Baseline Monitoring Document & As-Built Baseline Report

SUMMIT SEEP NON-RIPARIAN WETLAND MITIGATION SITE

RFP # 16-002835 Contract # 003244
Davidson County, North Carolina
Data Collected March 21st 2011

Prepared for:

NC Department of Environment and Natural Resources
Ecosystem Enhancement Program
1652 MailServiceCenter
Raleigh, NC27699-1652

June 2011

TABLE OF CONTENTS

APPENDICES

Executive Summary

This **Baseline Monitoring Document & As-Built Baseline Report** describes the **Summit Seep Wetland Mitigation Site (Site)** and is designed specifically to assist in fulfilling North Carolina Ecosystem Enhancement Program wetland restoration goals. The Site is located in the Targeted Local Watershed (TLW) 03040103020010, identified in the 2009 Yadkin Pee-Dee River Basin RBRP (2009 *Yadkin Pee-Dee River Basin RBRP*, NCEEP 2009). The watershed is characterized by approximately 21 percent agricultural use with approximately 12 percent of the stream length identified as impaired for aquatic life according to 2006 DWQ 303(d) data.The Site is located upslope from an unnamed tributary to North Potts Creek, which has been assigned Stream Index Number 12-112, a Best Usage Classification of **C,** and is Fully Supporting its intended uses (NCDWQ 2010b).

The 2009 *Yadkin Pee-Dee River Basin RBRP* identified stormwater runoff and other development impacts as likely contributors to turbidity and chlorophyll violations within this TLW. The Summit Seep Wetland Mitigation Project was identified as a non-riparian wetland restoration opportunity to improve water quality, enhance flood attenuation, and to restore wildlife habitat within the TLW. The project goals aim to address stressors identified in the TLW and include the following:

- Remove nonpoint sources of pollution associated with vegetation maintenance including:
  a. the cessation of broadcasting fertilizer, pesticides, and other agricultural chemicals into and adjacent to Site drainage ditches; and
  b. providing a vegetated wetland to aid in the treatment of runoff.
- Restore wetland hydro periods that satisfy wetland jurisdictional requirements and approximate the Site's natural range and variation.
- Promote floodwater attenuation by filling ditches and enhancing groundwater storage capacity.
- Restore and reestablish natural community structure, habitat diversity, and functional continuity.
- Enhance and protect the Site's full potential of wetland functions and values in perpetuity.

Located approximately five miles southwest of Lexington, in western Davidson County, the Site is upslope from the western edge of the North Potts Creek Floodplain. The single, 6.4 acre, parcel had been cleared of native forest vegetation, ditched and drained to remove groundwater hydrology from a spring and hillside seep along the western edge of the Site, and was utilized as a livestock pasture. Detailed soil mapping conducted by licensed soil scientists in February 2010 indicate that 4.1 acres of the Site contain "Class A" hydric Armenia silt loam soils, characterized by a dark gray matrix. Site soils had been impacted by land clearing, ditching, and hoof shear from livestock.

In a minimally invasive approach, Site restoration included the re-introduction of hydrology and the establishment of native regional vegetation. With existing Site soil characteristics being nearly level and slow draining, hydrology was restored by implementing low density earthen ditch plugs placed in critical areas, followed by the filling of existing ditches. This approach will restore hydrology to characteristic levels expected with Armenia silt loam, provided by year round hydrology from a groundwater spring on the uphill portion of the site. Native vegetation was reintroduced based on a reference forest, existing site vegetation and characteristic Low Elevation Seep vegetation as described in Schafale & Weakley's Classification of Natural Communities of NC. The distribution of planted species was not done in a specific manner, and all species occur throughout the 6.4 acre Site. The hydrology will be monitored using five (5) Infinities Pressure Water Level Data Loggers for a period of (7) seven years. Vegetation monitoring will follow CVS protocol at six (6) vegetation monitoring plots measuring 10 meters x 10 meters, lasting for five years or until success criteria is met.

Project Goals, Background & Attributes

Location & Setting:
Located in western Davidson County and within the 14-Digit Cataloging Unit 03040103020010 the Site is approximately five miles southwest of Lexington, NC. Within the Southern Outer Piedmont physiographic province of NC, the regional physiography is characterized by dissected irregular plains, some low rounded hills and ridges, and low to moderate gradient streams with mostly cobble, gravel, and sandy substrates (Griffith et al. 2002). The Site is upslope from the western edge of the floodplain of an unnamed tributary to North Potts Creek draining 35.6 acres. The 6.4 acre Site sits on both sides of the unnamed tributary. The 4.1 acres of restoration and enhancement is located on the western side of the Site between the unnamed tributary and a natural spring and hillside seep with hydric "A" soils consisting of Armenia silt loam. Elevations within the Site range from 690-720 feet National Geodetic Vertical Datum (USGS Lexington West, NC 7.5-minute topographic quadrangle).

Appendix A: Figure 1 – Vicinity Map

Project Goals & Objectives:
The 2009 *Yadkin Pee-Dee River Basin RBRP* identified stormwater runoff and other development impacts as likely contributors to turbidity and chlorophyll violations within this TLW. The Summit Seep Wetland Mitigation Project was identified as a non-riparian wetland restoration opportunity to improve water quality, enhance flood attenuation, and to restore wildlife habitat within the TLW.

The project goals address stressors identified in the TLW and include the following:

- Remove nonpoint sources of pollution associated with vegetation maintenance including:
  a. the cessation of broadcasting fertilizer, pesticides, and other agricultural chemicals into and adjacent to Site drainage ditches; and
  c. providing a vegetated wetland to aid in the treatment of runoff.
- Restore wetland hydro-periods that satisfy wetland jurisdictional requirements and approximate the Site's natural range and variation.
- Promote floodwater attenuation by filling ditches and enhancing groundwater storage capacity.
- Restore and reestablish natural community structure, habitat diversity, and functional continuity.
- Enhance and protect the Site's full potential of wetland functions and values in perpetuity.

The project goals will be addressed through the following project objectives:

- Providing 4.0 Non-riparian Wetland Mitigation Units (WMUS), as calculated in accordance with the requirements stipulated in RFP #16-002835, by restoring 3.91 acres and enhancing 0.18 acres of non-riparian wetland. This will be accomplished by filling ditches, removing spoil castings, excluding livestock, redirecting hydrology from a spring across the Site, and planting with native forest vegetation.
- Protecting the Site in perpetuity with a conservation easement.

Project Structure, Restoration Type & Approach

Project Structure:
Straddling an unnamed tributary which lies upslope from the western edge of North Potts Creek floodplain, the 6.4 acre conservation easement catches drainage of approximately 35.6 acres of agriculture fields. Within the western portion of the easement lays 4.1 acres of existing "Class A" hydric soils. The Armenia silt loam soils have been ditched and thus, channeling water from a hillside groundwater spring located in the southwest corner of the site, as well as hillside seepages from the western slope. After an on-site visit from the regulatory community and NCEEP, 404 and 401 permits were required by the USACE Regulatory Division and the NC Department of Water Quality to fill the ditches after they were delineated as existing wetlands. Then entire 6.4 acre site has been be fenced in and with gated access off Sam Sharpe Rd. and another gate on the eastern boundary of the project to facilitate the adjoining landowner should cattle unexpectedly enter the site.

Appendix A: Figure 2 - Project Components
Appendix A: Table 1 - Project Components and Mitigation Credits
Appendix A: Table 4 – Project Baseline Information & Attributes Table

Restoration Type
The project consists of 3.91 acres of non-riparian wetland restoration and 0.18 acres of non-riparian enhancement, for a total for 4.0 non-riparian wetland mitigation units (WMUS). Vegetation restoration aims to mimic Schafale and Weakley's *Classification of the Natural Communities of North Carolina* (1990) of a Low Elevation Seep, supplemented by reference forest and onsite observations (Table 5, Appendix A).

Approach:
The Site had previously been cleared of native forest vegetation, ditched and drained to remove groundwater hydrology from a spring and hillside seeps along the western edge of the Site. Historically the site was predominantly utilized as pasture for livestock and hay production.

The approach taken to restore the project goal of 4.0 WMUS of non-riparian wetland, and re-vegetating 5.5 acres was to reintroduce hydrology back onto the surface from groundwater sources and to replant the site with bare-root seedlings. To do so three (3) low density earthen ditch plugs were installed at the ends of the three main drainage ditches and a fourth was installed at the top of the ditch that was the largest drainage of the three. Next, the ditches were backfilled using existing spoil material adjacent to each ditch. Then the flow from the groundwater spring was redirected onto the site to facilitate surface re-hydrology. Finally, regionally specific, woody bare root stems were planted (Table 6, Appendix A).

Project History, Contact & Attribute Data:

The site is located in the Targeted Local Watershed (TLW) 03040103020010 as identified in the 2009 Yadkin Pee-Dee River Basin RBRP (2009 *Yadkin Pee-Dee River Basin RBRP*, NCEEP 2009). Situated on 6.4 acres, the Site is upslope from the western edge of the floodplain of an unnamed tributary to North Potts Creek draining 35.6 acres. The Site sits on both sides of the unnamed tributary and the 4.1 acres of restoration and enhancement lie between the unnamed tributary and a natural spring and hillside seeps with hydric "A" soils consisting of Armenia silt loam. The watershed is characterized by approximately 21 percent agricultural use with approximately 12 percent of the stream length located in this watershed identified as impaired for aquatic life according to 2006 DWQ 303(d) data. The Site is located upslope

from an unnamed tributary to North Potts Creek, which has been assigned Stream Index Number 12-112, a Best Usage Classification of **C,** and is Fully Supporting its intended uses (NCDWQ 2010b).

Appendix A: Table 2 - Project Activity & Reporting History
Appendix A: Table 3 - Project Contact
Appendix A: Table 4 - Project Baseline Information & Attributes Table

Success Criteria

Hydrology Success Criteria

Target hydrological characteristics include saturation or inundation for 7.5 percent of the growing season at a minimum of 12 inches below ground level during average climatic conditions for a period of seven (7) years. During growing seasons with atypical climatic conditions, groundwater gauges in reference wetlands may dictate threshold hydrology success criteria. These areas are expected to support hydrophytic vegetation. If wetland parameters are marginal as indicated by vegetation and/or hydrology monitoring, the site may be modified in accordance with the Hydrologic Contingency Plan detailed in this document.

Vegetation Success Criteria

Success criteria have been established to verify that the vegetation component supports community elements necessary for floodplain forest development. Dependent upon density and growth of "Characteristic Tree Species," criteria will follow the U.S. Army Corps of Engineers, Wilmington District 2003 Stream Mitigation Guidelines for successful vegetation. In which an average density of 320 stems per acre of Characteristic Tree Species must be surviving in the first three monitoring years. Subsequently, 290 Characteristic Tree Species per acre must be surviving in year 4 and 260 Characteristic Tree Species per acre in year 5. Characteristic Tree Species include planted species and species identified through inventory of a reference (relatively undisturbed) forest community used to orient the planting plan. All canopy tree species planted and identified in the reference forest will be utilized to define “Characteristic Tree Species” as termed in the success criteria.

Monitoring Plan

The Summit Seep Non-riparian Wetland Mitigation Site monitoring plan consists of a comparison between reference and restoration areas along with evaluation of jurisdictional wetland criteria (Environmental Laboratory 1987). Monitoring will entail analysis of two primary parameters: hydrology and vegetation. Monitoring of restoration efforts will be performed for a minimum of 5 years or until success criteria are fulfilled. The detailed monitoring plan is depicted in As-Built Sheet D, Appendix C.

Hydrology

Measurement of wetland hydrology will be performed in accordance with traditional methods as per the April 2003 USACE Wilmington District Stream Mitigation Guidelines. Six (6) continuously recording, surficial monitoring gauges were installed in accordance with specifications in *Installing Monitoring Wells/Piezometers in Wetlands* (NCWRP 1993); five (5) site gages and one (1) reference gauge (Sheet D, Appendix C). The fifth monitoring gauge was installed on June, 8th 2011 per EEP recommendations received on May 31st 2011. Monitoring gauges were set to a depth of approximately 24 inches below the soil surface. Screened portions of each gauge were surrounded by filter fabric, buried in screened well

sand, and sealed with a bentonite cap to prevent siltation and surface flow infiltration during floods. Data will be downloaded at least every 30 days during the growing season. Additionally, an electronic rain water recording gauge was installed at the site.

Hydrological sampling will be performed in restoration and reference areas during the growing season. The growing season will be based on the USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coasts Plain Region 2010. Which states:

> *The growing season has begun on a site in a given year when two or more different non-evergreen vascular plant species growing in the wetland or surrounding areas exhibit one or more of the following indicators of biological activity:*
>
> *a. Emergence of herbaceous plants from the ground*
> *b. Appearance of new growth from vegetative crowns (e.g., in graminoids, bulbs, and corms)*
> *c. Coleoptile/cotyledon emergence from seed*
> *d. Bud burst on woody plants (i.e., some green foliage is visible between spreading bud scales)*
> *1. Emergence or elongation of leaves of woody plants*
> *f. Emergence or opening of flowers*
>
> *The end of the growing season is indicated when woody deciduous species lose their leaves and/or the last herbaceous plants cease flowering and their leaves become dry or brown, generally in the fall due to cold temperatures or reduced moisture availability. Early plant senescence due to the initiation of the summer dry season in some areas does not necessarily indicate the end of the growing season and alternative procedures (e.g., soil temperature) should be used.*

Vegetation
The monitoring of planted vegetation will follow the Carolina Vegetation Survey (CVS) EEP Protocol for Recording Vegetation (Lee et al. 2006) between June 1 and September 30 until the vegetation success criteria are achieved. Six, 10 by 10-meter vegetation plots have been placed within the 4.1 acres of restored and enhanced wetlands (Sheet D, Appendix C). Vegetation will receive a visual evaluation on a periodic basis to ascertain the degree of overtopping of planted elements by nuisance species.

Maintenance and Contingency Plans

Hydrologic Contingency
Hydrologic contingency may include soil surface modifications such as re-directing surface water from the groundwater springs or the installation of additional ditch plugs. Recommendations for contingency to establish wetland hydrology may be implemented and monitored until Hydrology Success Criteria is achieved.

Vegetation Contingency
If vegetation success criteria are not achieved based on average density calculations from combined plots over the entire restoration area, supplemental planting may be performed with tree species approved by regulatory agencies. Supplemental planting may be performed as needed until achievement of vegetation

success criteria.

References

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1.United States Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

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

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation. Version 4.0.North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.

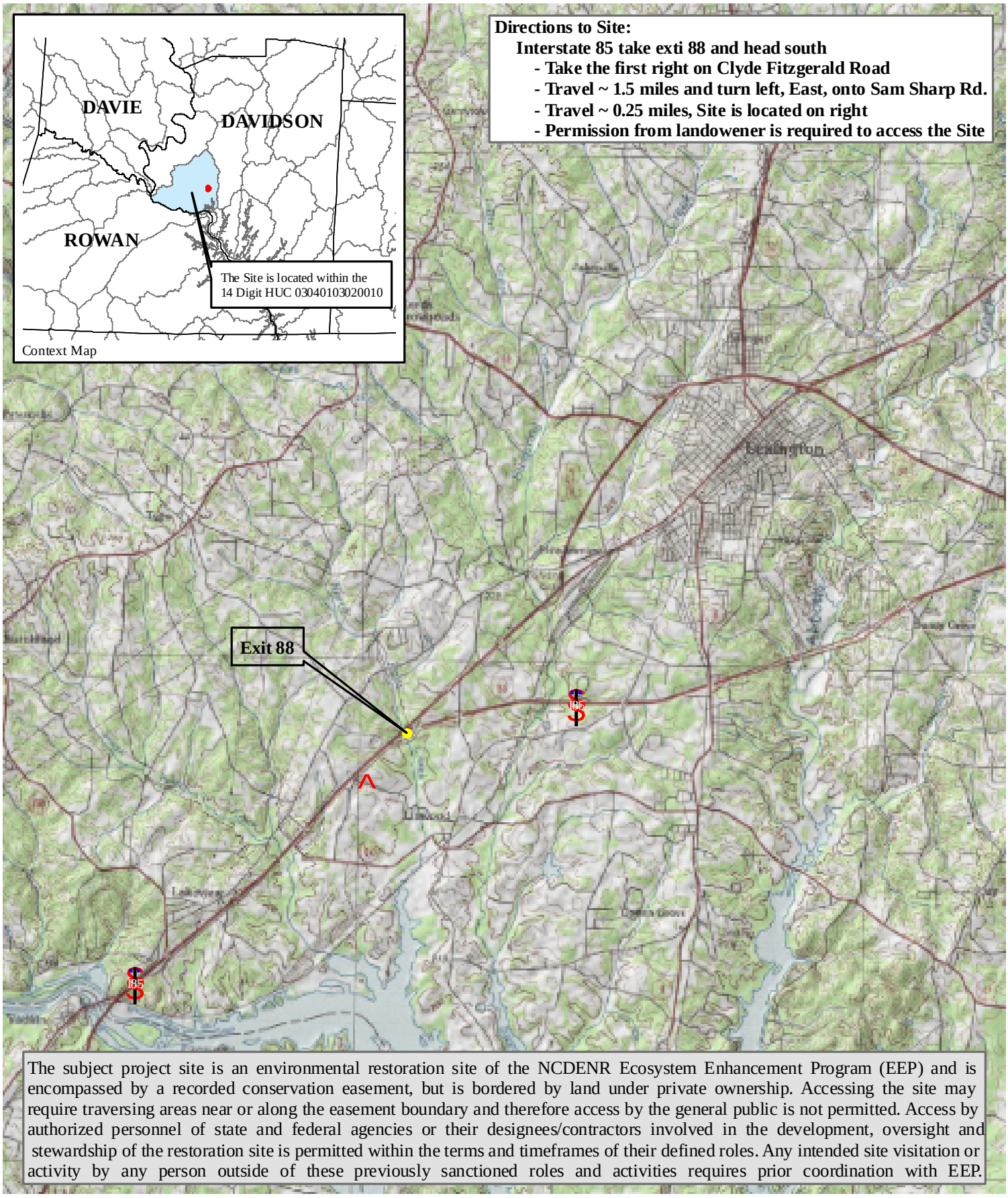
North Carolina Wetlands Restoration Program (NCWRP). 1993. Installing Monitoring Wells/Piezometers in Wetlands (WRP Technical Note HY-IA-3.1). North Carolina Department of Environment, Health, and Natural Resources, Raleigh, North Carolina

North Carolina Ecosystem Enhancement Program (NCEEP). 2009. Yadkin-Pee Dee River Basin Restoration Priorities (online). Available: http://www.nceep.net/services/restplans/Yadkin_Pee_Dee_RBRP_2009_Final.pdf [February 19, 2010].North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.

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

US Army Corps of Engineers (USACE). 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantis and Golf Coasts Plain Regional 2010 (online). Available: http://www.usace.army.mil/CECW/Documents/cecwo/reg/AGCP_regsupV2.pdf [April, 2011] USACE**,** Wetlands Regulatory Assistance Program.

Appendix A: General Figures and Tables



The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with EEP.

Prepared For: Ecosystem Enhancement Program

Prepared By: RS Restoration Systems | LLC

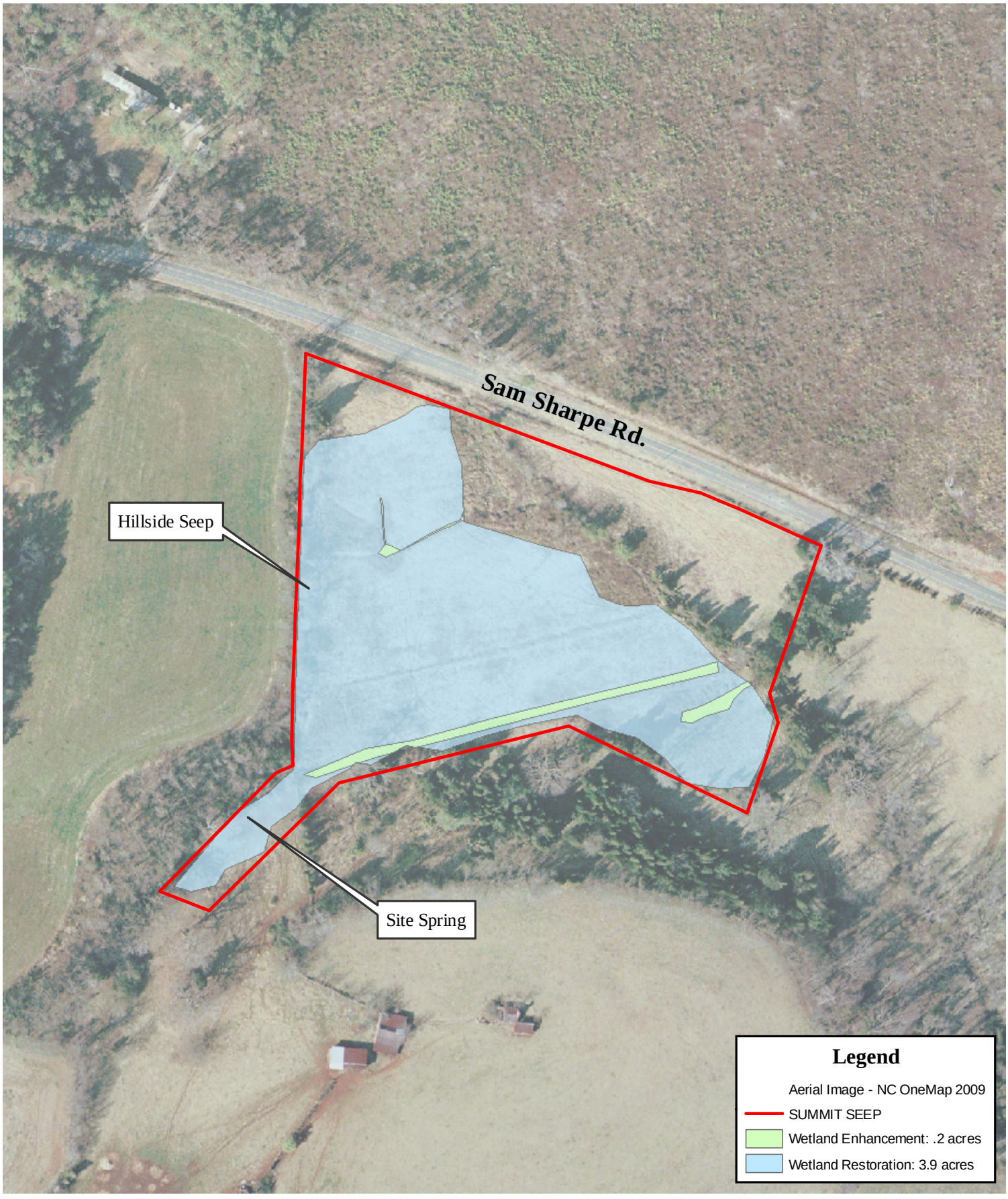
Summit Seep Non-Riparian Wetland Mitigation Site

RFP # 16-002835 Contract # 003244
Davidson County, North Carolina

0 2,625 5,250 10,500 15,750 Feet

Figure 1

Site Location Map



Prepared For:

Ecosystem Enhancement Program

Prepared By:

RS Restoration Systems | LLC

Summit Seep Non-Riparian Wetland Mitigation Site

RFP # 16-002835 Contract # 003244
Davidson County, North Carolina

0 50 100 200 300
Feet

Figure 2
Component & Asset Map

Table 1. Project Components and Mitigation Credits

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

Mitigation Credits									
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals					3.91	0.18			

Project Components						
Project Component -or- Reach ID	Stationing / Location	Existing Footage/Acreage	Approach (PI,PII etc.)	Restoration – or- Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio
Non-riparian restoration	NA	3.91	NA	Restoration	3.91	1.0
Non-riparian enhancement	NA	0.18	NA	Enhancement	0.18	0.5

Component Summation						
Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	0	0	0	3.91	0	0
Enhancement		0	0	0.18	0	0
Enhancement 1	0					
Enhancement II	0					
Creation		0	0	0		
Preservation	0	0	0	0		0
High Quality Preservation	0	0	0	0		0

Table 2: Project Activity and Reporting History

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

Activity or Report	*Data Collection Complete*	*Completion or Delivery*
CE Document	*NA*	*Oct-10*
Conservation Easement	*Apr-11*	*Apr-11*
Mitigation Plan	*NA*	*Nov-10*
Construction	*NA*	*Apr-11*
Bare Root Planting	*NA*	*Apr-11*
Baseline Monitoring Document	*Apr-11*	*June-11*

Table 3: Project Contact Table

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

	Firm	POC & Address
Designer:	Axiom Environmental, Inc.	Grant Lewis; 919.215.1693 218 Snow Ave. Raleigh, NC 27603
Construction Contractor:	Land Mechanics, Inc.	Lloyd Glover; 919.422.3392 780 Landmark Road Willow Spring, NC 27592-7756
Planting Contractor:	Restoration Systems, LLC	Worth Creech; 919.334.9114 1101 Haynes St. Suite 211 Raleigh, NC 2604
Seeding Contractor:	Land Mechanics, Inc.	Lloyd Glover; 919.422.3392 780 Landmark Road Willow Spring, NC 27592-7756
Nursery Stock Suppliers:	ArborGen	1.888.888.7158
Baseline Data Collection	Axiom Environmental, Inc.	Grant Lewis; 919.215.1693 218 Snow Ave. Raleigh, NC 27603
Vegetation Monitoring:	Restoration Systems, LLC	Ray Holz; 919.604.9314
Wetland Monitoring:	Restoration Systems, LLC	Ray Holz; 919.604.9314

Table 4: Project Baseline Information & Attributes Table

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

Project Information			
Project Name	Summit Seep		
County	Davidson		
Project Area (acres)	6.4		
Project Coordinates (latitude and longitude)	35.76130, 80.33430		
Project Watershed Summary Information			
Physiographic Province		Southern Outer Piedmont	
River Basin		Yadkin	
USGS Hydrologic Unit 8-digit	3040103	USGS Hydrologic Unit 14-digit	3040103020010
DWQ Sub-basin		3/7/2004	
Project Drainage Area, Total Outfall (acres)		51.5	
Groundwater Treated by Site (acres)		35.6	
Project Drainage Area Percentage of Impervious Area		< 3%	
CGIA Land Use Classification		Cropland and Pasture	
Wetland Summary Information			
Parameters		**Wetland 1**	
Size of Wetland (acres)		4.1	
Wetland Type (non-riparian, riparian riverine or riparian non riverine)		Non-riparian	
Mapped Soil Series		Armenia silt loam	
Drainage class		Class A	
Soil Hydric Status		Hydric	
Source of Hydrology		Natural Seep	
Hydrologic Impairment		Ditches	
Native vegetation community		Low Elevation Seep	
Percent composition of exotic invasive vegetation		0%	
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States – Section 404	Yes	Yes	Yes, Appendix A
Waters of the United States – Section 401	Yes	Yes	Yes, Appendix A
Endangered Species Act	No		
Historic Preservation Act	No		
Coastal Zone Management Act [CZMA/Coastal Area Management Act (CAMA)]	No		
FEMA Floodplain Compliance	No		
Essential Fisheries Habitat	No		

Table 5: Reference Vegetation Species

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

Schafale and Weakley's Character Vegetation Species	**Reference Forest Ecosystem & Onsite observations**	
	Armenia silt loam (ArA) & Davidson Loam 8-25% slope (DdD, DdE) Soils	
	Canopy Species	***Understory Species***
Betula nigra	*Acer negundo*	*Asimina triloba*
Carpinus caroliniana	*Acer rubrum*	*Cephalanthus occidentalis*
Celtis laevigata	*Celtis occidentalis*	*Cornus amomum*
Platanus occidentalis	*Diospyros virginiana*	*Crataegus monogyna*
Quercus michauxii	*Fraxinus pennsylvanica*	*Juniperus virginiana*
Quercus pagoda	*Juglans nigra*	*Sambucus canadensis*
Quercusphellos	*Liquidambar styraciflua*	*Symphoricarpos orbiculatus*
Ulmus americana	*Nyssa sylvatica*	
	Pinus taeda	
	Quercus alba	
	Quercus phellos	
	Salix nigra	
	Ulmus americana	

Table 6: Planted Tree Species

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

Vegetation Association: Low Elevation Seep		
Area: 5.5 acres		
SPECIES	Total Number Planted	Percentage of Total
American Elm (*Ulmus Americana*)	500	9.80%
Cherry Bark Oak (*Quercus pagoda*)	700	13.73%
Commonm Pawpaw (*Asimina triloba*)	700	13.73%
American persimmon (*Dyospyros virginiana*)	400	7.84%
Hackberry (*Celtis occidentalis*)	600	11.76%
Ironwood (*Carpinus caroliniana*)	500	9.80%
River Birch (*Betula nigra*)	500	9.80%
Swamp Chestnut Oak (*Quercus michauxii*)	500	9.80%
Sycamore (*Platanus occidentalis*)	500	9.80%
Willow Oak (*Quercus phellos*)	600	11.76%
Totals:	5100	100.00%

Appendix B: Baseline Vegetation Data, Plot Photos

Table 7. Baseline Vegetation
Vegetation Plot Photos 1-6

Table 7: Baseline Vegetation

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

	Species	CommonName	Total Stems	# plots	avg# stems	Summit-RS-0001	Summit-RS-0002	Summit-RS-0003	Summit-RS-0004	Summit-RS-0005	Summit-RS-0006
	Asimina triloba	pawpaw	14	6	2.33	1	1	3	2	3	4
	Betula nigra	river birch	10	6	1.67	3	1	2	2	1	1
	Carpinus caroliniana	American hornbeam	9	5	1.8		1	1	2	3	2
	Celtis occidentalis	common hackberry	3	3	1	1		1	1		
	Diospyros virginiana	common persimmon	11	5	2.2	1	1	3		5	1
	Platanus occidentalis	American sycamore	10	5	2		1	2	2	1	4
	Quercus michauxii	swamp chestnut oak	15	6	2.5	1	3	2	2	2	5
	Quercus pagoda	cherrybark oak	13	6	2.17	2	1	2	2	1	5
	Quercus phellos	willow oak	7	4	1.75	1			1	3	2
	Ulmus americana	American elm	8	5	1.6	2	1	2	1	2	
	Unknown		1	1	1						1
Total	**11**	**10**	**101**	**11**		**12**	**10**	**18**	**15**	**21**	**25**

Baseline Vegetation Monitoring Plot Photos

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244 Photos Taken: 3-21-2011

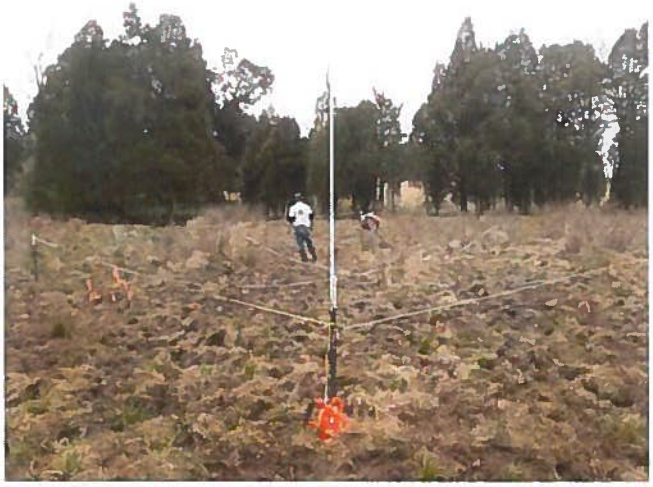
Veg Plot 1

Veg Plot 2

Veg Plot 3

Veg Plot 4

Veg Plot 5



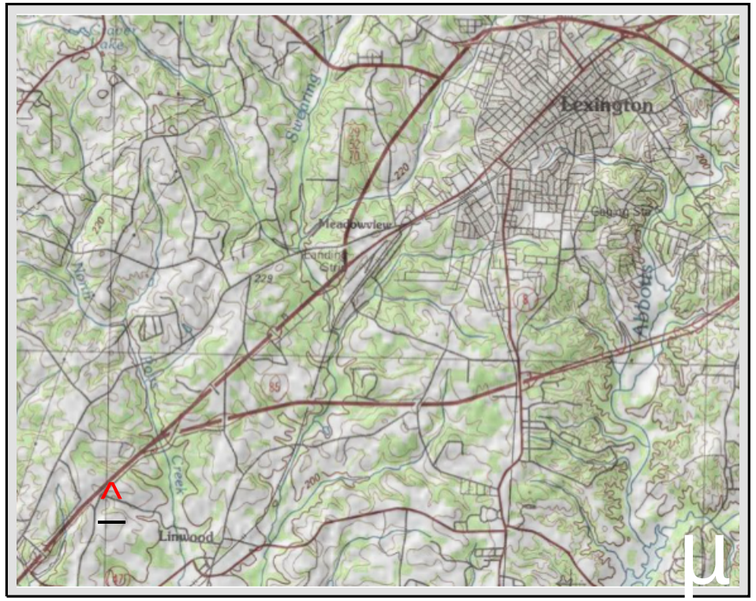
Veg Plot 6

Appendix C: As-Built Plan Sheets

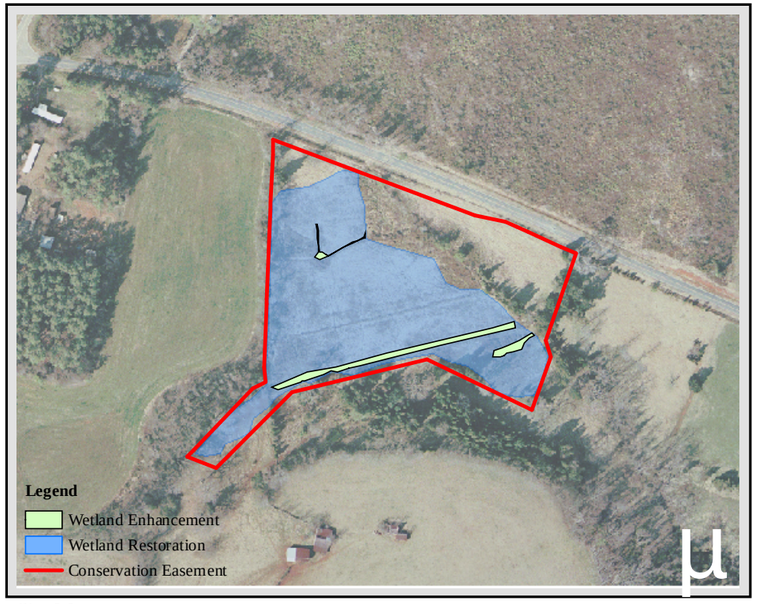
Sheet A. Title Page
Sheet B. Construction
Sheet C. Planting
Sheet D. Monitoring
Construction Photos

SUMMIT SEEP
NONRIPARIAN WETLAND RESTORATION
PROJECT PLAN SHEETS

DAVIDSON COUNTY, NORTH CAROLINA



Vicinity Map



Site Map

PROJECT DISCRIPTION:

THE SUMMIT SEEP NONRIPARIAN WETLAND RESTORATION SITE ENCOMPASSES 6.4 ACRES INCLUDING 3.914 ACRES OF WETLAND RESTORATION AND 0.186 ACRES OF WETLAND ENHANCEMENT WITHIN FORMER FARM PASTURE LAND. THE SITE HAS BEEN CLEARED OF NATIVE FOREST VEGETATION, DITCHED, AND DRAINED TO REMOVE GROUNDWATER HYDROLOGY FROM AN EXISTING SPRING AND HILLSIDE SEEPS. THE SITE IS LOCATED UPSLOPE FROM AN UNNAMED TRIBUTARY TO NORTH POTTS CREEK, WHICH HAS BEEN ASSIGNED A BEST USAGE CLASSIFICATION OF C AND IS FULLY SUPPORTING ITS INTENDED USES. THE SITE IS LOCATED WITHIN TARGETED LOCAL WATERSHED 03040103020010.

CONSTRUCTION ACTIVITIES AT THE SITE WILL RE-ELEVATE THE GROUNDWATER TABLE TO HISTORIC CONDITION THAT EXISTED PRIOR TO DITCHING OF THE SITE. CONSTRUCTION METHODS WERE BASED PRIMARILY UPON CARBON COPY METHOD FOR WETLAND RESTORATION, MIMICKING REFERENCE (RELATIVELY UNDISTURBED) WETLANDS IN THE REGION. THE PROJECT IS DESIGNED TO MAXIMIZE GROUNDWATER RECHARGE AND WATER QUALITY BENEFITS IN THE YADKIN RIVER BASIN.

PROJECT LOCATION:

THE SITE IS LOCATED WITH 14-DIGIT CATALOGING UNIT 03040103020010 APPROXIMATELY 5 MILES SOUTHWEST OF LEXINGTON, IN WESTERN DAVIDSON COUNTY.

LATITUDE: 35.761264
LONGITUDE: -80.334264
(NAD 83/WGS 84)

TYPE OF WORK: WETLAND RESTORATION & ENHANCEMENT
- DITCH CLEARING
- DITCH FILLING
- SITE GRADING
- SITE PLANTING

INDEX OF SHEETS
A: TITLE PAGE
B: CONSTRUCTION
C: PLANTING
D: MONITORING

FIRM NAME & POC
WORTH CREECH - 919.334.9101
RESTORATION SYSTEMS, LCC
1101 HAYNES STREET, SUITE 211
RALEIGH, NC 27604

Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, NC 27604

Prepared For :

Notes & Revisons

Project:

Summit Seep
Non-Riparian Wetland
Restoration Site

Davidson County
North Carolina

Sheet Title:

TITLE

Figure No.

A

Scale: No Scale

Date: 04.25.2011

EEP Contract # : 003244

RESTORATION SYSTEMS | LLC

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Prepared For :

Ecosystem Enhancement PROGRAM

Notes & Revisons

Project:

Summit Seep
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Davidson County
North Carolina

Sheet Title:

CONSTRUCTION

Figure No.

B

Scale: 1:1500

Date: 06.08.2011

EEP Contract # : 003244

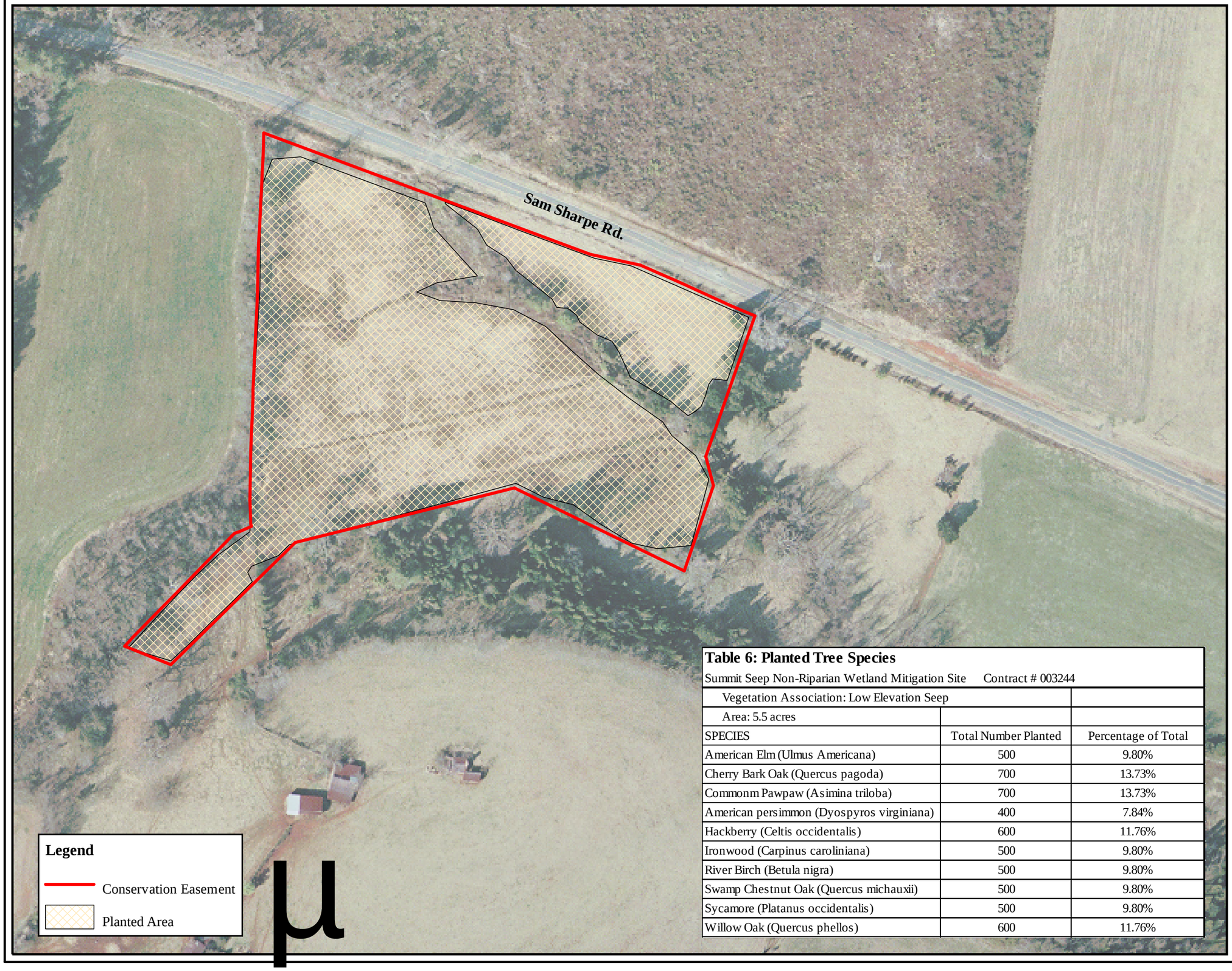

Table 6: Planted Tree Species

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244

Vegetation Association: Low Elevation Seep		
Area: 5.5 acres		
SPECIES	Total Number Planted	Percentage of Total
American Elm (Ulmus Americana)	500	9.80%
Cherry Bark Oak (Quercus pagoda)	700	13.73%
Commonm Pawpaw (Asimina triloba)	700	13.73%
American persimmon (Dyospyros virginiana)	400	7.84%
Hackberry (Celtis occidentalis)	600	11.76%
Ironwood (Carpinus caroliniana)	500	9.80%
River Birch (Betula nigra)	500	9.80%
Swamp Chestnut Oak (Quercus michauxii)	500	9.80%
Sycamore (Platanus occidentalis)	500	9.80%
Willow Oak (Quercus phellos)	600	11.76%

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Sheet Title:

PLANTING

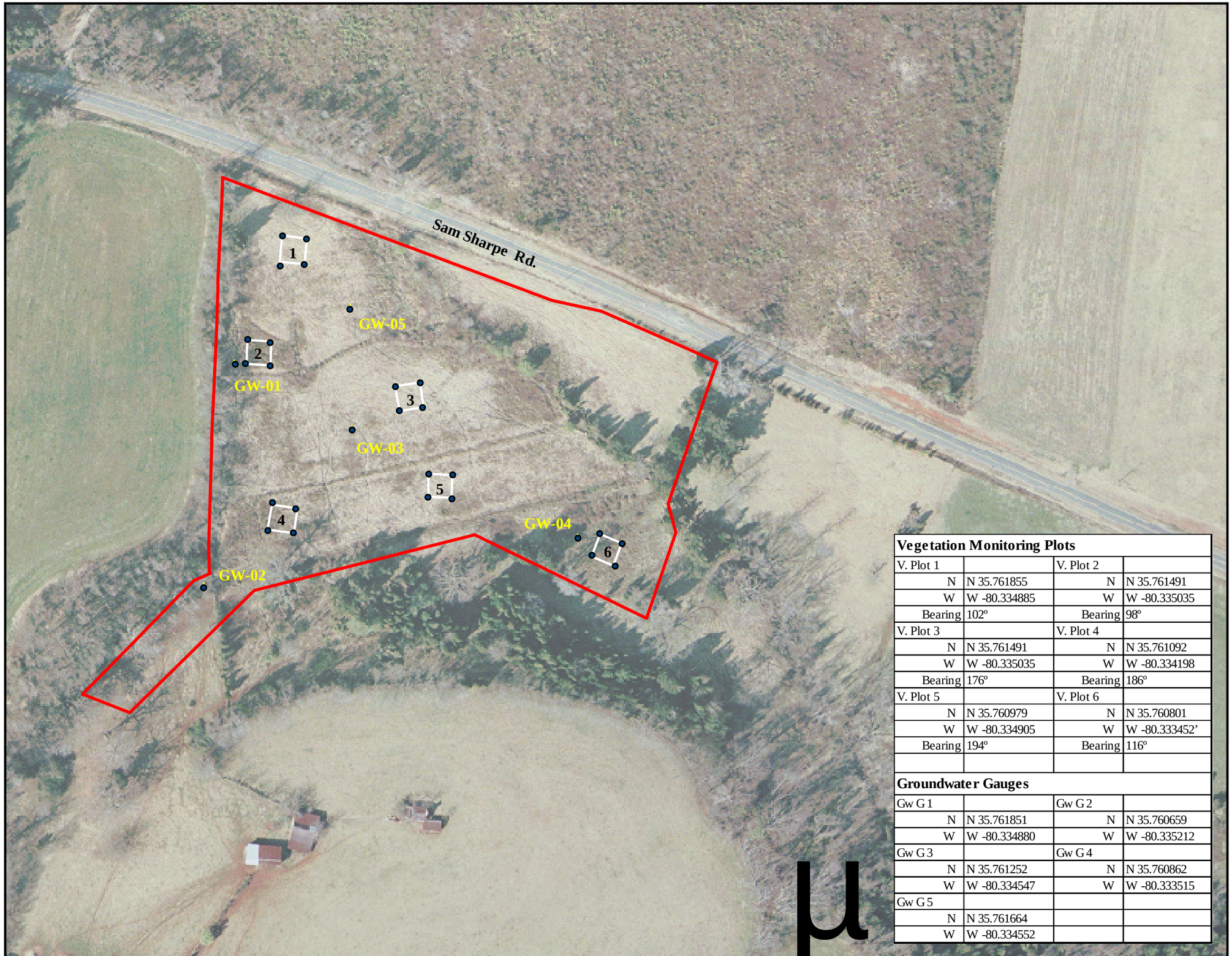
Figure No.

C

Scale: 1:1500

Date: 06.08.2011

EEP Contract # : 003244



Vegetation Monitoring Plots			
V. Plot 1		V. Plot 2	
N	N 35.761855	N	N 35.761491
W	W -80.334885	W	W -80.335035
Bearing	102º	Bearing	98º
V. Plot 3		V. Plot 4	
N	N 35.761491	N	N 35.761092
W	W -80.335035	W	W -80.334198
Bearing	176º	Bearing	186º
V. Plot 5		V. Plot 6	
N	N 35.760979	N	N 35.760801
W	W -80.334905	W	W -80.333452’
Bearing	194º	Bearing	116º
Groundwater Gauges			
Gw G 1		Gw G 2	
N	N 35.761851	N	N 35.760659
W	W -80.334880	W	W -80.335212
Gw G 3		Gw G 4	
N	N 35.761252	N	N 35.760862
W	W -80.334547	W	W -80.333515
Gw G 5			
N	N 35.761664		
W	W -80.334552		

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MONITORING

Figure No.

D

Scale: 1:1500

Date: 06.08.2011

EEP Contract # : 003244

Construction Photos

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244 Photos Taken: 4.13.2011 - 4.15.2011

Construction Photos

Summit Seep Non-Riparian Wetland Mitigation Site Contract # 003244 Photos Taken: 4.13.2011 - 4.15.2011