Powell Property
48.4 Acres of Riverine Wetland Restoration &
3,310 Linear Feet of Stream Restoration
Full Delivery Project ● Contract No. D06065-B

Prepared for:

NC Ecosystem Enhancement Program
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Powell Property Wetland and Stream Mitigation

1.0 Introduction

The North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program has selected the property originally owned by Ella and Pierce Powell for wetland/stream restoration to partially fulfill the Request for Proposals (RFP): Full Delivery Project Chowan River Basin, RFP 16-D06065. An option for an easement purchase by Albemarle Restorations, LLC was signed by the landowners on March 8, 2006 for this full delivery contract. The purpose of the RFP and subsequent contract(s) awarded by EEP are to provide compensatory stream, wetland and/or buffer mitigation within the Chowan River Basin, Cataloging Unit 03010203. Albemarle Restorations, LLC entered into a contract with the State of North Carolina on July 11, 2006 (Contract No. D06065-B) to deliver 48.4 wetland mitigation units and 3,310 stream mitigation units on the Powell project site. A conservation easement was recorded on the 90 acres encompassing this project on December 28, 2006 at the Bertie County Courthouse and is provided in **Appendix B**. Per the request of EEP following the initial Restoration Plan submittal, a comprehensive analysis of the site and underlying soils was performed, and the U.S. Army Corps of Engineers was consulted. It was agreed by all parties involved that the project be redesigned to include wetland restoration only on areas that exhibit strong hydric soil characteristics.

Albemarle Restorations, LLC has redesigned the restoration plan and now proposes to restore a total of 48.4 acres of riverine wetlands (48.4 Wetland Mitigation Units, WMU's) and 3,310 linear feet of stream restoration (3,310 Stream Mitigation Units, SMU's). To maximize available restoration credits and allow for continuity, the design incorporates several hundred feet of swamp at the head of the southern two swamp runs where swamp run morphology will be constructed but will receive wetland restoration credit. This will provide a more diverse and complete wetland system throughout the site.

The site 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. Additionally, the site was selected because of the presence of hydric soils, and the extensive drainage system (ditches & tiles) designed to provide surface and subsurface drainage of highly degraded headwater streams. Previous site visits also revealed high water marks from frequent overbank flooding and widespread wet soil conditions.

The property is located on Meadow Road (State Road 42) near Buzzards Crossroads, Bertie County, North Carolina. The Powell Property is in the Ahoskie Creek sub-watershed (USGS Catalog Unit 03010203050011), a Targeted Local Watershed. The +/- 378-acre property is currently in agricultural production, located at the headwaters of Quioccosin Swamp, and is contiguous with nearby forested wetland areas. The

conversion of the 90-acre project area from agricultural use to a swamp run/riverine wetland community will create a vegetated corridor within the project area linking upstream forested wetlands with Quioccosin Swamp, making this a practical and environmentally beneficial restoration project.

2.0 Project Goals and Objectives

The restoration plan has been developed based on studying reference wetlands and streams immediately adjacent to the site and within the coastal plain of North Carolina, and utilizing over 50 years of combined wetland restoration experience brought forth by the principals of Albemarle Restorations, LLC. The baseline goals of the project are to restore a headwater stream system (swamp run) and its associated riverine wetlands representative of swamps found throughout the upper coastal plain of North Carolina and the Chowan River Basin. Beyond that, the goals and objectives are as follows:

1) Provide floodflow attenuation.
2) Provide water quality improvement through sediment, toxicant, and nutrient retention and reduction.
3) Alleviate downstream flooding issues by lessening the effect of pulse or flashy flows.
4) Provide shading through long-term forest cover to reduce algae growth and associated low dissolved oxygen levels in surface water moving through the site.
5) Produce and export wildlife food sources.
6) Create wildlife habitat and recreational opportunities.

3.0 Site Location

The 90-acre project site is located in the eastern portion of the Powell property, in the Ahoskie Creek sub-watershed (USGS Catalog Unit 03010203050011). The restoration site encompasses the headwaters of Quioccosin Swamp, a tributary to Ahoskie Creek. The site is accessed via an existing farm lane off of Meadow Road. **Figure 1** is a vicinity map found in **Appendix A.** Downstream from the site, Quioccosin Swamp runs almost entirely through wooded areas containing extensive wetlands before joining Stony Creek and eventually Ahoskie Creek. The existing ditches and the proximity of the site to nearby forested areas on the most recent available GIS aerial photos of the area are shown on **Figure 2** in **Appendix A**.

4.0 General Watershed Description

The project site is located in Targeted Local Watershed USGS Catalog Unit 03010203050011, Ahoskie Creek, which lies in Sub-basin 03-01-01, the Upper Chowan River. The following information was extrapolated from the *Chowan River Basinwide*

Water Quality Management Plan, 1997. Forest/wetlands constitute 73% of the land area in Sub-basin 03-01-01, while 24% is agricultural, and 2% is surface water. In 1990, the population in this 579 square mile sub-basin was estimated at 24,884 people. Ahoskie Creek, into which Quioccosin Swamp eventually drains, was considered partially supporting its uses in 1995.

5.0 Existing Site Conditions

The Powell farm consists of approximately 378 +/- acres, 90 of which are designated for this project site. These 90 acres are located within the eastern portion of the farm. This area is presently bisected by a large drainage ditch that runs south to north and forms the headwaters of Quioccosin Swamp. There are also several small ditches that intersect the project area contributing flow to the main ditch. They are currently bordered by agricultural fields on all sides. Degradation to the channels and surrounding areas by past agricultural activities, including channel straightening and planting of row crops up to the channel edges, allows excessive nutrient and sediment accumulation in the channels. These past activities have also served to reduce the flood flow attenuation capabilities of the channels. **Appendix C** contains photographs taken during a recent site visit, showing the degradation of the channel and the proximity of tilled ground. The site is not located within a FEMA regulated floodplain, therefore floodplain requirements are not addressed in this restoration plan.

5.1 Soils

Soils examined at various locations throughout the project site in fall of 2006 exhibited strong hydric indicators, including sulfitic odor and deep gray color. The majority of the soils on-site are mapped with the Lynchburg and Raines series, with smaller areas of Wehadkee and Goldsboro series also mapped on-site.

The Raines series consist of poorly drained soils formed in loamy marine and fluvial sediments. The Lynchburg series consists of somewhat poorly drained soils formed in loamy marine and fluvial sediments. The seasonal high water table is the major limitation of these soils. The Wehadkee series, encompassing a small area at the downstream terminus of the project area, consists of very deep poorly drained soils on floodplains, formed in loamy sediments. These soils are frequently flooded and are found along the Quiocossin Swamp. The Goldsboro series, found in small inclusions within the project site consist of moderately well drained soils that formed in loamy marine and fluvial sediments.

An extensive network of ditches and drainage tile has been in place within the Powell project area for well over 30 years to promote drainage. **Appendix E** shows the network of ditches and drainage tile, the locations of which are shown on the Conservation Plan Map produced by the Bertie Soil & Water Conservation District, dated February 3, 1978, a copy of which is also included in **Appendix E**.

The complex of Raines and Lynchburg soils on the project site are situated on nearly the same elevations, as the site is extremely flat, save for the main ditch which bisects the project site. The Goldsboro series is situated on areas that are slightly higher and/or have a slightly greater slope than the surrounding Raines/Lynchburg complex, resulting in a more moderately well drained character than the Raines and Lynchburg areas. The Raines series generally follows the historic drainage pattern of the swamp runs which formerly drained the site and are bordered by the Lynchburg series which historically (greater than 50 years ago) functioned as riverine wetlands. The extensive drainage network of ditches and tile on the site indicates the site was poorly to very poorly drained prior to it being cleared and drained for agriculture.

At the request of EEP, Albemarle Restorations engaged the services of a licensed Soil Scientist to perform an assessment of the soils on-site. Mr. Steven Stokes with KCI, Inc., performed an evaluation of the site to determine the extent and character of hydric soils on the site in November, 2007. Mr. Stokes' findings indicated much of the Goldsboro Series and portions of the Lynchburg series did not exhibit strong hydric soil characteristics. Per recommendations provided by Mr. Bill Biddlecome of the US Army Corps of Engineers through written and verbal communications, areas not showing hydric soil characteristics within the project site are not proposed for restoration, nor is restoration credit proposed for these areas. Mapping of the hydric soils within the project area is provided on sheet H-1 of the Restoration Design Plan Sheets.

5.2 Hydrology

The project site is currently intersected by several drainage ditches. The areas within the easement area proposed for restoration are mapped and field verified as having hydric soils with a seasonally high water table and low hydraulic conductivity which allows surface and subsurface water to be retained for long periods during the growing season. The Hydric Code for both soils is 2B3 meaning they are poorly to very poorly drained and saturated for a significant period during the growing season. Hydrology is similar to conditions at the reference site and the desired wetland hydrology should be achieved quickly after the site grading is completed. In addition to the ditches currently draining the site, there is an extensive drain tile system installed to allow row crop farming. The overall drainage area to the site is approximately 870 acres, with approximately 630 acres of drainage area contributing to the main ditch entering the site near the southeastern corner, approximately 80 acres contributing to the ditch entering the site from the south, and approximately 160 acres contributing to the ditch entering the site from the southwest.

5.3 Topography and Adjoining Land Uses

The topography of the project site is extremely flat, with slightly lower elevations on the eastern and northern sides. Elevations of the project area vary from 55.0 feet to 60.0 feet at the bottom of the ditches to 64.0 feet at the highest points of the project area. Surrounding properties of the project site that are within the project site's drainage area are mapped as agricultural fields or timberland.

5.4 Threatened/Endangered Species and Existing Vegetation

On August 3, 2006 letters (**see Appendix B**) were sent by Albemarle Restorations, LLC to the U.S. Fish and Wildlife Service Ecological Services Office and the North Carolina Wildlife Resources Commission requesting a project review for coordination under the Endangered Species Act, the Fish and Wildlife Coordination Act, and the Migratory Bird Treaty Act. Albemarle Restorations, LLC received no response to either letter. A review of Bertie County's Threatened and Endangered Species list shows one threatened and two endangered species exist in the county. The bald eagle (*Haliaeetus leucocephalus*) is the one threatened species which occurs in the county. While the possibility of an eagle occurring on the site exists due to their migratory nature, the current habitat is not conducive to long term stays. The red-cockaded woodpecker (*Picoides borealis*) is listed as endangered in the county. However, the mature stands of Longleaf pine which the woodpecker requires do not exist anywhere on the property. The other endangered species found in the county, the shortnose sturgeon (*Acipenser brevirostrum*), could not inhabit the shallow waters of the project site.

The only existing vegetation within the project area consists of soybeans, cotton, and corn grown for agricultural purposes. Any native vegetation present is incidental and on a scale that is not measurable for the purposes of this report.

5.5 Jurisdictional Wetlands

Aerial photographs reviewed from the Bertie County Soil Conservation Office for the years 1938, 1954, and 1970 show that the Powell property was in agricultural use at those times, similar to its current state. The extensive ditching and soil classes on site indicate that the project area was historically a swamp run and wetland complex. All cropland within the project area is classified as Prior Converted Cropland by the Bertie County Soil Conservation District. As with other similar projects, an application will be made to the U.S. Army Corps of Engineers (COE) and the North Carolina Division of Water Quality when the Restoration Plan has been completed and approved by EEP. Impacts to the stream/ditches are considered a conversion of wetland type from waters to vegetated wetlands. Normally this conversion and relocation of Waters is

authorized under Nationwide Permit #27, Stream and Wetland Restoration Activities.

5.6 Historic Preservation

On August 17, 2006 Ecotone, Inc. received a letter (see **Appendix B**) from the North Carolina Department of Cultural Resources State Historic Preservation Office concerning the subject site. The letter from the above agency states that "there are no known archaeological sites within the proposed project area."

6.0 Reference Wetlands/Stream

A representative plot of a tributary to Quioccosin Swamp, located on the Powell property directly adjacent to the project site, is proposed as the reference site for this project. The site consists of a wetland/swamp run with wetland hydrology and flora typical of coastal plain wetland systems within the same physiographic region. The site proposed is located approximately 135 feet northwest of the northwestern corner of the project area. See **Appendix C** for location of the reference site. This is a wetland site typical of a forested wetland that would be found throughout the coastal plain in North Carolina.

6.1 Hydrological Characterization

The hydrology of the site is seasonally or semi-permanently inundated or saturated during the growing season. During the January 2008 site visit, the swamp run and the adjacent wetlands were saturated within 6 inches of the surface. The hydrology appears to be derived from a combination of a high groundwater table, slow permeability, and frequent overbank flooding.

6.2 Soil Characterization

The soils at the site were mapped Rains sandy loam, 0-2 percent slopes, and poorly drained. Field observations confirmed this mapped type. Water was found at a depth of 14 inches and the soil was saturated at 6 inches. At the reference site, primary hydrologic indicators such as drainage patterns, soil saturation in the upper layers, oxidized root channels, and water stained leaves were observed. A formal sampling plot and detailed soil profiles were taken in April 2008 by Aston Soil Works, Inc. Four soil borings were measured and detailed profiles were documented for each boring. Horizon A was found at a depth of 0 – 20 inches and was a black (10YR 2/1) sandy loam with weak fine to medium granular structure. Horizon Btg was found at a depth of 12 – 24 inches and was gray to dark gray (10YR 4/1 to 10YR 6/1) sandy loam or sandy clay loam. Boring 2 for this Horizon exhibited weak medium granular structure and boring 1, 3, and 4 had weak medium to moderate subangular blocky structure. Boring 4 also had few faint yellowish brown (10YR 5/8) mottles for the Btg Horizon. Boring 1 had Horizon Btg2 at a depth of 20 – 24 inches and was dark gray (10YR 4/1) sandy

clay loam with weak moderate subangular blocky structure. This boring also had few light gray (10YR 7/1) and yellowish brown (10YR 5/6) mottles. A site location map and detailed soil profile description for each soil boring, along with photographs for the reference site can be found in **Appendix C**.

6.3 Plant Community Characterization

At the reference site, 100 percent of the dominant species were OBL, FACW or FAC. Within the swamp run and in the adjacent wetlands, the open canopy was dominated by willow oak (*Quercus phellos*), red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), and loblolly pine (*pinus taeda*). Willow oak, water oak (*Quercus nigra*), red maple, sweet gum, and black gum (*Nyssa sylvatica*) comprised the upper layers of the understory. The lower layers of the understory and shrub layer were also moderately open, with greenbriar (*Smilax rotundifolia*), switch cane (*Arundinaria gigantea*), and sweetbay magnolia (*Magnolia virginiana*) dominant. The herb layer was indiscernible due to the time of year.

7.0 Wetland Restoration Plan

The goal of the proposed restoration plan is to create a continuous headwater swamp run/riverine wetland system typically found in the middle to upper reaches of first or zero order tributary systems. The swamp run will have an average width of 100 feet and an overall slope of 0.1 percent. The flow will be through a broad series of intertwined sinuous micro-channels. The majority of the water flowing through the site under normal conditions will be concentrated in the swamp run by leaving the elevation on average of 1.5 to 2.0 feet below the adjacent riverine wetlands. The target plant community is a varied wetland forest surrounding a cypress-dominated swamp with elevated hummocks to promote cypress growth and provide a continuous forested and diverse greenway along the tributary. Any invasive or exotic species found on the site while earth work is being completed will be removed through physical and/or chemical means.

7.1 Hydrologic Modifications

The primary goal of the project is to restore to a more natural state the channelized and straightened ditches bisecting the project site. The site will consist of two swamp run/wetland systems, a large area on the northern portion surrounding the main source of inflow to the site via the ditch entering from the southeastern edge of the site (under Meadow Road), and a smaller area in a slightly higher landscape position encompassing the two ditches entering from the south and southwest edges of the site. The smaller area on the southern portion of the site will feed into the larger area via a channel near the current confluence of the three ditches. The majority of the three ditches will be converted to swamp runs, with the surrounding areas converted to riverine wetlands. The elevation at the point where each of the three ditches enters the site will be maintained to prevent a backwater effect on upslope areas. Throughout the project area, the

ditches will be graded out to create wide swamp run morphology with a gradient of less than 0.5 percent slope and multiple sinuous interconnected channels. Adjacent to the swamp run on both banks will be riverine wetlands at an elevation between 1.5 and two feet above the mean elevation of the swamp run. After restoration, swamp run elevations will range from 58.0 to 61.0 feet and the riverine wetland elevations will range from 58.5 to 62.5. Periodic flooding from the swamp run, the seasonally high water table, and the extremely slow permeability of the soils will provide the necessary wetland hydrology for the adjacent wetlands. The five-year storm discharge results in a minimum flood elevation of 62.54 feet, inundating the entire project site.

To add to the retention time of flooding events in the wetland area and increase the direct relationship between the swamp run and the surrounding wetlands, microtopography will be used to create hummocks and depressions utilizing current as well as proposed changes in elevation. The grading plan allows for deviations of up to one foot (1') for creating hummocks and depressional areas. Excess spoil material will be spread in non-restoration areas within the 90-acre easement area. The channel from the system will flow over a stabilized outlet before draining into the main stem of Quioccosin Swamp.

7.2 Soil Restoration

Soils found in the project area currently exhibit hydric characteristics and will remain. Topsoil removed during restoration will be stockpiled and redistributed over disturbed areas. Because minimal grading is proposed, some areas may not require the stockpiling of topsoil. Because sufficient organic material appears to be present to a significant depth, no amendments are specified. Large woody debris encountered within the project area will be placed throughout the created wetlands to add variety to soil conditions and encourage diversity of volunteer species.

7.3 Plant Community Restoration

The plant species chosen for the project are native to the area, with an emphasis on species that will provide habitat and a viable, yearlong food source for a wide range of animal and plant species. Surrounding areas are home to bear, whitetail deer, raccoon, squirrel, fox, migrating waterfowl, and a wide variety of amphibian and reptile species, and the project is intended to provide food and habitat to complement and enhance the existing ecosystem. Hydrophytic species shown on the planting plan were selected to create a diverse matrix of wetland communities including shrub/scrub wetlands, areas of open water, emergent, and forested wetlands. Invasive and exotic species will not be planted on the site. Any invasive or exotic species found on the site will be removed through physical or chemical means during the planting phase. In selecting vegetation, we have considered reference riverine wetland areas adjacent to the site and "Dominant

Plants for Major Wetland Types" published by the North Carolina Department of Environment Water Quality Section. **Sheet P-2** contains detailed planting and seeding schedules for the site. An average of 420 stems per acre are proposed for both the swamp run and wetland restoration areas.

7.4 Plant Material

7.4.1 Planting Specifications

1. Planting material will conform to the current issue of the "American Standards for Nursery Stock", published by the "American Association of Nurserymen".
2. The root system of plant material shall be well-developed and undamaged, and the plant size must conform to the size specified. Plants not meeting these criteria will be rejected.
3. Foliage of non-dormant plants shall appear healthy, with no leaf spots, damage, discoloration, or wilting, and no evidence of insects on the plant. Plants not meeting these criteria will be rejected.
4. Planting materials may be substituted upon written approval from Albemarle Restorations, LLC.

7.4.2 Storage and Delivery

1. Seed shall be delivered in containers having labels reporting the origin, purity, and germination percentage of the seed, and the date of germination testing of the seed.
2. All bare root plants shall be clearly and correctly labeled to allow confirmation of species and quantities. At least 25% of each species in every shipment shall have legible labels securely attached prior to delivery to the site.
3. All plants delivered to the project site must have thoroughly moist soil/root masses. Dry or light-weight plants shall be rejected.
4. All rejected material shall be immediately removed from the project site.
5. All plants delivered to the project site shall be stored in a cool, shaded location, and watered regularly so that roots are kept moist until time of planting.

7.4.3 Products

1. Planting Schedules specifying quantity, species, size, condition, and spacing can be found on **Sheet P-2** of the Restoration Design Plan Sheets.
2. Straw shall be from small grain species such as wheat or barley, and shall be free of rot, mildew, and noxious weed seeds.

7.4.4 Planting Procedures

1. Planting shall be performed in accordance with the current edition of the Landscape Contractors Association "Landscape Specification Guidelines" and as specified below.
2. Plants shall be randomly installed within the planting area, using the plant spacing specified in the plant schedule as a guide.
3. Planting will occur during the period of February 1 - April 30. Planting outside of these specified dates is not permissible without approval from Albemarle Restorations, LLC.
4. Planting shall not occur during periods of sub-freezing temperatures, when the ground is frozen or excessively wet or dry, or when other conditions not generally accepted as suitable for planting persist.
5. Seedlings shall be planted within two days of shipment.
6. Seedlings and whips shall be minimum 1/4" to 1/2" caliper.
7. Seedlings and whips shall be planted in accordance with the detail provided on **Sheet P-2** of the Restoration Design Plan Sheets unless otherwise approved by Albemarle Restorations, LLC.
8. All woody material must be planted erect. Plants leaning greater than 10 degrees from perpendicular must be straightened or replanted by the Contractor.

7.4.5 Maintenance and Guarantee

1. Plant material shall be maintained by the Contractor for one full year from the date of final inspection and acceptance by Albemarle Restorations, LLC.
2. The Contractor shall guarantee an 80% survival of all plants for the one year period stated above, except in the case of damage by fire, animal damage, vandalism, or other events beyond the Contractors ability to control.
3. Plants which are 25% dead or more shall be considered dead.
4. Replacement plants shall be of the same type, size, and variety as the plants specified herein, or substitutions approved by Albemarle Restorations, LLC. Replacement plants shall be provided and installed subject to the requirements of these plans and specifications.

7.5 Seeding

7.5.1 Final Grading

1. Seeding of wetland areas is to be according to the Wetland Seed Mix detail on **Sheet P-2** of the Restoration Design Plan Sheets. Seed shall be spread with a broadcast spreader and may be mixed with dry sand to facilitate even spreading.

7.5.2 Soil Amendments

1. Soil tests must be performed to determine if lime and/or fertilizer are required within seeding areas. Soil analysis may be performed by the N.C. Department of Agriculture and Consumer Services Agronomic Division or a recognized commercial laboratory.
2. Amend soil as needed based on N.C. Department of Agriculture and Consumer Services Agronomic Division recommendations.

7.5.3 Seedbed Preparation

1. If needed, seedbed preparation shall consist of loosening soil to a depth of 3-5" by means of suitable agricultural or construction equipment such as disc harrows or chisel plows or rippers mounted in construction equipment. After the soil is loosened it should not be rolled or dragged smooth but left in the roughened condition. Sloped areas (Exceeding 3:1) should be tracked leaving an irregular surface with ridges running parallel to the contour of the slope.
2. Apply fertilizer and lime if required.
3. If required, incorporate lime and fertilizer into the top 3-5" of soil by disking or other suitable means.

7.5.4 Seed Specification

All seed shall be free of noxious weeds. All seed shall be subject to re-testing by a recognized seed laboratory. All seed shall have been tested within the 6 months immediately preceding the date of sowing such materials on this job. Seed tags shall be made available to the inspector to verify type and rate of seed used.

7.5.5 Methods of Seeding

1. Dry seeding: This includes use of conventional drop or broadcast spreaders.
a) Seed spread dry shall be incorporated into the subsoil at the rates prescribed on the temporary or permanent seeding recommendations.
b) Where practical, seed should be applied in two directions perpendicular to each other. Apply half the seeding rate in each direction.

2. Drill or cultipacker seeding: Mechanized seeders that apply and cover seed with soil.
a) Cultipacking seeders are required to bury the seed in such a fashion as to provide at least 1/4 inch of soil covering. Seedbed must be firm after planting.
b) Where practical, seed should be applied in two directions perpendicular to each other. Apply half the seeding rate in each direction.

8.0 Monitoring

Following construction, a Mitigation Plan and As Built Drawings will be prepared for the site and submitted to EEP. The Mitigation Plan will include the monitoring plan and protocol, as well as an invasive and exotic species management plan. The management plan will identify potential invasive species as defined in the "*North Carolina Noxious Weed List"*, identify site constraints, and provide for a two-part control plan. The first part of the two-part plan will suppress the establishment of noxious plants through eradication of existing species seen on site and installation of sufficient densities of native woody and herbaceous species. The second part will be to implement an early detection and rapid response program, to identify and remove invasive species before they become established. 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. Photographs and/or video footage of major flow events, to the extent possible, will be included in each year's monitoring report.

8.1 Swamp Run Monitoring

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, monitoring of these systems should be geared toward documenting restored functions rather than using traditional geomorphic studies. Monitoring will consist of continuous water elevation documentation, vegetation plot monitoring, and methods to assess flow patterns and duration of inundation.

Surface and sub-surface hydrology within the swamp run will be monitored using continuous recording pressure transducer type water level loggers suspended in monitoring wells within the limits of the swamp run. Monumented cross-sections will be installed and surveyed once a year to determine the extent of surface inundation, and to a lesser extent, to demonstrate stability of the system. To determine the presence of water moving through the system, three wrack material monitoring stations will be installed at varying locations in the swamp run and monitored several times throughout the year. Rainfall data will also be collected on-site through an event rainfall logger. This gauge will be placed on-site, and will record rainfall intensity, duration, time and quantity.

A minimum of three 10 meter by 10 meter square vegetation monitoring plots will be established, one at each swamp run monitoring well location, to provide a representative sample of the swamp run vegetative community. Plot sampling will coincide with that of the wetland vegetation plots and continue for the duration of the 5-year monitoring period or until the site receives final approval. Vegetation plot sampling will consist of Level 1: Planted stem inventory plots for the first year, and Level 2: Total woody stem inventory lots for remaining years, as defined in the *CVS-EEP Protocol for Recording Vegetation Version 4.0.*

8.2 Riverine Wetland Monitoring

Monitoring of hydrology on the riverine wetland portion of the restoration site will be completed using continuous recording water level loggers suspended in two-inch PVC monitoring wells. The wells will be located to assess subsurface water levels at various elevations on the site planned as seasonally saturated or temporarily flooded. Data will be downloaded from each monitoring well four times per year, and during each site visit hand measurements will be taken to ensure the accuracy of the water level loggers. An additional backup water level logger will be installed in case of malfunctions which could potentially occur with the data loggers. Data from the backup logger will be utilized if any of the four original loggers malfunction. Groundwater elevation data collected from each monitoring well will be presented relative to the ground surface elevation at the well location in graph form. In addition to measurements of sub-surface water elevations, a visual estimate of the extent of inundation will also be made and documented.

Rainfall data will be collected on site through an event rainfall logger. This gauge will be placed at the edge of the project site and will record rainfall intensity, duration, time, and quantity. Rainfall data from other sites in close proximity to the project will be used as references to determine the deviation from climatologically normal rainfall in the area. The rainfall data will be assessed to determine degree to which climatologic extremes (i.e. drought or excessive rainfall) affect project hydrology.

Vegetation monitoring plots will be 10 meter by 10 meter square and installed to provide a representative sample of forested wetland communities. The initial plot sampling will occur following the completion of construction, with successive vegetative monitoring occurring once per year for 5 years, 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 lots for remaining years, as defined in the *CVS-EEP Protocol for Recording Vegetation Version 4.0.*

The reference wetland site will be utilized to set a target vegetative community for the restored wetlands. The reference wetland for the target vegetative

community is the same wetland where reference wells will be installed for wetland hydrology monitoring. Vegetation in the reference wetland is dominated by woody plants including *Quercus phellos, Quercus nigra, Acer rubrum, Liquidambar styraciflua, Nyssa sylvatica, Pinus taeda, and Magnolia virginiana*. A Routine Wetland Determination Data Form was completed for the reference wetland and is included in **Appendix C**.

Monitoring Reports will be submitted to EEP by December 31 of the year in which the monitoring was conducted. In the unlikely event that success criteria outlined below are not achieved by the end of the five-year minimum monitoring period, with permission from EEP corrective measures including regrading, replanting, removal of certain species, etc. will be performed. If areas are deemed to be severely deficient in meeting the success criteria, Albemarle Restoration, LLC may opt to ask the Department to allow corrective measures prior to the end of the five-year period.

9.0 Success Criteria:

The intent of the project is to create a diverse forested swamp run and riverine wetland forest. The target hydrologic regime for the swamp run will be inundation greater than three inches for the majority of the growing season in the lowest "channel" areas, interspersed with higher hummocks which will be seasonally saturated for the majority of the growing season. The target hydrologic regime for the riverine wetlands will be inundation or saturation to within 12 inches of the ground surface for a minimum of 21 consecutive days during the growing season. Hydrologic success of the project will be correlated to conditions documented at the reference wetland which also functions as a swamp run with adjacent riverine wetlands. In cases where severe drought or other natural occurrences affect groundwater levels which prevent hydrologic success criteria from being achieved, data collected at the reference site will be used to verify that fluctuations in water surface elevations within the swamp run are due to natural occurrences and not to deficiencies in the project design. One accepted method for determining how precipitation relates to a normal rainfall year can be found at: http://www.wcc.nrcs.usda.gov/climate/wets_doc.html.

More detailed description of the hydrologic regime for the swamp run and riverine wetland areas will be provided in the mitigation plan, to be submitted with the as-built construction drawings. In addition to two monitoring wells to be installed at the reference wetland, a vegetation monitoring plot will also be documented.

With regard to vegetation monitoring and success for both the swamp run and riverine areas, in accordance with the *US Army Corps of Engineers, Stream Mitigation guidelines, April 2003*, Albemarle Restorations will maintain survivability of planted woody species planted to 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 wetland areas. It is expected that volunteer species will colonize the site from adjacent and nearby wetland 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.

10.0 References

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11.0 Restoration Design Plan Sheets

WETLAND & STREAM MITIGATION PROJECT
ALBEMARLE RESTORATIONS, LLC
POWELL SITE
EEP CONTRACT # D06065-B

BERTIE COUNTY

LOCATION: WEST SIDE OF MEADOW ROAD
NORTH OF BUZZARDS CROSSROADS
TYPE OF WORK: MITIGATION

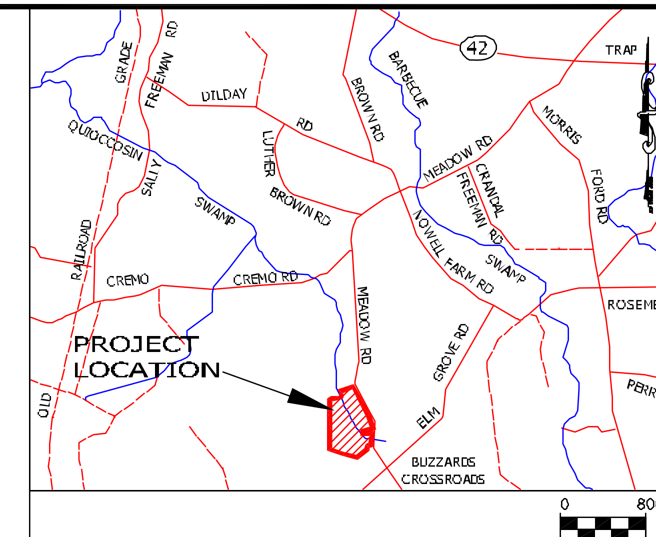
GENERAL NOTES:

1. This wetland and swamp run restoration plan has been prepared for the North Carolina Ecosystem Enhancement Program for the purpose of restoring greater than 48 acres of riverine wetlands and restoring 3,310 linear feet of stream on the Powell property located within the Chowan River Basin.
3. Existing 1.0 foot topography within the project areas was prepared by True Line Surveying. Other base information was derived from Bertie County GIS data as amended and corrected by Albemarle Restorations, LLC based on field observations and ground surveys.
4. The Contractor shall notify Albemarle Restorations, LLC and the landowner's representative at least two (2) weeks prior to start of grading operations within the project area.
5. The Contractor is responsible for the location of all underground utilities prior to the start of construction. Any damages to utilities as a result of grading or other activities will be the sole responsibility of the Contractor and shall be repaired at the Contractors expense.
6. Access to the wetland and swamp run restoration areas shall be from Meadow Road via existing driveway as indicated hereon. No disturbance is to occur between the public roads and the LOD for the wetland grading.
7. The Contractor will be responsible for any damage to private property, including but not limited to fences and private roads resulting from the execution of this contract. Repairs for any such damage will be made at the Contractors expense to the satisfaction of the private property owner and Albemarle Restorations, LLC.
8. All machinery, equipment and supplies for the project shall be stored in an upland location so as not to disturb any environmentally sensitive areas.
9. All rough and finish grading work will be started at the lowest proposed elevation of the wetland restoration area and proceed up-slope to minimize soil compaction.
10. All topsoil removed during grading will be stockpiled and returned once grading is completed.
11. A Nationwide 27 Permit, 401 Water Quality Permit, and Land Disturbance Permit will be obtained prior to the start of construction. Erosion control details and procedures will be provided to the Bertie County Soil Conservation District for review and approval prior to construction.

SEEDING NOTES:

1. Prior to seeding, remove any mounds or surface irregularities not in conformance with grading plan. Areas that have experienced washing out, rilling, or sediment deposition shall be reconstructed and grades re-established by the Contractor in accordance with the plan or as otherwise directed by Albemarle Restorations, LLC.
2. After bringing the wetland and swamp run restoration areas to final grades, loosen soil by discing or scarifying to a depth of at least 3 inches.
3. Prior to seeding, remove all trash, debris and large objects such as stones that might interfere with the seeding operation.
4. Seeding of wetland areas is to be according to the Wetland Seed Mix provided onsheet P-2 of this set. Seed shall be spread with a broadcast spreader and may be mixed with dry sand to facilitate even spreading.

SITE OVERVIEW
SCALE 1" = 400'



VICINITY MAP

INDEX OF SHEETS

LEGEND

- PROPERTY LINE
- EASEMENT BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING GRADE
- APPROXIMATE SWAMP RUN LIMITS
- PROPOSED WETLAND LIMITS
- PROPOSED "SWAMP RUN" RESTORATION
- PROPOSED RIVERINE WETLAND RESTORATION

PROPOSED WETLAND MITIGATION CREDIT SUMMARY

WETLAND RESTORATION AREAS	(1:1)	ACREAGE	WMU's
RIVERINE WETLAND RESTORATION		48.4	48.4
Total		48.4	48.4
"SWAMP RUN" RESTORATION		LINEAR FEET	SMU's
"SWAMP RUN" (7.5 ACRES)		3,310	3,310

400 0 400 800

TITLE SHEET
APRIL 16, 2008

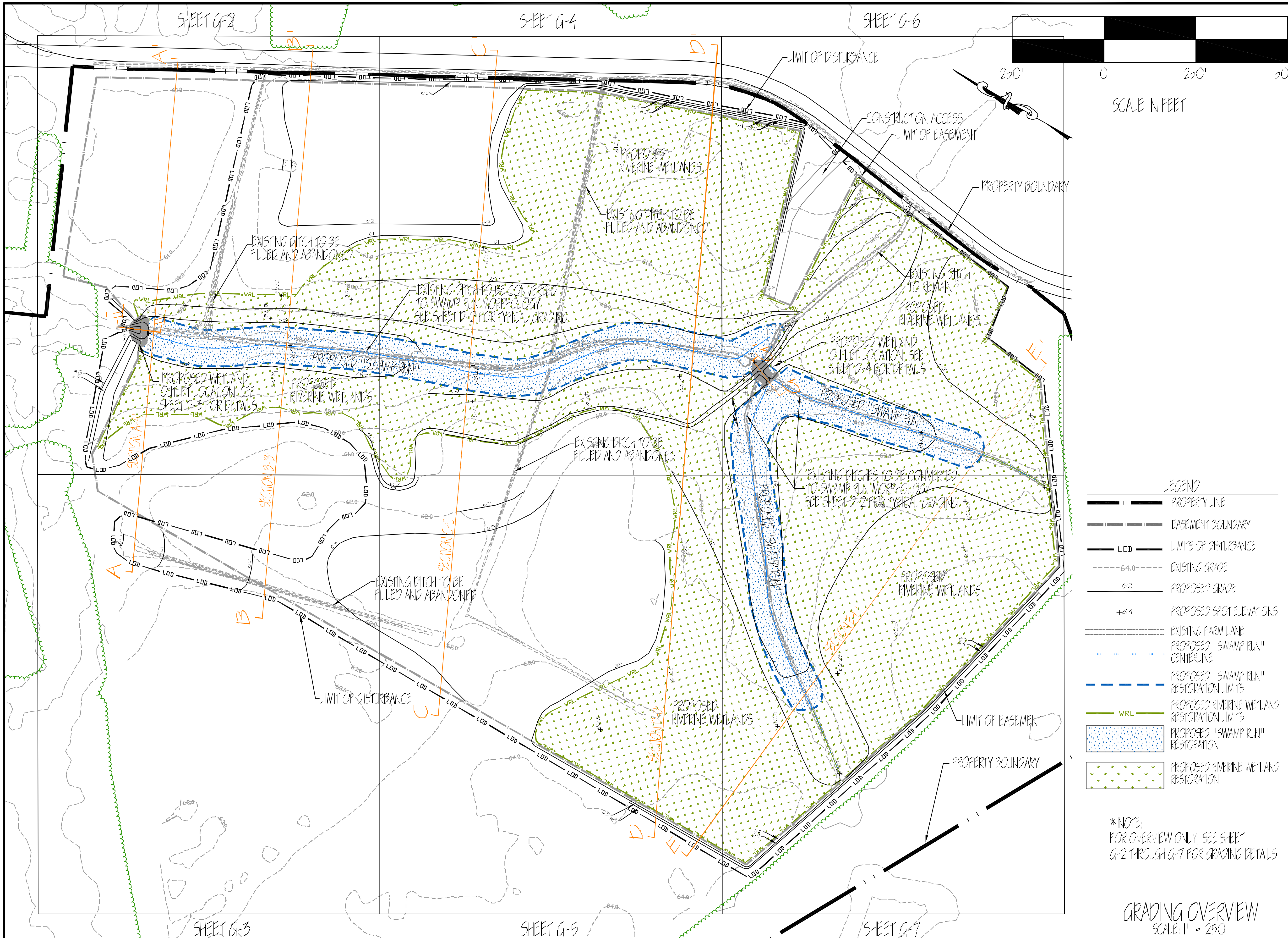
POWELL PROPERTY
WETLAND MITIGATION UNITS: 48.4 WMU'S
STREAM MITIGATION UNITS: 3,310 SMU'S
BERTIE COUNTY, NORTH CAROLINA
EEP CONTRACT #: D06065-B

Ecosystem Enhancement PROGRAM

PREPARED BY:

ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION
404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0249 • FAX (252) 357-4852

SHEET T-1



SHEET G-2
SHEET G-4
SHEET G-6
SHEET G-3
SHEET G-5
SHEET G-7
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SCALE IN FEET
LIMIT OF DISTURBANCE
CONSTRUCTION ACCESS
LIMIT OF EASEMENT
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PROPOSED RIVERINE WETLANDS
EXISTING DITCH TO BE FILLED AND ABANDONED
EXISTING DITCH TO REMAIN
EXISTING DITCH TO BE CONVERTED TO SWAMP RUN MORPHOLOGY SEE SHEET D-2 FOR TYPICAL GRADING
PROPOSED WETLAND OUTLET LOCATION SEE SHEET D-4 FOR DETAILS
PROPOSED "SWAMP RUN"
EXISTING DITCHES TO BE CONVERTED TO SWAMP RUN MORPHOLOGY SEE SHEET D-2 FOR TYPICAL GRADING
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LIMITS OF DISTURBANCE
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PROPOSED GRADE
PROPOSED SPOT ELEVATIONS
EXISTING FARM LANE
PROPOSED "SWAMP RUN" CENTERLINE
PROPOSED "SWAMP RUN" RESTORATION LIMITS
PROPOSED RIVERINE WETLAND RESTORATION LIMITS
PROPOSED "SWAMP RUN" RESTORATION
PROPOSED RIVERINE WETLAND RESTORATION
*NOTE
FOR OVERVIEW ONLY. SEE SHEET G-2 THROUGH G-7 FOR GRADING DETAILS

GRADING OVERVIEW

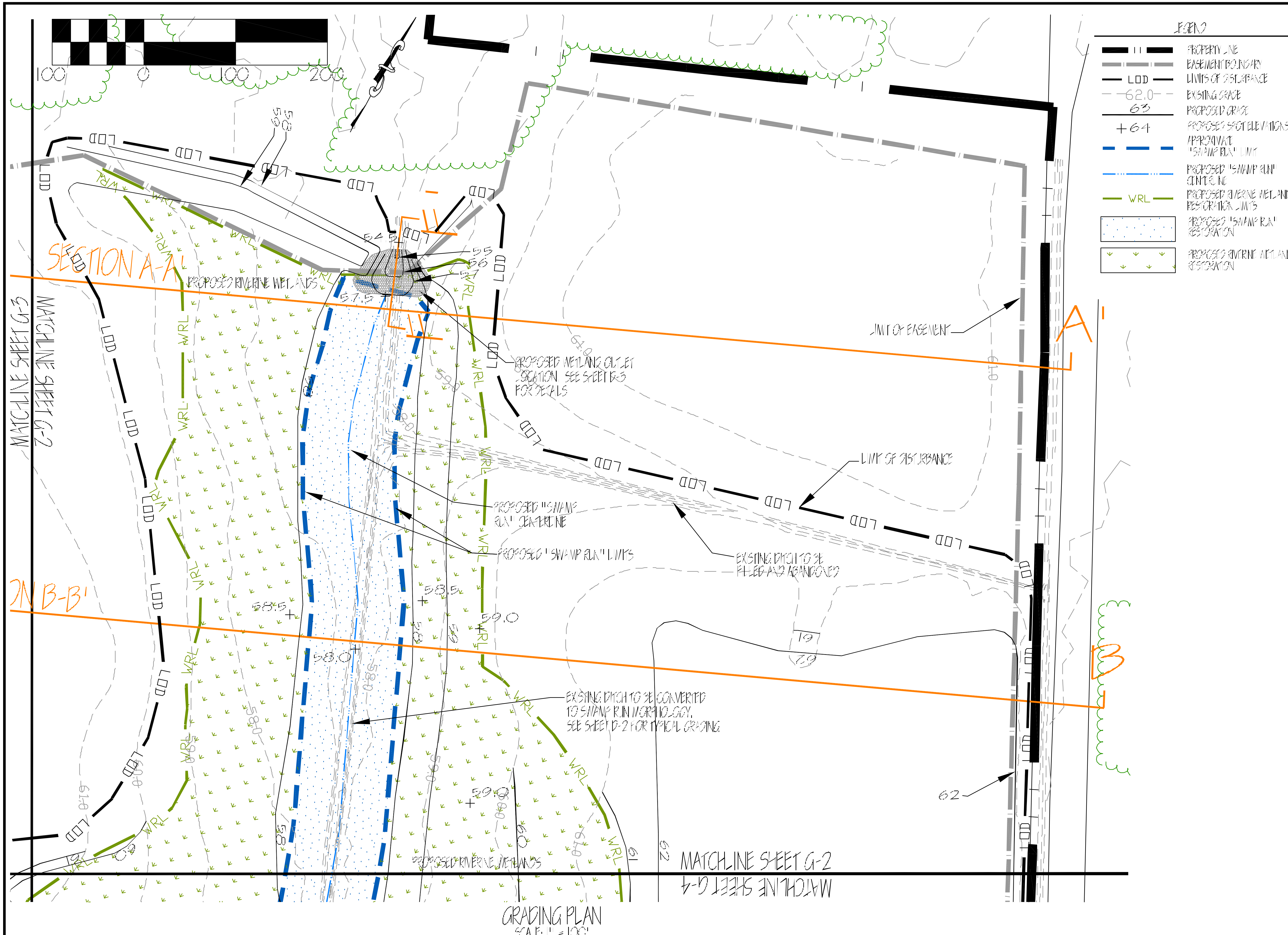
SCALE 1" = 250'

GRADING OVERVIEW
APRIL 16, 2008

POWELL PROPERTY
WETLAND MITIGATION UNITS: 46.4 WMU's
BERTIE COUNTY, NORTH CAROLINA

PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION & WILDLIFE HABITAT CREATION

SHEET G-1



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MATCHLINE SHEET G-2
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PROPOSED RIVERINE WETLANDS
PROPOSED WETLAND OUTLET LOCATION. SEE SHEET D-3 FOR DETAILS
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LIMIT OF DISTURBANCE
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PROPOSED "SWAMP RUN" LIMITS
EXISTING DITCH TO BE FILLED AND ABANDONED
EXISTING DITCH TO BE CONVERTED TO SWAMP RUN MORPHOLOGY. SEE SHEET D-2 FOR TYPICAL GRADING
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PROPOSED GRADE
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PROPOSED SPOT ELEVATIONS
APPROXIMATE "SWAMP RUN" LIMIT
PROPOSED "SWAMP RUN" CENTERLINE
PROPOSED RIVERINE WETLAND RESTORATION LIMITS
PROPOSED "SWAMP RUN" RESTORATION
PROPOSED RIVERINE WETLAND RESTORATION

GRADING PLAN
SCALE: 1" = 100'

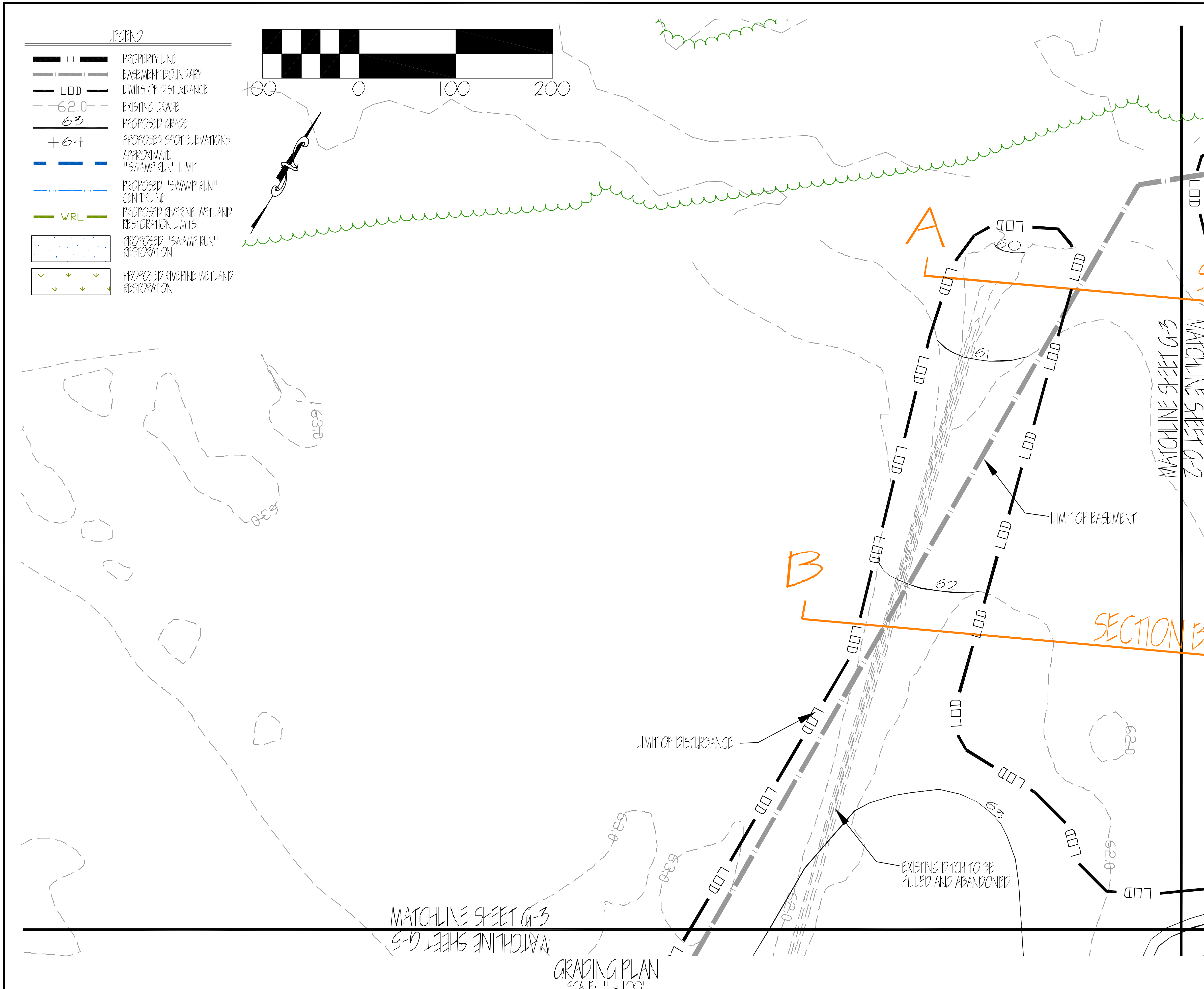
GRADING PLAN
APRIL 16, 2008

POWELL PROPERTY
WETLAND MITIGATION UNITS: 48.4 WMU's
STREAM MITIGATION UNITS: 3,310 SMU's
BERTIE COUNTY, NORTH CAROLINA

Ecosystem Enhancement Program

PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION & WILDLIFE HABITAT CREATION

SHEET G-2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PROPOSED GRADE
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PROPOSED SPOT ELEVATIONS
APPROXIMATE "SWAMP RUN" LIMIT
PROPOSED "SWAMP RUN" CENTERLINE
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PROPOSED "SWAMP RUN" RESTORATION
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LIMIT OF DISTURBANCE
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MATCHLINE SHEET G-2
MATCHLINE SHEET G-5
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GRADING PLAN
SCALE: 1" = 100'

GRADING PLAN

APRIL 16, 2008

REVISION DATE	REVISION	INITIALS

POWELL PROPERTY

WETLAND MITIGATION UNITS: 46.4 WMU'S

STREAM MITIGATION UNITS: 3,310 SMU'S

BERTIE COUNTY, NORTH CAROLINA

EEP CONTRACT #: D06085-B

Ecosystem Enhancement PROGRAM

PREPARED BY:

ALBEMARLE RESTORATIONS, LLC

WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION

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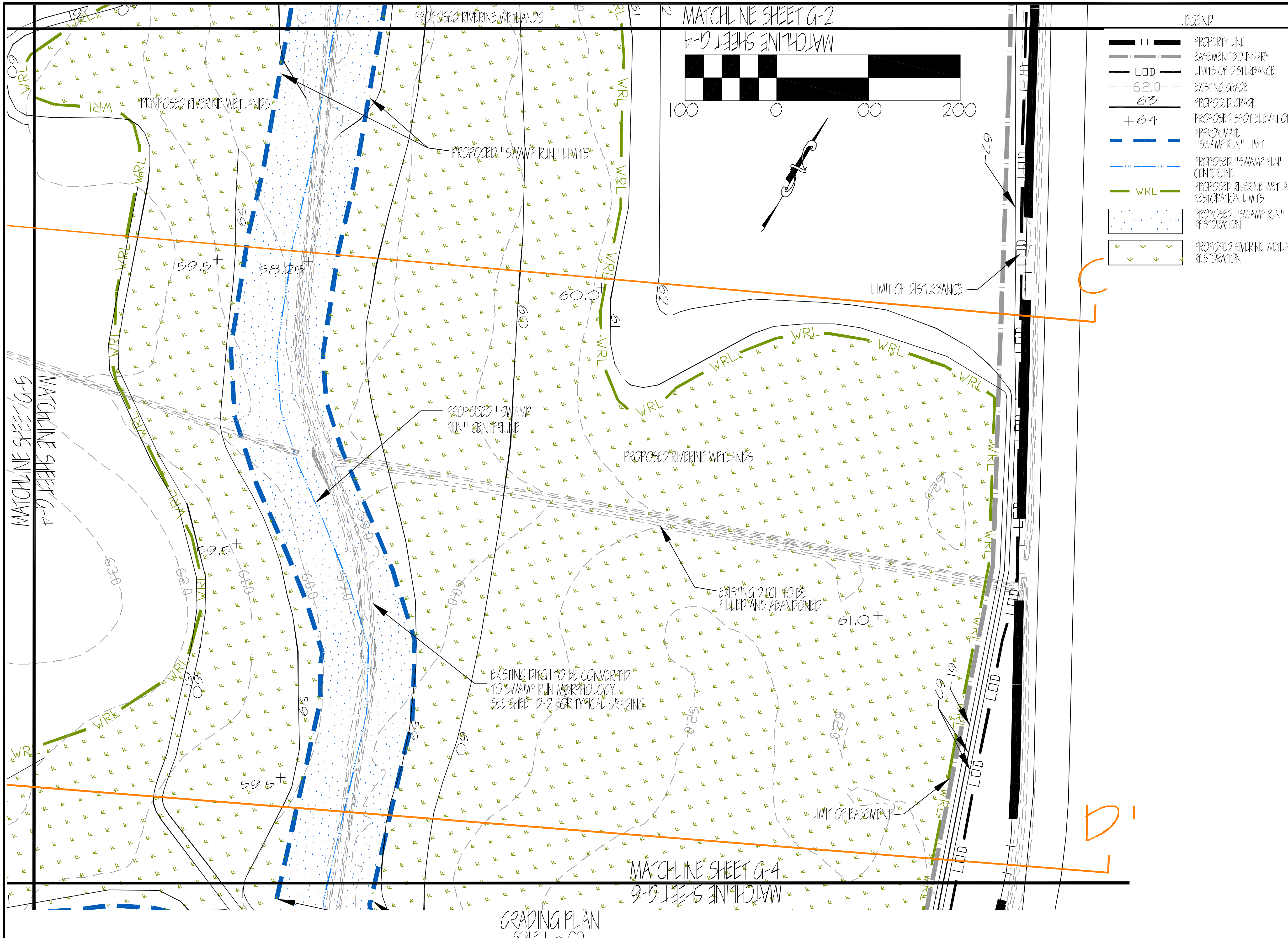
SHEET G-3



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MATCHLINE SHEET G-4
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EXISTING GRADE
PROPOSED GRADE
PROPOSED SPOT ELEVATIONS
APPROXIMATE "SWAMP RUN" LIMIT
PROPOSED "SWAMP RUN" CENTERLINE
PROPOSED RIVERINE WETLAND RESTORATION LIMITS
PROPOSED "SWAMP RUN" RESTORATION
PROPOSED RIVERINE WETLAND RESTORATION
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GRADING PLAN
SCALE: 1" = 100'

GRADING PLAN
APRIL 16, 2006

REVISIONS		
DATE:	REVISION:	INITIALS:

POWELL PROPERTY
WETLAND MITIGATION UNITS: 48.4 WMU'S
STREAM MITIGATION UNITS: 3,510 SMU'S
BERTIE COUNTY, NORTH CAROLINA
EEP CONTRACT #:

Ecosystem Enhancement PROGRAM

PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
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(252) 333-0249 • FAX (252) 357-4652

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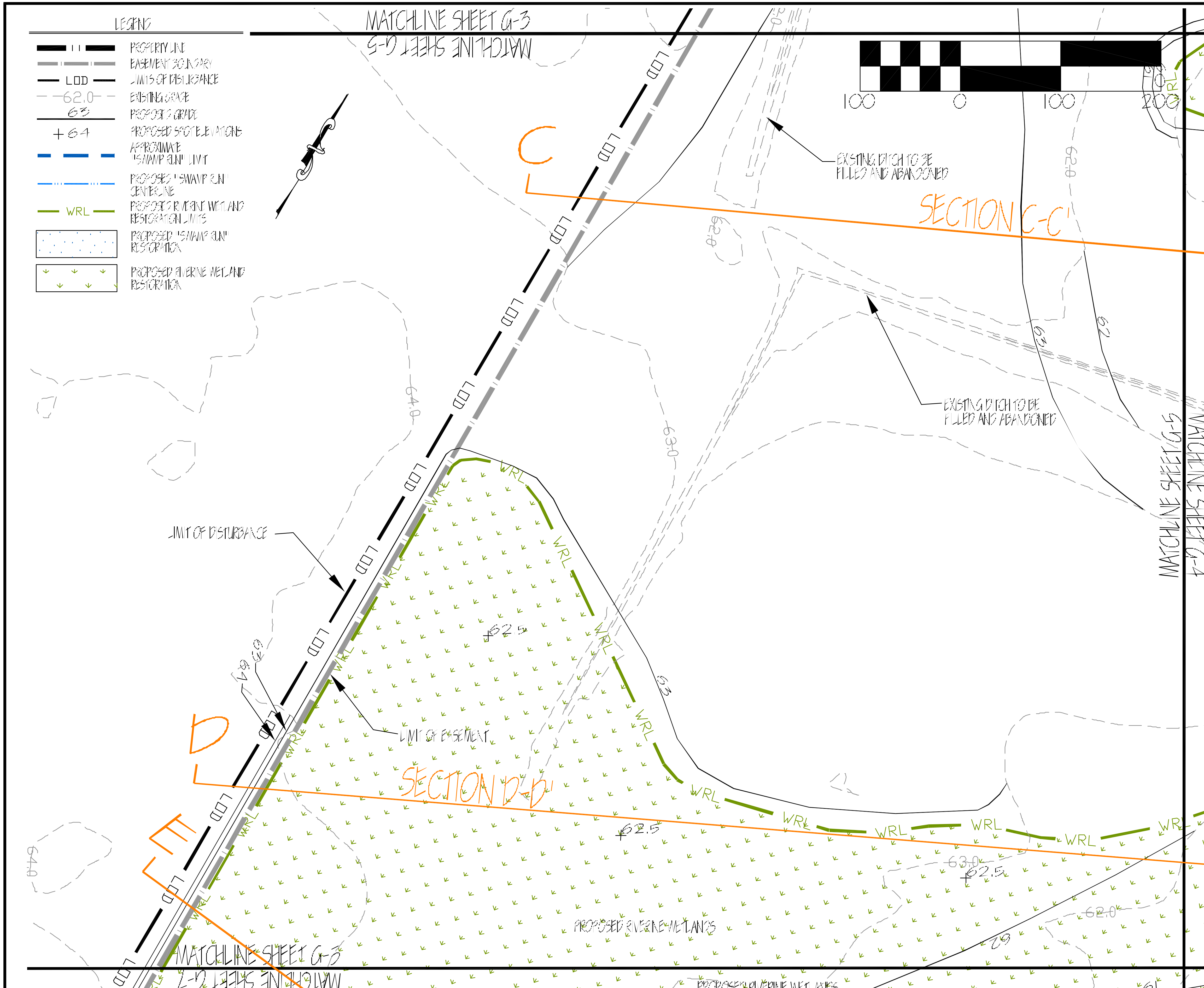
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PROPOSED SPOT ELEVATIONS
APPROXIMATE "SWAMP RUN" LIMIT
PROPOSED "SWAMP RUN" CENTERLINE
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PROPOSED RIVERINE WETLAND RESTORATION LIMITS
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PROPOSED RIVERINE WETLANDS

GRADING PLAN

SCALE: 1" = 100'

GRADING PLAN

APRIL 16, 2008

REVISIONS

DATE:

REVISION:

INITIALS:

POWEL PROPERTY

WETLAND MITIGATION UNITS: 48.4 WMU'S

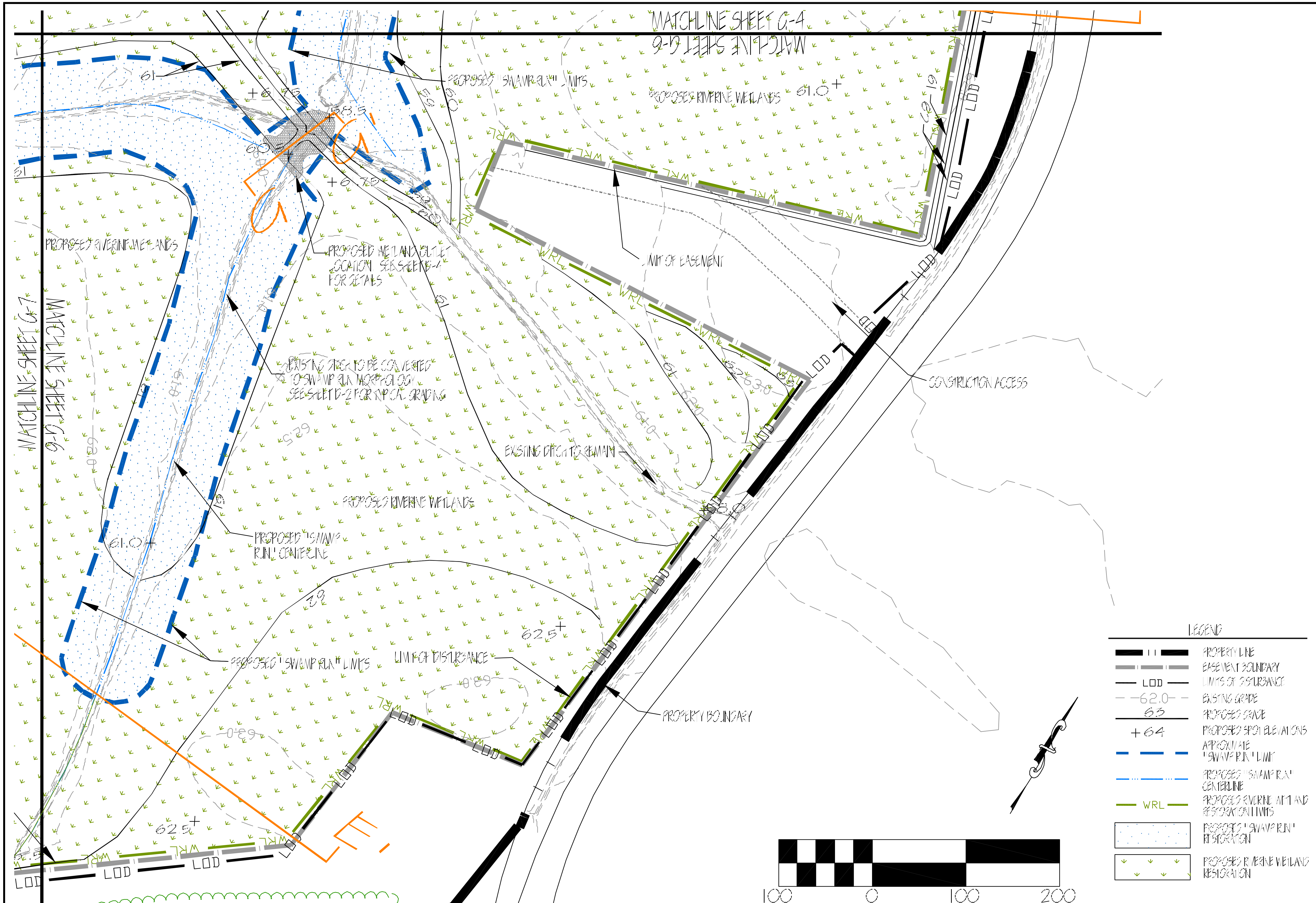
BERTIE COUNTY, NORTH CAROLINA

Ecosystem Enhancement PROGRAM

PREPARED BY:

ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION
STREAM RESTORATION
& WILDLIFE HABITAT CREATION

SHEET G-5



MATCHLINE SHEET G-4
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MATCHLINE SHEET G-6
PROPOSED "SWAMP RUN" LIMITS
PROPOSED RIVERINE WETLANDS
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APPROXIMATE "SWAMP RUN" LIMIT
PROPOSED "SWAMP RUN" CENTERLINE
PROPOSED RIVERINE WETLAND RESTORATION LIMITS
PROPOSED "SWAMP RUN" RESTORATION
PROPOSED RIVERINE WETLAND RESTORATION
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GRADING PLAN

SCALE: 1" = 100'

GRADING PLAN

APRIL 6, 2008

POWELL PROPERTY

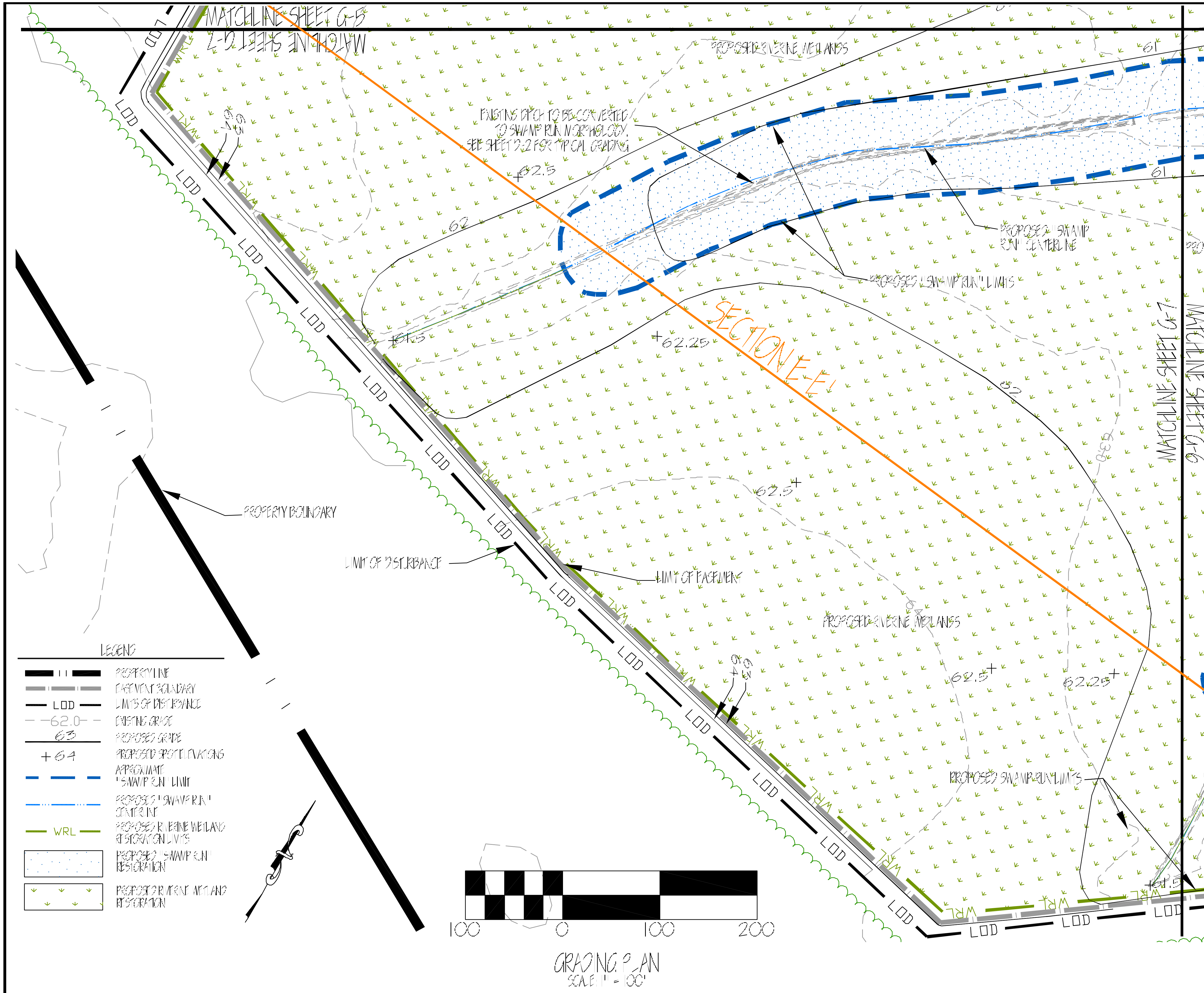
PREPARED BY:

ALBEMARLE RESTORATIONS, LLC

WETLAND RESTORATION
STREAM RESTORATION
& WILDLIFE HABITAT CREATION

404 COURT STREET GATESVILLE, NC 27938
(252) 333-0243 • FAX (252) 357-4852

SHEET G-6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MATCHLINE SHEET G-7
PROPOSED RIVERINE WETLANDS
EXISTING DITCH TO BE CONVERTED TO SWAMP RUN MORPHOLOGY. SEE SHEET D-2 FOR TYPICAL GRADING
PROPOSED "SWAMP RUN" CENTERLINE
PROPOSED "SWAMP RUN" LIMITS
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MATCHLINE SHEET G-6
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PROPOSED GRADE
PROPOSED SPOT ELEVATIONS
APPROXIMATE "SWAMP RUN" LIMIT
PROPOSED "SWAMP RUN" CENTERLINE
PROPOSED RIVERINE WETLAND RESTORATION LIMITS
PROPOSED "SWAMP RUN" RESTORATION
PROPOSED RIVERINE WETLAND RESTORATION
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GRADING PLAN
SCALE: 1" = 100'

GRADING PLAN
APRIL 16, 2008

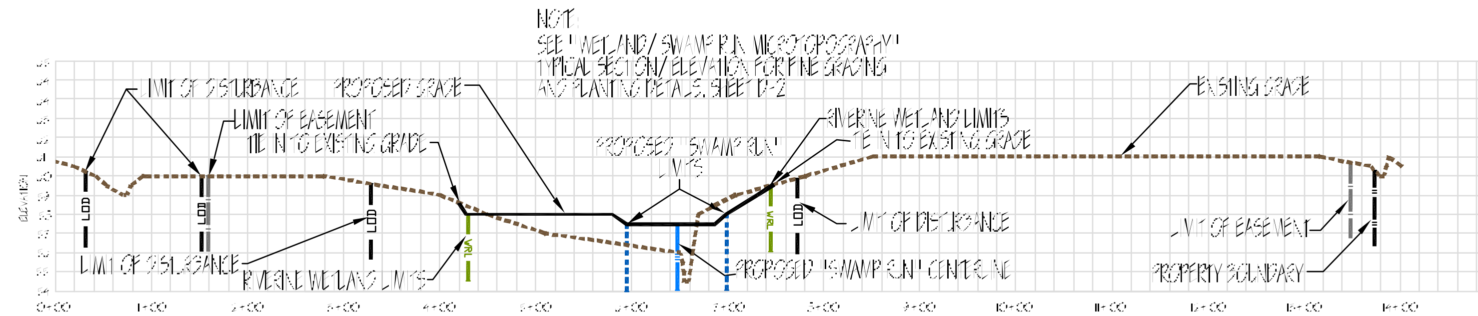
REVISIONS DATE	REVISION	INITIALS

POWELL PROPERTY
WETLAND MITIGATION UNITS: 48.4 WMU'S
STREAM MITIGATION UNITS: 3,310 SMU'S
BERTIE COUNTY, NORTH CAROLINA
EEP CONTRACT #: D06085-B

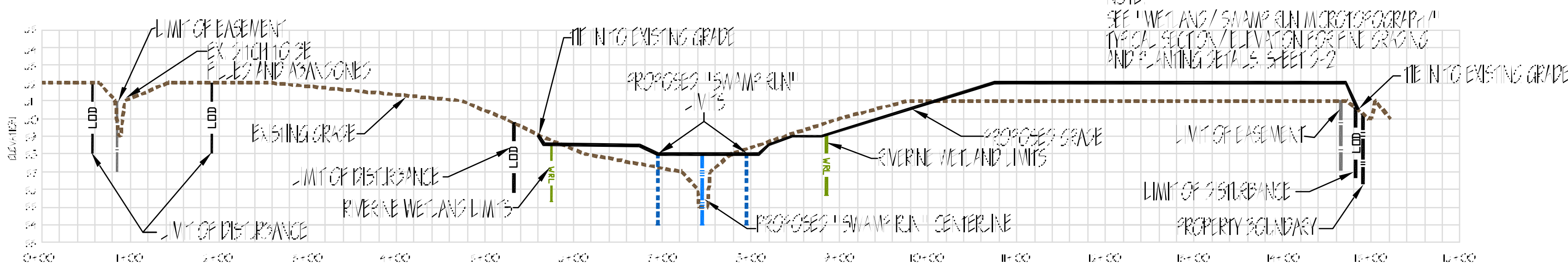
Ecosystem Enhancement PROGRAM

PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION
404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0249 • FAX (252) 357-4992

SHEET G-7



GRADING CROSS SECTION A-A'
HORIZONTAL SCALE: 1" = 200
VERTICAL SCALE: 1" = 10



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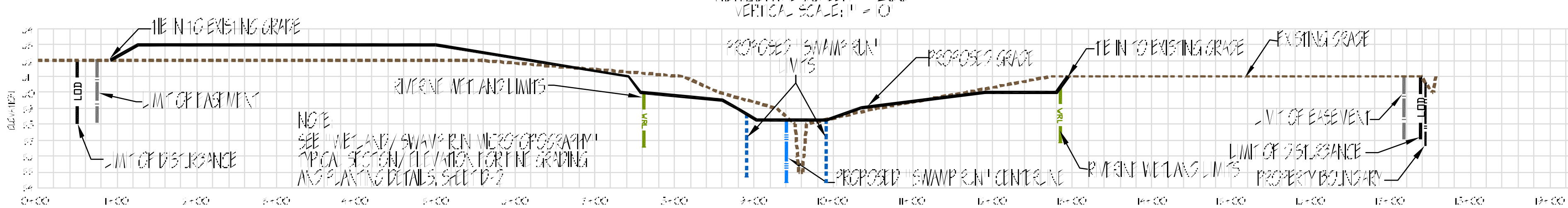

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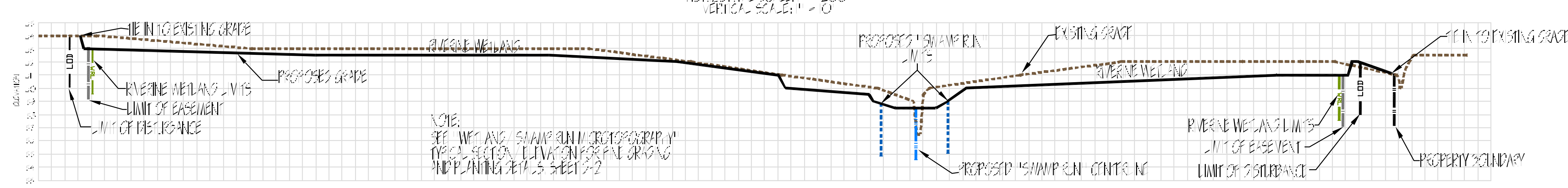
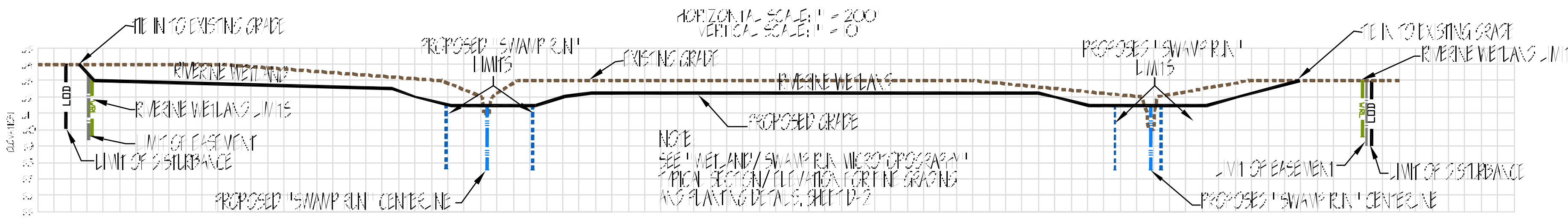


GRADING CROSS SECTION D-D'
HORIZONTAL SCALE: 1" = 200
VERTICAL SCALE: 1" = 10



GRADING CROSS SECTION E-E'
HORIZONTAL SCALE: 1" = 200
VERTICAL SCALE: 1" = 10

DETAILS AND SECTIONS
APRIL 15, 2008

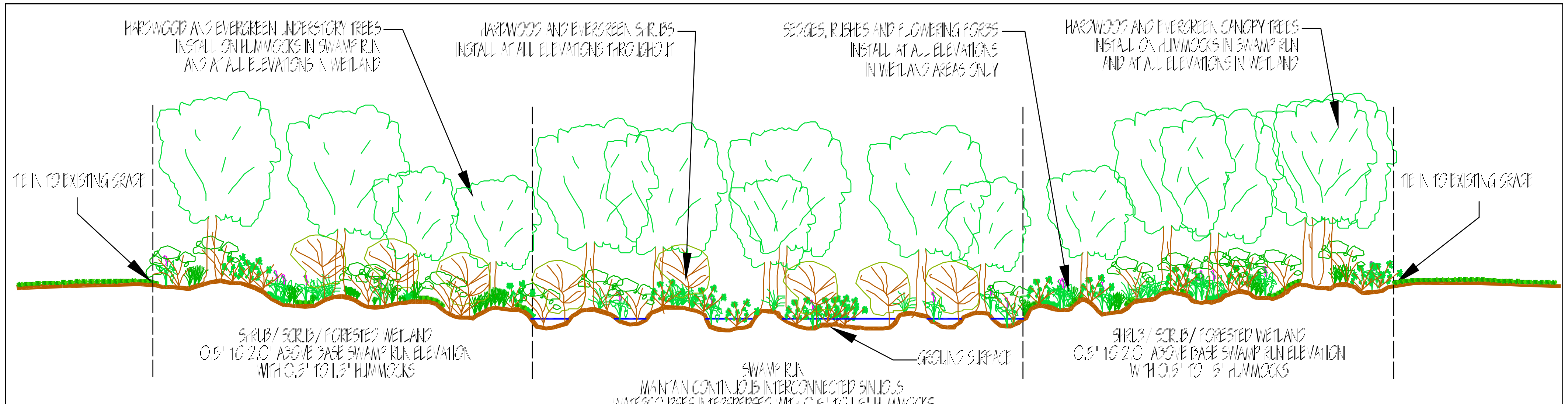
REVISIONS DATE	REVISION	INITIALS

POWELL PROPERTY
WETLAND MITIGATION UNITS: 45.4 WMU'S
STREAM MITIGATION UNITS: 3,310 SMU'S
BERTIE COUNTY, NORTH CAROLINA
EEP CONTRACT #: 2008055-B

Ecosystem Enhancement PROGRAM

PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION
404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0243 • FAX (252) 357-4832

SHEET D-1



WETLAND / SWAMP RUN MICROTOPOGRAPHY
TYPICAL SECTION / ELEVATION
NOT TO SCALE

SITE INFORMATION (not for bidding purposes)		
Total Area of Wetlands	55.9	Acres
Area Disturbed	85.5	Acres
Area to be Roofed or Paved	0	Acres
Total Cut	61,510	Cu. Yds.
Total Fill	27,060	Cu. Yds.
Offsite Waste / Borrow Area Location (Powell Farm)	34,450	Cu. Yds.

UTILITY NOTIFICATION

"Ecotone, Inc. makes no representation as to the existence or non existence of any utilities at the construction site. Shown on these construction drawings are those utilities which have been identified. It is the responsibility of the landowners or operators and contractors to assure themselves that no hazard exists or damage will occur to utilities. It is suggested that NC One-Call Center be contacted at: 1-800-632-4949."

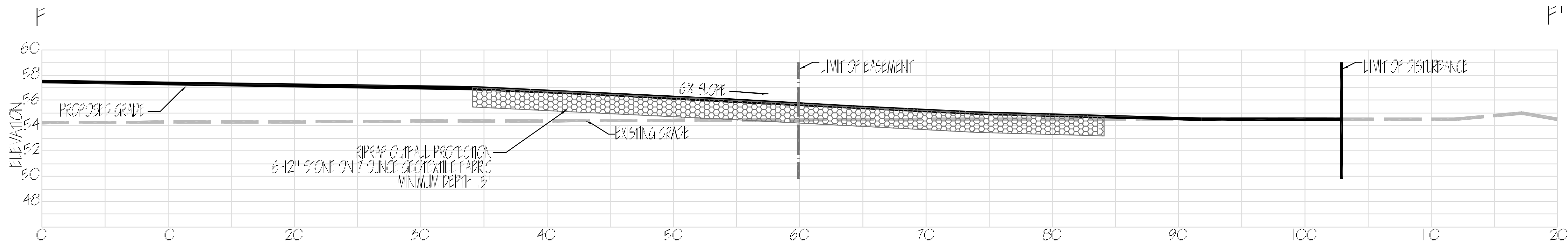
DETAILS AND SECTIONS
APRIL 16, 2008

POWELL PROPERTY

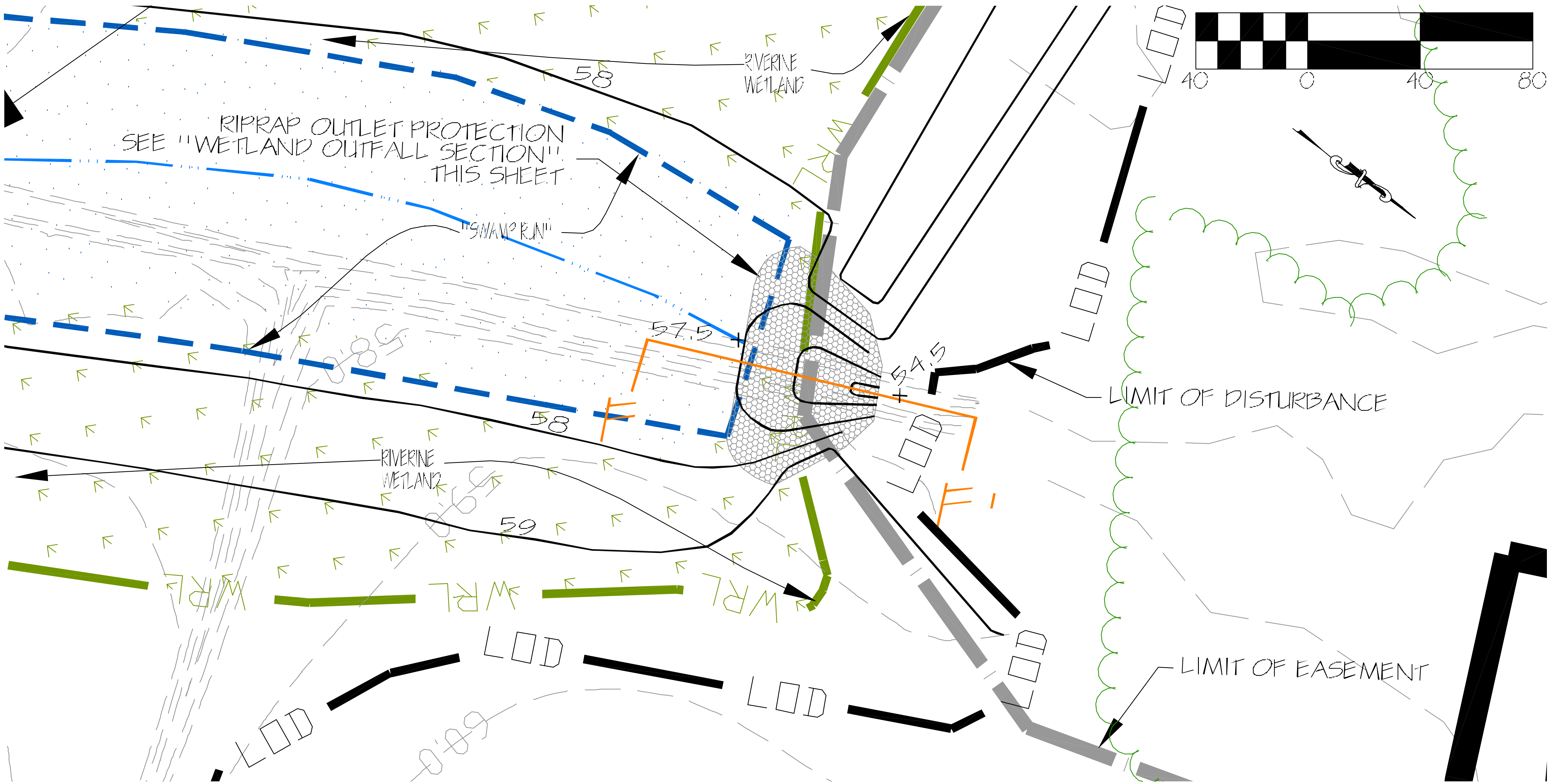
Ecosystem Enhancement Program

PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION
404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0243 • FAX (252) 357-4852

SHEET 9-2



WETLAND OUTFALL SECTION (CROSS SECTION F-F')
HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 10'



WETLAND OUTFALL DETAIL
SCALE 1" = 40'

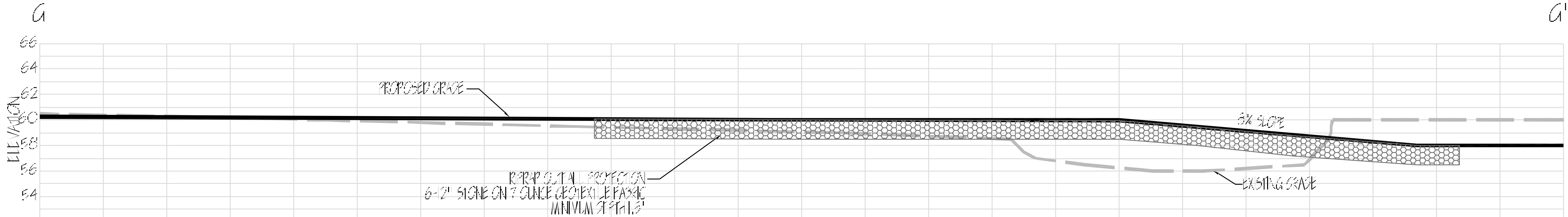
DETAILS AND SECTIONS
APRIL 16, 2008

POWELL PROPERTY
WETLAND MITIGATION UNITS: 48.4 WMU'S
STREAM MITIGATION UNITS: 3,310 SMU'S
BERTIE COUNTY, NORTH CAROLINA
EEP CONTRACT #: 20806-3

Ecosystem Enhancement PROGRAM

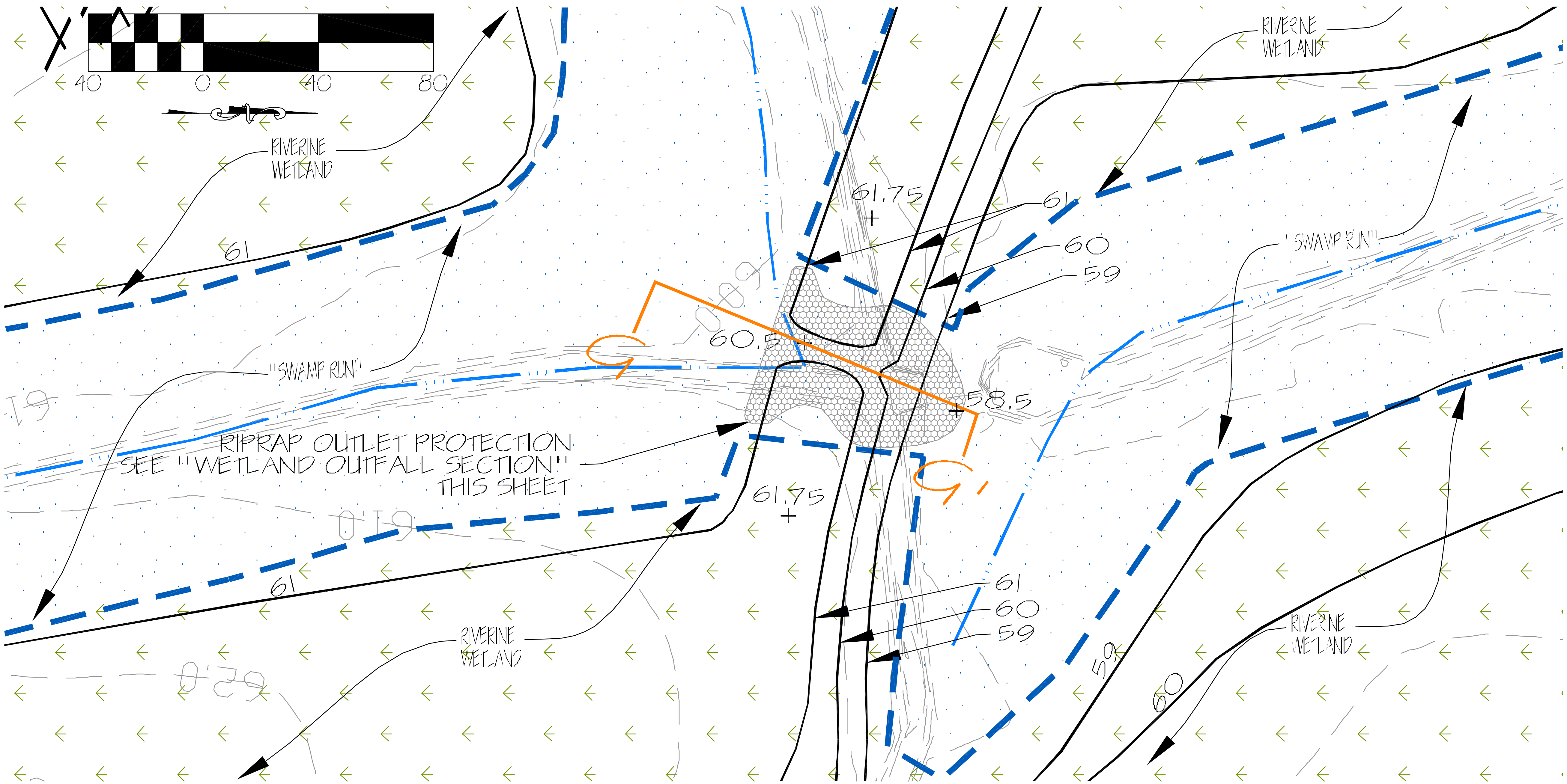
PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION
STREAM RESTORATION
& WILDLIFE HABITAT CREATION
404 COURT STREET • GATESVILLE, NC 27938

SHEET D-3



DISTANCE ALONG SECTION IN FEET

WETLAND OUTFALL SECTION (CROSS SECTION G-G')
HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 10'



WETLAND OUTFALL DETAIL
SCALE: 1" = 40'

DETAILS AND SECTIONS
APRIL 16, 2008

REVISION DATE	REVISED	INITIALS

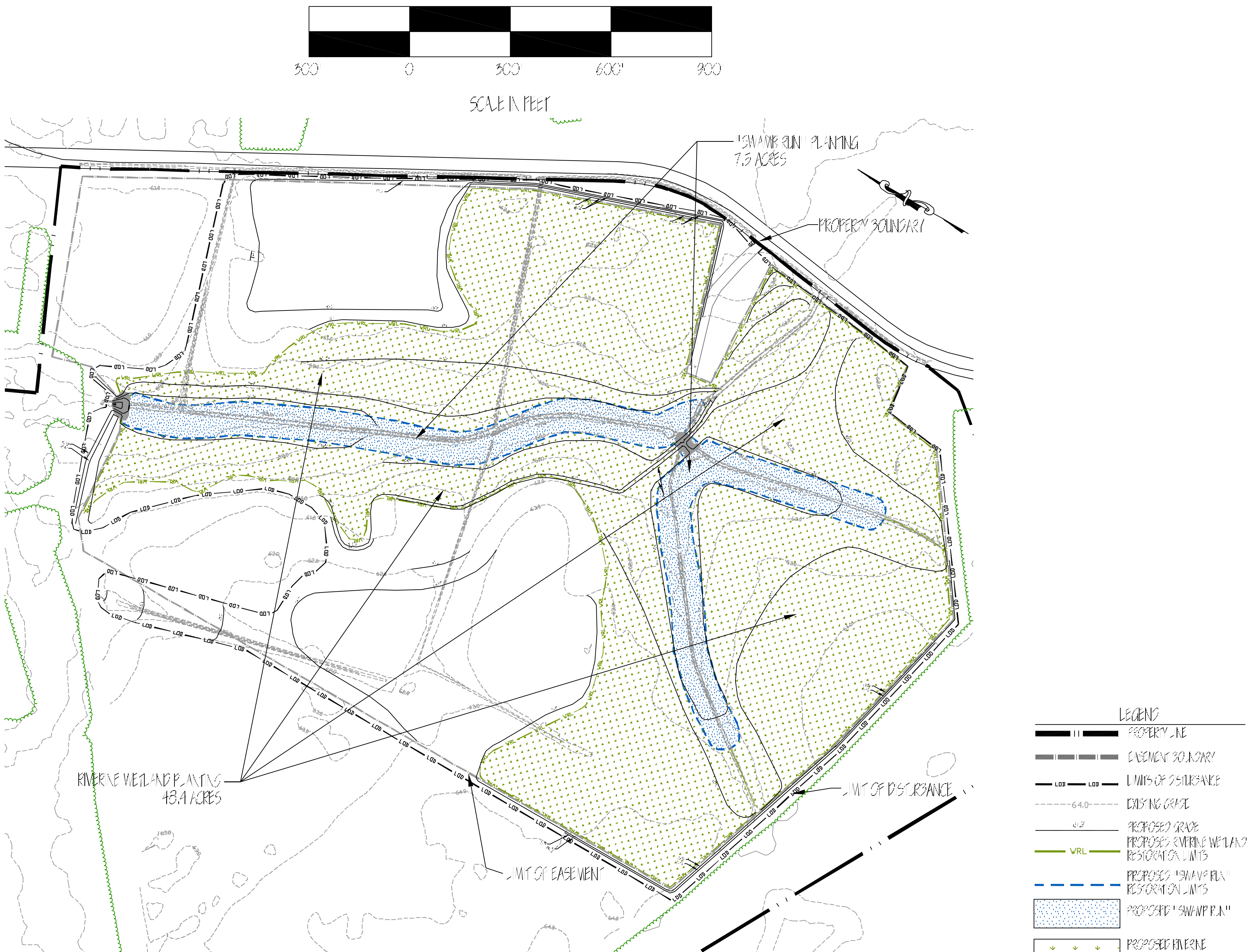
POWELL PROPERTY
WETLAND MITIGATION UNITS: 48.4 WMU'S
STREAM MITIGATION UNITS: 3,310 SMU'S
GREENE COUNTY, NORTH CAROLINA
EEP CONTRACT #: 2006-3

Ecosystem Enhancement PROGRAM

PREPARED BY:

ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION
404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0243 • FAX (252) 357-4852

SHEET D-4



PLANTING PLAN

SCALE 1" = 300'

POWELL PROPERTY

WETLAND MITIGATION UNITS: 48.4 WMU'S

STREAM MITIGATION UNITS: 3,910 SMU'S

BERTIE COUNTY, NORTH CAROLINA

EEP CONTRACT #

PLANTING PLAN

APRIL 16, 2008

REVISIONS		
DATE	REVISION	INITIALS

Ecosystem Enhancement PROGRAM

PREPARED BY:

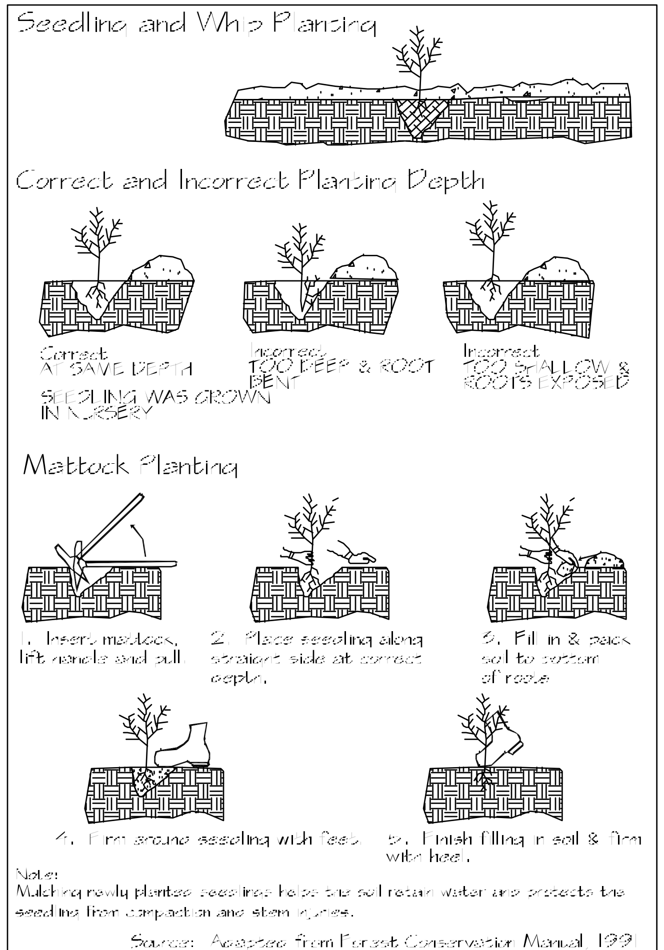
ALBEMARLE RESTORATIONS, LLC

WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION

404 COURT STREET • GATESVILLE, NC 27938

(252) 333-0249 • FAX (252) 357-4832

SHEET P-1



Seedling and Whip Planting Techniques

PERMANENT WETLAND SEED MIX: 55.9 ACRES

Botanical Name	Common Name	Min. % Purity	Min. % Germ.	% of Mix by weight	Seeding Rate (lbs/ac)
Lolium multiflorum	Annual Ryegrass	90	85	48	4.80
Agrostis alba	Redtop	90	85	7.5	0.75
Panicum virgatum	Switch Grass	90	85	7.5	0.75
Agrostis stolonifera	Creeping Bentgrass	90	85	7.5	0.75
Elymus virginiana	Wild Rye Grass	90	85	7.5	0.75
Peltandra virginica	Arrow Arum	90	85	3	0.30
Setaria geniculata	Foxtail Grass	90	85	3	0.30
Tripsacum dactyloides	Eastern Gamma Grass	90	85	2	0.20
Echinochloa muricata	Barnyard Grass	90	85	2	0.20
Zizania aquatica	Wild Rice	90	85	2	0.20
Carex vulpinoidea	Fox Sedge	90	85	2	0.20
Polygonum pensylvanicum	Penn. Smartweed	90	85	2	0.20
Sparganium americanum	Eastern Bur Reed	90	85	2	0.20
Scirpus americana	3-Square Bulrush	90	85	0.5	0.05
Scirpus validus	Soft Stem Bulrush	90	85	0.5	0.05
Pontederia cordata	Pickerel Weed	90	85	0.5	0.05
Eleocharis obtusa	Blunt Spike Rush	90	85	0.5	0.05
Carex lurida	Lurid (Shallow) Sedge	90	85	0.5	0.05
Juncus effusus	Soft Rush	90	85	0.5	0.05
Scirpus cyperinus	Wool Grass	90	85	0.5	0.05
Leersia oryzoides	Rice Cutgrass	90	85	0.5	0.05
			Total	100%	10 lbs/ac

"SWAMP RUN" BOTTOMLAND HARDWOOD RIPARIAN COMMUNITY PLANTING SCHEDULE - 7.5 Acres

Key:

	Quantity	Botanical Name	Common Name	Size	Condition	Spacing
Trees:	520	*Taxodium distichum*	Bald Cypress	2-5'	Bare Root	12' Random Spacing
	520	*Nyssa aquatica*	Water Tupelo	2-5'	Bare Root	12' Random Spacing
	315	*Nyssa biflora*	Swamp Black Gum	2-5'	Bare Root	12' Random Spacing
	270	*Quercus phellos*	Willow Oak	2-5'	Bare Root	12' Random Spacing
	265	*Quercus bicolor*	Swamp White Oak	2-5'	Bare Root	12' Random Spacing
	315	*Quercus nigra*	Water Oak	2-5'	Bare Root	12' Random Spacing
Total:	2,205					
Shrubs:	237	*Alnus serrulata*	Tag Alder	1/4" caliper	Bare Root	12' Random Spacing
	236	*Lyonia lucida*	Fetterbush	1/4" caliper	Bare Root	12' Random Spacing
	236	*Itea virginica*	Virginia Sweetspire	1/4" caliper	Bare Root	12' Random Spacing
	236	*Cephalanthus occidentalis*	Buttonbush	1/4" caliper	Bare Root	12' Random Spacing
Total:	945					

RIVERINE WETLAND PLANTING SCHEDULE - 48.4 Acres

Key:

	Quantity	Botanical Name	Common Name	Size	Condition	Spacing
Trees:	2,846	*Taxodium distichum*	Bald Cypress	2-5'	Bare Root	12' Random Spacing
	2,846	*Quercus michauxii*	Swamp Chestnut Oak	2-5'	Bare Root	12' Random Spacing
	2,846	*Nyssa biflora*	Swamp Black Gum	2-5'	Bare Root	12' Random Spacing
	2,846	*Quercus phellos*	Willow Oak	2-5'	Bare Root	12' Random Spacing
	2,846	*Quercus bicolor*	Swamp White Oak	2-5'	Bare Root	12' Random Spacing
Total:	14,230					
Shrubs:	1,015	*Myrica cerifera*	Wax Myrtle	1/4" caliper	Bare Root	12' Random Spacing
	1,025	*Magnolia virginiana*	Sweetbay	1/4" caliper	Bare Root	12' Random Spacing
	1,015	*Vaccinium Corymbosum*	Highbush Blueberry	1/4" caliper	Bare Root	12' Random Spacing
	1,015	*Itea virginica*	Virginia Sweetspire	1/4" caliper	Bare Root	12' Random Spacing
	1,015	*Cephalanthus occidentalis*	Buttonbush	1/4" caliper	Bare Root	12' Random Spacing
	1,015	*Clethra alnifolia*	Sweet Pepperbush	1/4" caliper	Bare Root	12' Random Spacing
Total:	6,100					

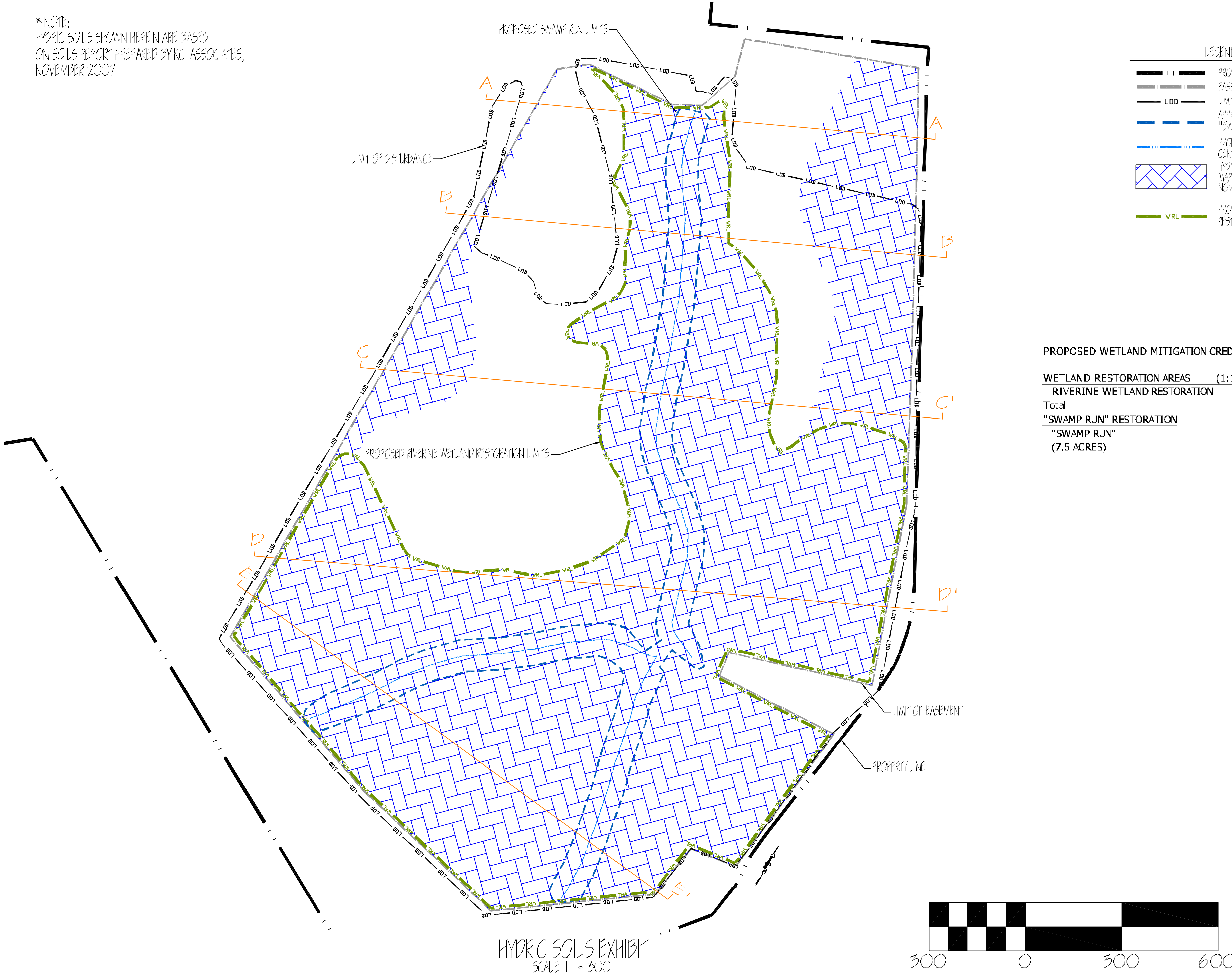
PLANTING DETAILS
APRIL 16, 2008
REVISIONS DATE

POWELL PROPERTY
WETLAND MITIGATION UNITS: 48.4 WMU'S
STREAM MITIGATION UNITS: 3,310 SMU'S
GREENE COUNTY, NORTH CAROLINA

Ecosystem Enhancement PROGRAM

PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION
404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0249 • FAX (252) 357-4832

SHEET P-2



LEGEND

- PROPERTY LINE
- EASEMENT BOUNDARY
- LOD — LIMITS OF DISTURBANCE
- APPROXIMATE "SWAMP RUN" LIMIT
- PROPOSED "SWAMP RUN" CENTERLINE
- HYDRIC SOILS: MAPPED BY KCI ASSOCIATES NOVEMBER 2007
- WRL — PROPOSED RIVERINE WETLAND RESTORATION LIMITS

PROPOSED WETLAND MITIGATION CREDIT SUMMARY

WETLAND RESTORATION AREAS (1:1)	ACREAGE	WMU's
RIVERINE WETLAND RESTORATION	48.4	48.4
Total	48.4	48.4
"SWAMP RUN" RESTORATION	LINEAR FEET	SMU's
"SWAMP RUN" (7.5 ACRES)	3,310	3,310

HYDRIC SOILS EXHIBIT
APRIL 16, 2008

REVISIONS		
DATE:	REVISION:	INITIALS:

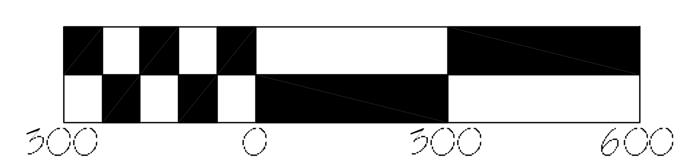
POWELL PROPERTY
WETLAND MITIGATION UNITS: 48.4 WMU'S
STREAM MITIGATION UNITS: 3,310 SMU'S
BERTIE COUNTY, NORTH CAROLINA
EEP CONTRACT #: D06035-B

Ecosystem Enhancement PROGRAM

PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION
STREAM RESTORATION
& WILDLIFE HABITAT CREATION
404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0249 • FAX (252) 357-4682

SHEET H-1

MAN MADE DRAINAGE FEATURES EXHIBIT
SCALE 1" = 300'



LEGEND

- PROPERTY LINE
- EASEMENT BOUNDARY
- LIMITS OF DISTURBANCE (LOD)
- EXISTING GRADE (62.0)
- APPROXIMATE SWAMP RUN LIMIT
- PROPOSED "SWAMP RUN" CENTERLINE
- PROPOSED "SWAMP RUN" CENTERLINE (WRL)
- PROPOSED "SWAMP RUN" RESTORATION
- PROPOSED RIVERINE WETLAND RESTORATION
- DRAINAGE TILE FLOW PATTERN
- EXISTING DRAINAGE DITCH FLOW PATTERN

* NOTE:
DRAINAGE INFORMATION BASED FROM USDA SOIL CONSERVATION SERVICE BERTIE COUNTY NORTH CAROLINA CONSERVATION PLAN MAP # 21890 II, FEBRUARY 3, 1978

MAN MADE DRAINAGE FEATURES
APRIL 16, 2008

REVISIONS		
DATE:	REVISION:	INITIALS:

POWELL PROPERTY
WETLAND MITIGATION UNITS: 48.4 WMU'S
STREAM MITIGATION UNITS: 3,310 SMU'S
BERTIE COUNTY, NORTH CAROLINA
EEP CONTRACT #: 2006-5-9

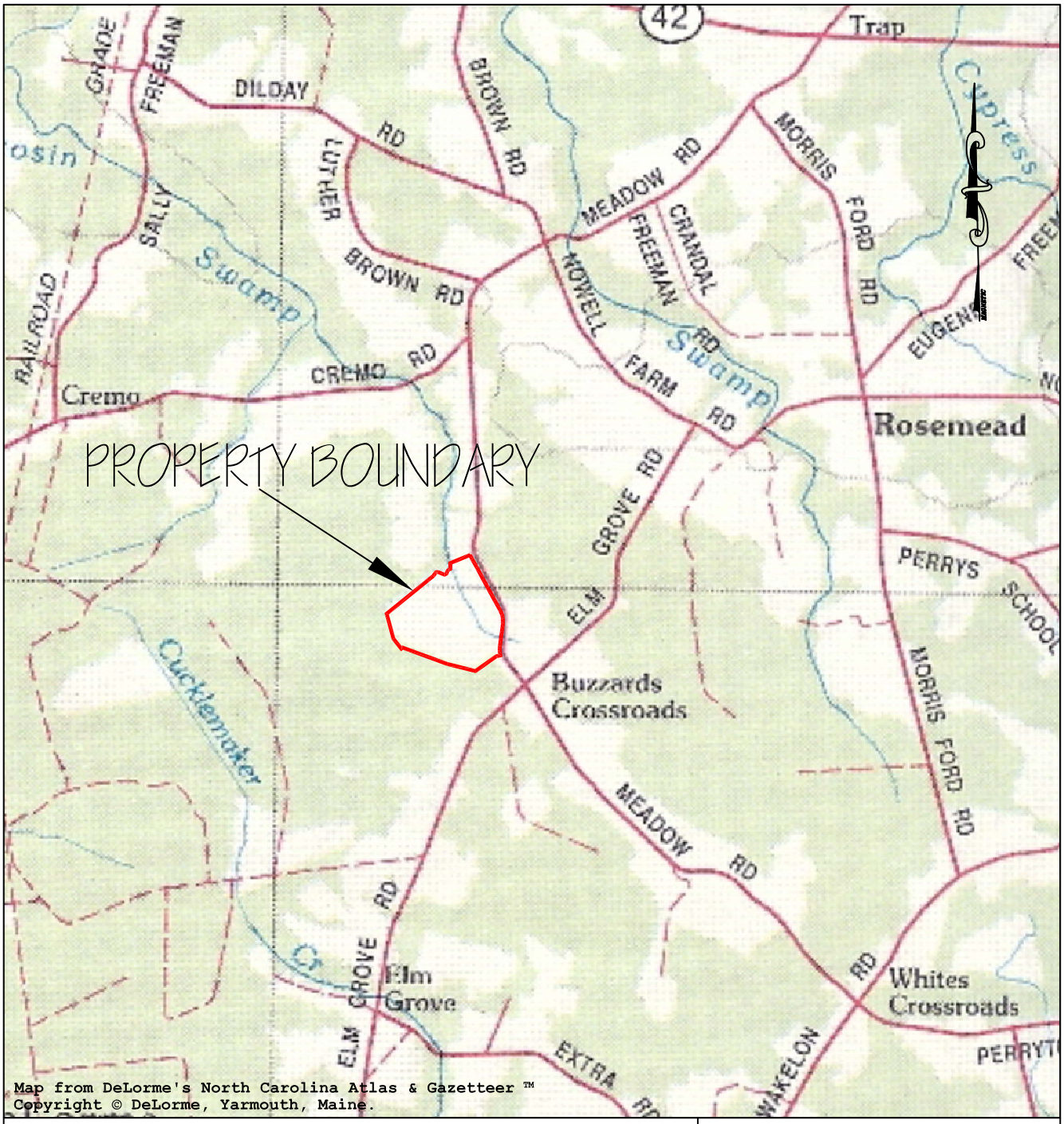
Ecosystem Enhancement PROGRAM

PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION
404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0249 • FAX (252) 357-4862

SHEET OF

APPENDIX A

-Figures-



VICINITY MAP

Scale: 1" = 4000'	4/2008	Drawn By: LMS

PREPARED FOR:

ALBEMARLE RESTORATIONS, LLC

WETLAND RESTORATION,
STREAM RESTORATION,
& WILDLIFE HABITAT CREATION

404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0249 • FAX (252) 357-4892

SCALE

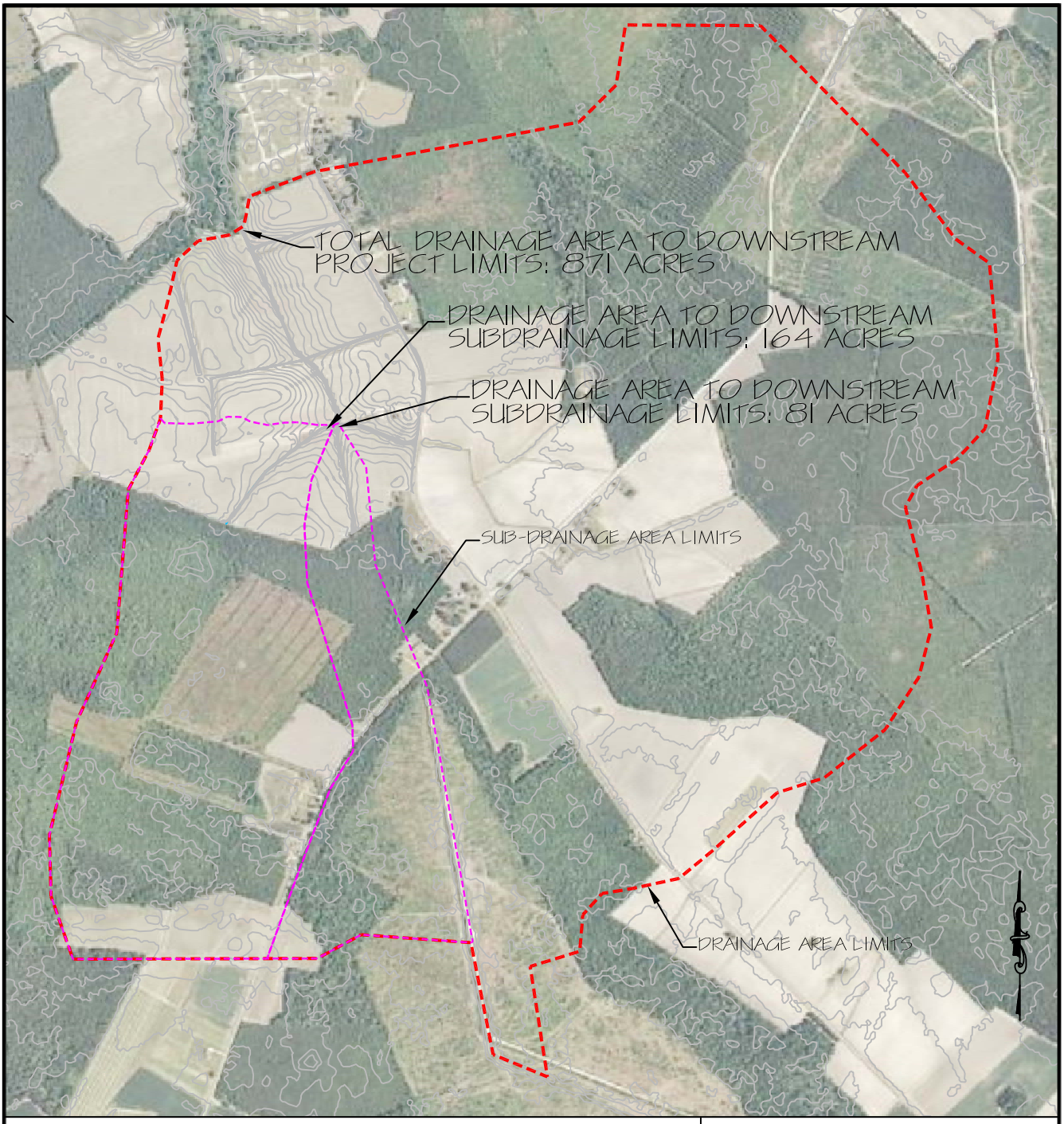
0 4,000' 8,000'

POWELL PROPERTY

RIVERINE WETLAND RESTORATION
48.4 ACRES (48.4 WMU'S)

STREAM RESTORATION
3,310 LINEAR FEET (3,310 SMU'S)

BERTIE COUNTY, NORTH CAROLINA
CONTRACT # 16-D06065-B



DRAINAGE AREA MAP

Scale: 1" = 1,250' | 4/2008 | Drawn By: RBB

PREPARED FOR:

ALBEMARLE RESTORATIONS, LLC

WETLAND RESTORATION,
STREAM RESTORATION,
& WILDLIFE HABITAT CREATION

404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0249 • FAX (252) 357-4892

SCALE

0 1,250' 2,500

POWELL PROPERTY

RIVERINE WETLAND RESTORATION
48.4 ACRES (48.4 WMU'S)

STREAM RESTORATION
3,310 LINEAR FEET (3,310 SMU'S)

BERTIE COUNTY, NORTH CAROLINA
CONTRACT # 16-D06065-B

APPENDIX B

-Supporting Documents-

Recorded Easement
Categorical Exclusion Approval
Farmland Conversion Impact Rating
Historic Preservation
Threatened/Endangered Species
CAMA Jurisdictional Determination

Bertie County--Register of Deeds
Belinda S. White, Register of Deeds
Inst# 17474 Book 863 Page 738
Pgs: 10 01/02/2007 10:10:02am

STATE OF NORTH CAROLINA

CONSERVATION EASEMENT PROVIDED PURSUANT TO FULL DELIVERY MITIGATION CONTRACT

BERTIE COUNTY
SPO File Number 8-ZU
Prepared by: Office of the Attorney General
Property Control Section
Return to: Blane Rice, State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

THIS CONSERVATION EASEMENT DEED, made this 28 day of December, 2006, by Ella S. Powell and Piercy S. Powell, ("**Grantor**"), whose mailing address is 217 US 13 North, Windsor, NC 27983 to the State of North Carolina, ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

WHEREAS, pursuant to the provisions of N.C. Gen. Stat. § 143-214.8 et seq., the State of North Carolina has established the Ecosystem Enhancement Program (formerly known as the Wetlands Restoration Program) within the Department of Environment and Natural Resources for the purposes of acquiring, maintaining, restoring, enhancing, creating and preserving wetland and riparian resources that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

WHEREAS, this Conservation Easement from Grantor to Grantee has been negotiated, arranged and provided far as a condition of a full delivery contract between Albemarle Restorations, LLC, whose mailing address is P.O. Box 204, Gatesville, NC 27938, and the North Carolina Department of Environment and Natural Resources, to provide stream, wetland and/or buffer mitigation pursuant to the North Carolina Department of Environment and Natural Resources Purchase and Services Contract Number D06065-B.

WHEREAS, The State of North Carolina is qualified to be the Grantee of a Conservation Easement pursuant to N.C. Gen. Stat. § 121-35; and

WHEREAS, the Department of Environment and Natural Resources, the North Carolina Department of Transportation and the United States Army Corps of Engineers, Wilmington District entered into a Memorandum of Agreement, (MOA) duly executed by all parties in Greensboro, NC on July 22, 2003. This MOA recognizes that the Ecosystem Enhancement Program is to provide for compensatory mitigation by effective protection of the land, water and natural resources of the State by restoring, enhancing and preserving ecosystem functions; and

WHEREAS, the acceptance of this instrument for and on behalf of the State of North Carolina was granted to the Department of Administration by resolution as approved by the Governor and Council of State adopted at a meeting held in the City of Raleigh, North Carolina, on the 8th day of February 2000; and

WHEREAS, the Ecosystem Enhancement Program in the Department of Environment and Natural Resources, which has been delegated the authority authorized by the Governor and Council of the State to the Department of Administration, has approved acceptance of this instrument; and

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in Colerain Township, Bertie County, North Carolina (the "**Property**"), and being more particularly described as that certain parcel of land containing approximately 369.90 acres and being conveyed to the Grantor by deed as recorded in **Deed Book 483 at Page 193** of the Bertie County Registry, North Carolina; and

WHEREAS, Grantor is willing to grant a Conservation Easement over the herein described areas of the Property, thereby restricting and limiting the use of the included areas of the Property to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept such Conservation Easement. This Conservation Easement shall be for the protection and benefit of the waters of ***Quioccosin Swamp, a tributary of the Chowan River.***

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, forever and in perpetuity, a Conservation Easement of the nature and character and to the extent hereinafter set forth, over a described area of the Property, referred to hereafter as the "**Easement Area**", for the benefit of the people of North Carolina, and being all of the tract of land as identified as the Powell Project as shown on a plat of survey entitled "Conservation Easement Survey for the State of North Carolina Ecosystem Enhancement Program Powell Project" dated October 30, 2006, certified by Curk T. Lane, and **recorded in Plat 1, Cabinet C, Pages 62-63,** Bertie County Registry. The Powell Project being more particularly described as follows:

Commencing at a point, said point being the NCGS Monument "Pump" and having North Carolina grid coordinates of North 895972.6175, East 2603162.2018 and an Elevation of 42.513 feet. Thence from said point a bearing and distance of S10°03'56"W 9772.48 feet to a point. Said point being the NCGS Monument "Moss" and having North Carolina grid coordinates of North 886350.5501, East 2601454.2065 and an Elevation of 59.2125 feet. Thence a bearing and

distance of S80°35'17"E 19455.17 feet to a point. Said point being an iron pipe found and the northeastern corner of the Lawrence Farm Properties tract as recorded in Deed Book 851 Page 695 in the Bertie County, North Carolina Register of Deeds and the southeastern corner of the Ealease P. Myers property as recorded in Deed Book 632 Page 438. Thence a bearing and distance of N61°13'38"W 129.84 feet to a point. Said point being a marked tree with red paint and chops. Said marked tree also shown as a "snag" on a plat entitled "Survey for Lawrence Farm Properties, LLC" dated December 14, 2005 by Roanoke Land Surveying and recorded in Book CAB B Page 715 in the Bertie County Register of Deeds. Thence a bearing and distance of N61°13'38"W 238.29 feet to a point. Said point being an iron pipe found and the northwestern corner of the Lawrence Farm Properties tract as recorded in Deed Book 851 Page 695, the northeastern corner of the Illinois Municipal Retirement Fund property as recorded in Deed Book 712 Page 153 and along a common property line of the Ella S. Powell property as recorded in Deed Book 632 Page 779. Thence leaving the common property line of the Illinois Municipal Retirement Fund and the Ella and Piercy S. Powell property a bearing and distance of N18°43'09"E 1195.67 feet to a point. Said point being an iron pipe set and the **POINT OF BEGINNING**. Thence a bearing and distance of S81°52'57"W 149.81 feet to and iron pipe set. Thence a bearing and distance of S07°19'48"W 178.10 feet to an iron pipe set. Thence a bearing and distance of S54°14'04"W 516.49 feet to an iron pipe set. Thence a bearing and distance of N76°41'18"W 539.69 feet to an iron pipe set. Thence a bearing and distance of N71°00'47"W 638.01 feet to an iron pipe set. Thence a bearing and distance of N00°03'39"W 2037.00 feet to an iron pipe set. Thence a bearing and distance of N51°06'01"E 101.74 feet to an iron pipe set. Thence a bearing and distance of N85°41'34"E 287.79 feet to an iron pipe set. Thence a bearing and distance of N61°54'53"E 93.47 feet to an iron pipe set. Thence a bearing and distance of N18°10'32"E 136.43 feet to an iron pipe set. Thence a bearing and distance of N15°56'50"W 119.30 feet to an iron pipe set. Thence a bearing and distance N69°28'20"E 549.67 feet to an iron pipe set. Thence a bearing and distance of S28°56'45"E 346.76 feet to an iron pipe set. Thence a bearing and distance of S28°24'55"E 494.33 feet to an iron pipe set. Thence a bearing and distance of S28°05'03"E 515.47 feet to an iron pipe set. Thence a bearing and distance of S19°07'39"E 574.13 feet to an iron pipe set. Thence a bearing and distance of S72°58'56"W 456.81 feet to an iron pipe set. Thence a bearing and distance of S08°23'48"E 78.94 feet to an iron pipe set. Thence a bearing and distance of N86°59'06"E 399.81 feet to an iron pipe set. Thence a bearing and distance of S06°44'25"W 513.12 feet to an iron pipe set and the **POINT OF BEGINNING** and containing 90.000 acres according to a plat by True Line Surveying, P.C. entitled "Conservation Easement Survey for The State of North Carolina Ecosystem Enhancement Program, Powell Project" dated October 27, 2006.

Also conveyed herewith a 30' access easement dedicated to the State of North Carolina and more particularly described as follows:

Commencing at a point, said point being the NCGS Monument "Pump" and having North Carolina grid coordinates of North 895972.6175, East 2603162.2018 and an Elevation of 42.513 feet. Thence from said point a bearing and distance of S10°03'56"W 9772.48 feet to a point. Said point being the NCGS Monument "Moss" and having North Carolina grid coordinates of North 886350.5501, East 2601454.2065 and an Elevation of 59.2125 feet. Thence a bearing and distance of S80°35'17"E 19455.17 feet to a point. Said point being an iron pipe found and the northeastern corner of the Lawrence Farm Properties tract as recorded in Deed Book 851 Page 695 in the Bertie County, North Carolina Register of Deeds and the southeastern corner of the Ealease P. Myers property as recorded in Deed Book 632 Page 438. Thence a bearing and

distance of N61°13'38"W 129.84 feet to a point. Said point being a marked tree with red paint and chops. Said marked tree also shown as a "snag" on a plat entitled "Survey for Lawrence Farm Properties, LLC" dated December 14, 2005 by Roanoke Land Surveying and recorded in Book CAB B Page 715 in the Bertie County Register of Deeds. Thence a bearing and distance of N61°13'38"W 238.29 feet to a point. Said point being an iron pipe found and the northwestern corner of the Lawrence Farm Properties tract as recorded in Deed Book 851 Page 695, the northeastern corner of the Illinois Municipal Retirement Fund property as recorded in Deed Book 712 Page 153 and along a common property line of the Ella and Piercy S. Powell property as recorded in Deed Book 632 Page 779. Thence leaving the common property line of the Illinois Municipal Retirement Fund and the Ella and Piercy S. Powell property a bearing and distance of N18°43'09"E 1195.67 feet to an iron pipe set. Thence a bearing and distance of N06°44'25"E 513.12 feet to an iron pipe set. Thence a bearing and distance of N33°18'49"E 55.68 feet to a point and the **POINT OF BEGINNING**. Said point also being located along the western right-of-way of Elm Grove Road, SR 1307. Thence leaving the right-of-way of Elm Grove Road a bearing and distance of N74°14'31"W 88.13 to a point. Thence a bearing and distance of N77°17'51"W 94.36 feet to a point. Thence a bearing and distance of S89°31'57"W 51.80 feet to a point. Thence a bearing and distance of S72°58'56"W 217.80 feet to a point. Thence a bearing and distance of N08°23'48"W 30.34 feet to an iron pipe set. Thence a bearing and distance of N72°58'56"E 217.62 feet to a point. Thence a bearing and distance of N8931'57"E 59.62 feet to a point. Thence a bearing and distance of S77°17'51"E 98.62 feet to a point. Thence a bearing and distance of S74°14'31"E 85.03 feet to a point. Said point also being located on the western right-of-way of Elm Grove Road. Thence along the western right-of-way of Elm Grove Road a bearing and distance of S08°21'01"W 30.25 feet to a point and the **POINT OF BEGINNING** and containing 0.314 acres according to a plat by True Line Surveying, P.C. entitled "Conservation Easement Survey for The State of North Carolina Ecosystem Enhancement Program, Powell Project" dated October 27, 2006.

The purposes of this Conservation Easement are to maintain, restore, enhance, create and preserve wetland and/or riparian resources in the Easement Area that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; to maintain permanently the Easement Area in its natural condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

I. DURATION OF EASEMENT

This Conservation Easement shall be perpetual. It is an easement in gross, runs with the land, and is enforceable by Grantee against Grantor, their personal representatives, heirs, successors, and assigns, lessees, agents, and licensees.

II. GRANTOR RESERVED USES AND RESTRICTED ACTIVITES

The Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Easement Area by the Grantor is prohibited as inconsistent with the purposes of this Conservation Easement. Any rights not expressly

reserved hereunder by the Grantor have been acquired by the Grantee. The following specific uses are prohibited, restricted, or reserved as indicated:

A. **Recreational Uses.** Grantor expressly reserves the right to undeveloped recreational uses, including hiking, bird watching, hunting and fishing, and access to the Easement Area for the purposes thereof. Usage of motorized vehicles in the Easement Area is prohibited, except as they are used exclusively for management, maintenance, or stewardship purposes, and on existing trails, paths or roads.

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

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

D. **Industrial, Residential and Commercial Uses.** All are prohibited in the Easement Area.

E. **Agricultural Use.** All agricultural uses within the Easement Area including any use for cropland, waste lagoons, or pastureland are prohibited.

F. **New Construction.** There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Easement Area.

G. **Roads and Trails.** There shall be no construction of roads, trails, walkways, or paving in the Easement Area. Existing roads or trails located in the Easement Area may be maintained by Grantor in order to minimize runoff, sedimentation and for access to the interior of the Property for management, maintenance, stewardship purposes, or undeveloped recreational and educational uses of the Easement Area. Existing roads, trails or paths may be maintained with loose gravel or permanent vegetation to stabilize or cover the surfaces.

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

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

J. **Grading, Mineral Use, Excavation, Dredging.** There shall be no grading, filling, excavation, dredging, mining, or drilling; no removal of topsoil, sand, gravel, rock, peat, minerals, or other materials.

K. **Water Quality and Drainage Patterns.** There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides is prohibited. In the event of an emergency interruption or shortage of all other water sources, water from within the Easement Area may temporarily be used for good cause shown as needed for the survival of livestock and agricultural production.

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

M. **Development Rights.** All development rights are removed from the Easement Area and shall not be transferred.

N. **Disturbance of Natural Features**. Any change, disturbance, alteration or impairment of the natural features of the Easement Area or any intentional introduction of non-native plants, trees and/or animal species by Grantor is prohibited.

The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is consistent with the purposes of this Conservation Easement. The Grantor shall not vary from the above restrictions without first obtaining written approval from the N.C. Ecosystem Enhancement Program, whose mailing address is 1652 Mail Services Center, Raleigh, NC 27699-1652.

III. GRANTEE RESERVED USES

A. **Ingress, Egress, Regress and Inspection.** The Grantee, its employees and agents, successors and assigns, receive the perpetual right of general ingress, egress, and regress to the Easement Area over the Property at reasonable times to undertake any activities to restore, manage, maintain, enhance, and monitor the wetland and riparian resources of the Easement Area, in accordance with restoration activities or a long-term management plan. Unless otherwise specifically set forth in this Conservation Easement, the rights granted herein do not include or establish for the public any access rights.

B. **Restoration Activities.** These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade,

fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

IV. ENFORCEMENT AND REMEDIES

A. **Enforcement.** To accomplish the purposes of this Conservation Easement, Grantee is allowed to prevent any activity within the Easement Area that is inconsistent with the purposes of this Easement and to require the restoration of such areas or features of the Easement Area that may have been damaged by such activity or use. Upon any breach of the terms of this Conservation Easement by Grantor, their successors or assigns, that comes to the attention of the Grantee, the Grantee shall, except as provided below, notify the Grantor, their successors or assigns in writing of such breach. The Grantor shall have ninety (90) days after receipt of such notice to correct the conditions constituting such breach. If the breach remains uncured after ninety (90) days, the Grantee may enforce this Conservation Easement by appropriate legal proceedings including damages, injunctive and other relief. The Grantee shall also have the power and authority, consistent with its statutory authority: (a) to prevent any impairment of the Easement Area by acts which may be unlawful or in violation of this Conservation Easement; (b) to otherwise preserve or protect its interest in the Property; or (c) to seek damages from any appropriate person or entity. Notwithstanding the foregoing, the Grantee reserves the immediate right, without notice, to obtain a temporary restraining order, injunctive or other appropriate relief if the breach of the term of this Conservation Easement is or would irreversibly or otherwise materially impair the benefits to be derived from this Conservation Easement. The Grantor and Grantee acknowledge that under such circumstances damage to the Grantee would be irreparable and remedies at law will be inadequate. The rights and remedies of the Grantee provided hereunder shall be in addition to, and not in lieu of, all other rights and remedies available to Grantee in connection with this Conservation Easement.

B. **Inspection.** The Grantee, its employees and agents, successors and assigns, have the right, with reasonable notice, to enter the Easement Area over the Property at reasonable times for the purpose of inspection to determine whether the Grantor, their successors or assigns are complying with the terms, conditions and restrictions of this Conservation Easement.

C. **Acts Beyond Grantor's Control.** Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor, their successors or assigns, for any injury or change in the Easement Area caused by third parties, resulting from causes beyond the Grantor's control, including, without limitation, fire, flood, storm, and earth movement, or from any prudent action taken in good faith by the Grantor under emergency conditions to prevent, abate, or mitigate significant injury to life, damage to property or harm to the Property resulting from such causes.

D. **Costs of Enforcement.** Beyond regular and typical monitoring, any costs incurred by Grantee in enforcing the terms of this Conservation Easement against Grantor, their successors or assigns, including, without limitation, any costs of restoration necessitated by Grantor's acts or omissions in violation of the terms of this Conservation Easement, shall be borne by Grantor.

E. **No Waiver.** Enforcement of this Easement shall be at the discretion of the Grantee and any forbearance, delay or omission by Grantee to exercise its rights hereunder in the event of any breach of any term set forth herein shall not be construed to be a waiver by Grantee.

V. MISCELLANEOUS

A. This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be invalid, the remainder of the provisions of the Conservation Easement, and the application of such provision to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

B. Any notices shall be sent by registered or certified mail, return receipt requested to the parties at their addresses shown above or to other address(es) as either party establishes in writing upon notification to the other.

C. Grantor shall notify Grantee in writing of the name and address and any party to whom the Property or any part thereof is to be transferred at or prior to the time said transfer is made. Grantor further agrees to make any subsequent lease, deed, or other legal instrument by which any interest in the Property is conveyed subject to the Conservation Easement herein created.

D. The Grantor and Grantee agree that the terms of this Conservation Easement shall survive any merger of the fee and easement interests in the Property or any portion thereof.

E. This Conservation Easement may be amended, but only in a writing signed by all parties hereto, and provided such amendment does not affect the qualification of this Conservation Easement or the status of the Grantee under any applicable laws, and is consistent with the purposes of the Conservation Easement.

F. The parties recognize and agree that the benefits of this Conservation Easement are in gross and assignable provided, however, that the Grantee hereby covenants and agrees, that in the event it transfers or assigns this Conservation Easement, the organization receiving the interest will be a qualified holder under N.C. Gen. Stat. § 121-34 et seq. and § 170(h) of the Internal Revenue Code, and the Grantee further covenants and agrees that the terms of the transfer or assignment will be such that the transferee or assignee will be required to continue in perpetuity the conservation purposes described in this document.

VI. QUIET ENJOYMENT

Grantor reserves all remaining rights accruing from ownership of the Property, including the right to engage in or permit or invite others to engage in only those uses of the Easement Area that are expressly reserved herein, not prohibited or restricted herein, and are not inconsistent with the purposes of this Conservation Easement. Without limiting the generality of the foregoing, the Grantor expressly reserves to the Grantor, and the Grantor's invitees and

licensees, the right of access to the Easement Area, and the right of quiet enjoyment of the Easement Area.

TO HAVE AND TO HOLD the said rights and easements perpetually unto the State of North Carolina for the aforesaid purposes.

AND Grantor covenants that Grantor is seized of said premises in fee and has the right to convey the permanent Conservation Easement herein granted; that the same are free from encumbrances and that Grantor will warrant and defend title to the same against the claims of all persons whomsoever.

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

Ella S. Powell (SEAL)
Ella S. Powell

Piercy S. Powell (SEAL)
Piercy S. Powell

NORTH CAROLINA

COUNTY OF Bertie

I, Alice B. Taylor, a Notary Public in and for the County and State aforesaid, do hereby certify that Ella S. Powell, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the 28th day of December, 2006

Alice B. Taylor
Notary Public

My commission expires:
September 27, 2010

ALICE B. TAYLOE NOTARY PUBLIC BERTIE COUNTY, N. C.

NORTH CAROLINA

COUNTY OF Bertie

I, Alice B. Taylor, a Notary Public in and for the County and State aforesaid, do hereby certify that Piercy S. Powell, Grantor, personally appeared before me this day and acknowledged the execution of the foregoing instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and Notary Seal this the 28th day of December, 2006.

Alice B. Taylor
Notary Public

My commission expires:
September 27, 2010

ALICE B. TAYLOE NOTARY PUBLIC BERTIE COUNTY, N. C.

Albemarle Restorations, LLC

Wetland Restoration
Stream Restoration
Wildlife Habitat

October 3, 2006

Mr. Donnie Brew
Federal Highway Administration -- NC Division
310 New Bern Avenue
Suite 410
Raleigh 27601-1418

RE: EEP Contract D06065-B
Powell Property Wetland Restoration, Bertie County, NC

Dear Mr. Brew:

Enclosed please find a completed Categorical Exclusion form for the above referenced contract and project. The project consists of the restoration of 86 acres of prior converted cropland to bottomland hardwood wetlands. Also enclosed are all required supporting documentation required as part of the Categorical Exclusion process. As instructed we have enclosed only the first few pages of the Phase I Environmental Assessment (40 or so pages total) per your request. If you would like a complete copy of the Phase I, we would be happy to forward one. Please call or e-mail me at (410) 692-7500 or smcgill@ecotoneinc.com if you have any questions or comments related to this matter.

Sincerely,

Ecotone, Inc.

Scott McGill
Principal

Cc: Mr Guy Pearce, NC EEP Project Manager

P.O. BOX 204
GATESVILLE, NC 27938
PHONE (252)333-0249
FAX (252)357-4892

Appendix A

Categorical Exclusion Form for Ecosystem Enhancement Program Projects Version 1.3

Note: Only Appendix A should to be submitted (along with any supporting documentation) as the environmental document.

Part 1: General Project Information	
Project Name:	Powell Property
County Name:	Bertie
EEP Number:	D06065-B
Project Sponsor:	Albemarle Restorations, LLC.
Project Contact Name:	Ed Temple
Project Contact Address:	P.O. Box 204 Gatesville, NC 27938
Project Contact E-mail:	edtemple@vol.com
EEP Project Manager:	Guy Pearce
Project Description	

For Official Use Only

Reviewed By:

Date — **EEP Project Manager**

Conditional Approved By:

Date — **For Division Administrator FHWA**

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

Final Approval By:

10-13-06 — Donald R Ryan

Date — **For Division Administrator FHWA**

Part 2: All Projects Regulation/Question	Response
Coastal Zone Management Act (CZMA)	
1. Is the project located in a CAMA county?	☒ Yes ☐ No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?	☐ Yes ☒ No ☐ N/A
3. Has a CAMA permit been secured?	☐ Yes ☐ No ☒ N/A
4. Has NCDCM agreed that the project is consistent with the NC Coastal Management Program?	☒ Yes ☐ No ☐ N/A
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	
1. Is this a "full-delivery" project?	☒ Yes ☐ No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?	☐ Yes ☒ No ☐ N/A
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☒ No ☐ N/A
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	☐ Yes ☐ No ☒ N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?	☐ Yes ☐ No ☒ N/A
6. Is there an approved hazardous mitigation plan?	☐ Yes ☐ No ☒ N/A
National Historic Preservation Act (Section 106)	
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?	☐ Yes ☒ No
2. Does the project affect such properties and does the SHPO/THPO concur?	☐ Yes ☐ No ☒ N/A
3. If the effects are adverse, have they been resolved?	☐ Yes ☐ No ☒ N/A
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)	
1. Is this a "full-delivery" project?	☒ Yes ☐ No
2. Does the project require the acquisition of real estate?	☒ Yes ☐ No ☐ N/A
3. Was the property acquisition completed prior to the intent to use federal funds?	☐ Yes ☒ No ☐ N/A
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?	☒ Yes ☐ No ☐ N/A

Part 3: Ground-Disturbing Activities Regulation/Question	Response
American Indian Religious Freedom Act (AIRFA)	
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?	☐ Yes ☒ No
2. Is the site of religious importance to American Indians?	☐ Yes ☐ No ☒ N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?	☐ Yes ☐ No ☒ N/A
4. Have the effects of the project on this site been considered?	☐ Yes ☐ No ☒ N/A
Antiquities Act (AA)	
1. Is the project located on Federal lands?	☐ Yes ☒ No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?	☐ Yes ☐ No ☒ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☒ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☒ N/A
Archaeological Resources Protection Act (ARPA)	
1. Is the project located on federal or Indian lands (reservation)?	☐ Yes ☒ No
2. Will there be a loss or destruction of archaeological resources?	☐ Yes ☐ No ☒ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☒ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☒ N/A
Endangered Species Act (ESA)	
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	☒ Yes ☐ No
2. Is Designated Critical Habitat or suitable habitat present for listed species?	☐ Yes ☒ No ☐ N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?	☐ Yes ☐ No ☒ N/A
4. Is the project "likely to adversely affect" the specie and/or "likely to adversely modify" Designated Critical Habitat?	☐ Yes ☐ No ☒ N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?	☐ Yes ☐ No ☒ N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	☐ Yes ☐ No ☒ N/A

Executive Order 13007 (Indian Sacred Sites)	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	☐ Yes ☒ No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	☐ Yes ☐ No ☒ N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	☐ Yes ☐ No ☒ N/A
Farmland Protection Policy Act (FPPA)	
1. Will farmland be converted?	☒ Yes ☐ No
2. Has NRCS determined that the project contains prime, unique, statewide or local important farmland?	☒ Yes ☐ No ☐ N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	☒ Yes ☐ No ☐ N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	☒ Yes ☐ No
2. Have the USFWS and the NCWRC been consulted?	☒ Yes ☐ No ☐ N/A
Land and Water Conservation Fund Act (Section 6(f))	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	☐ Yes ☒ No
2. Has the NPS approved of the conversion?	☐ Yes ☐ No ☒ N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	☐ Yes ☒ No
2. Is suitable habitat present for EFH-protected species?	☐ Yes ☐ No ☒ N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	☐ Yes ☐ No ☒ N/A
4. Will the project adversely affect EFH?	☐ Yes ☐ No ☒ N/A
5. Has consultation with NOAA-Fisheries occurred?	☐ Yes ☐ No ☒ N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	☐ Yes ☒ No
2. Have the USFWS recommendations been incorporated?	☐ Yes ☐ No ☒ N/A
Wilderness Act	
1. Is the project in a Wilderness area?	☐ Yes ☒ No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	☐ Yes ☐ No ☒ N/A

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 8/3/06
Name Of Project Powell Project	Federal Agency Involved Federal Highway Administration
Proposed Land Use Stream & Wetland Mitigation	County And State Bertie County, NC
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 8-3-06

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).* Yes ☒ No ☐		Acres Irrigated NONE	Average Farm Size 432 (2002 census)
Major Crop(s) CORN	Farmable Land In Govt. Jurisdiction Acres: 340,840 % 72.3	Amount Of Farmland As Defined in FPPA Acres: 316,455 % 67.1	
Name Of Land Evaluation System Used Bertie LE	Name Of Local Site Assessment System NONE	Date Land Evaluation Returned By NRCS 9-1-06 JAS	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	76			
B. Total Acres To Be Converted Indirectly	59			
C. Total Acres In Site	135	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	135			
B. Total Acres Statewide And Local Important Farmland	0			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	<.01			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	38.6			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	93.3	0	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use		14			
2. Perimeter In Nonurban Use		9			
3. Percent Of Site Being Farmed		20			
4. Protection Provided By State And Local Government		0			
5. Distance From Urban Builtup Area		15			
6. Distance To Urban Support Services		10			
7. Size Of Present Farm Unit Compared To Average		0			
8. Creation Of Nonfarmable Farmland		10			
9. Availability Of Farm Support Services		5			
10. On-Farm Investments		14			
11. Effects Of Conversion On Farm Support Services		0			
12. Compatibility With Existing Agricultural Use		0			
TOTAL SITE ASSESSMENT POINTS	160	97	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	93.3	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	97.0	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	190.3	0	0	0

Site Selected: YES	Date Of Selection 9/25/06	Was A Local Site Assessment Used? Yes ☐ No ☒

Reason For Selection:

This site was selected over several alternative sites by the NCDENR, Ecosystem Enhancement Program (EEP) because of its location w/in a targeted watershed, likelihood of success (design) and cost: benefit ratio (budget).

(See Instructions on reverse side)

Form was electronically produced by National Production Services Staff

Form AD-1006 (10-83)

North Carolina Department of Cultural Resources

State Historic Preservation Office

Peter B. Sandbeck, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

August 17, 2006

Curt Hall
Ecotone, Inc.
P.O. Box 5
1204 Baldwin Mill Road
Jarrettsville, Maryland 21084

Re: Request for Historical Review Statement-Powell Property, Bertie County, ER 06-2134

Dear Mr. Hall:

Thank you for your letter of July 31, 2006. We have reviewed the information provided in the document and offer the following comments.

There are no known archaeological sites within the proposed project area. Based on our knowledge of the area, it is unlikely that any archaeological resources that may be eligible for inclusion in the National Register of Historic Places will be affected by the project. We, therefore, recommend that no archaeological investigation be conducted in connection with this project.

We have determined that the project as proposed will not affect any historic structures.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comments, please contact Renee Gledhill-Earley, environmental review coordinator, at 919-733-4763. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

Renee Gledhill-Earley

Peter Sandbeck

	Location	Mailing Address	Telephone/Fax
ADMINISTRATION	507 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-4763/733-8653
RESTORATION	515 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6547/715-4801
SURVEY & PLANNING	515 N. Blount Street, Raleigh, NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6545/715-4801

Albemarle Restorations, LLC

Wetland Restoration
Stream Restoration
Wildlife Habitat

August 3, 2006

Ms. Maria Tripp
North Carolina Wildlife Resources Commission
943 Washington Square Mall
Washington, NC 27889

Dear Ms. Tripp,

I am writing to request a project review for coordination under the Fish and Wildlife Coordination Act and the Migratory Bird Treaty Act. We are constructing a wetland and stream restoration project under the North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program (EEP) in Bertie County, North Carolina.

The project site consists of 135 acres of prior-converted (PC) and upland cropland that are drained by several field ditches that flow into Quioccosin Swamp, a tributary of the Chowan River and Albemarle Sound. The restoration project will consist of plugging drainage ditches, minor land grading to restore natural topography, reforestation using bottomland hardwoods, and constructing a low-level berm around the project to contain flooding on site. If successful, this site will increase migratory bird habitat, improve water quality, and enhance anadromous fish and shellfish habitat downstream.

To assist in your review, I have enclosed a location map and an aerial photo showing the project site. If you have any questions or comments, please do not hesitate to contact me at 252-333-0249. Thank you for your time and attention to this matter.

Sincerely,

Edmund R. Temple, Jr.
Project Manager

404 COURT STREET
GATESVILLE, NC 27938
PHONE (252)333-0249

Albemarle Restorations, LLC

COPY

Wetland Restoration
Stream Restoration
Wildlife Habitat

August 3, 2006

Mr. Peter Benjamin, Office Supervisor
U.S. Fish and Wildlife Service
Ecological Services Office
P.O. Box 33726
Raleigh, NC 27636

Dear Mr. Benjamin,

I am writing to request a project review for coordination under the Endangered Species Act, the Fish and Wildlife Coordination Act, and the Migratory Bird Treaty Act. We are constructing a wetland and stream restoration project under the North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program (EEP) in Bertie County, North Carolina. A review of the county's Threatened and Endangered Species list shows 1 threatened and 2 endangered species, of which none of these species, nor their habitats, are currently found on the project site.

The project site consists of 135 acres of prior-converted (PC) and upland cropland that are drained by several field ditches that flow into Quioccosin Swamp, a tributary of the Chowan River and Albemarle Sound. The restoration project will consist of plugging drainage ditches, minor land grading to restore natural topography, reforestation using bottomland hardwoods, and constructing a low-level berm around the project to contain flooding on site. If successful, this site will increase migratory bird habitat, improve water quality, and enhance anadromous fish and shellfish habitat downstream.

To assist in your review, I have enclosed a location map and an aerial photo showing the project site. If you have any questions or comments, please do not hesitate to contact me at 252-333-0249. Thank you for your time and attention to this matter.

Sincerely,

Edmund R. Temple, Jr.
Project Manager

404 COURT STREET
GATESVILLE, NC 27938
PHONE (252)333-0249

North Carolina Department of Environment and Natural Resources
Division of Coastal Management
Michael F. Easley, Governor **Charles S. Jones, Director** William G. Ross, Jr., Secretary

6 September 2006

Mr. Ed Temple
P.O. Box 204
Gatesville, North Carolina 27938

Dear Mr. Temple:

This letter is in reference to your request for a jurisdictional determination for the purpose of restoring approximately 3,310 feet of stream and 70 acres of riverine wetlands on existing cropland located off SR 1312 near Askewville, Bertie County. The project is known as the Powell Stream and Restoration project. I have reviewed in-house jurisdictional determination references and been on-site to determine if permits for development are required per the Coastal Area Management Act or the State's Dredge and Fill Law.

From my review of the proposed location of the project I have determined that the project will not occur within an Area of Environmental Concern as designated by the Coastal Resources Commission. Therefore, no permits are required from this Division for stream channel and wetland restoration at this location.

I appreciate your concern and effort to comply with the permit requirements of this Division and encourage you to continue to consult representatives of this Division for future questions regarding CAMA jurisdiction. Thank you for your time and concern in these matters. If you have any questions, please do not hesitate to contact me at (252) 948-3853.

Sincerely,

R. Kelly Spivey
Coastal Management Representative

cc: Terry E. Moore- District Manager, Washington Office, DCM
Raleigh Bland – U.S. Army Corps of Engineers, Washington Office

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

APPENDIX C

-Photographs and Reference Wetland Supporting Documents-

Appendix C: Typical Views of th ePowell Property
July 2006

Photo 1: **Main stem flowing toward Quioccosin Swamp**.

Photo 2: **Main stem, facing away from Quioccosin Swamp.**

Appendix C: Typical Views of th ePowell Property
July 2006

Photo 3: Tributary of main stem, facing away from Quioccosin Swamp.

Photo 4: Confluence of tributaries and main stem, facing Quioccosin Swamp.

Appendix C: Reference Wetland Site Photographs
Approximately 135 feet north west of project area.
January 2008

Photo 1: Typical View of Swamp Run in Reference Wetland.

Photo 2: Typical View of Reference Wetland

Appendix C: Reference Wetland Site Photographs
Approximately 135 feet north west of project area.
January 2008

Photo 3: Typical View of Soils on Reference Site

Photo 4: Typical View of Soils on Reference Site

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project Site:	Powell Reference Site	Date:	1/28/2008
Applicant/Owner:		County:	Bertie
Investigator:	ET	State:	North Carolina

			Community ID:	
Do Normal Circumstances exist on the site?	☒ Yes	☐ No		
Is the site significantly disturbed (Atypical Situation)?	☐ Yes	☒ No	Transect ID:	
Is Area a Potential Problem Area? *(if needed, explain on reverse)*	☐ Yes	☒ No	Plot ID:	

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	*Quercus phellos*	Tree	FACW-	8	*Arundinaria gigantea*	Shrub	FACW
2	*Quercus nigra*	Tree	FAC	9	*Magnolia virginiana*	Shrub	FACW+
3	*Acer rubrum*	Tree	FAC	10			
4	*Liquidambar styraciflua*	Tree	FAC+	11			
5	*Nyssa sylvatica*	Tree	FAC	12			
6	*Pinus taeda*	Tree	FAC	13			
7	*Smilax rotundifolia*	Shrub	FAC	14			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100%

Remarks:

HYDROLOGY

☐ Recorded Data (describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

X No recorded data available

Field Observations:
- Depth of Surface Water: 0 (In.)
- Depth to Free Water in Pit: 14 (In.)
- Depth to Saturated Soil: 6 (In.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patters in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in Upper 12"
- ☒ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (explain in remarks)

Remarks:

SOILS

Map Unit Name (Series and Phase):
Taxonomy (Subgroup):

Drainage Class:
Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10YR 2/1			Sandy Loam
12-20	Btg	10YR 4/1			Sandy Clay Loam
20-24	Btg2	10Yr 4/1	10YR 5-6, 10YR 7/1	few	Sandy Clay Loam

Hydric Soil Indicators:
- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquatic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ Organic Streaking in Sandy Soils
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Listed on National Hydric Soils List
- ☐ Listed on Local Hydric Soils List
- ☐ Other (explain in remarks)

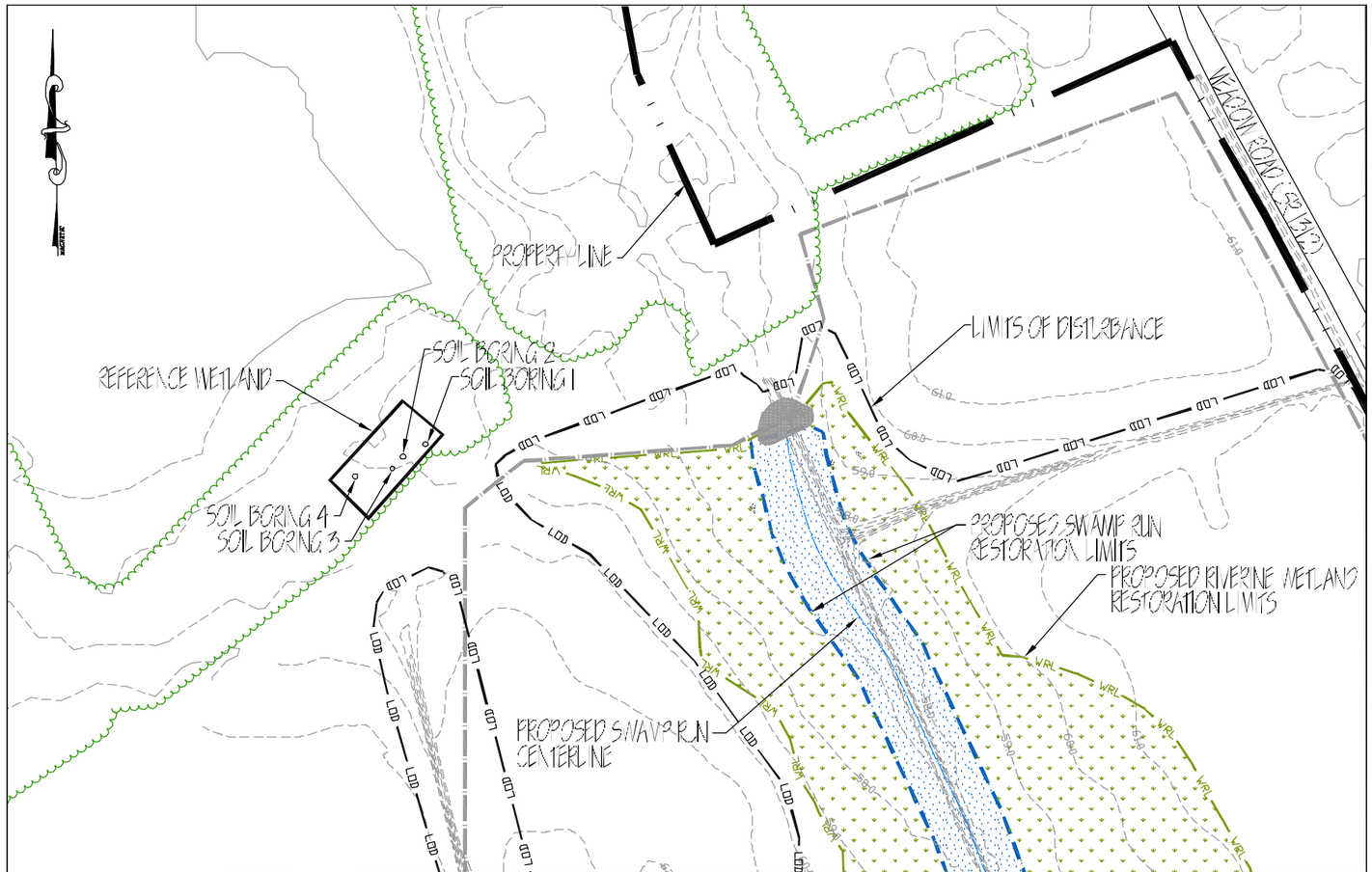
Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ Yes	☐ No	Is this Sampling Point Within a Wetland?	☒ Yes ☐ No
Wetland Hydrology Present?	☒ Yes	☐ No		
Hydric Soils Present?	☒ Yes	☐ No		

Remarks:

Form Content Approved by HQUSACE 3/92



PREPARED FOR: ALBEMARLE RESTORATIONS, LLC WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION 404 COURT STREET GATESVILLE, NC 27938 (252) 333-0248 FAX (252) 357-4652	POWELL PROPERTY RIVERINE WETLAND MITIGATION: 46.4 ACRES SWAMP RESTORATION: 5,280 LINEAR FEET PERSON COUNTY, NORTH CAROLINA CONTRACT #: 2008065-5	POWELL REFERENCE WETLAND SOIL BORING SITE MAP	SCALE 0' 200' 400' 4/ 2008 | DRAWN BY: CHT

Soil Profile Descriptions Powell Project Reference Wetland Site Bertie County, NC

Boring 1:

A - 0-12 inches; black (10 YR 2/1) sandy loam; weak medium granular structure; friable.
Btg - 12-20 inches; dark gray (10YR4/1) sandy clay loam: weak moderate subangular blocky structure; slightly sticky; slightly plastic.
Btg2 - 20-24 inches; dark gray (10YR4/1) sandy clay loam; few light gray (10YR 7/1) and yellowish brown (10YR 5/6 mottles); weak moderate subangular blocky structure; slightly sticky; slightly plastic.

Boring 2:

A - 0-12 inches; black (10 YR 2/1) sandy loam; weak medium granular structure; friable.
Btg - 12-24 inches; gray (10YR6/1) sandy loam; weak medium granular structure; friable.

Boring 3:

A - 0-20 inches; black (10 YR 2/1) loam; weak fine granular structure; friable.
Btg – 20-24 inches; gray (10YR6/1) sandy clay loam: weak moderate subangular blocky structure; slightly sticky; slightly plastic.

Boring 4:

A - 0-17 inches; black (10 YR 2/1) sandy loam; weak medium granular structure; friable.
Btg - 17-24 inches; gray (10YR6/1) sandy clay loam; few faint yellowish brown (10YR 5/8) mottles; weak moderate subangular blocky structure; slightly sticky; slightly plastic.

APPENDIX D

-Hydraulic Analysis-

FLOOD STUDY

for

POWELL SITE WETLAND MITIGATION AREA

BERTIE COUNTY, NORTH CAROLINA

May 1, 2008

Prepared by:
State Line Engineering, LLC
4901 Picker Drive
Pylesville, Maryland 21132

INTRODUCTION

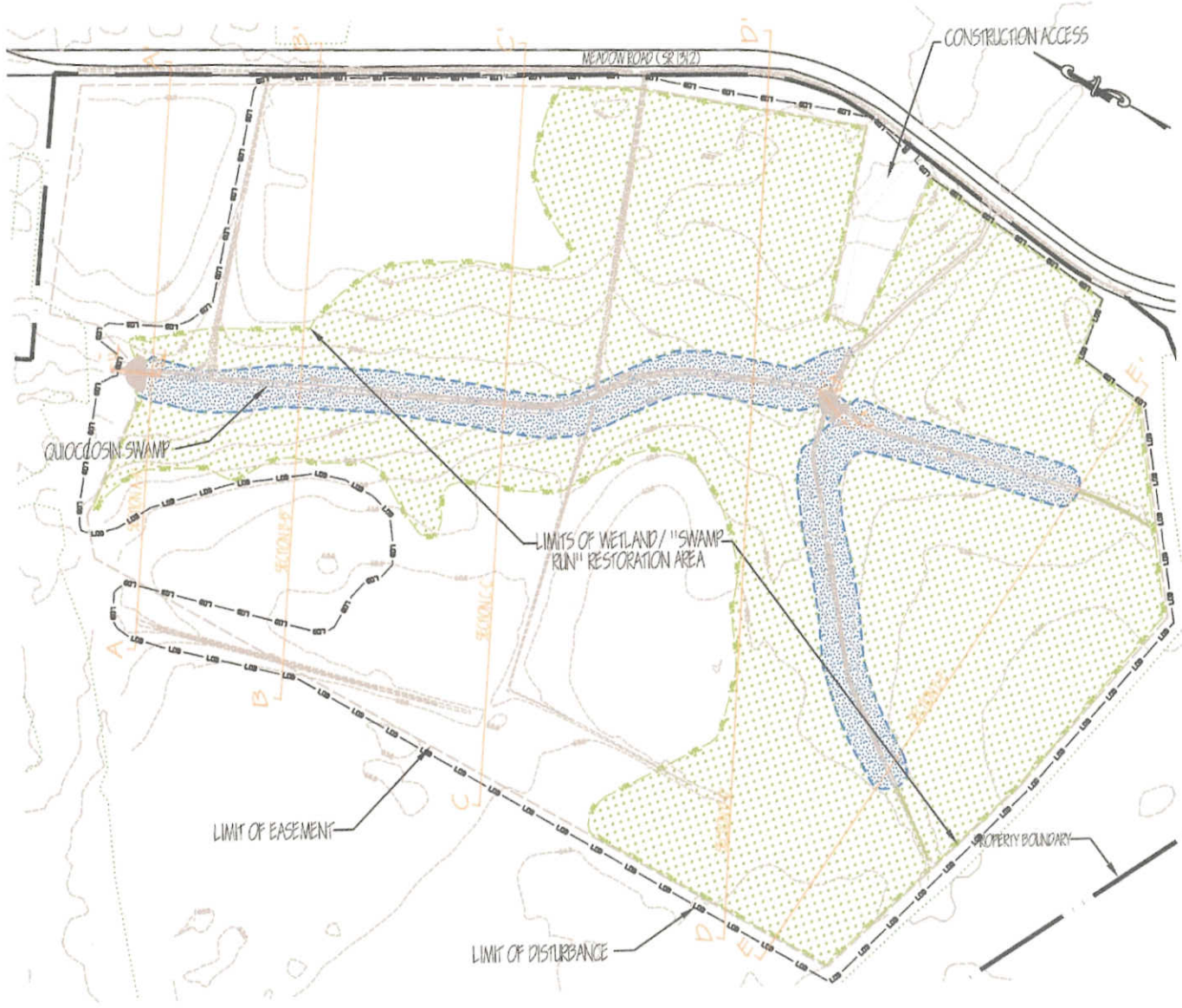
The subject site is located in Bertie County on the west side of State Route 1312w (Meadow Road). The study area is located on the southwest portion of the Powell property. The purpose of this study is to determine the 5-year flood elevation within the proposed riverine wetlands.

METHODOLOGY

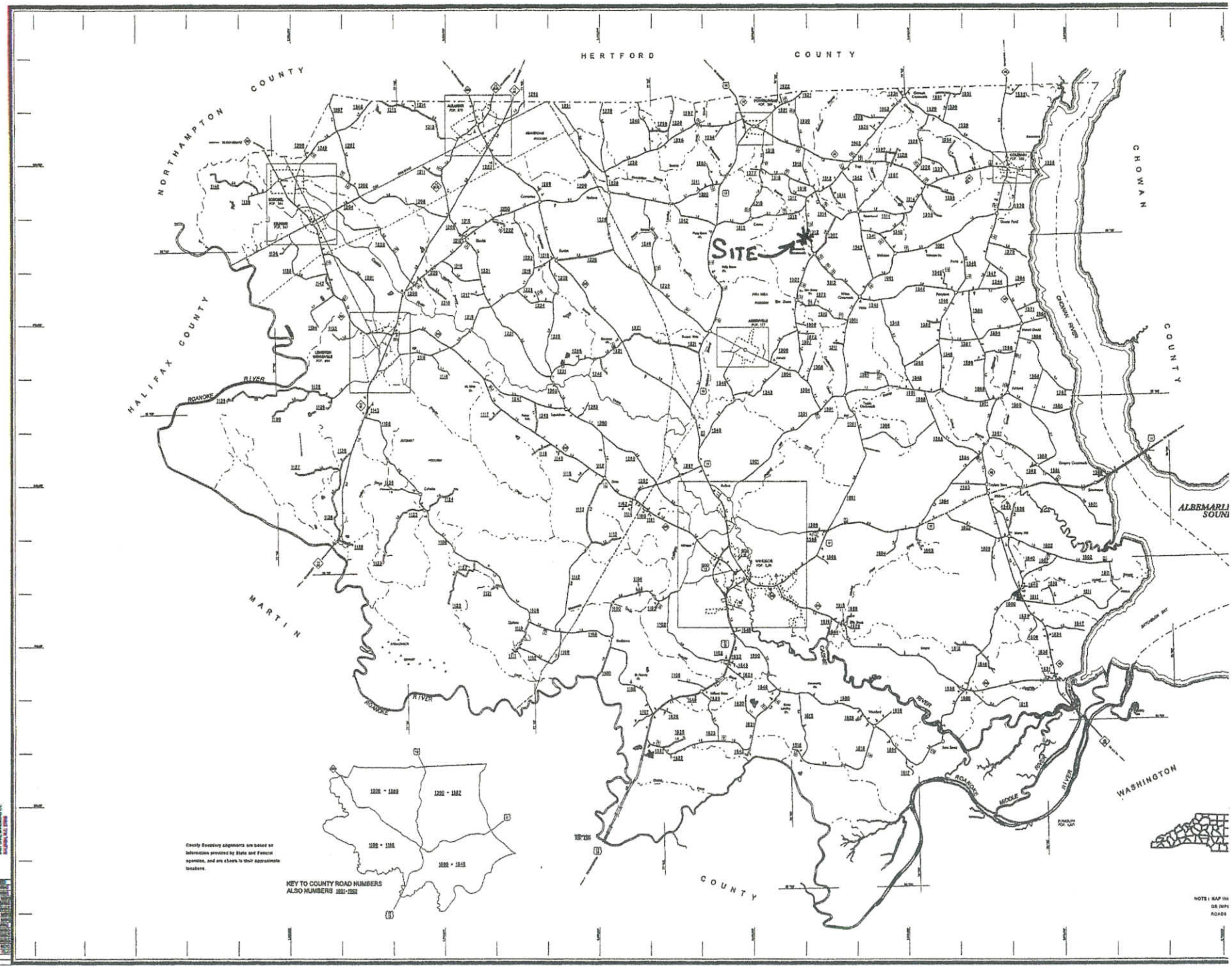
The geometry of the existing and proposed cross sections were derived from a field run topographic survey as well as Bertie County GIS (Geographic Information System). The hydrologic portion of the study was based on drainage areas that were defined through site investigations in addition to the GIS. The TR-55 Urban Hydrology For Small Watersheds was utilized to calculate the peak discharges for the various sub-areas. The calculated peak discharges, as well as the stream geometry were entered into the HEC-RAS modelling program. The results of both the existing and proposed hydrologic and hydraulic evaluation are presented hereinafter.

CONCLUSION

The attached exhibit reflects the inundation area of the 5-year storm event based on the output provide by the HEC-RAS program.


MEADOW ROAD (SR 132)
CONSTRUCTION ACCESS
QUIOCCOSIN SWAMP
LIMITS OF WETLAND / "SWAMP RUN" RESTORATION AREA
LIMIT OF EASEMENT
PROPERTY BOUNDARY
LIMIT OF DISTURBANCE


Area
Lands


HERTFORD COUNTY
NORTHAMPTON COUNTY
HALIFAX COUNTY
MARTIN COUNTY
CHOWAN COUNTY
SITE
ROANOKE RIVER
CHOWAN RIVER
ALBEMARLE SOUND
ROANOKE RIVER
CASHIE RIVER
MIDDLE RIVER
WASHINGTON
KEY TO COUNTY ROAD NUMBERS
ALSO NUMBERS 1001-2551

Existing Summary

HEC-RAS Plan: Plan 03 River: Stream Reach: Powell

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Powell	20.38	2-Yr	467.00	57.90	62.29	60.84	62.31	0.001116	1.62	504.62	562.51	0.17
Powell	20.38	5-Yr	606.00	57.90	62.54	60.97	62.56	0.001049	1.66	658.77	691.68	0.17
Powell	20.38	10-Yr	966.00	57.90	63.05	61.71	63.07	0.000805	1.62	1070.68	895.58	0.15
Powell	20.38	100-Yr	1937.00	57.90	63.88	62.24	63.90	0.000716	1.75	2161.88	1559.00	0.15
Powell	17.02	2-Yr	601.00	57.00	61.83		61.85	0.000680	0.95	682.49	524.10	0.13
Powell	17.02	5-Yr	783.00	57.00	62.08		62.10	0.000711	1.05	819.98	597.49	0.13
Powell	17.02	10-Yr	1261.00	57.00	62.65		62.67	0.000691	1.23	1231.05	854.91	0.13
Powell	17.02	100-Yr	2556.00	57.00	63.43		63.46	0.000871	1.64	1994.63	1095.36	0.16
Powell	14.81	2-Yr	601.00	56.30	61.61		61.64	0.001475	2.00	546.67	528.74	0.20
Powell	14.81	5-Yr	783.00	56.30	61.86		61.89	0.001464	2.09	686.99	606.61	0.20
Powell	14.81	10-Yr	1261.00	56.30	62.46		62.48	0.001171	2.08	1219.73	1057.52	0.18
Powell	14.81	100-Yr	2556.00	56.30	63.23		63.26	0.001172	2.34	2119.01	1492.84	0.19
Powell	10.01	2-Yr	601.00	55.10	60.62		60.67	0.002485	2.81	419.86	405.94	0.26
Powell	10.01	5-Yr	783.00	55.10	60.96		61.01	0.002028	2.69	571.57	487.64	0.23
Powell	10.01	10-Yr	1261.00	55.10	61.76		61.79	0.001534	2.64	1193.29	1177.93	0.21
Powell	10.01	100-Yr	2556.00	55.10	62.75		62.77	0.000751	2.09	2572.18	1555.69	0.15
Powell	5.00	2-Yr	601.00	54.60	59.98		60.00	0.000826	1.87	598.84	409.54	0.15
Powell	5.00	5-Yr	783.00	54.60	60.43		60.45	0.000693	1.83	797.31	481.97	0.14
Powell	5.00	10-Yr	1261.00	54.60	61.27		61.29	0.000707	2.04	1312.65	996.61	0.15
Powell	5.00	100-Yr	2556.00	54.60	62.42		62.44	0.000589	2.10	2708.90	1446.46	0.14
Powell	0.00	2-Yr	601.00	54.30	59.75	57.27	59.76	0.000321	1.22	825.51	438.26	0.10
Powell	0.00	5-Yr	783.00	54.30	60.21	57.43	60.22	0.000320	1.30	1051.31	530.65	0.10
Powell	0.00	10-Yr	1261.00	54.30	61.05	57.77	61.06	0.000320	1.43	1580.70	754.85	0.10
Powell	0.00	100-Yr	2556.00	54.30	62.21	58.43	62.23	0.000320	1.61	2834.55	1189.00	0.11

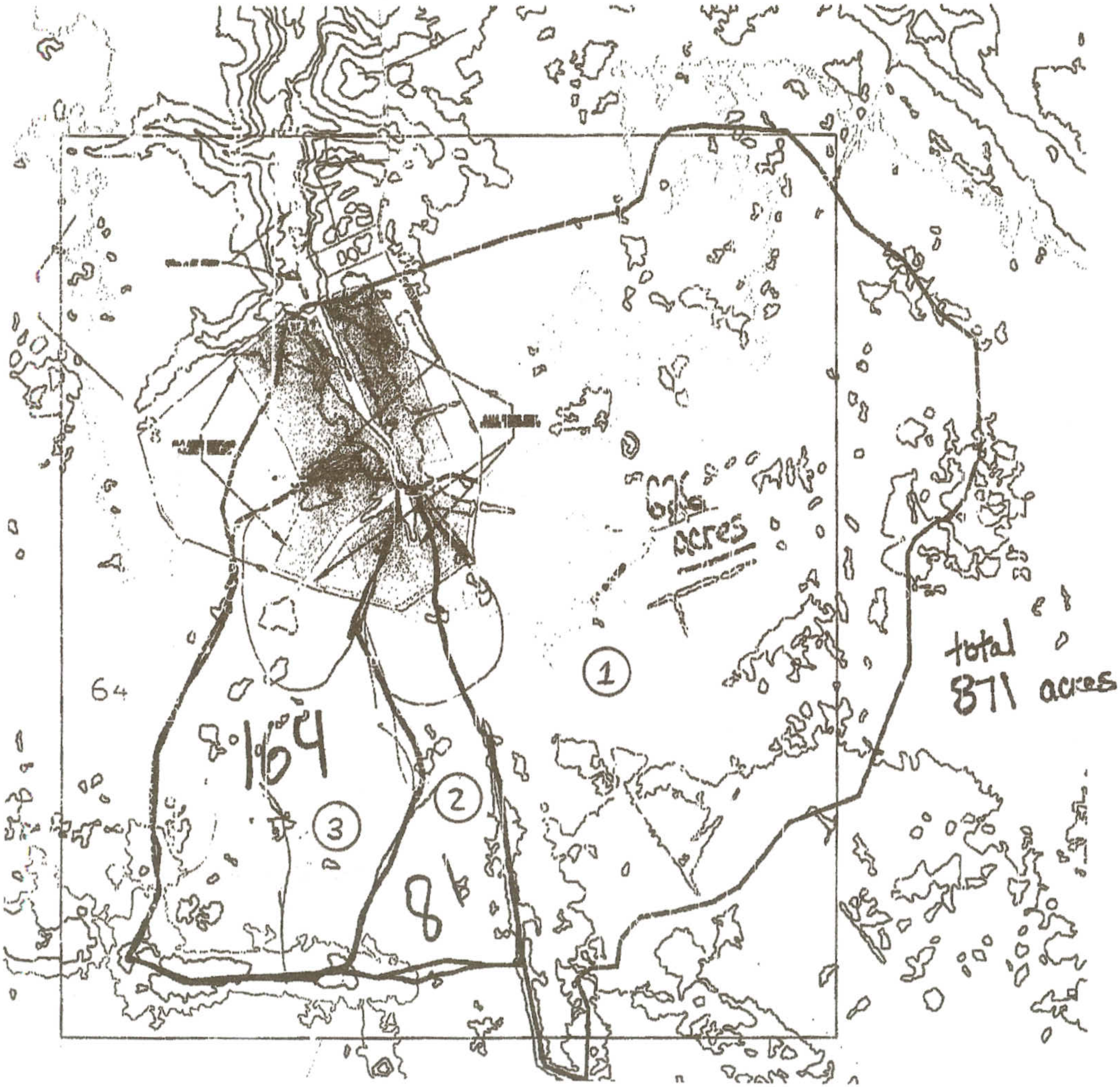
PROPOSED SUMMARY

HEC-RAS Plan: Plan 01

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Stream 1	Powell	17.02	2-Yr	601.00	58.50	61.05	59.70	61.07	0.000966	1.24	701.89	881.50	0.15
Stream 1	Powell	17.02	5-Yr	783.00	58.50	61.27	59.86	61.29	0.000884	1.27	905.05	966.58	0.15
Stream 1	Powell	17.02	10-Yr	1261.00	58.50	61.73	60.35	61.75	0.000764	1.34	1388.47	1143.87	0.14
Stream 1	Powell	17.02	100-Yr	2556.00	58.50	62.62		62.64	0.000635	1.47	2552.89	1533.89	0.14
Stream 1	Powell	15.37	2-Yr	601.00	58.00	60.93		60.95	0.000637	0.94	789.49	825.66	0.12
Stream 1	Powell	15.37	5-Yr	783.00	58.00	61.16		61.17	0.000620	1.00	986.32	888.81	0.12
Stream 1	Powell	15.37	10-Yr	1261.00	58.00	61.63		61.64	0.000594	1.12	1418.73	963.52	0.12
Stream 1	Powell	15.37	100-Yr	2556.00	58.00	62.52		62.54	0.000600	1.38	2385.77	1557.86	0.13
Stream 1	Powell	10.57	2-Yr	601.00	58.00	60.59		60.61	0.000782	0.90	733.35	757.66	0.13
Stream 1	Powell	10.57	5-Yr	783.00	58.00	60.83		60.85	0.000733	0.96	931.85	889.95	0.13
Stream 1	Powell	10.57	10-Yr	1261.00	58.00	61.32		61.34	0.000640	1.06	1414.12	1032.34	0.13
Stream 1	Powell	10.57	100-Yr	2556.00	58.00	62.23		62.25	0.000572	1.26	2413.98	1159.76	0.13
Stream 1	Powell	5.56	2-Yr	601.00	58.00	60.20		60.22	0.000761	1.06	623.17	443.62	0.13
Stream 1	Powell	5.56	5-Yr	783.00	58.00	60.44		60.46	0.000832	1.20	732.44	480.74	0.14
Stream 1	Powell	5.56	10-Yr	1261.00	58.00	60.91		60.94	0.000995	1.49	978.07	555.19	0.16
Stream 1	Powell	5.56	100-Yr	2556.00	58.00	61.78		61.83	0.001278	2.05	1545.41	757.23	0.19
Stream 1	Powell	0.56	2-Yr	601.00	57.52	59.64		59.67	0.001760	1.58	493.88	439.91	0.20
Stream 1	Powell	0.56	5-Yr	783.00	57.52	59.80		59.83	0.002073	1.81	565.86	467.21	0.22
Stream 1	Powell	0.56	10-Yr	1261.00	57.52	60.08		60.14	0.002962	2.37	706.91	517.16	0.27
Stream 1	Powell	0.56	100-Yr	2556.00	57.52	60.59		60.71	0.004900	3.47	1006.37	703.84	0.36
Stream 1	Powell	0.00	2-Yr	601.00	55.30	58.50	58.50	59.31	0.046386	7.25	82.85	51.84	1.01
Stream 1	Powell	0.00	5-Yr	783.00	55.30	59.34	59.34	59.58	0.011710	4.50	301.22	686.56	0.54
Stream 1	Powell	0.00	10-Yr	1261.00	55.30	59.56	59.56	59.82	0.013277	5.11	472.95	856.20	0.58
Stream 1	Powell	0.00	100-Yr	2556.00	55.30	59.88	59.88	60.21	0.018344	6.53	785.78	1099.93	0.70
Trib 2	Powell	8.44	2-Yr	97.00	61.00	62.49	61.54	62.50	0.000350	0.47	239.38	447.86	0.08
Trib 2	Powell	8.44	5-Yr	125.00	61.00	62.59	61.61	62.59	0.000389	0.52	284.23	479.00	0.09
Trib 2	Powell	8.44	10-Yr	198.00	61.00	62.78	61.74	62.79	0.000471	0.64	382.04	533.48	0.10
Trib 2	Powell	8.44	100-Yr	393.00	61.00	63.11	61.98	63.11	0.000652	0.87	567.99	595.84	0.12
Trib 2	Powell	6.20	2-Yr	97.00	61.00	62.43		62.43	0.000250	0.38	283.59	537.90	0.07
Trib 2	Powell	6.20	5-Yr	125.00	61.00	62.51		62.52	0.000290	0.43	335.23	642.92	0.07
Trib 2	Powell	6.20	10-Yr	198.00	61.00	62.69		62.69	0.000362	0.53	464.97	829.85	0.09
Trib 2	Powell	6.20	100-Yr	393.00	61.00	62.98		62.99	0.000497	0.72	750.96	1138.21	0.10

HEC-RAS Plan: Plan 01 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib 2	Powell	0.80	2-Yr	97.00	60.50	61.90	61.90	61.99	0.017629	3.48	78.88	568.97	0.57
Trib 2	Powell	0.80	5-Yr	125.00	60.50	61.94	61.94	62.02	0.016855	3.48	102.41	631.36	0.56
Trib 2	Powell	0.80	10-Yr	198.00	60.50	61.99	61.99	62.08	0.021279	4.03	138.36	716.32	0.64
Trib 2	Powell	0.80	100-Yr	393.00	60.50	62.64		62.65	0.000810	1.04	682.33	947.22	0.13
Trib 2	Powell	0.00	2-Yr	97.00	58.50	61.07	59.04	61.07	0.000024	0.20	718.96	888.96	0.02
Trib 2	Powell	0.00	5-Yr	125.00	58.50	61.29	59.09	61.29	0.000021	0.20	923.21	973.83	0.02
Trib 2	Powell	0.00	10-Yr	198.00	58.50	61.75	59.22	61.75	0.000018	0.21	1410.20	1151.20	0.02
Trib 2	Powell	0.00	100-Yr	393.00	58.50	62.64		62.65	0.000015	0.23	2558.14	1543.60	0.02
Trib 1	Powell	11.64	2-Yr	119.00	61.40	62.49	61.93	62.52	0.000474	0.46	167.00	292.90	0.09
Trib 1	Powell	11.64	5-Yr	161.00	61.40	62.57	62.00	62.62	0.000473	0.49	195.09	364.13	0.09
Trib 1	Powell	11.64	10-Yr	277.00	61.40	62.73	62.08	62.81	0.000524	0.58	262.69	507.73	0.10
Trib 1	Powell	11.64	100-Yr	600.00	61.40	62.96	62.80	63.13	0.000716	0.77	402.74	719.15	0.12
Trib 1	Powell	6.78	2-Yr	119.00	60.85	62.35		62.35	0.000234	0.39	305.95	442.92	0.07
Trib 1	Powell	6.78	5-Yr	161.00	60.85	62.42		62.43	0.000298	0.46	340.87	527.01	0.08
Trib 1	Powell	6.78	10-Yr	277.00	60.85	62.57		62.58	0.000355	0.55	431.27	679.52	0.09
Trib 1	Powell	6.78	100-Yr	600.00	60.85	62.71		62.77	0.000661	0.81	538.47	804.90	0.12
Trib 1	Powell	0.80	2-Yr	119.00	60.50	61.91	61.91	62.01	0.002562	1.34	85.41	586.93	0.22
Trib 1	Powell	0.80	5-Yr	161.00	60.50	61.96	61.96	62.06	0.001841	1.16	115.60	663.80	0.19
Trib 1	Powell	0.80	10-Yr	277.00	60.50	62.03	62.03	62.17	0.001701	1.16	164.95	736.42	0.18
Trib 1	Powell	0.80	100-Yr	600.00	60.50	62.62		62.66	0.000078	0.32	662.05	939.85	0.04
Trib 1	Powell	0.00	2-Yr	119.00	58.50	61.07	59.08	61.07	0.000036	0.24	718.75	888.86	0.03
Trib 1	Powell	0.00	5-Yr	161.00	58.50	61.29	59.16	61.29	0.000036	0.26	922.91	973.71	0.03
Trib 1	Powell	0.00	10-Yr	277.00	58.50	61.75	59.33	61.75	0.000035	0.29	1409.69	1151.03	0.03
Trib 1	Powell	0.00	100-Yr	600.00	58.50	62.64		62.65	0.000035	0.35	2557.06	1543.28	0.03
Stream	Powell	20.94	2-Yr	467.00	58.00	62.55	61.17	62.56	0.000796	1.68	515.24	382.12	0.15
Stream	Powell	20.94	5-Yr	606.00	58.00	62.80	61.35	62.82	0.000853	1.80	615.70	420.66	0.15
Stream	Powell	20.94	10-Yr	966.00	58.00	63.26	61.64	63.29	0.000944	2.03	822.25	452.00	0.16
Stream	Powell	20.94	100-Yr	1937.00	58.00	64.01	62.19	64.06	0.001253	2.58	1161.26	452.00	0.19
Stream	Powell	19.22	2-Yr	467.00	58.00	61.09	61.09	61.41	0.019564	6.06	141.55	207.74	0.67
Stream	Powell	19.22	5-Yr	606.00	58.00	61.23	61.23	61.58	0.021028	6.52	174.05	237.11	0.70
Stream	Powell	19.22	10-Yr	966.00	58.00	61.52	61.52	61.91	0.023591	7.38	248.95	293.82	0.76
Stream	Powell	19.22	100-Yr	1937.00	58.00	62.51		62.69	0.009035	5.54	626.25	443.46	0.49


626 acres
1
2
3
164
81
64
total 871 acres

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

WILLIAMSTON 1 E, NORTH CAROLINA (31-9440) 35.85 N 77.0333 W 3 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Thu Apr 12 2007

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | D

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	[illegible]	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.44	0.70	0.88	1.20	1.50	1.76	1.89	2.26	2.64	[illegible]	3.61	4.10	4.81	5.49	7.43	9.19	11.41	13.70
2	0.51	0.81	1.02	1.41	1.77	2.10	2.24	2.68	3.15	[illegible]	4.37	4.96	5.79	6.58	8.85	10.93	13.50	16.18
5	0.58	0.92	1.17	1.66	2.12	2.56	2.75	3.29	3.88	[illegible]	5.61	6.30	7.28	8.15	10.77	13.14	16.12	19.08
10	0.66	1.05	1.33	1.93	2.51	3.08	3.34	4.00	4.74	[illegible]	6.67	7.42	8.51	9.45	12.34	14.93	18.27	21.39
25	0.74	1.18	1.50	2.22	2.96	3.71	4.06	4.88	5.82	[illegible]	8.28	9.06	10.29	11.32	14.59	17.38	21.27	24.56
50	0.82	1.30	1.65	2.48	3.36	4.30	4.76	5.74	6.89	[illegible]	9.68	10.45	11.78	12.89	16.41	19.34	23.71	27.05
100	0.88	1.41	1.78	2.72	3.75	4.88	5.46	6.61	7.99	[illegible]	11.24	11.96	13.37	14.55	18.35	21.35	26.24	29.57
200	0.95	1.51	1.90	2.96	4.15	5.51	6.24	7.58	9.22	[illegible]	12.99	13.60	15.10	16.34	20.39	23.42	28.88	32.12
500	1.03	1.63	2.05	3.27	4.69	6.37	7.33	8.93	10.97	[illegible]	15.64	16.18	17.59	18.90	23.26	26.26	32.54	35.58
1000	1.11	1.75	2.19	3.55	5.18	7.18	8.37	10.25	12.68	[illegible]	17.93	18.43	19.67	21.01	25.59	28.50	35.46	38.25

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

RUNOFF CURVE NUMBER COMPUTATION Version 2.00

Project : POWELL SITE User: JPD Date:
County : BERTIE State: NC Checked: ____ Date: _____
Subtitle: EXISTING & PROPOSED
Subarea : 1

COVER DESCRIPTION			Hydrologic Soil Group A	B	C	D
			Acres (CN)			
CULTIVATED AGRICULTURAL LANDS						
Row crops	SR + Crop residue	good	-	-	474 (82)	-
OTHER AGRICULTURAL LANDS						
Woods		good	-	-	152 (70)	-
Total Area (by Hydrologic Soil Group)					626	

SUBAREA: 1 TOTAL DRAINAGE AREA: 626 Acres WEIGHTED CURVE NUMBER: 79

RUNOFF CURVE NUMBER COMPUTATION Version 2.00

Project : POWELL SITE User: JPD Date:
County : BERTIE State: NC Checked: ____ Date: _____
Subtitle: EXISTING & PROPOSED
Subarea : 2

COVER DESCRIPTION			Hydrologic Soil Group A	B	C	D
				Acres	(CN)	
CULTIVATED AGRICULTURAL LANDS						
Row crops	SR + Crop residue	good	-	-	65(82)	-
OTHER AGRICULTURAL LANDS						
Woods		good	-	-	16(70)	-
Total Area (by Hydrologic Soil Group)					81	

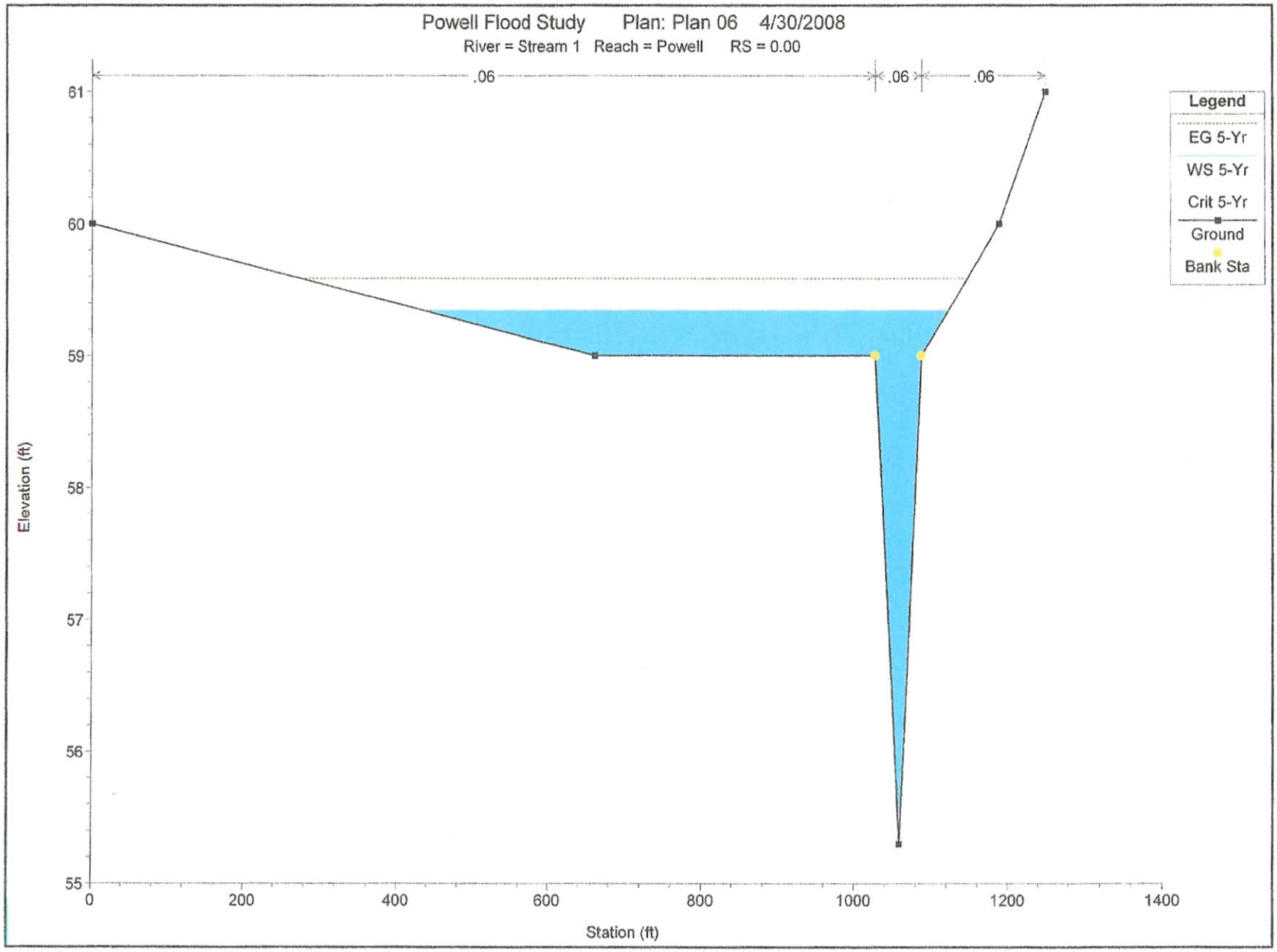
SUBAREA: 2 TOTAL DRAINAGE AREA: 81 Acres WEIGHTED CURVE NUMBER: 80

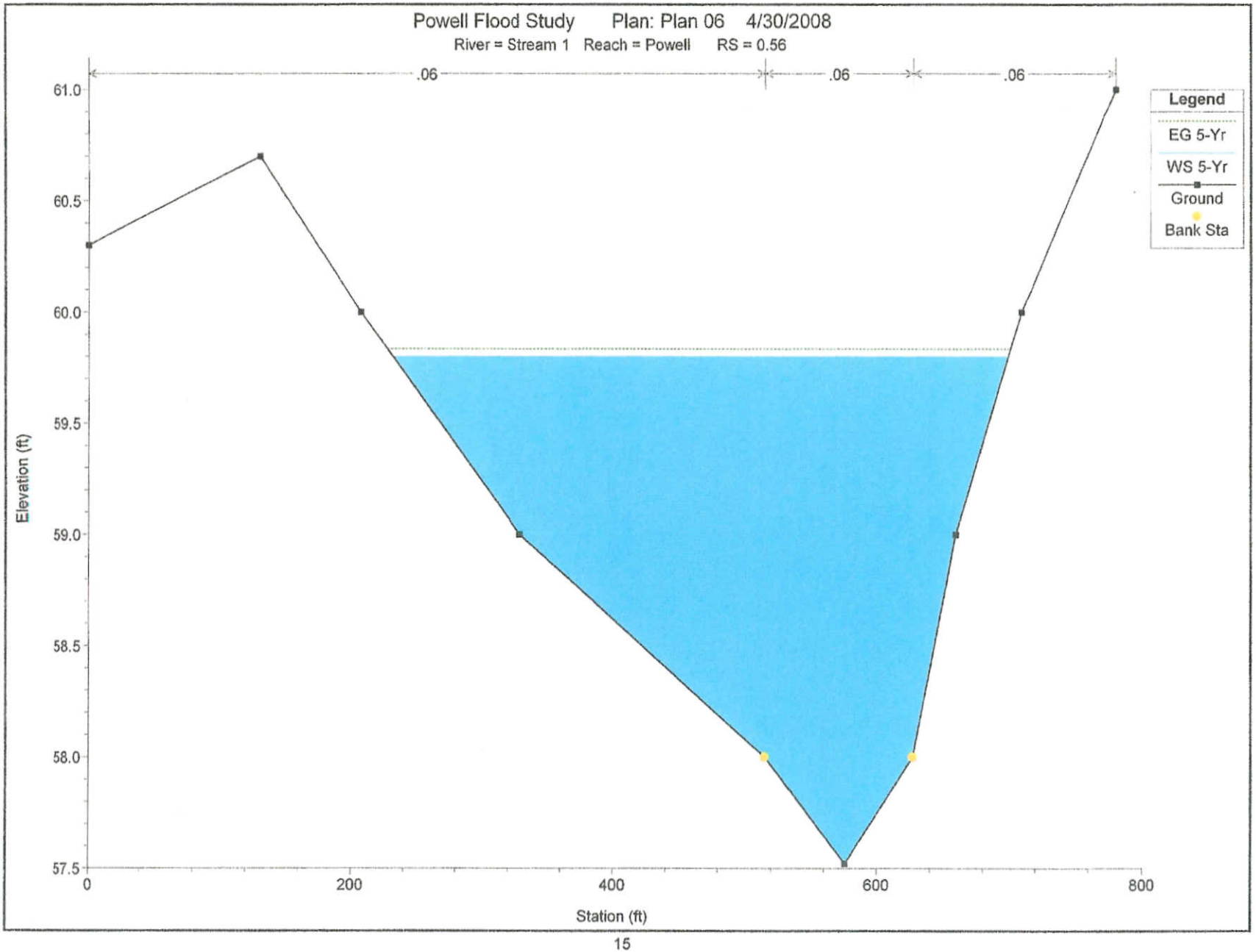
RUNOFF CURVE NUMBER COMPUTATION Version 2.00

Project : POWELL SITE User: JPD Date:
County : BERTIE State: NC Checked: ____ Date: _____
Subtitle: EXISTING & PROPOSED
Subarea : 3

COVER DESCRIPTION			Hydrologic Soil Group A	B	C	D
			Acres (CN)			
CULTIVATED AGRICULTURAL LANDS						
Row crops	SR + Crop residue	good	-	-	50 (82)	-
OTHER AGRICULTURAL LANDS						
Woods		good	-	-	114 (70)	-
Total Area (by Hydrologic Soil Group)					164	

SUBAREA: 3 TOTAL DRAINAGE AREA: 164 Acres WEIGHTED CURVE NUMBER: 74


Powell Flood Study Plan: Plan 06 4/30/2008
River = Stream 1 Reach = Powell RS = 0.00
.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta
Elevation (ft)
61
60
59
58
57
56
55
0
200
400
600
800
1000
1200
1400
Station (ft)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.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Ground
Bank Sta
Elevation (ft)
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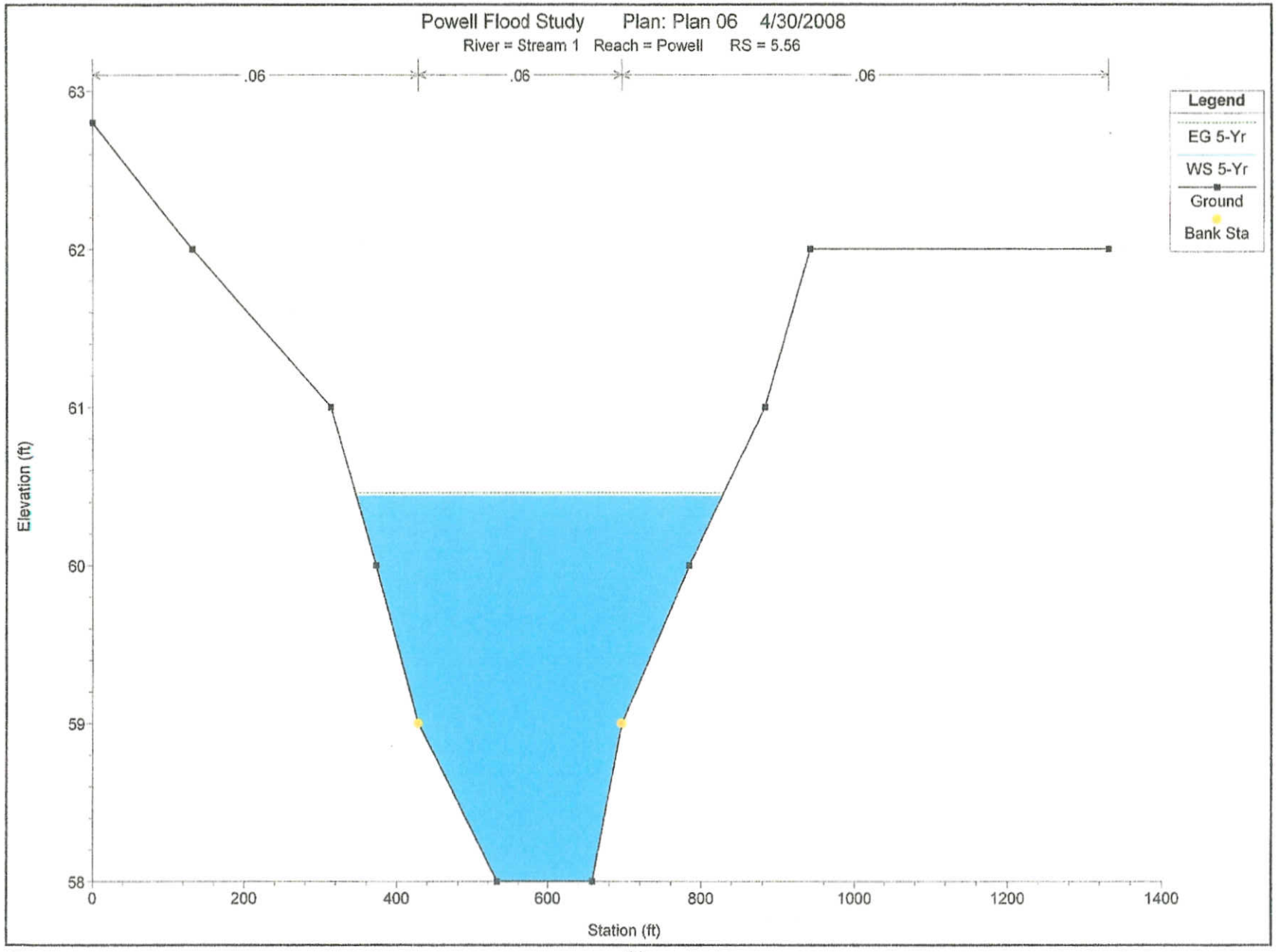
60.5
60.0
59.5
59.0
58.5
58.0
57.5
0
200
400
600
800
Station (ft)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.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Ground
Bank Sta
Elevation (ft)
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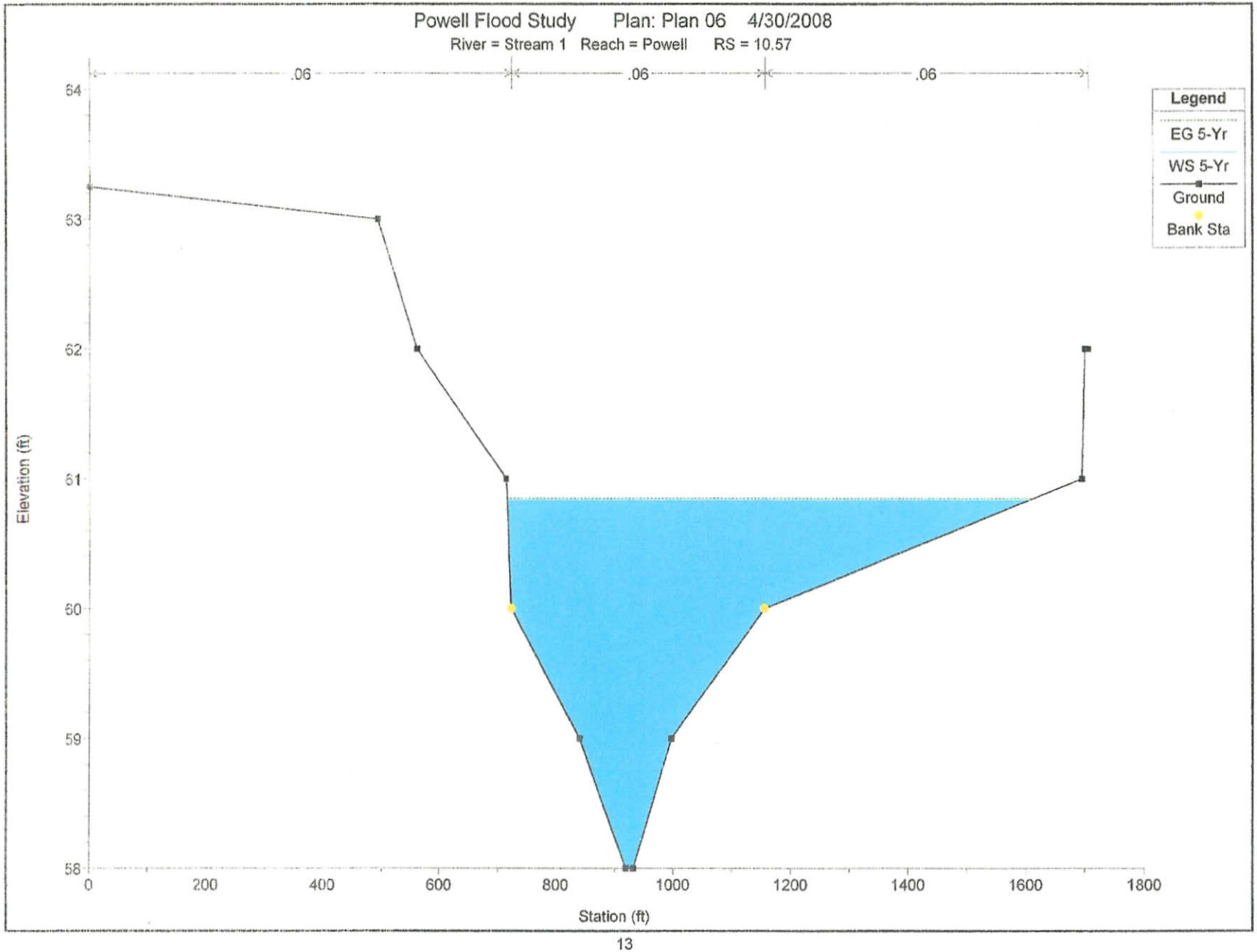
62
61
60
59
58
0
200
400
600
800
1000
1200
1400
Station (ft)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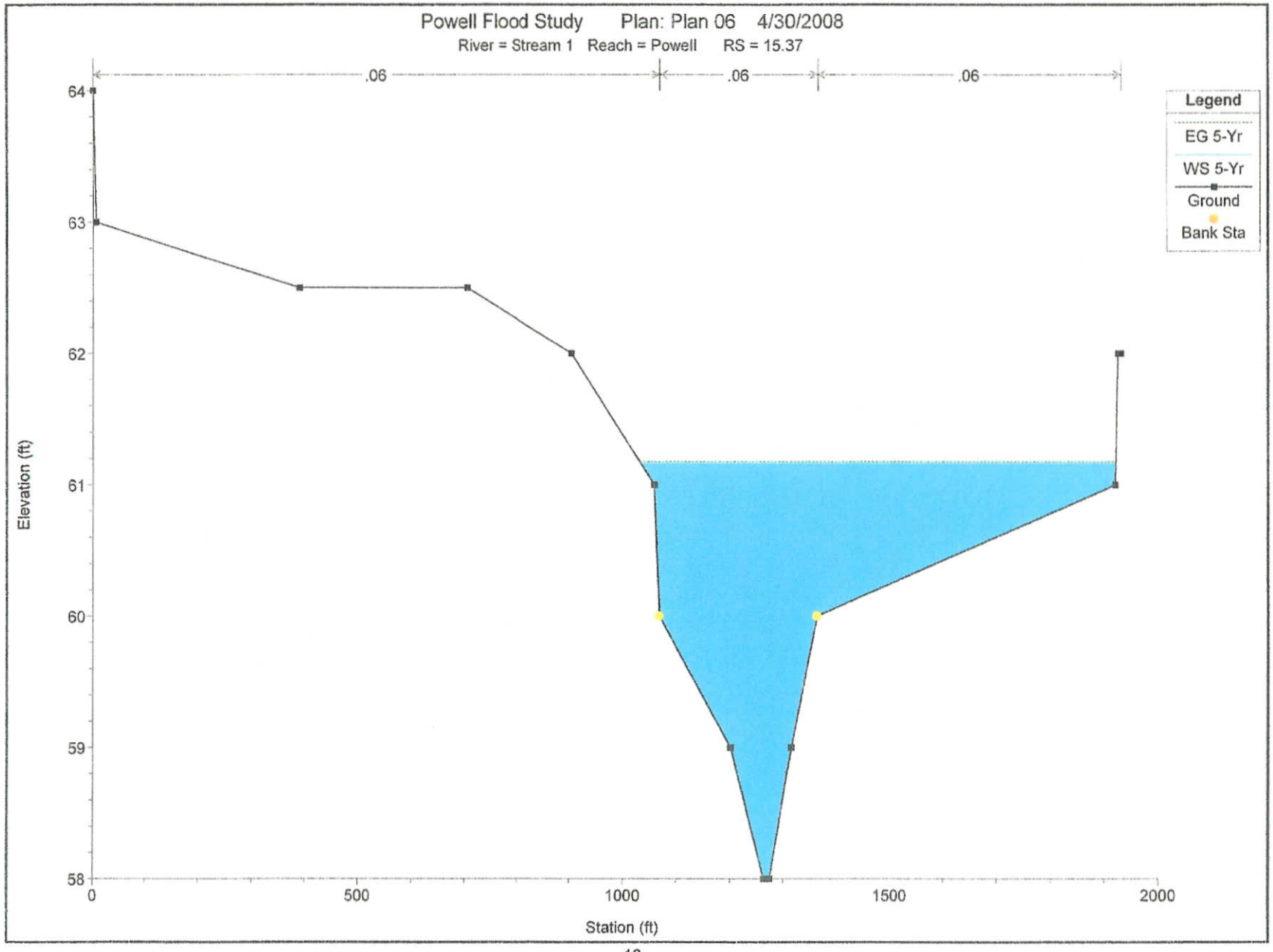
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Ground
Bank Sta
Elevation (ft)
64
63
62
61
60
59
58
0
200
400
600
800
1000
1200
1400
1600
1800
Station (ft)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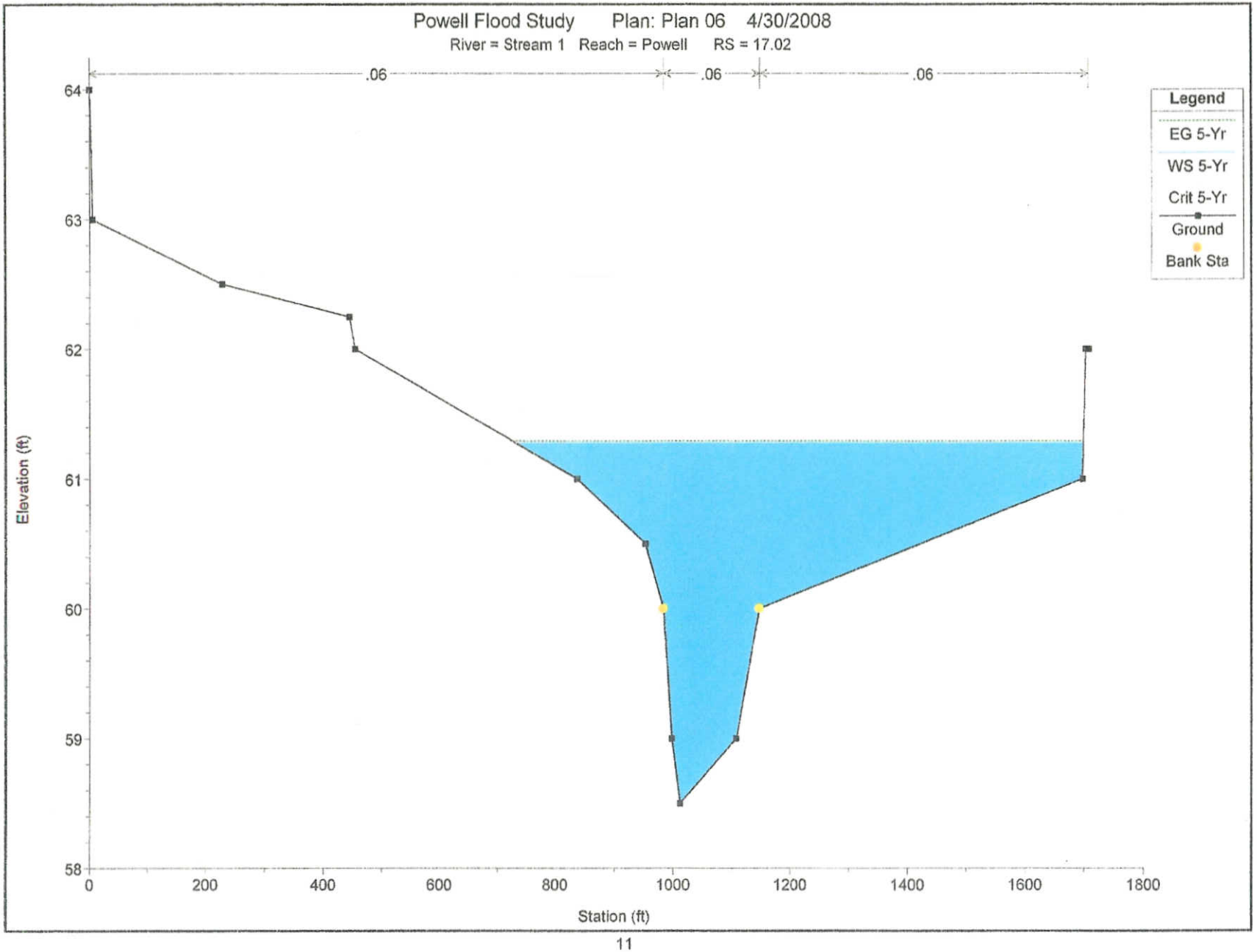
River = Stream 1 Reach = Powell RS = 15.37
.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Ground
Bank Sta
Elevation (ft)
64
63
62
61
60
59
58
0
500
1000
1500
2000
Station (ft)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.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta
Elevation (ft)
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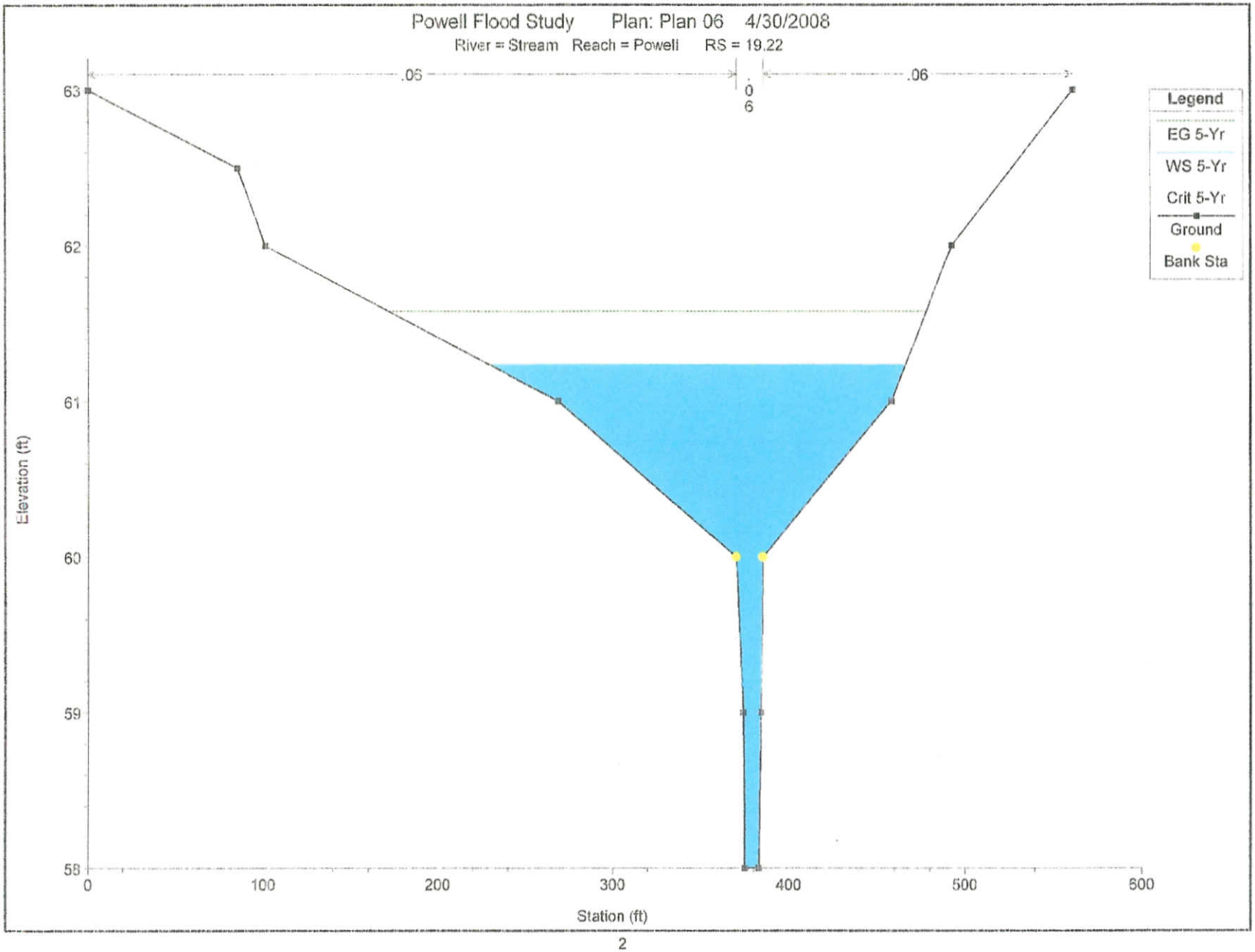
63
62
61
60
59
58
0
200
400
600
800
1000
1200
1400
1600
1800
Station (ft)


Powell Flood Study Plan: Plan 06 4/30/2008
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.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta
Elevation (ft)
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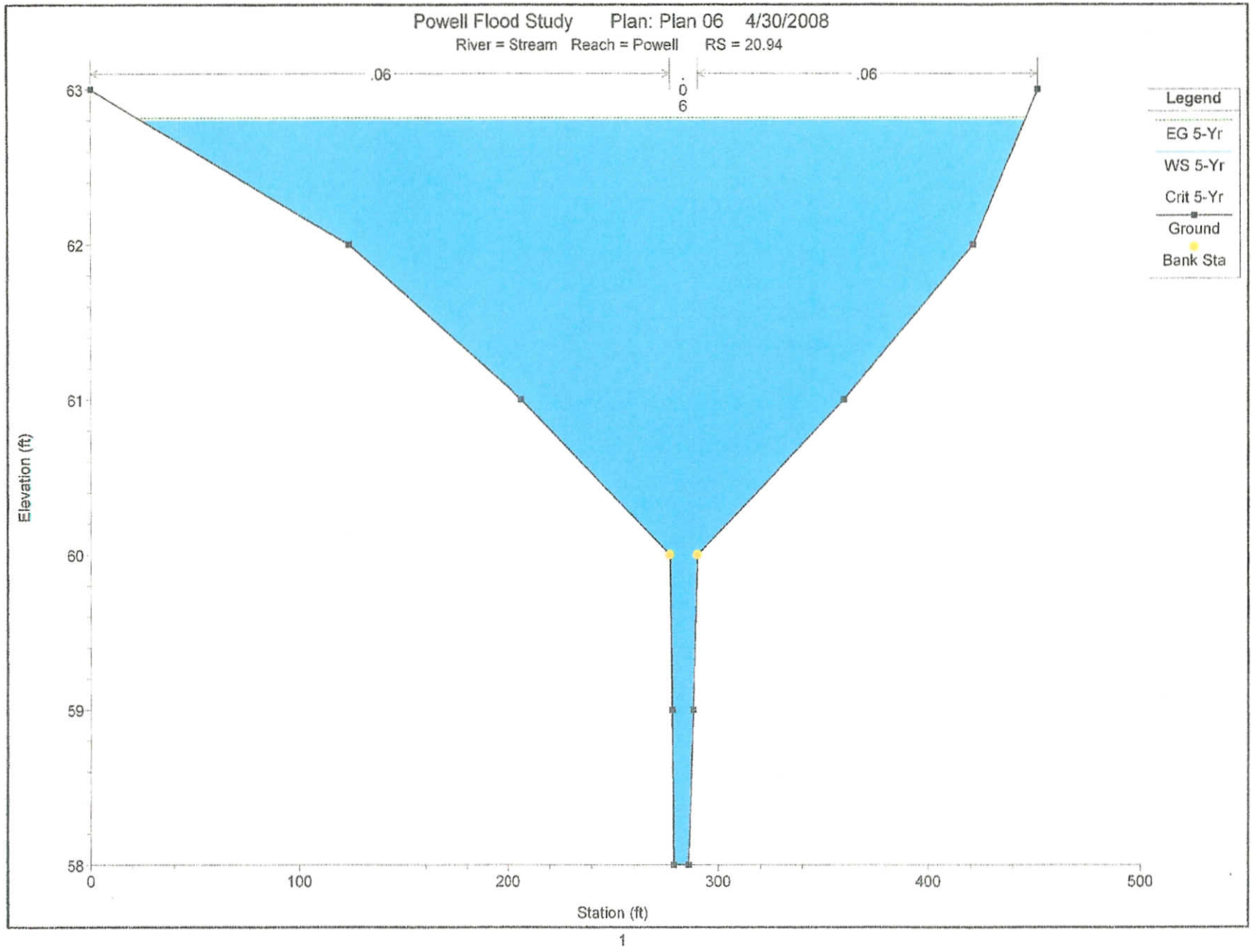
62
61
60
59
58
0
100
200
300
400
500
600
Station (ft)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.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta
Elevation (ft)
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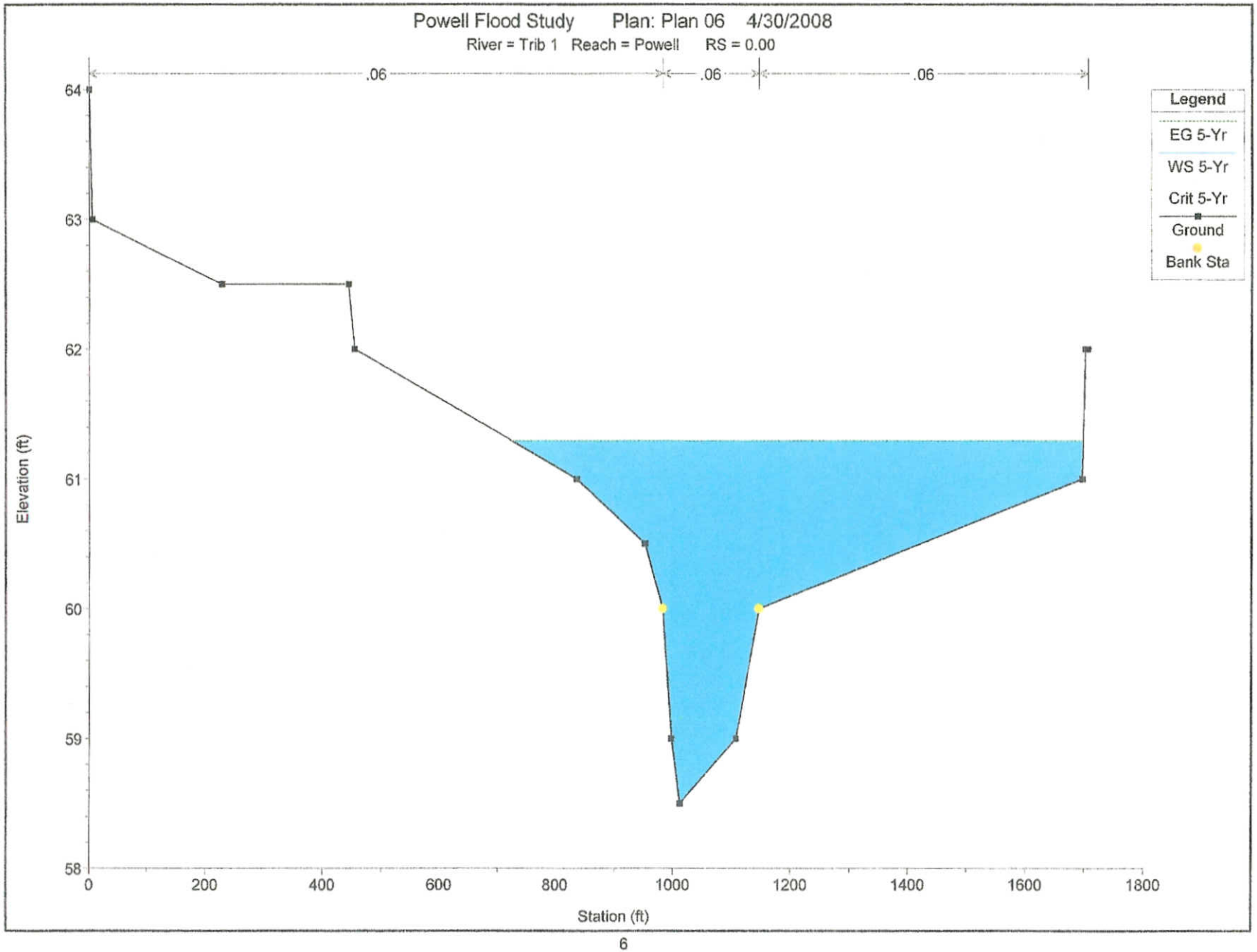
62
61
60
59
58
0
100
200
300
400
500
Station (ft)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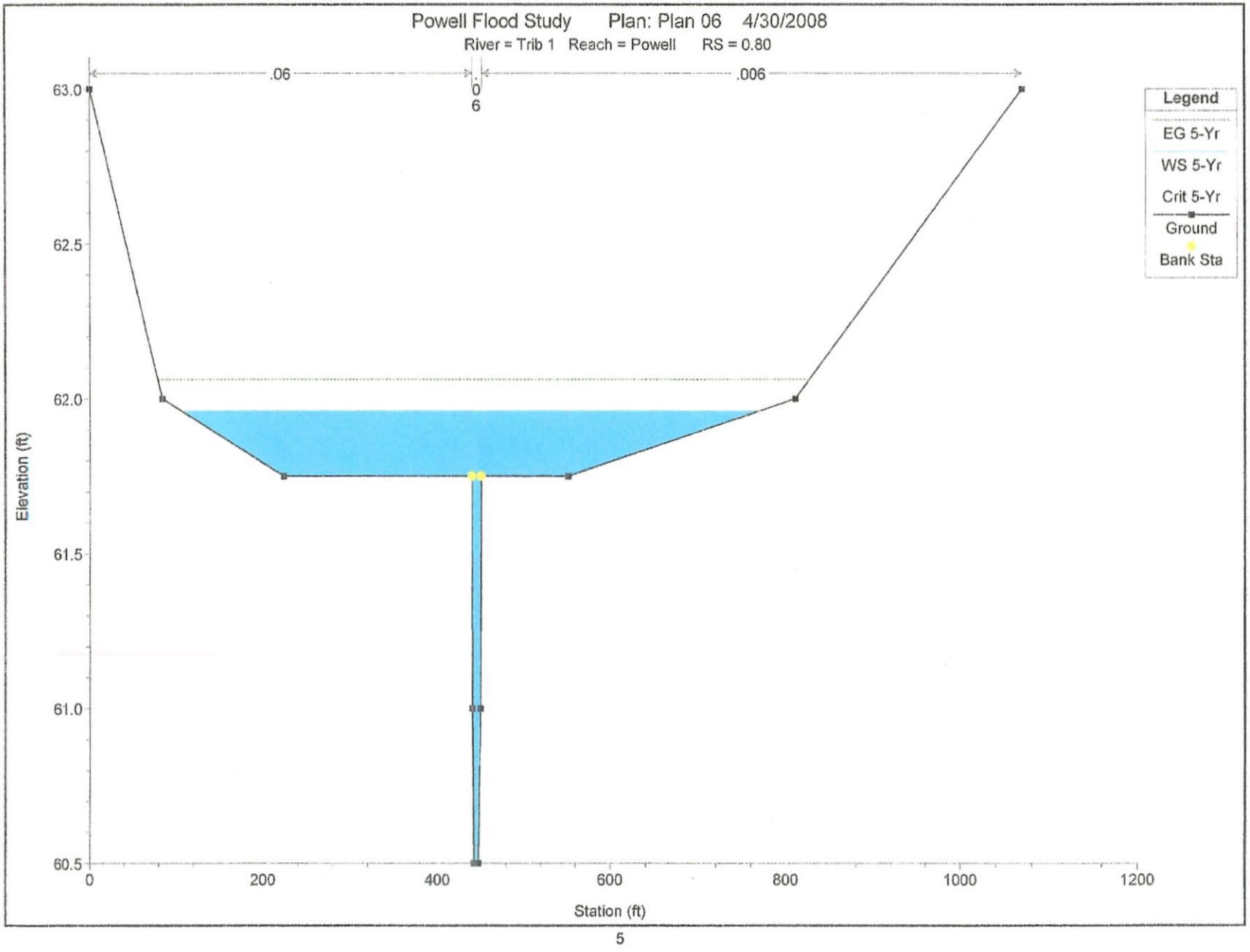
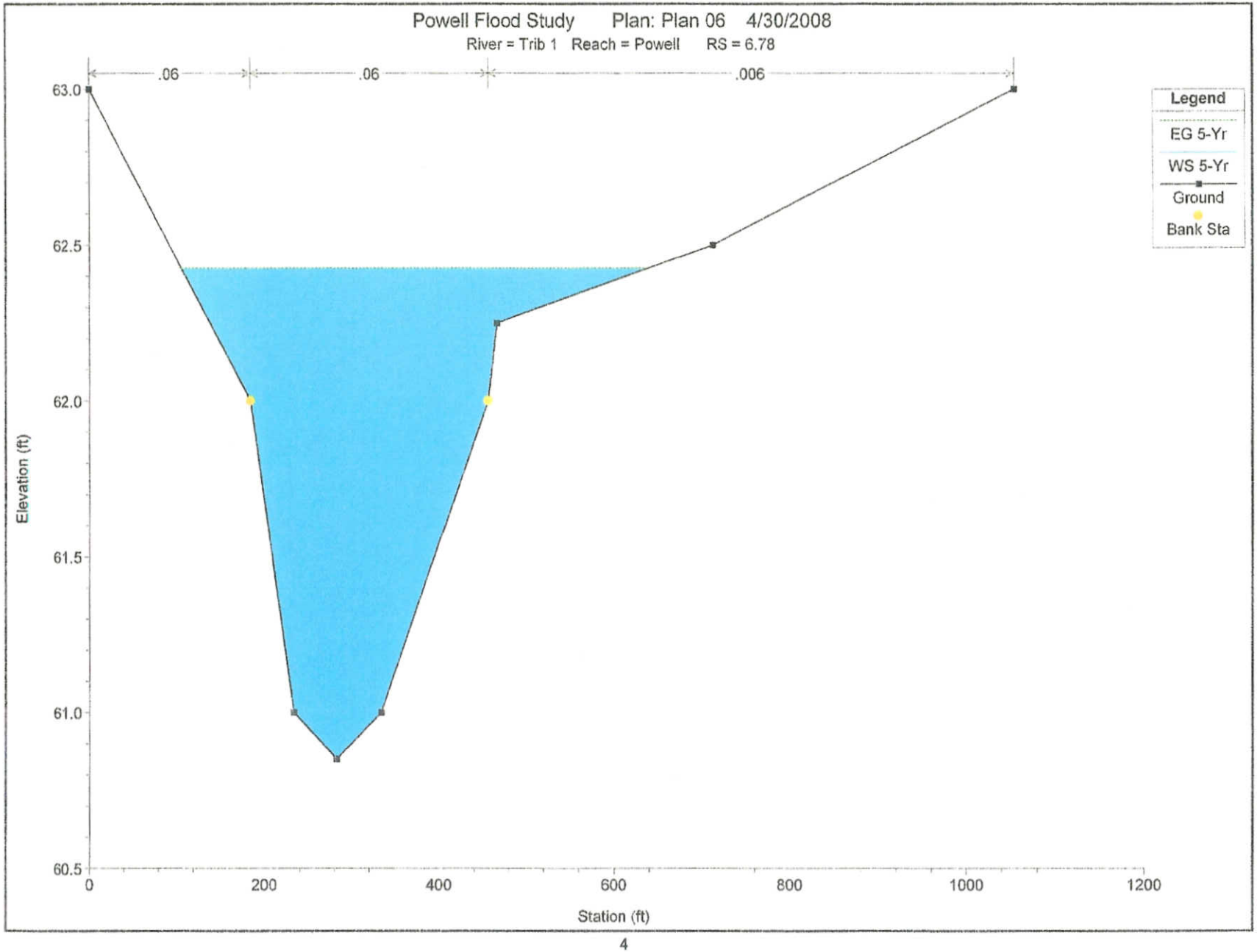
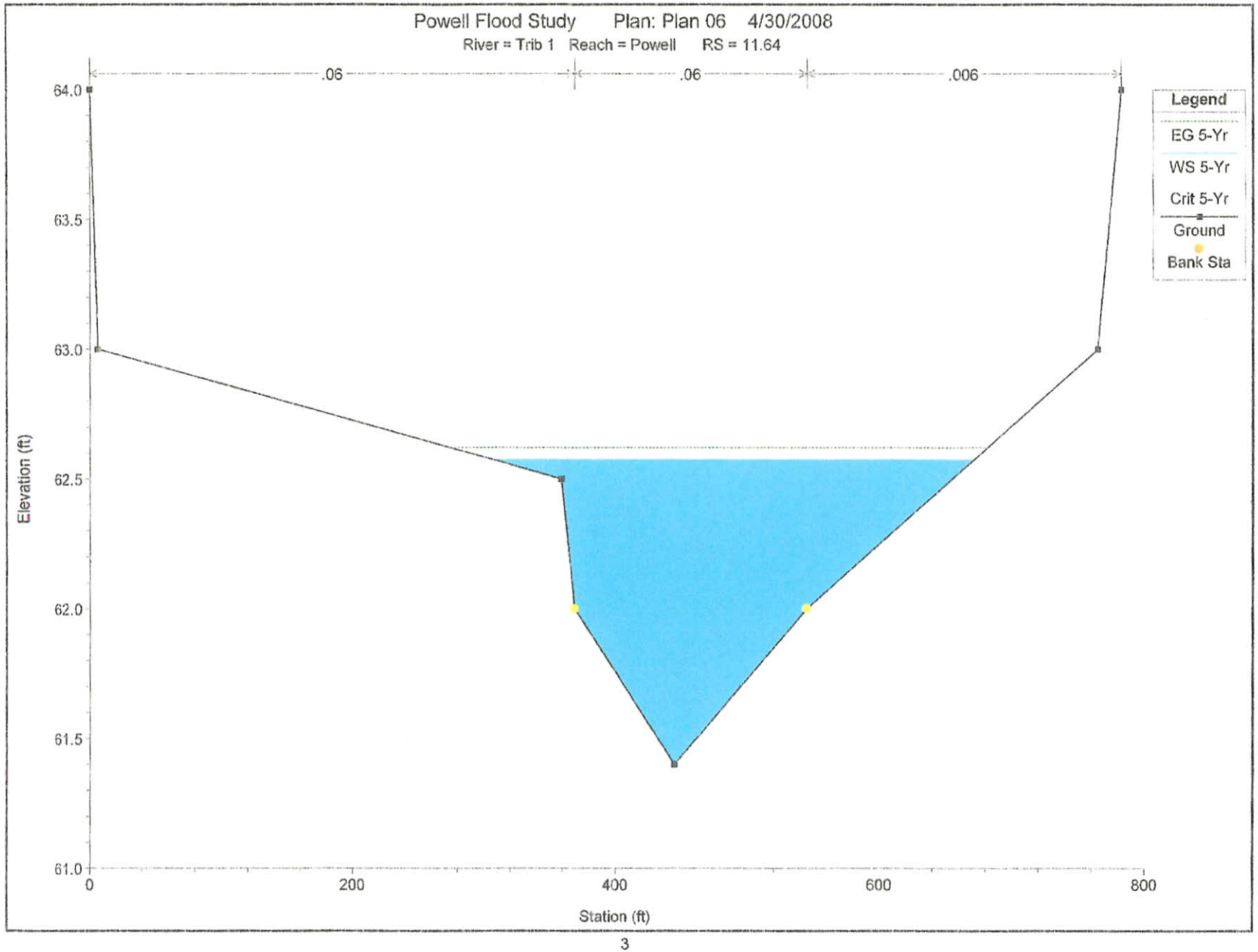
River = Trib 1 Reach = Powell RS = 0.00
.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta
Elevation (ft)
64
63
62
61
60
59
58
0
200
400
600
800
1000
1200
1400
1600
1800
Station (ft)


Powell Flood Study Plan: Plan 06 4/30/2008
River = Trib 1 Reach = Powell RS = 0.80
.06
.006
0.06
63.0
62.5
62.0
61.5
61.0
60.5
Elevation (ft)
0
200
400
600
800
1000
1200
Station (ft)
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta


Powell Flood Study Plan: Plan 06 4/30/2008
River = Trib 1 Reach = Powell RS = 6.78
.06
.06
.006
Legend
EG 5-Yr
WS 5-Yr
Ground
Bank Sta
63.0
62.5
62.0
61.5
61.0
60.5
Elevation (ft)
0
200
400
600
800
1000
1200
Station (ft)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River = Trib 1 Reach = Powell RS = 11.64
.06
.06
.006
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta
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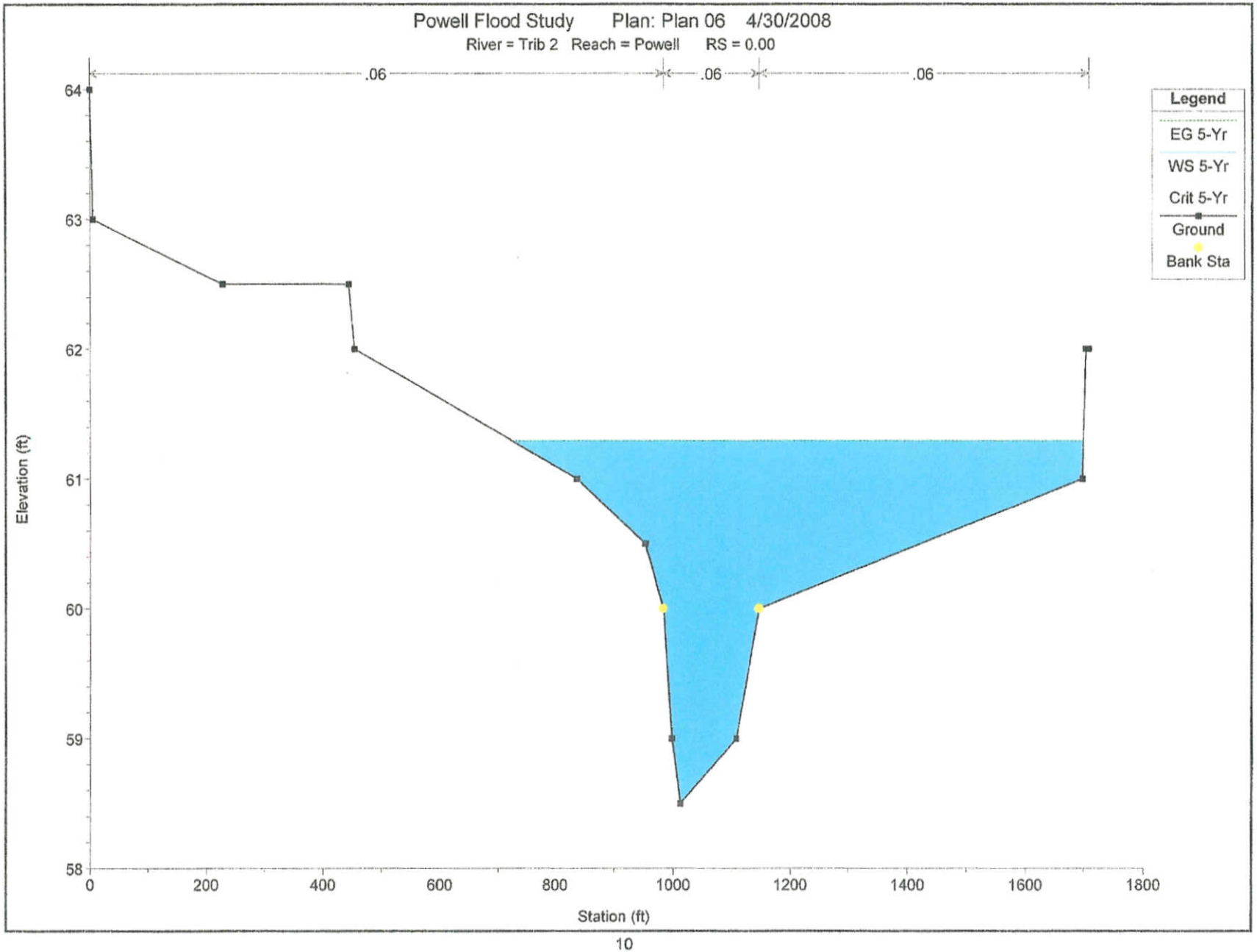
63.5
63.0
62.5
62.0
61.5
61.0
Elevation (ft)
0
200
400
600
800
Station (ft)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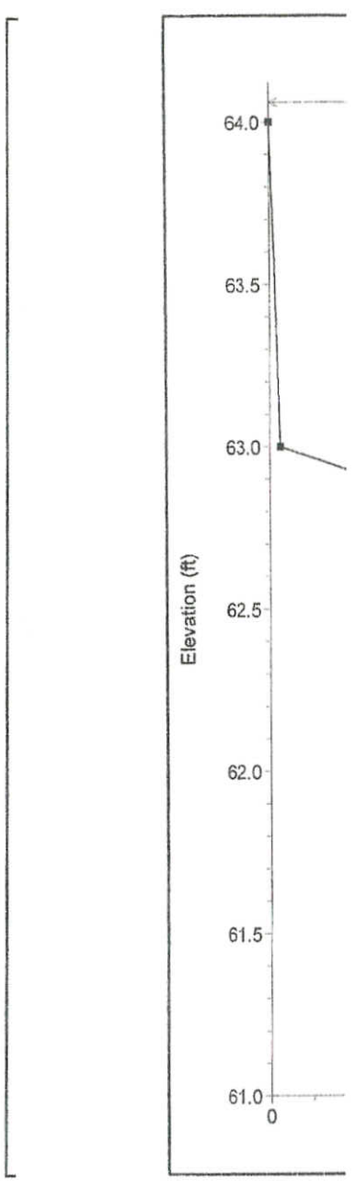
River = Trib 2 Reach = Powell RS = 0.00
.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta
Elevation (ft)
64
63
62
61
60
59
58
0
200
400
600
800
1000
1200
1400
1600
1800
Station (ft)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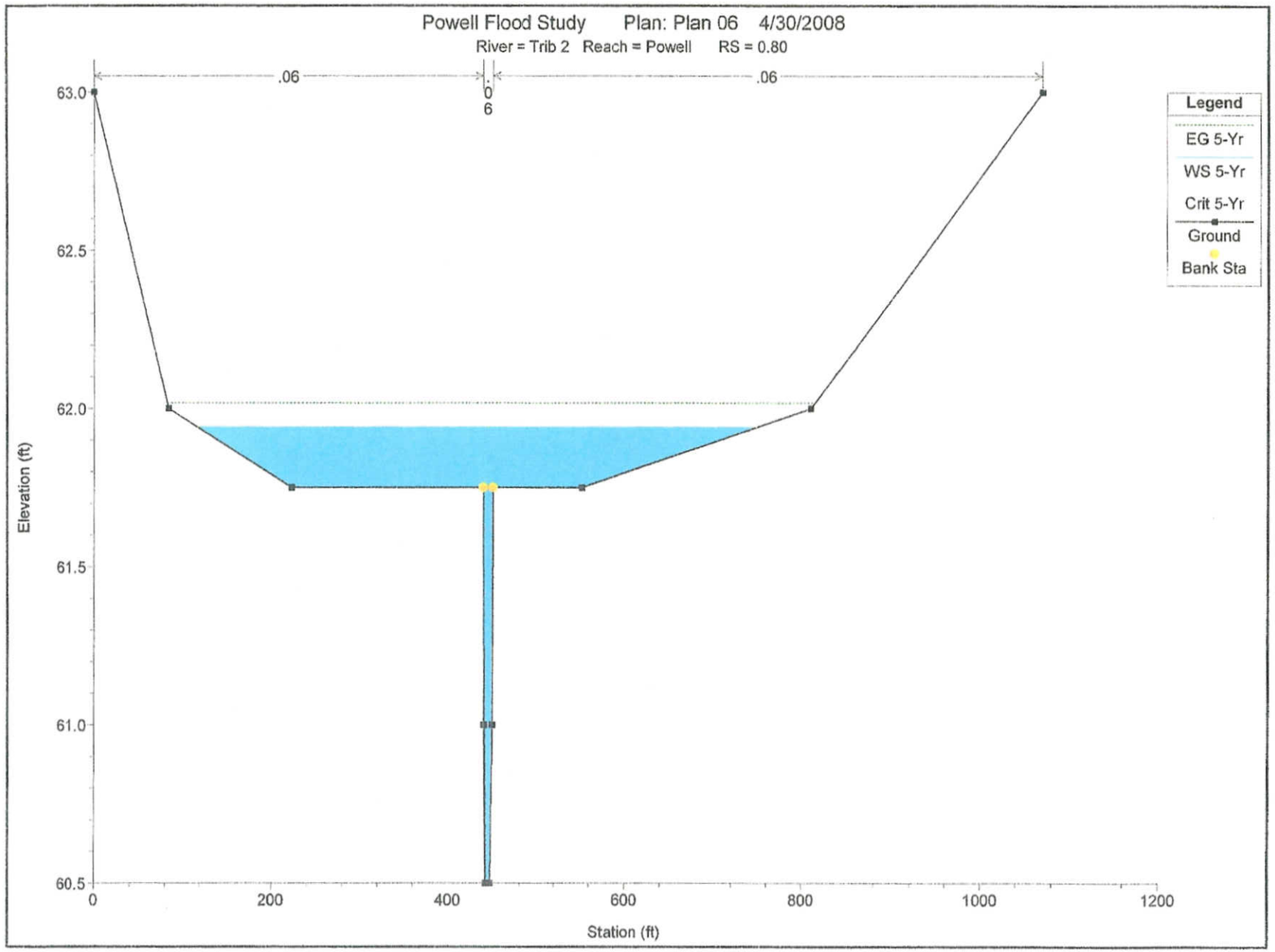
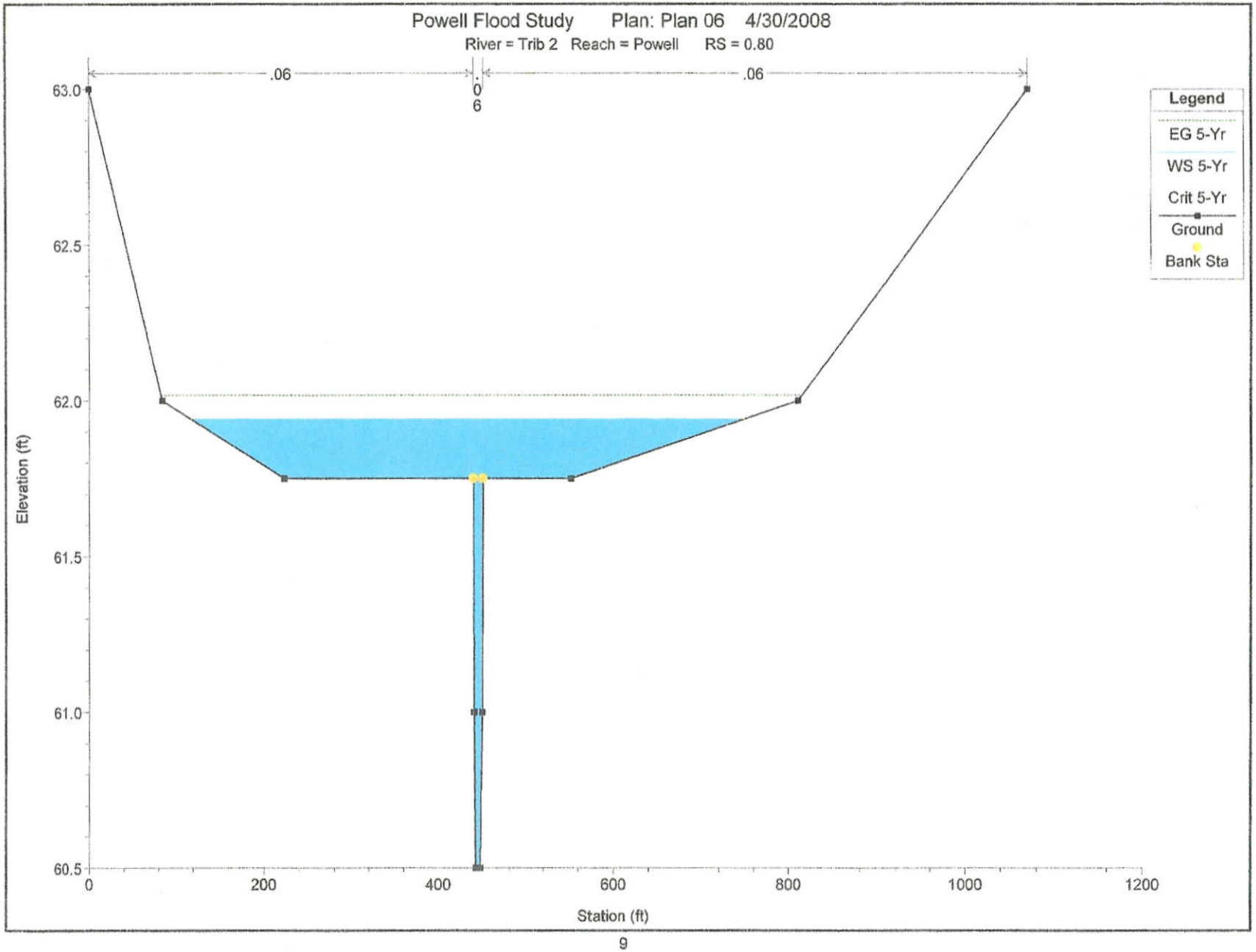
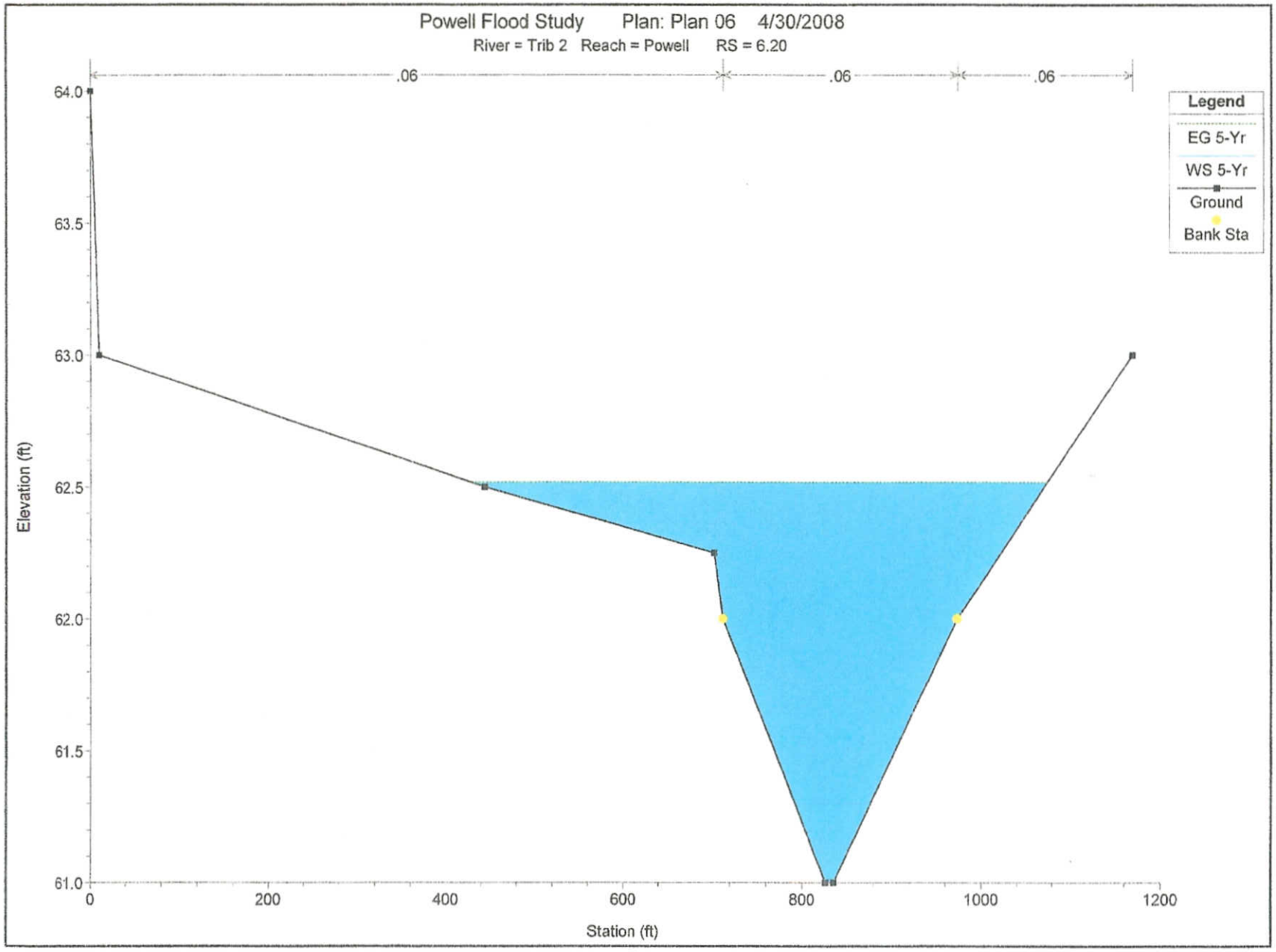
63.0
62.5
62.0
61.5
61.0
Elevation (ft)
0


Powell Flood Study Plan: Plan 06 4/30/2008
River = Trib 2 Reach = Powell RS = 0.80
.06
.06
0
6
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta
63.0
62.5
62.0
61.5
61.0
60.5
Elevation (ft)
0
200
400
600
800
1000
1200
Station (ft)

9


Powell Flood Study Plan: Plan 06 4/30/2008
River = Trib 2 Reach = Powell RS = 0.80
.06
0
6
.06
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta
63.0
62.5
62.0
61.5
61.0
60.5
Elevation (ft)
0
200
400
600
800
1000
1200
Station (ft)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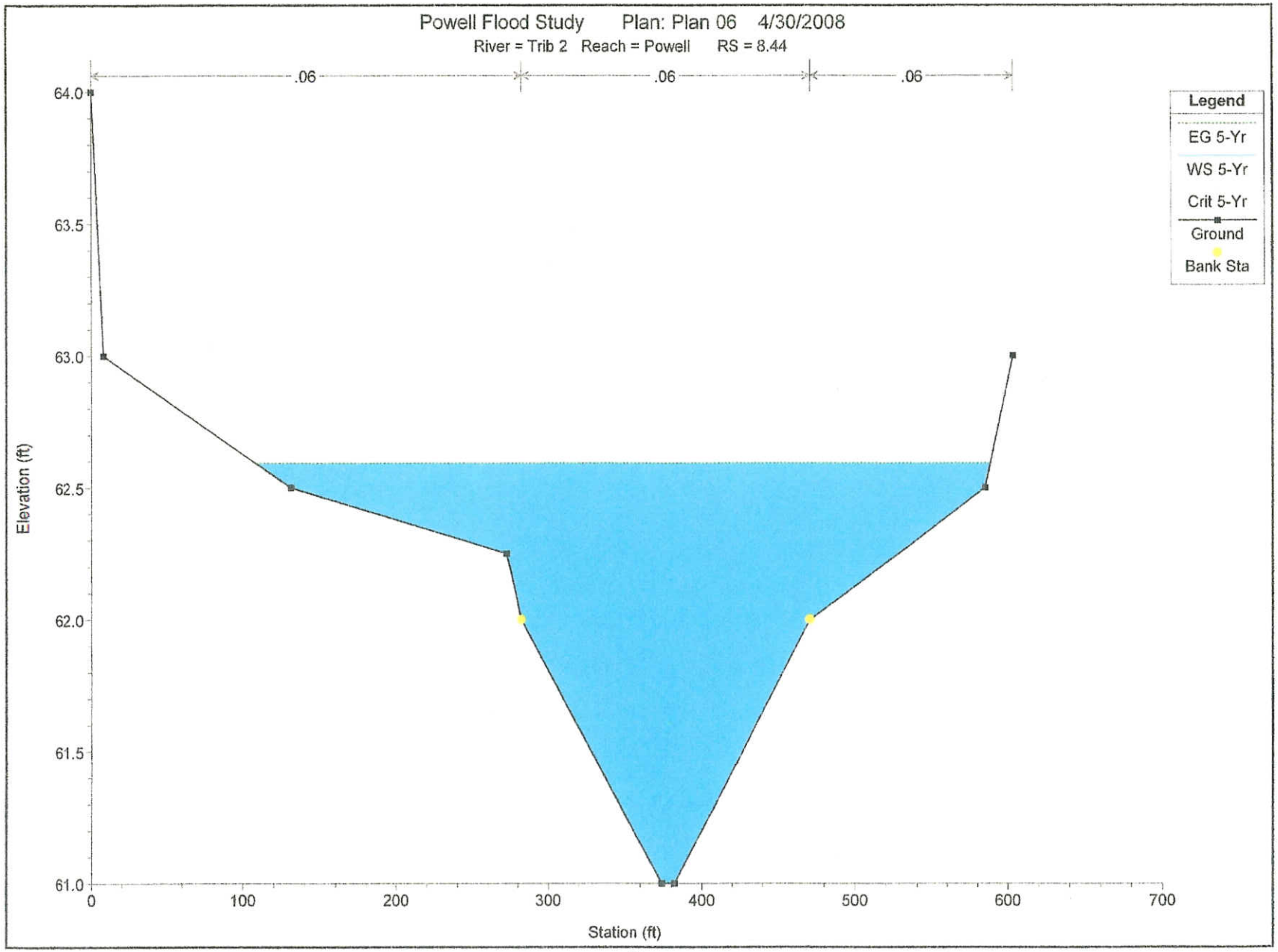
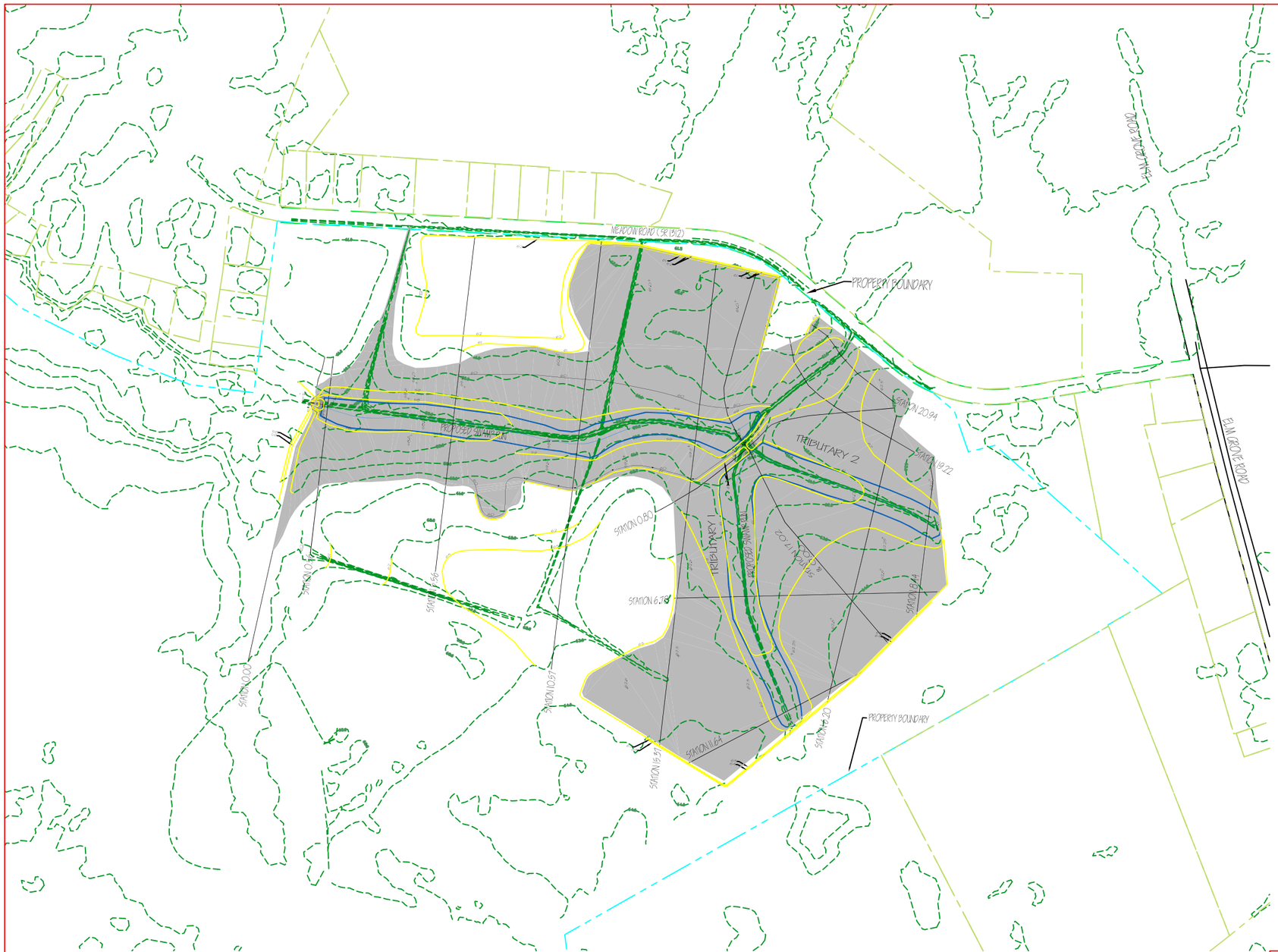
River = Trib 2 Reach = Powell RS = 6.20
.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Ground
Bank Sta
64.0
63.5
63.0
62.5
62.0
61.5
61.0
Elevation (ft)
0
200
400
600
800
1000
1200
Station (ft)


Powell Flood Study Plan: Plan 06 4/30/2008
River = Trib 2 Reach = Powell RS = 8.44
.06
.06
.06
Legend
EG 5-Yr
WS 5-Yr
Crit 5-Yr
Ground
Bank Sta
64.0
63.5
63.0
62.5
62.0
61.5
61.0
Elevation (ft)
0
100
200
300
400
500
600
700
Station (ft)



FLOOD STUDY PLAN

SCALE: 1" = 200'

0' 200' 400' 600'

REPRESENTS 5-YEAR FLOOD PLAIN

State Line Engineering, LLC

4901 Picker Drive
Pylesville, Maryland 21132
Phone: 443-324-1641 Fax: 410-803-1299

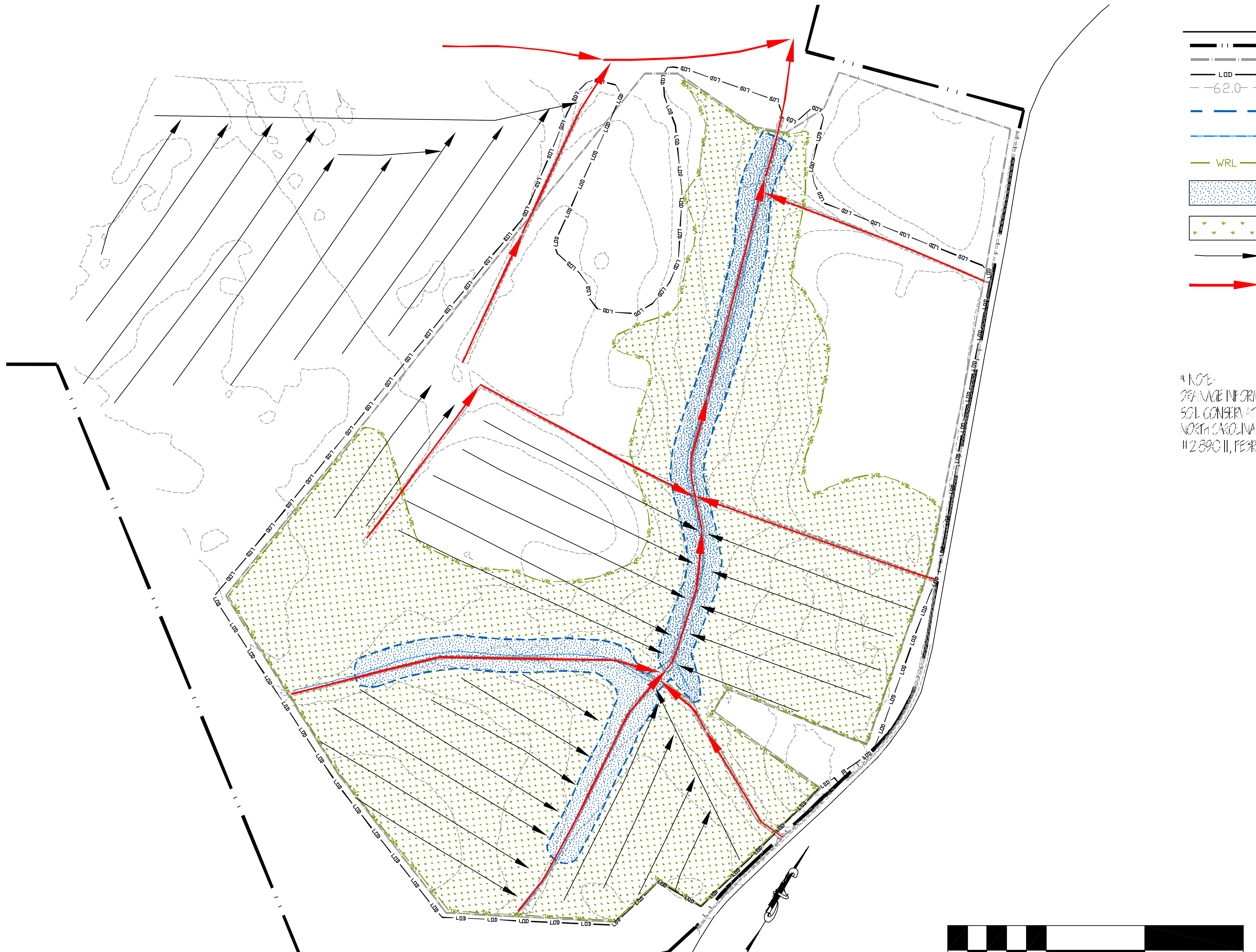
POWELL SITE MITIGATION PROJECT
PROPOSED FLOOD STUDY PLAN

BERTIE COUNTY NORTH CAROLINA

REVISIONS	DRAWN BY:	DESIGNED BY:	SCALE:
	JPD	JPD	1" = 200'
	DATE: 4/30/08	JOB NO.: 07002	SHEET NO.: 1 OF 1

APPENDIX E

-DRAINAGE TILES AND DITCH EXHIBITS-



MAN MADE DRAINAGE FEATURES EXHIBIT
SCALE 1" = 300'

LEGEND

- PROPERTY LINE
- EASEMENT BOUNDARY
- LOD — LIMITS OF DISTURBANCE
- 62.0 — EXISTING GRADE
- APPROXIMATE SWAMP RUN LIMIT
- PROPOSED "SWAMP RUN" CENTERLINE
- WRL — PROPOSED "SWAMP RUN" CENTERLINE
- PROPOSED "SWAMP RUN" RESTORATION
- PROPOSED RIVERINE WETLAND RESTORATION
- DRAINAGE TILE FLOW PATTERN
- EXISTING DRAINAGE DITCH FLOW PATTERN

* NOTE:
DRAINAGE INFORMATION BASED FROM USDA SOIL CONSERVATION SERVICE BERTIE COUNTY NORTH CAROLINA CONSERVATION PLAN MAP # 21890 II, FEBRUARY 3, 1978

MAN MADE DRAINAGE FEATURES
APRIL 16, 2008

REVISIONS		
DATE:	REVISION:	INITIALS:

POWELL PROPERTY
WETLAND MITIGATION UNITS: 48.4 WMU'S
STREAM MITIGATION UNITS: 3,310 SMU'S
BERTIE COUNTY, NORTH CAROLINA
EEP CONTRACT #: D06063-S

Ecosystem Enhancement PROGRAM

PREPARED BY:
ALBEMARLE RESTORATIONS, LLC
WETLAND RESTORATION, STREAM RESTORATION, & WILDLIFE HABITAT CREATION
404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0249 • FAX (252) 357-4852

SHEET OF

HISTORICAL TILES MAP

Scale: 1" = 500'

4/2008

Drawn By: LMS

POWELL PROPERTY

RIVERINE WETLAND MITIGATION: 48.4 ACRES (48.4 WMU'S)
STREAM RESTORATION: 3,310 LINEAR FEET (3,310 SMU'S)

BERTIE COUNTY, NORTH CAROLINA
CONTRACT #: D06065-B

PREPARED FOR:

ALBEMARLE RESTORATIONS, LLC

WETLAND RESTORATION,
STREAM RESTORATION,
& WILDLIFE HABITAT CREATION

404 COURT STREET • GATESVILLE, NC 27938
(252) 333-0249 • FAX (252) 357-4892

SCALE

0 500' 1000'