLY DRY SECTIONS OF CHANNEL.
2. IMPERVIOUS DIKES SHOULD BE USED TO ISOLATE WORK AREAS FROM STREAM FLOW.
3. THE CONTRACTOR SHALL NOT DISTURB MORE AREA THAN CAN BE STABILIZED IN ONE WORKING DAY.
4. THE PUMP-AROUND PUMP SHOULD ADEQUATELY CONVEY 1 CFS (450 GALLONS PER MINUTE).



SEQUENCE OF CONSTRUCTION FOR TYPICAL PUMP - AROUND

1. INSTALL STABILIZED OUTLET AT THE DOWNSTREAM END OF THE DESIGNATED PROJECT WORKING AREA.
2. THE CONTRACTOR WILL INSTALL THE PUMP AROUND PUMP AND THE TEMPORARY FLEXIBLE HOSE THAT WILL CONVEY THE BASE FLOW FROM UPSTREAM OF THE WORK SITE TO THE SPECIAL STILLING BASIN OR STABILIZED OUTLET.
3. INSTALL UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. INSTALL THE DOWNSTREAM IMPERVIOUS DIKE AND PUMPING APPARATUS IF NEEDED TO DEWATER THE ENTRAPPED AREA. THE PUMP AND HOSE FOR THIS PURPOSE SHALL BE OF SUFFICIENT SIZE TO DEWATER THE WORK AREA. THIS WATER WILL FLOW INTO A SPECIAL STILLING BASIN.
5. THE CONTRACTOR WILL PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLAN AND FOLLOWING THE GENERAL CONSTRUCTION SEQUENCE.
6. THE CONTRACTOR WILL EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF THE IMPERVIOUS DIKE. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE STARTING WITH THE DOWNSTREAM DIKE FIRST.
7. THE CONTRACTOR WILL COMPLETE ALL GRADING AND STABILIZATION IN ONE DAY WITHIN THE PUMP AROUND AREA BETWEEN THE IMPERVIOUS DIKES.
8. ONCE THE WORKING AREA IS COMPLETED, REMOVE THE SPECIAL STILLING BASIN AND STABILIZED OUTLET AND STABILIZE DISTURBED AREAS WITH SEED AND MULCH.

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10/05/18

10/5/2018
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TABLES

STRUCTURE TABLES - UT1 R1/R2 & UT1A

Log Vanes

Structure ID	Station at Point 2	Arm			Log Length (ft)	Elevation (ft)	
		Length (ft)	Angle (deg)	Slope (%)		Pt 1	Pt 2
LV1	10+12.00	7.5	26.0	5.0	16.0	114.85	115.23
LV2	10+67.00	6.5	31.0	5.0	15.0	114.74	115.06
LV3	10+94.00	6.0	34.0	5.5	14.0	114.67	115.00
LV4	11+31.00	7.5	27.0	5.0	16.0	114.56	114.93
LV5	11+97.00	6.5	30.0	5.0	15.0	114.40	114.72
LV6	12+53.00	6.5	30.0	5.0	15.0	114.25	114.58
LV7	13+09.00	7.5	27.0	5.0	16.0	114.10	114.47
LV8	13+62.00	6.5	30.0	5.0	15.0	113.97	114.29
LV9	14+23.00	6.5	30.0	5.0	15.0	113.82	114.14
LV10	14+80.00	6.5	30.0	5.0	15.0	113.67	113.99
LV11	15+35.00	7.5	27.0	5.0	16.0	113.51	113.89
LV12	15+91.00	6.5	30.0	5.0	15.0	113.38	113.71
LV13	16+42.00	7.0	28.0	5.0	15.0	113.25	113.60
LV14	16+70.00	8.0	25.0	4.0	16.0	113.08	113.40
LV15	16+98.00	8.0	28.0	6.0	16.0	112.94	113.42
LV16	17+45.00	7.5	30.0	6.0	16.0	112.74	113.19
LV17	17+95.00	7.5	30.0	6.0	16.0	112.52	112.97
LV18	18+46.00	8.0	29.0	6.0	16.0	112.30	112.78
LV19	19+01.00	8.0	29.0	6.0	16.0	112.07	112.55
LV20	19+69.00	9.0	26.0	5.0	17.0	111.77	112.22
LV21	20+31.00	8.0	29.0	6.0	16.0	111.52	112.00
LV22	20+82.00	9.0	26.0	5.5	17.0	111.30	111.80
LV23	21+49.00	9.0	26.0	5.0	17.0	110.96	111.41
LV24	22+34.00	9.0	26.0	5.5	17.0	110.50	111.00
LV25	22+89.00	9.5	24.0	5.5	18.0	110.15	110.68
LV26	23+72.00	8.0	29.0	5.5	16.0	109.79	110.23
LV27	24+11.00	8.0	29.0	5.5	16.0	109.60	110.04
LV28	24+69.00	9.0	26.0	5.5	17.0	109.27	109.77
LV29	25+35.00	8.0	28.0	5.5	16.0	108.99	109.43
LV30	25+63.00	7.5	30.0	5.5	16.0	108.84	109.26
LV31	25+96.00	9.0	26.0	5.5	17.0	108.62	109.12
LV32	26+44.00	7.0	31.0	5.5	15.0	108.41	108.79
LV33	27+28.00	7.0	31.0	5.5	15.0	107.97	108.35
LV34	27+63.00	8.0	29.0	5.5	16.0	107.76	108.20
LV35	28+07.00	9.0	26.0	5.5	17.0	107.51	108.01
LV36	28+57.00	8.5	27.0	5.5	17.0	107.29	107.75
LV37	29+02.00	8.0	28.0	5.5	16.0	107.06	107.50
LV38	29+62.00	9.0	25.0	5.0	17.0	106.74	107.19
LV39	29+99.00	8.5	27.0	5.0	17.0	106.54	106.96

Constructed Riffles

Structure ID	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CR1	10+00.00	115.68	10+12.00	114.90	2.6	12.0	6.50%
CR2	30+12.00	106.59	30+32.61	106.50	3.0	20.6	0.44%
CR16	10+16.00	113.90	10+26.00	113.75	2.1	10.0	1.50%

Grade Control Woody Riffles

Structure ID	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
WR1	10+85.00	114.78	10+94.00	114.72	2.6	9.0	0.65%
WR2	11+14.00	114.71	11+31.00	114.61	2.6	17.0	0.60%
WR3	12+29.00	114.41	12+53.00	114.30	2.6	24.0	0.45%
WR4	13+45.00	114.11	13+62.00	114.02	2.6	17.0	0.57%
WR5	14+56.00	113.83	14+80.00	113.72	2.6	24.0	0.46%
WR6	15+12.00	113.68	15+35.00	113.56	2.6	23.0	0.52%
WR7	16+23.00	113.40	16+42.00	113.30	2.6	19.0	0.52%
WR8	16+91.00	113.11	16+98.00	112.99	3.0	7.0	1.67%
WR9	17+28.00	112.95	17+45.00	112.79	3.0	17.0	0.96%
WR10	18+84.00	112.29	19+01.00	112.12	3.0	17.0	1.01%
WR11	20+12.00	111.75	20+31.00	111.57	3.0	19.0	0.95%
WR12	21+26.00	111.25	21+49.00	111.01	3.0	23.0	1.04%
WR13	21+88.00	110.92	21+98.00	110.78	3.0	10.0	1.46%
WR14	22+24.00	110.74	22+34.00	110.55	3.0	10.0	1.82%
WR15	22+72.00	110.48	22+89.00	110.20	3.0	17.0	1.66%
WR16	23+51.00	110.07	23+72.00	109.84	3.0	21.0	1.09%
WR17	24+03.00	109.80	24+11.00	109.65	3.0	8.0	1.89%
WR18	24+47.00	109.57	24+69.00	109.32	3.0	22.0	1.11%
WR19	25+16.00	109.21	25+35.00	109.04	3.0	19.0	0.88%
WR20	25+53.00	109.01	25+63.00	108.89	3.0	10.0	1.20%
WR21	25+82.00	108.86	25+96.00	108.67	3.0	14.0	1.34%
WR22	26+30.00	108.61	26+44.00	108.46	3.0	14.0	1.08%
WR23	26+71.00	108.39	26+87.00	108.23	3.0	16.0	1.01%
WR24	27+13.00	108.17	27+28.00	108.02	3.0	15.0	1.04%
WR25	27+50.00	107.98	27+63.00	107.81	3.0	13.0	1.28%
WR26	27+92.00	107.76	28+07.00	107.56	3.0	15.0	1.32%
WR27	28+42.00	107.50	28+57.00	107.34	3.0	15.0	1.08%
WR28	28+87.00	107.26	29+02.00	107.11	3.0	15.0	1.04%
WR29	29+39.00	106.99	29+69.00	106.79	3.0	30.0	0.67%
WR30	29+85.00	106.75	29+99.00	106.59	3.0	14.0	1.14%
WR68	10+45.00	113.63	10+55.00	113.49	2.1	10.0	1.40%

Log Sill

Structure ID	Point 1		Log Length
	Station	Elevation	
LS1	10+26.00	113.75	10.0
LS2	10+55.00	113.49	10.0

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	70% MITIGATION PLAN	KLT	EMP	9/13/17
2	REVISED 70% MITIGATION PLAN	KLT	EMP	6/13/18
3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:
RS RESTORATION SYSTEMS, LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER SEAL 036254 ENGINEER EMMETT PERDUE

10/5/2018
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PROJECT # 074 | SHEET NO 3A

TABLES

STRUCTURE TABLES - UT1 R3

Log Vanes

Structure ID	Station at Point 2	Arm			Log Length (ft)	Elevation (ft)	
		Length (ft)	Angle (deg)	Slope (%)		Pt 1	Pt 2
LV40	10+65.00	12.5	24.0	5.0	21.0	105.32	105.94
LV41	11+49.00	10.0	30.0	5.5	18.0	105.18	105.73
LV42	12+04.00	10.0	30.0	5.5	18.0	105.07	105.62
LV43	12+84.00	10.5	29.0	5.5	19.0	104.92	105.50
LV44	13+65.00	11.5	26.0	5.5	20.0	104.76	105.39
LV45	14+43.00	10.0	30.0	5.5	18.0	104.64	105.19
LV46	15+21.00	11.0	27.0	5.5	19.0	104.49	105.10
LV47	16+36.00	10.5	29.0	5.5	19.0	104.29	104.86
LV48	17+07.00	10.5	29.0	5.5	19.0	104.15	104.73
LV49	17+68.00	10.5	29.0	5.5	19.0	104.04	104.61
LV50	18+54.00	11.5	26.0	5.5	20.0	103.88	104.51
LV51	19+37.00	11.0	27.0	5.5	19.0	103.72	104.33
LV52	20+14.00	10.5	29.0	5.5	19.0	103.59	104.17
LV53	20+88.00	10.5	29.0	5.5	19.0	103.46	104.04
LV54	21+52.00	10.5	29.0	5.5	19.0	103.34	103.91
LV55	22+33.00	11.0	27.0	5.5	19.0	103.20	103.81
LV56	23+08.00	10.0	30.0	5.5	18.0	103.08	103.63
LV57	23+82.00	9.5	32.0	5.5	18.0	102.95	103.48

Grade Control Woody Riffles

Structure ID	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
WR31	11+83.00	105.20	12+04.00	105.12	4.0	21.0	0.36%
WR32	14+23.00	104.76	14+43.00	104.69	4.0	20.0	0.37%
WR33	15+66.00	104.50	15+86.00	104.45	4.0	20.0	0.28%
WR34	16+16.00	104.41	16+36.00	104.34	4.0	20.0	0.39%
WR35	17+54.00	104.16	17+68.00	104.09	4.0	14.0	0.56%
WR36	19+94.00	103.73	20+14.00	103.64	4.0	20.0	0.43%
WR37	21+32.00	103.48	21+52.00	103.39	4.0	20.0	0.46%
WR38	22+88.00	103.20	23+08.00	103.13	4.0	20.0	0.34%
WR39	23+62.00	103.06	23+82.00	103.00	4.0	20.0	0.28%

Constructed Riffles

Structure ID	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CR3	10+40.00	105.46	10+65.00	105.37	4.0	25.0	0.37%
CR4	24+30.00	102.94	24+50.90	102.90	4.0	20.9	0.18%

STRUCTURE TABLES - UT2

Log Vanes

Structure ID	Station at Point 2	Arm			Log Length (ft)	Elevation (ft)	
		Length (ft)	Angle (deg)	Slope (%)		Pt 1	Pt 2
LV58	11+88.00	9.0	26.0	5.5	17.0	105.95	106.45
LV59	12+33.00	8.0	29.0	6.0	16.0	105.64	106.12
LV60	12+89.00	8.0	29.0	6.0	16.0	105.37	105.85
LV61	13+44.00	9.0	26.0	5.5	17.0	105.05	105.55
LV62	13+97.00	8.0	29.0	5.5	16.0	104.76	105.20
LV63	14+49.00	8.0	29.0	6.0	16.0	104.43	104.91
LV64	15+11.00	8.0	29.0	6.0	16.0	104.10	104.58
LV65	15+73.00	9.0	26.0	5.5	17.0	103.72	104.22
LV66	16+52.00	9.0	25.0	5.5	17.0	103.25	103.75
LV67	17+09.00	9.0	26.0	5.0	17.0	103.18	103.63
LV68	17+65.00	9.0	26.0	5.0	17.0	103.11	103.56
LV69	18+20.00	9.0	26.0	5.0	17.0	103.05	103.50
LV70	18+88.00	7.5	30.0	5.5	16.0	102.98	103.39
LV71	19+50.00	9.0	26.0	5.0	17.0	102.90	103.35

Grade Control Woody Riffles

Structure ID	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
WR40	12+18.00	105.94	12+33.00	105.69	3.0	15.0	1.67%
WR41	12+74.00	105.62	12+89.00	105.42	3.0	15.0	1.33%
WR42	13+27.00	105.31	13+44.00	105.10	3.0	17.0	1.24%
WR43	13+80.00	105.01	13+97.00	104.81	3.0	17.0	1.18%
WR44	14+33.00	104.70	14+49.00	104.48	3.0	16.0	1.37%
WR45	14+90.00	104.37	15+11.00	104.15	3.0	21.0	1.05%
WR46	15+53.00	104.01	15+73.00	103.77	3.0	20.0	1.20%
WR47	16+95.00	103.28	17+09.00	103.23	3.0	14.0	0.36%
WR48	18+05.00	103.14	18+20.00	103.10	3.0	15.0	0.27%
WR49	19+23.00	103.00	19+50.00	102.95	3.0	27.0	0.19%

Constructed Riffles

Structure ID	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CR5	19+80.00	102.93	19+96.72	102.90	3.0	16.7	0.18%
CR6	10+00.00	107.85	10+50.00	106.78	3.0	50.0	2.14%
CR7	11+20.27	106.43	11+40.00	106.33	3.0	19.7	0.50%

10/5/2018
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REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	KLT	EMP	9/13/17
2	REVISED 70% MITIGATION PLAN	KLT	EMP	6/13/18
3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

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ALLIANCE HEADWATERS
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DMS PROJECT NO.: 97086

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559 JONES FRANKLIN ROAD, SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036254 10/05/18 EMMETT PERDUE

PROJECT # 074 | SHEET NO. 3B

TABLES

STRUCTURE TABLES - UT3

Log Vanes

Structure ID	Station at Point 2	Arm			Log Length (ft)	Elevation (ft)	
		Length (ft)	Angle (deg)	Slope (%)		Pt 1	Pt 2
LV72	10+01.00	9.0	26.0	5.0	17.0	116.77	117.22
LV73	10+50.00	8.0	29.0	5.0	16.0	116.23	116.63
LV74	11+04.00	8.0	29.0	5.0	16.0	115.58	115.98
LV75	11+59.00	8.0	28.0	5.0	16.0	115.35	115.75
LV76	12+27.00	9.0	26.0	5.0	17.0	115.09	115.54
LV77	13+08.00	8.5	27.0	5.0	17.0	114.78	115.21
LV78	13+68.00	8.5	27.0	5.0	17.0	114.54	114.97
LV79	14+27.00	8.5	27.0	5.0	17.0	114.33	114.76
LV80	14+72.00	8.5	27.0	5.0	17.0	114.15	114.58
LV81	15+34.00	9.5	24.0	5.0	18.0	113.91	114.38
LV82	15+88.00	9.0	25.0	5.0	17.0	113.70	114.15
LV83	16+38.80	8.5	32.0	5.5	17.0	113.34	113.80
LV84	16+94.00	10.5	27.0	5.5	19.0	113.13	113.70
LV85	17+53.00	8.5	32.0	6.0	17.0	112.92	113.43
LV86	18+15.00	9.5	29.0	5.5	18.0	112.69	113.22
LV87	18+81.00	8.5	32.0	6.0	17.0	112.47	112.98
LV88	19+49.00	8.5	33.0	5.5	17.0	112.25	112.72
LV89	20+25.00	9.5	29.0	5.5	18.0	111.96	112.49
LV90	20+85.00	9.0	30.0	5.5	17.0	111.75	112.25
LV91	21+72.00	10.0	28.0	5.5	18.0	111.43	111.98
LV92	22+62.00	8.5	33.0	5.5	17.0	111.13	111.60
LV93	23+18.00	8.5	33.0	5.5	17.0	110.93	111.40
LV94	23+88.00	9.5	29.0	5.5	18.0	110.67	111.19
LV95	24+45.00	8.5	33.0	6.0	17.0	110.47	110.98
LV96	25+09.00	9.0	30.0	5.5	17.0	110.22	110.71
LV97	25+87.00	9.5	29.0	5.5	18.0	109.95	110.47
LV98	26+61.00	9.5	29.0	5.5	18.0	109.52	110.04
LV99	27+27.00	9.0	31.0	5.5	17.0	109.16	109.65
LV100	28+00.00	10.0	39.0	5.5	18.0	108.78	109.33

Grade Control Woody Riffles

Structure ID	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
WR50	11+51.00	115.45	11+59.00	115.40	3.0	8.0	0.64%
WR51	12+13.00	115.22	12+27.00	115.14	3.0	14.0	0.58%
WR52	13+55.00	114.67	13+68.00	114.59	3.0	13.0	0.62%
WR53	14+59.00	114.29	14+72.00	114.20	3.0	13.0	0.67%
WR54	15+21.00	114.03	15+34.00	113.96	3.0	13.0	0.58%
WR55	17+38.00	113.05	17+53.00	112.97	3.7	15.0	0.54%
WR56	18+65.00	112.61	18+81.00	112.52	3.7	16.0	0.51%
WR57	20+10.00	112.08	20+25.00	112.01	3.7	15.0	0.47%
WR58	21+57.00	111.55	21+72.00	111.48	3.7	15.0	0.49%
WR59	23+03.00	111.06	23+18.00	110.98	3.7	15.0	0.52%
WR60	24+31.00	110.59	24+45.00	110.52	3.7	14.0	0.55%
WR61	25+72.00	110.08	25+87.00	110.00	3.7	15.0	0.51%
WR62	27+85.00	108.93	28+00.00	108.83	3.7	15.0	0.68%

Constructed Riffles

Structure ID	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CR8	10+40.00	116.47	10+50.00	116.28	3.0	10.0	1.93%
CR9	10+94.00	115.81	11+04.00	115.63	3.0	10.0	1.81%
CR10	16+09.00	113.75	16+38.80	113.39	3.0	29.8	1.21%
CR11	27+13.00	109.32	27+27.00	109.21	3.7	14.0	0.82%
CR12	28+08.00	108.83	28+24.00	108.74	3.7	16.0	0.56%
CR13	28+92.00	108.55	29+14.86	108.20	3.7	22.9	1.53%

STRUCTURE TABLES - UT4

Log Vanes

Structure ID	Station at Point 2	Arm			Log Length (ft)	Elevation (ft)	
		Length (ft)	Angle (deg)	Slope (%)		Pt 1	Pt 2
LV101	10+74.00	6.5	30.0	6.5	15.0	115.61	116.03
LV102	11+18.00	7.0	29.0	7.0	15.0	114.96	115.45
LV103	11+76.00	6.0	32.0	6.0	14.0	114.75	115.11
LV104	12+26.00	7.5	26.0	5.0	16.0	114.52	114.90
LV105	13+02.00	7.5	26.0	5.0	16.0	114.22	114.60
LV106	13+66.00	6.0	32.0	6.0	14.0	113.99	114.35
LV107	14+13.00	6.5	30.0	5.5	15.0	113.76	114.12
LV108	14+56.00	7.0	28.0	5.5	15.0	113.58	113.96
LV109	15+05.00	7.5	27.0	5.0	16.0	113.36	113.74

Grade Control Woody Riffles

Structure ID	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
WR63	11+66.00	114.86	11+76.00	114.80	2.6	10.0	0.57%
WR64	12+15.00	114.65	12+26.00	114.57	2.6	11.0	0.67%
WR65	13+55.00	114.10	13+66.00	114.04	2.6	11.0	0.58%
WR66	14+45.00	113.71	14+56.00	113.63	2.6	11.0	0.80%
WR67	14+95.00	113.49	15+05.00	113.41	2.6	10.0	0.75%

Constructed Riffles

Structure ID	Point 1		Point 2		Bottom Width	Length	Slope
	Station	Elevation	Station	Elevation			
CR14	10+64.00	115.88	10+74.00	115.66	2.6	10.0	2.19%
CR15	11+08.00	115.26	11+18.00	115.01	2.6	10.0	2.50%

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	KLT	EMP	9/13/17
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3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

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PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE 10/05/18

10/5/2018
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TABLES

VEGETATION SELECTION

TEMPORARY SEEDING

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

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

Total Planting Area for Temporary Seeding **57.1** *acre(s)*

PERMANENT SEEDING - Zones 1 and 2

This permanent herbaceous seed mixture shall be planted in all disturbed areas as specified on the plans as Zones 1 and 2. This permanent herbaceous seed mixture shall be applied with temporary seed, as defined in the construction specifications. Permanent seed for this zone shall be applied at a rate of **20 lbs/acre**.

RIPARIAN AND WETLAND BUFFER SEED MIX

Scientific Name	Common Name	by Species	Indicator Status
Panicum virgatum	Switchgrass	23%	FAC
Elymus riparius	Riverbank Wildrye	20%	FACW
Panicum dichotomiflorum	Smooth Panicgrass	14%	FACW
Carex vulpinoidea	Fox sedge	12%	OBL
Panicum rigidulum	Redtop Panicgrass	8%	FACW
Dichanthelium clandestinum	Deer-tongue	8%	FAC
Bidens frondosa (or aristosa)	Beggars Tick	7%	FACW
Juncus effusus	Soft Rush	4%	FACW
Persicaria pensylvanica	Pennsylvania smartweed	2%	FACW
Sparganium americanum	American Bur Reed	2%	OBL
	Total	**100%**	

Total Planting Area for Permanent Seeding: Zones 1 and 2 **45.2** acre(s)

PERMANENT SEEDING - Upland Buffer - Zone 3

This permanent herbaceous seed mixture shall be planted in all disturbed areas as specified on the plans as Zone 3. This permanent herbaceous seed mixture shall be applied with temporary seed, as defined in the construction specifications. Permanent seed for this zone shall be applied at a rate of 20 lbs/acre.

UPLAND BUFFER SEED MIX

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

Total Planting Area for Permanent Seeding: Zone 3 **6.1** acre(s)

ZONE 1 - Live Staking

Live stakes will be installed as shown on plans and details at a 5 x 5 spacing (1,742 live stakes/acre). To ensure the proper quantity during construction, an additional 10% was added to each of the species totals. These adjusted values are shown below. **Note:** See plan sheets and details for live stake planting locations.

Scientific Name	Common Name	Percent Planted by Species	Wetland Indicator Status
Cephalanthus occidentalis	Button bush	25%	OBL
Cornus amomum	Silky dogwood	50%	FACW
Salix nigra	Black willow	10%	OBL
Sambucus canadensis	Elderberry	15%	FAC
	Total	**100%**	

Total Planting Area for Livestakes **0.30**

ZONE 2 - Riparian and Wetland Buffer

Riparian and wetland vegetation species (bare-roots) shall be planted in the areas as designated on the plans and details. Species shall be planted at an overall density of 680 stems/acre, using the mixture of species and percentages listed below.

Scientific Name	Common Name	Percent Planted	Wetland Indicator Status
Betula nigra	River Birch	7%	FACW
Carpinus caroliniana	Ironwood	4%	FAC
Liriodendron tulipifera	Tulip Poplar	7%	FACU
Magnolia virginiana	Sweet Bay	4%	FACW
Nyssa biflora	Swamp Black Gum	7%	OBL
Persea palustris	Red Bay	4%	FACW
Quercus laurifolia	Laurel Oak	15%	FACW
Quercus lyrata	Overcup Oak	15%	OBL
Quercus michauxii	Swamp Chestnut Oak	15%	FACW
Taxodium distichum	Bald Cypress	15%	OBL
Ulmus americana	American elm	7%	FAC
	Total	**100%**	

Total Planting Area for Riparian Vegetation **43.8** acre(s)

ZONE 3 - Upland Buffer

Upland vegetation species (bare-roots) shall be planted in the areas as designated on the plans and details. Species shall be planted at an overall density of 680 stems/acre, using the mixture of species and percentages listed below.

Scientific Name	Common Name	Percent Planted	Wetland Indicator Status
Acer saccharum	Sugar Maple	4%	FACU
Diospyros virginiana	Persimmon	4%	FAC
Liriodendron tulipifera	Tulip Poplar	12%	FACU
Nyssa sylvatica	Black Gum	12%	FAC
Prunus serotina	Black Cherry	4%	FACU
Quercus alba	White Oak	26%	FACU
Quercus michauxii	Swamp Chestnut Oak	12%	FACW
Quercus pagoda	Cherrybark Oak	26%	FAC
	Total	**100%**	

Total Planting Area for Upland Vegetation **6.1** acre(s)

10/5/2018
R:\PROJECTS\RDU\074_RS-ALLIANCEHEADWATERS\CADD\PLANS\AHW_PSH_03C.DGN
MROON

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	KLT	EMP	9/13/17
2	REVISED 70% MITIGATION PLAN	KLT	EMP	6/13/18
3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:
RS
1101 HAYNES ST
RALEIGH, NC 27604

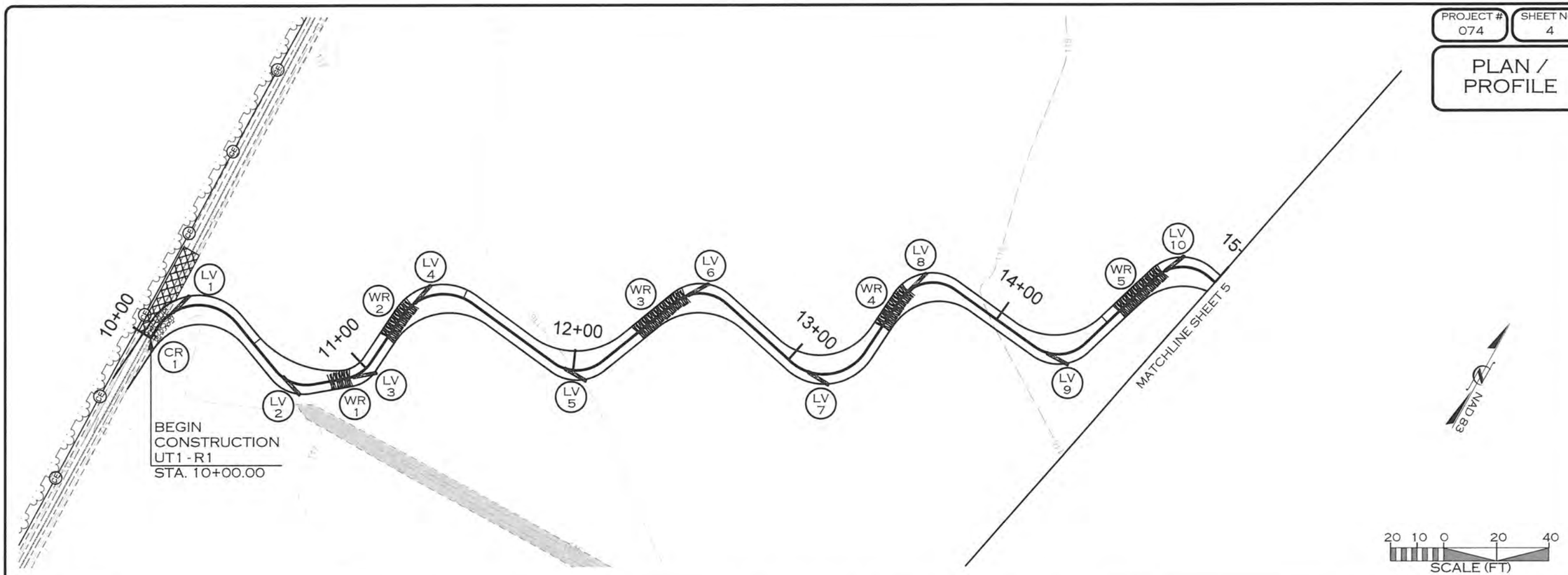
ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

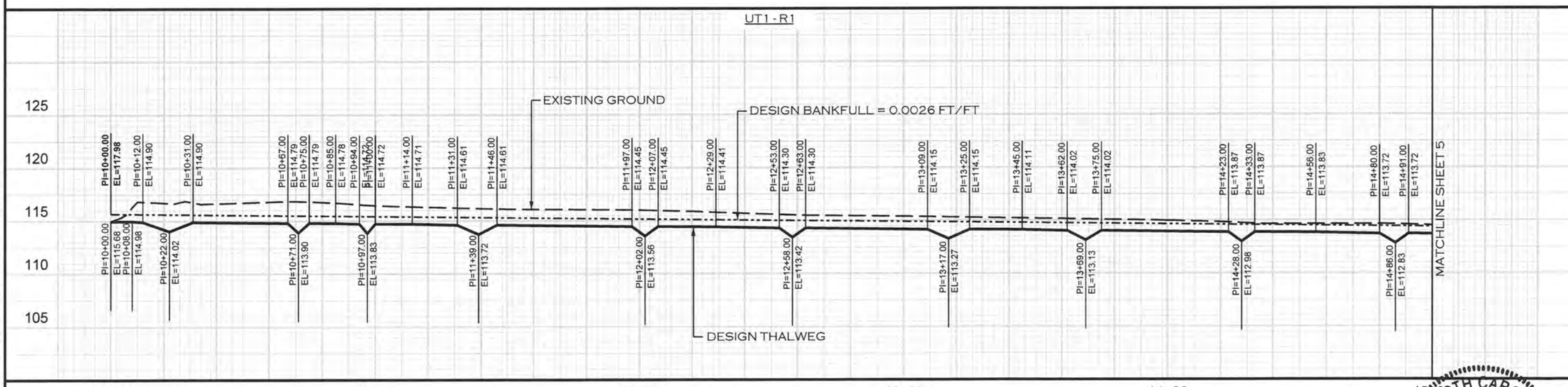
PREPARED IN THE OFFICE OF:
ECOSYSTEM PLANNING & RESTORATION
559 JONES FRANKLIN ROAD, SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE
10/05/18

PROJECT # 074 | SHEET NO. 4

PLAN / PROFILE





REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
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RESTORATION SYSTEMS, LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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559 JONES FRANKLIN RD. SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

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PROJECT ENGINEER

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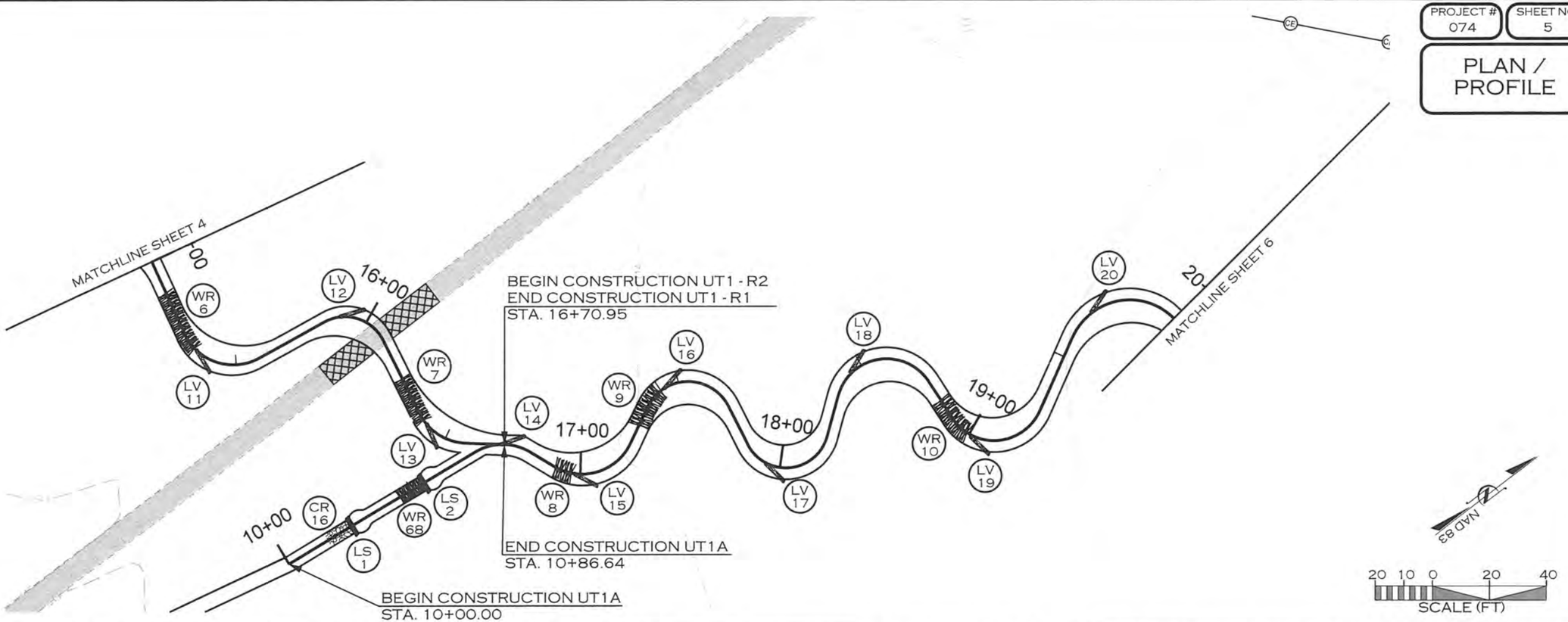
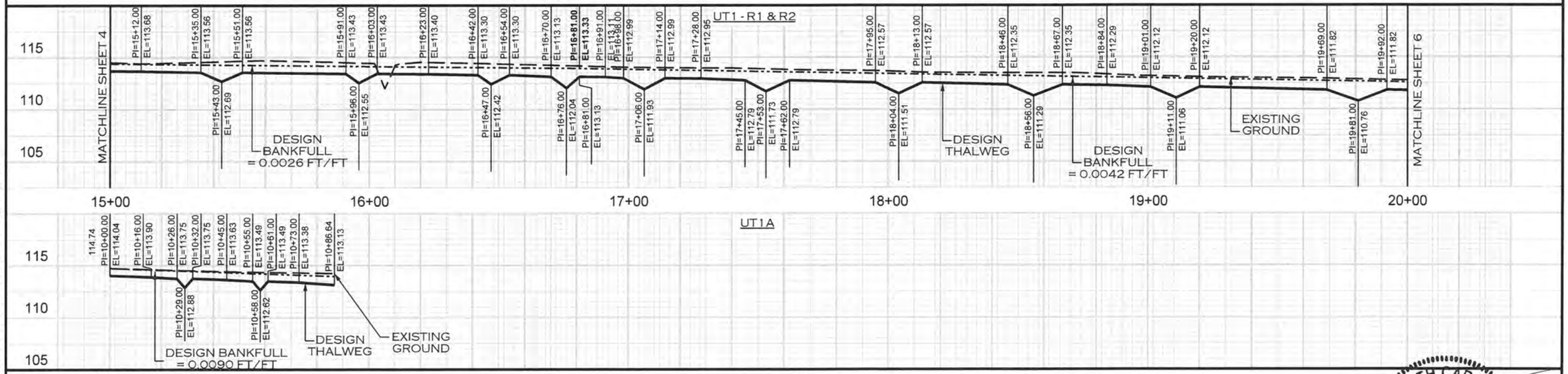
PROJECT # 074 | SHEET NO. 5

PLAN / PROFILE





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RESTORATION SYSTEMS, LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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559 JONES FRANKLIN RD, SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036254 ENGINEER EMMETT PERDUE

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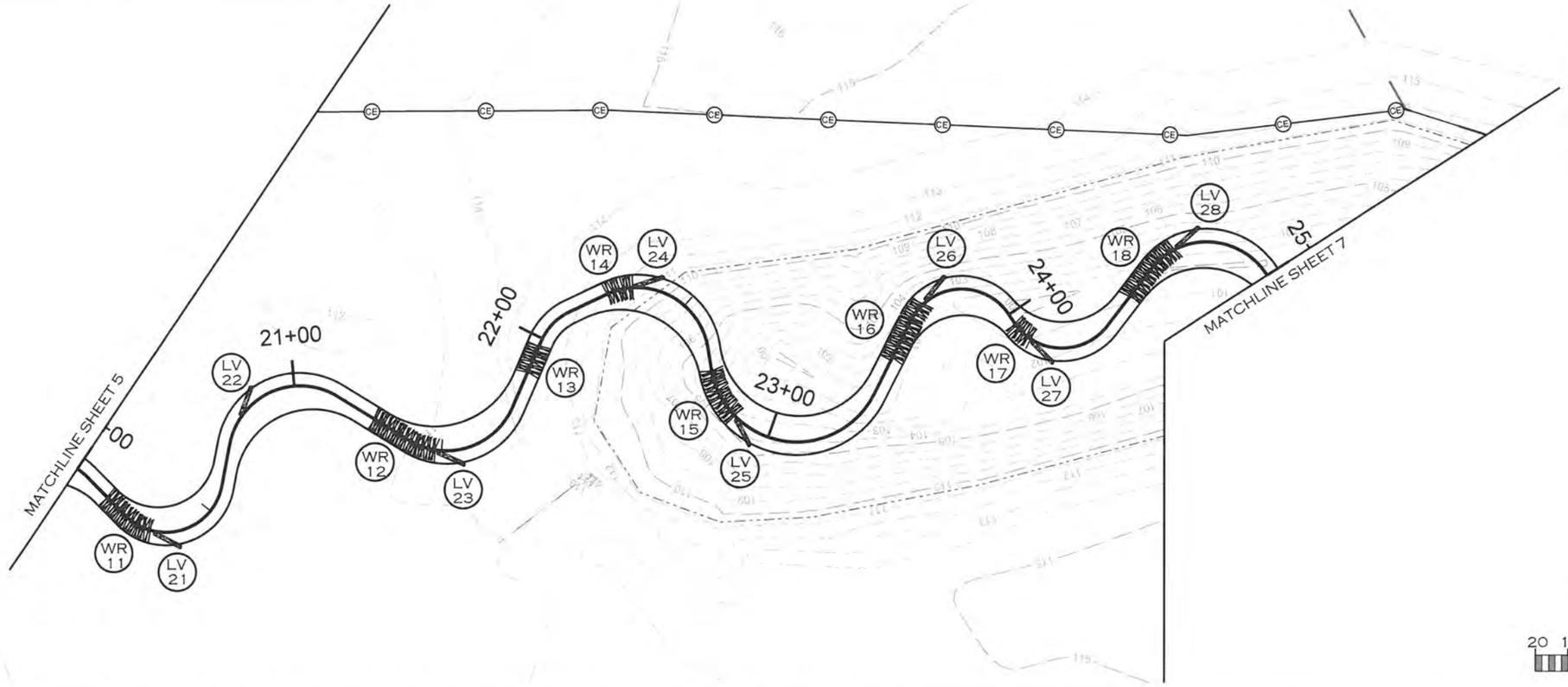
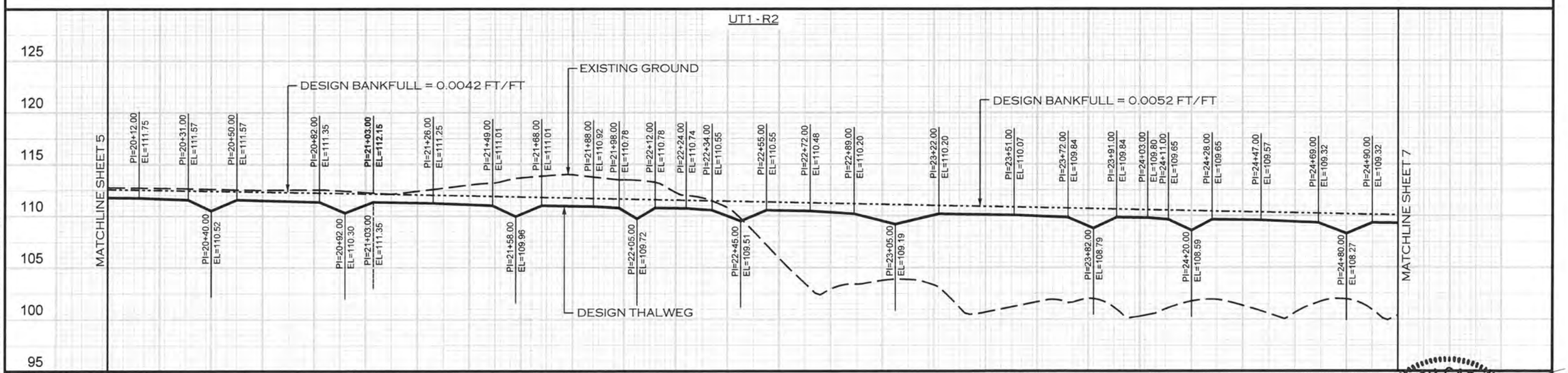
PROJECT # 074 | SHEET NO. 6

PLAN / PROFILE





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1101 HAYNES ST
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ALLIANCE HEADWATERS
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LICENSE # P-1182

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PROJECT ENGINEER

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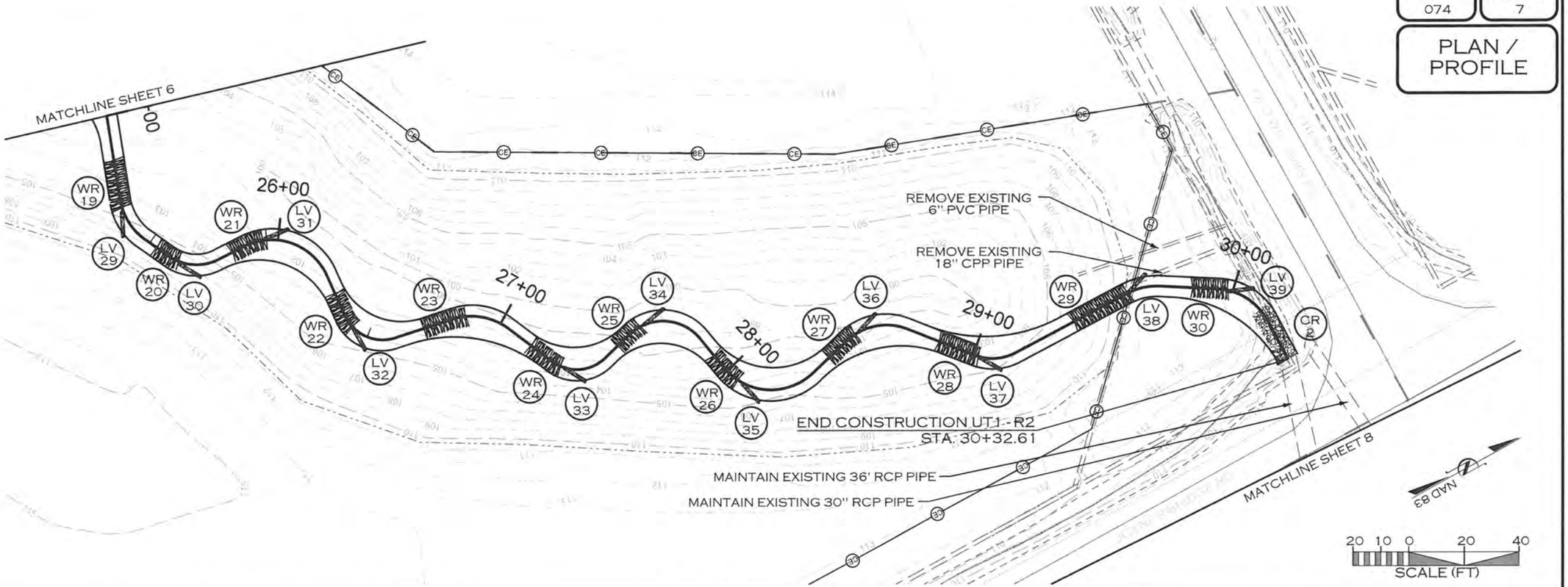
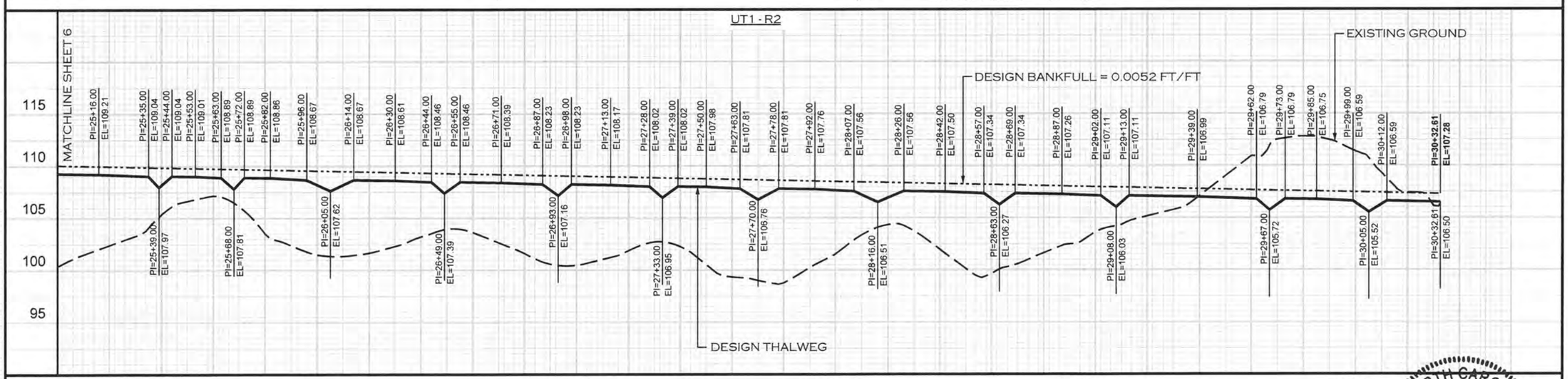
PROJECT # 074 | SHEET NO. 7

PLAN / PROFILE





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RESTORATION SYSTEMS, LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
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LICENSE # P-1182

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PROJECT ENGINEER

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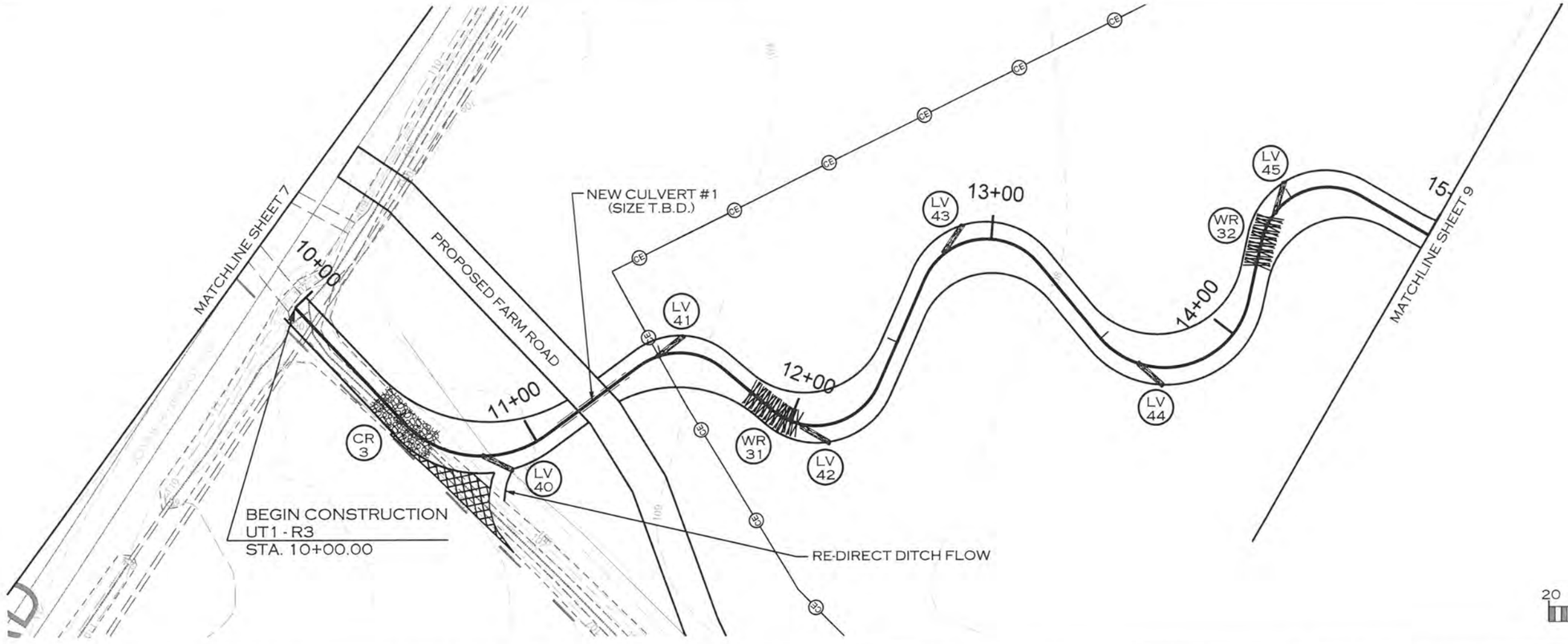
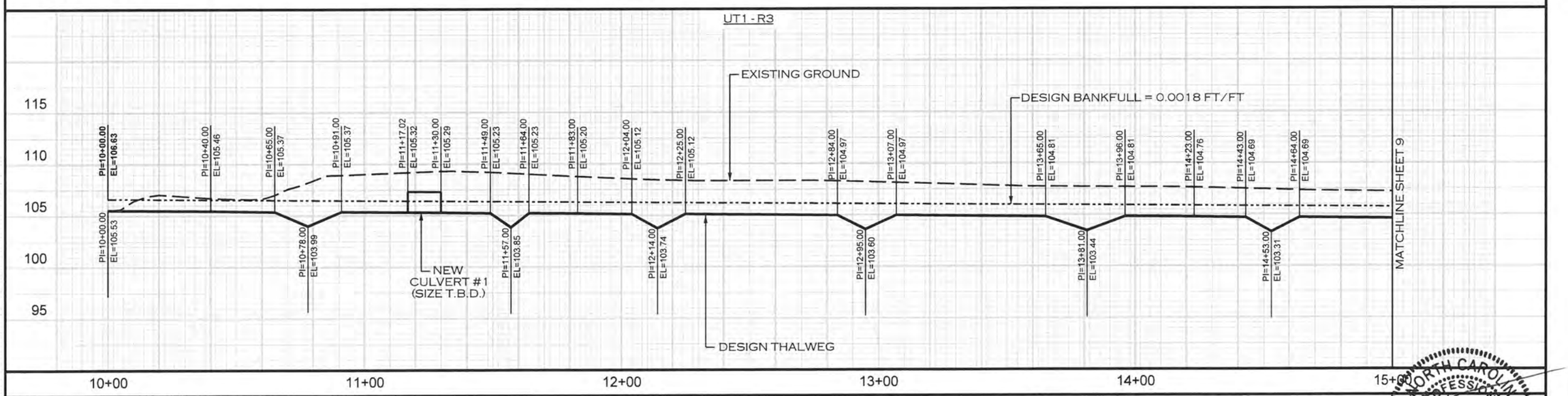
PROJECT # 074 | SHEET NO. 8

PLAN / PROFILE





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1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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559 JONES FRANKLIN RD. SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE
10/05/18

10/5/2018
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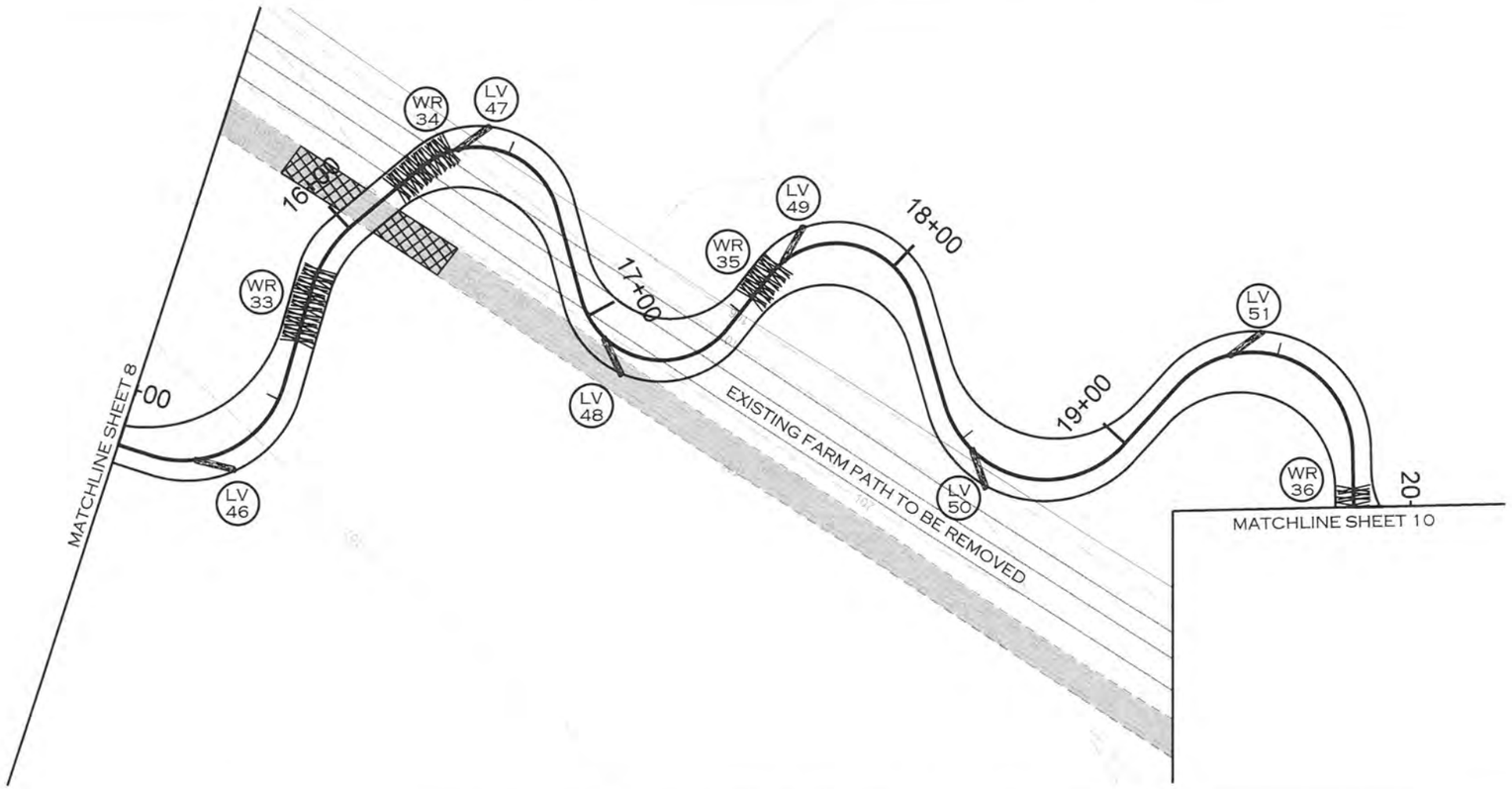
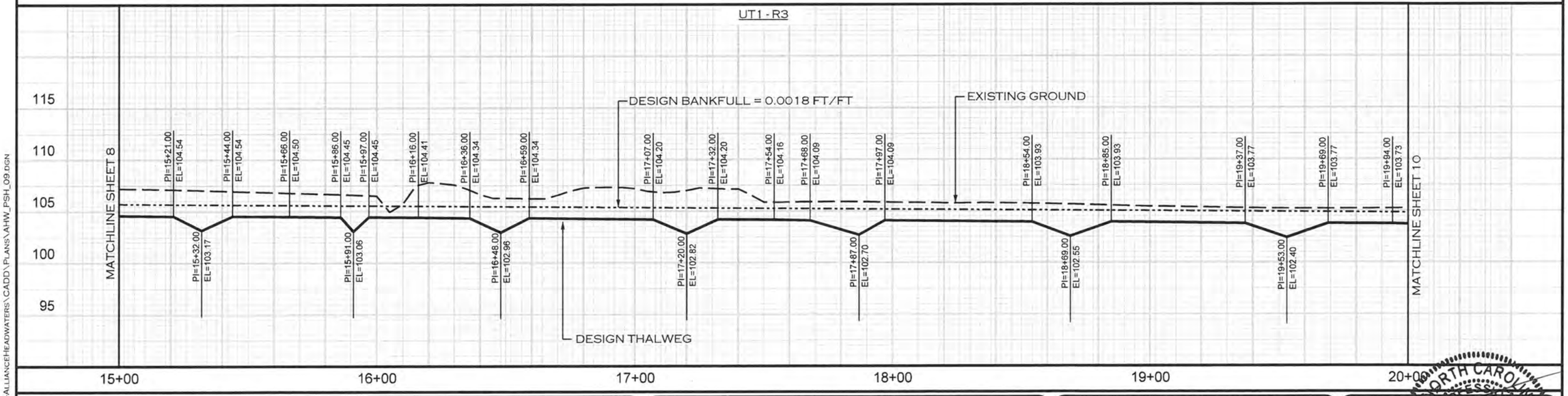
PROJECT # 074 | SHEET NO. 9

PLAN / PROFILE





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1101 HAYNES ST
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ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

PROJECT ENGINEER:
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE 10/05/16

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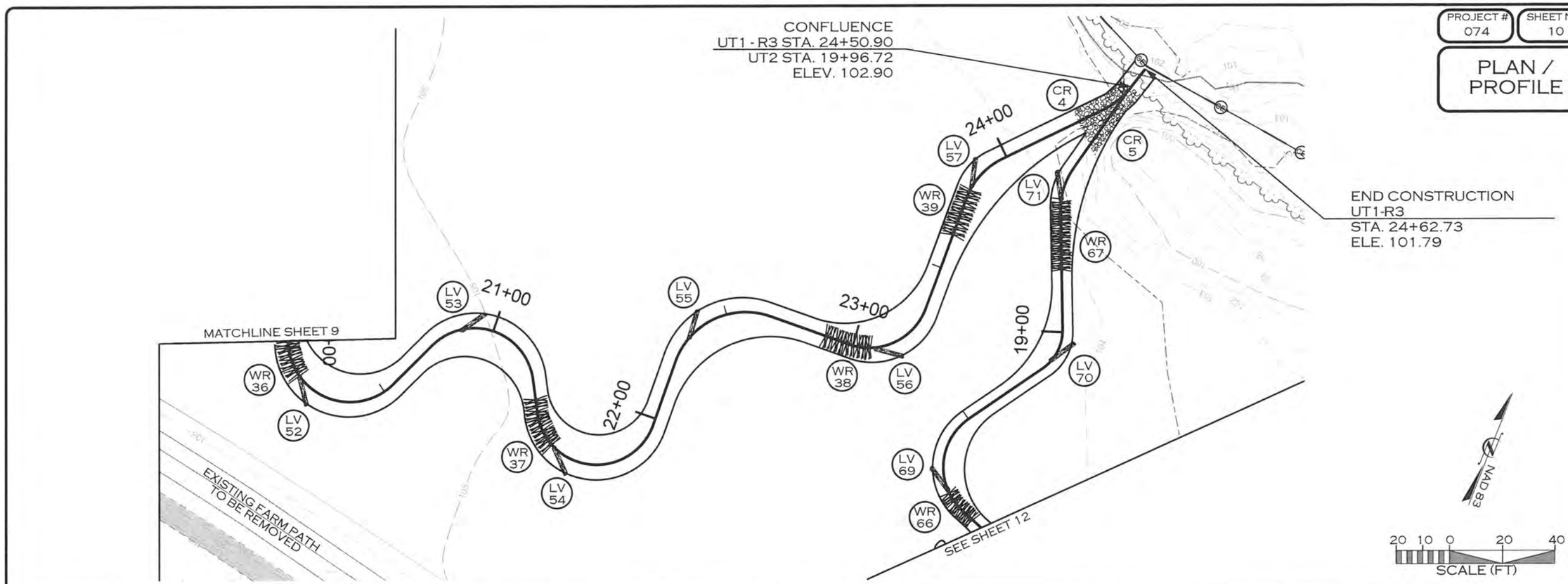
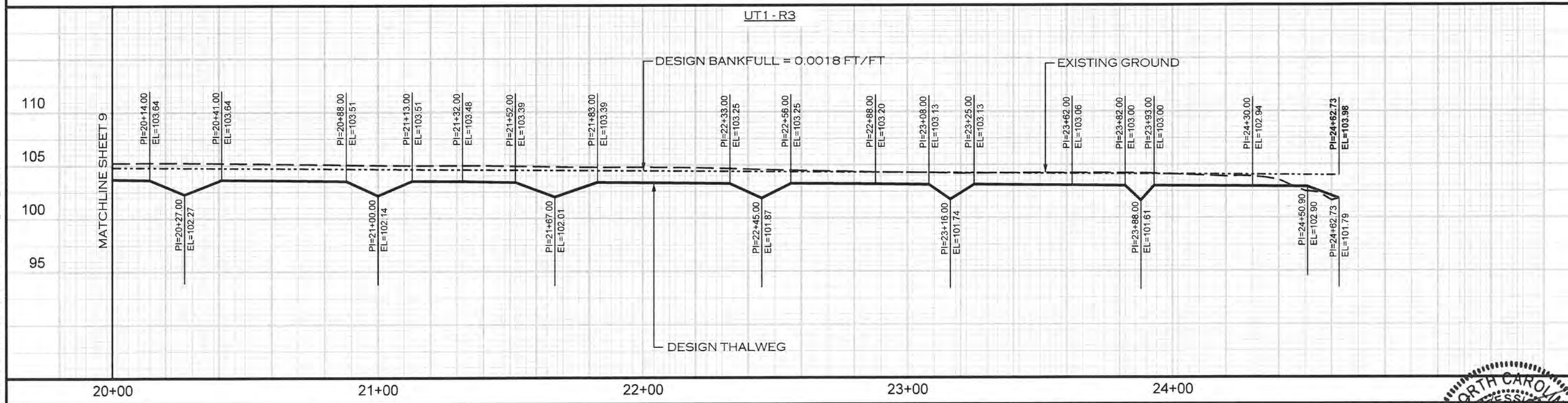
PROJECT # 074 | SHEET NO. 10

PLAN / PROFILE





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1101 HAYNES ST
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ALLIANCE HEADWATERS
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PROJECT ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE 10/05/18

10/5/2018
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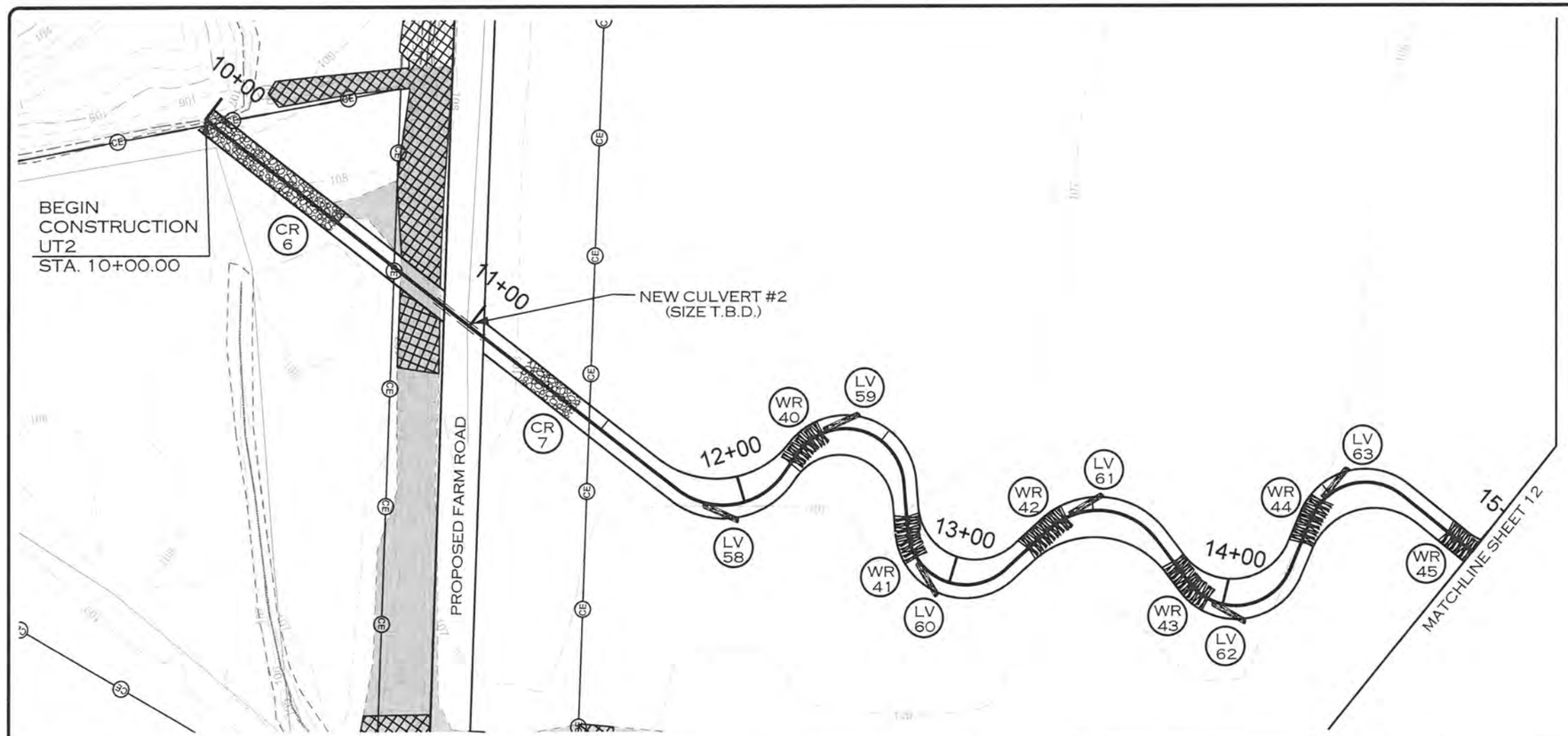
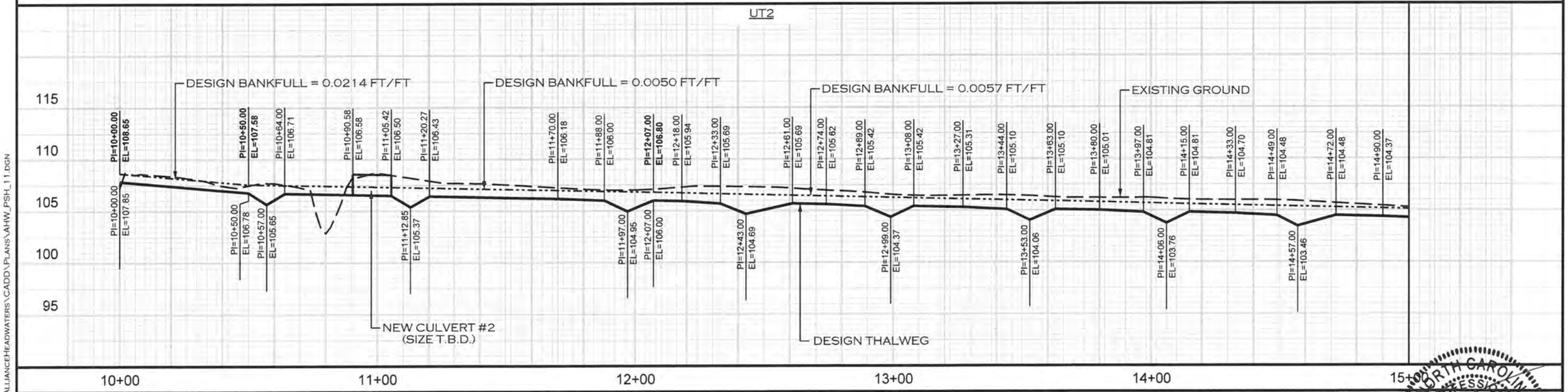
PROJECT # 074 | SHEET NO. 11

PLAN / PROFILE





REVISIONS				
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PREPARED FOR:
RESTORATION SYSTEMS, LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

PROJECT ENGINEER:
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE
10/05/2018

10/5/2018
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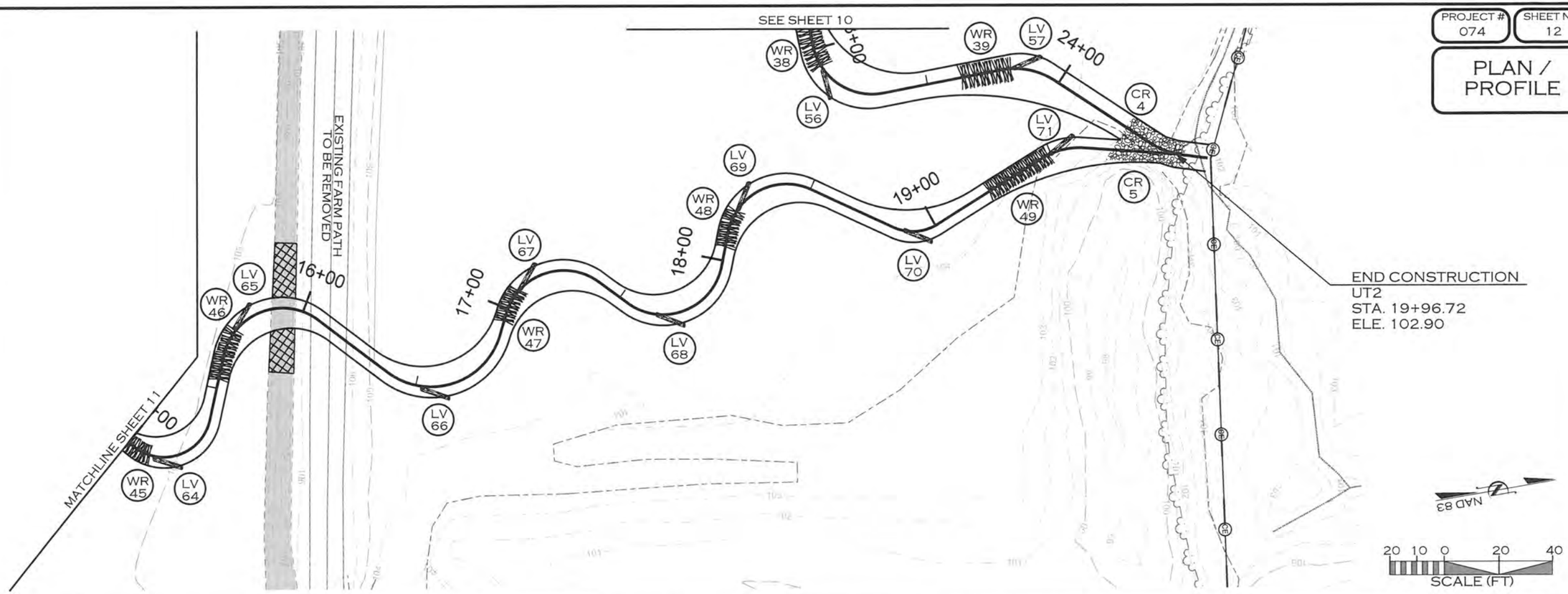
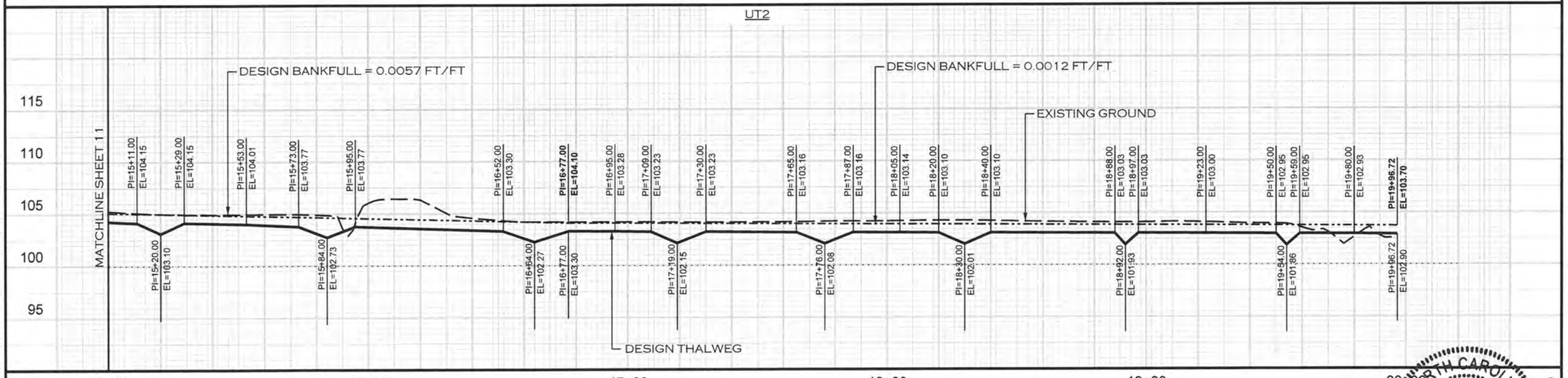
PROJECT # 074 | SHEET NO. 12

PLAN / PROFILE





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1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
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RALEIGH, NC 27606
LICENSE # P-1182

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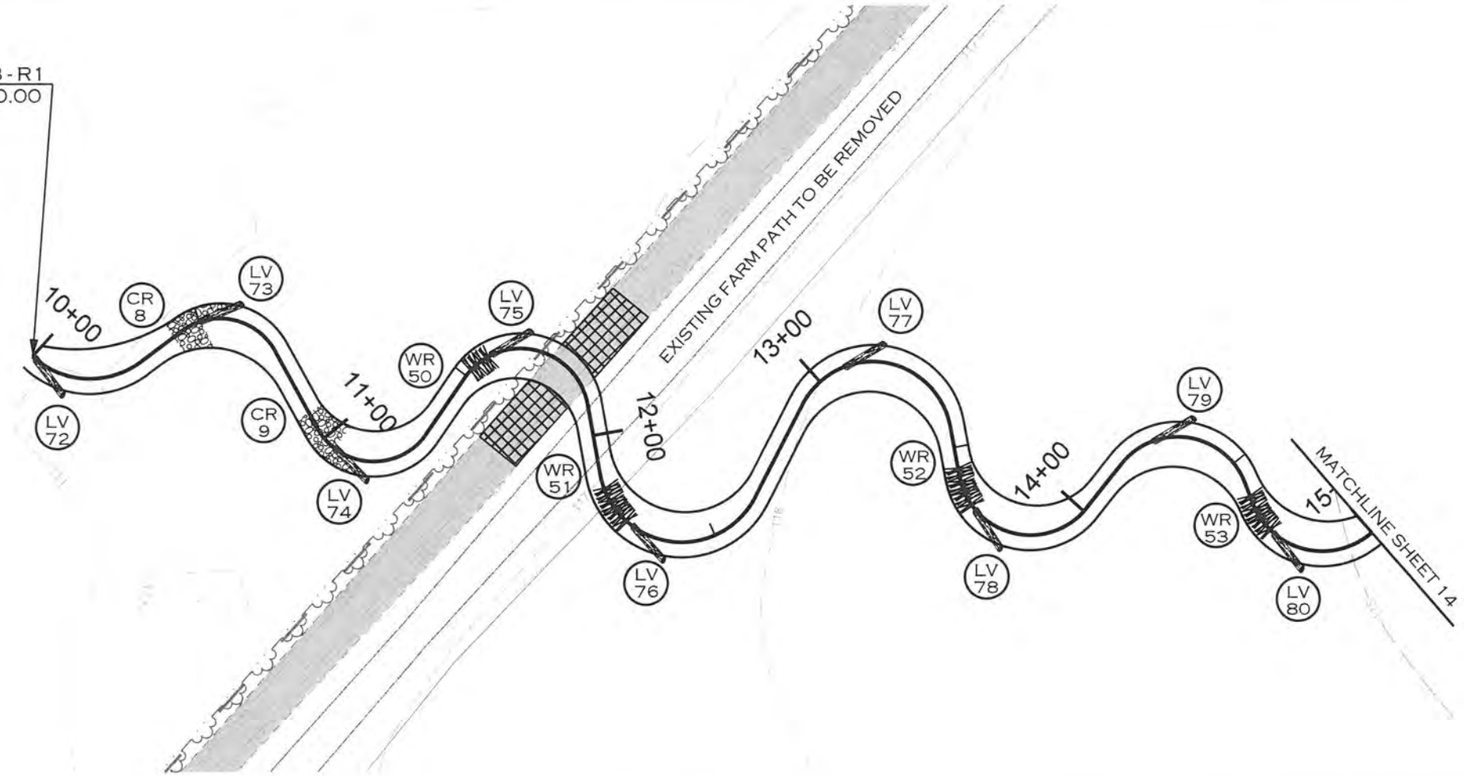
PLAN / PROFILE

BEGIN CONSTRUCTION UT3 - R1
STA. 10+00.00

NOTE:
BEGINNING OF UT3 WILL TRANSITION FROM EXISTING CHANNELS INSIDE WOODLINE PER ENGINEERS DIRECTION. DISTURBANCE WITHIN WOODS WILL BE MINIMIZED.



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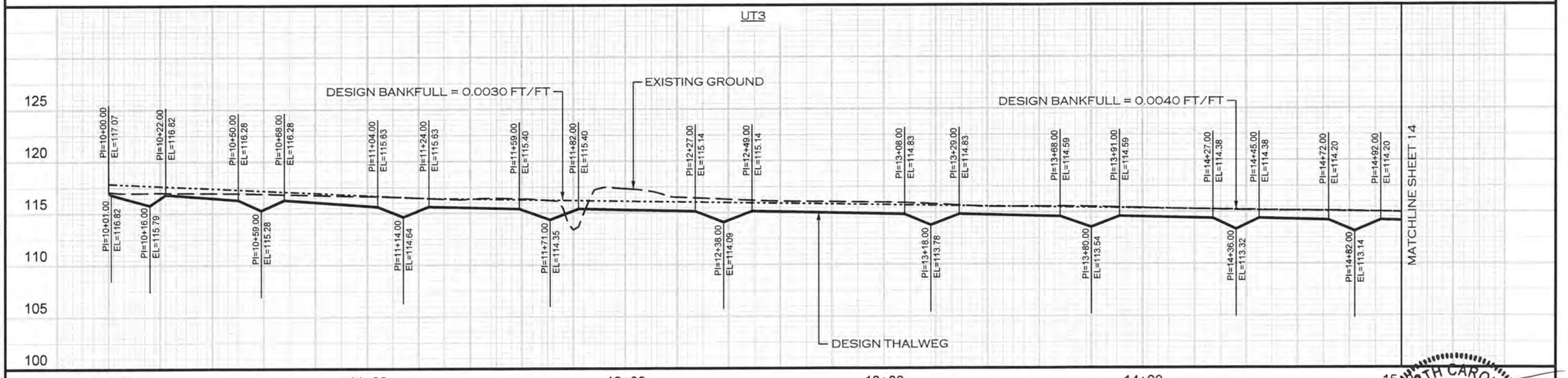
SCALE (FT)



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1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
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RALEIGH, NC 27606
LICENSE # P-1182

NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE
PROJECT ENGINEER
10/5/18

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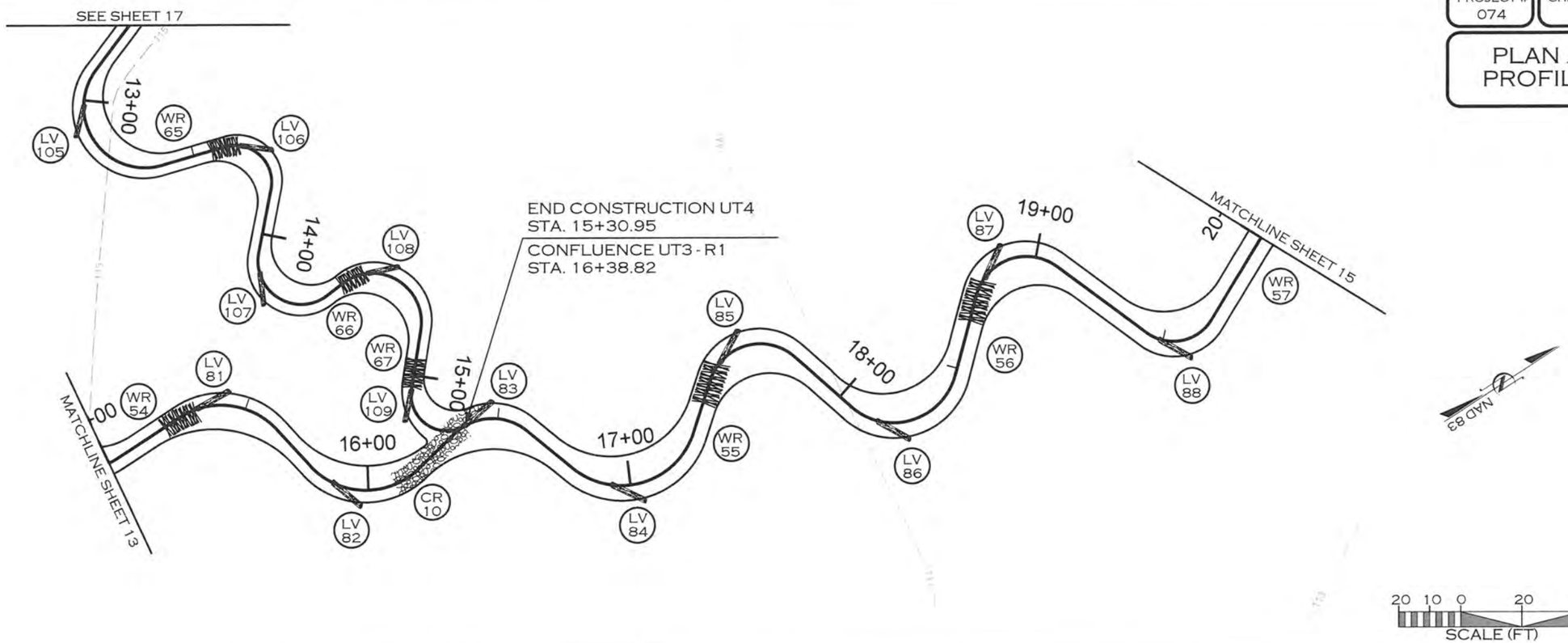
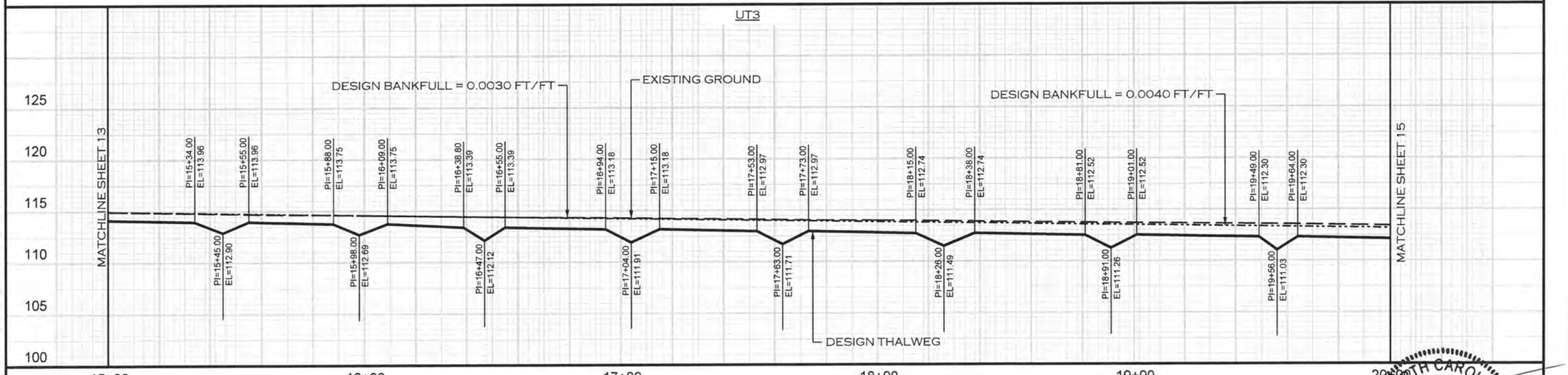
PROJECT # 074 | SHEET NO. 14

PLAN / PROFILE





REVISIONS				
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RESTORATION SYSTEMS, LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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559 JONES FRANKLIN RD. SUITE 150
RALEIGH, NC 27606
LICENSE # P-1182

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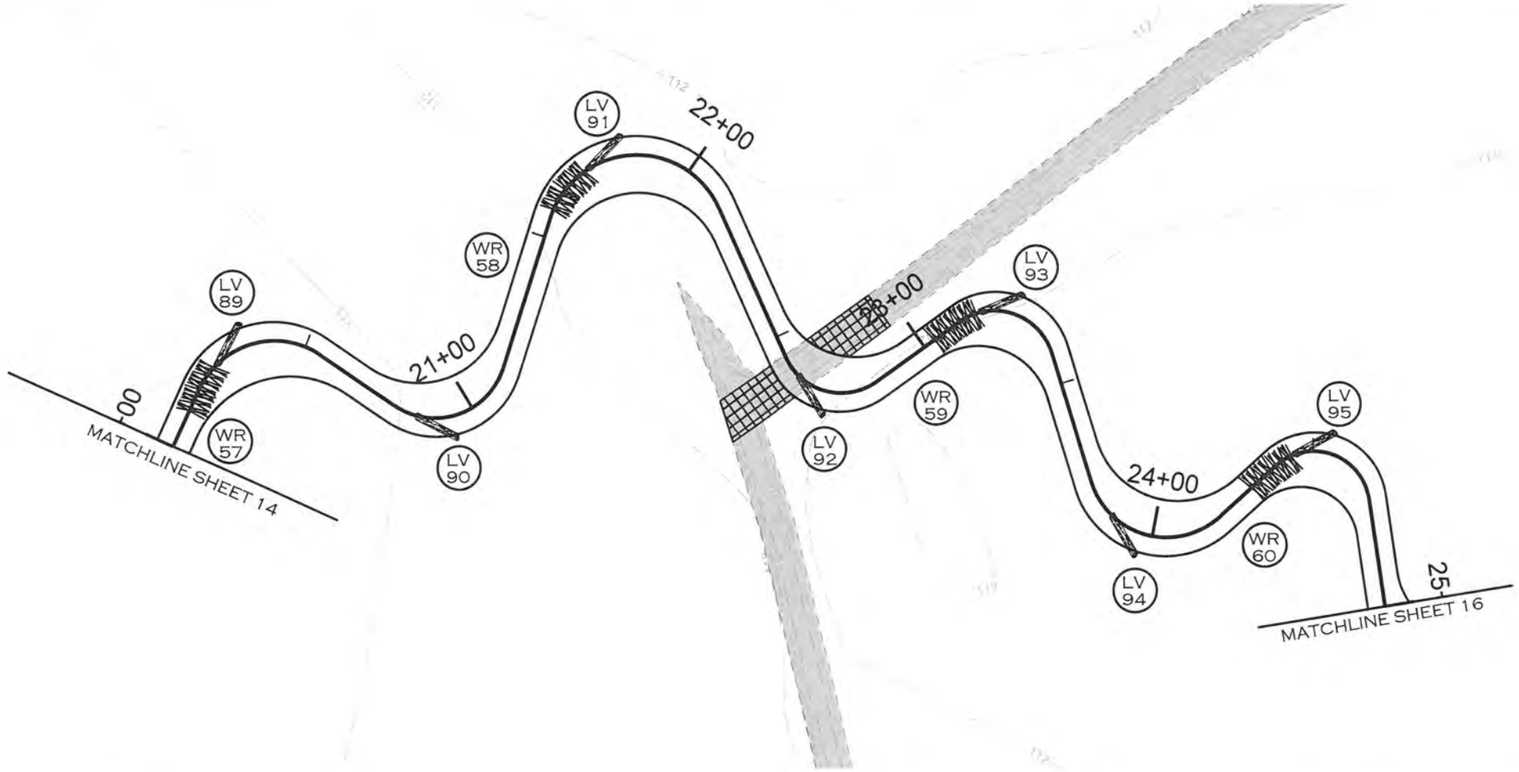
PROJECT # 074 | SHEET NO. 15

PLAN / PROFILE



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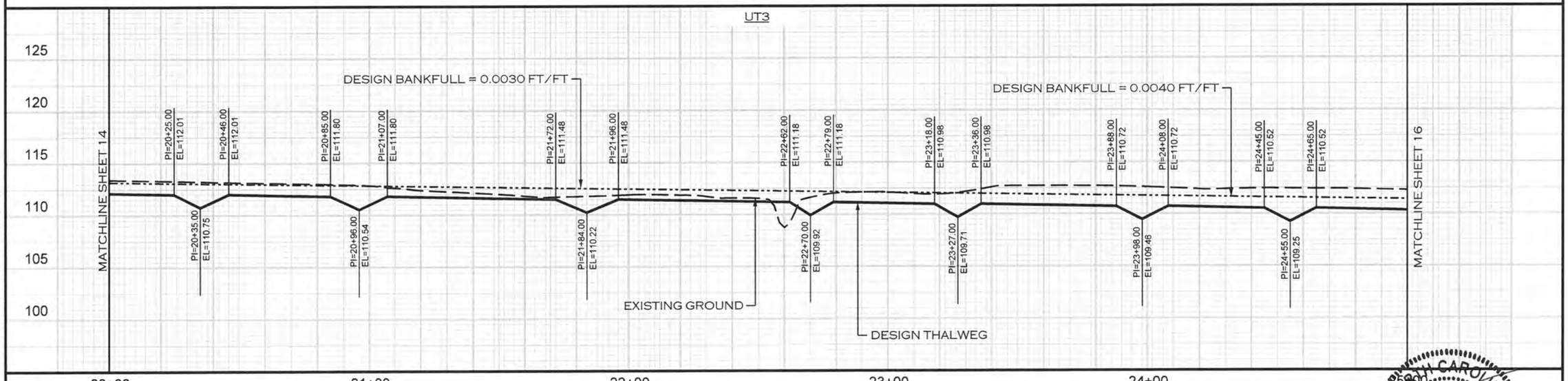

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PREPARED FOR:
RS RESTORATION SYSTEMS LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036254 10/05/18 ENGINEER EMMETT PERDUE

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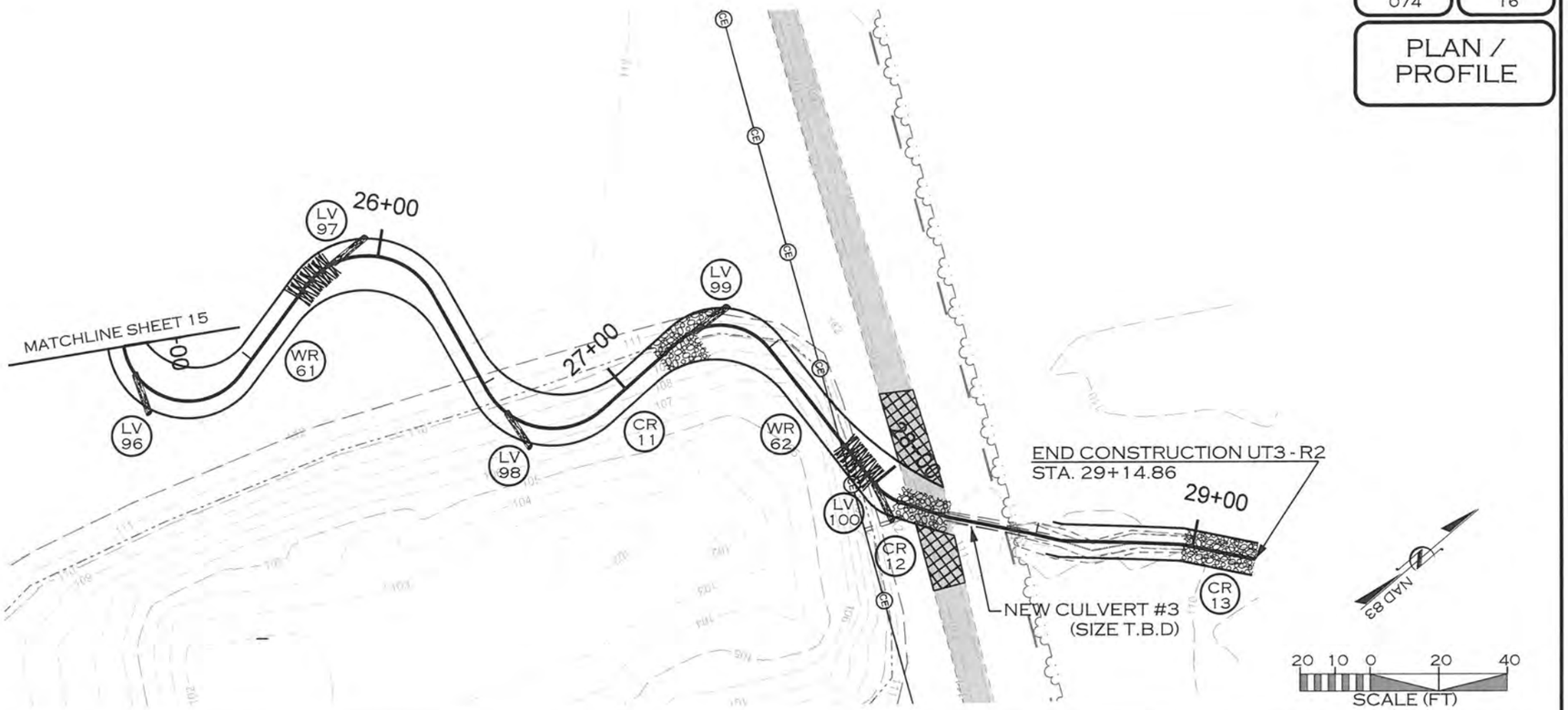
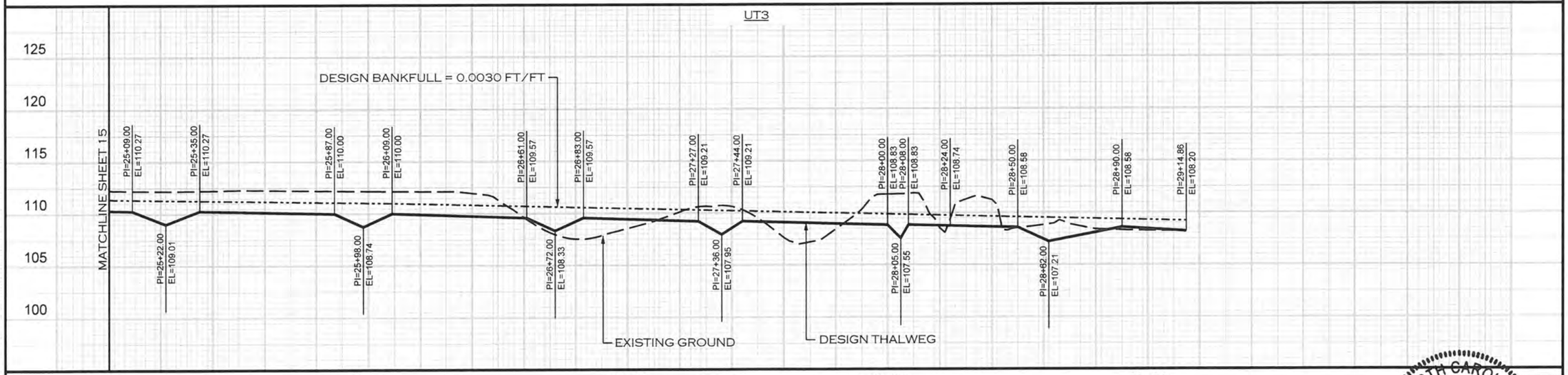
PROJECT # 074 | SHEET NO. 16

PLAN / PROFILE





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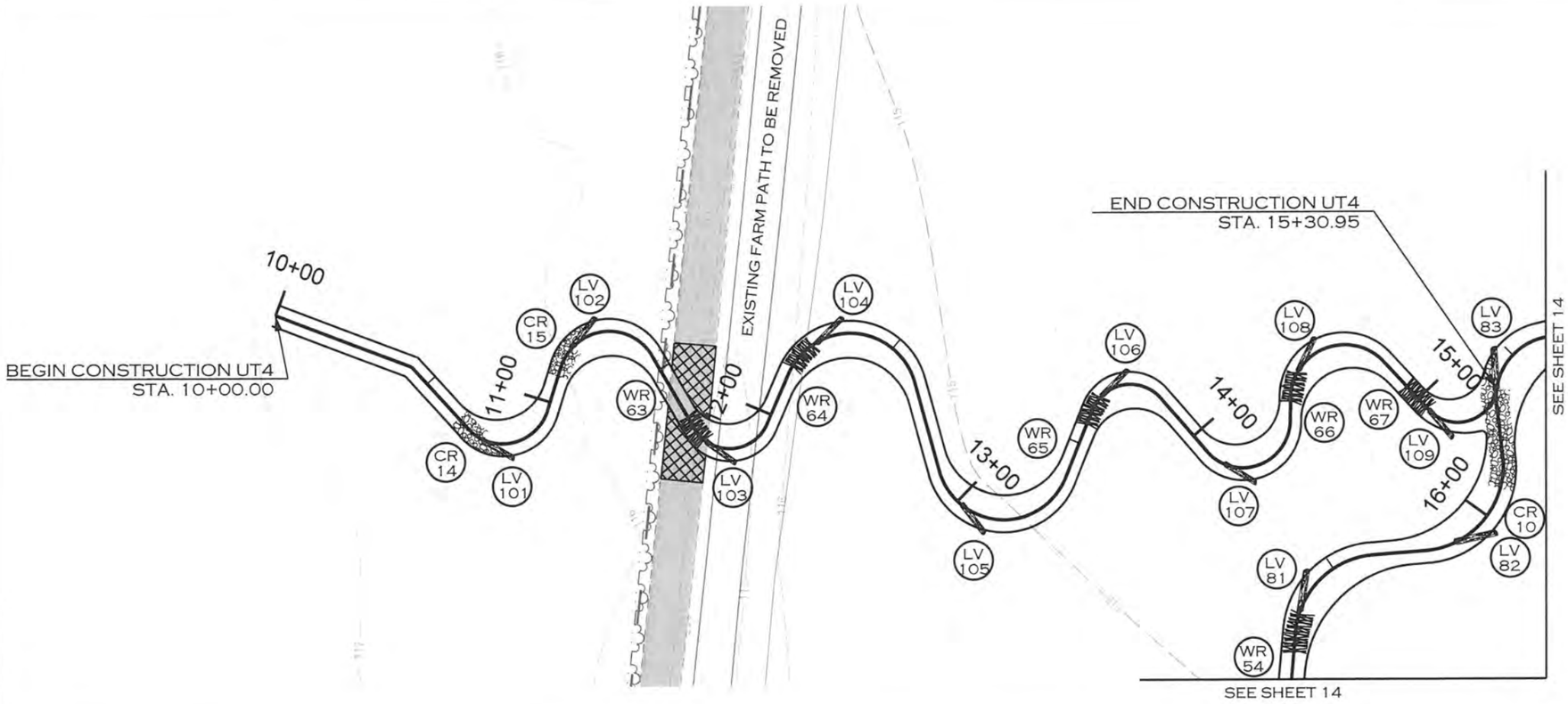
MKODY

PROJECT # 074 | SHEET NO. 17

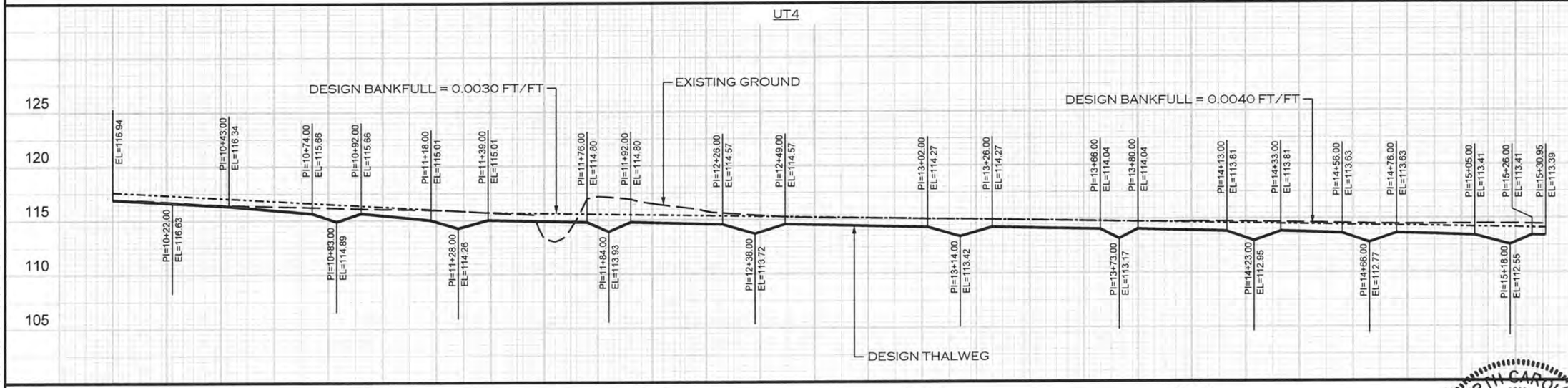
PLAN / PROFILE



NOTE:
BEGINNING OF UT4 WILL TRANSITION FROM EXISTING CHANNELS INSIDE WOODLINE PER ENGINEERS DIRECTION. DISTURBANCE WITHIN WOODS WILL BE MINIMIZED.

NAD 83

20 10 0 20 40
SCALE (FT)



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV	DATE
1	70% MITIGATION PLAN	KLT	EMP	9/13/17
2	REVISED 70% MITIGATION PLAN	KLT	EMP	6/13/18
3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

PREPARED FOR:
RESTORATION SYSTEMS, LLC
1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
DMS PROJECT NO.: 97086

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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036254 ENGINEER EMMETT PERDUE 10/2/18
PROJECT ENGINEER

10/5/2018
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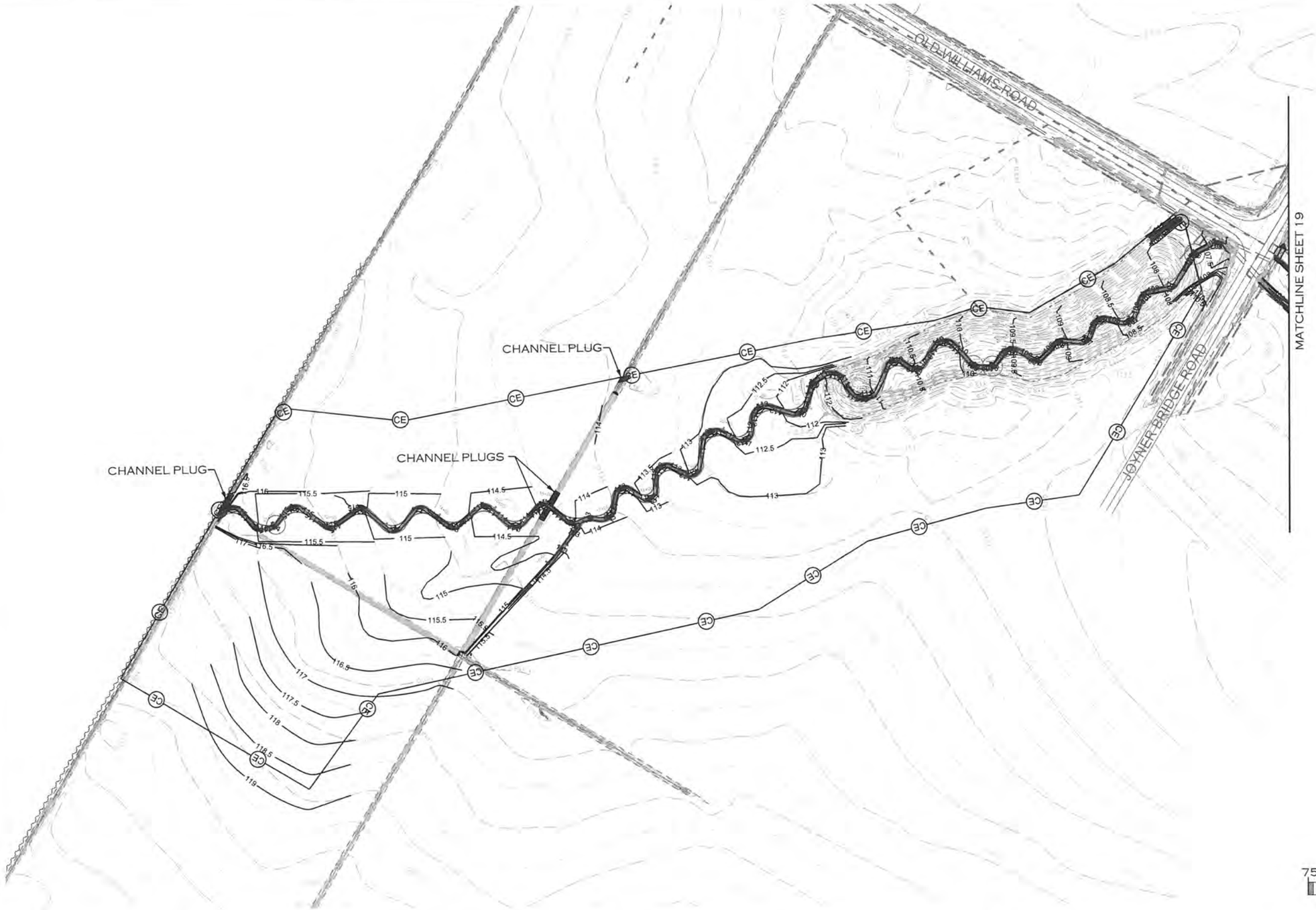
PROJECT # 074 | SHEET NO. 18

PROPOSED GRADING



REVISIONS				
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LICENSE # P-1182

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036254 ENGINEER EMMETT PERDUE

10/5/2018
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PROJECT # 074 | SHEET NO. 19

PROPOSED GRADING

REVISIONS				
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1	70% MITIGATION PLAN	KLT	EMP	9/13/17
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3	95% CONSTRUCTION DRAWINGS	KLT	EMP	10/02/18

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1101 HAYNES ST
RALEIGH, NC 27604

ALLIANCE HEADWATERS
JOHNSTON COUNTY, NC
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LICENSE # P-1182

NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE 10/05/18

10/5/2018
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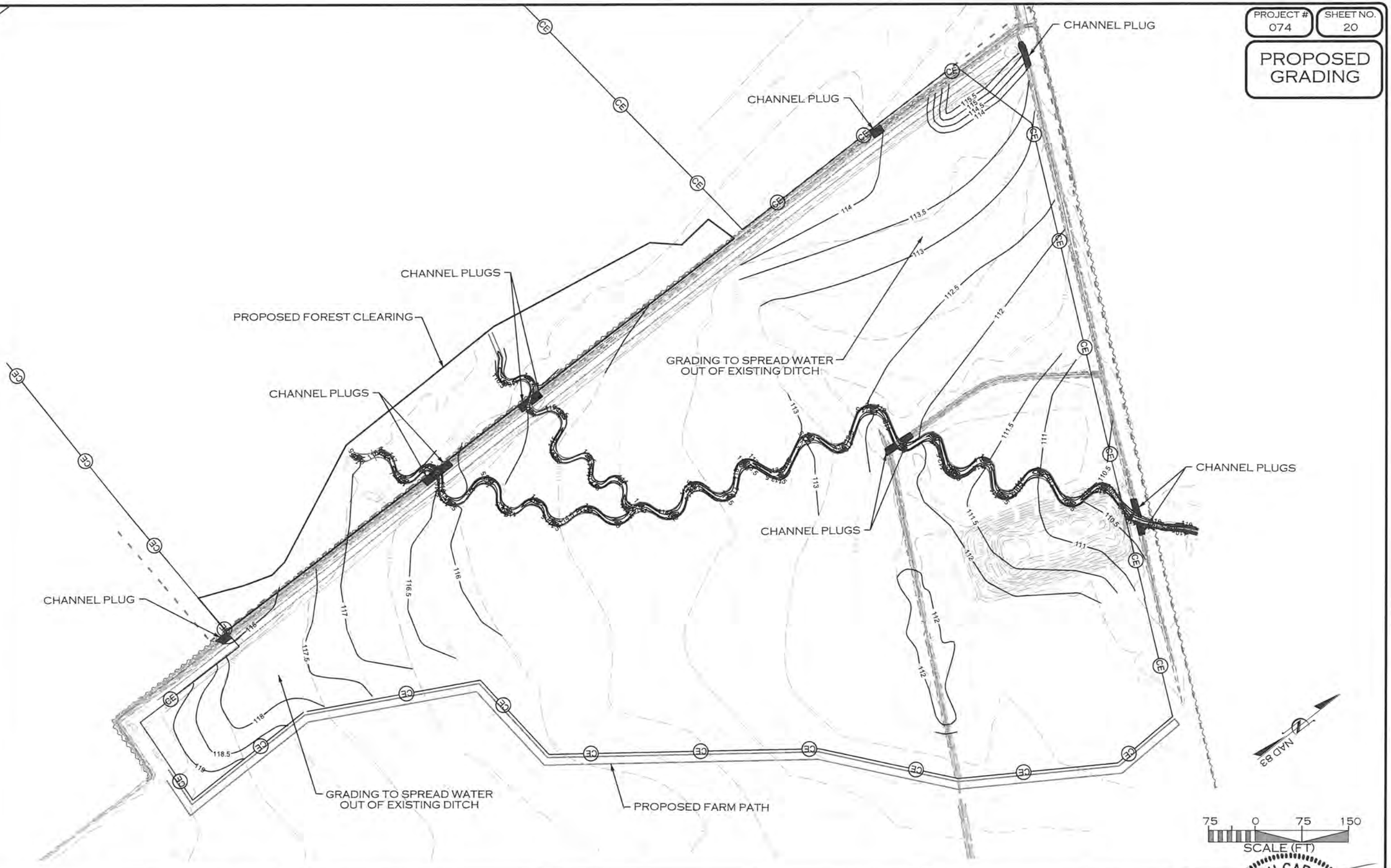
MKOON

PROJECT # 074 | SHEET NO. 20

PROPOSED GRADING



REVISIONS				
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LICENSE # P-1182

PROFESSIONAL ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE
10/05/18

10/5/2018
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MOON

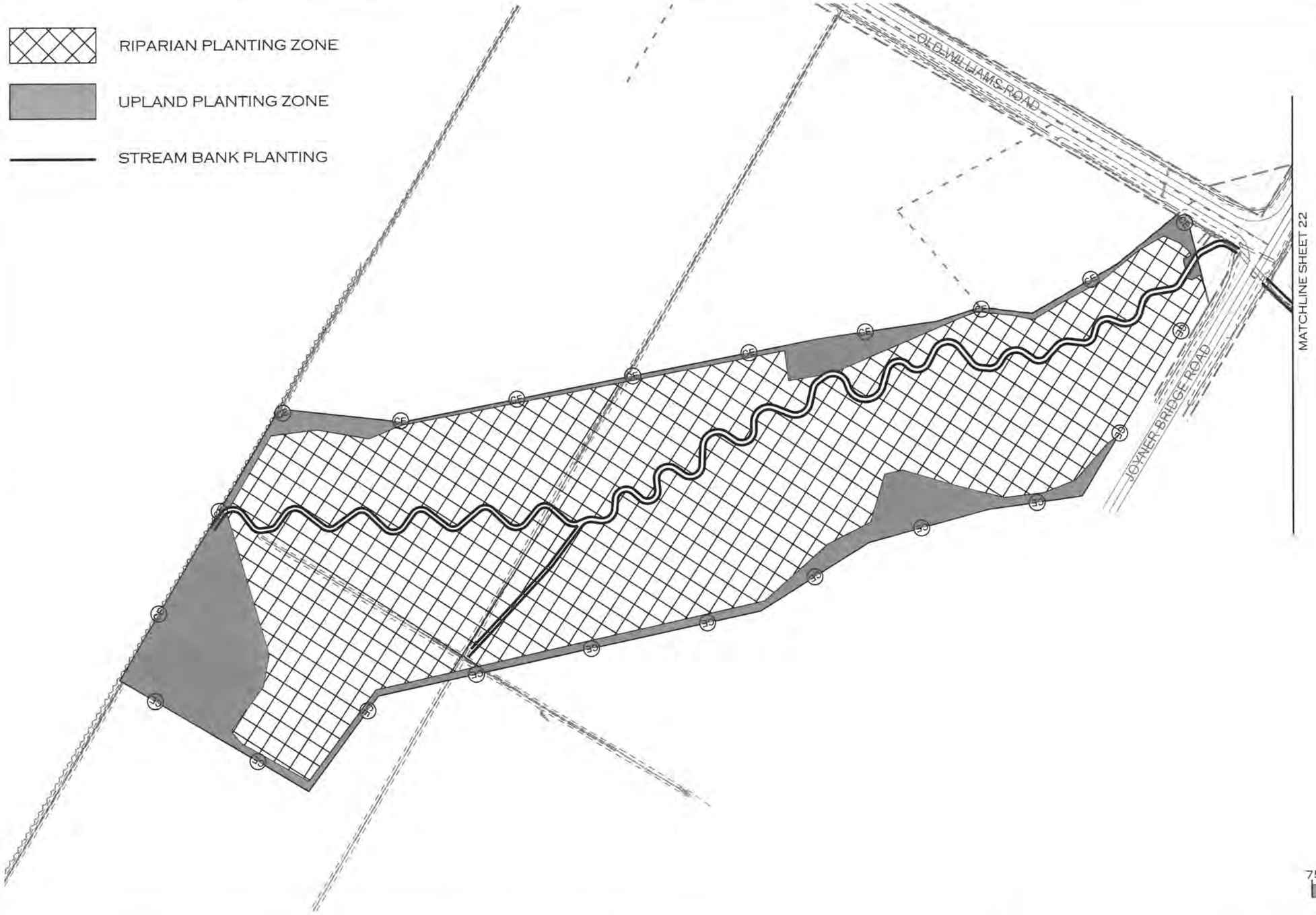
PROJECT # 074 | SHEET NO. 21

VEGETATION PLAN

RIPARIAN PLANTING ZONE

UPLAND PLANTING ZONE

STREAM BANK PLANTING



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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036254 EMMETT PERDUE 10/04/18

10/5/2018
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MICROS

PROJECT # 074 | SHEET NO. 22

VEGETATION PLAN

RIPARIAN PLANTING ZONE

UPLAND PLANTING ZONE

STREAM BANK PLANTING

JOHNER BRIDGE ROAD

MATCHLINE SHEET 21

NAD 83

75 0 75 150

SCALE IN FEET

REVISIONS				
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10/5/2018
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PROJECT # 074 | SHEET NO. 23

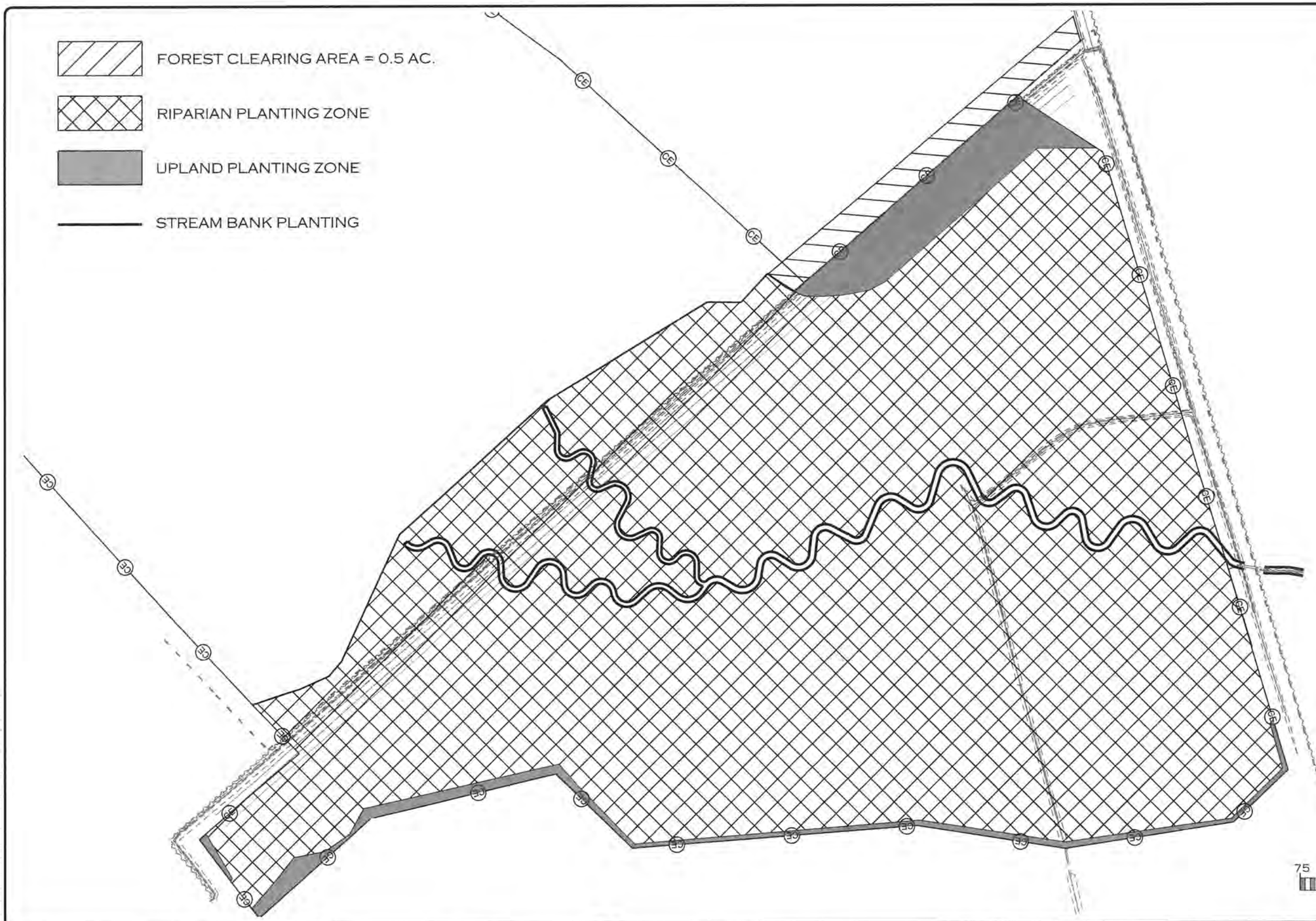
VEGETATION PLAN

FOREST CLEARING AREA = 0.5 AC.

RIPARIAN PLANTING ZONE

UPLAND PLANTING ZONE

STREAM BANK PLANTING



75 0 75 150
SCALE (FT)

REVISIONS				
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NORTH CAROLINA PROFESSIONAL SEAL 036254 ENGINEER EMMETT PERDUE
10/05/18

10/5/2018
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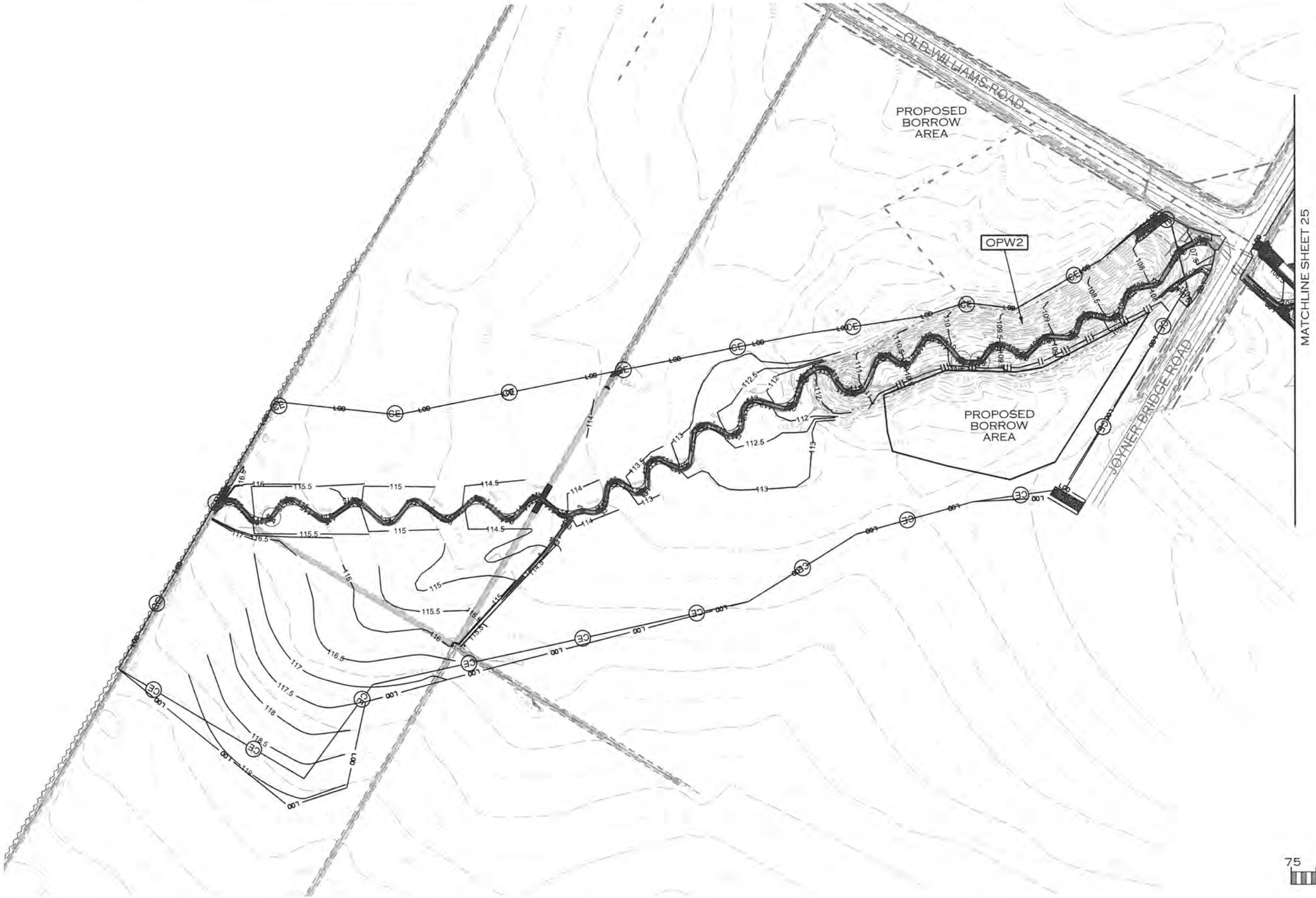
PROJECT # 074 | SHEET NO. 24

EROSION CONTROL



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10/5/2018
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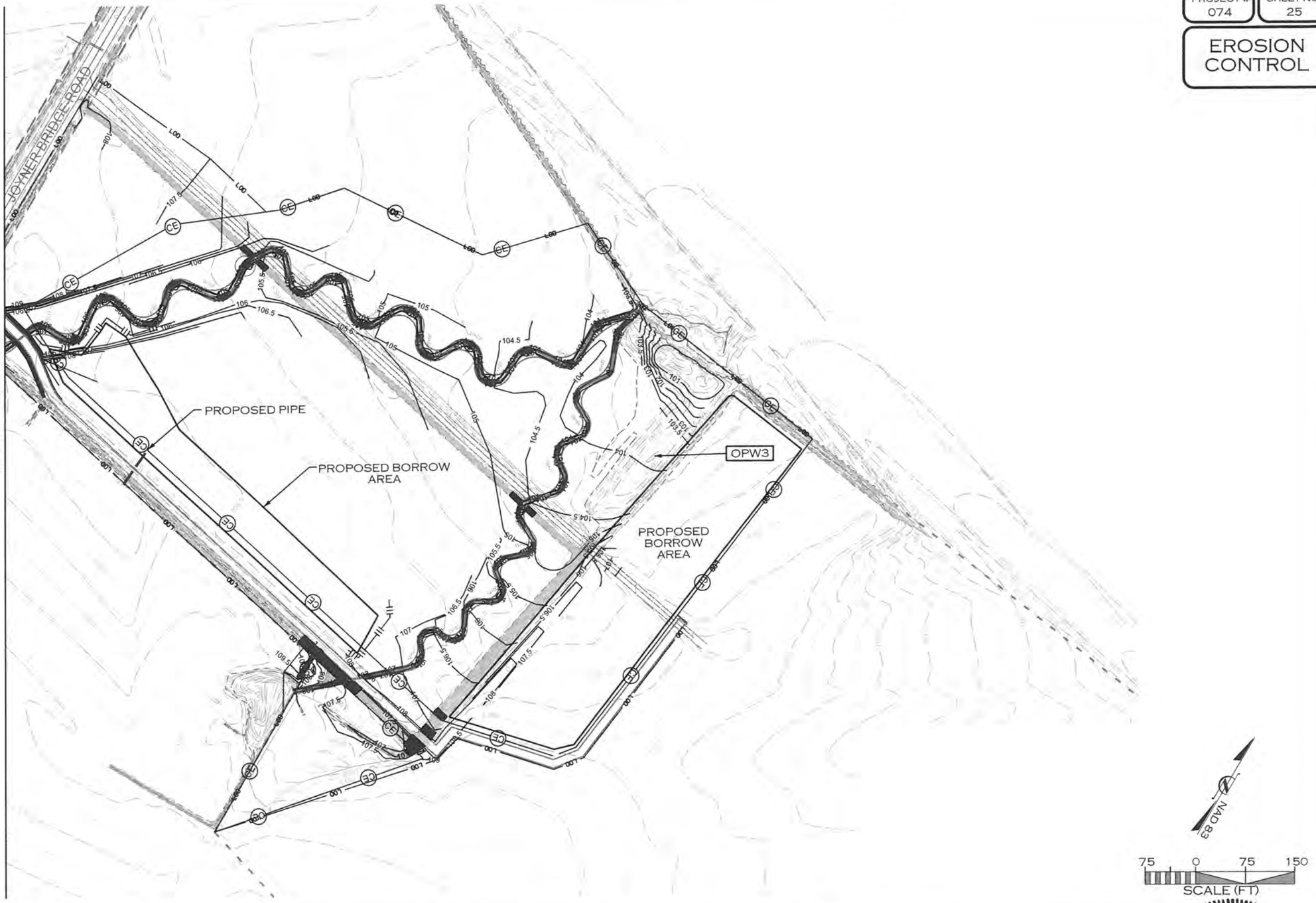
PROJECT # 074 | SHEET NO. 25

EROSION CONTROL



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10/5/2018
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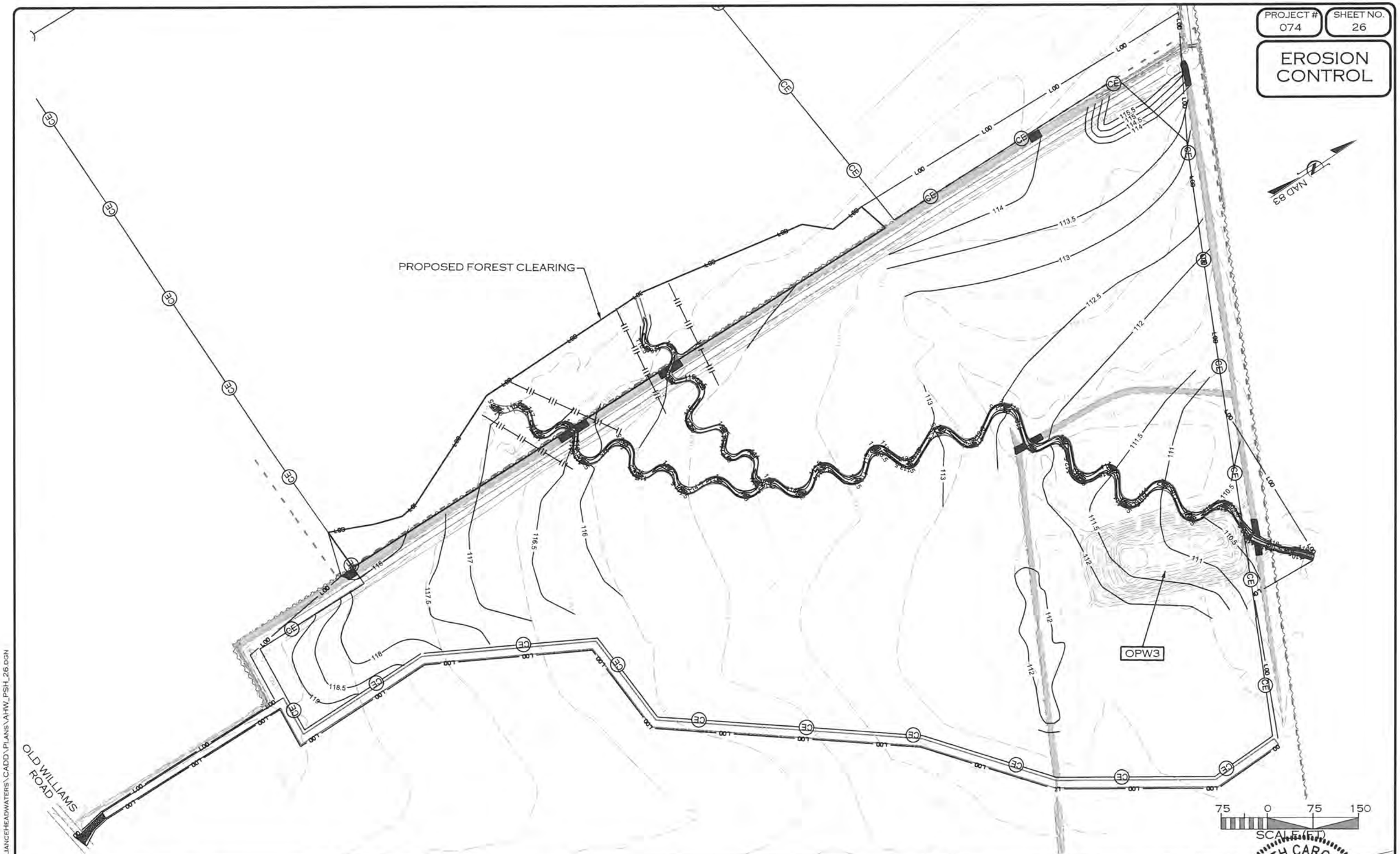
KROON

PROJECT # 074 | SHEET NO. 26

EROSION CONTROL



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MROSS