

FINAL MITIGATION PLAN

BROCK MILL POND MITIGATION SITE Jones County, North Carolina

TIP No. R-2301WM

Consultant Project No. 00-ES-15

The North Carolina Department of Transportation
Raleigh, North Carolina



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I. Introduction

Brock Mill Pond is located in the town of Trenton in Jones County, North Carolina. The property (Figure 1) is approximately 120 acres (ac) [48.6 hectares (ha)] in size and includes a number of significant cultural and natural resource features including: millhouse, millpond (with breached dam), stream channel (Crooked Run) and associated forested wetlands. The dam was breached in June of 2000 as a result of stress damage caused by Hurricane Floyd. The Crooked Run floodplain upstream of the site is contiguous with the Hofmann Forest, which is owned by N.C. State University (Figure 2). Crooked Run continues downstream to its confluence with the Trent River, which forms the northern boundary of the Croatan National Forest.

The purpose of this study is to evaluate the potential to conduct wetland and stream mitigation activities at the Brock Mill Pond property. The property is located on NC 58 immediately south of the town of Trenton, Jones County, North Carolina. The North Carolina Department of Transportation (NCDOT) is investigating the feasibility of developing the Brock Mill Pond property as a wetland mitigation site.

The Brock Mill site is located in the U.S. Geological Survey's (USGS) Hydrologic Cataloging Unit 03020204 of the Neuse River Basin (Figure 3). This is within the N.C. Division of Water Quality (DWQ) subbasin 03-04-11. The riverine wetland credits generated at this site would likely be utilized to mitigate for unavoidable impacts for the US 17 New Bern Bypass (R-2301).

Eddy Engineering, P.C. (EEPC) was originally contacted by Charles Jones, the current landowner, in the spring of 2000 after the dam was damaged by Hurricane Floyd. EEPC was tasked with assessing the damage to the existing dam and developing plans for a repaired/replacement dam. At EEPC's recommendation the dam was breached in June 2000 to avoid a catastrophic failure and the damaged dam was stabilized. Due to the extent of damage to the existing structure the dam will need to be re-constructed. A final design for the dam has been completed and re-construction is tentatively scheduled for 2003.

At the request of Mr. Jones Environmental Services, Inc., (ESI) biologists and archaeologists visited the site on 31 October and 2 November 2000 to conduct a preliminary cultural resource and natural resource assessment. The study resulted in a determination that the site has the potential to generate wetland/stream mitigation credits while meeting the primary objective for this site of restoring the dam with a normal pool similar to the historic conditions present on the site from at least 1750. The major benefits of this restoration are the prevention of continued stream degradation of Crooked Run and restoring the opportunity for traditional use of the millpond for public recreation, education, and research.

NCDOT was approached to determine if the Department would be interested in acquiring the site for mitigation purposes. A preliminary interagency field meeting was held on 5 March 2001 with

representatives of ESI, NCDOT, and the state and federal natural resources agencies to solicit input and guidance on mitigation activities for the site.

On 29 and 30 May 2001, ESI biologists visited the Brock Mill Site to gather environmental data to aid in evaluating the feasibility of mitigation activities for the site. The information gathered in the NCDOT/agency meeting and the data analyses requested were summarized in a Mitigation Feasibility report, which was distributed for review in November 2001. The feasibility evaluation considers the goals of the current landowner as well as NCDOT, the mitigation credits that may be generated on the site, and the cost of generating the mitigation credits. The goals of the landowner notwithstanding, the goals of NCDOT are to provide cost effective riverine wetland and stream mitigation within the lower Neuse River basin.

In November 2001 NCDOT made the decision to seek regulatory agency approval for the proposed mitigation activities, proposed mitigation credit scenario, and land disposition strategy. In June 2002 NCDOT obtained regulatory approval for the mitigation credits presented in this report. The present report summarizes NCDOT mitigation plans for the Brock Mill Mitigation site and serves as the FINAL Mitigation Plan for the Brock Mill Mitigation Site. It includes all information presented in the Mitigation Feasibility report but also includes a detailed list of implementation and planning tasks completed and on-going and a detailed land disposition plan.

II. Existing Conditions

Physiography, Topography, Land use, and Soils

Jones County is in the Coastal Plain physiographic province and contains 467 square miles (mi) [1210 square kilometers (km)] of flat to gently sloping land, with steep bluffs along the major rivers. Regionally, agriculture and forest resources are important components of the economic base. Croatan National Forest and Hofmann Forest cover a substantial portion of the land area of Jones County.

Detailed topographic data are not available for the entire Brock Mill Pond site, but available mapping by USGS indicates that under pre-breach conditions land elevations across the site range from approximately 20 and 26 feet (ft) [6 and 8 meters (m)] above mean sea level. This does not take into account land previously submerged, now exposed. The site is currently forested and has a history of use as a water source for the on-site gristmill and as a resource for forest products, primarily bald cypress timber. The adjacent land uses are dominated by agricultural land (cotton and corn) as well as the Trenton business district located to the northeast of the site on NC 58.

County soils mapping (USDA 1981) indicates that soils present on the site are a combination of Class A soils (map units that are all hydric soils or have hydric soils as a major component), Class B soils (map units of nonhydric soils with inclusions of hydric soils or having wet spots), and nonhydric soils (Figure 4). The majority of the floodplain is mapped as a Class A soil: Muckalee loam (thermic Typic Fluvaquent). The upland islands in the floodplain are not mapped as

separate units. Areas adjacent to the floodplain are mapped as a combination of Class A soil: Rains fine sandy loam (thermic Typic Paleaquults); Class B soils: Autreyville loamy fine sand (thermic Arenic Paleudult) and Marvyn loamy sand (thermic Typic Hapludults); and nonhydric soil: Pactolus loamy fine sand (coated Aquic Quartzipsamment).

Streams, Water Quality, and Buffers

The water resources located on the site are all part of Crooked Run. Crooked Run is a 3rd order, perennial, black water stream system. The headwaters for this stream system are located in the White Oak Pocosin, a large portion of which lies within the Hofmann Forest. Crooked Run enters the property to the west and exits the property at the breached dam to the east 0.6 mi (1.0 km) upstream of its confluence with the Trent River. Currently, 13,806 linear feet (4208 m) of Crooked Run are located on the property. Historically approximately 75% of Crooked Run located on the site was impounded as part of the millpond. Currently, the dam is no longer functional and the lower portion of Crooked Run present on the site is heavily degraded and entrenched due to the alterations in the slope and water velocity.

A Best Usage Classification is assigned to waters of the state of North Carolina based on the existing or contemplated best usage of various streams or stream segments in the basin. Crooked Run (Stream Index No. 27-101-18), from its source to its confluence with the Trent River, has a best usage classification of **C Sw NSW** (DEHNR, 1993a). The designation **C** denotes appropriate uses including aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Secondary recreation refers to human body contact with waters on an infrequent or incidental basis. The supplementary classification **Sw** refers to Swamp waters which are defined as waters which have low velocities and other natural characteristics which are different from surrounding waters. The supplemental classification **NSW** refers to Nutrient Sensitive Waters which are defined as waters subject to growths of microscopic or macroscopic vegetation requiring limitations on nutrient inputs.

In August 2000 the Environmental Management Commission approved the *Neuse River Basin: Nutrient Sensitive Waters Management Strategy: Protection and Maintenance of Existing Riparian Buffers* (15A NCAC 2B .0233) (the Neuse Rules). This initiative adopted rules protecting riparian areas immediately adjacent to surface waters within the Neuse River Basin, including intermittent and perennial streams, lakes, ponds, and estuaries. Stream determination for these rules requires the channel to be present on either the most current version of the Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service) soil survey or as a blue line (bluelines) on the most recent USGS topographic quadrangles. Crooked Run is depicted as a stream on both the USGS topographic quadrangles (USGS 1982a, 1982b) and the *Jones County Soil Survey* (USDA 1981), and is therefore subject to the Rules. However, the dam maintenance and mitigation activities proposed to be conducted at the site are classified as **Exempt** under the Neuse Rules. Exempt activities do not require compensatory mitigation for impacts to riparian buffers.

Plant Communities

Natural communities were classified using the taxonomy of the *Classification of Natural Communities of North Carolina: Third Approximation* (Schafale and Weakley 1990). Five natural community types were identified as occurring on the site. These are: Mesic Mixed Hardwood Forest, Coastal Plain Small Stream Swamp Forest, Coastal Plain Semipermanent Impoundment and associated Cypress–Gum Swamp (Blackwater Subtype), and Low Elevation Seep. None of these types is rare regionally or within North Carolina. The current landowner has indicated that a number of the bald cypress (*Taxodium distichum*) present on the site may approach 300 years in age. These trees are likely interspersed throughout the interior of the cypress dominated communities identified on the site. A complete description of each community type is found in Appendix A.

Wildlife

The Brock Mill Pond site functions as a forested riparian corridor that serves to connect Hofmann Forest to the forested floodplain of the Trent River which further links the site to the Croatan National Forest, using the Trent River corridor. This site is an important migration corridor for large animals such as black bear (*Ursus americanus*), bobcat (*Felis rufus*), and white tailed deer (*Odocoileus virginianus*). In addition the site may serve as a breeding/resting stop for migratory birds. The diversity of aquatic habitats present on the site provide habitat for a wide range of aquatic reptiles and amphibians and fish.

Scat and footprints of American black bear (*Ursus americanus*) were observed within the floodplain forest. Eastern cottonmouth (*Agkistrodon piscivorous*) and redbelly water snake (*Nerodia erythrogaster*) were observed along the streamside and in the stream. Bird species seen or heard include: great blue heron (*Ardea herodias*), osprey (*Pandion haliaetus*), yellow-billed cuckoo (*Coccyzus americanus*), pileated woodpecker (*Dryocopus pileatus*), barred owl (*Strix varia*), prothonotary warbler (*Protonotaria citrea*), and white-eyed vireo (*Vireo griseus*).

Wetlands

Jurisdictional wetlands were identified using the three-parameter approach (hydrophytic vegetation, hydric soils, and hydrology) as outlined in the Corps of Engineers Wetland Delineation Manual (DOA 1987). The stream channel and upland islands within the floodplain were delineated and GPS-mapped (Figure 5). The upland slopes adjacent to the floodplain have not been field delineated. Figure 5 also depicts the pre-breached extent of Brock Mill Pond (photo base) compared to the existing condition (line overlay).

Jurisdictional wetlands in the study area are palustrine, as defined in Cowardin *et al.* (1979) and as identified on National Wetlands Inventory (NWI) maps. The NWI mapped four wetland types on the site (Figure 6): diked/impounded permanently flooded palustrine unconsolidated bottom (PUBHh), semipermanently flooded palustrine deciduous forest (PFO6F), temporarily flooded broad-leaved deciduous palustrine forest (PFO1A), and seasonally flooded broad-leaved deciduous forest (PFO1C). The majority of the site was originally classified as PFO6F, with the

millpond proper being classified as PUBHh. Small isolated pockets along the edge of the floodplain were classified as PFO1A and PFO1C. The PFO1A and PFO1C classifications generally correspond to the small seeps identified on the site.

The extant wetland system on the site formed under the hydrological influence of at least 250 years of impoundment by Brock Mill dam. This hydrological influence was removed in June 2000. The wetland descriptions that follow correspond to the wetland system as it was observed after the dam breach occurred.

The existing wetlands on the site can be classified as both riverine and non-riverine:

- Riverine wetlands are characterized as wetlands that receive hydrological input from overbank flooding from an associated stream. The wetlands present in the Small Stream Swamp natural community show evidence of recent overbank flooding and therefore exhibit characteristics of riverine wetlands.
- Non-riverine wetlands typically receive their hydrological input from precipitation, natural springs, or other nonriverine influences. The small seeps observed on the site would be classified as non-riverine. The seeps represent a minor portion of the overall site. The majority of the Cypress – Gum Swamp natural community is currently isolated from the stream channel due to stream entrenchment and exposure of previously inundated levees, and the hydrology of this wetland community is now presumed to be primarily precipitation driven.

Recent observations of the site suggest that the extant wetlands can currently be classified as a combination of saturated deciduous forest PFO6B, PFO1C, and PUBHh. The PFO6B classification corresponds to the majority of the area that was formerly classified as PFO6F (semipermanently flooded) and the current distribution of the PUBHh classification is substantially less than it was historically.

Rare and Endangered Species

Species with the federal classification of Endangered or Threatened are protected under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). Two species (Table 1) are listed with ranges extending into Jones County (U.S. Fish and Wildlife Service list dated 07 March 2002). Descriptions of both federally protected species known to occur within Jones County, along with habitat requirements and Biological Conclusion, are presented in Appendix B. Appendix B also summarizes Federal Species of Concern and State Listed Species.

Table 1. Federally Listed Species

Common Name	Scientific Name	Federal Status	Biological Conclusion
American alligator	<i>Alligator mississippiensis</i>	T (S/A)*	None Required
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	No Effect

*Denotes Threatened due to similarity of appearance.

Mitigation activities at this site will not affect red-cockaded woodpecker and may benefit American alligator, which is also state-listed as threatened.

Cultural Resources

The Brock Mill Pond is first mentioned in a property deed as early as 1738; the earliest reference to a dam at the site is from 1750. The 18th century dam was replaced in the 1830s by a dam with a millhouse on top of it. In 1945-1946, the 1830s dam and mill were torn down and replaced by the current concrete dam and adjacent millhouse.

The State of North Carolina Department of Cultural Resources has a mandate to acquire properties that have statewide historical, architectural, and/or archaeological significance and utilizes National Register criteria when determining such significance. The complex consisting of the dam, millhouse, and millpond was found to be a significant historic property, and is listed in the National Register in the Trenton Historic District.

Upland areas of the project tract adjacent to the creek have a moderate to high potential to contain buried prehistoric archaeological sites. However, farming and logging activities may have disturbed any subsurface deposits.

III. Mitigation Concept

The breach of the dam on the site has resulted in a lowering of the water table by as much as 10 ft (3 m) in some parts of the site. Alterations in the water table have resulted in significant destabilization of the stream channel, dewatering of adjacent wetlands, and significant alterations to natural community structure. Restoration of the dam on the site will result in cessation of destructive factors affecting the site and result in a restoration or enhancement of the ecological function and values of that portion of the site under the hydrological influence of the dam (normal pool area). The dam is expected to be designed to restore historic normal pool conditions.

The basis for the mitigation credits proposed to be generated by the site centers around the portion of the site that will be under the hydrological influence of the dam (normal pool area). The proposed normal pool area present prior to the breaching of the dam was estimated using a combination of aerial photography, conversations with the landowner, historical watermarks, root collar position, and plant species presence, absence and abundance.

Riparian Buffers

The area that is subject to protection under the Neuse Rules was altered when the dam was breached and the millpond drained (Figure 7). The buffer area adjacent to surface waters increased from 28.9 ac (11.7 ha) to 31.7 ac (12.8 ha) and resulted in an increase of 2.8 ac (1.1 ha) of buffers. The mitigation activities proposed for the site will restore the buffers back to their previous location on the site. Even though this will result in a loss of 2.8 ac (1.1 ha) of current riparian buffers, the historic buffers will be reestablished adjacent to the restored millpond surface

waters. Activities proposed for the site include dam maintenance and wetland mitigation. Both of these activities are classified as Exempt uses under the Neuse Rules.

Streams

The accumulated sediments behind the dam during the past 250 years have resulted in a steepening of the stream gradient when the dam was breached at the Brock Mill Pond site. The steepening of a stream's gradient due to breaching a dam and draining an impoundment generally leads to the stream down-cutting from its base level and becoming entrenched. This usually occurs as a head cut moving upstream until a nick point is encountered. During the entrenching process large amounts of sediments are eroded and transported by the stream. Additionally, riverine wetlands may be affected by the newly entrenched stream by reduced overbank flooding; and reduced near-surface hydroperiods due to the lowered base level of the stream.

The segment of Crooked Run that is located within the proposed normal pool area is currently entrenched and shows evidence of down-cutting. The hydrological conditions present in this stream segment will be controlled by the dam and therefore this stream channel segment is ineligible for stream mitigation credit. Stream down-cutting was not evaluated in detail since it is not anticipated that this reach will be eligible for stream mitigation credit. However, restoration of normal water levels will prevent continued down-cutting of this stream segment and restore overbank flooding of adjacent wetland areas. The stream segment located upstream of the proposed normal pool area shows few signs of alteration from the removal of the dam and is thought to be stable. In the absence of dam reconstruction and restoration of historic millpond water levels, this stream segment is likely to become unstable and degraded as segments downstream move towards a new equilibrium under the current hydraulic conditions. Restoration of normal water levels on the site should prevent degradation of this stream segment. The stream segment located upstream of the proposed normal pool area, approximately 3400 linear feet (1037 linear meters), will be considered for stream preservation credit.

Wetlands

The alterations to the water table and the entrenched stream channel are having an effect on the wetlands present on the site. The wetland communities along the floodplain developed under the hydrologic conditions resulting from more than 250 years of substantially higher water levels behind the milldam. The entrenched stream channel is now functioning as a drainage ditch removing hydrology from surrounding wetlands. In addition, the entrenched stream does not show evidence of recent overbank flooding, thus breaching of the dam did not restore this important wetland function. It is predicted that the severity of this effect will increase over time, resulting in the continued degradation of the majority of the extant wetlands if the dam is not restored and hydrologic conditions returned to historic levels. By restoring the dam, the water levels will be restored to conditions under which much of the existing wetlands are presumed to have been formed. Wetland function will be enhanced by restoring/increasing the frequency of overbank flooding events, and the restored water levels are expected to enhance jurisdictional hydrology to areas adjacent to the normal pool area. Mitigation credits for this site will be

composed of a combination of open water restoration, wetland preservation, and stream preservation. A summary of mitigation credits available on the site is presented in Table 2 and a graphical depiction of mitigation areas is presented in Figure 8.

Open Water Restoration is defined as restoring hydrologic conditions to an area that has been altered from historic conditions. NCDOT has received agency concurrence that areas within the proposed normal pool that will be converted from PFO6B to PUBHh with a restoration in normal hydroperiod will be considered for open water restoration.

Wetland Preservation is defined as the protection of wetlands through the purchase, donation, or conveyance of a conservation easement to an appropriate government or non-profit agency for management. Wetlands associated with the segment of Crooked Run located upstream of the proposed normal pool area show no evidence of functional impairment. These wetland areas will be considered for wetland preservation. These wetlands are classified as a combination of PFO6F, PFO1C, and PFO1A.

Stream Preservation is defined as the protection of a relatively undisturbed stream and its associated buffer through purchase and/or conservation easement beyond that presently required by a regulatory program. The stream segment considered for preservation credit is located above the influence of the dam and is expected to degrade over time if the dam is not rebuilt and have a detrimental affect on the adjacent wetland areas.

Table 2. Summary of mitigation credits available.

Mitigation Category	Community Type	Amount available	Credit Ratio	Mitigation Credits
Open Water Restoration	PUBHh	11 ac.	2:1	5.5
Riverine Preservation	PFO6F, PFO1A, PFO1C	109 ac.	10:1	10.9
Stream Preservation	---	3400 lin. ft	10:1	340

Wetland mitigation credit ratios are based on mitigation ratios for linear projects as required by the DWQ and described in Administrative Code Section 15A NCAC 24.0506 (h)(7). Stream mitigation credit ratios are based on DWQ guidelines found in the *Interim, Internal DWQ Policies on Stream Mitigation Options and Associated Macrobenthos Monitoring* (May 2000).

Site Management

A major component of any plan for promoting and enhancing long-term health of the wetland forest communities on the property is water level management. A study on a similar site in south-central Louisiana (Keeland and Conner 1999) found that survival of cypress seedlings is

dependent on their ability to attain sufficient height to maintain foliage above the water level during the growing season. Lake Chicot is a 1977 ac (800 ha) freshwater lake constructed in 1943. Since impoundment, the lake has been permanently flooded except for occasional fall and winter draw-downs for aquatic weed control. Although cypress seedlings were able to get established during the draw-downs and survive the dormant season even if submerged, they were completely submerged and killed by high water levels the next growing season. In 1986 the lake was drained for repairs to the levee. This draw down lasted 18 months and encompassed two growing seasons; previous draw-downs usually lasted 5 months and did not occur during the growing season. Nine years after the lake was re-flooded following the 18-month draw-down, there are still 1.9 surviving seedlings per square meter within the study plots.

Based on the presence of an extant, but hydrologically altered, Cypress–Gum Swamp on-site, seed source and availability will not be a limiting factor in the establishment of new tree seedlings required for the maintenance of structural and compositional integrity of the Cypress–Gum Swamp following dam restoration. The most important management considerations are season of initiation, frequency, and duration of draw-down events. Our recommendations follow.

Season of initiation: Draw-down events should be initiated in late winter or early spring. This will provide conditions conducive for seed germination and will provide the exposed substrate necessary for germination and seedling development.

Frequency: Draw-down events should be scheduled at intervals that ensure the recruitment of new individuals replaces dying individuals to maintain a healthy forested community. Draw-down events will be initiated in the event of a catastrophic disturbance to the vegetation on the site (*i.e.*, hurricane). Additional draw-down events after the initial draw-down for dam construction that is currently on-going will be at the discretion of the Board of Directors.

Duration: Each draw-down event will need to span at least two growing seasons. Tree seedlings will require adequate time to establish themselves and to grow taller than the typical growing season water level.

Invasive Aquatic Vegetation

No invasive aquatic vegetation was noted during the field investigation. If invasive aquatic vegetation is identified as a problem in the future, remedial action will be the responsibility of the ultimate recipient of the site.

Land Disposition

An important aspect for the success of the Brock Mill Pond site is successful land disposition to an organization willing to maintain the site in its restored state and maintain public accessibility

to the resources on the site. The N. C. Cooperative Extension Service has been identified as the likely recipient of the site.

The N.C. Cooperative Extension Service is a state operated land acquisition foundation that focuses on research, public trust, and conservation. This organization is a subsidiary of N.C. State University and has experience in managing conservation land and has the full resources of the University to draw upon to manage the property.

NCDOT is currently in the process of negotiating the purchase of the Brock Mill property with the current owner, Charles Jones. Contingent upon land acquisition, and successful negotiations with the N.C. Cooperative Extension Service, NCDOT will donate the property to the N.C. Cooperative Extension Service. As part of the land donation NCDOT will use surplus funds from the project to establish an endowment to fund site maintenance. Surplus funds from the project are considered to be those as determined by the estimated mitigation value over and above the site acquisition costs and costs for implementing the mitigation plan. ESI and NCDOT are working with the N.C. Cooperative Extension Service to identify additional funding sources to increase the endowment. A board of directors will be established for the site with members from the local community, NCSU, regulatory community, NCDOT, EEPC, and ESI. All research projects and site improvement projects will need to be submitted to the board for approval.

IV. Cost Analysis and Feasibility

The Brock Mill Pond site provides the opportunity to develop riverine wetland mitigation credits and stream preservation credits. The following discussions describe the various tasks undertaken to replace the dam at the Brock Mill site and produce an approved mitigation plan for the mitigation credits generated by the replacement of the dam. In some cases this discussion includes the actual cost of the task, when that information is available.

Preliminary Studies: \$5,000

The cost for preliminary studies covers actual expenses incurred by the present landowner for determining whether the site has potential for mitigation uses.

Mitigation Feasibility Study: \$22,000

The cost for the mitigation feasibility study covers the consultant fees incurred by NCDOT for developing the feasibility evaluation and locating potential recipients for final disposition. This cost does not include direct costs incurred by NCDOT for in-house efforts.

Mitigation Plan: \$25,000

The cost for the mitigation plan covers the consultant fees incurred by NCDOT for developing the mitigation plan and coordinating final land disposition with NCSU and the current landowner. This cost does not include direct costs incurred by NCDOT for in-house efforts. This task does not include the costs of completing a site boundary survey.

Land Acquisition (Appraised Value of Property): \$160,000

An appraisal of the property was completed in September 2001. The appraised value of the property includes the value of the timber present on the site and all other potential uses.

Dam Final Design and Construction: \$300,000

The cost for dam final design and construction is an estimate provided by EEPC. This estimate is preliminary and subject to change depending on any modifications required to the preliminary design, timing of construction, and construction schedule. The construction plans for the new dam have been reviewed by NCDOT.

Mitigation Implementation

No additional costs beyond dam final design and construction are expected for mitigation implementation.

Mitigation Monitoring

Based on agency comments at the preliminary site review meeting, the as-built report prepared upon completion of dam construction is expected to satisfy the monitoring requirements for demonstrating mitigation success. Additional monitoring costs will be incurred if additional monitoring is required.

Land Disposition

The costs associated with land disposition are limited to the costs of transferring the deed to the N.C. Cooperative Extension Service and a one-time donation to establish an endowment to fund site maintenance. The amount of the donation for the endowment is not known at this time but is expected to include any surplus funds from the development of the site and additional private and public funds identified by the N.C. Cooperative Extension Service.

Summary

Based on the analysis of the known and estimated costs we anticipate that the mitigation at the Brock Mill Pond site will be feasible if the assumptions discussed do not change. Any increases to the cost of developing the mitigation site will result in a reduction in the amount of money available to establish the endowment, thus increasing the reliance on private funding sources. A significant decrease in the funding available for the endowment may necessitate pursuing alternative land disposition strategies. Credits presented in this mitigation plan have been presented to and approved by the COE, DWQ, and FHWA.

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APPENDIX A

Coastal Plain Semipermanent Impoundment and Cypress – Gum Swamp (Blackwater Subtype)

The majority of the property is forested by bald-cypress (*Taxodium distichum*) associated with the millpond impoundment and other areas under the hydrological influence of the dam. All of the area that was inundated prior to the dam being breached, but that was shallow enough to support woody vegetation, is in bald-cypress forest of varying densities. Beyond the shrubs on the tree bases, we found no additional woody species present in these areas except cypress. It is likely that the majority of the cypress trees present became established in the 1940s when the water was drawn down to permit construction of the most recent dam. It further seems likely that at that time, most of the large cypress trees then extant were harvested. This impoundment community type is common in both North Carolina and the southeastern United States.

Outside of the impounded area, but still under the hydrological influence of the dam, is an occurrence of Cypress – Gum Swamp (Blackwater Subtype). Since the breach of the dam and the water level draw down, seedlings of several species are becoming established including bald-cypress, red maple (*Acer rubrum*), and sweetgum (*Liquidambar styraciflua*). Herbaceous vegetation consists of dog-fennel (*Eupatorium capillifolium*), false nettle (*Boehmeria cylindrica*), lizard's tail (*Saururus cernuus*), seedbox (*Ludwigia leptocarpa* and *Ludwigia palustris*), and other species.

Mesic Mixed Hardwood Forest

The swamp islands and upland slopes surrounding the site support a Mesic Mixed Hardwood Forest. Earlier investigations identified these two areas as possibly comprising Basic Mesic Forest. Two variants of this Mesic Mixed Hardwood Forest community were observed on the site, Swamp Island Variant and Bluff/Slope Variant. The swamp islands are classified as the Swamp Island Variant and the upland slopes surrounding the floodplain are classified as the Bluff/Slope variant. Spring visits to observe the herbaceous flora would be useful to further characterize and rank the quality of these forests. The overstory is mixed with beech (*Fagus grandifolia*), white oak (*Quercus alba*), swamp chestnut oak (*Quercus michauxii*), and hickories (*Carya alba*, *Carya glabra*, *Carya ovalis*, and possibly *Carya pallida*) appeared to be the most common species. Additional canopy and subcanopy species include water oak (*Quercus nigra*), Southern sugar maple (*Acer barbatum*), horsesugar (*Symplocos tinctoria*) American holly (*Ilex opaca*), swamp red bay (*Persea palustris*), black cherry (*Prunus serotina*), American strawberrybush (*Euonymus americana*), sourwood (*Oxydendrum arboreum*), witch-hazel (*Hamamelis virginiana*), beautyberry (*Callicarpa americana*), sparkleberry (*Vaccinium arboreum*), ironwood (*Carpinus caroliniana*), flowering dogwood (*Cornus florida*), and common spicebush (*Lindera benzoin*). The herbaceous layer appears relatively depauperate with crane-fly orchid (*Tipularia discolor*), partridgeberry (*Mitchella repens*), licorice bedstraw (*Galium circaezens*), arrowleaf heartleaf (*Hexastylis arifolia*), ebony spleenwort (*Asplenium platyneuron*), grape fern (*Botrychium sp.*) and panic grass (*Panicum sp.*). The upland slopes in particular

showed evidence of past logging and in some places the canopy was absent. Additionally, some of these areas had the presence of the exotic species Chinese privet (*Ligustrum sinense*) and Japanese honeysuckle (*Lonicera japonica*). The quality of the island forest is higher with less evidence of past disturbance.

Coastal Plain Small Stream Swamp Forest

The Coastal Plain Small Stream Swamp Forest present along the upper reaches of the stream and outside of the influence of the impoundment shows less signs of disturbance and has fairly good species richness. There is some evidence of past logging but many mature trees remain. Overstory species include bald-cypress, green ash (*Fraxinus pennsylvanica*), laurel oak (*Quercus laurifolia*), swamp black gum (*Nyssa biflora*), red maple (*Acer rubrum*), American elm (*Ulmus americana*), and sweetgum. Subcanopy and shrub species include ironwood (*Carpinus caroliniana*), swamp red bay (*Persea palustris*), mayberry (*Vaccinium elliotii*), Virginia willow (*Itea virginica*), and swamp chestnut oak. Herbaceous layer species include cane (*Arundinaria gigantea*), netted chainfern (*Woodwardia areolata*), lizard's tail, royal fern (*Osmunda regalis*), green arrow-arum (*Peltandra virginica*), reed (*Juncus repens*), mermaidweed (*Proserpinaca pectinata*), and netted chainfern (*Woodwardia virginica*).

Low Elevation Seep

Low Elevation Seep is present on the site in several areas. These areas occur at the intersection of natural drainage features and ditches with the drained impoundment. Species include sweet bay (*Magnolia virginiana*), American holly, red maple, laurel oak, sweetgum, black gum (*Nyssa biflora*), and swamp red bay present in the canopy and subcanopy. Coastal doghobble (*Leucothoe axillaris*) and common winterberry (*Ilex verticillata*) are dominant in the shrub layer. Additional species present include evergreen bayberry (*Myrica heterophylla*), netted chainfern, cinnamon fern (*Osmunda cinnamomea*), royal fern, partridgeberry, lizard's tail, tag alder (*Alnus serrulata*), sassafras (*Sassafras albidum*), climbing hydrangea (*Decumaria barbara*), peatmoss (*Sphagnum sp.*), naked-fruit rush (*Juncus gymnocarpus*), red water-horehound (*Lycopus virginicus*), pennywort (*Hydrocotyle sp.*), and titi (*Cyrilla racemiflora*).

APPENDIX B

Federally protected species

American alligator – The American alligator is a large reptile with a broad snout, a short neck, a heavy body, and a laterally compressed tail. Adults are blackish or dark gray, although faint yellowish crossbands are sometimes evident. The young are black with conspicuous yellow crossbands. The American alligator inhabits fresh water swamps, marshes, abandoned rice fields, ponds, lakes, and backwaters of large rivers. Females lay eggs in June and hatchlings emerge in late summer or early fall (Martof *et al.* 1980). The American alligator is listed as threatened based on the similarity in appearance to other federally listed crocodylians; however, there are no other crocodylian species found in North Carolina. No biological opinion is required for this species. In general, however, mitigation activities are expected to benefit this species by the restoration of the millpond normal pool and flooded cypress-gum community.

Red-cockaded woodpecker – This small 7 to 8 in (18 to 21 cm) in length woodpecker has a black head, prominent white cheek patches, and black-and-white barred back. Males often have red markings (cockades) behind the eye, but the cockades may be absent or difficult to see (Potter *et al.* 1980). Primary habitat consists of mature to over-mature southern pine forests dominated by loblolly (*Pinus taeda*), long-leaf (*Pinus palustris*), slash (*Pinus elliottii*), and pond (*Pinus serotina*) pines (Henry 1989). Primary nest sites include open pine stands greater than 60 years of age with little or no mid-story development. Nest cavity trees tend to occur in clusters that are referred to as colonies (FWS 1985). Foraging habitat is comprised of open pine or pine/mixed hardwood stands 30 years of age or older. Pine flatwoods or pine-dominated savannas that have been maintained by frequent natural fires serve as ideal nesting and foraging sites for this woodpecker. Development of a thick understory may result in abandonment of cavity trees. The woodpecker drills holes into the bark around the cavity entrance, resulting in a shiny, resinous buildup around the entrance that allows for easy detection of active nest trees (Henry 1989).

BIOLOGICAL OPINION: No Effect

Potentially suitable habitat in the form of pine-dominated forested stands is not present on the site. Forested areas on the site have few if any individuals of pine species present. Therefore any construction activities associated with the development of this site for mitigation will not affect the red-cockaded woodpecker.

Federal species of concern

Species of concern are those species that are possible candidates for listing as Endangered or Threatened, but at present receive no legal protection. There are eleven species of federal concern in Jones County (U.S. Fish and Wildlife Service list dated 12 April 2001). These are listed in the table below.

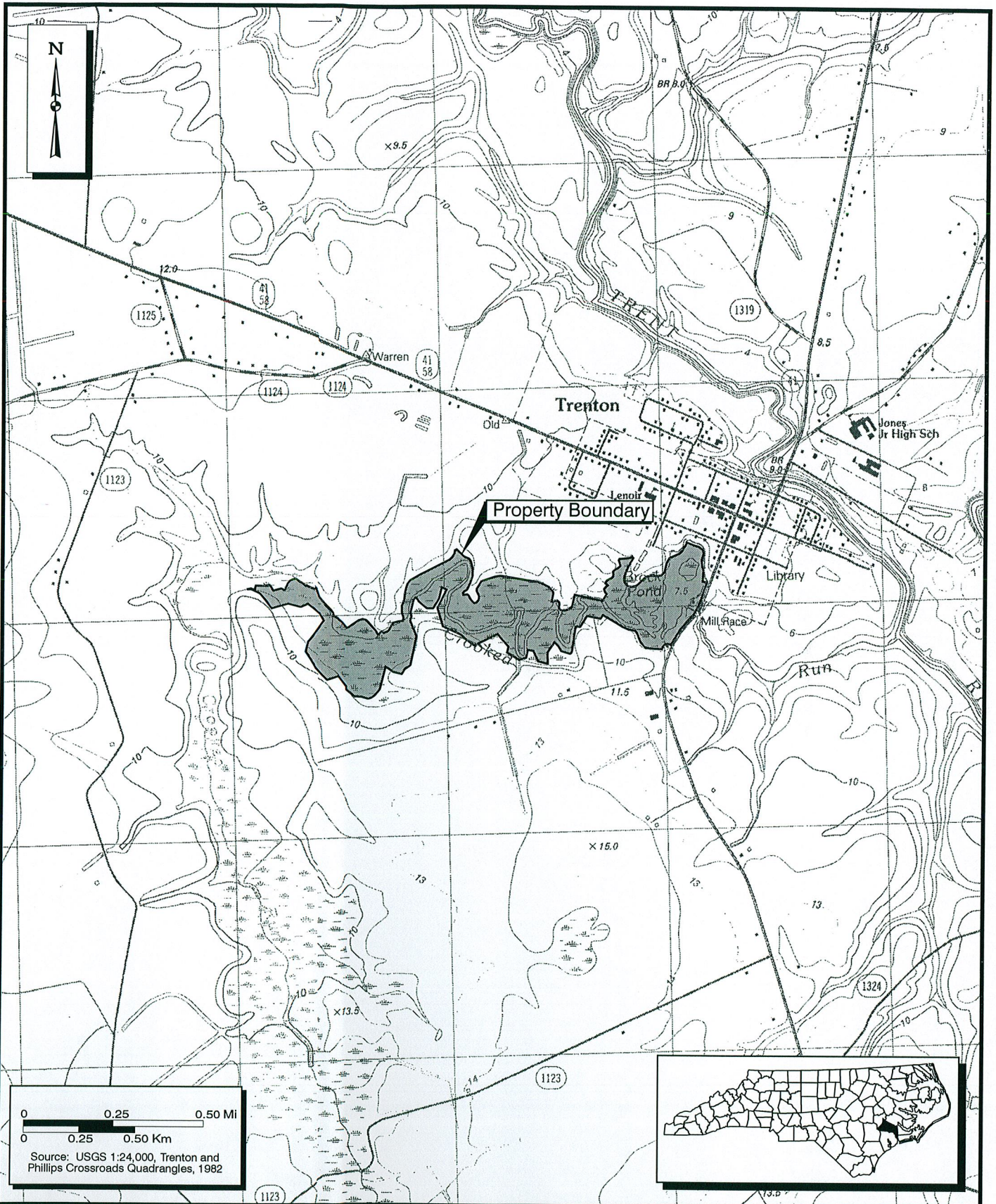
Table B-1. Federal species of concern in Jones County, North Carolina

Common Name	Scientific name	State Status*	Potential Habitat
Southern hognose snake	<i>Heterodon simus</i>	SR (PSC)	no
Carolina gopher frog	<i>Rana capito capito</i>	SC (PT)	no
Croatan crayfish	<i>Procambarus plumimanus</i>	WL	yes
Carolina spleenwort	<i>Asplenium heteroresiliens</i>	E	yes
Chapman's sedge	<i>Carex chapmanii</i>	WL	no
Venus flytrap	<i>Dionea muscipula</i>	C-SC	no
Carolina bogmint	<i>Macbridea caroliniana</i>	T	yes
Godfrey's sandwort	<i>Minuartia godfreyi</i>	E	yes
Savanna cowbane	<i>Oxypolis ternata</i>	E	yes
Carolina goldenrod	<i>Solidago pulchra</i>	E	no
Spring-flowering goldenrod	<i>Solidago verna</i>	T	no

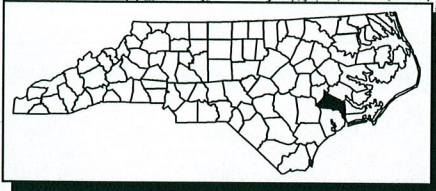
* Designations for species protected under state laws are: E-endangered, T-Threatened, and SC-Special Concern. Designations for other species which are not protected by state laws are: C-Candidate, SR-Significantly Rare, and WL-Watch List. P-Proposed.

Of the above-listed species, potentially suitable habitat exists for five species on the Brock Mill Site. There is a high potential for Godfrey's sandwort and Carolina spleenwort. The former grows on moist slopes of stream banks and seepage slopes in marl woods, and the latter on marl outcrops along small blackwater streams. Seepage slopes are present at the site, and several small outcrops of marl were observed.

APPENDIX C



0 0.25 0.50 Mi
 0 0.25 0.50 Km
 Source: USGS 1:24,000, Trenton and Phillips Crossroads Quadrangles, 1982



Environmental Services, Inc.

**Location Map
 Brock Mill Pond
 Trenton, Jones County, North Carolina**

Figure:	1
Project:	ER00041.15
Date:	January 2003

ER00041.15/location.cdr



Figure:	2
Project:	ER00041.15
Date:	January 2003

Landscape Connectivity Map
 Brock Mill Pond
 Trenton, Jones County, North Carolina



**Environmental
 Services, Inc.**

Reproduced with permission from the North Carolina Atlas and Gazetteer, DeLorme Mapping, 1993

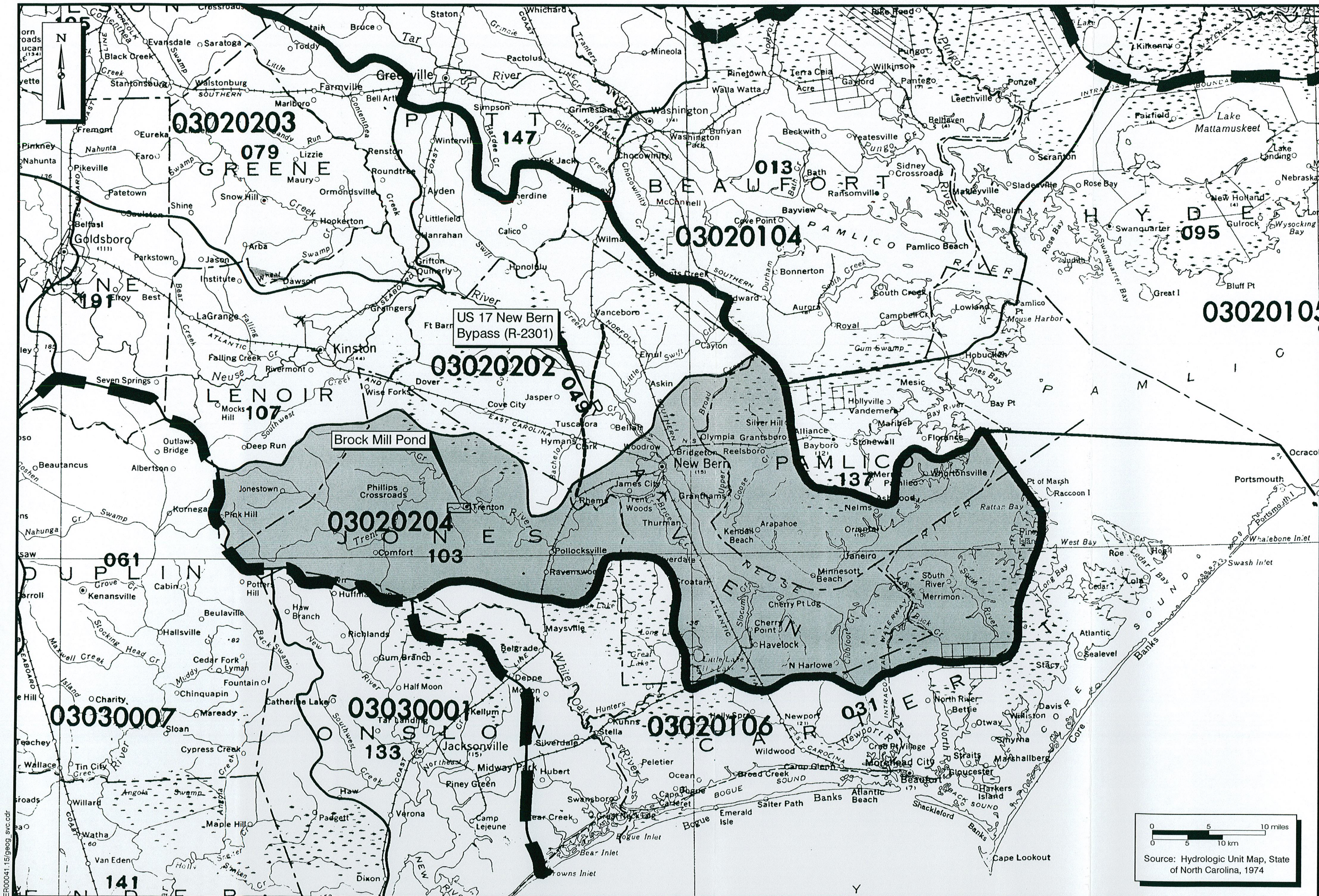


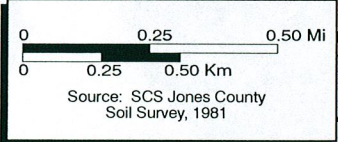
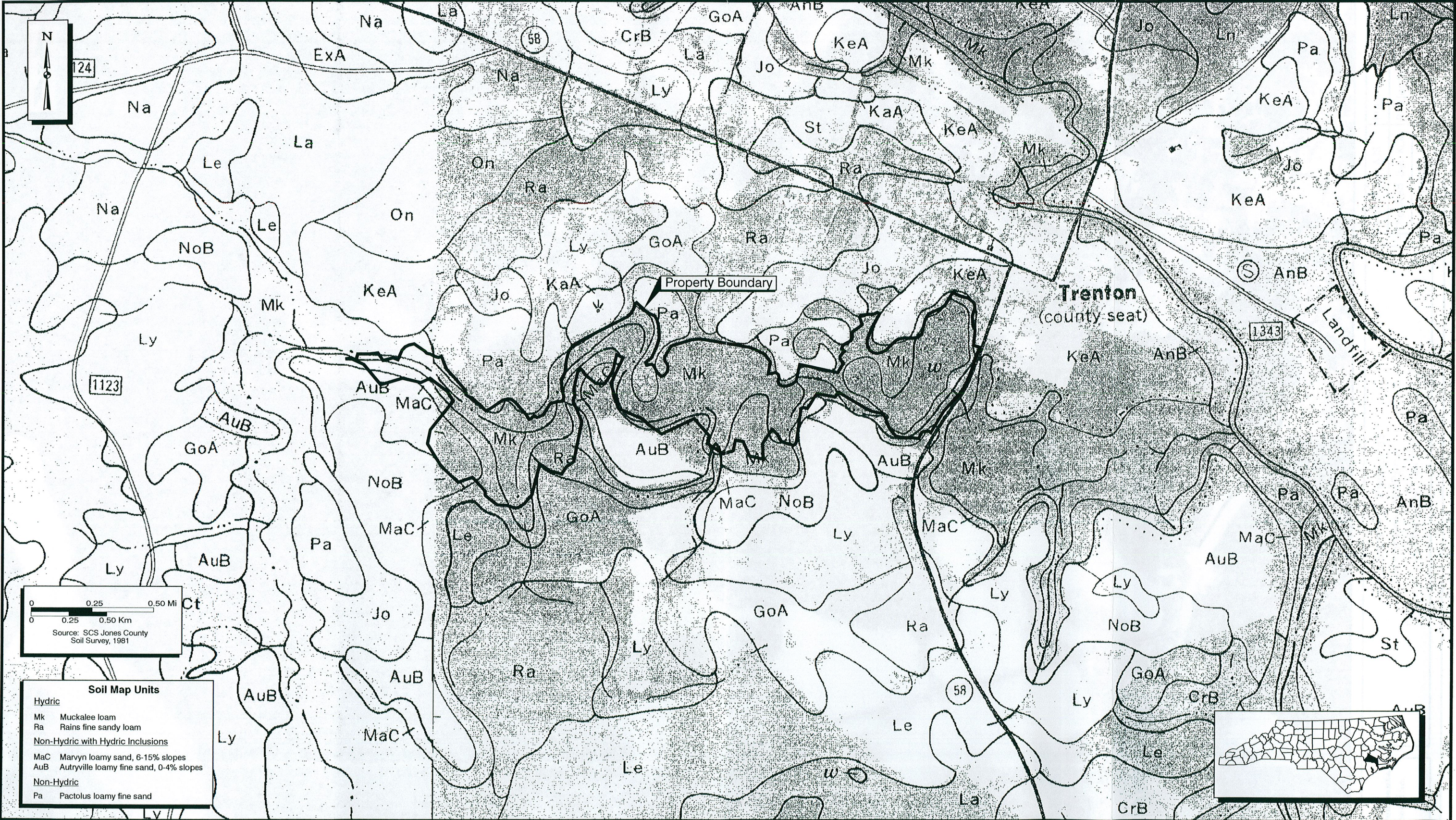
Figure: 3
 Project: ER00041.15
 Date: January 2003

Proposed Geographic Service Area
 Brock Mill Pond
 Trenton, Jones County, North Carolina

Environmental Services, Inc.

ER00041.15\geog_svc.cdr

0 5 10 miles
 0 5 10 km
 Source: Hydrologic Unit Map, State of North Carolina, 1974



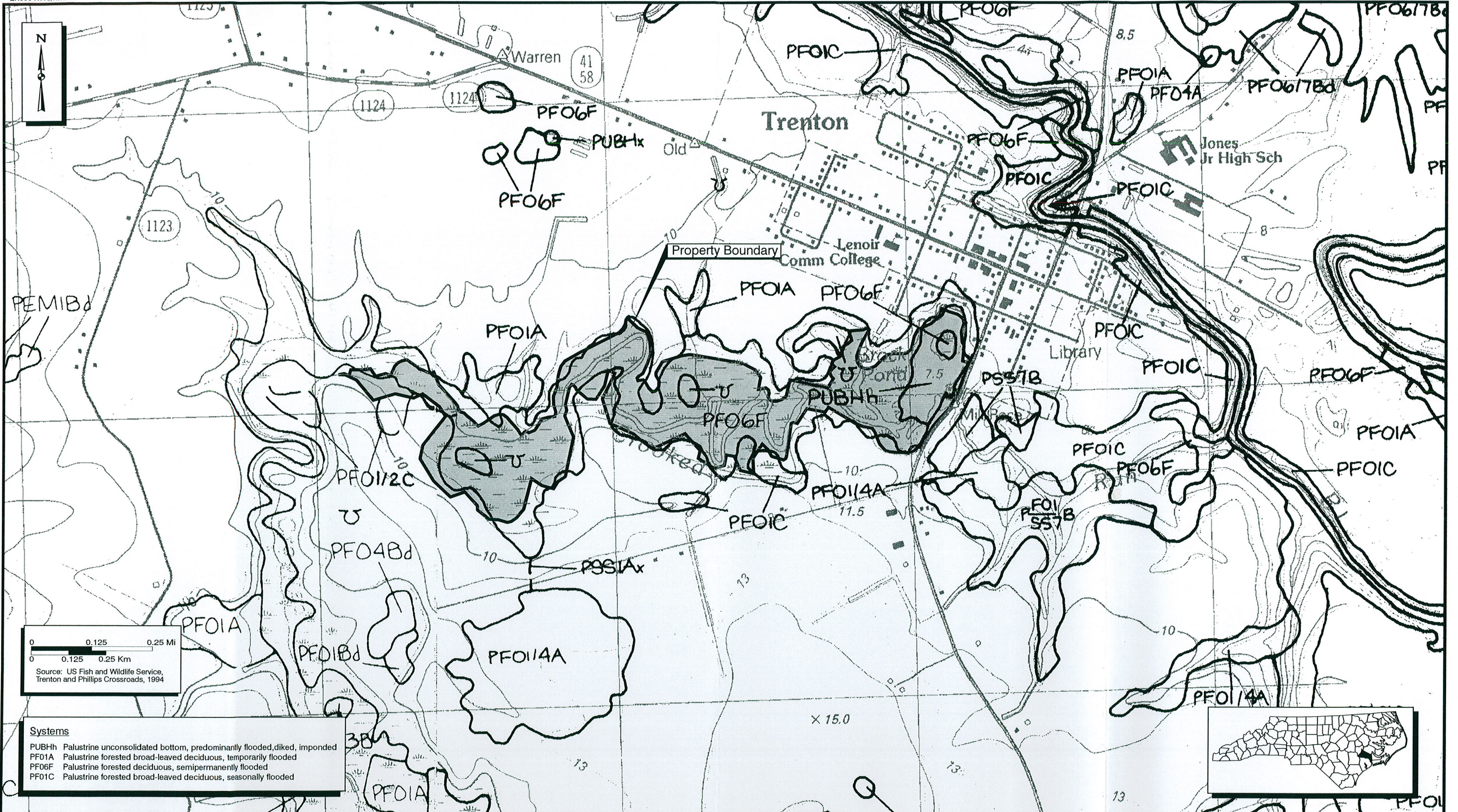
Soil Map Units

Hydric	
Mk	Muckalee loam
Ra	Rains fine sandy loam
Non-Hydric with Hydric Inclusions	
MaC	Marvyn loamy sand, 6-15% slopes
AuB	Autryville loamy fine sand, 0-4% slopes
Non-Hydric	
Pa	Pactolus loamy fine sand



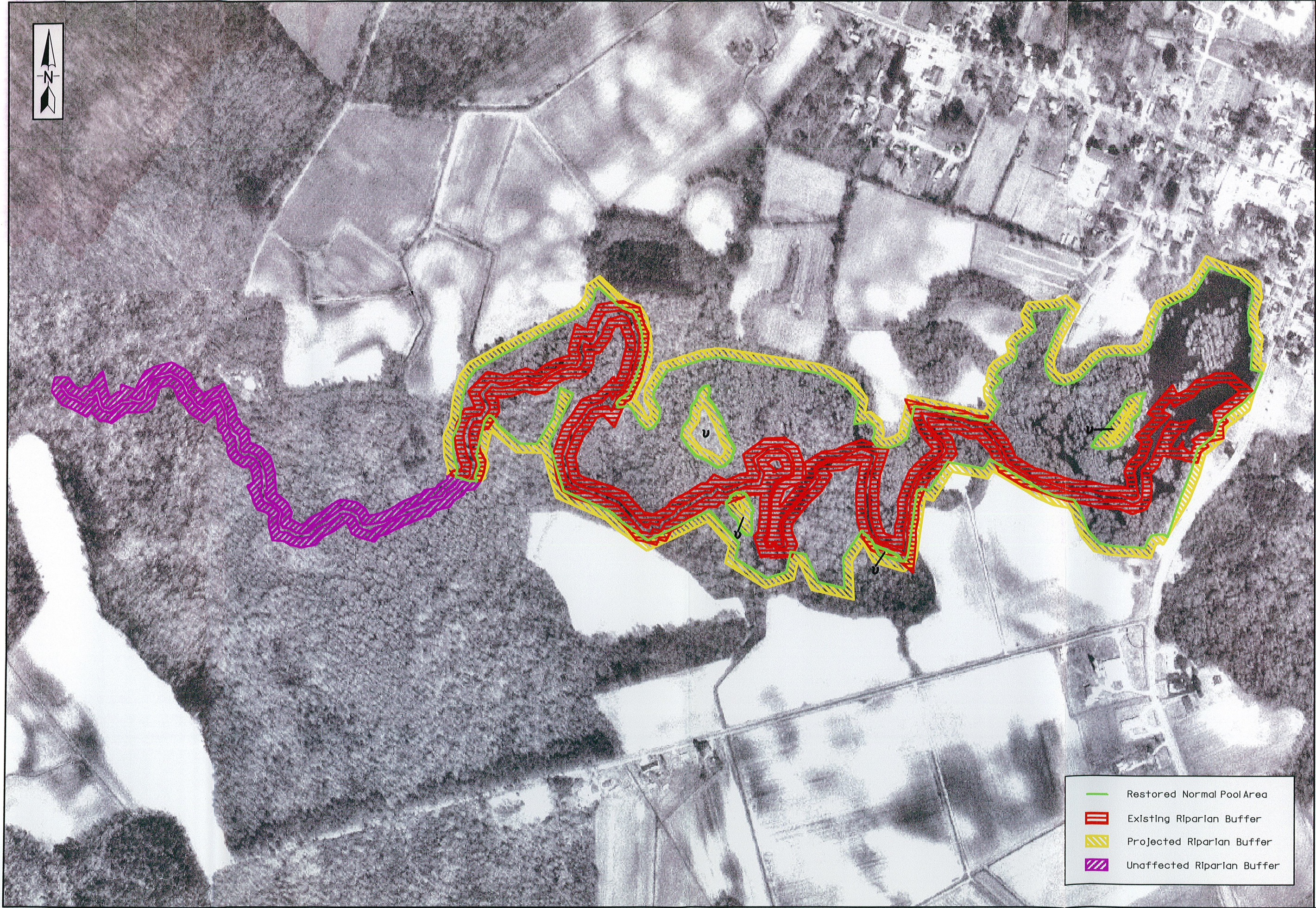
Soils Map
 Brock Mill Pond
 Trenton, Jones County, North Carolina





Figure:	4
Project:	ER00041.15
Date:	January 2003



National Wetlands Inventory Map
 Brock Mill Pond
 Trenton, Jones County, North Carolina

Figure: 6
 Project: ER00041.15
 Date: January 2003

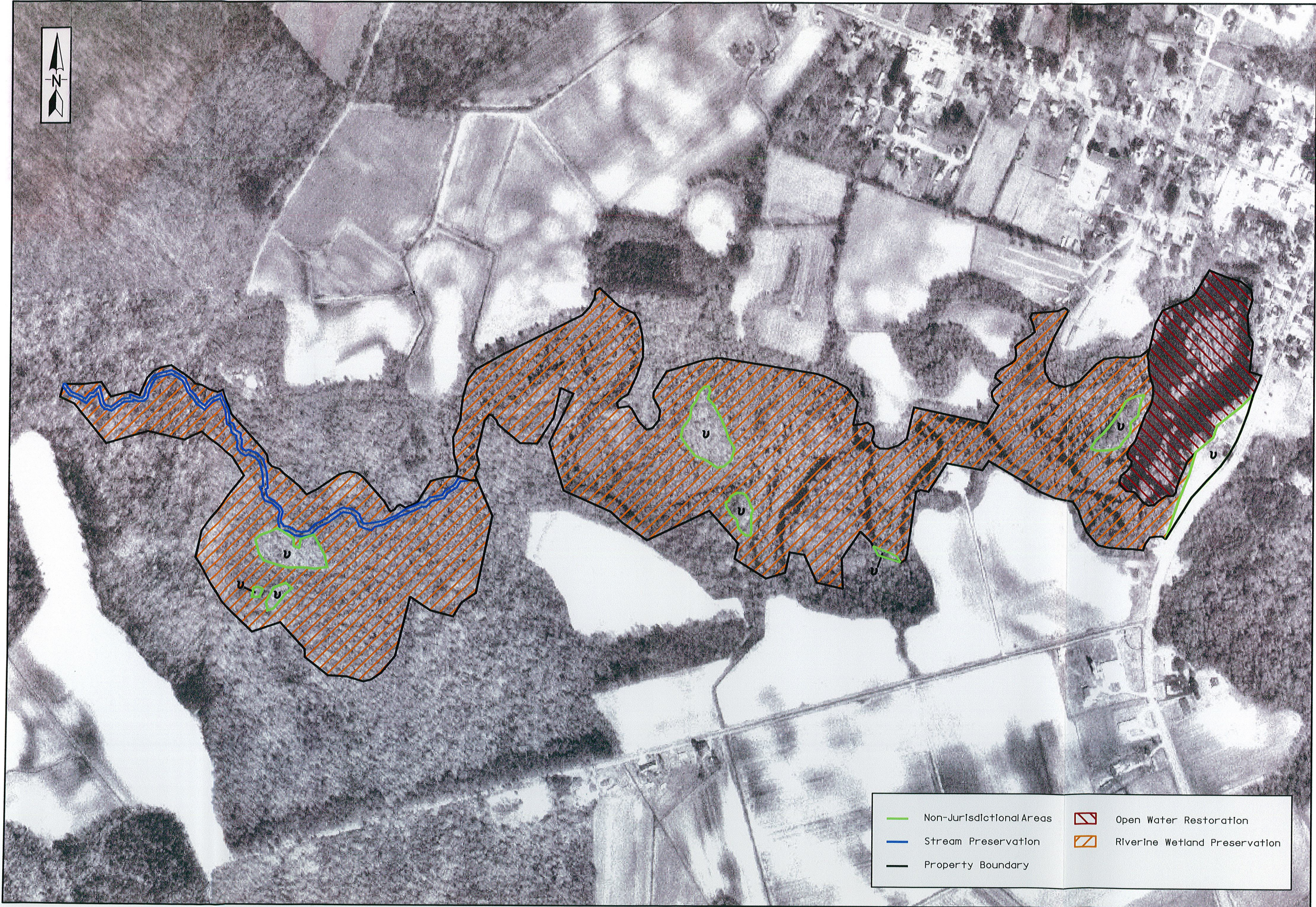




-  Restored Normal Pool Area
-  Existing Riparian Buffer
-  Projected Riparian Buffer
-  Unaffected Riparian Buffer



Existing and Predicted Buffers
 Brock MillPond
 Trenton, Jones County, North Carolina

Drawn By: AJS	Figure: 7
Checked By: KLM	Project: ER00041.15
Scale: 1"=500'	Date: January 2003



	Non-Jurisdictional Areas		Open Water Restoration
	Stream Preservation		Riverine Wetland Preservation
	Property Boundary		



Mitigation Areas
Brock Mill Pond
Trenton, Jones County, North Carolina

Drawn By: AUS	Figure: 8
Checked By: KLM	Project: ER0004I.15
Scale: 1"=500'	Date: January 2003