BROCK STREAM RESTORATION

FINAL RESTORATION PLAN

Jones County, North Carolina
SCO Project Number 050650601

Prepared for:
North Carolina Ecosystem Enhancement Program
1652 Mail Service Center
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EXECUTIVE SUMMARY

The Brock Restoration Site was discovered during the Lower and Middle Neuse Wetland and Stream Mitigation Site Search conducted by the North Carolina Department of Transportation (NCDOT) in 2001. The northern Jones County site is located approximately 12 miles southeast of Kinston, North Carolina. The Restoration Plan presented here includes the restoration of an unnamed tributary to Big Chinquapin Branch and its riparian buffer, as well as buffer restoration adjacent to Big Chinquapin Branch, and the preservation of a portion of the relic Coastal Plain Bottomland Hardwood Forest along an old oxbow of Big Chinquapin Branch.

Restoration of a degraded stream system to a stable condition leads to improvements in the aquatic and terrestrial communities that depend on it. Big Chinquapin Branch is a major tributary to the Trent River and both systems are nutrient sensitive waters (NCDWQ, 1998). The proposed plan will provide important benefits by improving the biological integrity of the stream system, reducing impacts from surrounding nutrient runoff, reducing downstream sedimentation, increasing dissolved oxygen, moderating pH levels, and moderating water temperatures of the stream through shading by the surrounding buffer.

The United States Army Corps of Engineers (USACE and NCDWQ, 2005) recently released a new draft mitigation guidance document related to stream restoration in the outer Coastal Plain of North Carolina. The new guidance, developed in cooperation with the North Carolina Division of Water Quality (NCDWQ), addresses mitigation credits for headwater streams. Many natural headwater streams and wetlands in the Coastal Plain were historically channelized for agricultural purposes. A number of these channels, including the channel on the Brock Restoration Site, are eroding and lack functionality and habitat. While many of these areas would benefit from restoration, traditional natural channel design with pattern and profile has been determined to be inappropriate for all coastal headwater streams. The driving factor behind the new guidance is that it is difficult to discern the original condition of these first order channels: whether they were historically intermittent streams or headwater wetlands. Emphasis is now being placed on restoring habitat and floodplain functionality to these types of channels. The Brock Restoration Site is one of the first Ecosystem Enhancement Program projects to fall under the new guidelines.

Using Rosgen classification (Rosgen, 1996), the existing channel is classified as a G5, which is narrow and deep. The stream system will be restored using Priority 3 restoration, which involves excavation of a new bankfull bench near the existing channel elevation. The bankfull bench will be constructed entirely on the east side of the channel to minimize construction costs and avoid disturbing a cemetery located onsite. The restored stream channel will classify as an E5 channel with a sinuosity less than 1.05. Wetlands are expected to form within portions of the newly created bankfull bench, especially in the more downstream section of the project where backwater from Big Chinquapin Branch will affect the stream.

The Brock Restoration Site is located in an area of intense agricultural land use. The proposed restoration plan will reforest riparian buffer along the restored floodplain. An upland riparian buffer will also be reforested along a portion of Big Chinquapin Branch. The buffer restoration will reconnect existing forested buffers along Big Chinquapin Branch and provide a wooded corridor for

wildlife. By reforesting a mosaic of vegetative communities, local biological diversity will be increased. The buffer will also intercept overland flow from a swale draining the agricultural fields on the Brock property. Buffer reforestation at this site will reduce the input of nutrients from the fields to the waters downstream of the unnamed tributary to Big Chinquapin Branch, designated as nutrient sensitive waters by NCDWQ. The Brock Restoration Site offers the potential to:

- Restore 1,850 linear feet of stream
- Restore 6.88 acres of riparian buffer
- Preserve 0.52 acres of riparian buffer

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1.0 Project Site Location

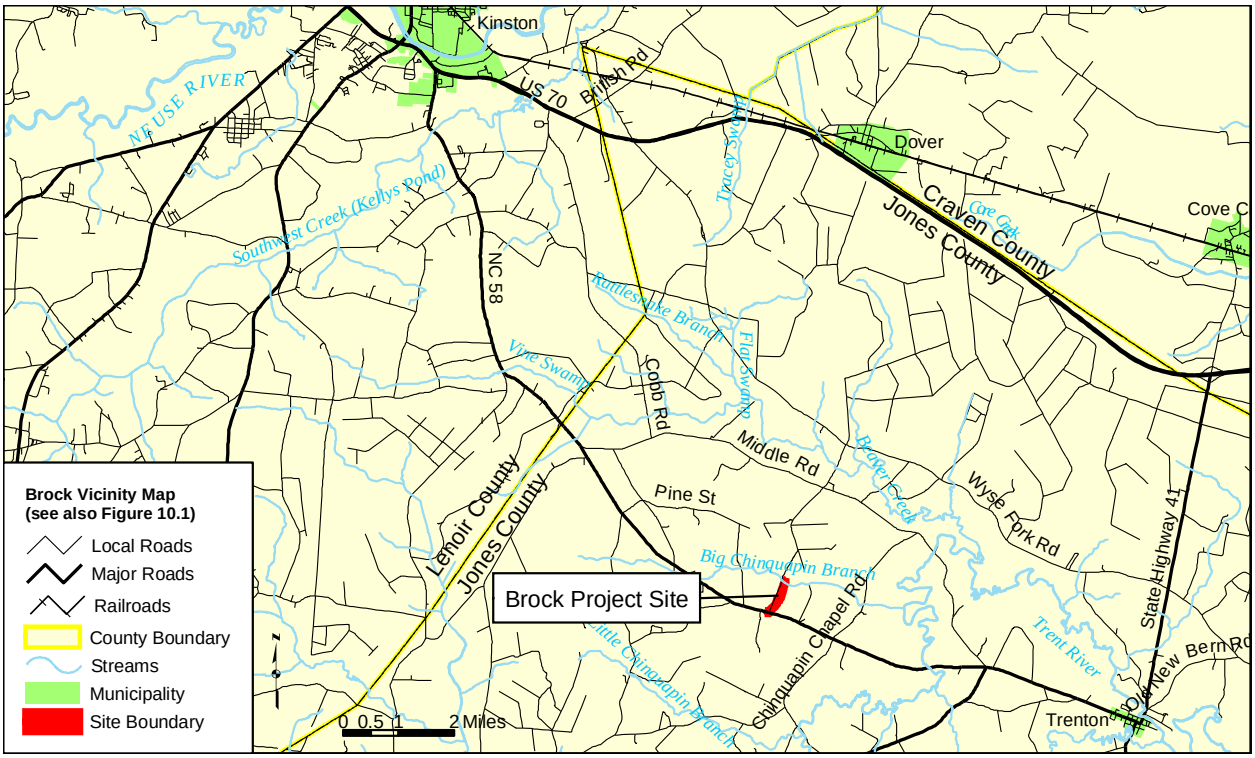
1.1 DIRECTIONS TO PROJECT SITE

The Brock Restoration Site is located approximately 12 miles southeast of Kinston, North Carolina (Figure 10.1) and lies in northern Jones County. From US 70 East in Kinston turn right on NC 58 and travel approximately 12 miles. The site is located on the left approximately three miles past the beginning of the Pine Street loop (SR 1301).

1.2 USGS HUC AND NCDWQ RIVER BASIN DESIGNATIONS

The Brock Restoration Site is located within the Neuse River Basin (NCDWQ Subbasin 03-04-11) and the United States Geological Survey (USGS) 14-digit Hydrologic Unit Code 03020204010060. The unnamed tributary to Big Chinquapin Branch is a perennial stream. The restoration reach begins at a 54-inch corrugated metal pipe under a farm path crossing. The channel flows in a northerly direction along the east side of a small cemetery, terminating at its confluence with Big Chinquapin Branch (Figure 10.2).

1.3 PROJECT VICINITY MAP



2.0 Watershed Characterization

2.1 DRAINAGE AREA

The Brock Site is located on an unnamed tributary to Big Chinquapin Branch with a watershed of approximately 315 acres in size (Figure 10.2). A field verification of the watershed area delineated from the USGS topographic map was conducted on March 6, 2002.

2.2 SURFACE WATER CLASSIFICATION / WATER QUALITY

The unnamed stream is a tributary of Big Chinquapin Branch, which is classified as C Sw NSW from its source to the Trent River. The "Use Support Rating" has not been determined for this section of Big Chinquapin Branch.

2.3 PHYSIOGRAPHY, GEOLOGY AND SOILS

The project watershed is located in the eastern portion of the Coastal Plain Physiographic Province of North Carolina. Broad, flat interstream areas are the dominant topographic features of this province. Slopes are generally less than four percent. Elevations on the Brock Site range from approximately 39 to 52 feet above mean sea level. The soil survey for Jones County (Barnhill, 1981) indicates that the area is underlain by Goldsboro loamy sand, Grifton fine sandy loam, Lynchburg fine sandy loam, Muckalee loam, and Norfolk loamy sand. The watershed geology contains Tertiary Period material including the Comfort Member and New Hanover Member of the Castle Hayne Formation. The Comfort Member is Bryozoan-echinoid skeletal limestone with common solution cavities. The New Hanover Member is a thin, micritic phosphate-pebble conglomerate.

2.4 HISTORICAL LAND USE AND DEVELOPMENT TRENDS

The watershed is a mixture of forested lands, agricultural row crops, two-lane roadways, farm roads, cemeteries, minor culverts, and a few single-family homes (Table 9.3). Agricultural drainage features, including ditches and drain tile, have been constructed and maintained on the Brock and neighboring properties. The Brock Site and adjacent properties are utilized primarily for agricultural purposes. No zoning exists in this part of Jones County and little development is expected in the future.

2.5 PROTECTED SPECIES

Some populations of flora and fauna are in decline due to natural forces or their inability to coexist with human activities. Federal law (under the provisions of the Endangered Species Act of 1973, as amended) requires that any action likely to adversely affect a species classified as federally protected be subject to review by the United States Fish and Wildlife Service (USFWS). Other species may receive additional protection under separate state laws.

Letters were sent to the USFWS and the North Carolina Natural Heritage Program (NCNHP) on November 18, 2005 requesting comments on the project study area. A response letter dated November 29, 2005 was received from the NCNHP stating "The Natural Heritage Program has no record of rare species, significant natural communities, or priority natural areas at the site or within a mile of the project area" (Appendix 6).

Plants and animals with federal classifications of 'endangered,' 'threatened,' 'proposed endangered,' and 'proposed threatened' are protected under the provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. The USFWS lists two federally protected species for Jones County, the red-cockaded woodpecker (*Picoides borealis*) and the American alligator (*Alligator mississippiensis*).

2.5.1 Red-cockaded woodpecker (*Picoides borealis*)

The federal and state status for the red cockaded woodpecker is 'endangered.' An endangered species is one whose continued existence as a viable component of the State's fauna is determined to be in jeopardy. Red-cockaded woodpeckers (RCW) are mostly black and white birds with barred backs and wings and a large white cheek patch. Its habitat preference is wet pine flatwoods and pine savannas. The project watershed does not have trees of suitable age and size to support RCW cavities. The upper half of the watershed is forested, although according to North Carolina Gap Analysis Project (NCGAP) data, this area is predominantly pocosin woodlands and shrublands. These areas are not suitable for nesting due to the small size of the pine trees and/or the presence of hardwood species in the canopy or understory. Foraging is unlikely as there is a lack of open pine stands for suitable nesting habitat within half a mile of the watershed. This adjacent area contains regenerating pine stands, pine plantations, and Coastal Plain nonriverine wet flat forests which are unsuitable due to the small size of pine trees and/or the presence of hardwood species. NCNHP does not indicate any occurrences of RCWs within the project watershed or its vicinity and no individuals were observed during field surveys. Therefore, the Brock restoration will have no effect on the red-cockaded woodpecker.

2.5.2 American Alligator (Alligator mississippiensis)

The American alligator has a federal status of T(S/A), which denotes a species that is threatened due to similarity of appearance with other rare species and is listed for its protection. These species are not biologically endangered or threatened and are not subject to Section 7 consultation. The American alligator is listed as "threatened due to similar appearance" to provide protection to the American crocodile, a species which it closely resembles. The state status for the American alligator is 'threatened.' A threatened species is one that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The American alligator is 6 to 17 feet long with a broadly rounded snout, distinguishing it from the American crocodile (*Crocodylus aeutus*). The American crocodile is a tropical species and is not found this far north of Florida. The American alligator inhabits fresh water swamps, marshes, abandoned rice fields, ponds, lakes, and backwaters of large rivers. Although its range once extended north in the coastal plain to the Dismal Swamp, the American alligator is now absent in the area north of the Albemarle Sound and in much of the upper coastal plain. Big Chinquapin Branch does not provide suitable habitat for the American alligator because it is typically found in larger streams and waterbodies further south. None have been observed in Big Chinquapin Branch during field visits. Therefore, the Brock restoration will have no effect on the American alligator.

2.5.3 Federal Species of Concern

'Federal species of concern' are not afforded federal protection under the Endangered Species Act and are not subject to any of its provisions, including Section 7, until they are formally listed or proposed as 'threatened' or 'endangered.' However, the status of these species is subject to change, and therefore should be included for consideration. A 'federal species of concern' is defined as a species that is under consideration for listing, but for which there is insufficient information to support its listing. In addition, organisms that are listed 'endangered,' 'threatened,' or of 'special concern' by the NCNHP list of Rare Plant and Animal Species, are afforded state protection under the N.C. State Endangered Species Act and the N.C. Plant Protection and Conservation Act of 1979.

As of November 2005, there are thirteen 'federal species of concern' listed by the USFWS for Jones County. There are three vertebrates, the Southern hog-nosed snake (*Heterodon simus*), the Carolina gopher frog (*Rana capito capito*), and the "Neuse" madtom (*Notorus furiosus*), and one invertebrate, the Croatan crayfish *(Procambarus plumimanus).* The other nine species are vascular plants including quillwort (*Isoetes microvela*), Carolina bogmint (*Macbridea caroliniana*), Carolina goldenrod (*Solidago pulchra*), Carolina spleenwort (*Asplenium heteroresiliens*), Chapman's sedge (*Carex chapmanii*), Godfrey's sandwort (*Minuartia godfreyi*), Savanna cowbane (*Oxypolis ternate*), Spring-flowering goldenrod (*Solidago verna*), and Venus flytrap (*Dionea muscipula*). None of these species were observed during site visits.

The Brock Restoration Site has potential to provide future habitat for some 'federal species of concern' such as the Southern hog-nosed snake, Croatan crayfish, and Carolina bogmint.

2.6 CULTURAL RESOURCES

The Brock Site consists of agricultural fields with no apparent historical or cultural significance. There is small cemetery on the west side of the project stream and is overgrown with vegetation. A letter of inquiry has been sent to the State Historic Preservation Office (SHPO) regarding the site and specifically the cemetery. A response was received on January 4, 2006 requesting an investigation of the Brock site because of its proximity to the Civil War Battle of Kinston. SHPO also recommended that the cemetery be evaluated by a professional architectural historian (Appendix 6). Subsequent discussions between the Federal Highway Administration and the Office of State Archeology resulted in the decision that an archeological survey would not be necessary for this project (Appendix 6).

2.7 POTENTIAL CONSTRAINTS

The landowner and the tenant farmer at the Brock Site were consulted on land use, proposed channel alignments, proposed vegetated buffers and the ability to incorporate restored stream system within the current and future land use constraints. A discussion of the various constraints is provided below.

2.7.1 Property Ownership and Boundary

The State has acquired a conservation easement from Ms. Clare Brock on the sections of her property selected for restoration. The conservation easement places mutually agreed upon restrictions on the

property deeds that will guide the use and management of the stream and its buffer areas, including the preservation of a portion of the Coastal Plain Bottomland Hardwood Forest and the buffer reforestation areas. After signing the easement, the property owners retain ownership, but agree to manage the property according to the restrictions. The easement remains with the property if it is sold or transferred and the new owner(s) will be required to honor the provisions of the conservation easement. NCEEP has been working with the primary landowner, Ms. Clare Brock, and the tenant farmer such that they are aware of the type of work and extent of the project's area.

2.7.2 Site Access

Currently, the site is easily accessible from NC 58 via a dirt road on the adjacent property to the west. An agreement with Jean and Robert Tillett must be reached to use this access point for construction. An undeveloped 15' ingress and egress easement is also present on the southeast portion of Clare Brock's property. However, road access for construction equipment will need to be greatly improved.

2.7.3 Utilities

No utilities are known to exist within the project area.

2.7.4 Cemetery

A small cemetery with at least five gravesites is located on the west side of the stream channel. The cemetery is identified on an antique property map as "negro" cemetery. A site investigation found the cemetery overgrown with vegetation. Five headstones, dated between 1920 and 1955, were found in the southern portion of the 50 by 200 foot area marked as a cemetery. Photos of the headstones, as well as a map of the cemetery location, can be found in Appendix 6. The proposed bankfull bench is to be excavated on the east side of the channel away from the cemetery, therefore negative impacts by this restoration project are not expected.

2.7.5 Drain Tiles

At least two drain tiles are known to exist along the unnamed tributary. These drains were found during the jurisdictional wetland delineation on December 1, 2005. One of the drains is located on the adjacent property to the south and the other is located within the project reach downstream from the cemetery (Figure 10.4). Both drains were discharging water at the time of inspection. Additional drain tiles are likely located throughout the site. As the floodplain is widened during construction, these drains will be exposed and will require installation of floodplain interceptors to prevent future erosion.

2.7.6 FEMA / Hydrologic Trespass

A HEC-RAS analysis indicated that the proposed channel geometry would not increase the 100-year flood elevations within the project area. In fact, the analysis predicts reductions in the water surface elevation by 2.89 feet at the downstream end (HEC-RAS Section 37) of the project (Appendix 5). The HEC-RAS analysis is discussed further in section 6.3.

3.0 Project Site Streams

A field survey of the existing channel was completed on October 9, 2001. A detailed topographic survey of the Site was completed on November 15, 2001. Field survey measurements were gathered using the US Forest Service Technical Report RM-245 (Harrelson *et al.*, 1994). Elevation measurements taken for the longitudinal profile and two cross-sections (one riffle and one pool) include, but were not limited to: thalweg, water surface, bankfull, low bank, and terrace. Measurements were also taken to calculate the bank slope, width of flood prone area, belt width, valley length, straight length, pool-to-pool spacing, and channel materials. The survey and data collection provided detailed existing conditions and identified design constraints (such as cemetery location) (Sheet 11.1).

The fluvial processes occurring have been causing instability and eroding banks. These trends may continue if the stream is not restored to a stable condition. The channel is also a pathway for nutrients from the surrounding agricultural areas to the nutrient sensitive waters of the Trent River. Impacts resulting from sediment and nutrient depositions will decrease once the channel and buffer are restored. Photographs of the channel are located in Appendix 1.

3.1 CHANNEL CLASSIFICATION

The restoration reach is shown on both the USGS Phillips Crossroads topographic quadrangle and the Soil Survey of Jones County (Barnhill, 1981). The channel is a first order stream. Regular maintenance (vegetation removal, channel bed material removal, and grade alteration) has created the current dimension, pattern, and profile. See Appendix 1 for photos of existing conditions.

The North Carolina Division of Water Quality (NCDWQ) stream classification method for determining ephemeral, intermittent, and perennial channels was utilized to evaluate the unnamed tributary to Big Chinquapin Branch. The jurisdictional determination was conducted on October 10, 2001 during an extended dry period. A score of 12.5 was recorded for the upstream portion of the channel between NC 58 and the Brock property, indicating that portions of the stream near NC 58 are potentially ephemeral. The existing channel at a point just downstream from NC 58 received a numerical score of 22.5, indicating it was at least an intermittent stream (Appendix 3).

Dave Penrose (NCDWQ), Leilani Paugh (NCDOT), and Lia Myott (Stantec) conducted a further evaluation on February 21, 2002, to determine if the existing channel was perennial or intermittent. Based on the aquatic fauna identified and the drainage basin size, the reach from the southern boundary of the Brock property to Big Chinquapin Branch was determined to be perennial. See Appendix 1 for photos of existing conditions and Appendix 4 for the Biological Reconnaissance Form.

It should be noted that coastal streams score lower on the NCDWQ stream classification evaluation than their mountain and piedmont counterparts. The form depends heavily on geomorphologic features (e.g. riffle and pool sequence) that are not always exhibited as strongly in smaller perennial and intermittent coastal plain streams when compared to non-coastal plain streams. The project site stream scored in the intermittent range, although after analyzing the aquatic fauna it was determined to be perennial.

Stream channels are classified using five criteria: width-to-depth ratio, entrenchment ratio, slope, sinuosity, and channel materials (Rosgen, 1996). Width-to-depth ratio is the ratio of the bankfull surface width to the mean depth of the bankfull channel. The ratio is an indication of the channel's ability to dissipate energy and transport sediment. Entrenchment ratio is the vertical containment of the stream and the degree to which the channel is incised in the valley floor. Entrenchment ratio indicates the stream's ability to access its floodplain. Flood-prone width divided by bankfull width yields the entrenchment ratio. The slope is the change in water surface elevation per unit of stream length. Slope can be analyzed over the entire reach to determine if the slope is stable within the existing channel material, or over sections to determine the condition of pools and riffles. Sinuosity is the ratio of stream length to valley length. Channels with low sinuosity in eastern North Carolina typically indicate a straightened channel. Channel bed and bank materials indicate the channel's resistance to hydraulic stress and ability to transport sediment. All five of the criteria were used to determine the current condition of the channel.

Using Rosgen classification, the restoration reach is classified as a G5. The 'G' classification indicates that the channel is entrenched, and has a low width-to-depth ratio and sinuosity. The existing channel is approximately 20 feet wide at the top, 8 feet deep and 4 feet across at the bottom. The '5' classification designates it as a predominantly sand bed channel. Areas of firm marine clay are apparent from the downcutting process. The existing channel data is presented in Table 9.4.

Stream flow fluctuates dramatically, from fast flowing and relatively deep water to no flow with water pooled only in scattered locations during drought conditions. Aquatic fauna observed in the channel during the field investigation included various minnow species, dragonfly and damselfly nymphs, and crayfish. In-stream habitat quality is poor due to agricultural maintenance practices, the lack of woody streambank vegetation, algal growth, lack of riffle-pool sequence, and temperature fluctuations. Only the most pollutant-tolerant species were present, further indicating poor water quality and/or habitat.

Bank height ratios describe the difference between the bankfull elevation and the lowest stream bank. Commonly, stable channels exhibit bank height ratios between 1.0 and 1.3; however, these numbers may increase based on stream classification and overall entrenchment. The existing bank height ratio at the Brock Site is 3.5 indicating that the stream is deeply incised. Additional information including pattern data for the existing channels can be found in Table 9.4.

3.2 DISCHARGE

Bankfull discharge is defined as the dominant channel forming flow that moves the most sediment over time (Rosgen, 1994). This generally equates to a 1.2 to 1.5 year storm event in North Carolina. Bankfull discharge is estimated using various methods. Coastal Plain Regional Curves developed by the Stream Restoration Institute at North Carolina State University were reviewed (NCSRI, 2004). These curves provide a graphical representation of bankfull discharge to drainage area. USGS regional regression methods for determining peak discharge were also examined (Pope *et al.*, 2001). This method employs long-term gage data to develop equations based on hydro-physiographic region. Coastal plain regression equations were used to calculate various peak discharges for 2, 5, 10, 50 and 100-year events. A log-log plot of these discharges can then be extrapolated to determine the bankfull discharge. A third method to estimate bankfull discharge is based on channel morphology. Once bankfull areas and bed roughness were determined from field surveys, Manning's equation is applied to calculate the mean velocity in the channel. This velocity is then multiplied by the channel area to determine the discharge. The existing

bankfull velocity is approximately 2.1 ft/s equating to a bankfull discharge of 20.8 ft^3/s (Table 9.2). The calculated discharge compares well to the NCSU regional curves and the USGS regression method.

3.3 CHANNEL MORPHOLOGY

Bankfull width of the existing stream channel at the Brock Site is approximately 6.9 feet and bankfull depth is approximately 1.4 feet. The stream has a sinuosity of 1.06; however, due to past channel straightening, there are no radii to measure for radius of curvature ratios or meander length ratios. The width-to-depth ratio of 5.0 is moderate and the entrenchment ratio of 1.9 is moderately entrenched as expected for a G5 type stream. The Brock restoration site's streambed material is sand dominated. Photographs of the existing stream channel are presented in Appendix 1. A complete morphological table for the existing stream channel is presented in Table 9.4.

The composition of the streambed and banks is an important facet of stream character, influencing channel form and hydraulics, erosion rates and sediment supply. The streambeds on the Brock Site were characterized using the modified Wolman Pebble Count (Rosgen, 1994). Pebble counts were taken at representative locations along each reach. The locations included both riffle and pool cross sections. The average d_{50} (50% of the sampled population is equal to or finer than the representative particle diameter) is less than 2.0 mm for the stream, which falls into the sand size category.

3.4 CHANNEL STABILITY ASSESSMENT

The existing channel on the Brock Site was analyzed for overall stability. This analysis included the morphological assessment as mentioned above, and calculations of shear stress and stream power. The existing channels exhibited average shear stresses of approximately 0.25 lb/ft^2, which equates to a stream power of 0.41 $lb/ft^2/s$. In a relatively flat, sand bed system such as the Brock Site, the stream power is slightly excessive. Shield's curve indicates shear of this magnitude can move particles 45 mm in diameter. The largest particles found at the Brock Site are 30 mm. Field observations indicated bank erosion and attempted lateral migration of the channel. These indicators include sloughing banks, especially in locations of drain tiles, center bar formation and lateral bar formation. The proposed channel is designed to reduce the shear and stream power to an acceptable level capable of moving the largest particles but without degrading the channel.

3.5 VEGETATION

Vegetative communities present on the Brock Site include agricultural row crops, Coastal Plain Bottomland Hardwood Forest, and a Mesic Hardwood Forest. The majority of the Brock and surrounding properties are used for agricultural crop production. On the Brock Site, this land use covers approximately 87 acres. Cotton was the dominant crop noted during Fall 2001 and 2005. The natural communities on the site were identified based on the classification system established by Schafale and Weakley (1990). Restoration of the stream channel and riparian buffer will provide additional wildlife habitat for terrestrial and aquatic species where very little habitat existed before.

The historic forested riparian buffer has been replaced with a narrow grassy border and row crops that provide only limited thermal and chemical moderating effects. The channel banks are sparsely vegetated

by a variety of herbaceous species, while black willow (*Salix nigra*), *Juncus* spp. and *Carex* spp. grow in the wetter areas.

4.0 Reference Streams

Priority 3 stream restoration will be carried out on the unnamed tributary on the Brock Site. This will involve excavating a new bankfull bench but will not include restoring pattern to the stream. Reference reaches are not required for this methodology. Additional information is provided in section 6.0 of this report.

5.0 Project Site Wetlands

5.1 JURISDICTIONAL WETLANDS

The methods outlined in the US Army Corps of Engineers (USACE) Wetlands Delineation Manual (Environmental Laboratory, 1987) were used to delineate the jurisdictional wetlands on the Brock property (Appendix 2). Approximately 0.11 acres of existing wetlands are located in the former channel of Big Chinquapin Branch (Figure 10.5). The property line runs down the center of the old channel splitting the wetland area.

5.2 HYDROLOGICAL CHARACTERIZATION

Hydrology for the existing wetland comes primarily from large overbank flows from Big Chinquapin Branch, which still enter the old channel. Some surface runoff also contributes to the hydrology.

5.3 SOIL CHARACTERIZATION

The soil survey for Jones County (Barnhill, 1981) indicates Goldsboro loamy sand, Grifton fine sandy loam, Lynchburg fine sandy loam, Muckalee loam, and Norfolk loamy sand underlie the Restoration Site (Figure 10.3). According to the soil survey, the unnamed tributary and buffer area are underlain by Goldsboro, Muckalee and Norfolk soils. The only hydric soils found within the project vicinity during the field visits were located in the small Coastal Plain Bottomland Hardwood Forest in the northwest portion of the project area.

Goldsboro loamy sand is a moderately well drained soil found near drainageways in uplands. The soils formed in moderately fine textured sediment. Infiltration is moderate and runoff is slow. Slopes range from 0 to 2 percent. The seasonal high water table is below 2 or 3 feet. Goldsboro soils typically contain inclusions of hydric Muckalee soils. Goldsboro soils are fine-loamy, siliceous, thermic Aquic Paleudults. Goldsboro soils are mapped on the southern end of the property, primarily in the agricultural fields.

The Grifton series consists of very deep, poorly drained, moderately permeable soils on uplands, stream terraces, and floodplains in the Coastal Plain. The soils formed in loamy marine sediments and are underlain by alluvial marly sands and clays. Slopes range from 0 to 2 percent. The water table is at a depth of 0.5 to 1 foot below the ground surface from December to May. Grifton soils are fine-loamy, siliceous, thermic Typic Ochraqualfs and are classified as a hydric soil by the Natural Resources Conservation Service (NRCS). Grifton fine sandy loam is mapped along Big Chinquapin Branch where the riparian buffer will be planted connecting the Coastal Plain Bottomland Hardwood Forest to the Mesic Hardwood Forest. Wetland restoration is not feasible in this area because the water table has been lowered as a result of the channelization of Big Chinquapin Branch.

Lynchburg fine sandy loam is a very deep, somewhat poorly drained soil that forms in loamy marine sediments. Lynchburg soils are on low Coastal Plain areas, generally in shallow depressions or on broad interstream divides. Runoff is slow and permeability is moderately slow to moderate. The water table is typically at a depth of 0.5 to 1.5 feet from November to April. Lynchburg soils typically contain inclusions of hydric Rains soils. Lynchburg soils are fine-loamy, siliceous, thermic Aeric Paleaquults. Lynchburg soils are mapped on the Brock property outside of the project area.

Muckalee loam is a poorly drained soil found in level areas or drainageways. Infiltration is moderate and surface runoff is very slow. These wide flat areas are frequently flooded for brief periods and ponded in winter. The water table is at a depth of 0.5 to 1.5 feet. The NRCS classifies Muckalee loam as a hydric soil. Muckalee soils are coarse-loamy, siliceous, nonacid, thermic Typic Fluvaquents. Muckalee loam is mapped in the area of the Coastal Plain Bottomland Hardwood Forest on the northwest corner of the property.

Norfolk loamy sand is a well-drained soil found near major drainageways. Infiltration is moderate and surface runoff is medium. The seasonal high water table remains below 4 feet. Norfolk soils are fine-loamy, siliceous, thermic Typic Paleudults. Norfolk loamy sand is mapped along most of the stream channel on the property. Norfolk soils typically contain inclusions of hydric Muckalee soils.

5.4 PLANT COMMUNITY CHARACTERIZATION

The entire Brock property encompasses approximately 99 acres located between NC 58 and Big Chinquapin Branch. Vegetative communities present on the property include agricultural row crops, Coastal Plain Bottomland Hardwood Forest, and a Mesic Hardwood Forest. The conservation easement primarily contains agricultural row crops.

The Coastal Plain Bottomland Hardwood Forest community lies at the confluence of the unnamed tributary with Big Chinquapin Branch. This vegetative community encompasses nearly two acres. Historically, Big Chinquapin Branch followed a meandering path through this area. When Big Chinquapin Branch was channelized, one of the stream's meanders was cut-off from the straightened mainstem. This area still supports a Coastal Plain Bottomland Hardwood Forest, which rarely floods because of the channelization of Big Chinquapin Branch. The dominant canopy tree species include American sycamore (*Platanus occidentalis)*, sweetgum (*Liquidambar styraciflua*), ironwood (*Carpinus caroliniana*), red maple (*Acer rubrum*), water oak (*Quercus nigra*), and green ash (*Fraxinus pennsylvanica)*. The understory is dominated by canopy species such as red maple and sweetgum. The shrub layer is dominated by box elder (*Acer negundo*) and sassafras (*Sassafras albidum*). The herbaceous

layer is dominated by jewel-weed (*Impatiens capensis*), Indian strawberry (*Duchesnea indica*), false nettle (*Boehmeria cylindrica*), giant cane (*Arundinaria gigantea*), lizard's tail (*Saururus cernuus*), and panic grass (*Panicum* spp.). Standing water was noted in the old meander channel, which discharges into the unnamed tributary during periods of overbank flows from Big Chinquapin Branch.

This Coastal Plain Bottomland Hardwood Forest community is underlain by Muckalee loam. Based on the hydric soils listing of Muckalee, presence of hydrophytic vegetation, and hydrology this portion of the old channel is a wetland (Appendix 2). However, the United States Army Corps of Engineers (USACE) has not verified it as a wetland at this time. The existing wetland area encompasses a total of 0.11 acres, while less than half of that area is within the conservation easement. Photographs of the Coastal Plain Bottomland Hardwood Forest are located in Appendix 1.

The Mesic Hardwood Forest is located in the northeast portion of the Brock property outside the conservation easement. The canopy contains primarily red maple with tulip poplar (*Liriodendron tulipifera*), hackberry (*Celtis laevigataI*), American sycamore, and white oak (*Quercus alba*) interspersed among the maples. The understory contains saplings of the canopy species as well as American holly (*Ilex opaca*) and flowering dogwood (*Cornus florida*). Shrubs and vines include horsesugar (*Symplocos tinctoria*), giant cane, greenbrier (*Smilax* spp.), trumpet creeper (*Campsis radicans*) and poison ivy (*Toxicodendron radicans*). The sparse herbaceous layer includes Christmas fern (*Polystichum acrostichoides*), partridgeberry (*Mitchella repens*), and *Carex* spp. This community encompasses approximately ten acres.

6.0 Project Site Restoration Plan

The United States Army Corps of Engineers (USACE and NCDWQ, 2005) recently released a new draft mitigation guidance document related to stream restoration in the outer Coastal Plain of North Carolina. The new guidance, developed in cooperation with the North Carolina Division of Water Quality (NCDWQ), addresses mitigation credits for headwater streams. Many natural headwater streams and wetlands in the Coastal Plain were historically channelized for agricultural purposes. A number of these channels, including the channel on the Brock Restoration Site, are eroding and lack functionality and habitat. While many of these areas would benefit from restoration, traditional natural channel design with pattern and profile has been determined to be inappropriate for all coastal headwater streams. The driving factor behind the new guidance is that it is difficult to discern the original condition of these first order channels: whether they were historically intermittent streams or headwater wetlands. Emphasis is now being placed on restoring habitat and floodplain functionality to these types of channels. The Brock Restoration Site is one of the first Ecosystem Enhancement Program projects to fall under the new guidelines.

6.1 RESTORATION PROJECT GOALS AND OBJECTIVES

The health of a watershed is dependent on the quality of the headwater system(s), individual tributaries, and major channels. High quality tributaries with vegetated buffers filter contaminants, maintain moderate water temperatures, provide high quality aquatic and terrestrial habitat and regulate flows downstream.

Big Chinquapin Branch is a major tributary to the Trent River, and both water bodies are nutrient sensitive (NCDWQ, 1998). Agricultural land use practices have narrowed or removed many natural, vegetated buffers along streams within the Trent River watershed as well as draining and converting nonriverine wet hardwood forests to cropland. This restoration will enhance functional elements of the unnamed tributary.

The Brock Restoration Plan calls for the restoration of the unnamed tributary to Big Chinquapin Branch, reforestation of the associated riparian buffer, reforestation of the buffer along Big Chinquapin Branch, and preservation of the existing wetlands and Coastal Plain Bottomland Hardwood Forest within the conservation easement. This involves the creation of a stable channel, riverine floodplain, and associated riparian buffer.

Priority 3 stream restoration will be carried out on the unnamed tributary on the Brock Site (Table 9.1). This will involve reconnecting the stream channel to its floodplain, which will allow overbank flooding. To reduce construction costs and avoid disturbing the cemetery, a bankfull bench will be cut entirely on the east side of the existing channel. Water quality functions will be improved due to the creation of more storage for floodwaters and increased filtering of pollutants. Wetlands are expected to form within portions of the newly created bankfull bench, especially in the downstream section of the project where backwater from Big Chinquapin Branch will affect the stream. Barring water quality issues outside of the Brock Site, the restoration should improve aquatic species diversity and abundance in the stream channels.

The restoration of riparian buffers along the restored stream channel will improve water quality. The re-establishment of the riparian buffers with hardwood species will also improve wildlife habitat on the property.

These measures will improve the physical, chemical, and biological components of the unnamed tributary and the Brock property, as well as Big Chinquapin Branch and other downstream waters. Specific project goals:

- Improve water quality by limiting the bank erosion
- Provide a stable stream channel (1850 linear feet of stream restoration)
- Restore 6.9 acres and preserve 0.52 acres of riparian buffers along the stream channel
- Improve aquatic and terrestrial habitat within the unnamed tributary to Big Chinquapin Branch

6.1.1 Designed Channel Classification

The proposed stream channel will be modified, by cutting a floodplain bench. Due to the constraint imposed by a culvert at the upstream end of the project, the stream will not be returned to the original floodplain; rather the stream has been designed as a Priority 3 restoration (re-establishing a floodplain at its existing elevation). The state of the existing channel reveals how it is able to handle the system's flow and sediment supply. The existing shear stress and stream power are compared with the design in order to evaluate aggradation and degradation.

Design channel dimensions were calculated utilizing the regional curve and the few bankfull indicators that could be found in the existing channel. The stream design allows the stream to transfer less sediment through the restoration reach but will also allow for the sediment to deposit on the newly formed bankfull bench without aggrading or degrading. The channel pattern and profile will not be adjusted. The channel dimension will be adjusted by grading a bankfull bench on the east side of the channel. Flood analysis ensures that the stream restoration project will not increase flood stage following construction.

The proposed channel will have a total length of 1,850 feet. The bankfull bench is designed to handle larger flows. Flood flows will be able to access the newly excavated floodplain. In conjunction with the channel restoration, the proposed design will reforest 6.88 acres of riparian buffer along the restored stream channel. Design sheets are included in section 11.

6.1.2 Target Buffer Communities

Buffer reforestation will establish a stable buffer along the restoration reach extending to the limits of the conservation easement (Table 9.6, Sheet 11.3). The planting plan is dependent on the hydrology of the site, the surrounding vegetative communities, and available supply of species. The plan is modeled after mature, unaltered systems as outlined in the *Natural Communities of North Carolina* (Schafale and Weakley, 1990). The newly excavated floodplain will be planted with a Coastal Plain Bottomland Hardwood Forest community. Remaining areas outside the floodplain, excluding the cemetery, will be planted as a Mesic Mixed Hardwood Forest Coastal Plain Subtype.

6.2 SEDIMENT TRANSPORT ANALYSIS

6.2.1 Methodology

A stable stream has the ability to transfer its sediment load without aggrading (depositing sediment) or degrading (scouring sediment) over long periods of time. The stream design is based on a comparison with the existing channel's aggrading/degrading pattern and adjusting the proposed channel's shear stress and stream power such that the channel has the ability to transfer its sediment load in a stable manner.

Shear stress (lbs/sqft): $\tau = \gamma R S$

Stream power (lbs/sqft/s): $\omega = \tau \mu$

γ = specific weight of water

R = hydraulic radius

S = hydraulic slope

μ = velocity

The geometry and the profile of the proposed stream combine to provide a stream that will convey the bankfull discharge and transport the stream's sediment supply. Grade control devices will be installed to further reduce the possibility of degradation within the restored channel.

6.2.2 Discussion

When working with a sandbed channel the standard practice is to evaluate the stream power of the channel. Stream power is the product of the shear stress and the bankfull flow velocity. The current

stream power is down-cutting the existing streambed; thus the proposed design reduces stream power. At bankfull flows the unit stream power and shear stress will remain un-changed (Table 9.5). During higher flood flows the shear stress and average velocity will both decrease on the proposed channel as compared to the design channel. In the existing stream system during high flows there is more power and a higher sediment transport capacity than in the proposed channel.

6.3 HEC-RAS ANALYSIS

6.3.1 No-Rise, LOMR, CLOMR

The methodology used to evaluate the hydrologic analysis required the evaluation of the existing stream's bankfull elevation and corresponding bankfull area. Due to the severe alterations in the stream channels at the Brock Site, bankfull indicators were not easily observed in the field. For this reason, the Coastal Plain Regional Curves were used to verify the bankfull dimensions surveyed (NCSRI, 2004). Also, bankfull discharge was verified with the regional curves equation below.

$$Q = 16.56 (A_{watershed})^{0.72} \quad R^2 = 0.95 \text{ (NCSRI, 2004)}$$

The Hydrologic Engineering Center's River Analysis System (HEC-RAS) was used to evaluate how the discharge flows within the proposed channel geometry (USACE, 1997). This evaluation verifies that the proposed plan, dimension, and profile would adequately carry the discharge at the bankfull stage, the point where water begins to overflow onto the floodplain.

Given that the project involves modifications to a stream channel, it is important to analyze the effect of these changes on flood elevations. Floodwater elevations were analyzed using the HEC-RAS Version 3.0.1.

HEC-RAS is a software package that is designed to perform one-dimensional, steady flow, hydraulic calculations for water surface profiles for a network of natural and constructed channels. The model is based on the energy equation, and the energy losses are evaluated by friction (Manning's equation) and contraction/expansion (coefficient multiplied by the change in velocity head). The momentum equation is used in situations where the water surface profile rapidly varies, such as hydraulic jumps and stream junctions.

Discharge rates for the design have been evaluated with the regional curve. The bankfull discharge for the restoration reach is approximately 20.8 ft^3/s. The existing channel's V-shaped dimension, straight pattern, and uniform profile channels the bankfull discharge through a reduced area at a faster velocity than the proposed design. The proposed design will reduce this velocity. The existing and proposed geometries were evaluated at the bankfull discharge rates using HEC-RAS. The proposed bankfull bench dimensions, slow the velocity as the stream travels through the valley.

The analysis supports the field identification of the existing bankfull area with a close approximation and confirms the proposed channel will adequately carry the discharge at bankfull stage.

6.3.2 Hydrologic Trespass

The 100-year discharges were determined using the hydrological procedure and charts presented in the NCDOT guidelines for Drainage Studies and Hydraulic Design (NCDOT, 1999). According to Chart C200.1, the Hydrologic Contour is 4. With a drainage area of 315 acres and a hydrologic contour of 4, the 100-year discharge of 130 cfs can be determined from Chart C200.2.

The HEC-RAS analysis indicates that the proposed channel geometry will not increase the 100-year flood elevations within the project area, and that the water surface elevation will be reduced by greater than 2.0 feet at the upstream end of the project (Station 37 or Station 10+00) (Appendix 5). The HEC-RAS plan layout is shown in Sheet 11.4.

6.4 SOIL RESTORATION

The recommended construction sequence will include removing the existing topsoil within the areas to be restored. The excavated material will be stockpiled and spread across the new floodplain area to provide a more nutrient rich substrate for the establishment of planted vegetation. Compacted areas of the soil will be "deep ripped" prior to planting.

6.5 NATURAL PLANT COMMUNITY RESTORATION

6.5.1 Narrative & Plant Community Restoration

As previously discussed, the target streambank and floodplain riparian communities are Coastal Plain Bottomland Hardwood Forest. The remaining unforested areas within the easement are to be planted with Mesic Mixed Hardwood Forest Coastal Plain Subtype species. The planting plan was designed to include species that would be found in these communities as described by Schafale and Weakley's Classification of the Natural Communities of North Carolina (1990). Proposed plantings for each zone are presented in Table 9.6.

Seeding, mulching, live staking, and vegetation planting will be used to stabilize the restored streambanks and floodplain. All disturbed areas will be seeded with a non-invasive grass species and either mulched or matted. Matting will provide immediate protection for the streambanks against shear stress while the plantings develop a root mass. The matting will be made from biodegradable material. In time, the plantings will replace the matting. The streambed and point bars of the stream channel will not be matted or planted so they may function as natural point bars.

Plantings will be used for streambank stabilization and riparian buffer establishment. Plantings will quickly develop a root mass and help protect streambanks and floodplains from erosive forces while absorbing nutrients. The plantings will eventually provide the stream with shade and wildlife habitat. The entire unforested areas of the easement will be planted.

The planting plan will use three different groupings of woody vegetation: streambank, floodplain, and upland riparian buffer (Table 9.6, Sheet 11.3). In addition, it can be expected that natural recruitment from onsite woody and herbaceous material will occur. Streambank planting will involve planting trees and shrubs on the channel banks for stability and reinforcement. Planting techniques may include live

staking, containerized, and bare root plantings. Species approved for streambank planting include swamp dogwood (*Cornus stricta*), smooth alder (*Alnus serrulata*), elderberry (*Sambucus canadensis),* and Virginia willow (*Itea virginica*).

Vegetative planting within the new floodplain will consist of Coastal Plain Bottomland Hardwood species native to the Coastal Plain physiographic region. Based on species availability at the time of construction, the following woody species are proposed: American sycamore, willow oak (*Quercus phellos*), green ash, water oak, and swamp chestnut oak (*Quercus michauxii*).

Vegetative planting within the upland riparian area of the restored channel and along the buffer adjacent to Big Chinquapin Branch will be modeled after species found in coastal plain mesic hardwood forests. Based on species availability, the proposed woody species include cherrybark oak (*Quercus falcata var. pagodaefolia*), white oak, bitternut hickory (*Carya cordiformis*), sweet pepperbush (*Clethra alnifolia*), American sycamore, and swamp chestnut oak.

6.5.2 On-site Invasive Species Management

It is not anticipated that invasive plant species will be a significant problem on the Brock Restoration Site. During the first year of monitoring, any invasive species problems will be noted and specific management options will be proposed.

7.0 Performance Criteria

7.1 STREAMS

The stability of the stream channel will be monitored annually for five years or until success criteria are met. One reach of the new channel will be monitored for dimension, pattern and profile. Permanent cross section pins will be installed in the monitoring reach. The longitudinal profile will be a minimum of 20 bankfull widths or 200 feet. As vegetation establishes and the channel stabilizes, the channel's cross-section is expected to tighten slightly; however, the cross-section should not indicate downcutting or widening. Monitoring efforts will evaluate any changes by overlaying each year's cross-section and longitudinal profile with the previous years' for comparison. In addition, photo reference points will be located using a Global Positioning System and included on the "as-built" plan for the Brock Restoration Site.

7.2 VEGETATION

Vegetative sample plots will be quantitatively monitored during the growing season. According to NCEEP guidance, 1-2% of the planted area should be sampled. Based on the approximate buffer area, four 100m plots will be established. In each plot, species composition, density, and survival will be monitored. The four plot corners will be located using a Global Positioning System (GPS), permanently located with ROW stakes, and included in the "as-built" report for the Brock Site.

The vegetative success of the riparian buffer will be evaluated based on the species density and survival rates. Vegetation monitoring will be considered successful if at least 260 trees/acre are surviving at the end of five years.

7.3 SCHEDULE & REPORTING

1. Restoration Plan — July 2006

2. Final Design — August 2006

3. Bid Administration

- Execute Contract — September 2006

4. Construction Management

- Begin Construction — October/November 2006
- Complete Construction/Planting — December 2006

5. Mitigation Plan — December 2006

6. First Year Monitoring Report — October 2007

8.0 References

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9.0 Tables

Table 9.1 Restoration Structure and Objectives Project Number 050650601 Brock Stream Restoration				
Restoration Reach	**Restoration Type**	**Priority Approach**	**Existing Linear Footage or Acreage**	**Designed Linear Footage or Acreage**
Stream	Restoration	Priority 3	1,850 feet	**1,850 feet**
Buffer	Restoration			6.88 acres
	Preservation			0.52 acres
Total Buffer Acres				**7.4 acres**

Table 9.2 Bankfull Cross-Sectional Areas and Discharge Project Number 050650601 (UT to Big Chinquapin Creek)		
Parameter	**Existing**	**Proposed**
Bkf Discharge (cfs)	20.8	20.8
Bkf Area Utilized (sqft)	9.9	9.9
Bkf Velocity (f/s)	2.1	2.1

Table 9.3 Land Use of Watershed Project Number 050650601 (UT to Big Chinquapin Creek)		
Land Use	**Acreage**	**Percentage**
Forested	188.0	59.1%
Agriculture	117.8	37.0%
Rural Residential	10.2	3.2%
Road	2.2	0.7%

Table 9.4 Morphological Table Project Number 050650601 Brock Stream and Wetland Restoration				
Variables		**Existing Channel**		**Proposed Reach**
		Brock		**Brock**
1. Stream Type		G5		E5
2. Drainage Area (sq. mi)		0.49		0.49
3. Bankfull Width (Wbkf) ft	Mean:	7.0	Mean:	7.0
4. Bankfull Mean Depth (dbkf) ft	Mean:	1.4	Mean:	1.4
5. Width/Depth Ratio (Wbkf/dbkf)	Mean:	4.9	Mean:	4.9
6. Bankfull Cross-Sectional Area (Abkf) sq ft	Mean:	9.9	Mean:	9.9
7. Bankfull Mean Velocity (Vbkf) fps	Mean:	2.1	Mean:	2.1
8. Bankfull Discharge (Qbkf) cfs	Mean:	20.8	Mean:	20.8
9. Maximum Bankfull Depth (dmax) ft	Mean:	2.2	Mean:	2.2
10. Ratio of Low Bank Height to	Mean:	3.3	Mean:	1.0
Maximum Bankfull Depth (lbh/dmax)				
11. Width of Flood Prone Area (Wfpa) ft	Mean:	13.0	Mean:	42.0
12. Entrenchment Ratio (Wfpa/Wbkf)	Mean:	1.9	Mean:	6.0
13. Meander Length (Lm) ft	Mean:	N/A	Mean:	N/A
14. Ratio of Meander Length to	Mean:	N/A	Mean:	N/A
Bankfull Width (Lm/Wbkf)				
15. Radius of Curvature (Rc) ft	Mean:	N/A	Mean:	N/A
16. Ratio of Radius of Curvature to	Mean:	N/A	Mean:	N/A
Bankfull Width (Rc/Wbkf)				
17. Belt Width (Wblt) ft	Mean:	20.0	Mean:	20.0
18. Meander Width Ratio (Wblt/Wbkf)	Mean:	2.9	Mean:	2.9
20. Sinuosity (Stream length/valley distance) (K)	Mean:	1.05	Mean:	1.05
21. Valley Slope (ft/ft)	Mean:	0.0033	Mean:	0.0033
22. Average Water Surface Slope for Reach (Savg)	Mean:	0.0031	Mean:	0.0031
23. Pool Slope (Spool) ft/ft	Mean:	0.0001	Mean:	0.0001
24. Ratio of Pool Slope to	Mean:	0.032	Mean:	0.032
Average Slope (Spool/Savg)				
25. Maximum Pool Depth (dpool) ft	Mean:	3.0	Mean:	3.0
26. Ratio of Maximum Pool Depth to Bankfull Mean	Mean:	2.1	Mean:	2.1
Depth (dpool/dbkf)				
27. Pool Width (Wpool) ft	Mean:	8.5	Mean:	8.5
28. Ratio of Pool Width to Bankfull	Mean:	1.2	Mean:	1.2
Width (Wpool/Wbkf)				
29. Bankfull Cross-sectional Area at Pool (Apool) sq ft	Mean:	15.2	Mean:	15.2
30. Ratio of Pool Area to Bankfull Area (Apool/Abkf)	Mean:	1.5	Mean:	1.5
31. Pool to Pool Spacing (p-p) ft	Mean:	20.0	Mean:	20.0
32. Ratio of Pool-to-Pool Spacing	Mean:	2.9	Mean:	2.9
to Bankfull Width (p-p/Wbkf)				
33. Pool Length (Lp) ft	Mean:	20.0	Mean:	20.0
34. Ratio of Pool Length to Bankfull Width (Lp/Wbkf)	Mean:	2.9	Mean:	2.9
35. Riffle Slope (Sriff) ft/ft	Mean:	0.021	Mean:	0.021
36. Ratio of Riffle Slope to Average Slope (Sriff/Savg)	Mean:	6.8	Mean:	6.8
37. Maximum Riffle Depth (driff) ft	Mean:	2.2	Mean:	2.2
38. Ratio of Maximum Riffle Depth to	Mean:	1.6	Mean:	1.6
Bankfull Mean Depth (driff/dbkf)				

Table 9.5 Shear Stress and Stream Power Analysis Project Number 050650601 Brock Stream Restoration		
PARAMETER	**EXISTING**	**PROPOSED**
Velocity (f/s)	2.1	2.1
Shear Stress (lbs/sqft)	0.25	0.25
Stream Power (lbs/sqft/s)	0.413	0.413
D100 (mm)	30	30

Table 9.6 Designed Vegetative Communities by Zone Project Number 050650601 Brock Stream Restoration		
Common Name	**Scientific Name**	**Southeast Region Indicator**
Streambank		
Smooth Alder	*Alnus serrulata*	Facultative Wetland +
Swamp Dogwood	*Cornus stricta*	Facultative Wetland -
Virginia Willow	*Itea virginica*	Facultative Wetland +
Elderberry	*Sambucus Canadensis*	Facultative Wetland -
Floodplain – Coastal Plain Bottomland Hardwood Forest		
Green Ash	*Fraxinus pennsylvanica*	Facultative Wetland
American Sycamore	*Platanus occidentalis*	Facultative Wetland -
Swamp Chestnut Oak	*Quercus michauxii*	Facultative Wetland -
Water Oak	*Quercus nigra*	Facultative
Willow Oak	*Quercus phellos*	Facultative Wetland -
Upland Riparian Area – Mixed Mesic Hardwood Forest Coastal Plain Subtype		
Bitternut Hickory	*Carya cordiformis*	Facultative
Sweet Pepperbush	*Clethra alnifolia*	Facultative Wetland
American Sycamore	*Plantanus occidentalis*	Facultative Wetland -
Cherrybark Oak	*Quercus alcate* var *pagodaefolia*	Facultative +
White Oak	*Quercus alba*	Facultative Upland
Swamp Chestnut Oak	*Quercus michauxii*	Facultative Wetland -

10.0 Figures

Figure 10.1. Project Site Vicinity Map

Figure 10.2. Project Site Watershed Map

Figure 10.3. Project Site NRCS Soil Survey Map

Figure 10.4. Project Site Hydrological Features Map

Figure 10.5. Project Site Wetland Delineation Map

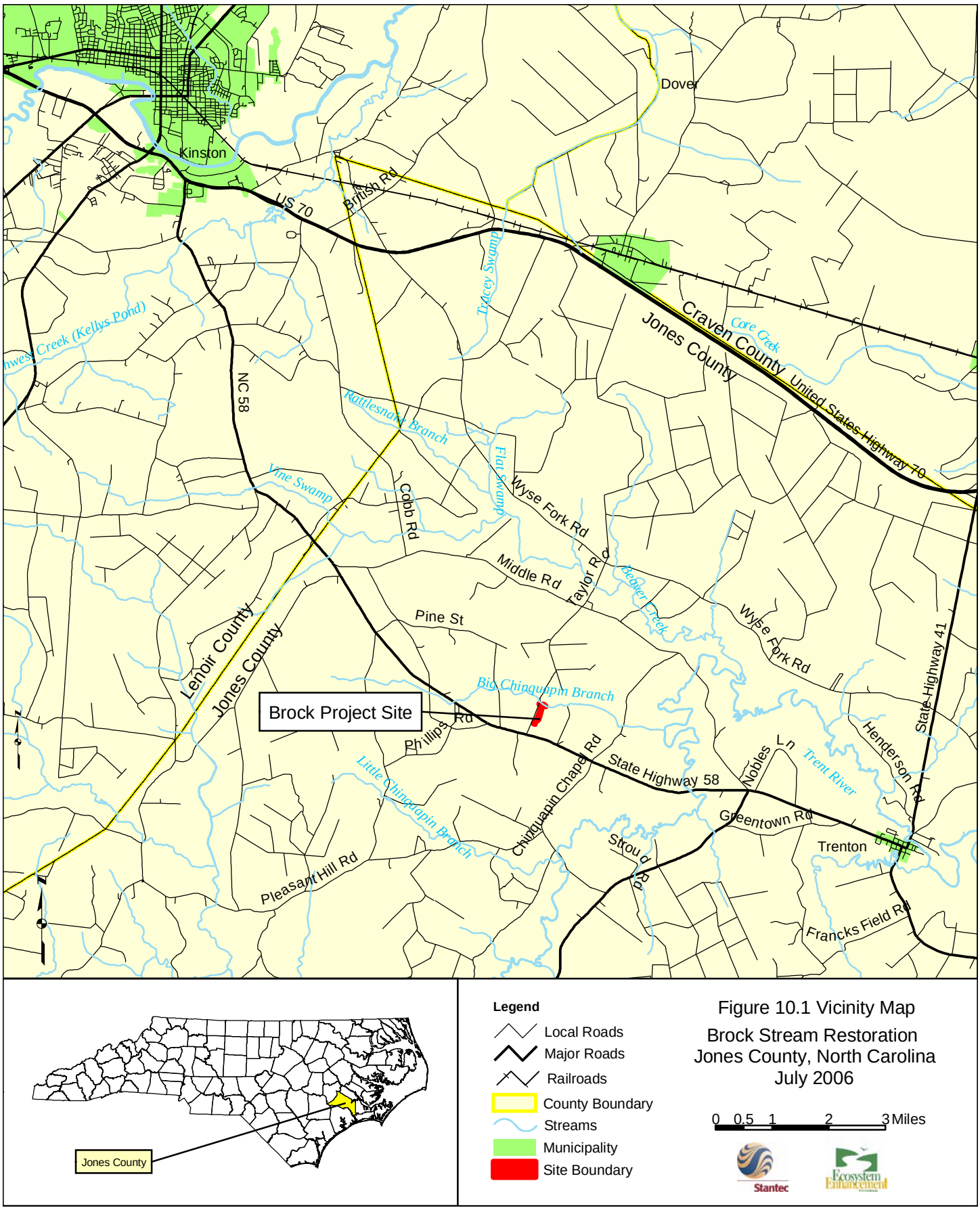


Figure 10.1 Vicinity Map
Brock Stream Restoration
Jones County, North Carolina
July 2006

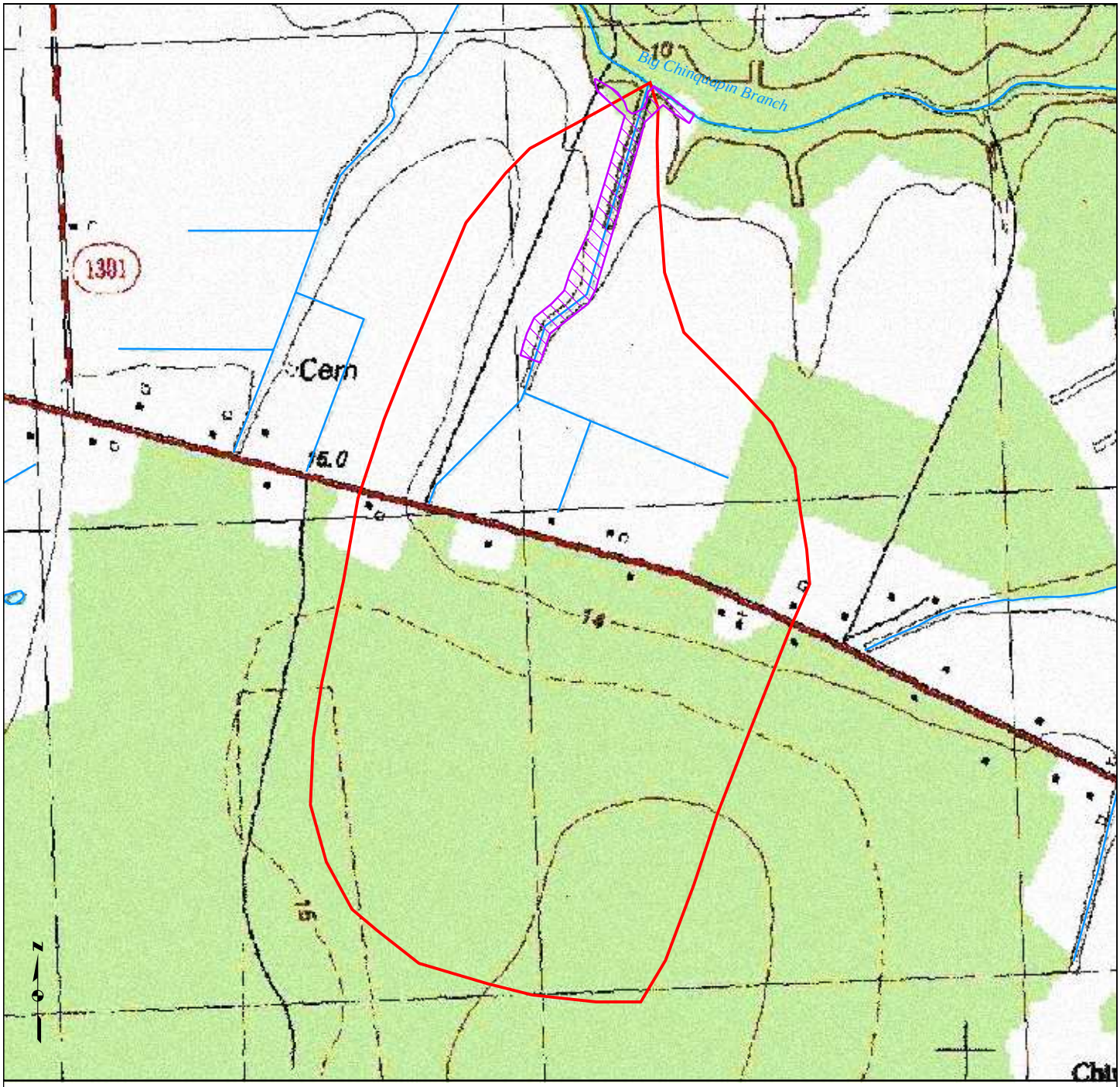


Figure 10.2 Project Site Watershed Map

Brock Stream Restoration
Jones County, North Carolina
July 2006

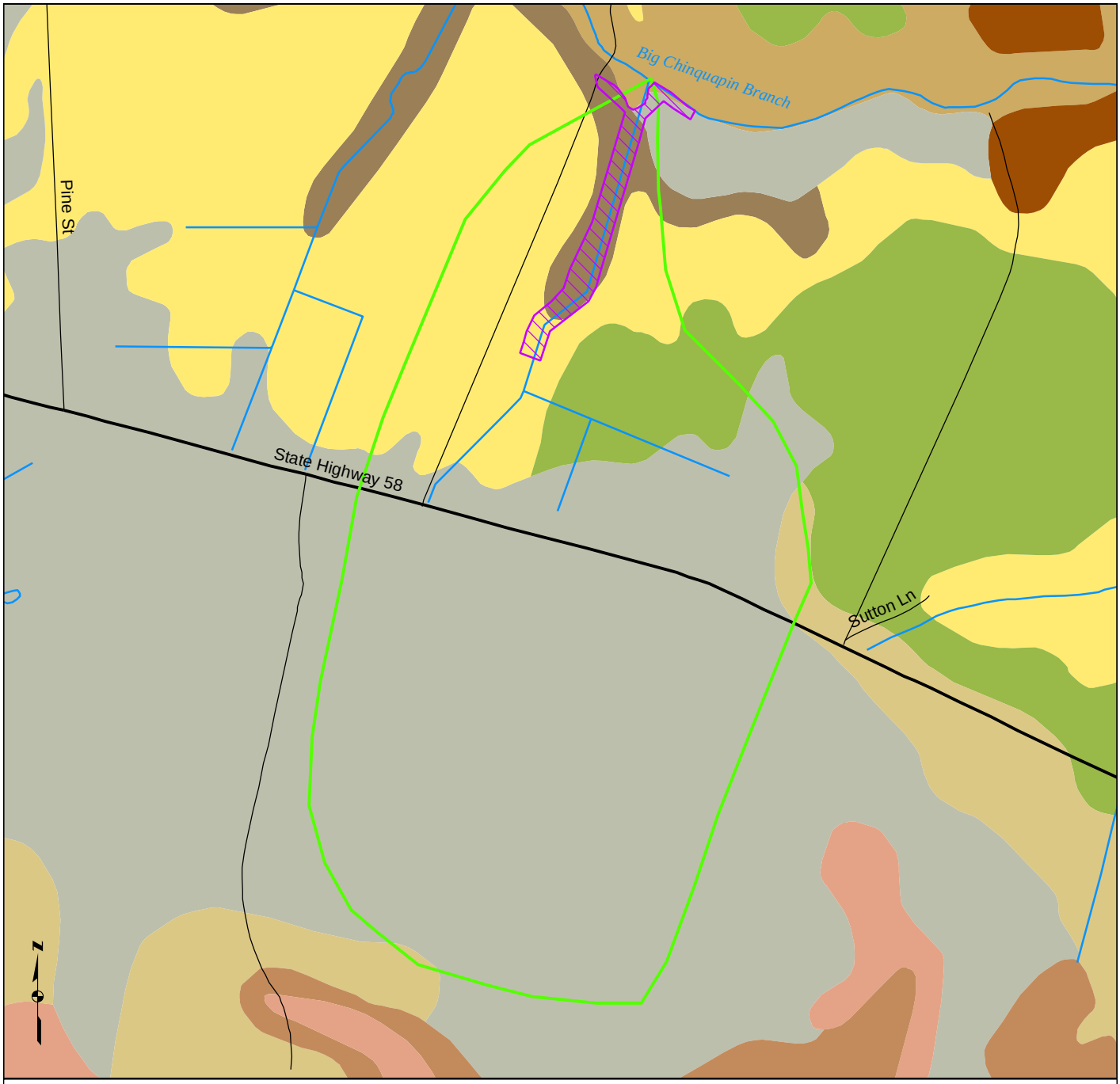
Legend

Streams
Watershed
Approximate Easement
Phillips Crossroads USGS 7.5' Quad

0 500 1000 2000 Feet

Stantec

Ecosystem Enhancement Program



Legend

- Approximate Easement
- Streams
- Local Roads
- Major Roads
- Watershed

Soils

- AuB - Autryville
- GoA - Goldsboro
- Gt - Grifton
- Ly - Lynchburg
- Me - Meggett
- Mk - Muckalee
- NoB - Norfolk
- On - Onslow
- Pn - Pantego
- Ra - Rains

Figure 10.3 Project Site NRCS Soil Survey Map

Brock Stream Restoration
Jones County, North Carolina
July 2006

0 500 1000 2000 Feet

Stantec

Ecosystem Enhancement Program

Legend

- Streams
- Wetland
- Drain tiles
- Approximate Easement

Aerial Photos: September 2003
Hurricane Isabel Damage Assessment
and Recovery Effort (USGS)

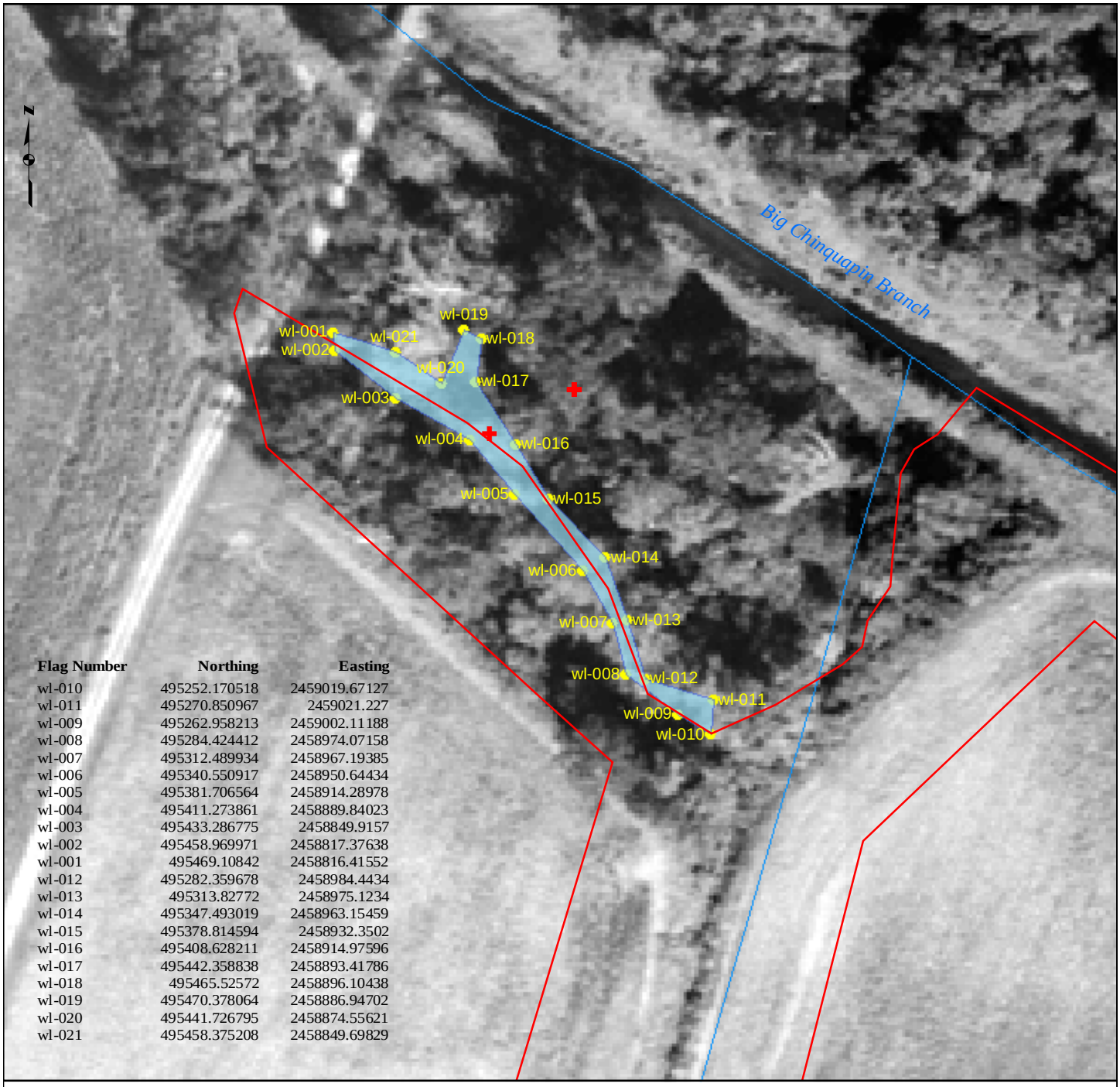
Figure 10.4 Project Site Hydrological Features

Brock Stream Restoration
Jones County, North Carolina
July 2006

0 250 500 1000 Feet

Stantec

Ecosystem Enhancement Program



Flag Number	Northing	Easting
wl-010	495252.170518	2459019.67127
wl-011	495270.850967	2459021.227
wl-009	495262.958213	2459002.11188
wl-008	495284.424412	2458974.07158
wl-007	495312.489934	2458967.19385
wl-006	495340.550917	2458950.64434
wl-005	495381.706564	2458914.28978
wl-004	495411.273861	2458889.84023
wl-003	495433.286775	2458849.9157
wl-002	495458.969971	2458817.37638
wl-001	495469.10842	2458816.41552
wl-012	495282.359678	2458984.4434
wl-013	495313.82772	2458975.1234
wl-014	495347.493019	2458963.15459
wl-015	495378.814594	2458932.3502
wl-016	495408.628211	2458914.97596
wl-017	495442.358838	2458893.41786
wl-018	495465.52572	2458896.10438
wl-019	495470.378064	2458886.94702
wl-020	495441.726795	2458874.55621
wl-021	495458.375208	2458849.69829

Legend

- Streams
- Wetland Flags
- Wetland
- Approximate Easement
- Data Form Sampling Points

Aerial Photos: September 2003
Hurricane Isabel Damage Assessment
and Recovery Effort (USGS)

Figure 10.5 Project Site Wetland Delineation Map

Brock Stream Restoration
Jones County, North Carolina
July 2006

0 25 50 100 150 Feet

Stantec

Ecosystem Enhancement Program

11.0 Design Sheets

Sheet 11.1. Existing Conditions

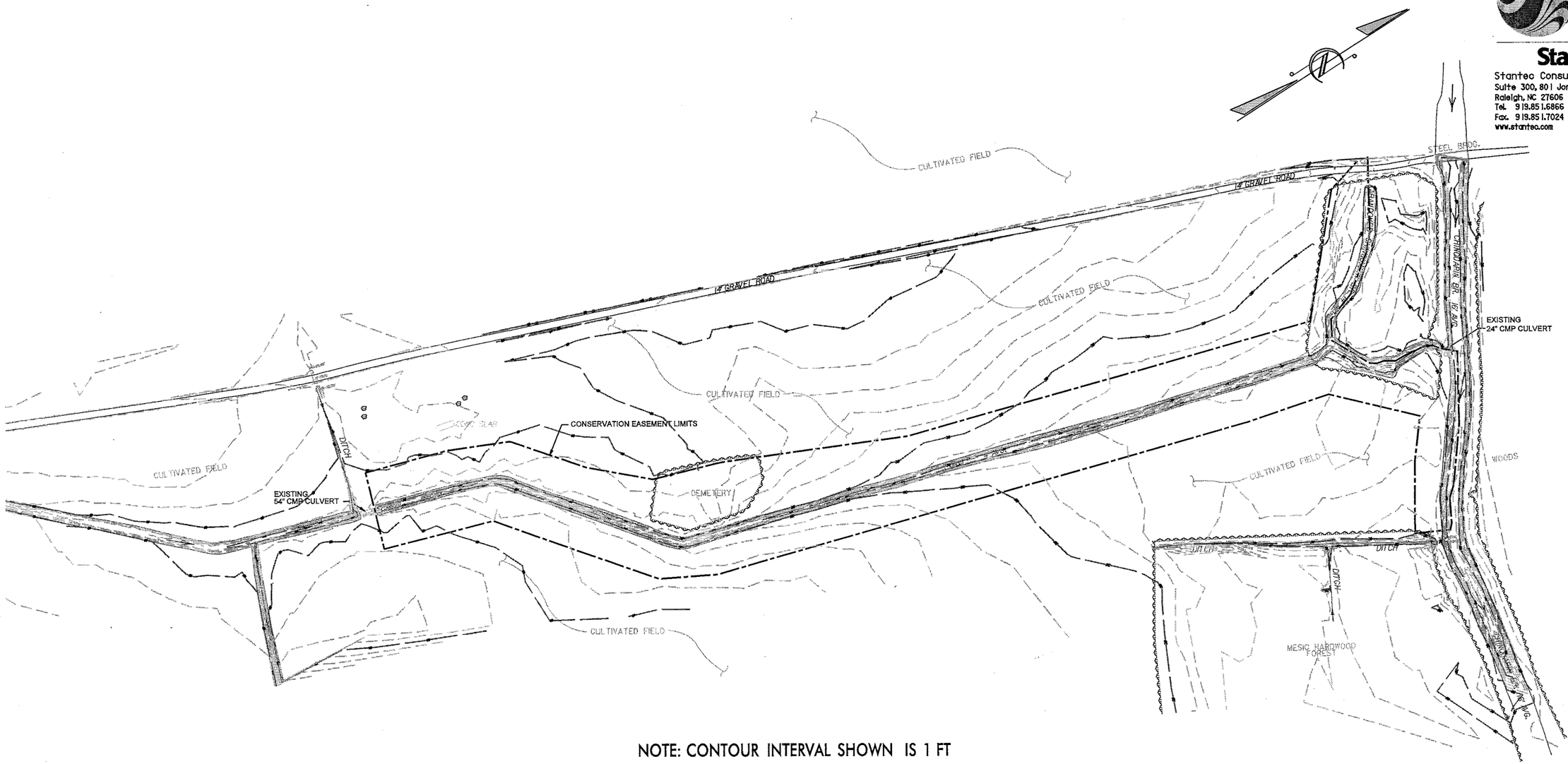
Sheet 11.2. Plan View

Sheet 11.3. Planting Plan

Sheet 11.4. HEC-RAS Analysis

Sheet 11.5. Typical Section

EXISTING CONDITIONS



NOTE: CONTOUR INTERVAL SHOWN IS 1 FT

50 0 100
SCALE

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www.stantec.com

BROCK
STREAM RESTORATION

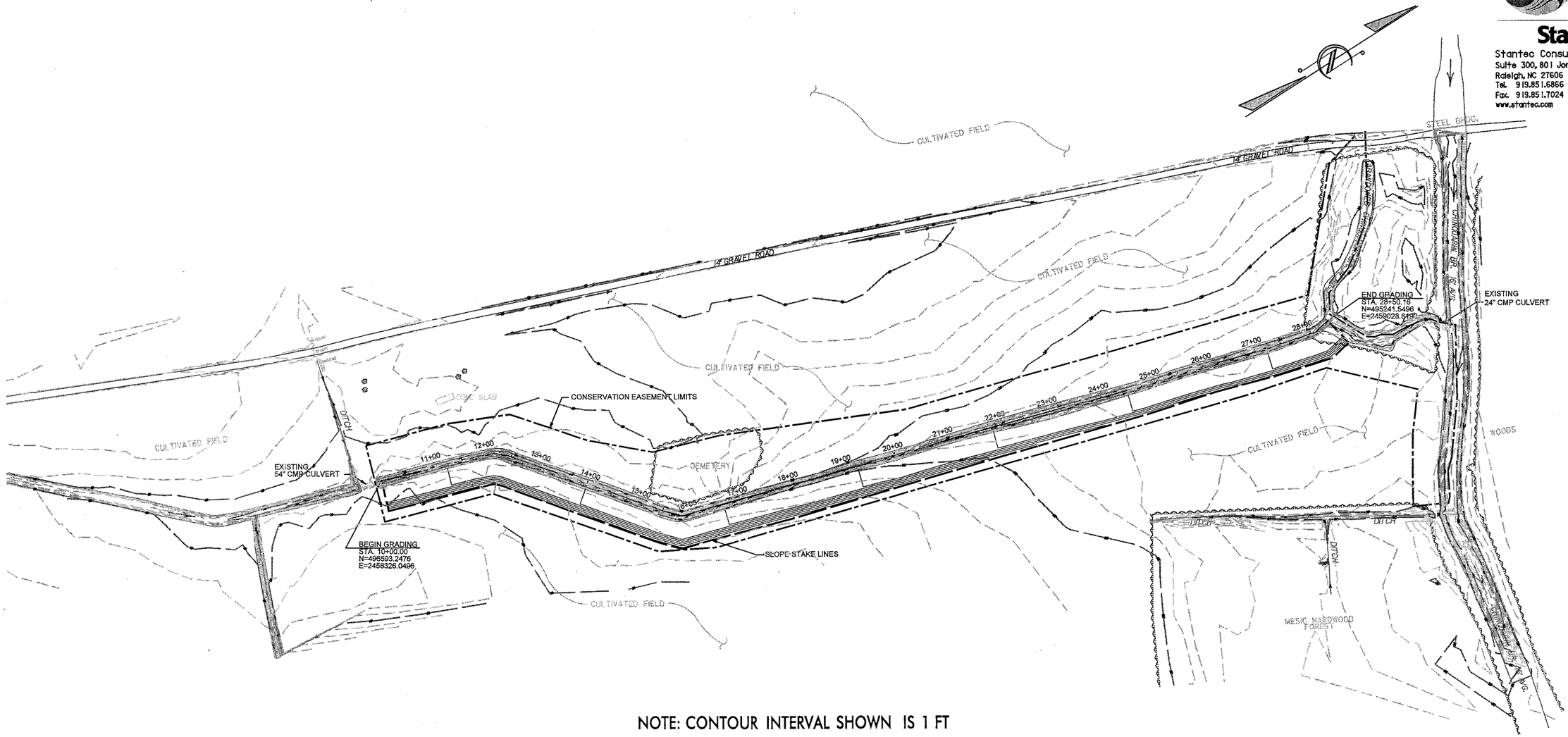
Jones County, North Carolina

Existing Conditions

SHEET 11.1

PLAN VIEW

Stantec
Stantec Consulting Services Inc.
Suite 300, 801 Jones Franklin Road
Raleigh, NC 27606
Tel. 919.851.6866
Fax. 919.851.7024
www.stantec.com



NOTE: CONTOUR INTERVAL SHOWN IS 1 FT

50 0 100
SCALE

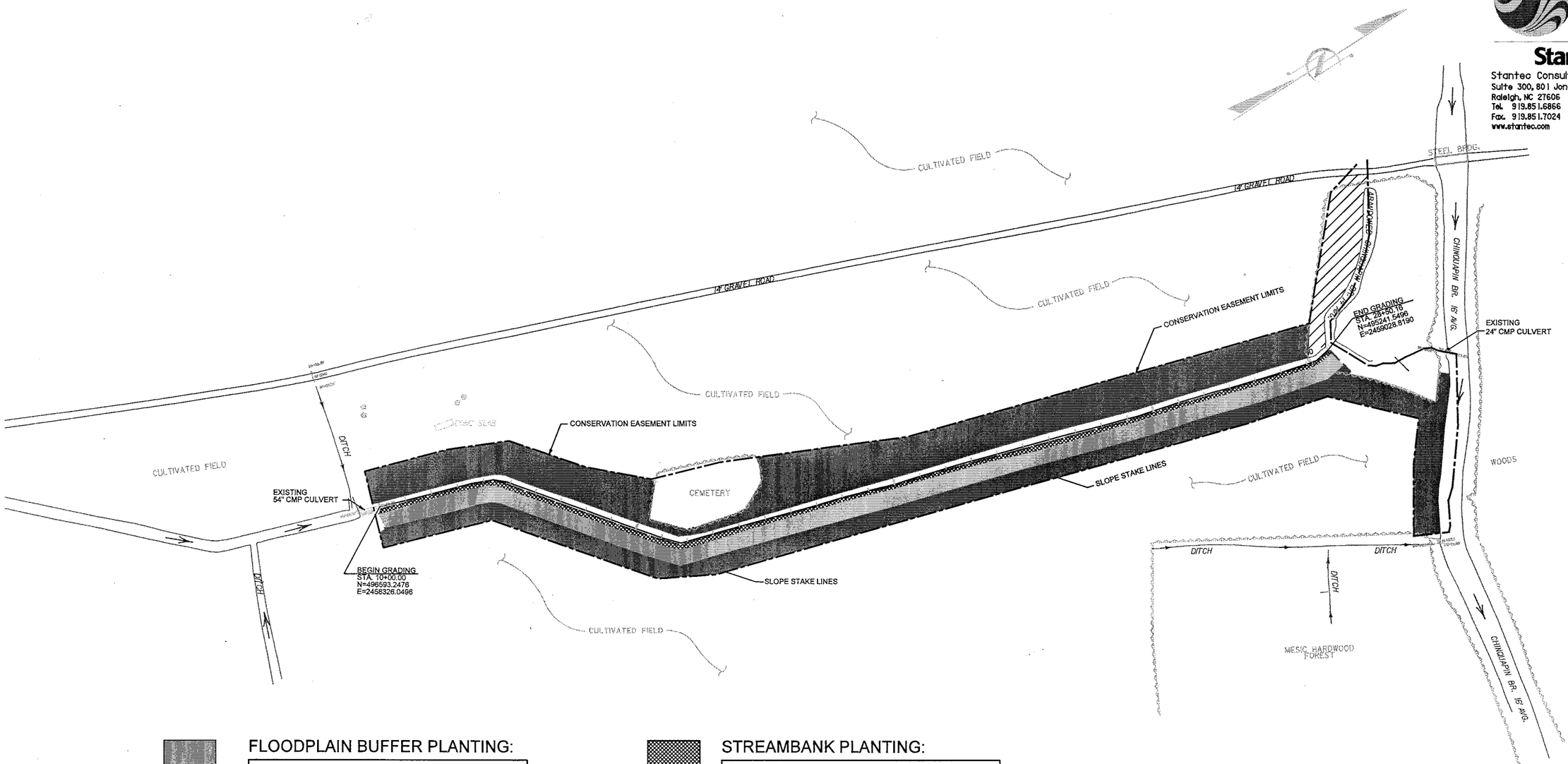
BROCK
STREAM RESTORATION

Jones County, North Carolina

Plan View

SHEET 11.2

PLANTING PLAN



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FLOODPLAIN BUFFER PLANTING:

Green Ash	*Fraxinus pennsylvanica*
Swamp Chestnut Oak	*Quercus michauxii*
American Sycamore	*Platanus occidentalis*
Water Oak	*Quercus nigra*
Willow Oak	*Quercus phellos*

UPLAND BUFFER PLANTING:

Bitternut Hickory	*Carya cordiformis*
Sweet Pepperbush	*Clethra alnifolia*
American Sycamore	*Plantanus occidentalis*
Cherrybark Oak	*Quercus alcate var pagodaefolia*
White Oak	*Quercus alba*
Swamp Chestnut Oak	*Quercus michauxii*

BOTTOMLAND HARDWOOD PRESERVATION

STREAMBANK PLANTING:

Smooth Alder	*Alnus serrulata*
Swamp Dogwood	*Cornus stricta*
Elderberry	*Sambucus canadensis*
Virginia Willow	*Itea virginica*

50 0 100
SCALE

BROCK STREAM RESTORATION

Jones County, North Carolina

Planting Plan

SHEET 11.3

HEC-RAS ANALYSIS

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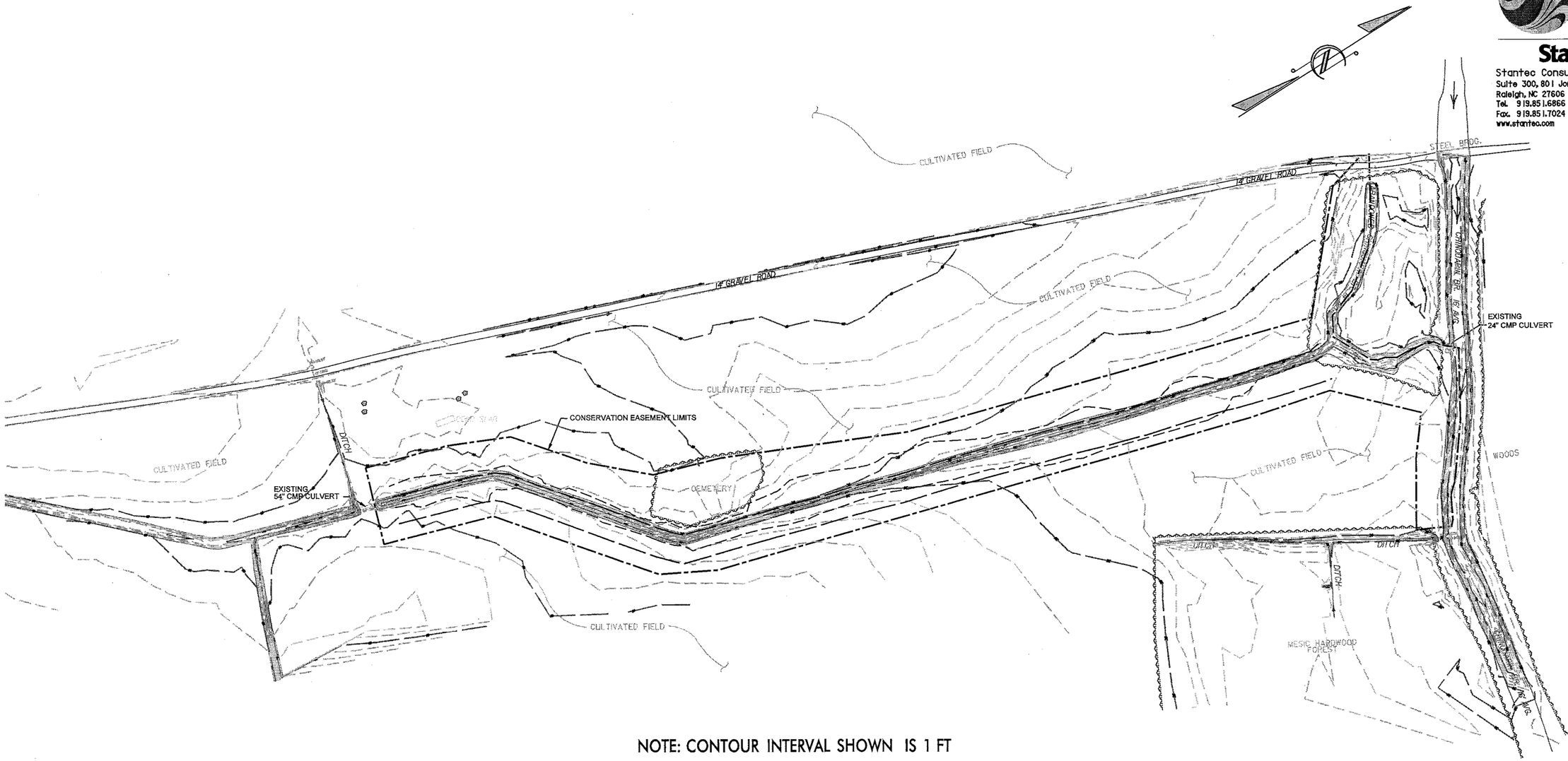


NOTE: CONTOUR INTERVAL SHOWN IS 1 FT

100 yr - UPSTREAM STATION

– – – – – – – –	EXISITNG	39.0 ft
— — — —	DESIGN	36.1 ft
	NO RISE	-2.9 ft

50 0 100
SCALE

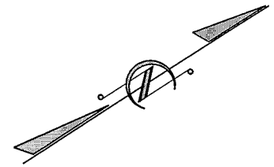
BROCK
STREAM RESTORATION

Jones County, North Carolina

HEC-RAS Cross-Section Locations

SHEET 11.4

TYPICAL SECTION



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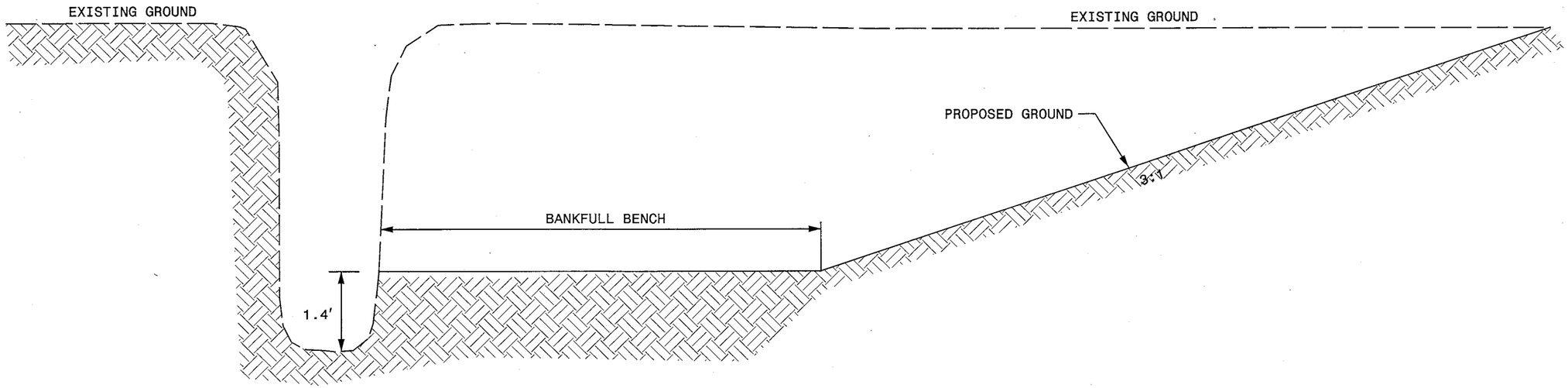
PRIORITY III TYPICAL CHANNEL SECTION

SCALE: NTS



~ 5.0' VARING DEPTHS OF CUT
~ 40.0' FLOODPLAIN WIDTH
~ 60.0' FLOODPLAIN SLOPE GRADING LIMITS

NOTE:
SEE SLOPE STAKE LINES ON PLANSHEETS OR E&SC SHEETS

NOT TO SCALE

BROCK
STREAM RESTORATION
Jones County, North Carolina

Typical Section

SHEET 11.5

12.0 Appendices

Appendix 1. Project Site Photographs

Appendix 2. Project Site Notification of Jurisdictional Determination and USACE Routine Wetland Determination Data Forms

Appendix 3. Project Site NCDWQ Stream Classification Forms

Appendix 4. Project Site Biological Reconnaissance Form

Appendix 5. HEC-RAS Analysis

Appendix 6. Correspondence

Appendix 1. Project Site Photographs

Photo 1. Coastal Plain Bottomland Hardwood Forest
Adjacent to Big Chinquapin Branch

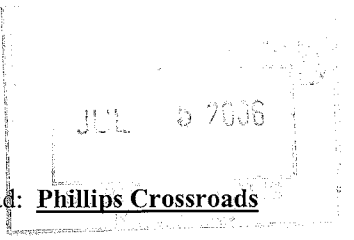
Photo 2. Former Channel of Big Chinquapin Branch
Located in Coastal Plain Bottomland Hardwood Forest

Photo 3. Existing Channel; Southern Property Limits Facing North
Looking Downstream Showing Entrenched Channel

Photo 4. Existing Channel; Middle Reach Facing North
Looking Downstream Showing Mowed Buffer

Appendix 2. Project Site Notification of Jurisdictional Determination and USACE Routine Wetland Determination Data Forms

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT



ORM ID: **SAW-2006-32014-152** County: **Jones** U.S.G.S. Quad: **Phillips Crossroads**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner/Agent: **North Carolina Ecosystem Enhancement Program**
Address: **c/o Ms. Amber Coleman, Stantec Consulting**
801 Jones Franklin Road, Suite 300
Raleigh, North Carolina 27606
Telephone No.: **(919) 851-6866**

Property description:
Size (acres) **approximately 7 acres** Nearest Town **Dover**
Nearest Waterway **Chinquapin Branch** River Basin **Middle Neuse**
USGS HUC **03020202** Coordinates N **35.100723** W **-77.465240**
Location description **An approximate 7 acre tract located on the north side of NCSR 1002 approximately 0.5 miles east of the intersection with NCSR 1301 adjacent to Chinquapin Branch near the Town of Dover in Jones County, North Carolina.**

Indicate Which of the Following Apply:

A. Preliminary Determination

_ Based on preliminary information, there may be wetlands on the above described property. We strongly suggest you have this property inspected to determine the extent of Department of the Army (DA) jurisdiction. To be considered final, a jurisdictional determination must be verified by the Corps. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).

B. Approved Determination

_ There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

X There are wetlands on the above described property subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ We strongly suggest you have the wetlands on your property delineated. Due to the size of your property and/or our present workload, the Corps may not be able to accomplish this wetland delineation in a timely manner. For a more timely delineation, you may wish to obtain a consultant. To be considered final, any delineation must be verified by the Corps.

_ The wetland on your property have been delineated and the delineation has been verified by the Corps. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

X The wetlands have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on **7/3/2006**. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ Please be advised that a Prior Converted Cropland (PC) determination made by the Natural Resource Conservation Service (NRCS) remains valid as long as the area is devoted to an agricultural use. If the land changes to a non-agricultural use, the PC determination is no longer applicable and a new wetland determination is required for Clean Water Act purposes.

ORM ID: SAW-2006-32014-152

_ There are no waters of the U.S., to include wetlands, present on the above described property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in Morehead City, NC, at (252) 808-2808 to determine their requirements.

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Mr. Scott Jones, PWS** at **(252) 975-1616 extension 27**.

C. Basis For Determination

This site exhibits wetland criteria as described in the 1987 Corps Wetland Delineation Manual and is adjacent to Chinquapin Branch, a tributary flowing to the Trent River.

D. Remarks

Plat entitled "BROCK RESTORATION SITE FOR ECOSYSTEM ENHANCEMENT PROGRAM" and dated 03/21/2006. Plat prepared by Stantec Consulting Inc.

E. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B. above)

This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the South Atlantic Division, Division Office at the Following address:

Mr. Michael F. Bell, Administrative Appeal Review Officer
CESAD-ET-CO-R
U.S. Army Corps of Engineers, South Atlantic Division
60 Forsyth Street, Room 9M15
Atlanta, Georgia 30303-8801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **09/03/2006**.

It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: Scott Jones, PWS

Date **07/03/2006** Expiration Date **07/03/2011**

Copy furnished:

JURISDICTIONAL DETERMINATION

Revised 8/13/04

U.S. Army Corps of Engineers

DISTRICT OFFICE: CESAW-RG-W
FILE NUMBER: SAW-2006-32014-152

PROJECT LOCATION INFORMATION:

State: NC
County: Jones
Center coordinates of site (latitude/longitude): 35.100723 / -77.465240
Approximate size of area (parcel) reviewed, including uplands: 7 acres.
Name of nearest waterway: Chinquapin Branch
Name of watershed: Middle Neuse

JURISDICTIONAL DETERMINATION

Completed: Desktop determination ☐ Date:
Site visit(s) ☒ Date(s): 03/21/2006

Jurisdictional Determination (JD):

☐ Preliminary JD - Based on available information, ☐ *there appear to be* (or) ☐ *there appear to be no* "waters of the United States" and/or "navigable waters of the United States" on the project site. A preliminary JD is not appealable (Reference 33 CFR part 331).

☒ Approved JD – An approved JD is an appealable action (Reference 33 CFR part 331).
Check all that apply:

☐ *There are* "navigable waters of the United States" (as defined by 33 CFR part 329 and associated guidance) within the reviewed area. Approximate size of jurisdictional area: .

☒ *There are* "waters of the United States" (as defined by 33 CFR part 328 and associated guidance) within the reviewed area. Approximate size of jurisdictional area: 0.11 acres.

☐ *There are "isolated, non-navigable, intra-state* waters or wetlands" within the reviewed area.
☐ Decision supported by SWANCC/Migratory Bird Rule Information Sheet for Determination of No Jurisdiction.

BASIS OF JURISDICTIONAL DETERMINATION:

A. Waters defined under 33 CFR part 329 as "navigable waters of the United States":
☐ The presence of waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

B. Waters defined under 33 CFR part 328.3(a) as "waters of the United States":
☐ (1) The presence of waters, which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide.
☐ (2) The presence of interstate waters including interstate wetlands[1].
☐ (3) The presence of other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate commerce including any such waters (check all that apply):
- ☐ (i) which are or could be used by interstate or foreign travelers for recreational or other purposes.
- ☐ (ii) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- ☐ (iii) which are or could be used for industrial purposes by industries in interstate commerce.

☐ (4) Impoundments of waters otherwise defined as waters of the US.
☐ (5) The presence of a tributary to a water identified in (1) – (4) above.
☐ (6) The presence of territorial seas.
☒ (7) The presence of wetlands adjacent[2] to other waters of the US, except for those wetlands adjacent to other wetlands.

Rationale for the Basis of Jurisdictional Determination (applies to any boxes checked above). *If the jurisdictional water or wetland is not itself a navigable water of the United States, describe connection(s) to the downstream navigable waters. If B(1) or B(3) is used as the Basis of Jurisdiction, document navigability and/or interstate commerce connection (i.e., discuss site conditions, including why the waterbody is navigable and/or how the destruction of the waterbody could affect interstate or foreign commerce). If B(2, 4, 5 or 6) is used as the Basis of Jurisdiction, document the rationale used to make the determination. If B(7) is used as the Basis of Jurisdiction, document the rationale used to make adjacency determination:* This site exhibits wetland criteria as described in the 1987 Corps Wetland Delineation Manual and is adjacent to Chinquapin Branch, a tributary of the Trent River.

Lateral Extent of Jurisdiction: (Reference: 33 CFR parts 328 and 329)

☒ Ordinary High Water Mark indicated by:
- ☐ clear, natural line impressed on the bank
- ☐ the presence of litter and debris
- ☐ changes in the character of soil
- ☐ destruction of terrestrial vegetation
- ☐ shelving
- ☐ other:

☒ High Tide Line indicated by:
- ☐ oil or scum line along shore objects
- ☐ fine shell or debris deposits (foreshore)
- ☐ physical markings/characteristics
- ☐ tidal gages
- ☐ other:

☒ Mean High Water Mark indicated by:
☐ survey to available datum; ☐ physical markings; ☐ vegetation lines/changes in vegetation types.

☒ Wetland boundaries, as shown on the attached wetland delineation map and/or in a delineation report prepared by: Stantec Consulting

Basis For Not Asserting Jurisdiction:

☒ The reviewed area consists entirely of uplands.
☒ Unable to confirm the presence of waters in 33 CFR part 328(a)(1, 2, or 4-7).
☒ Headquarters declined to approve jurisdiction on the basis of 33 CFR part 328.3(a)(3).
☒ The Corps has made a case-specific determination that the following waters present on the site are not Waters of the United States:
- ☐ Waste treatment systems, including treatment ponds or lagoons, pursuant to 33 CFR part 328.3.
- ☐ Artificially irrigated areas, which would revert to upland if the irrigation ceased.
- ☐ Artificial lakes and ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.
- ☐ Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.
- ☐ Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States found at 33 CFR 328.3(a).
- ☐ Isolated, intrastate wetland with no nexus to interstate commerce.
- ☐ Prior converted cropland, as determined by the Natural Resources Conservation Service. Explain rationale:
- ☐ Non-tidal drainage or irrigation ditches excavated on dry land. Explain rationale:
- ☐ Other (explain):

DATA REVIEWED FOR JURSIDICTIONAL DETERMINATION (mark all that apply):

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant.
☒ Data sheets prepared/submitted by or on behalf of the applicant.
- ☒ This office concurs with the delineation report, dated 02/17/2006, prepared by (company): Stantec Consulting
- ☐ This office does not concur with the delineation report, dated , prepared by (company):

☒ Data sheets prepared by the Corps.
☒ Corps' navigable waters' studies:
☒ U.S. Geological Survey Hydrologic Atlas:
☒ U.S. Geological Survey 7.5 Minute Topographic maps: Phillips Crossroads
☒ U.S. Geological Survey 7.5 Minute Historic quadrangles:
☒ U.S. Geological Survey 15 Minute Historic quadrangles:
☒ USDA Natural Resources Conservation Service Soil Survey: Jones
☒ National wetlands inventory maps:
☒ State/Local wetland inventory maps:
☒ FEMA/FIRM maps (Map Name & Date):
☒ 100-year Floodplain Elevation is: (NGVD)
☒ Aerial Photographs (Name & Date): CESAW
☒ Other photographs (Date):
☒ Advanced Identification Wetland maps:
☒ Site visit/determination conducted on: 03/21/2006
☒ Applicable/supporting case law:
☒ Other information (please specify):

[1]Wetlands are identified and delineated using the methods and criteria established in the Corps Wetland Delineation Manual (87 Manual) (i.e., occurrence of hydrophytic vegetation, hydric soils and wetland hydrology).

[2]The term "adjacent" means bordering, contiguous, or neighboring. Wetlands separated from other waters of the U.S. by man-made dikes or barriers, natural river berms, beach dunes, and the like are also adjacent.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: NC EEP	File No.: SAW-2006-32014-152	Date: 07/03/2006
Attached is:		See Section below
☐ INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
☐ PROFFERED PERMIT (Standard Permit or Letter of permission)		B
☐ PERMIT DENIAL		C
☒ APPROVED JURISDICTIONAL DETERMINATION		D
☐ PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

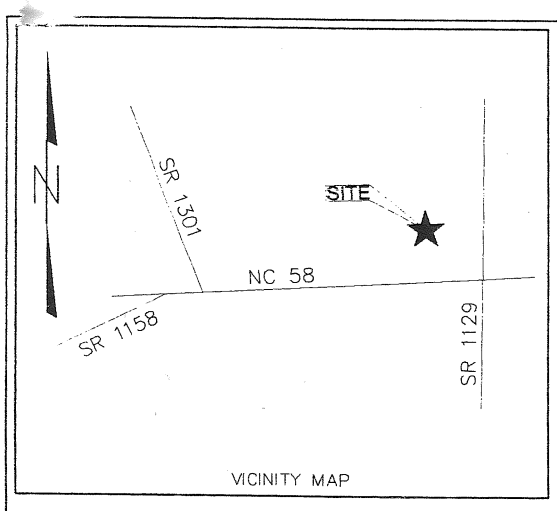
POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: Mr. Scott Jones, Project Manager CESAW-RG-W Post Office Box 1000 Washington, North Carolina 27889	If you only have questions regarding the appeal process you may also contact: Mr. Michael F. Bell, Administrative Appeal Review Officer CESAD-ET-CO-R U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 9M15 Atlanta, Georgia 30303-8801

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

DIVISION ENGINEER:
Commander
U.S. Army Engineer Division, South Atlantic
60 Forsyth Street, Room 9M15
Atlanta, Georgia 30303-3490



VICINITY MAP

"This certifies that this copy of this plat accurately depicts the boundary of the jurisdiction of Section 404 of the Clean Water Act in the areas impacted by the present proposed activity, as determined by the undersigned on this date. Other areas of jurisdiction may be present on the site but have not been delineated. Unless there has been a change in the law or our published regulations, this determination of Section 404 jurisdiction may be relied upon for a period not to exceed five years from this date. This determination was made utilizing the 1987 Corps of Engineers Wetlands Delineation Manual."

Name: Scott Jarvis, PWS
Title: PROJECT MANAGER
Date: 7/31/2006
AID: SAW-2006-32014-BZ

GRAPHIC SCALE

200' 0' 200' 400' 600'

1 INCH = 200 FEET

I, F. REX COOPER, CERTIFY THAT THIS MAP WAS PREPARED IN PART FROM AN ACTUAL FIELD SURVEY OF THE WETLANDS AND A MAP AS REFERENCED HEREON; THAT THE BOUNDARIES NOT SURVEYED ARE SHOWN AS BROKEN LINES AND THAT THE COORDINATES SHOWN ARE NC GRID - NAD83. WITNESS MY HAND AND SEAL THIS 4TH DAY OF APRIL, 2006.

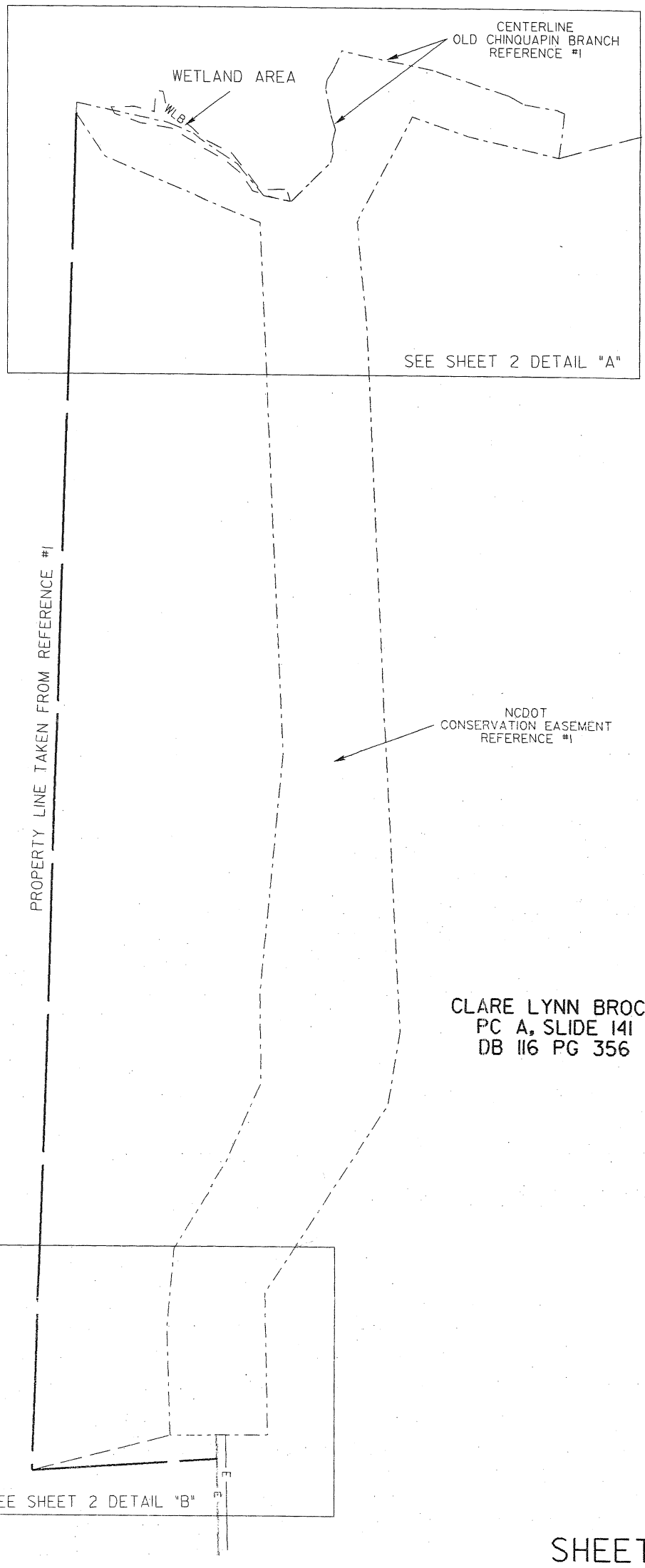
F. Rex Cooper

PROFESSIONAL LAND SURVEYOR L-4269

NORTH CAROLINA PROFESSIONAL SEAL L-4269 LAND SURVEYOR F. REX COOPER

4-4-06

N
NC GRID
NAD 83



LEGEND

——— ———	PROPERTY LINE
— - — - — - —	CONSERVATION EASEMENT LINE
— — — — — —	TIE LINE
— — — WLB — — —	WETLANDS BOUNDARY LINE
——— E ———	EASEMENT LINE
●	COMPUTED POINT
PC	PLAT CABINET
DB	DEED BOOK
PG	PAGE

NOTES:

1. THIS MAP DOES NOT REPRESENT A BOUNDARY SURVEY BY THIS FIRM.
2. COORDINATES SHOWN ON THIS MAP ARE NC GRID-NAD83 AND WERE OBTAINED USING MAPPING GRADE TRIMBLE GPS RECEIVERS POST-PROCESSED USING TRIMBLE PATHFINDER SOFTWARE.

REFERENCE:

1. CONSERVATION EASEMENT AND BOUNDARY INFORMATION TAKEN FROM PLAT CABINET B, SLIDE 366 PAGE 1 ENTITLED 'CONSERVATION EASEMENT SURVEY ON CLARE LYNN BROCK PROPERTY' BY McKIM & CREED AND DATED JANUARY 07, 2003.

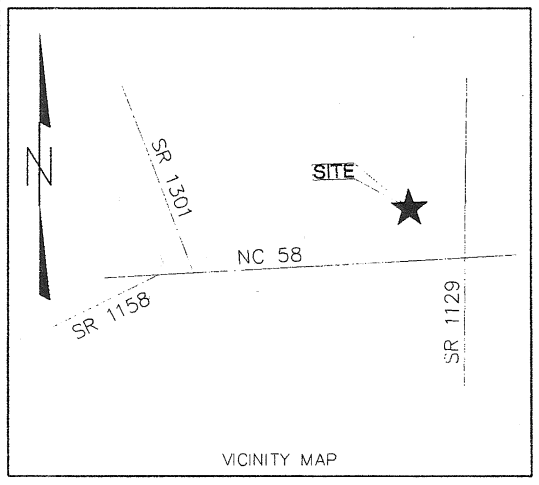
3/21/2006

Stantec Consulting Inc.
Suite 300, 801 Jones Franklin Road
Raleigh NC U.S.A.
27606
Tel. 919.851.6866
Fax. 919.851.7024
www.stantec.com

Stantec

BROCK RESTORATION SITE
FOR
ECOSYSTEM ENHANCEMENT PROGRAM

JONES COUNTY NORTH CAROLINA



VICINITY MAP

I, F. REX COOPER, CERTIFY THAT THIS MAP WAS PREPARED IN PART FROM AN ACTUAL FIELD SURVEY OF THE WETLANDS AND A MAP AS REFERENCED HEREON; THAT THE BOUNDARIES NOT SURVEYED ARE SHOWN AS BROKEN LINES AND THAT THE COORDINATES SHOWN ARE NC GRID - NAD83. WITNESS MY HAND AND SEAL THIS 4TH DAY OF APRIL, 2006.

F. Rex Cooper

PROFESSIONAL LAND SURVEYOR L-4269

NORTH CAROLINA PROFESSIONAL SEAL L-4269 LAND SURVEYOR F. REX COOPER

4-4-06

NOTES:

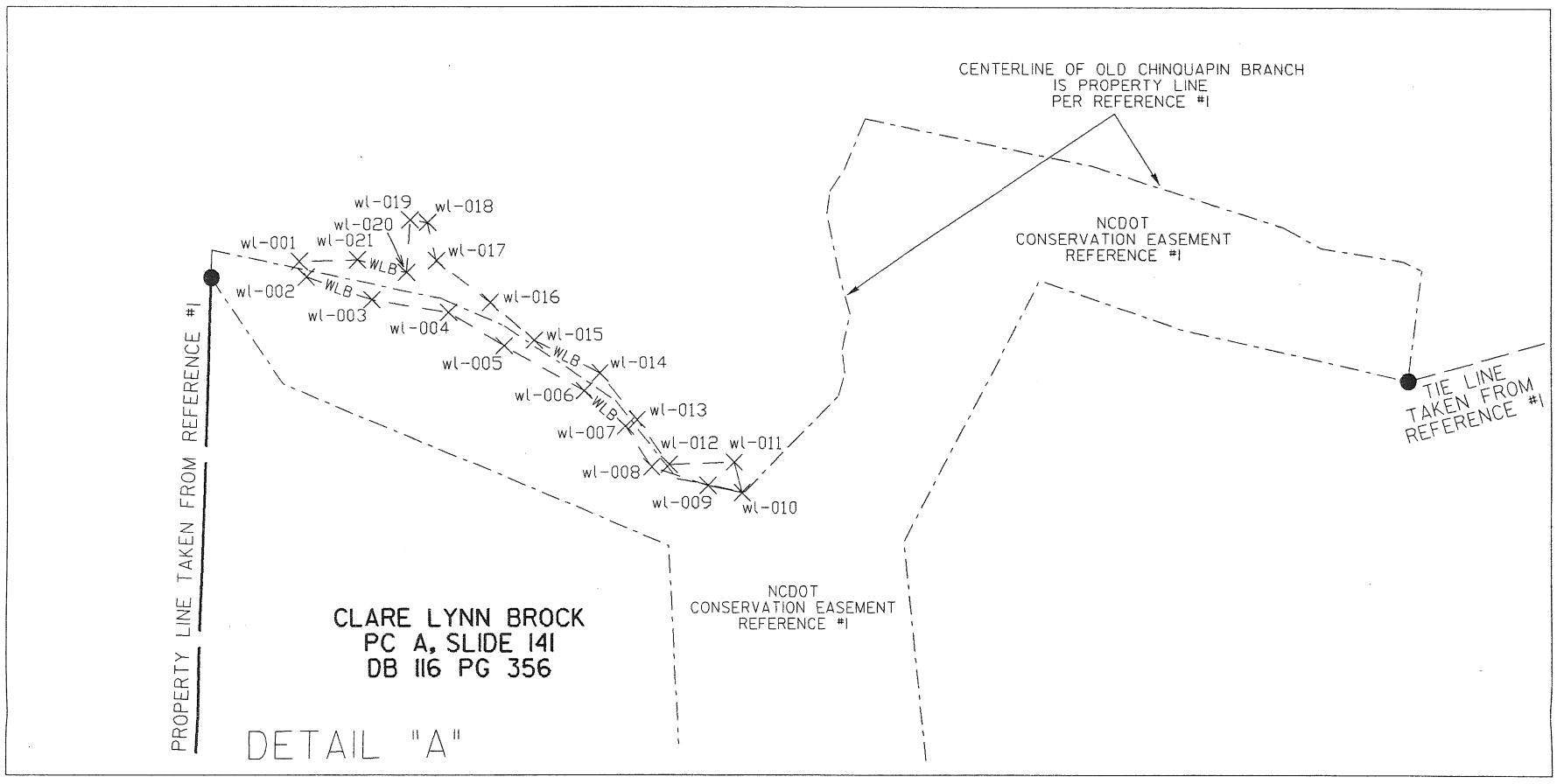
1. THIS MAP DOES NOT REPRESENT A BOUNDARY SURVEY BY THIS FIRM.
2. COORDINATES SHOWN ON THIS MAP ARE NC GRID-NAD83 AND WERE OBTAINED USING MAPPING GRADE TRIMBLE GPS RECEIVERS POST-PROCESSED USING TRIMBLE PATHFINDER SOFTWARE.

REFERENCE:

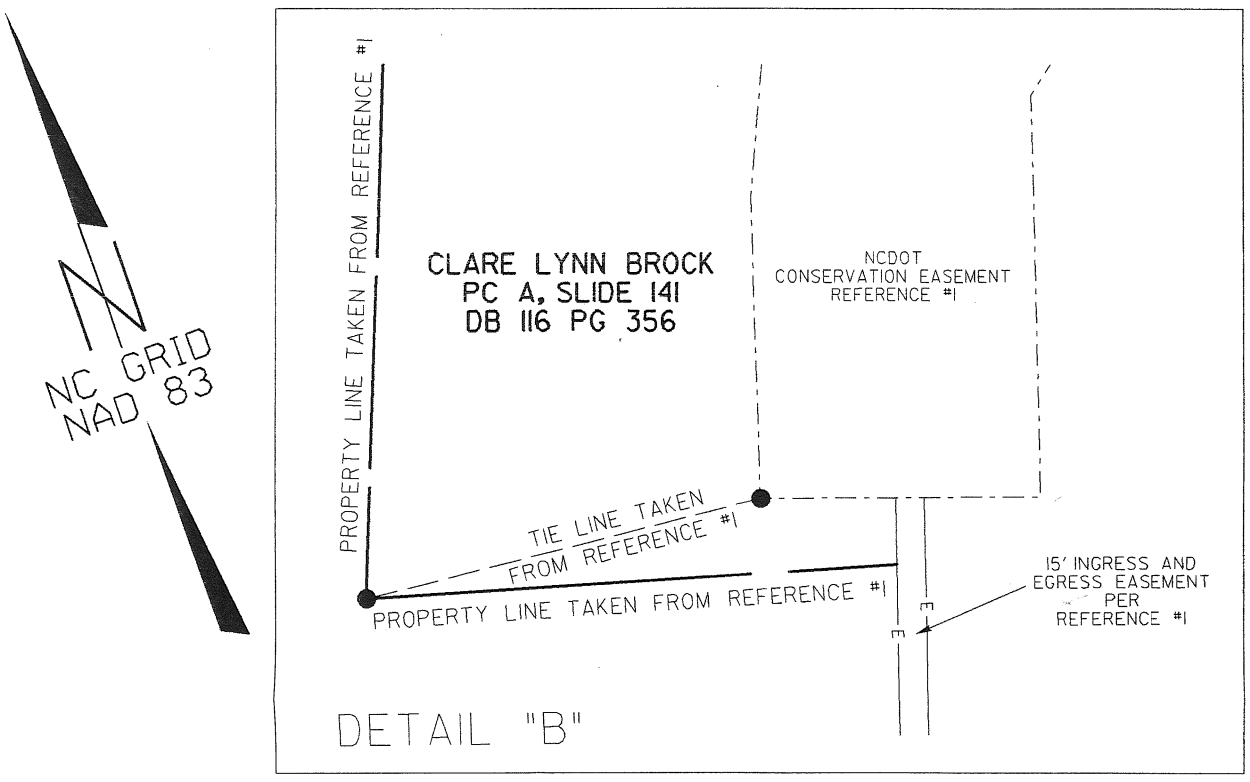
1. CONSERVATION EASEMENT AND BOUNDARY INFORMATION TAKEN FROM PLAT CABINET B, SLIDE 366 PAGE 1 ENTITLED "CONSERVATION EASEMENT SURVEY ON CLARE LYNN BROCK PROPERTY" BY McKIM & CREED AND DATED JANUARY 07, 2003.

LEGEND

———	PROPERTY LINE
— - — - — - —	CONSERVATION EASEMENT LINE
— — — — — —	TIE LINE
— — — — WLB — —	WETLANDS BOUNDARY LINE
— ——— E ———	EASEMENT LINE
●	COMPUTED POINT
PC	PLAT CABINET
DB	DEED BOOK
PG	PAGE



DETAIL "A"



DETAIL "B"

POINT #	NORTHING	EASTING
wl-001	495469.108	2458816.416
wl-002	495458.970	2458817.376
wl-003	495433.287	2458849.916
wl-004	495411.274	2458889.840
wl-005	495381.707	2458914.290
wl-006	495340.551	2458950.644
wl-007	495312.490	2458967.194
wl-008	495284.424	2458974.072
wl-009	495262.958	2459002.112
wl-010	495252.171	2459019.671
wl-011	495270.851	2459021.227
wl-012	495282.360	2458984.443
wl-013	495313.828	2458975.123
wl-014	495347.493	2458963.155
wl-015	495378.815	2458932.350
wl-016	495408.628	2458914.976
wl-017	495442.359	2458893.418
wl-018	495465.526	2458896.104
wl-019	495470.378	2458886.947
wl-020	495441.727	2458874.556
wl-021	495458.375	2458849.698

"This certifies that this copy of this plat accurately depicts the boundary of the jurisdiction of Section 404 of the Clean Water Act in the areas impacted by the present proposed activity, as determined by the undersigned on this date. Other areas of jurisdiction may be present on the site but have not been delineated. Unless there has been a change in the law or our published regulations, this determination of Section 404 jurisdiction may be relied upon for a period not to exceed five years from this date. This determination was made utilizing the 1987 Corps of Engineers Wetlands Delineation Manual."

Name: Scott Viney PWS
Title: Project Manager
Date: 7/31/2006
AID: SAW-2006-32014-152

GRAPHIC SCALE

100' 0' 100' 200' 400'

1 INCH = 100 FEET

3/21/2006

SHEET 2 OF 2

Stantec

Stantec Consulting Inc.
Suite 300, 801 Jones Franklin Road
Raleigh NC U.S.A.
27606
Tel. 919.851.6866
Fax. 919.851.7024
www.stantec.com

BROCK RESTORATION SITE
FOR
ECOSYSTEM ENHANCEMENT PROGRAM

JONES COUNTY NORTH CAROLINA

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

Project/Site: Brock Restoration Site			Date: 12/1/2005
Applicant / Owner: NC EEP			County: Jones
Investigator: P Colwell, M Ruiz, A Coleman			State: NC
Do Normal Circumstances exist on the site?	YES	***NO***	Community ID: wetland
Is the site significantly disturbed (Atypical Situation)?	YES	***NO***	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse)	YES	***NO***	Plot ID: wet

VEGETATION

Dominant Plant Species	Scientific Name	Stratum	Indicator
1 red maple	*Acer rubrum*	Tree	FAC
2 sycamore	*Platanus occidentalis* L.	Tree	FACW-
3 ironwood	*Carpinus caroliniana*	Tree	FAC
4 giant cane	*Arundinaria gigantea*	Herb	FACW
5 pickerel weed	*Pontederia cordata* L.	Herb	OBL
6			
7			
8			
9			
10			
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	3	(in)
Depth of Free Water in Pit		(in)
Depth to Saturated Soil		(in)

WETLAND HYDROLOGY INDICATORS
Primary Indicators:
- [X] Inundated
- [X] Saturated in Upper 12 Inches
- [X] Water Marks
- [X] Drift Lines
- [ ] Sediment Deposits
- [X] Drainage Patterns in Wetlands

Secondary Indicators (2 or more Required)
- [X] Oxidized Root Channels in Upper 12 inches
- [X] Water-stained Leaves
- [ ] Local Soil Survey Data
- [ ] FAC-Neutral Test
- [ ] Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name (Series and Phase):					Drainage Class:
Taxonomy (Subgroup):				Field Observations Confirm Mapped Type? YES NO	
PROFILE DESCRIPTION					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10YR3/2			Loam
12-24	Bt	2.5Y4/2			Clay loam

HYDRIC SOIL INDICATORS:

[ ] Histosol	[ ] Concretions
[ ] Histic Epipedon	[ ] High Organic Content in Surface Layer in Sandy Soils
[X] Sulfidic Odor	[ ] Organic Streaking in Sandy Soils
[ ] Aquic Moisture Regime	[ ] Listed on Local Hydric Soils List
[X] Reducing Conditions	[ ] Listed on National Hydric Soils List
[X] Gleyed or Low-Chroma Colors	[ ] 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 Soil Present?	***YES*** NO	

Remarks: Old meander channel of Big Chinquapin Branch

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

Project/Site: Brock Restoration Site			Date: 11/2/2005
Applicant / Owner: NC EEP			County: Jones
Investigator: P Colwell, M Ruiz, A Coleman			State: NC
Do Normal Circumstances exist on the site?	***YES***	NO	Community ID: upland
Is the site significantly disturbed (Atypical Situation)?	YES	***NO***	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse)	YES	***NO***	Plot ID: up

VEGETATION

Dominant Plant Species	Scientific Name	Stratum	Indicator
1 sugar maple	*Acer saccharum*	Tree	FACU-
2 tulip poplar	*Liriodendron tulipifera* L.	Tree	FAC
3 sycamore	*Platanus occidentalis* L.	Tree	FACW-
4 hackberry	*Celtis occidentalis* L.	Tree	FACU
5 green ash	*Fraxinus pennsylvanica*	Tree	FACW
6 Chinese privet	*Ligustrum sinense*	Shrub	FAC
7 honeysuckle	*Lonicera japonica.*	Vine	FAC-
8 saw greenbrier	*Smilax bona-nox*	Vine	FAC
9			
10			
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 63%			
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	--	(in)
Depth of Free Water in Pit	--	(in)
Depth to Saturated Soil	--	(in)

WETLAND HYDROLOGY INDICATORS

Primary Indicators:
- [ ] Inundated
- [ ] Saturated in Upper 12 Inches
- [ ] Water Marks
- [ ] Drift Lines
- [ ] Sediment Deposits
- [ ] Drainage Patterns in Wetlands

Secondary Indicators (2 or more Required)
- [ ] Oxidized Root Channels in Upper 12 inches
- [ ] Water-stained Leaves
- [ ] Local Soil Survey Data
- [ ] FAC-Neutral Test
- [ ] Other (Explain in Remarks)

Remarks: no wetland hydrology

SOILS

Map Unit Name (Series and Phase):					Drainage Class:
Taxonomy (Subgroup):				Field Observations Confirm Mapped Type? YES NO	
PROFILE DESCRIPTION					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-10	A	2.5Y3/2			Loam
10-15	Bt1	2.5Y4/3			Clay loam
15+	Bt2	2.5Y5/4 / 2.5Y3/2			Clay loam

HYDRIC SOIL INDICATORS:

[ ] Histosol	[ ] Concretions
[ ] Histic Epipedon	[ ] High Organic Content in Surface Layer in Sandy Soils
[ ] Sulfidic Odor	[ ] Organic Streaking in Sandy Soils
[ ] Aquic Moisture Regime	[ ] Listed on Local Hydric Soils List
[ ] Reducing Conditions	[ ] Listed on National Hydric Soils List
[ ] Gleyed or Low-Chroma Colors	[ ] Other (Explain in Remarks)

Remarks: not a hydric soil

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	***YES*** NO	Is this Sampling Point Within a Wetland? YES ***NO***
Wetland Hydrology Present?	YES ***NO***	
Hydric Soil Present?	YES ***NO***	

Remarks: This point is located in the forested area between the old channel and the current channel of Big Chinquapin Branch.

Appendix 3. Project Site NCDWQ Stream Classification Forms

NCDWQ Stream Classification Form

Project Name: Brock River Basin: Neuse County: Jones Evaluator: MPE/KFC/LEM

DWQ Project Number: N/A Nearest Named Stream: Big Chinquapin Branch Latitude: 35 05 52

Date: 10/9/01 USGS QUAD: Phillips Crossroads Longitude: 77 28 01

Location/Directions: Brock Property – North of NC58, approximately 6.5 miles west of Trenton (Existing channel between Brock/Tillett culvert crossing and Big Chinquapin Branch)

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgment of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is There A Riffle-Pool Sequence?	0	***1***	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	***1***	2	3
3) Are Natural Levees Present?	0	***1***	2	3
4) Is The Channel Sinuous?	0	***1***	2	3
5) Is There An Active (Or Relic) Floodplain Present?	***0***	1	2	3
6) Is The Channel Braided?	***0***	1	2	3
7) Are Recent Alluvial Deposits Present?	***0***	1	2	3
8) Is There A Bankfull Bench Present?	0	***1***	2	3
9) Is A Continuous Bed & Bank Present?	***0***	1	2	3
*(*NOTE: If Bed & Bank Caused By Ditching And WITHOUT Sinuosity Then Score=0*)*				
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map *And/Or* In Field) Present?	*Yes*=3	***No=0***		

***PRIMARY GEOMORPHOLOGY INDICATOR POINTS*: 5**

II. Hydrology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is There A Groundwater Flow/Discharge Present?	0	1	***2***	3

***PRIMARY HYDROLOGY INDICATOR POINTS*: 2**

III. Biology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Are Fibrous Roots Present In Streambed?	3	2	***1***	0
2) Are Rooted Plants Present In Streambed?	3	2	***1***	0
3) Is Periphyton Present?	0	1	***2***	3
4) Are Bivalves Present?	0	1	***2***	3

***PRIMARY BIOLOGY INDICATOR POINTS*: 6**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is There A Head Cut Present In Channel?	***0***	.5	1	1.5
2) Is There A Grade Control Point In Channel?	0	.5	***1***	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	***1.5***

***SECONDARY GEOMORPHOLOGY INDICATOR POINTS:* 2.5**

II. Hydrology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is This Year's (Or Last's) Leaf litter Present In Streambed?	1.5	1	***.5***	0
2) Is Sediment On Plants (Or Debris) Present?	0	***.5***	1	1.5
3) Are Wrack Lines Present?	0	.5	***1***	1.5
4) Is Water In Channel *And* >48 Hrs. Since Last *Known* Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	.5	***1***	1.5
5) Is There Water In Channel During Dry Conditions *Or* In Growing Season)?	0	.5	1	***1.5***
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	*Yes=1.5*			***No=0***

SECONDARY HYDROLOGY INDICATOR POINTS: 4.5

III. Biology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Are Fish Present?	0	.5	***1***	1.5
2) Are Amphibians Present?	***0***	.5	1	1.5
3) Are Aquatic Turtles Present?	***0***	.5	1	1.5
4) Are Crayfish Present?	0	***.5***	1	1.5
5) Are Macrobenthos Present?	0	***.5***	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	***0***	.5	1	1.5
7) Is Filamentous Algae Present?	0	***.5***	1	1.5

8) Are Wetland Plants In Streambed? N/A	**SAV**	**Mostly OBL**	**Mostly FACW**	**Mostly FAC**	**Mostly FACU**	**Mostly UPL**
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	2	1	.75	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: 2.5

TOTAL POINTS (Primary + Secondary)= 22.5 (If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)

NCDWQ Stream Classification Form

Project Name: Brock River Basin: Neuse County: Jones Evaluator: MPE/KFC/LEM

DWQ Project Number: N/A Nearest Named Stream: Big Chinquapin Branch Latitude: 35 05 42

Date: 10/09/01 USGS QUAD: Phillips Crossroads Longitude: 77 28 07

Location/Directions: Tillett Property – North of NC58, approximately 6.5 miles west of Trenton (Existing channel between NC58 and Brock/Tillett culvert).

PLEASE NOTE:** ***If evaluator and landowner agree that the feature is a man-made ditch, then use of this form is not necessary. Also, if in the best professional judgment of the evaluator, the feature is a man-made ditch and not a modified natural stream—this rating system should not be used*

Primary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is There A Riffle-Pool Sequence?	***0***	1	2	3
2) Is The USDA Texture In Streambed Different From Surrounding Terrain?	0	***1***	2	3
3) Are Natural Levees Present?	0	***1***	2	3
4) Is The Channel Sinuous?	0	***1***	2	3
5) Is There An Active (Or Relic) Floodplain Present?	***0***	1	2	3
6) Is The Channel Braided?	***0***	1	2	3
7) Are Recent Alluvial Deposits Present?	***0***	1	2	3
8) Is There A Bankfull Bench Present?	0	***1***	2	3
9) Is A Continuous Bed & Bank Present? *(*NOTE: If Bed & Bank Caused By Ditching And WITHOUT Sinuosity Then Score=0*)*	***0***	1	2	3
10) Is A 2nd Order Or Greater Channel (As Indicated On Topo Map *And/Or* In Field) Present?	*Yes*=3	***No=0***		

***PRIMARY GEOMORPHOLOGY INDICATOR POINTS*: 4**

II. Hydrology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is There A Groundwater Flow/Discharge Present?	***0***	1	2	3

***PRIMARY HYDROLOGY INDICATOR POINTS*: 0**

III. Biology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Are Fibrous Roots Present In Streambed?	3	2	***1***	0
2) Are Rooted Plants Present In Streambed?	3	2	***1***	0
3) Is Periphyton Present?	***0***	1	2	3
4) Are Bivalves Present?	***0***	1	2	3

***PRIMARY BIOLOGY INDICATOR POINTS*: 2**

Secondary Field Indicators: *(Circle One Number Per Line)*

I. Geomorphology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is There A Head Cut Present In Channel?	***0***	.5	1	1.5
2) Is There A Grade Control Point In Channel?	0	.5	***1***	1.5
3) Does Topography Indicate A Natural Drainage Way?	0	.5	1	***1.5***

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: 2.5

II. Hydrology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Is This Year's (Or Last's) Leaf litter Present In Streambed?	1.5	1	***.5***	0
2) Is Sediment On Plants (Or Debris) Present?	0	***.5***	1	1.5
3) Are Wrack Lines Present?	0	***.5***	1	1.5
4) Is Water In Channel *And* >48 Hrs. Since Last *Known* Rain? *(*NOTE: If Ditch Indicated In #9 Above Skip This Step And #5 Below*)*	0	***.5***	1	1.5
5) Is There Water In Channel During Dry Conditions *Or* In Growing Season)?	0	.5	***1***	1.5
6) Are Hydric Soils Present In Sides Of Channel (Or In Headcut)?	*Yes=1.5*			***No=0***

SECONDARY HYDROLOGY INDICATOR POINTS: 3

III. Biology	**Absent**	**Weak**	**Moderate**	**Strong**
1) Are Fish Present?	0	***.5***	1	1.5
2) Are Amphibians Present?	***0***	.5	1	1.5
3) Are AquaticTurtles Present?	***0***	.5	1	1.5
4) Are Crayfish Present?	0	***.5***	1	1.5
5) Are Macrobenthos Present?	***0***	.5	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	***0***	.5	1	1.5
7) Is Filamentous Algae Present?	***0***	.5	1	1.5

8) Are Wetland Plants In Streambed? N/A	**SAV**	**Mostly OBL**	**Mostly FACW**	**Mostly FAC**	**Mostly FACU**	**Mostly UPL**
(**NOTE:** If Total Absence Of All Plants In Streambed As Noted Above Skip This Step **UNLESS** SAV Present*).*	2	1	.75	.5	0	0

SECONDARY BIOLOGY INDICATOR POINTS: 1

TOTAL POINTS (Primary + Secondary)= 12.5 (If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)

Appendix 4. Project Site Biological Reconnaissance Form

BIOLOGICAL RECONNAISANCE FORM
Perennial/Intermittent Point

Send to Dave Penrose
401/Wetlands Unit, Division of Water Quality
1650 Mail Services Center
Raleigh, North Carolina 27699-1621
e-mail Dave.Penrose@NCmail.net, FAX 919/715-5637

a) Location Brock Site, DOT

Stream Name: UT Chinquapin Branch		Receiving Waterbody: Chinquapin Br, Trent River	
Location/Road: nr NC 58	County: Jones	Date: 21Feb02	Regional Office: Washington RO
Basin: Neuse	Subbasin: 030411	Latitude/Longitude: See site description below	
Ecoregion: Coastal Plain	Rosgen Class: ?	Observers: Dave Penrose, LeiLani Paugh, Lia Myott	USGS Quad Sheet: Phillips Crossroads
Notes (attach photograph or drawing on the back of this form): Three sites were sampled on the mainstem of this tributary; Marker 23 (350536/772831) was above NC 58 within a dense canopy, Marker 24 was at the property line (350543/772811) and Marker 25 near the downstream confluence (350600/772820). Both downstream sites had no riparian canopy, agricultural runoff.			

b) Habitat

Primary Adjacent Land Use: agriculture, cotton	Riparian Zone Characteristics: eliminated downstream	
Stream Width: up to one meter downstream	Flow Conditions: perennial.	Stream Order: first
Stream Permanence Characteristics, Rating (if relevant): Interesting river rock layer about 18" below soil surface. Good bed and bank characteristics, degree of incision and catchment size (222 AC at the upstream property line and 285 at the confluence)		

c) Biology

Benthic Macroinvertebrate Taxa: Amphipoda: X Isopoda: X Decapoda: X Chironomidae: X Oligochaeta: ☐ Mollusca: X (Sphaerium) Ephemeroptera: ☐ Plecoptera: ☐ Trichoptera: ☐ Coleoptera: ☐ Other Diptera: ☐
Fish and Salamander Taxa:
I/P Results: The most upstream location was dominated by Isopods suggesting intermittent conditions. We started to see perennial indicators at the Brock property line (Sphaerium, Crayfish) and made the I/P call at that point. The downstream location had many more perennial indicators. We did not collect any primary indictors (EPT's) at any location, perhaps due to the level of perturbation in the catchment.

Appendix 5. HEC–RAS Analysis

HEC-RAS Plan: Plan 11 River: BROCK Reach: EXISTING

Reach	River Sta	Profile	Q Total	W.S. Elev	E.G. Slope	Vel Total	Shear Total	Power Total
			(cfs)	(ft)	(ft/ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
EXISTING	37	2- YEAR	25.00	34.42	0.003196	2.37	0.21	0.49
EXISTING	37	10-YEAR	150.00	36.91	0.002628	3.61	0.37	1.34
EXISTING	37	100-YEAR	315.00	39.01	0.002980	3.17	0.33	1.04
EXISTING	36	2- YEAR	25.00	34.29	0.002673	2.25	0.19	0.43
EXISTING	36	10-YEAR	150.00	36.76	0.002997	3.72	0.42	1.56
EXISTING	36	100-YEAR	315.00	38.82	0.003449	3.38	0.37	1.26
EXISTING	35	2- YEAR	25.00	34.16	0.002355	2.21	0.17	0.38
EXISTING	35	10-YEAR	150.00	36.59	0.003189	3.86	0.44	1.70
EXISTING	35	100-YEAR	315.00	38.67	0.003259	3.24	0.35	1.12
EXISTING	34	2- YEAR	25.00	34.03	0.002274	2.16	0.17	0.36
EXISTING	34	10-YEAR	150.00	36.41	0.003111	3.81	0.43	1.65
EXISTING	34	100-YEAR	315.00	38.47	0.003394	3.23	0.33	1.08
EXISTING	33	2- YEAR	25.00	33.80	0.003315	2.49	0.23	0.56
EXISTING	33	10-YEAR	150.00	36.11	0.004016	4.19	0.53	2.20
EXISTING	33	100-YEAR	315.00	38.13	0.004105	3.86	0.46	1.77
EXISTING	32	2- YEAR	25.00	33.58	0.003576	2.45	0.23	0.56
EXISTING	32	10-YEAR	150.00	35.92	0.003214	3.77	0.43	1.62
EXISTING	32	100-YEAR	315.00	37.94	0.002703	3.83	0.43	1.63
EXISTING	31	2- YEAR	25.00	33.28	0.006429	3.07	0.36	1.11
EXISTING	31	10-YEAR	150.00	35.68	0.003916	4.14	0.51	2.10
EXISTING	31	100-YEAR	315.00	37.75	0.003003	4.22	0.50	2.13
EXISTING	30	2- YEAR	25.00	33.15	0.002493	2.19	0.18	0.39
EXISTING	30	10-YEAR	150.00	35.56	0.002914	3.66	0.41	1.49
EXISTING	30	100-YEAR	315.00	37.63	0.003122	3.77	0.43	1.62
EXISTING	29	2- YEAR	25.00	33.03	0.002201	2.08	0.16	0.33
EXISTING	29	10-YEAR	150.00	35.44	0.002592	3.50	0.37	1.28
EXISTING	29	100-YEAR	315.00	37.50	0.002641	3.69	0.40	1.48
EXISTING	28	2- YEAR	25.00	32.93	0.002057	2.05	0.15	0.31
EXISTING	28	10-YEAR	150.00	35.30	0.002575	3.50	0.36	1.27
EXISTING	28	100-YEAR	315.00	37.35	0.002704	3.74	0.40	1.50
EXISTING	27	2- YEAR	25.00	32.82	0.002334	2.11	0.17	0.35
EXISTING	27	10-YEAR	150.00	35.15	0.002935	3.66	0.41	1.49
EXISTING	27	100-YEAR	315.00	37.19	0.003048	3.95	0.46	1.82
EXISTING	26	2- YEAR	25.00	32.74	0.001661	1.85	0.12	0.23
EXISTING	26	10-YEAR	150.00	35.06	0.002235	3.33	0.32	1.07
EXISTING	26	100-YEAR	315.00	37.10	0.002556	3.51	0.37	1.30
EXISTING	25	2- YEAR	25.00	32.65	0.003419	2.39	0.22	0.54
EXISTING	25	10-YEAR	150.00	34.94	0.003346	3.80	0.45	1.69
EXISTING	25	100-YEAR	315.00	37.01	0.003041	3.59	0.39	1.41
EXISTING	24	2- YEAR	25.00	32.44	0.004247	2.59	0.27	0.69
EXISTING	24	10-YEAR	150.00	34.72	0.003903	4.07	0.51	2.08

HEC-RAS Plan: Plan 11 River: BROCK Reach: EXISTING (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	E.G. Slope	Vel Total	Shear Total	Power Total
			(cfs)	(ft)	(ft/ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
EXISTING	24	100-YEAR	315.00	36.79	0.003868	3.88	0.47	1.81
EXISTING	23	2- YEAR	25.00	32.09	0.008322	3.22	0.43	1.40
EXISTING	23	10-YEAR	150.00	34.50	0.004078	4.17	0.53	2.22
EXISTING	23	100-YEAR	315.00	36.58	0.005359	3.76	0.49	1.86
EXISTING	22	2- YEAR	25.00	31.98	0.001862	2.02	0.14	0.29
EXISTING	22	10-YEAR	150.00	34.37	0.002793	3.71	0.40	1.48
EXISTING	22	100-YEAR	315.00	36.42	0.003328	3.05	0.32	0.97
EXISTING	21	2- YEAR	25.00	31.85	0.002592	2.29	0.19	0.42
EXISTING	21	10-YEAR	150.00	34.16	0.003649	4.09	0.49	2.01
EXISTING	21	100-YEAR	315.00	36.26	0.003622	2.86	0.30	0.85
EXISTING	20	2- YEAR	25.00	31.67	0.003792	2.64	0.25	0.67
EXISTING	20	10-YEAR	150.00	33.88	0.004990	4.60	0.63	2.89
EXISTING	20	100-YEAR	315.00	36.00	0.005231	3.35	0.41	1.38
EXISTING	19	2- YEAR	25.00	31.38	0.006048	3.07	0.36	1.09
EXISTING	19	10-YEAR	150.00	33.57	0.005571	4.79	0.69	3.28
EXISTING	19	100-YEAR	315.00	35.61	0.007068	3.90	0.55	2.16
EXISTING	18	2- YEAR	25.00	31.14	0.004398	2.69	0.28	0.76
EXISTING	18	10-YEAR	150.00	33.35	0.004857	4.40	0.61	2.68
EXISTING	18	100-YEAR	315.00	35.30	0.005956	3.68	0.49	1.79
EXISTING	17	2- YEAR	25.00	30.92	0.004645	2.80	0.30	0.83
EXISTING	17	10-YEAR	150.00	33.06	0.005655	4.67	0.68	3.18
EXISTING	17	100-YEAR	315.00	35.05	0.005665	3.47	0.44	1.54
EXISTING	16	2- YEAR	25.00	30.75	0.003069	2.41	0.21	0.50
EXISTING	16	10-YEAR	150.00	32.81	0.004776	4.47	0.60	2.68
EXISTING	16	100-YEAR	315.00	34.79	0.005319	3.28	0.40	1.30
EXISTING	15	2- YEAR	25.00	30.63	0.002347	2.08	0.16	0.34
EXISTING	15	10-YEAR	150.00	32.64	0.003810	4.04	0.50	2.03
EXISTING	15	100-YEAR	315.00	34.54	0.004466	3.25	0.38	1.22
EXISTING	14	2- YEAR	25.00	30.52	0.002162	2.01	0.15	0.29
EXISTING	14	10-YEAR	150.00	32.47	0.003363	3.85	0.44	1.69
EXISTING	14	100-YEAR	315.00	34.28	0.004132	3.47	0.38	1.31
EXISTING	13	2- YEAR	25.00	30.43	0.001843	1.81	0.12	0.22
EXISTING	13	10-YEAR	150.00	32.36	0.002634	3.44	0.35	1.22
EXISTING	13	100-YEAR	315.00	34.11	0.003350	3.26	0.32	1.04
EXISTING	12	2- YEAR	25.00	30.29	0.003128	2.18	0.18	0.40
EXISTING	12	10-YEAR	150.00	32.20	0.003167	3.56	0.39	1.38
EXISTING	12	100-YEAR	315.00	33.93	0.003306	2.98	0.23	0.68
EXISTING	11	2- YEAR	25.00	29.75	0.018037	4.10	0.73	2.99
EXISTING	11	10-YEAR	150.00	31.87	0.005287	4.36	0.58	2.54
EXISTING	11	100-YEAR	315.00	33.76	0.003942	2.80	0.22	0.62

HEC-RAS Plan: Plan 11 River: BROCK Reach: EXISTING (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	E.G. Slope	Vel Total	Shear Total	Power Total
			(cfs)	(ft)	(ft/ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
EXISTING	10	2- YEAR	25.00	29.53	0.003690	2.41	0.23	0.56
EXISTING	10	10-YEAR	150.00	31.73	0.003385	3.74	0.44	1.63
EXISTING	10	100-YEAR	315.00	33.61	0.003766	2.46	0.22	0.55
EXISTING	9	2- YEAR	25.00	29.24	0.006448	2.97	0.36	1.08
EXISTING	9	10-YEAR	150.00	31.46	0.004690	4.27	0.58	2.46
EXISTING	9	100-YEAR	315.00	33.03	0.006621	3.76	0.30	1.13
EXISTING	8	2- YEAR	25.00	29.13	0.002133	2.06	0.16	0.32
EXISTING	8	10-YEAR	150.00	31.32	0.003340	3.86	0.45	1.75
EXISTING	8	100-YEAR	315.00	32.96	0.002842	2.70	0.18	0.49
EXISTING	7	2- YEAR	25.00	28.98	0.003148	2.35	0.21	0.50
EXISTING	7	10-YEAR	150.00	31.09	0.004219	4.16	0.54	2.24
EXISTING	7	100-YEAR	315.00	32.92	0.002156	2.16	0.16	0.35
EXISTING	6	2- YEAR	25.00	28.76	0.004610	2.68	0.29	0.77
EXISTING	6	10-YEAR	150.00	30.80	0.005281	4.50	0.64	2.90
EXISTING	6	100-YEAR	315.00	32.81	0.002318	2.08	0.16	0.34
EXISTING	5	2- YEAR	25.00	28.49	0.005249	2.79	0.31	0.87
EXISTING	5	10-YEAR	150.00	30.49	0.005606	4.60	0.67	3.09
EXISTING	5	100-YEAR	315.00	32.07	0.011794	4.27	0.47	2.02
EXISTING	4	2- YEAR	25.00	28.11	0.009168	3.36	0.46	1.54
EXISTING	4	10-YEAR	150.00	30.26	0.004907	4.41	0.59	2.62
EXISTING	4	100-YEAR	315.00	31.85	0.004392	4.57	0.50	2.29
EXISTING	3	2- YEAR	25.00	27.86	0.004271	2.65	0.27	0.72
EXISTING	3	10-YEAR	150.00	30.06	0.004496	4.21	0.56	2.34
EXISTING	3	100-YEAR	315.00	31.67	0.003928	4.82	0.66	3.18
EXISTING	2	2- YEAR	25.00	27.54	0.007084	3.23	0.42	1.36
EXISTING	2	10-YEAR	150.00	29.54	0.008611	5.50	0.98	5.40
EXISTING	2	100-YEAR	315.00	31.18	0.007154	6.09	1.09	6.66
EXISTING	1	2- YEAR	25.00	27.44	0.005009	2.80	0.30	0.83
EXISTING	1	10-YEAR	150.00	29.49	0.005001	4.59	0.62	2.84
EXISTING	1	100-YEAR	315.00	31.17	0.005009	5.08	0.74	3.74

HEC-RAS Plan: Plan 11 River: BROCK Reach: PROPOSED WITH BE

Reach	River Sta	Profile	Q Total	W.S. Elev	E.G. Slope	Vel Total	Shear Total	Power Total
			(cfs)	(ft)	(ft/ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
PROPOSED WITH BE	37	2- YEAR	25.00	34.51	0.003454	1.64	0.07	0.12
PROPOSED WITH BE	37	10-YEAR	150.00	35.41	0.003539	2.63	0.25	0.66
PROPOSED WITH BE	37	100-YEAR	315.00	36.12	0.003501	3.40	0.38	1.29
PROPOSED WITH BE	36	2- YEAR	25.00	34.28	0.004551	1.87	0.08	0.16
PROPOSED WITH BE	36	10-YEAR	150.00	35.24	0.003376	2.58	0.24	0.63
PROPOSED WITH BE	36	100-YEAR	315.00	35.95	0.003387	3.35	0.37	1.24
PROPOSED WITH BE	35	2- YEAR	25.00	34.16	0.002193	1.46	0.05	0.07
PROPOSED WITH BE	35	10-YEAR	150.00	35.09	0.002906	2.47	0.22	0.54
PROPOSED WITH BE	35	100-YEAR	315.00	35.80	0.003125	3.27	0.35	1.13
PROPOSED WITH BE	34	2- YEAR	25.00	34.08	0.001530	1.15	0.05	0.05
PROPOSED WITH BE	34	10-YEAR	150.00	34.95	0.002665	2.40	0.21	0.50
PROPOSED WITH BE	34	100-YEAR	315.00	35.64	0.003040	3.25	0.34	1.12
PROPOSED WITH BE	33	2- YEAR	25.00	33.89	0.003526	1.59	0.08	0.12
PROPOSED WITH BE	33	10-YEAR	150.00	34.72	0.004134	2.76	0.28	0.78
PROPOSED WITH BE	33	100-YEAR	315.00	35.40	0.004117	3.59	0.43	1.53
PROPOSED WITH BE	32	2- YEAR	25.00	33.68	0.003660	1.43	0.09	0.13
PROPOSED WITH BE	32	10-YEAR	150.00	34.51	0.003873	2.68	0.27	0.73
PROPOSED WITH BE	32	100-YEAR	315.00	35.19	0.003894	3.52	0.41	1.45
PROPOSED WITH BE	31	2- YEAR	25.00	33.40	0.004677	2.05	0.08	0.16
PROPOSED WITH BE	31	10-YEAR	150.00	34.27	0.004562	2.88	0.30	0.87
PROPOSED WITH BE	31	100-YEAR	315.00	34.97	0.004263	3.64	0.44	1.60
PROPOSED WITH BE	30	2- YEAR	25.00	33.14	0.004940	2.00	0.08	0.17
PROPOSED WITH BE	30	10-YEAR	150.00	34.08	0.003787	2.67	0.26	0.70
PROPOSED WITH BE	30	100-YEAR	315.00	34.79	0.003656	3.43	0.39	1.34
PROPOSED WITH BE	29	2- YEAR	25.00	32.97	0.003232	1.75	0.06	0.11
PROPOSED WITH BE	29	10-YEAR	150.00	33.90	0.003320	2.57	0.24	0.61
PROPOSED WITH BE	29	100-YEAR	315.00	34.62	0.003314	3.32	0.36	1.20
PROPOSED WITH BE	28	2- YEAR	25.00	32.88	0.001774	1.29	0.05	0.06
PROPOSED WITH BE	28	10-YEAR	150.00	33.75	0.002974	2.49	0.22	0.55
PROPOSED WITH BE	28	100-YEAR	315.00	34.46	0.003141	3.27	0.35	1.14
PROPOSED WITH BE	27	2- YEAR	25.00	32.63	0.007774	2.09	0.13	0.27
PROPOSED WITH BE	27	10-YEAR	150.00	33.57	0.003963	2.71	0.28	0.75
PROPOSED WITH BE	27	100-YEAR	315.00	34.27	0.003807	3.49	0.41	1.41
PROPOSED WITH BE	26	2- YEAR	25.00	32.50	0.002449	1.49	0.06	0.08
PROPOSED WITH BE	26	10-YEAR	150.00	33.40	0.003127	2.54	0.23	0.59
PROPOSED WITH BE	26	100-YEAR	315.00	34.10	0.003316	3.35	0.37	1.22
PROPOSED WITH BE	25	2- YEAR	25.00	32.46	0.002366	1.26	0.06	0.08
PROPOSED WITH BE	25	10-YEAR	150.00	33.28	0.003358	2.57	0.25	0.63
PROPOSED WITH BE	25	100-YEAR	315.00	33.96	0.003569	3.42	0.39	1.33
PROPOSED WITH BE	24	2- YEAR	25.00	32.33	0.002909	1.29	0.08	0.10
PROPOSED WITH BE	24	10-YEAR	150.00	33.07	0.004321	2.79	0.30	0.83
PROPOSED WITH BE	24	100-YEAR	315.00	33.73	0.004287	3.64	0.44	1.62
PROPOSED WITH BE	23	2- YEAR	25.00	31.97	0.013833	2.17	0.22	0.48
PROPOSED WITH BE	23	10-YEAR	150.00	32.82	0.005160	2.93	0.33	0.98
PROPOSED WITH BE	23	100-YEAR	315.00	33.51	0.004505	3.68	0.46	1.68
PROPOSED WITH BE	22	2- YEAR	25.00	31.72	0.002860	1.65	0.06	0.10

HEC-RAS Plan: Plan 11 River: BROCK Reach: PROPOSED WITH BE (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	E.G. Slope	Vel Total	Shear Total	Power Total
			(cfs)	(ft)	(ft/ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
PROPOSED WITH BE	7	100-YEAR	315.00	31.33	0.001003	2.25	0.15	0.34
PROPOSED WITH BE	6	2- YEAR	25.00	28.79	0.003312	1.39	0.08	0.11
PROPOSED WITH BE	6	10-YEAR	150.00	29.62	0.003785	2.66	0.27	0.71
PROPOSED WITH BE	6	100-YEAR	315.00	31.29	0.000909	2.19	0.14	0.31
PROPOSED WITH BE	5	2- YEAR	25.00	28.62	0.002968	1.40	0.07	0.10
PROPOSED WITH BE	5	10-YEAR	150.00	29.39	0.004348	2.79	0.30	0.83
PROPOSED WITH BE	5	100-YEAR	315.00	31.25	0.000785	2.08	0.13	0.26
PROPOSED WITH BE	4	2- YEAR	25.00	28.32	0.009200	2.16	0.14	0.31
PROPOSED WITH BE	4	10-YEAR	150.00	29.15	0.005203	2.92	0.33	0.96
PROPOSED WITH BE	4	100-YEAR	315.00	31.22	0.000624	1.91	0.10	0.20
PROPOSED WITH BE	3	2- YEAR	25.00	27.85	0.004764	2.73	0.30	0.81
PROPOSED WITH BE	3	10-YEAR	150.00	28.92	0.004345	2.76	0.29	0.80
PROPOSED WITH BE	3	100-YEAR	315.00	31.20	0.000482	1.75	0.09	0.15
PROPOSED WITH BE	2	2- YEAR	25.00	27.46	0.008667	3.48	0.50	1.72
PROPOSED WITH BE	2	10-YEAR	150.00	28.63	0.006093	3.10	0.37	1.15
PROPOSED WITH BE	2	100-YEAR	315.00	31.18	0.000426	1.69	0.08	0.13
PROPOSED WITH BE	1	2- YEAR	25.00	26.95	0.024940	4.87	1.06	5.14
PROPOSED WITH BE	1	10-YEAR	150.00	28.15	0.012686	4.01	0.59	2.38
PROPOSED WITH BE	1	100-YEAR	315.00	31.17	0.000335	1.52	0.06	0.10

Appendix 6. Correspondence

Stantec Inc.
801 Jones Franklin Road Ste 300
Raleigh, NC 27606
Tel: (919) 851-6866 Fax: (919) 851-7024
stantec.com

Stantec

November 14, 2005

Rene Gledhill-Early
State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 28516

RE: EEP Wetland and Stream mitigation projects in Jones County.

Dear Ms. Gledhill-Early:

The Ecosystem Enhancement Program (EEP) requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with two potential wetland and stream restoration projects in Jones County (see attached site maps).

The Stallings site and Brock site have been identified for the purpose of providing in-kind mitigation for unavoidable stream channel and wetland impacts. Several sections of channel have been identified as significantly degraded. The agriculture fields on the Stallings site are classified as prior converted wetlands.

At the Stallings site, remnants of a brick foundation have been observed in an area adjacent to Webb Farm Rd during preliminary surveys of the site for restoration purposes. Stream and wetland restoration would not occur where the foundation is located (see site map). The majority of the site has historically been disturbed due to agricultural purposes such as tilling. Enclosed are current photos of the site and the foundation. We ask that you review this site based on the attached information to determine the presence of any historic properties.

At the Brock site, according to survey conducted in 2003, a cemetery is located adjacent to the stream in an area covered with shrubs and vines measuring approximately 50 feet wide by 200 feet long. The area was recently investigated and five headstones were found in the southern section of the area marked as a cemetery. All of the located headstones were dated between 1920 and 1955. The dense vegetation covering the area could be concealing additional headstones. Enclosed are current photos of the cemetery area and the headstones. Stream restoration would occur adjacent to the cemetery avoiding any impact on headstones. The remainder of the site has historically been disturbed due to agricultural purposes such as tilling.

Reference: EEP Wetland and Stream mitigation projects in Jones County

We thank you in advance for your timely response and cooperation. Please feel free to contact us at (919) 851-6866 ext. 259 with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,

Melissa Ruiz
Scientist, Environmental Management

cc:
Julia Hunt,
EEP Project Manager
1652 Mail Service Center
Raleigh, NC 27699

Enclosed: Site photos, Project Vicinity and Project Site maps

Photos of headstones found at Brock Site in Jones County

Photo 5: Old graveyard is located in this area of shrubs and vines, agriculture fields surround the cemetery

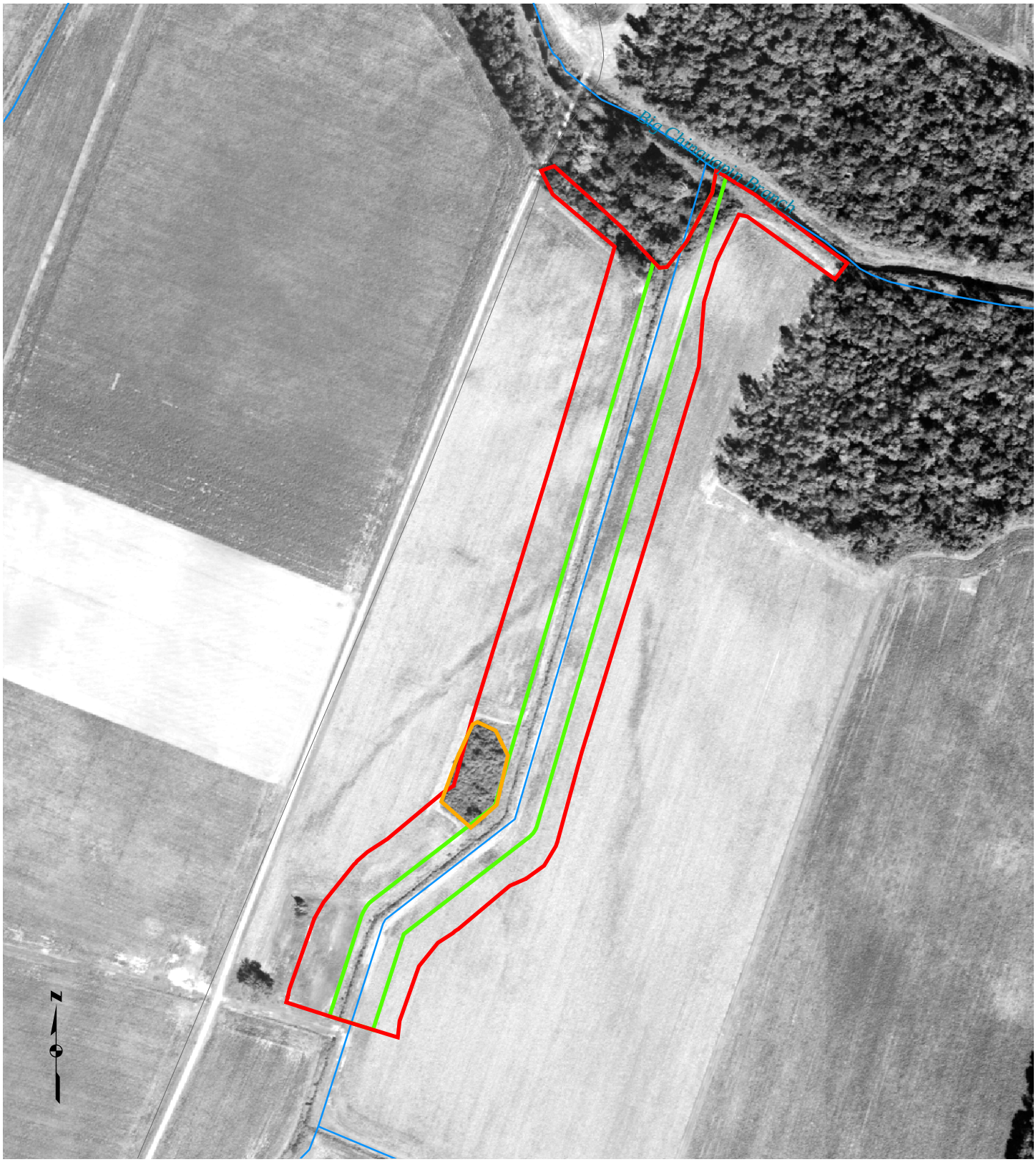
Photo 6: Eliza Miller 1884-1954


Photo 7: Mordecai Jarmon 1877-1950

Photo 8: Sarah Jarmon ~1900 - ?

Photo 9: Lizzie Flower died 1955

Photo 10: Toney Flowers died 1920



Legend

- Cemetery
- Approximate Easement
- Grading_Area
- Roads
- Streams

Brock Restoration Site
Jones County, North Carolina

0 150 300 600 Feet

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

January 4, 2006

Melissa Ruiz
Stantec Consulting Services, Inc.
801 Jones Franklin Road, Suite 300
Raleigh, NC 27606

RE: EPP Wetland and Stream Restoration Project, Brock Site, Jones County, ER 05-2736

Thank you for your letter of November 18, 2005. We have reviewed this project and offer the following comments.

We recommend that a professional architectural historian identify and evaluate the cemetery located at the Brock Site and report the findings to us.

No previously recorded archaeological sites are noted on maps housed at the Office of State Archaeology. A professional archaeologist, however, has never formally surveyed the project area. The project area is located in the general vicinity of the 1862 Battle of Kinston and the 1865 Battle of Wyse Fork. Given this setting, it is recommended that a comprehensive archaeological survey be conducted to record any sites within the APE. In particular a survey is warranted to fully document the cemetery located within the APE and to determine if there are any sites or remains related to the Civil War era.

We recommend that the survey be conducted by an experienced archaeologist to identify and evaluate the significance of archaeological remains that may be damaged or destroyed by the proposed project. Potential effects on unknown resources must be assessed prior to the initiation of construction activities. We also recommend that the archaeologist consult with the Office of State Archaeology prior to the commencement of any fieldwork.

Two copies of the resulting archaeological survey report, as well as one copy of the appropriate site forms, should be forwarded to us for review and comment as soon as they are available and well in advance of any construction activities.

A list of archaeological consultants who have conducted or expressed an interest in contract work in North Carolina is available at www.arch.dcr.state.nc.us/consults.htm. The archaeologists listed, or any other experienced archaeologist, may be contacted to conduct the recommended survey.

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.

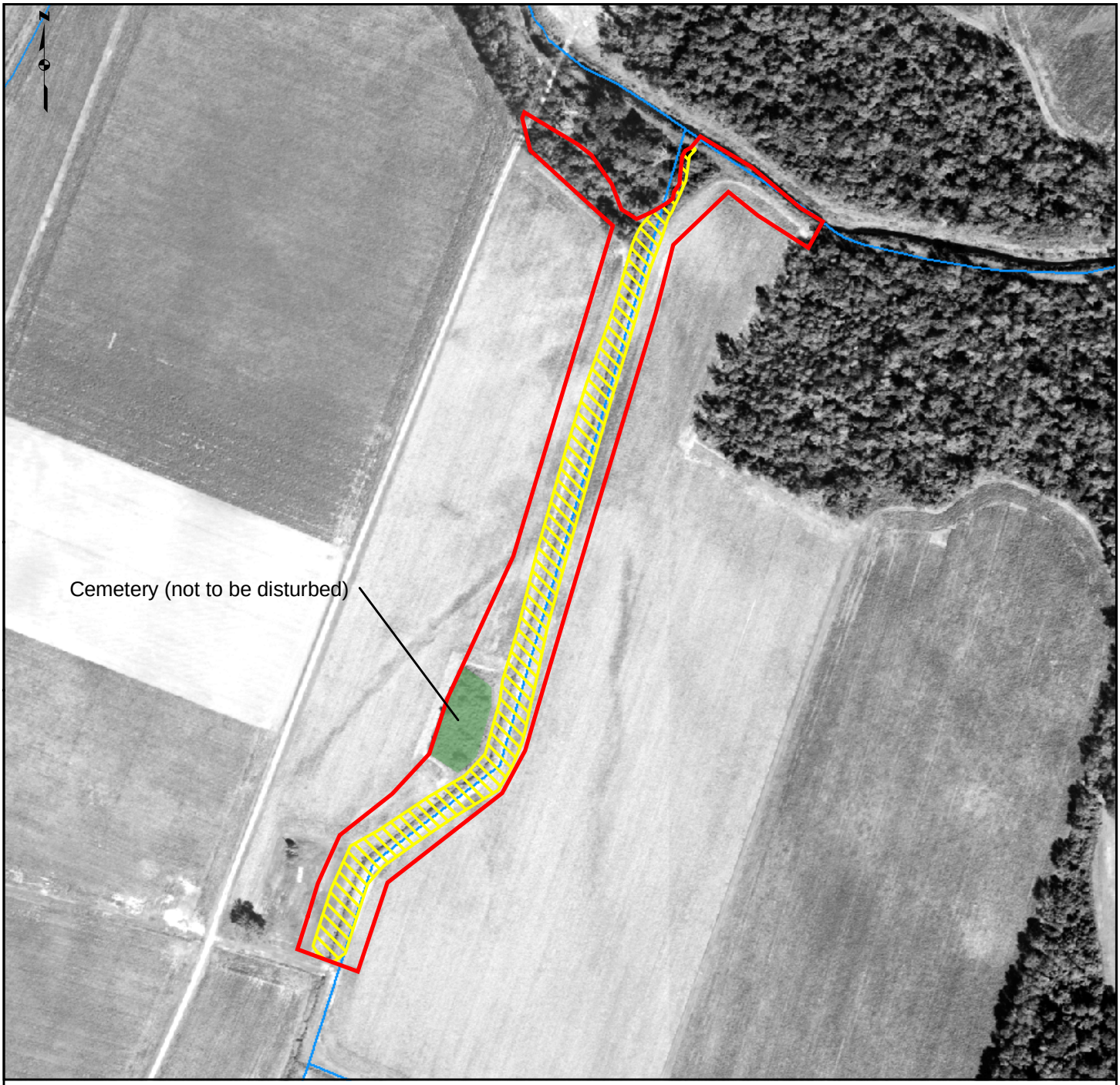
Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919-733-4763. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

Renee Gledhill-Earley

Peter Sandbeck

cc: Julia Hunt, EEP Project Manager



Legend

- Approximate Easement
- Streams
- Cemetery Area
- Area of Potential Effect

Aerial Photos: September 2003
Hurricane Isabel Damage Assessment
and Recovery Effort (USGS)

Approximate Area of Potential Effect

Brock Stream Restoration
Jones County, North Carolina
March 2006

0 250 500 1000 Feet

Stantec

Ecosystem Enhancement Program

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: ER 05-2736 Date: May 10, 2006

From: Donnie Brew
Environmental Protection Specialist
Federal Highway Administration
310 New Bern Avenue, Suite 410
Raleigh, NC 27601

To: Renee Gledhill-Early
State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 28516

RE: EEP Stream Restoration Project, Brock Site, Jones County, ER 05-2736

Lea Abbott of the Office of State Archeology and I met on April 19th to discuss the Brock Site stream restoration project. Upon review of additional information, Mr. Abbott concurred that an archeological survey for this project would not be necessary.

Thank you for your assistance,

Donnie

cc:
Julia Hunt
EEP Project Manager
1652 Mail Service Center
Raleigh, NC 27699

Lea Abbott
Office of State Archeology
4619 Mail Service Center
Raleigh, NC 27699-4619

Enclosed: Site photos, Project site map

Stantec Inc.
801 Jones Franklin Road Ste 300
Raleigh, NC 27606
Tel: (919) 851-6866 Fax: (919) 851-7024
stantec.com

Stantec

November 14, 2005

Mr. Harry E. LeGrand
NC Natural Heritage Program
1601 Mail Service Center
Raleigh, NC 27569-1601

RE: EEP Wetland and Stream mitigation projects in Jones County.

Dear Mr. LeGrand:

The purpose of this letter is to request a review and comments on any possible issues that might emerge with respect to endangered species, and migratory birds from two potential wetland and stream restoration projects located in Jones County (see attached site maps).

The Stallings site and Brock site have been identified for the purpose of providing in-kind mitigation for unavoidable stream channel and wetland impacts. Several sections of channel have been identified as significantly degraded. The agriculture fields at the Stallings site are classified as prior converted wetlands.

We have reviewed the information on your website and provided a letter to the US Fish and Wildlife Service. Any comments and/or recommendations that you may have for the site would be greatly appreciated. If you have any questions concerning this project, or need additional information, please do not hesitate to call me at (919) 851-6866 ext. 259. We greatly appreciate your assistance in this matter.

Sincerely,

Melissa Ruiz
Scientist, Environmental Management

cc:
Julia Hunt,
EEP Project Manager
1652 Mail Service Center
Raleigh, NC 27699

Enclosed: Project Vicinity and Project Site maps

NCDENR

North Carolina Department of Environment and Natural Resources

Michael F. Easley, Governor

William G. Ross Jr., Secretary

November 29, 2005

Ms. Melissa Ruiz
Stantec Consulting Services, Inc.
801 Jones Franklin Road, Suite 300
Raleigh, NC 27606

Subject: EEP Wetland and Stream Restoration Projects –Stallings and Brock sites; Jones County

Dear Ms. Ruiz:

The Natural Heritage Program has no record of rare species, significant natural communities, or priority natural areas at either site nor within a mile of the project areas. Although our maps do not show records of such natural heritage elements in the project area, it does not necessarily mean that they are not present. It may simply mean that the area has not been surveyed. The use of Natural Heritage Program data should not be substituted for actual field surveys, particularly if the project area contains suitable habitat for rare species, significant natural communities, or priority natural areas.

You may wish to check the Natural Heritage Program database website at <www.ncsparks.net/nhp/search.html> for a listing of rare plants and animals and significant natural communities in the county and on the topographic quad map. Please do not hesitate to contact me at 919-715-8697 if you have questions or need further information.

Sincerely,

Harry E. LeGrand Jr.

Harry E. LeGrand, Jr., Zoologist
Natural Heritage Program

HEL/hel

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Stantec

November 14, 2005

Mr. Gary Jordan
US Fish and Wildlife Service
Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636-3726

RE: EEP Wetland and Stream mitigation projects in Jones County.

Dear Mr. Jordan:

The purpose of this letter is to request a review and comments on any possible issues that might emerge with respect to endangered species, and migratory birds from two potential wetland and stream restoration projects in Jones County (see attached site maps).

The Stallings site and Brock site have been identified for the purpose of providing in-kind mitigation for unavoidable stream channel and wetland impacts. Several sections of channel have been identified as significantly degraded. The agriculture fields on the Stallings site are classified as prior converted wetlands.

We have reviewed the information on your website and provided a letter to the North Carolina Natural Heritage Program. Any comments and/or recommendations that you may have for the site would be greatly appreciated. If you have any questions concerning this project, or need additional information, please do not hesitate to call me at (919) 851-6866 ext. 259. We greatly appreciate your assistance in this matter.

Sincerely,

Melissa Ruiz
Scientist, Environmental Management

cc:
Julia Hunt,
EEP Project Manager
1652 Mail Service Center
Raleigh, NC 27699

Enclosed: Project Vicinity and Project Site maps