

**UT Pembroke Creek Wetland  
and Stream Restoration Site  
Repair Baseline Report  
Project # 283  
Chowan County**



Submitted to:



NCDENR-EEP, 1652 Mail Service Center, Raleigh, NC 27699-1652

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## 1.0 **Introduction**

### 1.1 **Site Description**

The North Carolina Ecosystem Enhancement Program (EEP) restored, enhanced, and preserved wetlands and restored a headwater wetland valley, which is analogous to a stream in this setting at the UT Pembroke Creek Site in Chowan County, North Carolina. The 59-acre site is located within the USGS 8-digit HUC 03010205 of the Pasquotank River Basin. Prior to restoration, the site was planted in row crops and had been ditched since the 1920's. The restoration project, completed in the fall of 2007, restored and enhanced the wetland by filling the ditches and focusing the hydrology into headwater wetland valleys. The project also preserved a large forested wetland and decommissioned an animal waste lagoon adjacent to the project. The project goals and objectives are listed below.

**Goal:** Modify the channelized water features, based on reference condition, with the intent to restore the site's primary wetland functions such as nutrient cycling, flood storage, and providing wildlife habitat.

#### **Objectives:**

- Improve water quality in the basin by filtering nutrients through on-site wetlands.
- Buffer flood flows downstream by increasing infiltration and storage areas.
- Design a waterway through the wetland complex with appropriate cross-section, slope, and pattern as to provide nutrient filtering, flood storage, and wildlife habitat while meeting the appropriate success criteria for the wetland.
- Improve terrestrial and aquatic habitat diversity.
- Establish a contiguous buffer along the project that can serve as a migration corridor for local fauna.
- Use natural materials and native vegetation into the proposed restoration design to the greatest extent possible.
- Establish a native forested riparian plant community within the non-wetland buffer area.
- Establish a headwater wetland community.
- Provide an aesthetically pleasing landscape.

### 1.2 **Adaptive Management Needs**

The two roads that divided the site into three separate pieces were site constraints in the original design of the project. One road (Road A) runs east-west and separates the two large restoration parts of the project, and the other road (Road B) runs north-south and separates most of the preservation part of the site from the restoration part. The restoration installed road crossings on each road so that water can flow over the roads to provide hydrologic connection throughout the site. Even with the installation of the crossings, these two roads were still impeding the flow of water through the wetland. There is also a structure at the bottom of the site that transitions the flow to a single thread channel. The elevation of this structure was impeding the natural flow of water through the site.

These issues mentioned above caused long durations of standing water that negatively affected the planted stem survivability. In other parts of the site *Juncus effusus* has become so thick and tall that it was out-competing the planted vegetation.

### **1.3 Additional Project Information**

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in project monitoring reports. Narrative background and supporting information can be found in the mitigation and restoration plan documents available on the EEP's website. All raw data supporting the tables and figures in the appendices are available from the EEP upon request.

## **2.0 Repair Approach**

### **2.1 Description**

In early June 2010, KCI conducted a site survey at the UT Pembroke Site. This survey was used to verify the existing elevations of the roads, the road crossings, the grade transition structure, and the elevations of the surrounding wetland areas. The information from this survey was used to develop the Conceptual Plan (October 2010) for repairs at the UT Pembroke Site to correct the failures described in Section 1.2. The repairs were implemented in September 2011 and supplemental planting occurred in December 2011.

#### **2.1.1 Piped Road Crossings**

Three drainage pipes were installed under Road A. The pipes are 8" schedule 40 PVC. These pipes increase the volume of water that can flow from the northern to the southern half of the site without flowing over the top of the road. The exact location of the pipes and the elevation of the pipe inverts were determined in the field during construction. The invert elevations are shown in the repair record drawings. These elevations were chosen to hydrologically connect the wetlands on either side of the road. The most easterly pipe was installed with a different type of inlet, because it needed to be buried deep enough below the road grade. A picture of this inlet can be found in Appendix A.

#### **2.1.2 Additional Road Crossing**

To reduce the quantity of standing water in the depressional area adjacent to Road B an additional road crossing was installed. As designed, this crossing does not eliminate the standing water, because this depression is naturally the lowest part of the site and parts of it are still lower than the new crossing, but it has reduced the area of standing water. The lowest elevation of the road adjacent to the depression prior to the repair was 15.5'. The elevation of the new road crossing is approximately 14.6'.

#### **2.1.3 Alteration to Grade Transition Structure**

The grade transition structure at the downstream end of the site contributed to the ponding and long hydroperiod at the site. The top of the structure was originally set at 15.0'. To reduce the amount of standing water in the preservation wetland, the top two logs at the top of the structure were removed and the stone base of the step was graded down by approximately one foot. The second log structure was rebuilt to repair piping and lowered to approximately 13.9' in elevation. These measures still maintain a small ponded area at the southern part of the preservation wetland; however, this structure no longer influences the flow and hydroperiod on the western side of Road B.

#### **2.1.4 Additional Planting**

The site was also planted with additional native trees. These plantings included: 1” caliper trees along some of the site boundaries and in the large areas of standing water; bare root trees in areas of low density and low diversity; and ½” caliper fabricated root ball trees in other parts of the site with low survivability due to excessively long hydroperiods. The plant list and quantities are included in Table 4.

### **2.2 Repair Goals and Objectives**

The project accomplished the goals of this repair by implementing the objectives as described below.

#### **Goals:**

- Modify the hydrology at the UT Pembroke Creek Site to decrease the amount and duration of standing water in the restored and preserved wetlands while maintaining the site’s wetland hydrology.
- Increase the site’s vegetative density, with particular attention to the areas with standing water.

#### **Objectives:**

- Add piped road crossings along Road A between the northern and southern parts of the site to facilitate surface flow.
- Build an additional road crossing on Road B, between the southern part of the site and the preservation wetland, providing a flow path for the excess standing water in the restored wetland.
- Adjust the grade transition structure at the outlet of the preservation wetland to decrease the amount of standing water in the preservation wetland.
- Plant native trees and shrubs in parts of the site that have experienced excessive mortality of the previously planted vegetation.

### **2.3 Restoration Components**

The repairs have altered the path of the headwater wetland valley. By installing the new road crossing, the headwater wetland valley crosses Road B and flows south along the eastern side of the road to the site’s downstream outlet. This change converts some area from wetland preservation to headwater wetland valley (stream) restoration. This modified flowpath coincides with the natural valley through the site. Since the road is not in the conservation easement, the 100’ corridor for the new location of the wetland valley extends to the western side of Road B. This change decreases the wetland preservation and stream restoration credit, but increases the wetland restoration credit at the site. See Tables 1 and 2 for the revised credit calculation.

## **TABLES AND FIGURES**

**Table 1. Project Restoration Components**  
**Project Number and Name: 283 - UT Pembroke**

Project Component	Restoration Level	Original Acreage / Linear Feet	Post Repair Acreage / Linear Feet	Original Stationing	Post Repair Stationing	Comment
Headwater Wetland Valley	Restoration	4,488 lf	4,355 lf*	00+00 to 34+73 and 40+00 to 58+72	00+00 to 28+39 and 30+00 to 46+07	This feature is 100 feet wide for its entire length, encompassing 9.94 acres.
Riparian Wetlands	Restoration	13.81 ac	14.41 ac	N/A	N/A	
Non-Riparian Wetlands	Restoration	4.46 ac	4.46 ac	N/A	N/A	
Non-Riparian Wetlands	Enhancement	5.26 ac	5.26 ac	N/A	N/A	
Riparian Wooded Wetlands	Preservation	8.95 ac	8.35 ac	N/A	N/A	
Non-Riparian Wooded Wetlands	Preservation	16.97 ac	16.97 ac	N/A	N/A	

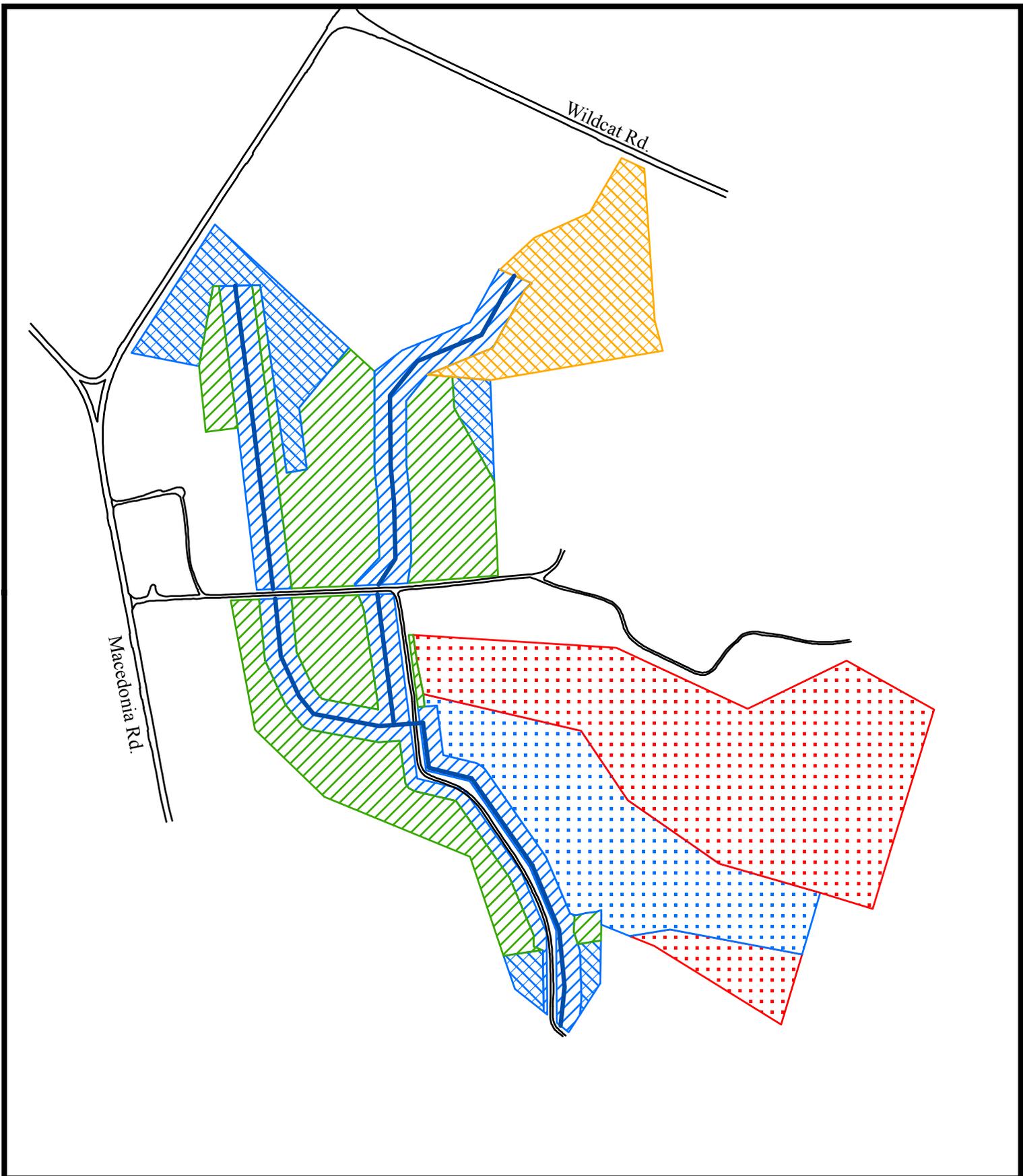
\* This length reflects the exclusion of three 30' road crossings from the creditable footage.

**Table 2. Post-Repair Component Summations**  
**Project Number and Name: 283 - UT Pembroke**

Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Riparian (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	4,355	14.41		4.46			
Enhancement				5.26			
Enhancement I							
Enhancement II							
Creation							
Preservation		8.35		16.97			
HQ Preservation							

<b>Table 3. Project Contacts Table</b>	
<b>Project Number and Name: 283 - UT Pembroke</b>	
<b>Site Maintenance</b>	
<b>Design Firm</b>	KCI Associates of NC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266
<b>Construction Contractor</b>	Land Mechanics Designs 126 Circle G Lane Willow Springs, NC 27592 Contact: Mr. Lloyd Glover Phone: (919) 639-6132
<b>Planting Contractor</b>	Bruton Natural Systems PO Box 1197 Fremont, North Carolina 27830 Contact: Mr. Charlie Bruton Phone: (919) 242-6555

<b>Table 4. Plant Quantity and Species</b>				
<b>Project Number and Name: 283 - UT Pembroke</b>				
<b>Common Name</b>	<b>Scientific Name</b>	<b>Quantity</b>		
		<b>Bare Root</b>	<b>1/2" Caliper Fabricated Root Ball</b>	<b>1" Caliper Ball and Burlap</b>
Willow Oak	<i>Quercus phellos</i>	1,000	0	10
Swamp Chestnut Oak	<i>Quercus michauxii</i>	1,000	0	0
Cherrybark Oak	<i>Quercus pagoda</i>	1,600	0	10
Water Oak	<i>Quercus nigra</i>	1,600	875	0
Green Ash	<i>Fraxinus pennsylvanica</i>	1,500	875	10
Yellow Poplar	<i>Liriodendron tulipifera</i>	0	0	10
Bald Cypress	<i>Taxodium distichum</i>	0	875	15
Swamp Tupelo	<i>Nyssa biflora</i>	0	875	0



**Figure 1. Post-Repair Site Asset Map**  
**UT Pembroke Creek, Chowan County, EEP Project # 283**

- |  |   |
|--|---|
| Wetland Valley Centerline (4,355 lf)       | Non-Riparian Wooded Wetland Preservation (16.97 ac) |
| Headwater Wetland Valley (9.94 ac)         | Riparian Wetland Restoration (14.41 ac)             |
| Non-Riparian Wetland Enhancement (5.26 ac) | Riparian Wooded Wetland Preservation (8.35 ac)      |
| Non-Riparian Wetland Restoration (4.46 ac) |   |



**APPENDIX A**

**PROJECT PHOTO LOG**



09/12/2011 – View of repair to Grade Transition Structure.



09/12/2011 – View of repair to Grade Transition Structure.



09/12/2011 – View of repair to Grade Transition Structure.



09/12/2011 – View of repair to Grade Transition Structure.



09/13/2011 – View of newly constructed road crossing immediately after installation, with previously ponded water draining across the road.



09/14/2011 – View of newly constructed road crossing after water has drawn down.



09/14/2011 – View of one of the piped road crossings immediately after installation.



09/14/2011 – View of drain inlet modification to the most eastern piped crossing.



12/08/2011 – View of 1” caliper ball and burlap tree prior to planting.



01/03/2012 – View of planted 1” caliper ball and burlap tree.



12/08/2011 – View of 1/2” caliper fabricated root ball tree prior to planting.



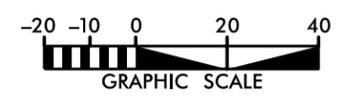
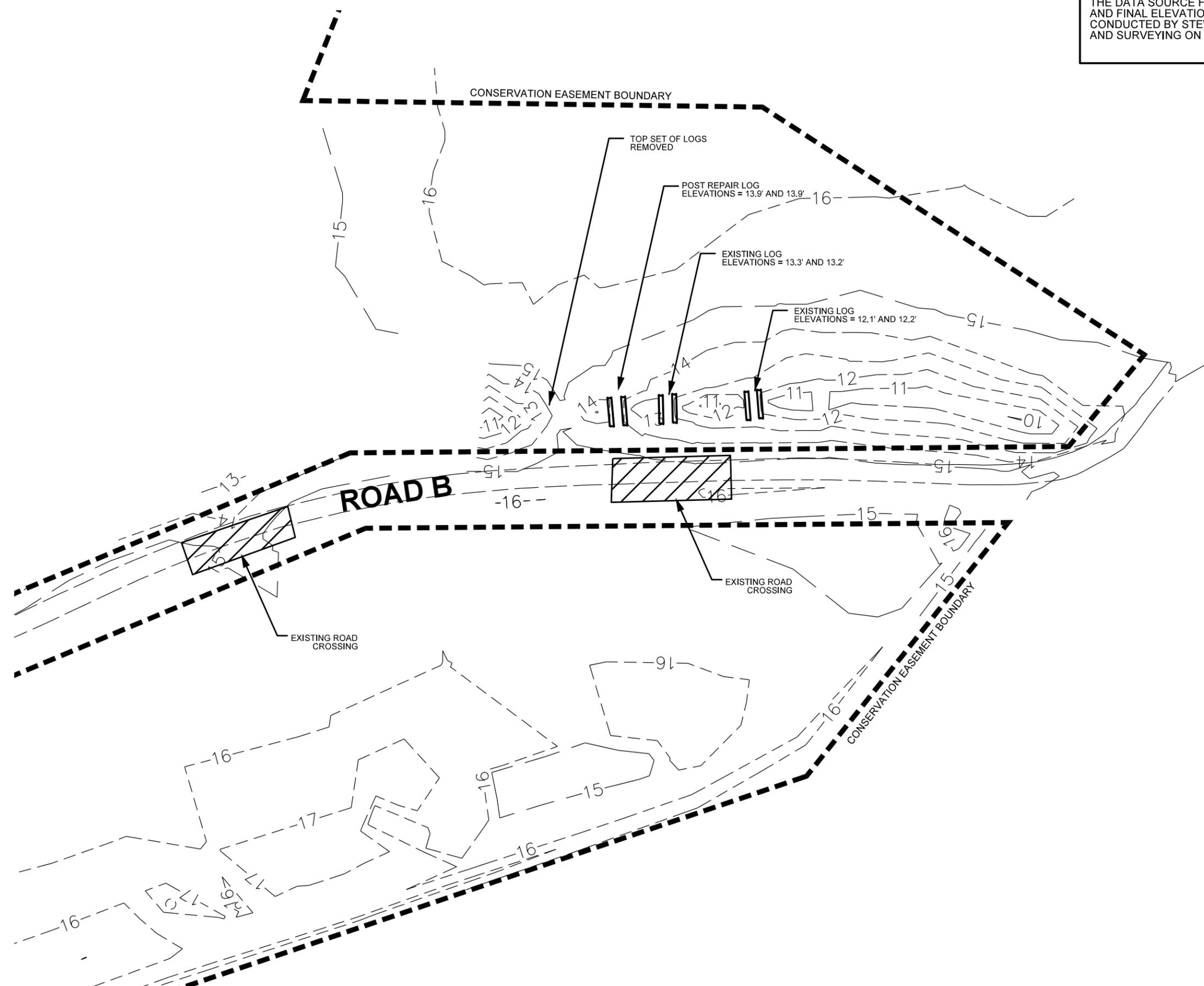
12/08/2011 – View of 1/2” caliper fabricated root ball trees prior to planting.

**APPENDIX B**

**RECORD DRAWINGS**



THE DATA SOURCE FOR THE REPAIR LOCATIONS AND FINAL ELEVATIONS IS THE AS-BUILT SURVEY CONDUCTED BY STEWART - PROCTOR ENGINEERING AND SURVEYING ON OCTOBER 10, 2011.



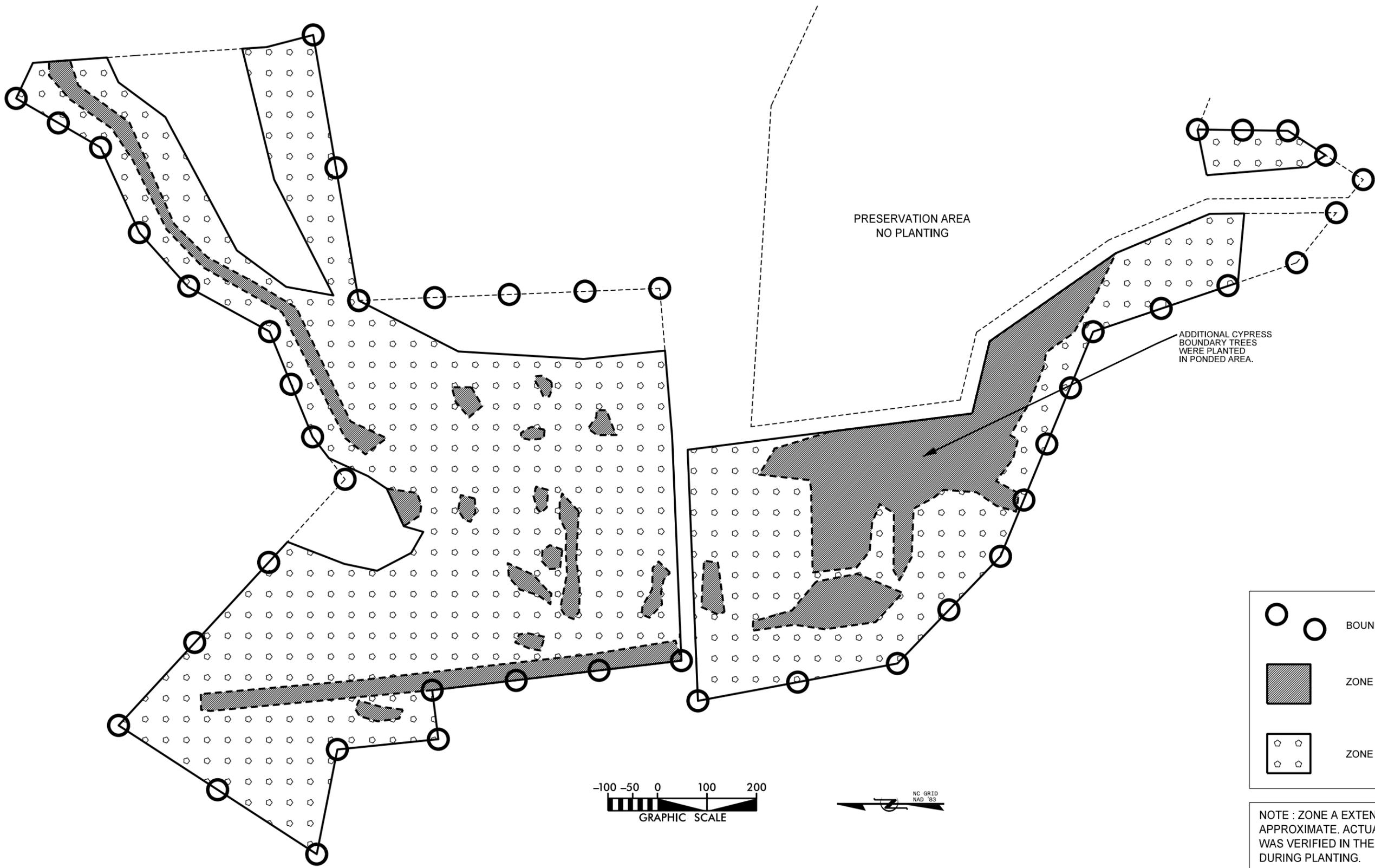
SYMBOL	DESCRIPTION	DATE	APPROVED



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UT PEMBROKE CREEK  
 REPAIRS AND PLANTING  
 EEP PROJECT #283  
 CHOWAN COUNTY, NORTH CAROLINA

DATE: FEBRUARY 2012  
 SCALE: 1" = 40'  
 REPAIR RECORD DRAWING  
 SHEET 2 OF 4



-   BOUNDARY TREES
-  ZONE A
-  ZONE B

NOTE : ZONE A EXTENT IS APPROXIMATE. ACTUAL EXTENT WAS VERIFIED IN THE FIELD DURING PLANTING.

SYMBOL	DESCRIPTION	DATE	APPROVED



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UT PEMBROKE CREEK  
REPAIRS AND PLANTING  
EEP PROJECT #283  
CHOWAN COUNTY, NORTH CAROLINA  
PLANTING - UT PEMBROKE

DATE: FEBRUARY 2012  
SCALE: 1" = 200'  
PLANTING PLAN  
RECORD  
DRAWING  
SHEET 3 OF 4

