

US Army Corps
Of Engineers
Wilmington District

PUBLIC NOTICE

Issue Date: November 16, 2006
Comment Deadline: December 18, 2006
Corps Action ID #: SAW 2006 41354 241

The Wilmington District, Corps of Engineers (Corps) has received an application from the Piedmont Triad Airport Authority (PTAA) seeking Department of the Army (DA) authorization to impact approximately 0.09 acre of wetland and 674 linear feet of stream channels of the jurisdictional waters of an unnamed tributary of Horsepen Creek associated with Federal Aviation Administration (FAA) standards required runway 5R/23L safety improvements including a runway threshold relocation and Glidescope antenna array construction located at the existing Piedmont Triad International Airport (PTIA) facility off of Airport Parkway, in Greensboro, Guilford County, North Carolina.

Specific plans and location information are described below and shown on the attached plans. This Public Notice and all attached plans are also available on the Wilmington District Web Site at www.saw.usace.army.mil/wetlands

Applicant: Mr. Mickie Elmore
Piedmont Triad Airport Authority
P.O. Box 35445
Greensboro, NC 27425

Agent: Mr. Richard Darling
Baker and Associates
7800 Airport Center Drive, Suite 100
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Authority

The Corps will evaluate this application and decide whether to issue, conditionally issue, or deny the proposed work pursuant to applicable procedures of Section 404 of the Clean Water Act.

Location

The proposed project site is located on the northern end of the existing runway 5R/23L of the PTIA facilities adjacent to Airport Parkway, west of Greensboro, in Guilford County, North Carolina. Coordinates (in decimal degrees) for the site are 36.1111 North, 79.9208 West. The

site is adjacent to an unnamed tributary of Horsepen Creek in the Cape Fear River Basin (8-Digit Cataloging Unit 03030002).

Existing Site Conditions

General land use in the vicinity of the project site is the existing airport operation facilities. The surrounding high ground is open with scrub vegetation located around the small unnamed stream channels. One jurisdictional stream is present within the project site's boundaries, an unnamed tributary of Horsepen Creek. The stream channel has been degraded by the surrounding airport operations. It has already been segmented by an existing 618 linear foot 48" culvert and another existing 50 linear foot 36" culvert.

Applicant's Stated Purpose

As stated by the applicant, the purpose of the project is for the applicant to construct facilities that comply with Federal Aviation Administration (FAA) standards for required runway 5R/23L safety improvements including a runway threshold relocation and Glidescope antenna array construction located at the existing Piedmont Triad International Airport (PTIA) facility off of Airport Parkway, in Greensboro, Guilford County, North Carolina.

Project Description

As a result of unintended aircraft overruns (travel beyond available runway length) of departing and arriving aircraft on runways nationwide, and loss of life associated with those overruns, Federal Order 5200.8 was issued by the United States Congress in 1999. This order requires that all certificated airports in the United States provide a runway safety area (RSA) that meets FAA standards for the designated service category of each runway on the airport. In the case of Runway 5R/23L at PTIA, RSA's 500 feet wide and 1,000 feet long are required at both ends of the runway. The purpose of the proposed work is to address FAA RSA requirements while maintaining runway lengths and operational capabilities.

The proposed project involves relocation of the northern end of runway 5R/23L threshold to provide for a standard RSA meeting FAA design requirements. The runway relocation will result in permanent unavoidable impacts to approximately 0.09 acres of jurisdictional wetland and approximately 148 linear feet of channel of the jurisdictional waters of an unnamed tributary of Horsepen Creek.

As part of the instrument landing system at PTIA, a Glideslope antenna array is to be situated to one side of the runway touchdown zone of Runway 5R/23L. The Glideslope signal is transmitted via radio frequency with the centerline of the signal being arranged to define a Glideslope for the approach of landing aircraft. In addition to the Glideslope antenna, the relocation of the perimeter road is proposed around the relocated runway in order for service vehicles, such as fuel and maintenance trucks, to traverse the airport without leaving the Air

Operations Area (AOA) while remaining out of the operational area of aircraft. Construction of the Glideslope antenna and relocated perimeter road in compliance with FAA Advisory Circular 150/5300-13 would result in permanent unavoidable impacts to approximately 526 linear feet of stream channel of an unnamed tributary to Horsepen Creek.

A total of 0.21 acres (comprised of 0.09 acres of wetlands and 674 linear feet of stream channel) of the jurisdictional waters of Horsepen Creek would be impacted by the proposed project. These potential unavoidable impacts are proposed to be mitigated by creating 0.6 acres of wetlands (for 0.10 credit at 6:1 "creation" ratio) and restoring 1,123 linear feet of stream channel (for 702 credits at 1.6:1 "off-site" ratio). (See attached "Wetland and Stream Mitigation Plan" for details.)

Other Required Authorizations

This notice and all applicable application materials are being forwarded to the appropriate State agencies for review. The Corps will generally not make a final permit decision until the North Carolina Division of Water Quality (NCDWQ) issues, denies, or waives State certification required by Section 401 of the Clean Water Act (PL 92-500). The receipt of the application and this public notice combined with the appropriate application fee at the NCDWQ Central Office in Raleigh will constitute initial receipt of an application for a 401 Water Quality Certification. A waiver will be deemed to occur if the NCDWQ fails to act on this request for certification within sixty days of the date of the receipt of this notice in the NCDWQ Central Office. Additional information regarding the Clean Water Act certification may be reviewed at the NCDWQ Central Office, 401 Oversight and Express Permits Unit, 2321 Crabtree Boulevard, Raleigh, North Carolina 27604-2260. All persons desiring to make comments regarding the application for certification under Section 401 of the Clean Water Act should do so in writing delivered to the North Carolina Division of Water Quality (NCDWQ), 1650 Mail Service Center, Raleigh, North Carolina 27699-1650 Attention: Ms Cyndi Karoly by December 11, 2006.

Essential Fish Habitat

This notice initiates the Essential Fish Habitat (EFH) consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act. The Corps' initial determination is that the proposed project will not adversely impact EFH or associated fisheries managed by the South Atlantic or Mid Atlantic Fishery Management Councils or the National Marine Fisheries Service.

Cultural Resources

The Corps has consulted the latest published version of the National Register of Historic Places and is not aware that any registered properties, or properties listed as being eligible for inclusion therein are located within the project area or will be affected by the proposed work. Presently,

unknown archeological, scientific, prehistoric, or historical data may be located within the project area and/or could be affected by the proposed work.

Endangered Species

The Corps has reviewed the project area, examined all information provided by the applicant and consulted the latest North Carolina Natural Heritage Database. Based on available information, the Corps is not aware of the presence of species listed as threatened or endangered or their critical habitat formally designated pursuant to the Endangered Species Act of 1973 (ESA) within the project area. A final determination on the effects of the proposed project will be made upon additional review of the project and completion of any necessary biological assessment and/or consultation with the U.S. Fish and Wildlife Service."

Evaluation

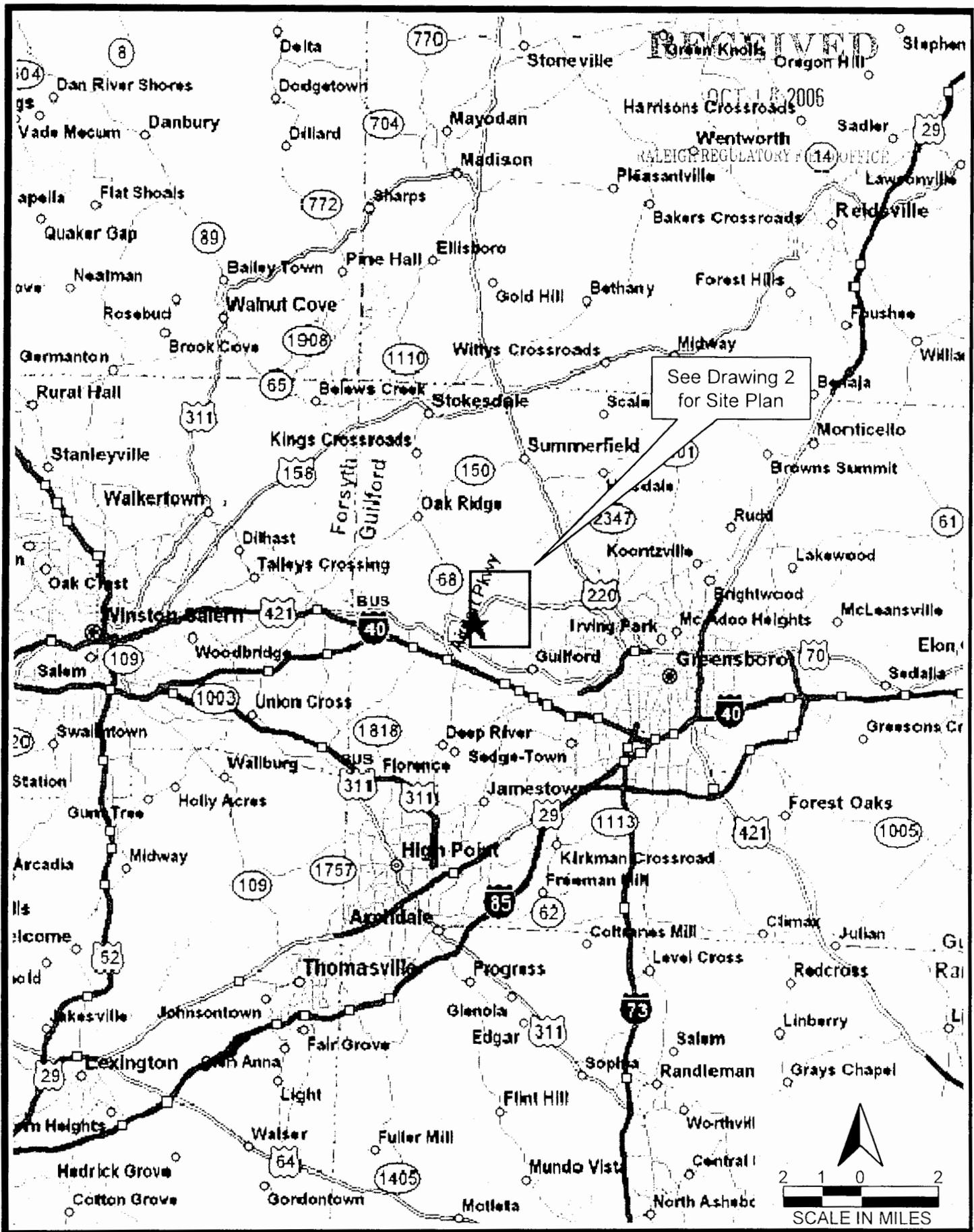
The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit, which reasonably may be expected to accrue from the proposal, must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof: among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, flood plain values (in accordance with Executive Order 11988), land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people. For activities involving the discharge of dredged or fill materials in waters of the United States, the evaluation of the impact of the activity on the public interest will include application of the Environmental Protection Agency's 404(b)(1) guidelines.

Commenting Information

The Corps of Engineers is soliciting comments from the public; Federal, State and local agencies and officials, including any consolidate State Viewpoint or written position of the Governor; Indian Tribes and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment (EA) and/or an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA). Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider the application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing. Requests for a public hearing shall be granted, unless the District Engineer determines that the issues raised are insubstantial or there is otherwise no valid interest to be served by a hearing.

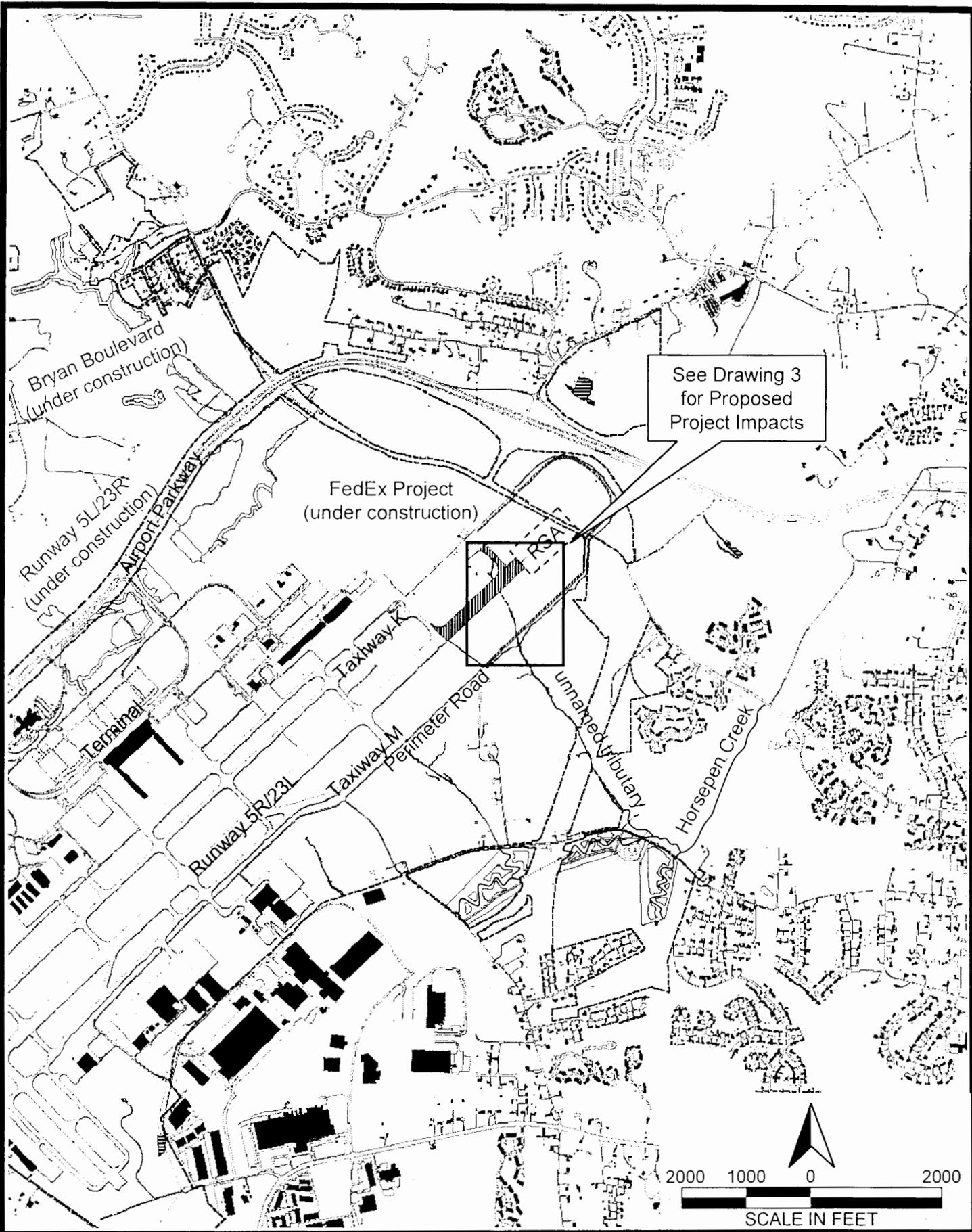
Written comments pertinent to the proposed work, as outlined above, will be received by the Corps of Engineers, Wilmington District, until 5pm, December 18, 2006. Comments should be submitted to John Thomas, Raleigh Regulatory Field Office, 6508 Falls of the Neuse Road, Suite 120, Raleigh, NC 27615.



Section 404/401 Permit
Runway 5R RSA Improvements

VICINITY MAP

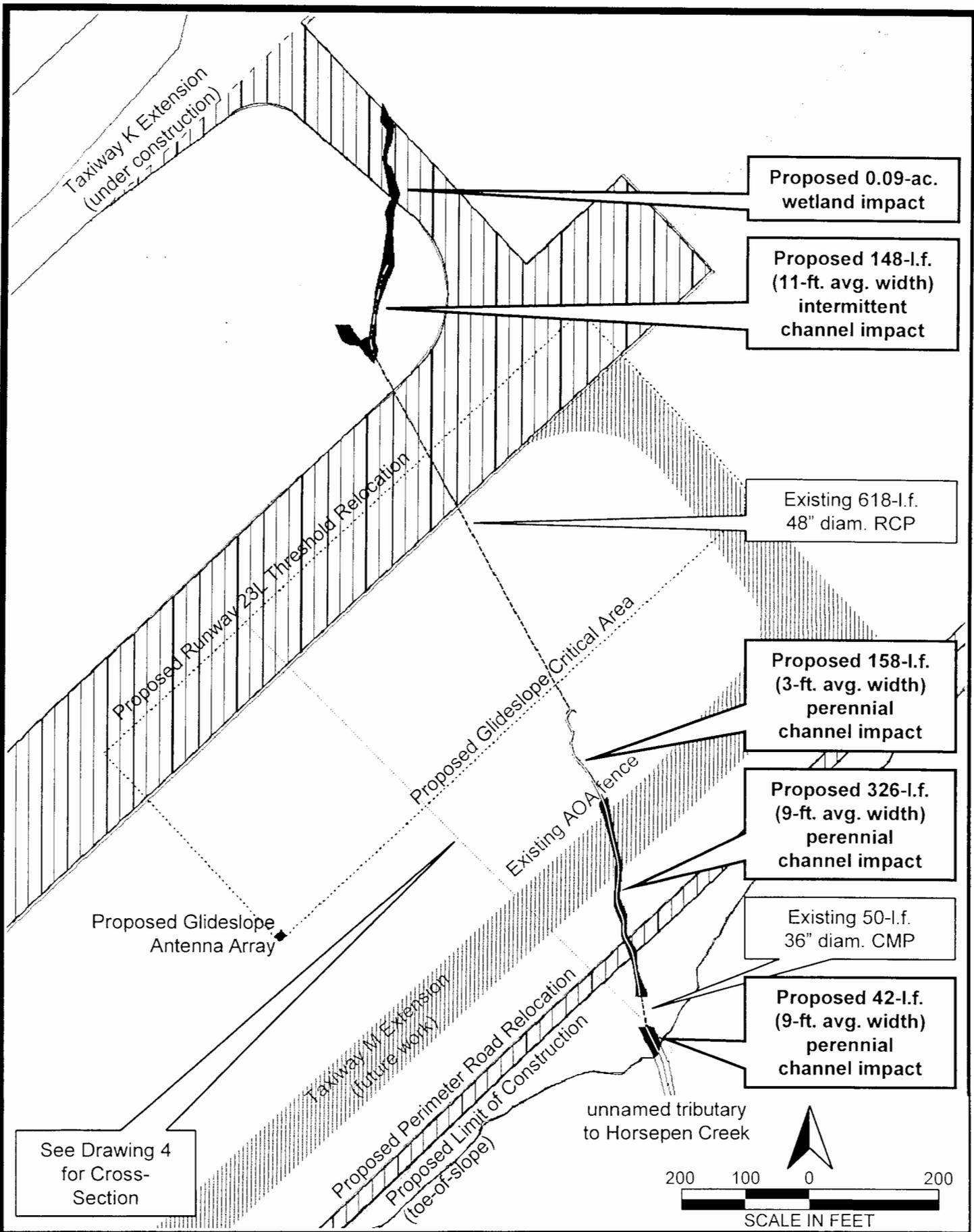
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Section 404/401 Permit
Runway 5R RSA Improvements

SITE PLAN

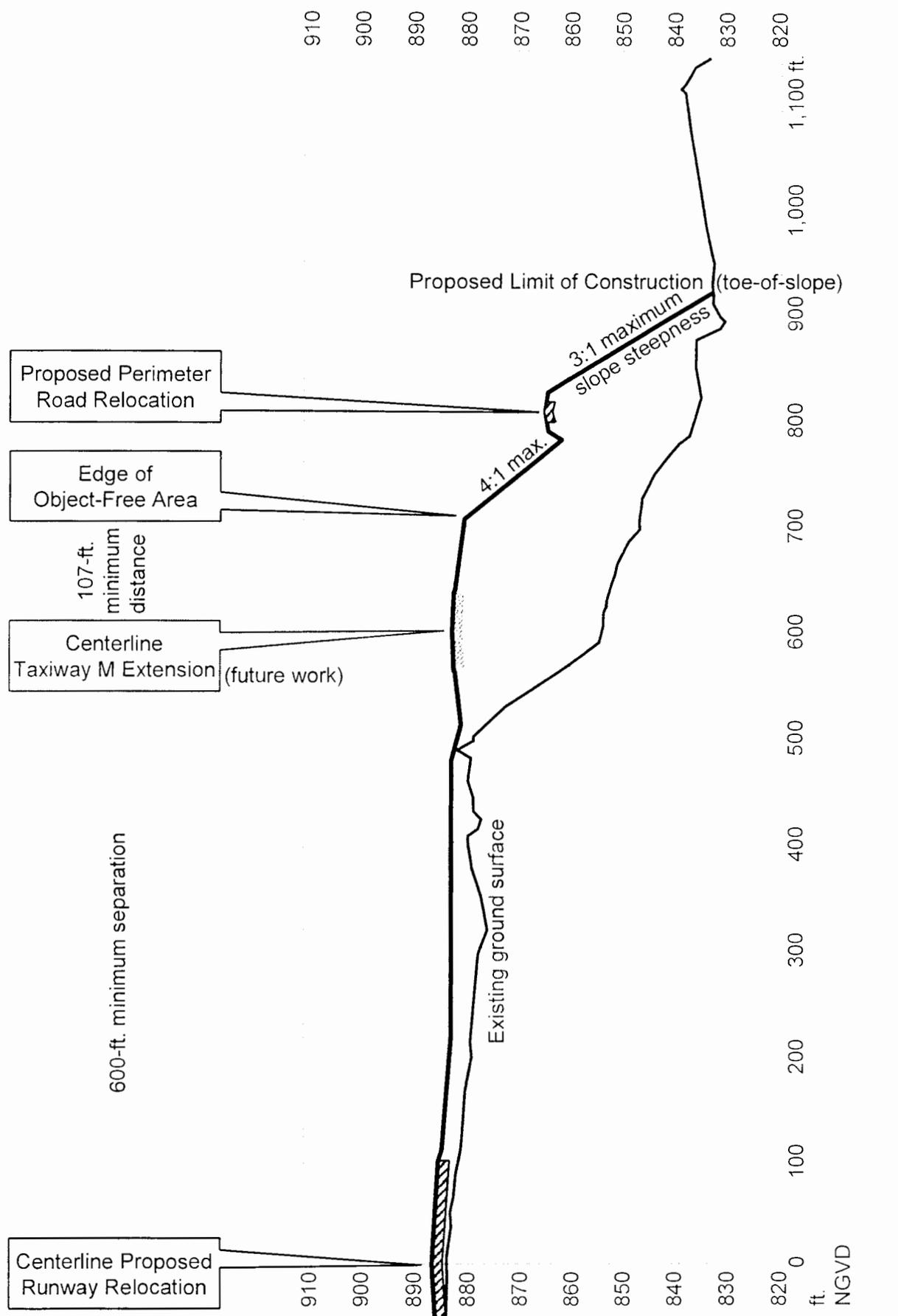
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Section 404/401 Permit
Runway 5R RSA Improvements

PROJECT IMPACTS

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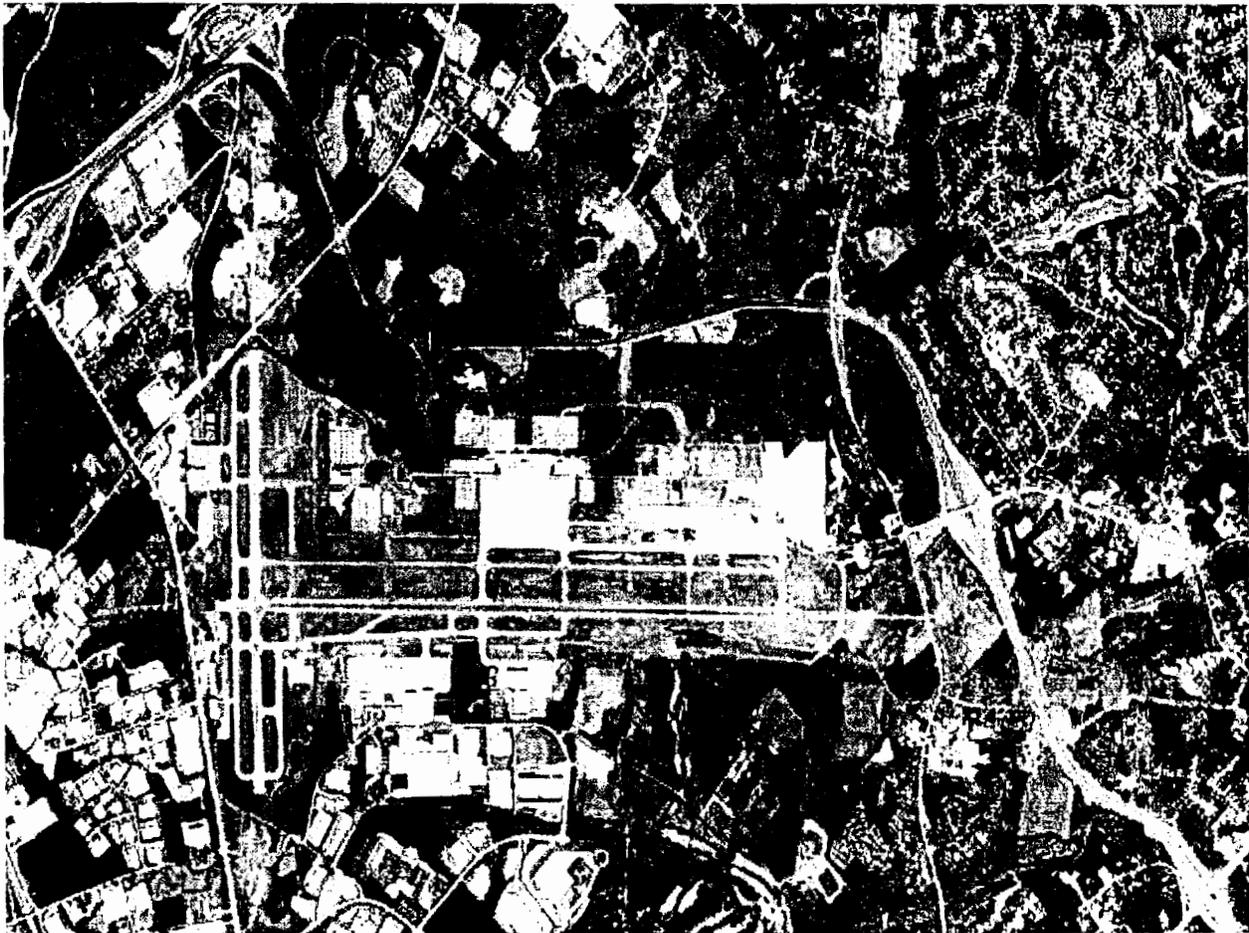
OCT 18 2006

RALEIGH REGULATORY FIELD OFFICE



**WETLAND AND STREAM MITIGATION PLAN
RUNWAY 5R SAFETY AREA AND RELATED IMPROVEMENTS**

**PIEDMONT TRIAD INTERNATIONAL AIRPORT
GREENSBORO, NORTH CAROLINA**



Prepared by:

Baker

Baker and Associates
Greensboro, NC

October 6, 2006

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1 Introduction

The Piedmont Triad Airport Authority (PTAA) is applying for Individual Permit and Water Quality Certification under Sections 404 and 401 of the Clean Water Act and 15A NCAC 2H.0500 for unavoidable impacts to jurisdictional waters of the U.S. in conjunction with construction of the Runway 5R Runway Safety Area (RSA) and related improvements at Piedmont Triad International Airport (PTIA). For safety reasons, Federal Order 5200.8 mandates that PTIA provide RSAs for Runway 5R/23L of 500 feet wide and 1,000 feet long at both ends.

The Runway 5R RSA project is currently the subject of an Environmental Assessment (EA) sponsored by the Federal Aviation Administration (FAA) consistent with the National Environmental Policy Act of 1969 (NEPA). Through the NEPA process, FAA has documented practicable project alternatives and impact minimization prior to addressing compensatory mitigation (sequencing).

Unavoidable project impacts to jurisdictional waters of the U.S. including wetlands are proposed to be mitigated through creation of additional wetlands on-site and restoration of off-site stream channel. The mitigation specific to the Runway 5R RSA impacts is proposed to be located within the recorded conservation easement boundaries for the "FedEx" project (Runway 5L/23R, New Overnight express Air Cargo Sorting and Distribution Facility, and Associated Developments at PTIA, permitted under U.S. Army Corps of Engineers [USACE] Action ID 200021655 and North Carolina Department of Environment and Natural Resources [NCDENR] Division of Water Quality [DWQ] Water Quality Certification No. 3428). The additional wetland creation acreage and stream restoration linear footage proposed as mitigation for the Runway 5R RSA project is beyond that required under the permits issued for the FedEx project and was not contemplated therein. The area dedicated in the conservation easements does, however, include space for the additional mitigation sites and the proposed construction, maintenance, and monitoring of same is consistent with the governing restrictive covenants.

1.1 Site Location

The PTIA is located northwest of the intersection of Market Street and West Friendly Avenue near Greensboro in western Guilford County, North Carolina (Figure 1). The airport is north of Interstate Highway 40, east of State Route 68, north of West Market Street, northwest of Friendly Avenue, and southwest of Old Oak Ridge Road. The proposed project impacts are located primarily within the restricted Air Operations Area (AOA) at the northeast end of Runway 5R/23L.

Proposed mitigation is located on-site (designated BC-2a) adjacent to the permitted Brush Creek wetland creation area (BC-2) and off-site (designated CFa) at the Causey Farm (CF) permitted stream restoration area. Both on and off-site mitigation areas are located within the same 8-digit USGS Hydrologic Unit (HUC 03030002) as the proposed impacts. Both sites are adjacent to existing mitigation areas required and permitted by USACE and DWQ in conjunction with the FedEx project. The proposed additional wetland creation acreage and stream restoration linear footage were not specified in the permits issued for that project although they are included within the recorded conservation easement areas.



Figure 1 Mitigation Vicinity Map

1.2 Project Purpose and Need

As a result of unintended overruns (aircraft travel beyond available runway length) of departing and arriving aircraft on runways nationwide, and loss of life associated with those overruns, Federal Order 5200.8 was issued by the United States Congress in 1999. This order requires that all certificated airports in the U.S. provide a RSA that meets FAA standards for the designated service category of each runway on the airport. In the case of Runway 5R/23L at PTIA, RSAs 500 feet wide and 1,000 feet long are required at both ends of the Runway.

The proposed project involves relocation of the Runway 5R threshold to provide for a standard RSA meeting FAA design requirements. The Runway 23L threshold will be relocated in order to maintain the existing runway length and provide a runway threshold that coincides with the full length of Taxiway K. As part of the instrument landing system at PTIA, a Glideslope antenna array is to be situated to one side of the runway touchdown zone of Runway 23L. The Glideslope signal is transmitted via radio frequency with the centerline of the signal being arranged to define a glide slope for the approach of landing aircraft. In addition to the Glideslope antenna, a service road is proposed around the perimeter of the relocated runway in order for service vehicles, such as fuel and maintenance trucks, to traverse the airport without leaving the AOA while remaining out of the operational area of aircraft.

1.3 Impact Avoidance

Avoidance of impacts to the wetland and upper stream components of the delineated jurisdictional waters from the proposed RSA improvements is not possible due to the requirement for straight runway. Construction of the Glideslope antenna and the perimeter road are constrained by location requirements specified in FAA Advisory Circular 150/5300-13 for Airport Design, as follows:

- The location of the Glideslope antenna must be on the Southeast side of the existing Runway 23L and it must be 1000 feet from the end and a minimum of 400 feet from the centerline of the proposed relocated runway. (Location of the Glideslope antenna on the Northwest side of existing Runway 23L would interfere with airfield operations, especially aircraft movements to and from the entrance to Taxiway K)
- The area in front of the Glideslope antenna must be graded relatively flat in order to reduce the amount of reflective surfaces which may interfere with the transmission of the Glideslope signal
- The Ultimate Airport Development Plan requires the extension of Taxiway M out to the proposed end of Runway 23L at a 600-foot separation from the runway centerline
- The perimeter service road on the Southeast side of Runway 23L can be no closer than 400 feet from the runway centerline.
- Relocation of the perimeter service road must allow for the extension of Taxiway M and remain clear of the Glideslope critical area in order to eliminate additional future work or impacts
- The grade from the centerline of Taxiway M to the centerline of Runway 23L must not exceed 1.5%

The ratios applicable to each mitigation type are specified by DWQ for wetlands at 15A NCAC 2H.0506(h)(7) and streams in the May 10, 2000 Interim Internal DWQ Policy on Stream Mitigation Options. General wetland mitigation ratio guidance for USACE is provided in the January 16, 2001 EPA Region 4 Compensatory Mitigation Policy. These general EPA wetland mitigation ratios were adjusted for streams and location (on-site vs. off-site). A functional assessment relative to off-site stream and riparian buffer restoration justified the application of the 1.6:1 stream restoration ratio (Law, 2001) where DWQ policy specifies a 1:1 ratio and USACE usually defers to a 2:1 ratio in the absence of a specific study.

The objective of the wetland and stream mitigation plan is to describe the **creation** of approximately **0.6 ac.** of wetlands and the **restoration** of approximately **1,123 l.f.** of stream channel to mitigate the anticipated 0.09 ac. and 674 l.f. project impacts, respectively. The mitigation credits proposed are calculated by applying the appropriate ratios as follows:

$$\begin{aligned} 0.6 \text{ ac.} \div 6 &= 0.10 \text{ credit (wetland)} \\ 1,123 \text{ l.f.} \div 1.6 &= 702 \text{ credit (stream)} \end{aligned}$$

This mitigation plan proposes on-site creation of wetlands and off-site restoration of stream channel within the same 8-digit North Carolina Hydrologic Unit (03030002) as the proposed project impacts. This plan follows guidelines for compensatory mitigation pursuant to EPA Region 4 Compensatory Mitigation Policy; Interim, Internal DWQ Policies on Stream Mitigation Options; and North Carolina Wildlife Resources Commission (WRC) Guidelines for Stream Relocation and Restoration in North Carolina. Items on the USACE "Compensatory Mitigation Planning Checklist" and the "Stream Channel Mitigation Planning Checklist" are addressed within the plan also.

2 Brush Creek Wetland Creation

Wetland creation is the establishment of a wetland or other aquatic resource where one did not formerly exist. Wetland creation is proposed at sites where it cannot be conclusively documented that wetlands previously existed.

The proposed wetland creation (BC-2a) is located on PTAA property along the western edge of mitigation area BC-2 specified in USACE Action ID 200021655. This area is southeast of Airport Parkway and northwest of the Airport Terminal (Figure 2). The proposed BC-2a area extends into the previously outlined upland buffer area, which in-turn will be re-aligned along the western edge of BC-2a, in order to provide contiguous vegetative buffer area of appropriate size and configuration.

Implementation of the on-site wetland mitigation will be approached in phases including final design, solicitation of bids, contractor selection, installation of erosion control devices, wetland construction, soil amendment (if needed), and vegetation installation.

Since wetland creation will be designed to closely integrate with natural site features, rather than grossly altering them, plans will be finessed during construction to meet grades, merge hydrological dynamics, and respond to variations in soil. The wetland material requirements described herein may require modification during actual construction to produce conditions most amenable to establishing stable, natural systems.

Mitigation efforts at the BC-2a site will involve limited re-grading and excavation in order to increase the lateral extent of the adjacent Brush Creek wetland. Existing wetland elevations will be matched during this effort, in order to allow hydrologic input from periodic overbank flooding of Brush Creek. To limit drainage and enhance wetland conditions in the re-graded area, clay amendments, compaction, and wetland soil top-dressing may be utilized. Proposed grade elevations will closely match existing wetland contours, to enhance connectivity and provide a gradual transition to adjacent upland buffer areas. Wetland and buffer planting efforts at this site will be similar to those used at BC-1, 2, and 3 and will be based on Brush Creek reference wetland conditions. During construction, erosion control measures will be implemented to protect the adjacent Brush Creek wetlands from potential sedimentation.

2.1 Existing Conditions

The Brush Creek wetland creation site is located northwest of the existing airport facilities along the southeast side of Airport Parkway, approximately a mile northwest of the project impact area (see Figure 2). The site is currently an active borrow area (Figure 3), being used as a fill source for FedEx Project components and subject to an Erosion and Sedimentation Control Permit. See Appendix A for available pre-existing site maps including USGS topographic quadrangle and USDA NRCS Soil Survey.

2.1.1 Topography

The pre-existing topography of the BC-2a site ranged in elevation from 850 feet above National Geodetic Vertical Datum (NGVD) to 800 feet above NGVD according to the USGS map (Appendix A). This site was characterized by slightly rolling terrain that generally sloped southward from the existing roadway grade. Moderate undulations in the landscape averaged one to two feet elevation difference. Existing topography is currently changing but will be stabilized at an elevation averaging about 810 feet NGVD which is about 10 feet above the adjacent wetland preservation area.

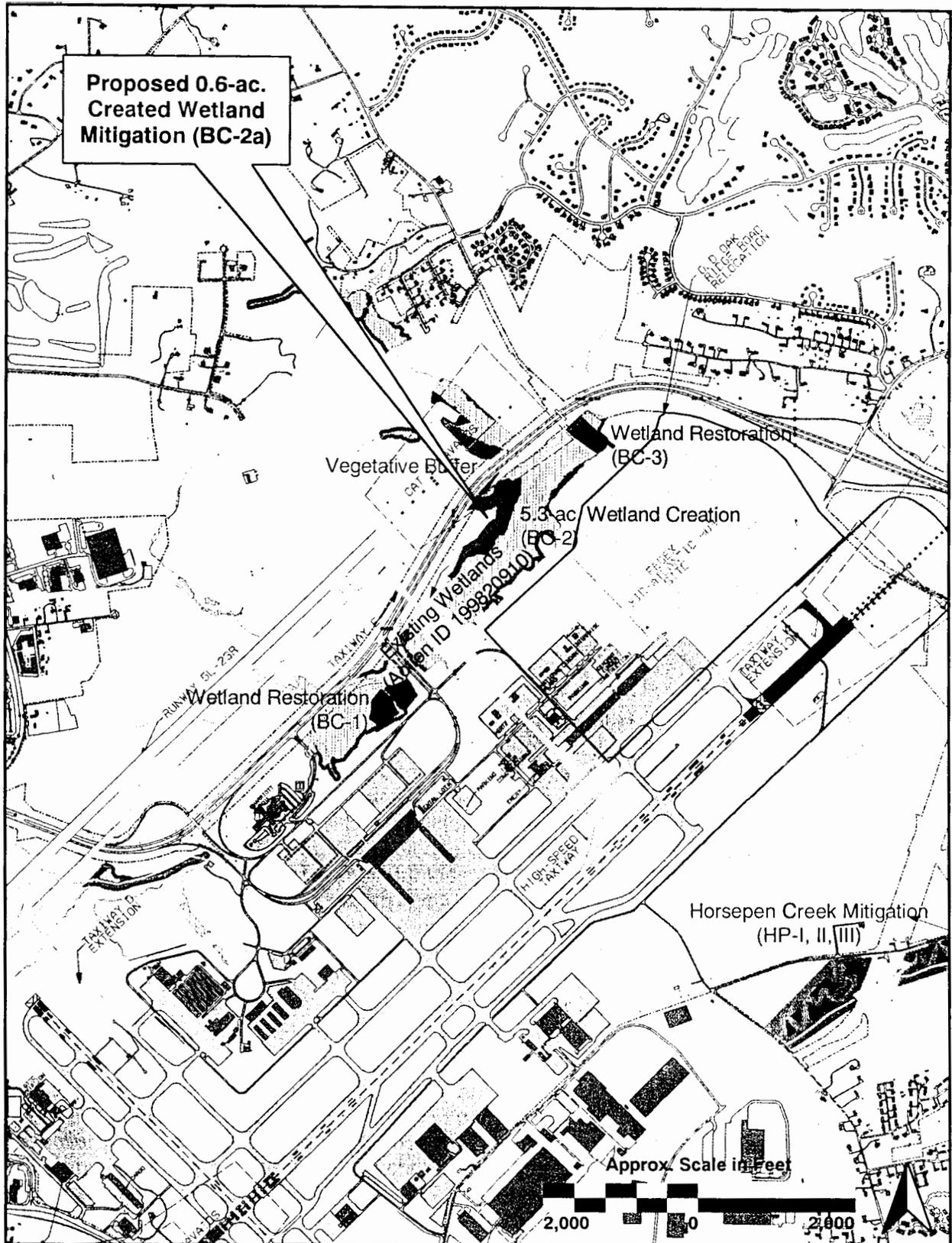


Figure 2 BC-2a Location



Figure 3 BC-2a Site, facing Northeast from Borrow Area

2.1.2 Soils

The BC-2a site is mapped as Madison clay loam, 15 to 25 percent slopes, eroded (McE2). According to the Soil Survey of Guilford County, North Carolina, this well drained soil is on long narrow upland side slopes adjacent to streams ranging from 3 to 60 acres in size. Typically, the surface layer is reddish brown clay loam about 5 inches thick. The subsoil is 29 inches thick; the upper part is red clay, and the lower part is mottled red clay loam. The underlying material, to a depth of 80 inches, is mottled reddish yellow sandy clay loam in the upper part and mottled reddish yellow sandy loam on the lower part. Most of the acreage of this soil is forested. Slope, runoff, erosion, permeability, and mica content are the main limitations in the use and management of this soil. The current soils are being excavated as a fill source for the FedEx project. After excavation down to adjacent wetland elevations under the proposed FedEx mitigation plan, Site BC-2a will be excavated adjacent to the permitted BC-2 site and the existing substrate may be supplement with hydric soils.

2.1.3 Vegetation

Prior to permitted impacts (Borrow Area B for the Taxiway E component of the FedEx project), the BC-2a area was dominated by sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and red cedar (*Juniperus virginiana*) with some tulip poplar (*Lyriodendron tulipifera*) closer to the wetlands. In the area nearest Airport Parkway, the trees are primarily red maple, sweet gum, and red (*Quercus falcata*) and white oaks (*Q. alba*) with significant areas of maintained lawn (Figure 4).

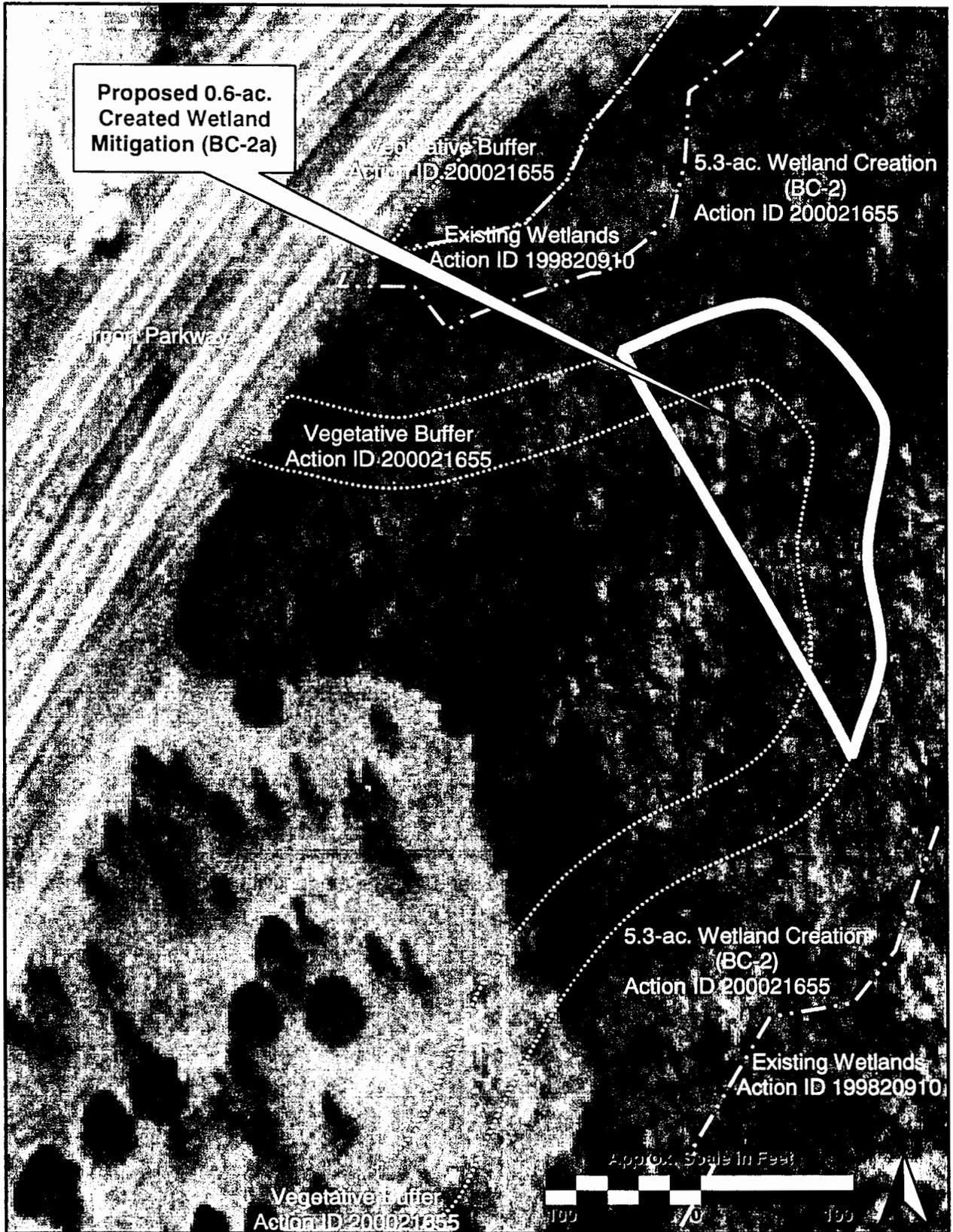


Figure 4 BC-2a Existing Conditions

2.1.4 Hydrology

A significant portion of the Brush Creek basin drains the PTIA property and the Stormwater Management Plan includes several stormwater detention facilities for the FedEx project. These and pre-existing stormwater management facilities provide some degree of control of the local hydrology. The watershed includes of approximately 4.7 square miles with drainage generally from west to east towards Lake Brandt.

The Stormwater Management Plan (Baker, 2001) provides the basis for the hydrologic consideration for the sub-basins draining PTIA property along its northwest boundaries. Available reports and data relevant to the local hydrology of the site including local and Federal sources (USGS, FEMA, Guilford County Topographic Maps) were reviewed. These data and reports, in addition to field data collected at the site, are summarized with respect to local hydrologic conditions for the site in the Wetland and Stream Mitigation Plan (Law, 2001) for the FedEx project. Flow duration analyses for the growing season and a water budget for the proposed wetland creation at Brush Creek also has been detailed therein.

2.1.5 Water Quality

DWQ monitors Brush Creek in Guilford County at the SR-2136 (Fleming Road) crossing. Waters of Brush Creek are classified by DWQ as WS-III NSW, with a use rating assessment of "Partially Supporting." The WS-III classification indicates that Brush Creek is part of a Water Supply Watershed with low to moderate development. The NSW classification of Brush Creek further indicates that surface waters within this drainage basin have been determined to be "Nutrient Sensitive Waters." This is a supplemental classification for waters that need additional nutrient management in order to minimize excessive growth of microscopic or macroscopic vegetation. DWQ benthic macroinvertebrate sampling for Brush Creek in 1998 resulted in a "Fair" bioclassification rating resulting in the use support rating of "Partially Supporting". In-stream habitat in this system has been described as predominately sand with no riffles or pools but with favorable leaf-pack habitat. Potential sources of the cause of impairment are believed to be habitat degradation and urban runoff / storm sewers.

2.1.6 Disposition of Property

The Brush Creek mitigation site is owned by PTAA and is located within an area dedicated as Conservation Easement in perpetuity. The conservation easement has been recorded and declares conservation purposes, prohibited and restricted activities, permitted activities (including wetland creation), enforcement, and remedies.

2.2 Reference Site

The wetland reference site for the BC-2a creation is the adjacent preservation area of jurisdictional Brush Creek bottomland hardwood forest. The vegetation in the adjacent Brush Creek wetland preservation area can be generally described as a Bottomland Hardwood Forest community type. The canopy is well-developed and is dominated by tulip tree (*Lyriodendron tulipifera*), sweetgum (*Liquidambar styraciflua*), and red maple (*Acer rubrum*) over a subcanopy of flowering dogwood (*Cornus florida*), box elder (*Acer negundo*), and black cherry (*Prunus serotina*). The shrub layer is sparse, becoming more developed along the edges of the Bottomland Hardwood Forest community and includes black willow (*Salix nigra*), elderberry (*Sambucus canadensis*), silky willow (*Salix sericea*), silky dogwood (*Cornus amomum*), and arrow-wood (*Viburnum dentatum*). The herbaceous layer is fairly well developed and is dominated by jewelweed (*Impatiens capensis*), softstem bulrush (*Scirpus validus*), soft rush (*Juncus effusus*), Japanese honeysuckle (*Lonicera japonica*), and greenbrier (*Smilax rotundifolia*).

2.3 Erosion Control and Stabilization

Upon completion of grading operations, erosion control fabric and/or seeding will be applied to areas susceptible to erosion. Graded side slopes will be stabilized with a native, non-invasive, herbaceous seed mixture to control erosion. Soil amendments will be used sparingly to avoid nutrient loading in the adjacent stream channels, and fertilizer will not be applied within 25 feet of a stream channel. Slow-release fertilizers or slow release tablets may be included in the planting holes for woody plants only. Particular attention will be paid to ensuring protection of existing Brush Creek wetland areas from potential sedimentation impacts. Although the appropriate erosion and sedimentation (E&S) permits have already been issued by the NCDENR Division of Land Resources (DLR) for soil removal at BC-2a (Permit GUILF-2005-001), an additional E&S permit application specific to the BC-2 (including BC-2a) mitigation project may be submitted to DLR prior to initiation of site mitigation earthwork, if required.

2.4 Grading

Rough grading of the BC-2a creation area has commenced under the FedEx project as Taxiway E Borrow Area B and the E&S permit has been issued for this excavation. As needed, the soils will be left in place at the subgrade elevation or over-excavated and back-filled with clay-amended soil. Excavated hydric soils from impacted wetland areas, along with meiofauna, mycorrhizae, and associated seed bank, may be used to "top-dress" soils in the created wetland area. This mitigation site will be excavated to a depth of approximately 0.5 feet below final specified grade. Approximately, 0.5 feet of stockpiled topsoil will be uniformly distributed and spread to bring the site to final grade. The grading contractor will provide the appropriate depth of topsoil throughout the new wetland area. Topsoil will be graded to lines and elevations indicated on final design drawings and specifications (Figure 5). Levels, profiles, and contours of subgrades will be maintained. Stones, roots, trash, and other debris that would significantly interfere with wetland function will be removed.

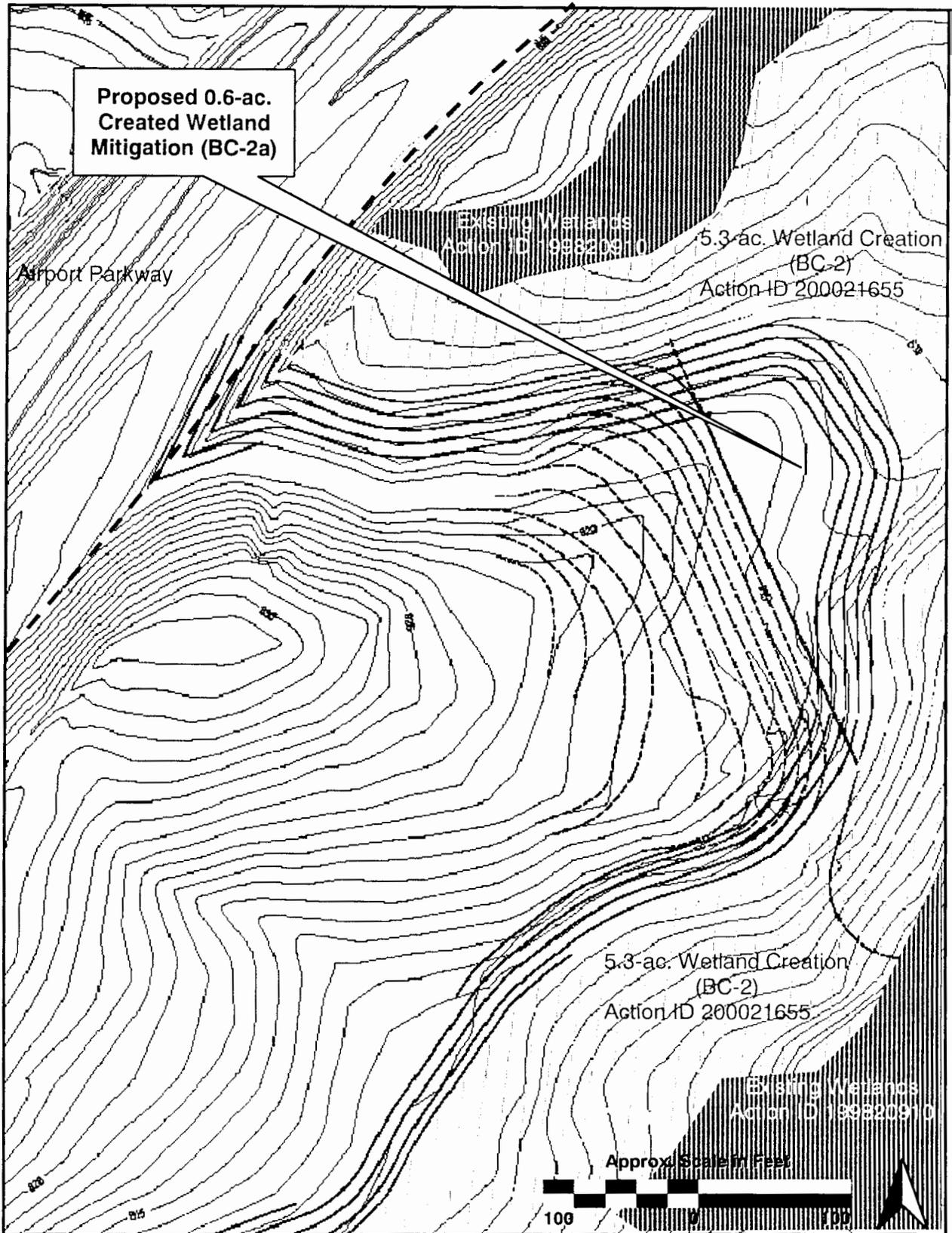


Figure 5 BC-2a Wetland Creation Grading

2.5 Hydrology

During FedEx Project planning, drainage sub-basins contributing flow to the affected portions of the Brush Creek wetlands were delineated and their run-off characteristics were developed. These runoff estimates were then utilized to assess potential hydrologic inputs to the wetland system and help determine target wetland grade elevations. The goal of grading and soils management at the proposed Brush Creek site is to produce saturation for a minimum of 12.5% of the growing season. The proposed mitigation effort will specifically target the removal of fill material along with limited grading to expand the extent of the existing Brush Creek wetlands. Due to the presence of existing adjacent wetlands, it is anticipated that the created wetlands will experience appropriate saturation. Variations in micro-topography will produce a mosaic interspersed of wetter and dryer areas. This site will be hydrologically supported by a combination of groundwater interception, direct precipitation, and periodic flooding from Brush Creek.

2.6 Planting

The Piedmont Bottomland Hardwood Forest community type anticipated for this site will have a goal of 100% canopy coverage, with sparsely vegetated subcanopy and shrub layers, and a diverse herbaceous layer (Figure 6). This coverage will be achieved by initially planting 320 trees per acre (intended to successfully establish 260 stems per acre), as specified in Table 1, and through layers of sparsely scattered vegetation in the subcanopy strata. The planted woody seedlings will also be supplemented with a native herbaceous seed mix. Additional shrubs and woody vines may also be planted at appropriate locations throughout the wetland, if needed. Specific planting species were chosen based on their ability to meet the following set of criteria: 1) native to Guilford County; 2) associated with the Piedmont Bottomland Hardwood Forest community type (per Schafale and Weakley, 1990); and 3) commercial availability. Priority consideration was given to plant species currently existing on site. Many of the species listed have been identified as dominant vegetation in adjoining wetland areas based on data collected during previous wetland delineation efforts.

Table 1 Planting Palette for Piedmont Bottomland Hardwood Forest

TREE SPECIES	COMMON NAME	STATUS ¹	MOISTURE REGIME	FORM
<i>Betula nigra</i>	River birch	FACW	seasonal inundation	bare root
<i>Celtis laevigata</i>	Sugarberry	FACW	seasonal inundation	container
<i>Fraxinus pennsylvanica</i>	Green ash	FACW	seasonal inundation	
<i>Quercus nigra</i>	Water oak	FAC	seasonal inundation	bare root
<i>Q. lyrata</i>	Overcup oak	OBL	saturation - seasonal inundation	container
<i>Q. michauxii</i>	Swamp chestnut oak	FAC	seasonal inundation	
<i>Q. phellos</i>	Willow oak	FACW-		
<i>Q. shumardii</i>	Swamp red oak			
<i>Salix nigra</i>	Black willow	OBL	saturation - seasonal inundation	live stake

¹ U.S. Fish and Wildlife Service wetland indicator status

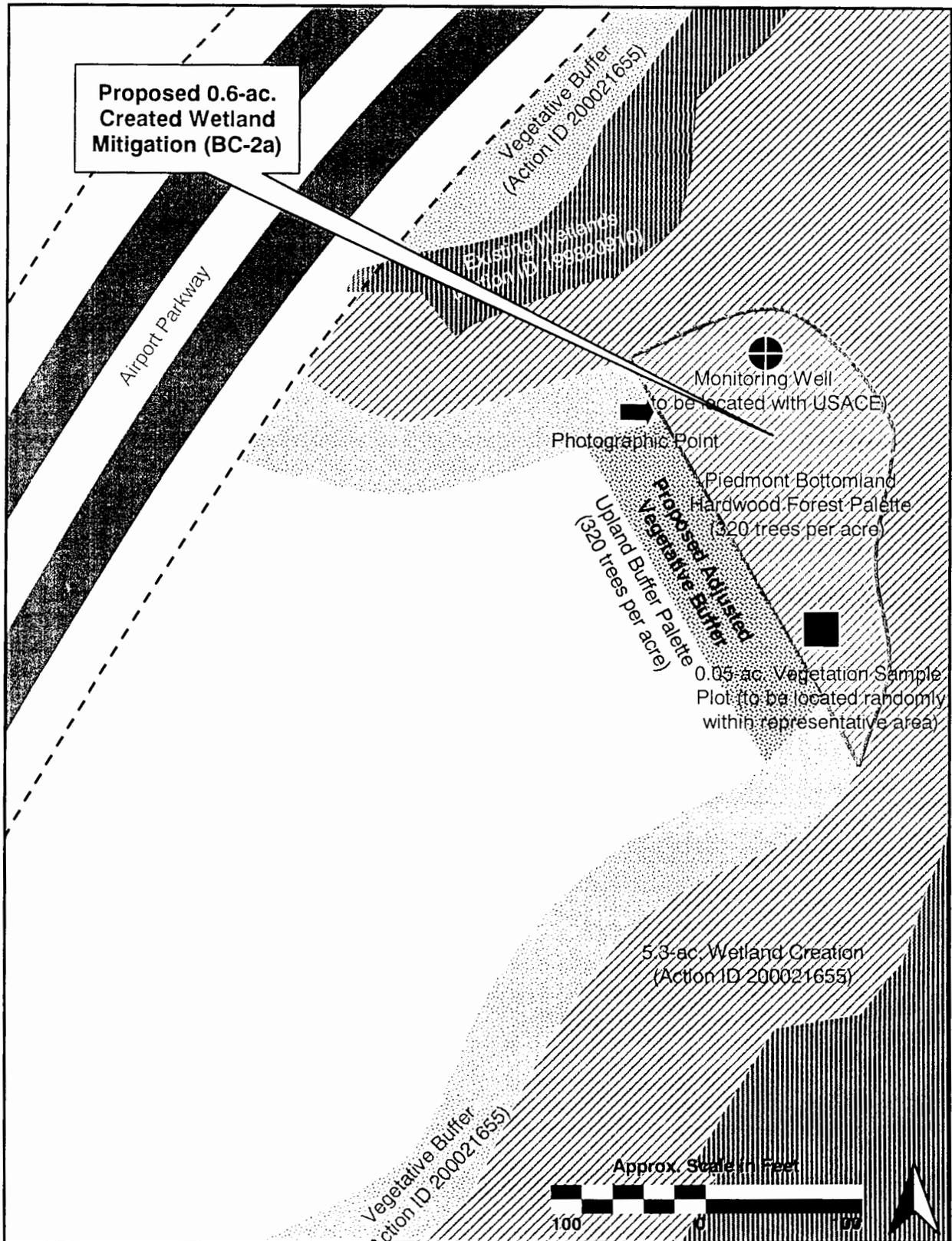


Figure 6 BC-2a Wetland Creation Plan

The created wetland areas will also be seeded with a wetland seed mix at a rate of approximately ten pounds of seed per acre (Table 2). This will be accomplished using either hydroseeding methods or broadcast spreading, combined with straw application. It is anticipated that the seed bank in top-dressed soils will also contribute to overall diversity, but an appropriate low-growing nurse crop may also be used to reduce potential erosion concerns. Mulching materials with noxious weed seed will not be used. Hydromulch may be dyed green and will be applied at a rate of 1,200 lbs./acre. Hay/straw bale mulching for broadcast seeding will use a minimum of 50 lbs./acre.

Table 2 Seed Mix for Wetland Creation

SEED SPECIES	COMMON NAME	MIX	COMMENTS
<i>Andropogon gerardii</i>	Big bluestem	3%	tall grass with bluish blades
<i>Bidens aristosa</i>	Bur-marigold	7%	yellow flowers (Sep.-Oct.)
<i>Chamaecrista fasciculata</i>	Partridge pea	10%	legume with yellow flowers (Jun.-Sep.)
<i>Chasmanthium latifolium</i>	River oats	5%	medium grass (Piedmont version of sea oats)
<i>Coreopsis lanceolata</i>	Lance-leaved coreopsis	5%	yellow flowers (Apr.-Jun.)
<i>Dicanthelium clandestinum</i>	Deertongue tioga	10%	short bunch grass with strong fibrous root system
<i>Helianthus angustifolius</i>	Swamp sunflower	5%	yellow flowers with dark red centers (Jul.-frost)
<i>Lobelia cardinalis</i>	Cardinal flower	5%	red flowers (Jul.-Oct.)
<i>Oenothera biennis</i>	Evening primrose	5%	yellow flowers (Jun.-Oct.)
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	10%	yellow flowers (May-Jul.)
<i>Mimulus ringens</i>	Square-stem monkey flower	5%	lavendar to white flowers (Jun.-Sep.)
<i>Polygonum lapathifolium</i>	Slender smartweed	5%	pale pink-white flowers (Aug.-frost)
<i>P. pennsylvanicum</i>	Pennsylvania smartweed	5%	deep pink flowers (Jul.-frost)
<i>Rudbeckia hirta</i>	Black-eyed susan	5%	yellow flowers with brown centers (May-Jul.)
<i>Schizachryrium scoparium</i>	Little bluestem	10%	medium grass; bluish stems, red-brown after frost
<i>Sorghastrum nutans</i>	Indian grass	5%	tall grass with yellow flowers

Specifications and guidance on plant material are as follows:

1. Plants will be obtained from sources that propagate plants from Piedmont genotypes.
2. Plants will be healthy and disease free, meeting or exceeding the specifications of federal, state and county laws requiring inspection for disease and insect control.
3. The rootstock of plant material will be kept moist and will be provided with shade during transport to the job site and until plantings are completed.
4. Plants will be true to name and each bundle or lot will be tagged with the correct botanical name according to the "Manual of the Vascular Flora of the Carolinas" (Radford *et al.*, 1968).

5. Individual plant species will be installed within specified topographic contours (elevations) and assigned vegetation zones.
6. At any time during planting efforts, construction may be halted if methodologies, labor, and/or equipment are not appropriate to satisfactory performance of the job.

2.7 Vegetative Buffer

An average 50-foot area buffering the created wetland will be planted and maintained through appropriate installation of trees and a supplemental seed mixture to establish ground cover. This buffer will be established by using selected plant species from the upland buffer planting palette (Table 3). Planting will generally occur at a density of 320 trees and/or shrubs per acre in order to achieve an eventual survivorship of 260 trees per acre. Future application of pesticides or fertilizers within the buffer area will be limited to the minimum required to establish a ground cover and to prevent erosion.

Table 3 Planting Palette for Upland Buffer

TREE SPECIES	COMMON NAME	STATUS	MOISTURE REGIME	FORM
<i>Carya glabra</i>	Pignut hickory	FACU	upland	bare root
<i>Carya tomentosa</i>	Mockernut hickory	UPL		
<i>Fagus grandifolia</i>	American beech	FACU	mesic-upland	
<i>Ilex americana</i>	American holly	UPL	upland	container
<i>Juglans nigra</i>	Black walnut	FACU	mesic-upland	
<i>Prunus serotina</i>	Black cherry	FACU	upland	bare root
<i>Quercus alba</i>	White oak			
<i>Q. falcata</i>	Southern red oak	FACU-		
<i>Q. marylandica</i>	Blackjack oak	UPL		
<i>Q. rubra</i>	Northern red oak	FACU		container
<i>Q. stellata</i>	Post oak			

2.8 Schedule

Excavation at the 5.3-ac. wetland creation near Brush Creek has commenced as Borrow Area B of the FedEx Taxiway E project component. Grading to the appropriate wetland elevation will be completed by November 1, 2007 with planting of wetland vegetation completed by March 15, 2008. This mitigation component is adjacent to and contiguous with Brush Creek Mitigation Area 2 for the FedEx project and will be constructed and completed concurrent with that mitigation project.

3 Causey Farm Stream Restoration

Stream restoration is defined as "...the process of converting an unstable, altered or degraded stream corridor, including adjacent riparian zone and flood-prone areas to its natural or referenced, stable conditions considering recent and future watershed conditions. This process also includes restoring the geomorphic dimensions, pattern and profile, as well as biological and chemical integrity, including transport of water and sediment produced by the stream's watershed in order to achieve dynamic equilibrium."

PTAA's search for suitable stream restoration mitigation has been concentrated in the vicinity of the airport, with particular attention paid to Brush Creek to the north and Horsepen Creek to the south. Stream segments and tributaries of Horsepen Creek, Reedy Fork Creek, Beaver Creek, and Moore's Creek within the City of Greensboro's Water-Supply Watershed were reviewed via available maps and aerial photography. Indicators of channel modifications and/or instability, including straight segments and segments not within forested areas, were highlighted, followed by delineation onto tax maps to identify landowners. Richland Creek, Long Branch Creek, Squirrel Creek, and tributaries north of the water supply lakes were also reviewed. A more detailed summary of this mitigation site search was provided in the FedEx Wetland and Stream Mitigation Plan (Law, 2001).

Due to the limited availability and potential of stream restoration sites close to the proposed project impacts, the search was expanded to non-water-supply watersheds in Guilford County and then further from PTIA within the Upper Haw River watershed. This search led to the stream restoration opportunities identified at Causey Farm in 2002, 6,539 l.f. of which (unnamed tributary to North Prong Stinking Quarter Creek) was included as mitigation for the FedEx project. The stream restoration (CFa) proposed to mitigate the Runway 5R RSA project stream impacts is located at the northern end of the Causey Farm mitigation area (Figure 7) in the southeastern part of Guilford County (see Appendix B). This is the main stem of North Prong Stinking Quarter Creek, north of the unnamed tributary.



Figure 7 CFa Stream Restoration Reach (from "As-Built" Survey)

The 1,123 l.f. stream restoration of North Prong Stinking Quarter Creek at Causey Farm was constructed in 2004 as additional linear footage in conjunction with the off-site mitigation for the FedEx project. 7,670 l.f. (which includes the 6,539 l.f. required for the FedEx project, plus the

1,123 l.f. proposed to mitigate the Runway 5R RSA project impacts) total stream restoration was documented in the "As-Built" survey submitted to USACE and DWQ in 2005 (Figure 8).

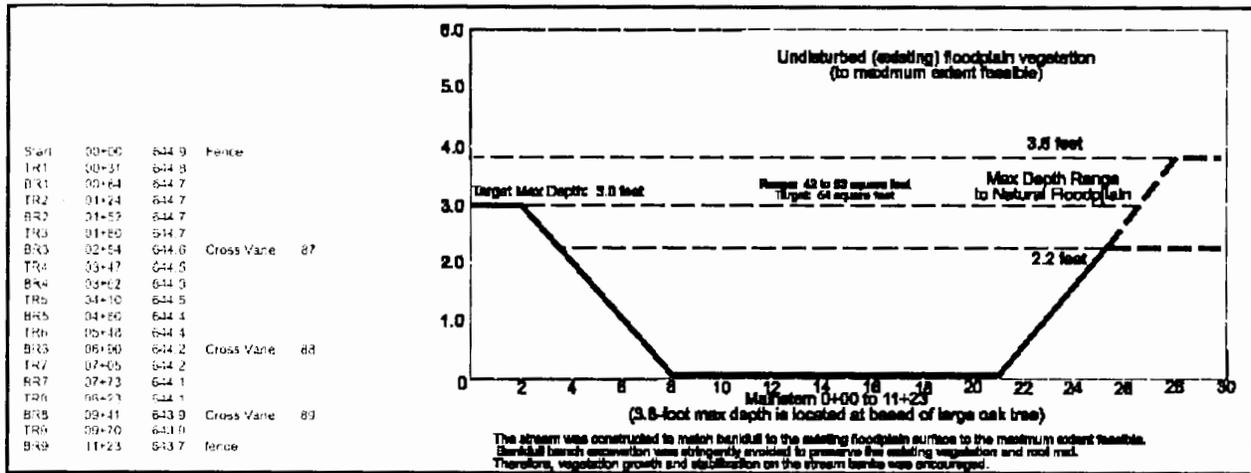


Figure 8 CFa Geometry/Elevation Data (from "As-Built" Survey)

The first year of mitigation success was documented in the First Annual Monitoring Report submitted to USACE and DWQ on January 31, 2006. This mitigation component (Figure 9) is, therefore, offered "up-front" and has already met with preliminary regulatory approval. This additional successful channel restoration was not required for FedEx project mitigation and is hereby proposed to mitigate the stream channel impacts contemplated under the current Runway 5R RSA project.



Figure 9 CFa Site, One Year after Construction

The existing landowner retains title to the entire 38.7-ac. Causey Farm mitigation parcel. Restoration Systems, LLC holds a Conservation Easement over the 38.7 ac. in perpetuity. As required by Action ID 200021655 and PTAA contract, Restoration Systems, will assign the Easement to the North Carolina Wildlife Habitat Foundation (a qualified non-profit conservation organization). Restoration Systems will retain access to the site for maintenance and monitoring requirements until final success criteria are achieved. The "As-Built" survey and subsequent first year's success monitoring for the Causey Farm Stream and Wetland Restoration project document the additional 1,123 l.f. stream restored (Figure 10).

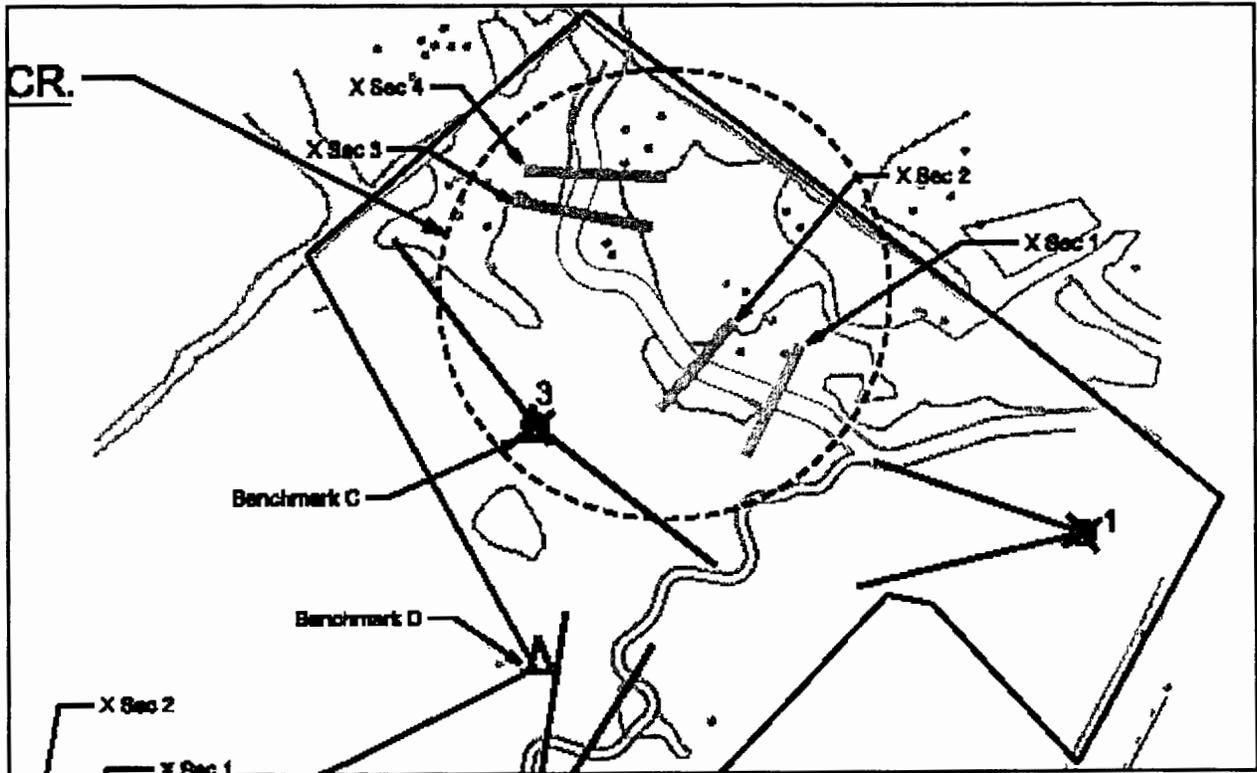


Figure 10 CFa In-Place Stream Restoration (from Year-One Monitoring Report)

4 Monitoring

Construction monitoring will focus on adherence to design specifications and preservation / protection of existing and adjacent functions and values. Identification of permanent sampling plots to observe ecological changes as a result of specific mitigation activities is also included. A qualified consultant has provided on-site construction monitoring during restoration of the stream channel and will monitor creation of the wetland area. The consultant will also monitor protection of adjacent wetlands and streams, and project mitigation landscaping activities. General criteria used to evaluate the success or failure of activities at the mitigation sites and required remedial actions to be implemented should monitoring indicate failure of a component will be consistent with USACE protocols summarized in Table 4, as follows.

Table 4 General Mitigation Success Criteria²

COMPONENT	SUCCESS	FAILURE →	ACTION
<u>Photo Reference Sites</u> Longitudinal photos Lateral photos	No substantial ³ aggradation, degradation or bank erosion	Substantial aggradation, degradation or bank erosion.	Remedial actions will be planned, approved, and implemented.
<u>Plant Survival</u> Survival plots Stake counts Tree counts	≥75% Coverage in Photo Plots Survival and growth of at least 320 trees/acre through year 3, then 10% mortality allowed in year 4 (288 trees/acre) and additional 10% mortality in year 5 for 260 trees/acre through year 5.	<75% coverage in photo plots for herbaceous cover Survival of less than 320 trees/acre through year 3 and then less than the success criteria for years 4 and 5.	Areas of less than 75% coverage will be reseeded and/or fertilized, live stakes and bare rooted trees will be planted to achieve desired densities.
<u>Channel Stability</u> Cross-sections Longitudinal profiles Pebble counts	Minimal evidence of instability (down-cutting, deposition, bank erosion, increase in sands or finer substrate material).	Substantial evidence of instability.	Remedial actions will be planned, approved, and implemented.
<u>Biological Indicators</u> Invertebrate populations Fish populations	Population measurements remain the same or improve, and species composition indicates a positive trend.	Population measurements and species composition indicate a negative trend.	Reasons for failure will be evaluated and remedial action plans developed, approved, and implemented.

² From USACE Action ID 200021655

³ Substantial or subjective determinations of success will be made by the mitigation sponsor and confirmed by USACE and review agencies

4.1 Construction Monitoring

To ensure that the mitigation concepts described herein are appropriately adhered to, a qualified consultant with experience in mitigation implementation will be on site to provide construction oversight. The purpose of the construction monitoring will be to provide plan details, biological information, and comments to the contractor(s) during project implementation. Monitored activities will include:

- establishment and maintenance of sediment and erosion control measures
- excavation and grading of wetland creation areas and vegetative buffer
- preparation of appropriate rooting zone soil layers above compacted substrata
- planting of groundcover, emergent riparian and wetland vegetation, riparian trees, bare-root hardwood seedlings
- planting and establishment of vegetation consistent with FAA height and wildlife attractant restrictions within 10,000 feet of runway (as required by FAA)

4.2 Wetland Monitoring

The permittee will monitor the site vegetation between June 1 and November 30, inclusively, of each year, and document plant mortality and stress. A 0.05-acre sample plot will be established within the BC-2a creation area at PTIA and will be placed randomly within a representative position. The permittee will continue monitoring of the planting areas annually until the respective performance criteria are met, as described below.

Performance criteria for tree planting areas will be met if the sample plot demonstrates that for each of the first three complete years of monitoring, a minimum of 320 target species trees per acre have survived, such that at the end of three years, a minimum of 320 three-year old target-species trees per acre have survived on the site, and, in years four and five, 288 and 260 trees per acre, respectively, have survived on the site, such that at the end of year five, a minimum of 260 five-year old target-species trees per acre have survived on the site.

If for any monitoring year, vegetation survival is not favorable, as determined by USACE, remedial action required by USACE will be performed, the required enhancement / restoration areas will be replanted, and the five-year monitoring period will begin again with year one.

Hydrology at the BC-2a site creation area will be monitored through use of a monitoring gauge during each growing season for the first five years of the vegetative monitoring, or until performance criteria have been met, whichever occurs later.

To meet the hydrology success criteria, the monitoring data must show that for each normal precipitation year within the monitoring period, the site has been inundated or saturated within the upper 12 inches of the soil for a minimum of 12.5% of the growing season (28 consecutive days for Guilford County). WETS tables for Guilford County <<ftp://ftp.wcc.nrcs.usda.gov/support/climate/wetlands/nc/37081.txt>> will be utilized as appropriate to determine normal precipitation years.

If there are no normal precipitation years during the first five years of monitoring, to meet performance criteria, the permittee will continue to monitor hydrology on the site until it reflects that the site has been inundated or saturated as described above during a normal precipitation year.

In the alternative, and at USACE discretion, a site may be found to meet the hydrology performance criteria on the basis of comparison of monitoring data taken from the site with

monitoring data taken from an established jurisdictional mitigation reference site approved by USACE. USACE retains the discretion to find that the hydrology criteria are met if such monitoring data from the mitigation site and the reference site are substantially the same. This finding by USACE may be made during years with or without normal rainfall.

In the event there are years of normal precipitation during the monitoring period, and the data for those years do not show that the site has been inundated or saturated within the upper 12 inches of the soil for a minimum of 12.5% of the growing season (28 consecutive days) during a normal precipitation year, USACE may require remedial action. The permittee shall perform such required remedial action, and continue to monitor hydrology on the site until it displays that the site has been inundated or saturated as described above, during a normal precipitation year. If USACE determines that further remediation is not appropriate, other options will be considered, including use of a different site to mitigate for project impacts.

The permittee will submit yearly mitigation monitoring reports by the first day of February after each assessment period, for five years following final site manipulation. These reports will include, at a minimum, sample plot, well, and rainfall data; number of individuals of each tree species within the sample plot; photographs, including a location key; and problems/resolution, and will be provided to both USACE and DWQ.

The permittee shall contact the USACE, Raleigh Regulatory Field Office, Regulatory Project Manager, to provide that individual with the opportunity to attend the yearly mitigation monitoring efforts.

4.3 Stream Monitoring

The "as-built" channel survey was submitted to USACE and DWQ in 2005. This survey documented the dimension, pattern, and profile of the restored channel (including the CFa reach specific to this project). Permanent cross-sections have been established representing approximately 50% pools and 50% riffle areas. The permittee also included photo documentation at cross-sections and structures; a plan view diagram; a longitudinal profile; vegetation information; and a pebble count for permanent cross sections.

The permittee will perform Level I (Appendix C) monitoring each year for the 5-year monitoring period. If less than two bankfull events occur during the first 5 years, the permittee will continue monitoring until the second bankfull event is documented. The bankfull events must occur during separate monitoring years. In the event that the required bankfull events do not occur during the five-year monitoring period, USACE, in consultation with DWQ, may determine that further monitoring is not required. It is suggested that all bankfull occurrences be monitored and reported through the required monitoring period. The permittee will perform photo documentation twice each year (summer and winter) for the 5-year monitoring period, and for subsequently required monitoring.

The permittee will include the following information in the Level I monitoring report for the site: reference photos; plant survival analysis; and channel stability analysis. The permittee will complete the Monitoring Data Record, Sections 1-3, (Appendix C) for each cross-section, and for each year of monitoring. The permittee will include in the monitoring reports a discussion of any deviations from as-built and an evaluation of the significance of these deviations and whether they are indicative of a stabilizing or destabilizing situation. The mitigation success criteria, and required remediation actions, will be based on the summary provided in Table 4, and the Photo Documentation, Ecological Function, and Channel Stability criteria in the "Stream Mitigation Guidelines", dated April, 2003 <http://www.saw.usace.army.mil/wetlands/Mitigation/stream_mitigation.html>, pages 24 and 25, under "Success Criteria:".

4.4 Nuisance Species Control

The site selected for wetland creation has been chosen, in part, based on the relative lack of existing noxious weeds. Precautionary steps will be taken not to introduce noxious weeds into wetland mitigation area. Plant materials used for planting and seeding will be screened for the presence of noxious weeds. The organic material used for soil amendments will be clean and free of noxious seeds including, but not limited to, *Typha* spp., *Phragmites* sp., and *Microstegium vimineum*. Steps will be taken to ensure that noxious weeds are not being introduced into graded areas. Field observations during monitoring events will include data collection on the presence and abundance of volunteer and noxious weed species. Invasive and aggressive species currently known to exist on site include Chinese privet and Japanese honeysuckle. If a problem with the presence of noxious weeds is identified, a species specific control plan will be developed. Mechanical, manual, and chemical methods may be employed to control identified noxious weeds.

4.5 Contingency Plan / Remedial Activities

The applicant is committed to the design and implementation of successful wetland and stream mitigation. The applicant will take necessary remedial action if the mitigation efforts do not achieve established success criteria. Remedial activities may include replanting of areas, manipulation of hydrology, and/or discussions with involved parties regarding alternative solutions. After five years, if the mitigation site has not met the minimum success criteria, then additional measures for mitigation may be discussed. If the mitigation effort is determined to be only partially successful at any time during the monitoring period, PTAA reserves the right to perform appropriate adjustments.

If excessive maintenance is necessary (expenditures exceeding \$300 per acre), the applicant will work with the USACE and DWQ to select the most environmentally benign and cost-effective method for resolving the problem. PTAA will be the responsible entity with jurisdiction over the mitigation areas following mitigation success determinations.

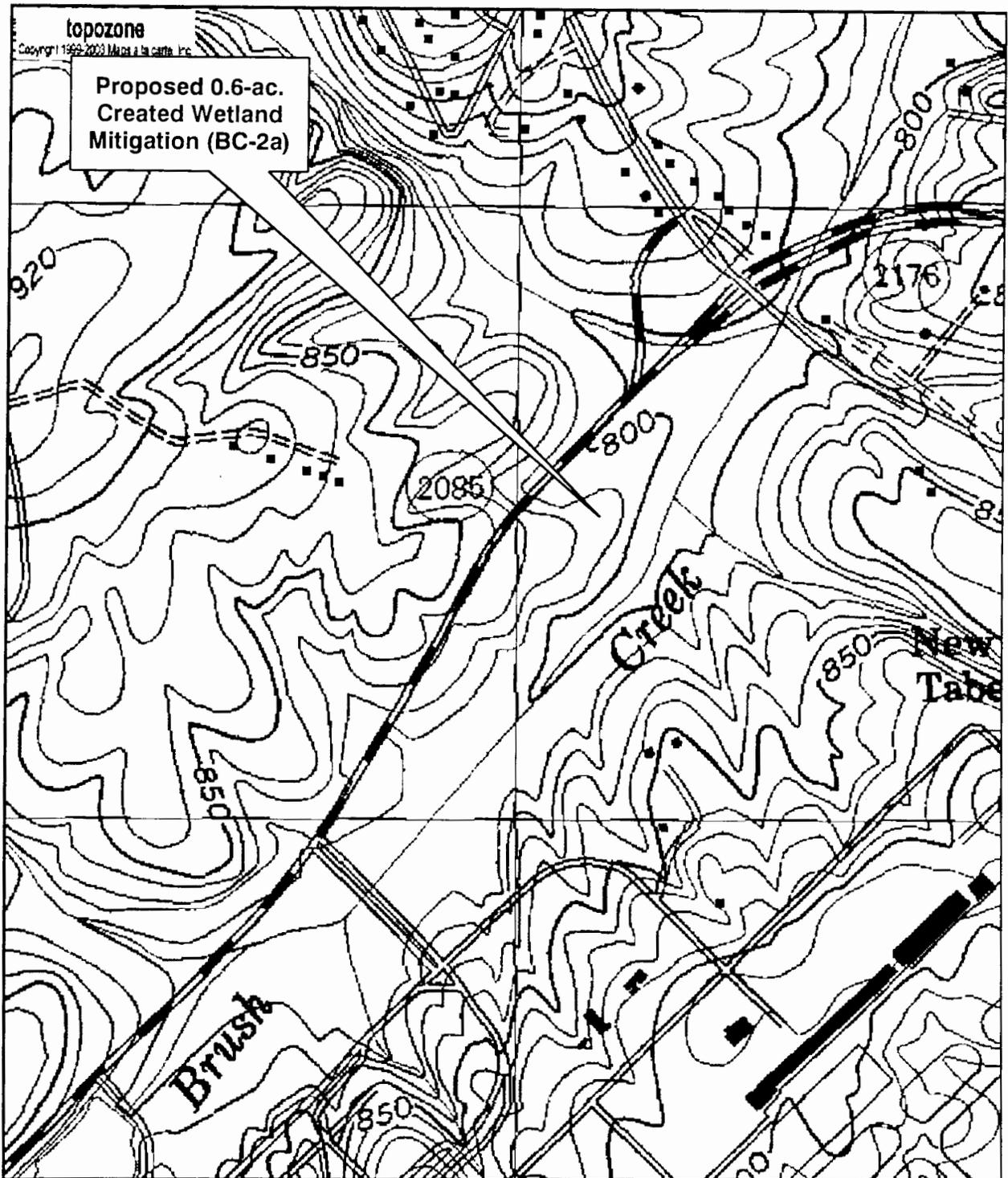
4.6 Reporting

Annual mitigation monitoring reports will be prepared following completion of the wetland and stream mitigation monitoring events for a period of five years. These reports will include presentation of vegetation and hydrologic data, selected photographs, recorded wildlife observations, and a discussion of the results. One copy of the report will be provided to USACE (Raleigh Regulatory Field Office) and one copy to NCDENR (DWQ, Raleigh) by February 1 following the monitoring year. In the event success criteria are not achieved, methods for contingency or remediation will be recommended.

5 References

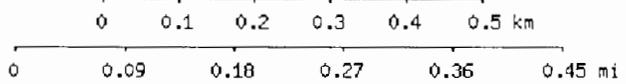
- Baker and Associates. 2001. Stormwater Management Plan - Piedmont Triad International Airport, Greensboro, North Carolina.
- Law Engineering and Environmental Services, Inc. 2001. Wetland and Stream Mitigation Plan - Piedmont Triad International Airport, Greensboro, North Carolina.
- Radford, A.E., H.E. Ahles, and C.R. Bell. 1968. Manual of Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill, NC.
- Schafale, M.P. and A.S. Weakley. 1990. Classification of Natural Communities of North Carolina.

Appendix A Wetland Creation Site Maps



topozone
Copyright 1999-2003 Micro a la carte, Inc.

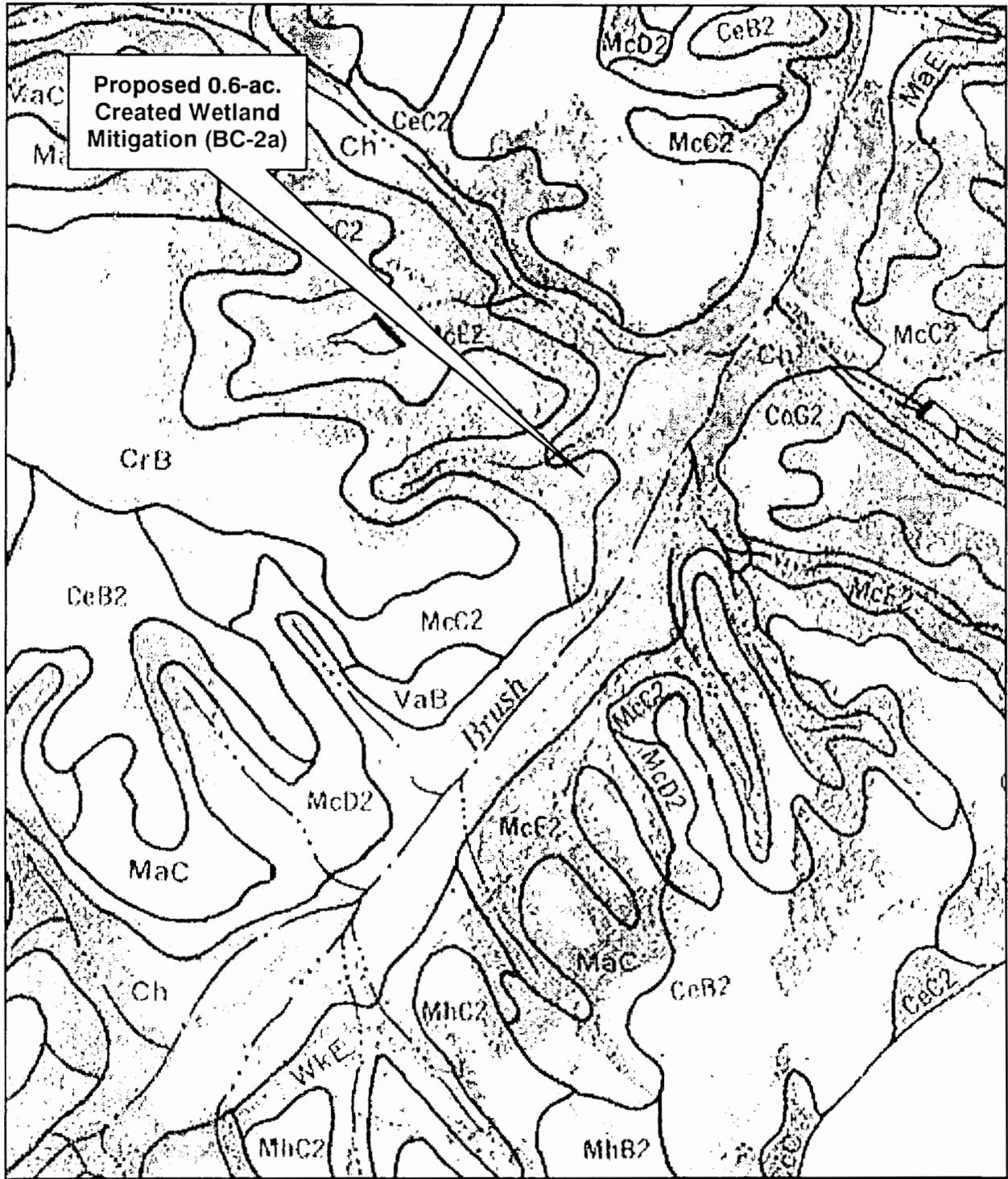
Proposed 0.6-ac.
Created Wetland
Mitigation (BC-2a)



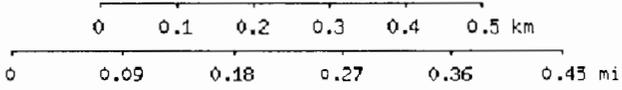
UTM 17 595960E 3997148N (NAD27)
USGS Guilford (NC) Quadrangle
Projection is UTM Zone 17 NAD83 Datum

M*
G
M=-8.001
G=0.629

Exhibit A-1 BC-2a USGS 7.5-Minute Topographic Quadrangle



Proposed 0.6-ac.
Created Wetland
Mitigation (BC-2a)



M=-8.001
G=0.629

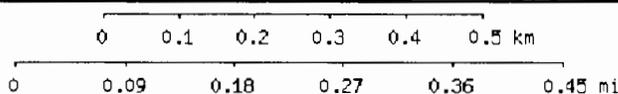
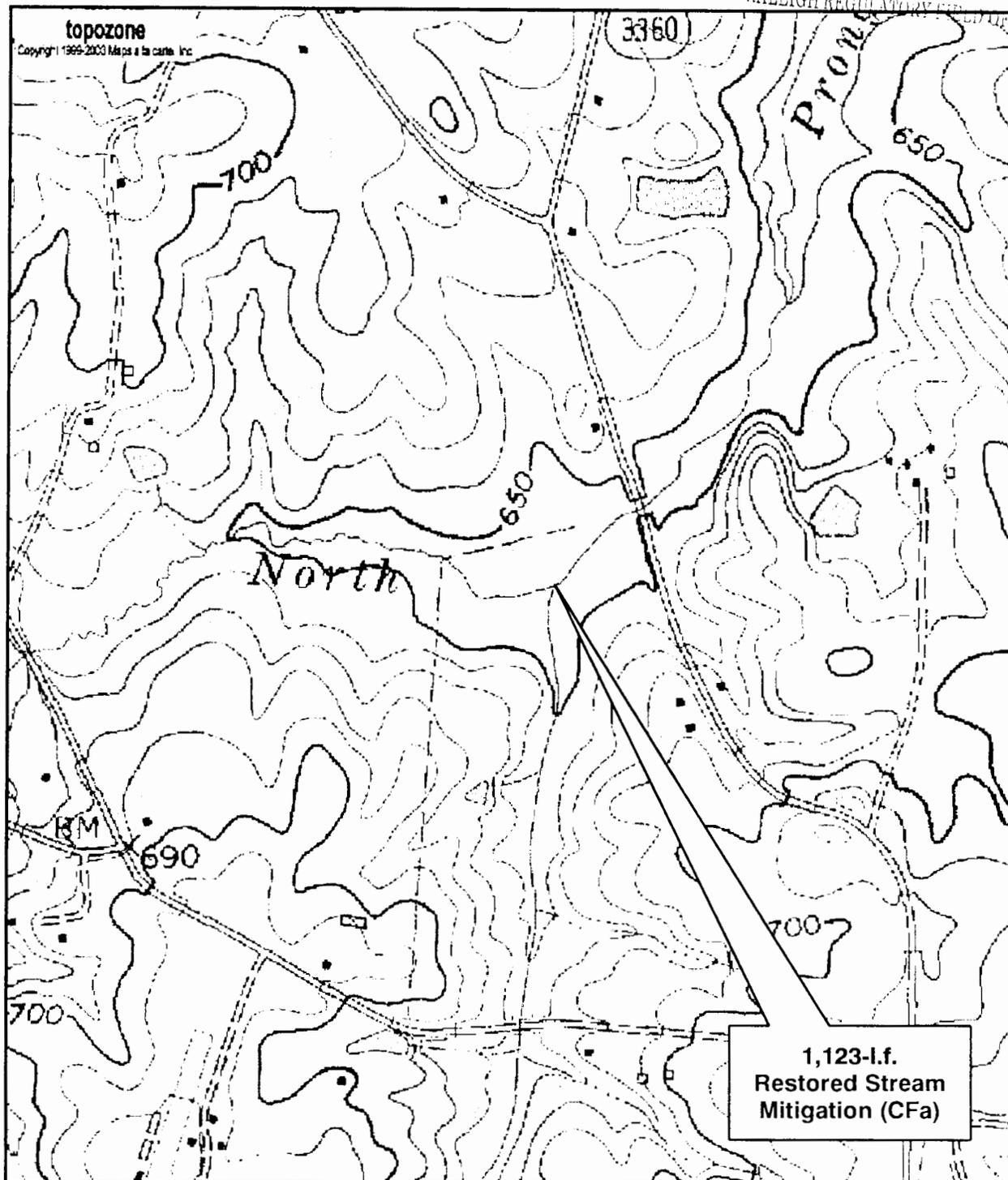
Exhibit A-2 BC-2a USDA NRCS Soil Survey of Guilford County

Appendix B Stream Restoration Site Maps

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UTM 17 625351E 3976027N (NAD27)
USGS Kimesville (NC) Quadrangle
Projection is UTM Zone 17 NAD83 Datum

M*
G
M=-8.191
G=0.815

Exhibit B-1 CFa USGS 7.5-Minute Topographic Quadrangle

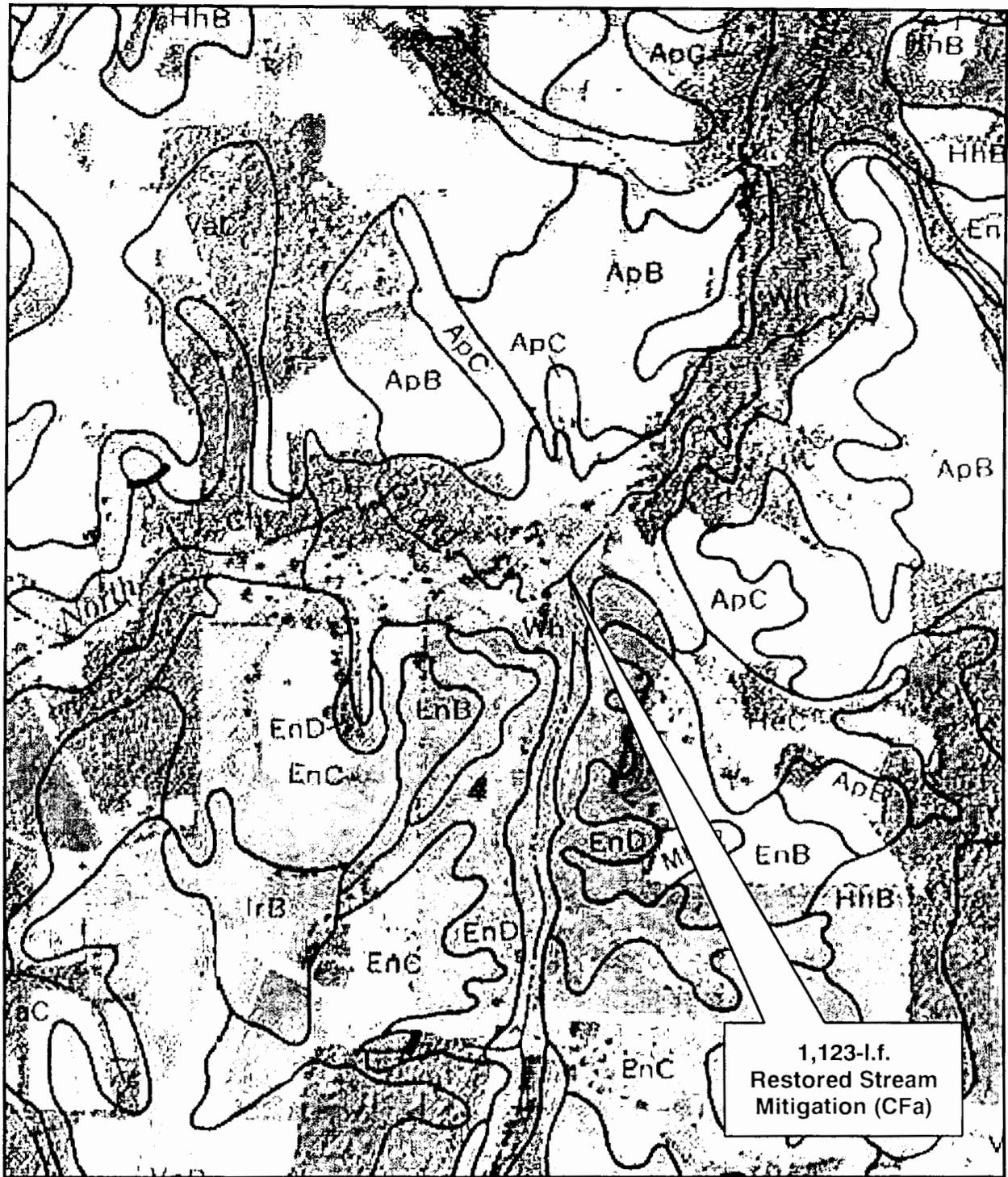


Exhibit B-2 CFa USDA NRCS Soil Survey of Guilford County

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RALEIGH REGULATORY FIELD OFFICE

Appendix C Monitoring Data Record

Channel Mitigation Monitoring Sheets I, II, III, AND IV

Monitoring Data Record

Project Title: _____ COE Action ID: _____
Stream Name: _____ DWQ Number: _____
City, County and other Location Information: _____
Date Construction Completed: _____ Monitoring Year: () of 5
Ecoregion: _____ 8 digit HUC unit _____
USGS Quad Name and Coordinates: _____
Rosgen Classification: _____
Length of Project: _____ Urban or Rural: _____ Watershed Size: _____
Monitoring DATA collected by: _____ Date: _____
Applicant Information:
Name: _____
Address: _____
Telephone Number: _____ Email address: _____
Consultant Information:
Name: _____
Address: _____
Telephone Number: _____ Email address: _____
Project Status: _____

Monitoring Level required by COE and DWQ (404/Sec. 10 permit/ 401 Cert.): Level 1 2 3
Monitoring Level 3 requires completion of *Section 1* (circle one)
Monitoring Level 2 requires completion of *Section 1 and Section 2*
Monitoring Level 1 requires completion of *Section 1, Section 2 and Section 3*
If biological monitoring is required by DWQ, then Section 4 should also be completed

Section 1. PHOTO REFERENCE SITES

(Monitoring at all levels must complete this section)

Attach site map showing the location and angle of all reference photos with a site designation (name, number, letter, etc.) assigned to each reference photo location. Photos should be provided for all structures and cross section locations, should show both banks and include an upstream and downstream view. Photos taken to document physical stability should be taken in winter. Photos taken to document vegetation should be taken in summer (at representative locations). Attach photos and a description of each reference photo or location. We recommend the use of a photo identification board in each photo to identify location.

Total number of reference photo locations at this site: _____
Dates reference photos have been taken at this site: _____

Individual from whom additional photos can be obtained (name, address, phone): _____

Other Information relative to site photo reference: _____

If required to complete Level 3 monitoring only stop here; otherwise, complete section 2.

Section 2. PLANT SURVIVAL

Attach plan sheet indicating plots and sample area locations and reference photos.

Survival plots:

DATE:					
Area within the easement is:					
Area sampled by survival plots:					
Number of survival plots sampled:					
Random or nonrandom site selection:					
% Coverage within survival plots is:					
Photos of reference plots taken: yes/no					

Provide a written description of specific data or findings and photos as needed for clarity.

Live Stake counts:

DATE:					
Area within the easement is:					
Area sampled for stake survival:					
Number of plots sampled:					
Random or nonrandom site selection:					
Average number of surviving stakes:					
Range of survival for all plots:					

Provide a written description of specific data or findings as needed for clarity.

Tree counts:

DATE:					
Area within the easement is:					
Area sampled for tree survival:					
Number of plots sampled:					
Random or nonrandom site selection:					
Average number of surviving trees:					
Range of survival for all plots:					

Provide a written description of specific data or findings as needed for clarity.

Bankfull Events:

Date measured:					
Method of Verification:					

COMMENTS: _____

If required to complete Level 1 and Level 2 monitoring only stop here; otherwise, complete section 3.

Section 3. CHANNEL STABILITY

Attach plan sheet(s) indicating the locations of cross-sections and beginning and ending of longitudinal profiles if the entire reach is not profiled. Year to year changes in cross-sections, longitudinal profile and bed material should be plotted and submitted. Comparison overlays from previous years for profile and cross-section monitoring should be provided.

Cross sections: attach plots of each cross-section showing year to year changes.

Provide the following data for each cross-section:

Date measured					
Cross-section being measured					
Cross-sectional area: as-built/present					
Bankfull width: as-built/present					
Floodprone Width: as-built/present					
Width/depth: as-built/present					
Entrenchment ratio: as-built/present					
Stream Type: as-built/present*					

* only required for riffle cross-sections

Longitudinal profiles: attach plots of the longitudinal profile showing year to year changes and the locations of installed or natural structures that affect profile.

Date measured	
Avg. slope riffles: as-built/present	
Avg. slope pools: as-built/present	
Number of riffles: as-built/present	
Number of pools: as-built/present	

Pebble counts: Attach a printout of pebble count data and a graphical plot of bed material showing the cumulative % finer than X millimeters and the number of particles in standard size classes. Year to year changes in bed material should also be plotted and provided.

Date measured					
Cross-section being measured					
D16: as-built/present					
D50: as-built/present					
D84: as-built/present					

Visual Inspection: The entire stream project as well as each in-stream structure and bank stabilization/revetment structure must be evaluated and problems addressed.

Date Inspected	Station Number				
Structure Type					
Is water piping through or around structure?					
Head cut or down cut present?					
Bank or scour erosion present?					
Other problems noted?					

NOTE: Attach separate narrative sheets to each monitoring report describing/discussing the overall monitoring results. Include the identification of specific problem areas/channel failures, estimated cause and proposed/required remedial action. This should include a brief discussion of any parameter that has changed significantly from as-built. (See success criteria discussion in Section 11.)