FINAL

Stream and Wetland Mitigation Plan

St. Clair Creek Restoration Project

Beaufort County, North Carolina

EEP Project ID No. 95015

EEP Contract No. 003986

Tar-Pamlico River Basin: 03020104-040040

Prepared for:

NC Department of Environment and Natural Resources
Ecosystem Enhancement Program (EEP)
1652 Mail Service Center
Raleigh, North Carolina 27699-1652

September 2013

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September 2013

EXECUTIVE SUMMARY

Michael Baker Engineering, Inc. (Baker) proposes to restore 3,274 linear feet (LF) of perennial and intermittent stream and 2.8 acres (AC) of riparian wetlands along two unnamed tributaries (UT2 and UT3) to St. Clair Creek in Beaufort County, North Carolina (NC) (Figure 2.1). The St. Clair Creek Restoration Project site (project) is located in Beaufort County, approximately five miles east of the Town of Bath. The project site is located in the NC Division of Water Quality (NCDWQ) subbasin 03-03-07 and the Targeted Local Watershed (TLW) 03020104-040040 of the Tar-Pamlico River Basin. The purpose of the project is to restore stream, wetland, and riparian buffer functions along areas where the impaired stream channels flow through the site. Examination of the available hydrology and hydric soils data indicate that there are favorable conditions for the restoration of a headwater stream and wetland ecosystem.

The St. Clair Creek Restoration Project will involve the restoration of a Coastal Plain Headwater Small Stream Swamp system (NC WAM 2010, Schafale and Weakley 1990) which has been impaired due to past agricultural conversion and silviculture. Due to the productivity and accessibility of these smaller stream and wetland systems, many have experienced heavy human disturbance. UT2 and UT3 have been ditched and drained numerous times in the past, most recently during the summer of 2010; and two waterfowl impoundments were constructed by installing water control structures at the outlets of both UT2 and UT3. Restoration practices on UT2 and UT3 will involve restoring the remnant headwater valleys, reconnecting the stream to the relic floodplain, and restoring diffuse flows to abandoned wetland floodplains and hydric soils areas previously drained by ditching activities. The existing ditches within the restoration area will be partially filled, to decrease surface and subsurface drainage and raise the local water table, or graded to promote diffuse flow into the restored system. The project will include removal of the existing waterfowl impoundments and water control structures. Vegetated buffers in excess of 50 feet will be established along both sides of the reaches. A recorded conservation easement consisting of 17.43 AC will protect the site in perpetuity.

Based on the NC Ecosystem Enhancement Program's (NCEEP) 2010 Tar-Pamlico River Basin Restoration Priorities (RBRP) Plan, the St. Clair Creek Restoration Project area is located in an existing targeted local watershed (TLW) within the Tar-Pamlico River Basin (http://www.nceep.net/services/restplans/FINAL%20RBRP%20Tar-Pamlico%2020110523.pdf). The restoration strategy for the Tar-Pamlico River Basin targets specific projects that will promote nutrient and sediment reduction in agricultural areas by restoring and preserving wetlands, streams, and riparian buffers. The proposed project aligns with RBRP priorities, which focus on restoring ditched streams and projects that reduce sediment and nutrient impacts.

The proposed project areas are shown in Figure 17.2 and described briefly in Tables ES.1 and ES.2. The primary restoration goals of the project are to improve ecologic functions to the impaired areas within the Tar-Pamlico River Basin as described below:

- Create geomorphically stable conditions along the unnamed tributaries across the site,
- Implement agricultural BMPs to reduce nonpoint source inputs to the estuary,
- Protect and improve water quality by reducing nutrient and sediment inputs,
- Restore stream and wetland hydrology by connecting historic flow paths and promoting natural flood processes, and
- Restore and protect riparian buffer functions and corridor habitat in perpetuity by establishing a permanent conservation easement

To accomplish these goals, the following objectives have been identified:

- Restore existing channelized streams by restoring the relic headwater valley and allowing diffuse flow, providing the streams access to their floodplains,
- Increase aquatic habitat value by allowing natural microtopography to form,
- Plant native species riparian buffer vegetation within the headwater valley and floodplain areas, and within the wetland areas, protected by a permanent conservation easement, to increase stormwater runoff filtering capacity, decrease erosion, and shade the stream to decrease water temperature,
- Improve aquatic and terrestrial habitat through improved substrate and in-stream cover, addition of woody debris, and reduction of water temperature, and
- Control invasive species vegetation within the project area and if necessary continue treatments during the monitoring period.

Table ES.1 St. Clair Creek Restoration Project Overview (Streams)
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Reach	Design Approach	Existing Reach Length (LF)*	Design Reach Length (LF)	SMU Credit Ratio	Potential SMUs	Stationing	Comment
Unnamed Tributaries (Reaches UT2 and UT3)							
UT2	R	2,660	2,133	1:1	2,133	12+57 to 33+91	Restoration will consist of filling the channelized portions of stream and restoring valley topography. The system will be allowed to form on its own, as a multi-thread channel headwater stream within the valley. (DA stream type)
UT3	R	1,075	1,141	1:1	1,141	11+02 to 18+57 and 18+91 to 22+78	Restoration will consist of filling the channelized portions of stream and restoring valley topography. The system will be allowed to form on its own, as a multi-thread channel headwater stream within the valley. (DA stream type)
Total		**3,735**	**3,274**		**3,274**		

*Existing Reach lengths are approximate and calculated by measuring the lengths of the main ditches that convey the UT2 and UT3 drainages

Table ES.2 St. Clair Creek Restoration Project Overview (Wetlands)
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan – EEP Project No. 95015

Design Approach	Existing Area (AC)	Design Area (AC)	WMU Credit Ratio	Potential WMUs	Comments
Wetland Along UT2					
R	0.0	1.1	1:1	1.1	Riparian wetland restoration will involve removal of the ditches that currently direct surface and subsurface drainage directly to the channelized stream. Wetland hydrology will be reintroduced to drained areas of hydric soil and overbank flooding regimes will be restored. Planted pines and invasive species vegetation will be removed and appropriate wetland hardwood species will be planted.
Wetland Along UT3					
R	0.0	1.7	1:1	1.7	Riparian wetland restoration will involve removal of the ditches that currently direct surface and subsurface drainage directly to the channelized stream. Wetland hydrology will be reintroduced to drained areas of hydric soil and overbank flooding regimes will be restored. Planted pines and invasive species vegetation will be removed and appropriate wetland hardwood species will be planted.
TOTALS	**0.0**	**2.8**	**1:1**	**2.8**	

This mitigation plan was developed 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).
- NCDENR Ecosystem Enhancement Program In-Lieu Fee Instrument signed and dated July 28, 2010.

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

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1.0 RESTORATION PROJECT GOALS AND OBJECTIVES

The North Carolina Ecosystem Enhancement Program (NCEEP) develops River Basin Restoration Priorities (RBRPs) to guide its mitigation activities within each of the state's 17 major river basins. RBRPs designate specific watersheds that exhibit both the need and opportunity for wetland, stream and riparian buffer restoration. These watersheds, designated as Targeted Local Watersheds (TLWs), receive priority for EEP planning and restoration project funds. The 2010 Tar-Pamlico River Basin RBRP identified cataloguing unit (HUC) 03020104-040040 as a TLW (http://www.nceep.net/services/restplans/FINAL%20RBRP%20Tar-Pamlico%2020110523.pdf).

The Pamlico and Pungo Rivers sub-watershed is located in HUC 03020104-040040. The sub-watershed covers 70 square miles, including 130 miles of stream. Approximately 54 percent of stream reaches within the sub-watershed lack adequate riparian buffers. Over half of the sub-watershed is open water mostly comprised of the Pamlico and Pungo Rivers. The remainder of the sub-watershed is characterized by forested wetlands (33 percent of total area), agriculture (14 percent of total area), and developed land (2 percent of the total area) (EEP, 2010).

Agricultural development, disturbance of natural riparian buffers (timber harvesting) and other various land-disturbing activities in the Pamlico and Pungo Rivers sub-watershed have negatively impacted both water quality and bank stability along the mouths of the Pamlico and Pungo Rivers and there various tributaries. To improve watershed health, one of the 2010 Tar-Pamlico River Basin Restoration Priorities emphasized the need for increased implementation of agricultural best management practices (BMPs) in the Pamlico and Pungo Rivers sub-watershed. Nutrients, sedimentation, streambank erosion, channel modification and loss of wetlands and riparian buffers are major stressors within this TLW.

Additionally, water quality monitoring conducted by the North Carolina Division of Water Quality found high levels of Chlorophyll a in the Pamlico River near the mouth of St. Clair Creek (DWQ Tar-Pamlico River Basin Water Quality Plan, 2010). The nearest assessed reach downstream of the proposed project is the Pamlico River at Hickory Point near South Creek (Station ID 09059000). The Pamlico River in this reach is classified as SB; NSW (SB-Primary Recreation, Salt Water; NSW-Nutrient Sensitive Water) (http://portal.ncdenr.org/c/document_library/get_file?uuid=abc27fa8-73ae-4a81-a6c3-5cdb213d3d2a&groupId=38364).

The proposed project aligns with RBRP goals, which focus on restoring wetland and riparian area values such as maintaining and enhancing water quality, increasing storage of floodwaters, and improving fish and wildlife habitat.

The St. Clair Creek Restoration Project provides an opportunity to improve water quality and ecological functions within the TLW. The primary restoration goals of the project are described below:

- Create geomorphically stable conditions along the unnamed tributaries on the site,
- Implement agricultural BMPs to reduce nonpoint source inputs to receiving waters,
- Protect and improve water quality by reducing nutrient and sediment inputs,
- Restore stream and wetland hydrology by connecting historic flow paths and promoting natural flood processes,
- Restore and protect riparian buffer functions and corridor habitat in perpetuity by establishing a permanent conservation easement,

To accomplish these goals, the following objectives have been identified:

- Restore existing channelized streams by restoring the relic headwater valley and providing access to their floodplains,
- Increase aquatic habitat value by creating naturally formed microtopography,
- Plant native species riparian buffer vegetation within the headwater valley and floodplain areas, protected by a permanent conservation easement, to increase stormwater runoff filtering capacity, decrease erosion, and shade the stream to decrease water temperature,
- Improve aquatic and terrestrial habitat through improved substrate and in-stream cover, addition of woody debris, and reduction of water temperature, and
- Control invasive species vegetation within the project area and if necessary continue treatments during the monitoring period.

The project goals will directly address stressors identified in the Tar-Pamlico River Basin RBRP, namely degraded riparian conditions, channel modification, and excess sediment and nutrient inputs. The proposed natural channel design approach will result in a stable riparian headwater stream and wetland system that will reduce sediment and nutrient loading to the Pamlico and Pungo River sub-watershed, while improving water quality conditions that support terrestrial and aquatic species.

2.0 SITE SELECTION

2.1 Project Description and Directions to Project Site

The St. Clair Creek Restoration Project site (site) is located in Beaufort County, NC, approximately five miles east of the Town of Bath, as shown on the Project Site Vicinity Map (Figure 2.1). To access the site from Raleigh, follow Interstate 40 east to Interstate 440 west and take the US Highway 264 east exit. Near the city of Greenville, NC, take exit 73B to stay on US 264 east towards Washington, NC. From Washington, stay on US 264 east until NC 92/99 splits to the right from US 264 east. Take NC 92/99 for approximately 11 miles and turn left onto Peoples Road. Continue on Peoples Road for approximately 2 miles. Access to the site is via the farm road on the right.

2.2 Site Selection

The site is located in the NC Division of Water Quality (NCDWQ) subbasin 03-03-07 of the Tar-Pamlico River Basin (Figure 2.2). The site includes two unnamed headwater tributaries (UTs) to St. Clair Creek and areas of previously disturbed wetlands. Soils and topographic information (Figures 2.2, 2.3, 2.4, 2.5, and 2.6) indicate that the area once supported a headwater stream and wetland complex. Like many headwater systems in the Mid-Atlantic Coastal Plain physiographic region, the area was drained for agricultural and silvicultural production. Drainage ditches along the UTs have disconnected the stream from their historic floodplains. The relic valley signatures for the UTs are visible from LiDAR (Light Detection and Ranging) imagery of the site (Figure 2.6), and were verified during field investigations.

The UT2 project reach is shown as a solid blue-line stream on the USGS topographic quadrangle map. UT2 is also shown as a perennial stream along the lower portions of the site on the Beaufort County Soil Survey. UT3 is not shown on the USGS or County Soil Survey; however, the presence of historic valleys can be seen from LiDAR imagery for the site and observed during field investigations.

Field evaluations of intermittent/ perennial status and use of NCDWQ stream assessment protocols were difficult for UT2 since the channels on site were all maintained with an excavator during the late summer of 2010. As a result, no geomorphic or vegetation characteristics were evident along the reach. However, NCDWQ stream forms were completed and are included in Appendix B. Field investigations and photographs taken during March 2010, prior to clean-out, were used to assist in determining jurisdictional status; however, the channels at that time had been impacted by recent timber harvest. The NCDWQ Methodology for Identification of Intermittent and Perennial Streams and Their Origins Manual, Version 4.11 indicates that in situations with ditching and modified natural streams, contour crenulations and the presence of linear soil mapping units can be used to determine the presence of a natural stream channel. The LIDAR imagery for the site shows a distinct topographic valley signature along much of UT2, and the county soil survey shows a linear soil mapping unit just downstream of the project limits, as well as a steam feature that extends into the project site. In addition, the landowner provided information regarding observations of biological life during the cleaning of the channelized stream system. He had observed fish and turtles in the channel, along with submerged aquatic vegetation. Based on these observations and the available drainage area of the UT (89 acres), the stream was determined to be a perennial stream channel and appropriate for use with the Coastal Plain headwater stream guidance. Due to its channelized nature, the stream would most appropriately be classified as a Rosgen G stream type but use of this classification system on this channel is questionable due to its highly altered state.

Like UT2, the UT3 channel was maintained during the summer of 2010; therefore, geomorphic and vegetation characteristics were difficult to assess to determine jurisdictional status. However, NCDWQ stream forms were completed and are included in Appendix B. The same analysis as described for UT2 was conducted for UT3. The LiDAR data for the site indicates the presence of a valley, but the county soil survey did not indicate the presence of a stream feature. The drainage area for UT3 is smaller than that for UT2 (30 acres), but this drainage area is consistent with the drainages of small headwater reference sites that have been identified and surveyed in the same region. The landowner did not recall as extensive of a variety of aquatic life observations in the UT3 channel prior to the most recent maintenance work. Therefore, the reach was determined to be an intermittent stream channel, but appropriate for use with the Coastal Plain headwater stream guidance due to the defined valley signature. Due to its channelized nature, the stream would most appropriately be classified as a Rosgen G stream type but use of this classification system on this channel is questionable due to its highly altered state. Drainage areas for both UT2 and UT3 were delineated using USGS topographic maps and LiDAR data.

Historically, it is likely that the area functioned as a headwater stream and wetland system, with diffuse flow and no clearly defined channel throughout the reaches. A more defined channel more likely existed near the confluence with St Clair Creek towards the bottom reaches of the tributaries, due to the increased drainage area and steeper valley slopes. By restoring historic stream, wetland, and riparian buffer functions to the site, the area will provide improved habitat for biota, and improved water quality to receiving waters.

2.2.1 Historical Land Use and Development Trends

Land use in the watersheds is approximately 73 percent forested (silviculture), and 27 percent agricultural. Recent land use of the site includes silviculture (managed pine plantation for timber production), agricultural production, and small parts are managed as waterfowl impoundments. Potential for land use change or future development in the area adjacent and upstream to the conservation easement is low, given the rural setting of the project location.

Through channelization, the project area was drained many years ago for agricultural purposes. The channels are currently disconnected from their historic floodplain. In addition, the ditched channels have also served to drain wetlands at the site. Over time, these practices have contributed to habitat degradation and nutrient loading to the UTs and their receiving waters: St Clair Creek, and the Pamlico River.

2.2.2 Successional Trends

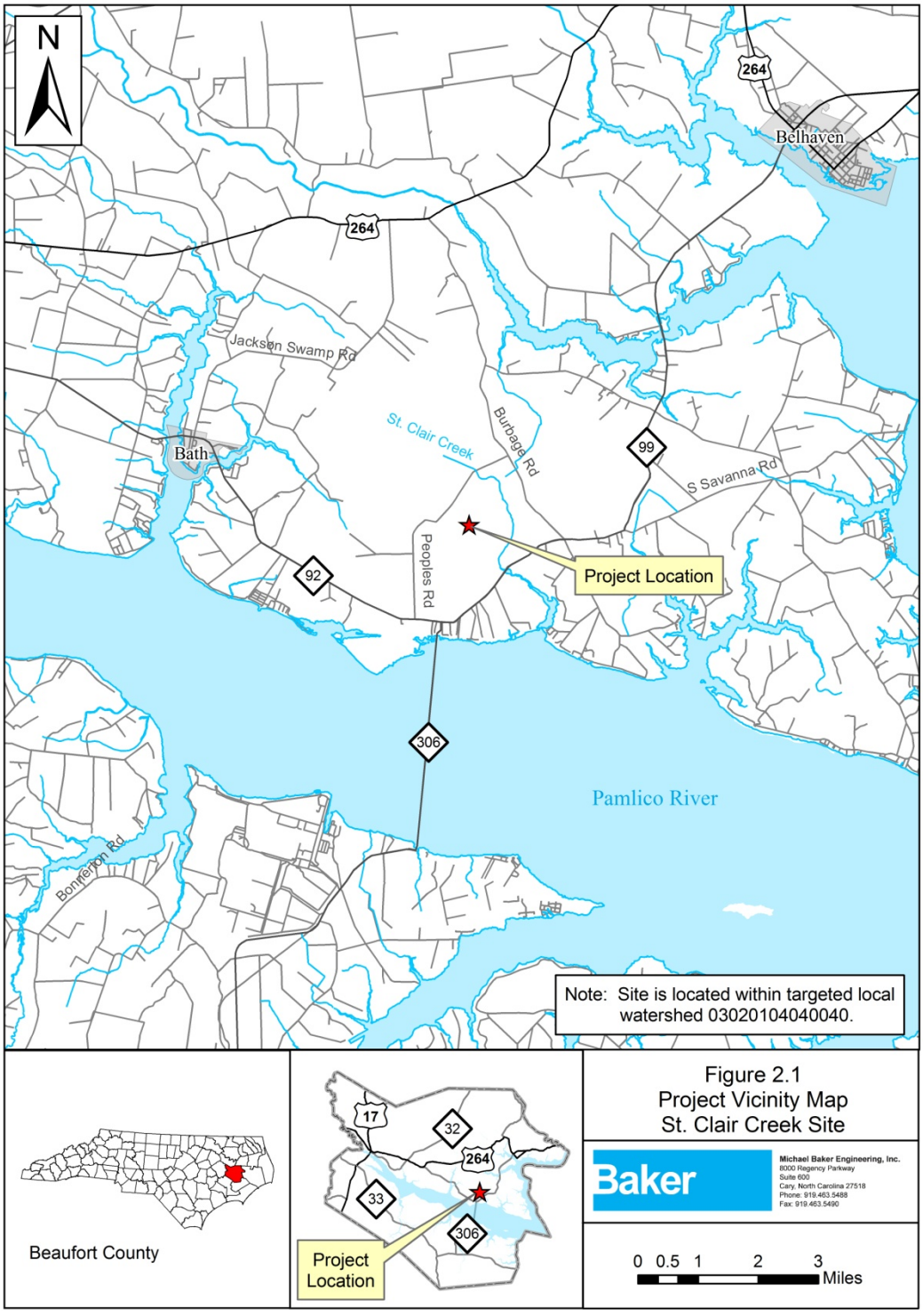
To convert the land for agricultural use, early settlers excavated ditches to drain the wetlands for use as fields and plantation areas. Over time, the drainage ditches incised and connectivity with the floodplain became further reduced. Additionally, landowners cleared some of the riparian area within the project area to provide additional land for recreational purposes. For example, to develop waterfowl impoundments on UT2 and UT3.

UT2 and UT3 flow into the project limits as a channelized headwater stream systems, receiving their drainage from parallel ditches on upstream agricultural fields and timberlands. Due to the small drainage and very low slopes, the channels are not actively incising. While active channel incision is not contributing large amounts of sediment to the receiving waters, the lowered water table, degraded buffers, and drained wetlands have negatively impacted the water quality and ecology of the St. Clair Creek watershed and the Pamlico River.

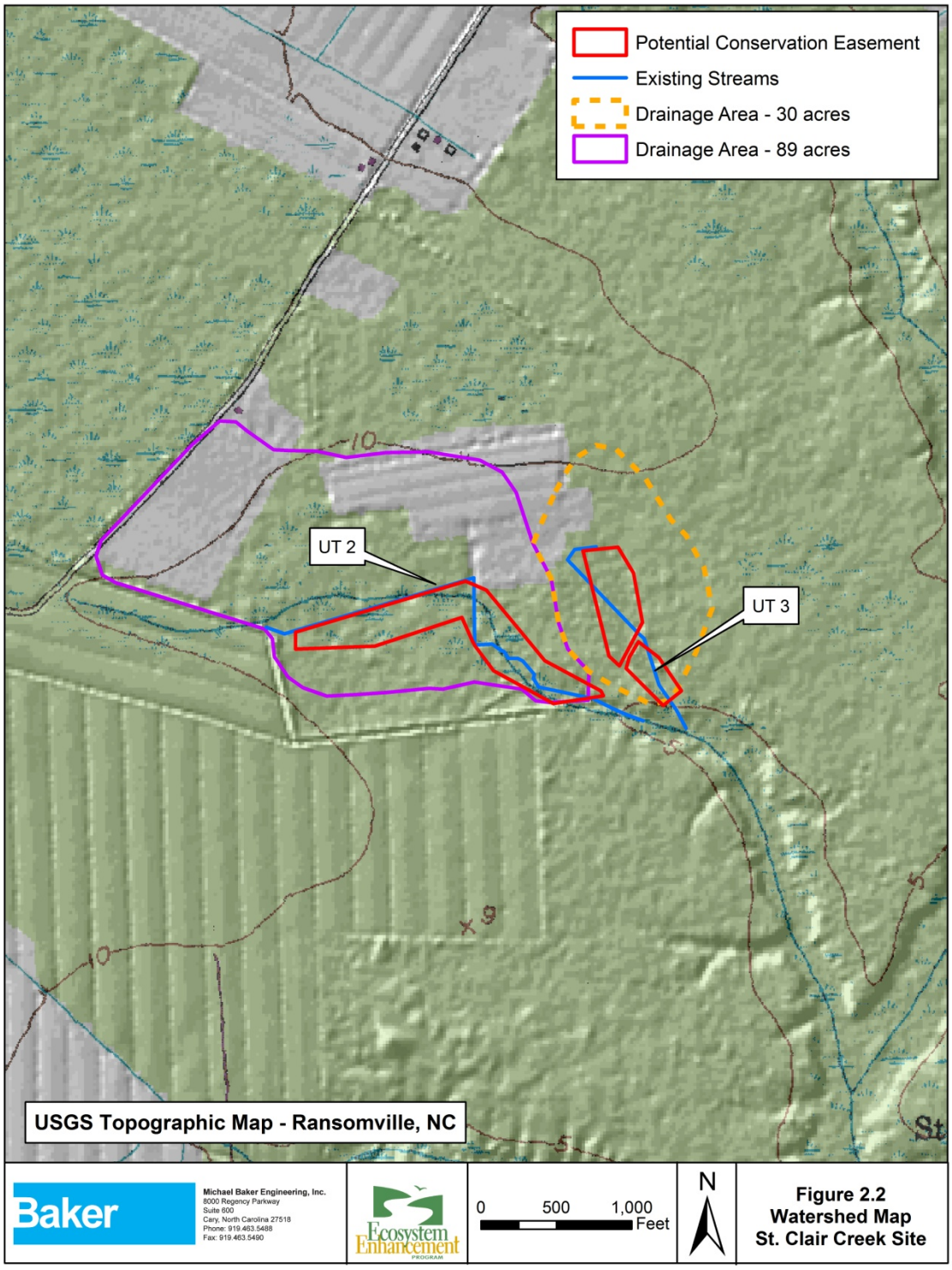
UT2 and UT3 currently exist as ditched channels with wooded buffers largely absent directly adjacent to the channel banks. These areas are maintained for farm roads, access to the ditches for

periodic maintenance, and waterfowl impoundments. Outside of the maintained areas, wooded riparian buffers exist along UT2 and UT3. While these buffers do exist, they consist of planted Loblolly pine (*Pinus taeda*) except for a small area along upper UT3 on the left bank that consist of mature Sweet gum (*Liquidambar styraciflua*), Tulip poplar (*Liriodendron tulipifera*), Loblolly pine (*Pinus taeda*), Red maple (*Acer rubrum*), Green Ash (*Fraxinus pennsylvanica*), and various oaks (*Quercus spp.*).

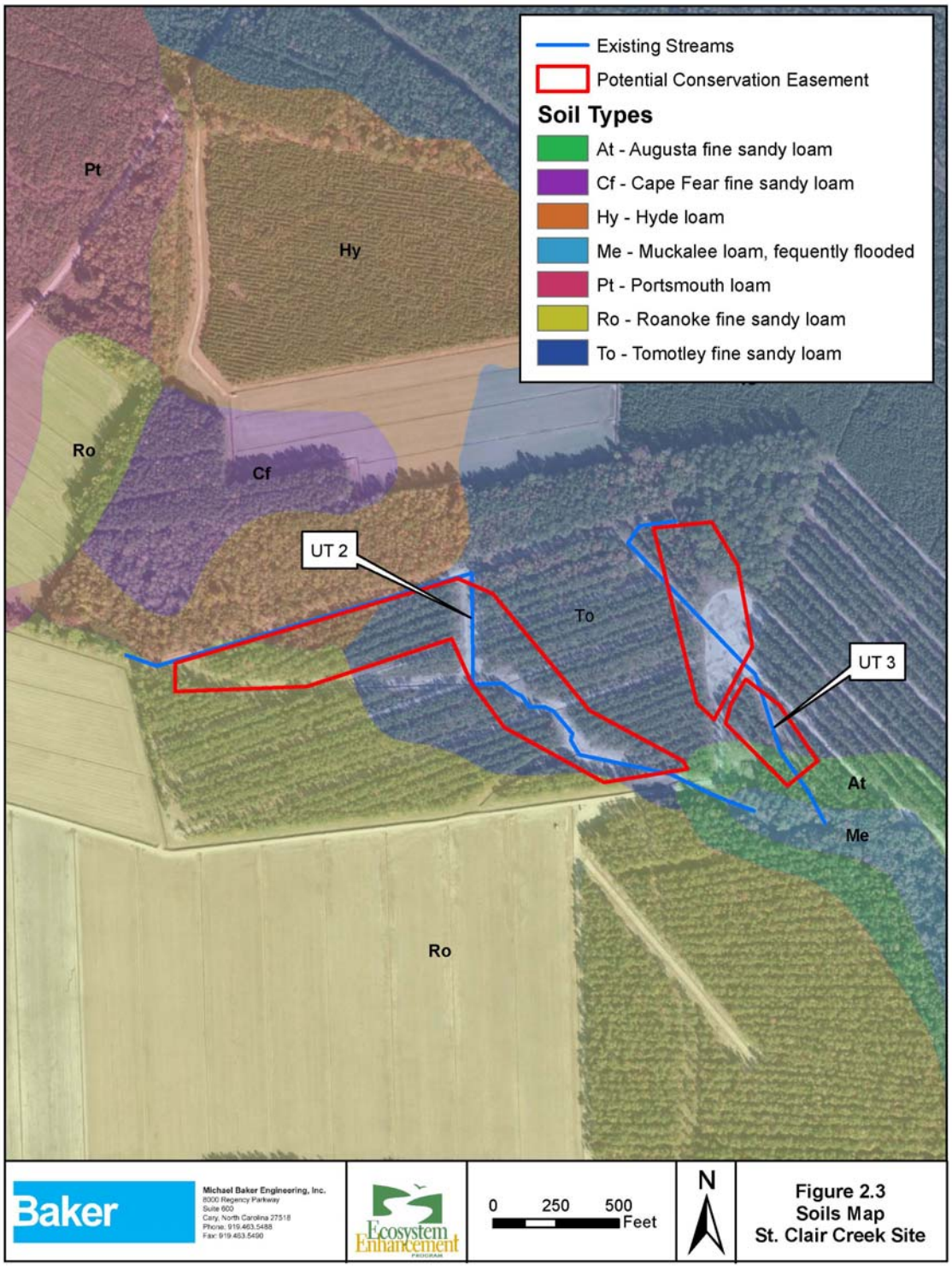
2.3 Vicinity Map



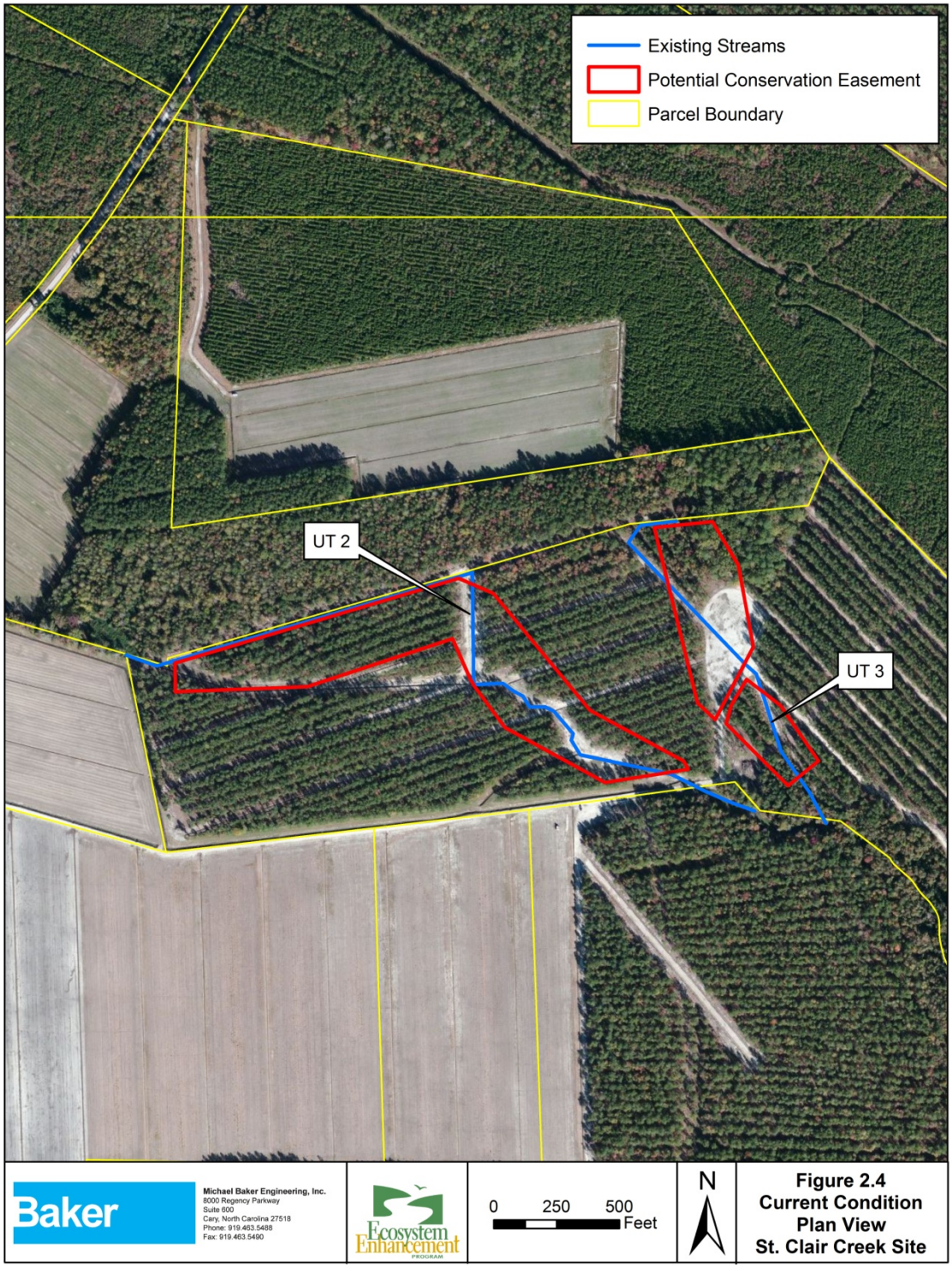
2.4 Watershed Map



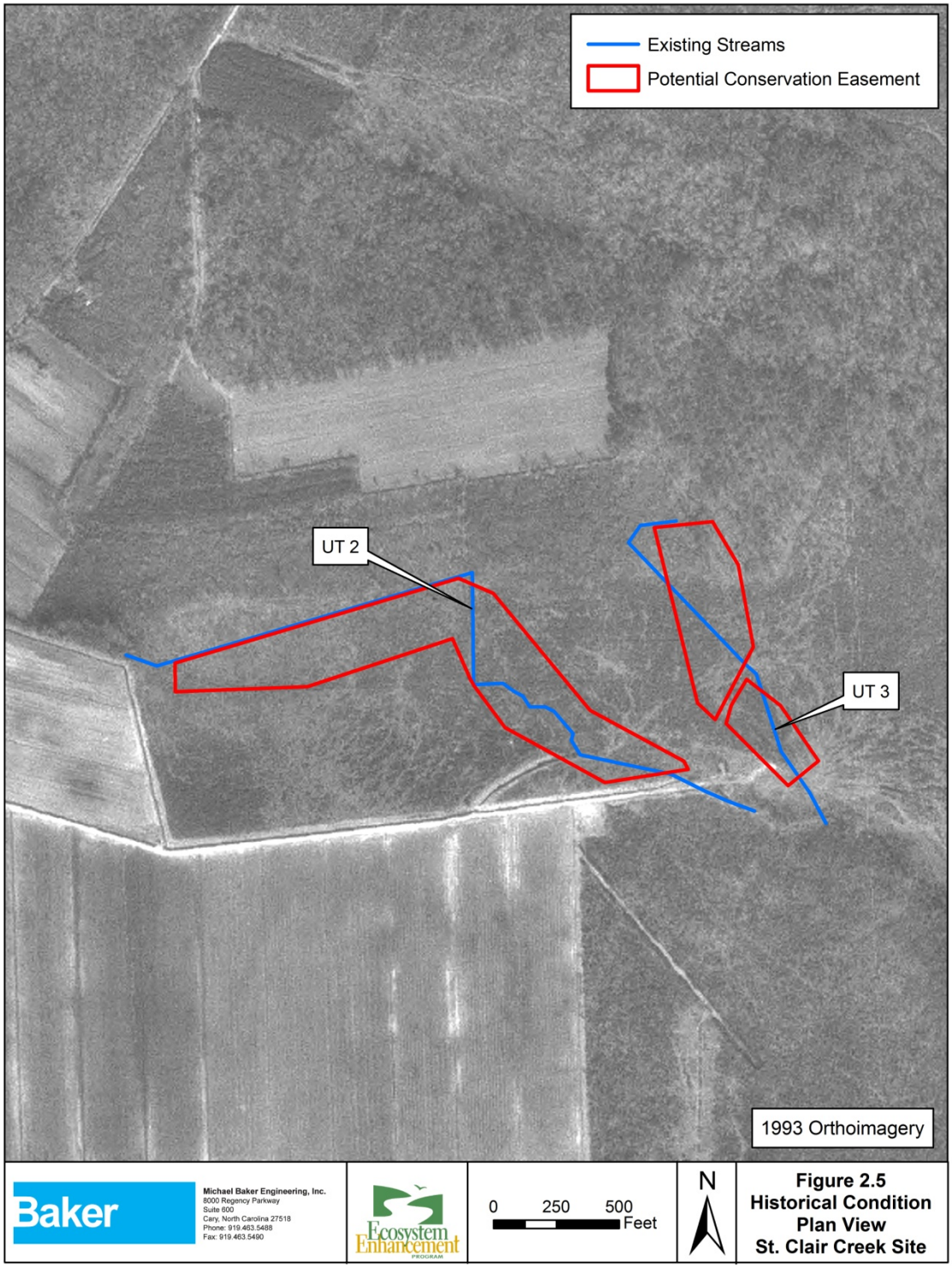
2.5 Soils Map


Existing Streams
Potential Conservation Easement
Soil Types
At - Augusta fine sandy loam
Cf - Cape Fear fine sandy loam
Hy - Hyde loam
Me - Muckalee loam, fequently flooded
Pt - Portsmouth loam
Ro - Roanoke fine sandy loam
To - Tomotley fine sandy loam
Pt
Hy
Ro
Cf
UT 2
To
UT 3
At
Me
Ro
Baker
Michael Baker Engineering, Inc.
8000 Regency Parkway
Suite 600
Cary, North Carolina 27518
Phone: 919.463.5488
Fax: 919.463.5490
Ecosystem Enhancement Program
0 250 500 Feet
N
Figure 2.3
Soils Map
St. Clair Creek Site

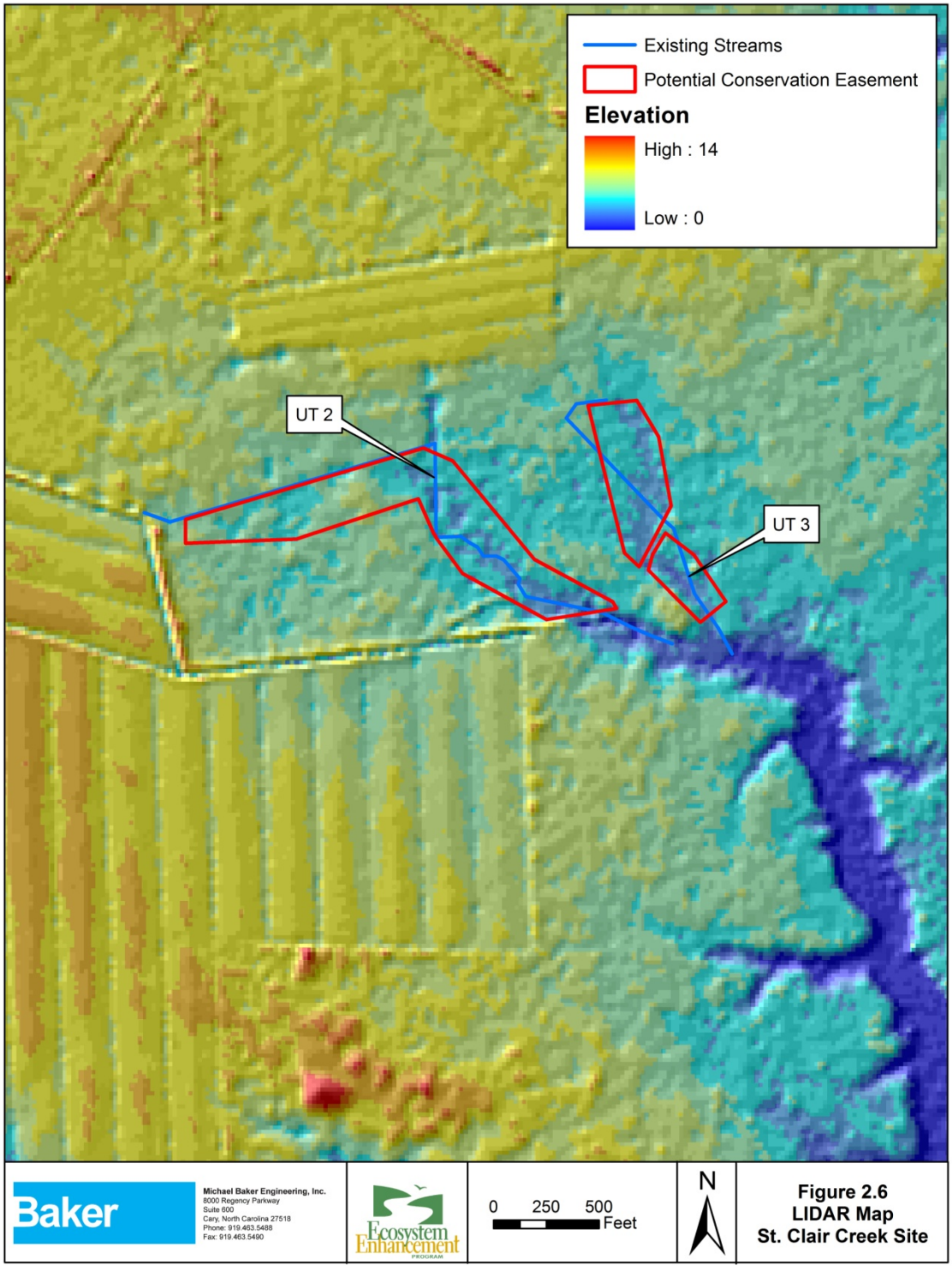
2.6 Current Conditions Map



2.7 Historical Conditions Map



2.8 LiDAR Map


Existing Streams
Potential Conservation Easement
Elevation
High : 14
Low : 0
UT 2
UT 3
Baker
Michael Baker Engineering, Inc.
8000 Regency Parkway
Suite 600
Cary, North Carolina 27518
Phone: 919.463.5488
Fax: 919.463.5490
Ecosystem Enhancement Program
0 250 500
Feet
N
Figure 2.6
LIDAR Map
St. Clair Creek Site

2.9 Site Photographs

View looking downstream from the proposed beginning of UT3

View looking up valley along the existing farm road on UT3 and proposed wetland restoration area along UT3

View looking upstream at the proposed beginning of UT2

View looking downstream along existing ditches at the proposed beginning of UT2

View looking downstream at the existing culverts at the proposed end of UT2

Existing planted pine timber throughout project site

3.0 SITE PROTECTION INSTRUMENT

3.1 Site Protection Instrument Summary Information

The land required for the construction, management, and stewardship of this mitigation project includes portions of the following parcels. A copy of the land protection instrument is included in Appendix A.

Table 3.1 Site Protection Instrument Summary
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project 95015

Landowner	PIN	County	Instrument Number	Deed Book and Page Numbers	Acreage Protected
Stephen R. Poole, III, and Chad A. Poole	15005359	Beaufort	2013003692	1821, 53-64	17.43

Baker has obtained a conservation easement from the current landowners for the St. Clair Creek Restoration Project area. The easement and survey plat (Easement: Deed Book 1821, Page Numbers 53-64; Plat: Plat Cabinet I, Slide 4-5 through 4-7) is held by the State of North Carolina and has been recorded at the Beaufort County Courthouse. The secured easement allows Baker to proceed with the restoration project and restricts the land use in perpetuity.

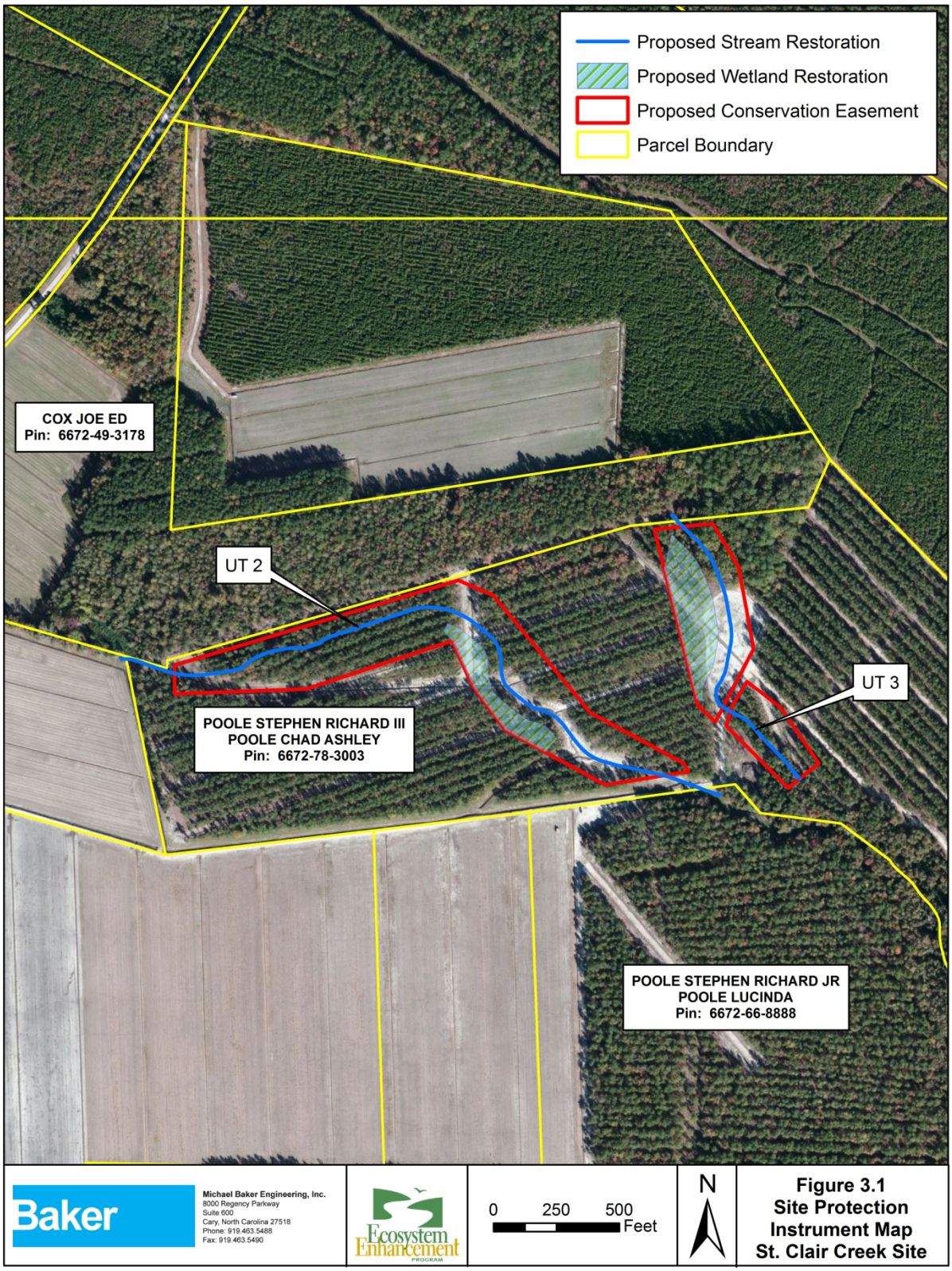
3.1.1 Potential Constraints

No fatal flaws have been identified at the time of this mitigation plan. A farm path crosses UT3 where the easement is broken. The stream will be piped under the path with new, appropriately sized culverts. No exiting or proposed easements for power and telephone utilities are located within the conservation easement. Riparian buffer widths will be at least 50 feet perpendicular from the stream centerline in both directions (100-foot minimum total buffer width) for all of the proposed stream reaches. The project area is located in a special flood hazard area and the Beaufort County Floodplain Manager has verified that no action needs to be taken to fulfill additional floodplain permitting requirements. Hydraulic trespass will not result from the implementation of the proposed project. Other regulatory factors discussed in Section 16, Appendix B were also not determined to pose potential site constraints. Construction access and staging areas have been identified and exact locations will be determined during final design.

3.2 Site Protection Instrument Figure

The conservation easement for the project area is shown in Figure 3.1 and copies of the recorded survey plat are included in Section 15, Appendix A.

Figure 3.1 Site Protection Instrument Map



4.0 BASELINE INFORMATION

Table 4.1 Baseline Information St. Clair Creek Restoration Project - EEP Project No. 95015		
Project Information		
Project Name	St. Clair Creek Restoration Project	
County	Beaufort	
Project Area (acres)	17.5	
Project Coordinates (latitude and longitude)	35.452835 N, -76.76726215 W	
Watershed Summary Information		
Physiographic Province	Outer Coastal Plain	
River Basin	Tar-Pamlico	
USGS Hydrologic Unit 8-digit and 14-digit	03020104 / 03020104040040	
DWQ Sub-basin	03-03-07	
Project Drainage Area (AC)	89 (UT2), 30 (UT3)	
Project Drainage Area Percentage of Impervious Area	<1%	
CGIA Land Use Classification	3.02, Passively Managed Forest Stands, 2.01.01.07, Annual Row Crop Rotation;	
Stream Reach Summary Information		
Parameters	**Reach UT2**	**Reach UT3**
Length of Reach (LF)	2,133 (proposed) 2,660 (existing)	1,141 (proposed) 1,075 (existing)
Valley Classification (Rosgen)	X	X
Drainage Area (AC)	89	30
NCDWQ Stream Identification Score	36	20
NCDWQ Water Quality Classification	C; Sw, NSW	C; Sw, NSW
Morphological Description (Rosgen stream type)*	Channelized Headwater System (Perennial)	Channelized Headwater System (Intermittent)
Evolutionary Trend **	N/A	N/A
Underlying Mapped Soils	To, Hy, Ro	To, At
Drainage Class	Very poorly drained, poorly drained	Poorly drained, somewhat poorly drained
Soil Hydric Status	Hydric	Hydric
Average Channel Slope (ft/ft)	0.0006	0.0009
FEMA Classification	SFHA, AE	SFHA, AE
Native Vegetation Community	Coastal Plain Small Stream Swamp	Coastal Plain Small Stream Swamp
Percent Composition of Exotic/Invasive Vegetation	<5%	<5%
Wetland Summary Information		
Parameters	**Wetland Along UT2**	
Size of Wetland (AC)	1.1 (proposed) 0.0 (existing)	
Wetland Type	Riparian	
Mapped Soil Series	To – Tomotley fine sandy loam	
Drainage Class	Poorly drained	
Soil Hydric Status	Hydric	
Source of Hydrology	Groundwater	
Hydrologic Impairment	Disconnected floodplain from ditches, lowered water table	
Native Vegetation Community	Coastal Plain Small Stream Swamp	
Percent Composition of Exotic/Invasive Vegetation	<5%	
Parameters	**Wetland Along UT3**	
Size of Wetland (AC)	1.7 (proposed), 0.0 (existing)	

Table 4.1 Baseline Information
St. Clair Creek Restoration Project - EEP Project No. 95015

Wetland Type	Riparian
Mapped Soil Series	To – Tomotley fine sandy loam
Drainage Class	Poorly drained
Soil Hydric Status	Hydric
Source of Hydrology	Groundwater
Hydrologic Impairment	Disconnected floodplain from ditches, lowered water table
Native Vegetation Community	Coastal Plain Small Stream Swamp
Percent Composition of Exotic/Invasive Vegetation	<5%

Regulatory Considerations

Regulation	Applicable	Resolved	Supporting Documentation
Waters of the United States – Section 404	Yes	Yes	(Appendix B)
Waters of the United States – Section 401	Yes	Yes	(Appendix B)
Endangered Species Act	No	N/A	Categorical Exclusion (Appendix B)
Historic Preservation Act	No	N/A	Categorical Exclusion (Appendix B)
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	Categorical Exclusion (Appendix B)
FEMA Floodplain Compliance	Yes	Yes	(Appendix B)
Essential Fisheries Habitat	No	N/A	Categorical Exclusion (Appendix B)

Notes:

* Due to its channelized nature, the stream would most appropriately be classified as a Rosgen G stream type but use of this classification system on this channel is questionable due to its highly altered state.

** Due to the low channel slopes and small watersheds, the headwater coastal plain systems are not actively evolving.

See Figure 2.3 for key to soil series symbols.

5.0 DETERMINATION OF CREDITS

Table 5.1 Project Components and Mitigation Credits
St. Clair Creek Restoration Project - EEP Project No. 95015

Mitigation Credits

	Stream	Riparian Wetland	Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorus Nutrient Offset
Type	R	R					
Totals	3,274 SMU	2.7 WMU					

Project Components

Project Component or Reach ID	Stationing/ Location	Existing Footage*/ Acreage	Approach	Restoration/ Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio
Reach UT2	12+57 – 33+91	2,660 LF	Headwater Restoration	2,133 SMU	2,133 LF	1:1
Reach UT3	11+02 - 18+57 and 18+91 - 22+78	1,075 LF	Headwater Restoration	1,141 SMU	1,141 LF	1:1
Wetland along UT2	See plan sheets	0.0 AC	Restoration	1.1 WMU	1.1 AC	1:1
Wetland along UT3	See plan sheets	0.0 AC	Restoration	1.7 WMU	1.7 AC	1:1

*Existing Reach lengths are approximate and calculated by measuring the lengths of the main ditches that convey the UT2 and UT3 drainages

Component Summation

Restoration Level	Stream (LF)	Riparian Wetland (AC)		Non-riparian Wetland (AC)	Buffer (SF)	Upland (AC)
		Riverine	Non-Riverine			
Restoration	3,274	2.8				
Enhancement I						
Enhancement II						
Creation						
Preservation						
High Quality Preservation						

BMP Elements

Element	Location	Purpose/Function	Notes

BMP Elements: BR= Bioretention Cell; SF= Sand Filter; SW= Stormwater Wetland; WDP= Wet Detention Pond; DDP= Dry Detention Pond; FS= Filter Strip; S= Grassed Swale; LS= Level Spreader; NI=Natural Infiltration Area

6.0 CREDIT RELEASE SCHEDULE

All credit releases will be based on the total credit generated as reported by the as-built survey of the mitigation site. Under no circumstances shall any mitigation project be debited until the necessary Department of the Army (DA) authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the 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 in Table 6.1 as follows:

Table 6.1 Credit Release Schedule
St. Clair Creek Restoration Project - EEP Project No. 95015

Forested Wetland Credits			
Monitoring Year	**Credit Release Activity**	**Interim Release**	**Total Release**
0	Initial Allocation - see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50%
3	Third year monitoring report demonstrates performance standards are being met	10%	60%
4	Fourth year monitoring report demonstrates performance standards are being met	10%	70%
5	Fifth year monitoring report demonstrates performance standards are being met; Provided that all performance standards are met, the IRT may allow the NCEEP to discontinue hydrologic monitoring after the fifth year, vegetation monitoring must continue for an additional two years after the fifth year for a total of seven years.	10%	80%
6	Sixth year monitoring report demonstrates performance standards are being met	10%	90%
7	Seventh year monitoring report demonstrates performance standards are being met and project has received closeout approval.	10%	100%
Stream Credits			
Monitoring Year	**Credit Release Activity**	**Interim Release**	**Total Release**
0	Initial Allocation - see requirements below	30%	30%

1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50% (65%*)
3	Third year monitoring report demonstrates performance standards are being met	10%	60% (75%*)
4	Fourth year monitoring report demonstrates performance standards are being met	10%	70% (85%*)
5	Fifth year monitoring report demonstrates performance standards are being met and project has received closeout approval.	15%	100%

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 percent of a site's total stream credits shall be released after two bankfull events have occurred, in separate years, provided the channel is stable and all other performance standards are met. In the event that less than two bankfull events occur during the monitoring period, release of these reserve credits shall be at the discretion of the IRT. As projects approach milestones associated with credit release, the 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.

7.0 MITIGATION WORK PLAN

7.1 Target Stream Type(s), Wetland Type(s), and Plant Communities

7.1.1 Target Stream Types

The primary goal when targeting a stream type was to select a site-specific design approach that would return Coastal Plain headwater stream functions to a stable state prior to past disturbances as described in the guidance document entitled "*Information Regarding Stream Restoration in the Outer Coastal Plain of North Carolina*." (USACE, DWQ 2005). Current assessment methods and data analyses were utilized for identifying lost or impaired functions at the site and to determine overall mitigation potential. Among these are reviewing existing hydrogeomorphic conditions, historical aerials and LiDAR mapping, evaluating 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 and exploring the potential for restoration, an approach to the site was developed, that would address restoration of stream, wetland and buffer functions within the project area. Topography and soils at the site indicate that the project area most likely functioned in the past as headwater tributary stream system with associated wetlands, eventually flowing downstream into the larger St. Clair Creek system. Assigning an appropriate stream type for the corresponding valley that accommodates the existing and future hydrologic conditions and sediment supply was considered prior to selecting the proposed design approach. This was primarily based on the range of the reference reach data available and the desired performance of the site.

Previous research performed by Baker in the Croatan National Forest examined the point at which smaller (zero to first order) Coastal Plain streams develop into defined channels (Tweedy, 2008). As described further in Section 17.1.3, and with supplemental information presented in Section 20.0, Appendix F, data collected suggest that for small tributary drainages, single thread channels are often found when drainage areas approach one square mile and slope is 0.001 foot/foot or greater. For smaller drainages and decreased slopes, multi-thread systems that function more like headwater wetlands are more common. These data, along with successful project implementation by Baker, helped to provide a basis for evaluating the valley topography of the site and determining how these stream and wetland systems may have functioned historically.

7.1.2 Target Wetland Types

The restoration approach for the riparian wetland areas targets a "Coastal Plain Small Stream Swamp" (Blackwater subtype), as identified by Schafale and Weakley (1990) and a Headwater Forest as identified by the North Carolina Wetland Assessment Method (NCWAM). Hydrology of this system will be palustrine, "intermittently, temporarily, or seasonally flooded".

The goal of the wetland design component of the project is to restore functions in areas where evidence of hydric soil conditions are present. The wetland restoration approach is based on a detailed soil analyses by a licensed soil scientist, hydrologic monitoring using rainfall data and groundwater level monitoring wells, as well as other assessment data collected at the site. Four main activities will be employed to restore on-site wetlands:

- Minor grading to remove overburden and spoil piles from buried hydric soil layers in limited areas, this grading is anticipated to be less than 6 inches in all proposed wetland restoration areas
- Re-establishing hydrology by filling existing ditches and raising of the local water table,
- Planting native wetland species vegetation to establish buffer vegetation,
- Connecting channels to their relic floodplains.

As a result of raising the streambeds and reconnecting the streams to their relic floodplains, 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 steam and wetland system. Much of this wetland uplift and restoration will occur within the 50-foot restored buffers of the stream system, and therefore is unavailable for wetland mitigation credits.

However, there are two areas of drained and impacted hydric soils adjacent to UT2 and UT3 that lie outside the proposed 50-foot buffers of the stream restoration and are available for wetland restoration. The areas are approximately 1.1 AC (UT2) and 1.7 AC (UT3) in size, and soil conditions have been independently confirmed as hydric by a licensed soil scientist (see Section 19, Appendix E). These soils have been modified by a series of ditches that were installed in the past for agricultural and timber production. The area consists of planted pines, raised farm paths, and small sections of an existing waterfowl impoundment.

A jurisdictional determination conducted in 2008 found that there is a small area of existing wetland at the downstream end of UT3 (See Section 21, Appendix G). However, the only construction activities planned will be to minimally grade an area where an old farm path had been built to restore the relic valley. Any temporary impacts to marginal or fringe wetlands associated with the restoration activities would be considered minimal and would involve minor surface excavation or roughening, re-establishment of native species wetland vegetation, and adjustments to drainage patterns as necessary to restore historic channel pattern to the system. Exposed soils will be ripped and tilled to reduce compaction from past farming practices and further soils tests will be conducted to determine appropriate liming and fertilization rates appropriate for the targeted vegetation types. Thus, stream and wetland restoration activities would improve the existing hydrology, vegetation, and soil conditions throughout the site. Additional information regarding the design approach for wetland restoration activities is located in Section 17, Appendix C.

7.1.3 Target Plant Communities

Native species riparian vegetation will be established in both the restored headwater stream valley, restored buffer and wetland complexes throughout the site. Schafale and Weakley's (1990) guidance on vegetation communities as well as the USACE Wetland Research Program (WRP) Technical Note VN-RS-4.1 (1997) were referenced during the development of riparian and wetland planting lists for the site. In general, bare root vegetation will be planted at a target density of 680 stems per acre. Existing invasive species vegetation, such as Chinese privet (*Ligustrum sinense*), will be removed to allow native plants to become established within the conservation easement. Planted pines will be removed within the conservation easement, however native tree species will be preserved whenever possible and harvested woody material will be utilized to provide cover and/or nesting habitat. Wetland hardwood species will be planted to provide the appropriate vegetation for the restored headwater stream, riparian wetland, and riparian buffer areas. Species will include: Green Ash (*Fraxinus pennsylvanica*), Swamp Tupelo (*Nyssa sylvatica*), Swamp Chestnut Oak (*Quercus michauxii*), Laurel Oak (*Quercus laurifolia),* Overcup oak (*Quercus lyrata*), Willow Oak (*Quercus phellos),* Bald Cypress (*Taxodium distichum*), and American Elm (*Ulmus americana*). Understory species will include: Sweet Pepperbush (*Clethra alnifolia*), Ironwood (*Carpinus caroliniana*), Titi (*Cyrilla racemiflora*), Sweetbay Magnolia (*Magnolia virginiana*), Swamp Bay (*Persea palustris*), Swamp Doghobble (*Leucothoe racemosa*), Fetterbush (*Lyonia lucida*), and Virginia Sweetspire (*Itea virginica*).

7.2 Design 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 Baker

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 (shown in Section 17, Appendix C) also considered current guidelines from the USACE and NCDWQ guidance document entitled "*Information Regarding Stream Restoration in the Outer Coastal Plain of North Carolina.*" (USACE, DWQ 2005).

The restoration activities are justified for the following reasons:

1. Site streams have been channelized during the conversion of the surrounding area for agricultural use. Re-establishing the historic stream, valley, and wetland conditions will allow stream flow to spread onto the historic floodplain, dissipating flow energies and forming multi-thread flow patterns, improve water quality, and improve wetland hydrology;
2. Past agricultural and silvicultural activities, such as timber production, have resulted in lowered water tables and monoculture vegetation within the historic riparian zone;
3. Enhancement or preservation measures would not achieve the highest possible level of functional lift for the degraded stream and wetland system.

Selection of a general restoration approach was the first step in selecting design criteria for reaches UT2 and UT3. The approaches were based on the potential for restoration as determined during the site assessment and the specific design parameters were developed so that plan view layout, cross-section dimensions, and profile could be described for developing construction documents. The design philosophy is to use these design parameters as conservative values for the selected stream types and to allow natural variability in stream dimension and bed features to form over long periods of time under the processes of flooding, re-colonization of vegetation, and watershed influences.

Table 7.1 Project Design Stream Types
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Stream	Proposed Stream Type	Approach/Rationale
UT2 to St. Clair Creek	DA	Coastal Plain Headwater Stream: Restoration will consist of grading the historic valley topography, returning the flow to this valley, and filling the channelized portions of stream and ditches. The system will be allowed to form a multi-thread channel on its own. This approach will allow for restoration of historic flow patterns. Riparian buffers at least 50 feet wide (100-foot total minimum width) will be established or protected along both sides of the centerline of the restored valley and all buffer areas will be protected by a perpetual conservation easement.
UT3 to St. Clair Creek	DA	Coastal Plain Headwater Stream: Restoration will consist of grading the historic valley topography, returning the flow to this valley, and filling the channelized portions of stream and ditches. The system will be allowed to form a multi-thread channel on its own. This approach will allow for restoration of historic flow patterns. Riparian buffers at least 50 feet wide (100-foot total minimum width) will be established or protected along both sides of the centerline of the restored valley and all buffer areas will be protected by a perpetual conservation easement.

Due to the small drainage and very low slopes, the channels are not actively incising. While active channel incision is not contributing large amounts of sediment to the receiving waters, the lowered water

table, degraded buffers, and drained wetlands have negatively impacted the water quality and ecology of the St. Clair Creek watershed and the Pamlico River. Excess nutrients are currently entering the system from upstream farm fields where buffers are either minimal or non-existent. Ecological uplift will come from the restoration of diverse aquatic and terrestrial habitats that are appropriate for the ecoregion and landscape setting. By raising the stream bed and reconnecting the relic floodplains, the maximum degree of potential uplift will be provided, restoring stream, buffer, and wetland functions. Uplift will also be provided to the system by restoring and extending wildlife corridors that connect with existing wetlands and wooded areas near the downstream extents of the reaches. The water quality of receiving waters will be improved by reduced nutrient inputs. Approximately 17.5 acres of riparian buffer will be protected by a perpetual conservation easement.

7.3 Data Analyses

Both UT2 and UT3 have been straightened/channelized and dredged in the past and this manipulation has created a single-thread channel that is overly deep for the given drainage area which, along with adjacent parallel ditching, has lowered the water table. Both UT2 and UT3 most likely existed prior to conversion as a multi-thread channel (DA stream type). This is evidenced by the presence of small remnant headwater valleys and soil features in the areas and described further in Section 17, Appendix C.

Additionally, detailed topographic surveys were conducted to determine the elevations of the existing ditches and to validate the headwater valley signatures shown on the LiDAR imagery. The valley slopes are generally uniform and very flat along both UT2 and UT3.

Under Coastal Plain headwater reference conditions where channel formation is poor, unregulated flows are often conveyed through multiple small channels across a relatively well-defined floodplain. These stream and wetland systems flood regularly and their associated floodplains are typically characterized as depositional, which provide sediment storage during higher flow events. Microtopography that develops across these broad bottomlands is quite variable, because of tree roots, tip mounds, and debris jams. Debris appears to be a critical component in maintaining the characteristics of diffuse flow, as stream energy is not sufficient to provide excess scour and movement of large debris. Shear stress and stream power relationships developed for these reference sites are shown in Appendix C.

Since both UT2 and UT3 most likely previously existed as multi-thread headwater stream and wetland systems and have now been channelized/ditched, the use of Rosgen's stream classification system (Rosgen, 1996) is questionable but UT2 and UT3 would most closely classify as a Rosgen G stream type. Additionally, feature formation throughout the channelized reaches are poor with minimal habitat diversity or woody debris. The riparian buffer vegetation is absent or consist mostly of planted pines. The stream displays no measurable meander geometry due to its channelized condition. These conditions generally lead to lateral instability over time; however, small watersheds and very low stream gradients have served to prevent any significant bed or bank erosion.

Automated groundwater well data collected from April 2012 through March 2013 indicate that the site currently exhibits hydrologic conditions drier than jurisdictional wetland conditions. The data were collected during both dormant and growing season, and jurisdictional wetland hydrology was not observed across the project site. The ditches and channelized streams on the site transport surface and shallow, subsurface drainage from the farms fields, lowering the water table and keeping soil conditions favorable for agricultural production. Examination of the available hydrology and hydric soil data indicate that there is good potential for the restoration of a productive wetland and stream ecosystem.

The proposed design approach will restore hydrologic conditions prior to channelization by raising the local water table, base flow levels and introducing a natural flooding regime. The existing conditions data indicates that proposed mitigation activities will result in re-establishment of functional stream, floodplain

and wetland ecosystem. The restoration efforts, including site protection from a conservation easement, will promote the greatest ecological benefit, a rapid recovery period, and a justifiable and reduced environmental impact.

8.0 MAINTENANCE PLAN

The site will be monitored on a regular basis, to include physical inspection of the site at least once a 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 will be most likely in the first two years following site construction and may include the following components as described in Table 8.1:

Table 8.1 Routine Maintenance Components
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Feature	Maintenance through project close-out
Stream	Routine channel maintenance and repair activities may include stabilizing any significant rilling or erosional areas and supplemental installations of target vegetation along the project reaches. Areas of concentrated stormwater and floodplain flows that intercept the channel may also require maintenance to prevent bank failures and head-cutting until vegetation becomes established.
Wetland	Routine wetland maintenance and repair activities may include supplemental installations of target vegetation within the wetland. Areas of concentrated stormwater and floodplain flows that intercept the wetland may also require maintenance to prevent scour.
Vegetation	Vegetation will be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, and fertilizing. Exotic/invasive plant species will controlled by mechanical and/or chemical methods. Any invasive plant species control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.
Site Boundary	Site boundaries will be demarcated in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries may be identified by fence, marker, bollard, post, 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.
Culverted Farm Road Crossings	The road crossing within the site may be maintained only as allowed by the recorded Conservation Easement, deed restrictions, rights of way, or corridor agreements.

9.0 PERFORMANCE STANDARDS

Baker has been involved in obtaining recent approvals from the regulatory agencies for several Coastal Plain stream and wetland mitigation plans. The success criteria for the project site will follow the mitigation plans developed for these projects, as well as the Stream Mitigation Guidelines (USACE 2003 and NCDWQ 2003) and EEP's recent supplemental guidance document *Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation* dated November 7, 2011. Additionally, the USACE and NCDWQ Guidance Document *Information Regarding Stream Restoration in the Outer Coastal Plain of North Carolina* will be referenced for monitoring purposes. All monitoring activities will be conducted for a period of 7 years unless the site demonstrates complete success by Year 5 and no concerns have been identified. An early closure provision may be requested by the provider for some or all of the monitoring components. Early closure may only be obtained through written approval from the USACE in consultation with the NCIRT.

For reaches UT2 and UT3, which involve the restoration of the historic flow pattern as a multi-thread headwater stream system to be constructed as a broad valley with shallow flow paths, monitoring will focus primarily on visual assessments and flow documentation. It shall be consistent with the requirements described in the Federal Rule for compensatory mitigation sites in the Federal Register Title 33 Navigation and Navigable Waters Volume 3 Chapter 2 Section § 332.5 paragraphs (a) and (b). Specific success criteria components and evaluation methods are described below.

9.1 Stream Monitoring – Reach UT2 & UT3

Geomorphic monitoring of reaches UT2 and UT3 will conducted once a year for seven years following the completion of construction to evaluate the effectiveness of the restoration practices. Since this approach involves the restoration of historic flow patterns and flooding functions in a multi-thread headwater stream system, monitoring efforts will focus on visual observations to document stability and the use of water level monitoring gauges to document saturation and flooding functions. The methods used and any related success criteria are described below for each parameter.

9.1.1 Bankfull Events and Flooding Functions

The occurrence of bankfull events and flooding functions within the monitoring period will be documented by the use of automated water level gauges and photographs. Groundwater levels within the restored headwater valley should approximate the wetland hydroperiods of similar reference sites. At least four automated gauges on UT2 and two on UT3 will be installed approximately 500 feet apart within the restored systems to document flow duration. The automated loggers will be programmed to collect data at a minimum of every 6 hours to capture flow frequency and duration. Installation of monitoring stations will follow the standard methods found in Stream Mitigation Guidelines (USACE and NCDWQ 2006).

A surface water flow event will be considered perennial when the flow duration occurs for a minimum of 30 days. Two surface water flow events must be documented within a five-year monitoring period; otherwise, monitoring will continue for seven years or until two flow events have been documented in separate years. The automated gauges should document the occurrence of extended periods of shallow surface ponding, indicative of flow. Additional monitoring or alternative analyses may be necessary in the event of abnormal climatic conditions.

9.1.2 Photo Reference Stations

Visual monitoring of both stream reaches will be conducted twice per monitoring year with at least five months in between each site visit. Photographs will be used to visually-document system performance. Reference stations will be photographed annually for a minimum of seven years following construction. Photographs will be taken from a height of approximately five to six feet. Permanent markers will be

established to ensure that the same locations (and view directions) on the site are documented in each monitoring period.

The reaches will be photographed longitudinally beginning at the downstream end of the restoration site and moving upstream to the end of the site. Photographs will be taken looking upstream at delineated locations throughout the restored stream valley. Points will be close enough together to provide an overall view of the reach lengths and valley crenulations. The angle of the shot will depend on what angle provides the best view and will be noted and continued in future shots.

Lateral photographs will also be used to evaluate channel development, erosion, success of riparian vegetation, and effectiveness of erosion control measures subjectively. Photo reference stations will be marked and described for future reference to document the development of appropriate vegetation.

A series of photos over time should demonstrate successional maturation of riparian vegetation. When modifications to photo position must be made due to obstructions or other reasons, the position will be noted along with any landmarks and the same position will used in the future. Additional photographs and/or video footage may be taken to document any observed evidence of flooding patterns such as debris/leaf litter, wrack lines, water marks, diffuse flow features, sediment sorting/deposits, shelving, etc.

9.1.3 Bed Material Analyses

Since the streams through the project site are dominated by silt or sand-size particles, pebble count procedures would not show a significant change in bed material size or distribution over the monitoring period; therefore, bed material analyses are not recommended for this project.

9.2 Wetland Monitoring

9.2.1 Groundwater Data Collection

Groundwater monitoring wells will be installed in the wetland mitigation areas to document hydrologic conditions of the restored wetland area. Up to four groundwater monitoring wells will be installed to evaluate hydrology during each growing season for seven years of hydrologic monitoring, or until success criteria have been met, whichever occurs later. To meet the hydrologic success criteria, the monitoring gauge data must show that for each normal year within the monitoring period, the site has been inundated or saturated for a certain hydroperiod. The targeted hydroperiod will be based on the range of wetness conditions for the type of wetland system to be restored and comparable hydrology of a nearby reference wetland site.

9.2.2 Hydrology

In order to determine if the hydrologic success criteria are achieved, automated groundwater-monitoring stations will be installed across the restored site and monitored year-round. Groundwater monitoring stations will follow the USACE standard methods found in the WRP Technical Notes ERDC TN-WRAP-00-02, (July 2000). In the event that there are years of normal precipitation during the monitoring period, and the data for those years do not show that the site has been inundated or saturated for the appropriate hydroperiod during the normal precipitation year, the review agencies may require remedial action. Baker will provide any required remedial action and continue to monitor hydrology on the site until it displays that the site has been inundated or saturated for the appropriate hydroperiod.

The objective is for the monitoring data to show the site exhibits an increased frequency of flooding. Groundwater levels will be compared to pre-restoration conditions and reference conditions. The

success criteria for wetland hydrology will be met when the site is saturated within 12 inches of the soil surface for 12% of the growing season (NCEEP, 2009b).

In order to determine if the rainfall is normal for the given year, a rainfall gage will be installed on the site to compare precipitation amounts using tallied data for the Pamlico Aquaculture Field Lab station, obtained from the CRONOS Database located on the State Climate Office of North Carolina's website. The Pamlico Aquaculture Field Lab station is approximately 6.5 miles from the project site. If a normal year of precipitation does not occur during the first seven years of monitoring, Baker will continue to monitor hydrology on the site until it documents that the site has been inundated or saturated for the appropriate hydroperiod.

If the rainfall data for any given year during the monitoring period are abnormal, it is possible that the desired hydrology for the site may not meet specific success criteria. However, reference wetland data will be assessed to determine if there is a positive correlation between the underperformance of the project site and the natural hydrology of the reference site(s).

9.2.3 Photo Reference Stations

Visual monitoring of all wetland areas will be conducted twice per monitoring year with at least five months in between each site visit. Photographs will be used to visually document system performance and identify areas of low stem density, invasive species vegetation, beaver activity, or other areas of concern. Reference stations will be photographed twice a year for a minimum of seven years following construction. Photographs will be taken from a height of approximately five to six feet. Permanent markers will be established to ensure that the same locations (and view directions) on the site are documented in each monitoring period.

9.3 Vegetation Monitoring

Successful restoration of the vegetation on a site is dependent upon hydrologic restoration, planting of preferred canopy species, and volunteer regeneration of the native plant community. In order to determine if the criteria are achieved, vegetation-monitoring quadrants will be installed and monitored across the restoration site in accordance with the CVS-NCEEP Protocol for Recording Vegetation, Version 4.1 (2007). The vegetation monitoring plots shall be a minimum of 2 percent of the planted portion of the site with a minimum of nine plots established randomly within the planted riparian buffer areas per Monitoring Levels 1 and 2. The size of individual quadrants will be 100 square meters for woody tree species.

Vegetation monitoring will occur in the fall, prior to the loss of leaves. Individual quadrant data will be provided and will include species diameter, height, density, and coverage quantities. Relative values will be calculated, and importance values will be determined. Individual seedlings will be marked such that they can be found in succeeding monitoring years. Mortality will be determined from the difference between the previous year's living, planted seedlings and the current year's living, planted seedlings.

At the end of the first full growing season (baseline/year 0) or after 180 days between March 1st and November 30th, species composition, stem density, and survival will be evaluated. For each subsequent year, vegetation plots shall be monitored for seven years in years 1, 2, 3, 5 and 7 or until the final success criteria are achieved. The restored site will be evaluated between March and November. The interim measure of vegetative success for the site will require the survival of at least 320, 3-year old, planted trees per acre at the end of year three of the monitoring period. At Year five, density must be no less than 260, 5-year old, planted trees per acre. The final vegetative success criteria will be the survival of 210, 7-year old, planted trees per acre at the end of the seven-year monitoring period, which must average 10 feet in height. However, if the performance standard is met by Year 5 and stem densities are greater than 260, 5-

year old stems/acre, vegetation monitoring may be terminated with approval by the USACE and Interagency review Team (IRT).

While measuring species density and height is the current accepted methodology for evaluating vegetation success on mitigation projects, species density and height alone may be inadequate for assessing plant community health. For this reason, the vegetation monitoring plan will incorporate the evaluation of additional plant community indices, native volunteer species, and the presence of invasive species vegetation to assess overall vegetative success.

Baker will provide any required remedial action on a case-by-case basis, such as replanting more wet/drought tolerant species, beaver management/dam removal, or removing undesirable/invasive species vegetation, and continue to monitor vegetation performance until the corrective actions demonstrate that the site is trending towards or meeting the standard requirement.

Additionally, herbaceous vegetation, primarily native grasses and forbs, will be seeded/planted throughout the site. During and immediately following construction activities, all ground cover at the project site must comply with the NC Erosion and Sedimentation Control requirements.

9.4 Stormwater Management Monitoring

No stormwater BMPs are proposed at the site therefore no such monitoring will be included.

10.0 MONITORING REQUIREMENTS

Annual monitoring reports containing the information defined within Table 10.1 below will be submitted to EEP by December 31st of the each year during which the monitoring was conducted. The monitoring report shall provide a project data chronology for EEP to document the project status and trends. Project success criteria must be met by the final monitoring year prior to project closeout, or monitoring will continue until unmet criteria are successfully met.

Table 10.1 Monitoring Requirements
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Required	Parameter	Quantity	Frequency	Notes
X	Surface Water Hydrology	As per April 2003 USACE Wilmington District Stream Mitigation Guidelines	Annually	A Crest Gauge and/or Pressure Transducers will be installed on site; the device will be inspected on a quarterly/semi-annual basis to document the occurrence of bankfull events on the project.
X	Groundwater Hydrology	Will be determined in consultation with EEP as applicable	Annually	Groundwater monitoring gauges with data recording devices will be installed on site as necessary to characterize the degree of attainment of the reference hydrology. The data will be downloaded on a monthly basis during the growing season.
X	Vegetation	EEP-CVS Guidance	Annually	Vegetation will be monitored using the Carolina Vegetation Survey (CVS) protocols.
X	Exotic and Nuisance Vegetation		Twice Annually	Locations of exotic and nuisance vegetation will be visually assessed and mapped a minimum of 5 months apart.
X	Project Boundary		As-Needed	Locations of fence damage, vegetation damage, boundary encroachments, etc. will be mapped.
X	Digital Photos		Annually	Photo stations will be established to capture the state of the channel and for vegetation plots. Stream photos will be preferably taken when the vegetation is minimal and within the same 2-month window between monitoring years.

11.0 LONG-TERM MANAGEMENT PLAN

Upon approval for close-out by the IRT the site will be transferred to the EEP. This party shall be responsible for periodic inspection of the site to ensure that restrictions required in the conservation easement or the deed restriction document(s) are upheld. Endowment funds required to uphold easement and deed restrictions shall be negotiated prior to site transfer to the responsible party.

The NCDENR Division of Natural Resource Planning and Conservation's Stewardship Program currently houses EEP stewardship endowments within the non-reverting, interest-bearing Conservation Lands Stewardship Endowment Account. The use of funds from the Endowment Account is governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used only for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable. The NCDENR Stewardship Program intends to manage the account as a non-wasting endowment. Only interest generated from the endowment funds will be used to steward the compensatory mitigation sites. Interest funds not used for those purposes will be re-invested in the Endowment Account to offset losses due to inflation.

12.0 ADAPTIVE MANAGEMENT PLAN

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

1. Notify the USACE as required by the Nationwide 27 permit general conditions.
2. Revise performance standards, maintenance requirements, and monitoring requirements as necessary and/or required by the USACE.
3. Obtain other permits as necessary.
4. Implement the Corrective Action Plan.
5. Provide the USACE a Record Drawing of Corrective Actions. This document shall depict the extent and nature of the work performed.

13.0 FINANCIAL ASSURANCES

Pursuant to Section IV H and Appendix III of the Ecosystem Enhancement Program's In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environment and Natural Resources has provided the USACE-Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by EEP. This commitment provides financial assurance for all mitigation projects implemented by the program.

14.0 OTHER INFORMATION

14.1 Definitions

This document is consistent with the requirements of the federal rule for compensatory mitigation 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). Specifically the document addresses the following requirements of the federal rule:

(2) *Objectives.* A description of the resource type(s) and amount(s) that will be provided, the method of compensation (i.e., restoration, establishment, enhancement, and/or preservation), and the manner in which the resource functions of the compensatory mitigation project will address the needs of the watershed, ecoregion, physiographic province, or other geographic area of interest.

(3) *Site selection.* A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and the practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the compensatory mitigation site. (See § 332.3(d).)

(4) *Site protection instrument.* A description of the legal arrangements and instrument, including site ownership, that will be used to ensure the long-term protection of the compensatory mitigation site (see § 332.7(a)).

(5) *Baseline information.* A description of the ecological characteristics of the proposed compensatory mitigation site and, in the case of an application for a DA permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other site characteristics appropriate to the type of resource proposed as compensation. The baseline information should also include a delineation of waters of the United States on the proposed compensatory mitigation site. A prospective permittee planning to secure credits from an approved mitigation bank or in-lieu fee program only needs to provide baseline information about the impact site, not the mitigation bank or in-lieu fee site.

(6) *Determination of credits.* A description of the number of credits to be provided, including a brief explanation of the rationale for this determination. (See § 332.3(f).)

(7) *Mitigation work plan.* Detailed written specifications and work descriptions for the compensatory mitigation project, including, but not limited to, the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water, including connections to existing waters and uplands; methods for establishing the desired plant community; plans to control invasive plant species; the proposed grading plan, including elevations and slopes of the substrate; soil management; and erosion control measures. For stream compensatory mitigation projects, the mitigation work plan may also include other relevant information, such as plan form geometry, channel form (e.g. typical channel cross-sections), watershed size, design discharge, and riparian area plantings.

(8) *Maintenance plan.* A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.

(9) *Performance standards.* Ecologically-based standards that will be used to determine whether the compensatory mitigation project is achieving its objectives. (See § 332.5.)

(10) *Monitoring requirements.* A description of parameters to be monitored in order to determine if the compensatory mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting on monitoring results to the district engineer must be included. (See § 332.6.)

(11) *Long-term management plan.* A description of how the compensatory mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management. (See § 332.7(d).)

(12) *Adaptive management plan.* A management strategy to address unforeseen changes in site conditions or other components of the compensatory mitigation project, including the party or parties responsible for implementing adaptive management measures. The adaptive management plan will guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success. (See § 332.7(c).)

(13) *Financial assurances.* A description of financial assurances that will be provided and how they are sufficient to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with its performance standards (see § 332.3(n)). 2) *Objectives.* A description of the resource type(s) and amount(s) that will be provided, the method of compensation (i.e., restoration, establishment, enhancement, and/or preservation), and the manner in which the resource functions of the compensatory mitigation project will address the needs of the watershed, ecoregion, physiographic province, or other geographic area of interest.

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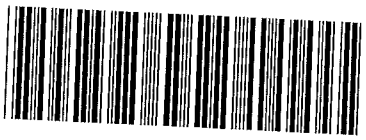
15.0 APPENDIX A - SITE PROTECTION INSTRUMENT

FOR REGISTRATION REGISTER OF DEEDS
Jennifer Leggett Whitehurst
Beaufort County, NC
June 27, 2013 09:56:00 AM
Book 1821 Page 53-64
FEE: $26.00
NC REVENUE STAMP: $640.00
INSTRUMENT # 2013003692



INSTRUMENT # 2013003692

BEAUFORT COUNTY LAND RECORDS
ROUTING FORM N/A
Land Records Official 6-27-13 Date

Prepared by and return to:
Robert H. Merritt, Jr.
Bailey & Dixon, LLP
P. O. Box 1351
Raleigh, NC 27602

Excise Tax $ 640.00

STATE OF NORTH CAROLINA

BEAUFORT COUNTY

CONSERVATION EASEMENT
PROVIDED PURSUANT TO
FULL DELIVERY MITIGATION CONTRACT
CONTRACT 003986

SPO# 007-K
EEP SITE ID#: 95015

THIS CONSERVATION EASEMENT DEED, made this 24th day of June, 2013, by CHAD ASHLEY POOLE (unmarried) and STEPHEN RICHARD POOLE, III and wife, JENNIE C. POOLE, (hereinafter collectively "Grantor"), 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 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 Ecosystem Enhancement Program (formerly known as the 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 Michael Baker Engineering, Inc. and the North Carolina Department of Environment and Natural Resources, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environment and Natural Resources purchase and Services Contract Number 003986.

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, the North Carolina Department of Transportation and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Agreement, (the "MOA") duly executed by all parties in Greensboro, NC on July 22, 2003, which recognizes that the 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 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 Ecosystem Enhancement Program in the Department of Environment and Natural Resources, which has been delegated the authority authorized by the Governor and the Council of State to the Department of Administration, has approved acceptance of this instrument; and

WHEREAS, Grantor owns in fee simple a certain parcel of real property situated, lying and being in Bath Township, Beaufort County, North Carolina, which parcel is identified by PIN: 15-005359 (GPIN: 6672-78-3003) containing approximately 125.57 acres having been conveyed to Grantor by deed recorded in Deed Book 1235, Page 0484, Beaufort County Registry, North Carolina and which parcel is described in said recorded deed as Tract One and Tract Two, but is treated in the Beaufort County tax records as one parcel under the PIN: 15-005359 (the "Property"); and

WHEREAS, Grantor is willing to grant a Conservation Easement (as hereinafter defined) over portions of the Property referred to above, thereby restricting and limiting the use of the included portions of the Property to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept such Conservation Easement for the protection and benefit of the waters and the other portions of the Saint Clair Creek Restoration Project, Beaufort County, North Carolina;

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth and other good and valuable consideration, the receipt and legal sufficiency of which is hereby acknowledged, 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, as follows:

The Easement Area consists of the following:

All of the land identified as follows:

Conservation Easements identified as CE-1, CE-2, and CE-3, as shown on a Plat entitled "Saint Clair Creek Restoration Project for State of North Carolina – Ecosystem Enhancement Program on the property of Richard Stephen Poole, III and Chad Ashley Poole, Bath Township – Beaufort County – North Carolina" dated June 17, 2013, prepared by Gaskins Land Surveying, P.A. and recorded at Plat or Map Book I, SLIDE ~~Page~~ 4-5 thru 7, Beaufort County Registry.

TOGETHER WITH easements and rights for access, ingress, egress and regress as described on the above-referenced recorded plat and this Conservation Easement Deed.

The Conservation Easements described above are hereinafter referred to as the "Easement Area" or the "Conservation Easement" and are further set forth in a metes and bounds description attached hereto as Exhibit 1 and incorporated herein by reference.

The purposes of the Conservation Easement are to maintain, restore, enhance, create and preserve wetland and/or riparian resources in the 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 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, lessees, agents and licensees.

II. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The 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 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 are hereby and 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 Easement Area for the purposes thereof.

B. Motorized Vehicle Use. Usage of motorized vehicles in the Easement Area is prohibited.

C. Educational Uses. The Grantor reserves the right to engage in and permit others to engage in educational uses in the Easement Area not inconsistent with this Conservation Easement, and the right of access to the Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the Conservation Easement shall not alter vegetation, hydrology or topography of the site.

D. Vegetation Cutting. Except as related to the removal of non-native plants, diseased or damaged trees, and vegetation that destabilizes or renders unsafe the Easement Area to persons or natural habitat, all cutting, removal, mowing, harming, or destruction of any trees and vegetation in the Easement Area is prohibited.

E. Industrial, Residential and Commercial Uses. All industrial, residential and commercial uses are prohibited in the Easement Area.

F. Agricultural Use. All agricultural uses are prohibited within the 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 Easement Area.

H. Roads and Trails. There shall be no construction of roads, trails, walkways, or paving in the Easement Area.

I. Signs. No signs shall be permitted in the Easement Area except interpretive signs describing restoration activities and the conservation values of the Easement Area, signs identifying the owner of the Property and the holder of the Easement Area, signs giving directions, or signs prescribing rules and regulations for the use of the Easement Area.

J. Dumping or Storing. Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances, machinery, or other material in the Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, drilling, removal of topsoil, sand, gravel, rock, peat, minerals, or other materials in the Easement Area.

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 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 pesticides or biocides in the Easement Area is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Easement Area may temporarily be used for good cause shown as needed for the survival of livestock and agricultural production on the Property.

M. Subdivision and Conveyance. Grantor voluntarily agrees that no subdivision, partitioning or dividing of the underlying Property owned by the Grantor in fee simple ('fee") that is subject to this Easement is allowed. Unless agreed to by the Grantee in writing, any future conveyance of the underlying fee and the rights conveyed herein shall be as a single block of property. Any future transfer of the fee is subject to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Easement Area for the purposes set forth herein.

N. Development Rights. All development rights are permanently removed from the Easement Area and are non-transferrable.

O. Disturbance of Natural Features. Any change, disturbance, alteration or impairment of the natural features of the 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 consistent with the purposes of this Conservation Easement and the Grantor obtains advance written approval from the N. C. Ecosystem Enhancement Program, whose mailing address is currently 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 the perpetual Right of Access to the Easement Area over the Property, as further described below, at reasonable times to undertake any activities to restore, construct, manage, maintain, enhance, and monitor the stream, wetland and other riparian resources in the 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.

The permanent Right of Access set forth herein shall be over that certain five foot (5') access easement shown on Plat Book 82/, Page 69, leading from the western boundary of the Property to and between each of Conservation Easements CE-1, CE-2 and CE-3

as shown on said Plat.

In addition to the five foot (5') permanent Right of Access set forth above, Grantor hereby grants to Grantee, its agents and invitees, access for ingress, egress and regress over that certain thirty foot (30') right-of-way described in Book 800, Page 361, Beaufort County Registry (except the portion of said right-of-way running from point "a" to point "b") and as necessary, over the Property for the purpose of accessing said conservation easements CE-1, CE-2 and CE-3, or either of them, in the event of extraordinary circumstances requiring such access, provided the landowner is given ten (10) days' notice of such need by Grantee.

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. The Grantee, its employees and agents, successors or assigns, shall be permitted to place fencing on the Property to restrict livestock access. Although the Grantee is not responsible for fence maintenance, the Grantee reserves the right to repair the fence, at its sole discretion.

IV. ENFORCEMENT AND REMEDIES

A. Enforcement. To accomplish the purposes of this Conservation Easement, Grantee is allowed to prevent any activity within the Easement Area that is inconsistent with the purposes of this Conservation Easement and to require the restoration of such areas or features in the 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 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 will be 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 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 to or change in the Easement Area caused by third parties or 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, 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 Conservation 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 above or to such other address(es) as such 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 shall be 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 a writing signed by all parties hereto, or their successors and/or assigns, and provided 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 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. Such notification shall be addressed to: Justin McCorkle, 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 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 Easement Area, and the right of quiet enjoyment of the 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 are free from

encumbrances except the easements, leases, restrictions and rights-of-way reserved or granted herein or otherwise of record and described below and that Grantor will warrant and defend title to the same against the claims of all persons whomsoever. The easements, leases, restrictions and rights-of-way reserved herein or of record constituting exceptions to title are as follows:

1. Reservation of rights as set forth in Article II, above.

IN TESTIMONY WHEREOF, the Grantor has hereunder set its hand and seal, the day and year first above written.

Stephen Richard Poole III (SEAL)
Stephen Richard Poole, III

Chad Ashley Poole (SEAL)
Chad Ashley Poole

Jennie C. Poole (SEAL)
Jennie C. Poole

NORTH CAROLINA

COUNTY OF Beaufort

I, Thomas E. Archie do certify that **Stephen Richard Poole, III and wife, Jennie C. Poole,** personally appeared before me this day, each acknowledging that they voluntarily signed the foregoing document for the purposes therein expressed. I have received satisfactory evidence of the principals' identity in the form of Drivers License.

Witness my hand and official stamp or seal this 27th day of June, 2013.

Notary Public
Thomas E. Archie
Printed or typed notary name

My Commission Expires: 2/19/16

Thomas E. Archie
Notary Public
Beaufort County
North Carolina
My Commission Expires 2/19/16

NORTH CAROLINA

COUNTY OF BEAUFORT

I, THOMAS E. ARCHIE, do certify that **Chad Ashley Poole**, personally appeared before me this day, each acknowledging that they voluntarily signed the foregoing document for the purposes therein expressed. I have received satisfactory evidence of the principals' identity in the form of DRIVERS LICENSE.

Witness my hand and official stamp or seal this 24 day of JUNE, 2013.

Notary Public

THOMAS E. ARCHIE

Printed or typed notary name

My Commission Expires: 2/19/16

00351628

Thomas E. Archie
Notary Public
Beaufort County
North Carolina
My Commission Expires

Thomas E. Archie
Notary Public
Beaufort County
North Carolina
My Commission Expires 2/19/16

Exhibit 1
Legal Description
Permanent Conservation Easements
Saint Clair Creek Restoration Project
Beaufort County, NC

1. Permanent Conservation Easement (Ref: PIN: 15005359) (CE-1)

A permanent conservation easement over a portion of land in Bath Township, Beaufort County, North Carolina, as shown on a map entitled *"Saint Clair Creek Restoration Project for State of North Carolina - Ecosystem Enhancement Program on the property of Stephen Richard Poole, III and Chad Ashley Poole,* dated June 17, 2013, and recorded in Plat Book I, ~~Page~~ SLIDE 4-5 thru 7, of the Beaufort County Registry, and being a portion of the parcel owned by *Richard Stephen Poole, III and Chad Ashley Poole* (PIN: 15005359), more particularly described as follows:

Commencing at an existing 1" iron pipe with NC Grid coordinates of N 628175.8383, E 2674618.4510, and identified as Control Point # 2 on the above referenced plat and running S 26°12'38" E 68.43', to a point, which is the **POINT AND PLACE OF BEGINNING**; thence continuing the following courses and distances:

N00°12'24"W 113.71' ; thence
N73°22'26"E 1177.01' ; thence
S66°31'07"E 150.49' ; thence
S39°39'31"E 605.53' ; thence
S61°36'54"E 422.03' ; thence
S28°23'35"E 36.59'; thence
S80°57'22"W 335.24'; thence
N61°13'14"W 453.80'; thence
N36°34'12"W 205.42' ; thence
N24°43'19"W 207.22'; thence
S71°44'06"W 608.27'; thence
S87°49'56"W 525.44', to the **POINT AND PLACE OF BEGINNING**, said permanent conservation easement containing 11.55 acres, more or less.

2. Permanent Conservation Easement (Ref: PIN: 15005359) (CE-2)

A permanent conservation easement over a portion of land in Bath Township, Beaufort County, North Carolina, as shown on a map entitled *"Saint Clair Creek Restoration Project for State of North Carolina - Ecosystem Enhancement Program on the property of Stephen Richard Poole, III and Chad Ashley Poole,* dated June 17, 2013, and recorded in Plat Book I, ~~Page~~ SLIDE 4-5 thru 7, of the Beaufort County Registry,

and being a portion of the parcel owned by *Richard Stephen Poole, III and Chad Ashley Poole* (PIN: 15005359), more particularly described as follows:

Commencing at an iron bar and cap with NC Grid coordinates of N 627778.5460, 2676800.1700, and identified as Control Point # 3 on the above referenced plat and running N 14° 06' 35" W 299.24', to a point, which is the **POINT AND PLACE OF BEGINNING**; thence continuing the following courses and distances:

N13°56'12"W 718.86' ; thence
N84°05'38"E 233.03' ; thence
S30°53'00"E 200.07' ; thence
S10°21'12"E 331.20' ; thence
S27°39'10"W 326.86' ; thence
N46°37'24"W 95.17', to the **POINT AND PLACE OF BEGINNING**, said permanent conservation easement containing 4.19 acres, more or less.

3. Permanent Conservation Easement (Ref: PIN: 15005359) (CE-3)

A permanent conservation easement over a portion of land in Bath Township, Beaufort County, North Carolina, as shown on a map entitled *"Saint Clair Creek Restoration Project for State of North Carolina - Ecosystem Enhancement Program on the property of Stephen Richard Poole, III and Chad Ashley Poole,* dated June 17, 2013, and recorded in Plat Book J Slide, ~~Page~~ 4-5 thru 9, of the Beaufort County Registry, and being a portion of the parcel owned by *Richard Stephen Poole, III and Chad Ashley Poole* (PIN: 15005359), more particularly described as follows:

Commencing at an iron bar and cap with NC Grid coordinates of N 627778.5460, 2676800.1700, and identified as Control Point # 3 on the above referenced plat and running N 17° 31' 30" E 403.84', to a point, which is the **POINT AND PLACE OF BEGINNING**; thence continuing the following courses and distances:

N16°16'47"E 80.54'; thence
N30°54'08"E 115.11' ; thence
S52°13'28"E 170.24' ; thence
S34°25'19"E 267.28' ; thence
S50°54'54"W 155.60' ; thence
N44°58'41"W 349.03', to the **POINT AND PLACE OF BEGINNING**, said permanent conservation easement containing 1.69 acres, more or less.

Label - Bailey + Dixon LLP/ao

OWNER(S) CERTIFICATE

TAX GPIN: 6672-78-3003 (PIN: 15-005359)

WE, CHAD ASHLEY POOLE (UNMARRIED) AND STEPHEN RICHARD POOLE III AND WIFE, JENNIE C. POOLE, HEREBY CERTIFY THAT WE ARE THE OWNERS OF THE PROPERTIES SHOWN AND DESCRIBED HEREON, WHICH WERE CONVEYED TO US BY DEEDS RECORDED IN DEED BOOK 1235, PAGE 484 (TAX GPIN: 6672-78-3003, PIN: 15005359), OF THE BEAUFORT COUNTY REGISTRY; AND THAT WE HEREBY ADOPT THIS PLAN OF SUBDIVISION AND GRANT AND CONVEY THE EASEMENTS HEREIN WITH FREE CONSENT. FURTHER, I HEREBY CERTIFY THAT THE LAND AS SHOWN HEREON IS WITHIN THE SUBDIVISION REGULATION JURISDICTIONS OF BEAUFORT COUNTY, NORTH CAROLINA.

Chad Ashley Poole 6/24/13
CHAD ASHLEY POOLE DATE

Stephen Richard Poole III 6/24/13
STEPHEN RICHARD POOLE, III DATE

Jennie C. Poole 6/24/13
JENNIE C. POOLE DATE

STATE OF NORTH CAROLINA
COUNTY OF BEAUFORT

I, THOMAS E ARCHIE A NOTARY PUBLIC FOR THE COUNTY AND STATE AFORESAID, DO HEREBY CERTIFY THAT STEPHEN RICHARD POOLE, III AND WIFE JENNIE C. POOLE PERSONALLY APPEARED BEFORE ME THIS DAY AND ACKNOWLEDGED THE DUE EXECUTION OF THE FOREGOING INSTRUMENT.

WITNESS MY HAND AND OFFICIAL STAMP OR SEAL THIS 24TH DAY OF JUNE, 2013

NOTARY PUBLIC

MY COMMISSION EXPIRES: 2/9/16

Thomas E Archie
Notary Public
Beaufort County
North Carolina
My Commission Expires 2/9/16

STATE OF NORTH CAROLINA
COUNTY OF BEAUFORT

I, THOMAS E ARCHIE A NOTARY PUBLIC FOR THE COUNTY AND STATE AFORESAID, DO HEREBY CERTIFY THAT CHAD ASHLEY POOLE PERSONALLY APPEARED BEFORE ME THIS DAY AND ACKNOWLEDGED THE DUE EXECUTION OF THE FOREGOING INSTRUMENT.

WITNESS MY HAND AND OFFICIAL STAMP OR SEAL THIS 24TH DAY OF JUNE, 2013

NOTARY PUBLIC

MY COMMISSION EXPIRES: 2/9/16

Thomas E Archie
Notary Public
Beaufort County
North Carolina
My Commission Expires 2/9/16

NORTH CAROLINA
BEAUFORT COUNTY
This Map/Plat was presented for registration and recorded in this office in Plat Cabinet I, Slide 4-5.
This 27th day of June 2013 at 956 A.m.
Jennifer Leggett Whitehurst By Angie E Watson, Deputy
Register of Deeds Asst/Deputy

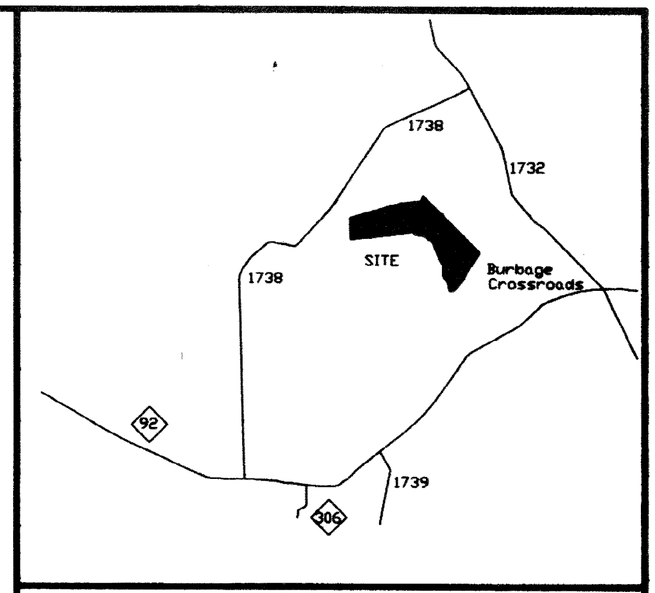
REFERENCES:
DEED BOOK 1235 PAGE 484
DEED BOOK 180 PAGE 389
DEED BOOK 260 PAGE 374
SPECIAL PROCEEDINGS 1735 BK 10 PG 506
DEED BOOK 800 PAGE 361
PLAT CABINET B SLIDE 266
MAP BOOK 6 PAGE 37
DEED BOOK 305 PAGE 423
DEED BOOK 908 PAGE 211
DEED BOOK 855 PAGE 761
DEED BOOK 835 PAGE 765
DEED BOOK 873 PAGE 819
DEED BOOK 865 PAGE 723

CONSERVATION EASEMENT AREA SUMMARY

BY COORDIANTES

TAX GPIN: 6672-78-3003 (PIN: 15-005359)

CE - 1	11.55 ACRES
CE - 2	4.19 ACRES
CE - 3	1.69 ACRES
TOTAL AREA =	17.43 ACRES



VICINITY SKETCH NTS

NORTH CAROLINA PROFESSIONAL SEAL L-3824 LAND SURVEYOR KENDALL E. GASKINS

SURVEYORS CERTIFICATION

I, KENDALL E. GASKINS CERTIFY THAT THIS SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT ORDERED SURVEY, OR OTHER EXCEPTION TO THE DEFINITION OF A SUBDIVISION.

KENDALL E. GASKINS L-3824

I, KENDALL E. GASKINS, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM A SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED IN BOOK SEE, PAGE REFERENCES); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND IN BOOK ____, PAGE ____; THAT THE RATIO OF PRECISION AS CALCULATED IS 1:10,000+; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED.

WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 24th DAY OF JUNE, A.D., 2013.

KENDALL E. GASKINS L-3824

Approved, Beaufort Co. Planning
NOT Subject To Subdivision Regulations
Subdivision Administrator Date 6-27-13

STATE OF NORTH CAROLINA
COUNTY OF BEAUFORT

I, A. Harris, REVIEW OFFICER OF BEAUFORT COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED TO MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING

REVIEW OFFICER DATE 6-27-13

NOTES:
1. THE PURPOSE OF THIS PLAT IS TO IDENTIFY THE LOCATION OF CONSERVATION EASEMENTS DEPICTED AS EASEMENT AREAS CE-1, CE-2 AND CE-3.
2. BOUNDARY INFORMATION IS DERIVED FROM FIELD SURVEYS, DEEDS, PLATS AND TAX RECORDS.
3. COMBINED GRID FACTOR =0.9999536413
4. ALL DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS
5. AREAS CALCULATED BY COORDINATES
6. CONSERVATION EASEMENT CORNERS WILL BE MONUMENTED WITH A 5 / 8" REBAR WITH CAP AFTER CONSTRUCTION IS COMPLETE. CURRENTLY CORNERS ARE CALCULATED POINTS.
7. 30' DRAINAGE EASEMENT FOR JEROL SELBY EXTENDING FROM POINT "A" TO POINT "B" AS SHOWN ON PLAT B, SLIDE 266 AND DESCRIBED IN A DOCUMENT RECORDED AT DEED BOOK 800 PAGE 361, BEAUFORT COUNTY REGISTRY, IS EXTINGUISHED BY THE OWNERS HEREIN THROUGH DOCUMENT RECORDED AT BOOK 1881 . PAGE 47 BEAUFORT COUNTY REGISTRY.
8. 5' PERMANENT ACCESS EASEMENT ALONG NORTHERN BOUNDARY OF PARCEL GPIN: 6672-38-5008 IS MORE FULLY DESCRIBED IN DOCUMENT RECORDED AT BOOK 1821 PAGE 65 BEAUFORT COUNTY REGISTRY.
9. OWNERS GRANT ACCESS TO OWNER OF CONSERVATION EASMENTS AND ITS AGENTS AND INVITEES, OVER THE 30' RIGHT-OF-WAY DESCRIBED IN BOOK 800 PAGE 361 FOR PURPOSE OF ACCESS TO AND FROM THE CONSERVATION EASEMENTS IN EVENT OF EXTRAORDINARY CIRCUMSTANCES REQUIRING SUCH ACCESS AND ON TEN DAYS NOTICE TO LAND OWNER.

OWNER(S) CERTIFICATE

TAX GPIN: 6672-38-5008 (PIN: 15-005303)

WE, STEPHEN R. POOLE, JR. AND WIFE LUCINDA T. POOLE, HEREBY CERTIFY THAT WE ARE THE OWNERS OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH WERE CONVEYED TO US BY DEED RECORDED IN DEED BOOK 986, PAGE 211 (TAX GPIN: 6672-38-5008, PIN: 15-005303), OF THE BEAUFORT COUNTY REGISTRY; AND THAT WE HEREBY ADOPT THIS PLAN OF SUBDIVISION AND GRANT AND CONVEY THE EASEMENTS HEREIN WITH FREE CONSENT INCLUDING THE 5' PERMANENT ACCESS EASEMENT ALONG THE NORTHERN BOUNDARY OF PARCEL GPIN: 6672-38-5008. FURTHER, I HEREBY CERTIFY THAT THE LAND AS SHOWN HERON IS WITHIN THE SUBDIVISION REGULATION JURISDICTIONS OF BEAUFORT COUNTY, NORTH CAROLINA.

Stephen R Poole Jr 6-24-13
STEPHEN R. POOLE, JR. DATE

Lucinda T. Poole 6-24-13
LUCINDA T. POOLE DATE

STATE OF NORTH CAROLINA
COUNTY OF BEAUFORT

I, THOMAS E ARCHIE A NOTARY PUBLIC FOR THE COUNTY AND STATE AFORESAID, DO HEREBY CERTIFY THAT STEPHEN R. POOLE, JR. AND WIFE LUCINDA T. POOLE PERSONALLY APPEARED BEFORE ME THIS DAY AND ACKNOWLEDGED THE DUE EXECUTION OF THE FOREGOING INSTRUMENT.

WITNESS MY HAND AND OFFICIAL STAMP OR SEAL THIS 24TH DAY OF JUNE, 2013

NOTARY PUBLIC

MY COMMISSION EXPIRES: 2/9/16

Thomas E Archie
Notary Public
Beaufort County
North Carolina
My Commission Expires 2/9/16

300 150 0 300 600
SCALE: 1 = 300'

Gaskins Land Surveying, P.A.
PROFESSIONAL LAND SURVEYING
C-3023
Phone: 252-244-0599
Fax: 252-244-5899
PO Box 354
Vanceboro, NC 28586

SAINT CLAIR CREEK RESTORATION PROJECT CONSERVATION EASEMENT

FOR

STATE OF NORTH CAROLINA – ECOSYSTEM ENHANCEMENT PROGRAM

ON THE PROPERTY OF

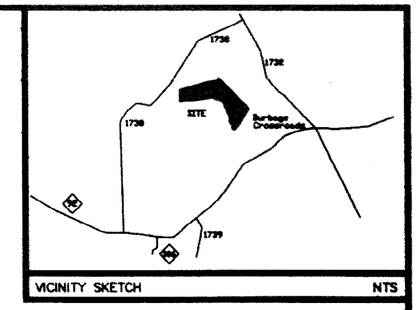
STEPHEN RICHARD POOLE, III AND CHAD ASHLEY POOLE

BATH TOWNSHIP – BEAUFORT COUNTY – NORTH CAROLINA

EEP CONTRACT NO. 003986
SPO NO. 007-K
IMS NO. 95015
BE PROJECT NO. 125116
DATE: 6-17-13
SCALE: 1" = 300'

PC-I S-4-5

13-0015



VICINITY SKETCH NTS

MATTHEWS RESET
NAD 83/2007
N 654875.2700
E 2672165.1300

N 88°50'19" E 3644.92' TIE

NCGS TEEM
NAD 83/2007
N 654801.4000
E 2668520.9600

S 07°48'53" E 2655.97' TIE

EX. 1" IP BURIED .5' IN PEOPLES ROAD AS CALLED FOR IN DB 1756 PG 817

EX. 1" IP BURIED 1' IN PEOPLES ROAD AS CALLED FOR IN DB 1756 PG 817

S 36°33'07"W 92.00' TIE

S 39°02'10"W 2269.31' TIE

SR 1708 - PEOPLES ROAD R/W VARIES

S 41°44'03" W 6.18' TIE FROM EX. REBAR TO SET REBAR IN THE C/L OF THE PERMANENT ACCESS EASEMENT

CONTROL POINT 1
EX. ½" REBAR ON SHOULDER OF ROAD
NAD 83
N 628628.3754
E 2673173.7082

SET ½" IN C/L OF ACCESS EASEMENT

S 74°04'14" E 1329.22' TIE

SEE PAGE 3 FOR 5' PERMANENT ACCESS EASEMENT

JOE ED COX
DEED BOOK 993 PAGE 666

S 02°37'04" W 36.00' TIE

EX. 1" IP NPS

JOE ED COX
DEED BOOK 993 PAGE 666

JACK B. GODLEY
DEED BOOK 993 PAGE 666
PC F SLIDE 17-5

TIDE WATER LAND & TIMBER, LLC
DEED BOOK 1756 PAGE 817

EX. 1" IP
N 55°07'32"W 131.00' TIE

MARKED PINE TREE
EX. ½" REBAR ONLINE 50.00' FROM PINE

N 25°04'39"E 210.00' TIE

REMAINS OF OLD DITCH

SIR

N 84°05'09" E 714.00'

BRICK FOUNDATION OF OLD TOBACCO BARN

STEPHEN RICHARD. POOLE, III & CHAD A. POOLE
DEED BOOK 1325 PAGE 484
PIN: 15-005359

S 00°53'33" W 470.55'

S 74°04'14" E 173.07' TIE

SEE INSET A

N 73°48'47" E 1914.26'

CE-2

CE-1

CE-3

N 13°30'16" E 237.16' TIE 6 TO 13 C/L OF 5' PERMANENT ACCESS EASEMENT

S 62°20'50" E 29.99' TIE & C/L OF 5' PERMANENT ACCESS EASEMENT

STEPHEN R. POOLE, JR.
LUCINDA T. POOLE
DEED BOOK 906 PAGE 211
PIN: 15-006303

CANAL

EX. 1" IP

SIR

EIA

CONTROL POINT 2
EX. 1" IP
NAD 83
N 628175.8383
E 2674618.4510

STEPHEN RICHARD POOLE, III & CHAD A. POOLE
DEED BOOK 1325 PAGE 484
PIN: 15-005359

N 00°24'57"E 717.07' TIE

825.36' TOTAL
786.15' IRON TO IRON TIE
N 12°55'40" W

MANN LINE AS CALLED FOR IN SPECIAL PROCEEDINGS 1735
DISTANCE SHOWN IN SP IS 825'
PC B SLIDE 266 CALLS FOR THE DISTANCE TO BE 786.20'.

LINE AS SHOWN ON MB 6 PG 37 AND AS CALLED FOR IN ORIGINAL DEED FROM ROPER TO W.W. CORDON. DB 180 PG 389 & ROPER TO W.M. CORDON DB 260 PG 374 (5½ ACRES).

30' DRAINAGE EASEMENT AS SHOWN ON PC B SLIDE 266 SEE NOTE 7 ON SHEET 1

POINT "B" AS SHOWN ON PC B SLIDE 266

POINT "A" AS SHOWN ON PC B SLIDE 266

10' RIGHT OF WAY & EASEMENT DB 865 PAGE 723

30' RIGHT OF WAY & EASEMENT AS SHOWN ON PC B SLIDE 266

S 76°15'52"E 2400.50' TIE (NTS)
THIS LINE NOT SURVEYED TAKEN FROM PC B SLIDE 266
BEARINGS ARE ROTATED TO NC GRID

EX. 1" EIP IN CONCRETE (OLD BRICK HOLE CORNER)

S 73°50'55"E 580.73' TIE

S 69°25'45"E 651.00' TIE

EX. 1" EIP AS SHOWN ON PC C SLIDE 220

EX. 1" IP

N 00°48'30" E 68.12'

N 89°22'19" W 428.34'

S 78°28'39"W 851.32' TIE

S 80°41'08"W 658.20' TIE

N 75°31'49" W 16.65' TIE

EX. 1" IP

EX. 1" IP

CANAL

10' RIGHT OF WAY & EASEMENT DB 865 PAGE 723

END OF 10' RIGHT OF WAY - EASEMENT

STEPHEN R. POOLE, JR. & LUCINDA T. POOLE DB 835 PAGE 761

STEPHEN R. POOLE, JR.
LUCINDA T. POOLE
DEED BOOK 873 PAGE 619
TRACT 1

EX. 1" EIP (DISTURBED) AS CALLED FOR IN SPECIAL PROCEEDINGS 1735, BOOK 10 PAGE 506 S.E. POOLE VS J.E. MANN & OTHERS AND CALLED FOR IN DB 800 PAGE 361 AS THE COMMON CORNER OF THE PAUL WATERS LAND AND SHOWN ON PC B SLIDE 266

STEPHEN R. POOLE, JR.
LUCINDA T. POOLE
DEED BOOK 835 PAGE 765

S 82°76' SIR TO EIP S 81°25'19"W TIE

STEPHEN R. POOLE, JR.
LUCINDA T. POOLE
DEED BOOK 835 PAGE 759

30' RIGHT OF WAY & EASEMENT AS SHOWN ON PC B SLIDE 266

S52°08'14"W 68.99' TIE

S77°28'39"W 113.27' TIE

CONTROL POINT 3
EX. ½" REBAR
NAD 83
N 627778.5460
E 2676800.1700

POINT LOCATED IN C/L OF CANAL WHERE THE OLD BRANCH CROSSED AND IS CALLED FOR IN DB 180 PG 389 & DB 260 PG 374

STEPHEN R. POOLE, JR.
LUCINDA T. POOLE
DEED BOOK 873 PAGE 619
TRACT II

LINE AS PER MB 4 PG 70 DB 873 PG 619

RUN OF ROSS MILL STREAM

N 44°45'31" W 1886.63' TIE REFERENCE BEARING

EXISTING 36" MARKED GUM TREE

NAD 83 (2007)

TIES

CE1
TIE FROM CONTROL POINT 2 TO CORNER NO. 1
S 26°12'38" E 68.43'

CE2
TIE FROM CONTROL POINT 3 TO POINT NO. 13
N 14°06'35" W 299.24'

CE3
TIE FROM CONTROL POINT 3 TO CORNER NO. 18
N 17°31'30" E 403.84'

LINE TABLE		
LINE	BEARING	LENGTH
L1	N00°12'24"W	113.71'
L2	N73°22'26"E	1177.01'
L3	S66°31'07"E	150.49'
L4	S39°59'31"E	605.53'
L5	S61°36'54"E	422.03'
L6	S28°23'35"E	36.59'
L7	S80°57'22"W	335.24'
L8	N61°13'14"W	453.80'
L9	N36°34'12"W	205.42'
L10	N24°43'19"W	207.22'
L11	S71°44'06"W	608.27'
L12	S87°49'56"W	525.44'
L13	N13°56'12"W	718.86'
L14	N84°05'38"E	233.03'
L15	S30°53'00"E	200.07'
L16	S10°21'12"E	331.20'
L17	S27°39'10"W	241.61'
L17A	S27°39'10"W	85.25'
L17B	N46°37'24"W	95.17'
L18	N16°16'47"E	80.54'
L19	N30°54'08"E	115.11'
L20	S52°13'28"E	170.24'
L21	S34°25'19"E	267.28'
L22	S50°54'54"W	155.60'
L23	N44°58'41"W	349.03'

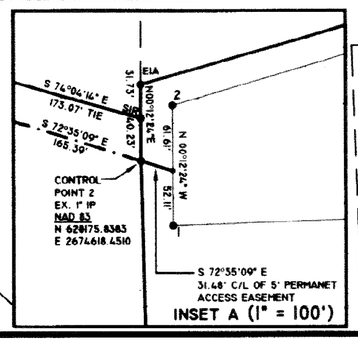
POINT TABLE		
POINT NUMBER	NORTHING	EASTING
1	628114.4479	2674648.6727
2	628228.1620	2674648.2623
3	628564.9304	2675776.0613
4	628504.9664	2675914.0916
5	628038.7898	2676300.5491
6	627838.1603	2676671.8388
7	627805.9695	2676689.2392
8	627753.2715	2676358.1626
9	627971.7505	2675960.4140
10	628136.7316	2675838.0220
11	628324.9627	2675751.3880
12	628134.3240	2675173.7341
13	628068.7629	2676727.2202
14	628766.4600	2676554.0844
15	628790.4382	2676785.8735
16	628618.7328	2676888.3689
17	628307.2856	2676945.9500
17A	628003.4042	2676796.3916
18	628163.6440	2676921.7765
19	628059.3583	2677056.3387
20	627838.8795	2677207.4280
21	627740.7811	2677086.6530
22	627987.6786	2676839.9440
23	628064.9928	2676862.5225

LEGEND

- EIP EXISTING IRON PIPE
- EIR EXISTING IRON ROD
- EIA EXISTING AXLE
- ECM EXISTING CONC MONUMENT
- SIR SET 5/8" REBAR
- NPS NO POINT SET
- R/W RIGHT OF WAY
- CORNERS OF CONSERVATION EASEMENT CALCULATED POINTS / SET 5/8" REBAR WITH CAPS AFTER CONSTRUCTION IS COMPLETE
- PROPERTY LINE SURVEYED
- PROPERTY LINE NOT SURVEYED
- CONSERVATION EASEMENT BOUNDARY
- CONSERVATION EASEMENT AREA
- CANAL
- PERMANENT ACCESS EASEMENT
- 30' RIGHT OF WAY - EASEMENT PC B SLIDE 266
- 10' RIGHT OF WAY - EASEMENT DB 865 PG 723

NORTH CAROLINA
BEAUFORT COUNTY

This Map/Plat was presented for registration and recorded in this office in Plat Cabinet I, Slide 4-6.
This 27th day of June 2013 at 9:56 a.m.
Jennifer Leggett Whitehurst By Angie L. Whitley, Deputy
Register of Deeds Asst/Deputy



NORTH CAROLINA PROFESSIONAL SEAL L-3824 LAND SURVEYOR KENDALL E. GASKINS

6-24-13

300 150 0 300 600
SCALE: 1 = 300'

PAGE 2 OF 3

Gaskins Land Surveying, P.A.
PROFESSIONAL LAND SURVEYING
C-3023
Phone: 252-244-0599
Fax: 252-244-5899
PO Box 354
Vanceboro, NC 28586

SAINT CLAIR CREEK RESTORATION PROJECT CONSERVATION EASEMENT
FOR
STATE OF NORTH CAROLINA - ECOSYSTEM ENHANCEMENT PROGRAM
ON THE PROPERTY OF
STEPHEN RICHARD POOLE, III AND CHAD ASHLEY POOLE
BATH TOWNSHIP - BEAUFORT COUNTY - NORTH CAROLINA

EEP CONTRACT NO. 003986
SPO NO. 007-K
IMS NO. 95015
BE PROJECT NO. 125116
DATE: 6-17-13
SCALE: 1" = 300'

PC-I S-4-6

13-0015

S 41°44'03" W 6.18' TIE FROM EX. REBAR TO SET REBAR IN THE C/L OF THE PERMANENT ACCESS EASEMENT

CONTROL POINT 1
EX. ½" REBAR
ON SHOULDER
OF ROAD
NAD 83
N 628628.3754
E 2673173.7082

SIR IN C/L OF ACCESS EASEMENT

SR 1738 - PEOPLES ROAD
R/W VARIES

CANAL

S 74°04'14" E

S 72°49'14" E

1329.22' TIE

1351.12'

C/L OF 5' ACCESS EASEMENT FROM SIR AT R/W TO CONTROL POINT #2

JOE ED COX
DEED BOOK 993 PAGE 666

STEPHEN R. POOLE, JR.
LUCINDA T. POOLE
DEED BOOK 906 PAGE 211

CANAL

SIR

S 74°04'14" E
175.07' TIE

EX. 1" IP

S 72°35'09" E
165.40'

SIR

C/L OF 5' ACCESS EASEMENT

CONTROL POINT 2
EX. 1" IP
NAD 83
N 628175.8383
E 2674618.4510

N00°12'24"E
31.73'

EIA

N00°12'24"E
742.23'

SIR

L12

SEE SHEET 2

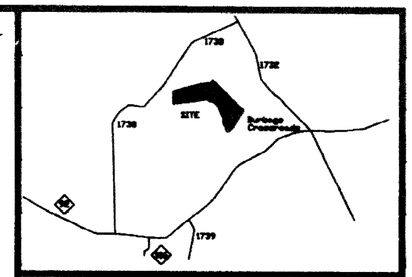
S 02°37'04" W
36.00' TIE
NPS

EX. 1" IP

S 00°13'33" W
470.55' TIE

LEGEND

- EIP EXISTING IRON PIPE
- EIR EXISTING IRON ROD
- EIA EXISTING AXLE
- ECM EXISTING CONC MONUMENT
- SIR SET 5/8" REBAR
- NPS NO POINT SET
- R/W RIGHT OF WAY
- CORNERS OF CONSERVATION EASEMENT CALCULATED POINTS / SET 5/8" REBAR WITH CAPS AFTER CONSTRUCTION IS COMPLETE
- PROPERTY LINE SURVEYED
- PROPERTY LINE NOT SURVEYED
- CONSERVATION EASEMENT BOUNDARY
- CONSERVATION EASEMENT AREA
- CANAL
- 30' RIGHT OF WAY - EASEMENT PC B SLIDE 266
- 30' RIGHT OF WAY - EASEMENT DB 865 PG 723



VICINITY SKETCH NTS

MANN LINE AS CALLED FOR IN SPECIAL PROCEEDINGS 1735
DISTANCE SHOWN IN SP IS 825'
PC B SLIDE 266 CALLS FOR THE DISTANCE TO BE 786.20'.

N 12°53'40" W 786.15' IRON TO IRON TIE

825.36 TOTAL

N01°24'57"E
717.07' TIE

CANAL

STEPHEN RICHARD POOLE, III &
CHAD A. POOLE
DEED BOOK 1325 PAGE 484
PIN: 15-006589

LINE AS SHOWN ON MB 6 PG 37 AND AS CALLED FOR IN ORIGINAL DEED FROM ROPER TO W.W. CORDON, DB 180 PG 389 & ROPER TO W.M. CORDON DB 260 PG 374 (5½ ACRES).

EX. 1" EIP
(DISTURBED)
AS CALLED FOR IN SPECIAL PROCEEDINGS 1735, BOOK 10 PAGE 506 S.E. POOLE VS J.E. MANN & OTHERS AND CALLED FOR IN DB 800 PAGE 361 AS THE COMMON CORNER OF THE PAUL WATERS LAND AND SHOWN ON PC B SLIDE 266

N 83°22'19" W

S69°25'45"E
651.00' TIE

S73°50'55"E 680.73' TIE

EX. 1" EIP
AS SHOWN ON PC C SLIDE 220

N 00°18'30" E
69.12'

EX. 1" IP

S78°28'39"W
851.32'

EX. 1" EIP
(OLD BRICK HOLE CORNER)

EX. 1" EIP
IN CONCRETE

10' RIGHT OF WAY & EASEMENT
DB 865 PAGE 723

30' RIGHT OF WAY & EASEMENT
AS SHOWN ON PC B SLIDE 266

BREAK LINE

S 76°15'54" E
2490.50' TIE
THIS LINE NOT SURVEYED
TAKEN FROM PC B SLIDE 266
BEARINGS ARE ROTATED TO NC GRID

NPS

NAD 83 (2007)

NORTH CAROLINA
BEAUFORT COUNTY
This Map/Plat was presented for registration and recorded in this office in Plat Cabinet I, Slide 4-7
This 27th day of Jan 2013 at 9:56 A. m.
Jennifer Leggett Whitehurst By Asst/Deputy
Register of Deeds

NORTH CAROLINA PROFESSIONAL SEAL L-3824 LAND SURVEYOR KENDALL E. GASKINS

6-24-13

100 50 0 100 200
SCALE: 1 = 100'

PAGE 3 OF 3

Gaskins Land Surveying, P.A.
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Phone: 252-244-0599
Fax: 252-244-5899
PO Box 354
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SAINT CLAIR CREEK RESTORATION PROJECT CONSERVATION EASEMENT

FOR

STATE OF NORTH CAROLINA - ECOSYSTEM ENHANCEMENT PROGRAM

ON THE PROPERTY OF

STEPHEN RICHARD POOLE, III AND CHAD ASHLEY POOLE

BATH TOWNSHIP - BEAUFORT COUNTY - NORTH CAROLINA

EEP CONTRACT NO. 003986
SPO NO. 007-K
IMS NO. 95015
BE PROJECT NO. 125116
DATE: 6-17-13
SCALE: 1" = 100'

PC-I 5-4-7

13-0015

16.0 APPENDIX B - BASELINE INFORMATION DATA

16.1 USACE Routine Wetland Determination Forms – per regional supplement to 1987 Manual

(USACE Routine Wetland Forms were not completed for this project, as the potential wetland areas investigated did not meet necessary criteria)

16.2 NCWAM Forms – Existing Wetlands

(NC Wetland Assessment Method (WAM) Forms were not provided for this project, as the NC Division of Water Quality did not require them at the time this project was contracted.)

16.3 NCDWQ Stream Classification Forms

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: March 3, ~~2009~~ 2010	**Project:** St. Clair Creek Project	**Latitude:**	
Evaluator: Tweedy	**Site:** UTZ	**Longitude:**	
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 36	**County:** Beaufort	**Other** *e.g. Quad Name:*	

A. Geomorphology (Subtotal = 15)	Absent	Weak	Moderate	Strong
1[a]. Continuous bed and bank	0	(1)	2	3
2. Sinuosity	0	(1)	2	3
3. In-channel structure: riffle-pool sequence	0	1	(2)	3
4. Soil texture or stream substrate sorting	0	1	(2)	3
5. Active/relic floodplain	0	1	2	(3)
6. Depositional bars or benches	0	1	(2)	3
7. Braided channel	(0)	1	2	3
8. Recent alluvial deposits	0	1	(2)	3
9[a] Natural levees	(0)	1	2	3
10. Headcuts	0	(1)	2	3
11. Grade controls	(0)	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	(1)	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = (0)		Yes = 3	

[a] Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 11)				
14. Groundwater flow/discharge	0	1	2	(3)
15. Water in channel and > 48 hrs since rain, **or** Water in channel -- dry or growing season	0	1	2	(3)
16. Leaflitter	(1.5)	1	0.5	0
17. Sediment on plants or debris	0	0.5	(1)	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	(1)	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = (1.5)	

C. Biology (Subtotal = 10)				
20[b]. Fibrous roots in channel	(3)	2	1	0
21[b]. Rooted plants in channel	3	(2)	1	0
22. Crayfish	0	(0.5)	1	1.5
23. Bivalves	(0)	1	2	3
24. Fish	0	0.5	1	(1.5)
25. Amphibians	(0)	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	(0)	0.5	1	1.5
27. Filamentous algae; periphyton	0	(1)	2	3
28. Iron oxidizing bacteria/fungus.	(0)	0.5	1	1.5
29[b]. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = (2.0); Other = 0			

[b] Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

- high water at time of sampling

Notes: (use back side of this form for additional notes.)

Score supported by recent DWQ call

Channelized system.

Sketch:

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: March 3, 2010	**Project:** St. Clair Creek Project	**Latitude:**
Evaluator: Tweedy	**Site:** UT3	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 20	**County:** Beaufort	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 9)	Absent	Weak	Moderate	Strong
1[a]. Continuous bed and bank	(0)	1	2	3
2. Sinuosity	(0)	1	2	3
3. In-channel structure: riffle-pool sequence	0	(1)	2	3
4. Soil texture or stream substrate sorting	0	(1)	2	3
5. Active/relic floodplain	0	1	(2)	3
6. Depositional bars or benches	(0)	1	2	3
7. Braided channel	(0)	1	2	3
8. Recent alluvial deposits	0	(1)	2	3
9[a] Natural levees	(0)	1	2	3
10. Headcuts	0	1	(2)	3
11. Grade controls	0	(0.5)	1	1.5
12. Natural valley or drainageway	0	0.5	1	(1.5)
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = (0)		Yes = 3	

[a] Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 5)				
14. Groundwater flow/discharge	0	(1)	2	3
15. Water in channel and > 48 hrs since rain, **or** Water in channel -- dry or growing season	0	1	(2)	3
16. Leaflitter	1.5	1	0.5	(0)
17. Sediment on plants or debris	(0)	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	(0.5)	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = (1.5)	

C. Biology (Subtotal = 6)				
20[b]. Fibrous roots in channel	3	2	(1)	~~(0)~~
21[b]. Rooted plants in channel	(3)	2	1	0
22. Crayfish	0	(0.5)	1	1.5
23. Bivalves	(0)	1	2	3
24. Fish	0	(0.5)	1	1.5
25. Amphibians	0	0.5	(1)	1.5
26. Macrobenthos (note diversity and abundance)	(0)	0.5	1	1.5
27. Filamentous algae; periphyton	(0)	1	2	3
28. Iron oxidizing bacteria/fungus.	(0)	0.5	1	1.5
29[b]. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = (0)			

[b] Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Most of channel has recently been dredged - stream features and aquatic life that may have been evident before are highly disturbed.

Sketch:

16.4 FHWA Categorical Exclusion Form

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:	St. Clair Creek Stream and Wetland Mitigation Project
County Name:	Beaufort County
EEP Number:	16-003570
Project Sponsor:	Michael Baker Engineering, Inc.
Project Contact Name:	Jake Byers, EI
Project Contact Address:	8000 Regency Parkway, Suite 200
Project Contact E-mail:	jbyers@mbakercorp.com
EEP Project Manager:	Heather Smith

Project Description

The St. Clair Creek Stream and Wetland Mitigation project seeks to restore approximately 3,000 linear feet (LF) of stream, 3,000 LF of riparian buffer and 2 acres of wetlands for the purpose of obtaining mitigation credits in the Tar-Pamlico River Basin. In addition, this project will accomplish significant ecological improvements through habitat restoration and a decrease in nonpoint source pollution. The project is located in DENR sub-basin 03-03-07 and the local watershed 03020104, approximately five miles east of the Town of Bath. Project designs include Rosgen Priority I restoration of two unnamed tributaries to St. Clair Creek, and restoration of two acres of wetlands.

For Official Use Only

Reviewed By:

4-2-12
Date

EEP Project Manager

Conditional Approved By:

Date

For Division Administrator FHWA

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

Final Approval By:

3-30-12
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

North Carolina Department of Environment and Natural Resources
Division of Coastal Management

Beverly Eaves Perdue
Governor

Braxton C. Davis
Director

Dee Freeman
Secretary

5 March 2012

Jake Byers, EI
Civil Associate/Project Manager
Michael Baker Engineering
8000 Regency Parkway Suite 200
Cary, NC 27518

Dear Mr. Beyers:

This letter confirms that on 1 March 2012 I was onsite the headwaters of St. Clair Creek located off SR 1738 near the Town of Bath in Beaufort County, North Carolina. This letter also confirms receipt of your 2 March 2012 email and attached map titled "Figure 6b". The purpose of my March 2012 site visit was to review the headwaters of St. Clair Creek in the area proposed for wetland and buffer restoration to determine if jurisdiction was warranted under General Statute (G.S.) 113A-100, the Coastal Area Management Act or G.S. 113-229, the State's Dredge and Fill Law.

Pursuant to North Carolina Administrative Code Subchapter 7H.0207(a) and G.S.113A-113(b)(2), the headwater areas of St. Clair Creek identified in the aforementioned Figure 6b do not meet the definition of Public Trust Area or Estuarine Waters Areas of Environmental Concern. Therefore, the proposed wetland and buffer restoration work will not require a permit from this Division. I recommend that you contact Ms. Emily Jernigan with the US Army Corps of Engineers at (910) 251-4605, concerning any Federal wetland jurisdiction and Mr. Roberto Scheller with the Division of Water Quality at (252) 948-3940.

I appreciate your concern and effort to comply with the permit requirements of this Division and encourage you to continue to consult representatives of this Division for future questions regarding Division of Coastal Management jurisdiction. Thank you for your time and concern in these matters and if you have any questions, please call me at (252) 948-3854.

Sincerely,

Steve J. Trowell
Coastal Management Representative

Cc: David W. Moye – District Manager, Washington Regional Office, DCM
Ted Tvndall – Assistant Director. DCM
Emily Jernigan – US Army Corps of Engineers, Washington Regulatory Field Office
Roberto Scheller – N C Division of Water Quality, Washington Regional Office

943 Washington Square Mall, Washington, NC 27889
Phone: 252-946-6481 \ FAX: 252-948-0478 Internet: www.nccoastalmanagement.net

16.5 FEMA Compliance - EEP Floodplain Requirements Checklist

The topography of the site supports the design without creating the potential for hydrologic trespass. The site is located in a FEMA mapped AE zone due to backwater from the Pamlico River. However, since St. Clair Creek is not listed on the FIS Report an extensive hydraulic analysis is not required to obtain a "No-Rise/No-Impact" certification as discussed with the Local Floodplain Administrator (Brandon Hayes) on October 4th, 2012. The project will also not require a Letter of Map Revision (LOMR) following construction in order to document changes (reductions) to Base Flood Elevations (BFEs). The EEP Floodplain Checklist was provided to the Beaufort County Floodplain Manager along with this report.

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. Edward Curtis), NC Floodplain Mapping Unit (attn. John Gerber) and Ecosystem Enhancement Program.

Project Location

Name of project:	St. Clair Creek Restoration Project
Name if stream or feature:	UT2 and UT3 to St. Clair Creek
County:	Beaufort
Name of river basin:	Tar-Pamlico
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Beaufort County
DFIRM panel number for entire site:	6662
Consultant name:	Jacob Byers, PE Michael Baker Engineering, Inc.
Phone number:	919-463-5488
Address:	8000 Regency Parkway, Suite 600 Cary, NC 27518

Design Information

Provide a general description of project (one paragraph). Include project limits on a reference orthophotograph at a scale of 1" = 500". The project site includes two unnamed tributaries to St. Clair Creek, east of the Town of Bath off Peoples Road (see Figure 1). The site lies within NC Division of Water Quality subbasin 03-03-07 and local watershed unit 03020104040040. Currently, the project reaches (see Figure 3) are impacted by the historic draining of area wetlands for agricultural use and the lack of adequate riparian buffers. Project goals include approximately 3,200 linear feet (LF) of headwater stream restoration, and approximately 2.0 acres of riparian wetland restoration to improve area water quality and the surrounding ecosystems and to obtain mitigation credit in the Tar-Pamlico River Basin.

Summarize stream reaches or wetland areas according to their restoration priority.

Reach / Wetland	Linear Feet / Acreage	Priority
UT2	2,200 LF	Headwater Restoration
UT3	1,000 LF	Headwater Restoration
UT2 Wetland	1.0 AC	Riparian Wetland Restoration
UT3 Wetland	1.0 AC	Riparian Wetland Restoration

Floodplain Information

Is project located in a Special Flood Hazard Area (SFHA)?

☑ Yes ☐ No

If project is located in a SFHA, check how it was determined:

☐ Redelineation

☐ Detailed Study

☑ Limited Detail Study

☐ Approximate Study

☐ Don't know

Located in AE Zone from backwater from the Pamlico River. However St Clair Creek is not listed in the FIS Report.

List flood zone designation:

Check if applies:

☑ AE Zone

- ☐ Floodway
- ☐ Non-Encroachment
- ☑ None

☐ A Zone

- ☐ Local Setbacks Required
- ☐ No Local Setbacks Required

If local setbacks are required, list how many feet: No specific setbacks required for areas not requiring a CAMA permit. We've coordinated with CAMA and are not required to obtain a CAMA permit.

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: Edward Curtis, (919) 715-8000 x369)

Name of Local Floodplain Administrator: Brandon Hayes
Phone Number: 252-946-7182

Floodplain Requirements

This section to be filled by designer/applicant following verification with the LFPA

☑ No Action

☐ No Rise

☐ Letter of Map Revision

☐ Conditional Letter of Map Revision

☐ Other Requirements

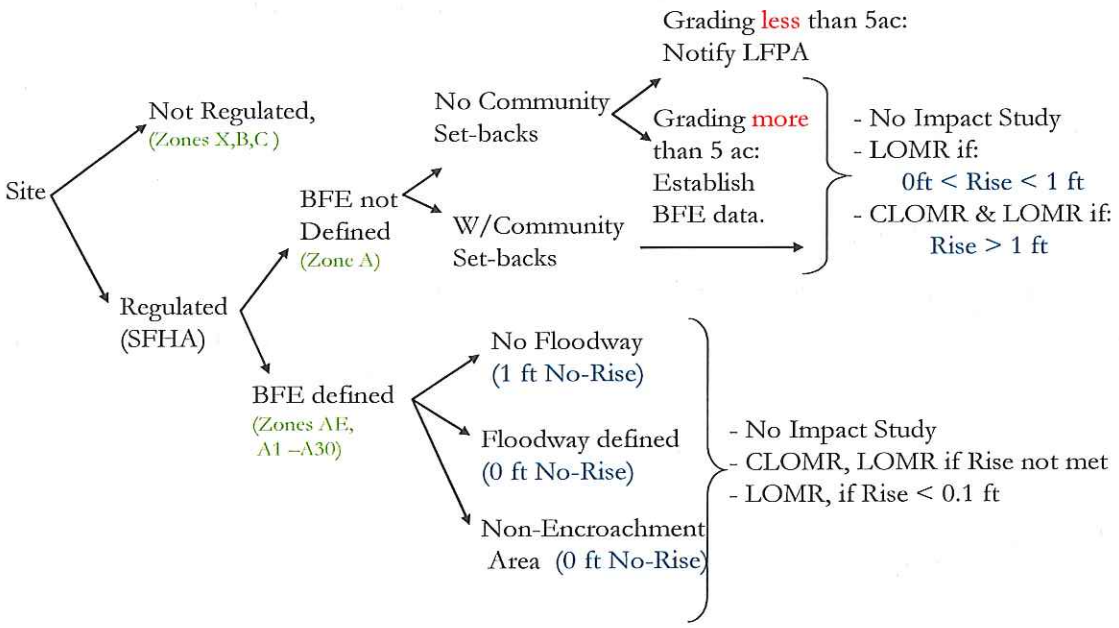
List other requirements:

Comments: Per conversation with Beaufort County LFPA, Brandon Hayes. (10/4/12)

Name: Jacob Byers, PE Signature: [signature]

Title: Design Engineer Date: 10/4/12

Criteria for Flooding Requirements



Summary of Scenarios					
Zone (map)	SFHA	BFE	Floodway Or Non-Encroachment	Comm. Set-back	Floodplain Criteria
X,B,C	No	No	No	No	a. Notify Floodplain Administration b. FP Dev. Permit maybe required
A	Yes	No	No	No	a. If grading < 5 ac, notify LFPA.
A	Yes	No	No	Yes	a. If No-Rise = 0 ft, LOMR not required b. If Rise > 0 ft, LOMR is Required c. If Rise ≥ 1 ft, CLOMR is required
AE, A1-A30	Yes	Yes	No	n/a	a. No-Rise Study b. CLOMR if ≥ 1ft c. LOMR
AEFW A1-A30	Yes	Yes	Yes	n/a	a. No-Rise Study b. CLOMR if ≥ 0 ft c. LOMR

Byers, Jake

From: Brandon Hayes <brandon.hayes@co.beaufort.nc.us>
Sent: Tuesday, June 04, 2013 10:16 AM
To: Byers, Jake
Subject: Re: St Clair Creek Restoration Project

Mr. Byers

As per our conversation, since the restoration work you are doing is very minimal you will not need anything from Beaufort County.

Thanks
Brandon Hayes
CFM

----- Original Message -----
From: Byers, Jake [mailto:jbyers@mbakercorp.com]
Sent: Mon, 3 Jun 2013 12:45:25 +0000
To: brandon.hayes@co.beaufort.nc.us
Subject: St Clair Creek Restoration Project

> Mr. Hayes,
>
> Please see the attached documents for the location of the
> proposed stream restoration project in Beaufort County and for
> the FEMA FIRM map with the proposed conservation easement in
> red. As per our discussion on October 4, 2012, please
> re-confirm that no action is needed in regards to a flood study
> in this area since our work in this zone will be minimal. This
> area is in a SFHA due to backwater from the Pamlico River.
>
>
>
> Please feel free to call or email with any concerns or questions.
>
>
>
> Thanks,
>
>
>
> -Jake
>
>
> Jacob "Jake" Byers, PE
> Civil Engineer
> Michael Baker Engineering, Inc.
> 8000 Regency Parkway Suite 600

> Cary, NC 27518
> 919-463-5488 Main
> 919-463-5490 Fax
> 919-481-5748 Direct
> 919-259-4814 Mobile
> jbyers@mbakercorp.com<mailto:jbyers@mbakercorp.com>
> _____
> From: Byers, Jake
> Sent: Thursday, October 04, 2012 8:48 AM
> To: brandon.hayes@co.beaufort.nc.us
> Subject: FW: St Clair Creek Restoration Project
>
>
>
> From: Byers, Jake
> Sent: Thursday, October 04, 2012 8:46 AM
> To: 'brandon.hayes@co.beaufor.nc.us'
> Subject: St Clair Creek Restoration Project
>
> Please see attached.
>
> Thanks
>
>
> Jacob "Jake" Byers, PE
> Civil Engineer
> Michael Baker Engineering, Inc.
> 8000 Regency Parkway Suite 600
> Cary, NC 27518
> 919-463-5488 Main
> 919-463-5490 Fax
> 919-481-5748 Direct
> 919-259-4814 Mobile
> jbyers@mbakercorp.com<mailto:jbyers@mbakercorp.com>
>
>

16.6 Buffer Rules Compliance

North Carolina Department of Environment and Natural Resources
Division of Water Quality
Coleen H. Sullins
Director

Beverly Eaves Perdue
Governor

Dee Freeman
Secretary

January 22, 2010

DWQ EXP# 10-0062
Beaufort County

Mr. Stephen Poole, Jr.
4847 Sidney Road
Belhaven, NC 27810

Subject Property: Property Located off (NCSR 1738) People Road
2 Drainage Features to St. Clair Creek, Tar-Pamlico River Basin

On-Site Determination for Applicability to the Tar-Pamlico River Riparian Area Protection Rules (15A NCAC 2B .0259)-EXPRESS REVIEW PROGRAM

Dear Mr. Poole:

On January 20, 2010 at the request of Mr. Hal Bain of Rummel, Klepper & Kahl, I conducted an on-site determination to review two drainage features located on the subject properties for applicability to the Tar-Pamlico Buffer Rules (15A NCAC 2B .0259). The features are labeled as "SC1A and SC2B" on the attached maps initialed by me on January 22, 2010.

The Division of Water Quality (DWQ) has determined that the features labeled as "SC1A and SC2B" on the attached maps, and highlighted in blue are *subject* to the Tar-Pamlico Buffer Rules. The subject features (SC1A) starts at the culvert crossing on People Road SR 1738, (N 35° 27.370', W 76° 44.361'), marked on the ground with yellow DWQ flagging, and follows the drainage downstream to the east corner of the field at N 35° 27.216' W 76° 43.651' and marked on the ground with yellow DWQ flagging (see maps for SC1A). The second feature SC2B is 1.023 miles north of SC1A on People Road. The subject feature starts at the inlet of culvert, marked on the ground with yellow DWQ flagging, at N 35° 28.056', W 76° 43.702' and goes upstream west, northwest to end at point N 35° 28.140' W 76° 43.880' and marked on the ground with yellow flagging as shown on the attached maps. The owner (or future owners) should notify the DWQ (and other relevant agencies) of this decision in any future correspondences concerning this property. This on-site determination shall expire five (5) years from the date of this letter.

Landowners or affected parties that dispute a determination made by the DWQ or Delegated Local Authority that a surface water exists and that it is subject to the buffer rule may request a determination by the Director. A request for a determination by the Director shall be referred to the Director in writing c/o John Dorney, DWQ Wetlands/401 Unit, 2321 Crabtree Blvd., Raleigh, NC 27604-2260. Individuals that dispute a determination by the DWQ or Delegated Local

North Carolina Division of Water Quality
943 Washington Square Mall
Washington, NC 27889
Phone: 252-946-6481 \ FAX: 252-946-9215
Internet: www.ncwaterquality.org

Authority that "exempts" a surface water from the buffer rule may ask for an adjudicatory hearing. You must act within 60 days of the date that you receive this letter. Applicants are hereby notified that the 60-day statutory appeal time does not start until the affected party (including downstream and adjacent landowners) is notified of this decision. DWQ recommends that the applicant conduct this notification in order to be certain that third party appeals are made in a timely manner. To ask for a hearing, send a written petition, which conforms to Chapter 150B of the North Carolina General Statutes to the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699-6714. This determination is final and binding unless you ask for a hearing within 60 days.

This letter only addresses the applicability to the buffer rules and does not approve any activity within the buffers. Nor does this letter approve any activity within Waters of the United States or Waters of the State. If you have any additional questions or require additional information please call Roberto Scheller in the Washington Regional Office at (252) 948-3940.

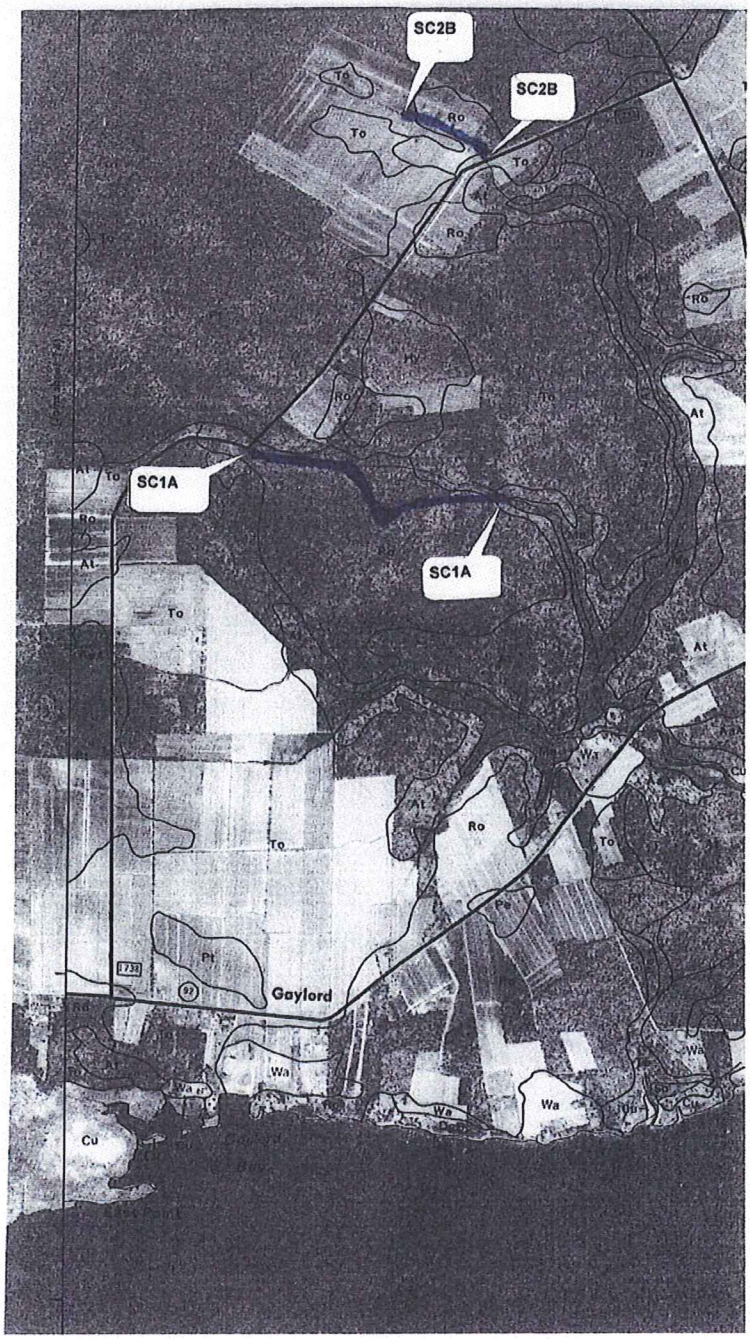
Sincerely,

For Coleen H. Sullins

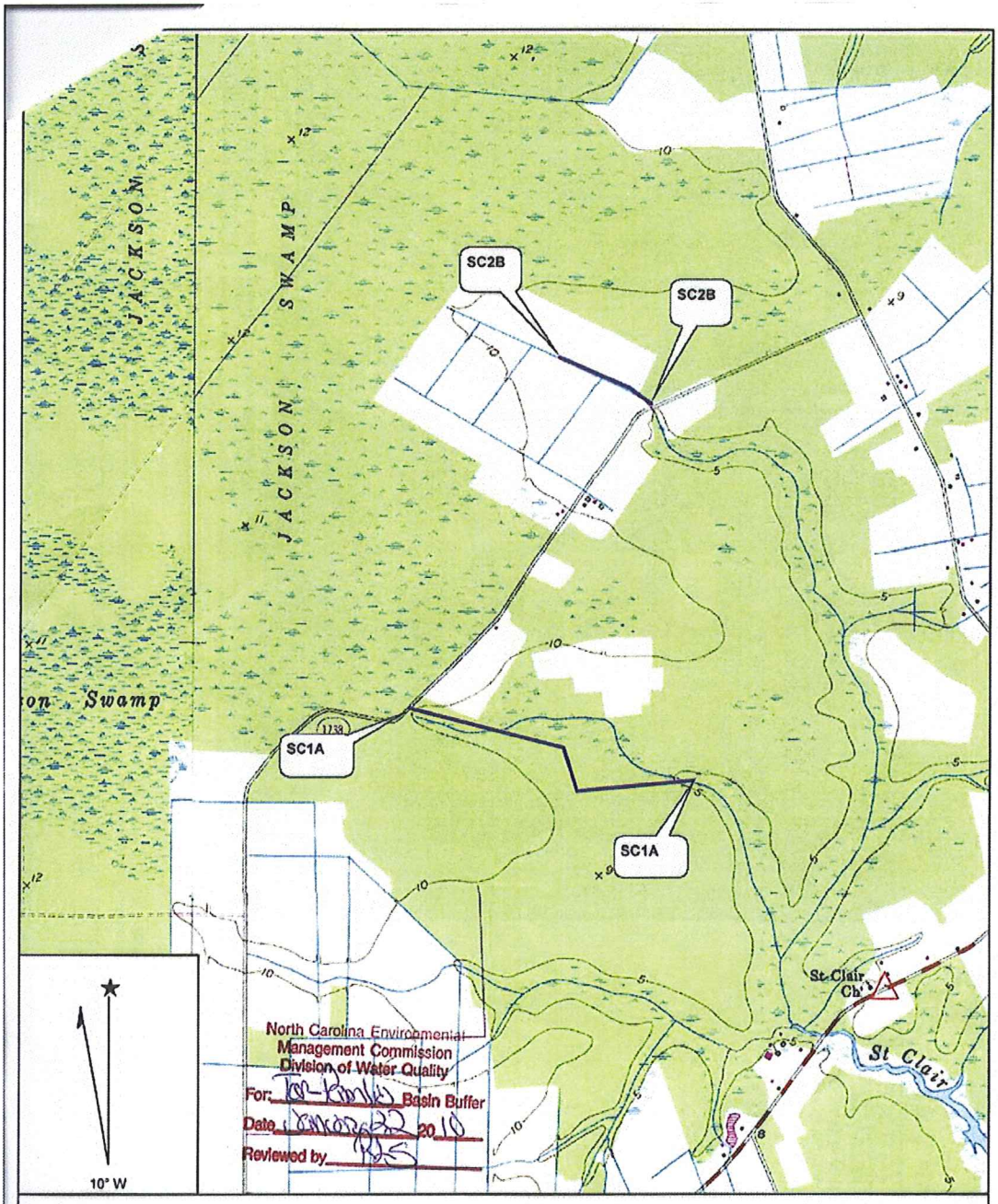
Attachments: Beaufort County Soil Survey map
USGS Ransomville Quad map
Goggle Earth map

cc: Hal Bain, Rummel, Klepper & Kahl
DWQ 401/Wetland Express Unit
File Copy

Filename 10-0062

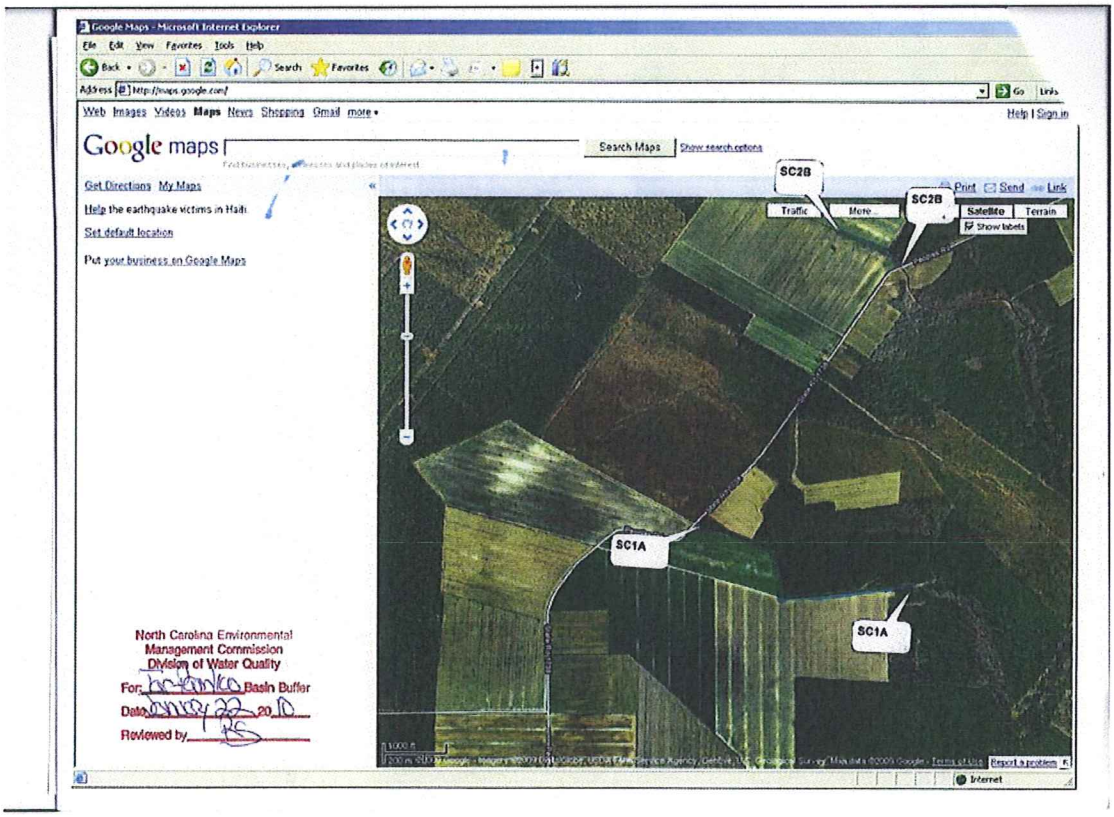


North Carolina Environmental
Management Commission
Division of Water Quality
For: EC Basin Buffer
Date: January 22, 2010
Reviewed by: [illegible]



Name: RANSOMVILLE
Date: 1/22/2010
Scale: 1 inch equals 1667 feet

Location: 035° 27' 34.31" N 076° 44' 07.46" W
Caption: Express Stream Call for Poole Property, Beaufort Co.


Google Maps - Microsoft Internet Explorer
Google maps
Search Maps
Get Directions My Maps
Help the earthquake victims in Haiti
Set default location
Put your business on Google Maps
SC2B
SC2B
SC1A
SC1A
North Carolina Environmental
Management Commission
Division of Water Quality
For: Basin Buffer
Date: 20
Reviewed by:

17.0 APPENDIX C - MITIGATION WORK PLAN DATA AND ANALYSES

17.1 Channel Morphology (Rosgen Analysis)

17.1.1 Existing Conditions

17.1.1.1 Channel Classification

UT2 and UT3 to St. Clair Creek are small headwater streams with total drainage areas of approximately 89 and 30 acres respectively (Figure 2.2). Historically, the areas have been extensively drained for silvicultural and agricultural production. The UTs were ditched and moved from their historic flow paths to promote drainage from the adjacent farm fields and forested areas, which has resulted in a disconnection from their relic floodplain and headwater valleys. These conditions generally lead to a lowered water table and were observed throughout the site. The riparian vegetation throughout the site is a mix of planted pine areas and herbaceous grasses that are regularly maintained by mowing.

For analysis purposes, Baker labeled the existing unnamed tributaries UT2 and UT3 respectively. The existing UT reach locations are shown on Figures 2.2, 2.3, 2.4, 2.5, 2.6, 3.1, and 17.2. UT2 begins at the most northwestern project boundary and flows east then south towards a farm access road. Field evaluations of intermittent/ perennial status and use of NCDWQ stream assessment protocols were difficult for UT2 since the channels on site were all maintained with an excavator during the late summer of 2010. As a result, no geomorphic or vegetation characteristics were evident along the reach. However, NCDWQ stream forms were completed and are included in Appendix B. Field investigations and photographs taken during March 2010, prior to clean-out, were used to assist in determining jurisdictional status; however, the channels at that time had been impacted by recent timber harvest.

The NCDWQ Methodology for Identification of Intermittent and Perennial Streams and Their Origins Manual, Version 4.11 indicates that in situations with ditching and modified natural streams, contour crenulations and the presence of linear soil mapping units can be used to determine the presence of a natural stream channel. The LIDAR imagery for the site shows a distinct topographic valley signature along much of UT2, and the county soil survey shows a linear soil mapping unit just downstream of the project limits, as well as a steam feature that extends up into the project site. In addition, the landowner had observed fish and turtles in the channel, along with submerged aquatic vegetation. Based on these observations and its available drainage area (89 acres), the stream was determined to be a perennial stream channel and appropriate for use with the Coastal Plain headwater stream guidance.

Like UT2, the UT3 channel was maintained during the summer of 2010; therefore, geomorphic and vegetation characteristics were difficult to assess to determine jurisdictional status. However, NCDWQ stream forms were completed and are included in Appendix B. UT3 is an intermittent stream that flows south from the most northeast project boundary. The same analysis as described for UT2 was conducted for UT3. The LIDAR data for the site indicates the presence of a valley, but the county soil survey does not indicate the presence of a stream feature. The drainage area for UT3 is smaller than that for UT2 (30 acres), but this drainage area is consistent with the drainages of small headwater reference sites that have been identified and surveyed in the same region. The

landowner also did not recall as extensive of a variety of aquatic life being present in the UT3 channel prior to the most recent maintenance work. Therefore, the reach was determined to be an intermittent stream channel, but appropriate for use with the Coastal Plain headwater stream guidance due to the defined valley signature. The total current length of the existing streams (UT2 and UT3) on the site is 3,735 LF. This number is approximate due to the highly altered flow path and is approximately measured along the main ditches that convey the drainage from each UTs watershed. Due to their channelized nature, the streams would most appropriately be classified as a Rosgen G stream type but use of this classification system is questionable due to the highly altered states of the channels. Table 17.1 represents geomorphic data compiled from the existing condition survey.

Table 17.1 Representative Existing Conditions Geomorphic Data for UT2 and UT3: Stream Channel Classification Level II
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Parameter	Reach UT2	Reach UT3
Existing Reach Length (ft)	2,660	1,075
Drainage Area (sq. mi.)	0.14	0.05
Bankfull Discharge, Q_{bkf} (cfs)[1]	1.96	0.9
Feature Type	Perennial Channelized Stream	Intermittent Channelized Stream
Rosgen Stream Type[2]	G	G
Bankfull Width (W_{bkf}) (ft)[3]	3.1	2.1
Bankfull Mean Depth, (d_{bkf}) (ft)[3]	0.68	0.45
Width to Depth Ratio (W_{bkf}/d_{bkf})[3]	4.5	4.8
Cross-Sectional Area, A_{bkf} (sq ft)[1]	2.1	1.0
Bankfull Max Depth (d_{mbkf}) (ft)[3]	0.92	0.61
Floodprone Width (W_{fpa}) (ft)[3]	4.3	12.5
Entrenchment Ratio (W_{fpa}/W_{bkf}) (ft)[3]	1.39	1.4
Bank Height Ratio[4]	3.3	5.3
Approximate Longitudinal Stationing of Cross-Section Along Existing Thalweg (ft)	12+00	13+00
Bankfull Mean Velocity, $V_{bkf}= (Q_{bkf}/A_{bkf})$ (ft/s)	0.93	0.8
Channel Materials (Particle Size Index – d50) – Based on Bulk Sample[5]		
d_{16} / d_{35} / d_{50} / d_{84} / d_{95} (mm)	0.08 / 0.15 / 0.2 / 1.1 / 2.4	0.08 / 0.15 / 0.2 / 0.7 / 1.5
Average Valley Slope (ft/ft)	0.001	0.001
Average Water Surface Slope (S) (ft/ft)	0.0009	0.00085
Average Channel Sinuosity (K)[6]	N/A	N/A

[1]Bankfull discharge and area estimated using NC Coastal Plain Regional Curve EcoScience Data (Sweet and Geratz, 2003)
[2]Due to their channelized nature, the streams would most appropriately be classified as Rosgen G stream type but use of this classification system is questionable due to the highly altered states of the channels
[3]No bankfull indicators were present inside the ditches so all bankfull parameters are based on bankfull cross-sectional area determined from the NC Coastal Plain Regional Curve EcoScience Data (Sweet and Geratz, 2003)
[4]High bank height ratios (values greater than 2.0 indicate system-wide self-recovery is unlikely
[5]Bulk samples taken since pebble count procedure not applicable for sand-bed streams
[6] Meander geometry information such as sinuosity, meander width, meander length, and radius of curvature were not measured because the channel exhibits minimal pattern since it has been straightened/channelized.

17.1.1.2 Valley Classification

The St. Clair Creek Site is located in eastern Beaufort County in the Outer Coastal Plain physiographic region of North Carolina. Undisturbed Coastal Plain valleys in this region are generally classified as Valley Type 'X' (Rosgen, 2006). These low gradient landforms are typically characterized as large areas of broad, level flatlands (interstream terraces) with extensive floodplains intersected by anastomosed stream and wetland complexes. The underlying geology in this area is identified as Surficial Deposits and formed during the Quaternary Period. The Surficial Deposits formation consists primarily of lake or marine deposit (non-glacial) and varying amounts of eolian material and sand, clay, gravel and (Geologic Map of North Carolina, NC Geological Survey, 1998).

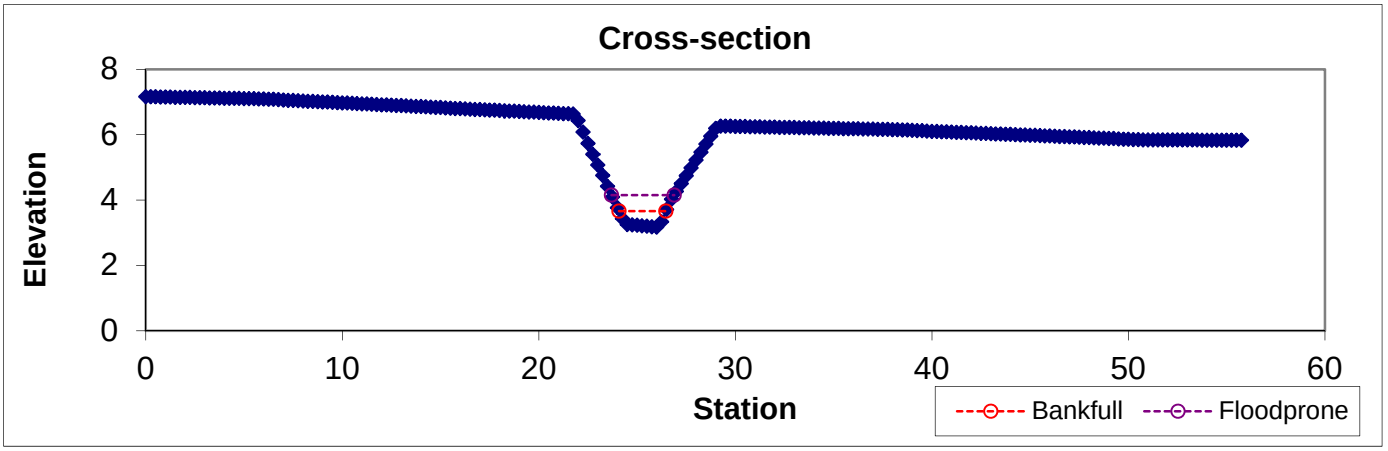
17.1.1.3 Channel Morphology and Stability Assessment

Baker performed general topographic and planimetric surveying of the project site and produced contour mapping based on survey data in order to create plan set base mapping (see Section 18.0, Appendix D). Two representative cross-sections (one on UT2 and one on UT3) were also cut along the two main ditches to assess the current condition and overall stability of the stream channels. The existing cross-section data are shown in Figure 17.1.

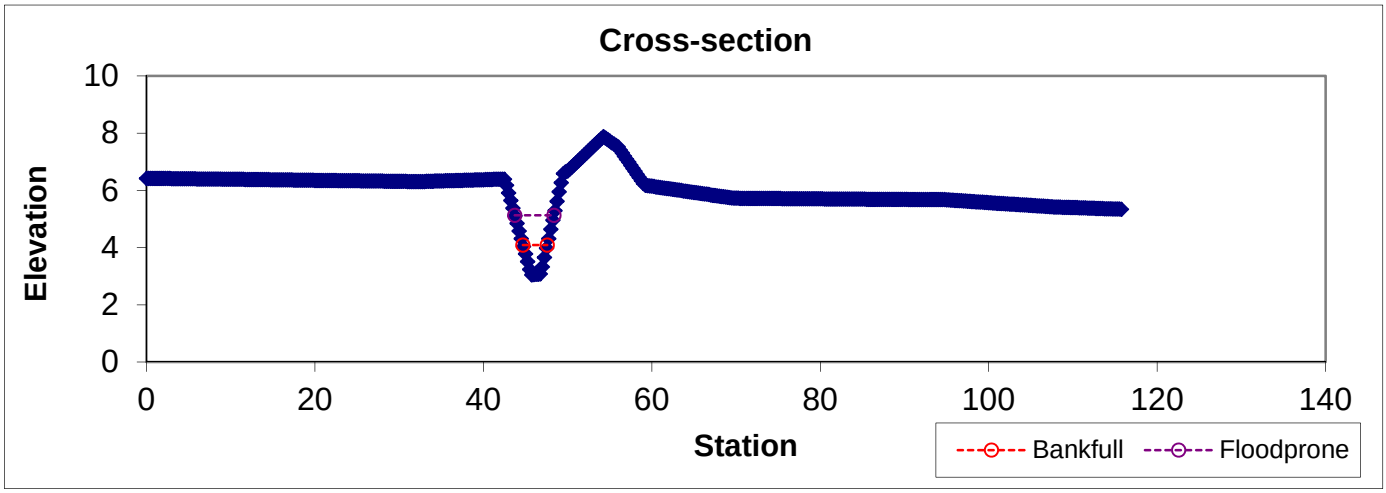
Since consistent bankfull indicators could not be identified in the field, bankfull cross-sectional areas were estimated using the EcoScience NC Coastal Plain Regional Curve to compare stability ratings. The representative cross-sections have a typical Bank Height Ratio (BHR) greater than 2.0. The cross-section data illustrate the channelized nature of the streams and the lack of a natural floodplain. The collected topography data showed UT2 and UT3 have average valley slopes of 0.001 foot/foot. Sinuosity and other pattern measurements for these existing ditches are inappropriate due to the straightened/ channelized nature of the ditches. Both reaches are entrenched but are stable due to the very low gradients and small watersheds.

Figure 17.1 Existing Ditch Cross-Sections for Reach UT2 and UT3

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
UT2 N/A	G	2.1	3.1	0.68	0.92	4.5	3.3	1.39	3.66	6.26



Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
UT3 N/A	G	1.0	2.1	0.45	0.61	4.8	5.3	1.4	4.09	6.39



17.1.1.4 Channel Stability

Sedimentation from bank erosion is a significant pollutant to water quality and aquatic habitat. Predicting stream bank erosion rates and annual sediment yields using the Bank Assessment for Non-point source Consequences of Sediment (BANCS) method (Rosgen 1996, 2001a) is not applicable to the coastal plain of North Carolina. Due to the very low gradients and small watersheds neither UT2 nor UT3 are contributing quantifiable sediment to the downstream watershed. This was visually verified in the field. No distinct erosion or sediment accumulation was observed along either UT.

Though both UT2 and UT3 are laterally and vertically stable, neither provide significant habitat nor function as a headwater stream and wetland complex as they most likely did in the past.

17.1.1.5 Channel Evolution

Channel stability is defined as the stream's ability to transport incoming flows and sediment loads supplied by the watershed without undergoing significant changes over a geologically short time-scale. A generalized relationship of stream stability was proposed by Lane (1955); it states that the product of sediment load and sediment size is in balance with the product of stream slope and discharge, or stream power. A change in any one of these variables induces physical adjustment of one or more of the other variables to compensate and maintain the proportionality.

Longitudinally, the water and sediment flows delivered to each subsequent section are the result of the watershed and upstream or backwater (downstream) conditions. Water and sediment pass through the channel, which is defined by its shape, material, and vegetative condition. Flow and sediment are either stored or passed through at each section along the reach. The resulting physical changes are a balancing act between gravity, friction, and the sediment and water being delivered into the system (Leopold et al., 1964).

Observed stream response to induced instability, as described by Simon's (1989) Channel Evolution Model, involve extensive modifications to channel form resulting in profile, cross-sectional, and plan form changes, which often take decades or longer to achieve

resolution. The Simon (1989) Channel Evolution Model characterizes typical evolution in six steps:

1. Pre-modified
2. Channelized
3. Degradation
4. Degradation and widening
5. Aggradation and widening
6. Quasi-equilibrium.

The channel evolution process is initiated when a stable, well-vegetated stream that interacts frequently with its floodplain is disturbed. Channelization, dredging, changing land use, removal of streamside vegetation, upstream or downstream channel modifications, and/or change in other hydrologic variables result in adjustments in channel morphology to compensate for the new condition(s). Disturbance commonly results in an increase in stream power that can cause degradation, often referred to as channel incision (Lane, 1955). Incision eventually leads to over-steepening of the banks and, when critical bank heights are exceeded, the banks begin to fail and mass wasting of soil and rock leads to channel widening. Incision and widening continue moving upstream in the form of a head-cut. Eventually the mass wasting slows, and the stream begins to aggrade. A new, low-flow channel begins to form in the sediment deposits. By the end of the evolutionary process, a stable stream with dimension, pattern, and profile similar to those of undisturbed channels forms in the deposited alluvium. The new channel is at a lower elevation than its original form, with a new floodplain constructed of alluvial material (FISRWG, 1998).
The channel stability assessment incorporated qualitative site observations. Conclusions reached were used to define overall channel stability and determine appropriate restoration approaches for the site. UT2 and UT3 originate from watersheds in which the land use is predominantly agriculture and silviculture. A change in land use within the watersheds is not anticipated. Due to past channelization and straightening, both UT2 and UT3 are incised as evidenced by entrenchment ratios greater than 2.0.

Both UT2 and UT3 currently exist in Step 2 of the Simon Channel Evolution Model. Due to very low gradients and small contributing watersheds, further degradation is not anticipated.

17.1.2 Proposed Morphological Conditions

After examining the assessment data collected at the site and exploring the potential for restoration, an approach was developed that would address restoration of both stream and wetland functions within the project area. Prior to impacts from past channelization, topography and soils on the site indicate that the project area most likely functioned in the past as a headwater tributary stream and wetland system, eventually flowing into the larger St. Clair Creek system.

Therefore, a design approach was formulated to restore this type of riparian headwater system. First, an appropriate stream type for the valley type, slope, and desired stream and wetland functions was selected and designed to restore historic flow paths. Then a grading plan was developed in order restore the historic valleys and adjacent wetland hydrology by filling existing ditches, removing past ditch spoil and other agricultural land manipulations.

17.1.2.1 Proposed Design Approach and Criteria Selection

Selection of a general restoration approach was the first step in selecting design criteria for reaches UT2 and UT3. The approach was based on the potential for restoration as

determined during the site assessment. Next, the specific design parameters were developed so that plan view layout, cross-section dimensions, and a longitudinal profile could be described for developing construction documents. The design philosophy is to use these design parameters as conservative values for the selected stream types and to allow natural variability of flow paths and bed features to form over long periods of time under the processes of flooding, re-colonization of vegetation, and watershed influences within the restored valley.

The design plans have been tailored to produce a cost and resource efficient design that is constructible, using a level of detail that corresponds to the tools of construction. The design also reflects a philosophy that the stream will adapt to the inherent uniformity of the restoration project. This will allow the system to adjust over long periods of time under the natural flood processes, re-colonization of vegetation, and local topographic influences.

UT2 and UT3 Restoration

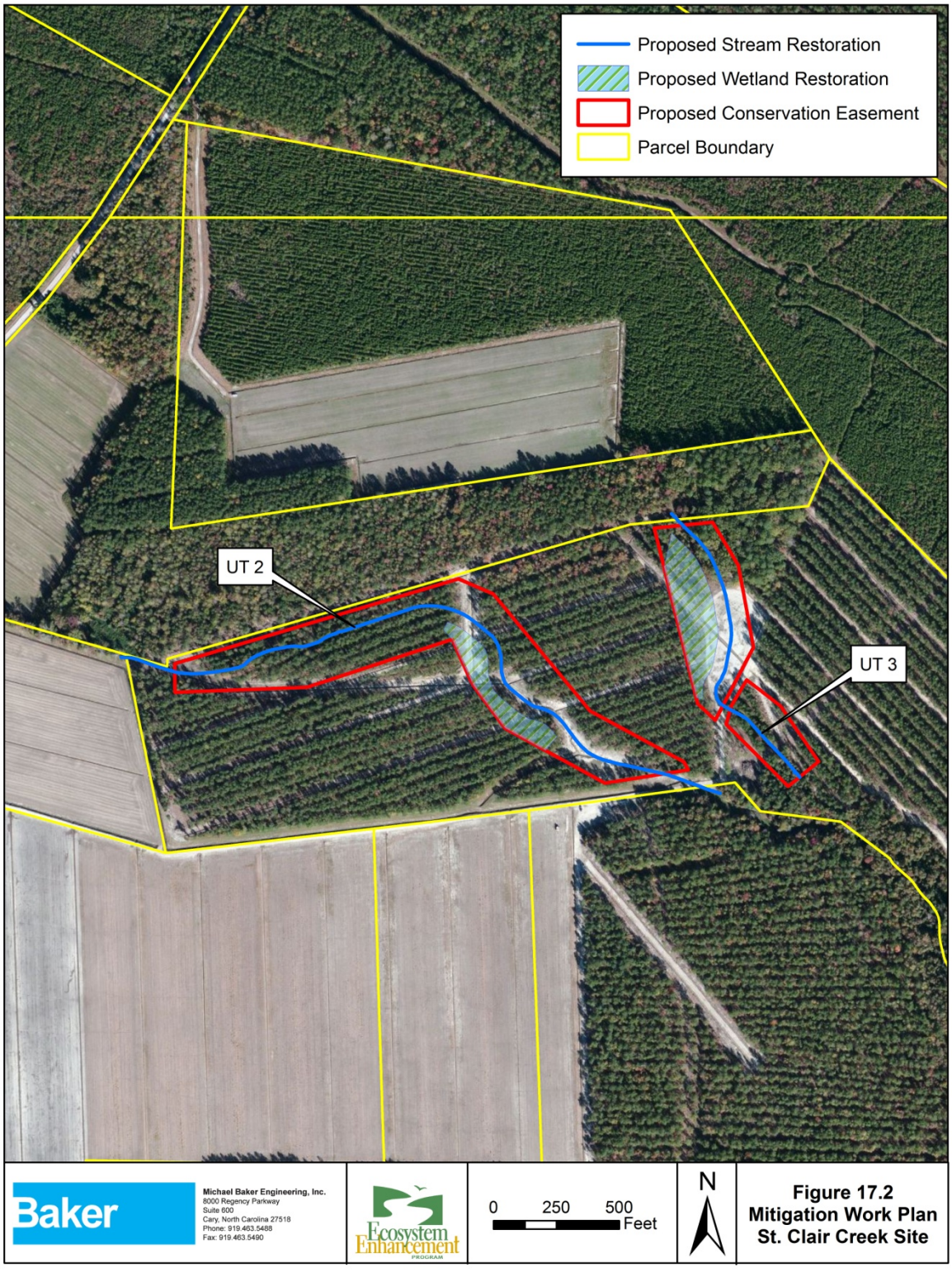
The restoration of both UT2 and UT3 will consider the USACE and NCDWQ guidance document entitled "*Information Regarding Stream Restoration in the Outer Coastal Plain of North Carolina*." Rather than the construction of a defined single thread channel, the current channelized stream will be filled and graded back to topographic contours that approximate the pre-drained condition. Field surveys were conducted to determine the elevation of the stream where it comes onto the project property, and the valley topographic elevations downstream.

As discussed in Section 7, the tributaries have been channelized through an existing riparian headwater system. The channelization has disrupted the historic flow and flooding patterns of the site. Restoration of these reaches will seek to restore historic flow and flooding processes. Based on average valley slopes (UT2 0.001 foot/foot, UT3 0.001 foot/foot) and catchment areas (UT2 89 AC, UT3 30 AC), this area most likely functioned prior to disturbance as a headwater stream and wetland system (Rosgen 'DA' stream type). Restoration will focus on filling in the drainage ditches, and restoring the pre-disturbed topography of the valley. The valley bottom will then be graded to restore the natural microtopographic variability that is common within multi-thread headwater systems. The system will be allowed to form multi-thread channels and diffuse flow patterns on its own over time.

The restoration of UT2 will end near the existing culverted crossing at approximately Station 36+50. At this location, the UT2 channel will flow through the proposed culverts and connect with the existing, stable single thread channel prior to its confluence with the larger St. Clair Creek system.

The restoration of UT3 will end near the existing culverted crossing at approximately Station 22+78. The restored stream within this area flows through a previously identified jurisdictional wetland (See Section 21, Appendix G) where prior to disturbance the historic flow path was located. Only the minor grading will performed in this area. A high spot in the existing topography where a past farm road once existed will be removed and blended in to the surrounding topography. At the end of UT3, the channel will be allowed to flow into the existing headwater stream and wetland system prior to the system's confluence with the larger St. Clair Creek system.

Figure 17.2 Mitigation Work Plan



17.1.3 Reference Reach Data Indicators

Reference reach surveys are valuable tools for comparison. The morphologic data obtained such as dimension, pattern, and profile can be used as a template for design of a stable stream in a similar valley type with similar bed material. In order to extract the morphological relationships observed in a stable system, dimensionless ratios are developed from the surveyed reference reach. These ratios can be applied to a stream design to allow the designer to 'mimic' the natural, stable form of the target channel type.

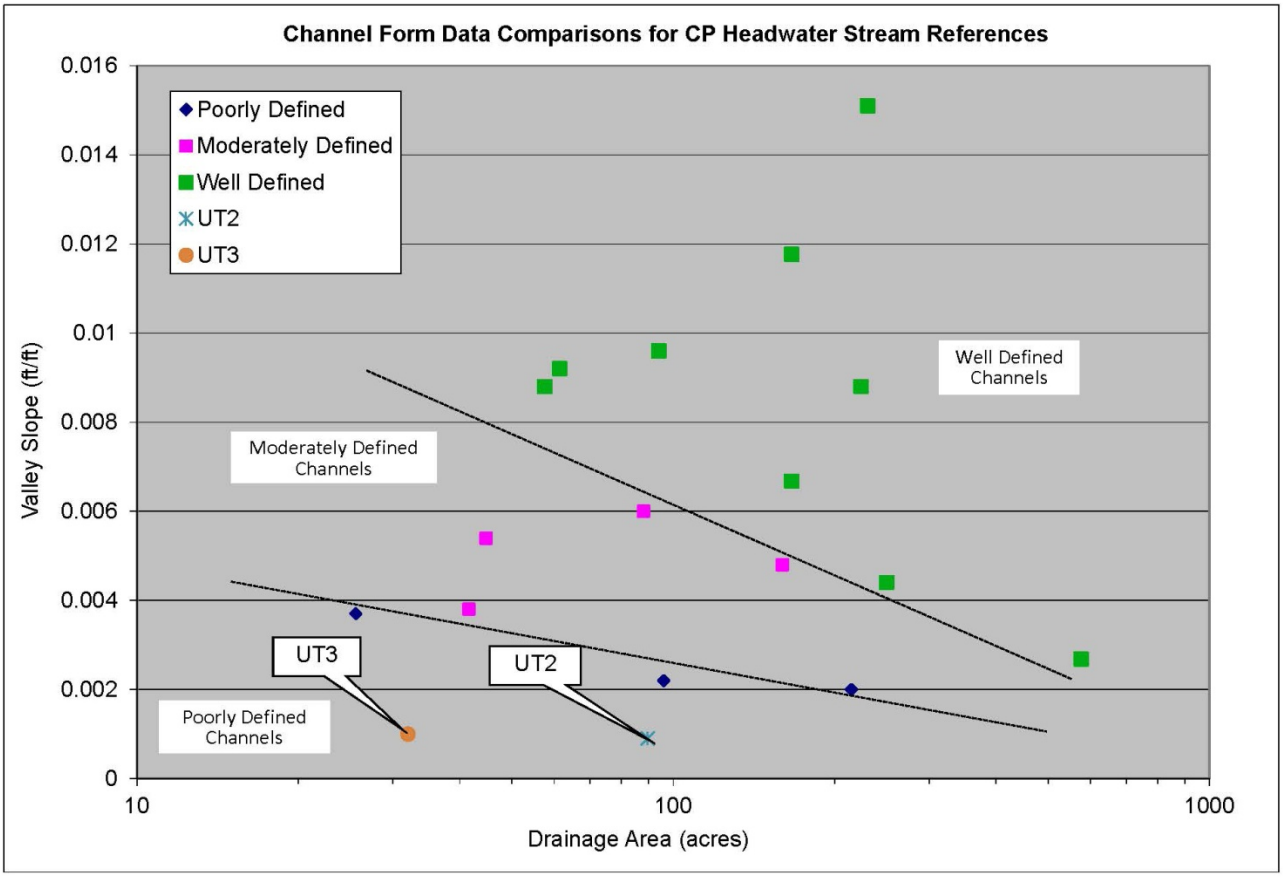
Often the best reference data are from adjacent stable stream reaches, or reaches within the same watershed. Many local headwater valleys have been identified with similar drainage areas, soils, and topography; however, most that were investigated had been drained and any stream and/or wetland features that may have been present had been channelized or modified. Therefore, reference data and past projects from other Coastal Plain stream systems were evaluated to help in the development of design criteria.

Baker conducted research in the Croatan National Forest to examine the landscape position at which small Coastal Plain headwater tributaries develop defined stream channels. Data collected indicate that for small tributary drainages, single thread channels are often found when drainage areas approach one square mile and slope is 0.001 foot/foot or greater. For smaller drainages and decreased slopes, mutli-thread systems that function more like headwater stream and wetland complexes are more common. These data help to provide a basis for evaluating the valley slope and topography of the project site and determining the stream systems that may have been present historically.

While reference reaches can be used as an aid in designing channel dimension, pattern, and profile, there are limitations in smaller coastal plain headwater streams. The flow patterns and channel formation for most reference reach quality streams is often controlled by slope, drainage areas and large trees and other deep rooted vegetation.

Collectively, the data provide valuable information regarding the range of conditions documented for similar headwater stream systems. Figure 17.3 illustrates the data comparison for Coastal Plain headwater streams as a reference for design considerations.

Figure 17.3 Channel Form Data Comparisons for Coastal Plain Headwater Stream References



17.2 Bankfull Verification Analysis

17.2.1 Bankfull Stage and Discharge

Bankfull stage and its corresponding discharge are the primary variables used to develop a natural channel design. However, the correct identification of the bankfull stage in the field can be difficult and subjective (Williams, 1978; Knighton, 1984; and Johnson and Heil, 1996). Numerous definitions exist of bankfull stage and methods for its identification in the field (Wolman and Leopold, 1957; Nixon, 1959; Schumm, 1960; Kilpatrick and Barnes, 1964; and Williams, 1978). The identification of bankfull stage in the humid Southeast is especially difficult because of dense understory vegetation and a long history of channel modification and subsequent adjustment in channel morphology. It is generally accepted that bankfull stage corresponds with the discharge that fills a channel to the elevation of the active floodplain and represents a breakpoint between processes of channel formation and floodplain development. The bankfull discharge, which also corresponds with the dominant discharge or effective discharge, is thought to be the flow that moves the most sediment over time in stable alluvial channels.

Field indicators include the back of point bars, significant breaks in slope, changes in vegetation, the highest scour line, or the top of the bank (Leopold, 1994). The most consistent bankfull indicators for streams in the Coastal Plain of North Carolina are the backs

of point bars, breaks in slope at the front of flat bankfull benches, or the top of bank (Sweet and Geratz, 2003).

An accurate identification of bankfull stage could not be made throughout the site due to channelized conditions. For this reason, bankfull stage was identified by using regional curve information. Regional curve equations developed from the NC Coastal Plain study are provided by EcoScience (Sweet and Geratz, 2003) and are shown in Table 17.2. Due to man-made alterations, normal channel forming processes do not to occur at the site.

17.2.2 Bankfull Hydraulic Geometry Relationships (Regional Curves)

Hydraulic geometry relationships are often used to predict channel morphology features and their corresponding dimensions. The stream channel hydraulic geometry theory developed by Leopold and Maddock (1953) describes the interrelations between dependent variables such as width, depth, and area as functions of independent variables such as watershed area or discharge. These relationships can be developed at a single cross-section or across many stations along a reach (Merigliano, 1997). Hydraulic geometry relationships are empirically derived and can be developed for a specific river or extrapolated to a watershed in the same physiographic region with similar rainfall/runoff relationships (FISRWG, 1998).

Regional curves developed by Dunne and Leopold (1978) relate bankfull channel dimensions to drainage area. A primary purpose for developing regional curves is to aid in identifying bankfull stage and dimension in un-gaged watersheds, as well as to help estimate the bankfull dimension and discharge for natural channel designs (Rosgen, 1994). Gage station analyses throughout the United States have shown that the bankfull discharge has an average return interval of 1.5 years or 66.7% annual exceedence probability on the maximum annual series (Dunne and Leopold, 1978; Leopold, 1994). However, it should be noted that in comparison to the NC Coastal Plain Regional Curve, the recurrence of bankfull events is much shorter (average 0.61 years) likely due to higher rainfall amounts, elevated water tables, and increased floodplain storage.

Table 17.2 NC Coastal Plain Regional Curve Equations
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

NC Coastal Plain Regional Curve Equations EcoScience Data (Sweet and Geratz, 2003)	
$Q_{bkf} = 8.79\ A_w^{0.76}$	$R^2=0.92$
$A_{bkf} = 9.43\ A_w^{0.74}$	$R^2=0.96$
$W_{bkf} = 9.64\ A_w^{0.38}$	$R^2=0.95$
$D_{bkf} = 0.98\ A_w^{0.36}$	$R^2=0.92$

The NC Coastal Plain Regional Curve estimates a bankfull cross-sectional area of approximately 2.1 square feet and a bankfull discharge of approximately 2.0 cfs for a 0.14 square mile watershed though it should be noted that this drainage area is much smaller than any of the streams used to develop this curve. The existing channel has cross-sectional areas at the top-of-banks that is approximately 19 square feet. As described in in Section 7.3, the Rosgen stream classification system (Rosgen, 1996) depends on the proper field identification of consistent geomorphic features related to the active floodplain, therefore bankfull verification was not possible in the field under these conditions.

17.3 Sediment Transport Analysis

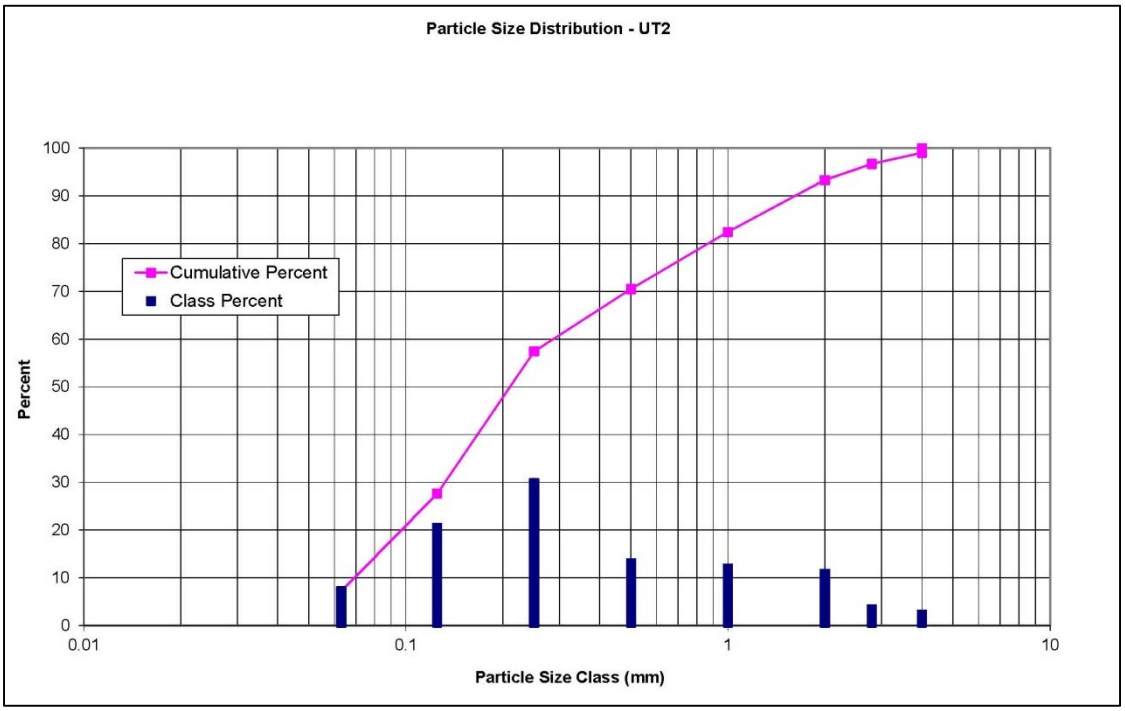
17.3.1 Methodology

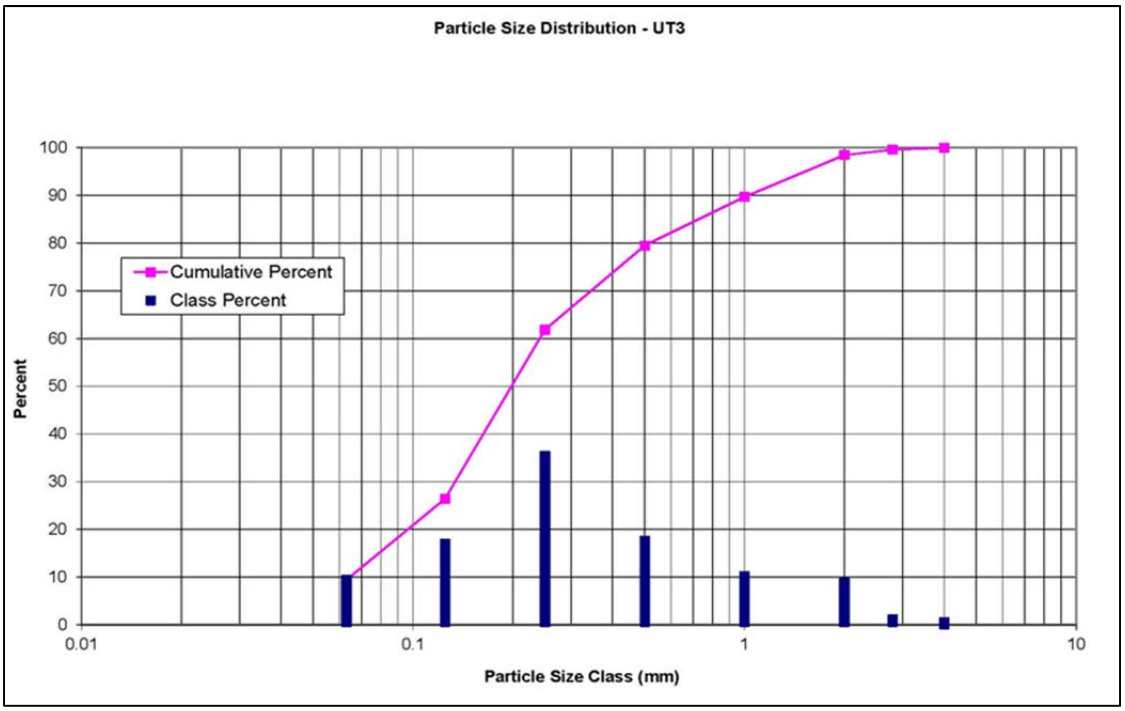
The purpose of a sediment transport analysis is to ensure that the stream restoration design creates a stable channel that does not aggrade or degrade over time. The overriding assumption is that the project reach should be transporting all the sediment delivered from upstream sources, thereby being a "transport" reach and classified as a Rosgen "C" or "E" type channel. However, under headwater stream and wetland reference conditions where channel formation is poor, flows are often conveyed through multiple small channels across a relatively well defined floodplain. Microtopography in these headwater systems is quite variable, as a result of tree roots, tip mounds, and debris jams. Debris appears to be a critical component in maintaining the characteristics of diffuse flow, as stream energy is not sufficient to provide scour and movement of large debris.

The design for reaches UT2 and UT3 involves the construction of broad/shallow flow paths along the valley bottom and allowing the system to form as a multi-thread channel; in essence, the restoration of a headwater stream and wetland system. Under normal conditions, sediment deposits in these systems and they are aggradational in nature, due to low flow velocities and scour stresses. Furthermore, sediment supply is typically limited, such that over time, these systems remain stable and deposited sediment becomes part of the natural processes of soil formation. Field observations from the project site and upper watershed such as a lack of depositional features confirm that sediment supply from upstream sources are limited, therefore sediment transport relationships are predicted to function normally in the restored reaches of UT2 and UT3.

It should be noted that the modified Wolman pebble count (Rosgen, 1994) is not appropriate for sand-bed streams; therefore, a bulk sampling procedure was used to characterize the bed material. The majority of the reach contains sand and silt stream bottom due to the parent soil. Bed material samples were collected to confirm these initial observations. The samples collected were taken to a lab and dry sieved to obtain a sediment size distribution. The sieve data shown in Figure 17.4 indicate that the UTs to St Clair Creek have an approximate D50 of 0.2-mm indicating that under current conditions, the dominant bed material in the stream channel is fine sand.

Figure 17.4 Sediment Particle Size Distribution





17.3.2 Conclusions for Channel Forming Discharge

Table 17.3 provides a bankfull discharge analysis and sediment transport data summary based on the bankfull regional curve flows, the Manning's equation discharges calculated from the representative cross-sections for each reach, and the bankfull design discharge calculated based on the proposed design valley cross-sections for UT2 and UT3.

Table 17.3 Design Discharge and Sediment Transport Data Summary
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Stream	Downstream Drainage Area (mi^2)	Bankfull Q, NC Coastal Plain Regional Curve[2] (cfs)	Bankfull Q, Manning's Formula[1] (cfs)	Bankfull Velocity[3] (ft/sec)	Shear Stress (lbs/ft^2)	Stream Power (W/m^2)
UT2	0.14	2.0	0.9	0.43-0.95	0.014	0.091
UT3	0.05	0.9	0.3	0.26-0.9	0.009	0.042

[1] Bankfull discharge estimate is based on Manning's Equation for the design valley cross-section and an assumed *n*-value of 0.04.
[2] NC Coastal Plain Regional Curve bankfull discharge estimates (Sweet and Geratz, 2003).
[3] A range of flows is provided to account for variability of the calculation methods as well as to account for conditional changes within the project reaches due to increased drainage area.

17.4 Existing Vegetation Assessment

Limited wooded riparian buffers exist along UT2 and UT3. While these buffers do exist, they consist of planted Loblolly pine (*Pinus taeda*) except for a small area of successional deciduous forest along upper UT3 on the left bank that consist of mature Sweet gum (*Liquidambar styraciflua*), Tulip poplar (*Liriodendron tulipifera*), Loblolly pine (*Pinus taeda*), Red maple (*Acer rubrum*), Green Ash (*Fraxinus pennsylvanica*), and various oaks (*Quercus spp.*). Woody shrub and vine species include Blackberry (*Rubus spp*.), Greenbrier (*Smilax rotundifolia*), and Muscadine (*Vitis rotundifolia*). Herbaceous species consist of Dog fennel (*Eupatorium capillifolium*), Giant cane (*Arundinaria gigantea*), and Netted chainfern (*Woodwardia areolata*). Historic land management surrounding the project area has been primarily for agricultural and silvicultural purposes through the alteration of drainage patterns and the removal of native vegetation in the riparian zone. All riparian buffer areas have been significantly disturbed. The primary invasive species vegetation present on the project site is Chinese privet (*Ligustrum sinense*) which is sparsely found throughout the riparian buffer areas.

17.5 Site Wetlands

17.5.1 Jurisdictional Wetland Assessment

The proposed project area was reviewed for the presence of wetlands and waters of the United States in accordance with the provisions on Executive Order 11990, the Clean Water Act, and subsequent federal regulations. Wetlands have been defined by the USACE as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR 328.3(b) and 40 CFR 230.3 (t)). The areas in the project boundaries that displayed one or more wetland characteristics were reviewed to determine the presence of wetlands. The wetland characteristics included:

1. Prevalence of hydrophytic vegetation.
2. Permanent of periodic inundation or saturation.
3. Hydric soils.

On June 5, 2007, the USACE and US Environmental Protection Agency (USEPA) issued joint guidance for their field offices for Clean Water Act jurisdictional determinations in response to the Supreme Court's decision in the consolidated cases of Rapanos v. United States and Carabell v. United States (USEPA and USACE, 2007). Based on this guidance, the agencies will assert jurisdiction over the following waters:

- Traditional navigable waters (TNWs)
- Wetlands adjacent to TNWs
- Non-navigable tributaries of TNWs that are considered relatively permanent waters (RPWs). Such tributaries flow year-round or exhibit continuous flow for at least 3 months.
- Wetlands that directly abut RPWs.

The agencies will decide jurisdiction over the following waters based on a standardized analysis to determine whether they have a significant nexus with a traditional navigable water:

- Non-navigable tributaries that are not relatively permanent waters (non-RPWs)
- Wetlands adjacent to non-RPWs
- Wetlands that are adjacent to but do not directly abut an RPW.

The significant nexus analysis is fact-specific and assesses the flow characteristics of a tributary and the functions performed by all its adjacent wetlands to determine if they significantly affect the physical, chemical, and biological integrity of downstream TNWs. A significant nexus exists when a tributary, in combination with its adjacent wetlands, has more than a speculative or insubstantial effect on the physical, chemical, or biological integrity of a TNW.

The USACE and USEPA will apply the significant nexus standard within the limits of jurisdiction specified by the Supreme Court decision in the case of Solid Waste Agency of Northern Cook County (SWANCC) v. US Army Corps of Engineers. Under the SWANCC decision, the USACE and USEPA cannot regulate isolated wetlands and waters that lack links to interstate commerce sufficient to serve as a basis for jurisdiction under the Clean Water Act. Though isolated wetlands and waters are not regulated by the USACE, within the state of North Carolina isolated wetlands and waters are considered "waters of the state" and are regulated by the NCDWQ under the isolated wetlands rules (15A NCAC 2H .1300).

Following a desktop review of the National Wetland Inventory (NWI), NRCS soil survey and USGS quadrangle maps, a licensed soil scientist from The Catena Group performed a hydric soils delineation in February 2011 (see Section 19, Appendix E). A field survey of the project area was conducted by Baker wetland scientists in January 2012 to investigate potential wetlands throughout the hydric soils area and confirm perennial and intermittent streams in the project area. Excluding the known jurisdictional wetland delineated by a third party at the end of UT3 the findings during the subsequent wetland investigation determined that there were small wetland areas adjacent to the project boundaries at the upper ends of both UT 2 and UT3. However; any temporary impacts to the marginal or fringe wetlands associated with the restoration activities would be considered minimal and would involve minor surface excavation or roughening, re-establishment of native wetland vegetation, and adjustments to drainage patterns as necessary to restore historic channel pattern to the system.

17.5.2 Wetland Impacts and Considerations

However, it is likely that wetlands were historically present in some of these locations by evaluating existing soils, hydrology and hydrophytic vegetation within the project reaches. The original plant community located in these wetlands was most likely indicative of other wetlands in the region, but past agricultural land use practices have altered the composition of the plant community currently present.

These wetland conditions have been altered and the hydrological connection between the historic wetlands, streams and ground water has been partially lost due to a series of ditches that runs through the project area.

Information on hydric soils located during investigations, data from groundwater wells currently being monitored on-site, and topographic information have provided Baker with enough data to propose approximate boundaries for an additional total of 2.8 acres of wetlands to be restored under this project. After completing the proposed stream and wetland restoration practices, these areas will experience a more natural hydrology and flooding regime and the riparian buffer area will be planted with native species woody wetland vegetation that is tolerant of flooded conditions. The design approach for the headwater stream and wetland system will also enhance any potential areas of adjacent fringe or marginal wetlands through higher water table conditions (elevated stream profile) and a more frequent over-bank flooding regime.

17.5.3 Climatic Conditions

The average growing season (defined as the period in which air temperatures are maintained above 28° Fahrenheit at a frequency of 5 years in 10) for the project locale is 282 days, beginning on February 28th and ending December 6th (NRCS Beaufort County WETS Station: Aurora 6 N, NC0375, 2002). The area experiences an average annual rainfall of 50.01 inches as shown on Table 17.4. In much of the southeastern US, average rainfall exceeds average evapotranspiration losses and these areas experience a moisture excess during most years. Excess water leaves a site by groundwater flow, surface runoff, channelized surface flow, or deep seepage. Annual losses due to deep seepage, or percolation of water to confined aquifer systems, are usually small and are not considered a significant loss pathway for excess water. Although groundwater flow can be significant in some systems, most excess water is lost via surface and shallow subsurface flow.

Table 17.4 Comparison of Monthly Rainfall Amounts for Project Site vs. Long-term Averages
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Month	Observed 2012 Monthly Precipitation (in)	WETS Table Average Monthly Precipitation (in)	Deviation of Observed from Average (in)
January	2.44	4.35	-1.91
February	2.66	3.05	-0.39
March	3.12	4.20	-1.08
April	2.49	3.27	-0.78
May	5.86	4.18	1.68
June	1.19	4.75	-3.56
July	5.57	5.83	-0.26
August	7.67	6.45	1.22
September	3.99	4.58	-0.59
October	4.19	3.08	1.11
November	0.43	2.87	-2.44
December	4.54	3.40	1.14
Sum	**44.15**	**50.01**	**-5.86**

17.5.4 Hydrological Characterization

The presence of hydric soils over the project site is evidence that the site historically supported a wetland ecosystem. Like other rural areas in the state, drainage patterns on-site were historically altered to maximize the availability of arable lands or lands to support livestock. Man-made drainage patterns were added to further drain wetland complexes on-site. Evidence of these ditches still exist today and exert varying degrees of influence on water table hydrology.

A total of five pre-restoration groundwater monitoring wells are installed on the Site (see Figure 17.5 for well locations). Three wells (SCAW1, SCAW2 and SCAW3) are installed along UT2 and two wells (SCAW4 and SCAW5) are installed along UT3. The five monitoring wells are Infinities™ automated pressure transducers and record groundwater levels four times per day. All wells were installed within 50 feet of the existing ditches.

Groundwater well data were collected from April 2012 through May 2013, and data for all wells are presented in Figure 17.6. According to the observed well data, groundwater levels on the Site (SCAW1 - SCAW5) remained mostly below the existing ground surface during the dormant and growing seasons. The pre-restoration well data indicate that all five monitoring wells did experience variable fluctuations of groundwater levels during and after measurable rain events. After data observations were completed, these fluctuations were noted to be attributed to a deeper water table where even minor rainfall inputs have a significant impact on the groundwater levels, which cause the wells to rise and fall promptly back to pre-storm levels. These sensitive reactions to rain events indicate that local groundwater levels are too deep and have relatively infrequent access to ground surface interaction.

It was also noted, during a storm event from May 29 through May 30, 2012 approximately 3.55 inches of rain fell in the Bath, NC area (reference gauge). According to the on-site well data following this event, groundwater levels in SCAW2 and SCAW5 exceeded the ground surface by 1.9 inches and 10.8 inches, respectively. It was also noted that the three remaining monitoring wells also recorded an increase in groundwater levels during this storm event, however, the well data indicate that water levels in wells SCAW1, SCAW3 and SCAW4 did not exceed the ground surface.

According to the well data for SCAW1 located on UT2, the data logger recorded water levels throughout the 2012 growing season mostly below 12 inches from the ground surface. During the 2012 dormant season when groundwater levels are normally highest, the SCAW1 well data were shown to be below 12 inches from the ground surface from August 2012 until February 2013. Well data recorded in wells SCAW2 and SCAW3 were found to be similar to well SCAW1, with the exception that these wells exhibited higher groundwater levels throughout the 2012 growing season, but also displayed a relatively dry dormant season.

According to the well data for SCAW4 located on UT3, the data logger recorded water levels throughout the 2012 growing season mostly below 12 inches from the ground surface. During the 2012 dormant season when groundwater levels are normally highest, the SCAW4 data logger recorded groundwater levels to be below 12 inches from the ground surface from August 2012 through December 2012. Groundwater data recorded in well SCAW5 exhibited higher levels throughout the 2012 growing season, but also displayed a somewhat dry dormant season.

In general, the wells exhibited similar trends in water table depth throughout the pre-restoration monitoring period that reflect seasonal changes in rainfall as well the interaction between the disturbed stream and man-made drainage ways on-site. Average water table levels were at their lowest between September 2012 and December 2012 when rainfall was average to below average and evapotranspiration rates began to decrease. Water table levels were observed to have spiked in

response to significant rainfall events or smaller events that occurred over multiple days. The channelization of the existing streams has kept ground water levels deep in the upstream area of UT2 and UT3, as is demonstrated in the upstream well data.

Figure 17.5 Locations of Pre-restoration Monitoring Wells

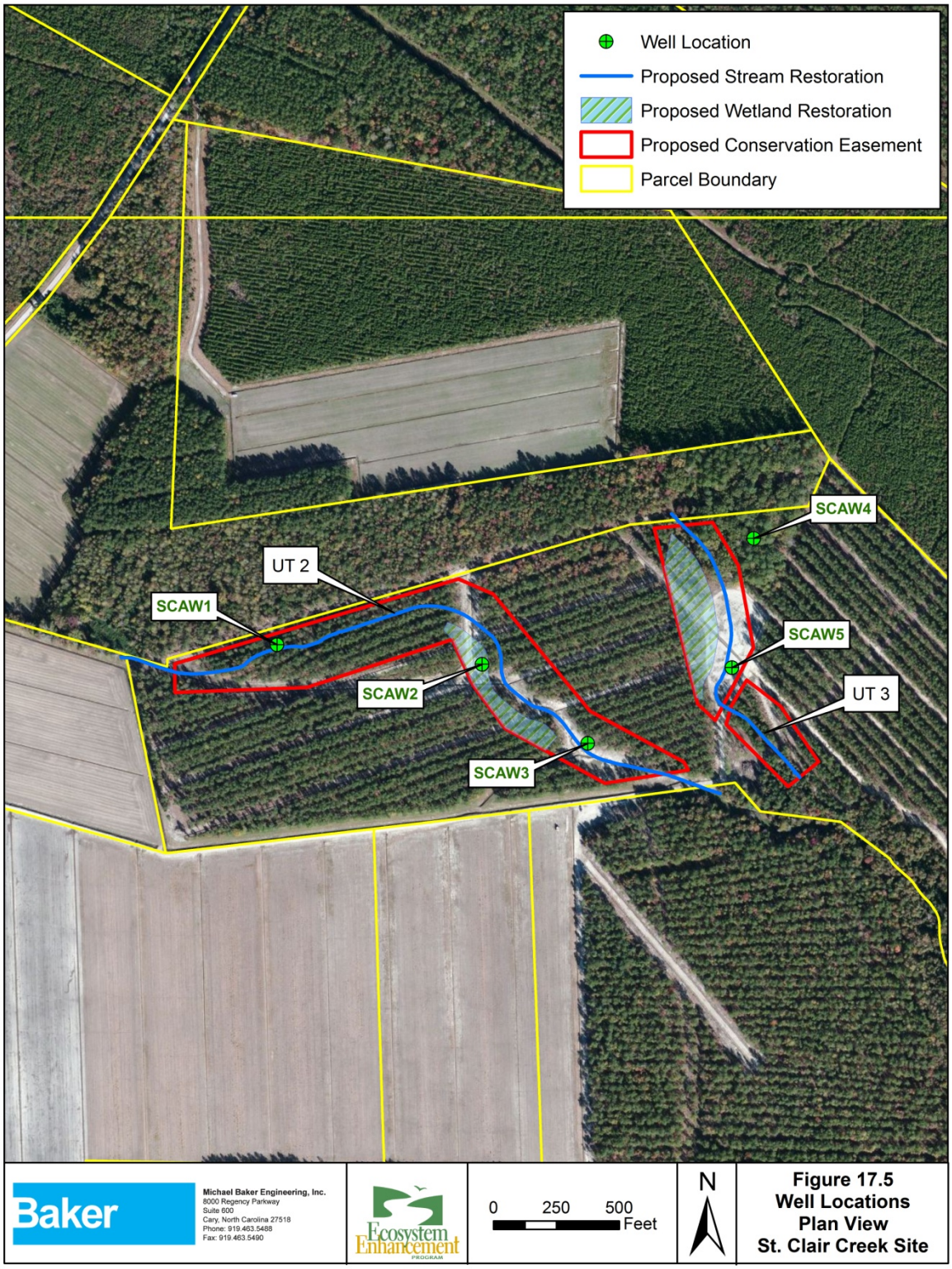


Figure 17.6 Hydrographs of the Groundwater Monitoring Wells 1-3 Compared to Local Rainfall (April 2012 through January 2013)

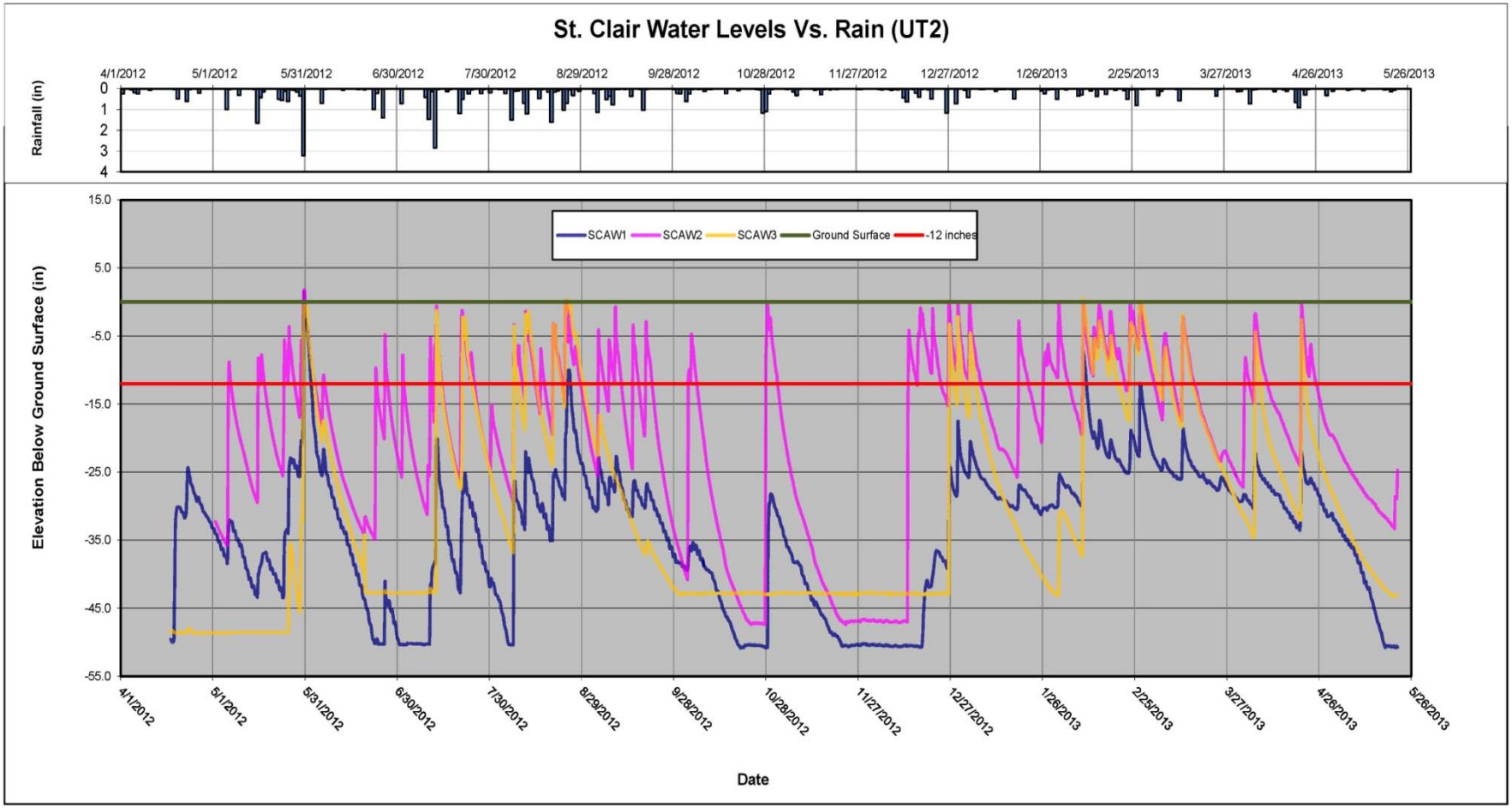
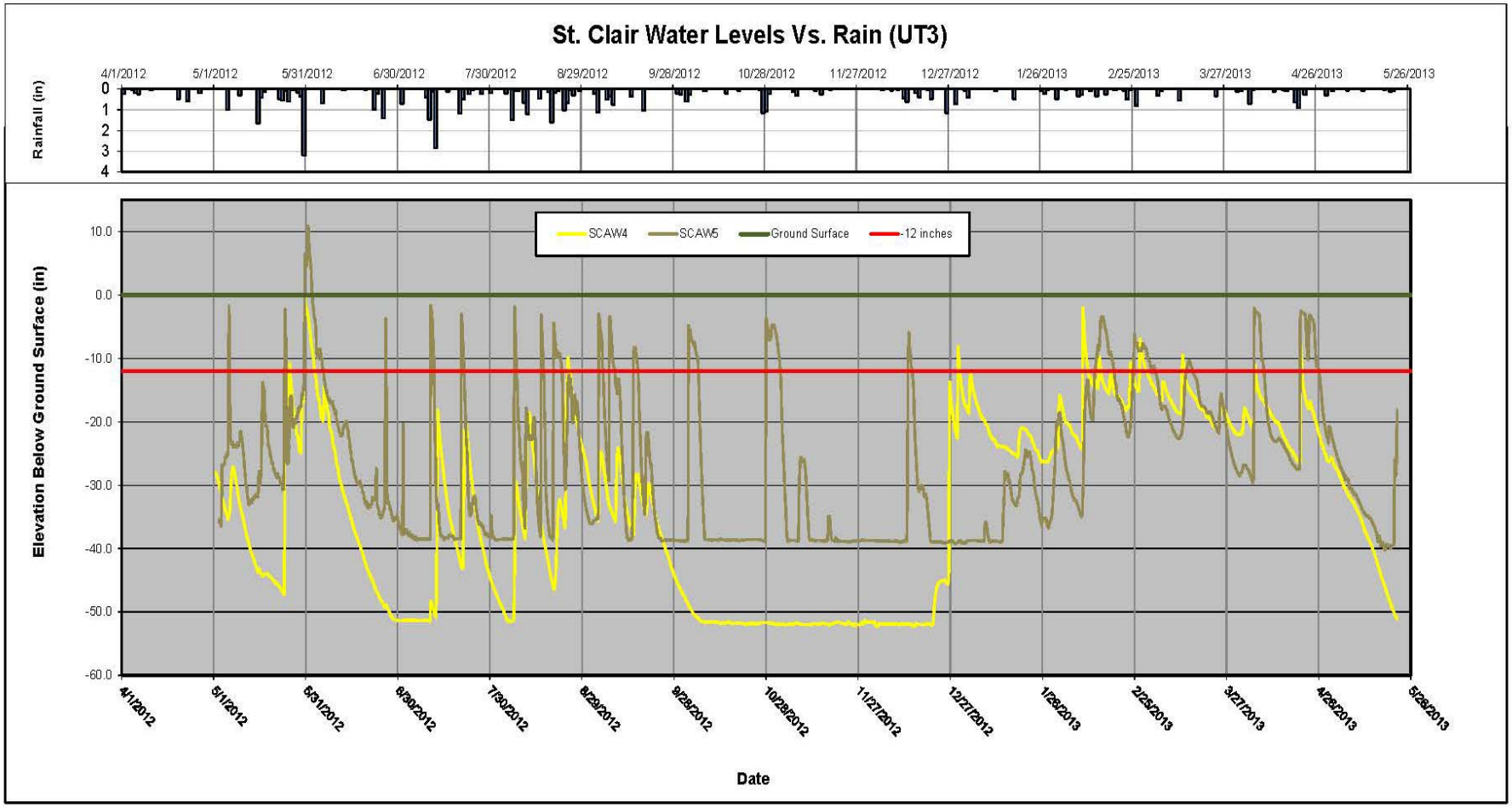


Figure 17.7 Hydrographs of the Groundwater Monitoring Wells 4-5 Compared to Local Rainfall (April 2012 through January 2013)



17.5.5 Soil Characterization

Soils at the St. Clair Creek Restoration Project site were initially determined using NRCS soil survey data for Beaufort County. The areas proposed for wetland restoration are mapped as hydric soils and are all mapped as Tomotley fine sandy loam. Most of UT2 is underlain by Tomotley and Roanoke fine sandy loams, which are classified as nearly level, poorly drained soils that are found on depressions on stream and marine terraces and flats on marine terraces. Most of UT3 is also underlain by Tomotley fine sandy loam. There are also small fringe areas of Hyde loam and Augusta fine sandy loam. Figure 2.3 shows soil conditions throughout the project area and the Soil Series are shown on Table 17.5.

Table 17.5 NRCS Soil Series (Beaufort County Soil Survey, NRCS, 1995)
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Soil Name	Landform	Hydric Soil	Description
Tomotley fine sandy loam	Depressions on stream terraces, flats on marine terraces	Yes	Poorly drained soils formed in loamy marine alluvial sediments. Slope ranges from 0 to 1 %. Permeability is moderate.
Roanoke fine sandy loam	Broad flats in shallow depressions on stream terraces	Yes	Poorly drained soils formed in loamy and clayey marine and fluvial sediments. Slope ranges from 0 to 1 %. Permeability is slow.
Hyde loam	Marine terraces and in shallow depressions	Yes	Very poorly drained soils formed in loamy marine and fluvial sediments. Slope ranges from 0 to 1 %. Permeability is moderately slow.
Augusta fine sandy loam	Depressions on marine terraces, flats on marine terraces	Yes	Somewhat poorly drained soils formed in loamy marine and fluvial sediments. Slope ranges from 0 to 2%. Permeability is moderate.

To further investigate the soil conditions present on the site, Baker contracted with the Catena Group, LLC to perform a detailed soils evaluation of the site to determine the depth of hydric soil conditions and the presence of buried hydric soil layers in the project area. A licensed soil scientist conducted a hydric soils investigation on February 4, 2011 (see Section 19, Appendix E). The report findings indicate the presence of hydric soils throughout the site, based on boring information and presence of at least one hydric indicator and observed inclusions.

17.5.6 Plant Community Characterization

Currently the majority of the proposed wetland restoration area is comprised of planted Loblolly pine timber (*Pinus taeda*). Historically, the project areas have been used as agriculture lands and timber lands. Woody shrub and vine species include Blackberry (*Rubus spp*.), Greenbrier (*Smilax rotundifolia*), and Muscadine (*Vitis rotundifolia*). Herbaceous species consist of Dog fennel (*Eupatorium capillifolium*), Giant cane (*Arundinaria gigantea*), and Netted chainfern (*Woodwardia areolata*).

17.6 Reference Wetlands

17.6.1 Wetland Descriptions

Two existing wetland and stream systems that are representative of the system to be restored at the St. Clair Creek Restoration Project site were identified. The sites fall within the same climatic, physiographic, and ecological region as the restoration site.

The first reference site (on-site reference wetland) is located downstream or UT3 along the previously identified jurisdictional wetland. (see Figure 17.10). The reference site is an example of a "Coastal Plain small stream swamp," as described by Schafale and Weakley (1990). These systems exist as the floodplains of small blackwater or brownwater streams in which separate fluvial features and associated vegetation are too small or poorly developed to distinguish. Hydrology of these systems is palustrine – intermittently, temporarily, or seasonally flooded. Stream flows tend to be highly variable, with floods of short duration, and periods of very low flow. Just downstream of the area proposed for the reference wetland (approximately 400 feet) is National Wetlands Inventory (NWI) mapped wetlands along the same system.

The reference site has experienced disturbances in the past, primarily due to timber harvest; however, cutting of timber occurred long ago, and a mature canopy of vegetation exists across the site, especially surrounding the stream channel itself. Visual evidence also suggests that the hydrology of the site was minimally affected by timber harvest.

Two locations within the reference site were chosen to serve as reference monitoring comparisons for the St. Clair Creek Restoration Project. Both sites are located along the downstream wooded wetland floodplain section of UT3 (see Figure 17.10). This reference site was chosen to represent reference hydrologic conditions for the riparian wetland areas that will be restored adjacent to the restored headwater streams.

The second reference site (Back Creek reference wetland) is located approximately 2.4 miles from the St. Clair Creek Restoration Project site along wooded wetland floodplain areas of the South Prong of Back Creek. This reference site was chosen to represent reference hydrologic condition for the riparian wetland areas that will be restored adjacent to UT2 and UT3 on the St. Clair Creek Restoration Project site. This reference site is also an example of a "Coastal Plain small stream swamp," as described by Schafale and Weakley (1990). These systems exist as the floodplains of small blackwater or brownwater streams in which separate fluvial features and associated vegetation are too small or poorly developed to distinguish. Hydrology of these systems is palustrine – intermittently, temporarily, or seasonally flooded. Stream flows tend to be highly variable, with floods of short duration, and periods of very low flow. Reference wells installed at this site fall inside the NWI wetland boundary. This reference site has also been timbered in the distant past; however, a mature canopy exists on the site. Visual evidence also suggests that the hydrology of the site was minimally affected by timber harvest.

Two groundwater monitoring wells were installed in this reference wetland in 2008. The wells were installed in locations to show a range of ground water levels throughout the wetland. The following sections describe the soils, hydrology, and vegetation for each of these sites.

17.6.2 Hydrological Characterization

Both reference sites classify as jurisdictional wetlands, utilizing criteria identified in the USACE 1987 Wetlands Delineation Manual. These criteria include the FAC-Neutral Test, oxidized root channels, and local soil survey data. Climatic conditions of the reference site are the same as those described for the project site (Section 17.5.3). Site hydrology for the on-site reference wetland is controlled primarily by UT3 that flows through the site and site hydrology for the Back Creek reference wetland is controlled primarily by the South Prong of Back Creek that also flows through the reference wetland site. Due to the shallow, stable condition of the streams through the sites, high water table conditions are maintained across the active floodplain for prolonged hydroperiods.

Ground water monitoring wells will be installed in the on-site reference wetland in April 2013. This data and data from the Back Creek reference site will be used to compare monitoring results of the restored wetland areas along UT2 and UT3.

Ground water monitoring wells were installed in the Back Creek reference wetland in 2008. Baker has collected five years (2008 through 2012) of water table hydrology data. Water table monitoring wells (RDS WL40 logging units) were installed along the South Prong of Back Creek. Table 17.6 summarizes the hydrologic conditions observed at each of the two well locations.

As expected, the data indicate that the two monitored locations vary in regards to their hydrologic wetness. Reference Well 1 was installed near the wetland boundary while Reference Well 2 was installed well within wetland boundary. At the Reference Well 1 area, hydroperiods (defined as a consecutive period of saturation within the growing season, expressed as a percentage of the growing season) ranged from 5.7 percent to 23 percent for the data collected. For the Reference Well 2 area, hydroperiods ranged from 5.7 percent to 35.8 percent with the years of 2009 through 2011 showing a greater difference in hydroperiods. The hydroperiods documented for both reference wells area are similar to those that have been collected from other, similar reference systems in the Coastal Plain.

Table 17.6 Reference Wetland Hydrologic Parameters – Back Creek Site
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Gauge ID	Percentage of Consecutive Days <12 inches from Ground Surface[1]	Most Consecutive Days Meeting Criteria[2]	Cumulative Days Meeting Criteria[3]	Number of Instances Meeting Criteria[4]	Drought Conditions During Growing Season[5]
2008					
Reference Well 1	5.7%	16	57	9	16.7% Normal 21.4% Abnormally Dry 57.1% Moderate Drought 4.8% Severe Drought
Reference Well 2	5.7%	16	71	12	
2009					
Reference Well 1	8.9%	25	97	19	45.2% Normal 52.4% Abnormally Dry 2.4% Moderate Drought
Reference Well 2	10.6%	30	178	11	
2010					
Reference Well 1	13.5%	38	47	2	52.4% Normal 38.1% Abnormally Dry 9.5% Moderate Drought
Reference Well 2	16.7%	47	97	4	
2011					
Reference Well 1	11.0%	31	114	11	31.4% Normal 20.0% Abnormally Dry 11.4% Moderate Drought 37.1% Severe Drought
Reference Well 2	35.8%	101	164	2	
2012					
Reference Well 1	23.0% (includes data gap of 26 days) in 2012	65	175	12	61.0% Normal 22.0% Abnormally Dry 17.1% Moderate Drought
Reference Well 2	23.4%	66	187	9	

Notes:

[1]Indicates the percentage of most consecutive number of days within the monitored growing season with a water 12

inches or less from the soil surface.

[2]Indicates the most consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

[3]Indicates the cumulative number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

[4]Indicates the number of instances within the monitored growing season when the water table rose to 12 Inches or less from the soil surface.

[5]Drought conditions determined from the NCDENR Division of Water Resources Drought Monitor History

Growing season for Beaufort County is from February 28 to December 6 and is 282 days long.

17.6.3 Soil Characterization

The soils found within the on-site reference wetland are mapped primarily of Augusta and Tomotley fine sandy loams. As described in Section 17.5.5, Augusta fine sandy loam soils are classified as hydric, sandy loam, somewhat poorly drained, and formed in loamy marine and fluvial sediments. Tomotely fine sandy loam soils are classified as hydric, sandy loam, poorly drained, and formed in loamy marine alluvial sediments.

The soils found within the Back Creek reference wetland are mapped as Augusta fine sandy loam. As described previously, soils are classified as hydric, sandy loam, somewhat poorly drained, and formed in loamy marine and fluvial sediments

The areas along UT2 and UT3 on the St. Clair Creek Restoration Project site proposed for wetland restoration are also mapped as Tomotley fine sandy loam.

17.6.4 Plant Community Characterization

Both reference wetland sites exhibit similar vegetation communities. Since both sites have been timbered in the past, both successional species and climax species are present. Canopy species include Sweet gum (*Liquidambar styraciflua*), Tulip poplar (*Liriodendron tulipifera*), Loblolly pine (*Pinus taeda*), Red maple (*Acer rubrum*), Green Ash (*Fraxinus pennsylvanica*), Swamp Tupelo (*Nyssa sylvatica*) and various oaks (*Quercus spp*.) The sub-canopy of the wetland system is often an expression of the native seed bank. Understory species primarily consist of Giant cane (*Arundinaria gigantea*), Wax myrtle (*Morella cerifera*), Ironwood (*Carpinus caroliniana*), Cinnamon fern (*Osmunda cinnamomea*), Fetterbush (*Lyonia lucida*), and Greenbrier (*Smilax spp*.). The reference sites are comprised of greater than 50 percent facultative or wetter species, and therefore meet the hydrophytic vegetation requirement.

Figure 17.8 Reference Wetlands Location Map

17.7 Restoration of Wetland Hydrology

The project area is currently drained by the channelized streams UT2 and UT3 along with multiple other drainage ditches. To improve wetland hydrology functions to the site, existing channels will be filled up to the floodplain elevation thereby restoring its historical connection and improve flow dynamics between the stream and wetland complex. Fill material will be generated on-site from the excavation necessary to restore the headwater valleys. The abandoned sections of channelized stream will be fully to partially filled to eliminate the drainage effect caused by these features. Likewise, any drain tiles and spoil piles within the fields will be excavated and removed where possible to disrupt drainage from the field. When complete filling of the stream and ditches is not possible, ditch plugs will be installed from compacted earth. Ditch plugs will also be used in locations where the restored stream channel will cross the existing stream channel

Baker has used these practices on numerous other projects with excellent results. Some sections of existing channel may be only partially filled depending on the amount of fill material that can be produced. These partially filled areas will be discontinuous and will mimic small floodplain pools or tree throws within the wetland areas that will add to the diversity of habitat on the project site.

Grading activities will focus on restoring pre-disturbance valley topography by removing any bedding, field crowns, surface drains, spoil piles, or swales that were installed during conversion of the land for agriculture and silviculture. In general, grading activities will be minor, with the primary goal of filling the drainage features on the site back to natural ground elevations and redefining the relic headwater valley.

The topography of the restored site will be patterned after natural riparian wetland reference sites, and will include the restoration of minor depressions that promote diversity of hydrologic conditions and habitats common to natural wetland areas. These techniques will be instrumental to the restoration of site hydrology by promoting surface ponding and infiltration, decreasing drainage capacity, and imposing higher water table conditions across the site. In order to improve drainage and increase agricultural production, farmed wetland soils are often graded to a smooth surface and crowned to enhance runoff (Lilly, 1981). Wetland microtopography contributes to the properties of forest soils and to the diversity and patterns of plant communities (Lutz, 1940; Stephens, 1956; Bratton, 1976; Ehrnfeld, 1995).

The restoration design for the wetland is based on a targeted “Coastal Plain small stream swamp” riparian wetland type, as identified by Schafale and Weakley (1990). Hydrology of this system will be palustrine, “intermittently, temporarily, or seasonally flooded”. The revegetation plan for the overall riparian system will native riparian communities identified by Schafale and Weakley (1990) that include “Coastal Plain Small Stream Swamp” and “Coastal Plain Bottomland Hardwood”.

17.7.1 Proposed Riparian Vegetation Plantings

The vegetative components of this project include headwater valley, riparian buffer, and riparian wetland. All areas within the conservation easement including the headwater valleys, riparian wetland, and riparian buffer will planted with the same mix of trees, shrubs and herbaceous vegetation as shown on the project revegetation plan sheets (Section 18, Appendix D).

The small area of successional hard wood trees on the left bank at the top of UT3 will be supplementally planted due to the presence of some mature native vegetation.

Bare-root trees will be planted within the conservation easement. A minimum 50-foot buffer will be established along both sides of the headwater stream centerline (100-foot total minimum width) for all of the proposed stream reaches within the project boundary. In many areas, the buffer width will be in

excess of 50 feet along one or both sides of the stream centerline (more than 100-foot total width) and will encompass adjacent wetland restoration areas. In general, bare-root vegetation will be planted at a total target density of 680 stems per acre. Planting will be conducted during the dormant season, with all trees installed between the last week of November and the third week of March.

Selected species for woody revegetation planting are presented in Table 17.7. Tree species selected for restoration areas will be tolerant of flooding with varying degrees of tolerance. Weakly tolerant species are able to survive and grow in areas where the soil is saturated or flooded for relatively short periods of time. Moderately tolerant species are able to survive in soils that are saturated or flooded for several months during the growing season. Flood tolerant species are able to survive on sites in which the soil is saturated or flooded for extended periods during the growing season (WRP, 1997).

Observations will be made during construction of the site regarding the relative wetness of areas to be planted as compared to the revegetation plan. Specific planting areas will be determined based on these comparisons, and planted species will be matched according to their wetness tolerance and the anticipated wetness of the planting area.

Once trees are transported to the site, they will be planted within two days. Soils across the site will be prepared by sufficiently disking and/or loosened prior to planting. Trees will be planted by manual labor using a dibble bar, mattock, planting bar, or other approved method. Planting holes for the trees will be sufficiently deep to allow the roots to spread out and down without "J-rooting." Soil will be loosely compacted around trees once they have been planted to prevent roots from drying out.

Permanent seed mixtures will be applied to all disturbed areas of the project site. Table 17.8 lists the species, mixtures, and application rates that will be used. A mixture is provided that is suitable for headwater stream valley, buffer, and wetland areas. Mixtures will also include temporary seeding (cereal rye or browntop millet) to allow for application with mechanical broadcast spreaders. To provide rapid growth of herbaceous ground cover and biological habitat value, the permanent seed mixture specified will be applied to all disturbed within the conservation easement. The species provided are deep-rooted and have been shown to proliferate along restored streams and in wetlands.

Temporary seeding will be applied to all disturbed areas of the site that are susceptible to erosion. These areas include access roads, filled ditches, and spoil piles. If temporary seeding is applied from September through March, cereal rye will be used and applied at a rate of 130 pounds per acre. If applied from April through August, temporary seeding will consist of browntop millet, applied at a rate of 40 pounds per acre.

Table 17.7 Proposed Bare-Root Species
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
Tree Species 8' X 8" spacing - 408 stems/Acre			
Fraxinus pennsylvanica	Green Ash	6%	FACW
Nyssa sylvatica var. biflora	Swamp Tupelo	9%	FACW+
Quercus michauxii	Swamp Chestnut Oak	12%	FACW-
Quercus laurifolia	Laurel Oak	9%	FACW

Quercus lyrata	Overcup Oak	6%	OBL
Quercus phellos	Willow Oak	6%	FACW-
Taxodium distichum	Bald Cypress	6%	OBL
Ulmus americana	American Elm	6%	FACW
Understory Species 8' x 8' spacing - 272 stems/Acre			
Clethra alnifolia	Sweet Pepperbush	4%	FACW
Carpinus caroliniana	Ironwood	4%	FAC
Cyrilla racemiflora	Titi	6%	FACW
Magnolia virginiana	Sweetbay Magnolia	6%	FAC-
Persea palustris	Swamp Bay	4%	FACW
Leucothoe racemosa	Swamp Doghobble	6%	FACW
Lyonia lucida	Fetterbush	6%	FACW
Itea virginica	Virginia Sweetspire	4%	FACW+
Note: Final species selection may change due to refinement or availability at the time of planting. If species substitution is required, the planting Contractor will submit a revised planting list to Baker for approval prior to the procurement of plant stock.			

Table 17.8 Proposed Permanent Seed Mixture
St. Clair Creek Restoration Project Stream and Wetland Mitigation Plan - EEP Project No. 95015

Botanical Name	Common Name	% Planted by Species	Density (lbs/ac)	Wetland Tolerance
Andropogon gerardii	Big blue stem	10%	1.75	FAC
Andropogon glomeratus	Bushy blue stem	10%	1.75	FACW+
Carex lupulina	Hop sedge	10%	1.0	OBL
Carex vulpinoidea	Fox sedge	10%	1.0	OBL
Elymus virginicus	Virginia wild rye	10%	1.75	FAC
Juncus effusus	Soft rush	15%	1.75	FACW+
Panicum virgatum	Switchgrass	10%	1.5	FAC+
Polygonum pennsylvanicum	Smartweed	5%	1.5	FACW
Schizachyrium scoparium	Little blue stem	10%	1.5	FACU
Sorghastrum nutans	Indiangrass	10%	1.5	FACU

	Total	*100%*	*15*	
Note: Final species selection may change due to refinement or availability at the time of planting. If species substitution is required, the planting Contractor will submit a revised planting list to Baker for approval prior to the procurement of plant stock.				

17.8 Site Construction

17.8.1 Construction Sequence

A general construction sequence is provided below and included on the plan set for the St. Clair Creek Restoration Project.

1. Prior to beginning any land disturbing activities, notification and approval must be granted from NCDENR Division of Land Resources - Land Quality Section, US Army Corp of Engineers, and NC Division of Water Quality.
2. The Contractor shall contact North Carolina "One Call" Center (1.800.632.4949) before any excavation.
3. The Contractor will mobilize equipment and materials to the site using the construction entrances (shown on the plans) along the farm roads off of Peoples Road. Two temporary gravel construction entrances will be installed.
4. The Contractor will utilize existing farm roads and ditch crossings to the extent possible. Any new ditch crossings to be installed will consist of temporary wood mats and shall be approved by the Engineer prior to installation.
5. Contractor will store all equipment and materials in staging/stockpile areas as shown on the plans.
6. Silt fence will be installed in locations shown on the plans prior to beginning any land disturbing activities in that area.
7. Contractor shall only clear and grub within the limits of disturbance and only to the extent necessary for construction.
8. Contractor shall begin construction on UT2 by first installing a temporary rock dam at approximate station 37+00.
9. Contractor shall then dewater the area upstream of the temporary rock dam using the typical pump around operation as shown in the details.
10. Contractor shall then install the proposed culverts as shown on the plans and repair the farm road.
11. Contractor shall then begin valley grading at the downstream end of UT2 and work up valley disturbing no more area than can be stabilized in one day. Contractor shall utilize pump around operation as necessary in this area and continue grading to approximate station 27+50.
12. Contractor shall then install ditch plug #1 at the upstream end of UT2 to divert water around the work area.
13. Contractor shall continue grading activities working upstream filling ditches and dewatering as necessary until approximate station 13+00.
14. Contractor shall then utilize pump around operations as necessary to complete grading activities.
15. Immediately upon completion of grading, apply seed and mulch per the construction specifications. The Contractor shall not discharge flow into the new graded valley until valley has been seeded and mulched. After the new graded valley has been constructed, stabilized, and approved by the Engineer, the Contractor shall then plug and fill the remaining ditches and turn water into the new graded valley.
16. Contractor shall then begin construction on UT3 by installing ditch plug #2 as shown on the plans. This ditch plug is temporary and will be used to divert flow around the work area.
17. Then the Contractor shall grade the high area as shown at approximate station 21+40.
18. Next, the Contractor shall install the RCP culverts as shown on the plans and repair the farm road.

19. Contractor shall then begin grading the valley and filling ditches as shown on the plans working upstream dewatering as necessary to approximate station 10+50.
20. Immediately upon completion of grading, apply seed and mulch per the construction specifications. The Contractor shall not discharge flow into the new graded valley until valley has been seeded and mulched. After the new graded valley has been constructed, stabilized, and approved by the Engineer, the Contractor shall then install ditch plug #3, plug and fill the remaining ditches, remove ditch plug #2, and turn water into the new graded valley.
21. Any excess excavated material shall be used to elevate the existing farm roads as directed by the Engineer.
22. All areas should be seeded and mulched prior leaving the project reach. Remove all temporary stream crossings. All waste material must be removed from the project site.
23. The Contractor shall plant woody vegetation, according to planting details and specifications. Reforestation shall be completed at the appropriate time of the year.
24. The Contractor shall treat areas of invasive species within the conservation easement boundary.
25. The Contractor shall ensure that the site is free of trash and leftover materials prior to demobilization of equipment from the site.

17.8.2 Other Construction Elements

Ditch Plug / Channel Block

A compacted earth plug will be installed by filling the existing ditch to prevent subsurface flows and improve site hydrology. The fill material used for ditch plugs shall come from a nearby borrow area and be free of debris, rocks, trash, etc. and shall consist of compactable soil material.

Transplants

Vegetation transplants will be identified before starting construction as viable candidates (species and size) for uprooting and relocation. Areas that must be cleared will maximize the harvesting of transplants; transplants will be taken from other areas as suitable to enhance the rapid development of vegetative growth along the constructed channel.

Emergency Overflow

Stabilized emergency overflows will be constructed along the existing farm roads in the vicinities of the proposed culverts to allow large storm flows to overtop the farm roads in a stabilized concentrated area to prevent damage to the farm roads.

18.0 APPENDIX D - PROJECT PLAN SHEETS

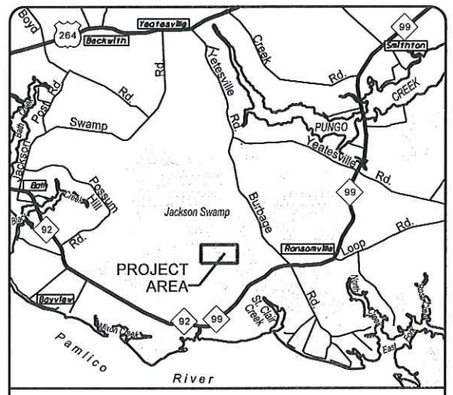
ST. CLAIR

PROJECT: 125116

STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	125116	1	20

NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

ST. CLAIR CREEK RESTORATION PROJECT

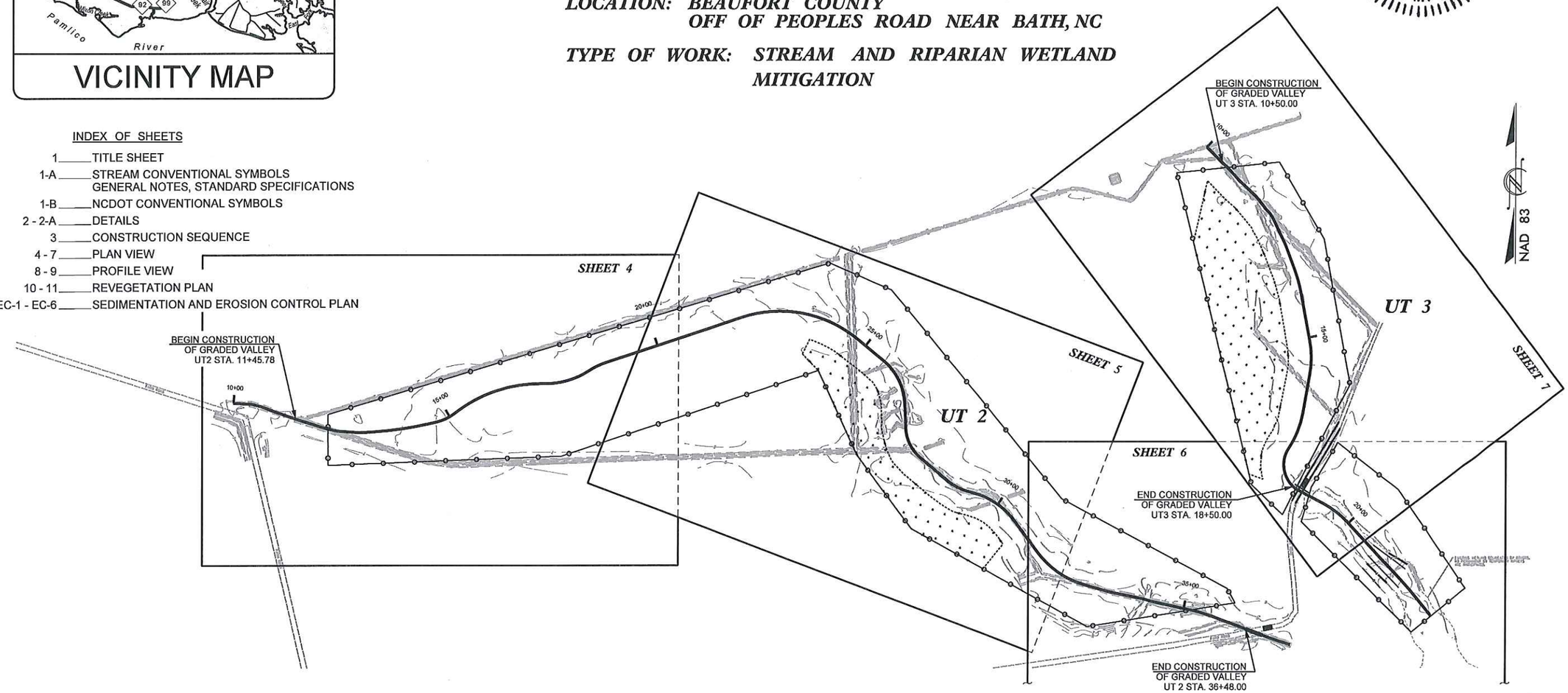


VICINITY MAP

LOCATION: *BEAUFORT COUNTY OFF OF PEOPLES ROAD NEAR BATH, NC*

TYPE OF WORK: *STREAM AND RIPARIAN WETLAND MITIGATION*

INDEX OF SHEETS



NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/1/13

GRAPHIC SCALES

40 20 0 40 80
PLANS

40 20 0 40 80
PROFILE (HORIZONTAL)

4 2 0 4 8
PROFILE (VERTICAL)

PROJECT DATA

		UT2	UT3	
DESIGN REACH LENGTH	=	2,494	1,278	FEET
PROPOSED STREAM CREDITS	=	2,133	1,141	SMU
PROPOSED RIPARIAN WETLAND CREDITS	=	1.1	1.7	WMU
CONSERVATION EASEMENT AREA	=	11.6	5.9	ACRES

PREPARED FOR THE OFFICE OF:

Ecosystem Enhancement PROGRAM

ECOSYSTEM ENHANCEMENT PROGRAM
217 WEST JONES STREET
RALEIGH, NC 27603

CONTACT: HEATHER SMITH
PROJECT MANAGER

PREPARED IN THE OFFICE OF:

Baker

Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

FALL 2013
LETTING DATE:

JACOB BYERS, PE
PROJECT ENGINEER

PROJECT ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SIGNATURE: *P.E.*

2/26/03

STREAM CONVENTIONAL SYMBOLS
SUPERCEDES SHEET 1B

- ROOT WAD
- LOG J-HOOK
- LOG VANE
- LOG WEIR
- LOG CROSS VANE
- FOOT BRIDGE
- TEMPORARY STREAM CROSSING
- PERMANENT STREAM CROSSING
- LOG STEP POOL
- SAFETY FENCE
- TF — TAPE FENCE
- FP — 100 YEAR FLOOD PLAIN
- CE — CONSERVATION EASEMENT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- TRANSPLANTED VEGETATION
- TREE REMOVAL
- TREE PROTECTION
- CHANNEL BLOCK
- TRANSPLANTS
- CHANNEL FILL

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

GENERAL NOTES

1. 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.
2. CONSTRUCTION IS SCHEDULED TO BEGIN FALL 2013.
3. CONTRACTOR SHOULD CALL NORTH CAROLINA "ONE-CALL" BEFORE EXCAVATION STARTS. (1-800-632-4949)

PROJECT REFERENCE NO.	SHEET NO.
125116	1-A

PROJECT ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Baker
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
2/4/13

STANDARD SPECIFICATIONS

EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL
MARCH 2009

6.06 TEMPORARY GRAVEL CONSTRUCTION ENTRANCE

6.62 SILT FENCE

6.70 TEMPORARY STREAM CROSSING

VEGETATION SELECTION

The following table lists the vegetation selection for the project site. Total planting area is approximately 17.5 acres. Exact placement of species shall be determined in the field and based on apparent wetness of planting locations and per the vegetation specialist. The entire easement area shall be planted. All bare-root species shall be planted at a density of 680 stems per acre at an 8'X8' spacing.

Tree Species

Botanical Name	Common Name	Percent Planted by Species	Approx. Number of Stems Per Acre	Wetland Tolerance
Fraxinus pennsylvanica	Green Ash	6%	41	FACW
Nyssa sylvatica var. biflora	Swamp Tupelo	9%	61	FACW+
Quercus michauxii	Swamp Chestnut Oak	12%	81	FACW-
Quercus laurifolia	Laurel Oak	9%	61	FACW
Quercus lyrata	Overcup Oak	6%	41	OBL
Quercus phellos	Willow Oak	6%	41	FACW-
Taxodium distichum	Bald Cypress	6%	41	OBL
Ulmus americana	American Elm	6%	41	FACW
	Total	**60%**	408	

Understory Species

Botanical Name	Common Name	Percent Planted by Species	Approx. Number of Stems Per Acre	Wetland Tolerance
Clethra alnifolia	Sweet Pepperbush	4%	27	FACW
Carpinus caroliniana	Ironwood	4%	27	FAC
Cyrilla racemiflora	Titi	6%	41	FACW
Magnolia virginiana	Sweetbay Magnolia	6%	41	FAC-
Persea palustris	Swamp Bay	4%	27	FACW
Leucothoe racemosa	Swamp Doghobble	6%	41	FACW
Lyonia lucide	Fetterbush	6%	41	FACW
Itea virginica	Virginia Sweetspire	4%	27	FACW+
	Total	**40%**	272	

Permanent herbaceous seed mixtures for the restoration site shall be planted throughout the floodplain, the graded valley and buffer areas. Permanent herbaceous seed mixtures shall be applied with temporary seed, as defined in the construction specifications. Permanent seed shall be applied at a rate of 1.5 lbs/acre.

Permanent Seed

Botanical Name	Common Name	Percent Planted by Species	Wetland Tolerance
Andropogon gerardii	Big blue stem	10%	FAC
Andropogon glomeratus	Bushy blue stem	10%	FACW+
Carex lupulina	Hop sedge	10%	OBL
Carex vulpinoidea	Fox sedge	10%	OBL
Elymus virginicus	Virginia wild rye	10%	FAC
Juncus effusus	Soft rush	15%	FACW+
Panicum virgatum	Switchgrass	10%	FAC+
Polygonum pensylvanicum	Smartweed	5%	FACW
Schizachyrium scoparium	Little blue stem	10%	FACU
Sorghastrum nutans	Indiangrass	10%	FACU
	Total	**100%**	

The following table lists temporary seed species for the project site.

Botanical Name	Common Name	Rate	Dates
Secale cereal	Cereal Rye	130 lbs/acre	September to March
Panicum ramosum	Browntop Millet	40 lbs/acre	April to August

7/1/2013
R:\125116\Design\Plans\125116_PSH-01A.dgn

2/26/03

PROJECT REFERENCE NO.	SHEET NO.
125116	1-B

*S.U.E = SUBSURFACE UTILITY ENGINEER

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/1/13

ROADS & RELATED ITEMS

- Edge of Pavement
- Curb
- Prop. Slope Stakes Cut (C)
- Prop. Slope Stakes Fill (F)
- Prop. Woven Wire Fence
- Prop. Chain Link Fence
- Prop. Barbed Wire Fence
- Prop. Wheelchair Ramp (WCR)
- Curb Cut for Future Wheelchair Ramp (CCFR)
- Exist. Guardrail
- Prop. Guardrail
- Equality Symbol
- Pavement Removal

RIGHT OF WAY

- Baseline Control Point
- Existing Right of Way Marker
- Exist. Right of Way Line w/Marker
- Prop. Right of Way Line with Proposed R/W Marker (Iron Pin & Cap)
- Prop. Right of Way Line with Proposed (Concrete or Granite) R/W Marker
- Exist. Control of Access Line (CA)
- Prop. Control of Access Line (CA)
- Exist. Easement Line (E)
- Prop. Temp. Construction Easement Line (E)
- Prop. Temp. Drainage Easement Line (TDE)
- Prop. Perm. Drainage Easement Line (PDE)

HYDROLOGY

- Stream or Body of Water
- River Basin Buffer (RBB)
- Flow Arrow
- Disappearing Stream
- Spring
- Swamp Marsh
- Shoreline
- Falls, Rapids
- Prop Lateral, Tail, Head Ditches (FLOW)

STRUCTURES

MAJOR

- Bridge, Tunnel, or Box Culvert (CONC)
- Bridge Wing Wall, Head Wall and End Wall (CONC WW)

MINOR

- Head & End Wall (CONC HW)
- Pipe Culvert
- Footbridge
- Drainage Boxes (CB)
- Paved Ditch Gutter

UTILITIES

- Exist. Pole
- Exist. Power Pole
- Prop. Power Pole
- Exist. Telephone Pole
- Prop. Telephone Pole
- Exist. Joint Use Pole
- Prop. Joint Use Pole
- Telephone Pedestal (T)
- U/G Telephone Cable Hand Hold (HH)
- Cable TV Pedestal (C)
- U/G TV Cable Hand Hold (HH)
- U/G Power Cable Hand Hold (HH)
- Hydrant
- Satellite Dish
- Exist. Water Valve
- Sewer Clean Out
- Power Manhole (P)
- Telephone Booth
- Cellular Telephone Tower
- Water Manhole (W)
- Light Pole
- H-Frame Pole
- Power Line Tower
- Pole with Base
- Gas Valve
- Gas Meter
- Telephone Manhole (T)
- Power Transformer
- Sanitary Sewer Manhole (S)
- Storm Sewer Manhole (S)
- Tank; Water, Gas, Oil
- Water Tank With Legs
- Traffic Signal Junction Box (S)
- Fiber Optic Splice Box (F)
- Television or Radio Tower
- Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement (TS)

- Recorded Water Line
- Designated Water Line (S.U.E.*) (W)
- Sanitary Sewer (SS)
- Recorded Sanitary Sewer Force Main (FSS)
- Designated Sanitary Sewer Force Main (S.U.E.*) (FSS)
- Recorded Gas Line (G)
- Designated Gas Line (S.U.E.*) (G)
- Storm Sewer (S)
- Recorded Power Line (P)
- Designated Power Line (S.U.E.*) (P)
- Recorded Telephone Cable (T)
- Designated Telephone Cable (S.U.E.*) (T)
- Recorded U/G Telephone Conduit (TC)
- Designated U/G Telephone Conduit (S.U.E.*) (TC)
- Unknown Utility (S.U.E.*) (?UTL)
- Recorded Television Cable (TV)
- Designated Television Cable (S.U.E.*) (TV)
- Recorded Fiber Optics Cable (FO)
- Designated Fiber Optics Cable (S.U.E.*) (FO)
- Exist. Water Meter (0)
- U/G Test Hole (S.U.E.*) (ATTUR)
- Abandoned According to U/G Record
- End of Information (E.O.I.)

BOUNDARIES & PROPERTIES

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Property Line Symbol (PL)
- Exist. Iron Pin (EIP)
- Property Corner
- Property Monument (ECM)
- Property Number (123)
- Parcel Number (6)
- Fence Line (WW & ISBW)
- Existing Wetland Boundaries (WLB)
- High Quality Wetland Boundary (HQ WLB)
- Medium Quality Wetland Boundaries (MQ WLB)
- Low Quality Wetland Boundaries (LQ WLB)
- Proposed Wetland Boundaries (WLB)
- Existing Endangered Animal Boundaries (EAB)
- Existing Endangered Plant Boundaries (EPB)

BUILDINGS & OTHER CULTURE

- Buildings
- Foundations
- Area Outline
- Gate
- Gas Pump Vent or U/G Tank Cap
- Church
- School
- Park
- Cemetery
- Dam
- Sign (S)
- Well (W)
- Small Mine
- Swimming Pool

TOPOGRAPHY

- Loose Surface
- Hard Surface
- Change in Road Surface
- Curb
- Right of Way Symbol (R/W)
- Guard Post (GP)
- Paved Walk
- Bridge
- Box Culvert or Tunnel
- Ferry
- Culvert
- Footbridge
- Trail, Footpath
- Light House

VEGETATION

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard (VINEYARD)

RAILROADS

- Standard Gauge (CSX TRANSPORTATION)
- RR Signal Milepost (MILEPOST 35)
- Switch (SWITCH)

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PROJECT REFERENCE NO.	SHEET NO.
125116	2

PROJECT ENGINEER

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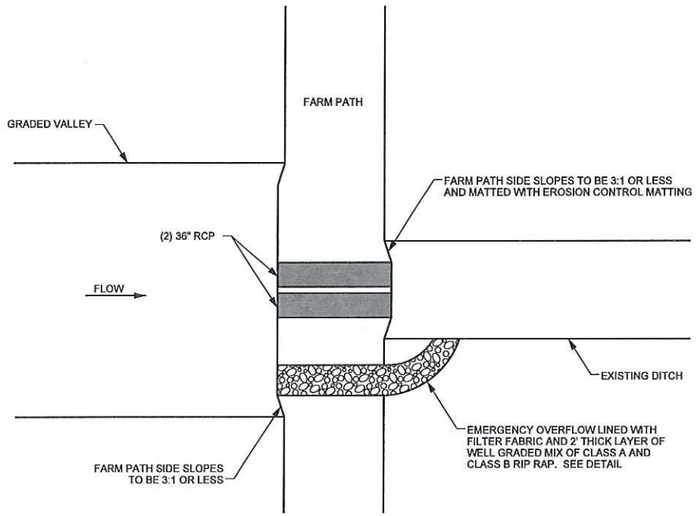
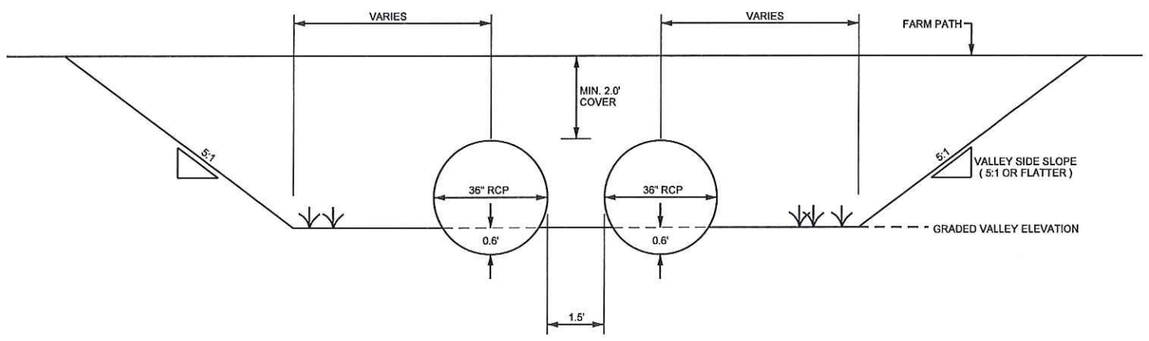
PERMANENT ROAD CULVERT CROSSING



PLAN VIEW



SECTION VIEW

NOTES:

1. CULVERTS TO BE SET TO THE ELEVATIONS SHOWN ON THE PLAN & PROFILE.
2. CULVERTS MUST HAVE A MINIMUM OF 2' OF COVER. ADJUST ROAD GRADE TO ENSURE THE COVER REQUIREMENT IS MET.

TYPICAL GRADED VALLEY

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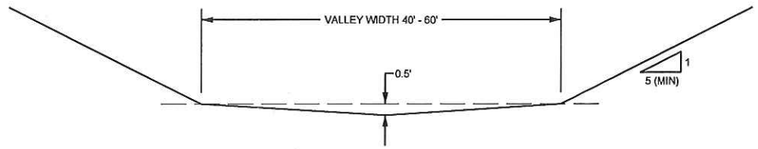
7/1/13

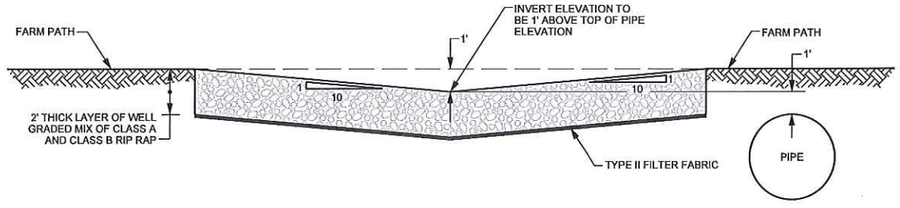


SECTION VIEW

NOTES:

1. GRADE VALLEY TO DESIGN GRADES SHOWN ON PROFILE.
2. MICROTOPOGRAPGHY IS ALLOWED TO FORM NATURALLY.

EMERGENCY OVERFLOW



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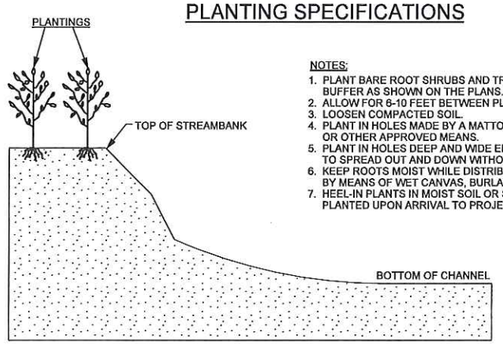
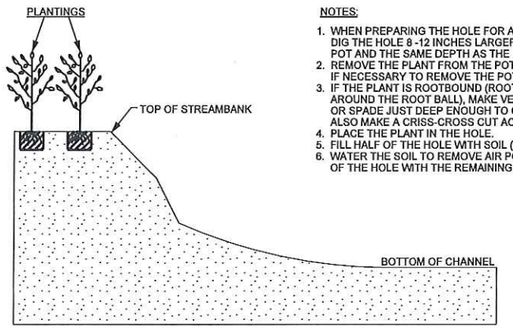
PLANTING SPECIFICATIONS



CROSS SECTION VIEW OF BARE ROOT PLANTING

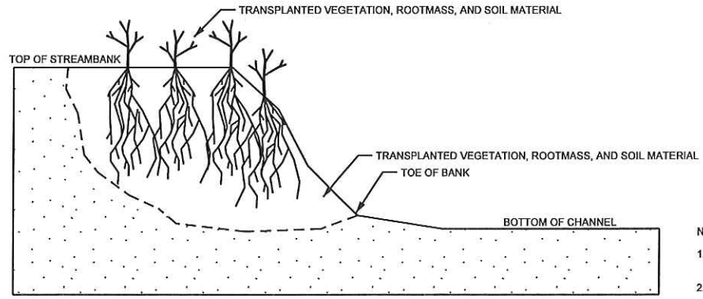
NOTES:
1. PLANT BARE ROOT SHRUBS AND TREES TO THE WIDTH OF THE BUFFER AS SHOWN ON THE PLANS.
2. ALLOW FOR 6-10 FEET BETWEEN PLANTINGS, DEPENDING ON SIZE.
3. LOOSEN COMPACTED SOIL.
4. PLANT IN HOLES MADE BY A MATTOCK, DIBBLE, PLANTING BAR, OR OTHER APPROVED MEANS.
5. PLANT IN HOLES DEEP AND WIDE ENOUGH 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.



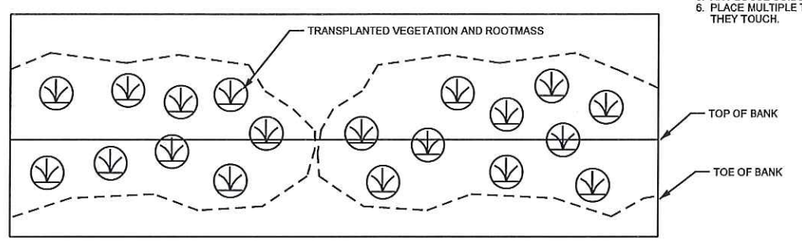
CROSS SECTION VIEW OF CONTAINER PLANTING

NOTES:
1. 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.
2. REMOVE THE PLANT FROM THE POT. LAY THE PLANT ON ITS SIDE IF NECESSARY TO REMOVE THE POT.
3. IF THE PLANT IS ROOTBOUND (ROOTS GROWNG 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.
4. PLACE THE PLANT IN THE HOLE.
5. FILL HALF OF THE HOLE WITH SOIL (SAME SOIL REMOVED FOR BACKFILL).
6. WATER THE SOIL TO REMOVE AIR POCKETS AND FILL THE REST OF THE HOLE WITH THE REMAINING SOIL.

TRANSPLANTED VEGETATION



CROSS SECTION VIEW



PLAN VIEW

NOTES:
1. EXCAVATE A HOLE IN THE BANK TO BE STABILIZED THAT WILL ACCOMMODATE THE SIZE OF TRANSPLANT TO BE PLACED. BEGIN EXCAVATION AT THE TOE OF THE BANK.
2. EXCAVATE TRANSPLANT USING A FRONT END LOADER. EXCAVATE THE ENTIRE ROOT MASS AND AS MUCH ADDITIONAL SOIL MATERIAL AS POSSIBLE. IF ENTIRE ROOT MASS CAN NOT BE EXCAVATE IN ONE BUCKET LOAD, THE TRANSPLANT IS TOO LARGE AND ANOTHER SHOULD BE SELECTED.
3. PLACE TRANSPLANT IN THE BANK TO BE STABILIZED SO THAT VEGETATION IS ORIENTATED VERTICALLY.
4. FILL IN ANY HOLES AROUND THE TRANSPLANT AND COMPACT.
5. ANY LOOSE SOIL LEFT IN THE STREAM SHOULD BE REMOVED.
6. PLACE MULTIPLE TRANSPLANTS CLOSE TOGETHER SUCH THAT THEY TOUCH.

PROJECT REFERENCE NO.	SHEET NO.
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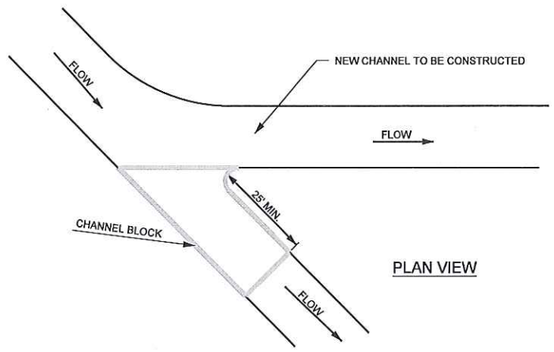
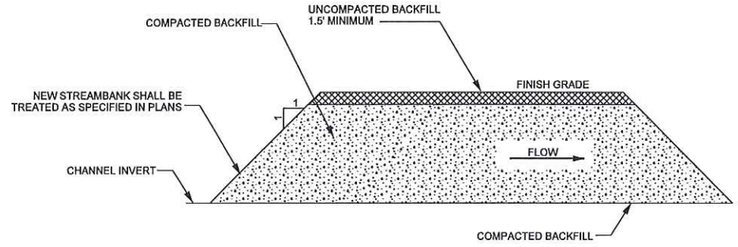
CHANNEL BLOCK

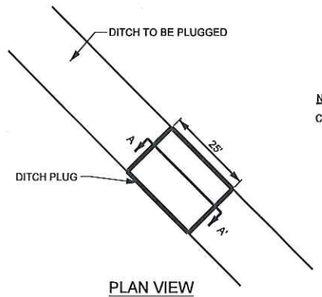


PLAN VIEW



PROFILE VIEW

DITCH PLUG



PLAN VIEW

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

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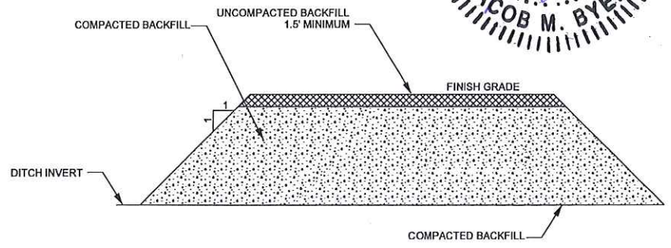

SECTION A - A'

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CONSTRUCTION SEQUENCE

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CONSTRUCTION SEQUENCE

A Baker Engineering Project Manager will provide construction observation during the construction phase of this project. The following construction sequence shall be used during implementation of the plan.

1. Prior to beginning any land disturbing activities, notification and approval must be granted from NCDENR Division of Land Resources - Land Quality Section, US Army Corp of Engineers, and NC Division of Water Quality.
2. The Contractor shall contact North Carolina "One Call" Center (1.800.632.4949) before any excavation.
3. The Contractor will mobilize equipment and materials to the site using the construction entrances (shown on the plans) along the farm roads off of Peoples Road. Two temporary gravel construction entrances will be installed.
4. The Contractor will utilize existing farm roads and ditch crossings to the extent possible. Any new ditch crossings to be installed will consist of temporary wood mats and shall be approved by the Engineer prior to installation.
5. Contractor will store all equipment and materials in staging/stockpile areas as shown on the plans.
6. Silt fence will be installed in locations shown on the plans prior to beginning any land disturbing activities in that area.
7. Contractor shall only clear and grub within the limits of disturbance and only to the extent necessary for construction.
8. Contractor shall begin construction on UT2 by first installing a temporary rock dam at approximate station 37+00.
9. Contractor shall then dewater the area upstream of the temporary rock dam using the typical pump around operation as shown in the details.
10. Contractor shall then install the RCP culverts as shown on the plans and repair the farm road.
11. Contractor shall then begin valley grading at the downstream end of UT2 and work up valley disturbing no more area than can be stabilized in one day. Contractor shall utilize pump around operation as necessary in this area and continue grading to approximate station 27+50.
12. Contractor shall then install ditch plug #1 at the upstream end of UT2 to divert water around the work area.
13. Contractor shall continue grading activities working upstream filling ditches and dewatering as necessary until approximate station 13+00.
14. Contractor shall then utilize pump around operations as necessary to complete grading activities.
15. Immediately upon completion of grading, apply seed and mulch per the construction specifications. The Contractor shall not discharge flow into the new graded valley until valley has been seeded and mulched. After the new graded valley has been constructed, stabilized, and approved by the Engineer, the Contractor shall then plug and fill the remaining ditches and turn water into the new graded valley.
16. Contractor shall then begin construction on UT3 by installing ditch plug #2 as shown on the plans. This ditch plug is temporary and will be used to divert flow around the work area.
17. Then the Contractor shall grade the high area as shown at approximate station 21+40.
18. Next, the Contractor shall install the RCP culverts as shown on the plans and repair the farm road.
19. Contractor shall then begin grading the valley and filling ditches as shown on the plans working upstream dewatering as necessary to approximate station 10+50.
20. Immediately upon completion of grading, apply seed and mulch per the construction specifications. The Contractor shall not discharge flow into the new graded valley until valley has been seeded and mulched. After the new graded valley has been constructed, stabilized, and approved by the Engineer, the Contractor shall then install ditch plug #3, plug and fill the remaining ditches, remove ditch plug #2, and turn water into the new graded valley.
21. Any excess excavated material shall be used to elevate the existing farm roads as directed by the Engineer.
22. All areas should be seeded and mulched prior leaving the project reach. Remove all temporary stream crossings. All waste material must be removed from the project site.
23. The Contractor shall plant woody vegetation, according to planting details and specifications. Reforestation shall be completed at the appropriate time of the year.
24. The Contractor shall treat areas of invasive species within the conservation easement boundary.
25. The Contractor shall ensure that the site is free of trash and leftover materials prior to demobilization of equipment from the site.

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
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PROJECT ENGINEER

PRELIMINARY PLANS
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7/11/13

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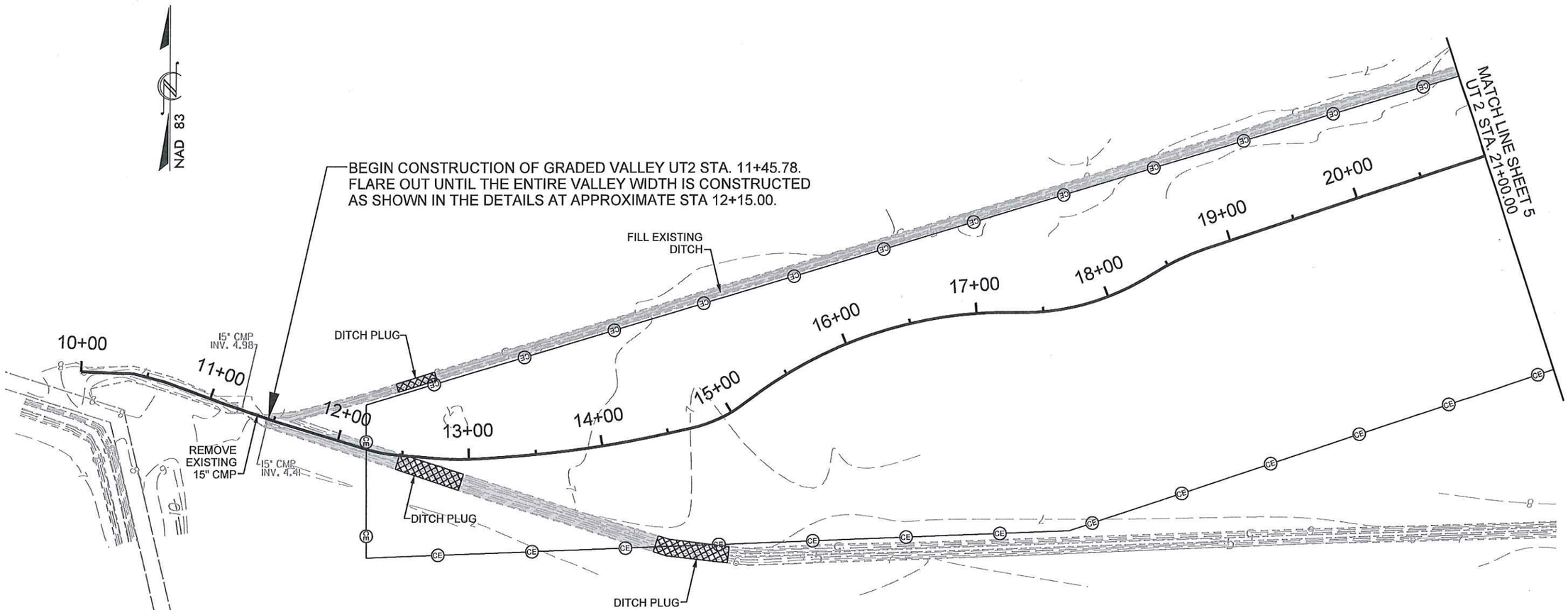

NOTES:

1. UT2 & UT3 WILL BE RESTORED TO A COASTAL PLAIN HEADWATER STREAM AND WETLAND SYSTEM BY RESTORING THE HEADWATER VALLEYS AND PROMOTING DIFFUSE FLOW.
2. TO THE EXTEND POSSIBLE, CONTRACTOR SHALL AVOID COMPACTION WITHIN THE RESTORED VALLEY.
3. USE EXCAVATED MATERIALS TO FILL EXISTING DITCHES AND TO ELEVATE EXISTING FARM ROADS AS DIRECTED BY THE ENGINEER.
4. CONTRACTOR SHALL ENSURE A MINIMUM OF 2' OF COVER OVER ALL PROPOSED CULVERTS UNDER FARM ROADS.
5. TOPOGRAPHY OUTSIDE THE RESTORED VALLEY AND WITHIN THE CONSERVATION EASEMENT SHALL BE UNIFORM WITH NO SPOIL PILES OR UNNATURAL TOPOGRAPHY.

FILL EXISTING DITCH
DITCH PLUG
PROPOSED WETLAND RESTORATION

PLAN VIEW

40 20 0 40 80
SCALE (FT)

7/1/2013
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BAKER PROJECT REFERENCE NO.	SHEET NO.
125116	5

PROJECT ENGINEER

PRELIMINARY PLANS
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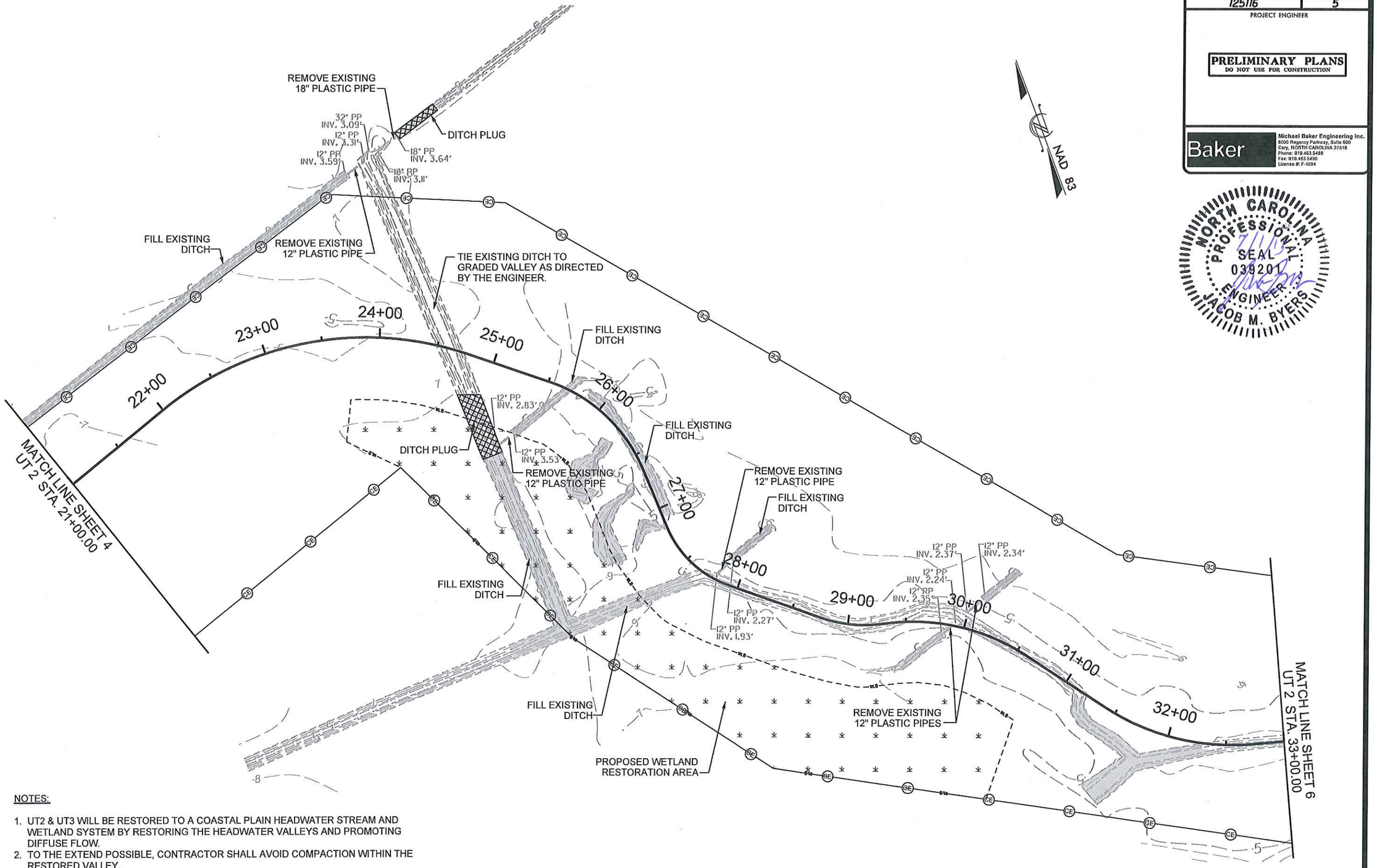

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FILL EXISTING DITCH
DITCH PLUG
PROPOSED WETLAND RESTORATION

PLAN VIEW

40 20 0 40 80
SCALE (FT)

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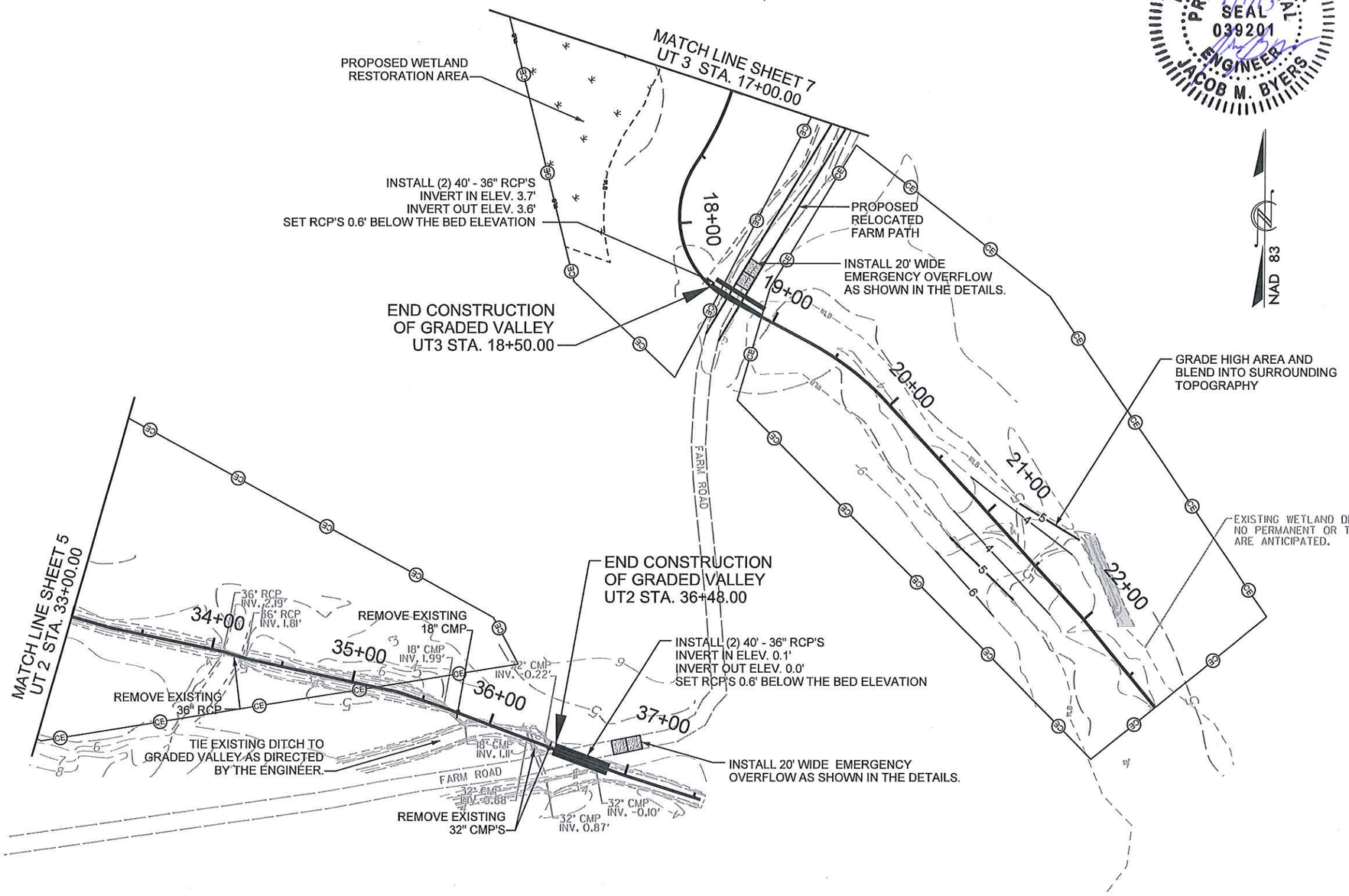

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5. TOPOGRAPHY OUTSIDE THE RESTORED VALLEY AND WITHIN THE CONSERVATION EASEMENT SHALL BE UNIFORM WITH NO SPOIL PILES OR UNNATURAL TOPOGRAPHY.
6. UT3 FROM APPROXIMATELY STA. 19+50 TO STA. 22+78 SHALL NOT BE DISTURBED EXCEPT TO GRADE THE HIGH AREA AT APPROXIMATE STA. 21+40 TO FILL THE EXISTING DITCH.

FILL EXISTING DITCH
DITCH PLUG
PROPOSED WETLAND RESTORATION

PLAN VIEW

40 20 0 40 80
SCALE (FT)

2/26/03

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PROJECT ENGINEER

PRELIMINARY PLANS
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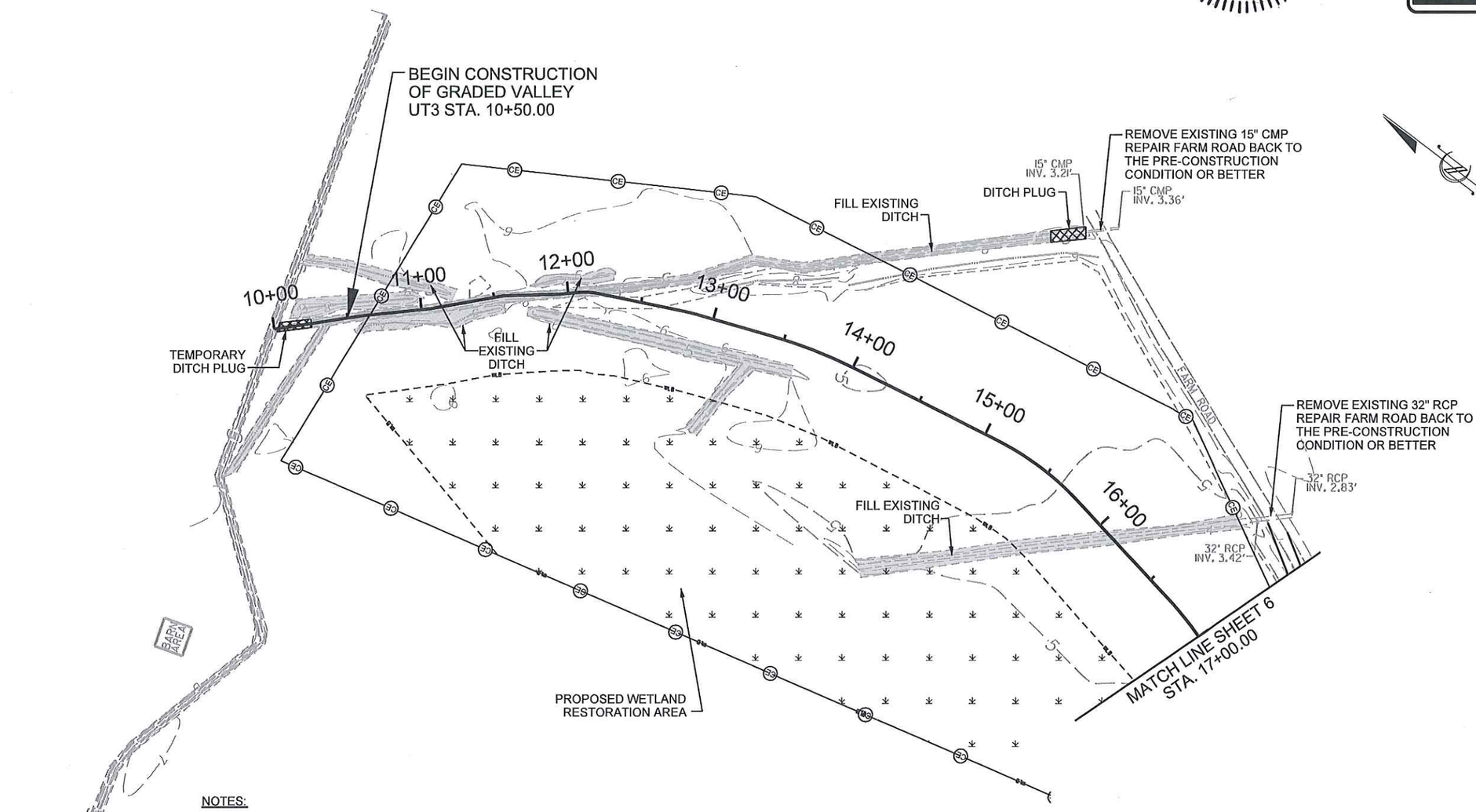

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FILL EXISTING DITCH

DITCH PLUG

PROPOSED WETLAND RESTORATION

PLAN VIEW

40 20 0 40 80
SCALE (FT)

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UT2

GRADE DITCH BOTTOM
STA. 10+25.00
EL = 6.00'

EXISTING GROUND

DESIGN VALLEY BOTTOM

BEGIN CONSTRUCTION OF GRADED VALLEY
UT3 STA. 11+45.78
EL = 5.83'

PROP. STA. / PROP. ELEV.	+50 5.97	+00 5.90	+50 5.83	+00 5.76	+50 5.69	+00 5.62	+50 5.55	+00 5.48	+50 5.41	+00 5.34	+50 5.27	+00 5.20	+50 5.13	+00 5.06	+50 4.99	+00 4.92	+50 4.85	+00 4.78
10+00	11+00		12+00		13+00		14+00		15+00		16+00		17+00		18+00		19+00	

UT2

EXISTING GROUND

PI=24+60.00
EL=4.00'

DESIGN VALLEY BOTTOM

EXISTING GROUND

PROP. STA. / PROP. ELEV.	+50 4.71	+00 4.64	+50 4.57	+00 4.50	+50 4.43	+00 4.36	+50 4.29	+00 4.22	+50 4.15	+00 4.08	+50 4.01	+00 3.98	+50 3.95	+00 3.92	+50 3.89	+00 3.86	+50 3.83	+00 3.80	+50 3.77	+00 3.74	+50 3.72	+00 3.69
19+00	20+00		21+00		22+00		23+00		24+00		25+00		26+00		27+00		28+00		29+00		30+00	

UT2

PI=32+00.00
EL=3.57'

EXISTING GROUND

DESIGN VALLEY BOTTOM

END CONSTRUCTION OF GRADED VALLEY
UT3 STA. 36+48.00
EL = 0.60'

PI=36+88.00
EL=0.50'

END GRADE
UT2 STA. 37+67.00
EL = 1.50'

INV. 0.1'

INV. 0.0'

2 - 36" RCP

PI=36+00.00
EL=2.00'

PROP. STA. / PROP. ELEV.	+50 3.66	+00 3.63	+50 3.60	+00 3.57	+50 3.37	+00 3.18	+50 2.98	+00 2.79	+50 2.59	+00 2.39	+50 2.20	+00 2.00	+50 0.60	+00 0.63	+50 1.28
30+00	31+00		32+00		33+00		34+00		35+00		36+00		37+00		

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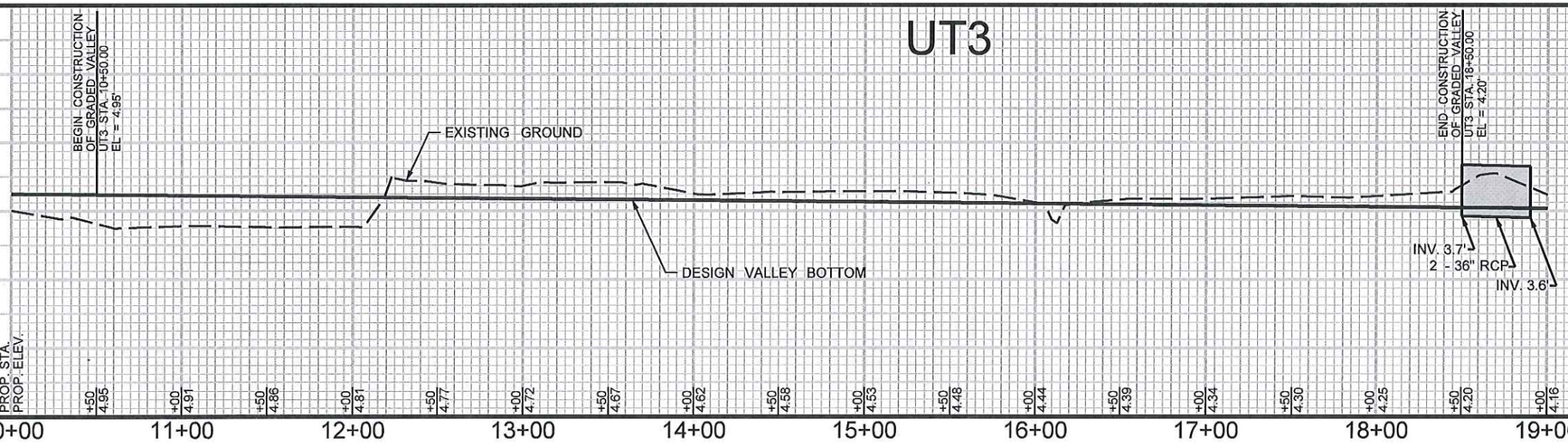
UT3



UT3

PROP. STA.
PROP. ELEV.

7/1/2013
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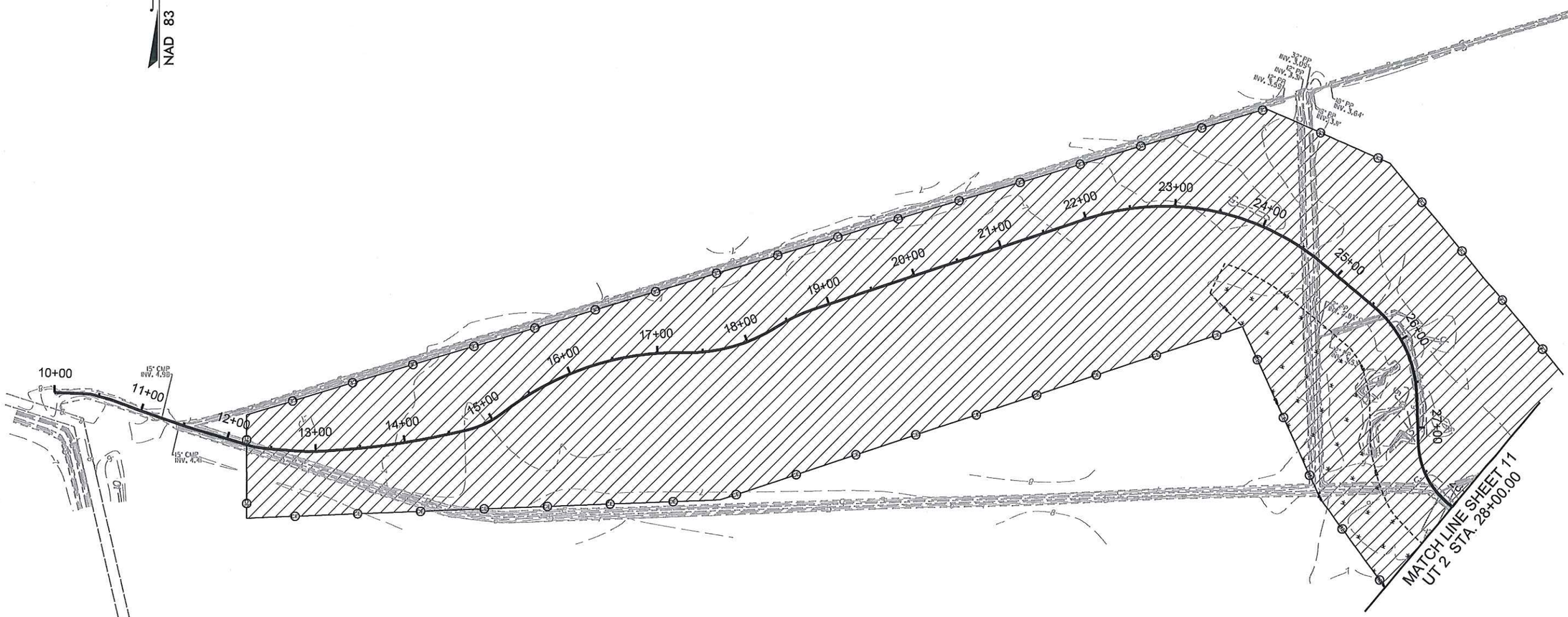
License #: F-1084

NAD 83



PLANTING ZONE

NOTES:

1. SEE VEGETATION SELECTION TABLES ON SHEET 1-A.
2. ALL AREAS WITHIN THE CONSTRUCTION EASEMENT SHALL BE PLANTED.
3. TOTAL PLANTING AREA = 17.5 ACRES.

REVEGETATION PLAN

60 30 0 60 120
SCALE (FT)

7/1/2013
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2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
125116	11

PROJECT ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS 7/1/13

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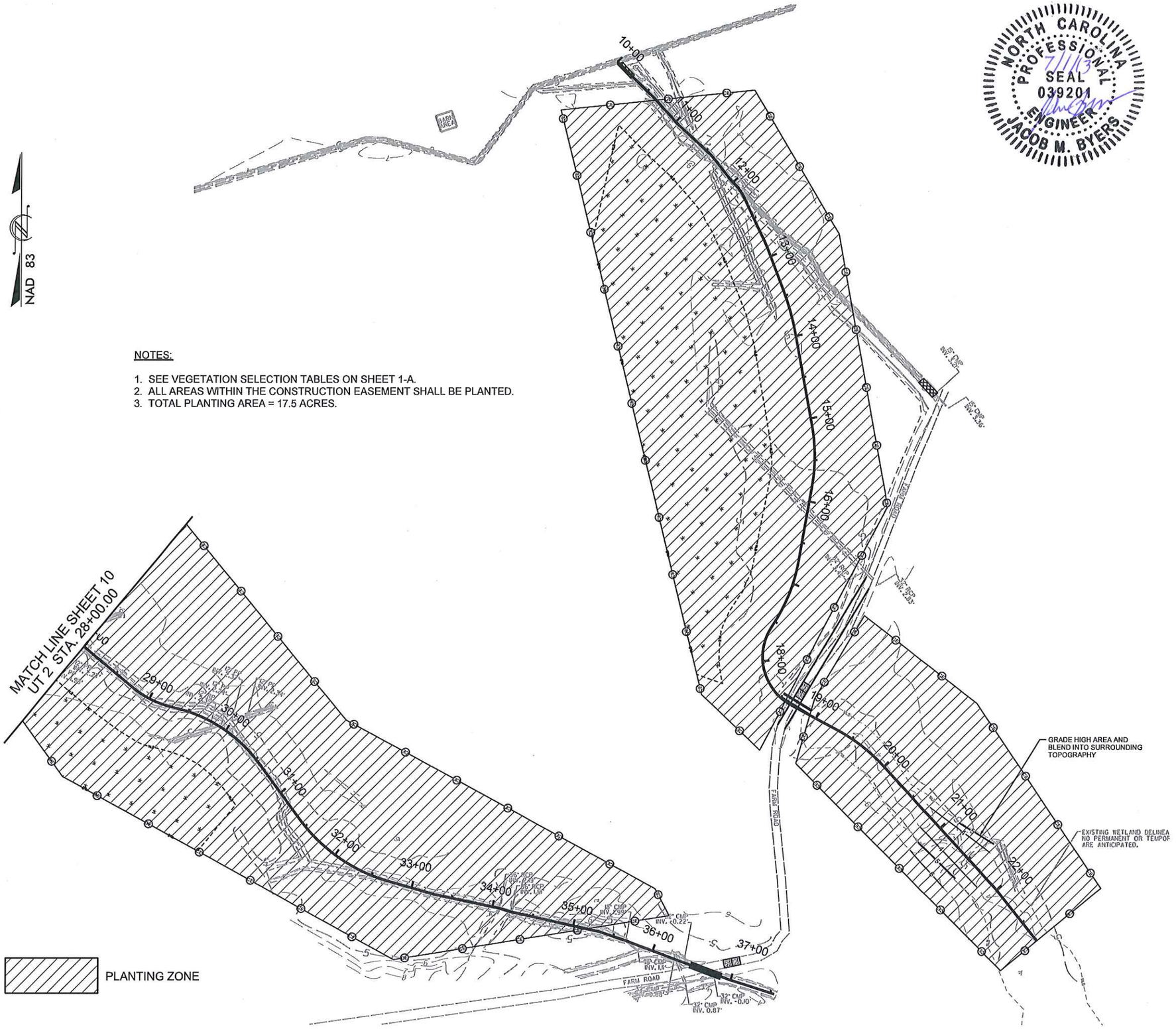
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NAD 83

NOTES:

1. SEE VEGETATION SELECTION TABLES ON SHEET 1-A.
2. ALL AREAS WITHIN THE CONSTRUCTION EASEMENT SHALL BE PLANTED.
3. TOTAL PLANTING AREA = 17.5 ACRES.



REVEGETATION PLAN

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SCALE (FT)

7/1/2013
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ST. CLAIR

PROJECT: 125116

NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	125116	EC-1	6

INDEX OF SHEETS

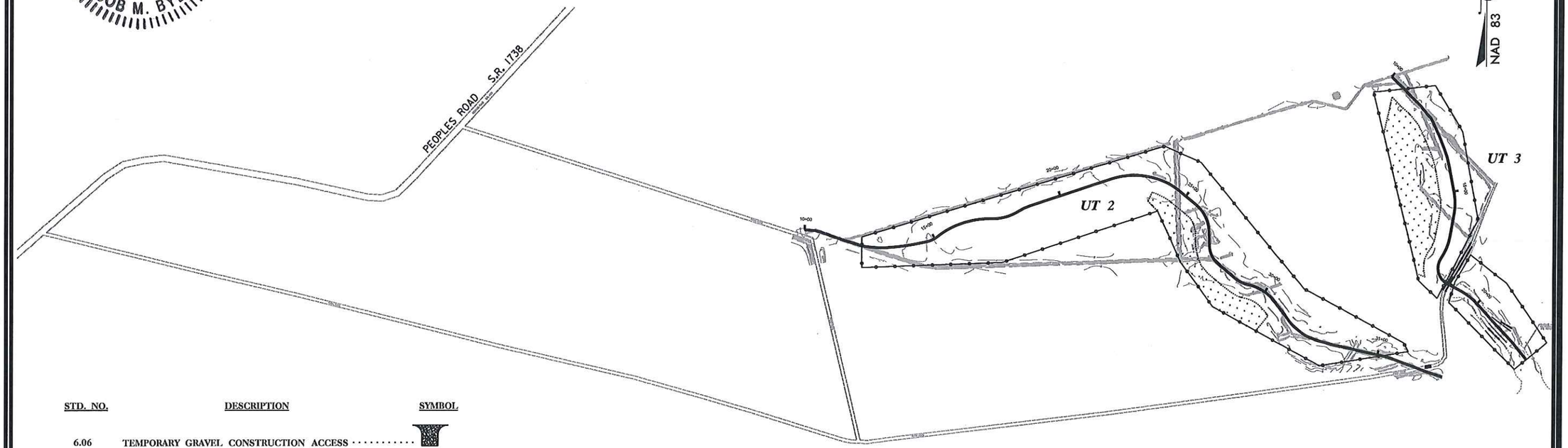
ST. CLAIR CREEK
SEDIMENTATION & EROSION CONTROL PLAN

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/1/13

LOCATION: BEAUFORT COUNTY
OFF OF PEOPLES ROAD NEAR BATH, NC

TYPE OF WORK: STREAM AND RIPARIAN WETLAND MITIGATION



STD. NO.	DESCRIPTION	SYMBOL
6.06	TEMPORARY GRAVEL CONSTRUCTION ACCESS	
6.62	SILT FENCE	

GRAPHIC SCALES

60 30 0 60 120
PLANS

THIS PROJECT CONTAINS EROSION CONTROL PLANS FOR ALL PHASES OF CONSTRUCTION.

TOTAL DISTURBED AREA = 24.9 Acres

PROJECT STANDARDS

THE FOLLOWING STANDARDS AS THEY APPEAR IN THE "NC EROSION CONTROL PLANNING AND DESIGN MANUAL" AND ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED PART OF THE PLANS.

6.06 TEMPORARY GRAVEL CONSTRUCTION ACCESS
6.62 SILT FENCE

PREPARED IN THE OFFICE OF:

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Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

FALL 2013
LETTING DATE:

JACOB BYERS, PE
PROJECT ENGINEER

PROJECT ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SIGNATURE: P.E.

2/26/03

PROJECT REFERENCE NO.	SHEET NO.
125116	EC-2

PROJECT ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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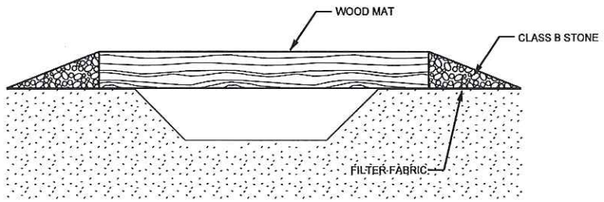
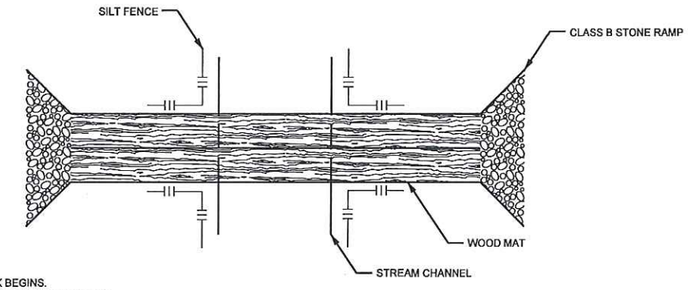
License #: F-1084

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/11/03

TEMPORARY STREAM CROSSING - WOOD MAT



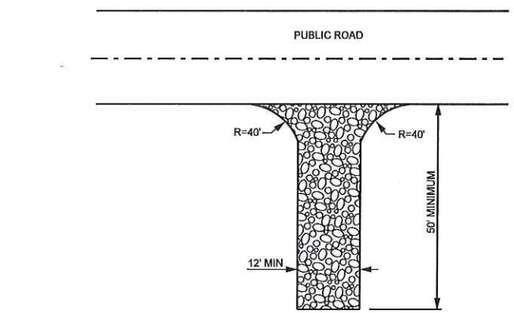
CROSS SECTION

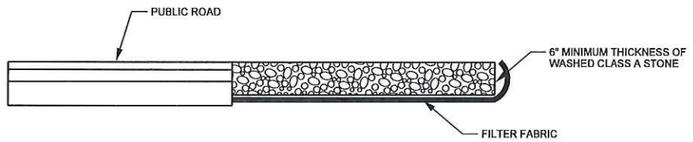


PLAN VIEW

NOTES:
1. CONSTRUCT STREAM CROSSING WHEN FLOW IS LOW.
2. HAVE ALL NECESSARY MATERIALS AND EQUIPMENT ON-SITE BEFORE WORK BEGINS.
3. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM.
4. LINE STREAMBANK AND ACCESS RAMP AREA WITH NON-WOVEN FILTER FABRIC.
5. INSTALL STREAM CROSSING AT RIGHT ANGLE TO THE FLOW.
6. TRANSPLANT SOD FROM ORIGINAL STREAMBANK ONTO SIDE SLOPES FOR LATER USE.
7. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL BY INSTALLING SILT FENCE ON ALL FOUR CORNERS ADJACENT TO THE STREAM. SEE SILT FENCE DETAIL.
8. STABILIZE AN ACCESS RAMP OF CLASS B STONE TO THE EDGE OF THE MUD MAT.
9. THE WOOD MAT SHALL BE OF SUFFICIENT SIZE AND WIDTH TO SUPPORT THE LARGEST VEHICLE CROSSING THE CHANNEL.
10. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED, RECOMMENDED AT A 5:1 SLOPE.

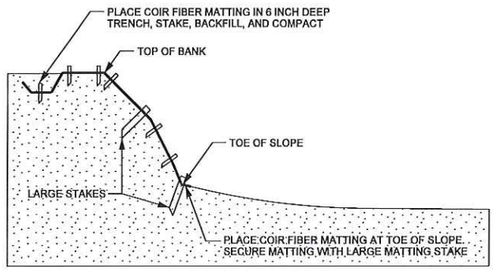
TEMPORARY GRAVEL CONSTRUCTION ENTRANCE



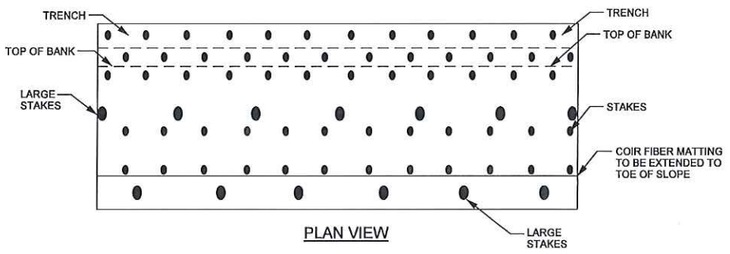


NOTES:
SPECIFICATION NO. 6.06 - CONSTRUCTION ACCESS "N.C. EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL MARCH 2009"

COIR FIBER MATTING



CROSS SECTION VIEW



PLAN VIEW

NOTES:
1. BANKS SHOULD BE SEEDED PRIOR TO PLACEMENT OF MATTING.
2. USE COIR FIBER MATTING.
3. LARGE STAKES SHOULD NOT BE SPACED FURTHER THAN 18" APART.
4. PLACE LARGE STAKES ALONG ALL SEAMS, IN THE CENTER OF BANK, AND TOE OF SLOPE.

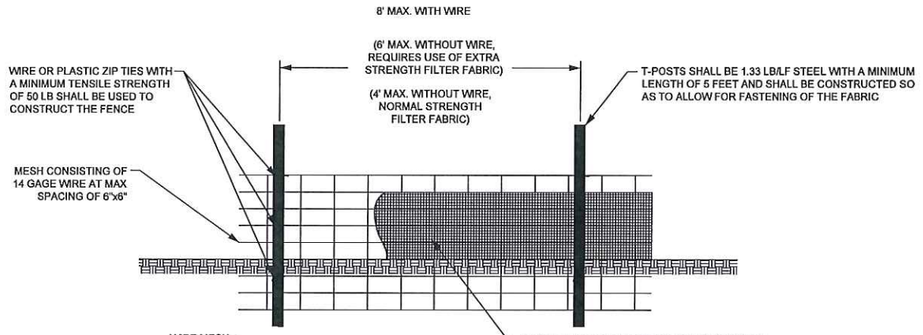
TYPICAL LARGE MATTING STAKE

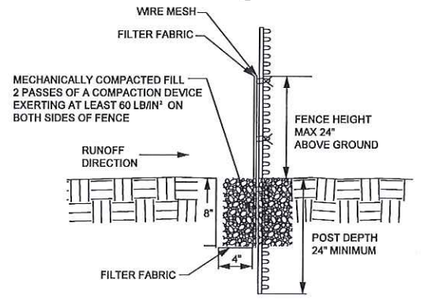
LEG LENGTH	17.00 IN (43.18 CM) (TAPERED TO POINT)
WIDTH	1.5 IN (3.81 CM)
THICKNESS	1.5 IN (3.81 CM)

TYPICAL SMALL MATTING STAKE

LEG LENGTH	11.00 IN (27.94 CM)
HEAD WIDTH	1.25 IN (3.18 CM)
HEAD THICKNESS	0.40 IN (1.02 CM)
LEG WIDTH	0.60 IN (1.52 CM) (TAPERED TO POINT)
LEG THICKNESS	0.40 IN (1.02 CM)
TOTAL LENGTH	12.00 IN (30.48 CM)

TEMPORARY SILT FENCE





NOTES:
1. AVOID JOINTS, UNAVOIDABLE JOINTS MUST HAVE 4 FEET OF CLOTH OVERLAP AND SHOULD TIE INTO THE NEXT ADJACENT POST
2. PLACE ON CONTOUR EXCEPT ENDS WHICH SHOULD BE 1' ABOVE GRADE TO PREVENT CUT AROUND
3. WRAP APPROX. 6" OF FABRIC AROUND END POSTS AND SECURE WITH TIES
4. REMOVE ONCE AREA IS STABLE

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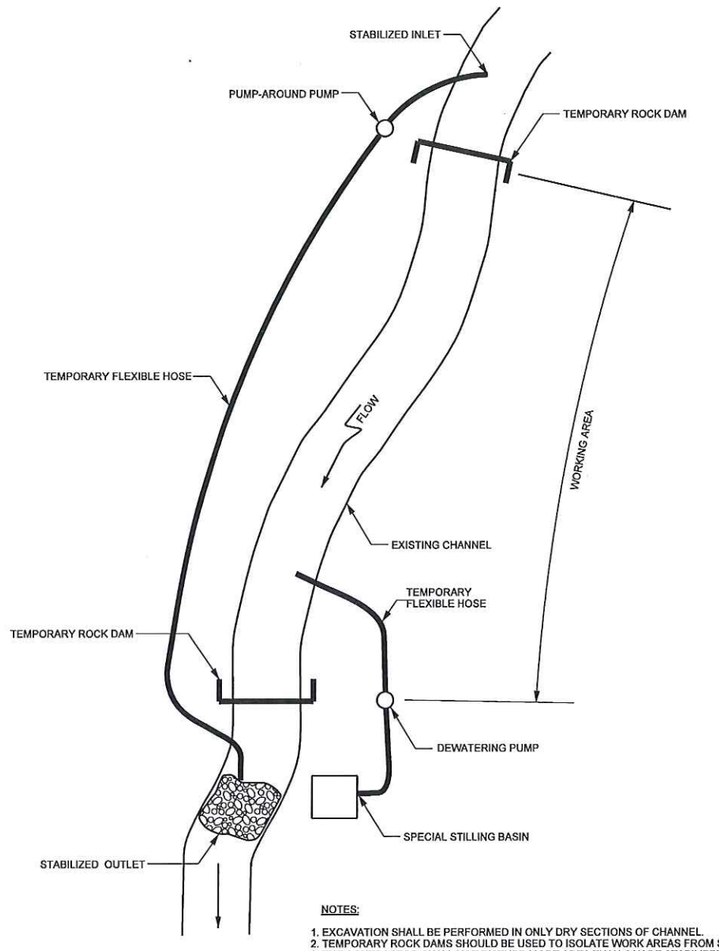
2/26/03

TYPICAL PUMP AROUND OPERATION

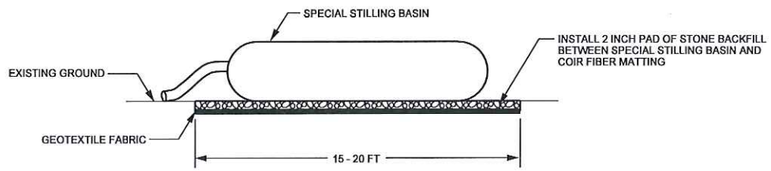


NOTES:

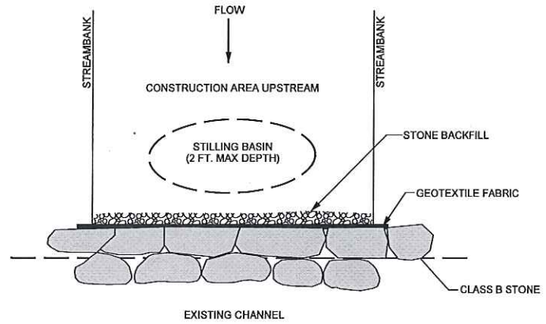
1. EXCAVATION SHALL BE PERFORMED IN ONLY DRY SECTIONS OF CHANNEL.
2. TEMPORARY ROCK DAMS SHOULD BE USED TO ISOLATE WORK AREAS FROM STREAM FLOW.
3. THE CONTRACTOR SHALL NOT DISTURB MORE AREA THAN CAN BE STABILIZED IN ONE WORKING DAY.
4. THE PUMP-AROUND PUMP SHOULD ADEQUATELY CONVEY 1 CFS (450 GALLONS PER MINUTE).

SEQUENCE OF CONSTRUCTION FOR TYPICAL PUMP AROUND

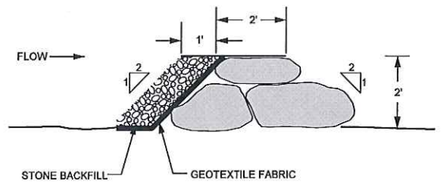
1. INSTALL STABILIZED OUTLET AT THE DOWNSTREAM END OF THE DESIGNATED PROJECT WORKING AREA.
2. THE CONTRACTOR WILL INSTALL THE PUMP AROUND PUMP AND THE TEMPORARY FLEXIBLE HOSE THAT WILL CONVEY THE BASE FLOW FROM UPSTREAM OF THE WORK SITE TO THE SPECIAL STILLING BASIN OR STABILIZED OUTLET.
3. INSTALL UPSTREAM TEMPORARY ROCK DAM AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. INSTALL THE DOWNSTREAM TEMPORARY ROCK DAM 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 TEMPORARY ROCK DAM. REMOVE TEMPORARY ROCK DAMS, PUMPS, AND TEMPORARY FLEXIBLE HOSE STARTING WITH THE DOWNSTREAM DAM FIRST.
7. THE CONTRACTOR WILL COMPLETE ALL GRADING AND STABILIZATION IN ONE DAY WITHIN THE PUMP AROUND AREA BETWEEN THE TEMPORARY ROCK DAMS.
8. ONCE THE WORKING AREA IS COMPLETED, REMOVE THE SPECIAL STILLING BASIN AND STABILIZED OUTLET AND STABILIZE DISTURBED AREAS WITH SEED AND MULCH.



TEMPORARY ROCK DAM



PLAN VIEW



CROSS SECTION

PROJECT REFERENCE NO.	SHEET NO.
125116	EC-3

PROJECT ENGINEER

PRELIMINARY PLANS
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NORTH CAROLINA PROFESSIONAL SEAL 079201 ENGINEER JACOB M. BYERS

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2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
125116	EC-4

PROJECT ENGINEER

PRELIMINARY PLANS
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NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/1/13

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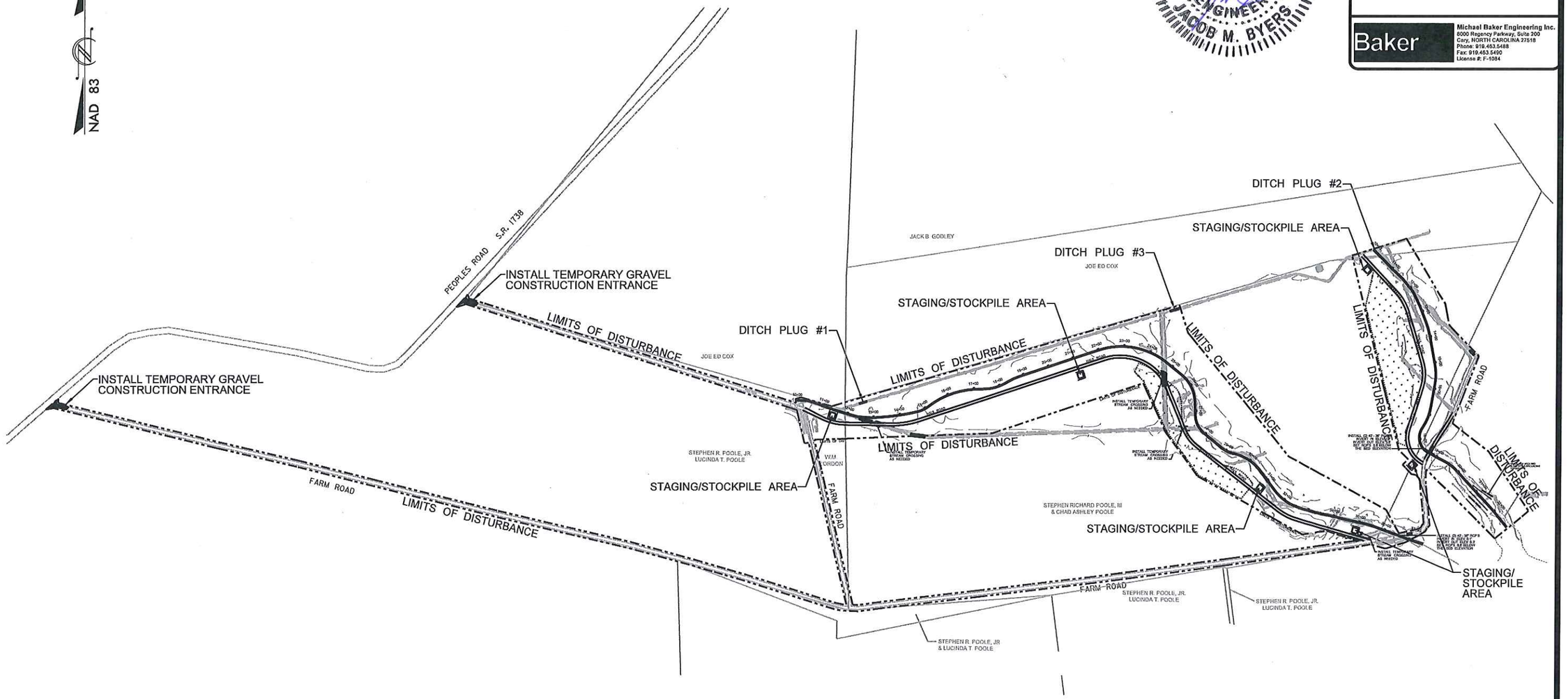
License #: F-1084

NAD 83



NOTES:

1. TEMPORARY SEEDING & MULCHING SHALL BE PLACED ON ALL DISTURBED AREAS AT THE END OF EACH WORK DAY.
2. CONTRACTOR SHALL DISTURB NO MORE GROUND THAN CAN BE STABILIZED THE SAME DAY.
3. ALL EXISTING ROADS OR PATHS USED FOR CONSTRUCTION ACTIVITIES SHALL BE REPAIRED, IF NECESSARY, TO THE PRE- CONSTRUCTION CONDITION OR BETTER.
4. GROUND STABILIZATION MUST BE PROVIDED IN 7 DAYS ON PERIMETER AREAS AND SLOPES GREATER THAN 3:1 AND IN 14 DAYS ON ALL OTHER AREAS.
5. CONTRACTOR SHALL ACCESS THE SITE FROM PEOPLES ROAD BY THE TEMPORARY GRAVEL CONSTRUCTION ENTRANCES AND USE THE EXISTING FARM ROADS AS HAUL ROADS TO THE EXTENT POSSIBLE.
6. ALL STAGING AND STOCKPILE AREAS SHALL BE BORDERED BY SILT FENCE.

EROSION CONTROL PLAN

200 100 0 200 400
SCALE (FT)

7/1/2013
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2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
125116	EC-5

PROJECT ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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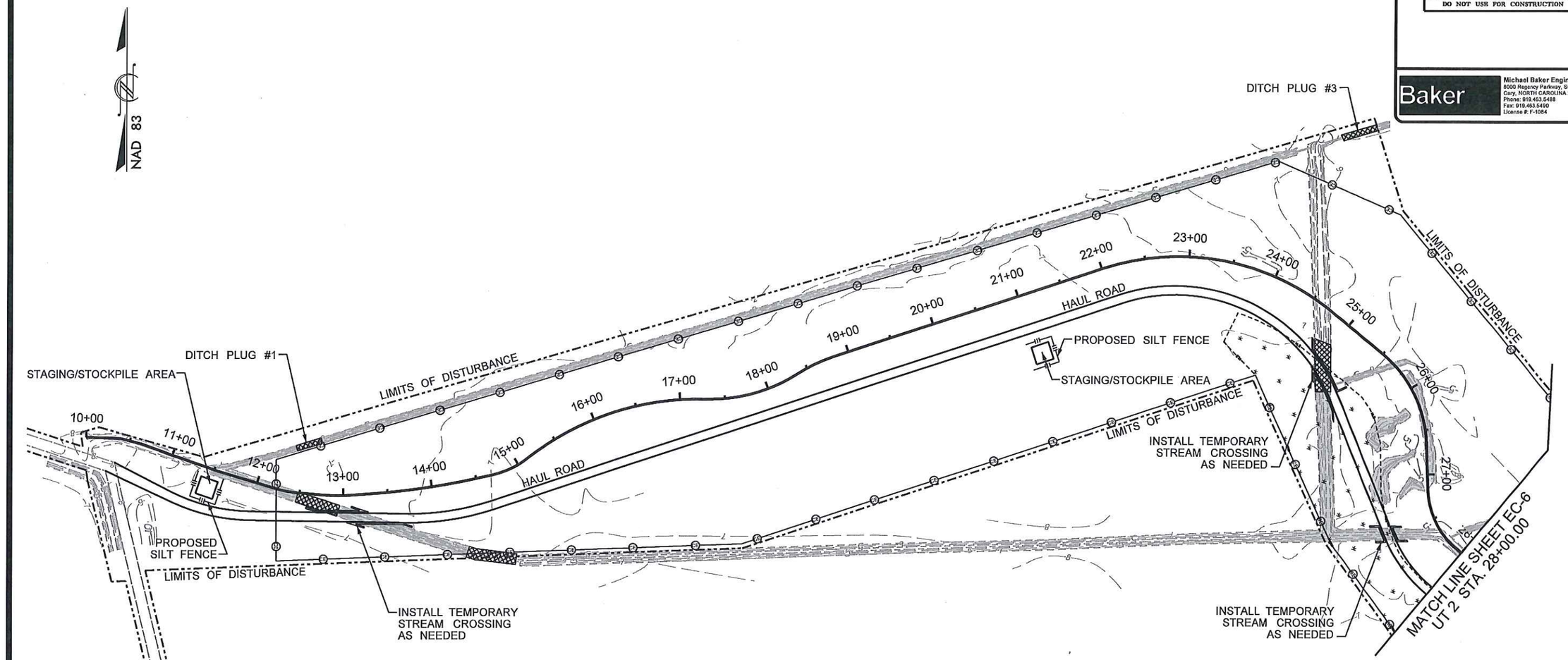
License #: F-1084



NOTES:

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6. ALL STAGING AND STOCKPILE AREAS SHALL BE BORDERED BY SILT FENCE.

NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS

7/1/2013
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EROSION CONTROL PLAN

60 30 0 60 120
SCALE (FT)

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
125116	EC-6

PROJECT ENGINEER

PRELIMINARY PLANS
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NORTH CAROLINA PROFESSIONAL SEAL 039201 ENGINEER JACOB M. BYERS
7/1/13

NAD 83

NOTES:

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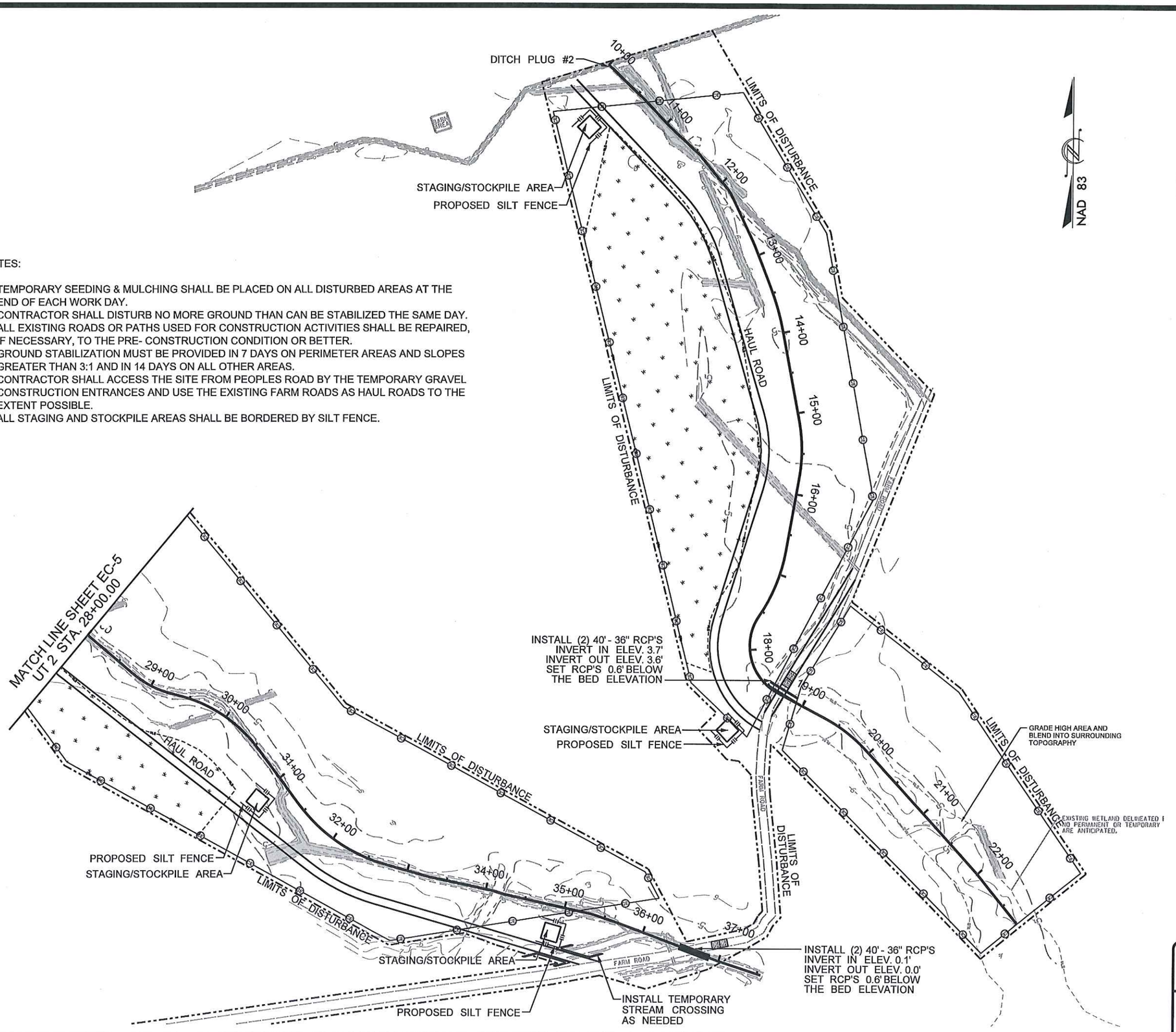
6. ALL STAGING AND STOCKPILE AREAS SHALL BE BORDERED BY SILT FENCE.



EROSION CONTROL PLAN

60 30 0 60 120
SCALE (FT)

7/1/2013
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19.0 APPENDIX E – LICENSED SOIL SCIENTIST REPORT

HYDRIC SOIL INVESTIGATION

Poole Mitigation Site

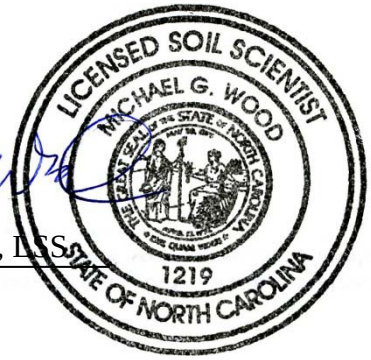
Beaufort County, North Carolina

Prepared for:

Scott Hunt, P.E.
Baker Engineering
800 Regency Parkway, Suite 200
Cary, NC 27518

Prepared by:

410B Millstone Drive
Hillsborough, NC 27278



Michael G. Wood, LSS

February 8, 2011

INTRODUCTION

Baker Engineering is proposing a mitigation site along two branches located in Beaufort County, NC. The approximately 208.74-acre study area is comprised of two sites, located on the west and east sides of Peoples Road. Site 1 is located on the west side of Peoples Road and is comprised of active agricultural fields. Site 2 is located on the east side of Peoples Road and is comprised of a managed loblolly pine stand. As part of the site development process, The Catena Group (TCG) has been retained to perform a detailed Hydric Soil Investigation that describes and classifies the soil throughout the study area and make a determination as to its hydric status and the feasibility to provide wetland mitigation.

METHODOLOGY

Prior to performing the evaluation, existing documentation was reviewed, including NRCS soils maps, USGS topographic maps, etc. The field investigation was performed on February 4, 2011. Eleven hand-turned soil auger borings were advanced throughout sites 1 and 2 at predetermined locations (Figure 1). Soil boring locations were located with a GPS Unit with sub-meter accuracy. Hydric soil status is based upon the NRCS Field Indicators of Hydric Soils (2010).

RESULTS

All soil borings within sites 1 and 2 exhibited at least one hydric soil indicator and are placed into the Hydric Soil Unit. A soil boring log detailing each soil description, described using the USDA-NRCS standard nomenclature, is included in the appendix. Hydric soil determinations were based upon Field Indicators of Hydric Soils in the Unities States - A Guide for Identifying and Delineating Hydric Soils (Version 7.0, 2010). The results are summarized in Table 1.

Table 1. List of all soil borings and corresponding hydric indicator.

Soil Boring	Hydric Soil Indicator
B1, B2	F6
B3	A11
B4, B5, B6, B7, B8, B9, B10, B11	F3

Hydric Soil Unit. All soils observed at the predetermined locations are classified as hydric by meeting one or more of the following indicator(s):

A11. Depleted Below Dark Surface: A layer with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less, starting within 30 cm (12 inches) of the soil surface, and having a minimum thickness of either:

a. 15 cm (6 inches), or

b. 5 cm (2 inches) if the 5 cm consists of fragmental soil material.

F3. Depleted Matrix: A layer that has a depleted matrix with 60 percent or more chroma of 2 or less and that has a minimum thickness of either:

a. 5 cm (2 inches) if the 5 cm is entirely within the upper 15 cm (6 inches) of the soil, or5 cm (6 inches), or
b. 15 cm (6 inches), starting within 25 cm (10 inches) of the soil surface.

F6. Redox Dark Surface: A layer that is at least 10 cm (4 inches) thick, is entirely within the upper 30 cm (12 inches) of the mineral soil, and has:

a. Matrix value of 3 or less and chroma of 1 or less and 2 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings, or
b. Matrix value of 3 or less and chroma of 2 or less and 5 percent of more distinct or prominent redox concentrations o occurring as soft masses or pore linings.

CONCLUSION

All soils were identified as hydric by showing at least one hydric soil indicator. The findings presented herein represent TCG's professional opinion based on our Soil and Site Evaluation and knowledge of the current regulations regarding wetland mitigation in North Carolina and national criteria for determining hydric soil. This investigation was done on a broad scale to generally identify the major soil units with regard to hydric status and mitigation potential. If the project is to proceed, additional soil borings are recommended in order to better delineate the soil units.

The Catena Group

Poole Mitigation Site

Site and Soil Investigation

Beaufort County, North Carolina

Date: February 2011

Scale 0 250 500 Feet

Job No.: 4152

Figure 1

Appendix A

Soil Boring Log

SOIL/SITE EVALUATION

(Continuation Sheet)

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH

Poole Mitigation Site

PROPERTY ID #:
DATE OF EVALUATION: 2-4-2011
COUNTY: Beaufort

PROFILE #	.1940 LANDSCAPE POSITION/ SLOPE %	HORIZ ON DEPTH (IN.)	SOIL MORPHOLOGY (.1941) .1941 STRUCTURE/ TEXTURE	SOIL MORPHOLOGY (.1941) .1941 CONSISTENCE/ MINERALOGY	OTHER PROFILE FACTORS .1942 SOIL WETNESS/ COLOR	.1943 SOIL DEPTH	.1956 SAPRO CLASS	.1944 RESTR HORIZ	PROFILE CLASS & LTAR
B1	A1	0-4	1, m, gr, sl	vfr	10YR 3/2				
	A2	4-12	1, m, gr, sl	fr	10YR 3/2	; c, P 10YR 5/6		; oxidized	rhizospheres
	Eg	12-18	1, m, gr sl	fr	2.5Y 4/1				
	Btg	18+	1, c, sbk scl	fi	2.5Y 5/2	; m, P 2.5Y 5/6			
	Hydric F6								
B2	A1	0-4	1, m, gr sl	vfr	10YR 3/2				
	A2	4-11	1, m gr sl	fr	10YR 3/2	; C, P 10YR 5/6;		oxidized	rhizospheres
	Ehg	11-18	1, m, gr sl	fr - spodic	10YR 3/2	; C, P 10YR 5/6;		oxidized	rhizospheres
	Btg	18+	1, c, sbk scl	fi	2.5Y 5/2	; m, P 2.5Y 5/6			
	Hydric F6								
B3	A	0-11	1, m, gr sl	vfr	2.5Y 3/1				
	Eg	11-20	1, m, gr sl	fr	2.5Y 5/2	; m, P 10YR 5/6			
	Btg	20-24	1, m, sbk scl	fi	2.5Y 5/2	; m, P 10YR 5/6			
	Hydric A11		inclusions of sc pockets		2.5Y 6/1				
B4	A	0-8	1, m, gr sl	vfr	2.5Y 4/2				
	Eg	8-12	1, m, gr sl	fr	2.5Y 6/2	; C, F 2.5Y 6/3			
	Btg	12-15	1, c, sbk sc	fi	2.5Y 5/1	; m, P 10YR 5/6			
	Hydric F3								
B5	A	0-4	1, m, gr sl	vfr	2.5Y 4/1	; oxidized rhizospheres (o.r.)			
	Btg1	4-12	1, m, sbk scl	fi	2.5Y 4/2	m F 2.5Y 6/1; m, P 2.5Y 6/4		2.5Y 6/6 (o.r.)	
	Btg2	12+	1, c, sbk sc	fi	2.5Y 6/1				
	Hydric F3								

COMMENTS:

SOIL/SITE EVALUATION

(Continuation Sheet)

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH

PROPERTY ID #:
DATE OF EVALUATION: 2-4-2011
COUNTY: Beaufort

PROFILE #	.1940 LANDSCAPE POSITION/ SLOPE %	HORIZON	DEPTH (IN.)	SOIL MORPHOLOGY (.1941) .1941 STRUCTURE/ TEXTURE	SOIL MORPHOLOGY (.1941) .1941 CONSISTENCE/ MINERALOGY	OTHER PROFILE FACTORS .1942 SOIL WETNESS/ COLOR	.1943 SOIL DEPTH	.1956 SAPRO CLASS	.1944 RESTR HORIZ	PROFILE CLASS & LTAR
B6	Hydric F3	A	0-4	l, m, gr sl	vfr	2.5Y 3/1; o.r.				
		Btg1	4-12	l, m, sbk scl	fi	2.5Y 4/2; m, D2.5Y 6/4 + 2.5Y 6/6; o.r.				o.r.
		Btg2	12+	l, c, sbk sc	fi	2.5Y 6/1				
B7	Hydric F3	A	0-4	l, m, gr sl	vfr	2.5Y 4/1; o.r.				
		Btg1	4-14	l, m, sbk scl	fi	2.5Y 4/2; m, D2.5Y 6/4 + 2.5Y 6/6; o.r.				
		Btg2	14+	l, c, sbk sc	fi	2.5Y 6/1				
B8	Hydric F3	A	0-4	l, m, gr sl	vfr	2.5Y 4/1; o.r.				
		Btg1	4-12	l, m, sbk, scl	fi	2.5Y 4/2; m, D2.5Y 6/4 + 2.5Y 6/6; o.r.				
		Btg2	12+	l, c, sbk sc	fi	2.5Y 6/1				
B9	Hydric F3	A	0-3	l, m, gr sl	vfr	2.5Y 3/1; o.r.				
		Btg1	3-12	l, m, sbk scl	fi	2.5Y 4/2; o.r.; m, D2.5Y 6/4				
		Btg2	12+	l, m, sbk sc	vfi	2.5Y 6/2				
				Some Topsoil removed		during	grading			
B10	Hydric F3	A1	0-1	l, m, gr sl	vfr	2.5Y 3/1; o.r.				
		A2	1-5	l, m, gr sl	vfr	2.5Y 4/1; o.r.				
		Btg1	5-10	l, m, sbk scl	fi	2.5Y 5/1; m, D2.5Y 6/4 + 2.5Y 6/6; o.r.				
		Btg2	10+	l, m, sbk sc	fi	2.5Y 6/1				

COMMENTS:

SOIL/SITE EVALUATION

(Continuation Sheet)

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH

PROPERTY ID #:
DATE OF EVALUATION: 2-4-2011
COUNTY: Beaufort

PROFILE #	.1940 LANDSCAPE POSITION/ SLOPE %	HORIZON DEPTH (IN.)	SOIL MORPHOLOGY (.1941) .1941 STRUCTURE/ TEXTURE	.1941 CONSISTENCE/ MINERALOGY	OTHER PROFILE FACTORS .1942 SOIL WETNESS/ COLOR	.1943 SOIL DEPTH	.1956 SAPRO CLASS	.1944 RESTR HORIZ	PROFILE CLASS & LTAR
B11	A1	0-1	1,m,gr sl	vfr	2.5Y 3/1 ; o.r.				
	A2	1-4	1,m,gr sl	vfr	2.5Y 4/1 ; o.r.				
	~~Bt~~g1	4-14	1,m,sbk scl	fi	2.5Y 5/1 ; m.P 2.5Y 6/6				
	Hydric Btg2 F3	14+	1,m,sbk sc	fi	2.5Y 4/1				

COMMENTS:

20.0 APPENDIX F – HEADWATER REFERENCE INFORMATION

Conference Proceedings
Stream Restoration in the Southeast: Advancing the Science and Practice

November 3 - 6, 2008
Asheville, North Carolina

A Methodology for Predicting Channel Form in Coastal Plain Headwater Systems

Kevin L. Tweedy, PE
Michael Baker Engineering, Inc.

Introduction

In 2007, an information paper was issued by the US Army Corps of Engineers (USACE) and the North Carolina Division of Water Quality (NCDWQ) that allowed for the restoration of Coastal Plain riparian headwater wetland valleys to provide compensatory stream mitigation. This information paper recognizes that in the Coastal Plain many headwater stream systems have been ditched and channelized to improve drainage. In their pre-disturbance condition, it is unlikely that these systems would have had defined channels; therefore, a restoration approach seeking to construct a meandering channel would not be appropriate.

Since few restoration projects have been implemented to date that make use of this information paper, technical design information for these systems is very limited. To provide additional design data, a study of Coastal Plain headwater reference sites was initiated with the following goals:

1) Identify reference sites that represent intact, functional systems
2) Describe the formation of channel features in headwater stream systems
3) Develop design guidance for determining when it is and is not appropriate to restore a defined stream channel.

The methods used to evaluate each goal are described in the sections that follow.

Identification of Reference Sites

Because headwater sites in the Coastal Plain are small and easily manipulated, it is difficult to locate systems that have not been altered or impacted by human activities. Searches were aimed at identifying small catchments (< 300 acres in size) with a wooded canopy and no apparent artificial drainage affecting the reference areas. Assessments would then be conducted at the most upstream point that showed a defined valley with periodic surface flow, and continuing downstream until a perennial flow feature was identified. Data collected from these assessments would then used to determine the points at which headwater valleys form channel and fluvial features.

An extensive search was conducted in an attempt to locate reference stream systems. Numerous potential sites were identified; however, the majority of these sites had been drained for agricultural purposes or local topography had been modified through forestry practices in the past. Initially, four reference reaches along two headwater drainages were identified in close

proximity to Aurora, NC. To provide additional data, eight reference reaches were identified along three headwater drainages within the Croatan National Forest, south of New Bern, NC. These reference sites are summarized as follows.

UT to Bailey Creek: Two reference reaches were surveyed on an unnamed tributary to Bailey Creek. Drainage areas for the upstream and downstream reaches are 88 and 94 acres, respectively. The upstream reach (UTBA-1A) exhibits wrack lines, scour features, and a somewhat braided flow pattern. In some locations, flow is confined but the channel is not well defined. Further downstream, the valley slope increases and the stream flow becomes confined to a single thread, meandering channel. This area was surveyed as the downstream reference reach (UTBA-1B). Channel dimension is relatively consistent, with riffle and pools formed by both channel meanders and woody debris.

UT to South Creek: Two reference reaches were surveyed on an unnamed tributary to South Creek. Drainage areas for the upstream and downstream reaches are 215 and 250 acres, respectively. The upstream reach (UTSC-1A) was surveyed approximately 600 feet downstream of NC Route 306. Along this upstream reach, flow patterns are diffuse and braided, with a considerable amount of subsurface flow during field surveys. Further downstream, the valley slope increases and the stream flow becomes confined to a single thread, meandering channel. This area was surveyed as the downstream reference reach (UTSC-1B), and is located approximately 400 feet downstream from UTSC-1A, and 400 feet upstream of a powerline transmission corridor. Channel dimension along this downstream reach is relatively consistent, with riffle and pools formed by both channel meanders and woody debris.

UTs to Brice Creek: Eight reference reach sites were identified along three separate headwater tributaries to Brice Creek in the Croatan National Forest, south of New Bern. These sites were identified as potential reference reaches through the help of NCDWQ staff who had reviewed the sites in the past. The three tributary drainages were labeled Sites 1, 2, and 3; Site 1 was the northern most site and Site 3 was the southern most site.

Three reference reaches were identified and surveyed along Site 1. Drainage areas for the three reaches from upstream to downstream (UTBR-1A, UTBR-1B, and UTBR-1C) are 96, 160, and 230 acres, respectively. UTBR-1A is the most upstream reach and exhibits diffuse flow patterns across a wetland floodplain, with few distinct channel features. UTBR-1B is the middle reach within the drainage and exhibits a more braided flow pattern with some sections of defined channel bed and banks. UTBR-1C is the further reach downstream and was located in an area where overall valley slope increases. The reach exists as a single thread, meandering stream channel with well defined bed and banks and a relatively constant channel dimension.

Three reference reaches were also identified along Site 2. Drainage areas were smaller than those identified for Site 1. Drainage areas for the three reaches from upstream to downstream (UTBR-2A, UTBR-2B, and UTBR-2C) are 25, 42, and 61 acres, respectively. The flow characteristics for each reach were similar to Site 1, with the most upstream reach (UTBR-2A) exhibiting diffuse flow with poorly defined channel features, the middle reach (UTBR-2B) exhibiting braided flows, and the downstream reach (UTBR-2C) exhibiting a single thread, meandering channel form.

Two reference reaches were identified along Site 3, which is a separate drainage just to the south of Site 2. Drainage areas for the two reaches from upstream to downstream (UTBR-3A and UTBR-3B) are 45 and 58 acres, respectively. The most upstream reach (UTBR-3A) exhibiting braided and diffuse flow with some channel features that were not consistent and were not well

defined along the reach length. The downstream reach (UTBR-3B) exhibiting a single thread, meandering channel form with well defined bed and banks.

Determining the Factors Affecting Channel Formation

Most stream restoration projects that have been completed in the Coastal Plain have involved the construction of a single-thread, meandering stream channel. As discussed in *Information Regarding Stream Restoration with Emphasis on the Coastal Plain* (2007), restoration of a single-thread channel is likely not appropriate for many headwater systems. In some situations, formation of a wetland valley with braided, diffuse flow will be more appropriate. By performing assessments on a range of reference sites (i.e. varying drainage areas, valley slopes, and channel definition), our goal was to determine the conditions under which different channel features (or no channel features at all) are formed. This understanding would allow for predicting the conditions under which various channel forms are developed, which could then be applied to future stream restoration projects in Coastal Plain headwater streams.

As discussed previously, we identified several reference sites that began as defined valleys with indications of periodic surface flows, and developed into more defined stream systems down valley as drainage area increased. Once these drainages were identified, specific reference reaches were delineated along the fall of the valley and survey were conducted to document channel form (or lack of channel form). Reference reaches were divided into three categories based on visible channel form:

Poorly Defined Channel - These systems exhibit a defined valley and evidence of periodic surface flow, but lack defined channel features. Channel bed and bank features cannot be identified, or if they can be identified, are poorly defined and only evident for short distances before their definition is lost. These reaches were commonly found at the upper most portions of the headwater drainage where flow events are not frequent and do not have sufficient energy to form channel features.

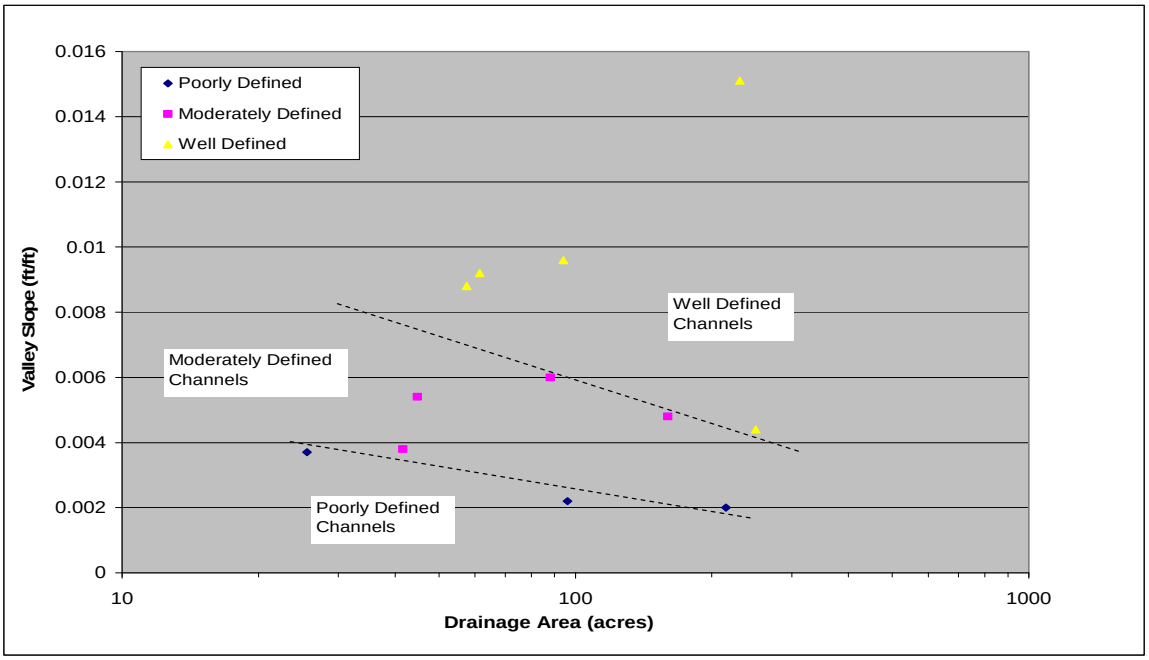
Moderately Defined Channel – These systems exhibit relatively constant bed and bank features, but the channel dimensions (cross-sectional area and shape) are highly variable. Flows are confined to one variable size channel in some areas, and multiple thread channels in other areas. Channel form appears to be defined mostly through localized scour, small debris jams, and vegetation.

Well Defined Channel – These systems can be considered typical, single-thread reference reach quality channels. Channel banks are obvious and constant, and sandy bed material is common. Channel dimension is relatively constant, with alternating riffle and pool areas. Some pools are formed by stream meanders while others are formed by scour from woody debris. Channel form is defined primarily through fluvial processes.

Each identified reference reach was surveyed along approximately 200 feet of its length. Cross-sections were surveyed at representative locations to document the dimension of any channel features, the width of the valley, and the general topography of the valley bottom. A longitudinal profile was also surveyed along the apparent center of the flow pathway, to determine overall slope, depth of a pools and riffles (if present), and variations in topography. Along reference reaches that exhibited well defined channels, surveys methods followed those used for traditional reference reach stream surveys that document channel dimension, pattern, and profile.

In simplest terms, the energy of flowing water is determined by its velocity and depth. Formation of a defined stream channel begins when flowing water has sufficient energy to begin the processes of scour, headcutting, and sediment transport. We used valley slope as a surrogate for flow velocity: the higher the valley slope, the higher the velocity of flowing water in the stream system during storm events. We used drainage area as a surrogate for flow depth and quantity: the higher the drainage area, the higher the volume of water (and depth of flowing water) for a given storm event. Each surveyed reference reach was classified as either a poorly defined, moderately defined, or well defined channel, based on visual observations during field surveys. Valley slope and drainage area data for each surveyed reference reach is provided in Chart 1 below.

Chart 1. Headwater reference reach data relating channel formation to drainage area and slope.



The collected data indicate that channel form can be predicted by measurements of valley slope and drainage area. As valley slope and drainage area increase, the energy of flowing water also increases and tends to form more defined stream channels. While boundaries have been placed on the graph to illustrate approximate ranges for each channel type, these boundaries should not be considered as distinct thresholds that trigger a change from one channel form to another. The data should be used to indicate ranges in which a particular channel form is likely to develop. In fact, reference sites that fell near the boundary of two channel forms were often difficult to classify distinctly as one of the three defined channel forms based on visual observations. For example, a reference site that plots near the boundary between a well defined and a moderately defined channel will usually display some characteristics of both.

Other results that were derived from this analysis are summarized below:

- Drainage area alone is not a good predictor of channel form. For example, at a drainage area of approximately 100 acres, all three defined channel forms were identified on reference sites.

- The document *Information Regarding Stream Restoration with Emphasis on the Coastal Plain* (2007) states that "… According to data being assembled by NCDWQ (Periann Russell, DWQ, personal communication) watershed less than 25 acres in size will not support a headwater system." Our data agree with this assessment. All identified reference sites were based on the presence of a defined valley and upstream drainage area, and evidence of periodic surface flow. The smallest drainage area of our evaluated reference sites was approximately 25 acres.
- The document *Information Regarding Stream Restoration with Emphasis on the Coastal Plain* (2007) also states that "… Typically, sites with watersheds less than 100 acres would not support a stream with defined bed and bank." Our data do not support this assessment. We identified two separate reference sites with drainage areas of 57 and 61 acres that displayed consistent bed and bank features, and well as fluvial bedform features. These sites were located within relatively steep valleys, where the small headwater valley transitioned into a deeper valley of a larger stream system.

Acknowledgements

The author would like to thank PCS Phosphate, who sponsored the research presented in this paper and provided access to field sites and past data. CZR, Inc. and specifically Ms. Julia Berger provided invaluable assistance with identification and review of potential reference sites, and evaluation of collected data. The North Carolina Division of Water Quality (Ms. Periann Russel) provided information regarding the location of reference sites within the Croatan National Forest.

References

US Army Corps of Engineers and North Carolina Division of Water Quality. April 4, 2007. *Information Regarding Stream Restoration with Emphasis on the Coastal Plain*.

21.0 APPENDIX G – JURISDICTIONAL WETLAND DETERMINATION

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. SAW-2008-02655 County: Beaufort U.S.G.S. Quad: Ransomville

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner/Agent: Chad Poole
Address: 4858 Sidney Road
Belhaven, North Carolina
27810
Telephone No.: 252-943-1932

Property description:
Size (acres) 125 acres
Nearest Waterway Sait Claire's Creek
USGS HUC 03020104
Nearest Town Bath
River Basin Tar-Pamlico
Coordinates N 35.452835 W -76.76.726215
Location description 125 acre tract (Pin#: 15005359) located on Peoples Road (SR 1738) off Highway 99 adjacent to Saint Claire's Creek in Bath, Beaufort County, North Carolina.

Indicate Which of the Following Apply:

A. Preliminary Determination

_ Based on preliminary information, there may be wetlands on the above described property. We strongly suggest you have this property inspected to determine the extent of Department of the Army (DA) jurisdiction. To be considered final, a jurisdictional determination must be verified by the Corps. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).

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 and Section 404 of the Clean Water Act. 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.

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

_ We strongly suggest you have the wetlands on your property delineated. Due to the size of your property and/or our present workload, the Corps may not be able to accomplish this wetland delineation in a timely manner. For a more timely delineation, you may wish to obtain a consultant. To be considered final, any delineation must be verified by the Corps.

X The wetland on your property 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 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 property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

X 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 Washington, NC, at (252) 946-6481 to determine their requirements.

Action Id. SAW-2008-02655

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). If you have any questions regarding this determination and/or the Corps regulatory program, please contact David L. Shaeffer at 252-975-1616 ext. 30.

C. Basis For Determination

This site exhibits wetland criteria as described in the 1987 Corps Wetland Delineation Manual and is part of a broad continuum of wetlands connected to Saint Claire'sCreek, a tributary of the Pamlico River.

D. Remarks

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

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

District Engineer, Wilmington Regulatory Division
Attn:David L. Shaeffer, Project Manager,
Washington Regulatory Field Office
Post Office Box 1000
Washington, North Carolina 27889

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 District 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 11/16/2008.

It is not necessary to submit an RFA form to the District Office if you do not object to the determination in this correspondence.

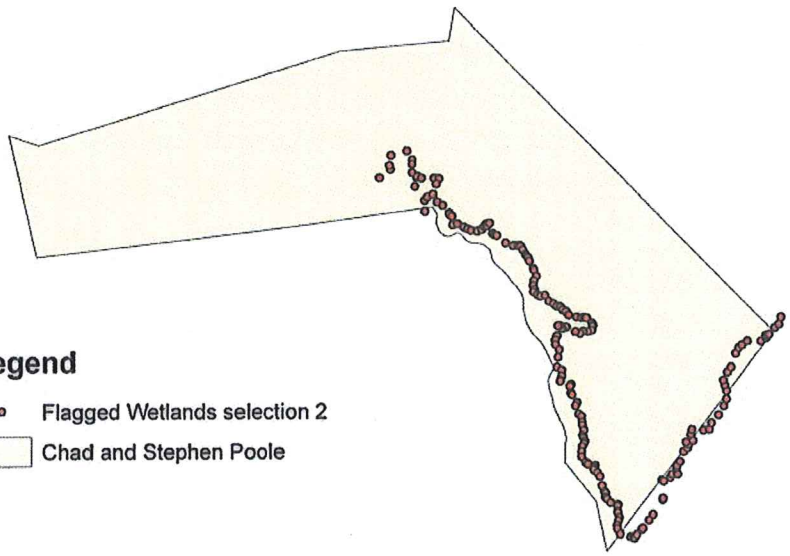
Corps Regulatory Official: 

Date 09/16/2008 Expiration Date 09/16/2013

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 http://regulatory.usacesurvey.com/ to complete the survey online.

Copy furnished:

Wetland as Flagged
on
Stephen and Chad Poole Tracts
Bath, NC
(Pin # 15005359)



Legend

- Flagged Wetlands selection 2
- Chad and Stephen Poole

0 700 1,400 2,800

Feet

22.0 APPENDIX H – RESPONSE TO EEP COMMENTS ON DRAFT MITIGATION PLAN

Michael Baker Engineering, Inc.
8000 Regency Parkway
Suite 600
Cary, North Carolina 27518
Phone: 919.463.5488
Fax: 919.463.5490

July 2, 2013

NCDENR Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652
Attn: Ms. Heather Smith, Project Manager

Subject: Response Letter to NCEEP Review Comments
St. Clair Creek Draft Mitigation Plan
Service Contract No. 003986
NCEEP Project ID No. 95015
RFP No. 16-003570
Baker Project No. 125116.

Dear Ms. Smith,

Please find enclosed the Final Draft Mitigation Plan and our responses to your review comments dated May 20, 2013, regarding the St. Clair Creek Stream & Wetland Restoration Project located in Beaufort County, NC. We have revised the Draft Mitigation Plan documents to produce the Final Draft Mitigation Plan in response to the referenced review comments:

1. General: Change EEP Project ID No. to 95015 everywhere and include Contract Number as 003986.

Response: Changed the NCEEP Project ID No. to 95015 and included the Contract Number on the Title Sheet.

2. Executive Summary: 2nd paragraph, remove last two sentences.

Response: Removed the last two sentences.

3. Executive Summary: 3rd paragraph, remove "although it is not located in a Local Watershed Planning (LWP) area".

Response: Removed "although it is not located in a Local Watershed Planning (LWP) area".

4. Executive Summary: 3rd paragraph, change NCEEP to RBRP.

Response: Changed NCEEP to RBRP.

5. Executive Summary: Table ES.2, remove references to microtopography.

Response: Removed references to microtopography from Table ES.2.

6. Section 1.0: 5th paragraph, change NCEEP to RBRP.

Response: Changed NCEEP to RBRP.

7. Section 2.0: Page 2-2 remove period after 1st paragraph.

Response: Removed period after 1st paragraph.

8. Section 2.0: Include a brief description of watershed assessment method and discussion on any watershed hydrology calculations performed.

Response: Included a brief statement in regards to using USGS quad maps and LiDAR data to delineate the watersheds for both UT2 and UT3.

9. Figure 2.5: Adjust figure so soil map abbreviation appears for the areas with UT3 and portions of UT2

Response: Adjusted Figure 2.5 to lower the abbreviation for Tomotley fine sandy loam (To) from underneath the legend.

10. Section 6.0: Page 6-1 & 6-2, remove Non-forested Wetland Credits portion of the table.

Response: Removed Non-forested Wetland Credits portion of the table.

11. Section 7.1.2: Provide additional information on the proposed minor grading activities. Note that the USACE may consider any grading of the surface in excess of 6" as wetland creation and not wetland restoration.

Response: While deeper grading along the centerline of the valley will be required in places in order to avoid any hydrologic trespass, the amount of grading has been minimized as much as possible. Also, grading activities within the boundaries of the proposed wetland restoration areas are anticipated to be less than six inches, thereby reducing the concerns over possible wetland creation claims. The proposed restored headwater valley will tie into existing ground outside of the proposed wetland restoration areas. Only areas of unnatural topography such as hummocks or spoil piles will be significantly graded within the proposed wetland restoration boundaries. Some grading may be required to smooth areas created during timbering activities within these areas. A statement has been added within Section 7.1.2 that all grading within the proposed wetland restoration areas is anticipated to be less than 6 inches and will occur only in limited areas.

12. Section 7.1.2: include NCWAM classification of Headwater Forest.

Response: Included NCWAM classification of Headwater Forest.

13. Section 7.1.2: indicate wetland grading will not encompass the entire area.

Response: See response to comment 11above.

14. Section 9.1.1: Indicate whether monitoring gauges will be on each tributary, to document flow success.

Response: Indicated that monitoring gauges will be installed on UT2 and UT3 in order to document flow success.

15. Section 9.2.2: Wetland hydrology success criteria need to be stated as a percent of the growing season. The current description will generate comments similar to UT to Mill Swamp during the IRT review.

Response: Changed the success criteria to be 12% of the growing season.

16. Table 10.1: The first three rows covering dimension, pattern, and profile, don't seem to be relevant to this type of restoration, and were not mentioned in the narrative. Unless these are in some other way relevant to the project, please remove, or explain their relevance in the narrative.

Response: Removed the dimension, pattern, and profile rows. The sediment sampling row was also removed.

17. Section 16.0: On page 16-6 –Include a letter or e-mail from Beaufort County floodplain manager indicated that there was no action needed regarding FEMA compliance

Response: A copy of the email from the Beaufort County Floodplain Manager stating that no action is needed regarding FEMA compliance has been included in Section 16.

18. Section 17.1.1: On page 17-2 of Table 17.1 – In the document, it indicated that UT2 and UT3 are intermittent streams. However, the feature type for UT2 and UT3 in the table 17.1 stated as ditches. Double check and explain.

Response: Changed UT2 rating to Perennial Channelized Stream and UT3 rating to Intermittent Channelized Stream. The stream calls are described/explained in Section 17.1.1 and stream forms are included in the appendices.

19. Section 17.3.2: Page 17-13, show data for UT3 in Table 17.3

Response: Included data for UT3 in Table 17.3.

20. Section 17.6.2: 4th paragraph highest hydroperiod for Ref. Well 2 is 35.8%, correct range and state whether rainfall was normal in the reviewed years.

Response: Corrected hydroperiod range and added a column to Table 17.6 which included the drought conditions during the growing season for the reviewed years. This information is broken into percentage of the growing season for each drought category that occurred that year. This information is from the NCDENR Division of Water Quality, Drought Monitor History for Beaufort County.

21. Construction Sheets: Correct EEP address on the title sheet, 217 West Jones St, Raleigh, NC 27603.

Response: Corrected the NCEEEP address on title sheet.

22. Sheet 6- Explain grading outside of conservation easement.

Response: The construction of the graded valley will continue until the existing farm road. This proposed grading will be conducted to avoid the stream being abruptly funneled/transitioned down and allow for natural multi-thread channel formation.

23. Show location of construction entrance, temporary stream crossings and permanent stream crossings on the erosion control plan.

Response: The locations of construction entrances are currently shown on Sheet EC-4 off of the public road (Peoples Road). The locations of the Temporary Stream Crossings have been added. There are no proposed Permanent Stream Crossings proposed, but the locations of the proposed culverts have been called out on Sheet EC-6.

If you have any questions concerning the Final Draft Mitigation Plan or Baker's responses to your comments, please feel free to contact me at 919-481-5748 or via email at jbyers@mbakercorp.com. We look forward to the Mitigation Plan approval and Task 3 milestone completion.

Sincerely,

Jacob Byers, P.E., Project Manager
Michael Baker Engineering, Inc.

23.0 APPENDIX I – NCIRT COMMENTS ON FINAL DRAFT MITIGATION PLAN AND RESPONSE

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

REPLY TO
ATTENTION OF:

CESAW-RG/Crumbley 15 August, 2013

MEMORANDUM FOR RECORD

SUBJECT: St. Clair Creek Restoration Project- NCIRT Comments During 30-day Mitigation Plan Review

PURPOSE: The comments and responses listed below were posted to the NCEEP Mitigation Plan Review Portal during the 30-day comment period in accordance with Section 332.8(g) of the 2008 Mitigation Rule.

NCEEP Project Name: St. Clair Creek Restoration Project, Beaufort County, NC

USACE AID#: SAW-2008-02655
NCEEP #: 95015

30-Day Comment Deadline: 14 August, 2013

1. *T. Crumbley, USACE; 13 August, 2013*:

- Pg. 9-1, 9.1.1, We have a concern over the number of events proposed for meeting success. It is proposed for these headwater features to have gauges installed within the braided channels along with visual documentation of surface water flow for 30 consecutive days for only 2 events within 5 years. Due to the small drainage areas for these features (32 ac on UT3 and 90 ac on UT2), please be advised that if UT2 or UT3 does not meet the 30 day flow requirement, or exhibit a prevalence of OHWM indicators as defined in RGL 05-05, these areas may be subject to reductions in stream credit generation.
- Pg. 11-1, In the Final Mitigation Plan, the long-term management plan discussion should be expanded upon. Particularly if the site is to be transferred to the NCDENR Stewardship Program.

2. *Eric Kulz, NCDWR; 14 August, 2013*:
    - DWR CO has reviewed the mitigation plan, and the site appears to be a good candidate for restoration. In addition, DWR WaRO staff visited the site on Monday, 8/12 and concurred that we have no comments.
    - FYI looking at Figure 2.2, it was unclear why the watershed delineation for UT 2 ended at Peoples Road. I calculated the watershed sizes using the USGS streamstats website, and they may be larger than reported. Streamstats calculated 358 acres for UT 2 and 43 acres for UT 3, so they may be larger than reported. Also, WaRO personnel confirmed fairly well-defined valleys (for Beaufort County) on the site.

Michael Baker Engineering, Inc.
8000 Regency Parkway
Suite 600
Cary, North Carolina 27518
Phone: 919.463.5488
Fax: 919.463.5490

August 20, 2013

US Army Corps of Engineers
11405 Falls of Neuse Road
Wake Forest, NC 27587
Attn: CESAW-RG/Crumbley

Subject: Response Letter to NCIRT Comments
St. Clair Creek Final Draft Mitigation Plan
Service Contract No. 003986
NCEEP Project ID No. 95015
RFP No. 16-003570
Baker Project No. 125116.

Dear Mr. Crumbley,

Please find enclosed the Final Draft Mitigation Plan and our responses to your review comments dated August 15, 2013, regarding the St. Clair Creek Stream & Wetland Restoration Project located in Beaufort County, NC. We have revised the Final Draft Mitigation Plan documents to produce the Final Mitigation Plan in response to the referenced review comments:

T. Crumbley, USACE; 13 August, 2013

- **Pg. 9-1, 9.1.1, we have a concern over the number of events proposed for meeting success. It is proposed for these headwater features to have gauges installed within the braided channels along with visual documentation of surface water flow for 30 consecutive days for only 2 events within 5 years. Due to the small drainage areas for these features (32 ac on UT3 and 90 ac on UT2), please be advised that if UT2 or UT3 does not meet the 30 day flow requirement, or exhibit a prevalence of OHWM indicators as defined in RGL 05-05, these areas may be subject to reductions in stream credit generation.**

Response: Baker understands this concern but we feel confident that the success criteria can be achieved as stated.

- **Pg.11-1, in the Final Mitigation Plan, the long-term management plan discussion should be expanded upon. Particularly if the site is to be transferred to the NCDENR Stewardship Program**

Response: The following language was added to Section 11.0:

The NCDENR Division of Natural Resource Planning and Conservation's Stewardship Program currently houses EEP stewardship endowments within the non-reverting, interest-bearing Conservation Lands Stewardship Endowment Account. The use of funds from the Endowment Account is governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used only for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable. The NCDENR Stewardship Program intends to manage the account as a non-wasting endowment. Only interest generated from the endowment funds will be used to steward the compensatory mitigation sites. Interest funds not used for those purposes will be re-invested in the Endowment Account to offset losses due to inflation.

Eric Kulz, NCDWR; 14 August, 2013

- **DWR CO has reviewed the mitigation plan, and the site appears to be a good candidate for restoration. In addition, DWR WaRO staff visited the site on Monday, 8/12 and concurred that we have no comments.**

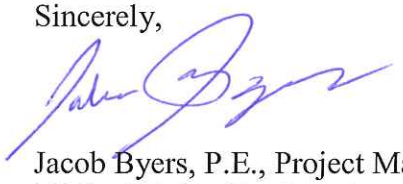
Response: Noted.

- **FYI looking at Figure 2.2, it was unclear why the watershed delineation of UT2 ended at Peoples Road. I calculated the watershed sizes using the USGS streamstats website, and they may be larger than reported. Streamstats calculated 358 acres for UT2 and 43 acres for UT3, so they may be larger than reported. Also, WaRO personnel confirmed fairly well-defined valleys (for Beaufort County) on the site.**

Response: While using the Streamstats website is a great tool that I've found to be very helpful on other recent projects, particularly in the mountains and piedmont, I feel that in this particular case it does not account for man-made drainage ways very well. Looking solely at the LIDAR data, I would agree with the Streamstats delineation but field investigations showed that significant portions of this drainage area are intercepted by roadside ditches and canals and diverted around the headwaters of this project. Some of this drainage does however flow into UT2 directly below the downstream terminus of the restoration project.

If you have any questions concerning the Final Draft Mitigation Plan or Baker's responses to your comments, please feel free to contact me at 919-481-5748 or via email at jbyers@mbakercorp.com. We look forward to the Final Mitigation Plan approval and anticipate Nationwide Permit authorization by the end of October.

Sincerely,



Jacob Byers, P.E., Project Manager
Michael Baker Engineering, Inc.

24.0 APPENDIX J – NCIRT FINAL APPROVAL LETTER

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

REPLY TO
ATTENTION OF:

3 September, 2013

Regulatory Division

Re: NCIRT Review and USACE Approval of the St. Clair Creek Draft Mitigation Plan; SAW 2008-02655; EEP# 95015

Mr. Tim Baumgartner
North Carolina Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

Dear Mr. Baumgartner:

The purpose of this letter is to provide the North Carolina Ecosystem Enhancement Program (NCEEP) with all comments generated by the North Carolina Interagency Review Team (NCIRT) during the 30-day comment period for the St. Clair Creek Draft Mitigation Plan, which closed on 14 August, 2013. 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. However, the minor issues with the Draft as discussed in the attached comment memo 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 and a summation of the addressed comments. 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 919-846-2564.

Sincerely,

Tyler Crumbley
Regulatory Specialist

Enclosures

Electronic Copies Furnished:

NCIRT Distribution List
CESAW-RG/Wicker
CESAW-RG-W/Steffens
Heather Smith, NCEEP

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

REPLY TO
ATTENTION OF:

CESAW-RG/Crumbley 15 August, 2013

MEMORANDUM FOR RECORD

SUBJECT: St. Clair Creek Restoration Project- NCIRT Comments During 30-day Mitigation Plan Review

PURPOSE: The comments and responses listed below were posted to the NCEEP Mitigation Plan Review Portal during the 30-day comment period in accordance with Section 332.8(g) of the 2008 Mitigation Rule.

NCEEP Project Name: St. Clair Creek Restoration Project, Beaufort County, NC

USACE AID#: SAW-2008-02655
NCEEP #: 95015

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