Baseline Monitoring Report
FINAL

Norman's Pasture Restoration Site
DMS Contract 005010
DMS Project Number 95717

Norman's Pasture II Restoration Site
DMS Contract 5787
DMS Project Number 96310

USACE Action ID: SAW-2013-00109
DWR#: 14-0107
Sampson County, North Carolina

Prepared for:
NCDMS, 1652 Mail Service Center, Raleigh, NC 27699-1652

Monitoring Data Collected: March 2016
Date Submitted: June 2016

Monitoring and Design Firm

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June 2016

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EXECUTIVE SUMMARY

There are two separate projects included within this report. The projects are adjacent to each other, which is why the reporting structure for these projects is combined. The Norman's Pasture Restoration Site (NPRS) was completed in February 2016 and restored a total of 16.2 acres of riparian wetlands. Two on-site tributaries were also restored to integrated headwater/stream systems, but no stream mitigation credit is included in the NPRS. The NPRS is a riparian wetland system in the Cape Fear River Basin (03030006 8-digit HUC) in eastern Sampson County, North Carolina, that had been substantially modified to maximize agricultural production. The completed project will restore impacted agricultural lands to riparian wetland habitat.

The Norman's Pasture II Restoration Site (NPII) is located directly adjacent to NPRS, was also completed in February 2016, and includes a total of 10.2 acres of riparian wetland restoration and 843 linear feet of stream enhancement II. The NPII also includes 0.8 acres of existing wetland preservation. The completed NPII project will expand on the restoration efforts of the NPRS by extending restoration and protection initiatives to the headwater extents of much of the local watershed. The site will restore and protect a range of unique aquatic resources in one setting – existing riparian wetlands, a forested tributary that had lost connection with its historic floodplain, lower gradient seep-fed headwaters, and adjacent upland buffers.

The NPRS is protected by a 36.9-acre permanent conservation easement, while NPII is protected by a 16.3-acre permanent conservation easement, both held by the State of North Carolina. Both sites are located on two parcels located off of Cornwallis Road, approximately 5 miles west of Magnolia, North Carolina. The project sites are bounded by Stewarts Creek to the south, agricultural land to the north, Cornwallis Road to the east, and woodlands to the west. The sites have a long history of hydrologic modification in order to allow for farming to take place on the property.

The Cape Fear River Basin Restoration Priorities state the goals for the NPRS and NPII's 14-digit HUC are to protect and improve water quality throughout the Basin by reducing sediment and nutrient inputs into streams and rivers and to support efforts to restore local watersheds (NCDENR EEP, 2009). The project goals for NPRS and NPII are in line with the basin priorities and include the following:

- Reconnect a continuous stream and wetland headwater wetland system to Stewarts Creek.
- Expand and protect riparian habitat along Stewart's Creek.
- Buffer nutrient inputs from adjacent agricultural and grazing practices.

Additional goals for the project include:

- Increase the local hydroperiod by encouraging both surface and subsurface storage and retention.
- Restore and establish a functional and diverse stream/wetland complex.

The project goals will be addressed through the following objectives:

- Redevelop a stream/wetland complex that has previously been impacted by ditching and cattle grazing.
- Fill field ditches to restore surface flow retention and historic flow paths.
- Protect and integrate existing riparian wetlands into the project design.
- Re-forest riparian areas with native plant communities.
- Re-connect headwater seeps to the broader swamp forest community of Stewarts Creek being restored by NPRS and NPII

Project planting and construction were completed in February 2016. The NPRS involved restoration and establishment a functional stream/wetland complex with 16.2 acres of riparian wetland restoration (15.5 acres of re-establishment and 0.7 acre of wetland rehabilitation). Select ditches across the site were modified

or filled and seeps were redirected and redeveloped to retain and distribute surface flow across the site. The two project tributaries (Tributaries 1 and 2 to Stewarts Creek) were restored to integrated headwater/stream systems, but no stream mitigation credit is included in NPRS. Approximately 9.0 acres of wetland preservation is included throughout the NPRS, but for no additional credit.

The NPII aimed to restore and establish a stream/wetland complex with 10.2 acres of riparian wetland restoration (8.8 acres of re-establishment and 1.4 acres of rehabilitation). Approximately 843 linear feet of Tributary 1 to Stewarts Creek were improved with Enhancement II and reconnected to the historic floodplain. Also, approximately 0.8 acre of existing wetlands were included as preservation at NPII (no mitigation credit).

Both NPRS and NPII were constructed as designed with only a few modifications made to the design plan during construction. On NPRS, several portions of the on-site ditches were not filled and a ditch plug was not installed to allow Stewart's Creek better flood access to the site. Two extra areas were also planted as Headwater Forest Communities. On NPII, one riffle enhancement and one log drop were not installed at the very beginning of the stream reach. Several extra HDPE pipes were also added at the crossings to allow better hydraulic connectivity between the different areas of the site.

The monitoring components were installed in February and March 2016 for both sites. 22 monitoring gauges (9 on NPRS and 13 on NPII) were installed to evaluate the attainment of jurisdictional wetland hydrology for both sites. One additional monitoring gauge was installed in the stream on NPII to document the presence of surface water and record the occurrence of bankfull events. To determine the success of the planted mitigation areas, 31 permanent vegetation monitoring plots (18 on NPRS and 13 on NPII) were established according to the CVS-EEP Level 2 protocol. Ten permanent photo points have been established with a total of twelve photos to be taken annually. The site will be monitored for five to seven years or until the success criteria are achieved. Reports will be submitted to the DMS each year. The first year of monitoring will take place in 2016.

The success criteria for the sites state that the planted wetlands must meet the success criteria of a site average of 320 stems/acre after three years, 288 stems/acre after four years, 260 stems/acre after five years, and 210 stems/acre after seven years to be considered successful. The baseline monitoring counted an average of 880 planted stems/acre in the 31 vegetation monitoring plots.

Wetland hydrology will be monitored with the series of 22 automatic gauges described above that record water table depth. To meet the success criterion, the upper 12 inches of the soil profile must have continuously saturated or inundated conditions for at least 9.0% of the growing season in the Headwater Forest community and 12.0% of the growing season in the Riverine Swamp Forest community during normal weather conditions based on a conservative estimate.

1.0 PROJECT GOALS, BACKGROUND, AND ATTRIBUTES

1.1 Location and Setting

NPRS is protected by a 36.9-acre permanent conservation easement, while NPII is protected by a 16.3-acre permanent conservation easement, both held by the State of North Carolina. Both projects are situated in Sampson County in the Rolling Coastal Plains (Level IV 65m) ecoregion of the Coastal Plain physiographic province. The sites are located on two parcels off of Cornwallis Road approximately 5 miles west of Magnolia, North Carolina (Figure 1, Appendix A).

The Site is within the 03030006 (8-digit Cataloging Unit) Black Watershed located within the Cape Fear River Basin and the 03030006110040 Stewarts Creek Local Watershed Unit (14-digit Cataloging Unit), which has been identified as a Targeted Local Watershed (NCDENR, EEP 2009). The populations of the counties within the watershed are stable or minimally declining and land use is predominately agricultural. For this reason, the restoration priorities laid out by DMS focus on mitigating impact to streams and wetlands from agricultural use (NCDENR EEP, 2009). The NPRS and NPII were both selected by KCI as stream and wetland opportunities to improve habitat within the TLW.

1.2 Project Goals and Objectives

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

- Reconnect a continuous stream and wetland headwater wetland system to Stewarts Creek.
- Expand and protect riparian habitat along Stewart's Creek.
- Buffer nutrient inputs from adjacent agricultural and grazing practices.

Additional goals for the project include:

- Increase the local hydroperiod by encouraging both surface and subsurface storage and retention.
- Restore and establish a functional and diverse stream/wetland complex.

The project goals will be addressed through the following objectives:

- Redevelop a stream/wetland complex that has previously been impacted by ditching and cattle grazing.
- Fill field ditches to restore surface flow retention and historic flow paths.
- Protect and integrate existing riparian wetlands into the project design.
- Re-forest riparian areas with native plant communities.
- Re-connect headwater seeps to the broader swamp forest community of Stewarts Creek being restored by NPRS and NPII

1.3 Project Structure, Restoration Type and Approach

1.3.1 Project Structure

The mitigation work at NPRS included approximately 16.2 acres of riparian wetland restoration and 9.0 acres of riparian wetland preservation, for a total of 16.0 Wetland Mitigation Units as shown in Figure 2 and described in Table 1 in Appendix A. The target natural community for the wetland consists of Headwater Forest and Riverine Swamp Forest Communities (NCWAM, v. 4.1 2010).

The mitigation work at NPII included approximately 10.2 acres of riparian wetland restoration, 0.8 acres of riparian wetland preservation, and 843 linear feet of stream enhancement II for a total of 9.7 Wetland Mitigation Units and 337 Stream Mitigation Units as shown in Figure 2 and described in Table 1 in Appendix A. The target natural community for the stream consists of Headwater Forest and Riverine Swamp Forest Communities (NCWAM, v. 4.1 2010).

1.3.2 Project Restoration Type and Approach

Norman's Pasture

Prior to construction, the site had a long history of hydrologic modification in order for farming and grazing to take place on the property. Two separate unnamed tributaries to Stewarts Creek flow through the site. Neither stream will be used for mitigation credit, but both are described here since they will be integrated into the project design. Tributary 1 (T1) begins northwest of the project site from a farm pond and flows south approximately 350 linear feet onto the project. Tributary 2 (T2) flows west, approximately 1,440 linear feet to join T1 and forms on the site from the southeast. T1 and T2 are both headwater channels due to their small drainage areas. The broad flat topography of the site means that the streams have minimal slope and are slow-moving systems. The Current Conditions Plan View in Section 2.6 shows the existing conditions at the NPRS and site photographs are included in Section 2.8.

T1 enters NPRS in the northwestern corner of the project. The channel has been ditched through an open agricultural field, and continues in this form until the edge of the field where an artesian spring is located. The channel has been further excavated in this location and the remaining spoil can be seen to the left of the stream. Further downstream, T1 transitions into a channel type with little evidence of ditching and with access to its floodplain. T2 joins T1 coming in from the west and then T1 travels along the property line as a straightened channel with spoil piles adjacent to the right bank until it enters into Stewarts Creek.

T2 begins in the middle of the NPRS site and flows to the north and then to the west before joining T1 along the western edge of the site. T2 receives its primary hydrologic input from an artesian spring. Based on landowner reports, this artesian spring provides a consistent source of hydrology. Currently, T2 is a functional headwater stream at its beginning and is surrounding by high-quality wetlands. Unlike a single-thread channel, the stream has multiple flow paths throughout the wetted section that moves in a linear direction. The braided system is largely shaped by the existing trees. T2 flows through a more heavily wooded area where it receives additional drainage from hillside seepage entering from the northeast. At this point, T2 flows toward the west, where it becomes a wide channelized ditch until it reaches the confluence with T1. There is little to no movement within the channel, leaving the water essentially ponded with large amounts of duckweed. Along the left bank of this lower section of T2, there is no riparian vegetation. The right bank has a narrow strip of trees.

The mitigation approach for NPRS aimed to restore and establish a functional stream/wetland complex with 16.2 acres of wetland restoration. All of the existing drained hydric soils were restored to a riparian wetland system. Mitigation actions focused on re-establishing an appropriate wetland hydroperiod by filling ditches,

installing ditch plugs, restoring integrated headwater streams, developing and redirecting productive seeps, and planting the site with appropriate vegetation. Existing spoil was used as available to fill the remainder of the ditches. After filling in ditches and bringing up the elevations of the channelized streams, the restored wetlands had a diffuse flow, creating a shallow braided stream/wetland system. The existing channelized reaches, T1 and T2, were graded to a natural condition for the integrated stream/wetland complex, but no stream mitigation credit is included in the NPRS project. Approximately 9.0 acres of wetland preservation (no wetland mitigation credit) was dispersed throughout the NPRS. The proposed project conditions are shown in Section 7.4.

A suitable reference wetland was found approximately 1,584 feet northeast of the eastern edge of the NPII, adjacent to Cornwallis Road. The reference wetland is comprised of deciduous hardwoods over a shrub layer and is consistent with the Headwater Forest Community that will be a target wetland type at the project site (see Appendix B, Reference Sites). A groundwater monitoring well was installed in September 2013 to document the reference wetland hydrology during the course of monitoring (see Appendix B, Reference Sites).

Norman's II

The mitigation approach for NPII will aim to restore and establish a functional stream/wetland system with 10.2 acres of wetland restoration. All of the existing drained hydric soils will be restored to a riparian wetland system. Mitigation actions will focus on filling ditches, developing and redirecting productive seeps, and integrating the wetland area into the adjacent stream/wetland complex. Tributary 1 will be improved using Enhancement II to a first-order stream/wetland system. Approximately 0.8 acre of wetland preservation is located at the southern portion of NPII, which connects to the existing wetlands on NPRS.

The same reference wetland used for the NPRS is also being used as a reference site for the NPII.

1.4 Project History, Contacts and Attribute Data

The project was first identified as a full-delivery mitigation project for the North Carolina Ecosystem Enhancement Program (EEP) by KCI Associates of NC, PA. This project began in the planning phase in 2012 with the final mitigation plan completed in November 2014. Construction began in December 2015. NPRS and NPII were completed and planted in February 2016. Completed project activities, reporting history, completion dates, project contacts, and background information are summarized in Tables 2-4 (Appendix A).

2.0 SUCCESS CRITERIA

NPRS and NPII will be monitored to determine if the development of the wetland indicators on-site meet the standards for mitigation credit production as presented in Table 1. The sites will also be monitored to document the development of the headwater stream system. The credits will be validated upon confirmation that the success criteria described below are met. The sites will be monitored for performance standards for seven years after completion of construction.

2.1 Wetland Vegetation

NPRS and NPII must demonstrate the re-establishment of the targeted vegetative community based on the survival and growth of planted species and volunteer colonization, with an average stem density of 320 stems/acre required after three years, 288 stems/acre after four years, 260 stems/acre after five years, and 210 stems/acre after 7 years. In addition to density requirements, plant height will be monitored within the monitoring plots to ensure that trees average 10 feet in height after seven years.

Permanent monitoring plots (10 by 10 meters) have been established in the mitigation areas at a density that statistically represents the total mitigation acreage. The average density of these plots will determine whether both sites meet the success criteria.

2.2 Wetland Hydrology

NPRS and NPII must present continuous saturated or inundated hydrologic conditions in the upper 12 inches of the soil profile for at least 9.0% of the growing season in the Headwater Forest community and 12.0% of the growing season in the Riverine Swamp Forest community during normal weather conditions based on a conservative estimate. A "normal" year is based on NRCS climatological data for Sampson County, and using the 30th to 70th percentile thresholds as the range of normal, as documented in the USACE Technical Report "Accessing and Using Meteorological Data to Evaluate Wetland Hydrology, April 2000." The soil survey for Sampson County estimates that the growing season begins February 28 and ends November 21 (265 days). The water table of the restored wetlands must be within 12" of the soils surface continuously for at least 9% (24 days) of the 265-day growing season.

3.0 MONITORING PLAN

Annual monitoring will be conducted during the first full growing season following project completion. Monitoring of NPRS and NPII restoration efforts will be performed for stream, vegetation, and hydrology components for five to seven years or until the success criteria are fulfilled. The establishment, collection, and summarization of monitoring data shall be conducted in accordance with the most current version of the EEP document entitled *Procedural Guidance and Content Requirements for EEP Monitoring Reports (version 1.5)*. Permanent monuments, marking monitoring feature locations, were established on-site in April 2016. The locations of these monitoring features are marked in Figure 3 (see Appendix A).

3.1 Wetland Hydrology

Twenty-two groundwater monitoring gauges were installed in the wetland mitigation areas to evaluate the attainment of jurisdictional wetland hydrology. Verification of wetland hydrology will be determined by automatic recording well data collected within the project area and reference wetland. The wetland gauges will be checked and/or downloaded every other month. Daily data will be collected from the automatic gauges over the 7-year monitoring period following wetland construction. The nearby reference wetland will also be monitored using the same procedures for comparative analysis. (see Figure 4 in Appendix A). These data will be reported to DMS in each of the site's monitoring years.

3.2 Vegetation

Thirty-one vegetation plots were set up and assessed for the baseline vegetation monitoring. The plots were installed with flagged metal conduit at each corner and a flagged PVC pipe was installed at the photo corner. Vegetation data collection must follow the CVS-EEP Protocol for Recording Vegetation (Lee *et al*. 2008). The baseline vegetation monitoring was conducted as Level 1: Inventory of Planted Stems, as will the first-year monitoring. Beginning in Year Two and continuing throughout the rest of the monitoring period, the NPRS and NPII will both be monitored using the Level 2 protocol. Vegetative monitoring will be conducted in monitoring years 1, 2, 3, 5, and if necessary 7. Baseline vegetation plot information can be found in Appendix B.

3.3 Visual Assessment

A yearly visual assessment of the site will include an assessment of the streams, the easement boundary, and the site vegetation to document the necessary parameters required for the DMS monitoring report.

3.4 Digital Photos

Ten photograph reference points (PRPs) with a total of twelve photos have been established as part of the baseline monitoring to assist in characterizing NPRS and NPII to allow qualitative evaluation of both sites' conditions. Starting in the first monitoring year, these photos will be taken in late summer, so that vegetative conditions are similar between monitoring years.

3.5 Watershed Conditions

Yearly monitoring will document any evident changes in the watershed. Any large hydrologic events in the watershed, such as tropical storms or hurricanes, will also be documented in the yearly monitoring reports.

3.6 Monitoring Guidelines

The first scheduled monitoring will be conducted during the first full growing season following project completion. Monitoring shall subsequently be conducted annually for a total period of seven years or until the projects meet their success criteria. Annual monitoring reports will be prepared and submitted each year that monitoring tasks are completed. The report will document the monitored components and include all collected data, analyses, and photographs. Each report will provide the new monitoring data and compare the most recent results against previous findings.

3.7 Maintenance and Contingency

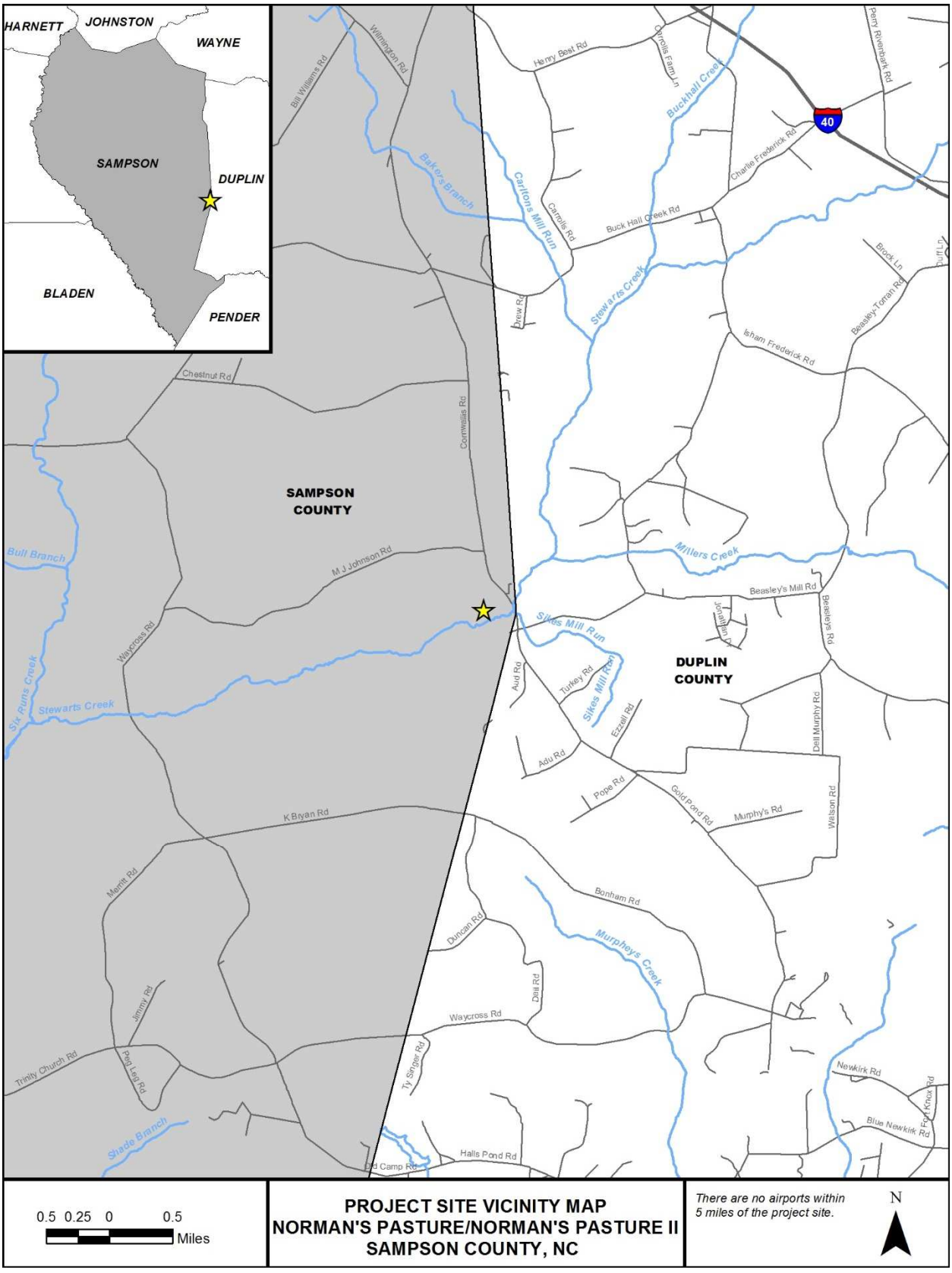
KCI will monitor NPRS and NPII on a regular basis and conduct a physical inspection of the sites a minimum of once per year throughout the post-construction monitoring period until performance standards are met. These site inspections may identify site components and features that require routine maintenance. Routine maintenance should be expected most often in the first two years following site construction and may include reinstallation of waddles, removal of debris from the channel, evaluating and repairing floodplain scour areas, constructed outlets and flow dispersement from seepage areas. Areas where stormwater and floodplain flows intercept the wetland may also require maintenance to prevent scour. Any maintenance activities will be documented in the yearly monitoring reports.

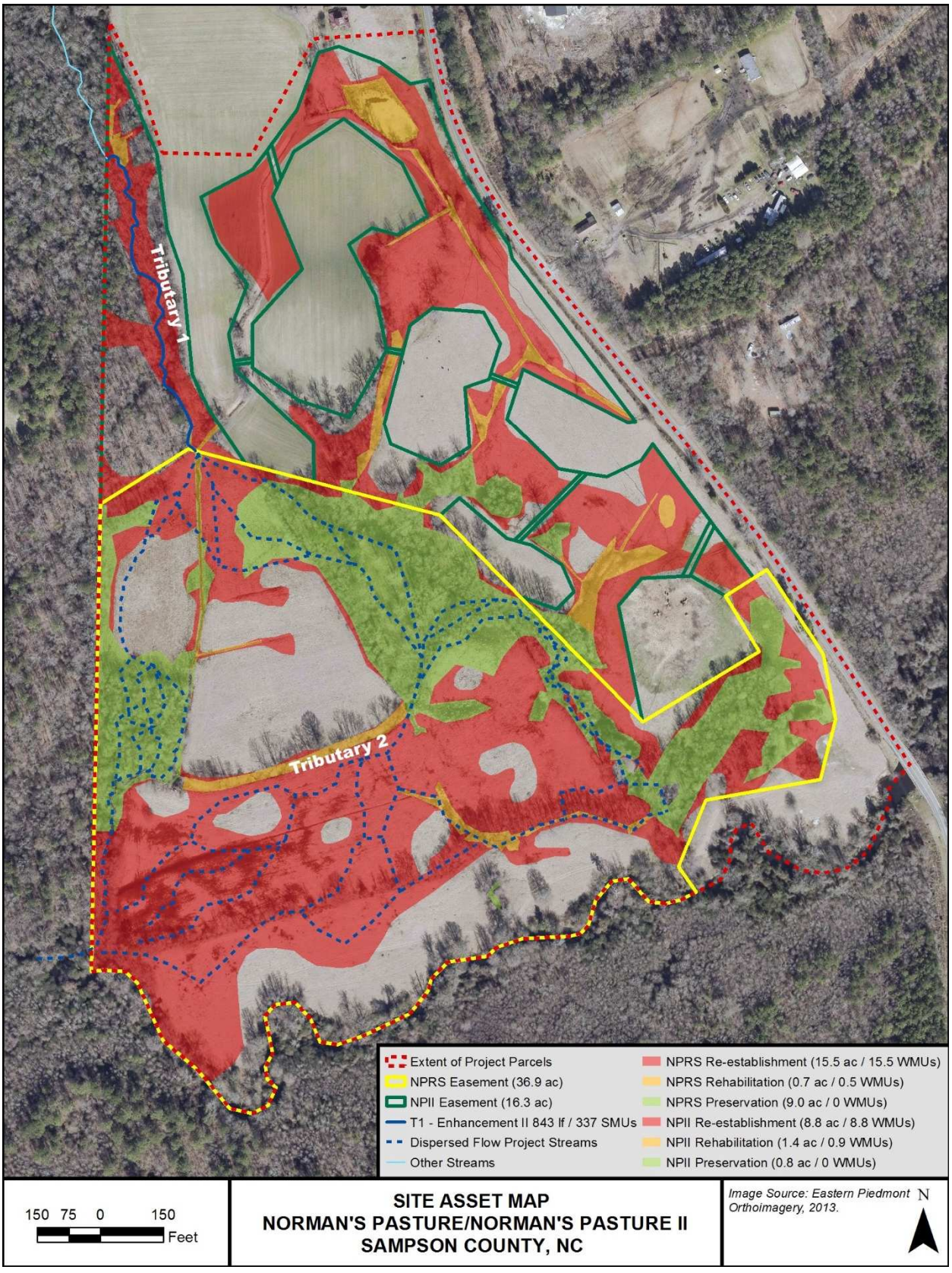
4.0 BASELINE CONDITIONS

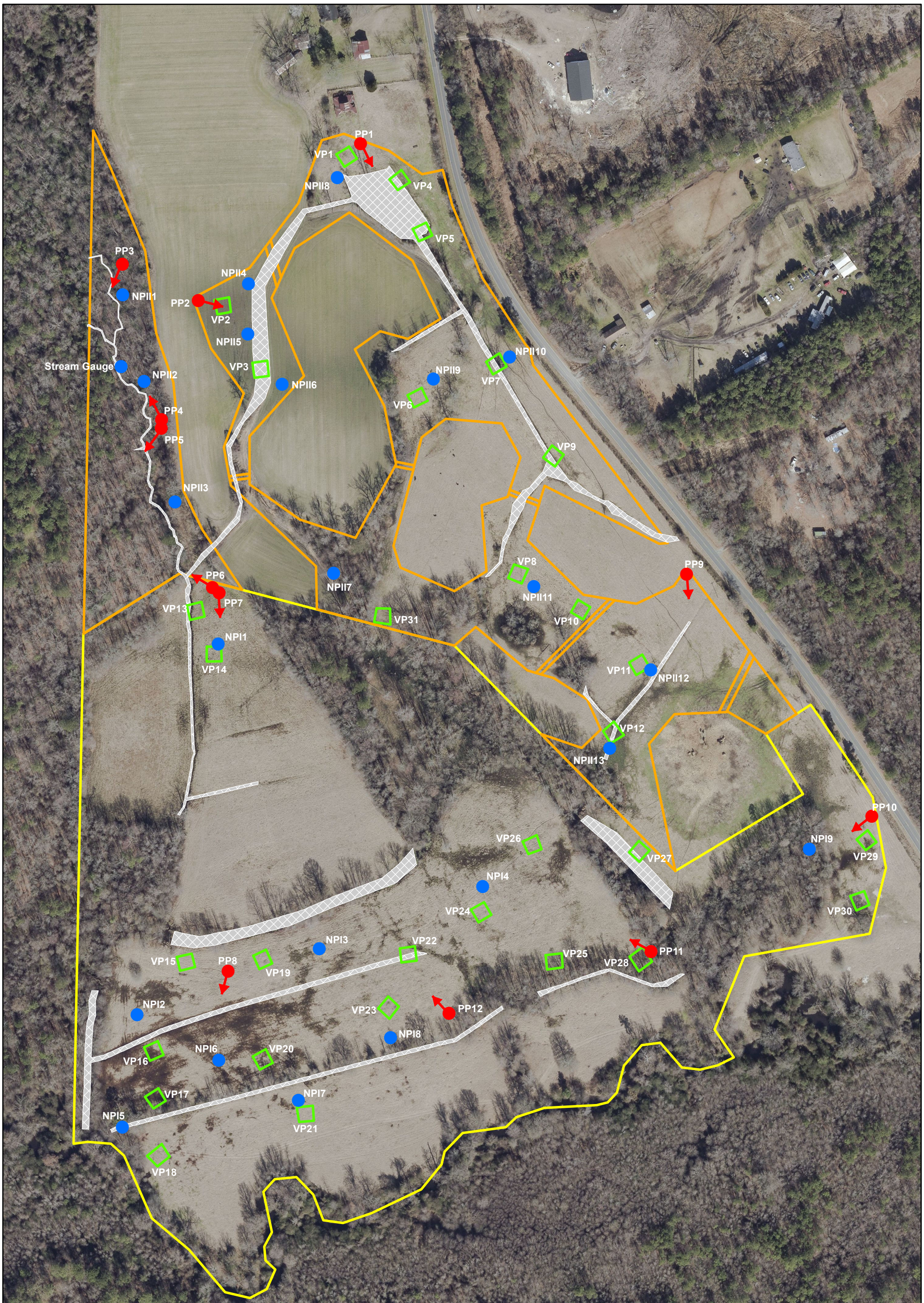
Baseline monitoring data were collected in March 2016. Any changes made to the design during construction are shown on the As-Built Site Plan in Appendix D. Both NPRS and NPII were constructed as designed with only a few modifications made to the design plan during construction. On NPRS, several portions of the on-site ditches were not filled and a ditch plug was not installed to allow Stewart's Creek better flood access to the site. Two extra areas were also planted as Headwater Forest Communities. On NPII, one riffle enhancement and one log drop were not installed at the very beginning of the stream reach. Several extra HDPE pipes were also added at the crossings to allow better hydraulic connectivity between the different areas of the site.

NPRS and NPII were planted with a total of fifteen different species of bare root trees in February 2016. Baseline vegetation monitoring data were collected in March 2016. The Level 1 CVS-EEP protocol was used to collect vegetation data. Plot photos from all the vegetation plots can be found in Appendix B.

The results of the vegetation baseline monitoring show an average of 880 stems per acre in the planted restoration area (Table 5 in Appendix B).


HARNETT
JOHNSTON
WAYNE
SAMPSON
DUPLIN
BLADEN
PENDER
SAMPSON COUNTY
DUPLIN COUNTY
Bill Williams Rd
Wilmington Rd
Henry Best Rd
Carrolls Farm Ln
Buckhall Creek
Perry Riverbank Rd
40
Charlie Frederick Rd
Bakers Branch
Carltons Mill Run
Carrolls Rd
Buck Hall Creek Rd
Brock Ln
Bluff Ln
Drew Rd
Stewarts Creek
Beasley Tomain Rd
Isham Frederick Rd
Chestnut Rd
Cornwallis Rd
Millers Creek
Beasley's Mill Rd
Bull Branch
M J Johnson Rd
Sikes Mill Run
Jonathan Ln
Beasleys Rd
Waycross Rd
Aud Rd
Turkey Rd
Sikes Mill Rd
Ezzell Rd
Dell Murphy Rd
Six Runs Creek
Stewarts Creek
Adu Rd
Pope Rd
Gold Pond Rd
Murphy's Rd
Watson Rd
K Bryan Rd
Merritt Rd
Bonham Rd
Duncan Rd
Murpheys Creek
Dell Rd
Jimmy Rd
Waycross Rd
Ty Singer Rd
Trinity Church Rd
Peg Leg Rd
Newkirk Rd
Fort Knox Rd
Blue Newkirk Rd
Shade Branch
Halls Pond Rd
Big Camp Rd
0.5 0.25 0 0.5
Miles
PROJECT SITE VICINITY MAP
NORMAN'S PASTURE/NORMAN'S PASTURE II
SAMPSON COUNTY, NC
There are no airports within
5 miles of the project site.
N


Tributary 1
Tributary 2
Extent of Project Parcels
NPRS Easement (36.9 ac)
NPII Easement (16.3 ac)
T1 - Enhancement II 843 lf / 337 SMUs
Dispersed Flow Project Streams
Other Streams
NPRS Re-establishment (15.5 ac / 15.5 WMUs)
NPRS Rehabilitation (0.7 ac / 0.5 WMUs)
NPRS Preservation (9.0 ac / 0 WMUs)
NPII Re-establishment (8.8 ac / 8.8 WMUs)
NPII Rehabilitation (1.4 ac / 0.9 WMUs)
NPII Preservation (0.8 ac / 0 WMUs)
150 75 0 150
Feet
SITE ASSET MAP
NORMAN'S PASTURE/NORMAN'S PASTURE II
SAMPSON COUNTY, NC
Image Source: Eastern Piedmont Orthoimagery, 2013.
N



NPRS Easement
NPII Easement
Vegetation Plot (VP)
Filled Ditches
Photo Point (PP)
Gauge Location

200 100 0 200
Feet

Image Source: NC Statewide Orthoimagery, 2013

N
W E
S

KCI ASSOCIATES OF NC

Monitoring Plan View
Norman's Pasture I & II Restoration Site
Sampson County, NC

April 2016


Tributary 1
Tributary 2
Stewarts Creek
Wetland Reference Gauge
Stream Reference Reach
Existing Streams
NPRS Easement
NPII Easement
Extent of Project Parcels
200 100 0 200
Feet
REFERENCE LOCATIONS
NORMAN'S PASTURE / NORMAN'S PASTURE II
SAMPSON COUNTY, NC
Image Source: Eastern Piedmont Orthoimagery, 2013.
N

5.0 REFERENCES

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NC Wetland Functional Assessment Team. 2010. NC Wetland Assessment Method (NC WAM) User Manual, version 4.1. Last accessed 11/2012 at: http://portal.ncdenr.org/c/document_library/get_file?uuid=76f3c58b-dab8-4960-ba43-45b7faf06f4c&groupId=38364

APPENDIX A

Background Tables

Table 1a. Project Components and Mitigation Credits
Norman's Pasture Restoration Site, DMS Project #95717

Mitigation Credits

	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Length			16.2						
Credits			16.0						
TOTAL CREDITS			16.0						

Project Components

Project Component -or- Reach ID	Stationing/ Location	Existing Footage/ Acreage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage/Acreage	Mitigation Ratio
Wetland Reestablishment				Restoration	15.5	1:1
Wetland Rehabilitation				Restoration	0.7	1.5:1
Wetland Preservation				Preservation	9.0	NA

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetlands (Acres)		Non-Riparian Wetlands (Acres)	Buffer (square feet)	Upland (Acres)
		Riverine	Non-Riverine			
Restoration		16.2				
Enhancement						
Enhancement I						
Enhancement II						
Creation						
Preservation						
High Quality Preservation						
TOTAL CREDITS		**16.0**				

R= Restoration RE= Restoration Equivalent of Creation or Enhancement

Table 1b. Project Components and Mitigation Credits
Norman's II Restoration Site, DMS Project #96310

Mitigation Credits

	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Length		843	10.2						
Credits		337	9.7						
TOTAL CREDITS	337		9.7						

Project Components

Project Component -or- Reach ID	Stationing/ Location	Existing Footage/ Acreage	Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage/Acreage	Mitigation Ratio
Tributary 1	10+00 – 18+43	843		Enhancement II	843	2:5
Wetland Reestablishment				Restoration	8.8	1:1
Wetland Rehabilitation				Restoration	1.4	1.5:1
Wetland Preservation				Preservation	0.8	NA

Component Summation

Restoration Level	Stream (linear feet)	Riparian Wetlands (Acres)		Non-Riparian Wetlands (Acres)	Buffer (square feet)	Upland (Acres)
		Riverine	Non-Riverine			
Restoration			9.7			
Enhancement						
Enhancement I						
Enhancement II	337					
Creation						
Preservation						
High Quality Preservation						
TOTAL CREDITS	**337**		**9.7**			

Table 2. Project Activity & Reporting History Norman's Pasture and Norman'ss II Restoration Sites		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Mitigation Plan		Nov 14
Final Design - Construction Plans		Jan 15
Construction		Jan 16
Planting		Feb 16
Baseline Monitoring/Report	April 16	April 16

Table 3. Project Contacts Norman's Pasture and Norman's II Restoration Sites	
Design Firm	KCI Associates of North Carolina, PC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 278-2512 Fax: (919) 783-9266
Construction Contractor	KCI Environmental Technologies and Construction 4601 Six Forks Rd. Suite 220 Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 278-2512
Planting Contractor	Conservation Services Inc. 1620 N. Delphine Ave. Waynesboro, VA 22980 Contact: Mr. David Coleman Phone: (540) 941-0067
Monitoring Performers	
MY-00	KCI Associates of North Carolina, PC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

Table 4a. Project Information, Norman's Pasture Restoration Site, DMS Project #95717			
Project Name	Norman's Pasture Restoration Site		
County	Sampson County		
Project Area (acres)	36.92 acres		
Project Coordinates (lat. and long.)	34.904893 N , -78.151460 W		
Project Watershed Summary Information			
Physiographic Province	Coastal Plain		
River Basin	Cape Fear		
USGS Hydrologic Unit 8-digit	03030006	**USGS Hydrologic Unit 14-digit**	03030006110040
DWQ Sub-basin	03-06-19		
Project Drainage Area (acres)	186 acres		
Project Drainage Area Percentage of Impervious Area	1%		
CGIA Land Use Classification	Managed Herbaceous Cover 42% (77.3 ac), Cultivated 24% (44.3 ac), Bottomland Forest/Hardwood Swamps 17% (31.0 ac), Southern Yellow Pine 10% (19.5 ac), Mixed Hardwoods/Conifers 5% (9.2 ac), and Evergreen Shrubland 2% (4.2 ac)		

Reach Summery Information (Post Restoration)		
Parameters	**T1**	**T2**
Length of reach (linear feet)	1,585	1,612
Valley classification	Valley Type X	Valley Type X
Drainage area (acres)	112 acres	36 acres
NCDWQ Water Quality Classification	Project Reach Not Classified; Receiving water = Stewart's Creek (C; SW)	Project Reach Not Classified; Receiving water = Stewart's Creek (C; SW)
Morphological Description (stream type)	Portions ditched channel; other C5	Portions headwater stream; others ditched channel
Evolutionary trend	Channelized	Channelized
Mapped Soil Series	Chipley Johnston; Torhunta	Bibb and Johnston; Johnston; Lumbee
Drainage class	Somewhat poorly drained, very poorly drained, very poorly drained	Poorly drained; very poorly drained; poorly drained
Soil Hydric status	Drained hydric	Drained hydric
Slope	0-2%	0-2%
FEMA classification	Zone AE	Zone AE
Native vegetation community	Pasture, Headwater Forest	Pasture, Riverine Swamp Forest
Percent composition of exotic invasive vegetation	<5%	<5%

Wetland Summary Information (Post Restoration)				
Parameters	**Area 1**	**Area 4**	**Area 9**	**Area 10**
Size of Wetland (acres)	1.99 acres	5.20 acres	2.19 acres	0.02 acres
Wetland Type	Riparian	Riparian	Riparian	Riparian
Mapped Soil Series	Bibb and Johnston	Lumbee	Bibb and Johnston	Bibb and Johnston
Drainage class	Poorly or very poorly drained	Poorly drained	Poorly or very poorly drained	Poorly or very poorly drained
Soil Hydric Status	Drained hydric	Drained hydric	Drained hydric	Drained hydric
Source of Hydrology	Seepage/ Precipitation	Seepage/ Precipitation	Seepage/ Precipitation	Seepage/ Precipitation
Hydrologic Impairment	Ditching and Crops	Ditching and Crops	Ditching and Crops	Ditching and Crops
Native vegetation community	Crops, Pasture, Wetland	Crops, Pasture, Forested Wetland	Crops, Pasture, Forested Wetland	Crops, Pasture
Percent composition of exotic invasive vegetation	<5%	<5%	<5%	<5%

Project Information continued - Norman's Pasture Restoration Site Restoration Site			
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States – Section 404	Yes	Yes	Jurisdictional Determination
Waters of the United States – Section 401	Yes	Yes	Jurisdictional Determination
Endangered Species Act	No	N/A	N/A
Historic Preservation Act	No	N/A	N/A
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	No-Rise Certification/FEMA Floodplain Checklist
Essential Fisheries Habitat**	No	N/A	N/A

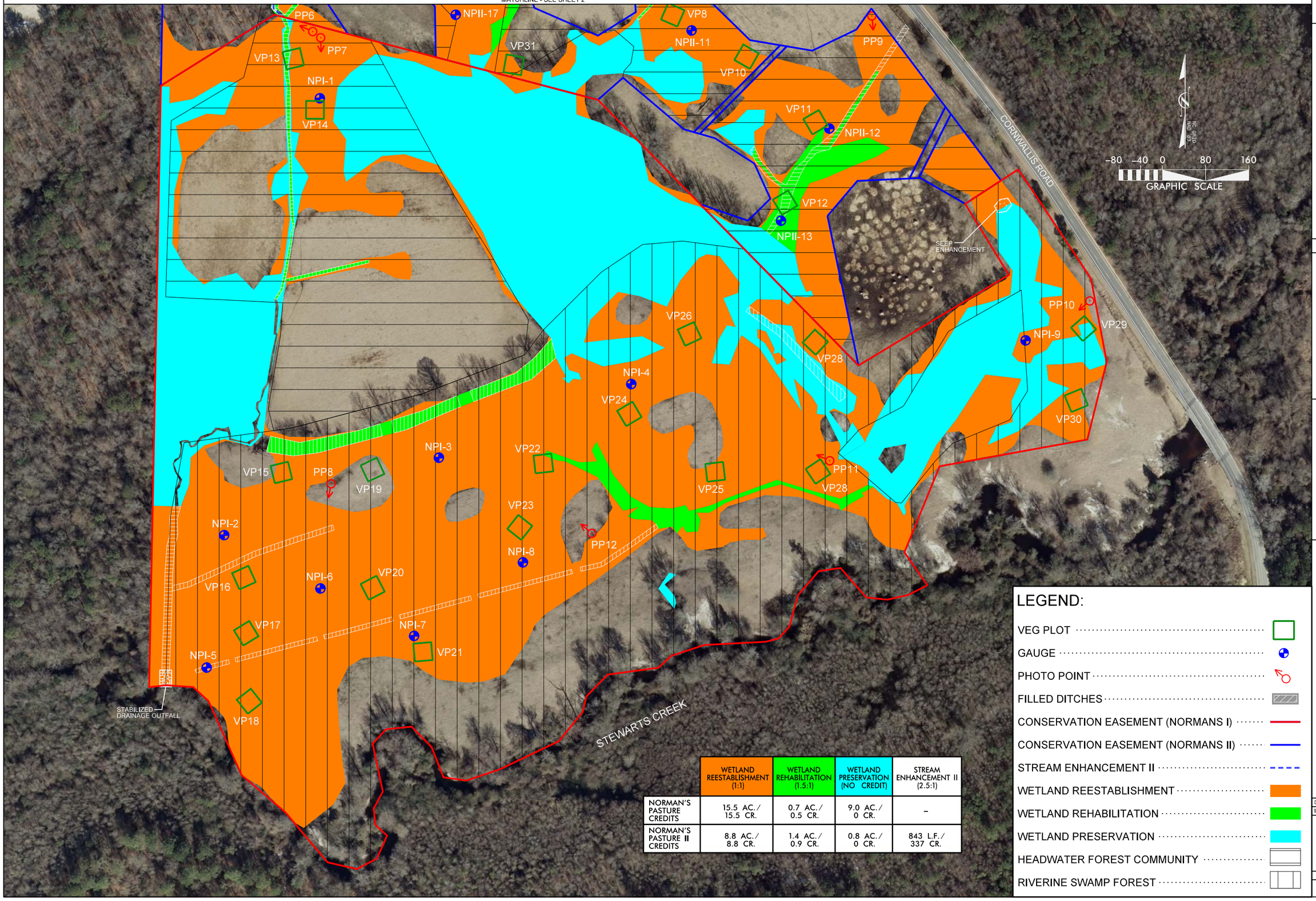
Table 4b. Project Information, Norman's II Restoration Site, DMS Project #96310					
Project Name	Norman's II Restoration Site				
County	Sampson County				
Project Area (acres)	16.3 acres				
Project Coordinates (lat. and long.)	34.906839 N , -78.151797 W				
Project Watershed Summary Information					
Physiographic Province	Coastal Plain				
River Basin	Cape Fear				
USGS Hydrologic Unit 8-digit	03030006	**USGS Hydrologic Unit 14-digit**	03030006110040		
DWQ Sub-basin	03-06-19				
Project Drainage Area (acres)	139 acres				
Project Drainage Area Percentage of Impervious Area	1%				
CGIA Land Use Classification	Cultivated 32% (44.3 ac), Managed Herbaceous Cover 31% (42.9 ac), Bottomland Forest/Hardwood Swamps 14% (19.5 ac), Southern Yellow Pine 14% (19.5 ac), Mixed Hardwoods/Conifers 6% (9.0 ac), and Evergreen Shrubland 3% (4.2 ac)				
Reach Summery Information (Post Restoration)					
Parameters	**T1**				
Length of reach (linear feet)	843				
Valley classification	Valley Type X				
Drainage area (acres)	112 acres				
NCDWQ Water Quality Classification	Project Reach Not Classified; Receiving water = Stewart's Creek (C; SW)				
Morphological Description (stream type)	Modified E5				
Evolutionary trend	Stage III				
Mapped Soil Series	Johnston				
Drainage class	Very poorly drained				
Soil Hydric status	Drained hydric				
Slope	0-1%				
FEMA classification	Zone AE & Zone X				
Native vegetation community	Headwater Forest				
Percent composition of exotic invasive vegetation	<5%				
Wetland Summary Information (Post Restoration)					
Parameters	**Area 6***	**Area 7***	**Area 8***	**Area 9***	**Area 11***
Size of Wetland (acres)	0.09 acre	0.17 acre	0.37 acre	0.02 acre	0.08 acre
Wetland Type	Riparian	Riparian	Pond and Riparian	Riparian	Riparian
Mapped Soil Series	Bibb and Johnston; Lumbee	Johnston loam	Lynn Haven	Bibb and Johnston	Torhunta Variant
Drainage class	Poorly or very poorly drained	Very poorly drained	Poorly or very poorly drained	Poorly or very poorly drained	Very poorly drained
Soil Hydric Status	Drained Hydric	Drained Hydric	Drained Hydric	Drained Hydric	Drained Hydric
Source of Hydrology	Seepage/ Precipitation	Seepage / Precipitation	Seepage/ Precipitation	Seepage / Precipitation	Seepage / Precipitation
Hydrologic Impairment	Ditching and Crops	Ditching and Crops	Ditching and Crops	Ditching and Crops	Ditching
Native vegetation community	Crops, Pasture, Wetland	Crops, Pasture, Wetland	Crops, Pasture	Crops, Pasture, Forested Wetland	Forested Wetland
Percent composition of exotic invasive vegetation	0%	0%	0%	0%	

Project Information continued - Norman's II Restoration Site Restoration Site			
Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States – Section 404	Yes	Yes	Jurisdictional Determination
Waters of the United States – Section 401	Yes	Yes	Jurisdictional Determination
Endangered Species Act**	No	N/A	N/A
Historic Preservation Act**	No	N/A	N/A
Coastal Zone Management Act ** (CZMA)/ Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	FEMA Floodplain Checklist
Essential Fisheries Habitat**	No	N/A	N/A

APPENDIX B

Visual Assessment Data

MATCHLINE - SEE SHEET 2



	WETLAND REESTABLISHMENT (1:1)	WETLAND REHABILITATION (1.5:1)	WETLAND PRESERVATION (NO CREDIT)	STREAM ENHANCEMENT II (2.5:1)
NORMAN'S PASTURE CREDITS	15.5 AC./ 15.5 CR.	0.7 AC./ 0.5 CR.	9.0 AC./ 0 CR.	–
NORMAN'S PASTURE II CREDITS	8.8 AC./ 8.8 CR.	1.4 AC./ 0.9 CR.	0.8 AC./ 0 CR.	843 L.F./ 337 CR.

LEGEND:

- VEG PLOT
- GAUGE
- PHOTO POINT
- FILLED DITCHES
- CONSERVATION EASEMENT (NORMANS I)
- CONSERVATION EASEMENT (NORMANS II)
- STREAM ENHANCEMENT II
- WETLAND REESTABLISHMENT
- WETLAND REHABILITATION
- WETLAND PRESERVATION
- HEADWATER FOREST COMMUNITY
- RIVERINE SWAMP FOREST

DATE

REVISIONS

NCDEQ DIVISION OF MITIGATION SERVICES

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4601 SIX FORKS ROAD, SUITE 223
RALEIGH, NORTH CAROLINA 27609

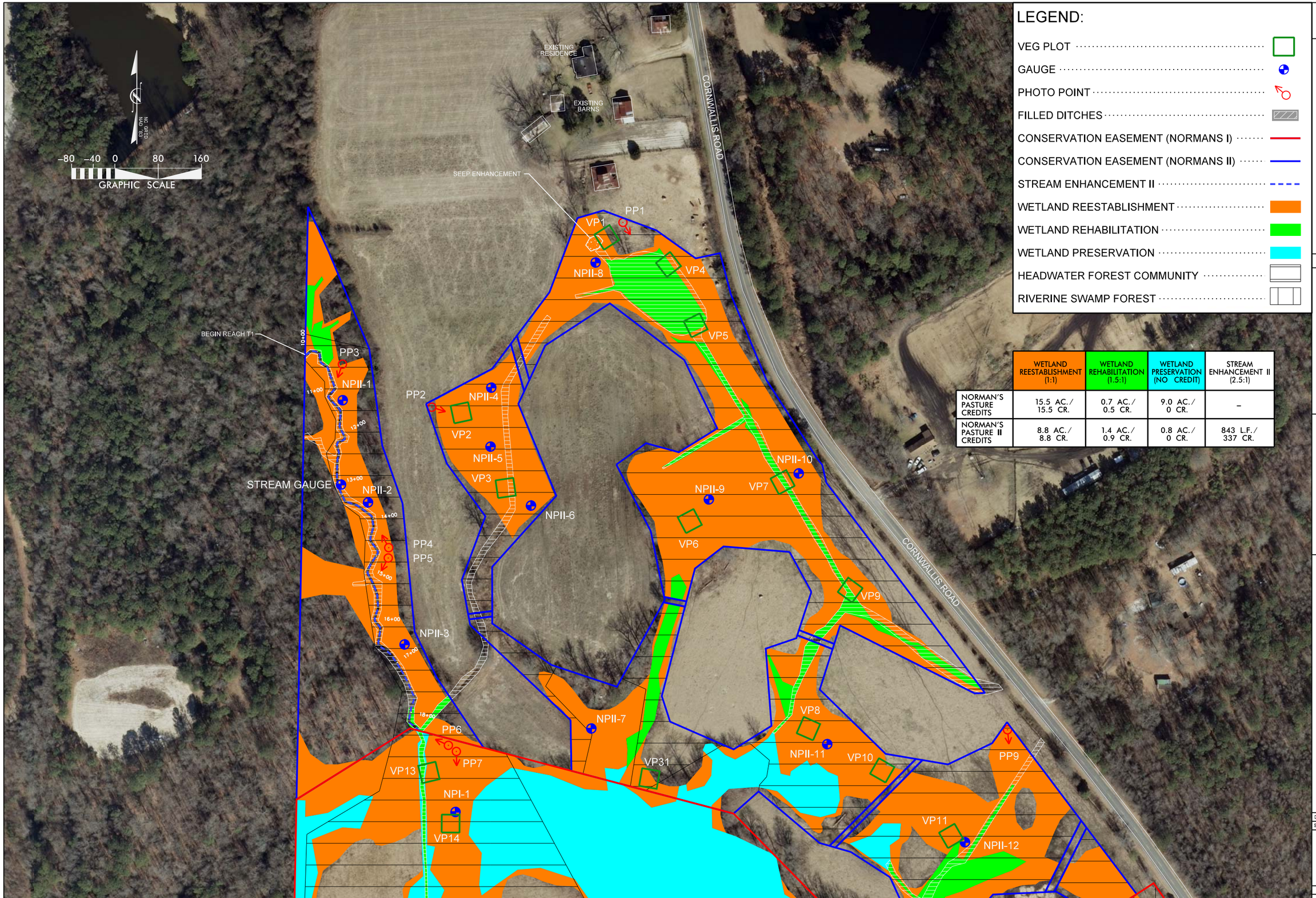
NORMAN'S PASTURE & NORMAN'S PASTURE II RESTORATION SITES

SAMPSON COUNTY, NORTH CAROLINA

DATE: JUNE 2016
SCALE: GRAPHIC

CCPV

SHEET 1 OF 2



LEGEND:

- VEG PLOT
- GAUGE
- PHOTO POINT
- FILLED DITCHES
- CONSERVATION EASEMENT (NORMANS I)
- CONSERVATION EASEMENT (NORMANS II)
- STREAM ENHANCEMENT II
- WETLAND REESTABLISHMENT
- WETLAND REHABILITATION
- WETLAND PRESERVATION
- HEADWATER FOREST COMMUNITY
- RIVERINE SWAMP FOREST

	WETLAND REESTABLISHMENT (1:1)	WETLAND REHABILITATION (1.5:1)	WETLAND PRESERVATION (NO CREDIT)	STREAM ENHANCEMENT II (2.5:1)
NORMAN'S PASTURE CREDITS	15.5 AC./ 15.5 CR.	0.7 AC./ 0.5 CR.	9.0 AC./ 0 CR.	–
NORMAN'S PASTURE II CREDITS	8.8 AC./ 8.8 CR.	1.4 AC./ 0.9 CR.	0.8 AC./ 0 CR.	843 L.F./ 337 CR.

DATE

REVISIONS

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NORMAN'S PASTURE & NORMAN'S PASTURE II RESTORATION SITES

SAMPSON COUNTY, NORTH CAROLINA

DATE: JUNE 2016

SCALE: GRAPHIC

CCPV

Photo Reference Photos

PP1 – MY-00 – 4/15/16

PP2 – MY-00 – 4/15/16

PP3 – MY-00 – 4/15/16

PP4 – MY-00 – 4/15/16

PP5– MY-00 – 4/15/16

PP6– MY-00 – 4/15/16

PP7 – MY-00 – 4/15/16

PP8 – MY-00 – 4/15/16

PP9 – MY-00 – 4/15/16

PP10 – MY-00 – 4/15/16

PP11 – MY-00 – 4/15/16

PP12 – MY-00 – 4/15/16

Vegetation Monitoring Plot Photos

Vegetation Plot 1 – MY-00 – 3/29/16

Vegetation Plot 2 – MY-00 – 3/29/16

Vegetation Plot 3 – MY-00 – 3/29/16

Vegetation Plot 4 – MY-00 – 3/31/16

Vegetation Plot 5 – MY-00 – 3/29/16

Vegetation Plot 6 – MY-00 – 3/29/16

Vegetation Plot 7 – MY-00 – 3/29/16

Vegetation Plot 8 – MY-00 – 3/29/16

Vegetation Plot 9 – MY-00 – 3/29/16

Vegetation Plot 10 – MY-00 – 3/29/16

Vegetation Plot 11 – MY-00 – 3/29/16

Vegetation Plot 12 – MY-00 – 3/29/16

Vegetation Plot 13 – MY-00 – 3/31/16

Vegetation Plot 14 – MY-00 – 3/31/16

Vegetation Plot 15 – MY-00 – 3/31/16

Vegetation Plot 16 – MY-00 – 3/31/16

Vegetation Plot 17 – MY-00 – 3/31/16

Vegetation Plot 18 – MY-00 – 3/31/16

Vegetation Plot 19 – MY-00 – 3/31/16

Vegetation Plot 20 – MY-00 – 3/31/16

Vegetation Plot 21 – MY-00 – 3/31/16

Vegetation Plot 22 – MY-00 – 3/31/16

Vegetation Plot 23 – MY-00 – 3/31/16

Vegetation Plot 24 – MY-00 – 3/31/16

Vegetation Plot 25 – MY-00 – 3/31/16

Vegetation Plot 26 – MY-00 – 3/31/16

Vegetation Plot 27 – MY-00 – 3/31/16

Vegetation Plot 28 – MY-00 – 3/29/16

Vegetation Plot 29 – MY-00 – 3/29/16

Vegetation Plot 30 – MY-00 – 3/29/16

Vegetation Plot 31 – MY-00 – 3/29/16

APPENDIX C

Vegetation Plot Data

Table 5. CVS Stem Count by Plot and Species, DMS Project Code 95717/96310. Project Name: Norman's Pasture/Norma's Pasture II

			Current Plot Data (MY0 2016)																														
			95717-01-0001			95717-01-0002			95717-01-0003			95717-01-0004			95717-01-0005			95717-01-0006			95717-01-0007			95717-01-0008			95717-01-0009			95717-01-0010			95717-01-0011		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Betula nigra	river birch	Tree	2	2	2	1	1	1	1	1	1	3	3	3	4	4	4	7	7	7	2	2	2	2	2	2							3	3	3
Fraxinus pennsylvanica	green ash	Tree	1	1	1	3	3	3	5	5	5				1	1	1	1	1	1	2	2	2				2	2	2				3	3	3
Liriodendron tulipifera	tuliptree	Tree	2	2	2																						2	2	2				1	1	1
Nyssa aquatica	water tupelo	Tree																																	
Quercus laurifolia	laurel oak	Tree	3	3	3	4	4	4	1	1	1				1	1	1	5	5	5	1	1	1	3	3	3	2	2	2	1	1	1	3	3	3
Quercus lyrata	overcup oak	Tree	4	4	4	5	5	5	2	2	2				2	2	2				1	1	1	4	4	4	2	2	2				1	1	1
Quercus michauxii	swamp chestnut oak	Tree				3	3	3	2	2	2	8	8	8				1	1	1												4	4	4
Quercus minima	dwarf live oak	Shrub				1	1	1																										
Quercus phellos	willow oak	Tree				1	1	1																										
Taxodium distichum	bald cypress	Tree	2	2	2	4	4	4	8	8	8										2	2	2	2	2	2	5	5	5	2	2	2			
Unknown		Shrub or Tree	12	12	12	6	6	6	10	10	10	2	2	2	5	5	5	6	6	6	3	3	3	8	8	8	4	4	4	7	7	7	8	8	8
		Stem count	26	26	26	28	28	28	29	29	29	13	13	13	13	13	13	20	20	20	11	11	11	19	19	19	17	17	17	10	10	10	23	23	23
		size (ares)	1			1			1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	7	7	7	9	9	9	7	7	7	3	3	3	5	5	5	5	5	5	6	6	6	5	5	5	6	6	6	3	3	3	7	7	7
		Stems per ACRE	1052	1052	1052	1133	1133	1133	1174	1174	1174	526	526	526	526	526	526	809	809	809	445	445	445	769	769	769	688	688	688	405	405	405	931	931	931

Table 5. CVS Stem Count by Plot and Species, DMS Project Code 95717/96310. Project Name: Norman's Pasture/Norma's Pasture II

			Current Plot Data (MY0 2016)																														
			95717-01-0012			95717-01-0013			95717-01-0014			95717-01-0015			95717-01-0016			95717-01-0017			95717-01-0018			95717-01-0019			95717-01-0020			95717-01-0021			95717-01-0022		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Betula nigra	river birch	Tree				1	1	1				2	2	2										3	3	3				3	3	3			
Fraxinus pennsylvanica	green ash	Tree	3	3	3	3	3	3				1	1	1				1	1	1										1	1	1	1	1	1
Liriodendron tulipifera	tuliptree	Tree				2	2	2																											
Nyssa aquatica	water tupelo	Tree										12	12	12	5	5	5	9	9	9				16	16	16	3	3	3				1	1	1
Quercus laurifolia	laurel oak	Tree	1	1	1	2	2	2	1	1	1	5	5	5							1	1	1							3	3	3	2	2	2
Quercus lyrata	overcup oak	Tree				1	1	1				2	2	2							3	3	3												
Quercus michauxii	swamp chestnut oak	Tree				5	5	5	1	1	1	2	2	2				1	1	1				6	6	6	6	6	6	1	1	1			
Quercus minima	dwarf live oak	Shrub																																	
Quercus phellos	willow oak	Tree																																	
Taxodium distichum	bald cypress	Tree	8	8	8	1	1	1	8	8	8				33	33	33	11	11	11				9	9	9	8	8	8	6	6	6	8	8	8
Unknown		Shrub or Tree	1	1	1	10	10	10	7	7	7	5	5	5				15	15	15	15	15	15	5	5	5	15	15	15	13	13	13	4	4	4
		Stem count	13	13	13	25	25	25	17	17	17	29	29	29	38	38	38	37	37	37	19	19	19	39	39	39	32	32	32	27	27	27	16	16	16
		size (ares)	1			1			1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	4	4	4	8	8	8	4	4	4	7	7	7	2	2	2	5	5	5	3	3	3	5	5	5	4	4	4	6	6	6	5	5	5
		Stems per ACRE	526	526	526	1012	1012	1012	688	688	688	1174	1174	1174	1538	1538	1538	1497	1497	1497	769	769	769	1578	1578	1578	1295	1295	1295	1093	1093	1093	647	647	647

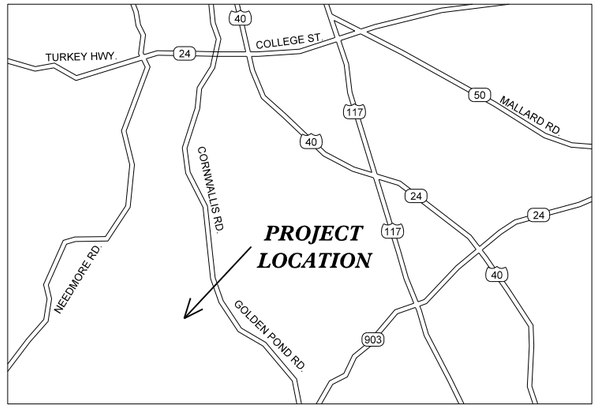
Table 5. CVS Stem Count by Plot and Species, DMS Project Code 95717/96310. Project Name: Norman's Pasture/Norma's Pasture II

			Current Plot Data (MY0 2016)																									Annual Means		
			95717-01-0023			95717-01-0024			95717-01-0025			95717-01-0026			95717-01-0027			95717-01-0028			95717-01-0029			95717-01-0030			95717-01-0031			MY0 (2016)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Betula nigra	river birch	Tree										8	8	8															42	42	42
Fraxinus pennsylvanica	green ash	Tree													2	2	2	2	2	2				4	4	4				36	36	36
Liriodendron tulipifera	tuliptree	Tree																									3	3	3	10	10	10
Nyssa aquatica	water tupelo	Tree	4	4	4							4	4	4				2	2	2				4	4	4				60	60	60
Quercus laurifolia	laurel oak	Tree							4	4	4	3	3	3	5	5	5	6	6	6	1	1	1	5	5	5	5	5	5	68	68	68
Quercus lyrata	overcup oak	Tree	1	1	1										2	2	2				1	1	1	1	1	1	1	1	1	33	33	33
Quercus michauxii	swamp chestnut oak	Tree													1	1	1													41	41	41
Quercus minima	dwarf live oak	Shrub																												1	1	1
Quercus phellos	willow oak	Tree																												1	1	1
Taxodium distichum	bald cypress	Tree	14	14	14	20	20	20	3	3	3	5	5	5	1	1	1	2	2	2	5	5	5	1	1	1	1	1	1	169	169	169
Unknown		Shrub or Tree	7	7	7	2	2	2	13	13	13	2	2	2	8	8	8	7	7	7	2	2	2	3	3	3	8	8	8	213	213	213
		Stem count	26	26	26	22	22	22	20	20	20	22	22	22	19	19	19	19	19	19	9	9	9	18	18	18	18	18	18	674	674	674
		size (ares)	1			1			1			1			1			1			1			1			1			31		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.77		
		Species count	4	4	4	2	2	2	3	3	3	5	5	5	6	6	6	5	5	5	4	4	4	6	6	6	5	5	5	11	11	11
		Stems per ACRE	1052	1052	1052	890	890	890	809	809	809	890	890	890	769	769	769	769	769	769	364	364	364	728	728	728	728	728	728	880	880	880

APPENDIX D

As-built Plan Sheets

CONTRACT #: NORMAN'S PASTURE = 005010 KCI JOB# : 20122905
NORMAN'S PASTURE II = 005787 KCI JOB# : 20145090



VICINITY MAP
NOT TO SCALE

NCDEQ DIVISION OF MITIGATION SERVICES

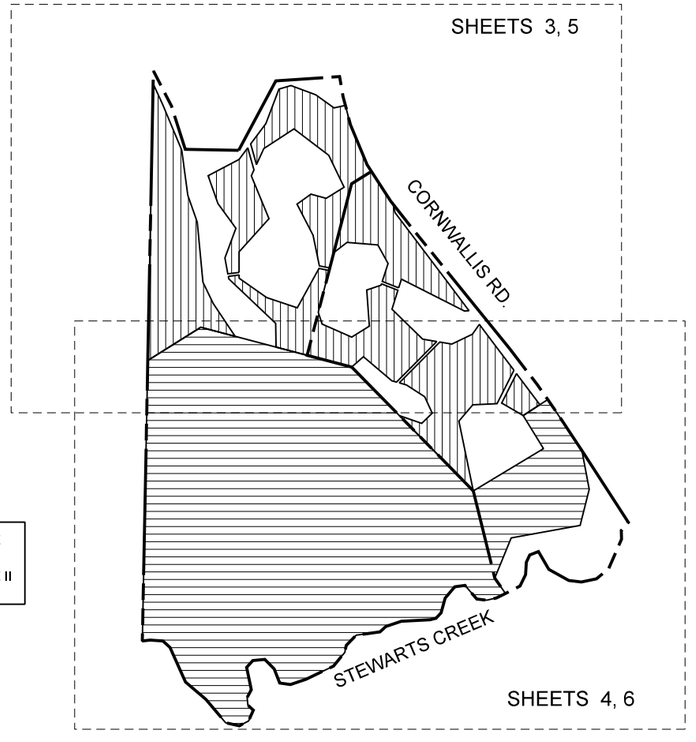
NORMAN'S PASTURE / NORMAN'S PASTURE II RESTORATION SITES

SAMPSON COUNTY, NORTH CAROLINA
CAPE FEAR RIVER BASIN

STEWARTS CREEK LOCAL WATERSHED
03030006110040

STATE	DMS PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
N.C.	NORMAN'S PASTURE = 95717 NORMAN'S II = 96310	1	7

SYM.	DESCRIPTION	DATE
A	REVISED PER DMS COMMENTS	05-31-2016
	REVISIONS	



AS–BUILT PLANS

INDEX OF SHEETS

DIRECTIONS

FROM RALEIGH TAKE I-40 EAST TOWARDS WILMINGTON. FOLLOW I-40 FOR 65 MILES. TAKE EXIT 356 AND TURN RIGHT ONTO NC-24 WEST. IN ABOUT A MILE, TAKE A LEFT ONTO CARROLS ROAD. TAKE THE FIRST RIGHT ONTO BLANCHARD ROAD. MERGE SLIGHTLY TO THE RIGHT TO STAY ON CORNWALLIS ROAD AND FOLLOW FOR 6 MILES. THE SITE WILL BE ON THE RIGHT, JUST PAST A WHITE HOUSE.

A *PROJECT DATA*

	WETLAND REESTABLISHMENT (1:1)	WETLAND REHABILITATION (1.5:1)	WETLAND PRESERVATION (NO CREDIT)	STREAM ENHANCEMENT II (2.5:1)
NORMANS PASTURE CREDITS	15.5 AC./ 15.5 CR.	0.7 AC./ 0.5 CR.	9.0 AC./ 0 CR.	–
NORMANS PASTURE II CREDITS	8.8 AC./ 8.8 CR.	1.4 AC./ 0.9 CR.	0.8 AC./ 0 CR.	843 L.F./ 337 CR.

Prepared in the Office of:

KCI Associates of North Carolina, P.A.
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PROJECT ENGINEER

JOSEPH PFEIFFER
WETLAND DESIGN

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

SIGNATURE: *P.E.*

GENERAL NOTES:

DISTANCES SHOWN ARE HORIZONTAL GROUND DISTANCES IN U.S. SURVEY FEET UNLESS OTHERWISE NOTED.

THE BASIS OF THE MERIDIANS AND COORDINATES FOR THIS PLAT IS THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM 1983 (NAD 83). ALL DISTANCES ARE GROUND UNLESS OTHERWISE NOTED.

NO UNDERGROUND UTILITY LOCATING PERFORMED DURING THE COURSE OF THIS SURVEY.

CONTROL POINTS:

	NORTHING	EASTING	ELEVATION
KCI#1	421327.02	2255180.03	84.25
KCI#2	420802.02	2255524.70	80.44
KCI#3	421074.48	2254096.57	77.81
KCI#4	420719.93	2254192.33	78.53
KCI#5	420159.95	2254533.95	76.72
KCI#6	420020.91	2253983.21	75.53
KCI#7	420589.61	2254676.16	76.12
KCI#8	420347.62	2255065.72	77.47
KCI#9	420497.08	2255378.18	77.48
KCI#10	421978.76	2254649.55	95.68
KCI#11	423050.98	2254450.09	115.17
KCI#12	420425.44	2253972.07	75.46
KCI#13	420267.67	2254832.42	76.59
KCI#14	421456.93	2254046.76	86.27
KCI#15	421798.55	2253885.11	88.59
KCI#16	421588.92	2253884.54	85.93
KCI#17	421943.33	2253888.17	91.11
KCI#18	422093.54	2253839.07	96.46

PROJECT LEGEND:

Filled Ditches

Ditch Plugs

Stabilized Drainage Outfall

Seep Enhancement

Existing Woods Line

Minor Contour Line

Major Contour Line — 77 —

Overhead Utilities — OHW —

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

DATE	REVISIONS

NCDEQ DIVISION OF MITIGATION SERVICES

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4601 SIX FORKS ROAD, SUITE 220
RALEIGH, NORTH CAROLINA 27609

NORMAN'S PASTURE & NORMAN'S PASTURE II
RESTORATION SITES
SAMPSON COUNTY, NORTH CAROLINA

DATE: FEB 2016
SCALE: N.T.S.

GENERAL NOTES & PROJECT LEGEND

MATCHLINE - SEE SHEET 4

INSTALLED DITCH PLUG. RE-GRADED TO DISPERSE FLOW THROUGHOUT FLOODPLAIN.

CONSERVATION EASEMENT NORMAN'S PASTURE II

CONSERVATION EASEMENT NORMAN'S PASTURE I

KCI#3

STABILIZED AT GRADE CROSSING

FILLED DITCH

THIS AREA UTILIZED FOR ONSITE BORROW FOR FILLING STREAM CHANNEL - APPROX 6" DEPTH.

CONSERVATION EASEMENT NORMAN'S PASTURE I

DITCH PLUG

DITCH PLUG

DITCH NOT FILLED

FILLED DITCH

KCI#12

FILLED DITCH

DITCH NOT FILLED

FILLED DITCH

DITCH NOT FILLED

KCI#6

STABILIZED DRAINAGE OUTFALL

CONSERVATION EASEMENT NORMAN'S PASTURE I

STEWARTS CREEK

KCI#7

FILLED NORTHERN PORTION OF DITCH USING SPOIL PILE ALONG TOP OF BANK

KCI#5

KCI#13

KCI#8

DITCH NOT FILLED

DITCH PLUG NOT INSTALLED

KCI#1

INSTALLED (1) 12" HDPE PIPES

A

FILLED DITCH

OHW

CORNWALLIS ROAD

STABILIZED AT GRADE CROSSING

OHW

SEEP ENHANCEMENT

OHW

KCI#2

CONSERVATION EASEMENT NORMAN'S PASTURE I

OHW

CONSERVATION EASEMENT NORMAN'S PASTURE I

KCI#9

OHW

NC GRID NAD '83

–80 –40 0 80 160

GRAPHIC SCALE

RE-ESTABLISHED HISTORIC GRADE/ DRAINAGE PATTERN (FILLED DITCHES - REMOVED SPOIL)

WETLAND CROSS-SECTION

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

	DATE	REVISIONS
A	05-31-2016	REVISED PER DMS COMMENTS

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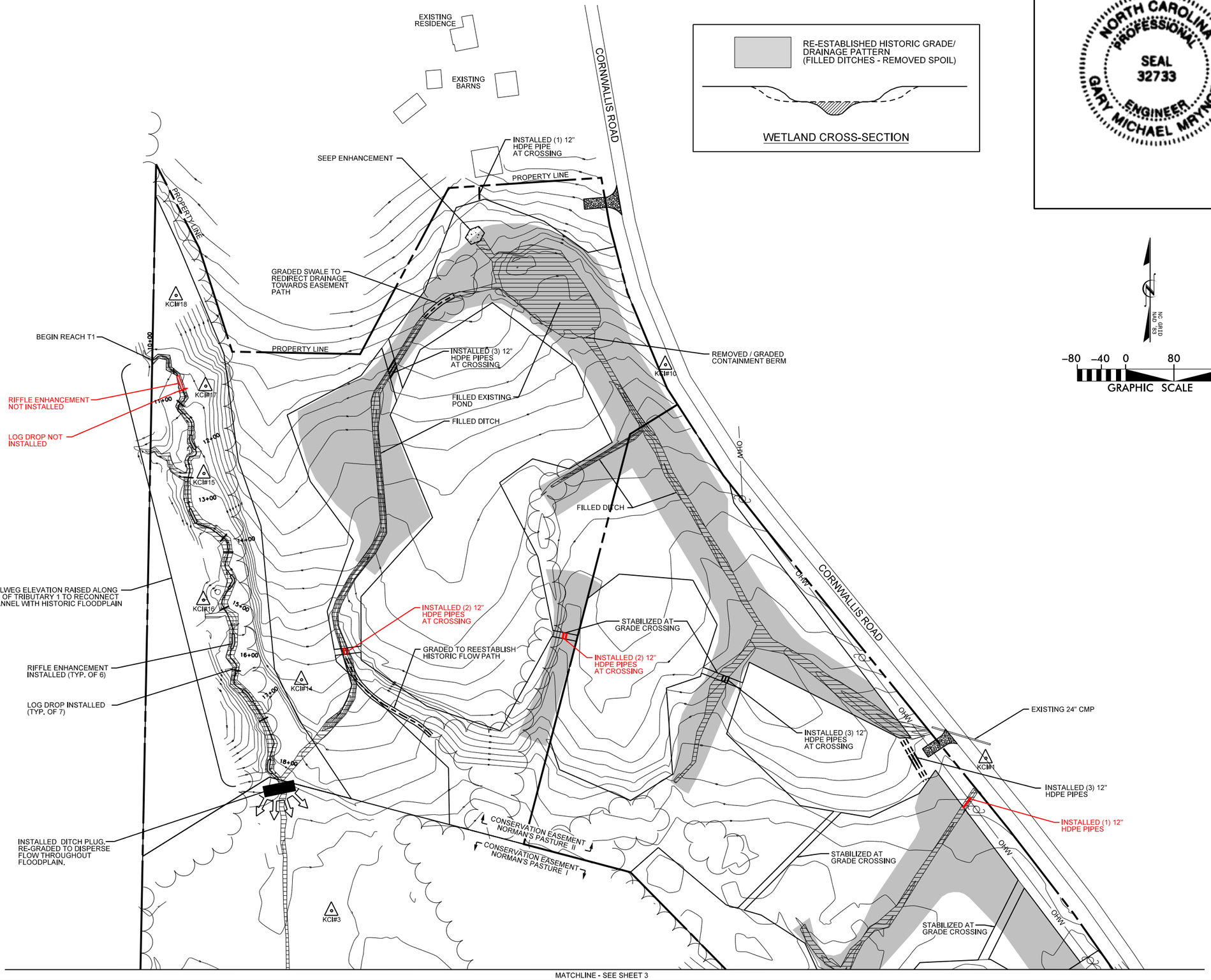
NORMAN'S PASTURE & NORMAN'S PASTURE II RESTORATION SITES

SAMPSON COUNTY, NORTH CAROLINA

DATE: FEB 2016

SCALE: GRAPHIC

AS-BUILT SITE PLAN



RE-ESTABLISHED HISTORIC GRADE/ DRAINAGE PATTERN (FILLED DITCHES - REMOVED SPOIL)

WETLAND CROSS-SECTION

NORTH CAROLINA PROFESSIONAL SEAL 32733 ENGINEER GARY MICHAEL MRYNCZA

NC 6010 NAD 83

–80 –40 0 80 160

GRAPHIC SCALE

DATE

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NORMAN'S PASTURE & NORMAN'S PASTURE II RESTORATION SITES

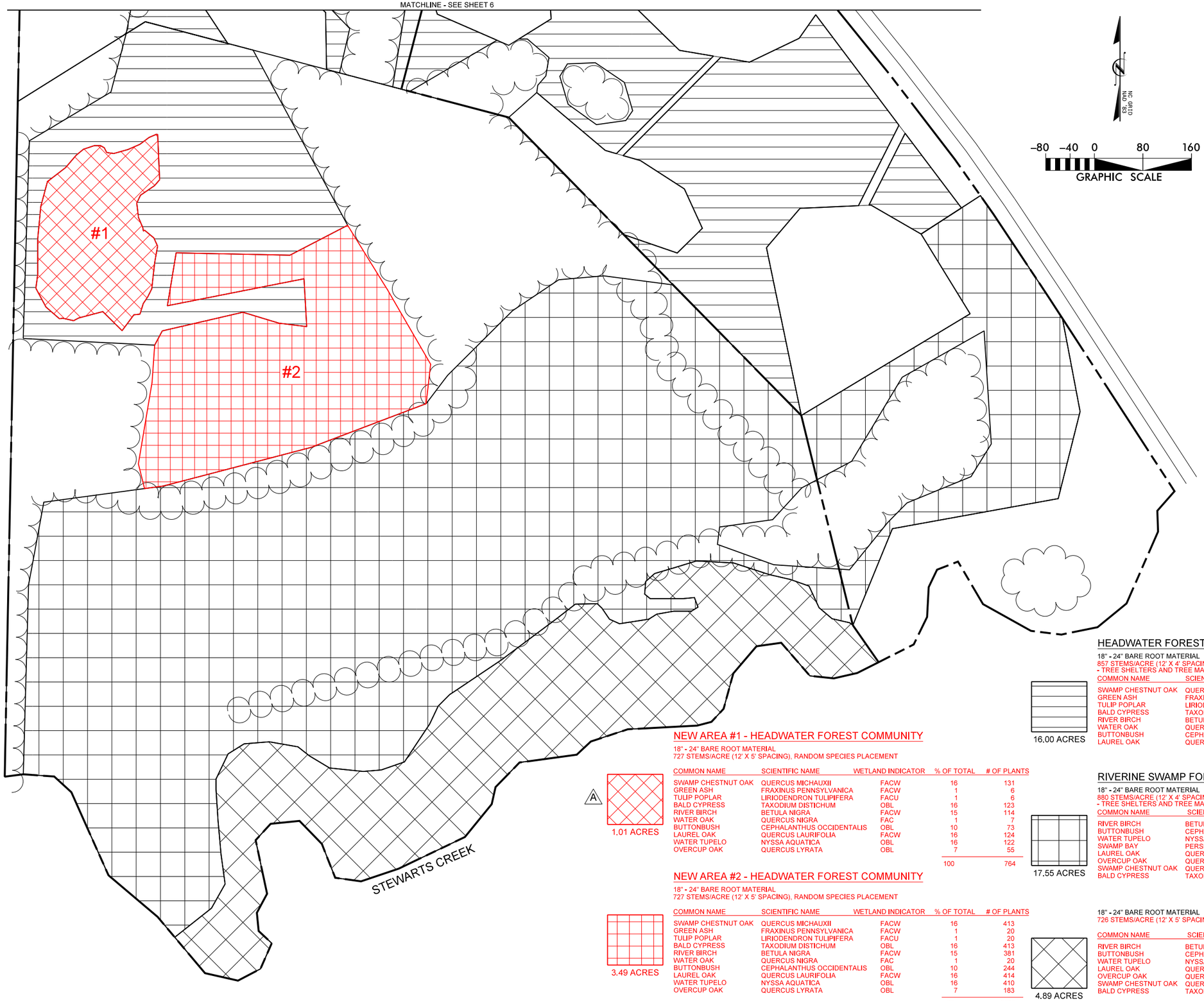
SAMPSON COUNTY, NORTH CAROLINA

DATE: FEB 2016

SCALE: GRAPHIC

AS-BUILT SITE PLAN

SHEET 4 OF 7



NC GRID NAD 83

–80 –40 0 80 160
GRAPHIC SCALE

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NORMAN'S PASTURE & NORMAN'S PASTURE II RESTORATION SITES

SAMPSON COUNTY, NORTH CAROLINA

DATE: FEB 2016
SCALE: GRAPHIC

PLANTING PLAN

SHEET 5 OF 7

NEW AREA #1 - HEADWATER FOREST COMMUNITY

18" - 24" BARE ROOT MATERIAL
727 STEMS/ACRE (12' X 5' SPACING), RANDOM SPECIES PLACEMENT

COMMON NAME	SCIENTIFIC NAME	WETLAND INDICATOR	% OF TOTAL	# OF PLANTS
SWAMP CHESTNUT OAK	QUERCUS MICHAUXII	FACW	16	131
GREEN ASH	FRAXINUS PENNSYLVANICA	FACW	1	6
TULIP POPLAR	LIRIODENDRON TULIPIFERA	FACU	1	6
BALD CYPRESS	TAXODIUM DISTICHUM	OBL	16	123
RIVER BIRCH	BETULA NIGRA	FACW	15	114
WATER OAK	QUERCUS NIGRA	FAC	1	7
BUTTONBUSH	CEPHALANTHUS OCCIDENTALIS	OBL	10	73
LAUREL OAK	QUERCUS LAURIFOLIA	FACW	16	124
WATER TUPELO	NYSSA AQUATICA	OBL	16	122
OVERCUP OAK	QUERCUS LYRATA	OBL	7	55
			100	764

A
1.01 ACRES

NEW AREA #2 - HEADWATER FOREST COMMUNITY

18" - 24" BARE ROOT MATERIAL
727 STEMS/ACRE (12' X 5' SPACING), RANDOM SPECIES PLACEMENT

COMMON NAME	SCIENTIFIC NAME	WETLAND INDICATOR	% OF TOTAL	# OF PLANTS
SWAMP CHESTNUT OAK	QUERCUS MICHAUXII	FACW	16	413
GREEN ASH	FRAXINUS PENNSYLVANICA	FACW	1	20
TULIP POPLAR	LIRIODENDRON TULIPIFERA	FACU	1	20
BALD CYPRESS	TAXODIUM DISTICHUM	OBL	16	413
RIVER BIRCH	BETULA NIGRA	FACW	15	381
WATER OAK	QUERCUS NIGRA	FAC	1	20
BUTTONBUSH	CEPHALANTHUS OCCIDENTALIS	OBL	10	244
LAUREL OAK	QUERCUS LAURIFOLIA	FACW	16	414
WATER TUPELO	NYSSA AQUATICA	OBL	16	410
OVERCUP OAK	QUERCUS LYRATA	OBL	7	183
			100	2537

3.49 ACRES

16.00 ACRES

HEADWATER FOREST COMMUNITY

18" - 24" BARE ROOT MATERIAL
857 STEMS/ACRE (12' X 4' SPACING), RANDOM SPECIES PLACEMENT
- TREE SHELTERS AND TREE MATS INSTALLED EVERY 8TH TREE -

COMMON NAME	SCIENTIFIC NAME	WETLAND INDICATOR	% OF TOTAL	# OF PLANTS
SWAMP CHESTNUT OAK	QUERCUS MICHAUXII	FACW	14	1974
GREEN ASH	FRAXINUS PENNSYLVANICA	FACW	14	1974
TULIP POPLAR	LIRIODENDRON TULIPIFERA	FACU	14	1974
BALD CYPRESS	TAXODIUM DISTICHUM	OBL	12	1579
RIVER BIRCH	BETULA NIGRA	FACW	14	1876
WATER OAK	QUERCUS NIGRA	FAC	14	1974
BUTTONBUSH	CEPHALANTHUS OCCIDENTALIS	OBL	2	296
LAUREL OAK	QUERCUS LAURIFOLIA	FACW	15	2073
			100	13,721

17.55 ACRES

RIVERINE SWAMP FOREST

18" - 24" BARE ROOT MATERIAL
880 STEMS/ACRE (12' X 4' SPACING), RANDOM SPECIES PLACEMENT
- TREE SHELTERS AND TREE MATS INSTALLED EVERY 8TH TREE -

COMMON NAME	SCIENTIFIC NAME	WETLAND INDICATOR	% OF TOTAL	# OF PLANTS
RIVER BIRCH	BETULA NIGRA	FACW	5	827
BUTTONBUSH	CEPHALANTHUS OCCIDENTALIS	OBL	6	918
WATER TUPELO	NYSSA AQUATICA	OBL	27	4133
SWAMP BAY	PERSEA PALUSTRIS	FACW	11	1653
LAUREL OAK	QUERCUS LAURIFOLIA	FACW	11	1653
OVERCUP OAK	QUERCUS LYRATA	OBL	10	1561
SWAMP CHESTNUT OAK	QUERCUS MICHAUXII	FACW	11	1653
BALD CYPRESS	TAXODIUM DISTICHUM	OBL	30	4684
			100	15,428

4.89 ACRES

18" - 24" BARE ROOT MATERIAL
726 STEMS/ACRE (12' X 5' SPACING), RANDOM SPECIES PLACEMENT

COMMON NAME	SCIENTIFIC NAME	WETLAND INDICATOR	% OF TOTAL	# OF PLANTS
RIVER BIRCH	BETULA NIGRA	FACW	23	804
BUTTONBUSH	CEPHALANTHUS OCCIDENTALIS	OBL	13	469
WATER TUPELO	NYSSA AQUATICA	OBL	9	335
LAUREL OAK	QUERCUS LAURIFOLIA	FACW	21	737
OVERCUP OAK	QUERCUS LYRATA	OBL	6	201
SWAMP CHESTNUT OAK	QUERCUS MICHAUXII	FACW	23	804
BALD CYPRESS	TAXODIUM DISTICHUM	OBL	6	201
			100	3550

NC GRID NAD 1983

–80 –40 0 80 160

GRAPHIC SCALE

STREAM ZONE PLANTING:

LIVE STAKES: 1.5' TO 2' LENGTHS, 1/2' TO 2" DIAMETER, 1 ROW AT 3' CENTER SPACING (EACH BANK), RANDOM SPECIES PLACEMENT

COMMON NAME	SCIENTIFIC NAME
BLACK WILLOW	SALIX NIGRA
SILKY WILLOW	SALIX SERICEA
SILKY DOGWOOD	CORNUS AMOMUM
ELDERBERRY	SAMBUCUS CANADENSIS

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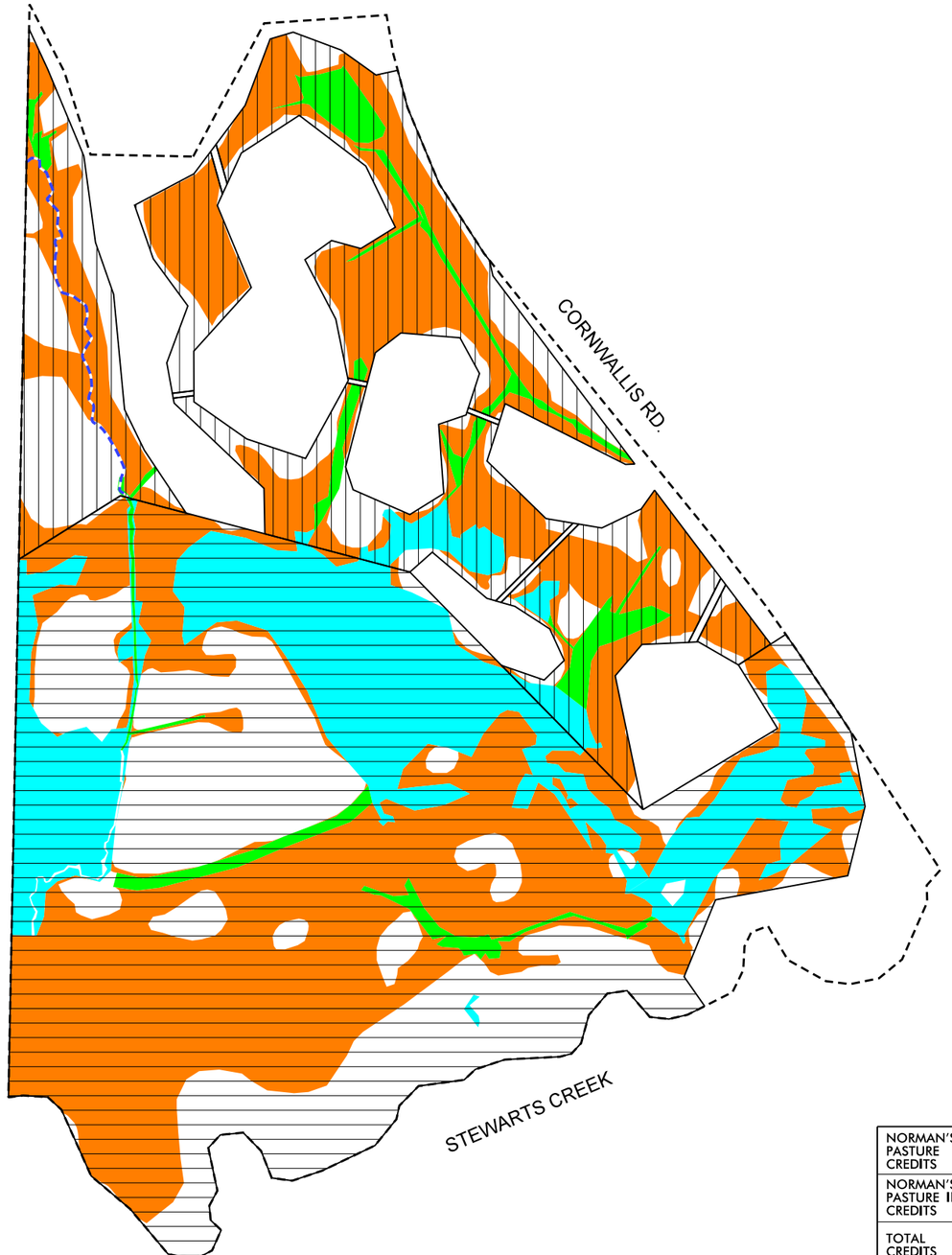
SAMPSON COUNTY, NORTH CAROLINA

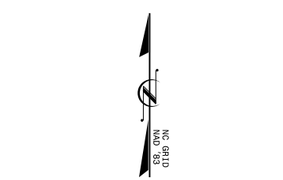
DATE: FEB 2016

SCALE: GRAPHIC

PLANTING PLAN

SHEET 6 OF 7





NORMAN'S PASTURE EASEMENT

NORMAN'S PASTURE II EASEMENT

STREAM ENHANCEMENT II

PROPERTY BOUNDARY

	WETLAND REESTABLISHMENT (1:1)	WETLAND REHABILITATION (1.5:1)	WETLAND PRESERVATION (NO CREDIT)	STREAM ENHANCEMENT II (2.5:1)
NORMAN'S PASTURE CREDITS	15.5 AC./ 15.5 CR.	0.7 AC./ 0.5 CR.	9.0 AC./ 0 CR.	–
NORMAN'S PASTURE II CREDITS	8.8 AC./ 8.8 CR.	1.4 AC./ 0.9 CR.	0.8 AC./ 0 CR.	843 L.F./ 337 CR.
TOTAL CREDITS	24.3 AC./ 24.3 CR.	2.1 AC./ 1.4 CR.	9.8 AC./ 0 CR.	843 L.F./ 337 CR.

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MITIGATION CLASSIFICATION