

**Goodman Property Stream Mitigation Plan**  
**4,325 Linear Feet of Stream Restoration**  
**3,205 Linear Feet of Stream Preservation**  
**Full Delivery Project • Contract No. 000616**  
Lenoir County, North Carolina  
Tar-Pamlico River Basin: 8-digit CU 03020105

*Prepared for:*



NC Ecosystem Enhancement Program  
1652 Mail Service Center  
Raleigh, NC 27699-1652



*Prepared by:*

**ALBEMARLE RESTORATIONS, LLC**

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**May 2009**

**Revise June 2009**

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**GOODMAN PROPERTY STREAM MITIGATION PLAN**

**Lenoir County  
USGS Catalog Unit 03020202  
EEP Project No 000616  
Design Firm: Albemarle Restorations, LLC**

**Prepared for:**



**NCDENR/ECOSYSTEM ENHANCEMENT PROGRAM  
2728 Capital Blvd.  
RALEIGH, NC 27604**

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**MAY 2009**

**REVISED JUNE 2009**

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## **1.0 EXECUTIVE SUMMARY**

This report is submitted by Albemarle Restorations, LLC (AR) to document the completion of the restoration of 4,325 linear feet of stream (swamp run restoration) and the preservation of 3,205 linear feet of stream on the Goodman property located on Pruitt Road in Falling Creek Township, Lenoir County, North Carolina.

Prior to restoration, the 20.6 acre easement area was used entirely for agriculture production, primarily corn, soybeans and cotton. The existing farm fields were drained by several drainage ditches that traverse the site and outfall into an unnamed tributary to Falling Creek. No natural plant communities of any biological value were found within the project area, and all ditches were actively maintained to remove vegetation and debris.

The goal of the project was to restore a diverse riparian headwater swamp run system to provide the following ecological benefits:

- 1) Water quality improvements, including nutrient, toxicant and sediment retention and reduction, increasing dissolved oxygen levels, as well as reducing excessive algae growth, and reducing surface water temperatures in receiving waters by providing permanent shading in the form of a shrub/scrub and forested headwater wetland system.
- 2) Wildlife habitat enhancement by adding to the existing adjacent forested areas to create a continuous travel corridor between habitat blocks and provide a wide range of habitat areas (open water, emergent, shrub/scrub and forested) for amphibians, reptiles, birds, insects and mammals.
- 3) Flood flow attenuation during storm events to help reduce sedimentation and erosion downstream, and improve long term water quality within the Neuse River.
- 4) Passive outdoor recreation and educational opportunities for the landowner and the surrounding community.

In order to achieve these goals, restoration activities, in accordance with the approved Restoration Plan, began February 11, 2009 and were completed on March 27, 2009. Restoration consisted of grading the headwater complex at varying elevations to create microtopography and braided channels that emulated natural “swamp run” systems found within the Neuse River Basin. Native trees and shrubs were planted on site on March 27, 2009 to restore habitat and create a species diverse swamp run system. Additionally, an emergent wetland seed mixture was applied concurrent with the finish grading to provide immediate habitat and water quality benefits. All planting and grading was conducted in accordance with the approved restoration plan.

To monitor the swamp run, eight water level monitoring gauges were installed on April 16, 2008 within the limits of the swamp run for the specific purpose of monitoring hydrology (both surface and sub-surface). The gauges were installed in groups of two, set perpendicular to the valleys in the upper and lower portions of the valley. Additionally, a pair of monitoring gauges was installed at the reference site within the

adjacent preservation area. They were installed in a similar perpendicular pattern to monitor flow within the reference area. Six vegetative monitoring plots have been permanently monumented within the swamp run restoration limits. Each plot is a 10 meter X 10 meter square, as recommended by the CVS-EEP Protocol for recording vegetation. These quadrants will be monitored for a minimum five-year period, or until success of the project can be validated. Locations of all installed monitoring devices and vegetative plots are shown on Sheet M-1 in Appendix B.

Monitoring Reports will be submitted to the North Carolina Ecosystem Enhancement Program (EEP) by December 31 of the year in which the monitoring was conducted. The reports will include all water elevation data and CVS-EEP Protocol vegetation data. The monitoring gauges will be checked four times per year, at which time a visual assessment of inundated areas will be made. The targeted plant community is a swamp run and riparian wetland mosaic. The site will be deemed successful if the acreages of each regime falls within a reasonable range related to the design during normal climatic conditions. Site hydrology during years of excessive rainfall or extreme drought will be assessed with climatic conditions in mind and will be compared with data collected at the reference swamp run (stream) site.

**Table 1: Mitigation Summary**

Type	Post Construction Linear Feet	Credit Ratio (Restoration/Preservation : WMU)	Total WMU's / SMUs
Stream Restoration (SwampRun)	4,325 linear feet	1:1	4,325 SMUs
Stream Preservation (Swamp Run)	3,205 linear feet	1:5	641 SMUs

## 2.0 AS-BUILT REPORT

### 2.1 Project Background

The Goodman Property, located on Pruitt Road in Falling Creek Township, Lenoir County, North Carolina was chosen in part because of its location in a targeted watershed and because it provides the opportunity to add contiguous diverse wetland habitat to a high quality forested wetland system directly adjacent to the project area. On October 11, 2007, AR entered into a contract with EEP for the procurement of 4,966 stream mitigation units (SMU's) on the Goodman Property. **Table 2** below summarizes the project history.

**Table 2: Project History**

October 9, 2008	Restoration Plan Approved
February 11 thru March 26, 2009	Construction
March 27, 2009	Planting
April 6, 2009	Monitoring Gauges Installed
December 31, 2009 (Scheduled)	First Monitoring Report (Year 1)

**2.2 Pre-existing Site Conditions**

The overall Goodman property consists of approximately 551 +/- acres, 20.6 of which are designated for this restoration and 14.4 for preservation. The project is located on the eastern portion of the farm and has a total drainage area of approximately 246 acres. The site was previously bisected by two drainage ditches that run southwest to northeast and empty into an unnamed tributary to Falling Creek. The stream restoration component of the project involved restoring the main drainage ditches to headwater swamp run morphology. Degradation to the channels and surrounding areas by past agricultural activities, including channel straightening and planting of row crops up to the channel edges, has allowed excessive nutrient and sediment accumulation in the channels and downstream receiving waters. These past activities have also served to dramatically reduce the flood flow attenuation capabilities of the channels. **Appendix A** contains photographs taken during a pre-construction site visit, showing the degradation of the channel and the proximity of tilled ground.

**2.3 Construction and Planting**

Restoration activities, in accordance with the approved Restoration Plan, began on February 11, 2009 with the installation of recommended erosion control practices and grading of the headwater swamp run system. After the swamp run (stream) portion of the project was completed, the adjacent riparian wetland and vegetated buffer were graded. Topsoil, which had been stockpiled during initial construction, was redistributed during final grading. On March 26, 2009 all grading operations were completed. The As- Built survey for the grading is included in **Appendix B**, sheets G-1 thru G-4.

Tree and shrub planting on the project site was completed March 27, 2009 using containerized and bare-root seedlings. The emergent wetland seed mixture was spread just after grading was completed. All planting was done in accordance with the approved restoration plan, the exception being some species were omitted due to availability and the planting rate was increased to 600 stems per acre, as opposed to the 350 stems/acre. **Table 3** below summarizes the species planted.

**Table 3: Tree/Shrub Planting Schedule**

TREE/SHRUB PLANTING SCHEDULE- 20.56 Acres						
Combined Swamp Run, Riparian Wetland, and Vegetated Buffer Areas						
	Quantity	Botanical Name	Common Name	Size	Condition	Spacing
Trees:	2,700	<i>Taxodium distichum</i>	Bald Cypress	2-3'	Bare Root	8-9' Random Spacing
	600	<i>Nyssa aquatica</i>	Water tupelo	2-3'	Bare Root	8-9' Random Spacing
	1,500	<i>Nyssa biflora</i>	Swamp Black Gum	2-3'	Bare Root	8-9' Random Spacing
	2,000	<i>Quercus phellos</i>	Willow Oak	2-3'	Bare Root	8-9' Random Spacing
	700	<i>Fraxinus pennsylvanicum</i>	Green Ash	2-3'	Bare Root	8-9' Random Spacing
	700	<i>Betula nigra</i>	River Birch	2-3'	Bare Root	8-9' Random Spacing
	400	<i>Quercus nigra</i>	Water Oak	2-3'	Bare Root	8-9' Random Spacing
	1,000	<i>Quercus michauxii</i>	Swamp Chestnut Oak	2-3'	Bare Root	8-9' Random Spacing
Total:	9,600					
Shrubs:	745	<i>Itea virginica</i>	Virginia Sweetspire	¼" caliper	Bare Root	8-9' Random Spacing
	1,000	<i>Cephalanthus occidentalis</i>	Button Bush	¼" caliper	Bare Root	8-9' Random Spacing
	1,000	<i>Myrica cerifera</i>	Wax Myrtle	¼" caliper	Bare Root	8-9' Random Spacing
Total	2,745					

**2.4 Post Construction Site Conditions**

Immediately following construction and during the planting phase, the swamp run was inundated through out the entire project area. Current site conditions have pockets of water below the confluence of the two swamp runs with standing water at the down stream end of the project. Above the confluence the north and south swamp runs are showing drier then expected conditions due to below average rainfall amounts in April. Photographs of the site taken in April 2009 are found in **Appendix A**.

**3.0 Monitoring Plan**

Monitoring of the site is to be completed per EEP’s guidelines titled **Content, Format and Data Requirements for EEP Monitoring Reports** for a five year period, with monitoring beginning in fall 2009 (Year 1) and concluding in 2013 (Year 5). Photographs and/or video footage of major flow events, to the extent that is possible, will be included in each year’s monitoring report. Monitoring methods for the headwater swamp run system will be in accordance with the “*Information Regarding Stream Restoration with Emphasis on the Coastal Plain*” as outlined in 3.1 below.

### 3.1 Swamp Run Hydrology Monitoring

Monitoring of the riparian headwater systems will focus on wetland hydrology, vegetative survival, and precipitation-driven flow events. While the methods regarding the monitoring of hydrology and vegetation are well established, flow documentation within zero-order stream systems is the topic of on-going research throughout the Coastal Plain. Both qualitative and quantitative information will be used to properly document the occurrence of flow within the proposed restored zero-order stream valley.

Monitoring of the headwater swamp run system created on the site will be in accordance with success criteria outlined in “*Information Regarding Stream Restoration with Emphasis on the Coastal Plain.*” According to the guidance, the monitoring of these systems should be geared toward documenting restored functions rather than using traditional geomorphic studies. Monitoring will consist of assessing groundwater elevations in the swamp run, continuous water surface elevation documentation, vegetation plot monitoring, and methods to assess flow patterns and duration of inundation. If it is determined that surface water inundation and coverage, surface water flow, and vegetation establishment are all within the attainment criteria set forth below, the restoration of a functional headwater swamp run will be deemed successful.

Surface and sub-surface hydrology within the swamp run will be monitored and evidence of flow will be documented. To monitor both subsurface and surface water elevations, four continuous recording pressure transducer type water level loggers suspended in monitoring gauges have been installed within the limits the of the swamp run and four within the adjacent riparian wetlands. The monitoring gauges have perforations in the PVC to allow water into the gauge so the logger can track surface water influences. Data from the gauges will be downloaded from each monitoring station four times per year, and during each site visit hand measurements will be taken and visual observation noted to ensure the accuracy of the water level loggers. The lateral extent of inundation will also be approximated at each site visit and recorded. In order to infer flow, data collected from these gauges will be correlated with elevation data from the longitudinal profiles, the on site rain gauge, and the offsite rain gauges in Kinston and Greenville and presented in graphical format.

Site visits will also be conducted following rain events to document the upstream extent of observed flow within each reach. GPS data will be collected to mark this location. During runoff/storm events, pictures, and/or video will be recorded to the extent practicable and provided in the annual monitoring reports in DVD format.

Qualitative data will be collected during the on-site investigations to document surface water flow. This shall be accomplished using photographic evidence of observed flow coupled with a preponderance of field indicators of recent flow events in the form of:

- a natural line impressed on the bank,
- shelving,
- changes in soil characteristics,



- destruction of terrestrial vegetation,
- presence of litter and debris,
- wracking,
- vegetation matted down, bent or absent,
- sediment sorting,
- leaf litter disturbed or washed away,
- scour,
- deposition,
- bed and bank formation,
- water staining, and
- change in plant community.

All field indicators present will be documented in each monitoring report. All quantitative and qualitative data will be used to document the upstream limit of flow, which will provide the basis for length of successful zero order stream restoration (i.e. valley length).

The primary success criteria for the Riparian Headwater/Zero Order Stream system will be the documentation of 2 flow events using the techniques discussed above within a normal rainfall year in 3 of the 5 years of monitoring. Additional monitoring may be necessary in the event of abnormal climatic conditions.

### **Precipitation Documentation:**

Rainfall data will be collected on-site through an event rainfall logger. This gauge has been placed directly adjacent to the project site, and will record rainfall intensity, duration, time and quantity. Rainfall data from two other sites, one in Kinston, North Carolina, approximately 7 miles from the project site and another in Greenville, North Carolina, approximately 35 miles from the site. These will be used as references to determine the deviation from climatologically normal rainfall in the area. The rainfall data will be assessed to determine the degree to which climatologic extremes (i.e. drought or excessive rainfall) affect subsurface water levels, and surface water extent and flow.

### **3.2 Swamp Run Vegetation Monitoring**

A total of 6 vegetative monitoring plots, 10 meter by 10 meter square, have been installed within the restoration limits. Plots 1, 3, and 6 coincide with the monitoring gauges within the swamp run limits and plots 2, 4, and 5 are in the outer riparian wetland areas. Plot sampling will continue for the duration of the 5-year monitoring period or until the site is deemed successful. Vegetation plot sampling will consist of Level 1: Planted stem inventory plots for the first year, and Level 2: Total woody stem inventory plots for remaining years, as defined in the *CVS-EEP Protocol for Recording Vegetation Version 4.0*.

In accordance with the *US Army Corps of Engineers, Stream Mitigation Guidelines, April 2003*, Albemarle Restorations will maintain survivability of planted woody species at a minimum of 320 stems/acre thru year three. A ten percent mortality rate will be accepted in year four (288 stems/acre), and another ten percent in year five, resulting in a required minimum survival rate of 260 trees/acre through year five. The vegetation component of the project will be considered successful if the planted wetland species dominate the tree and shrub layers in the planted areas. It is expected that volunteer species will colonize the site from adjacent and nearby wetland and swamp run areas. If these species become dominant, the wetland indicator status of each species will be assessed, and the site will be deemed successful if the dominant species in each layer are FAC or wetter. Non-native invasive species will not be included in this assessment.

#### **4.0 Maintenance and Contingency**

Maintenance of the site is expected to be minimal, as the site is proposed to function as a natural system. Periodic visual site inspections (four to five times per year) will be conducted to check for any issues of concern. If any of the following contingencies or issues arises during monitoring, Albemarle Restorations will take the necessary maintenance or corrective actions.

The main concern for the site is the introduction of non-native invasive species. No invasive species were encountered during construction, and the site will be monitored to ensure that such species do not become established. If invasive species are found, corrective action including spraying, mowing, or removing such species will be conducted if the invasive species are determined to be detrimental to the project's success.

If installed woody plant material is seen having a survival rate of less than 320 stems/acre, replanting will occur to maintain the required percent survival rate during the first three years of monitoring.

If monitoring data shows that the success criteria has not been achieved, the data will be analyzed in relation to the reference site data and rainfall data obtained on-site and off-site to determine if drought or drier than normal conditions have existed in coincidence with periods of non-attainment of success criteria. If this is found to be the case, AR will ask that the site be evaluated during normal climatic conditions. If it is determined that criteria has not been achieved, corrective action will be taken to enhance the site.

Other potential issues including animal damage, disease or pest infestation, or damage from extreme weather events will be noted during monitoring, with any apparent problem areas mapped for inclusion into the monitoring report. The monitoring will also include any corrective actions taken or proposed.

## 5.0 References

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- North Carolina Department of Environment and Natural Resources, Division of Coastal Management. *GIS Wetland Type Mapping for the North Carolina Coastal Plain*. GIS Data Guidance Document. <http://dcm2.enr.state.nc.us/Wetlands/wtypeguidanceweb.pdf>. September 2005.
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US Army Corps of Engineers. *Corps of Engineers Wetland Delineation Manual.* 1987.

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U. S. Army Corps of Engineers, Wilmington District Regulatory Division and North Carolina Department of the Environment and Natural Resources, Division of Water Quality. *Information Regarding Stream Restoration with Emphasis on the Coastal Plain, Version 2.* April 4, 2007

# **APPENDIX A**

# Appendix A

## Goodman Property—Pre-Construction



Photo 1: Stream preservation area.



Photo 2: Stream preservation area.

## Goodman Property—Pre-Construction



Photo 3: Ditched stream draining the cropland prior to swamp run restoration.



Photo 4: View of the valley showing “hook” tributary or the center tributary prior to swamp run restoration.

**Goodman Property—Construction**



Photo 5: Swamp run grading and stockpiling of topsoil.



Photo 6: Swamp run grading.



**Goodman Property—Construction**



Photo 7: Initial cutting and stockpiling of topsoil.



Photo 8: Swamp run grading.

## Goodman Property—Post Construction



Photo 9: Confluence of the swamp runs.



Photo 10: Facing upstream on the restored northern swamp run.

**Goodman Property—Post Construction**



Photo 11: One month post construction.



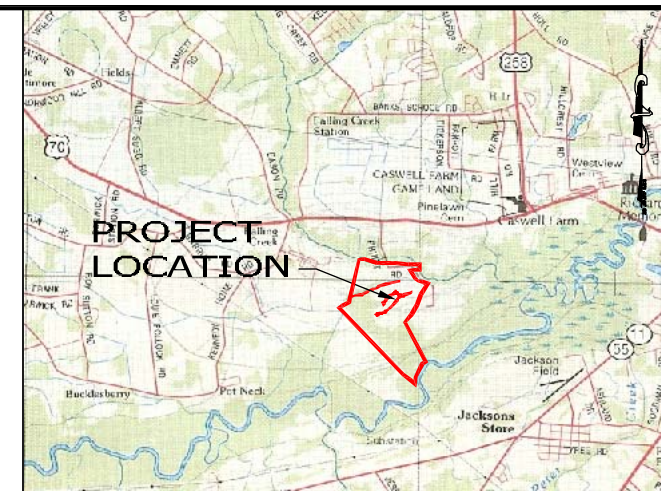
Photo 12: One month post construction.

## **APPENDIX B**

STREAM MITIGATION PROJECT  
 ALBEMARLE RESTORATIONS, L.C.  
 GOODMAN SITE  
 EEP CONTRACT # 000616

LENOIR COUNTY

LOCATION: WEST SIDE OF PRUITT ROAD  
 WEST OF KINSTON  
 TYPE OF WORK: MITIGATION



VICINITY MAP

SCALE: 1" = 12,000'

INDEX OF SHEETS

- T-1..... TITLE SHEET
- G-1..... AS-BUILT GRADING OVER NEW
- G-2..... AS-BUILT GRADING PLAN
- G-3..... AS-BUILT GRADING PLAN
- G-4..... AS-BUILT GRADING PLAN
- PR-1..... AS-BUILT PRESERVATION PLAN
- D-1..... AS-BUILT DETAILS AND SECTIONS
- M-1..... AS-BUILT PLANTING PLAN
- R-1..... REFERENCE GAUGE LOCATION

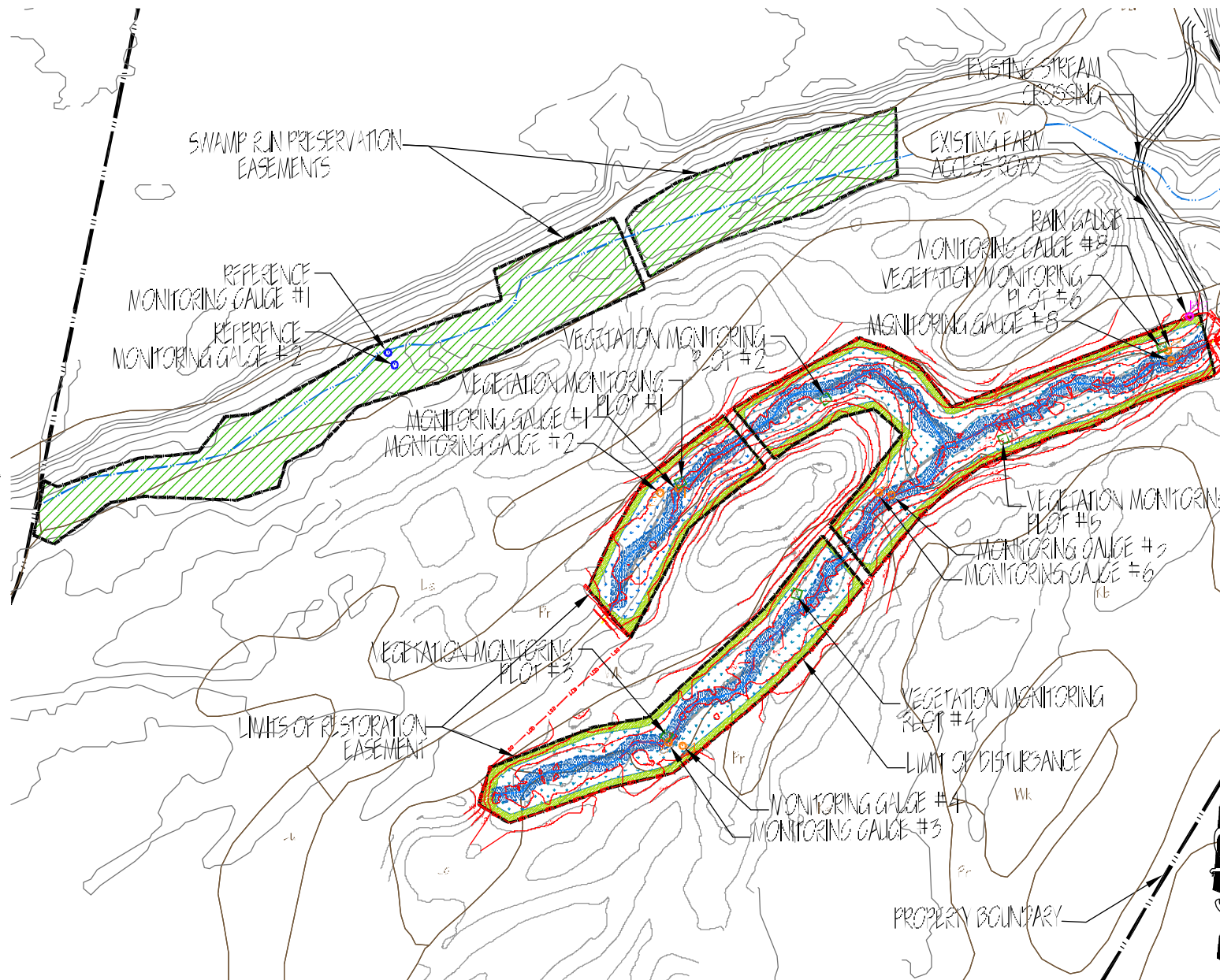
LEGEND

- EASEMENT BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING GRADE
- PROPOSED GRADE
- PROPOSED SPOT ELEVATIONS
- AS-BUILT GRADE
- AS-BUILT SPOT ELEVATIONS
- RAIN GAUGE LOCATION
- MONITORING GAUGE LOCATION
- VEGETATION MONITORING PLOT
- REFERENCE GAUGE LOCATION
- ▨ SWAMP RUN PLANTING
- ▨ RIPARIAN WETLAND PLANTING
- ▨ VEGETATED BUFFER PLANTING
- ▨ SWAMP RUN PRESERVATION

GENERAL NOTES:

1. This as-built wetland restoration plan has been prepared for the North Carolina Ecosystem Enhancement Program for the purpose of documenting the restoration of approximately 4,325 linear feet of stream (4,325 SMU's) and the preservation of 3,205 linear feet of stream (641 SMU's) on the Goodman property, located within the Neuse River Basin.
2. On site grading was completed on March 26, 2009.
3. Installation of woody plant material was completed March 27, 2009.
4. As-built topographic survey completed by True Line Surveying, Inc. on April 6, 2009.

PROPOSED WETLAND MITIGATION CREDIT SUMMARY		
<b>SWAMP RUN RESTORATION</b>	<b>LINEAR FEET</b>	<b>SMU's</b>
SWAMP RUN	4,325	4,325
<b>SWAMP RUN PRESERVATION</b>	<b>LINEAR FEET</b>	<b>SMU's</b>
SWAMP RUN	3,205	641



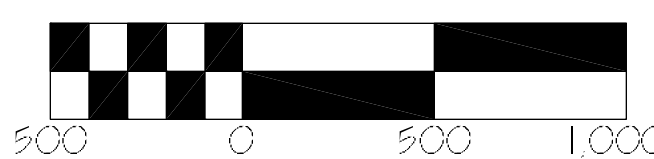
PREPARED BY:  
**ALBEMARLE RESTORATIONS, LLC**  
 WETLAND RESTORATION,  
 STREAM RESTORATION,  
 & WILDLIFE HABITAT CREATION  
 6386 PINEY WOODS ROAD • FAIRFIELD, NC 27426  
 (252) 333-0249 • FAX (252) 332-9383

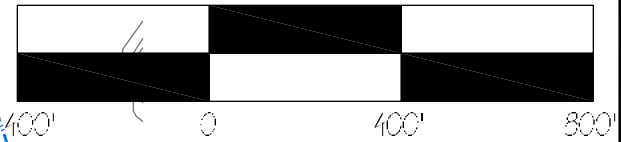
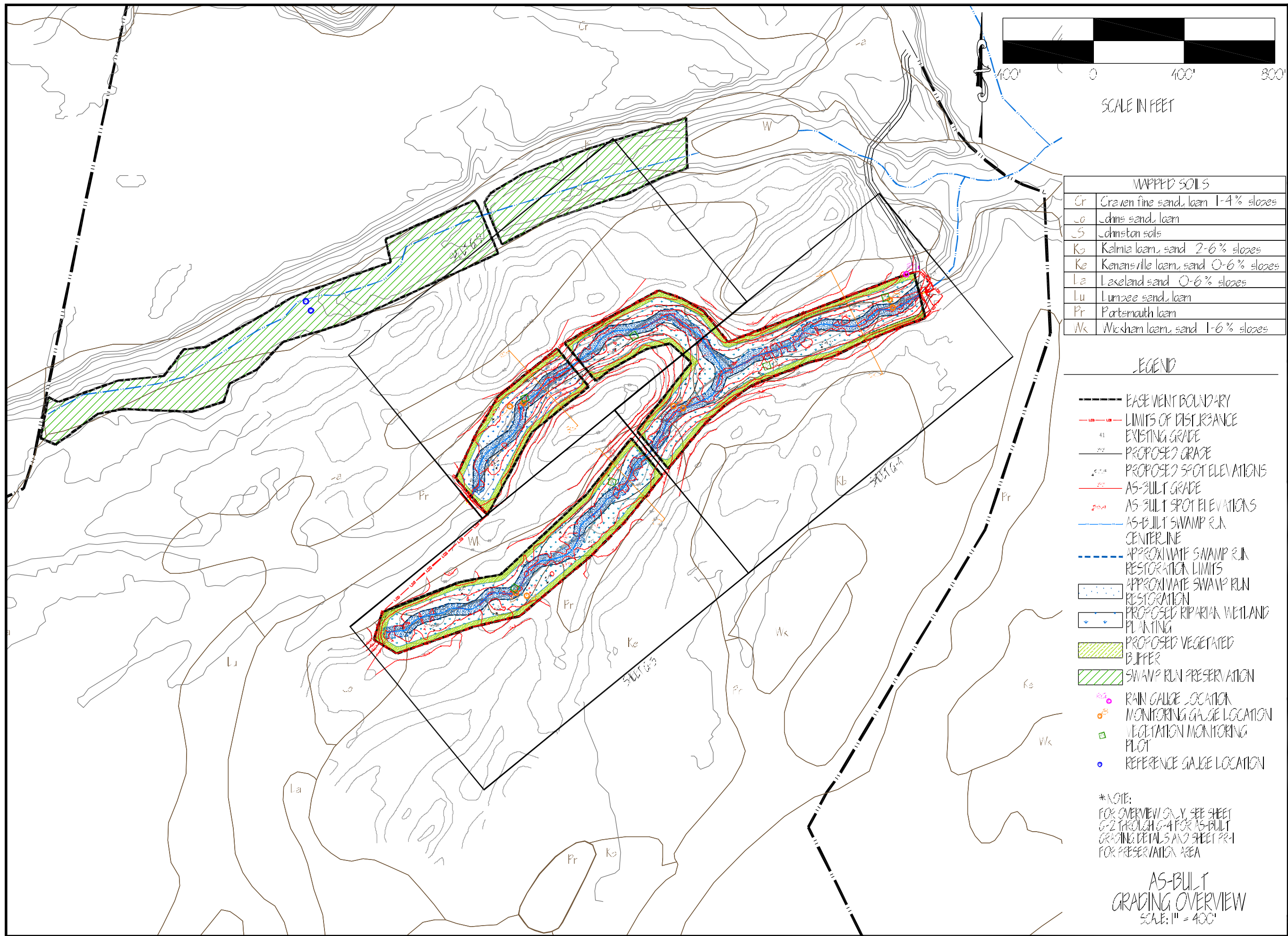
AS-BUILT CONDITIONS  
 SCALE: 1" = 500'



GOODMAN PROPERTY  
 STREAM WETLAND CREDITS: 4,966 SMU'S  
 LENOIR COUNTY NORTH CAROLINA  
 EEP CONTRACT #: 000616

AS-BUILT TITLE SHEET		
DATE	BY	CHK'D





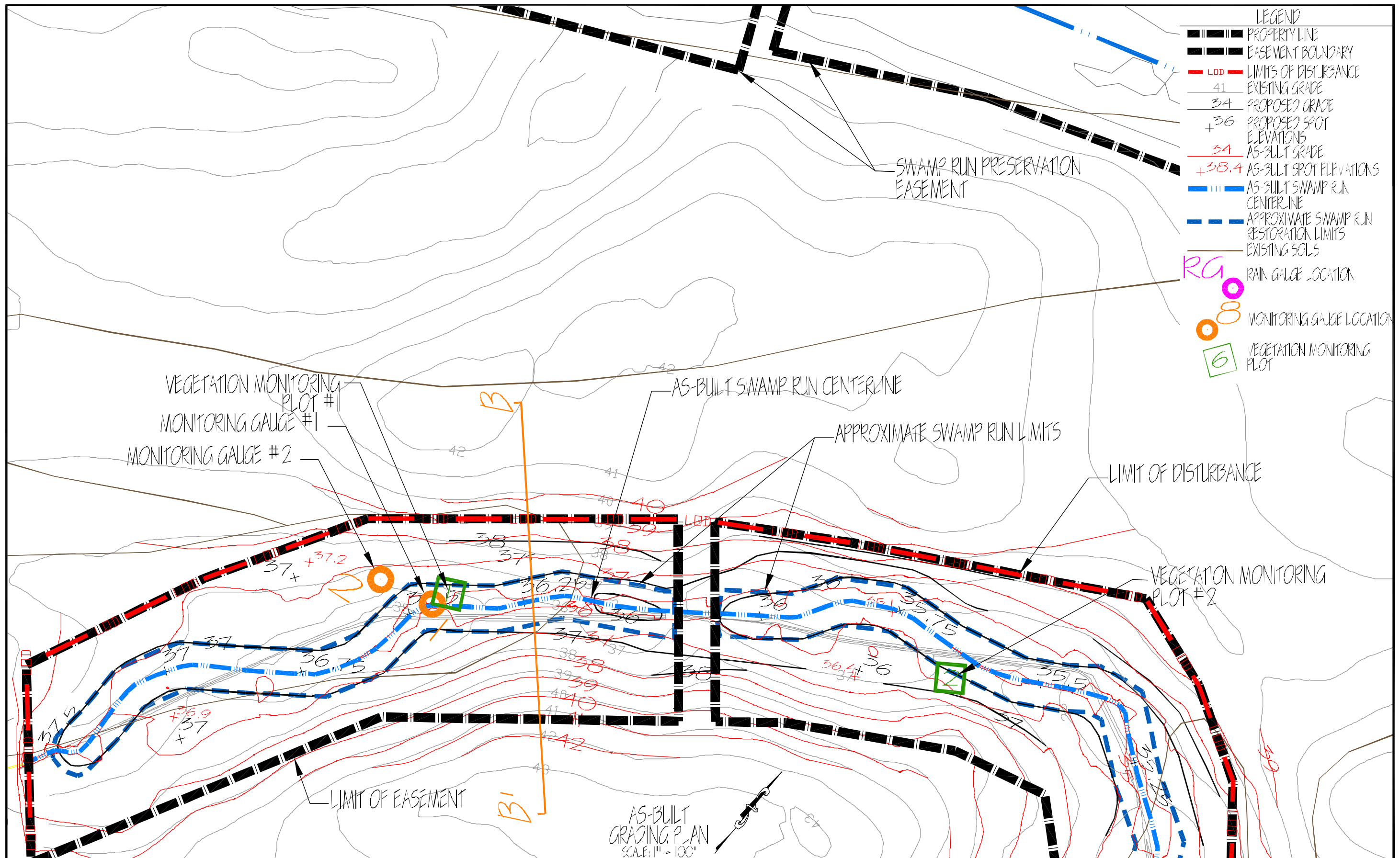
MAPPED SOILS	
Cr	Craven fine sand, loam 1-4% slopes
Lo	Johns sand, loam
S	Johnston soils
Ko	Kalmia loam, sand 2-6% slopes
Ke	Kenansville loam, sand 0-6% slopes
La	Laxland sand 0-6% slopes
Lu	Lumbee sand, loam
Pr	Portsmouth loam
Wk	Wicham loam, sand 1-6% slopes

LEGEND	
	EASEMENT BOUNDARY
	LIMITS OF DISTURBANCE
	EXISTING GRADE
	PROPOSED GRADE
	PROPOSED SPOT ELEVATIONS
	AS-BUILT GRADE
	AS-BUILT SPOT ELEVATIONS
	AS-BUILT SWAMP RUN CENTERLINE
	APPROXIMATE SWAMP RUN RESTORATION LIMITS
	APPROXIMATE SWAMP RUN RESTORATION
	PROPOSED RIPARIAN WETLAND PLANTING
	PROPOSED VEGETATED BUFFER
	SWAMP RUN PRESERVATION
	RAIN GAUGE LOCATION
	MONITORING GAUGE LOCATION
	VEGETATION MONITORING PLOT
	REFERENCE GAUGE LOCATION

\*NOTE:  
 FOR OVERVIEW ONLY, SEE SHEET  
 G-2 THROUGH G-4 FOR AS-BUILT  
 GRADING DETAILS AND SHEET PR-1  
 FOR PRESERVATION AREA

AS-BUILT  
 GRADING OVERVIEW  
 SCALE: 1" = 400'

AS-BUILT GRADING OVERVIEW 1/11/2008	
PREPARED BY: <b>ALBEMARLE RESTORATIONS, LLC</b> WETLAND RESTORATION & WILDLIFE HABITAT CREATION 6346 PINEY WOODS ROAD - FAIRFIELD, NC 27808 (252) 838-2525 • FAX (252) 569-5992	GROOMAN PROPERTY STREAM VEGETATION: 4,966 S.F.'S LEAKAGE: 1,000 G.P.M. RIPARIAN: 4,000 S.F.
SHEET G-1	



- LEGEND**
- PROPERTY LINE
  - EASEMENT BOUNDARY
  - LOD LIMITS OF DISTURBANCE
  - 41 EXISTING GRADE
  - 34 PROPOSED GRADE
  - +36 PROPOSED SPOT ELEVATIONS
  - 34 AS-BUILT GRADE
  - +38.4 AS-BUILT SPOT ELEVATIONS
  - AS-BUILT SWAMP RUN CENTERLINE
  - APPROXIMATE SWAMP RUN RESTORATION LIMITS
  - EXISTING SOILS
  - RG RAIN GAUGE LOCATION
  - MONITORING GAUGE LOCATION
  - VEGETATION MONITORING PLOT

VEGETATION MONITORING PLOT #1  
 MONITORING GAUGE #1  
 MONITORING GAUGE #2

AS-BUILT SWAMP RUN CENTERLINE  
 APPROXIMATE SWAMP RUN LIMITS

LIMIT OF DISTURBANCE

VEGETATION MONITORING PLOT #2

LIMIT OF EASEMENT

AS-BUILT GRADING PLAN  
 SCALE: 1" = 100'

**ALBEMARLE RESTORATIONS, LLC**

WETLAND RESTORATION  
 STREAM RESTORATION  
 & WILDLIFE HABITAT CREATION

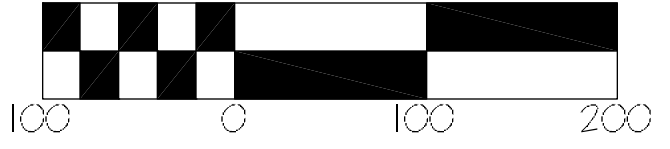
6386 PINEY WOODS ROAD • FAIRFIELD, NC 27826  
 (252) 333-0249 • FAX (252) 526-9943



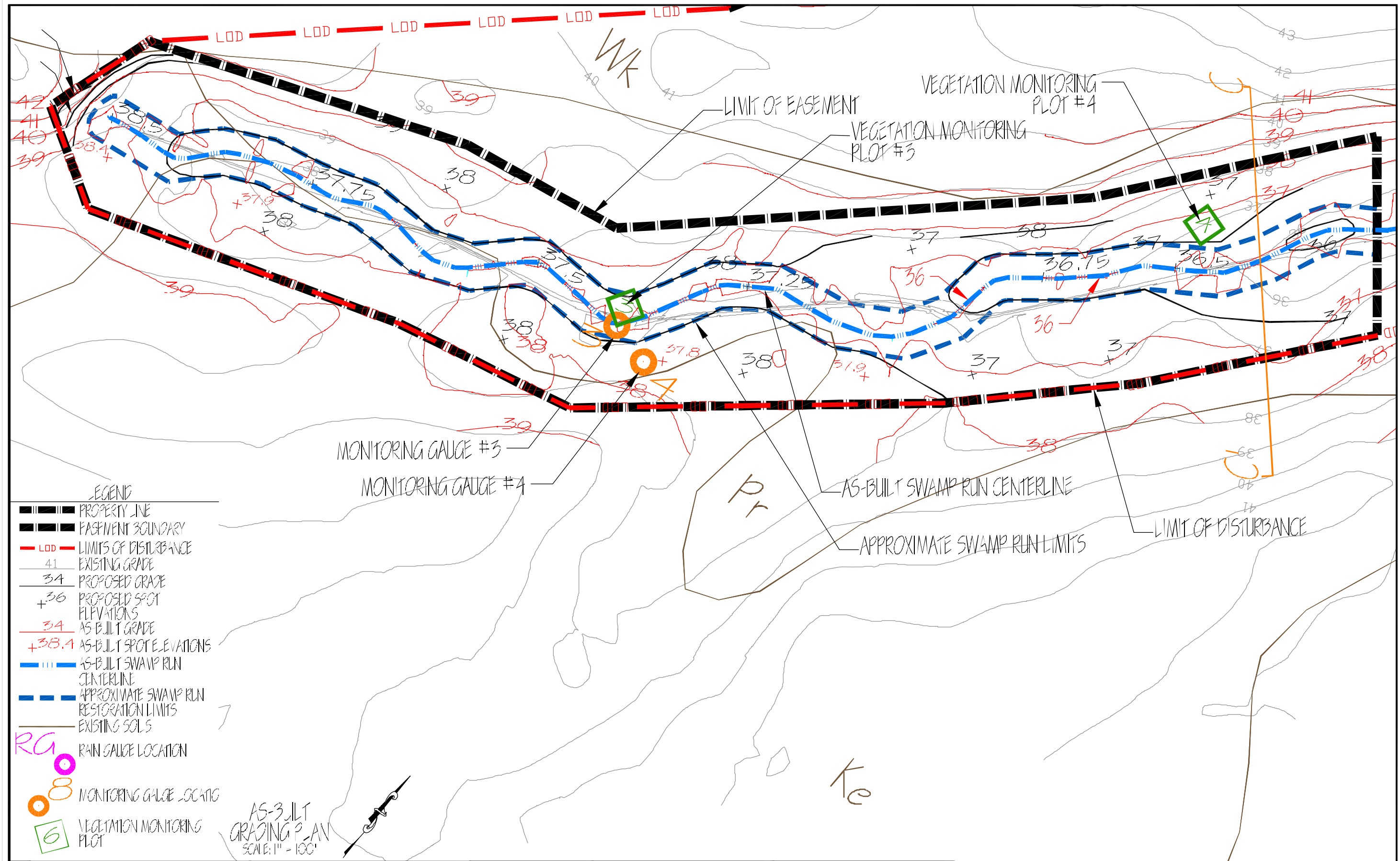
GOODMAN PROPERTY  
 STREAM MITIGATION UNIT: 4,560 SALS  
 LENOIR COUNTY, NORTH CAROLINA  
 REP CONTRACT #: 000016

GRADING PLAN  
 AS-BUILT  
 MAY 2009

REVISION	DATE	BY	REVISION



SHEET 02



- LEGEND**
- PROPERTY LINE
  - EASEMENT BOUNDARY
  - LOD LIMITS OF DISTURBANCE
  - 41 EXISTING GRADE
  - 34 PROPOSED GRADE
  - +36 PROPOSED SPOT ELEVATIONS
  - 34 AS-BUILT GRADE
  - +38.4 AS-BUILT SPOT ELEVATIONS
  - AS-BUILT SWAMP RUN CENTERLINE
  - APPROXIMATE SWAMP RUN RESTORATION LIMITS
  - EXISTING SOILS
  - RAIN GAUGE LOCATION
  - MONITORING GAUGE LOCATION
  - VEGETATION MONITORING PLOT

AS-BUILT GRADING PLAN  
SCALE: 1" = 100'

PREPARED BY:  
**ALBEMARLE RESTORATIONS, LLC**

WETLAND RESTORATION  
STREAM RESTORATION  
& WILDLIFE HABITAT CREATION

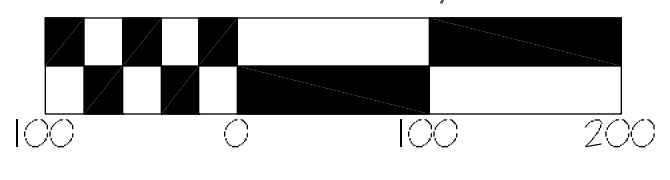
6386 PINEY WOODS ROAD • FAIRFIELD, NC 27420  
(252) 333-0249 • FAX (252) 326-9933



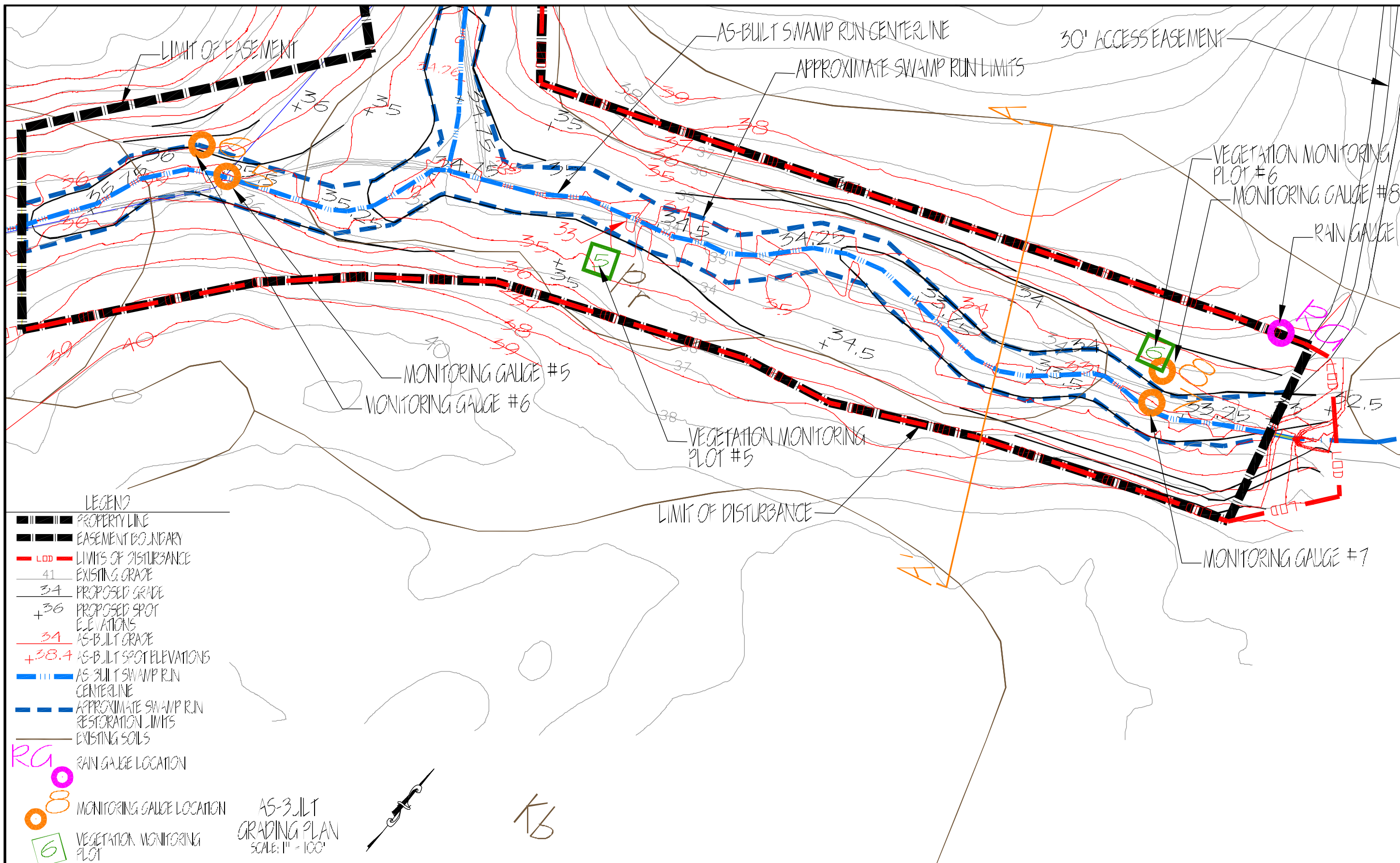
GOOD VAN PROPERTY  
STREAM RESTORATION: 4,968 SQ. FT.  
LEASING COUNTY, NORTH CAROLINA  
EPP CONTRACT #: 000016

AS-BUILT GRADING PLAN  
MAY 2009

REVISION	DATE	BY	APP. BY







LEGEND

- PROPERTY LINE
- EASEMENT BOUNDARY
- LIMITS OF DISTURBANCE
- 41 EXISTING GRADE
- 34 PROPOSED GRADE
- +36 PROPOSED SPOT ELEVATIONS
- +34 AS-BUILT GRADE
- +38.4 AS-BUILT SPOT ELEVATIONS
- AS-BUILT SWAMP RUN CENTERLINE
- APPROXIMATE SWAMP RUN RESTORATION LIMITS
- EXISTING SOILS
- RAIN GAUGE LOCATION
- MONITORING GAUGE LOCATION
- VEGETATION MONITORING PLOT

AS-BUILT GRADING PLAN  
SCALE: 1" = 100'

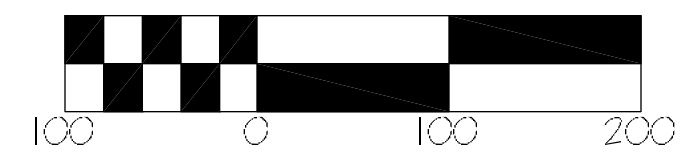
PREPARED BY:  
**ALBEMARLE RESTORATIONS, LLC**  
WETLAND RESTORATION,  
STREAM RESTORATION,  
& WILDLIFE HABITAT CREATION  
6346 PINEY WOODS ROAD • FAIRFIELD, NC 27426  
(252) 333-0243 • FAX (252) 526-9983

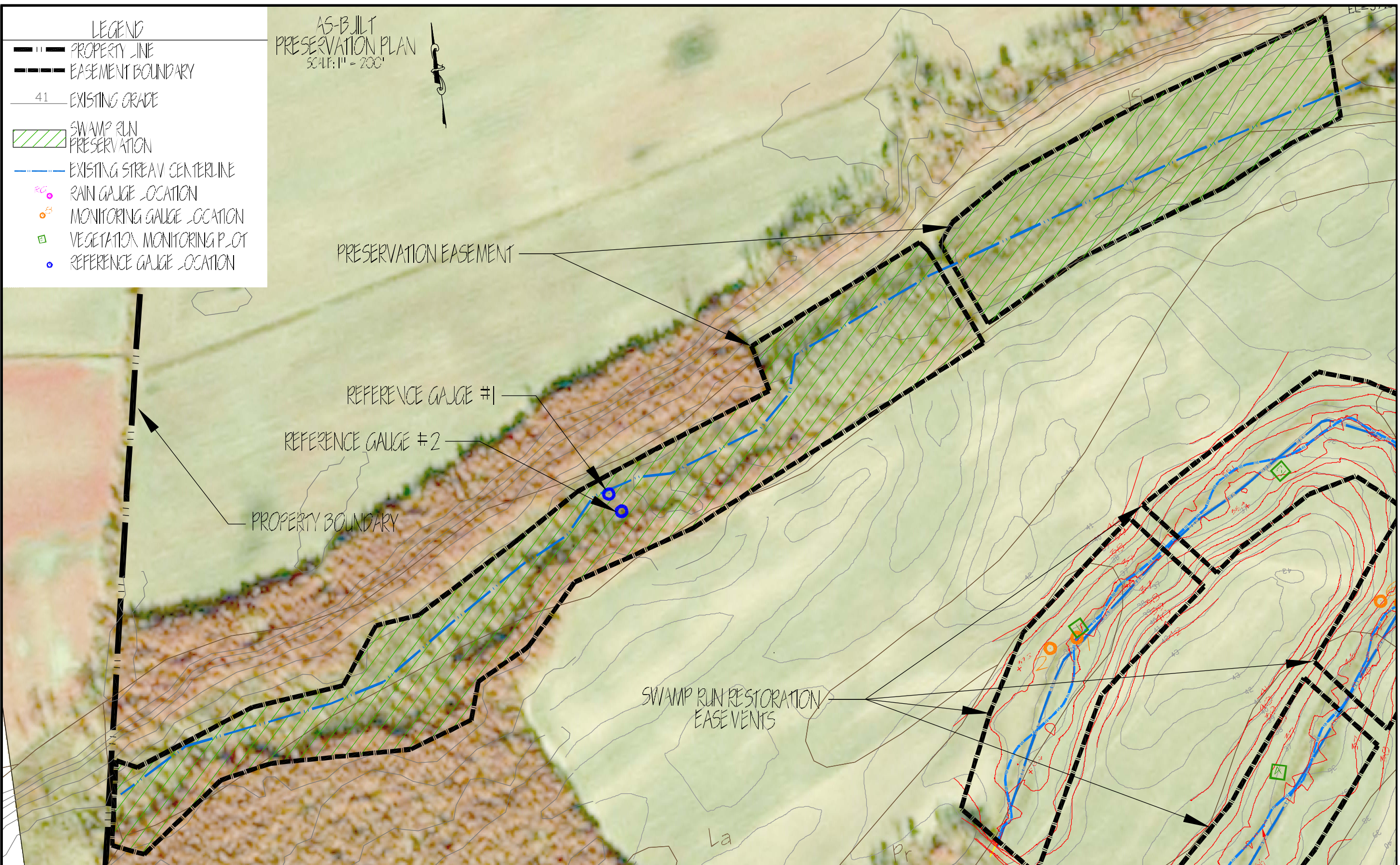


GOOSMAN PROPERTY  
SPRAW WETLAND UNIT: 4,966 SVU'S  
LINCOLN COUNTY, NORTH CAROLINA  
PPP CONTRACT #: 000016

AS-BUILT GRADING PLAN  
MAY 2009

DATE	BY	REVISION
8/25/09	SPENCER/STANLEY/RAV	1





AS-BUILT  
PRESERVATION PLAN  
SCALE: 1" = 200'

- LEGEND**
- PROPERTY LINE
  - - - EASEMENT BOUNDARY
  - 41 EXISTING GRADE
  - ▨ SWAMP RUN PRESERVATION
  - EXISTING STREAM CENTERLINE
  - RAIN GAUGE LOCATION
  - MONITORING GAUGE LOCATION
  - VEGETATION MONITORING POINT
  - REFERENCE GAUGE LOCATION

PRESERVATION EASEMENT

REFERENCE GAUGE #1

REFERENCE GAUGE #2

PROPERTY BOUNDARY

SWAMP RUN RESTORATION  
EASEMENTS

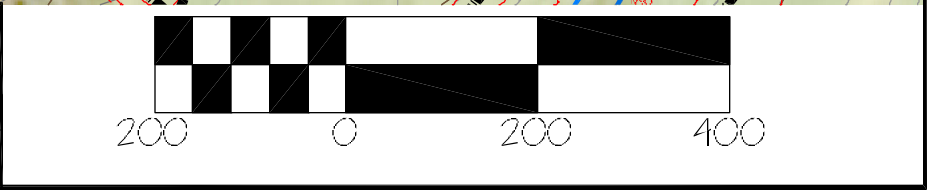
PREPARED BY:  
**ALBEMARLE RESTORATIONS, I.L.C.**  
WETLAND RESTORATION,  
STREAM RESTORATION,  
& WILDLIFE HABITAT CREATION  
6386 PINEY WOODS ROAD • FAIRFIELD, NC 27526  
(252) 333-0248 FAX (252) 333-9993

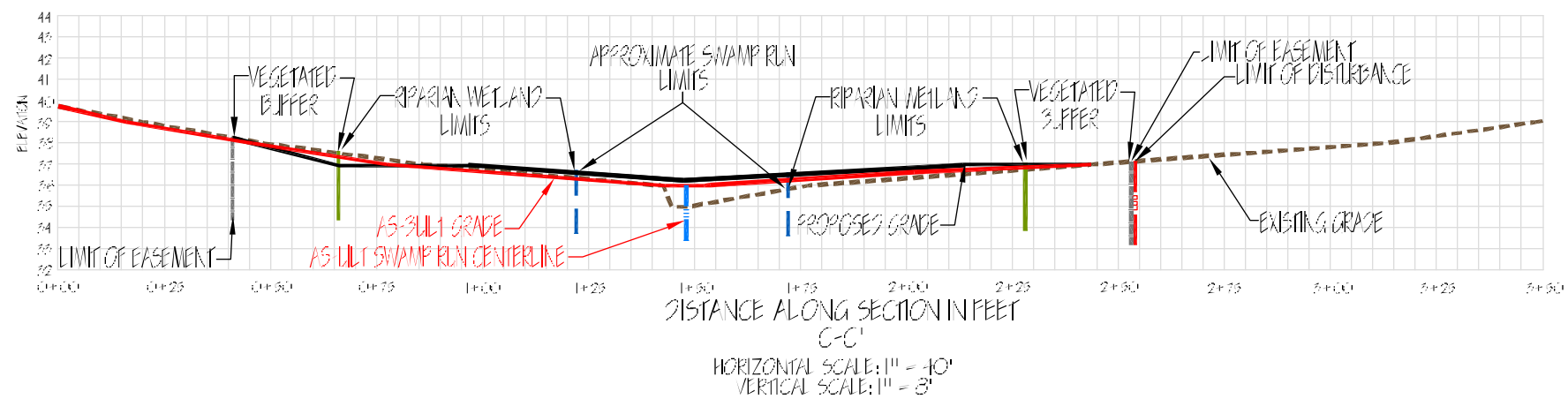
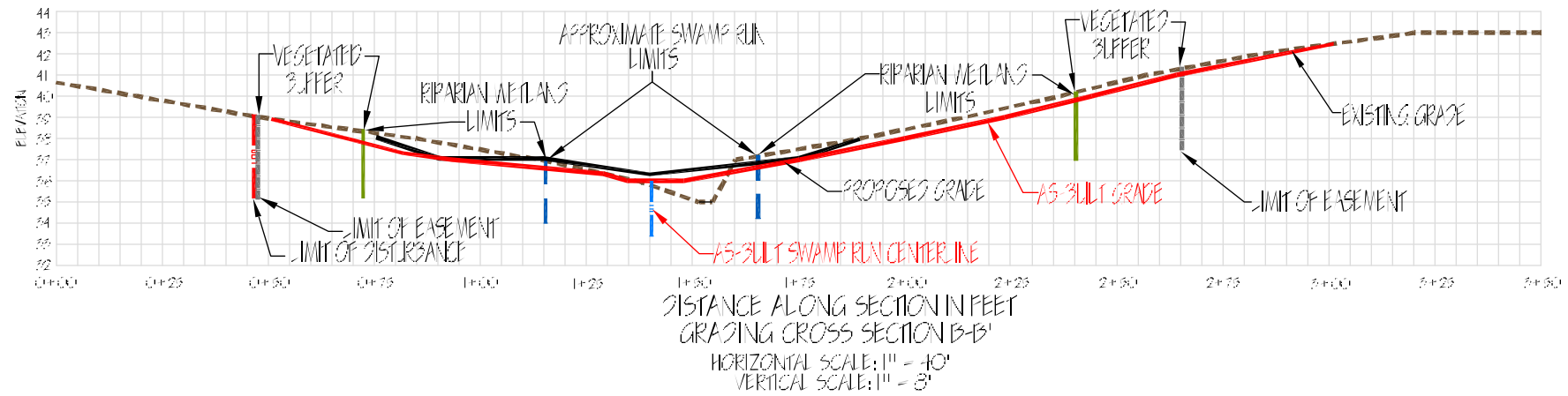
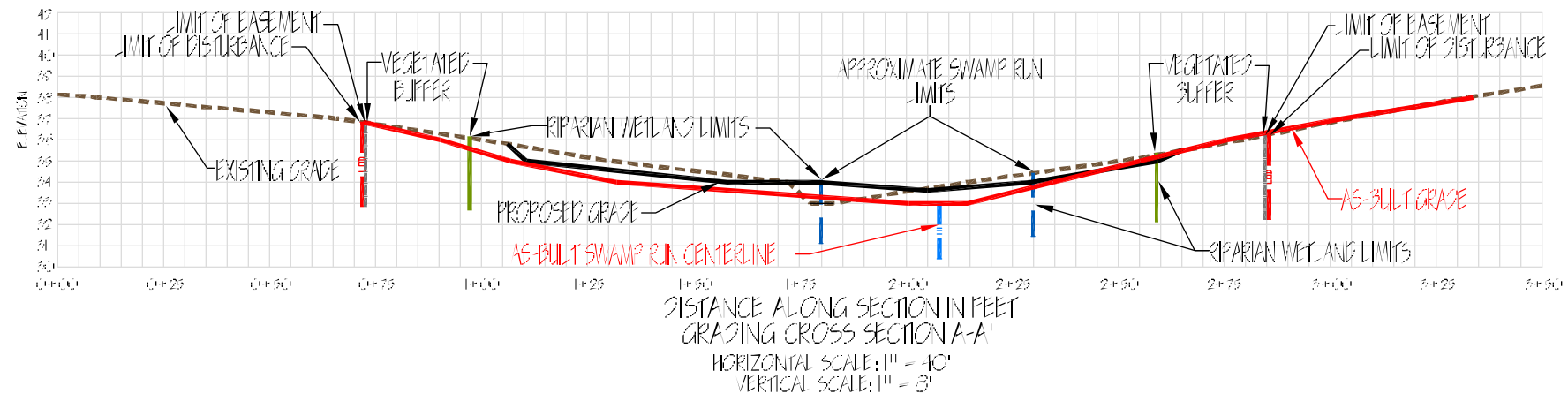


GOOZMAN PROPERTY  
STREAM MITIGATION LINES: 4,568 SQ.FS.  
LENCIR COUNTY, NORTH CAROLINA  
REP CONTRACT #: 000616

AS-BUILT  
PRESERVATION PLAN  
MAY 2009

REVISION	DATE	BY	REASON



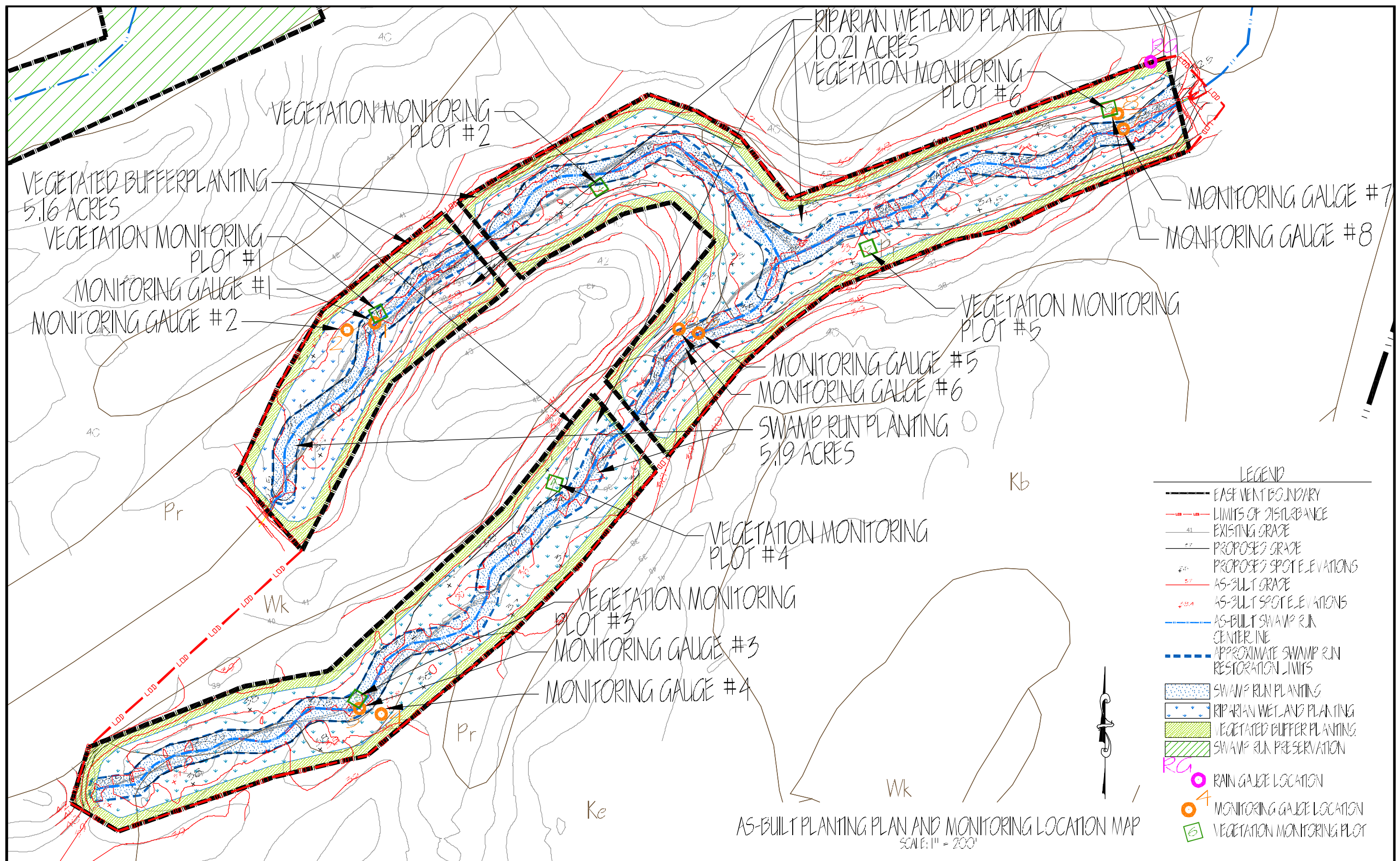


AS-BUILT DETAILS AND SECTIONS  
 MAR 2009

GOODMAN PROPERTY  
 STEAM WETLANDS: 4/9/09 SW/5  
 UPER 02/01/09/02/01/09  
 REF: CONTRACT # 000046

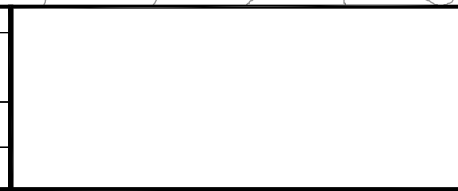


PREPARED BY:  
**ALBEMARLE RESTORATIONS, LLC**  
 WETLAND RESTORATION  
 STREAM RESTORATION  
 & WILDLIFE HABITAT CREATION  
 6246 PINEY WOODS ROAD • FARMFIELD, NC 27706  
 (919) 333-0248 • FAX (919) 333-0249



- LEGEND
- EASEMENT BOUNDARY
  - - - LIMITS OF DISTURBANCE
  - - - EXISTING GRADE
  - - - PROPOSED GRADE
  - 2.0' PROPOSED SPOT ELEVATIONS
  - 2.7' AS-BUILT GRADE
  - 2.5.4' AS-BUILT SPOT ELEVATIONS
  - AS-BUILT SWAMP RUN CENTER LINE
  - - - APPROXIMATE SWAMP RUN RESTORATION LIMITS
  - SWAMP RUN PLANTING
  - RIPIARIAN WETLAND PLANTING
  - VEGETATED BUFFER PLANTING
  - SWAMP RUN PRESERVATION
  - RAIN GAUGE LOCATION
  - MONITORING GAUGE LOCATION
  - VEGETATION MONITORING PLOT

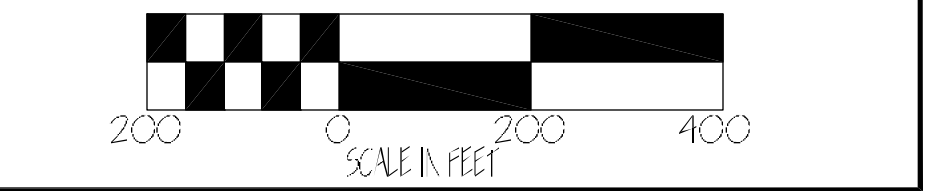
PREPARED BY:  
**ALBEMARLE RESTORATIONS, LLC**  
WETLAND RESTORATION  
STREAM RESTORATION  
& WILDLIFE HABITAT CREATION  
6386 PINEY WOODS ROAD • FAIRFIELD, NC 27426  
(252) 333-0249 • FAX (252) 326-9933

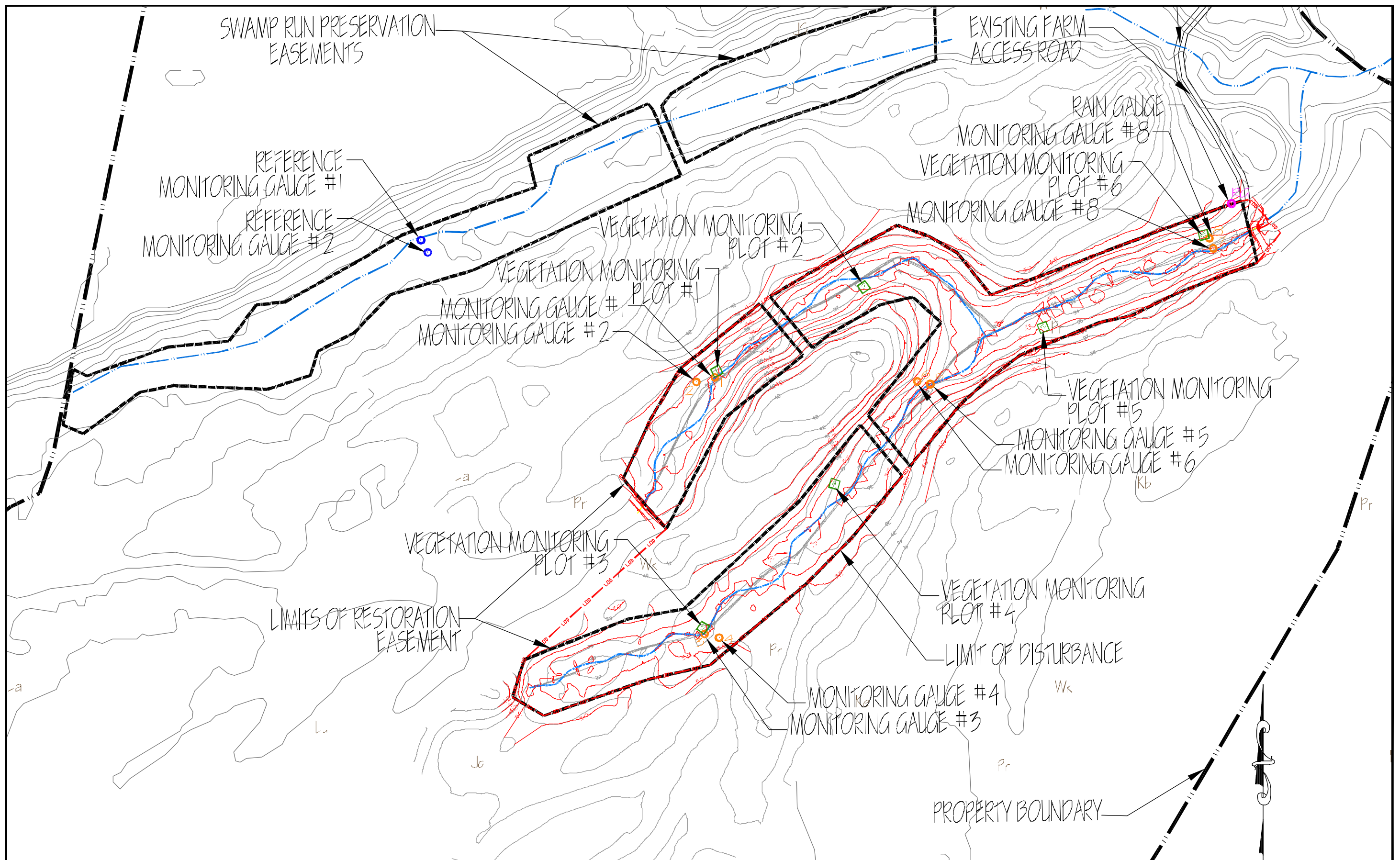


GOODMAN PROPERTY  
STREAM MILEAGE: 4.966 SM/5  
LINCOLN COUNTY, NORTH CAROLINA  
EPC CONTRACT #: 000816

PLANTING PLAN  
VW 2009

DATE	BY	REVISIONS





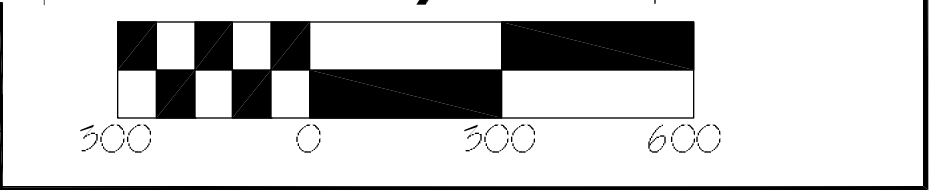
PREPARED BY:  
**ALBEMARLE RESTORATIONS, LLC**  
 WETLAND RESTORATION  
 STREAM RESTORATION  
 & WILDLIFE HABITAT CREATION  
 6286 PINEY WOODS ROAD #FAIRFIELD, NC 27486  
 (252) 333-0249 FAX (252) 3209942

REFERENCE GAUGE LOCATION  
 EXHIBIT  
 SCALE: 1" = 300'

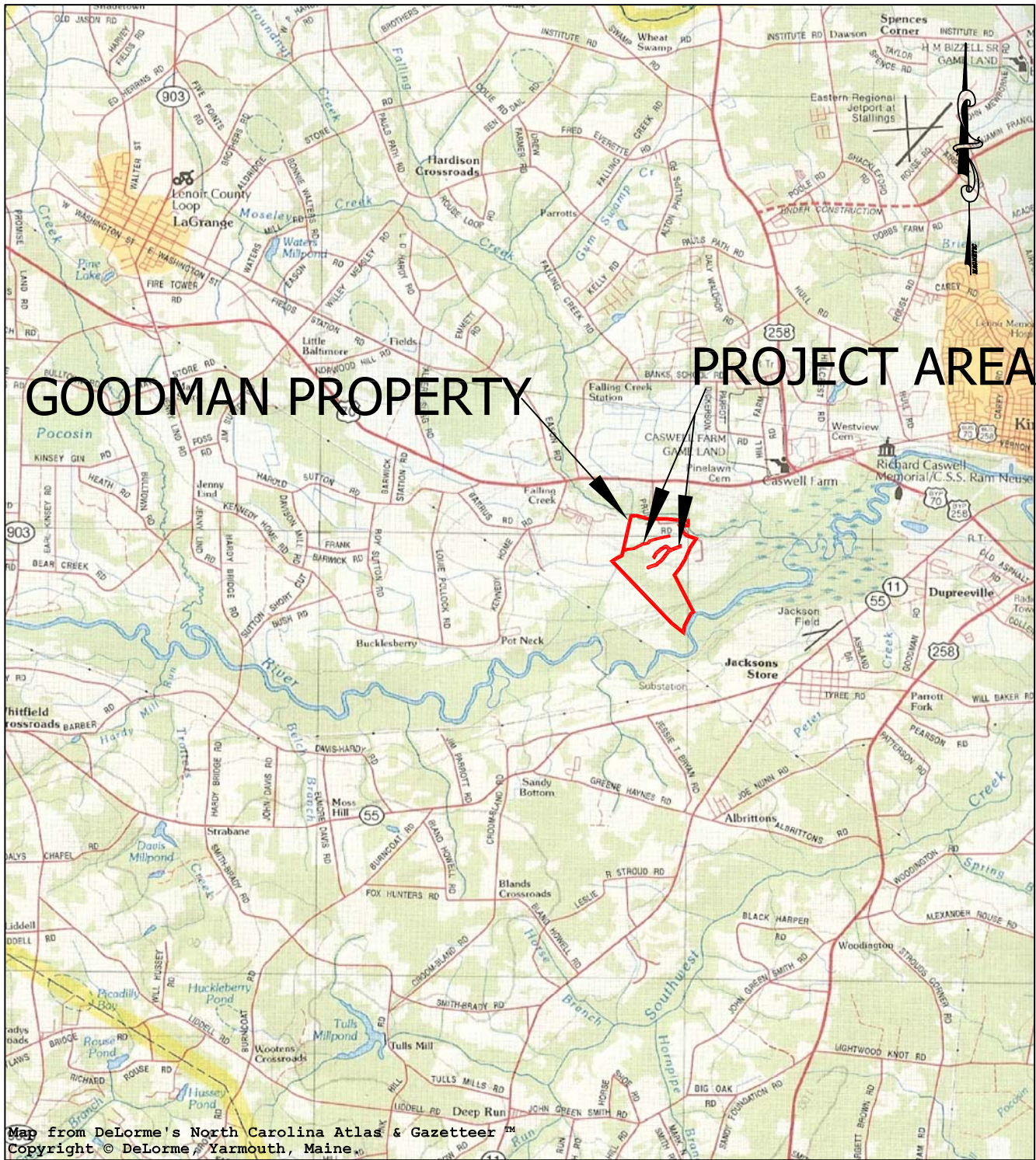


GOODMAN PROPERTY  
 STEVEN MITCHELL LANDS, 1936 S.W.15  
 JACOB COUNTY, NORTH CAROLINA  
 DEED CONTRACT # 000916

REFERENCE GAUGE LOCATION		
MAY 2009		
DATE	BY	CHK'D



## **APPENDIX C**



Map from DeLorme's North Carolina Atlas & Gazetteer  
 Copyright © DeLorme, Yarmouth, Maine

# APPENDIX C

SCALE



PREPARED BY:  
**ALBERMARLE RESTORATIONS, LLC**  
 WETLAND RESTORATION,  
 STREAM RESTORATION,  
 & WILDLIFE HABITAT CREATION  
 6386 PINEY WOODS ROAD FAIRFIELD, NC 27826  
 (252) 333-0249 FAX (252) 926-9983

## VICINITY MAP

GOODMAN FARM  
 STREAM RESTORATION (4,325 SMU's)  
 STREAM PRESERVATION (641 SMU's)  
 LENOIR COUNTY, NORTH CAROLINA  
 CONTRACT # 000616

Scale: 1" = 10,000' 5/2009 Drawn By: SFM