RESTORATION PLAN

UT TO ROCKY RIVER STREAM RESTORATION SITE

Cabarrus County, North Carolina
Contract No. 070708001

Prepared for:

NCDENR-Ecosystem Enhancement Program
2728 Capital Boulevard, Suite 1H 103
Raleigh, North Carolina 27604

September 9, 2008

Prepared by:

KO & ASSOCIATES, P.C.

Consulting Engineers

Ko & Associates, P.C.
5121 Kingdom Way, Suite 100
Raleigh, North Carolina 27607

919.851.6066
919.851.6846 (fax)

R. Kevin Williams, PE, PLS, CPESC, CPSWQ
Project Engineer/Manager

EXECUTIVE SUMMARY

The Site is located in northwest Cabarrus County approximately 6 miles southwest of the town of Kannapolis (Figure 1, Appendix 1). The center of the Site has a latitude and longitude of 035º 25' 32" N and 080º 44' 26'' W. The Site is situated in the northeast quadrant of the intersection of Harris Road and the Rocky River between Harris Middle School and Odell Elementary School, approximately 1.5 miles south of Highway 73.

The existing condition of the UT to Rocky River can be split into two categories. Much of the channel is influenced by backwater effects form beaver dams, sediment control fence, and an in-line BMP. The remaining portions of the Site are deeply eroded gullies caused by head cuts through the Site. The floodplain of the UT to Rocky River is dominated by low lying brush and shrubs indicative of early successional regrowth. A portion of the floodplain in the upper third of the Site contains a mature canopy with little to no underbrush.

This document details planned stream restoration and wetland enhancement activities at the Site. An 18.6-acre conservation easement will be placed on the Site to incorporate all project activities. The Site contains 8.75 acres of jurisdictional wetlands, an unnamed tributary (UT) to the Rocky River, associated floodplain, and upland slopes. The purpose of this project is to restore a stable pattern, dimension, and profile to the UT; revegetate Site stream banks, floodplains, wetlands, and upland slopes, and remove invasive vegetative species within the Site's boundaries.

The primary goals of this project focus on improving water quality, enhancing aquatic and terrestrial habitat within the UT to Rocky River watershed, establish wildlife corridors within the Site, enhance riparian wetlands adjacent to the UT to Rocky River, and provide an educational opportunity for students at grade schools adjacent to the Site.

These goals will be accomplished through the following objectives:

- Improve water quality and stabilize the UT to Rocky River by restoring a more natural pattern, profile, and dimension that will transport its sediment and flow without aggrading (as seen in areas effected by beavers and erosion control devices), or degrading (as seen in gully reaches on-site)
- Improve water quality by establishing a natural vegetative buffer adjacent to the UT to Rocky River that will filter runoff from adjacent development.
- Improve aquatic habitat by enhancing stream bed variability, providing shading/cover areas within the stream channel, and introducing woody debris in the form of rootwads, log vanes, and log sills.
- Enhance terrestrial habitat by removing existing invasive vegetative species and planting the buffer (floodplain) with native trees, shrubs, herbs and grasses.

- Create a wildlife corridor through the Site that will connect habitat areas along the Rocky River with habitat areas at the upstream end of the Site. The corridors will provide connectivity to a diversity of habitats including mature forest, early successional forest, stream-side forest, riparian wetlands, and uplands.
- Enhance wetlands by removing existing invasive species and planting native vegetative species.
- Provide an educational benefit to children who can utilize the pedestrian footpath crossing the floodplain, and can view the stream channel from adjacent terraces where schools are located.

Project restoration efforts will result in the following:

- Restore 2,703 linear feet of the UT to Rocky River.
- Enhance approximately 8.7 acres of riverine wetlands.
- Impact approximately 1.05 acres of existing wetlands during construction activities.
- Plant approximately 15.9 acres of floodplain, stream bank, upland slopes, and riverine wetlands and supplement approximately 1.2 acres of existing forested floodplain, stream bank, upland slopes, and riverine wetlands with native vegetative species.

The Upper Rocky River/Clarke Creek Local Watershed Plan was completed by EEP in 2004. The primary goals identified by the Watershed Plan include 1.) Engage and Educate the Public and Government, 2.) Implement Land Use Planning, 3.) Enhance Recreation and Open Space Preservation, 4.)Improve Water Quality, 5.) Restore Physical Habitat, 6.) Identify Potential Funding Sources, and 7.) Follow-up/Implement for the Long Term.

This project will engage and educate the public and government by restoring a stream and floodplain ecosystem adjacent to two schools that will utilize the site for educational purposes. The project enhances recreation and open space preservation by placing lands on and along a walking trail into a permanent conservation easement that follows the UT to Rocky River's valley. The overall Site helps improve water quality by reducing sedimentation in the UT to Rocky River and the Rocky River and planting a vegetated riparian buffer that filter nutrients form adjacent developments. The project will restore and enhance physical habitat for both aquatic and terrestrial species by planting native vegetation and restoring stream bed variability to the UT to Rocky River.

This document represents a detailed restoration plan summarizing activities proposed for the Site. The plan includes 1) descriptions of existing conditions; 2) reference stream and forest studies; 3) restoration plans; and 4) monitoring and success criteria. Upon approval of this plan by the EEP, engineering construction plans will be prepared and activities implemented as outlined. Proposed restoration activities may be modified during the design stage to address constraints such as access issues, sediment-erosion control measures, drainage needs (floodway constraints), or other design considerations.

TABLE OF CONTENTS

TABLES

APPENDICES

FIGURES

SHEETS

1.0 PROJECT SITE IDENTIFICATION AND LOCATION

The Site is located in northwest Cabarrus County approximately 6 miles southwest of the town of Kannapolis (Figure 1, Appendix 1). The center of the Site has a latitude and longitude of 035º 25' 32" N and 080º 44' 26'' W. The Site is situated in the northeast quadrant of the intersection of Harris Road and the Rocky River between Harris Middle School and Odell Elementary School, approximately 1.5 miles from Highway 73.

This document details planned stream and wetland restoration activities at the Site. An 18.6-acre conservation easement will be placed on the Site to incorporate all restoration activities. The Site contains 8.7 acres of jurisdictional wetlands, an unnamed tributary (UT) to the Rocky River, associated floodplain, and upland slopes. The purpose of this project is to restore a stable pattern, dimension, and profile to the UT; and revegetate Site streams, floodplains, wetlands, and upland slopes.

There are approximately 2,350 linear feet of the UT to Rocky River flowing on-site. The designed channel is expected to restore 2,703 linear feet of the UT to Rocky River. Table 1 outlines the Site restoration structures and objectives.

Table 1. Site Restoration Structures and Objectives
Project ID No. 070708001 (UT to Rocky River Stream Restoration Site)

Restoration Segment/ Reach ID	Station Range	Restoration Type	Existing Linear ft/ac	Design Linear ft/ac	Comment
UT to Rocky River	10+00 – 34+50	PI	2,020	2,450	Restored stream will reconnect bankfull with historic floodplain.
UT to Rocky River	34+50 – 37+03	PII	330	253	Restored stream will have a bankfull bench cut at the bankfull elevation as the UT to Rocky River drops invert elevation down to the Rocky River invert elevation.
Wetland	-	Enhancement	8.7	8.7	Invasive species will be eradicated and replanted with native vegetative species.

1.1 Directions to Project Site

Directions to the Site are as follows:

- Take Interstate 85 to Exit 55 (NC 73 West)
- Travel west on NC 73 for approximately 3.9 miles
- Take a left on Odell School Road and travel for 0.5 miles.
- Take a right onto Harris Road and travel approximately 0.8 mile following signs to Harris Middle School
- Turn right onto Moss Farm Street. The UT to Rocky River flows southwest under Moss Farm Street in approximately 0.18 miles

1.2 USGS Hydrologic Unit Code and NCDWQ River Basin Designation

The Site is located in Cabarrus County, North Carolina within United States Geological Survey (USGS) Hydrologic Unit (HU) and **Targeted Local Watershed 03040105010010** (North Carolina Division of Water Quality [NCDWQ] Subbasin 03-07-11) of the Yadkin-Pee Dee River Basin and will service the USGS 8-digit Cataloging Unit (CU) 03040105 (USGS 1974, NCEEP 2007).

The UT to Rocky River within the Site appears as an intermittent stream on the USGS 7.5-minute topographic quadrangle (Kannapolis, North Carolina); however, field observations indicate that the stream is perennial. In addition, a NCDWQ stream data form was completed for the UT to Rocky River, which confirms a perennial flow regime (NCDWQ form score of 41 - see Appendix 5).

2.0 WATERSHED CHARACTERIZATION

2.1 Drainage Area

The UT to Rocky River's contributing drainage area at the upstream most end of the Site is 0.64 square miles (410 acres). The UT to Rocky River's contributing drainage area at the downstream most end (at confluence with Rocky River) of the project is 0.77 square miles (493 acres) (Figure 2, Appendix 1 and Table 2). Onsite elevations range from approximately 610-640 feet National Geodetic Vertical Datum (NGVD) (Kannapolis, North Carolina USGS 7.5-minute topographic quadrangle).

Table 2. Site Drainage Areas
Project ID No. 070708001 (UT to Rocky River Stream Restoration Site)

Reach	Drainage Area	
	Acres	Square Mile(s)
UT to Rocky River (at upstream most end of Site)	410	0.64
UT to Rocky River (at downstream most end of Site)	493	0.77

2.2 Surface Water Classification/Water Quality

The Rocky River and its tributaries have been assigned Stream Index Number 13-17, a Best Usage Classification of **C**, and are fully supporting their intended uses (NCDWQ 2008b). Class C waters are suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner.

Site streams are included in the NCDWQ draft 2008 and final 2006 Section 303(d) lists (NCDWQ 2007, 2008a) of impaired streams in the state for increased turbidity resulting from urban runoff and stormwater, fecal coliform levels, and impaired biological integrity.

2.3 Physiography, Geology, and Soils

The Site is located within the Piedmont of North Carolina in the Southern Outer Piedmont Ecoregion. This ecoregion is characterized by dissected irregular plains, some low rounded hills and ridges, and low to moderate gradient streams with mostly boulder and cobble substrates (Griffith 2002). The Site is located in an area of Cabarrus County that consists of clayey and loamy subsoils formed in residuum from mixed acidic and basic igneous and metamorphic rock. The Chewacla and Wehadkee soils formed in recent alluvium and consists of transported parent material that has been changed very little by soil-forming processes (USDA 1988). Soils within the Site are depicted in Figure 3 (Appendix 1) and described in the table below (USDA 1988).

Table 3. USDA Mapping Units within the Site
Project ID No. 070708001 (UT to Rocky River Stream Restoration Site)

Soil Series	Symbol	Hydric Status*	Family	Description
Chewacla sandy loam	Ch	Class B	*Fluvaquentic Dystrochrepts*	This series consists of frequently flooded, nearly level, somewhat poorly drained, moderately permeable soils on broad plains and flat floodplains along the major streams and long, narrow, and flat floodplains along minor creeks and drainage ways. The seasonal high water table generally occurs at a depth of 0.5-1.5 feet.
Enon sandy loam	EnD	-	*Ultic Hapludalfs*	This series consists of well-drained, slowly permeable soils on slightly undulating uplands and side slopes.
Wehadkee loam	We	Class A	*Typic Fluvaquents*	This series consists of frequently flooded, poorly drained, moderately permeable, nearly level soils on narrow floodplains along major creeks and streams. Depth to the seasonal high water table is at or near the surface during wet periods.

* Class A = hydric soils; Class B = nonhydric soils, which may contain hydric soil inclusions (USDA 2008)

2.4 Historical Land Use and Development Trends

Until recently, the Site watershed was characterized primarily by agricultural land and pine plantation/forested land. However, high density residential housing, including two schools adjacent to the Site, has been and is continuing to be constructed within the majority of the watershed. (Figure 2, Appendix 1 and Table 4). It is anticipated that land uses will continue to trend towards residential and business development in the years to come.

Table 4. Land Use of Watershed
Project ID No. 070708001 (UT to Rocky River Stream Restoration Site)

Land Use	Acres	Percentage
Pine Plantation/Forest Land	74	15
Residential/Commercial Development	419	85
Total	**493**	**100**

2.5 Protected Species

Species with a Federal classification of Endangered or Threatened are protected under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). The term "Endangered species" is defined as "any species which is in danger of extinction throughout all or a significant portion of its range," and the term "Threatened species" is defined as "any species which is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C. 1532).

Based on the most recently updated county-by-county database of federally listed species in North Carolina as posted by the USFWS at http://nc-es.fws.gov/es/countyfr.html, two federally protected species are listed for Cabarrus County. The following table lists the federally protected species and indicates if potential habitat exists within the Site for each. A species description and biological conclusion for each follow.

Table 5. Federally Protected Species for Cabarrus County
Project ID No. 070708001 (UT to Rocky River Stream Restoration Site)

Common Name	Scientific Name	Status*	Habitat Present Within Site	Biological Conclusion
Invertebrates				
Carolina heelsplitter	*Lasmigona decorata*	Endangered	No	No Effect
Vascular Plants				
Schweinitz's sunflower	*Helianthus schweinitzii*	Endangered	Yes	Unresolved

*Endangered = a taxon "in danger of extinction throughout all or a significant portion of its range"

Lasmigona decorata (Carolina heelsplitter) **Endangered**
Animal Family: Unionidae
Date Listed: June 13, 1993

The Carolina heelsplitter was once fairly widely distributed in the Catawba and Pee Dee river basins in North Carolina and Pee Dee and Savannah river basins in South Carolina. There are only six known remaining populations of this species; two in North Carolina and four in South Carolina. The listing status for this species in Cabarrus County is "historic" and has not been seen in the County since the mid 1800's.

This mussel is usually found in a variety of substrates usually near stable, well-shaded stream banks. The stability of the stream banks appears to be very important to this species and no fish host has been identified.

The Carolina heelsplitter is a medium-sized mussel that has an ovate, trapezoid-shaped shell. The shell is yellowish, greenish brown to dark brown. Younger specimens have greenish brown

or black rays. The nacre is pearly white to bluish-white, grading to orange in the area of the umbo. The lateral teeth are well developed but thin and rather delicate.

Biological Conclusion: **NO EFFECT**

Potential habitat for the Carolina heelsplitter does not occur within the Site due to the disturbed nature of Site streams and the lack of stream shading. In addition, the listing for Carolina hellsplitter is a "historic" record and this species has not been documented in Cabarrus County since the mid 1800's. No known occurrences are documented by the North Carolina Natural Heritage Program (NCNHP) within or near the Site.

Helianthus schweinitzii (Schweinitz's sunflower) **Endangered**
Plant Family: Asteraceae
Federally Listed: June 6, 1991

This sunflower is found in the piedmont of North and South Carolina with 13 known populations occurring in North Carolina.

Schweinitz's sunflower is a rhizomatous perennial herb with one to several fuzzy purple stems. It grows to 3 to 6 feet in height from a cluster of carrot-like tubrous roots. Leaves are lance-shaped, usually opposite, approximately 2 to 7 inches in length, and 0.4 to 0.8 inches in width. The leaves are rough and resin-dotted on the surface with a felt-like feel on the underside. Flowers are yellow composites and fruits are small and dark brown. Flowering and fruiting occur from mid-September to frost. Based on its similar morphology to *H. laevigatus* and *H. microcephalus* it is difficult to positively identify this species prior to flowering.

Schweinitz's sunflower grows best in full sunlight or partial shade in clearings and along the edges of upland woods, thickets, and pastures. It is also found along roadsides, powerline clearings, old pastures, and woodland openings. Common soils that this species is found in include moist to dryish clays, clay-loams, or sandy clay-loams, often with high gravel content. Natural fires and large herbivores are considered to be historically important in maintaining open habitat for these sunflowers. Today, disturbances such as mowing, controlled burning, and logging help maintain its open habitat.

Biological Conclusion: **NO EFFECT**

Habitat for Schweinitz's sunflower is present within the project in the form of maintained-disturbed land. Plant-by-plant surveys for this species were conducted on September 5, 2008, during the optimal survey window. No Schweinitz's sunflower plants were identified during the surveys. No known occurrences are documented by the NCNHP within or near the Site.

No designated critical habitat is documented to occur within Cabarrus County.

2.6 Cultural Resources

Pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for compliance with Section 106 (36 CFR Part 800) comments were received for the Site from the North Carolina State Historic Preservation Office (NCSHPO). No documented archaeological sites or structures of historical or architectural importance occur within the Site. See the approved Categorical Exclusion document for more information concerning cultural resources.

2.7 Potential Constraints

The presence of conditions or characteristics that have the potential to hinder restoration activities within the Site was evaluated. The evaluation focused primarily on the presence of hazardous materials, utilities and restrictive easements, rare/threatened/endangered species or critical habitats, and the potential for hydrologic trespass. Existing information regarding constraints was acquired and reviewed. In addition, any Site conditions that have the potential to restrict the restoration design and implementation were documented during the field investigation.

The primary design constraint within the Site includes a sewer easement that runs parallel to the UT to Rocky River's valley through the majority of the Site, but also cuts perpendicular across the valley approximately one third of the way downstream of the upstream end of the Site.

Other constraints that were analyzed are the presence of beavers, an overhead utility line, several outfalls from runoff of adjacent schools, existing mature trees, and a footpath and bridge crossing the floodplain.

2.7.1 Property Ownership and Boundary

The large majority of the Site is contained in one parcel owned by Cabarrus County. However, it appears that there are two small pieces of land owned by Ambassador Development NC, LLC, and Bobbie Cannon Motley, respectively along the banks of Rocky River. A formal property boundary survey has not been completed at this point, but all indications are that the two small pieces of property not owned by Cabarrus County run along the top of bank of Rocky River.

2.7.2 Project Access

The Site is bounded to the north by Moss Farm Street, Harris Road to the East, and Rocky River to the South. There are two potential access points to the Site. The first access point is located off of Moss Farm Street along the eastern boundary of the UT to Rocky River. A second potential access point is located off of Harris Road near the downstream end of the Site. A transportation plan, including the location of access routes and staging areas will be designed to minimize Site disturbance during construction. The number of transportation access points into the floodplain will be maximized to avoid traversing long distances through the Site's interior.

2.7.3 Utilities

A sewer line (including its easement) runs parallel to the UT to Rocky River's valley through the majority of the Site, but also cuts perpendicular across the valley approximately one third of the way downstream of the upstream end of the Site. An overhead utility line is located along the western side of the valley near the upstream end of the Site.

2.7.4 FEMA/Hydrologic Trespass

The HEC-RAS analysis indicates that the restoration design will result in a no-rise in the 100-year floodplain water surface elevations outside of the project area. The results of this analysis confirm that hydrologic trespass to adjacent properties will not occur (Appendix 12).

3.0 PROJECT SITE STREAMS (EXISTING CONDITIONS)

3.1 Channel Classification

Stream geometry and substrate data have been evaluated to classify existing stream conditions, utilizing fluvial geomorphic principles (Rosgen 1996). Appendix 2 provides a summary of measured stream geometry attributes for the UT to Rocky River's existing conditions, proposed conditions and reference streams. Data collected during a Rosgen Level II survey were used to classify the UT to Rocky River as a degraded C5/D5 type channel through portions of the Site and a G5 type channel through other portions of the Site.

It should be noted that there are three primary influences on the Site that are controlling the stability and in turn the channel classification of the UT to Rocky River. First, the UT to Rocky River was channelized and ditched prior to August 4th, 2000 (see "Waters of the U.S. Survey/Delineation Verification" completed by Craig Wyant, in Appendix 7 for photos of the channel shortly after the landowner had ditched and channelized the UT to Rocky River). This action degraded the channel to the point that no bankfull indicators would have been present after ditching was completed. After reviewing cross-sections obtained on-site and reviewing photos taken of the channel in 2000 after it had been channelized and ditched, it is believed that in some areas the channel was relocated to sections of the valley that are higher than the low point of the valley. The action of ditching and channelizing the UT to Rocky River greatly influenced the ability to accurately define the bankfull stage of the channel within the site.

The second influence is that of beavers. It is apparent through active and relic beaver dams and beaver lodges, and also numerous trees and saplings that have been felled, that beavers are active within the Site. The dams, both active and relic, have blocked numerous sections of the channel causing many reaches of the Site to be influenced by ponding upstream of the dams. The ponding has silted in the channel in many areas and forced lower than bankfull flows out onto the floodplain.

The third influence is various remnant sediment and erosion control devices left from the construction of two schools adjacent to the valley of the UT to Rocky River. On-site investigations revealed a large sediment basin in-line with the channel near the downstream end of the site, and various sections of the channel that contained a silt fence traversing the channel. The sediment basin and silt fence are essentially acting as dams that are ponding water within the channel and silting the channel in.

C5 → G5 (Beaver and Sediment and Erosion Control Influence Reaches)

The UT to Rocky River can be classified as a C5 being forced to transition towards a D5 type channel through many portions of the Site. On-going beaver activity, and sediment and erosion control practices employed during the construction of adjacent schools are the primary culprits in the evolution of the channel's stream type through these reaches.

C5 type channels are typically characterized by high entrenchment ratios (> 2.2), moderately high width/depth ratios (> 12), and a moderate to high sinuosity (> 1.2). D type channels are characterized by very high width/depth ratios (>40, due to braiding), and a very low sinuosity. The 5 descriptor indicates the channel is dominated by sand particles.

If the channel were not influenced by beavers or man it would probably be a low width/depth ratio C5 or E5 type channel. However, there are numerous active and historic beaver dams through the site that are affecting the channels capacity to transport its flow and sediment. Additionally, when two schools were built on hill tops overlooking the Site, the building contractor placed a sediment basin and silt fences in the channel, which have also blocked flow. These impediments have silted in many portions of the channel and caused flows that are much less than bankfull to overtop the banks and spread through the floodplain. There is evidence that small side channels in the floodplain are forming where flow is concentrating. As previously stated these channels are collecting less than bankfull flows which indicate that portions of the Site are evolving into a D type (braided) channel.

G5/B5 (Gull Reaches)

The UT to Rocky River can be classified as a G5 type channel through many reaches on-site. G type channels are typically characterized by low entrenchment ratios (< 1.4), low width/depth ratios (< 12), and a low sinuosity (< 1.2).

There are two primary influences that are creating G type reaches within the Site. The first influence can be directly linked to the channelization and ditching of the UT to Rocky River prior to 2000. It is assumed that prior to channelization and ditching the historic channel was sinuous which helped to lower the stream slope considerably compared with the valley slope. After the channel was ditched and channelized the slope of the stream would have increased substantially which also would have dramatically increased the stream power and shear stress during high flows. This would provide the opportunity for the channel banks to degrade and the invert to scour, which could create a head cut through the Site.

The second influence that is creating gullies is the beaver dams. The dams create a backwater effect upstream of the dam, however there is typically a dramatic drop in elevation from the top of the dam to the invert of the channel downstream of the dam, which creates a massive amount of hydraulic head. The energy exerted on the channel downstream of the dam can scour the invert, which can create a gully or G type channel as previously explained.

Sediment

The channel classifies as being a sand bed stream. It was thought that the channel contained a sand substrate because development within the watershed upstream of the Site was funneling large amounts of small particles downstream. However, a study of the UT to Rocky River revealed that the channel substrate is sand dominated up through the watershed. Investigations were also conducted on the Rocky River, trunk channels to the Rocky River, and numerous unnamed tributaries to determine the substrate of channels within this area of the Rocky River Watershed. These investigations revealed that, at a minimum, this portion of the Rocky River Watershed is dominated by medium to large sand particles in the substrate. Conversations with landowners within this portion of the Rocky River Watershed revealed that the channels have

always been sandy and the residents that were spoken to could not remember ever seeing gravel in the substrate.

3.2 Discharge

The UT to Rocky River has a bankfull discharge of approximately 15.7 cfs through the studied reaches, and a bankfull discharge of approximately 18 cfs at its downstream confluence with the Rocky River.

3.3 Channel Morphology:

Morphological characteristics of the UT to Rocky River were collected during a Rosgen Level II survey. The Morphological Characteristics of UT to Rocky River and Reference table (Appendix 2) includes a summary of existing dimension, profile, and pattern data for the Site.

3.4 Channel Stability Assessment:

A visual assessment accompanied by a morphological assessment using data collected during a Rosgen Level II survey was used to determine channel stability. These data, which can be found in Appendix 2 (Morphological Characteristics of UT to Rocky River and Reference), Appendix 3 (Project Site Photographs), and Appendix 5 (Project Site NCDWQ Stream Classification Forms), confirms that the UT to Rocky River flowing through the Site does not display stable channel attributes

The stability analysis should be analyzed by separating the two distinct stream types through the site. The C5/G5 (Beaver and Sediment and Erosion Control Influence Reaches) reaches are characterized by 1) sediment buildup (aggrading conditions) inside of the bankfull channel, 2) a raised invert due to aggradation from beaver dams, the sediment basin, silt fence, and channelization that allows less than bankfull flows to access the floodplain causing small braded channels to form within the floodplain, 3) disturbance of flow dynamics by channel blockages which has impeded natural variation in pool and riffle lengths and depths, and 4) a Low Bank Erosion Hazard Index (BEHI) (scored a 16.4, Appendix 6).

The G5/B5 (Gull Reaches) are characterized by 1) mass wasting of channel banks, 2) incision of the bankfull elevation below exiting ground and the rooting depth of trees (as evidenced by Bank Height Ratios of 2.12), 3) continued scouring of substrate, 4) scouring of riffles has impeded the natural variation of their lengths and depths, 5) a High BEHI (scored a 36, Appendix 6).

3.5 Bankfull Verification:

Bankfull discharge within the studied reach of the UT to Rocky River is estimated to be approximately 15.7 cfs (watershed area at this point is approximately 0.64 square miles). Bankfull discharge was estimated by two methods. The first method used to estimate the discharge included identifying a stream reach on-site where bankfull indicators could be identified. A cross-section was taken through a riffle where bankfull indicators were identified and a longitudinal profile of the water surface was taken through the reach. A Manning's Roughness Coefficient was estimated for the reach. An estimated velocity was calculated using

Manning's Equation solving for flow velocity using data obtained from the cross-section, the slope of the water surface profile, and Manning's Roughness Coefficient. The calculated velocity was multiplied by the riffle cross-sectional area to estimate the discharge at the bankfull flow. Additionally, a reach of the UT to Rocky River was studied approximately 600' upstream of the Site to determine a discharge. This reach's discharge was estimated to be 12.9 cfs (drainage area is 0.6 square miles), which matches closely with the studied reach on-site.

The second method included comparing on-site data with existing hydraulic curves from Bankfull Hydraulic Geometry Relationships for North Carolina Streams (Harman, W. H. et al., 1999) (Piedmont Regional Curve). The Piedmont regional curves were deemed invalid for streams within the Rocky River Watershed near the Site after reviewing data obtained on-site, upstream of the Site and from other streams in the Rocky River Watershed near the Site. Therefore, a regional hydrologic geometry rating curve of the Rocky River Basin was created by Ko using reference streams in the vicinity of the Site. Data was collected from seven reference streams. This data included analyzing channel substrate, identifying bankfull, collecting cross-sectional data, and performing a longitudinal profile to obtain the bankfull water surface slope. This information was analyzed and compiled together to compare bankfull discharge, cross-sectional area, mean depth, and width. Information regarding this curve is presented in Appendix 10. The regional hydrologic geometry rating curves created for the Rocky River Basin correlated closely to the discharge estimated on-site. The curve estimated discharge for a 0.64 square mile watershed to be 17.9 cfs, which matches closely to the estimated discharge from on-site..

3.6 Vegetation:

The majority of the Site's floodplain has been timbered and is characterized by a disturbed scrub/shrub community containing blackberry (*Rubus argutus*), soft rush (*Juncus effuses*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), multiflora rose (*Rosa multiflora*), dog fennel (*Eupatorium capillifolium*), elm (*Ulmus* sp.), and broomsedge (*Andropogon* sp.) with cattail (*Typha* sp.) and crimsoneyed rosemallow (*Hibiscus moscheutos*) within ponded areas of the floodplain. Existing vegetation along Site streams is disturbed bordered by a light riparian fringe of black willow (*Salix nigra*), red maple (*Acer rubrum*), and tag alder (*Alnus serrulata*). Beaver activity is abundant within the Site and appears to have commenced recently as indicated by a lack of mature tree death.

The extreme upstream/northern portion of the Site is characterized by a small patch of mature forest containing willow oak (*Quercus phellos*), red maple, sycamore (*Platanus occidentalis*), winged elm (*Ulmus alata*), eastern red cedar (*Juniperus virginiana*), microstegium (*Microstegium vimineum*), and soft rush with smooth sumac (*Rhus copallina*) along the fringes of mature forest and disturbed, upland scrub/shrub. In addition, a thin strip of riparian vegetation occurs adjacent to the Rocky River along the southwestern most Site boundary and is characterized by black walnut (*Juglans nigra*), red maple, eastern red cedar, black cherry (*Prunus serotina*), black willow, sycamore, multiflora rose, and greenbrier (*Smilax rotundifolia*).

4.0 REFERENCE STREAMS

A reference reach search was completed to identify a stable, C5/E5 type stream within the UT to Rocky River Watershed in the vicinity of the Site. The search did not reveal a suitable reference. The UT to Rocky River is an atypical stream when compared with the majority of streams within the Piedmont physiographic region of North Carolina because it is naturally a sand bed system rather than gravel/coble bed stream.

Three sand bed streams, the UT to Ledge Creek, UT to Wildcat Branch, and Mill Creek were identified and used as reference reaches for the design of the UT to Rocky River. The three streams are within distinct physiographic provinces within North Carolina, including the Piedmont, Sand Hills, and Coastal Plain. These references were chosen for specific reasons. The UT to Ledge Creek, located within the Neuse River Basin north of Falls Lake, was used because it is a stable sand bed stream located within the Piedmont physiographic province. The system is stable however its stream and valley slopes are somewhat lower when compared with the UT to Rocky River. The UT to Wildcat Branch, located within the Lumber River Basin near the Howellsville Township, and Mill Creek, located within the Cape Fear River Basin near Southern Pines, are both outside of the Piedmont (Coastal Plain and Sand Hills, respectively), however, both are very stable sand bed streams that display stream and valley slopes similar to the UT to Rocky River.

Vegetative data collected from these reference reaches are not used to derive the planting plan because they are not within the same general location of the Site. Reference vegetative data are found in Section 6.0 Reference Forest Ecosystem.

4.1 Channel Classification

The UT to Ledge Creek is a low width/depth ratio (11.7) C5 type channel located in the Piedmont. The UT to Wildcat Branch is a low width/depth ratio (8) E5 type channel located in the Coastal Plain. Mill Creek is a low width/depth ratio (6.1) type channel located in the Sand Hills.

4.2 Discharge

The UT to Ledge Creek has a discharge of 22.3 cfs. The UT to Wildcat Branch has a discharge of 8.5 cfs. Mill Creek has a discharge of 30.6 cfs.

4.3 UT to Ledge Creek

4.3.1 Watershed Characterization

Land use within the UT to Ledge Creek's watershed can be characterized as rural in nature with the majority of lands historically being utilized for agriculture or woodlands. However, there is strong evidence in the form of industrial buildings, subdivisions, and other forms of impervious areas to suggest that the watershed is experiencing a shift from rural to a more urban land use.

4.3.2 Bankfull Verification

Onsite data was compared with the Piedmont Regional Curve to verify the bankfull discharge. The bankfull discharge estimated for the UT to Ledge Creek did not fall within a range of confidence when compared with the Piedmont Regional Curve. A regional curve, which will be referred to as the Ko Curve, was completed for this area within the Triassic Basin. Data from the Ko Curve verifies the estimated bankfull discharge for the UT to Ledge Creek reference reach. The estimated bankfull discharge for the UT to Ledge Creek was calculated to be 22.3 cubic feet per second. The Ko Curve estimates bankfull to be 35.2 cubic feet per second for the UT to Ledge Creek, which closely compares to data obtained from onsite.

4.3.3 Vegetation

The UT to Ledge creek is surrounded by a mature (50 years of older) vegetated floodplain. Dominant vegetation within the floodplain includes river birch (*Betula nigra*), sweetgum, slippery elm (*Ulmus rubra*), winged elm, red maple, box elder (*Acer negundo*), and yellow poplar (*Liriodendron tulipifera*).

4.4 UT to Wildcat Branch

4.4.1 Watershed Characterization

The UT to Wildcat Branch watershed is dominated (approximately 60 percent) by mature forests. Deforestation of the mature forests is occurring, but most deforested areas have been planted back into pine stands. The remaining portion of the watershed's land use is comprised primarily of agricultural practices (approximately 40 percent).

4.4.2 Bankfull Verification

On-site data was compared with Hydraulic Geometry Relationships for Rural North Carolina Coastal Plain Streams (Coastal Plain Regional Curve) (Doll et al. 2006) to verify the bankfull discharge. The bankfull discharge on UT to Wildcat Branch at the point of the survey is estimated to be 8.2 cfs. The regional curve estimates the bankfull discharge to be 9.2 cfs, which seems to verify the estimated bankfull discharge found on-site.

4.4.3 Vegetation

The UT to Wildcat Branch is surrounded by a mature (50 years or older) vegetated floodplain. The vegetated floodplain extends a minimum of 250 feet from both the left and right banks through the study area. Dominant vegetation within the floodplain includes giant cane (*Arundinaria gigantea*), red maple, sweet gum, red bay (*Persea borbonia*), sweet bay (*Magnolia virginiana*), Chinese privet (*Ligustrum sinense*), yellow poplar, greenbrier *(Smilax rotundifolia*), Amerian holly (*Ilex opaca*), cinnamon fern (*Osmunda cinnamomea*), doghobble (*Leucothoe fontanesiana*), and black gum (*Nyssa sylvatica*).

4.5 Mill Creek

4.5.1 Watershed Characterization

The Mill Creek watershed is largely dominated (approximately 80 percent) by mature forests. Some of the forests are experiencing impacts from harvesting of trees and minor residential development (approximately 10 percent). The remaining portion of the watershed's land use is comprised of agricultural practices (approximately 10 percent).

4.5.2 Bankfull Verification

On-site data was compared with the Coastal Plain Regional Curve to verify the bankfull discharge. The bankfull discharge on Mill Creek at the point of the survey is estimated to be 30.6 cfs. The regional curve estimates the bankfull discharge to be 18.1 cfs. The high end of the 95 percent confidence interval of the curve however, is 30 cfs, which would seem to verify the bankfull discharge for Mill Creek.

4.5.3 Vegetation

Mill Creek is surrounded by a mature (50 years or older) vegetated floodplain. The vegetated floodplain extends a minimum of 200 feet from both the left and right banks through the study area. Dominant vegetation within the flood plain includes giant cane, red maple, sweet gum, red bay (*Persea borbonia*), sweet bay, Chinese privet, yellow poplar, greenbrier, Amerian holly, cinnamon fern, and black gum.

4.6 Channel Morphology

Channel cross-sections and stream profiles were measured along the reference streams. Surveys included a plan form analysis, bed material evaluation, and buffer assessment. The reaches are transporting their sediment supply while maintaining their dimension, pattern, and profile. The table "Morphological Characteristics of UT to Rocky River and Reference" (Appendix 2) includes a summary of dimension, profile, and pattern data for each reference reach to assist with the establishment of reconstruction parameters.

All reference channels' streambed material is dominated by sand-sized particles.

4.7 Channel Stability Assessment

A visual assessment accompanied by a morphological assessment using data collected during a Rosgen Level II survey was used to determine channel stability. These data, which can be found in Appendix 2 (Morphological Tables), Appendix 8 (Reference Site Photographs) and Appendix 9 (Reference Site NCDWQ Stream Classification Forms), confirmed that the channels fell within acceptable ranges for a stable reference channel.

Major components for stability include determining if the channel is conveying its discharge and sediment load without aggrading or degrading. Evidence that a channel does not fit this criteria includes bank degradation, channel incision, channel widening, channel aggradation, massive amounts of sediment loading within and/or outside of the channel banks, channel armoring, and generally speaking no vegetation on the channel's banks.

5.0 SITE WETLANDS

5.1 Existing Jurisdictional Wetlands

Jurisdictional wetland limits are defined using criteria set forth in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). As stipulated in this manual, the presence of three clearly defined parameters (hydrophytic vegetation, hydric soils, and evidence of wetland hydrology) are required for a wetland jurisdictional determination.

Jurisdictional wetland limits were mapped in the field during March 2008. The Site contains 8.7 acres of wetlands. A Jurisdictional Determination was scheduled with the United States Army Corps of Engineers (USACE) for May 27, 2008 to verify the wetland boundaries. Due to scheduling issues the USACE was unable to meet in the field and has determined that a tearsheet will be will issued, (Appendix 11, Concurrence Letters)), as of August 26, 2008 the tearsheet has not been received. Jurisdictional wetlands have been timbered in the past and are characterized by a disturbed scrub/shrub community containing black berry, soft rush, red maple, sweetgum, multi flora rose, dog fennel, elm, and broomsedge with black willow and tag alder adjacent to the UT to Rocky River, and cattail and crimsoneyed rosemallow in ponded areas. Beaver activity is abundant within the Site and appears to have commenced recently as indicated by a lack of mature tree death.

Historically, onsite wetlands may have supported communities similar to a Piedmont Alluvial Forest (Schafale and Weakley 1990) and species contained within the reference forests. Piedmont Alluvial Forest communities typically occur on alluvial floodplains of smaller watersheds that are intermittently or seasonally flooded.

6.0 REFERENCE FOREST ECOSYSTEM

According to Mitigation Site Classification (MiST) guidelines (USEPA 1990), a Reference Forest Ecosystem (RFE) must be established for restoration sites. RFEs are forested areas on which to model restoration efforts of the restoration site in relation to soils and vegetation. RFEs should be ecologically stable climax communities and should be a representative model of the Site forested ecosystem as it may have existed prior to human disturbances. Quantitative data describing plant community composition and structure should be collected at the RFEs and subsequently applied as reference data in an attempt to emulate a natural climax community.

Two RFE areas located northeast of the Site were evaluated: UT to Crane Creek and UT to Reedy Creek. The RFEs support plant community and landform characteristics that restoration efforts will attempt to emulate. Circular plots, 0.1-acre in size were randomly established within the two RFEs with three plots at UT to Crane Creek and four plots at UT to Reedy Creek. Data collected within each plot include 1) tree species composition; 2) number of stems for each tree species; 3) diameter at breast height (DBH) for each tree species; and 4) a list of understory species. Data for the 0.1-acre plots were combined for each RFE and indicate importance values of dominant tree species calculated based on relative density, dominance, and frequency of tree species composition (Smith 1980). Hydrology, surface topography, and habitat features were also evaluated. Predominant species included swamp chestnut oak (*Quercus michauxii*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), and tulip poplar.

Table 6. Reference Forest Ecosystem (UT to Crane Creek)
Project ID No. 070708001 (UT to Rocky River Stream Restoration Site)

Tree Species	Number of Individuals *	Relative Density (%)	Frequency * (%)	Relative Frequency (%)	Basal Area * (ft^2/acre)	Relative Basal Area (%)	Importance Value
Box elder (*Acer negundo*)	3	7.9	67	8.7	2.3	5.9	0.07
Red maple (*Acer rubrum*)	3	7.9	67	8.7	4.2	10.6	0.09
Shagbark hickory (*Carya ovata*)	5	13.2	67	8.7	2.5	6.3	0.09
Mockernut hickory (*Carya alba/tomentosa*)	1	2.6	33	4.3	0.1	0.2	0.02
American beech (*Fagus grandifolia*)	1	2.6	33	4.3	2.0	5.2	0.04
White ash (*Fraxinus* americana)	1	2.6	33	4.3	1.3	3.3	0.03
Green ash (*Fraxinus pennsylvanica*)	6	15.8	100	13.0	3.5	8.8	0.13
Eastern red cedar (*Juniperus virginiana*)	1	2.6	33	4.3	0.4	0.9	0.03
Sweetgum (*Liquidambar styraciflua*)	1	2.6	33	4.3	0.1	0.3	0.02
Tulip poplar (*Liriodendron tulipifera*)	3	7.9	67	8.7	2.7	6.7	0.08
Black gum (*Nyssa sylvatica*)	1	2.6	33	4.3	0.1	0.2	0.02
Southern red oak (*Quercus falcata*)	1	2.6	33	4.3	2.9	7.3	0.05
Swamp chestnut oak (*Quercus michauxii*)	3	7.9	67	8.7	13.3	33.6	0.17
Willow oak (*Quercus phellos*)	2	5.3	33	4.3	2.3	5.8	0.05
American elm (*Ulmus americana*)	6	15.8	67	8.7	1.9	4.9	0.10
TOTALS	**38**	**100**	**767**	**100**	**165**	**100**	**1.00**

* Sum of three 0.1-acre plots

Table 7. Reference Forest Ecosystem (UT to Reedy Creek)
Project ID No. 070708001 (UT to Rocky River Stream Restoration Site)

Tree Species	Number of Individuals *	Relative Density (%)	Frequency * (%)	Relative Frequency (%)	Basal Area * (ft^2/acre)	Relative Basal Area (%)	Importance Value
Box elder (*Acer negundo*)	6	7.8	50	5.3	1.9	2.6	0.05
Red maple (*Acer rubrum*)	2	2.6	50	5.3	0.6	0.8	0.03
Ironwood (*Carpinus caroliniana*)	7	9.1	50	5.3	1.2	1.7	0.05
Shagbark hickory (*Carya ovata*)	2	2.6	50	5.3	5.4	7.3	0.05
Hackberry (*Celtis laevigata*)	6	7.8	50	5.3	3.1	4.2	0.06
American beech (*Fagus grandifolia*)	2	2.6	50	5.3	6.5	8.8	0.06
Green ash (*Fraxinus pennsylvanica*)	1	1.3	25	2.6	0.4	0.5	0.01
Black walnut (*Juglans nigra*)	4	5.2	75	7.9	5.2	7.0	0.07
Sweetgum (*Liquidambar styraciflua*)	7	9.1	75	7.9	6.6	8.9	0.09
Tulip poplar (*Liriodendron tulipifera*)	5	6.5	75	7.9	15.9	21.5	0.12
Red mulberry (*Morus rubra*)	8	10.4	75	7.9	4.0	5.4	0.08
Black gum (*Nyssa sylvatica*)	3	3.9	75	7.9	3.0	4.0	0.05
Sycamore (*Platanus occidentalis*)	2	2.6	25	2.6	6.5	8.8	0.05
White oak (*Quercus alba*)	2	2.6	25	2.6	1.7	2.2	0.02
Swamp chestnut oak (*Quercus michauxii*)	1	1.3	25	2.6	0.5	0.7	0.02
Willow oak (*Quercus phellos*)	1	1.3	25	2.6	1.6	2.2	0.02
Northern red oak (*Quercus rubra*)	7	9.1	50	5.3	7.2	9.8	0.08
American elm (*Ulmus americana*)	11	14.3	100	10.5	3.0	4.0	0.10
TOTALS	**77**	**100**	**950**	**100**	**74**	**100**	**1.00**

* Sum of four 0.1-acre plots

7.0 PROJECT SITE RESTORATION PLAN

7.1 Restoration Project Goals and Objectives

The primary goals of this project focus on improving water quality, enhancing aquatic and terrestrial habitat within the UT to Rocky River watershed, establish wildlife corridors within the Site, enhance riparian wetlands adjacent to the UT to Rocky River, and provide an educational opportunity for students at grade schools adjacent to the Site.

These goals will be accomplished through the following objectives:

- Improve water quality and stabilize the UT to Rocky River on-site by restoring a more natural pattern, profile, and dimension that will transport its sediment and flow without aggrading (as seen in areas effected by beavers and erosion control devices), or degrading (as seen in gully reaches on-site)
- Improve water quality by establishing a natural vegetative buffer adjacent to the UT to Rocky River that will filter runoff from adjacent development.
- Improve water quality and enhance semi-aquatic habitat by enhancing existing wetlands with native tree and shrub plantings.
- Improve aquatic habitat by enhancing stream bed variability, providing shading/cover areas within the stream channel, and introducing woody debris in the form of rootwads, log vanes, and log sills.
- Enhance terrestrial habitat by planting the adjacent buffer (floodplain) with native trees, shrubs, herbs and grasses.
- Create a wildlife corridor through the Site that will connect habitat areas along the Rocky River with habitat areas at the upstream end of the Site. The corridors will provide connectivity to a diversity of habitats including mature forest, early successional forest, stream-side forest, riparian wetlands, and uplands.
- Enhance terrestrial habitat by removing existing invasive vegetative species and planting the buffer (floodplain) with native trees, shrubs, herbs and grasses.
- Provide an educational benefit to children who can utilize the pedestrian footpath crossing the floodplain, and can view the stream channel from adjacent terraces where schools are located.

The proposed restoration plan, depicted on Sheets 2A through 2C (Appendix 1), is expected to produce a restored length of 2,703 linear feet of the UT to Rocky River. Additionally, 8.7 acres of riparian wetlands will be enhanced by eradicating invasive vegetative species and installing supplemental vegetation plantings. The remaining lands within the proposed easement will also be planted with native vegetation. All activities within the Site will be protected in perpetuity by an 18.6 acre permanent conservation easement.

7.1.1 Designed Channel Classification

The UT to Rocky River was designed using Natural Channel Design principals. Appendix 2 (Morphologic Tables) details channel classification and variables used to classify the design channel. The UT to Rocky River is designed as a low width/depth ratio (10) C5/E5 type stream. This channel classification is typical of low slope, sand bed streams that flow through broad alluvial valleys.

The UT to Rocky River will be constructed as a Priority I and Priority II restoration (Appendix 1, Sheets 3). Priority I restorations reconnect the bankfull discharge to the historic floodplain (existing ground). A floodplain bench is cut at the bankfull elevation for a Priority II restoration.

The UT to Rocky River will start as a Priority I restoration at the upstream end of the Site. The large majority of the channel (~ 2,450 linear feet) will be constructed as a Priority I restoration.

The UT to Rocky River will be constructed as a Priority II restoration in the downstream portion of the site (in the last ~ 304 linear feet). This section of the Site is restored as a Priority II restoration because the UT to Rocky River's channel invert has to drop through the floodplain to meet the existing invert of the Rocky River. The Rocky River's invert elevation is almost six feet lower than that of the floodplain that the UT to Rocky River is flowing through.

7.1.2 Stream Restoration Activities

Design Reasoning

As stated, the majority of the UT to Rocky River will be constructed as a Priority I restoration. The Priority I restoration will allow for the restored channel to meander through existing trees in the upstream portions of the Site without felling many existing trees. This also maximizes the amount of shading the channel will receive from existing mature vegetation, which should help to regulate water temperatures and add critical biomass to the stream from leaves, sticks, and nuts.

The location of the bankfull channel follows as closely as possible the natural low point of the valley through the Site. Historic aerial photographs were reviewed but no natural, historic alignments cold be clearly depicted (Figures 16, 17, and 18). The channel is placed as close to the low point of the valley, because that is the point at which natural channels would have historically utilized. Keeping the channel in the low point of the valley will ensure that the majority of water flowing through the valley is concentrated through the channel rather than utilizing the floodplain first. There are some small portions of the channel that are moved just to the side of the natural low point, but these are in areas were the design channel was placed to stay out of the existing incised channel. In these instances the existing channel will be filled with spoil material and raised to existing ground so that post-construction conditions have the bankfull channel in the low point of the valley. Additionally, the restored location of the channel utilizes existing trees, their root masses, and shading so as to add stability to the channel side

slopes, add shading to the channel for water temperature regulation, and the trees will add critical biomass which aquatic biota can forage from.

The designed channel is straight approximately 1,000 linear feet downstream of the beginning point of the Site due to a required bridge crossing for a pedestrian foot path. The current foot path is a raised path comprised of crush and run material traversing the floodplain. The design channel will require that the existing foot bridge on the path be relocated approximately 60 feet to the west of it current location.

One of the primary constraints is a sewer line and easement that runs through the Site. The proposed location of the channel spans the sewer easement at the existing location of the footpath. The proposed channel only crosses the sewer easement one time through the Site, so as to minimize the sewer easement's effects on the restored length of channel.

The downstream portion of the Site (the last ~430 linear feet) is where numerous drop structures (log sills) were placed to step the UT to Rocky River's invert down to the invert of Rocky River. The majority of this reach (~ 304 linear feet) is considered a Priority II restoration. The design concept through this reach was to increase the meander length substantially and decrease the pool-pool spacing. This will in effect promote a step-pool system similar to a B-type channel, with numerous pools to dissipate energy through each step. Whereas energy is primarily dissipated through plan form (i.e. meanders) in the upstream reach, it will be dissipated through bed form (i.e. pools) which should decrease stress on the channel banks in this lower reach. This concept was deemed critical rather than keeping a highly meandering channel through this section because of the overall increase in the slope of the UT to Rocky River's Valley at this point. Additionally, each drop structure was kept at approximately 0.25 feet, so as to not have large continuous steps at one point within the system. This design concept should ensure long-term stability through the downstream section of the UT to Rocky River.

An erosion control plan and construction/transportation plan are expected to be developed during the next phase of this project. Erosion control will be performed locally throughout the Site and incorporated into construction sequencing. Exposed soils at the Site are unconsolidated, alluvial sediments, which do not revegetate rapidly after disturbance. Therefore, seeding with appropriate grasses and immediate planting with disturbance-adapted shrubs will be employed following the earth-moving process.

A transportation plan, including the location of access routes and staging areas will be designed to minimize Site disturbance to the maximum extent feasible. The number of transportation access points into the floodplain will be maximized to avoid traversing long distances through the Site's interior. At this point it appears that two potential construction access points have been located for the Site.

Channel and Floodplain Bench Grading
The channel and corresponding floodplain will be excavated along the alignment as shown in Sheets 2A through 2C (Appendix 1). Material excavated during grading of the channel and floodplain will be stockpiled immediately adjacent to channel segments to be abandoned and backfilled. These segments will be backfilled after the design channel has been constructed. Preliminary earthwork estimates indicate the project's excavation and fill totals will balance out.

Spoil material may be placed to stabilize temporary access roads and to minimize compaction of the underlying floodplain. However, all spoil will be removed from floodplain surfaces upon completion of construction activities.

Channel Plugs
Impermeable plugs will be installed along abandoned channel segments. Impermeable plugs are installed along the downstream side of the proposed channel banks where the proposed channel crosses the existing channel. This will prevent the channel flow from accessing the abandoned channel segment. The plugs will consist of low-permeability materials designed to be of sufficient strength to withstand the erosive energy of surface flow events across the Site. The plug will be of sufficient width and depth to form an imbedded overlap in the existing banks and channel bed.

Channel Backfilling
After impermeable plugs are installed, the abandoned channel will be backfilled. Backfilling will be performed primarily by pushing stockpiled materials into the channel. The channel will be filled to the extent that onsite material is available and compacted to maximize microtopographic variability, including ruts, ephemeral pools, and hummocks in the vicinity of the backfilled channel.

Wetland Impacts
The proposed alignment of the UT to Rocky River is expected to impact 1.05 acres of existing riparian wetlands onsite. It is anticipated that filled sections of the existing channel will revert to wetalnds. It is expected that enhancing the existing 8.7 acres of riparian wetlands and the filling of the existing channel which should revert to wetlands will off set impacts to existing wetlands.

Justification for Wetland Impacts
Restoration activities will provide a functional uplift from existing conditions. Current conditions have resulted in degraded water quality, a loss of aquatic habitat, reduced nutrient and sediment retention, and unstable channel characteristics (mass wasting of channel banks, channel incision and aggradation, sediment loading, and the loss of bed form diversity) at the Site. Restoration of the channel will restore stable riffle-pool morphology, aid in energy dissipation, move sediment in a stable manner, and increase aquatic habitat. The proposed channel alignment took into account the existing wetlands, and the existing mature trees. Minimizing impact to the wetlands and the loss of existing mature trees played an important role in determining the location of the proposed alignment.

Existing wetlands typically form in areas where relocated (channelized) streams historically were located. The location of the restored channel follows the low point of the valley and will ultimately affect some of the existing wetlands on-site. However, these wetlands would have to be considered low quality due to the abundance of invasive/nuisance vegetative species and the lack of mature vegetation.

7.1.3 In-stream Structures

Stream restoration using Natural Channel Design techniques, typically involves the use of in-stream structures for bank stabilization, grade control, and habitat improvement. Primary structures used to achieve these objectives may include the installation of log vanes, log sills, log and rock cross-vanes, and root wads. Log structures will provide critical habitat for aquatic biota and assist in maintain pool integrity. Log structures should be considered temporary support to restored channels, however their longevity (typically a minimum of 5 to 7 years) will be sufficient for vegetation on stream banks to take hold and form a natural, stable condition for bank and bed protection.

7.1.4 Target Buffer Communities

Restoration of floodplain forest and stream-side habitat allows for development and expansion of characteristic species across the landscape. Community associations that will be utilized to develop primary plant community associations include: 1) Piedmont Alluvial Forest, 2) stream-side assemblage, and 3) riparian wetland. This is discussed in more detail in Section 7.5 (Natural Plant Community Restoration).

7.2 Sediment Transport Analysis:

One of the primary goals of this project is to construct a stable channel that will transport its sediment and flow such that, over time, the stream system neither aggrades nor degrades. This stability is achieved when the sediment input to the design reach equals the sediment output.

The channel's substrate is composed of sand materials, therefore bed substrate sampling was not necessary. Below is a discussion of both sediment concentration and stream power and their relation to stability in the design.

Sediment Concentration

The Engelund-Hansen function was used to analyze sediment transport capacity through the designed channel. The basic principal of the Engelund-Hansen function is to determine if sediment input to the design stream equals the sediment output from the design stream. If sediment input equals or is adequately close to sediment output then the channel is considered a stable channel in equilibrium. Below is the Engelund-Hansen function:

$$g = 0.535\ D^{1/2}\ S^{3/2}\ V\ Q\ /\ d$$

where;

g = sediment discharge (lbs/s)
D = water depth (ft)
S = channel slope (ft/ft)
V = average velocity (ft/s)
Q = discharge (cubic ft/s)
d = median particle diameter of stream bed material (ft)

Two stable reference reaches at offsite locations were used for sediment input calculations and comparisons since the existing stream channel is unstable. The reference reaches (UT to Wildcat Branch and Mill Creek) were characterized by similar stream types and had a similar slope, compared to the design channel, so that accurate comparisons could be made. A stable reference reach can be used because the sediment input is in balance with sediment output over geologic time. In most cases, the bankfull discharge of a reference reach is different from that of the design reach so, instead of using sediment discharge (lbs/s) for the comparison, sediment concentration (lbs/ft^3) is used in the analysis because the function of discharge is set equal per cubic foot (ft^3).

Below is the equation for sediment concentration:

$SC = g/Q$

where;

SC = sediment concentration (lbs/ft^3)
g = sediment discharge (lbs/s)
Q = discharge (ft^3/s)

The UT to Rocky River has two distinct reach types through the site. One stream type is aggrading due to channel blockages such as beaver dams and sediment and erosion control practices. An accurate, sediment output calculation through these reaches could not be calculated because of the backwater effects caused by the channel blockages. It is known however that these reaches are not transporting their sediment because the channel inverts aggrading due to siltation. The second reach type is a gully type reach. The sediment output through this reach type is calculated to be 0.936 lbs/ft^3. Conditions through the gully reaches are an indication that sediment being transported at a rate of 0.936 lbs/ft^3 is indicative of a degrading reach.

The sediment concentration input and output for the two references were deemed to be in equilibrium (because both channels are stable). Their sediment outputs are 0.019 lbs/ft^3 and 0.022 lbs/ft^3 respectively. The designed sediment output for the UT to Rocky River is 0.014 lbs/ft^3 which correlates closely with the two reference streams. The proposed design sediment output is similar to those of the stable reference reach and substantially lower than the output

calculation from the gully reach of existing conditions; therefore, the design channel is considered stable and in equilibrium.

Stream Power

A stream power analysis was used as a tool to study the capacity of the design channel to transport its sediment load. An analysis of reference stream power and proposed conditions stream power were completed to determine if the restoration design stream power will adequately convey its sediment load at the bankfull discharge.

Existing unit stream power through reaches impacted by channel blockages cannot be accurately calculated, however it is known that the stream power is not sufficient to move sediment through these reaches. Existing unit stream power through gully reaches was calculated to be 4.55 lbs/ft-s. Degrading conditions through the gully reaches indicates that 4.55 lbs/ft-s is substantially high.

The UT to Wildcat Branch and Mill Creek have calculated unit stream powers of 0.15 lbs/ft-s and 0.45 lbs/ft-s, respectively. As previously stated, both references are stable channels that are in equilibrium and adequately convey their sediment load. So, it can be assumed that the UT to Wildcat Branch's and Mill Creek's unit stream powers are adequate to transport their sediment loads. The UT to Rocky River design displays a unit stream power of 0.26 lbs/ft s which corresponds closely to both reference unit stream powers. Using the references, it was determined that the UT to Rocky River design has an adequate capacity to transport its sediment load at the bankfull discharge.

7.3 HEC-RAS Analysis:

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 HEC-RAS. HEC-RAS is a software package designed to perform one-dimensional, steady flow, analysis of water surface profiles for a network of natural and constructed channels.

HEC-RAS uses two equations, energy and/or momentum, depending upon the water surface profile. The model is based on the energy equation. 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.

Backwater analysis was performed for the existing and proposed conditions for both bankfull and 100-year discharges. In addition to steady flow data, geometric data is also required to run HEC-RAS. Geometric data consists of establishing the connectivity of the river system, which includes cross-section data, reach lengths, energy loss coefficients (friction losses, contraction, and expansion losses), and stream junction information.

7.3.1 Bankfull Discharge Analysis

Bankfull indicators were identified along the UT to Rocky River. Existing conditions surveys were conducted which included surveying representative riffle cross-sections, representative hydraulic (bankfull) slope, and determining an existing Manning's n coefficient for the surveyed reaches. The surveyed data and calculated Manning's n were correlated with identified bankfull indicators to estimate bankfull cross-sectional area and velocity, and consequently bankfull discharge. The estimated on-site bankfull cross-sectional area and discharge were compared with a calculated bankfull cross-sectional area and discharge using a regional hydraulic geometry curve created by Ko for the Rocky River Watershed (Appendix 10). Data obtained from on-site falls within a level of confidence of the data obtained from the Rocky River Watershed regional curve.

The UT to Rocky River was designed using one discharge through the entire Site (the discharge was determined by the downstream most contributing watershed area of 0.77 square miles). The discharge used is 18 cfs. Hydrologic Engineering Center's River Analysis System (HEC-RAS Version 4.0 Beta) was used to evaluate how the discharge flows within the proposed channel geometry. This evaluation verifies that the proposed plan, dimension, and profile would adequately convey the discharge at the bankfull stage; the point where water begins to overflow onto the floodplain.

7.3.2 No-Rise

A HEC-RAS analysis has been prepared and completed on existing and proposed conditions of the Site channel(s). The resulting data output has been analyzed to determine if the design channel is adequately conveying its bankfull discharge, and to determine if a rise, fall, or no-rise in water surface elevations during the 100-year flood event has occurred.

The analysis indicates the proposed channel geometry will not increase the 100-year flood elevations upstream of the project area. Results are located within the UT Rocky River HEC RAS Analysis in Appendix 12.

7.3.3 Hydrologic Trespass

Hydrologic trespass includes any issue which may affect hydrology outside of the property boundaries on which the Site is located. These issues were reviewed for this project. All on-site modifications should not affect offsite hydrology.

7.4 Topsoil Stockpiling

Soil grading will occur during stream restoration activities. Topsoils may be stockpiled during construction activities to place back on excavated subgrade soils where a bankfull bench has to be cut. The replaced topsoil can serve as a viable growing medium for community restoration to provide nutrients and aid in the survival of planted species.

7.4.1 Floodplain Soil Scarification

Microtopography and differential drainage rates within localized floodplain areas represent important components of floodplain functions. Reference forests in the region exhibit complex surface microtopography. Efforts to advance the development of characteristic surface microtopography will be implemented where a floodplain bench is excavated. In areas where soil surfaces have been compacted, ripping or scarification will be performed. After construction, the soil surface is expected to exhibit complex microtopography ranging to one foot in vertical asymmetry. Subsequently, plant community restoration will be initiated.

7.5 Wetland Enhancement

The areas to be enhanced already display all three wetland criteria (hydrology, vegetation, soils), and have been delineated as such (Figure 5 and Appendix 1). However, the large majority of wetlands on-site are located within historic pasture areas that have grown over in early successional species, including blackberry thickets. Theses areas are devoid of mature vegetation. Existing wetlands will be enhanced within the easement area by removing exotic/nuisance species, which are dominated by blackberry, and planting native vegetative species. The native species will be comprised of hydrophytic vegetation that allows for foraging habitat and cover for terrestrial and semi aquatic biota.

7.6 Natural Plant Community Restoration

Restoration of the floodplains, side slopes and stream-side habitat allows for development and expansion of characteristic species across the landscape. Ecotonal changes between community types contribute to diversity and provide secondary benefits, such as enhanced feeding and nesting opportunities for mammals, birds, amphibians, and other wildlife.

Reference Forest Ecosystem (RFE) data, onsite observations, and community descriptions from *Classification of the Natural Communities of North Carolina* (Schafale and Weakley 1990) were used to develop primary plant community associations that will be promoted during community restoration activities. Community descriptions of the RFE closely resemble a Piedmont Alluvial Forest community (Schafale and Weakley 1990). Community associations to be utilized include 1) Piedmont Alluvial Forest and 2) stream-side assemblage (Sheet 4, Appendix 1). The Piedmont Alluvial Forest will be distinguished further into four distinct planting areas including a) riverine wetland areas, b) nonwetland areas, c) supplemental planting in forested areas, and d) roadside planting areas with containerized trees for aesthetic appeal. Planting elements are listed below.

Piedmont Alluvial Forest (riverine wetland areas)

1. Sycamore (*Platanus occidentalis*)
2. American elm (*Ulmus americana*)
3. Hackberry (*Celtis laevigata*)
4. Green ash (*Fraxinus pennsylvanica*)
5. Willow oak (*Quercus phellos*)
6. Swamp chestnut oak (*Quercus michauxii*)
7. Tulip poplar (*Liriodendron tulipifera*)
8. River birch (*Betula nigra*)
9. Silky dogwood (*Cornus amomum*)
10. Pawpaw (*Asimina triloba*)
11. Shagbark hickory (*Cary ovata*)
12. Emergent herbaceous seed mixture (20 pounds/acre)
    a. Fox sedge (*Carex vulpinoidea*) 20% of mixture
    b. Big bluestem (*Andropogon gerardii*) 20% of mixture
    c. Virginia wildrye (*Elymus virgatum*) 15% of mixture
    d. Switchgrass (*Panicum virgatum*) 15% of mixture
    e. Soft rush (*Juncus effusus*) 10% of mixture
    f. Deertongue (*Dichanthelium clandestinum*) 20% of mixture

Piedmont Alluvial Forest (nonwetland areas)

1. Sycamore (*Platanus occidentalis*)
2. White ash (*Fraxinus americana*)
3. Shagbark hickory (*Carya ovata*)
4. Southern red oak (*Quercus falcata*)
5. Shingle oak (*Quercus imbricaria*)
6. Flowering dogwood (*Cornus florida*)
7. Pawpaw (*Asimina triloba*)
8. Shagbark hickory (*Cary ovata*)
9. Emergent herbaceous seed mixture (30 pounds/acre)
    a. Switchgrass (*Panicum virgatum*) 15% of mixture

   b. Indiangrass (*Sorghastum nutans*) 20% of mixture
   c. Big bluestem (*Andropogon gerardii*) 15% of mixture
   d. Broomsedge bluestem (*Andropogon virginicus*) 15% of mixture
   e. Gamagrass (*Tripsicum dactyloides*) 15% of mixture
   f. Purpletop (*Tridens flavus*) 20% of mixture

Piedmont Alluvial Forest (supplemental planting in forested areas)

1. American elm (*Ulmus americana*)
2. Green ash (*Fraxinus pennsylvanica*)
3. Willow oak (*Quercus phellos*)
4. Tulip poplar (*Liriodendron tulipifera*)
5. Silky dogwood (*Cornus amomum*)
6. Pawpaw (*Asimina triloba*)

Piedmont Alluvial Forest (roadside planting areas with containerized trees for aesthetic appeal)

1. Sycamore (*Platanus occidentalis*)
2. White ash (*Fraxinus americana*)
3. Shagbark hickory (*Carya ovata*)
4. Southern red oak (*Quercus falcata* var. *falcata*)
5. Shingle oak (*Quercus imbricaria*)
6. Flowering dogwood (*Cornus florida*)
7. Pawpaw (*Asimina triloba*)
8. Containerized trees with stems greater than or equal to 2 inches in diameter
   a. White ash (*Fraxinus americana*)
   b. Southern red oak (*Quercus falcata* var. *falcata*)
   c. Red maple (*Acer rubrum*)
   d. Flowering dogwood (*Cornus florida*)
9. Emergent herbaceous seed mixture (30 pounds/acre)
   a. Switchgrass (*Panicum virgatum*) 15% of mixture
   b. Indiangrass (*Sorghastum nutans*) 20% of mixture
   c. Big bluestem (*Andropogon gerardii*) 15% of mixture
   d. Broomsedge bluestem (*Andropogon virginicus*) 15% of mixture
   e. Gamagrass (*Tripsicum dactyloides*) 15% of mixture
   f. Purpletop (*Tridens flavus*) 20% of mixture

Stream-Side Assemblage

1. Black willow (*Salix nigra*)
2. Tag alder (*Alnus serrulata*)
3. Buttonbush (*Cephalanthus occidentalis*)
4. Emergent herbaceous seed mixture (20 pounds/acre)
   a. Fox sedge (*Carex vulpinoidea*) 20% of mixture
   b. Big bluestem (*Andropogon gerardii*) 20% of mixture
   c. Virginia wildrye (*Elymus virgatum*) 15% of mixture
   d. Switchgrass (*Panicum virgatum*) 15% of mixture
   e. Soft rush (*Juncus effusus*) 10% of mixture
   f. Deertongue (*Dichanthelium clandestinum*) 20% of mixture

Stream-side assemblage trees and shrubs include species with high value for sediment stabilization, rapid growth rate, and the ability to withstand hydraulic forces associated with bankfull flow and overbank flood events. Stream-side trees and shrubs will be planted from the toe of slope of the restored channel to the top of slope of the restored channel. Piedmont

Alluvial Forest is targeted for the majority of the Site including the floodplain, floodplain slopes, terrace, and riverine wetland areas.

7.6.1 Planting Plan

Species selected for planting will be dependent upon availability of local seedling sources. Advance notification to nurseries (1 year) will facilitate availability of various noncommercial elements. Bare-root seedlings of tree species will be planted within the Piedmont Alluvial Forest at a density of approximately 680 stems per acre on 8-foot centers including supplemental planting areas and roadside planting areas. Shrub species in the stream-side assemblage will be planted at a density of 2720 stems per acre on 4-foot centers.

In addition, larger, containerized trees will be planted throughout areas of the Piedmont Alluvial Forest adjacent to the roadside targeted for aesthetic appeal. Containerized trees will be intersperced within bare-root seedlings at a density of 340 trees per acre on 16-foot centers and will be concentrated along the perimeter of the planting zone. Containerized trees will be a minimum of one gallon in size with a minimum 2 inch diameter stem and will include white ash (*Fraxinus americana*), southern red oak (*Quercus falcata* var. *falcata*), red maple (*Acer rubrum*), and flowering dogwood (*Cornus florida*).

Table 8 depicts the total number of stems and species distribution within each vegetation association. Planting will be performed between December 1 and March 15 to allow plants to stabilize during the dormant period and set root during the spring season.

Table 8. Planting Plan
Project ID No. 070708001 (UT to Rocky River Stream Restoration Site)

Piedmont Alluvial Forest - Riverine Wetlands									**Acres**	**6.80**
Species	**Common Name**	**Max Spacing**	**Unit Type***	**Size****	**Stratum**	**Indiv. Spacing**	**% of Total**	**# of Stems**	**Total lbs**	
Asimina triloba	Pawpaw	8'	R	2 -3'	Subcanopy	8'	10	68		
Betula nigra	River birch	8'	R	2 -3'	Canopy	8'	10	68		
Celtis laevigata	Hackberry	8'	R	2 -3'	Shrub	8'	10	68		
Cornus amomum	Silky dogwood	8'	R	2 -3'	Subcanopy	8'	10	68		
Fraxinus pennsylvanica	Green ash	8'	R	2 -3'	Canopy	8'	10	68		
Platanus occidentalis	Sycamore	8'	R	2 -3'	Canopy	8'	5	34		
Liriodendron tulipifera	Tulip poplar	8'	R	2 -3'	Canopy	8'	5	34		
Quercus phellos	Willow oak	8'	R	2 -3'	Canopy	8'	10	68		
Quercus michauxii	Swamp chestnut oak	8'	R	2 -3'	Canopy	8'	10	68		
Ulmus americana	American elm	8'	R	2 -3'	Canopy	8'	10	68		
Carya ovata	Shagbark hickory	8'	R	2 -3'	Canopy	8'	10	68		
Carex vulpinoidea	Fox sedge		S		Herb		20		4	
Andropogon gerardii	Big bluestem		S		Herb		20		4	
Elymus virgatum	Virginia wildrye		S		Herb		15		3	
Panicum virgatum	Switchgrass		S		Herb		15		3	
Juncus effusus	Soft rush		S		Herb		10		2	
Dichanthelium clandestinum	Deetrongue		S		Herb		20		4	
						Subtotal		**680**	**20**	

Piedmont Alluvial Forest - Non-wetlands									**Acres**	**7.80**
Species	**Common Name**	**Max Spacing**	**Unit Type***	**Size****	**Stratum**	**Indiv. Spacing**	**% of Total**	**# of Stems**	**Total lbs**	
Asimina triloba	Pawpaw	8'	R	2 -3'	Subcanopy	8'	15	102		
Platanus occidentalis	Sycamore	8'	R	2 -3'	Canopy	8'	10	68		
Carya ovata	Shagbark hickory	8'	R	2 -3'	Canopy	8'	15	102		
Cornus florida	Flowering dogwood	8'	R	2 -3'	Canopy	8'	15	102		
Fraxinus americana	Green ash	8'	R	2 -3'	Canopy	8'	15	102		
Quercus falcata var. falcata	Southern red oak	8'	R	2 -3'	Canopy	8'	15	102		
Quercus imbricaria	Shingle oak	8'	R	2 -3'	Canopy	8'	15	102		
Panicum virgatum	Switchgrass		S		Herb		15		4.5	
Sorghastum nutans	Indiangrass		S		Herb		20		6	
Andropogon gerardii	Big bluestem		S		Herb		15		4.5	
Andropogon virginicius	Broomsedge bluestem		S		Herb		15		4.5	
Tripsicum dactyloides	Gamagrass		S		Herb		15		4.5	
Tridens flavus	Purpletop		S		Herb		20		6	
						Subtotal		**680**	**30**	

Piedmont Alluvial Forest - Supplemental Plantings									**Acres**	**1.50**
Species	**Common Name**	**Max Spacing**	**Unit Type***	**Size****	**Stratum**	**Indiv. Spacing**	**% of Total**	**# of Stems**	**Total lbs**	
Asimina triloba	Pawpaw	12'	R	2 -3'	Subcanopy	12'	20	60		
Cornus amomum	Flowering dogwood	12'	R	2 -3'	Subcanopy	12'	20	60		
Fraxinus pennsylvanica	Green ash	12'	R	2 -3'	Canopy	12'	15	45		
Liriodendron tulipifera	Tulip poplar	12'	R	2 -3'	Canopy	12'	15	45		
Quercus phellos	Willow oak	12'	R	2 -3'	Canopy	12'	15	45		
Ulmus americana	American elm	12'	R	2 -3'	Canopy	12'	15	45		
						Subtotal		**300**	**0**	
Piedmont Alluvial Forest - Roadside Plantings									**Acres**	**0.60**
Species	**Common Name**	**Max Spacing**	**Unit Type***	**Size****	**Stratum**	**Indiv. Spacing**	**% of Total**	**# of Stems**	**Total lbs**	
Acer rubrum	Red maple	12'	B	2"	Canopy	12'	25	76		
Cornus florida	Flowering dogwood	12'	B	2"	Subcanopy	12'	25	76		
Fraxinus americana	Green ash	12'	B	2"	Canopy	12'	25	76		
Quercus falcata var. falcata	Southern red oak	12'	B	2"	Canopy	12'	25	76		
Platanus occidentalis	Sycamore	8'	R	2 -3'	Canopy	8'	10	30		
Frazinus americana	White ash	8'	R	2 -3'	Canopy	8'	15	45		
Carya ovata	Shagbark hickory	8'	R	2 -3'	Canopy	8'	15	45		
Quercus falcata var. falcata	Southern red oak	8'	R	2 -3'	Canopy	8'	15	45		
Quercus imbricaria	Shingle oak	8'	R	2 -3'	Canopy	8'	15	45		
Cornus florida	Flowering dogwood	8'	R	2 -3'	Subcanopy	8'	15	45		
Asimina triloba	Pawpaw	8'	R	2 -3'	Subcanopy	8'	15	45		
Panicum virgatum	Switchgrass		S		Herb		15		4.5	
Sorghastum nutans	Indiangrass		S		Herb		20		6	
Andropogon gerardii	Big bluestem		S		Herb		15		4.5	
Andropogon virginicus	Broomsedge bluestem		S		Herb		15		4.5	
Tripsicum dactyloides	Gamagrass		S		Herb		20		6	
Tridens flavus	Purpletop		S		Herb		15		4.5	
						Subtotal		**604**	**30**	
Streamside Assemblage									**Acres**	**0.75**
Species	**Common Name**	**Max Spacing**	**Unit Type***	**Size****	**Stratum**	**Indiv. Spacing**	**% of Total**	**# of Stems**	**Total lbs**	
Alnus serrulata	Tag alder	4'	L	2'	Canopy	4'	35	952		
Cephalanthus occidentalis	Buttonbush	4'	L	2'	Subcanopy	4'	35	952		
Salix nigra	Black willow	4'	L	2'	Canopy	4'	30	816		
Carex vulpinoidea	Fox sedge		S		Herb		20		4	
Andropogon gerardii	Big bluestem		S		Herb		20		4	
Elymus virgatum	Virginia wildrye		S		Herb		15		3	
Panicum virgatum	Switchgrass		S		Herb		15		3	
Juncus effusus	Soft rush		S		Herb		10		2	
Dichanthelium clandestinum	Deertongue		S		Herb		20		4	
						Subtotal		**2720**	**20**	
						Total		**4984**	**100**	**17.45**

* Unit Type choices inlcude: Transplant (T), Lives stake (L), Ball and Burlap (B), Pot (P), Tubling (T), Bare Root (R), Mechanically Planted (M),
** Size units may vary, but must be stated.

7.6.2 Invasive Species Management

Noxious species will be identified and controlled so that none become dominant or alter the desired community structure of the Site. Currently beaver activity is prevalent within the Site and proactive removal and control of this species should be implemented as soon as possible and continued as necessary. Invasives such as black berry and multi flora rose have been identified throughout the Site and will be eradicated during construction.

Through coordination with EEP during the five-year monitoring period, where necessary, removal, treatment, or management of undesirable plant or animal species, including physical removal, use of herbicides, live trapping, confining wires, or nets.

All vegetation removal from the Site shall be done by mechanical means only unless EEP has first authorized the use of herbicides or algaecides for the control of plants in or immediately adjacent to the Site.

8.0 PERFORMANCE CRITERIA

Monitoring of restoration efforts will be performed until success criteria are fulfilled. Monitoring is proposed for the stream channel and vegetation. In general, the restoration success criteria, and required remediation actions, are based on the *Stream Mitigation Guidelines* (USACE et al. 2003).

8.1 Streams

The restored stream reaches are proposed to be monitored for geometric activity. Annual fall monitoring will include development of channel cross-sections on riffles and pools and a water surface profile of the channel. The data will be presented in graphic and tabular format. Data to be presented may include 1) cross-sectional area, 2) bankfull width, 3) average depth, 4) maximum depth, 5) width-to-depth ratio, 6) meander wavelength, 7) belt-width, 8) water surface slope, and 9) sinuosity. The stream will subsequently be classified according to stream geometry and substrate (Rosgen 1996). Significant changes in channel morphology will be tracked and reported by comparing data in each successive monitoring year. A photographic record that will include preconstruction and postconstruction pictures has been initiated with current Site photographs (Appendix 3).

8.1.1 Stream Success Criteria

Success criteria for stream restoration will include 1) successful classification of the reach as a functioning stream system (Rosgen 1996) and 2) channel variables indicative of a stable stream system.

The channel configuration will be measured on an annual basis in order to track changes in channel geometry, profile, or substrate. These data will be utilized to determine the success in restoring stream channel stability. Specifically, the width-to-depth ratio should characterize an E-type or borderline E-/C-type channel, bank-height ratios indicative of a stable or moderately unstable channel, and minimal changes in cross-sectional area, channel width, and/or bank erosion along the monitoring reach. In addition, channel abandonment and/or shoot cutoffs must not occur and sinuosity values must remain relatively constant. The field indicator of bankfull will be described in each monitoring year and indicated on a representative channel cross-section figure. If the stream channel is down-cutting or the channel width is enlarging due to bank erosion, additional bank or slope stabilization methods will be employed.

Stream substrate is not expected to coarsen over time (because the channel is comprised of sand); therefore, pebble counts are not proposed as part of the stream success criteria.

Visual assessment of in-stream structures will be conducted to determine if failure has occurred. Failure of a structure may be indicated by collapse of the structure, undermining of the structure, abandonment of the channel around the structure, and/or stream flow beneath the structure.

8.1.2 Stream Contingency

In the event that stream success criteria are not fulfilled, a mechanism for contingency will be implemented. Stream contingency may include, but may not be limited to 1) structure repair and/or installation; 2) repair of dimension, pattern, and/or profile variables; and 3) bank stabilization. The method of contingency is expected to be dependent upon stream variables that are not in compliance with success criteria. Primary concerns, which may jeopardize stream success, include 1) structure failure, 2) headcut migration through the Site, and/or 3) bank erosion.

Structure Failure

In the event that structures are compromised, the affected structure will be repaired, maintained, or replaced. Once the structure is repaired or replaced, it must function to stabilize adjacent stream banks and/or maintain grade control within the channel. Structures which remain intact, but exhibit flow around, beneath, or through the header/footer will be repaired by excavating a trench on the upstream side of the structure and reinstalling filter fabric in front of the pilings. Structures which have been compromised, resulting in shifting or collapse of header/footer, will be removed and replaced with a structure suitable for Site flows.

Headcut Migration Through the Site

In the event that a headcut occurs within the Site (identified visually or through measurements [i.e. bank-height ratios exceeding 1.4]), provisions for impeding headcut migration and repairing damage caused by the headcut will be implemented. Headcut migration may be impeded through the installation of in-stream grade control structures (sill and/or log cross-vane) and/or restoring stream geometry variables until channel stability is achieved. Channel repairs to stream geometry may include channel backfill with coarse material and stabilizing the material with erosion control matting, vegetative transplants, and/or willow stakes.

Bank Erosion

In the event that severe bank erosion occurs within the Site, resulting in elevated width-to-depth ratios, contingency measures to reduce bank erosion and width-to-depth ratio will be implemented. Bank erosion contingency measures may include the installation of log-vanes and/or other bank stabilization measures. If the resultant bank erosion induces shoot cutoffs or channel abandonment, a channel may be excavated which will reduce shear stress to stable values.

8.2 Vegetation

After planting has been completed in winter or early spring, an initial evaluation will be performed to verify planting methods were successful and to determine initial species composition and density. Supplemental planting and additional modifications will be implemented, if necessary.

During quantitative vegetation sampling in early fall of the first year, sample plots will be randomly placed within The Bank as per guidelines established in *CVS-EEP Protocol for*

Recording Vegetation, Version 4.0 (Lee et al. 2006). In each sample plot, vegetation parameters to be monitored include species composition and species density. Visual observations of the percent cover of shrub and herbaceous species will also be recorded.

8.2.1 Vegetation Success Criteria

An average density of 320 stems per acre of Characteristic Tree Species must be surviving in the first three monitoring years. Characteristic Tree Species are defined as those species planted from trees included in the Planting Plan or tree species that were identified in Table 7 Reference Forest Ecosystem. Subsequently, 290 Characteristic Tree Species per acre must be surviving in year 4 and 260 Character Tree Species per acre in year 5.

One goal of the project is to remove exotic/nuisance vegetative species. Exotic/nuisance species shall not comprise more than 20 percent of the total surveyed species. If exotic/nuisance species comprise more than 20 percent of the total surveyed species then success criteria may not be met and removal of these species may be required.

8.2.2 Vegetation Contingency

If vegetation success criteria are not achieved based on average density calculations from combined plots over the entire restoration area, supplemental planting may be performed with tree species approved by regulatory agencies. Supplemental planting will be performed as needed until achievement of vegetation success criteria.

8.2.3 Wetlands

Wetland success criteria will be strongly tied to vegetative success criteria. It is anticipated that if vegetation within the wetlands are meeting their success criteria, then the wetlands have meet sufficient criteria for enhancement. Existing wetlands meet the three criteria of wetlands (hydrology, vegetation, soils), therefore enhancement of the wetlands are the only means of obtaining mitigation credits. It is not anticipated that hydrology will be enhanced sufficiently enough to garner enhancement credits, therefore success criteria will not be applied to hydrology enhancement.

8.2.4 Scheduling and Reporting:

A tentative phasing schedule for the proposed project is presented below. Certain tasks may be dependant on seasonal conditions.

Table 9. Project Scheduling and Reporting
Project ID No. 070708001 (UT to Rocky River Stream Restoration Site)

Task Description	Date of Scheduled Completion
Restoration Plan Finalized	August 26, 2008
Submission of Final Design	August 26, 2008
Permitting Initiated	September 26, 2008
Advertise for Bidders	April 17, 2009

Bid Opening	May 15, 2009
Begin Construction	October 9, 2009
End Construction	February 22, 2010
Prepare As-built Mitigation Plan and Mitigation Plan	March 22, 2010
First Year Monitoring Report	December 2010
Second Year Monitoring Report	December 2011
Third Year Monitoring Report	December 2012
Fourth Year Monitoring Report	December 2013
Fifth Year Monitoring Report	December 2014

9.0 REFERENCES

Griffith, G.E. 2002. Ecoregions of North and South Carolina. Reston Virginia. U.S. Geological Society (map scale 1:1,500,000).

North Carolina Division of Water Quality (NCDWQ). 2007. Final North Carolina Water Quality Assessment and Impaired Waters List (2006 Integrated 305(b) and 303(d) Report) (online). Available: http://h2o.enr.state.nc.us/tmdl/documents/303d_Report.pdf [March 12, 2008]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.

Manning, R. 1891. On the Flow of Water in Open Channels and Pipes. Transactions of the Institution of Civil Engineers of Ireland. 20, 161-20.

North Carolina Division of Water Quality (NCDWQ). 2008a. Draft North Carolina Water Quality Assessment and Impaired Waters List (2008 303(d) Report). Public Review (online). Available: http://h2o.enr.state.nc.us/tmdl/documents/B.Draft2008303dList.pdf [March 12, 2008]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.

North Carolina Division of Water Quality (NCDWQ). 2008b. North Carolina Waterbody Reports (online). Available: http://h2o.enr.state.nc.us/bims/reports/reportsWB.html [March 12, 2007]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.

North Carolina Ecosystem Enhancement Program (NCEEP). 2007. Yadkin-Pee Dee River Basin Restoration Priorities (online). Available: http://www.nceep.net/services/restplans/yadkinpeedee_2007.pdf [March 12, 2007]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.

Radford, A.E., H.E. Ahles, and C.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. The University of North Carolina Press, Chapel Hill. 1183 pp.

Rosgen D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Ccarolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

Smith, R. L. 1980. Ecology and Field Biology, Third Edition. Harper and Row, New York. 835 pp.

United States Army Corps of Engineers (USACE), United States Environmental Protection Agency (USEPA), North Carolina Wildlife Resources Commission (NCWRC), Natural Resources Conservation Service (NRCS), and North Carolina Division of Water Quality (NCDWQ). 2003. Stream Mitigation Guidelines. State of North Carolina.

United States Army Corps of Engineers (USACE). HEC-RAS River Analysis System, Version 4.0, Beta.

United States Department of Agriculture (USDA). 1988. Soil Survey of Cabarrus County, North Carolina. United State Department of Agriculture, Soil Conservation Service.

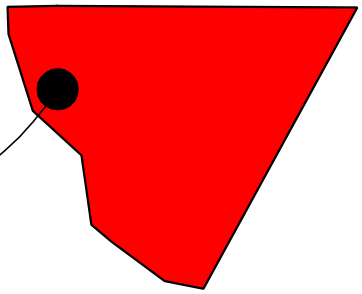
United States Department of Agriculture (USDA). 2008 National Hydric Soils List by State (online). Available: http://soils.usda.gov/use/hydric/lists/state.html [April 7, 2008]. United State Department of Agriculture, Natural Resources Conservation Service.

United States Environmental Protection Agency (USEPA). 1990. Mitigation Site Type Classification (MiST). USEPA Workshop, August 13-15, 1989. USEPA Region IV and Hardwood Research Cooperative, NCSU, Raleigh, North Carolina.

United States Geological Survey (USGS). 1974. Hydrologic Unit Map - 1974. State of North Carolina.

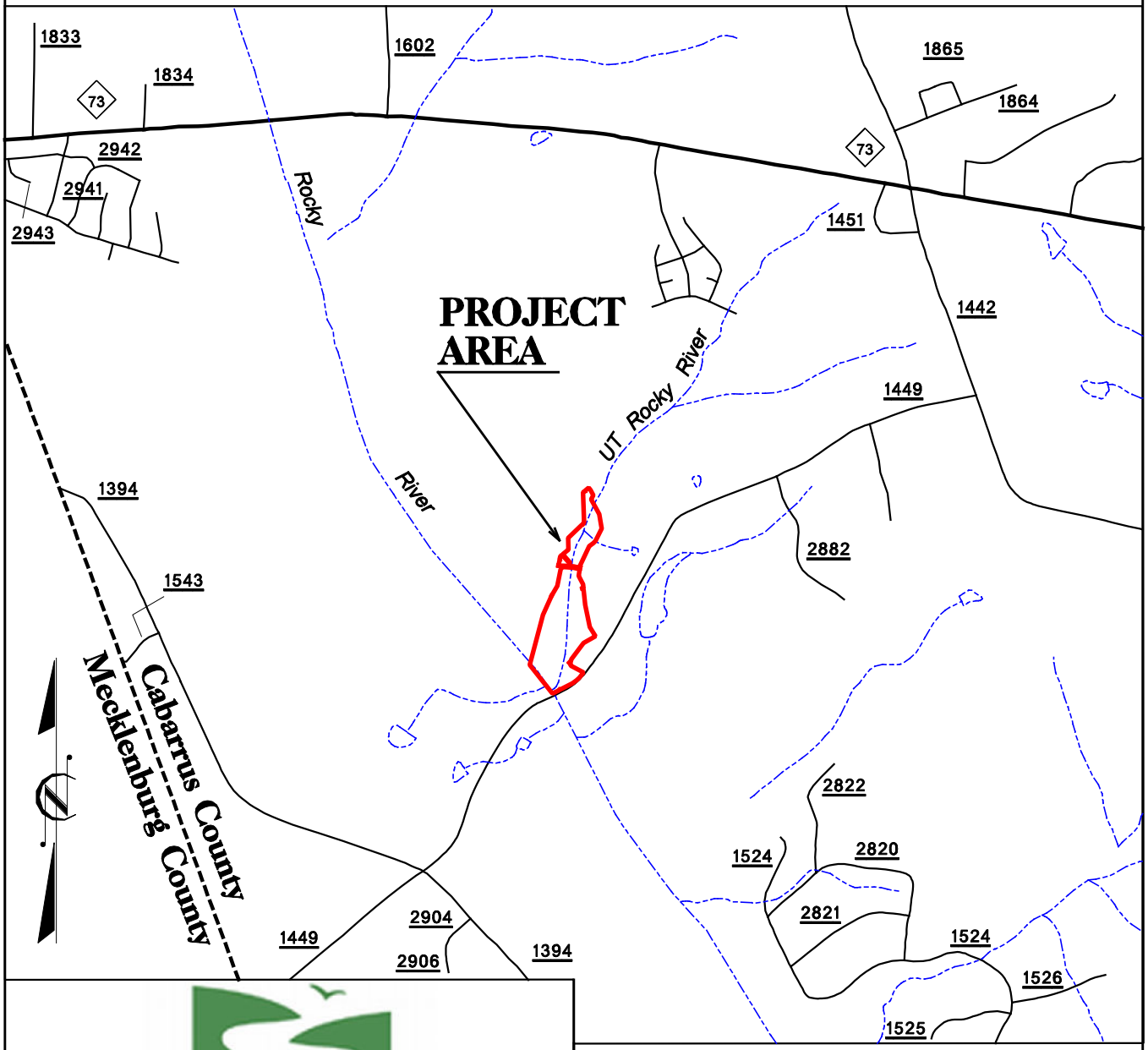
APPENDIX 1
FIGURES AND SHEETS

Cabarrus County
North Carolina



PROJECT AREA

0 1000 2000
FEET



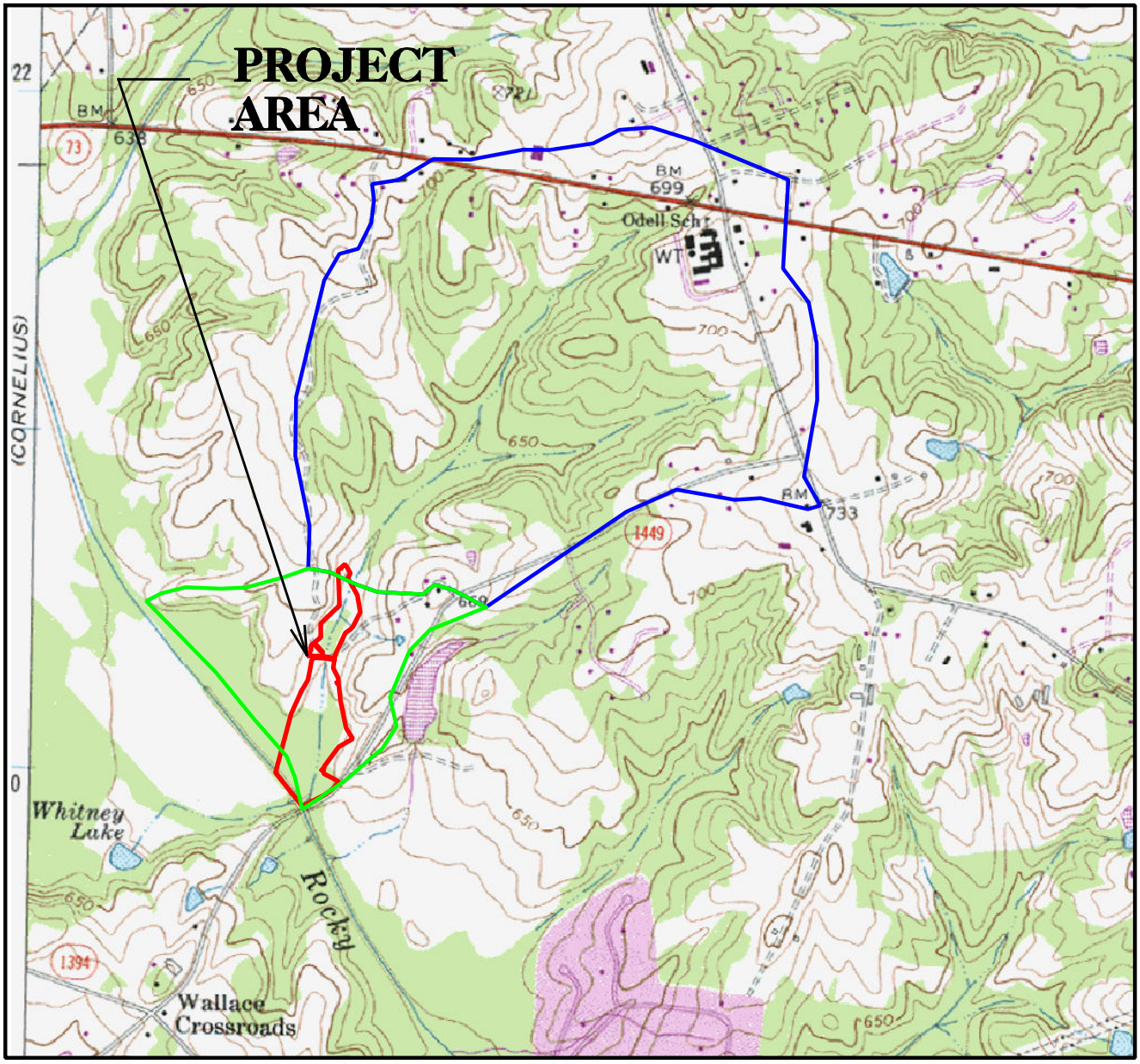
Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY., SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Vicinity Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

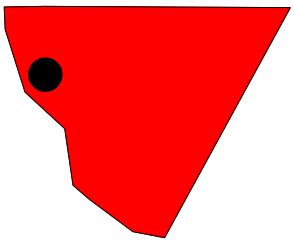
Date: 5/15/08	Figure: 1



LEGEND

- UT Rocky River Upstream Watershed (0.64 Sq. Miles)
- UT Rocky River Downstream Watershed (0.77 Sq. Miles)
- Proposed Easement

Cabarrus County
North Carolina



0 1000 2000
FEET

Watershed Map

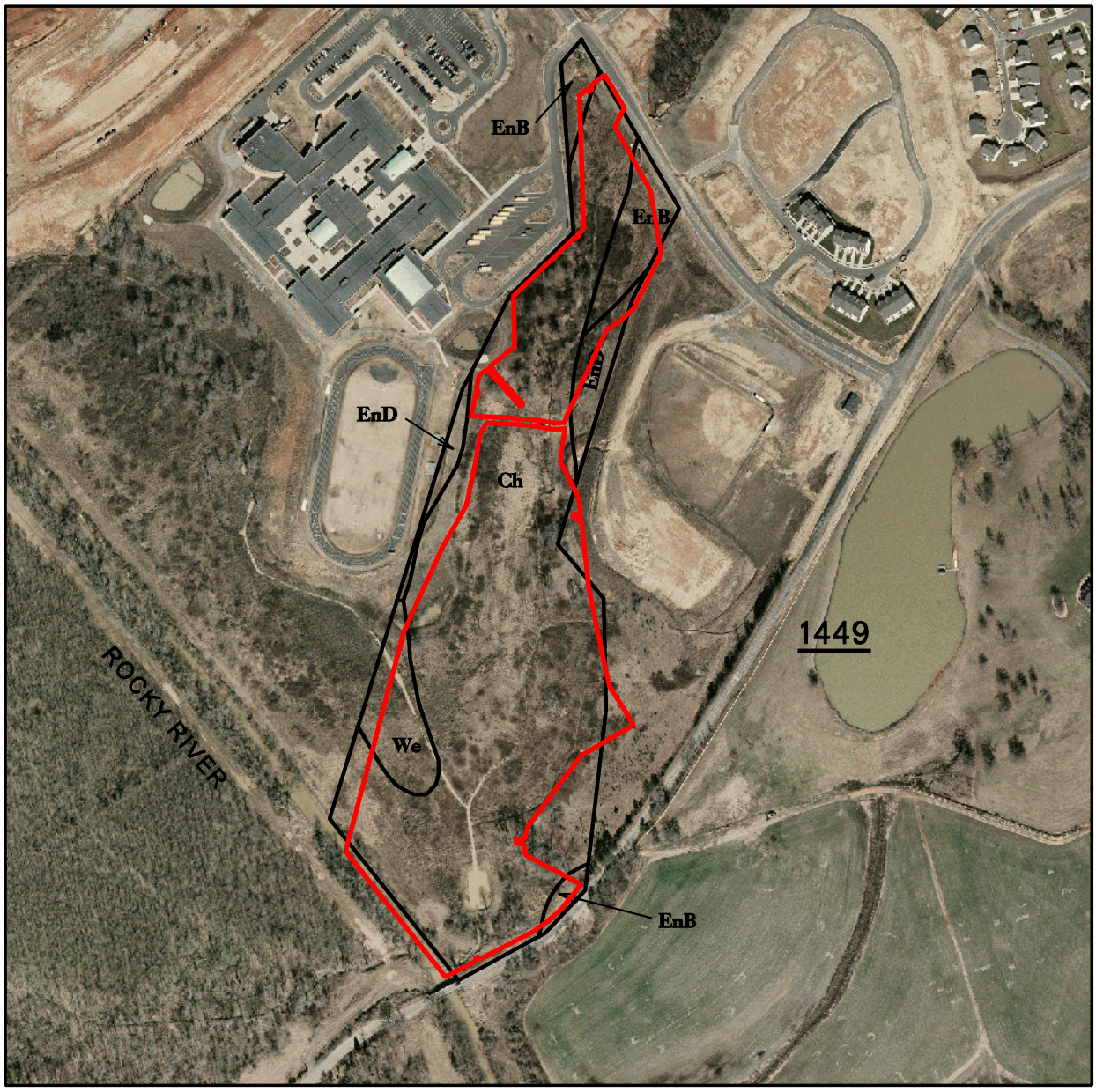
UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Date: 5/15/08

Figure: 2



0 500 1000

FEET

LEGEND

Symbol	Name
Ch	Chewacla
EnB	Enon
EnD	Enon
We	Wehadkee
	Proposed Easement

Ecosystem Enhancement Program

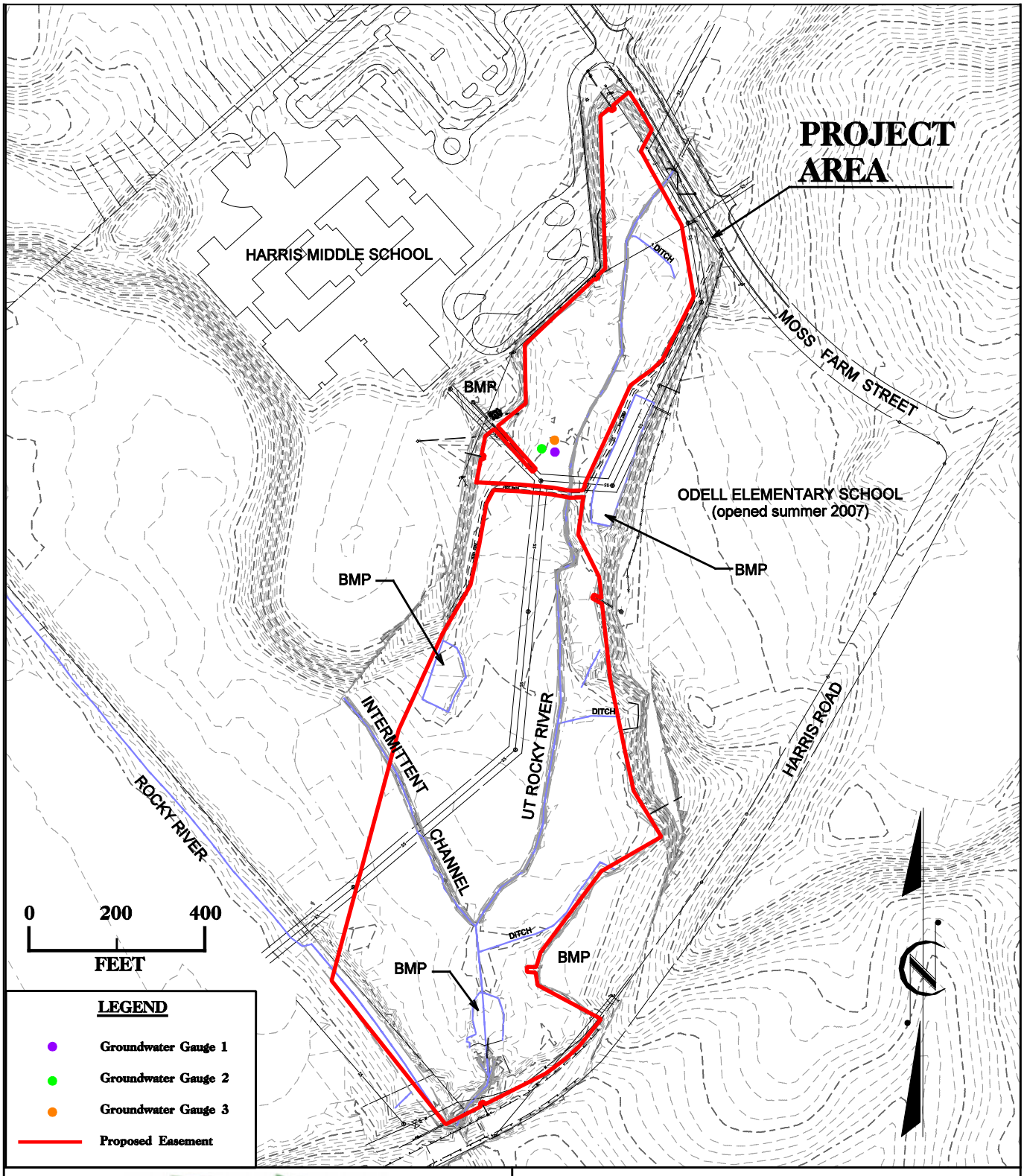
KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Soil Survey Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 5/15/08

Figure: 3



Hydrological Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Ecosystem Enhancement PROGRAM

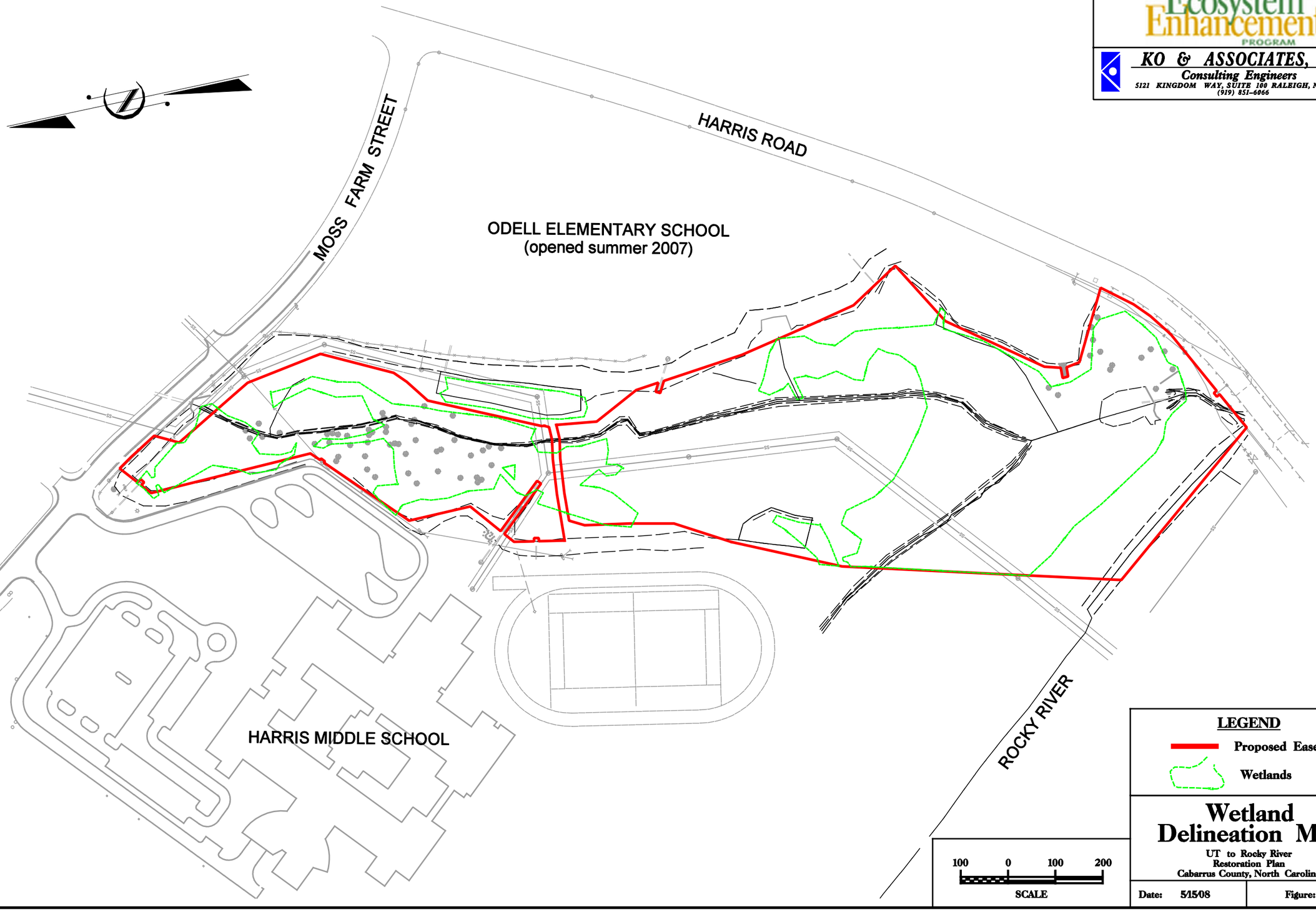
KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Date: 5/15/08

Figure: 4

Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066



LEGEND

Proposed Easement

Wetlands

Wetland Delineation Map

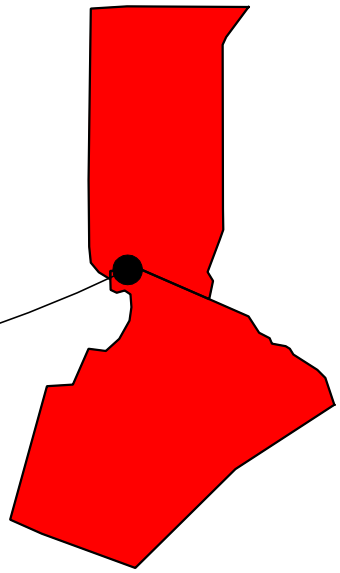
UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

100 0 100 200
SCALE

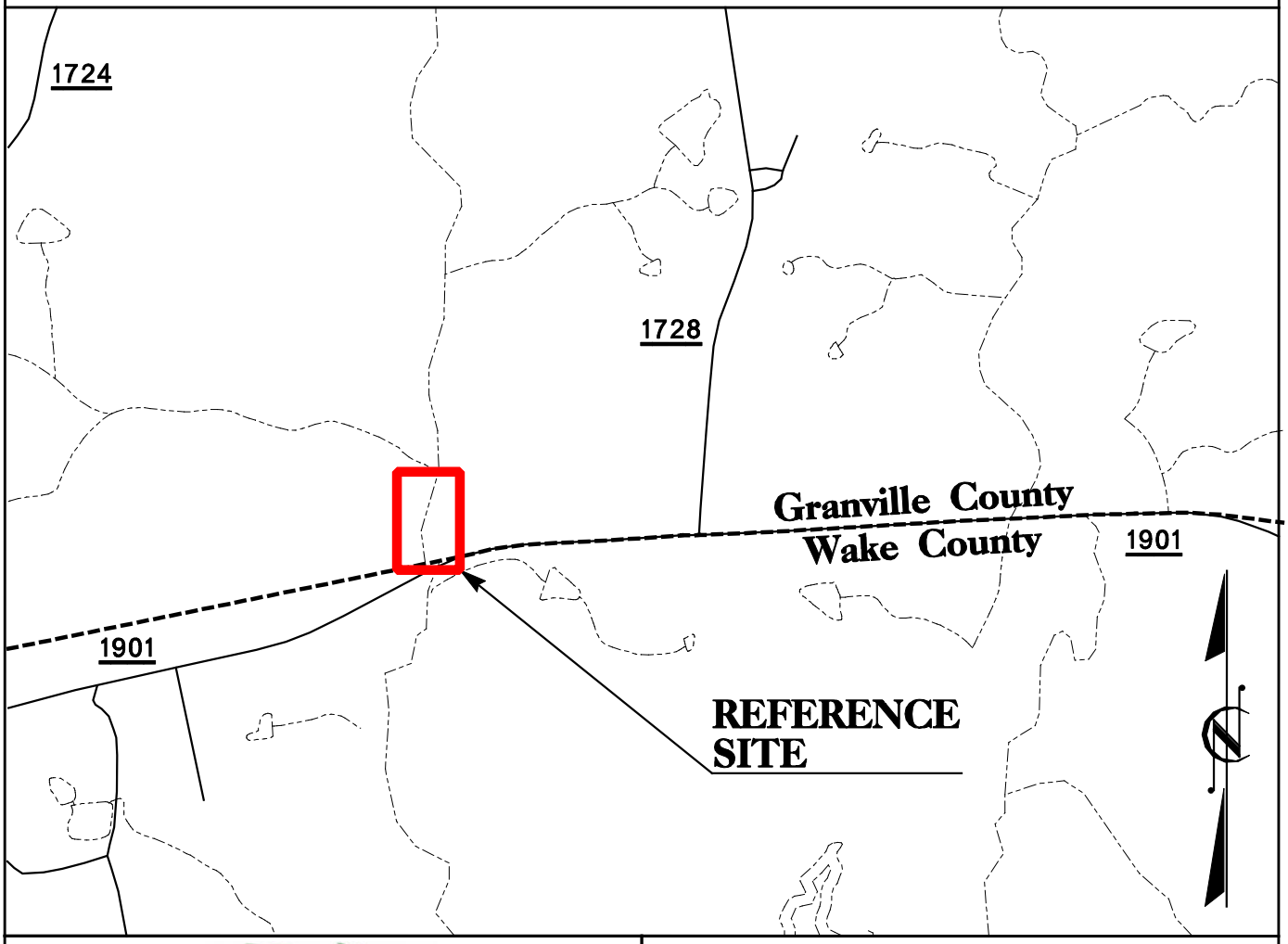
Date: 5/15/08

Figure: 5

Wake /Granville Counties North Carolina



0 1000 2000
FEET



Ecosystem Enhancement PROGRAM

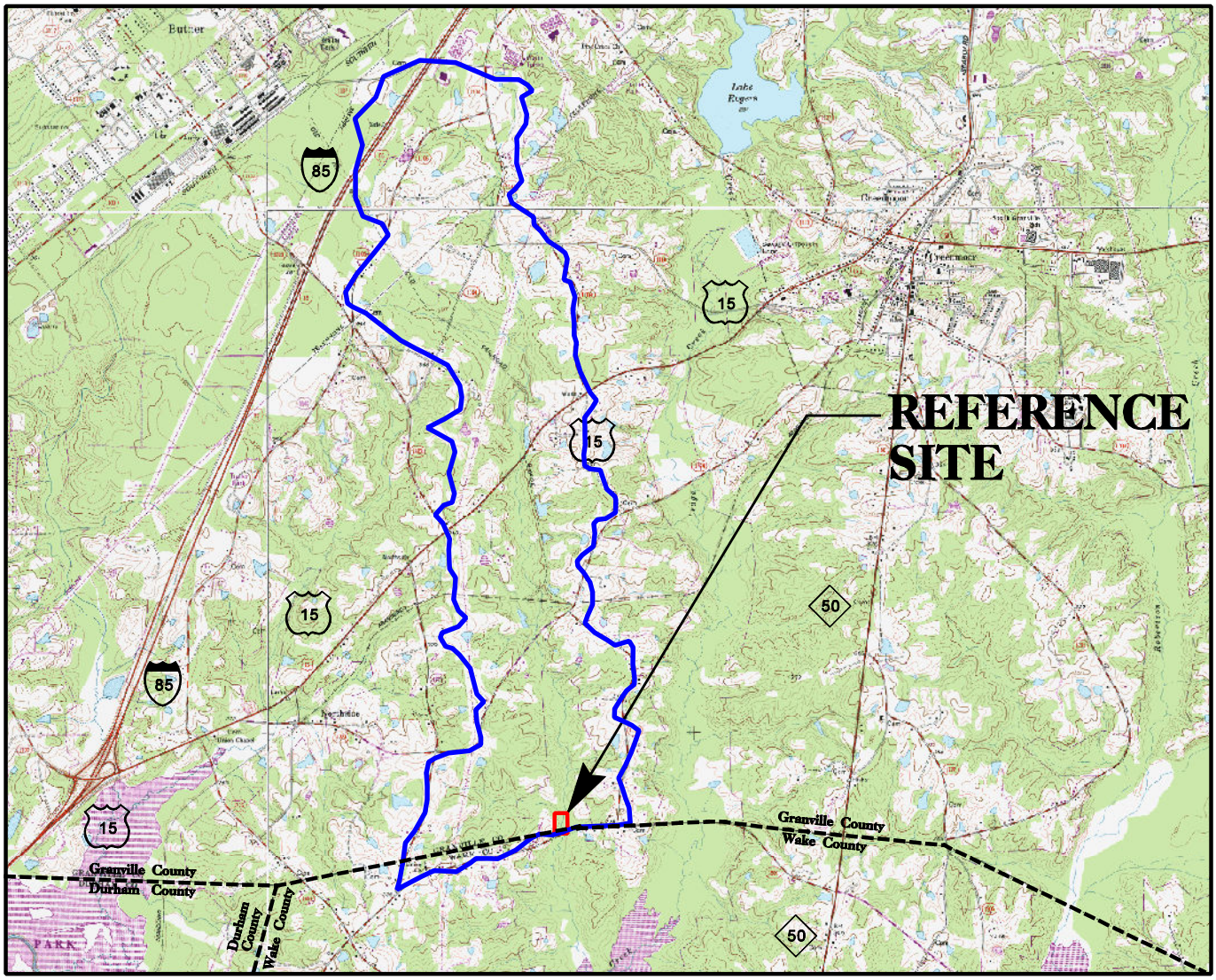
KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

UT to Ledge Creek Reference Site Vicinity Map

UT to Rocky River
Stream Restoration Plan
Cabarrus County, North Carolina

Date: 5/15/08

Figure: 6



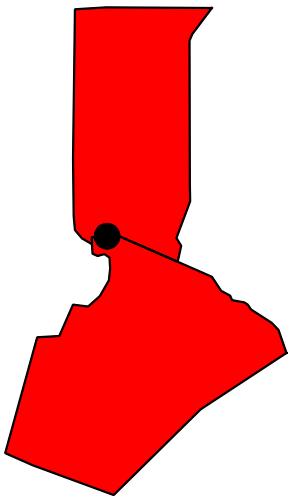
0 2000 4000
FEET

LEGEND

Watershed

Reference Site

Wake /Granville Counties North Carolina



Ecosystem Enhancement PROGRAM

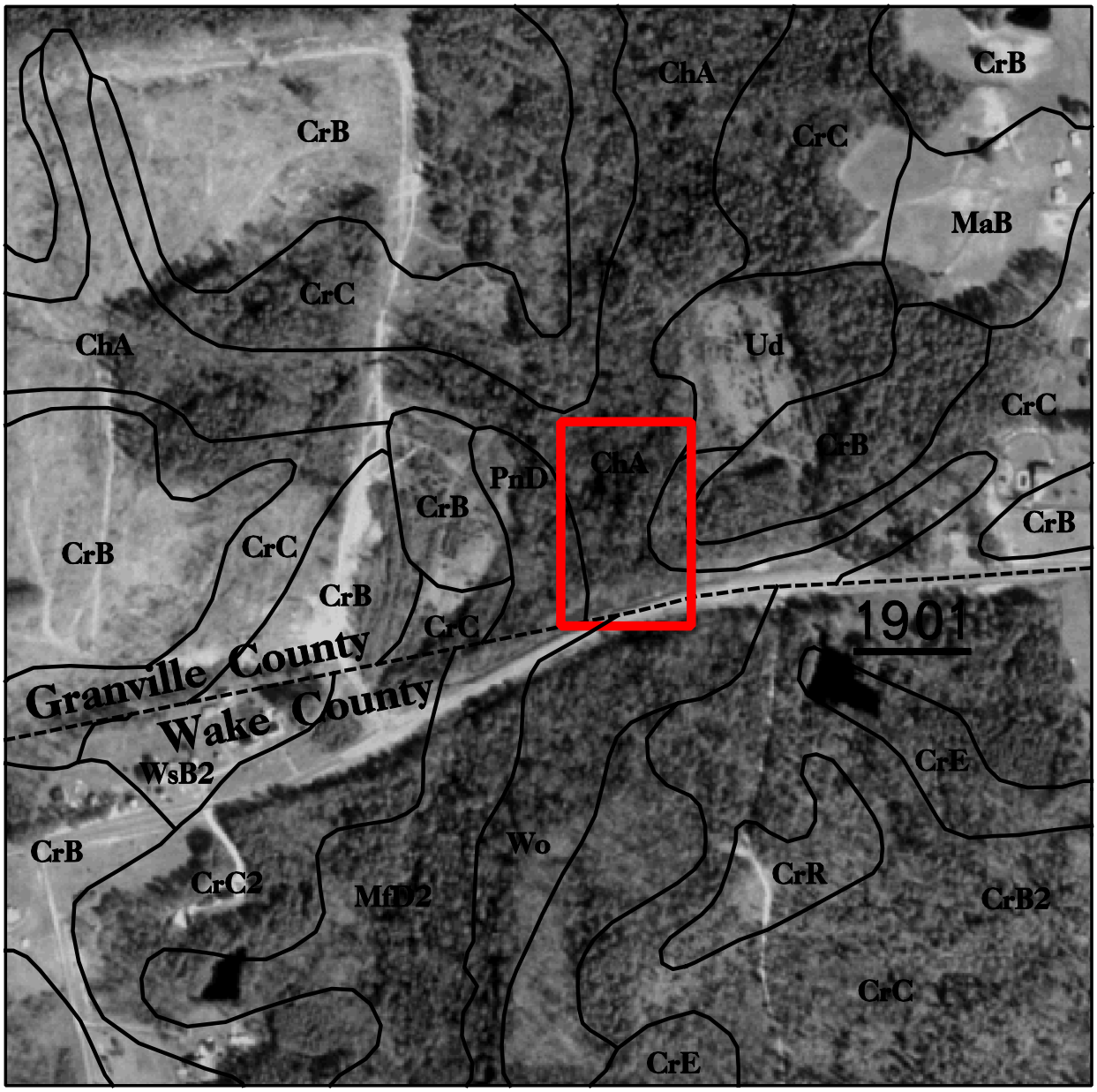
KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

UT to Ledge Creek Reference Site Watershed Topo Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 5/15/08

Figure: 7



Ecosystem Enhancement Program

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

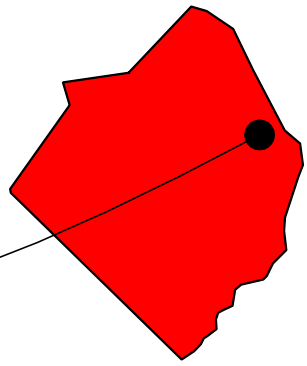
UT to Ledge Creek Reference Site Soil Survey Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 5/15/08

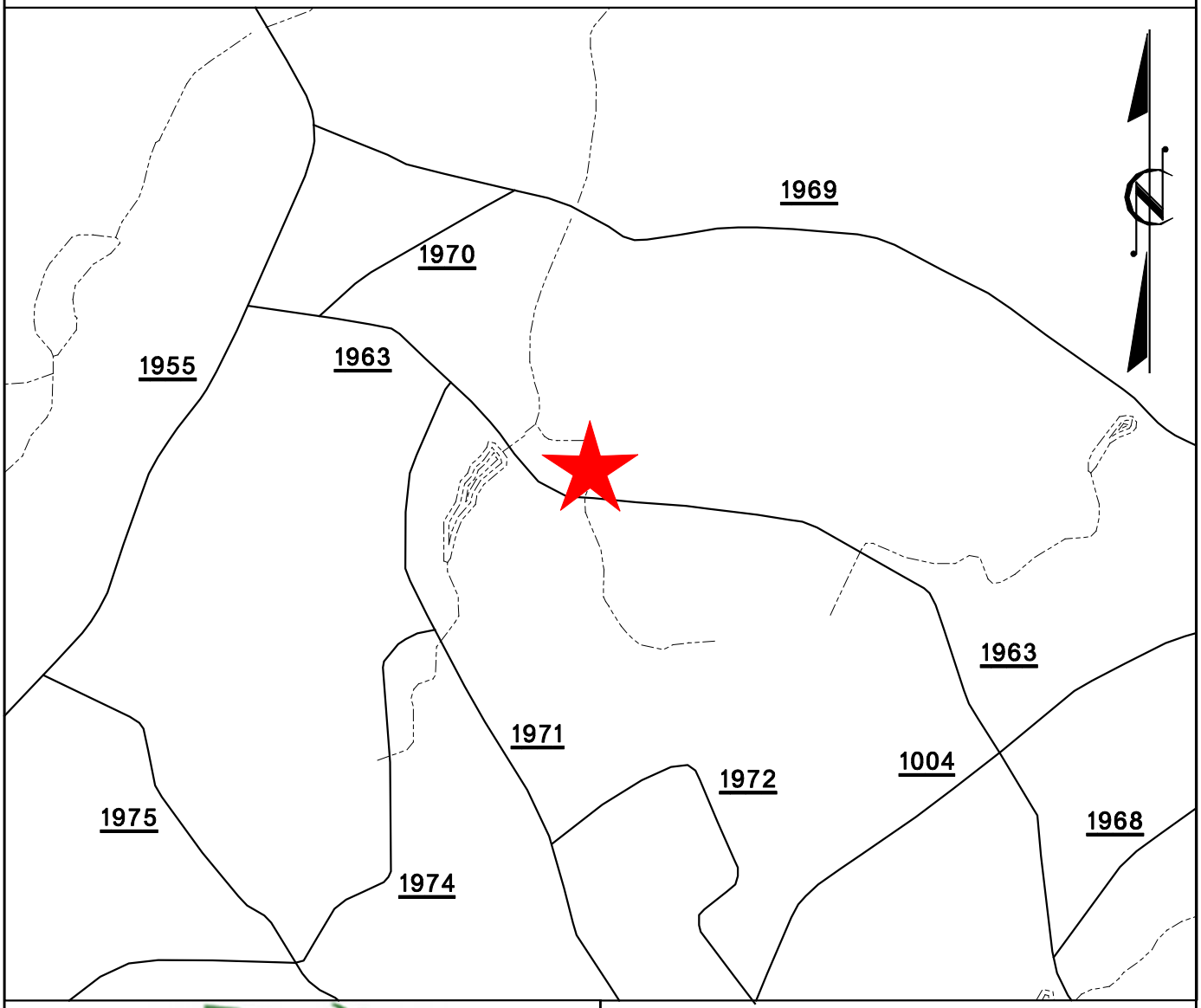
Figure: 8

Robeson County
North Carolina



REFERENCE SITE

0 2000 4000
FEET



Ecosystem Enhancement PROGRAM

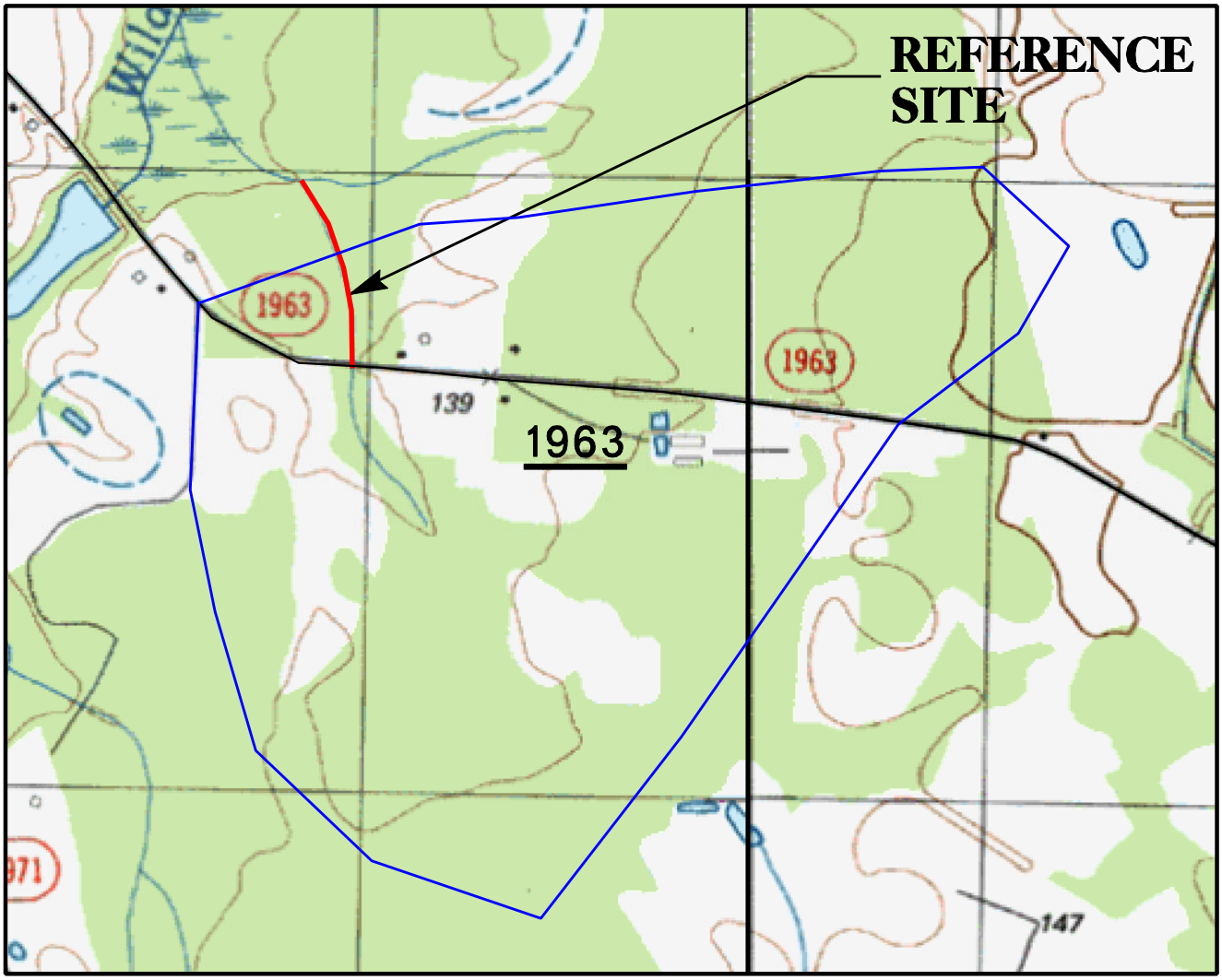
KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

UT to Wildcat Branch Reference Site Vicinity Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 05/15/08

Figure: 9

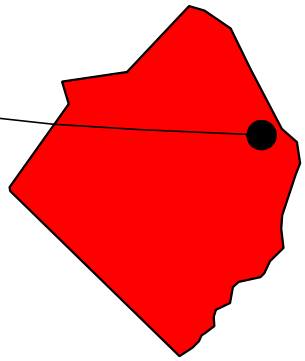


0 500 1000
FEET

LEGEND

Watershed
Project Area

Reference Site Robeson County North Carolina



Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

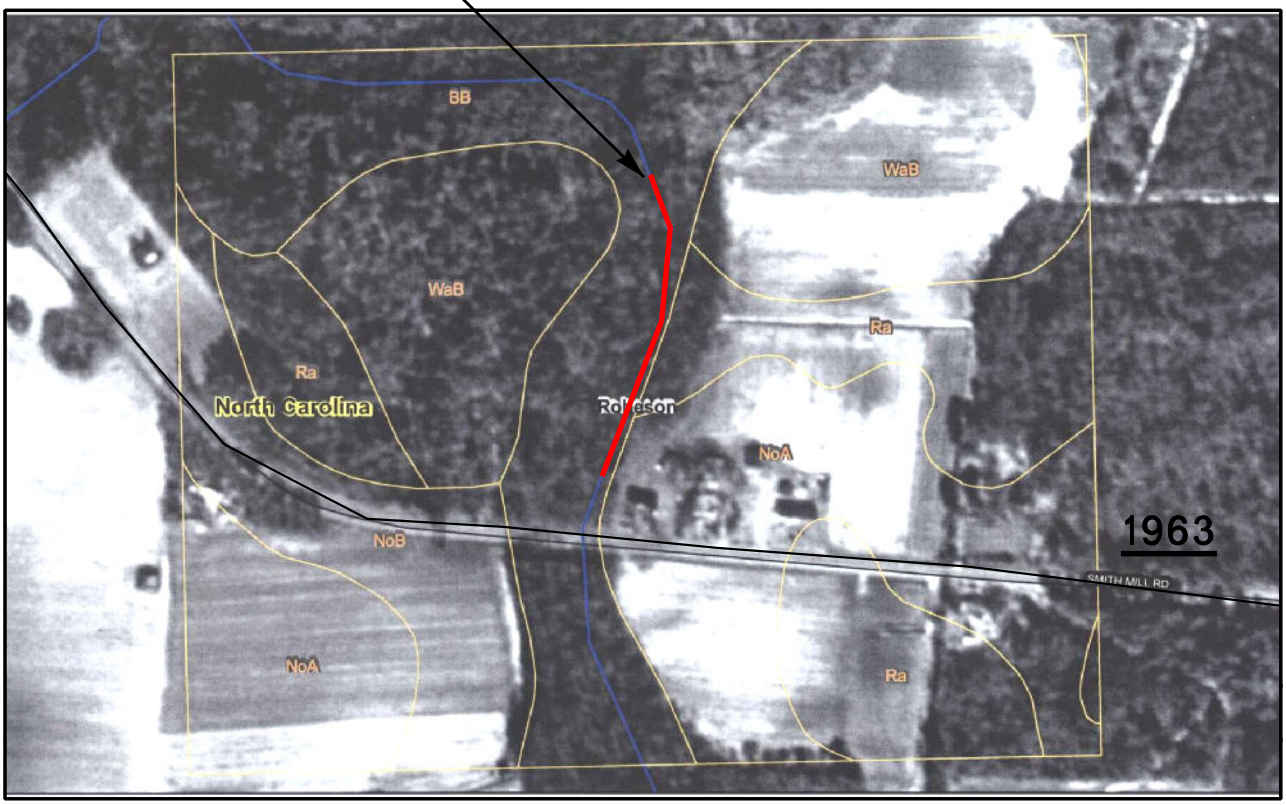
UT to Wildcat Branch Reference Site Watershed Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 05/15/08

Figure: 10

REFERENCE SITE



0 1000 2000
FEET

LEGEND

Symbol	Name
BB	Bibb
	Project Area

Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

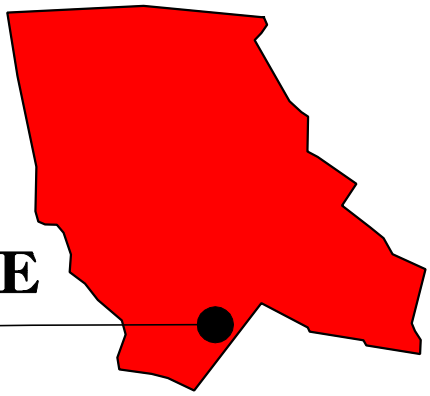
UT to Wildcat Branch Reference Site Soil Survey Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 05/15/08

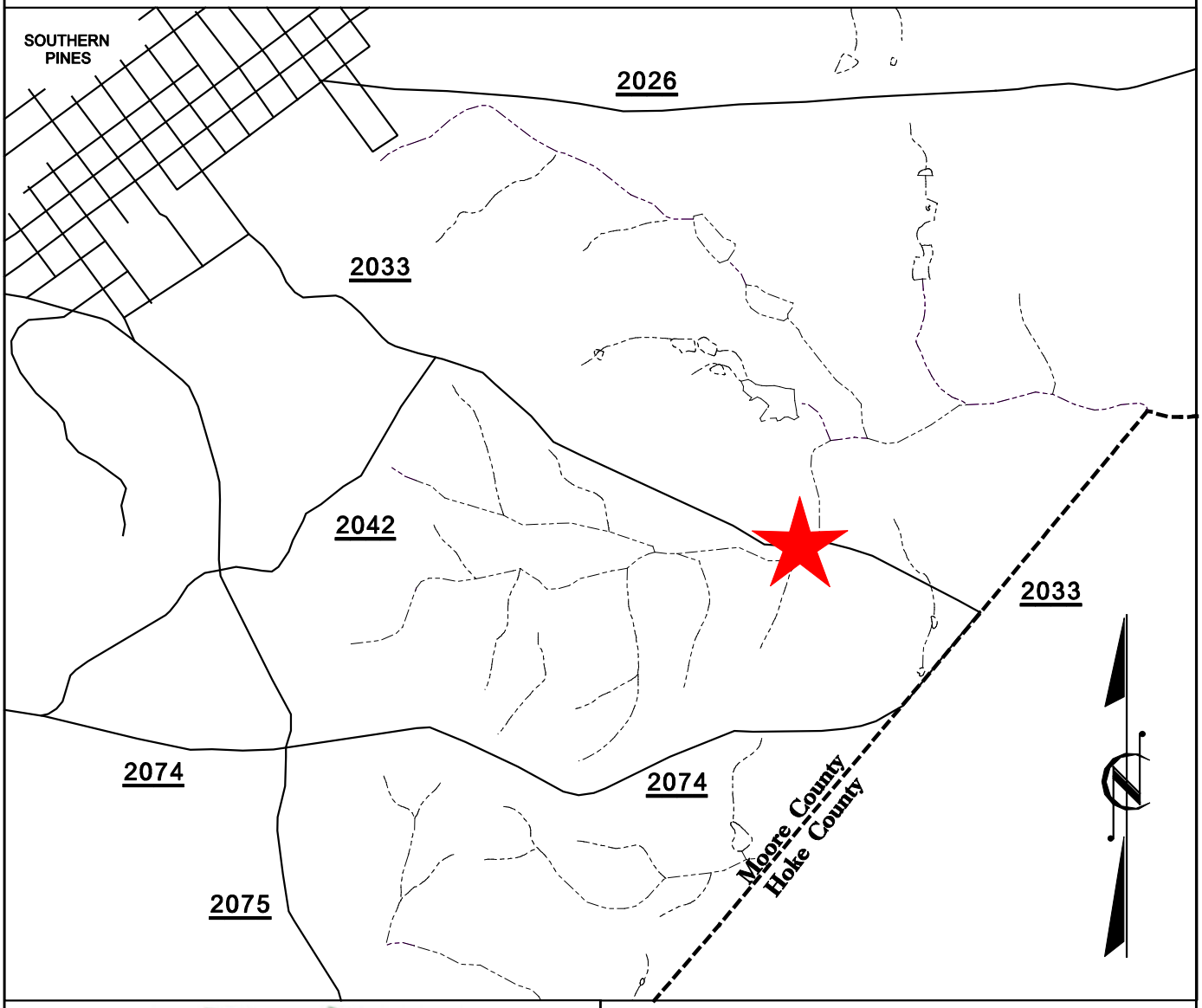
Figure: 11

Moore County
North Carolina



0 2000 4000
FEET

REFERENCE SITE



Ecosystem Enhancement PROGRAM

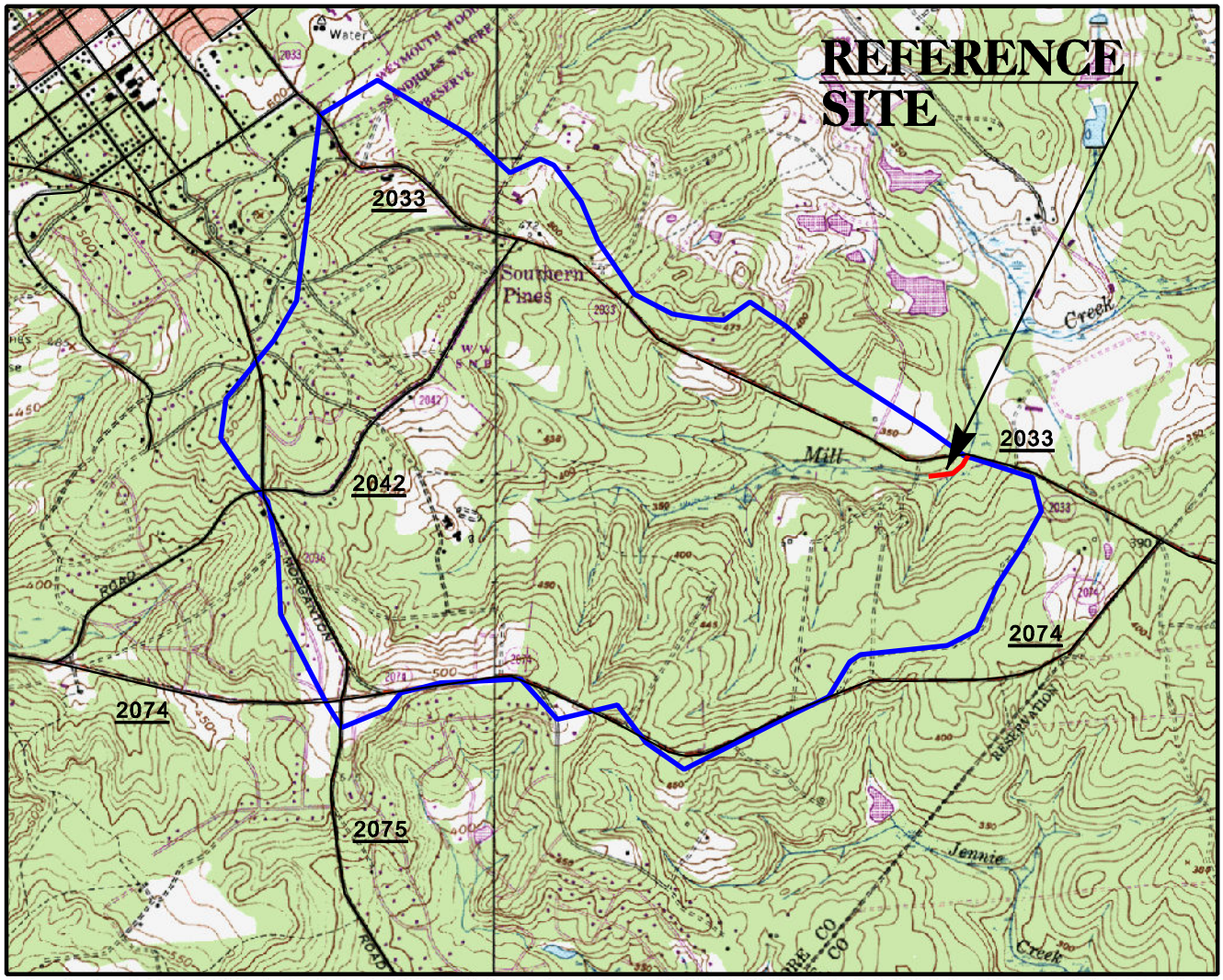
KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Mill Creek Reference Site Vicinity Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 05/15/08

Figure: 12



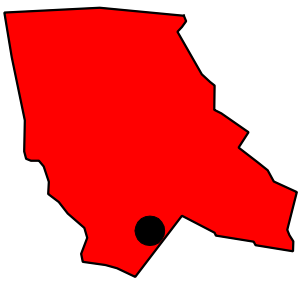
0 2000 4000

FEET

LEGEND

Watershed

Project Area



Reference Site Moore County North Carolina

Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

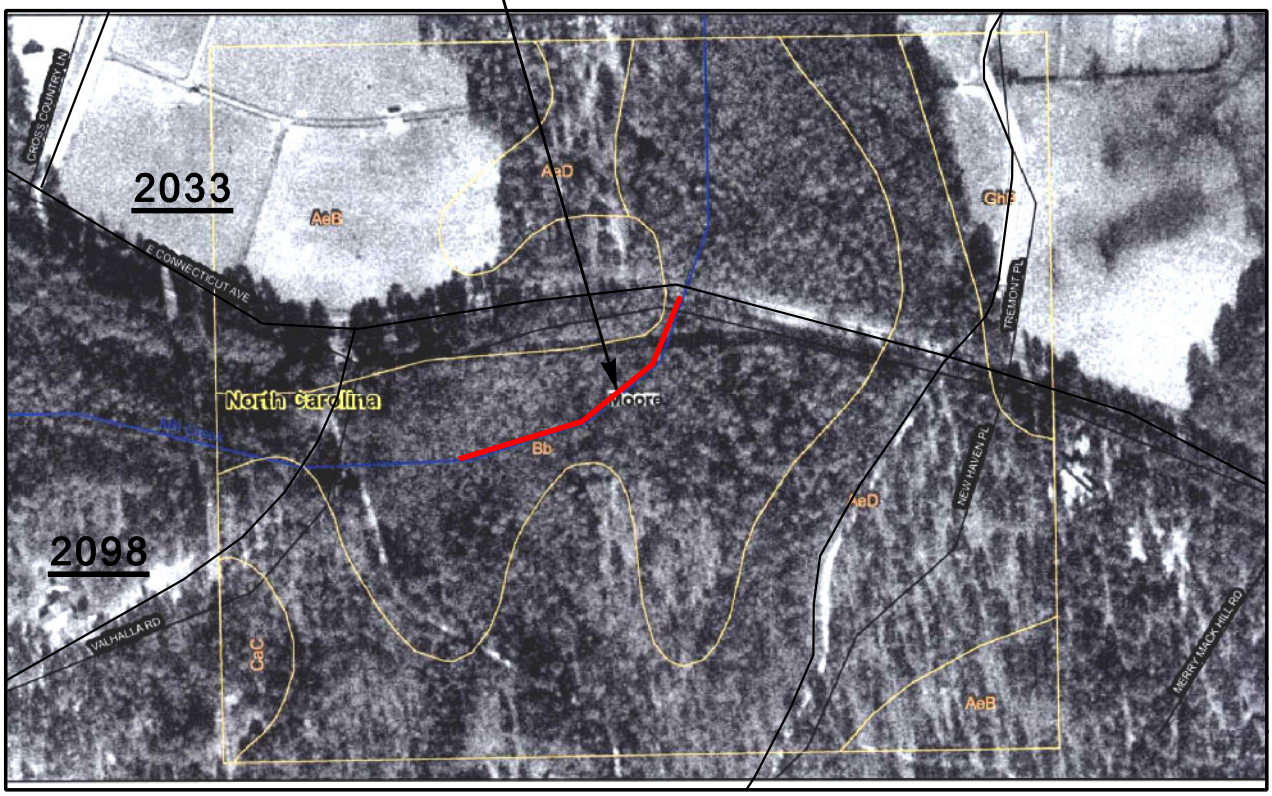
Mill Creek Reference Site Watershed Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 05/15/08

Figure: 13

REFERENCE SITE



0 500 1000

FEET

LEGEND

Symbol	Name
Bb	Bibb
	Project Area

Ecosystem Enhancement PROGRAM

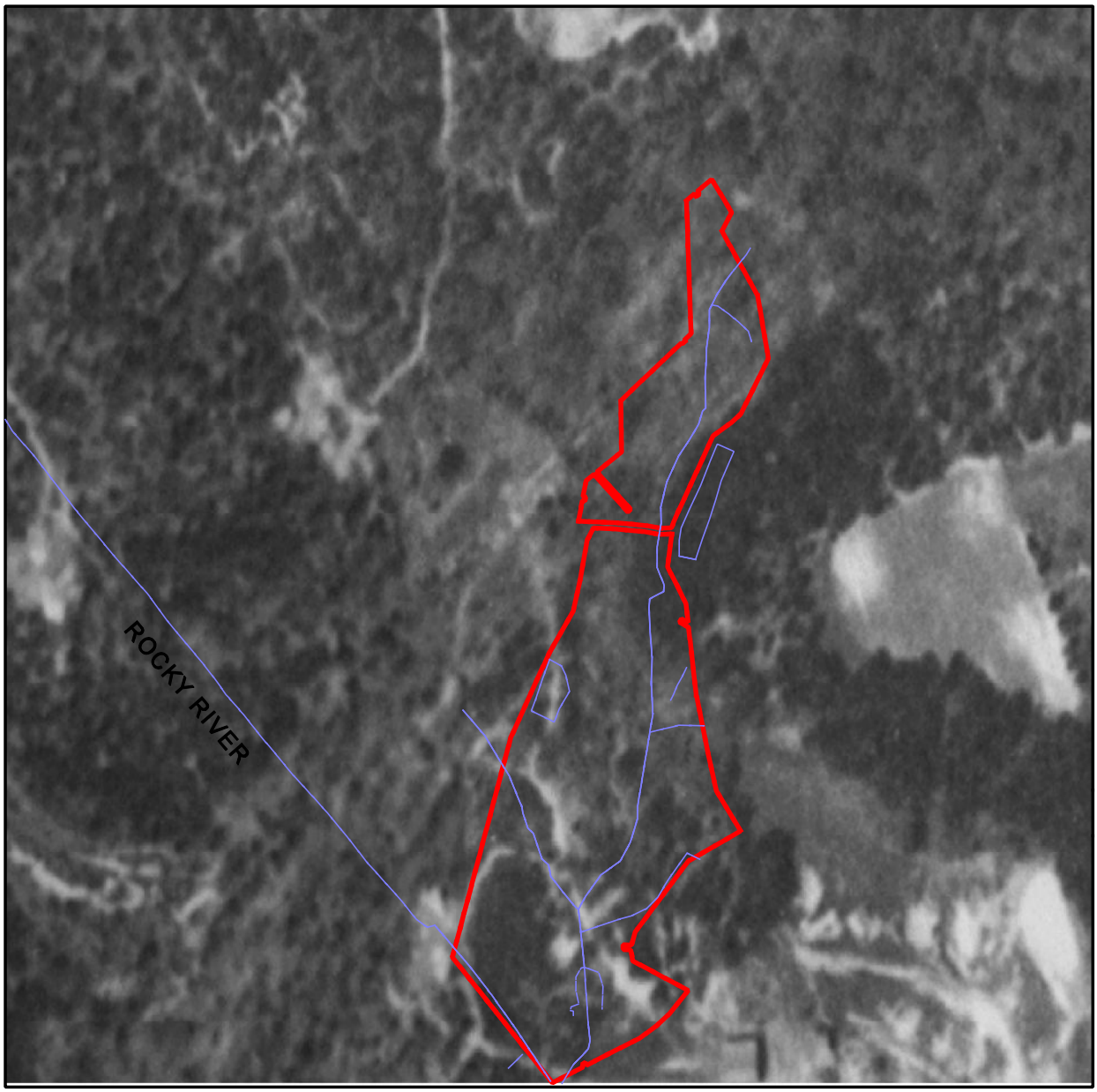
KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Mill Creek Reference Site Soil Survey Map

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 05/15/08

Figure: 14



0 500 1000

FEET

LEGEND

- Existing Channel
- Proposed Easement

Ecosystem Enhancement PROGRAM

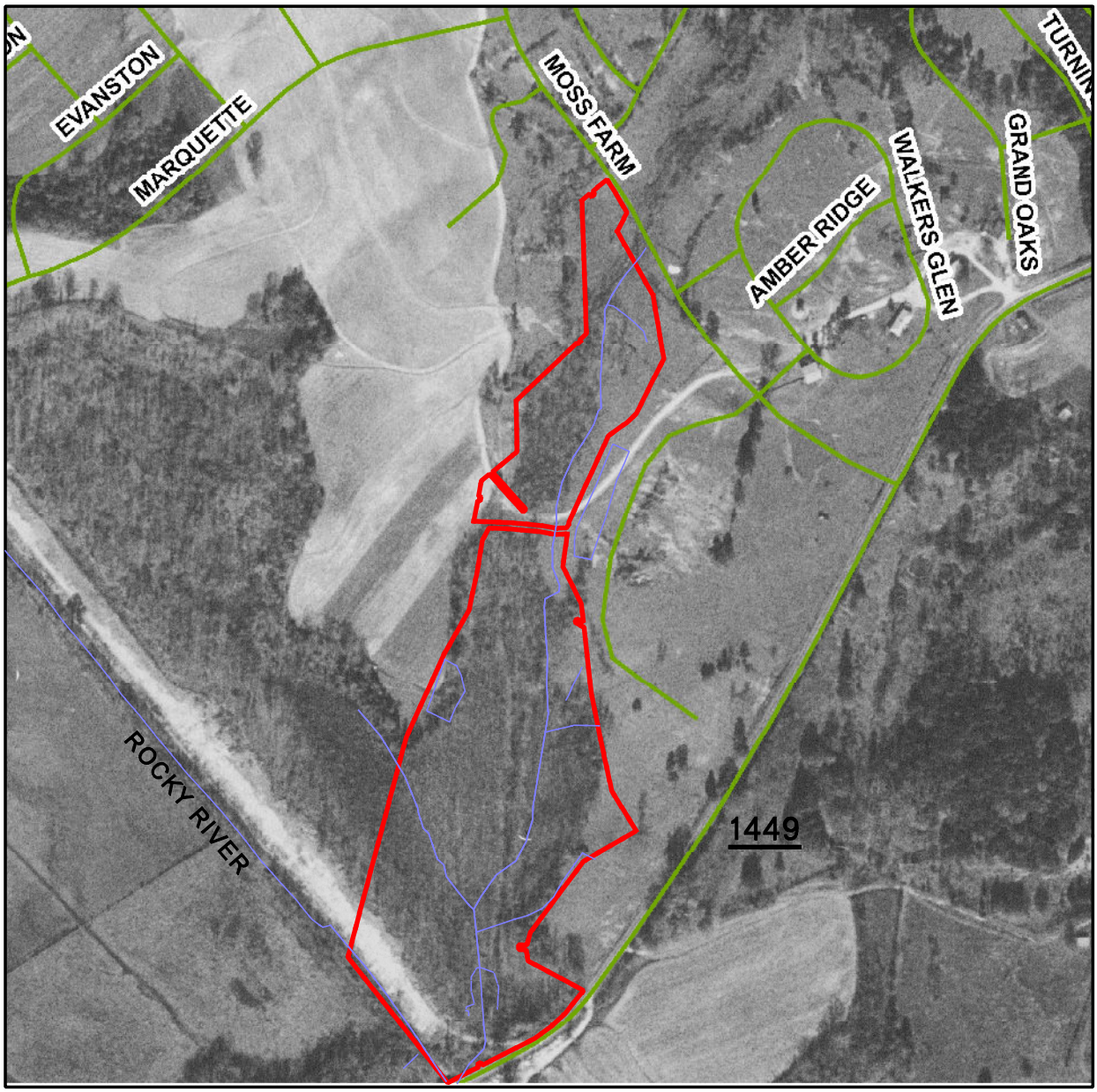
KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Historical Photo 1956

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 8/25/08

Figure: 15



0 500 1000

FEET

LEGEND

- Existing Channel
- Proposed Easement

Historical Photo 1975

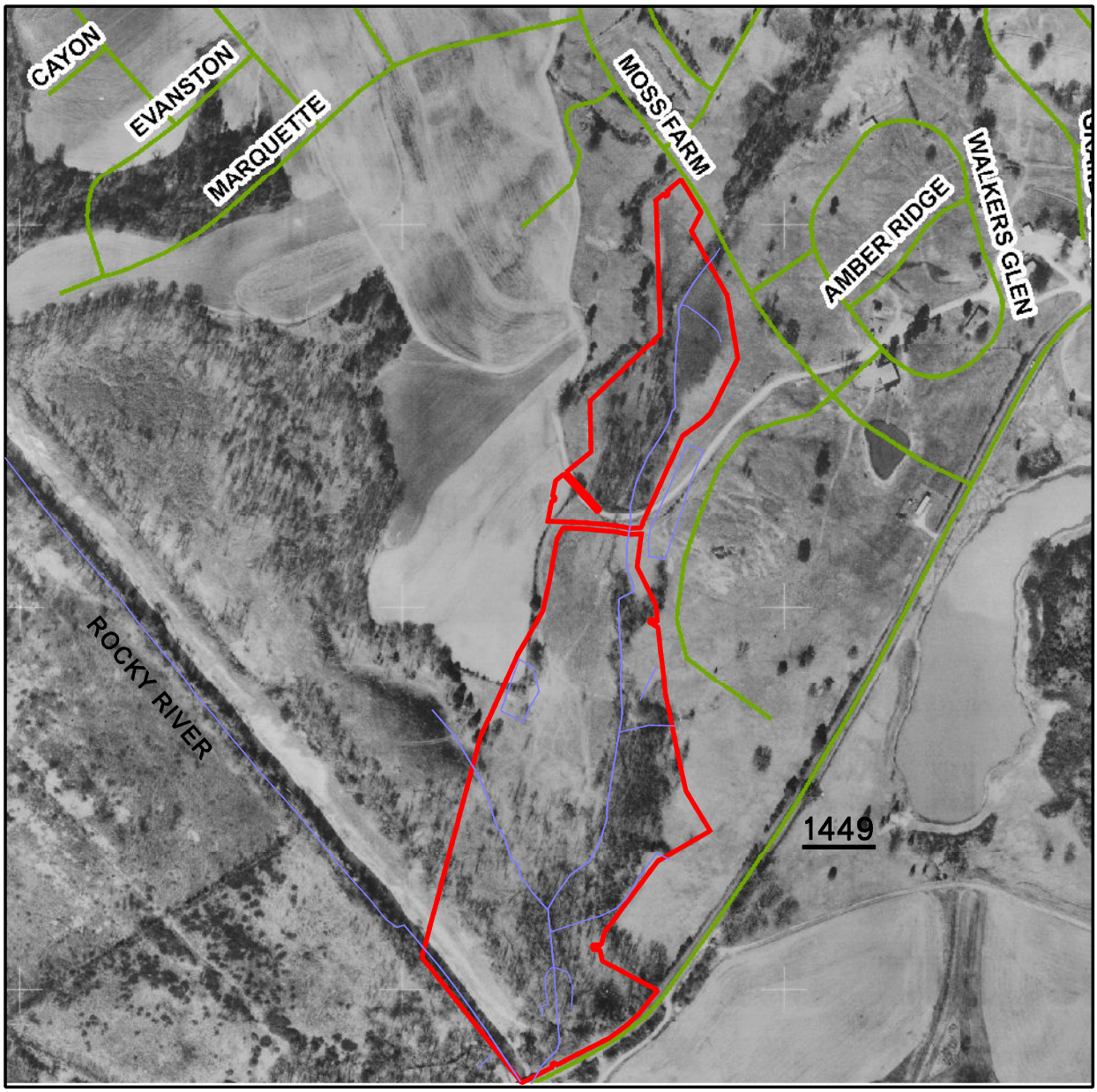
UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Date: 8/25/08

Figure: 16



0 500 1000

FEET

LEGEND

- Existing Channel
- Proposed Easement

Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Historical Photo 1986

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 8/25/08

Figure: 17

Ecosystem Enhancement Program

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

HARRIS ROAD

MOSS FARM STREET

ODELL ELEMENTARY SCHOOL
(opened summer 2007)

RETAINING WALL

RELIC BMP

DITCH

RELIC BMP

DITCH

DITCH

OVERHEAD UTILITY

Flow Direction

SANITARY SEWER

OVERFLOW CHANNEL

RELIC SEDIMENT BASIN

RELIC BMP

BMP

HARRIS MIDDLE SCHOOL

FOOT PATH

ROCKY RIVER

LEGEND

Proposed Easement

Tree

100 0 100 200

SCALE

Existing Conditions

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 5/15/08

Sheet 1

8/17/99

Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

10+00

11+00

12+00

13+00

14+00

15+00

16+00

17+00

18+00

19+00

20+00

PROPOSED BANKFULL

EXISTING SANITARY SEWER

ODELL ELEMENTARY SCHOOL

OVERHEAD UTILITY

EXISTING CHANNEL

RELIC BMP

BEGIN STREAM RESTORATION
STA. 10+00.00

PROPOSED EASEMENT

PROPOSED THALWEG

Flow Direction

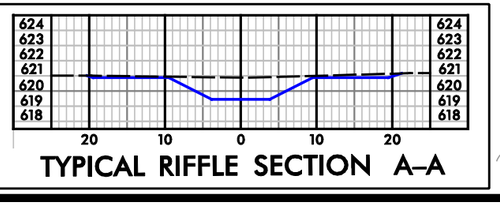
-MATCHLINE- SHEET 2B

HARRIS MIDDLE SCHOOL

BMP

LEGEND

- Proposed Easement
- Existing Fence
- Tree
- Existing Wetlands
- Rock Cross Vane
- Log Sill
- Log Vane w/Sill



TYPICAL RIFFLE SECTION A–A

25 0 25 50
SCALE

Proposed Conditions

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 5/15/08

Sheet 2A

8/26/2008
R:\stream\Proj\Report Stuff\RockyRiver_ps_proposed1.dgn

8/17/99

RELIC BMP

-MATCHLINE- SHEET 2A

EXISTING CHANNEL

21+00

22+00

23+00

24+00

25+00

26+00

27+00

28+00

PROPOSED BANKFULL

PROPOSED THALWEG

PROPOSED EASEMENT

EXISTING RETAINING WALL

Flow Direction

EXISTING SANITARY SEWER

PROPOSED EASEMENT

HARRIS MIDDLE SCHOOL

RELIC BMP

-MATCHLINE- SHEET 2C

FOOT PATH

WLB

SS

E

LEGEND

- Proposed Easement
- Existing Fence
- Tree
- Existing Wetlands
- Double Step Log Cross Vane
- Log Sill
- Log Vane w/Sill

25 0 25 50

SCALE

Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Proposed Conditions

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 5/15/08

Sheet 2B

8/26/2008
R:\stream\Proj\Report Stuff\RockyRiver_ps_proposed2.dgn

8/17/99

–MATCHLINE– SHEET 2B

EXISTING CHANNEL

30+00

31+00

PROPOSED BANKFULL

32+00

33+00

34+00

PROPOSED EASEMENT

RELIC BMP

RELIC SEDIMENT BASIN

35+00

36+00

37+00

Flow Direction

EXISTING SANITARY SEWER

PROPOSED THALWEG

INTERMITTENT CHANNEL

PROPOSED EASEMENT

END STREAM RESTORATION
STA. 37+30.33

ROCKY RIVER

WLB

SS

E

LEGEND

- Proposed Easement
- Existing Fence
- Tree
- Existing Wetlands
- Rock Cross Vane
- Log Sill

25 0 25 50
SCALE

Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Proposed Conditions

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 5/15/08 | Sheet 2C

8/26/2008
R:\Stream Proj\Report Stuff\RockyRiver_ps_proposed3.dgn

5/28/99

LONGITUDINAL PROFILE

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
ROCKY RIVER	3
PROJECT ENGINEER	

BEGIN UT ROCKY RIVER
STA 10+00.00
ELEV = 623.43

PROPOSED BANKFULL GRADELINE

EXISTING GROUND ALONG THALWEG

PROPOSED THALWEG INVERT

VPI 24+00
ELEV= 614.73

630
620
610
600

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

LONGITUDINAL PROFILE

VPI 24+00
ELEV= 614.73

PROPOSED BANKFULL GRADELINE

EXISTING GROUND ALONG THALWEG

PROPOSED THALWEG INVERT

END UT ROCKY RIVER
STA 37+30.33
ELEV = 607.43

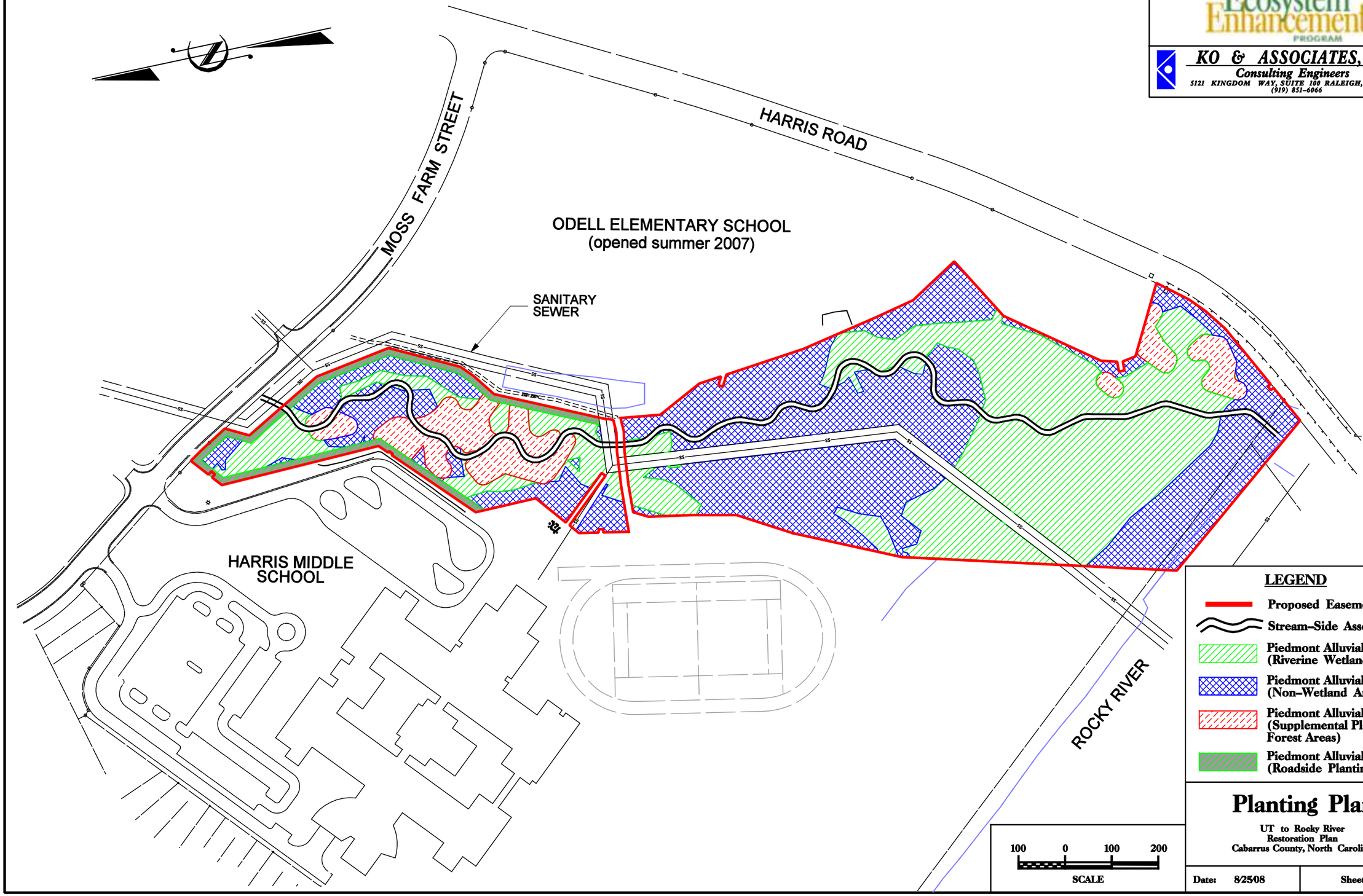
630
620
610
600

24 25 26 27 28 29 30 31 32 33 34 35 36 37

8/26/2008
P:\stream\Proj\Report Stuff\RockyRiver_ps_profile_plan.dgn

Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066



LEGEND

- Proposed Easement
- Stream-Side Assemblage
- Piedmont Alluvial Forest (Riverine Wetland Areas)
- Piedmont Alluvial Forest (Non-Wetland Areas)
- Piedmont Alluvial Forest (Supplemental Planting in Forest Areas)
- Piedmont Alluvial Forest (Roadside Planting Areas)

100 0 100 200
SCALE

Planting Plan

UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 8/25/08

Sheet 4

APPENDIX 2
MORPHOLOGIC TABLES

Morphological Characteristics of UT to Rocky River and Reference

Restoration Plan: **UT to Rocky River Stream Restoration Site**
County: **Cabarrus County, NC**
Design by: **RVS**
Checked by: **RKW**

ITEM	Existing Conditions	Existing Conditions	Reference Reach	Reference Reach	Reference Reach	Proposed Conditions
LOCATION	Beaver Influence Reach	Gully Reach	UT Ledge Creek	UT to WildCat Branch	Mill Creek	UT Rocky River
STREAM TYPE	Degraded C5/D5	G5	C5	E5	E5	C5/E5
DRAINAGE AREA, Ac - Sq Mi	410 Ac - 0.64 Sq Mi	410 Ac - 0.64 Sq Mi	2415 Ac - 3.77 Sq Mi	282 Ac - 0.44 Sq Mi	1229 Ac - 1.92 Sq Mi	493 Ac - 0.77 Sq Mi
BANKFULL WIDTH (W_{bkf}), ft	5.1 ft	4.7 ft	14.7 ft	8.2 ft	11.3 ft	9.5 ft
BANKFULL MEAN DEPTH (d_{bkf}), ft	0.17 ft	0.89 ft	1.25 ft	1.03 ft	1.85 ft	0.95 ft
WIDTH/DEPTH RATIO (W_{bkf}/d_{bkf})	29.8	5.3	11.7	8.0	6.1	10.0
BANKFULL X-SECTION AREA (A_{bkf}), ft^2	0.9 ft^2	4.2 ft^2	18.3 ft^2	8.5 ft^2	21.0 ft^2	9.0 ft^2
BANKFULL MEAN VELOCITY, fps	N/A	3.8 fps	1.2 fps	1.0 fps	1.5 fps	1.9 fps
BANKFULL DISCHARGE, cfs	N/A	15.7 cfs	22.3 cfs	8.5 cfs	30.6 cfs	18.0 cfs
BANKFULL MAX DEPTH (d_{max}), ft	0.40 ft	1.06 ft	1.75 ft	1.57 ft	2.58 ft	1.43 ft
BANK HEIGHT RATIO	1.00	2.12	1.54	1.09	1.09	1.00
WIDTH Flood-Prone Area (W_{fpa}), ft	270.0 ft	9.7 ft	63.0 ft	130.0 ft	300.0 ft	300.00 ft
ENTRENCHMENT RATIO (ER)	53.3	2.0	4.3	15.9	26.5	31.6
MEANDER LENGTH (Lm), ft	83 - 83 ft	83 - 83 ft	134.0 - 140.0 ft	22.5 - 29.0 ft	37.7 - 72.6 ft	57.0 - 133.0 ft
RATIO OF Lm TO W_{bkf}	16.4 - 16.4	17.6 - 17.6	9.1 - 9.6	2.7 - 3.5	3.3 - 6.4	6.0 - 14.0
RADIUS OF CURVATURE, ft	6 - 15 ft	6 - 15 ft	14.9 - 22.2 ft	10.9 - 15.3 ft	9.7 - 29.8 ft	28.5 - 38.0 ft
RATIO OF Rc TO W_{bkf}	1.2 - 2.9	1.3 - 3.1	1.0 - 1.5	1.3 - 1.9	0.9 - 2.6	3.0 - 4.0
BELT WIDTH, ft	41.00 - 41.00 ft	41.00 - 41.00 ft	48.0 - 55.0 ft	13.8 - 19.4 ft	15.1 - 27.0 ft	19.0 - 57.0 ft
MEANDER WIDTH RATIO	8.09 - 8.09 ft	8.70 - 8.70 ft	3.3 - 3.8	1.7 - 2.4	1.3 - 2.4	2.0 - 6.0
SINUOSITY (K)	1.05	1.05	1.26	1.15	1.18	1.24
*VALLEY SLOPE, ft/ft	0.0084 ft/ft	0.0084 ft/ft	0.0028 ft/ft	0.0027 ft/ft	0.0031 ft/ft	0.0047 ft/ft
**AVERAGE SLOPE (S), ft/ft	0.0066 ft/ft	0.0219 ft/ft	0.0005 ft/ft	0.0024 ft/ft	0.0026 ft/ft	0.0022 ft/ft
RIFFLE SLOPE, ft/ft	0.0184 ft/ft	0.0553 ft/ft	0.0010 ft/ft	0.0022 ft/ft	0.0037 ft/ft	0.0033 ft/ft
RATIO OF RIFFLE SLOPE TO AVERAGE SLOPE	2.8	2.5	2.0	0.9	1.4	1.5
POOL SLOPE, ft/ft	0.0023 ft/ft	0.0097 ft/ft	0.0005 ft/ft	0.0013 ft/ft	0.0028 ft/ft	0.0000 ft/ft
RATIO OF POOL SLOPE TO AVERAGE SLOPE	0.3	0.4	1.1	0.6	1.1	0.0
MAX POOL DEPTH, ft	1.38 ft	2.32 ft	2.67 ft	1.75 ft	3.12 ft	1.90 ft
RATIO OF POOL DEPTH TO AVERAGE BANKFULL DEPTH	8.1	2.6	2.1	1.7	1.7	2.0
POOL WIDTH, ft	9.7 ft	4.5 ft	13.56 ft	8.83 ft	11.85 ft	10.93 ft
RATIO OF POOL WIDTH TO BANKFULL WIDTH	1.9	1.0	0.93	1.08	1.05	1.15
POOL TO POOL SPACING, ft	7.16 - 42.49 ft	11.43 - 54.09 ft	12.0 - 72.0 ft	14.0 - 16.6 ft	11.4 - 61.0 ft	9.5 - 57.0 ft
RATIO OF POOL TO POOL SPACING TO BANKFULL WIDTH	1.41 - 8.38	2.43 - 11.48	0.8 - 4.9	1.7 - 2.0	1.0 - 5.4	1.0 - 6.0

* Radius, Belt Width, Meander Length, Valley Slope, and Sinuosity were taken from topographical data obtained on the entire site for existing conditions (i.e. data was not taken along reach lenghts).

** Average Slope was taken along a reach length for existing conditions, therefore Valley Slope cannot be divided by Average Slope to get the Site's Sinuosity.

APPENDIX 3
PROJECT SITE PHOTOGRAPHS

Silted in culvert at upstream end of Site.

Silt fence traversing channel causing backwater through upstream culvert.

Sediment basin inline with UT Rocky River's channel. Also, beavers have built a large dam that can be seen on far right side of picture.

Remnant beaver dam and backwater influence its causing.

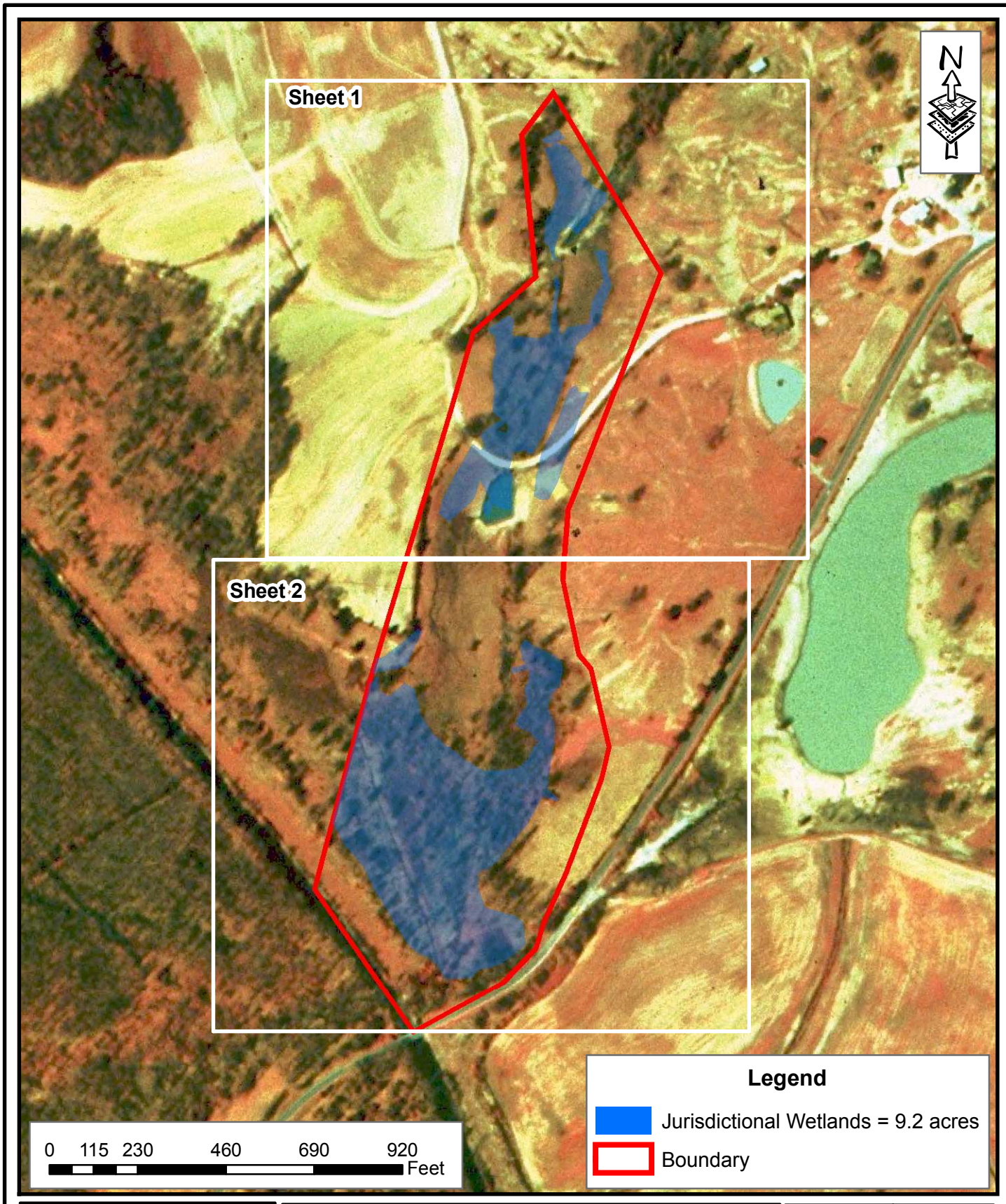
Floodplain flow from less than bankfull event.

Beaver dam near confluence with Rocky River

Backwater effect from sediment basin and beaver dams.

Mass wasting of channel banks through a gully reach.

APPENDIX 4
PROJECT SITE ROUTINE WETLAND DETERMINATION DATA FORMS

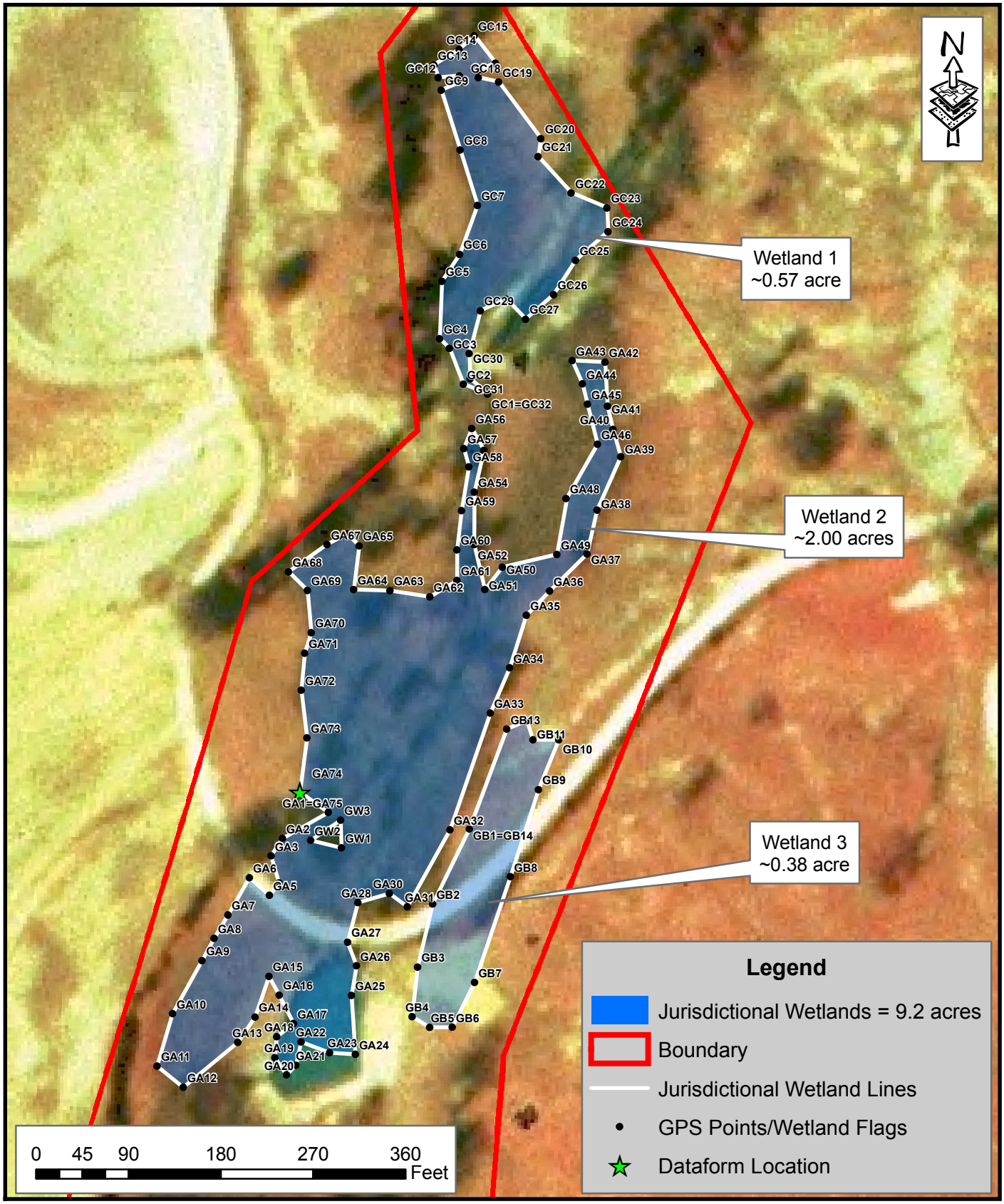


Axiom Environmental, Inc.
2126 Rowland Pond Drive
Willow Spring, NC 27592
(919) 215-1693
(919) 3413839 fax

KEY TO SHEETS
JURISDICTIONAL WETLAND DELINEATION
UT TO THE ROCKY RIVER
Cabarrus County, North Carolina

Dwn. by: CLF
Date: March 2008
Project: 07-015

KEY TO SHEETS

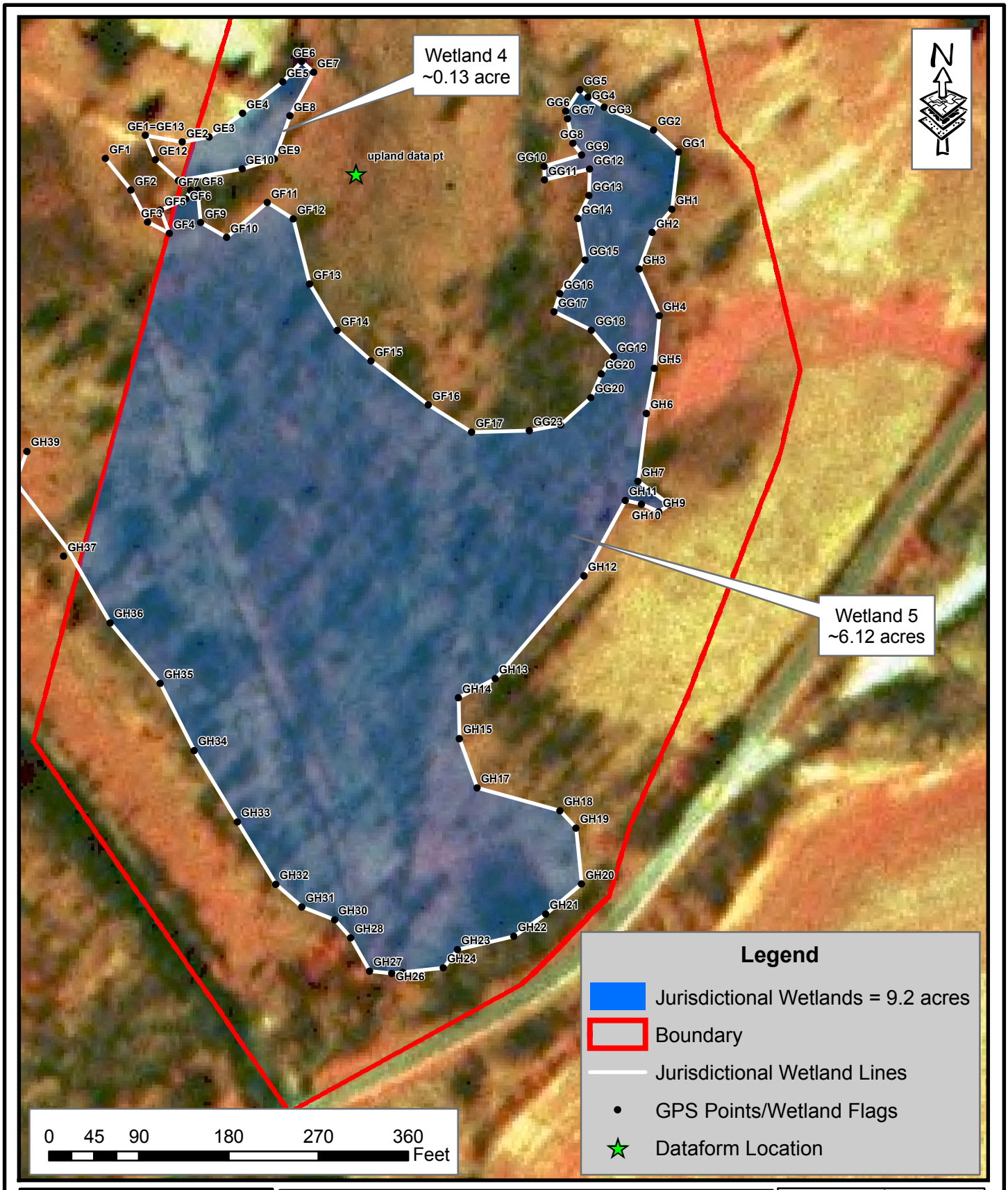


Axiom Environmental, Inc.
2126 Rowland Pond Drive
Willow Spring, NC 27592
(919) 215-1693
(919) 3413839 fax

SHEET 1
JURISDICTIONAL WETLAND DELINEATION
UT TO THE ROCKY RIVER
Cabarrus County, North Carolina

Dwn. by: CLF
Date: March 2008
Project: 07-015

SHEET 1



Axiom Environmental, Inc.
2126 Rowland Pond Drive
Willow Spring, NC 27592
(919) 215-1693
(919) 3413839 fax

SHEET 2
JURISDICTIONAL WETLAND DELINEATION
UT TO THE ROCKY RIVER
Cabarrus County, North Carolina

Dwn. by: CLF
Date: March 2008
Project: 07-015

SHEET 2

GA 74 UP

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

Project / Site: UT Rocky River Applicant / Owner: NC Ecosystem Enhancement Program Investigator: Axiom Environmental Inc. (Grant Lewis)	Date: 3/6/08 County: Cabarrus State: NC
Do normal circumstances exist on the site? Yes ✓ No ___ Is the site significantly disturbed (Atypical situation)? Yes ___ No ✓ Is the area a potential problem area? Yes ___ No ✓ (explain on reverse if needed)	Community ID: Shrub Scrub Transect ID: GA 74 Plot ID: UP

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Aster sp	H	—	9.		
2. Eupatorium cap.	H	FACW	10.		
3. Rubus sp	H	—	11.		
4. Allium canadense	H	FACU-	12.		
5. Carduus sp	H	—	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). —

Remarks:

HYDROLOGY

___ Recorded Data (Describe In Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

✓ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12"
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators:
- ___ Oxidized Roots Channels in Upper 12"
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): Chewacla Drainage Class: somewhat Poorly

Taxonomy (Subgroup): Fluvaquentic Dystrocrept Confirm Mapped Type? Yes ___ No ✓

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10 YR 4/4			clay loam
2+	B+	5 YR 4/6			Sandy clay

Hydric Soil Indicators:

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

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes ___ No ✓
Wetland Hydrology Present? Yes ___ No ✓
Hydric Soils Present? Yes ___ No ✓

Is the Sampling Point Within a Wetland? Yes ___ No ✓

Remarks:

GA74 Wet

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

Project / Site: UT Rocky River Applicant / Owner: NC Ecosystem Enhancement Program Investigator: Axiom Environmental Inc. (Grant Lewis)	Date: 3/6/08 County: Cabarrus State: NC
Do normal circumstances exist on the site? Yes ✓ No ___ Is the site significantly disturbed (Atypical situation)? Yes ___ No ✓ Is the area a potential problem area? Yes ___ No ✓ (explain on reverse if needed)	Community ID: Shrub Scrub Transect ID: GA 74 Plot ID: Wet

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Acer rubrum	T	FAC	9.		
2. Rosa sp	S	—	10.		
3. Juncus effusus	H	FACW+	11.		
4. Carex spp	H	—	12.		
5. Microstegium vimenium	H	FAC	13.		
6.			14.		
7.			15.		
8.			16.		

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

✓ No Recorded Data Available

Field Observations:

Depth of Surface Water: 1 (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ✓ Inundated
- ✓ Saturated in Upper 12"
- ✓ Water Marks
- ___ Drift Lines
- ✓ Sediment Deposits
- ✓ Drainage Patterns in Wetlands

Secondary Indicators:
- ✓ Oxidized Roots Channels in Upper 12"
- ✓ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): Chewacla — Drainage Class: Somewhat Poorly
Wa - Typic Fluvaquents
Taxonomy (Subgroup): Ch - Fluvaquentic Dystrochrepts — Confirm Mapped Type? Yes (No) ✓

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10 YR 5/2			Silt loam
2-6	A	10 YR 5/3	10 YR 5/2	Prominent / Distinct	Silty clay loam
6+	B+G	10 YR 5/2			clay loam

Hydric Soil Indicators:

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

Remarks:
Probably an inclusion of Wehadkee soils

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes ✓	No ___	Is the Sampling Point Within a Wetland?	Yes ✓ No ___
Wetland Hydrology Present?	Yes ✓	No ___		
Hydric Soils Present?	Yes ✓	No ___		

Remarks:

Upland Plot

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

Project / Site: UT Rocky River
Applicant / Owner: NC Ecosystem Enhancement Program
Investigator: Axiom Environmental Inc (Grant Lewis)

Date: 3/6/08
County: Cabarrus
State: NC

Do normal circumstances exist on the site? Yes ✓ No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No ✓
Is the area a potential problem area? Yes ___ No ✓
(explain on reverse if needed)

Community ID: shrub scrub
Transect ID: up Plot
Plot ID: up Plot

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Liquidambar styraciflua Sap		FAC+
2. Baccharis halimifolia	S	FACW+
3. Rosa sp	S	—
4. Ulmus alata	SAP	FACU+
5. Juncus effusus	H	FACW+
6. Carex spp	H	—
7. Andropogon virginicus	H	FAC-
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). > 50%

Remarks:

HYDROLOGY

___ Recorded Data (Describe In Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other

✓ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)
Depth to Free Water in Pit: 0 (in.)
Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators

Primary Indicators:
___ Inundated
✓ Saturated in Upper 12"
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands

Secondary Indicators:
✓ Oxidized Roots Channels in Upper 12"
___ Water-Stained Leaves
___ Local Soil Survey Data
✓ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): Chewacla Drainage Class: somewhat Poorly

Taxonomy (Subgroup): Fluvaquentic Dystrochrepts Confirm Mapped Type? Yes ___ No ✓

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10 YR 5/3			loam
2-10	B+	10 YR 5/3	10 YR 5/2	Few	loamy clay
10+	B+	10 YR 5/3			Sandy clay

Hydric Soil Indicators:

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

Remarks:
Bright Soils impacted by beaver

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes ✓ No ___
Wetland Hydrology Present? Yes ✓ No ___
Hydric Soils Present? Yes ___ No ✓

Is the Sampling Point Within a Wetland? Yes ___ No ✓

Remarks:

APPENDIX 5
PROJECT SITE NCDWQ STREAM CLASSIFICATION FORMS

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 3/7/08	**Project:** UT Rocky River	**Latitude:** 35° 25' 37.75" N
Evaluator: RVS	**Site:** UT Rocky River	**Longitude:** 80° 44' 25.18" W
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 41	**County:** Cabarrus	**Other** *e.g. Quad Name:* Kannapolis

A. Geomorphology (Subtotal = 20.5)	Absent	Weak	Moderate	Strong
1[a]. Continuous bed and bank	0	1	2	(3)
2. Sinuosity	0	(1)	2	3
3. In-channel structure: riffle-pool sequence	0	1	(2)	3
4. Soil texture or stream substrate sorting	0	1	2	(3)
5. Active/relic floodplain	0	1	2	(3)
6. Depositional bars or benches	0	(1)	2	3
7. Braided channel	0	(1)	2	3
8. Recent alluvial deposits	0	(1)	2	3
9[a] Natural levees	(0)	1	2	3
10. Headcuts	0	1	2	(3)
11. Grade controls	0	0.5	(1)	1.5
12. Natural valley or drainageway	0	0.5	1	(1.5)
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		(Yes = 3)	

[a] Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)				
14. Groundwater flow/discharge	0	1	2	(3)
15. Water in channel and > 48 hrs since rain, **or** Water in channel -- dry or growing season	0	1	2	(3)
16. Leaflitter	1.5	(1)	0.5	0
17. Sediment on plants or debris	0	(0.5)	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	(0.5)	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		(Yes = 1.5)	

C. Biology (Subtotal = 11)				
20[b]. Fibrous roots in channel	3	(2)	1	0
21[b]. Rooted plants in channel	(3)	2	1	0
22. Crayfish	0	(0.5)	1	1.5
23. Bivalves	0	1	(2)	3
24. Fish	0	(0.5)	1	1.5
25. Amphibians	0	(0.5)	1	1.5
26. Macrobenthos (note diversity and abundance)	0	(0.5)	1	1.5
27. Filamentous algae; periphyton	0	(1)	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	(1)	1.5
29[b]. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; (Other = 0)			

[b] Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

APPENDIX 6
PROJECT SITE BEHI FORMS

BEHI Form

Stream: UT Rocky River Reach: Beave/ SEC Driv Cross Section: Date: Crew: RJS

Erodibility Variable/Value			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B		
1.0	1.0	1.0	1.0	Very Low
Root Depth/Bank Height				
Root Depth (ft) C	C/A			
1.0	1.0		1.0	Very Low
Weighted Root Density				
Root Density (%) D	D*(C/A)			
50	50		4.5	Moderate
Bank Angle				
Bank Angle (degrees)				
75			5.4	High
Surface Protection				
Surface Protection (%)				
50			4.5	Moderate
Materials: Upper-sandy loam. Lower-gravel with sand matrix			–	
Stratification: Boundary between sandy loam and gravel			–	
TOTAL SCORE:			16.4	Low

Bank Erosion Hazard Index

Erodibility Variable		Very Low	Low	Moderate	High	Very High	Extreme
		Bank Erosion Potential					
Bank Height/ Bankfull Height	Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height	Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle	Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10

Bank Materials

Bedrock (Bedrock banks have very low bank erosion potential)
Boulders (Banks composed of boulders have low bank erosion potential)
Cobble (Subtract 10 points. If sand/gravel matrix greater than 50% of bank material, then do not adjust)
Gravel (Add 5-10 points depending on percentage of bank material that is composed of sand)
Sand (Add 10 points if sand is exposed to erosional processes)
Silt/Clay (+ 0: no adjustment)

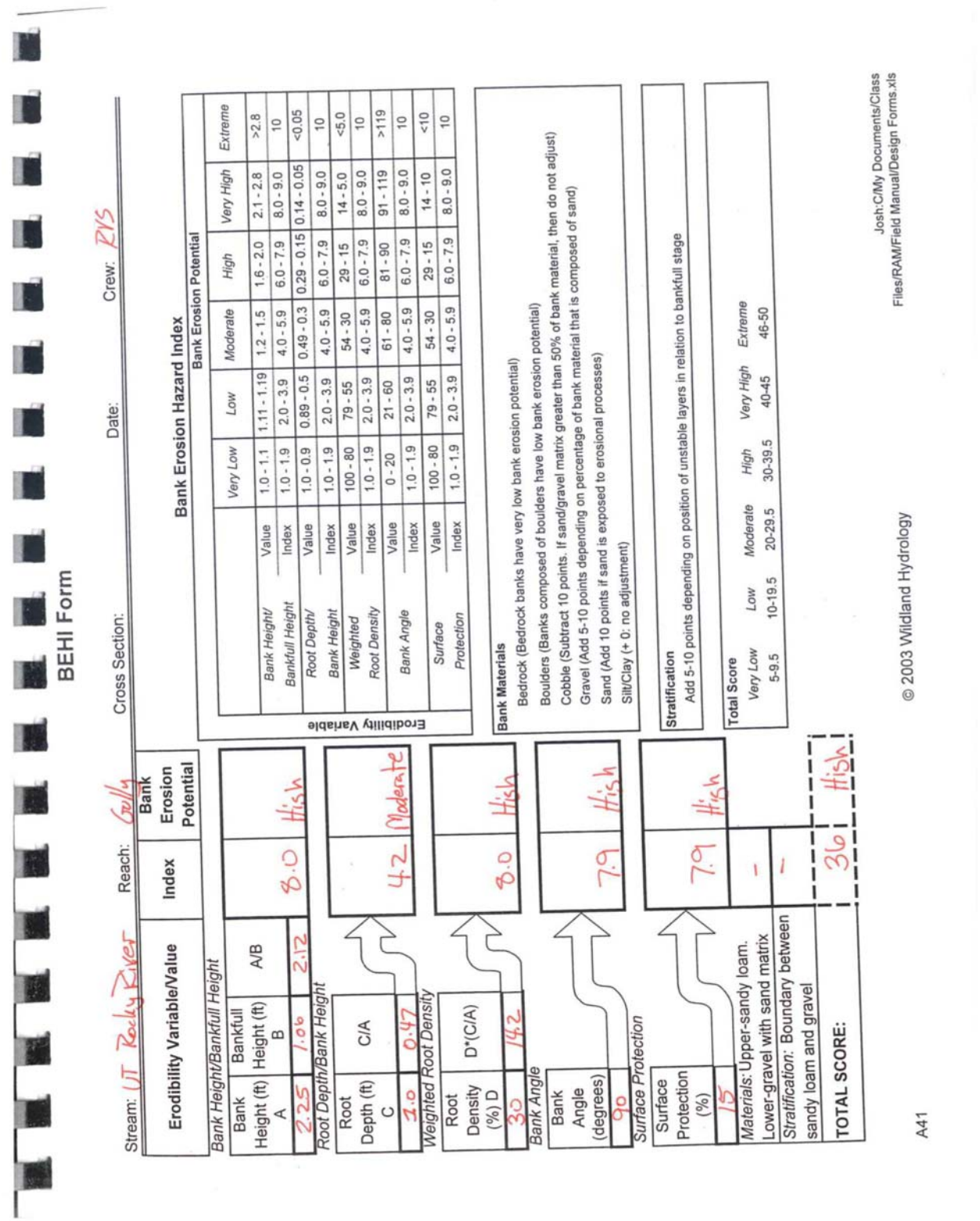
Stratification

Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

Very Low	Low	Moderate	High	Very High	Extreme
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Josh:C/My Documents/Class Files/RAM/Field Manual/Design Forms.xls



BEHI Form

Stream: UT Rocky River Reach: Gully Cross Section: Date: Crew: EVS

Erodibility Variable/Value			Index	Bank Erosion Potential
Bank Height/Bankfull Height				
Bank Height (ft) A	Bankfull Height (ft) B	A/B	8.0	High
2.25	1.06	2.12		
Root Depth/Bank Height				
Root Depth (ft) C	C/A		42	Moderate
3.0	0.47			
Weighted Root Density				
Root Density (%) D	D*(C/A)		8.0	High
30	142			
Bank Angle				
Bank Angle (degrees)			7.9	High
90				
Surface Protection				
Surface Protection (%)			7.9	High
15				
Materials: Upper-sandy loam. Lower-gravel with sand matrix			-	
Stratification: Boundary between sandy loam and gravel			-	
TOTAL SCORE:			36	High

Bank Erosion Hazard Index

Erodibility Variable		Bank Erosion Potential				
		Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
Bank Height/ Bankfull Height	Value	1.0 - 1.1	1.11 - 1.19	1.2 - 1.5	1.6 - 2.0	2.1 - 2.8	>2.8
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Root Depth/ Bank Height	Value	1.0 - 0.9	0.89 - 0.5	0.49 - 0.3	0.29 - 0.15	0.14 - 0.05	<0.05
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Weighted Root Density	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 5.0	<5.0
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Bank Angle	Value	0 - 20	21 - 60	61 - 80	81 - 90	91 - 119	>119
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10
Surface Protection	Value	100 - 80	79 - 55	54 - 30	29 - 15	14 - 10	<10
	Index	1.0 - 1.9	2.0 - 3.9	4.0 - 5.9	6.0 - 7.9	8.0 - 9.0	10

Bank Materials
Bedrock (Bedrock banks have very low bank erosion potential)
Boulders (Banks composed of boulders have low bank erosion potential)
Cobble (Subtract 10 points. If sand/gravel matrix greater than 50% of bank material, then do not adjust)
Gravel (Add 5-10 points depending on percentage of bank material that is composed of sand)
Sand (Add 10 points if sand is exposed to erosional processes)
Silt/Clay (+ 0: no adjustment)

Stratification
Add 5-10 points depending on position of unstable layers in relation to bankfull stage

Total Score

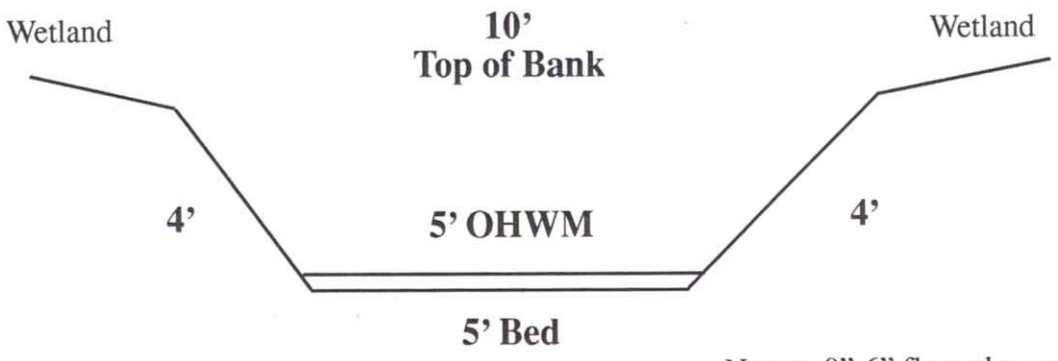
Very Low	*Low*	*Moderate*	*High*	*Very High*	*Extreme*
5-9.5	10-19.5	20-29.5	30-39.5	40-45	46-50

Josh:C/My Documents/Class Files/RAM/Field Manual/Design Forms.xls

A41

APPENDIX 7
PROJECT SITE HISTORIC PHOTOGRAPHS

Measurements looking upstream



Not to Scale

Notes: 0"-6" flow observed
Standing water
Bottom saturated
Amphibians / Fish

Moss Farm Site - 78.82 Ac.
Cabarrus School Board
Cabarrus County, NC

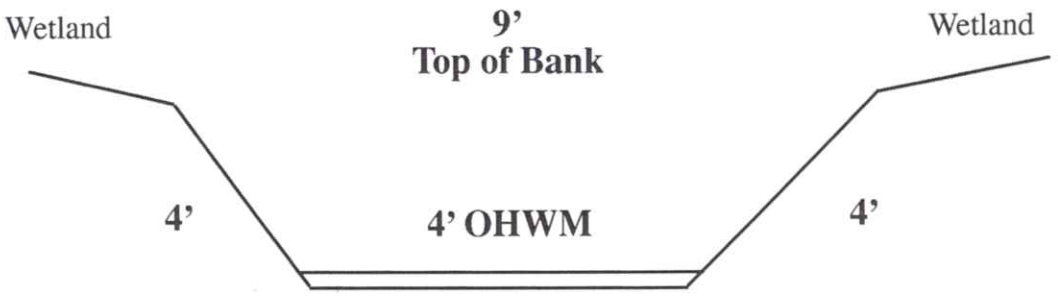
Channel T-1
Intermittent / Important
(Jurisdictional)

A Fine Line / DESIGN • 1960 Chapman-Wyant Lane • Lincolnton • NC • 28092 • (704) 735-1084

Moss Farm Site - 78.82 Ac.
Cabarrus School Board
Cabarrus County, NC

Channel T-1
Intermittent / Important
(Jurisdictional)

Measurements looking upstream



Not to Scale

Notes: 0"-6" flow observed
Standing water
Bottom saturated
Amphibians / Fish

Moss Farm Site - 78.82 Ac.

Cabarrus School Board
Cabarrus County, NC

Channel T-2
Ditch in Wetlands
(Jurisdictional)

A Fine Line / DESIGN • 1960 Chapman-Wyant Lane • Lincolnton • NC • 28092 • (704) 735-1084

Moss Farm Site - 78.82 Ac.
Cabarrus School Board
Cabarrus County, NC

Channel T-2
Ditch in Wetlands
(Jurisdictional)

A Fine Line / DESIGN • 1960 Chapman-Wyant Lane • Lincolnton • NC • 28092 • (704) 735-1084

APPENDIX 8
REFERENCE SITE PHOTOGRAPHS

UT to Ledge Creek looking upstream.

UT to Ledge Creek looking downstream.

UT to Wildcat Branch looking upstream. Notice mature vegetated riparian buffer.

UT to Wildcat Branch looking upstream. Notice stable meandering pattern.

Mill Creek looking upstream. Notice mature vegetated riparian buffer and gently meandering pattern.

Mill Creek looking upstream. Notice roots along the banks which help to stabilize soils.

APPENDIX 9
REFERENCE SITE NCDWQ STREAM CLASSIFICATION FORMS

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 9-19-06	**Project:** UT to Ledge Creek	**Latitude:** 36° 04' 33.0" N	
Evaluator: RVS	**Site:** UT to Ledge Creek	**Longitude:** 78° 43' 16.23" W	
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 42.5	**County:** Granville and Wake Counties	**Other** *e.g. Quad Name:* Creedmore	

A. Geomorphology (Subtotal = 26.5)	Absent	Weak	Moderate	Strong
1[a]. Continuous bed and bank	0	1	2	(3)
2. Sinuosity	0	1	2	(3)
3. In-channel structure: riffle-pool sequence	0	1	2	(3)
4. Soil texture or stream substrate sorting	0	1	(2)	3
5. Active/relic floodplain	0	1	2	(3)
6. Depositional bars or benches	0	1	2	(3)
7. Braided channel	(0)	1	2	3
8. Recent alluvial deposits	0	1	2	(3)
9[a] Natural levees	0	1	(2)	3
10. Headcuts	(0)	1	2	3
11. Grade controls	(0)	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	(1.5)
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		(Yes = 3)	

[a] Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 11.5)				
14. Groundwater flow/discharge	0	1	2	(3)
15. Water in channel and > 48 hrs since rain, or Water in channel -- dry or growing season	0	1	2	(3)
16. Leaflitter	(1.5)	1	0.5	0
17. Sediment on plants or debris	0	0.5	(1)	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	(1.5)
19. Hydric soils (redoximorphic features) present?	No = 0		(Yes = 1.5)	

C. Biology (Subtotal = 4.5)				
20[b]. Fibrous roots in channel	(3)	2	1	0
21[b]. Rooted plants in channel	(3)	2	1	0
22. Crayfish	(0)	0.5	1	1.5
23. Bivalves	(0)	1	2	3
24. Fish	0	0.5	1	(1.5)
25. Amphibians	0	0.5	(1)	1.5
26. Macrobenthos (note diversity and abundance)	0	0.5	(1)	1.5
27. Filamentous algae; periphyton	(0)	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	(1)	1.5
29[b]. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

[b] Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

NCDWQ Stream Classification Form **S500**

Project Name: UT to Wildcat Branch River Basin: Lumber County: Robeson Evaluators: R. Smith

DWQ Project Number: N/A Nearest Named Stream: Wildcat Branch Latitude: 34°42'36.63"N Signature:

Date: 8/2/04 USGS QUAD: Northeast Lumberton Longitude: 78°52'55.14"W

Location/Directions:

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: 21

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

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: 9

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: 7

TOTAL POINTS (Primary + Secondary) = 46 *(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)*

NCDWQ Stream Classification Form **S500**

Project Name: Mill Creek River Basin: Cape Fear County: Moore Evaluators: R. Smith

DWQ Project Number: N/A Nearest Named Stream: Mill Creek Latitude: Signature:

Date: 2/23/04 USGS QUAD: Niagra Longitude:

Location/Directions: Southern Pines, NC

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 judgement 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/3 Order Or Greater Channel (As Indicated On Topo Map *And/Or* In Field) Present?	*Yes*=3		*No*=0	

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: 23

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

PRIMARY HYDROLOGY INDICATOR POINTS: 3

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: 3

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: 8.5

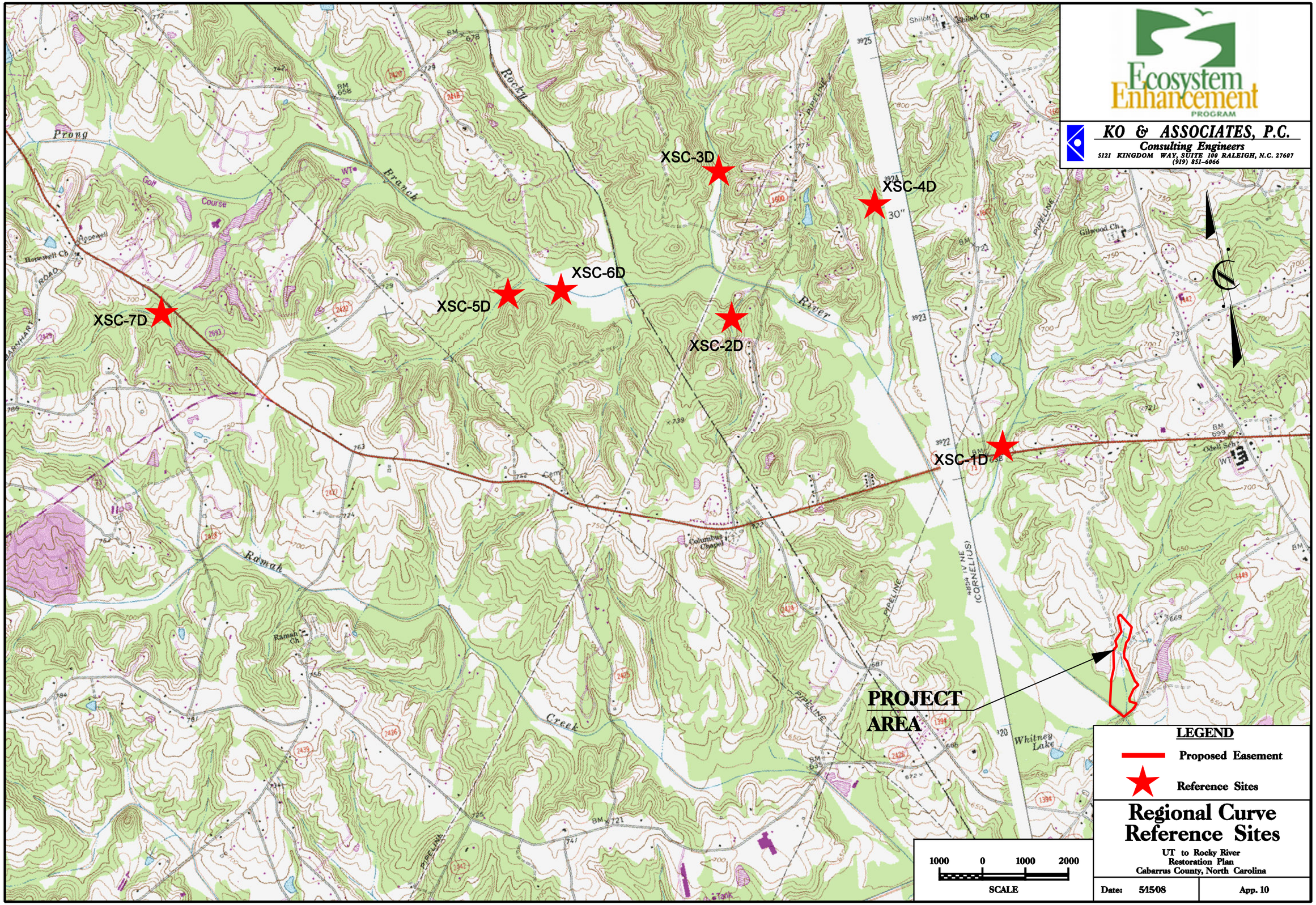
III. Biology	Absent	Weak	Moderate	Strong
1) Are Fish Present?	0	.5	1	1.5
2) Are Amphibians Present?	0	.5	1	1.5
3) Are AquaticTurtles Present?	0	.5	1	1.5
4) Are Crayfish Present?	0	.5	1	1.5
5) Are Macrobenthos Present?	0	.5	1	1.5
6) Are Iron Oxidizing Bacteria/Fungus Present?	0	.5	1	1.5
7) Is Filamentous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

TOTAL POINTS (Primary + Secondary) = 48.5 *(If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)*

APPENDIX 10
ROCKY RIVER REGIONAL CURVE



Ecosystem Enhancement PROGRAM

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

Regional Curve Reference Sites

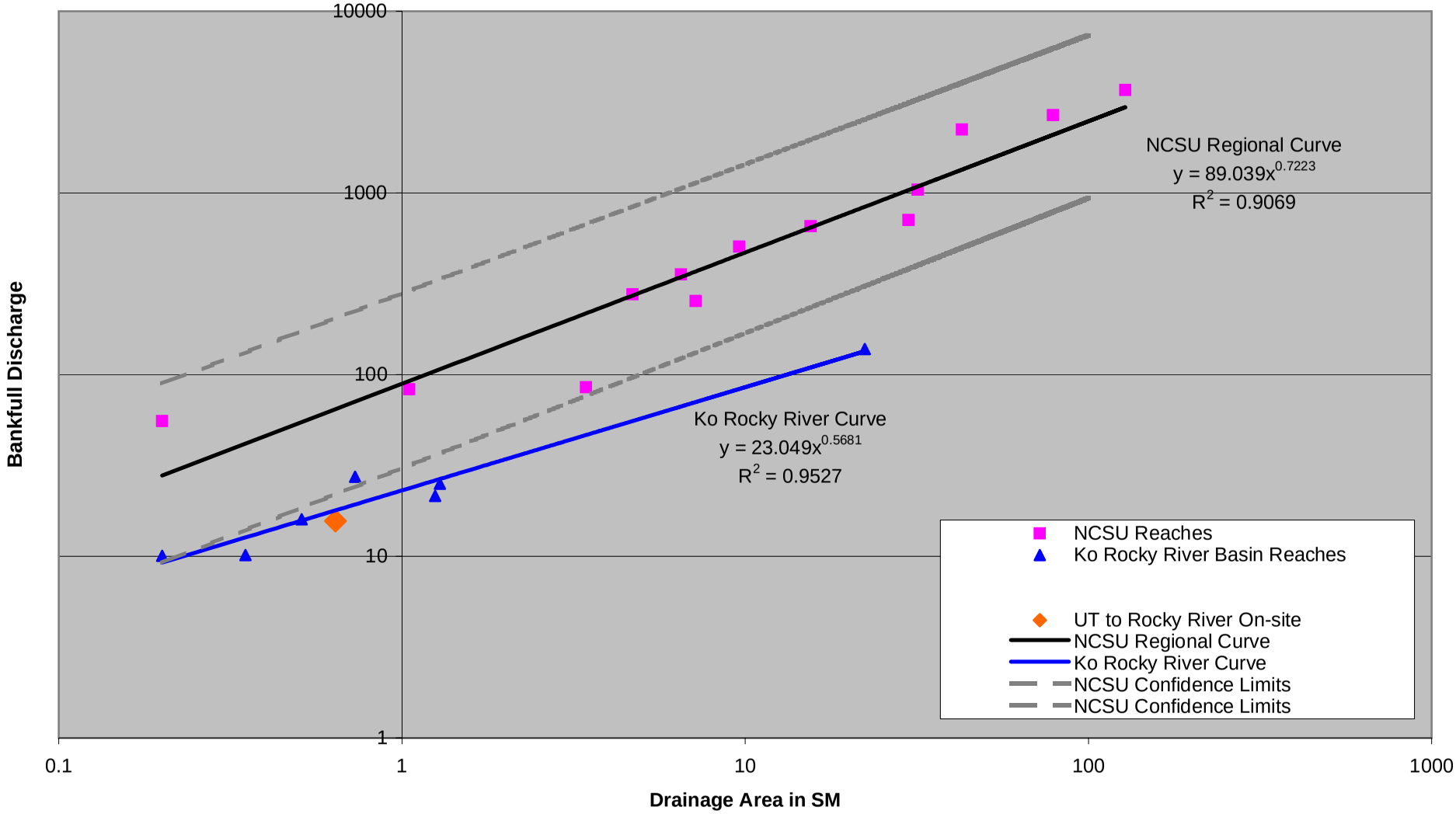
UT to Rocky River
Restoration Plan
Cabarrus County, North Carolina

Date: 5/15/08

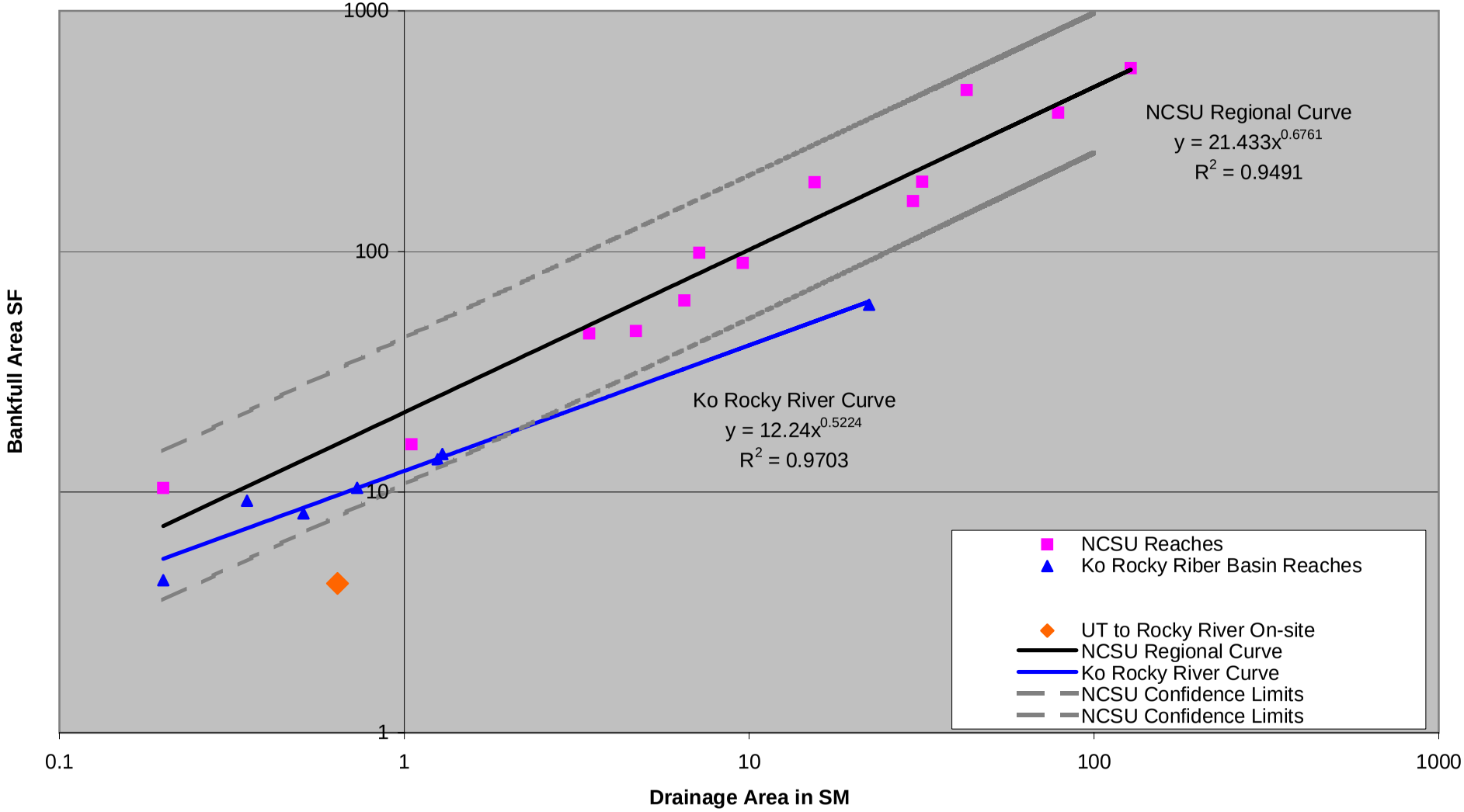
App. 10

Site	SqMI	Acres	Area	Width	Mean Depth	Discharge	Velocity	Stream	County	Ecoregion	River Basin	Nearest Road	Lat (N)	Long (W)
XSC-1D	1.29	825.60	14.40	11.95	1.20	25.07	1.74	UT Rocky River	Cabarrus	Southern Outher Piedmont	Rocky River (Yadkin)	US 73	35º 26' 32.82''	80º 44' 46.83"
XSC-2D	0.20	128.00	4.30	4.99	0.86	10.06	2.34	UT Rocky River	Cabarrus	Southern Outher Piedmont	Rocky River (Yadkin)	Shiloh Church Rd (SR 1600)	35º 27' 16.59''	80º 45' 52.10"
XSC-3D	1.25	800.00	13.69	11.41	1.20	21.47	1.57	UT Rocky River	Cabarrus	Southern Outher Piedmont	Rocky River (Yadkin)	Shiloh Church Rd (SR 1600)	35º 27' 40.06''	80º 45' 52.11"
XSC-4D	0.51	326.40	8.15	8.38	0.97	16.01	1.96	UT Rocky River	Cabarrus	Southern Outher Piedmont	Rocky River (Yadkin)	Placid Drive	35º 27' 35.84''	80º 45' 08.83"
XSC-5D	0.73	467.20	10.41	7.74	1.35	27.38	2.63	UT West Branch	Mecklenburg	Southern Outher Piedmont	Rocky River (Yadkin)	June Washam Road (SR 2422)	35º 27' 29.87''	80º 46' 54.29"
XSC-6D	22.30	14272.00	60.07	23.85	2.25	138.23	2.30	West Branch	Mecklenburg	Southern Outher Piedmont	Rocky River (Yadkin)	June Washam Road (SR 2422)	35º 27' 30.00'	80º 46' 42.49"
XSC-7D	0.35	224.00	9.21	8.40	1.10	10.15	1.10	UT South Prong	Mecklenburg	Southern Outher Piedmont	Rocky River (Yadkin)	Davidson Concord Rd (SR 2693)	35º 27' 40.79'	80º 48' 31.51"

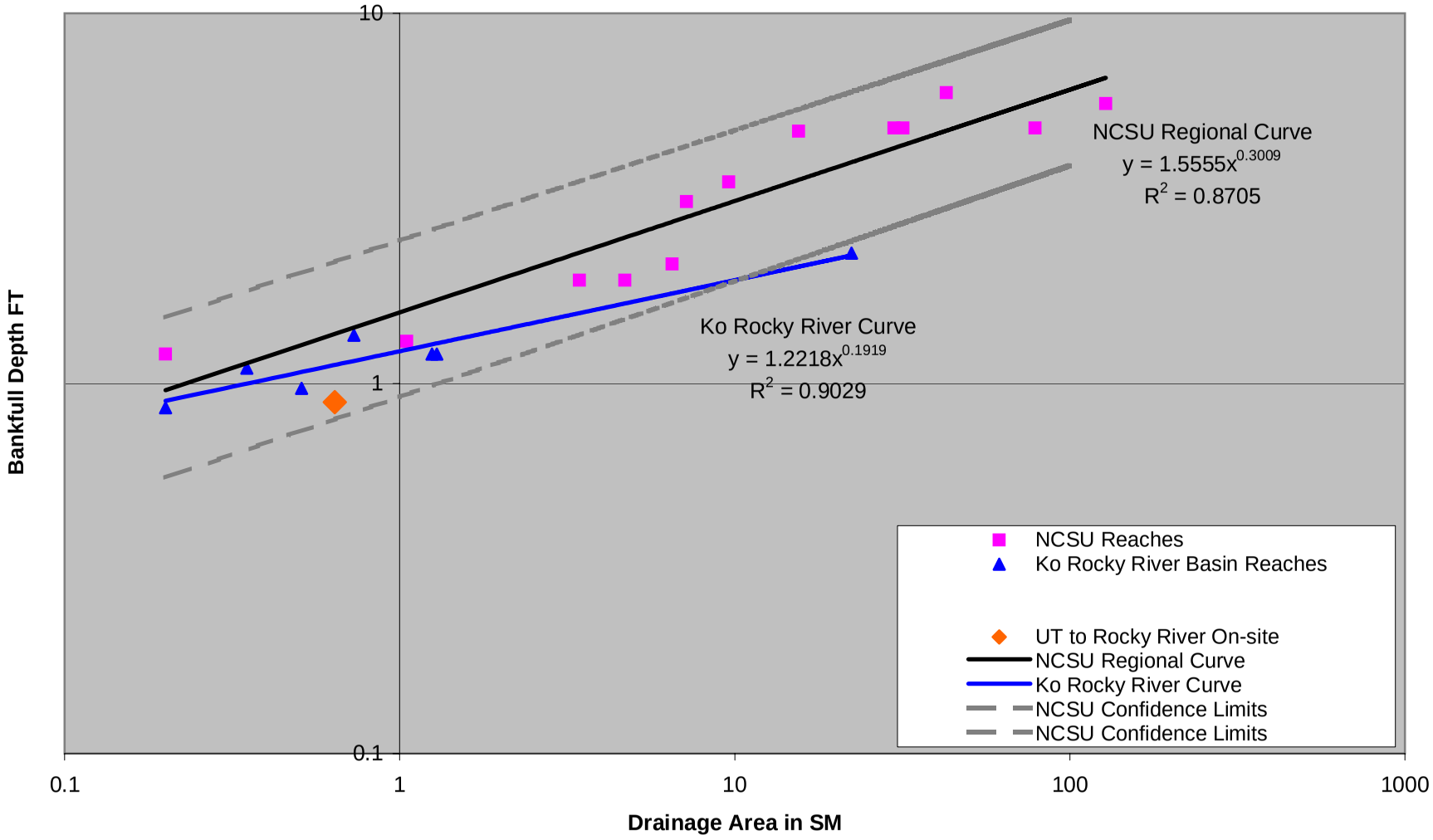
Rocky River Basin
Bankfull Discharge Curve



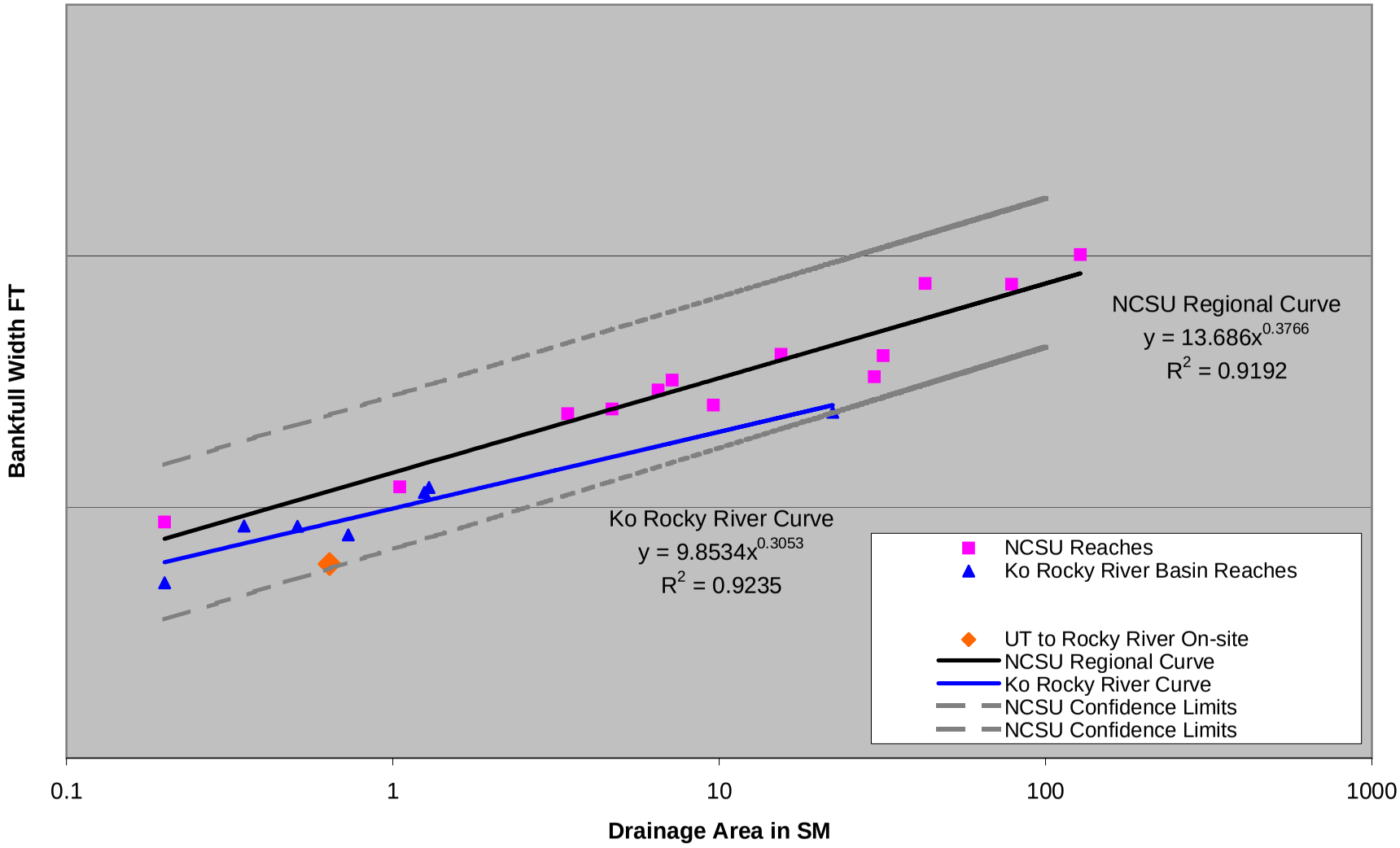
Rocky River Basin
Bankfull Area Curve



Rocky River Basin
Bankfull Mean Depth Curve



Rocky River Basin
Bankfull Width Curve



APPENDIX 11
CONCURRENCE LETTERS

Axiom Environmental, Inc.

Axiom Environmental, Inc.

2126 Rowland Pond Drive Willow Spring Raleigh, North Carolina 27592 919-215-1693

March 13, 2008

Renee Gledhill-Earley
Environmental Review Coordinator
North Carolina State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

Subject: UT to the Rocky River Stream Restoration Project, Cabarrus County **07-015**

Dear Ms. Gledhill-Earley,

The purpose of this letter is to request a concurrence letter for historic architectural and archaeological surveys and resources within the UT to the Rocky River Stream Restoration Site, a potential stream restoration project depicted on the attached Site Location Map.

The project includes approximately 2200 linear feet of an unnamed tributary to the Rocky River located in Cabarrus County (see attached figures). The site is located in previously timbered land and is characterized by a scrub/shrub community. The site stream is characterized by areas of degradation as well as sections of aggradation with a prevalence of beaver activity within the project area. The primary restoration activities at the Site include 1) construction of a stable, riffle-pool stream channel, 2) reconnect Site streams with the historic floodplain, 3) eliminate invasive vegetative species, 4) minimize disturbance to existing mature vegetation, 5) creation of a natural vegetation buffer along Site streams, and 6) establishment of a conservation easement.

Please note that no structures, including buildings, bridges, or monuments are to be affected by the project. The nearest building to the project is greater than 100 feet from the construction limits and all impacts are to be contained within 100 feet of the existing stream channel.

We thank you in advance for your timely response concerning historic architectural and archaeological issues from your office. I would appreciate receiving such letter for this project at your earliest convenience. Please feel free to contact us with any questions or concerns that you may have concerning the project.

Sincerely,

W Grant Lewis

Mr. W. Grant Lewis
Axiom Environmental, Inc.

Attachments: Figures 1-2

cc: Mr. Kevin Williams, Project Manager

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

April 10, 2008

W. Grant Lewis
Axiom Environmental, Inc.
2126 Rowland Pond Drive
Willow Springs, NC 27592

Re: UT to the Rocky River Stream Restoration, Cabarrus County, ER 08-0859

Dear Mr. Lewis:

Thank you for your letter of March 13, 2008, concerning the above project.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

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 919-807-6579. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

Renee Gledhill-Earley

Peter Sandbeck

Location: 109 East Jones Street, Raleigh NC 27601 **Mailing Address**: 4617 Mail Service Center, Raleigh NC 27699-4617 **Telephone/Fax**: (919) 807-6570/807-6599

Axiom Environmental, Inc.

Axiom Environmental, Inc.

2126 Rowland Pond Drive Willow Spring Raleigh, North Carolina 27592 919-215-1693

March 13, 2008

Dale Suiter
US Fish and Wildlife Service
Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636

Subject: UT to the Rocky River Stream Restoration Project, Cabarrus County **07-015**

Dear Mr. Suiter,

The purpose of this letter is to request comment on any possible issues that might emerge with respect to the Migratory Bird Treaty Act (MBTA), the Fish and Wildlife Coordination Act (FWCA), and the Endangered Species Act (ESA) from the UT to the Rocky River Stream Restoration Project. The project is depicted on the attached maps.

Site Description and Proposed Activities

The project includes approximately 2200 linear feet of an unnamed tributary to the Rocky River located in Cabarrus County (see attached figures). The site is located in previously timbered land and is characterized by a scrub/shrub community. The site stream is characterized by areas of degradation as well as sections of aggradation with a prevalence of beaver activity within the project area. The primary restoration activities at the Site include 1) construction of a stable, riffle-pool stream channel, 2) reconnect Site streams with the historic floodplain, 3) eliminate invasive vegetative species, 4) minimize disturbance to existing mature vegetation, 5) creation of a natural vegetation buffer along Site streams, and 6) establishment of a conservation easement.

Federally Protected Species

Based on the January 31, 2008 United States Fish and Wildlife Service (USFWS) list, two federally protected species are listed for Cabarrus County. The following table lists the federally protected species for Cabarrus County, indicates if potential habitat exists within the Site, and gives a biological conclusion for each species.

Federally Protected Species for Cabarrus County

Common Name	Scientific Name	Status*	Habitat Present Within Site	Biological Conclusion
Invertebrates				
Carolina heelsplitter	*Lasmigona decorata*	Endangered	No	No Effect
Vascular Plants				
Schweinitz's sunflower	*Helianthus schweinitzii*	Endangered	Yes	Unresolved

*Endangered = a taxon "in danger of extinction throughout all or a significant portion of its range".

Lasmigona decorata (Carolina heelsplitter) **Endangered**
Animal Family: Unionidae
Date Listed: June 13, 1993

The Carolina heelsplitter was once fairly widely distributed in the Catawba and Pee Dee river basins in North Carolina and Pee Dee and Savannah river basins in South Carolina. There are only six known remaining populations of this species; two in North Carolina and four in South Carolina.

This mussel is usually found in a variety of substrates usually near stable, well-shaded stream banks. The stability of the stream banks appears to be very important to this species and no fish host has been identified.

The Carolina heelsplitter is a medium-sized mussel that has an ovate, trapezoid-shaped shell. The shell is yellowish, greenish brown to dark brown. Younger specimens have greenish brown or black rays. The nacre is pearly white to bluish-white, grading to orange in the area of the umbo. The lateral teeth are well developed but thin and rather delicate.

Biological Conclusion: **NO EFFECT**
Potential habitat for the Carolina heelsplitter does not occur within the Site due to the disturbed nature of Site streams and the lack of stream shading. In addition, no known occurrences are documented by the North Carolina Natural Heritage Program (NCNHP) within or near the Site.

Helianthus schweinitzii (Schweinitz's sunflower) **Endangered**
Plant Family: Asteraceae
Federally Listed: June 6, 1991

This sunflower is found in the piedmont of North and South Carolina with 13 known populations occurring in North Carolina.

Schweinitz's sunflower is a rhizomatous perennial herb with one to several fuzzy purple stems. It grows to 3-6 feet in height from a cluster of carrot-like tubrous roots. Leaves are lance-shaped, usually opposite, approximately 2-7 inches in length, and 0.4-0.8 inches in width. The leaves are rough and resin-dotted on the surface with a felt-like feel on the underside. Flowers are yellow composites and fruits are small and dark brown. Flowering and fruiting occur from mid-September to frost. Based on its similar morphology to *H. laevigatus* and *H. microcephalus* it is difficult to positively identify this species prior to flowering.

Schweinitz's sunflower grows best in full sunlight or partial shade in clearings and along the edges of upland woods, thickets, and pastures. It is also found along roadsides, powerline clearings, old pastures, and woodland openings. Common soils that this species is found in include moist to dryish clays, clay-loams, or sandy clay-loams, often with high gravel content. Natural fires and large herbivores are considered to be historically important in maintaining open habitat for these sunflowers. Today, disturbances such as mowing, controlled burning, and logging help maintain its open habitat.

Biological Conclusion: **UNRESOLVED**
Habitat for Schweinitz's sunflower is present within the project in the form of maintained-disturbed land. Plant-by-plant surveys for this species will be conducted during the optimal survey window. No known occurrences are documented by the NCNHP within or near the Site.

Designated Critical Habitat
No designated critical habitat is documented to occur within Cabarrus County.

We thank you in advance for your timely response concerning letter(s) of concurrence from your office for the MBTA, FWCA, and ESA. I would appreciate receiving such letter(s) for this project at your earliest convenience. Please feel free to contact us with any questions or concerns that you may have concerning the project.

Sincerely,

W Grant Lewis

Mr. W. Grant Lewis
Axiom Environmental, Inc.

Attachments: Figures 1-2

cc: Mr. Kevin Williams, Project Manager

Axiom Environmental, Inc.

Axiom Environmental, Inc.

2126 Rowland Pond Drive Willow Spring Raleigh, North Carolina 27592 919-215-1693

March 13, 2008

Shannon Deaton
NC Wildlife Resources Commission
Division of Inland Fisheries
1751 Varsity Drive
NCSU Centennial Campus
Raleigh, NC 27606

Subject: UT to the Rocky River Stream Restoration Project, Cabarrus County **07-015**

Dear Ms. Deaton,

The purpose of this letter is to request comment on any possible issues that might emerge with respect to the Fish and Wildlife Coordination Act (FWCA) from the proposed UT to the Rocky River Stream Restoration Project. The project is depicted on the attached maps.

The project includes approximately 2200 linear feet of an unnamed tributary to the Rocky River located in Cabarrus County (see attached figures). The site is located in previously timbered land and is characterized by a scrub/shrub community. The site stream is characterized by areas of degradation as well as sections of aggradation with a prevalence of beaver activity within the project area. The primary restoration activities at the Site include 1) construction of a stable, riffle-pool stream channel, 2) reconnect Site streams with the historic floodplain, 3) eliminate invasive vegetative species, 4) minimize disturbance to existing mature vegetation, 5) creation of a natural vegetation buffer along Site streams, and 6) establishment of a conservation easement.

We thank you in advance for your timely response concerning a letter of concurrence from your office for the FWCA. I would appreciate receiving such letter for this project at your earliest convenience. Please feel free to contact us with any questions or concerns that you may have concerning the project.

Sincerely,

W Grant Lewis

Mr. W. Grant Lewis
Axiom Environmental, Inc.

Attachments: Figures 1-2

cc: Mr. Kevin Williams, Project Manager

North Carolina Wildlife Resources Commission

April 9, 2008

Mr. W. Grant Lewis
Axiom Environmental, Inc.
2126 Rowland Pond Drive Willow Spring
Raleigh, North Carolina 27592

RE: Unnamed Tributary Rocky River Stream Restoration Project, Cabarrus County

Dear Mr. Lewis:

This correspondence is in response to your letter of March 13, 2008. Biologists with the North Carolina Wildlife Resources Commission (NCWRC) are familiar with habitat values in the area. The NCWRC is authorized to comment and make recommendations which relate to the impacts of this project on fish and wildlife pursuant to Clean Water Act of 1977, North Carolina Environmental Policy Act, US National Environmental Policy Act, Endangered Species Act (16 U. S. C. 1531-1543; 87 Stat 884), the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d) and/or Federal License of Water Resource Project Act (Federal Power Act-16 U.S.C. 791a et seq.) as applicable.

The project includes approximately 2200 linear feet of stream. The property has been timbered and is in an early successional growth phase. Beaver are present in the area. Restoration efforts are indicated to be construction of stable channels, reconnection to floodplains, removal of invasive species, minimization of disturbance to mature vegetation, and the establishment of conservation easements.

The Carolina creekshell, *Villosa vaughaniana* (NCE, FSC) and the Carolina darter, *Etheostoma collis* (NCSC/FSC) are known for Clark Creek to the west of this project area. The presence of listed species within this stream is not indicated. Historically, the Carolina heelsplitter, *Lasmigona decorata* (NCE, FE) was known for the Rocky River. Although physical habitats for this species are known for the Rocky River, water quality is believed to be a significant limiting factor. Restoration of biologically functional headwater habitats should restore water quality and provide ancillary benefits.

Project proponents should be made aware of the above information. Improvements in stream and wetland habitats could improve habitats for aquatic listed species in the area. Accordingly,

Mailing Address: Division of Inland Fisheries • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

project proponents are encouraged to pursue mitigation activities at the site including preconstruction Clean Water Act permitting and certifications as well as providing biological investigations for the Carolina creekshell. If any Carolina creekshells are found in the work area, they should be relocated upstream or removed to safety and subsequently restored to the stream. Mussel work should be accomplished by professionally certified mussel biologists.

Only autochthonous plants should be used for the project. State-of-the-art stream and wetland natural channel design calculations and designs should be used for stream improvements. Planning and providing mussel and host species habitat restoration should be considered as very important. Minimum 50' intermittent and minimum 100' forested buffers should be provided. If possible, these buffers should be doubled to help restore diminished aquatic habitats and improve opportunities for listed species restoration in the Rocky River.

Please be advised that this office only reviews sites for animal species. You should also contact the NC Natural Heritage Program and the US Fish and Wildlife Service for their review and comments about the site and proposed mitigation activities.

Thank you for the opportunity to comment on your proposed project during early planning stages. If you have any questions regarding these comments, please contact me at 336/769-9453.

Sincerely,

Ron Linville
Regional Coordinator
Habitat Conservation Program

E-copy: Bryan Tompkins, USFWS
Sarah McRae, NHP

Grant Lewis

From: Grant Lewis
Sent: Thursday, March 13, 2008 10:46 AM
To: 'alan.walters@nc.usda.gov'
Cc: (kwilliams@koassociates.com)
Subject: UT to Rocky River Restoration Site - Farmland Conversion Impact Rating Form
Attachments: Site Location.pdf; UTRocky_FPPA_FormAD1006.pdf; Fig2_aerial.pdf

Hello Alan;

I am working on a restoration project in Cabarrus County that requires a Farmland Conversion Impact Rating form (Form AD-1006) to be completed. I have attached information for your review in completing the form. The Site is approximately 20 acres situated between two newly constructed schools. The property is shrub scrub vegetation dominated by blackberry and rose and appears to have been timbered approximately 7 to 10 years ago. There is no evidence of previous farmland use on the Site; however, beaver have made it difficult to fully asses the Site. I have aerials from 1998 which indicate the property was disturbed timberland.

I have attached several figures and the form AD-1006 for your use. If you need additional information please feel free to call me at 919-215-1693. You may fax the completed form to 919-341-3839.

Thank you for your assistance

Grant

W. Grant Lewis
Senior Project Manager
Axiom Environmental Inc.
2126 Rowland Pond Dr.
Willow Spring, North Carolina 27592
(919) 215-1693(cell)
(919) 341-3839 (fax)
glewis@axiomenvironmental.org

Axiom Environmental, Inc.

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request: March 13, 2008
Name Of Project: UT to Rock River Restoration Site	Federal Agency Involved: Federal Highway Administration
Proposed Land Use: Stream and Wetland Restoration	County And State: Cabarrus County, North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).* Yes ☐ No ☐ Acres Irrigated Average Farm Size

Major Crop(s) | Farmable Land In Govt. Jurisdiction Acres: % | Amount Of Farmland As Defined in FPPA Acres: %

Name Of Land Evaluation System Used | Name Of Local Site Assessment System | Date Land Evaluation Returned By NRCS

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	0			
B. Total Acres To Be Converted Indirectly	NA			
C. Total Acres In Site	20	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	0	0	0	0

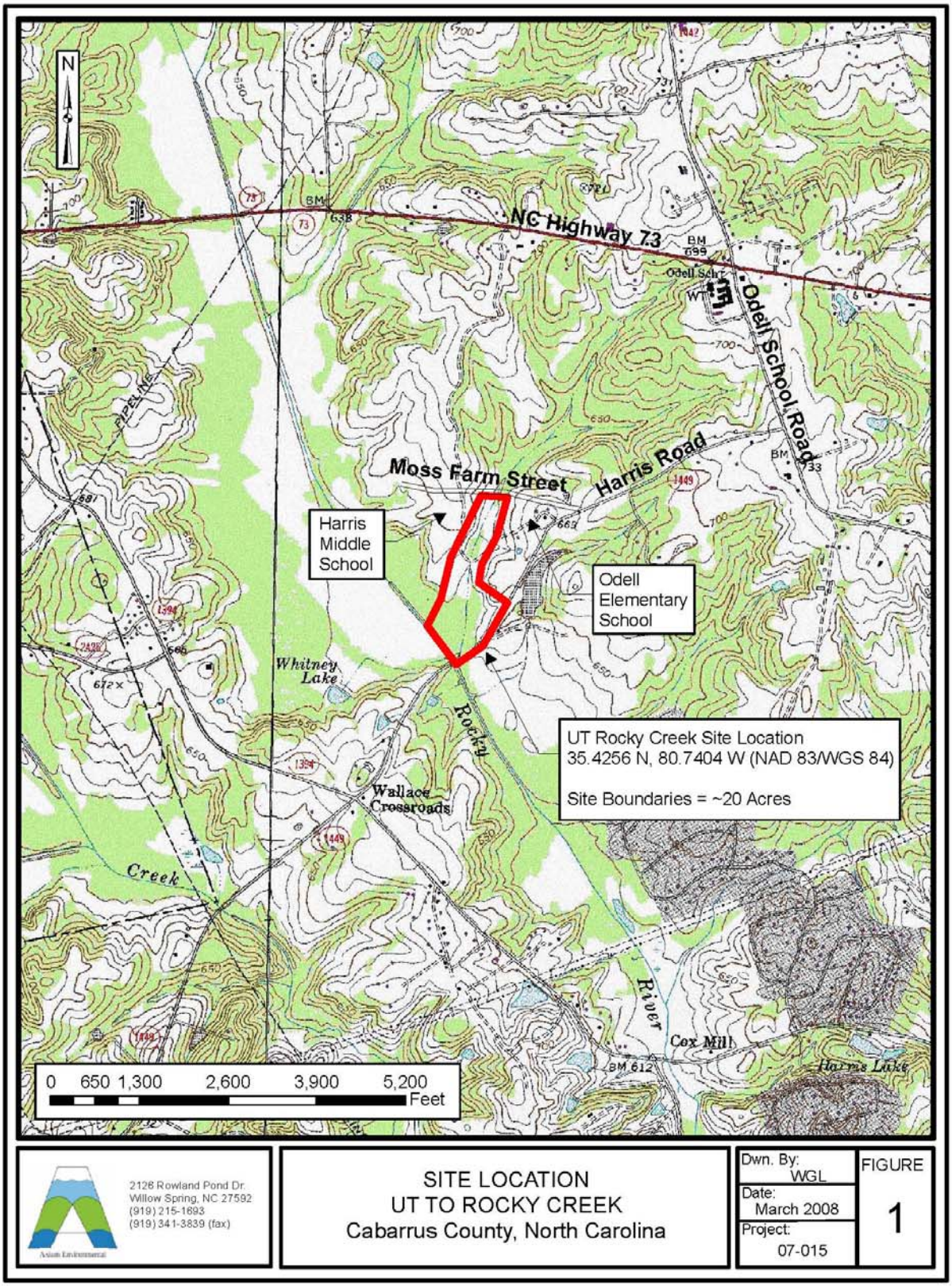
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5.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

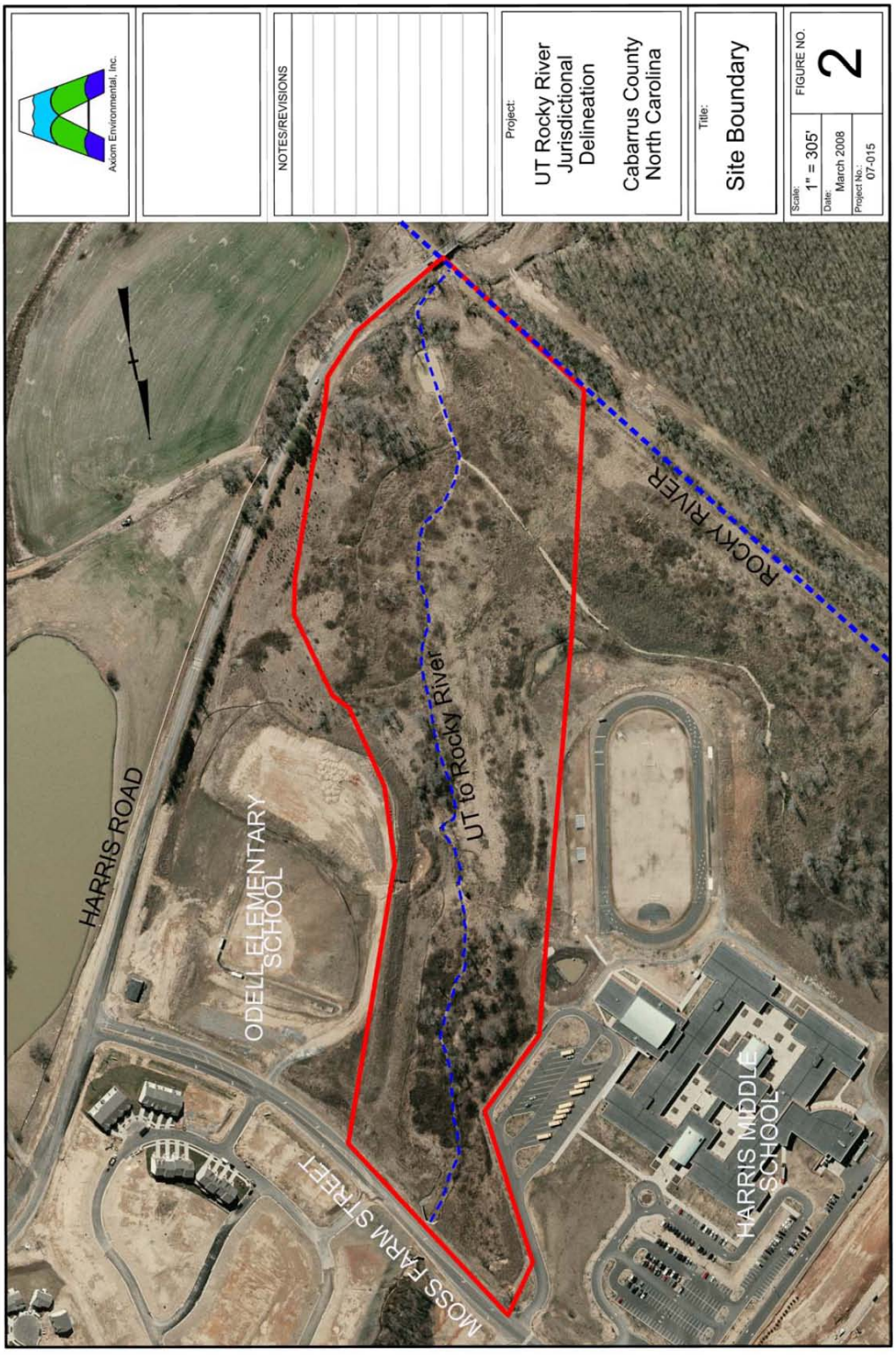
Site Selected: Date Of Selection | Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side) Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff


N
NC Highway 73
Odell School Road
Moss Farm Street
Harris Road
Harris Middle School
Odell Elementary School
Whitney Lake
Rocky
Wallace Crossroads
Creek
River
Cox Mill
Harris Lake
UT Rocky Creek Site Location
35.4256 N, 80.7404 W (NAD 83/WGS 84)
Site Boundaries = ~20 Acres
0 650 1,300 2,600 3,900 5,200 Feet
2126 Rowland Pond Dr.
Willow Spring, NC 27592
(919) 215-1693
(919) 341-3839 (fax)
SITE LOCATION
UT TO ROCKY CREEK
Cabarrus County, North Carolina
Dwn. By: WGL
Date: March 2008
Project: 07-015
FIGURE 1


Axiom Environmental, Inc.
NOTES/REVISIONS
Project:
UT Rocky River Jurisdictional Delineation
Cabarrus County North Carolina
Title:
Site Boundary
Scale: 1" = 305'
Date: March 2008
Project No.: 07-015
FIGURE NO. 2
HARRIS ROAD
ODELL ELEMENTARY SCHOOL
UT to Rocky River
ROCKY RIVER
MOSS FARM STREET
HARRIS MIDDLE SCHOOL

MAR-14-2008 FRI 01:23 PM SALISBURY AREA OFFICE FAX NO. 7046378077 P. 02/02

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request March 13 2008
Name Of Project UT to Rock River Restoration Site	Federal Agency Involved Federal Highway Administration
Proposed Land Use Stream and Wetland Restoration	County And State Cabarrus County, North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 3/10/2008

Does the site contain prime, unique, statewide or local important farmland? (If no, the FPPA does not apply -- do not complete additional parts of this form). Yes X No ☐ Acres Irrigated: C Average Farm Size: 111 acres

Major Crop(s): CORN
Farmable Land In Govt. Jurisdiction Acres: 202401 % 86.8
Amount Of Farmland As Defined in FPPA Acres: 106941 % 81.0
Name Of Land Evaluation System Used: CABARRUS CO LE
Name Of Local Site Assessment System: N/A
Date Land Evaluation Returned By NRCS: 3-17-2008

PART III *(To be completed by Federal Agency)*	Site A	Alternative Site Rating Site B	Site C	Site D
A. Total Acres To Be Converted Directly	0			
B. Total Acres To Be Converted Indirectly	NA			
C. Total Acres In Site	20	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	25.0			
B. Total Acres Statewide And Local Important Farmland	5.0			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0.018			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	23.3			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	0 85	0	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use		3			
2. Perimeter In Nonurban Use		0			
3. Percent Of Site Being Farmed		0			
4. Protection Provided By State And Local Government		0			
5. Distance From Urban Builtup Area		0			
6. Distance To Urban Support Services		0			
7. Size Of Present Farm Unit Compared To Average		0			
8. Creation Of Nonfarmable Farmland		0			
9. Availability Of Farm Support Services		5			
10. On-Farm Investments		0			
11. Effects Of Conversion On Farm Support Services		0			
12. Compatibility With Existing Agricultural Use		5			
TOTAL SITE ASSESSMENT POINTS	160	0 13	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	0 85	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	0 13	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	0 98	0	0	0

Site Selected: Date Of Selection: Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

APPENDIX 12
HEC-RAS ANALYSIS

UT ROCKY RIVER
HEC-RAS ANALYSIS

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
Upstream End of Project					
3730.33	BKF	18	623.67	623.08	-0.59
3730.33	100 YR	1082	629.16	628.70	-0.46
3713.33	BKF	18		622.83	
3713.33	100 YR	1082		627.83	
3701.33	BKF	18		622.89	
3701.33	100 YR	1082		626.90	
3697.33	BKF	18		622.86	
3697.33	100 YR	1082		626.72	
3680.98	BKF	18		622.81	
3680.98	100 YR	1082		626.05	
3671.62	BKF	18		622.80	
3671.62	100 YR	1082		626.02	
3662.26	BKF	18		622.74	
3662.26	100 YR	1082		626.13	
3634.93	BKF	18		622.63	
3634.93	100 YR	1082		626.15	
3615.2	BKF	18		622.59	
3615.2	100 YR	1082		626.07	
3595.47	BKF	18		622.49	
3595.47	100 YR	1082		625.96	
3571.22	BKF	18		622.33	
3571.22	100 YR	1082		625.79	
3559.71	BKF	18		622.29	
3559.71	100 YR	1082		625.78	
3548.2	BKF	18		622.15	
3548.2	100 YR	1082		625.79	
3545.33	BKF	18		622.20	
3545.33	100 YR	1082		625.77	
3537.33	BKF	18		622.18	
3537.33	100 YR	1082		625.76	
3511.51	BKF	18		622.13	
3511.51	100 YR	1082		625.73	

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
3494.77	BKF	18		622.11	
3494.77	100 YR	1082		625.68	
3478.04	BKF	18		622.09	
3478.04	100 YR	1082		625.63	
3447.65	BKF	18	621.90	621.99	0.09
3447.65	100 YR	1082	625.42	625.53	0.11
3435.8	BKF	18		621.98	
3435.8	100 YR	1082		625.47	
3423.95	BKF	18		621.93	
3423.95	100 YR	1082		625.43	
3394.6	BKF	18		621.85	
3394.6	100 YR	1082		625.34	
3375.19	BKF	18		621.83	
3375.19	100 YR	1082		625.24	
3355.38	BKF	18		621.75	
3355.38	100 YR	1082		625.10	
3336.27	BKF	18		621.68	
3336.27	100 YR	1082		625.03	
3320.55	BKF	18		621.67	
3320.55	100 YR	1082		625.01	
3276.34	BKF	18		621.55	
3276.34	100 YR	1082		624.93	
3269.84	BKF	18		621.55	
3269.84	100 YR	1082		624.89	
3263.34	BKF	18		621.52	
3263.34	100 YR	1082		624.87	
3224.56	BKF	18	621.74	621.36	-0.38
3224.56	100 YR	1082	624.69	624.75	0.06
3219.35	BKF	18		621.37	
3219.35	100 YR	1082		624.73	
3214.14	BKF	18		621.32	
3214.14	100 YR	1082		624.71	

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
3161.33	BKF	18		621.23	
3161.33	100 YR	1082		624.54	
3131.28	BKF	18	621.68	621.18	-0.50
3131.28	100 YR	1082	624.35	624.48	0.13
3125.33	BKF	18		621.14	
3125.33	100 YR	1082		624.46	
3113.33	BKF	18		621.13	
3113.33	100 YR	1082		624.44	
3087.61	BKF	18		621.06	
3087.61	100 YR	1082		624.35	
3056.3	BKF	18		621.01	
3056.3	100 YR	1082		624.29	
3038.69	BKF	18	621.66	620.98	-0.68
3038.69	100 YR	1082	624.08	624.25	0.17
3021.08	BKF	18		620.90	
3021.08	100 YR	1082		624.17	
2986.9	BKF	18		620.73	
2986.9	100 YR	1082		624.05	
2972.85	BKF	18		620.72	
2972.85	100 YR	1082		624.01	
2958.81	BKF	18	620.73	620.64	-0.09
2958.81	100 YR	1082	623.77	623.97	0.20
2947.49	BKF	18		620.52	
2947.49	100 YR	1082		623.89	
2929.11	BKF	18		620.46	
2929.11	100 YR	1082		623.68	
2910.73	BKF	18		620.17	
2910.73	100 YR	1082		623.51	
2907.33	BKF	18		620.25	
2907.33	100 YR	1082		623.44	
2902.33	BKF	18		620.22	
2902.33	100 YR	1082		623.42	

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
2887.33	BKF	18		620.10	
2887.33	100 YR	1082		623.33	
2872.7	BKF	18		620.04	
2872.7	100 YR	1082		623.29	
2869.16	BKF	18		620.04	
2869.16	100 YR	1082		623.27	
2864.16	BKF	18		620.03	
2864.16	100 YR	1082		623.25	
2845.53	BKF	18		619.89	
2845.53	100 YR	1082		623.20	
2818.56	BKF	18		619.59	
2818.56	100 YR	1082		623.03	
2791.6	BKF	18		619.49	
2791.6	100 YR	1082		622.74	
2789.16	BKF	18		619.48	
2789.16	100 YR	1082		622.69	
2784.16	BKF	18		619.48	
2784.16	100 YR	1082		622.57	
2760.96	BKF	18		619.32	
2760.96	100 YR	1082		622.38	
2749.55	BKF	18	617.98	619.32	1.34
2749.55	100 YR	1082	622.36	622.28	-0.08
2738.15	BKF	18		619.21	
2738.15	100 YR	1082		622.25	
2702.17	BKF	18		618.87	
2702.17	100 YR	1082		621.75	
2690.16	BKF	18		618.75	
2690.16	100 YR	1082		621.68	
2685.16	BKF	18		618.57	
2685.16	100 YR	1082		621.58	
2662.72	BKF	18		618.20	
2662.72	100 YR	1082		621.38	

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
2651.14	BKF	18		618.08	
2651.14	100 YR	1082		621.26	
2639.6	BKF	18		617.89	
2639.6	100 YR	1082		621.17	
2635.16	BKF	18		617.85	
2635.16	100 YR	1082		621.14	
2630.16	BKF	18		617.79	
2630.16	100 YR	1082		621.11	
2613.76	BKF	18		617.67	
2613.76	100 YR	1082		621.03	
2591.52	BKF	18		617.36	
2591.52	100 YR	1082		620.87	
2569.28	BKF	18		617.10	
2569.28	100 YR	1082		620.66	
2566.16	BKF	18		617.09	
2566.16	100 YR	1082		620.59	
2561.16	BKF	18		617.09	
2561.16	100 YR	1082		620.32	
2534.16	BKF	18		616.83	
2534.16	100 YR	1082		619.95	
2519.82	BKF	18	614.13	616.74	2.61
2519.82	100 YR	1082	619.62	619.70	0.08
2499.4	BKF	18		616.27	
2499.4	100 YR	1082		619.11	
2496.16	BKF	18		616.04	
2496.16	100 YR	1082		619.10	
2491.16	BKF	18		615.96	
2491.16	100 YR	1082		619.02	
2470.16	BKF	18		615.58	
2470.16	100 YR	1082		618.91	
2461.16	BKF	18		615.11	
2461.16	100 YR	1082		618.36	

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
2455.39	BKF	18		615.02	
2455.39	100 YR	1082		618.35	
2420.2	BKF	18		614.85	
2420.2	100 YR	1082		618.23	
2411.77	BKF	18		614.81	
2411.77	100 YR	1082		618.14	
2403.34	BKF	18		614.78	
2403.34	100 YR	1082		618.04	
2368.09	BKF	18	613.70	614.60	0.90
2368.09	100 YR	1082	617.85	617.72	-0.13
2348.94	BKF	18		614.36	
2348.94	100 YR	1082		617.61	
2329.79	BKF	18		614.06	
2329.79	100 YR	1082		617.46	
2327.16	BKF	18		614.05	
2327.16	100 YR	1082		617.42	
2323.16	BKF	18		614.06	
2323.16	100 YR	1082		617.32	
2312.86	BKF	18		614.00	
2312.86	100 YR	1082		617.23	
2292.02	BKF	18		613.93	
2292.02	100 YR	1082		617.08	
2272.16	BKF	18		613.85	
2272.16	100 YR	1082		616.94	
2269.16	BKF	18		613.85	
2269.16	100 YR	1082		616.91	
2264.16	BKF	18	613.42	613.85	0.43
2264.16	100 YR	1082	616.50	616.86	0.36
2241.56	BKF	18		613.76	
2241.56	100 YR	1082		616.72	
2222.05	BKF	18		613.68	
2222.05	100 YR	1082		616.54	

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
2202.48	BKF	18		613.63	
2202.48	100 YR	1082		616.31	
2170.66	BKF	18		613.53	
2170.66	100 YR	1082		615.96	
2163.99	BKF	18		613.49	
2163.99	100 YR	1082		615.92	
2157.33	BKF	18		613.46	
2157.33	100 YR	1082		615.89	
2114.16	BKF	18		613.12	
2114.16	100 YR	1082		615.74	
2102.75	BKF	18		613.03	
2102.75	100 YR	1082		615.70	
2078.57	BKF	18	613.07	612.83	-0.24
2078.57	100 YR	1082	615.40	615.54	0.14
2063.39	BKF	18		612.83	
2063.39	100 YR	1082		615.44	
2056.43	BKF	18		612.79	
2056.43	100 YR	1082		615.42	
2049.47	BKF	18		612.77	
2049.47	100 YR	1082		615.40	
2028.21	BKF	18		612.71	
2028.21	100 YR	1082		615.33	
2003.9	BKF	18		612.57	
2003.9	100 YR	1082		615.26	
1979.6	BKF	18		612.53	
1979.6	100 YR	1082		615.21	
1953.09	BKF	18	612.80	612.49	-0.31
1953.09	100 YR	1082	615.11	615.17	0.06
1927.63	BKF	18		612.47	
1927.63	100 YR	1082		615.14	
1772.57	BKF	18	612.55	612.29	-0.26
1772.57	100 YR	1082	614.88	614.82	-0.06

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
1741.17	BKF	18		612.23	
1741.17	100 YR	1082		614.62	
1726.3	BKF	18		612.18	
1726.3	100 YR	1082		614.62	
1711.43	BKF	18		612.14	
1711.43	100 YR	1082		614.59	
1681.99	BKF	18		612.08	
1681.99	100 YR	1082		614.52	
1665.41	BKF	18	611.78	612.02	0.24
1665.41	100 YR	1082	614.65	614.50	-0.15
1648.84	BKF	18		611.97	
1648.84	100 YR	1082		614.48	
1616.9	BKF	18	611.38	611.91	0.53
1616.9	100 YR	1082	614.53	614.43	-0.10
1602.4	BKF	18		611.83	
1602.4	100 YR	1082		614.38	
1587.91	BKF	18		611.78	
1587.91	100 YR	1082		614.36	
1553.27	BKF	18		611.64	
1553.27	100 YR	1082		614.32	
1535	BKF	18	611.00	611.51	0.51
1535	100 YR	1082	614.46	614.29	-0.17
1516.73	BKF	18		611.40	
1516.73	100 YR	1082		614.27	
1489.16	BKF	18		611.27	
1489.16	100 YR	1082		614.24	
1486.16	BKF	18		611.25	
1486.16	100 YR	1082		614.24	
1481.16	BKF	18		611.19	
1481.16	100 YR	1082		614.23	
1453.32	BKF	18		611.09	
1453.32	100 YR	1082		614.20	

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
1444.87	BKF	18		610.97	
1444.87	100 YR	1082		614.19	
1436.44	BKF	18		610.86	
1436.44	100 YR	1082		614.17	
1433.16	BKF	18		610.84	
1433.16	100 YR	1082		614.17	
1428.16	BKF	18		610.79	
1428.16	100 YR	1082		614.16	
1393.16	BKF	18		610.51	
1393.16	100 YR	1082		614.07	
1390.16	BKF	18		610.48	
1390.16	100 YR	1082		614.06	
1385.16	BKF	18		610.45	
1385.16	100 YR	1082		614.04	
1357.57	BKF	18	611.01	610.29	-0.72
1357.57	100 YR	1082	614.24	613.91	-0.33
1350.8	BKF	18		610.2	
1350.8	100 YR	1082		613.89	
1344.03	BKF	18		610.07	
1344.03	100 YR	1082		613.89	
1341.16	BKF	18		610.04	
1341.16	100 YR	1082		613.89	
1336.16	BKF	18		609.97	
1336.16	100 YR	1082		613.89	
1305.16	BKF	18		609.9	
1305.16	100 YR	1082		613.84	
1302.16	BKF	18		609.86	
1302.16	100 YR	1082		613.84	
1297.16	BKF	18		609.83	
1297.16	100 YR	1082		613.82	
1274.55	BKF	18		609.53	
1274.55	100 YR	1082		613.77	
1267.19	BKF	18		609.56	
1267.19	100 YR	1082		613.74	

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
1259.83	BKF	18		609.45	
1259.83	100 YR	1082		613.72	
1257.15	BKF	18		609.41	
1257.15	100 YR	1082		613.71	
1252.07	BKF	18		609.36	
1252.07	100 YR	1082		613.69	
1240.72	BKF	18		609.23	
1240.72	100 YR	1082		613.66	
1233.36	BKF	18		609.22	
1233.36	100 YR	1082		613.65	
1226	BKF	18		609.14	
1226	100 YR	1082		613.64	
1223.33	BKF	18		609.16	
1223.33	100 YR	1082		613.64	
1218.33	BKF	18		609.12	
1218.33	100 YR	1082		613.65	
1186.33	BKF	18	610.81	608.81	-2.00
1186.33	100 YR	1082	613.02	613.65	0.63
1183.33	BKF	18		608.85	
1183.33	100 YR	1082		613.65	
1178.33	BKF	18		608.78	
1178.33	100 YR	1082		613.65	
1156.61	BKF	18		608.49	
1156.61	100 YR	1082		613.64	
1139.77	BKF	18		608.45	
1139.77	100 YR	1082		613.64	
1122.93	BKF	18		608.28	
1122.93	100 YR	1082		613.63	
1120.33	BKF	18		608.32	
1120.33	100 YR	1082		613.63	
1115.33	BKF	18	607.71	608.27	0.56
1115.33	100 YR	1082	610.78	613.63	2.85
1093.33	BKF	18		608.07	
1093.33	100 YR	1082		613.62	

River Station	Storm Event	Discharge (cfs)	Existing WSEL (ft)	Proposed WSEL (ft)	Backwater (ft)
1090.33	BKF	18		608.11	
1090.33	100 YR	1082		613.62	
1085.33	BKF	18		608.04	
1085.33	100 YR	1082		613.62	
1071.65	BKF	18		607.8	
1071.65	100 YR	1082		612.27	
1055.14	BKF	18	606.92	607.79	0.87
1055.14	100 YR	1082	610.57	611.3	0.73
1038.64	BKF	18		607.56	
1038.64	100 YR	1082		610.55	
1035.33	BKF	18		607.62	
1035.33	100 YR	1082		610.55	
1030.33	BKF	18		607.56	
1030.33	100 YR	1082		610.54	
1004.33	BKF	18		607.05	
1004.33	100 YR	1082		610.48	
1001.33	BKF	18	606.34	606.53	0.19
1001.33	100 YR	1082	610.46	610.47	0.01
Downstream End of Project					

APPENDIX 13
CE

Appendix A

Categorical Exclusion Form for Ecosystem Enhancement Program Projects
Version 1.4

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

Part 1: General Project Information	
Project Name:	UT to Rocky River
County Name:	Cabarrus
EEP Number:	Contract No. 070708001
Project Sponsor:	Ko and Associates
Project Contact Name:	Kevin Williams, PE, PLS, CPESC, CPSWQ
Project Contact Address:	5121 Kingdom Way, Suite 100, Raleigh, NC, 27607
Project Contact E-mail:	kwilliams@koassociates.com
EEP Project Manager:	Robin Dolin

Project Description

EEP is developing stream restoration plans for the UT to Rocky River located in northwest Cabarrus County 6 miles southwest of Kannapolis. The Project is located in USGS HU and **Targeted Local Watershed 03040105010010** of the Yadkin-Pee Dee River Basin. The primary goals of this restoration project focus on restoring a stable dimension, pattern, and profile to the UT to the Rocky River; revegetating the Site; improving water quality; attenuating floodwaters; controlling invasive species; and restoring aquatic and riparian habitat.

For Official Use Only

Reviewed By:

Date | **EEP Project Manager**

Conditional Approved By:

Date | **For Division Administrator FHWA**

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

Final Approval By:

Date | **For Division Administrator FHWA**

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

Part 3: Ground-Disturbing Activities Regulation/Question	Response
American Indian Religious Freedom Act (AIRFA)	
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?	☐ Yes ☑ No
2. Is the site of religious importance to American Indians?	☐ Yes ☐ No ☑ N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?	☐ Yes ☐ No ☑ N/A
4. Have the effects of the project on this site been considered?	☐ Yes ☐ No ☑ N/A
Antiquities Act (AA)	
1. Is the project located on Federal lands?	☐ Yes ☑ No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Archaeological Resources Protection Act (ARPA)	
1. Is the project located on federal or Indian lands (reservation)?	☐ Yes ☑ No
2. Will there be a loss or destruction of archaeological resources?	☐ Yes ☐ No ☑ N/A
3. Will a permit from the appropriate Federal agency be required?	☐ Yes ☐ No ☑ N/A
4. Has a permit been obtained?	☐ Yes ☐ No ☑ N/A
Endangered Species Act (ESA)	
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	☑ Yes ☐ No
2. Is Designated Critical Habitat or suitable habitat present for listed species?	☑ Yes ☐ No ☐ N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat? `Surveys for Schweinitzii's sunflower occurred on September 9, 2008 (during the survey window). No plants were found.`	☐ Yes ☑ No ☐ N/A
4. Is the project "likely to adversely affect" the species and/or "likely to adversely modify" Designated Critical Habitat?	☐ Yes ☑ No ☐ N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination? `USFWS was contacted with no response.`	☐ Yes ☐ No ☑ N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?	☐ Yes ☐ No ☑ N/A

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

Axiom Environmental, Inc.

Axiom Environmental, Inc.

2126 Rowland Pond Drive Willow Spring Raleigh, North Carolina 27592 919-215-1693

March 13, 2008

Renee Gledhill-Earley
Environmental Review Coordinator
North Carolina State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

Subject: UT to the Rocky River Stream Restoration Project, Cabarrus County **07-015**

Dear Ms. Gledhill-Earley,

The purpose of this letter is to request a concurrence letter for historic architectural and archaeological surveys and resources within the UT to the Rocky River Stream Restoration Site, a potential stream restoration project depicted on the attached Site Location Map.

The project includes approximately 2200 linear feet of an unnamed tributary to the Rocky River located in Cabarrus County (see attached figures). The site is located in previously timbered land and is characterized by a scrub/shrub community. The site stream is characterized by areas of degradation as well as sections of aggradation with a prevalence of beaver activity within the project area. The primary restoration activities at the Site include 1) construction of a stable, riffle-pool stream channel, 2) reconnect Site streams with the historic floodplain, 3) eliminate invasive vegetative species, 4) minimize disturbance to existing mature vegetation, 5) creation of a natural vegetation buffer along Site streams, and 6) establishment of a conservation easement.

Please note that no structures, including buildings, bridges, or monuments are to be affected by the project. The nearest building to the project is greater than 100 feet from the construction limits and all impacts are to be contained within 100 feet of the existing stream channel.

We thank you in advance for your timely response concerning historic architectural and archaeological issues from your office. I would appreciate receiving such letter for this project at your earliest convenience. Please feel free to contact us with any questions or concerns that you may have concerning the project.

Sincerely,

W Grant Lewis

Mr. W. Grant Lewis
Axiom Environmental, Inc.

Attachments: Figures 1-2

cc: Mr. Kevin Williams, Project Manager

Axiom Environmental, Inc.

Axiom Environmental, Inc.

2126 Rowland Pond Drive Willow Spring Raleigh, North Carolina 27592 919-215-1693

March 13, 2008

Dale Suiter
US Fish and Wildlife Service
Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636

Subject: UT to the Rocky River Stream Restoration Project, Cabarrus County **07-015**

Dear Mr. Suiter,

The purpose of this letter is to request comment on any possible issues that might emerge with respect to the Migratory Bird Treaty Act (MBTA), the Fish and Wildlife Coordination Act (FWCA), and the Endangered Species Act (ESA) from the UT to the Rocky River Stream Restoration Project. The project is depicted on the attached maps.

Site Description and Proposed Activities

The project includes approximately 2200 linear feet of an unnamed tributary to the Rocky River located in Cabarrus County (see attached figures). The site is located in previously timbered land and is characterized by a scrub/shrub community. The site stream is characterized by areas of degradation as well as sections of aggradation with a prevalence of beaver activity within the project area. The primary restoration activities at the Site include 1) construction of a stable, riffle-pool stream channel, 2) reconnect Site streams with the historic floodplain, 3) eliminate invasive vegetative species, 4) minimize disturbance to existing mature vegetation, 5) creation of a natural vegetation buffer along Site streams, and 6) establishment of a conservation easement.

Federally Protected Species

Based on the January 31, 2008 United States Fish and Wildlife Service (USFWS) list, two federally protected species are listed for Cabarrus County. The following table lists the federally protected species for Cabarrus County, indicates if potential habitat exists within the Site, and gives a biological conclusion for each species.

Federally Protected Species for Cabarrus County

Common Name	Scientific Name	Status*	Habitat Present Within Site	Biological Conclusion
Invertebrates				
Carolina heelsplitter	*Lasmigona decorata*	Endangered	No	No Effect
Vascular Plants				
Schweinitz's sunflower	*Helianthus schweinitzii*	Endangered	Yes	Unresolved

*Endangered = a taxon "in danger of extinction throughout all or a significant portion of its range".

Lasmigona decorata (Carolina heelsplitter) **Endangered**
Animal Family: Unionidae
Date Listed: June 13, 1993

The Carolina heelsplitter was once fairly widely distributed in the Catawba and Pee Dee river basins in North Carolina and Pee Dee and Savannah river basins in South Carolina. There are only six known remaining populations of this species; two in North Carolina and four in South Carolina.

This mussel is usually found in a variety of substrates usually near stable, well-shaded stream banks. The stability of the stream banks appears to be very important to this species and no fish host has been identified.

The Carolina heelsplitter is a medium-sized mussel that has an ovate, trapezoid-shaped shell. The shell is yellowish, greenish brown to dark brown. Younger specimens have greenish brown or black rays. The nacre is pearly white to bluish-white, grading to orange in the area of the umbo. The lateral teeth are well developed but thin and rather delicate.

Biological Conclusion: **NO EFFECT**
Potential habitat for the Carolina heelsplitter does not occur within the Site due to the disturbed nature of Site streams and the lack of stream shading. In addition, no known occurrences are documented by the North Carolina Natural Heritage Program (NCNHP) within or near the Site.

Helianthus schweinitzii (Schweinitz's sunflower) **Endangered**
Plant Family: Asteraceae
Federally Listed: June 6, 1991

This sunflower is found in the piedmont of North and South Carolina with 13 known populations occurring in North Carolina.

Schweinitz's sunflower is a rhizomatous perennial herb with one to several fuzzy purple stems. It grows to 3-6 feet in height from a cluster of carrot-like tubrous roots. Leaves are lance-shaped, usually opposite, approximately 2-7 inches in length, and 0.4-0.8 inches in width. The leaves are rough and resin-dotted on the surface with a felt-like feel on the underside. Flowers are yellow composites and fruits are small and dark brown. Flowering and fruiting occur from mid-September to frost. Based on its similar morphology to *H. laevigatus* and *H. microcephalus* it is difficult to positively identify this species prior to flowering.

Schweinitz's sunflower grows best in full sunlight or partial shade in clearings and along the edges of upland woods, thickets, and pastures. It is also found along roadsides, powerline clearings, old pastures, and woodland openings. Common soils that this species is found in include moist to dryish clays, clay-loams, or sandy clay-loams, often with high gravel content. Natural fires and large herbivores are considered to be historically important in maintaining open habitat for these sunflowers. Today, disturbances such as mowing, controlled burning, and logging help maintain its open habitat.

Biological Conclusion: **UNRESOLVED**
Habitat for Schweinitz's sunflower is present within the project in the form of maintained-disturbed land. Plant-by-plant surveys for this species will be conducted during the optimal survey window. No known occurrences are documented by the NCNHP within or near the Site.

Designated Critical Habitat
No designated critical habitat is documented to occur within Cabarrus County.

We thank you in advance for your timely response concerning letter(s) of concurrence from your office for the MBTA, FWCA, and ESA. I would appreciate receiving such letter(s) for this project at your earliest convenience. Please feel free to contact us with any questions or concerns that you may have concerning the project.

Sincerely,

W Grant Lewis

Mr. W. Grant Lewis
Axiom Environmental, Inc.

Attachments: Figures 1-2

cc: Mr. Kevin Williams, Project Manager

Axiom Environmental, Inc.

Axiom Environmental, Inc.

2126 Rowland Pond Drive Willow Spring Raleigh, North Carolina 27592 919-215-1693

March 13, 2008

Shannon Deaton
NC Wildlife Resources Commission
Division of Inland Fisheries
1751 Varsity Drive
NCSU Centennial Campus
Raleigh, NC 27606

Subject: UT to the Rocky River Stream Restoration Project, Cabarrus County **07-015**

Dear Ms. Deaton,

The purpose of this letter is to request comment on any possible issues that might emerge with respect to the Fish and Wildlife Coordination Act (FWCA) from the proposed UT to the Rocky River Stream Restoration Project. The project is depicted on the attached maps.

The project includes approximately 2200 linear feet of an unnamed tributary to the Rocky River located in Cabarrus County (see attached figures). The site is located in previously timbered land and is characterized by a scrub/shrub community. The site stream is characterized by areas of degradation as well as sections of aggradation with a prevalence of beaver activity within the project area. The primary restoration activities at the Site include 1) construction of a stable, riffle-pool stream channel, 2) reconnect Site streams with the historic floodplain, 3) eliminate invasive vegetative species, 4) minimize disturbance to existing mature vegetation, 5) creation of a natural vegetation buffer along Site streams, and 6) establishment of a conservation easement.

We thank you in advance for your timely response concerning a letter of concurrence from your office for the FWCA. I would appreciate receiving such letter for this project at your earliest convenience. Please feel free to contact us with any questions or concerns that you may have concerning the project.

Sincerely,

W Grant Lewis

Mr. W. Grant Lewis
Axiom Environmental, Inc.

Attachments: Figures 1-2

cc: Mr. Kevin Williams, Project Manager

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request: March 13, 2008
Name Of Project: UT to Rock River Restoration Site	Federal Agency Involved: Federal Highway Administration
Proposed Land Use: Stream and Wetland Restoration	County And State: Cabarrus County, North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).* Yes ☐ No ☐

Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount Of Farmland As Defined in FPPA Acres: %	Acres Irrigated / Average Farm Size
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By NRCS	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	0			
B. Total Acres To Be Converted Indirectly	NA			
C. Total Acres In Site	20	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	0	0	0	0

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

Site Selected: Date Of Selection: Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side)

Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

Grant Lewis

From: Grant Lewis
Sent: Thursday, March 13, 2008 10:46 AM
To: 'alan.walters@nc.usda.gov'
Cc: (kwilliams@koassociates.com)
Subject: UT to Rocky River Restoration Site - Farmland Conversion Impact Rating Form
Attachments: Site Location.pdf; UTRocky_FPPA_FormAD1006.pdf; Fig2_aerial.pdf

Hello Alan;

I am working on a restoration project in Cabarrus County that requires a Farmland Conversion Impact Rating form (Form AD-1006) to be completed. I have attached information for your review in completing the form. The Site is approximately 20 acres situated between two newly constructed schools. The property is shrub scrub vegetation dominated by blackberry and rose and appears to have been timbered approximately 7 to 10 years ago. There is no evidence of previous farmland use on the Site; however, beaver have made it difficult to fully asses the Site. I have aerials from 1998 which indicate the property was disturbed timberland.

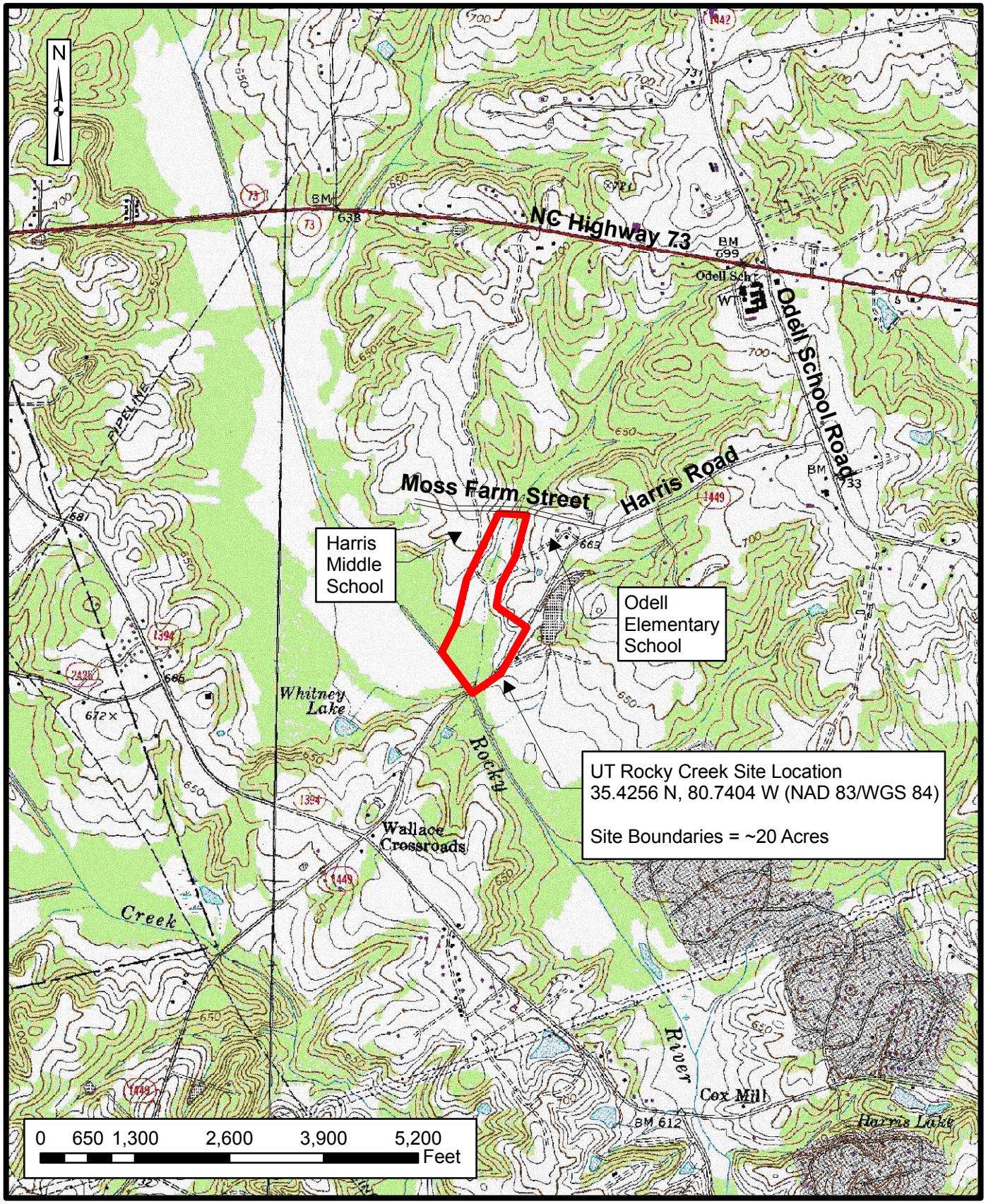
I have attached several figures and the form AD-1006 for your use. If you need additional information please feel free to call me at 919-215-1693. You may fax the completed form to 919-341-3839.

Thank you for your assistance

Grant

W. Grant Lewis
Senior Project Manager
Axiom Environmental Inc.
2126 Rowland Pond Dr.
Willow Spring, North Carolina 27592
(919) 215-1693(cell)
(919) 341-3839 (fax)
glewis@axiomenvironmental.org

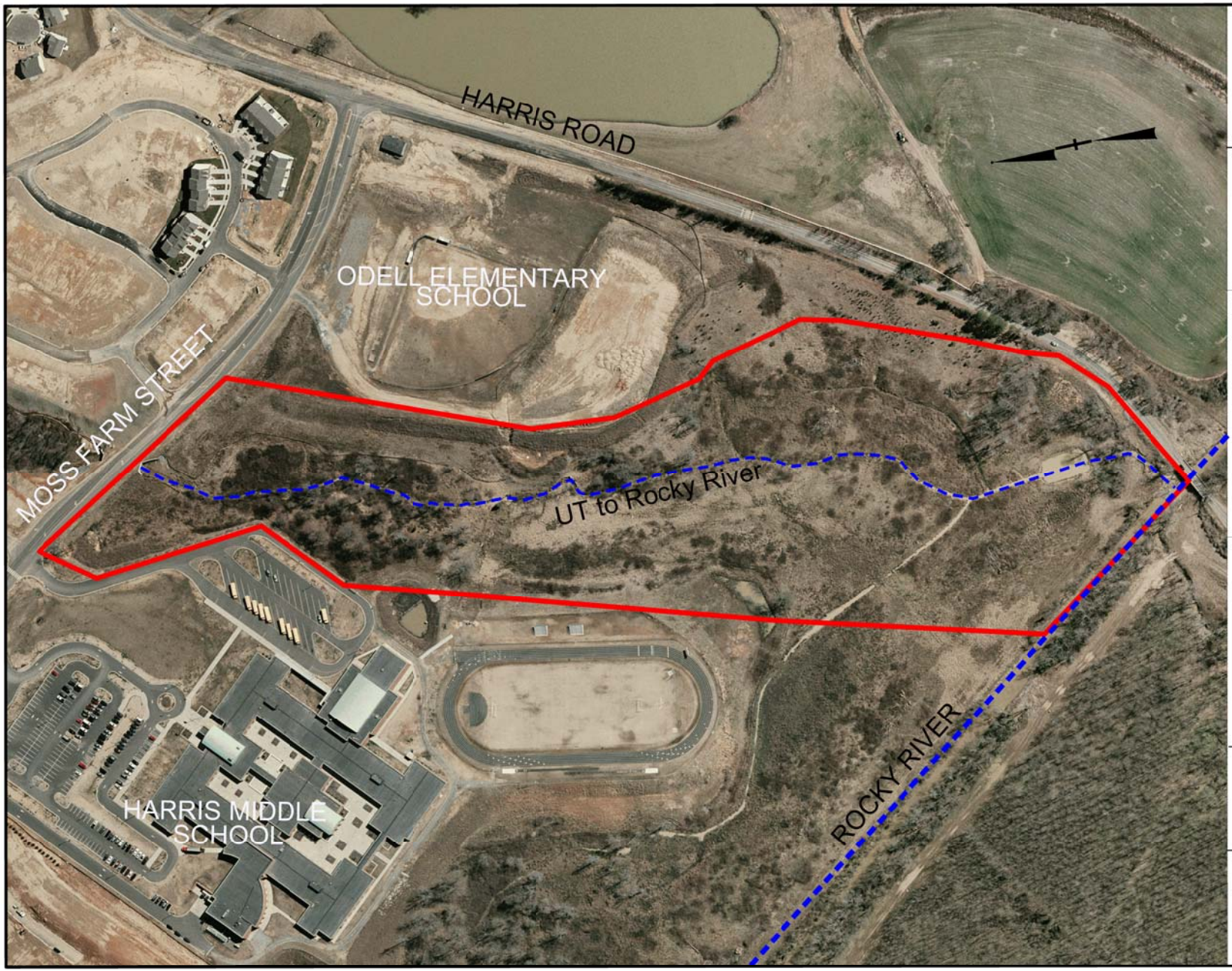
Axiom Environmental, Inc.



2126 Rowland Pond Dr.
Willow Spring, NC 27592
(919) 215-1693
(919) 341-3839 (fax)

SITE LOCATION
UT TO ROCKY CREEK
Cabarrus County, North Carolina

Dwn. By: WGL	FIGURE
Date: March 2008	1
Project: 07-015	



Axiom Environmental, Inc.

NOTES/REVISIONS

Project:

UT Rocky River Jurisdictional Delineation

Cabarrus County North Carolina

Title:

Site Boundary

Scale: 1" = 305'

Date: March 2008

Project No.: 07-015

FIGURE NO. 2

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

April 10, 2008

W. Grant Lewis
Axiom Environmental, Inc.
2126 Rowland Pond Drive
Willow Springs, NC 27592

Re: UT to the Rocky River Stream Restoration, Cabarrus County, ER 08-0859

Dear Mr. Lewis:

Thank you for your letter of March 13, 2008, concerning the above project.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

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 919-807-6579. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

Renee Gledhill-Earley

Peter Sandbeck

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request March 13 2008
Name Of Project UT to Rock River Restoration Site	Federal Agency Involved Federal Highway Administration
Proposed Land Use Stream and Wetland Restoration	County And State Cabarrus County, North Carolina
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 3/6/2008

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).* Yes [X] No [ ] Acres Irrigated 0 Average Farm Size 111 acres

Major Crop(s) CORN | Farmable Land In Govt. Jurisdiction Acres: 202401 % 86.8 | Amount Of Farmland As Defined in FPPA Acres: 106941 % 51.0

Name Of Land Evaluation System Used CABARRUS CO LE | Name Of Local Site Assessment System N/A | Date Land Evaluation Returned By NRCS 3-17-2008

PART III *(To be completed by Federal Agency)*

	Site A	Alternative Site B	Site C	Site D
A. Total Acres To Be Converted Directly	0			
B. Total Acres To Be Converted Indirectly	NA			
C. Total Acres In Site	20	0.0	0.0	0.0

PART IV *(To be completed by NRCS)* Land Evaluation Information

A. Total Acres Prime And Unique Farmland	25.0			
B. Total Acres Statewide And Local Important Farmland	5.0			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0.018			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	23.3			

PART V *(To be completed by NRCS)* Land Evaluation Criterion
Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)* | 0 | 85 | 0 | 0 | 0

PART VI *(To be completed by Federal Agency)*
Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*

	Maximum Points				
1. Area In Nonurban Use		3			
2. Perimeter In Nonurban Use		0			
3. Percent Of Site Being Farmed		0			
4. Protection Provided By State And Local Government		0			
5. Distance From Urban Builtup Area		0			
6. Distance To Urban Support Services		0			
7. Size Of Present Farm Unit Compared To Average		0			
8. Creation Of Nonfarmable Farmland		5			
9. Availability Of Farm Support Services		0			
10. On-Farm Investments		5			
11. Effects Of Conversion On Farm Support Services		0			
12. Compatibility With Existing Agricultural Use		5			
TOTAL SITE ASSESSMENT POINTS	160	0 13	0	0	0

PART VII *(To be completed by Federal Agency)*

Relative Value Of Farmland *(From Part V)*	100	0 85	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	0 13	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	0 98	0	0	0

Site Selected: | Date Of Selection | Was A Local Site Assessment Used? Yes [X] No [ ]

Reason For Selection:

(See Instructions on reverse side)

This form was electronically produced by National Production Services Staff

Form AD-1006 (10-83)

North Carolina Wildlife Resources Commission

April 9, 2008

Mr. W. Grant Lewis
Axiom Environmental, Inc.
2126 Rowland Pond Drive Willow Spring
Raleigh, North Carolina 27592

RE: Unnamed Tributary Rocky River Stream Restoration Project, Cabarrus County

Dear Mr. Lewis:

This correspondence is in response to your letter of March 13, 2008. Biologists with the North Carolina Wildlife Resources Commission (NCWRC) are familiar with habitat values in the area. The NCWRC is authorized to comment and make recommendations which relate to the impacts of this project on fish and wildlife pursuant to Clean Water Act of 1977, North Carolina Environmental Policy Act, US National Environmental Policy Act, Endangered Species Act (16 U. S. C. 1531-1543; 87 Stat 884), the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d) and/or Federal License of Water Resource Project Act (Federal Power Act-16 U.S.C. 791a et seq.) as applicable.

The project includes approximately 2200 linear feet of stream. The property has been timbered and is in an early successional growth phase. Beaver are present in the area. Restoration efforts are indicated to be construction of stable channels, reconnection to floodplains, removal of invasive species, minimization of disturbance to mature vegetation, and the establishment of conservation easements.

The Carolina creekshell, *Villosa vaughaniana* (NCE, FSC) and the Carolina darter, *Etheostoma collis* (NCSC/FSC) are known for Clark Creek to the west of this project area. The presence of listed species within this stream is not indicated. Historically, the Carolina heelsplitter, *Lasmigona decorata* (NCE, FE) was known for the Rocky River. Although physical habitats for this species are known for the Rocky River, water quality is believed to be a significant limiting factor. Restoration of biologically functional headwater habitats should restore water quality and provide ancillary benefits.

Project proponents should be made aware of the above information. Improvements in stream and wetland habitats could improve habitats for aquatic listed species in the area. Accordingly,

Mailing Address: Division of Inland Fisheries • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

project proponents are encouraged to pursue mitigation activities at the site including preconstruction Clean Water Act permitting and certifications as well as providing biological investigations for the Carolina creekshell. If any Carolina creekshells are found in the work area, they should be relocated upstream or removed to safety and subsequently restored to the stream. Mussel work should be accomplished by professionally certified mussel biologists.

Only autochthonous plants should be used for the project. State-of-the-art stream and wetland natural channel design calculations and designs should be used for stream improvements. Planning and providing mussel and host species habitat restoration should be considered as very important. Minimum 50' intermittent and minimum 100' forested buffers should be provided. If possible, these buffers should be doubled to help restore diminished aquatic habitats and improve opportunities for listed species restoration in the Rocky River.

Please be advised that this office only reviews sites for animal species. You should also contact the NC Natural Heritage Program and the US Fish and Wildlife Service for their review and comments about the site and proposed mitigation activities.

Thank you for the opportunity to comment on your proposed project during early planning stages. If you have any questions regarding these comments, please contact me at 336/769-9453.

Sincerely,

Ron Linville
Regional Coordinator
Habitat Conservation Program

E-copy: Bryan Tompkins, USFWS
Sarah McRae, NHP

EDR Radius Map™ with GeoCheck®

Prepared using the EDR FieldCheck® System

UT to Rocky River
Harris Road at the Rocky River
CONCORD, NC 28027

Inquiry Number: 2168239.2s

March 14, 2008

The Standard in Environmental Risk Information

440 Wheelers Farms Road
Milford, Connecticut 06461

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of the environmental records was conducted by Environmental Data Resources, Inc. (EDR). AXIOM ENVIRONMENTAL used the EDR FieldCheck System to review and/or revise the results of this search, based on independent data verification by AXIOM ENVIRONMENTAL. The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

HARRIS ROAD AT THE ROCKY RIVER
CONCORD, NC 28027

COORDINATES

Latitude (North):	35.426780 - 35° 25' 36.4''
Longitude (West):	80.740050 - 80° 44' 24.2''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	523597.6
UTM Y (Meters):	3920205.2
Elevation:	617 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	35080-D6 KANNAPOLIS, NC
Most Recent Revision:	1996
West Map:	35080-D7 CORNELIUS, NC
Most Recent Revision:	1996

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No sites were identified in following databases.

FEDERAL RECORDS

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
Delisted NPL ---------- National Priority List Deletions
NPL LIENS ---------- Federal Superfund Liens
CERCLIS ---------- Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP ---------- CERCLIS No Further Remedial Action Planned
LIENS 2 ---------- CERCLA Lien Information
CORRACTS ---------- Corrective Action Report

EXECUTIVE SUMMARY

RCRA-TSDF RCRA - Transporters, Storage and Disposal
RCRA-LQG RCRA - Large Quantity Generators
RCRA-SQG RCRA - Small Quantity Generators
RCRA-CESQG RCRA - Conditionally Exempt Small Quantity Generator
RCRA-NonGen RCRA - Non Generators
US ENG CONTROLS Engineering Controls Sites List
US INST CONTROL Sites with Institutional Controls
ERNS Emergency Response Notification System
HMIRS Hazardous Materials Information Reporting System
DOT OPS Incident and Accident Data
US CDL Clandestine Drug Labs
US BROWNFIELDS A Listing of Brownfields Sites
DOD Department of Defense Sites
FUDS Formerly Used Defense Sites
LUCIS Land Use Control Information System
CONSENT Superfund (CERCLA) Consent Decrees
ROD Records Of Decision
UMTRA Uranium Mill Tailings Sites
DEBRIS REGION 9 Torres Martinez Reservation Illegal Dump Site Locations
ODI Open Dump Inventory
MINES Mines Master Index File
TRIS Toxic Chemical Release Inventory System
TSCA Toxic Substances Control Act
FTTS FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS FIFRA/TSCA Tracking System Administrative Case Listing
SSTS Section 7 Tracking Systems
ICIS Integrated Compliance Information System
PADS PCB Activity Database System
MLTS Material Licensing Tracking System
RADINFO Radiation Information Database
FINDS Facility Index System/Facility Registry System
RAATS RCRA Administrative Action Tracking System

STATE AND LOCAL RECORDS

SHWS Inactive Hazardous Sites Inventory
NC HSDS Hazardous Substance Disposal Site
SWF/LF List of Solid Waste Facilities
OLI Old Landfill Inventory
HIST LF Solid Waste Facility Listing
LUST TRUST State Trust Fund Database
UST Petroleum Underground Storage Tank Database
AST AST Database
INST CONTROL No Further Action Sites With Land Use Restrictions Monitoring
VCP Responsible Party Voluntary Action Sites
DRYCLEANERS Drycleaning Sites
BROWNFIELDS Brownfields Projects Inventory
NPDES NPDES Facility Location Listing

TRIBAL RECORDS

INDIAN RESERV Indian Reservations
INDIAN ODI Report on the Status of Open Dumps on Indian Lands
INDIAN LUST Leaking Underground Storage Tanks on Indian Land

EXECUTIVE SUMMARY

INDIAN UST Underground Storage Tanks on Indian Land

EDR PROPRIETARY RECORDS

Manufactured Gas Plants EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STATE AND LOCAL RECORDS

IMD: Incident Management Database.

An online review and analysis by AXIOM ENVIRONMENTAL of the IMD list, as provided by EDR, and dated 07/21/2006 has revealed that there are 2 IMD sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
HARRIS ROAD	***9436 HARRIS ROAD***	***1/8 - 1/4 NE***	***1***	***6***
CANNON'S CROSSROADS DELI	9999 HARRIS ROAD	1/4 - 1/2 SSW	2	8

LUST: The Leaking Underground Storage Tank Incidents Management Database contains an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environment, & Natural Resources' Incidents by Address.

An online review and analysis by AXIOM ENVIRONMENTAL of the LUST list, as provided by EDR, and dated 11/30/2007 has revealed that there is 1 LUST site within approximately 0.5 miles of the target property.

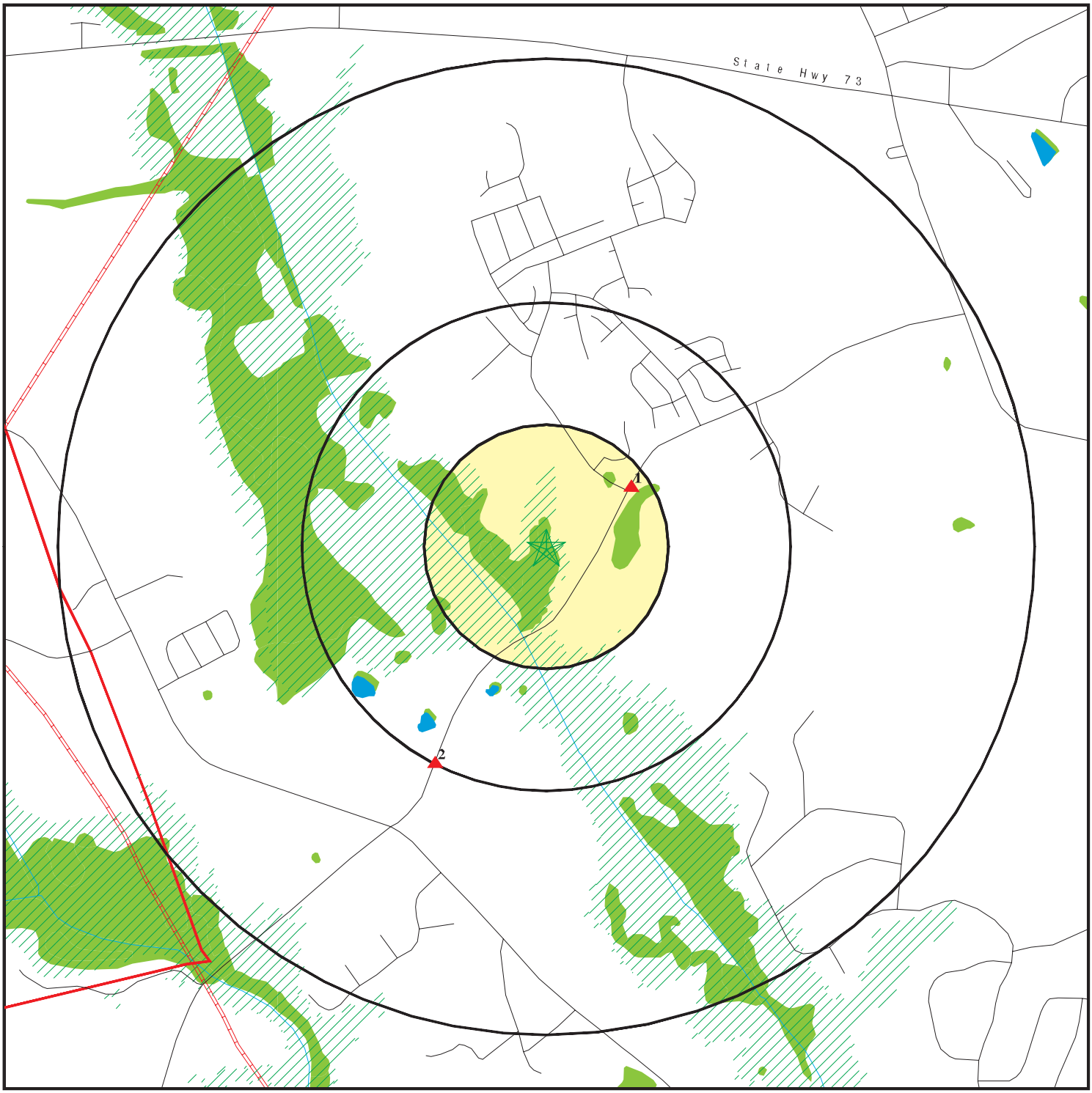
Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
HARRIS ROAD	***9436 HARRIS ROAD***	***1/8 - 1/4 NE***	***1***	***6***

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
CABARRUS COUNTY LANDFILL	HIST LF, IMD
CABARRUS COUNTY LANDFILL LCID	SWF/LF, HIST LF
JOE B PLOTT	SWF/LF, HIST LF
CABARRUS COUNTY HHW COLLECTION FACILITY	SWF/LF, HIST LF
CABARRUS COUNTY CDLF	SWF/LF, HIST LF
HAMMORY/KINCAID FURNITURE	SHWS
CABARRUS DISPOSAL COMPANY	SHWS, IMD
CONCORD COAL GAS PLANT	SHWS, VCP, IMD
LOVE BATTERY SITE	SHWS
LES MYERS PARK	SHWS
BELL AUTO SALES	LUST, IMD
CASPER'S SHELL	LUST, IMD
DON'S AUTO SALES	LUST, IMD
PIERCE REALTY CO. PROPERTY	LUST
MAX HARRIS RESIDENCE	LUST TRUST, LUST, IMD
EXPRESS SHOPPE # 10	LUST, IMD
LARRY MORRIS PROPERTY	LUST, IMD
CARL'S COUNTRY STORE	LUST, IMD
SHELL HWY 73 & 85	LUST, IMD
JOHNNY'S SAV-A-SUM	LUST TRUST
SHELL	LUST TRUST
ACCEL 4	UST
SAM LINKER	UST
PENSKE AUTO CENTER	FINDS, RCRA-CESQG
SADDLE TANK FROM A TRACTOR TRAILER/ MATERIAL SPILLED DUE TO	ERNS
BRAKE XPERTS (FORMER)	IMD
PIC N PAY (FORMER)/ JOHN MURPH	IMD
WHITES GRAVEL PIT	IMD
ORCHARD ELECTRONICS/ SUN TECH.	IMD
CROWN NC-021	IMD
NCDOT ASPHALT SITE #4 (M & M M	IMD
CABARRUS DISPOSAL DUMP	OLI

OVERVIEW MAP - 2168239.2s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites

0 1/4 1/2 1 Miles

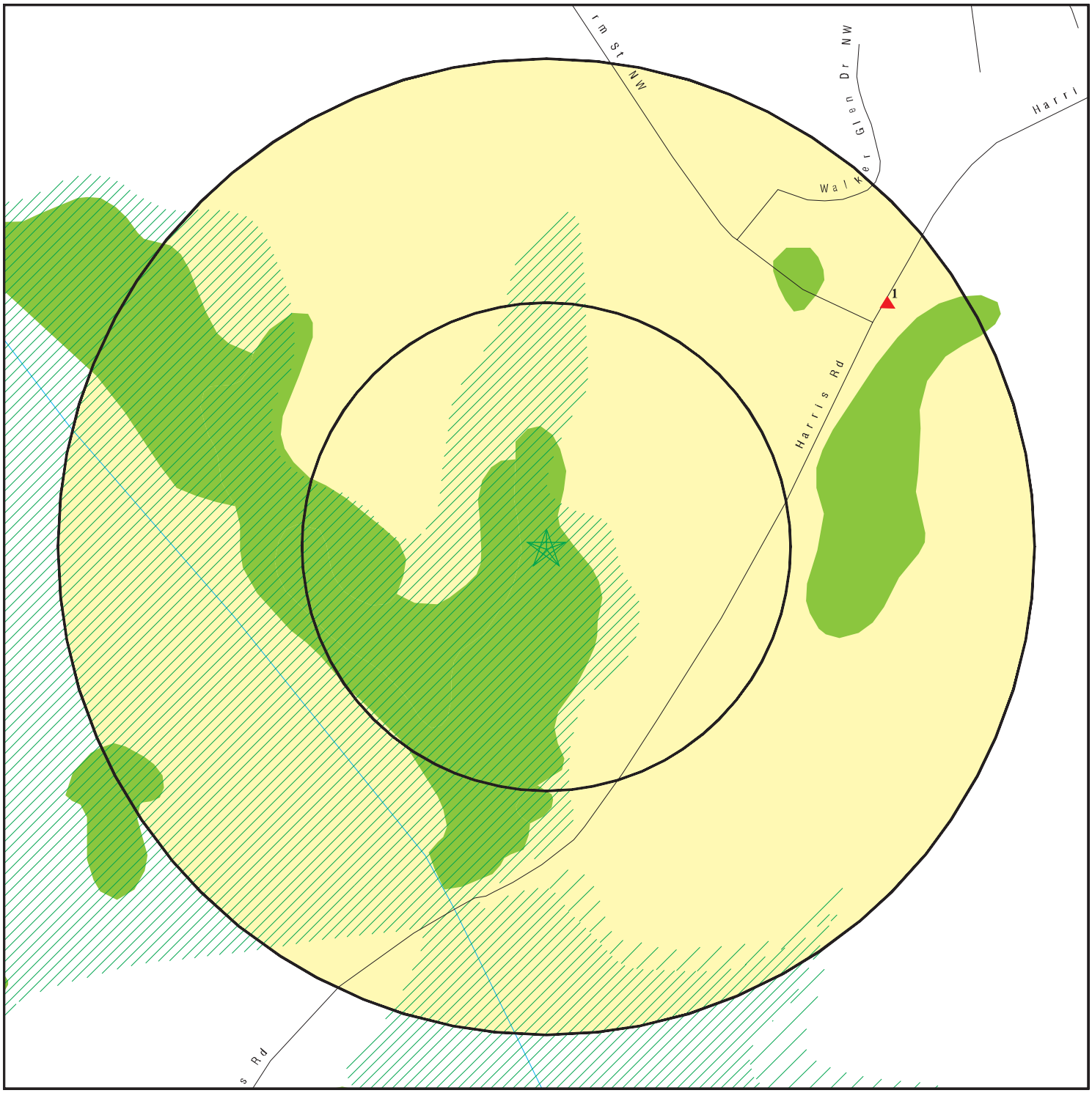
- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Hazardous Substance Disposal Sites

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: UT to Rocky River	CLIENT: Axiom Environmental
ADDRESS: Harris Road at the Rocky River CONCORD NC 28027	CONTACT: Grant Lewis
LAT/LONG: 35.4268 / 80.7400	INQUIRY #: 2168239.2s DATE: March 14, 2008 11:25 am

DETAIL MAP - 2168239.2s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Hazardous Substance Disposal Sites

0 1/16 1/8 1/4 Miles

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	UT to Rocky River	CLIENT:	Axiom Environmental
ADDRESS:	Harris Road at the Rocky River CONCORD NC 28027	CONTACT:	Grant Lewis
		INQUIRY #:	2168239.2s
LAT/LONG:	35.4268 / 80.7400	DATE:	March 14, 2008 11:25 am

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL RECORDS								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
NPL LIENS		TP	NR	NR	NR	NR	NR	0
CERCLIS		0.500	0	0	0	NR	NR	0
CERC-NFRAP		0.500	0	0	0	NR	NR	0
LIENS 2		TP	NR	NR	NR	NR	NR	0
CORRACTS		1.000	0	0	0	0	NR	0
RCRA-TSDF		0.500	0	0	0	NR	NR	0
RCRA-LQG		0.250	0	0	NR	NR	NR	0
RCRA-SQG		0.250	0	0	NR	NR	NR	0
RCRA-CESQG		0.250	0	0	NR	NR	NR	0
RCRA-NonGen		TP	NR	NR	NR	NR	NR	0
US ENG CONTROLS		0.500	0	0	0	NR	NR	0
US INST CONTROL		0.500	0	0	0	NR	NR	0
ERNS		TP	NR	NR	NR	NR	NR	0
HMIRS		TP	NR	NR	NR	NR	NR	0
DOT OPS		TP	NR	NR	NR	NR	NR	0
US CDL		TP	NR	NR	NR	NR	NR	0
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
FUDS		1.000	0	0	0	0	NR	0
LUCIS		0.500	0	0	0	NR	NR	0
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
UMTRA		0.500	0	0	0	NR	NR	0
DEBRIS REGION 9		0.500	0	0	0	NR	NR	0
ODI		0.500	0	0	0	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
HIST FTTS		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
ICIS		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
RADINFO		TP	NR	NR	NR	NR	NR	0
FINDS		TP	NR	NR	NR	NR	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
STATE AND LOCAL RECORDS								
SHWS		1.000	0	0	0	0	NR	0
IMD		0.500	0	1	1	NR	NR	2
NC HSDS		1.000	0	0	0	0	NR	0
SWF/LF		0.500	0	0	0	NR	NR	0
OLI		0.500	0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
HIST LF		0.500	0	0	0	NR	NR	0
LUST		0.500	0	1	0	NR	NR	1
LUST TRUST		0.500	0	0	0	NR	NR	0
UST		0.250	0	0	NR	NR	NR	0
AST		0.250	0	0	NR	NR	NR	0
INST CONTROL		0.500	0	0	0	NR	NR	0
VCP		0.500	0	0	0	NR	NR	0
DRYCLEANERS		0.250	0	0	NR	NR	NR	0
BROWNFIELDS		0.500	0	0	0	NR	NR	0
NPDES		TP	NR	NR	NR	NR	NR	0
TRIBAL RECORDS								
INDIAN RESERV		1.000	0	0	0	0	NR	0
INDIAN ODI		0.500	0	0	0	NR	NR	0
INDIAN LUST		0.500	0	0	0	NR	NR	0
INDIAN UST		0.250	0	0	NR	NR	NR	0
EDR PROPRIETARY RECORDS								
Manufactured Gas Plants		1.000	0	0	0	0	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1
NE
1/8-1/4
0.215 mi.
1134 ft.

HARRIS ROAD
9436 HARRIS ROAD
CONCORD, NC

LUST **S106074774**
IMD **N/A**

Relative:
Higher

Actual:
662 ft.

LUST:

Facility ID:	Not reported		
Incident Number:	27588	UST Number:	MO-6862
Lat/Long:	352543 804412	Lat/Long Decimal:	0 0
Testlat:	Not reported		
Regional Officer Project Mgr:	RHT		
Region:	Mooresville		
Company:	J & B DEVELOPMENT AND MANAGEME		
Contact Person:	Not reported		
Telephone:	7047827800		
RP Address:	9179 DAVIDSON HIGHWAY		
RP City,St,Zip:	CONCORD, NC 28027		
RP County:	Not reported		
Comm / Non-comm UST Site:	NON COMMERCIAL		
Risk Classification:	H		
Risk Class Based On Review:	L		
Corrective Action Plan Type:	Not reported		
Level Of Soil Cleanup Achieved:	Residential		
Tank Regulated Status:	Non Regulated		
Contamination Type:	Soil		
Source Type:	Leak-underground	Product Type:	PETROLEUM
Date Reported:	9/17/2003	Date Occur:	8/28/2003
NOV Issue Date:	Not reported	NORR Issue Date:	Not reported
Site Priority:	Not reported	Phase Of LSA Req:	1
Site Risk Reason:	Not reported	Land Use:	Residential
Closure Request:	Not reported	# Of Supply Wells:	0
Close Out:	7/29/2004		
MTBE:	No	MTBE1:	Unknown
Flag:	No	Flag1:	No
LUR Filed:	Not reported	Release Detection:	0
GPS Confirmed:	7	Cleanup:	10/9/2003
Current Status:	File Located in Archives	RBCA GW:	Cleanups to 2L.0202 standards
PETOPT:	4	RPL:	True
CD Num:	209	Reel Num:	0
RPOW:	True	RPOP:	False
Error Flag:	0		
Error Code:	Not reported	Valid:	False

PIRF:

Facility Id:	27588
Date Occurred:	8/28/2003
Date Reported:	9/17/2003
Description Of Incident:	Not reported
Owner/Operator:	Not reported
Ownership:	4
Operation Type:	3
Type:	Not reported
Location:	8
Site Priority:	Not reported
Priority Update:	Not reported
Wells Affected Y/N:	N
Samples Include:	Not reported
7#5 Minute Quad:	Y
5 Minute Quad:	Not reported

HARRIS ROAD (Continued) **S106074774**

Pirf/Min Soil: Not reported
Release Code: Not reported
Source Code: Not reported
Err Type: 2
Ust Number: C

Last Modified: 7/29/2004
Incident Phase: **Closed Out**
NOV Issued: Not reported
NORR Issued: Not reported
45 Day Report: Not reported
Public Meeting Held: Not reported
Corrective Action Planned: Not reported
SOC Signed: Not reported
Reclassification Report: Not reported
RS Designation: Not reported
Closure Request Date: Not reported
Close-out Report: Not reported
Comments: Not reported

IMD:
Region: MOR
Facility ID: 27588
Date Occurred: 8/28/2003
Submit Date: 9/17/2003
GW Contam: No Groundwater Contamination detected
Soil Contam: Yes
Incident Desc: Not reported
Operator: Not reported
Contact Phone: 7047827800
Owner Company: J & B DEVELOPMENT AND MANAGEME
Operator Address: 9179 DAVIDSON HIGHWAY
Operator City: CONCORD
Oper City,St,Zip: CONCORD, NC 28027
Ownership: Private
Operation: Residential
Material: Not reported
Qty Lost 1: Not reported
Qty Recovered 1: Not reported
Source: Leak-underground
Type: Gasoline/diesel
Location: 8
Setting: Not reported
Risk Site: H
Site Priority: Not reported
Priority Code: Not reported
Priority Update: Not reported
Dem Contact: RHT
Wells Affected: No
Num Affected: Not reported
Wells Contam: Not reported
Sampled By: Y
Samples Include: Not reported
7.5 Min Quad: Not reported
5 Min Quad: Not reported
Latitude: 35.42861111
Longitude: -80.73666666

HARRIS ROAD (Continued) **S106074774**

Latitude Number:	352543
Longitude Number:	804412
Latitude Decimal:	35.4286111111111
Longitude Decimal:	80.7366666666667
GPS:	7
Agency:	DWM
Facility ID:	27588
Last Modified:	7/29/2004
Incident Phase:	Closed Out
NOV Issued:	Not reported
NORR Issued:	Not reported
45 Day Report:	Not reported
Public Meeting Held:	Not reported
Corrective Action Planned:	Not reported
SOC Sighned:	Not reported
Reclassification Report:	Not reported
RS Designation:	Not reported
Closure Request Date:	Not reported
Close-out Report:	Not reported

---

2 **CANNON'S CROSSROADS DELI** **IMD** **S106349497**
SSW **9999 HARRIS ROAD** **N/A**
1/4-1/2 **CONCORD, NC**
0.496 mi.
2618 ft.

Relative:
Higher

Actual:
675 ft.

IMD:

Region:	MOR
Facility ID:	86937
Date Occurred:	10/9/2004
Submit Date:	7/19/2005
GW Contam:	Yes, Groundwater Contamination has been detected
Soil Contam:	Not reported
Incident Desc:	UST Section had originally considered former tanks as a clean closure but new info reopened the site. After initial investigation by APS related to a former AST
Operator:	Motley, John
Contact Phone:	Not reported
Owner Company:	Not reported
Operator Address:	3992 Cedar Wood Trail
Operator City:	Terrell
Oper City,St,Zip:	Terrell, NC
Ownership:	Federal
Operation:	8
Material:	Not reported
Qty Lost 1:	Not reported
Qty Recovered 1:	Not reported
Source:	Leak-underground
Type:	Gasoline/diesel
Location:	Not reported
Setting:	Not reported
Risk Site:	Not reported
Site Priority:	Not reported
Priority Code:	B
Priority Update:	Not reported
Dem Contact:	UST
Wells Affected:	No

CANNON'S CROSSROADS DELI (Continued) **S106349497**

Num Affected:	Not reported
Wells Contam:	Not reported
Sampled By:	Not reported
Samples Include:	Not reported
7.5 Min Quad:	Not reported
5 Min Quad:	Not reported
Latitude:	35.41844
Longitude:	-80.74563
Latitude Number:	Not reported
Longitude Number:	Not reported
Latitude Decimal:	Not reported
Longitude Decimal:	Not reported
GPS:	EST
Agency:	DWQ
Facility ID:	86937
Last Modified:	7/19/2005
Incident Phase:	Follow Up
NOV Issued:	Not reported
NORR Issued:	Not reported
45 Day Report:	Not reported
Public Meeting Held:	Not reported
Corrective Action Planned:	Not reported
SOC Sighned:	Not reported
Reclassification Report:	Not reported
RS Designation:	Not reported
Closure Request Date:	Not reported
Close-out Report:	Not reported

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CALDWELL	S106531982	HAMMORY/KINCAID FURNITURE	GAMEWELL		SHWS
CONCORD	S103554246	CABARRUS DISPOSAL COMPANY	SR 1152		SHWS, IMD
CONCORD	S103240156	CABARRUS COUNTY LANDFILL	SR 2411		HIST LF, IMD
CONCORD	S106467009	CABARRUS COUNTY LANDFILL LCID	SR 2411		SWF/LF, HIST LF
CONCORD	S105764837	BELL AUTO SALES	HWY 29		LUST, IMD
CONCORD	S105764487	CASPER'S SHELL	1324 HWY 29. N.		LUST, IMD
CONCORD	S105807449	BRAKE XPERTS (FORMER)	1579 HIGHWAY 29N		IMD
CONCORD	S105586666	PIC N PAY (FORMER)/ JOHN MURPH	1521 HIGHWAY 29N		IMD
CONCORD	S102328246	DON'S AUTO SALES	1389 HWY 29N		LUST, IMD
CONCORD	S108493080	PIERCE REALTY CO. PROPERTY	1965 HWY 49 S.	28075	LUST
CONCORD	S105043242	WHITES GRAVEL PIT	1515 HWY 49 SOUTH		IMD
CONCORD	S105163891	JOE B PLOTT	US 601 SOUTH		SWF/LF, HIST LF
CONCORD	S106521446	CABARRUS DISPOSAL DUMP	HWY 601 SOUTH FROM HWY 49. RIGHT ON		OLI
CONCORD	1004268807	JOHNNY'S SAV-A-SUM	HWY 601 / FLOWES STORE RD		LUST TRUST
CONCORD	S105218930	MAX HARRIS RESIDENCE	3410/3420 HWY 601 S.		LUST TRUST, LUST, IMD
CONCORD	U003876611	ACCEL 4	279 HWY 601 S-WARREN C COLEMAN	28027	UST
CONCORD	S105895358	EXPRESS SHOPPE # 10	HWY 73 / I-85		LUST, IMD
CONCORD	S105218341	SHELL	HIGHWAY 73 AND I-85		LUST TRUST
CONCORD	S103554300	CONCORD COAL GAS PLANT	WEST ACADEMY STREET		SHWS, VCP, IMD
CONCORD	S106936182	LARRY MORRIS PROPERTY	2701 CONCORD FARMS RD@ HWY 29		LUST, IMD
CONCORD	S104913355	ORCHARD ELECTRONICS/ SUN TECH.	DAVIDSON HIGHWAY		IMD
CONCORD	S106681745	CARL'S COUNTRY STORE	8952 DAVIDSON HWY @ ODELL SCHO	28027	LUST, IMD
CONCORD	S106681715	SHELL HWY 73 & 85	4550 A DAVIDSON HWY		LUST, IMD
CONCORD	S105529273	CABARRUS COUNTY HHW COLLECTION FACILITY	246 GENERAL SERVICES DRIVE		SWF/LF, HIST LF
CONCORD	S104919041	LOVE BATTERY SITE	US HIGHWAY 29 / LIST AVE		SHWS
CONCORD	S106406371	CROWN NC-021	1497 US HIGHWAY 29 NORTH		IMD
CONCORD	1004746640	PENSKE AUTO CENTER	545 US HWY 29N SERVICE CTR	28027	FINDS, RCRA-CESQG
CONCORD	S106467005	CABARRUS COUNTY CDLF	4441 IRISH POTATOE ROAD		SWF/LF, HIST LF
CONCORD	S105194131	LES MYERS PARK	LAWNDALE AVENUE EXT.		SHWS
CONCORD	S103131253	NCDOT ASPHALT SITE #4 (M & M M	N OF HWY 73, S OF I-85, W OF H		IMD
HARRISBURG	U001190635	SAM LINKER	RT 1 HARRISBURG BELT RD	28027	UST
LAKEWOOD	98421495	SADDLE TANK FROM A TRACTOR TRAILER/ MATERIAL SPILLED DUE TO	SADDLE TANK FROM A TRACTOR TRAILER/ MATERIAL SPILLED DUE TO	28027	ERNS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

FEDERAL RECORDS

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 10/02/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: EPA
Telephone: N/A
Last EDR Contact: 01/28/2008
Next Scheduled EDR Contact: 04/28/2008
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 10/02/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: EPA
Telephone: N/A
Last EDR Contact: 01/28/2008
Next Scheduled EDR Contact: 04/28/2008
Data Release Frequency: Quarterly

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 10/02/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: EPA
Telephone: N/A
Last EDR Contact: 01/28/2008
Next Scheduled EDR Contact: 04/28/2008
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 02/19/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: No Update Planned

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 01/09/2008
Date Data Arrived at EDR: 02/05/2008
Date Made Active in Reports: 02/20/2008
Number of Days to Update: 15

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 02/05/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: Quarterly

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 12/03/2007
Date Data Arrived at EDR: 12/06/2007
Date Made Active in Reports: 02/20/2008
Number of Days to Update: 76

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 12/06/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: Quarterly

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 12/09/2007
Date Data Arrived at EDR: 01/07/2008
Date Made Active in Reports: 02/20/2008
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Varies

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/12/2007
Date Data Arrived at EDR: 12/18/2007
Date Made Active in Reports: 02/20/2008
Number of Days to Update: 64

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 03/03/2008
Next Scheduled EDR Contact: 06/02/2008
Data Release Frequency: Quarterly

RCRA-TSDF: RCRA - Transporters, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 09/11/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 03/06/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Quarterly

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 09/11/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 03/06/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 09/11/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 03/06/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 09/11/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 03/06/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Varies

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 09/11/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 03/06/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 07/16/2007
Date Data Arrived at EDR: 08/03/2007
Date Made Active in Reports: 10/11/2007
Number of Days to Update: 69

Source: Environmental Protection Agency
Telephone: 703-603-8905
Last EDR Contact: 01/02/2008
Next Scheduled EDR Contact: 03/31/2008
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 07/16/2007
Date Data Arrived at EDR: 08/03/2007
Date Made Active in Reports: 10/11/2007
Number of Days to Update: 69

Source: Environmental Protection Agency
Telephone: 703-603-8905
Last EDR Contact: 01/02/2008
Next Scheduled EDR Contact: 03/31/2008
Data Release Frequency: Varies

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 01/24/2007
Date Made Active in Reports: 03/12/2007
Number of Days to Update: 47

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 01/23/2008
Next Scheduled EDR Contact: 04/21/2008
Data Release Frequency: Annually

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 10/01/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 01/17/2008
Next Scheduled EDR Contact: 04/14/2008
Data Release Frequency: Annually

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 11/14/2007
Date Data Arrived at EDR: 11/29/2007
Date Made Active in Reports: 02/20/2008
Number of Days to Update: 83

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 02/27/2008
Next Scheduled EDR Contact: 05/26/2008
Data Release Frequency: Varies

CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 12/28/2007
Next Scheduled EDR Contact: 03/24/2008
Data Release Frequency: Quarterly

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 01/03/2008
Date Data Arrived at EDR: 01/17/2008
Date Made Active in Reports: 02/20/2008
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 01/17/2008
Next Scheduled EDR Contact: 03/10/2008
Data Release Frequency: Semi-Annually

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 703-692-8801
Last EDR Contact: 02/08/2008
Next Scheduled EDR Contact: 05/05/2008
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 08/31/2007
Date Made Active in Reports: 10/11/2007
Number of Days to Update: 41

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 01/02/2008
Next Scheduled EDR Contact: 03/31/2008
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 03/10/2008
Next Scheduled EDR Contact: 06/09/2008
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 01/21/2008
Next Scheduled EDR Contact: 04/21/2008
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 01/14/2008
Date Data Arrived at EDR: 01/22/2008
Date Made Active in Reports: 01/30/2008
Number of Days to Update: 8

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 01/02/2008
Next Scheduled EDR Contact: 03/31/2008
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 07/13/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: Varies

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 12/28/2007
Date Data Arrived at EDR: 12/28/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 27

Source: EPA, Region 9
Telephone: 415-972-3336
Last EDR Contact: 12/26/2007
Next Scheduled EDR Contact: 03/24/2008
Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 11/20/2007
Date Data Arrived at EDR: 01/03/2008
Date Made Active in Reports: 02/20/2008
Number of Days to Update: 48

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 01/03/2008
Next Scheduled EDR Contact: 03/24/2008
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 04/27/2007
Date Made Active in Reports: 07/05/2007
Number of Days to Update: 69

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 02/29/2008
Next Scheduled EDR Contact: 06/16/2008
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2002
Date Data Arrived at EDR: 04/14/2006
Date Made Active in Reports: 05/30/2006
Number of Days to Update: 46

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 01/28/2008
Next Scheduled EDR Contact: 04/14/2008
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 01/15/2008
Date Data Arrived at EDR: 01/22/2008
Date Made Active in Reports: 01/30/2008
Number of Days to Update: 8

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 01/15/2008
Date Data Arrived at EDR: 01/22/2008
Date Made Active in Reports: 01/30/2008
Number of Days to Update: 8

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 03/13/2007
Date Made Active in Reports: 04/27/2007
Number of Days to Update: 45

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/28/2008
Next Scheduled EDR Contact: 04/14/2008
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 07/27/2007
Date Data Arrived at EDR: 08/13/2007
Date Made Active in Reports: 10/11/2007
Number of Days to Update: 59

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 01/15/2008
Next Scheduled EDR Contact: 04/14/2008
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 04/12/2007
Date Data Arrived at EDR: 06/08/2007
Date Made Active in Reports: 08/29/2007
Number of Days to Update: 82

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 02/07/2008
Next Scheduled EDR Contact: 05/05/2008
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 10/04/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 25

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 01/02/2008
Next Scheduled EDR Contact: 03/31/2008
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 10/30/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 01/31/2008
Next Scheduled EDR Contact: 04/28/2008
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 01/04/2008
Date Data Arrived at EDR: 01/10/2008
Date Made Active in Reports: 02/20/2008
Number of Days to Update: 41

Source: EPA
Telephone: (404) 562-9900
Last EDR Contact: 01/02/2008
Next Scheduled EDR Contact: 03/31/2008
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 03/03/2008
Next Scheduled EDR Contact: 06/02/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 03/06/2007
Date Made Active in Reports: 04/13/2007
Number of Days to Update: 38

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 03/13/2008
Next Scheduled EDR Contact: 06/09/2008
Data Release Frequency: Biennially

STATE AND LOCAL RECORDS

SHWS: Inactive Hazardous Sites Inventory

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 01/09/2008
Date Data Arrived at EDR: 01/11/2008
Date Made Active in Reports: 01/31/2008
Number of Days to Update: 20

Source: Department of Environment, Health and Natural Resources
Telephone: 919-733-2801
Last EDR Contact: 01/07/2008
Next Scheduled EDR Contact: 04/07/2008
Data Release Frequency: Quarterly

IMD: Incident Management Database

Groundwater and/or soil contamination incidents

Date of Government Version: 07/21/2006
Date Data Arrived at EDR: 08/01/2006
Date Made Active in Reports: 08/23/2006
Number of Days to Update: 22

Source: Department of Environment and Natural Resources
Telephone: 919-733-3221
Last EDR Contact: 01/25/2008
Next Scheduled EDR Contact: 04/21/2008
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

HSDS: Hazardous Substance Disposal Site

Locations of uncontrolled and unregulated hazardous waste sites. The file includes sites on the National Priority List as well as those on the state priority list.

Date of Government Version: 04/06/2006
Date Data Arrived at EDR: 02/28/2007
Date Made Active in Reports: 04/13/2007
Number of Days to Update: 44

Source: North Carolina Center for Geographic Information and Analysis
Telephone: 919-733-2090
Last EDR Contact: 02/28/2008
Next Scheduled EDR Contact: 05/26/2008
Data Release Frequency: Biennially

SWF/LF: List of Solid Waste Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 01/22/2008
Date Data Arrived at EDR: 01/23/2008
Date Made Active in Reports: 01/31/2008
Number of Days to Update: 8

Source: Department of Environment and Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 01/23/2008
Next Scheduled EDR Contact: 04/21/2008
Data Release Frequency: Semi-Annually

OLI: Old Landfill Inventory

Old landfill inventory location information. (Does not include no further action sites and other agency lead sites).

Date of Government Version: 10/01/2007
Date Data Arrived at EDR: 11/05/2007
Date Made Active in Reports: 01/14/2008
Number of Days to Update: 70

Source: Department of Environment & Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 01/24/2008
Next Scheduled EDR Contact: 04/21/2008
Data Release Frequency: Varies

HIST LF: Solid Waste Facility Listing

A listing of solid waste facilities.

Date of Government Version: 11/06/2006
Date Data Arrived at EDR: 02/13/2007
Date Made Active in Reports: 03/02/2007
Number of Days to Update: 17

Source: Department of Environment & Natural Resources
Telephone: 919-733-0692
Last EDR Contact: 01/21/2008
Next Scheduled EDR Contact: 04/21/2008
Data Release Frequency: Quarterly

LUST: Regional UST Database

This database contains information obtained from the Regional Offices. It provides a more detailed explanation of current and historic activity for individual sites, as well as what was previously found in the Incident Management Database. Sites in this database with Incident Numbers are considered LUSTs.

Date of Government Version: 11/30/2007
Date Data Arrived at EDR: 12/06/2007
Date Made Active in Reports: 01/14/2008
Number of Days to Update: 39

Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 03/05/2008
Next Scheduled EDR Contact: 06/02/2008
Data Release Frequency: Quarterly

LUST TRUST: State Trust Fund Database

This database contains information about claims against the State Trust Funds for reimbursements for expenses incurred while remediating Leaking USTs.

Date of Government Version: 11/02/2007
Date Data Arrived at EDR: 11/07/2007
Date Made Active in Reports: 01/14/2008
Number of Days to Update: 68

Source: Department of Environment and Natural Resources
Telephone: 919-733-1315
Last EDR Contact: 02/06/2008
Next Scheduled EDR Contact: 05/05/2008
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UST: Petroleum Underground Storage Tank Database

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 01/08/2008
Date Data Arrived at EDR: 02/06/2008
Date Made Active in Reports: 03/14/2008
Number of Days to Update: 37

Source: Department of Environment and Natural Resources
Telephone: 919-733-1308
Last EDR Contact: 03/07/2008
Next Scheduled EDR Contact: 05/05/2008
Data Release Frequency: Quarterly

AST: AST Database

Facilities with aboveground storage tanks that have a capacity greater than 21,000 gallons.

Date of Government Version: 01/17/2008
Date Data Arrived at EDR: 01/18/2008
Date Made Active in Reports: 02/21/2008
Number of Days to Update: 34

Source: Department of Environment and Natural Resources
Telephone: 919-715-6183
Last EDR Contact: 01/15/2008
Next Scheduled EDR Contact: 04/14/2008
Data Release Frequency: Semi-Annually

INST CONTROL: No Further Action Sites With Land Use Restrictions Monitoring

A land use restricted site is a property where there are limits or requirements on future use of the property due to varying levels of cleanup possible, practical, or necessary at the site.

Date of Government Version: 01/09/2008
Date Data Arrived at EDR: 01/11/2008
Date Made Active in Reports: 01/31/2008
Number of Days to Update: 20

Source: Department of Environment, Health and Natural Resources
Telephone: 919-733-2801
Last EDR Contact: 01/07/2008
Next Scheduled EDR Contact: 04/07/2008
Data Release Frequency: Quarterly

VCP: Responsible Party Voluntary Action Sites

Responsible Party Voluntary Action site locations.

Date of Government Version: 01/09/2008
Date Data Arrived at EDR: 01/11/2008
Date Made Active in Reports: 01/31/2008
Number of Days to Update: 20

Source: Department of Environment and Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 01/07/2008
Next Scheduled EDR Contact: 04/07/2008
Data Release Frequency: Semi-Annually

DRYCLEANERS: Drycleaning Sites

Potential and known drycleaning sites, active and abandoned, that the Drycleaning Solvent Cleanup Program has knowledge of and entered into this database.

Date of Government Version: 12/21/2007
Date Data Arrived at EDR: 01/17/2008
Date Made Active in Reports: 01/31/2008
Number of Days to Update: 14

Source: Department of Environment & Natural Resources
Telephone: 919-508-8400
Last EDR Contact: 01/17/2008
Next Scheduled EDR Contact: 04/14/2008
Data Release Frequency: Varies

BROWNFIELDS: Brownfields Projects Inventory

A brownfield site is an abandoned, idled, or underused property where the threat of environmental contamination has hindered its redevelopment. All of the sites in the inventory are working toward a brownfield agreement for cleanup and liabitliy control.

Date of Government Version: 10/01/2007
Date Data Arrived at EDR: 10/31/2007
Date Made Active in Reports: 01/14/2008
Number of Days to Update: 75

Source: Department of Environment and Natural Resources
Telephone: 919-733-4996
Last EDR Contact: 02/01/2008
Next Scheduled EDR Contact: 04/28/2008
Data Release Frequency: Varies

NPDES: NPDES Facility Location Listing
General information regarding NPDES(National Pollutant Discharge Elimination System) permits.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 01/03/2008
Date Made Active in Reports: 01/31/2008
Number of Days to Update: 28
Source: Department of Environment & Natural Resources
Telephone: 919-733-7015
Last EDR Contact: 03/10/2008
Next Scheduled EDR Contact: 05/26/2008
Data Release Frequency: Varies

TRIBAL RECORDS

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34
Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 02/08/2008
Next Scheduled EDR Contact: 05/05/2008
Data Release Frequency: Semi-Annually

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 02/25/2008
Next Scheduled EDR Contact: 05/26/2008
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 12/12/2007
Date Data Arrived at EDR: 12/12/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 43
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 12/03/2007
Date Data Arrived at EDR: 12/06/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 22
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 06/01/2007
Date Data Arrived at EDR: 06/14/2007
Date Made Active in Reports: 07/05/2007
Number of Days to Update: 21
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 11/30/2007
Date Data Arrived at EDR: 11/30/2007
Date Made Active in Reports: 12/28/2007
Number of Days to Update: 28
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 12/01/2006
Date Data Arrived at EDR: 12/01/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 59
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 09/05/2007
Date Data Arrived at EDR: 10/02/2007
Date Made Active in Reports: 10/11/2007
Number of Days to Update: 9
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 11/27/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Quarterly

INDIAN UST R4: Underground Storage Tanks on Indian Land
No description is available for this data

Date of Government Version: 09/05/2007
Date Data Arrived at EDR: 10/02/2007
Date Made Active in Reports: 10/11/2007
Number of Days to Update: 9
Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land
No description is available for this data

Date of Government Version: 12/21/2007
Date Data Arrived at EDR: 12/21/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 34
Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land
No description is available for this data

Date of Government Version: 11/27/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land
No description is available for this data

Date of Government Version: 12/03/2007
Date Data Arrived at EDR: 12/06/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 49
Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land
A listing of underground storage tank locations on Indian Land.

Date of Government Version: 12/01/2006
Date Data Arrived at EDR: 12/01/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 59

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land
No description is available for this data

Date of Government Version: 12/12/2007
Date Data Arrived at EDR: 12/12/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 43

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Semi-Annually

INDIAN UST R9: Underground Storage Tanks on Indian Land
No description is available for this data

Date of Government Version: 11/30/2007
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Quarterly

INDIAN UST R7: Underground Storage Tanks on Indian Land
No description is available for this data

Date of Government Version: 06/01/2007
Date Data Arrived at EDR: 06/14/2007
Date Made Active in Reports: 07/05/2007
Number of Days to Update: 21

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 02/15/2008
Next Scheduled EDR Contact: 05/19/2008
Data Release Frequency: Varies

EDR PROPRIETARY RECORDS

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 06/15/2007
Date Made Active in Reports: 08/20/2007
Number of Days to Update: 66

Source: Department of Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 03/14/2008
Next Scheduled EDR Contact: 06/09/2008
Data Release Frequency: Annually

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 09/30/2007
Date Data Arrived at EDR: 12/04/2007
Date Made Active in Reports: 12/31/2007
Number of Days to Update: 27

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 01/03/2008
Next Scheduled EDR Contact: 03/31/2008
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 11/26/2007
Date Data Arrived at EDR: 11/29/2007
Date Made Active in Reports: 02/05/2008
Number of Days to Update: 68

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 02/28/2008
Next Scheduled EDR Contact: 05/26/2008
Data Release Frequency: Annually

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 12/21/2007
Date Made Active in Reports: 01/10/2008
Number of Days to Update: 20

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 03/10/2008
Next Scheduled EDR Contact: 06/09/2008
Data Release Frequency: Annually

RI MANIFEST: Manifest information

Hazardous waste manifest information

Date of Government Version: 10/01/2007
Date Data Arrived at EDR: 11/09/2007
Date Made Active in Reports: 01/15/2008
Number of Days to Update: 67

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: Annually

WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 04/27/2007
Date Made Active in Reports: 06/08/2007
Number of Days to Update: 42

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 01/07/2008
Next Scheduled EDR Contact: 04/07/2008
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data

Source: PennWell Corporation
Telephone: (800) 823-6277

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Facility List
Source: Department of Health & Human Services
Telephone: 919-662-4499

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory
Source: Department of Environment & Natural Resources
Telephone: 919-733-2090

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

UT TO ROCKY RIVER
HARRIS ROAD AT THE ROCKY RIVER
CONCORD, NC 28027

TARGET PROPERTY COORDINATES

Latitude (North):	35.42678 - 35° 25' 36.4''
Longitude (West):	80.74005 - 80° 44' 24.2''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	523597.6
UTM Y (Meters):	3920205.2
Elevation:	617 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	35080-D6 KANNAPOLIS, NC
Most Recent Revision:	1996
West Map:	35080-D7 CORNELIUS, NC
Most Recent Revision:	1996

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

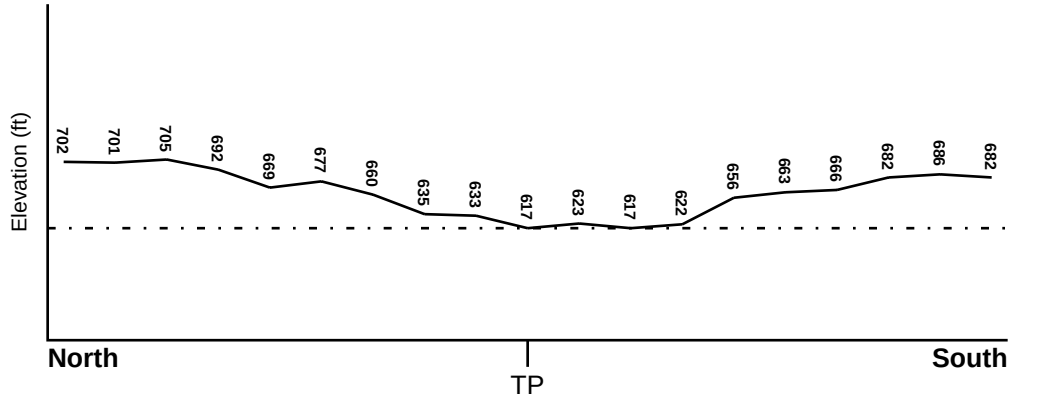
TOPOGRAPHIC INFORMATION

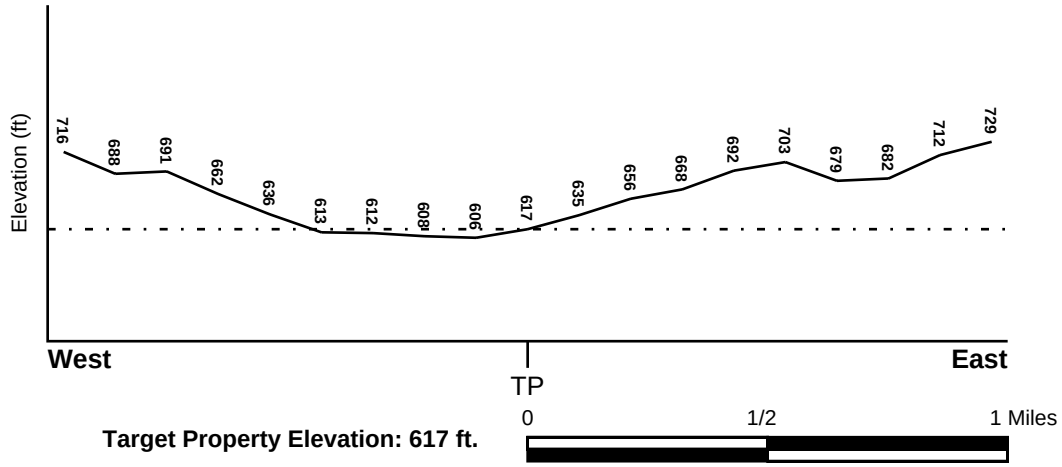
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General WSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 617 ft.

0 1/2 1 Miles

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
CABARRUS, NC	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 37025C0075D

Additional Panels in search area: 3701580040B
37025C0030D
37025C0025D
37025C0070D

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
KANNAPOLIS	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

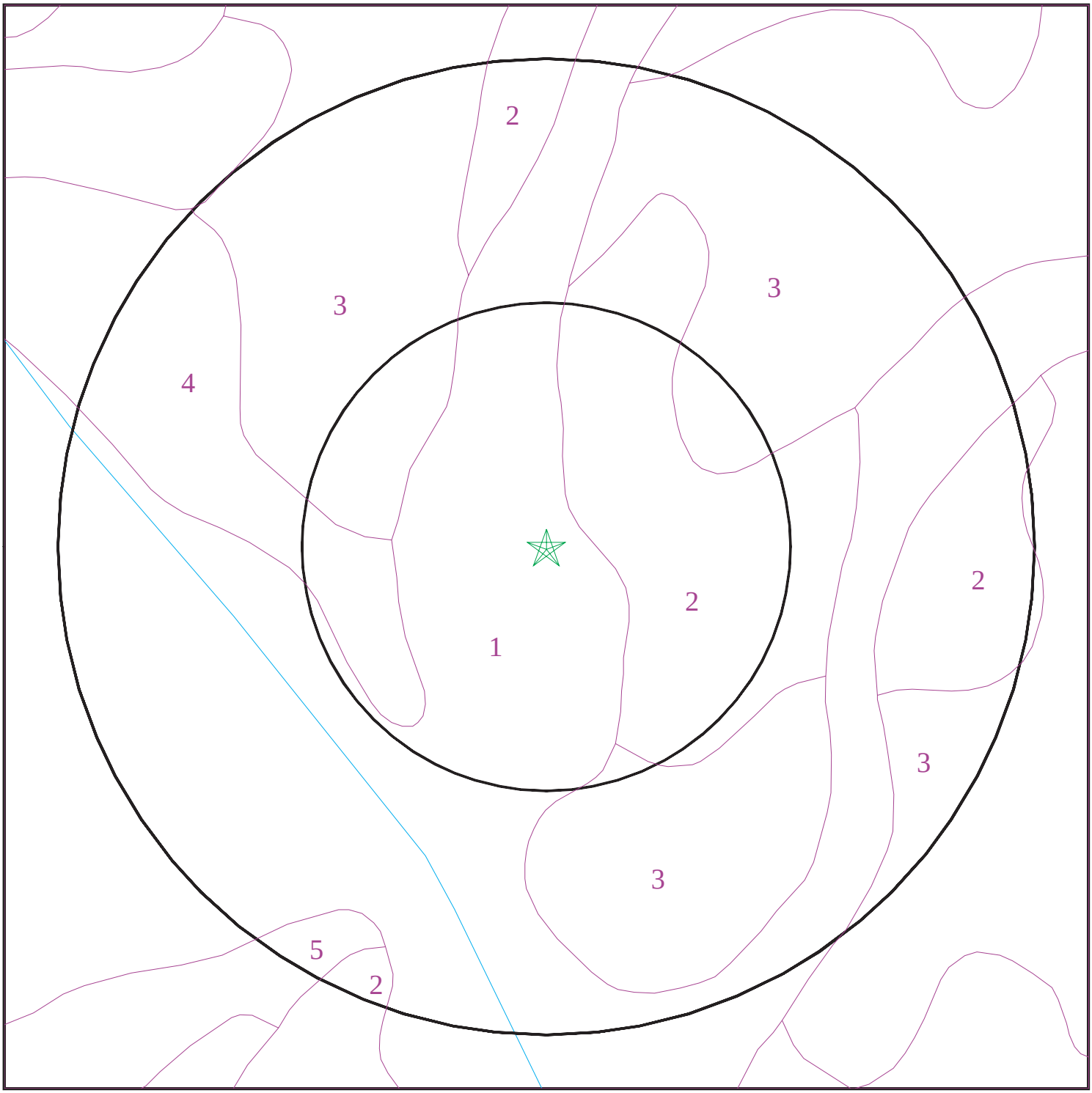
Era:	Paleozoic
System:	Mississippian
Series:	Paleozoic mafic intrusives
Code:	Pzmi *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Plutonic and Intrusive Rocks

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 2168239.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	UT to Rocky River	CLIENT:	Axiom Environmental
ADDRESS:	Harris Road at the Rocky River CONCORD NC 28027	CONTACT:	Grant Lewis
		INQUIRY #:	2168239.2s
LAT/LONG:	35.4268 / 80.7400	DATE:	March 14, 2008 11:25 am

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: CHEWACLA

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Somewhat poorly. Soils commonly have a layer with low hydraulic conductivity, wet state high in profile, etc. Depth to water table is 1 to 3 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 0 inches

Depth to Bedrock Max: > 0 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	9 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 2.00 Min: 0.60	Max: 8.40 Min: 7.40
1	0 inches	7 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 2.00 Min: 0.60	Max: 6.50 Min: 4.50
2	7 inches	50 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 2.00 Min: 0.60	Max: 6.50 Min: 4.50

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
2	9 inches	13 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 2.00 Min: 0.60	Max: 8.40 Min: 7.40
3	50 inches	70 inches	variable	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00
3	13 inches	13 inches	unweathered bedrock	Not reported	Not reported	Max: 0.60 Min: 0.00	Max: 0.00 Min: 0.00

Soil Map ID: 2

Soil Component Name: ENON

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 0 inches

Depth to Bedrock Max: > 0 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	7 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 6.00 Min: 2.00	Max: 6.50 Min: 5.10

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
2	7 inches	27 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 0.20 Min: 0.06	Max: 7.80 Min: 5.10
3	27 inches	60 inches	variable	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00

Soil Map ID: 3

Soil Component Name: ENON

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 0 inches

Depth to Bedrock Max: > 0 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	7 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 6.00 Min: 2.00	Max: 6.50 Min: 5.10

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
2	7 inches	27 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 0.20 Min: 0.06	Max: 7.80 Min: 5.10
3	27 inches	60 inches	variable	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00

Soil Map ID: 4

Soil Component Name: WEHADKEE

Soil Surface Texture: loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Poorly. Soils may have a saturated zone, a layer of low hydraulic conductivity, or seepage. Depth to water table is less than 1 foot.

Hydric Status: Soil meets the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 0 inches

Depth to Bedrock Max: > 0 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	8 inches	loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 6.00 Min: 2.00	Max: 6.50 Min: 4.50

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
2	8 inches	43 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 2.00 Min: 0.60	Max: 6.50 Min: 4.50
3	43 inches	72 inches	variable	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00

Soil Map ID: 5

Soil Component Name: CECIL

Soil Surface Texture: sandy clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 0 inches

Depth to Bedrock Max: > 0 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	7 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 2.00 Min: 0.60	Max: 6.50 Min: 4.50

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
2	7 inches	48 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 2.00 Min: 0.60	Max: 5.50 Min: 4.50
3	48 inches	72 inches	variable	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00

Soil Map ID: 6

Soil Component Name: POINDEXTER

Soil Surface Texture: loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: MODERATE

Depth to Bedrock Min: > 20 inches

Depth to Bedrock Max: > 40 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	7 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 6.00 Min: 2.00	Max: 7.30 Min: 5.10

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
2	7 inches	22 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 2.00 Min: 0.60	Max: 7.30 Min: 5.10
3	22 inches	48 inches	silty clay loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 6.00 Min: 0.60	Max: 7.30 Min: 5.10
4	48 inches	52 inches	weathered bedrock	Not reported	Not reported	Max: 0.06 Min: 0.00	Max: 0.00 Min: 0.00

Soil Map ID: 7

Soil Component Name: CECIL

Soil Surface Texture: sandy clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 0 inches

Depth to Bedrock Max: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	7 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 2.00 Min: 0.60	Max: 6.50 Min: 4.50
2	7 inches	48 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 2.00 Min: 0.60	Max: 5.50 Min: 4.50
3	48 inches	72 inches	variable	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	USGS2260091	1/4 - 1/2 Mile SSW
2	USGS2260102	1/2 - 1 Mile East

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
5	NC0113451	1/2 - 1 Mile SSW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
3	NC10001038	1/2 - 1 Mile SSW
4	NC10001107	1/2 - 1 Mile SE

OTHER STATE DATABASE INFORMATION

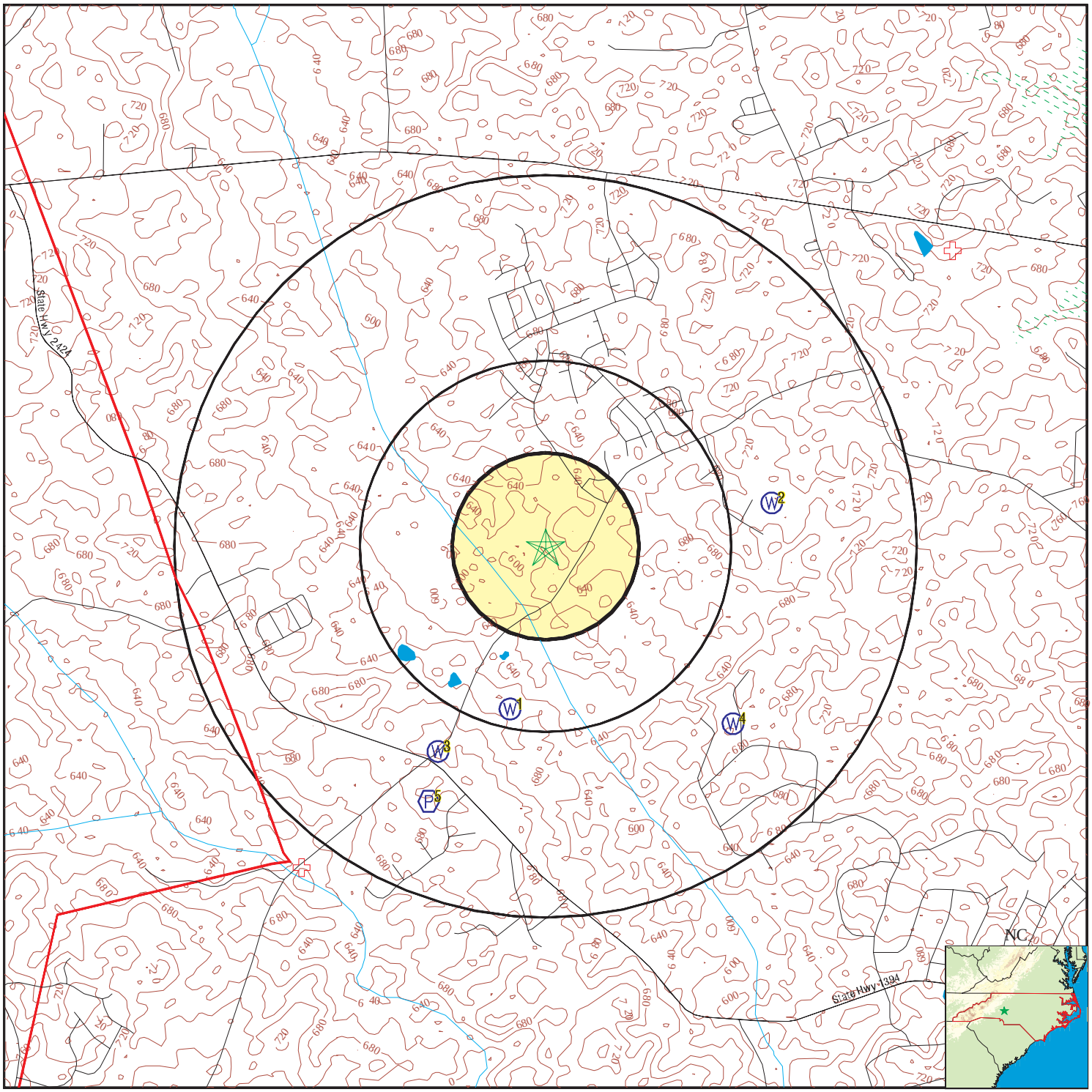
NORTH CAROLINA NATURAL HERITAGE ELEMENT OCCURRENCES

ID	Class
NC50004811	Invertebrate
NC50008148	Plants

NORTH CAROLINA SIGNIFICANT NATURAL HERITAGE AREAS DATABASE:

ID	Name
NC10002511	CODDLE CREEK RESERVOIR

PHYSICAL SETTING SOURCE MAP - 2168239.2s



0 1/4 1/2 1 Miles

- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- Wildlife Areas
- Natural Areas
- Rare & Endangered Species

SITE NAME:	UT to Rocky River	CLIENT:	Axiom Environmental
ADDRESS:	Harris Road at the Rocky River CONCORD NC 28027	CONTACT:	Grant Lewis
		INQUIRY #:	2168239.2s
LAT/LONG:	35.4268 / 80.7400	DATE:	March 14, 2008 11:25 am

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

1
SSW
1/4 - 1/2 Mile
Higher | **FED USGS** | **USGS2260091**

Agency cd:	USGS	Site no:	352513080443101
Site name:	CB-54		
Latitude:	352513		
Longitude:	0804431	Dec lat:	35.42041724
Dec lon:	-80.74173733	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	37
State:	37	County:	025
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	Not Reported		
Altitude method:	Not Reported		
Altitude accuracy:	Not Reported		
Altitude datum:	Not Reported		
Hydrologic:	Not Reported		
Topographic:	Hilltop		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	EST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	INTERMEDIATE METAIGNEOUS ROCK		
Well depth:	125.0	Hole depth:	Not Reported
Source of depth data:	reporting agency (generally USGS)		
Project number:	453709900		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

2
East
1/2 - 1 Mile
Higher | **FED USGS** | **USGS2260102**

Agency cd:	USGS	Site no:	352542080434601
Site name:	CB-53		
Latitude:	352542		
Longitude:	0804346	Dec lat:	35.42847271
Dec lon:	-80.72923707	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	37
State:	37	County:	025
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported

Altitude:	Not Reported		
Altitude method:	Not Reported		
Altitude accuracy:	Not Reported		
Altitude datum:	Not Reported		
Hydrologic:	Not Reported		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	EST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	INTERMEDIATE METAIGNEOUS ROCK		
Well depth:	110.0	Hole depth:	Not Reported
Source of depth data:	reporting agency (generally USGS)		
Project number:	453709900		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1952-00-00	Ground water data end date:	1952-00-00
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1952	45	

3
SSW
1/2 - 1 Mile
Higher

NC WELLS **NC10001038**

X coord:	-80.745181		
Y coord:	35.418758		
Pwsid:	0113451	Systemname:	CANNON'S-X-ROADS SER
Pwstype:	TransientNonCommunity	Locationci:	CONCORD
County:	Cabarrus	Sourcecode:	W01
Watertype:	Ground	Sourcename:	WELL #1
Latitude:	352507.527	Longitude:	804442.650
Availabili:	Permanent	Depthft:	Not Reported
Welltype:	Drilled	Owner:	CANNON'S-X-ROADS SER
Lat dec:	35.4187575		
Long dec:	-80.7451805555555		

4
SE
1/2 - 1 Mile
Higher

NC WELLS **NC10001107**

X coord:	-80.731084		
Y coord:	35.419845		
Pwsid:	0113191	Systemname:	POPLAR TRAILS WATER SYSTEM
Pwstype:	Community	Locationci:	CONCORD
County:	Cabarrus	Sourcecode:	S03
Watertype:	Ground	Sourcename:	WELL #3
Latitude:	352511.443	Longitude:	804351.904
Availabili:	Permanent	Depthft:	30
Welltype:	Drilled	Owner:	CORRIHER WATER SERVICE INC
Lat dec:	35.4198452777778		
Long dec:	-80.7310844444444		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

5
SSW
1/2 - 1 Mile
Higher | **FRDS PWS** | **NC0113451**

PWS ID:	NC0113451	PWS Status:	Active
Date Initiated:	7706	Date Deactivated:	Not Reported
PWS Name:	CANNON'S-X-ROADS SER CONCORD, NC 28025		
Addressee / Facility:	System Owner/Responsible Party CANNON'S-X-ROADS SER POPLAR TENT RD CONCORD, NC 28025		
Addressee / Facility:	System Owner/Responsible Party CANNON'S-X-ROADS SER POPLAR TENT RD CONCORD, NC 28025		
Facility Latitude:	35 24 30	Facility Longitude:	080 34 46
Facility Latitude:	35 25 00	Facility Longitude:	080 44 45
City Served:	CONCORD		
Treatment Class:	Untreated	Population:	00000035

Violations information not reported.

ENFORCEMENT INFORMATION:

System Name:	CANNON'S XROADS SER		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	10/1/2000 0:00:00 - 12/31/2000 0:00:00		
Violation ID:	401		
Enforcement Date:	7/31/2001 0:00:00	Enf. Action:	State Compliance Achieved
System Name:	CANNON'S XROADS SER		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	10/1/2000 0:00:00 - 12/31/2000 0:00:00		
Violation ID:	401		
Enforcement Date:	2/21/2001 0:00:00	Enf. Action:	State Formal NOV Issued
System Name:	CANNON'S XROADS SER		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	10/1/2000 0:00:00 - 12/31/2000 0:00:00		
Violation ID:	401		
Enforcement Date:	2/21/2001 0:00:00	Enf. Action:	State Public Notif Requested
System Name:	CANNON'S XROADS SER		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	10/1/2004 0:00:00 - 12/31/2004 0:00:00		
Violation ID:	505		
Enforcement Date:	2/4/2005 0:00:00	Enf. Action:	State Formal NOV Issued

ENFORCEMENT INFORMATION:

System Name:	CANNON'S XROADS SER		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	10/1/2004 0:00:00 - 12/31/2004 0:00:00		
Violation ID:	505		
Enforcement Date:	2/4/2005 0:00:00	Enf. Action:	State Public Notif Requested
System Name:	CANNON'S-X-ROADS SER		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	1999-04-01 - 1999-06-30		
Violation ID:	9909786		
Enforcement Date:	1999-08-12	Enf. Action:	State Formal NOV Issued
System Name:	CANNON'S-X-ROADS SER		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	1999-04-01 - 1999-06-30		
Violation ID:	9909786		
Enforcement Date:	1999-08-12	Enf. Action:	State Public Notif Requested

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Direction
Distance

Database EDR ID Number

NC_NHEO NC50004811

GIS ID: 191824
Classification by Type: Invertebrate
Occurrence Status: Extant

NC_NHEO NC50008148

GIS ID: 61757
Classification by Type: Plants
Occurrence Status: Historic, no evidence of destruction

NC_SNHA NC10002511

Site Name: CODDLE CREEK RESERVOIR
Quality: Not Reported
Acres per Polygon: 1285.6

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: NC Radon

Radon Test Results

County	Result Type	Total Sites	Avg pCi/L	Range pCi/L	Result Type
CABARRUS	Statistical	13	1.05	-0.30-4.20	Non-Statistical
CABARRUS	72	2.05	0.00-10.50		

Federal EPA Radon Zone for CABARRUS County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for CABARRUS COUNTY, NC

Number of sites tested: 11

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.809 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	1.900 pCi/L	67%	33%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory
Source: Department of Environment & Natural Resources
Telephone: 919-733-2090

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

North Carolina Public Water Supply Wells
Source: Department of Environmental Health
Telephone: 919-715-3243

OTHER STATE DATABASE INFORMATION

NC Natural Areas: Significant Natural Heritage Areas
Source: Center for Geographic Information and Analysis
Telephone: 919-733-2090
A polygon converage identifying sites (terrestrial or aquatic that have particular biodiversity significance. A site's significance may be due to the presenceof rare species, rare or hight quality natural communities, or other important ecological features.

NC Game Lands: Wildlife Resources Commission Game Lands
Source: Center for Geographic Information and Analysis
Telephone: 919-733-2090
All publicly owned game lands managed by the North Carolina Wildlife Resources Commission and as listed in Hunting and Fishing Maps.

NC Natural Heritage Sites: Natural Heritage Element Occurrence Sites
Source: Center for Geographic Information and Analysis
Telephone: 919-733-2090
A point coverage identifying locations of rare and endangered species, occurrences of exemplary or unique natural ecosystems (terrestrial or aquatic), and special animal habitats (e.g., colonial waterbird nesting sites).

RADON

State Database: NC Radon
Source: Department of Environment & Natural Resources
Telephone: 919-733-4984
Radon Statistical and Non Statiscal Data

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

STREET AND ADDRESS INFORMATION

APPENDIX 14
ERTR

ERTR

UT TO ROCKY RIVER STREAM RESTORATION SITE

Cabarrus County, North Carolina
Contract No. 070708001

Prepared for:

NCDENR-Ecosystem Enhancement Program
2728 Capital Boulevard, Suite 1H 103
Raleigh, North Carolina 27604

September 9, 2008

Prepared by:

KO & ASSOCIATES, P.C.
Consulting Engineers

Ko & Associates, P.C.
5121 Kingdom Way, Suite 100
Raleigh, North Carolina 27607

919.851.6066
919.851.6846 (fax)

R. Kevin Williams, PE, PLS, CPESC, CPSWQ
Project Engineer/Manager

TABLE OF CONTENTS

List of Tables

1.0 INTRODUCTION

The North Carolina Ecosystem Enhancement Program (EEP) is currently developing stream restoration plans for the UT to Rocky River Restoration Project (Project) located in northwest Cabarrus County approximately 6 miles southwest of the town of Kannapolis. The center of the site has a latitude and longitude of 035º 25' 32" N and 080º 44' 26'' W. The Site is situated in the northeast quadrant of the intersection of Harris Road and the Rocky River between Harris Middle School and Odell Elementary School, approximately 1.5 miles from Highway 73. The Project is located in United States Geological Survey (USGS) Hydrologic Unit (HU) and **Targeted Local Watershed 03040105010010** (North Carolina Division of Water Quality [NCDWQ] Subbasin 03-07-11) of the Yadkin-Pee Dee River Basin and will service the USGS 8-digit Cataloging Unit (CU) 03040105 (USGS 1974, NCEEP 2007).

1.1 Restoration Project Description

An 18.6-acre conservation easement will be placed on the Site to incorporate all project activities. The Site contains 6.5 acres of jurisdictional wetlands, an unnamed tributary (UT) to the Rocky River, associated floodplain, and upland slopes. The purpose of this project is to restore a stable pattern, dimension, and profile to the UT; revegetate Site stream banks, floodplains, wetlands, and upland slopes, and remove invasive vegetative species within the Site's boundaries.

The watershed is experiencing substantial growth in residential development. Site land uses consists primarily of early successional scrub/shrub vegetation, underground utilities, and stormwater basins with an abundance of recent beaver activity. Vegetation removal within the Project and recent adjacent development have resulted in degraded water quality and unstable channel characteristics (stream entrenchment, erosion, and bank collapse in some reaches with aggradation in other reaches). Project photographs can be found in Appendix 3.

Project restoration efforts will result in the following:

- Restore 2,754 linear feet of the UT to Rocky River.
- Enhance approximately 6.5 acres of riverine wetlands.
- Impact approximately 1.05 acres of existing wetlands during construction activities.
- Plant approximately 15.9 acres of floodplain, stream bank, upland slopes, and riverine wetlands and supplement approximately 1.2 acres of existing forested floodplain, stream bank, upland slopes, and riverine wetlands with native vegetative species.

1.2 Restoration Project Goals and Objectives

The primary goals of this project focus on improving water quality, enhancing aquatic and terrestrial habitat within the UT to Rocky River watershed, establish wildlife corridors within the Site, enhance riparian wetlands adjacent to the UT to Rocky River, and provide an educational opportunity for students at grade schools adjacent to the Site.

These goals will be accomplished through the following objectives:

- Improve water quality and stabilize the UT to Rocky River by restoring a more natural pattern, profile, and dimension that will transport its sediment and flow without aggrading (as seen in areas effected by beavers and erosion control devices), or degrading (as seen in gully reaches on-site)
- Improve water quality by establishing a natural vegetative buffer adjacent to the UT to Rocky River that will filter runoff from adjacent development.
- Improve aquatic habitat by enhancing stream bed variability, providing shading/cover areas within the stream channel, and introducing woody debris in the form of rootwads, log vanes, and log sills.
- Enhance terrestrial habitat by removing existing invasive vegetative species and planting the buffer (floodplain) with native trees, shrubs, herbs and grasses.
- Create a wildlife corridor through the Site that will connect habitat areas along the Rocky River with habitat areas at the upstream end of the Site. The corridors will provide connectivity to a diversity of habitats including mature forest, early successional forest, stream-side forest, riparian wetlands, and uplands.
- Enhance wetlands by removing existing invasive species and planting native vegetative species.
- Provide an educational benefit to children who can utilize the pedestrian footpath crossing the floodplain, and can view the stream channel from adjacent terraces where schools are located.

1.3 Qualifications of Investigators

Grant was the primary investigator. Grant graduated from Colorado State University in 1993 with a degree in Range Ecosystem Management. Grant has 11 years of experience and specializes in natural systems documentation, permitting and stream/wetland restoration. He has managed over 30 mitigation feasibility studies; 10 detailed mitigation plans and implemented over 13,300 linear feet of stream restoration and 160 acres of wetland restoration. Grant is experienced in site identification, feasibility assessment, and detailed restoration planning. Grant has been responsible for implementation of wetland/stream construction and monitoring the site after construction. He is familiar with CADD, Corel Draw, ArcView, GIS and Trimble and is proficient with various types of survey equipment. He is an expert in performing jurisdictional delineations, protected species and wildlife surveys. Grant is also a licensed soil scientist in North Carolina with extensive soil mapping experience.

2.0 PROJECT SITE LOCATION

2.1 Directions to Project Site

Directions to the Site are as follows:

- Take Interstate 85 to Exit 55 (NC 73 West)
- Travel west on NC 73 for approximately 3.9 miles
- Take a left on Odell School Road and travel for 0.5 miles.
- Take a right onto Harris Road and travel approximately 0.8 mile following signs to Harris Middle School
- Turn right onto Moss Farm Street. The UT to Rocky River flows southwest under Moss Farm Street in approximately 0.18 miles

2.2 USGS Hydrologic Unit Code and NCDWQ River Basin Designation

The Site is located in Cabarrus County, North Carolina within United States Geological Survey (USGS) Hydrologic Unit (HU) and **Targeted Local Watershed 03040105010010** (North Carolina Division of Water Quality [NCDWQ] Subbasin 03-07-11) of the Yadkin-Pee Dee River Basin and will service the USGS 8-digit Cataloging Unit (CU) 03040105 (USGS 1974, NCEEP 2007).

The UT to Rocky River within the Site appears as an intermittent stream on the USGS 7.5-minute topographic quadrangle (Kannapolis, North Carolina); however, field observations indicate that the stream is perennial. In addition, a NCDWQ stream data form was completed for the UT to Rocky River, which confirms a perennial flow regime (NCDWQ form score of 41 - see Appendix 5).

2.3 Study Area

The Site is located in northwest Cabarrus County approximately 6 miles southwest of the town of Kannapolis (Figure 1, Appendix 1). The center of the Site has a latitude and longitude of 035º 25’ 32” N and 080º 44’ 26’’ W. The Site is situated in the northeast quadrant of the intersection of Harris Road and the Rocky River between Harris Middle School and Odell Elementary School, approximately 1.5 miles from Highway 73.

3.0 WATERS OF THE UNITED STATES

3.1 Site Evaluation Methodology

Stream geometry and substrate data have been evaluated to classify existing stream conditions, utilizing fluvial geomorphic principles (Rosgen 1996). In addition, bankfull discharge analysis, sediment transport analysis, HEC-RAS analysis, and reference measurements were conducted to evaluate existing, reference, and proposed conditions.

3.2 Jurisdictional Streams

One jurisdictional stream, the UT to Rocky River is found on-site. A NCDWQ stream data form was completed for the UT to Rocky River, which confirms a perennial flow regime (NCDWQ form score of 41 - see Appendix 5).

Existing stream photographs can be found in Appendix 3.

Hydrological features within the Site are depicted on Figure 4.

3.3 Jurisdictional Wetlands

Jurisdictional wetland limits are defined using criteria set forth in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). As stipulated in this manual, the presence of three clearly defined parameters (hydrophytic vegetation, hydric soils, and evidence of wetland hydrology) are required for a wetland jurisdictional determination.

Jurisdictional wetland limits were delineated in March 2008, revealing approximately 6.5 acres of jurisdictional wetlands. A meeting with the USACE has been set to gain approval of jurisdictional limits, however the date is past the submittal date of this document. Jurisdictional wetlands have been timbered in the past and are characterized by a disturbed scrub/shrub community containing black berry (*Rubus argutus*), soft rush (*Juncus effuses*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), rose (*Rosa* sp.), dog fennel (*Eupatorium capillifolium*), elm (*Ulmus* sp.), and broomsedge (*Andropogon* sp.) with black willow (*Salix nigra*) and tag alder (*Alnus serrulata*) adjacent to the Project streams, and cattail (*Typha* sp.) and crimsoneyed rosemallow (*Hibiscus moscheutos*) in ponded areas. Beaver activity is abundant within the Project and appears to have commenced recently as indicated by a lack of mature tree death.

Historically, onsite wetlands may have supported communities similar to a Piedmont Alluvial Forest (Schafale and Weakley 1990). Piedmont Alluvial Forest communities typically occur on alluvial floodplains of smaller watersheds that are intermittently or seasonally flooded.

4.0 ENVIRONMENTAL SCREENING AND DOCUMENTATION

4.1 Federally Protected Species

4.1.1 Site Evaluation Methodology

Species with a Federal classification of Endangered or Threatened are protected under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). The term "Endangered species" is defined as "any species which is in danger of extinction throughout all or a significant portion of its range," and the term "Threatened species" is defined as "any species which is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C. 1532).

Based on the most recently updated county-by-county database of federally listed species in North Carolina as posted by the USFWS at http://nc-es.fws.gov/es/countyfr.html, two federally protected species are listed for Cabarrus County. The following table lists the federally protected species and indicates if potential habitat exists within the Site for each. A species description and biological conclusion for each follow.

Table 1. Federally Protected Species for Cabarrus County
Project ID No. 070708001 (UT to the Rocky River Restoration Project)

Common Name	Scientific Name	Status*	Habitat Present Within Site	Biological Conclusion
Invertebrates				
Carolina heelsplitter	*Lasmigona decorata*	Endangered	No	No Effect
Vascular Plants				
Schweinitz's sunflower	*Helianthus schweinitzii*	Endangered	Yes	Unresolved

*Endangered = a taxon "in danger of extinction throughout all or a significant portion of its range"

4.1.2 Threatened and Endangered Species

Federally protected species descriptions and biological conclusions are as follows.

Lasmigona decorata (Carolina heelsplitter) **Endangered**
Animal Family: Unionidae
Date Listed: June 13, 1993

The Carolina heelsplitter was once fairly widely distributed in the Catawba and Pee Dee river basins in North Carolina and Pee Dee and Savannah river basins in South Carolina. There are only six known remaining populations of this species; two in North Carolina and four in South Carolina. The listing status for this species in Cabarrus County is "historic" and has not been seen in the County since the mid 1800's.

This mussel is usually found in a variety of substrates usually near stable, well-shaded stream banks. The stability of the stream banks appears to be very important to this species and no fish host has been identified.

The Carolina heelsplitter is a medium-sized mussel that has an ovate, trapezoid-shaped shell. The shell is yellowish, greenish brown to dark brown. Younger specimens have greenish brown or black rays. The nacre is pearly white to bluish-white, grading to orange in the area of the umbo. The lateral teeth are well developed but thin and rather delicate.

Biological Conclusion: **NO EFFECT**
Potential habitat for the Carolina heelsplitter does not occur within the Site due to the disturbed nature of Site streams and the lack of stream shading. In addition, the listing for Carolina hellsplitter is a "historic" record and this species has not been documented

in Cabarrus County since the mid 1800's. No known occurrences are documented by the North Carolina Natural Heritage Program (NCNHP) within or near the Site.

Helianthus schweinitzii (Schweinitz's sunflower) **Endangered**
Plant Family: Asteraceae
Federally Listed: June 6, 1991

This sunflower is found in the piedmont of North and South Carolina with 13 known populations occurring in North Carolina.

Schweinitz's sunflower is a rhizomatous perennial herb with one to several fuzzy purple stems. It grows to 3-6 feet in height from a cluster of carrot-like tubrous roots. Leaves are lance-shaped, usually opposite, approximately 2-7 inches in length, and 0.4-0.8 inches in width. The leaves are rough and resin-dotted on the surface with a felt-like feel on the underside. Flowers are yellow composites and fruits are small and dark brown. Flowering and fruiting occur from mid-September to frost. Based on its similar morphology to *H. laevigatus* and *H. microcephalus* it is difficult to positively identify this species prior to flowering.

Schweinitz's sunflower grows best in full sunlight or partial shade in clearings and along the edges of upland woods, thickets, and pastures. It is also found along roadsides, powerline clearings, old pastures, and woodland openings. Common soils that this species is found in include moist to dryish clays, clay-loams, or sandy clay-loams, often with high gravel content. Natural fires and large herbivores are considered to be historically important in maintaining open habitat for these sunflowers. Today, disturbances such as mowing, controlled burning, and logging help maintain its open habitat.

Biological Conclusion: NO EFFECT
Habitat for Schweinitz's sunflower is present within the project in the form of maintained-disturbed land. Plant-by-plant surveys for this species were conducted on September 5, 2008, during the optimal survey window. No Schweinitz's sunflower plants were identified during the surveys. No known occurrences are documented by the NCNHP within or near the Site.

State Species
Plant and animal species which are on the North Carolina State list as Endangered, Threatened, Special Concern, Candidate, Significantly Rare, or Proposed (Amoroso 2002, LeGrand and Hall 2001) receive limited protection under the North Carolina Endangered Species Act (G.S. 113-331 et seq.) and the North Carolina Plant Protection Act of 1979 (G.S. 106-202 et seq.).

Based on comments from the North Carolina Wildlife Resources Commission (NCWRC), populations of Carolina creekshell (*Villosa vaughaniana*) are known for Clark Creek to the west of this project area. NCWRC recommended conducted biological investigations for the Carolina creekshell within and adjacent to the project

boundaries. Therefore, a survey of the Site for mussel species was conducted by The Catena Group (document dated June 20, 2008) to identify and record muscles within and adjacent to the Site. No federally or state protected mollusk species were identified during the survey.

4.1.3 Federal Designated Critical Habitat

No designated critical habitat is documented to occur within Cabarrus County.

4.1.4 USFWS Concurrence

A concurrence letter has been mailed to the USFWS and no reply has been received at this time. The Categorical Exclusion documentation is included as Appendix 11 and 13.

4.2 Cultural Resources

4.2.1 Site Evaluation Methodology

Pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for compliance with Section 106 (36 CFR Part 800) concurrence was received for the Project from the North Carolina State Historic Preservation Office (NCSHPO).

No known historical resources are located within the Project; therefore, NCSHPO has no comment on this Project.

4.2.2 NCSHPO Concurrence

The NCSHPO concurrence letter is included in the attached Categorical Exclusion document located in Appendix 11 and 13.

4.3 Other Compliance Issues:

The North Carolina Wildlife Resources Commission (NCWRC) commented on this project in a letter dated April 9, 2008 (Appendix 11 and 13). NCWRC notes that the Carolina creekshell (*Villosa vaughaniana*), a Federal Species of Concern and North Carolina state-listed endangerd species, is known in Clark Creek west of the Project. NCWRC has requested that biological investigations for the Carolina creekshell occur prior to mitigation activities; if any Carolina creekshells are found in the work area, they have requested that they be relocated upstream or removed to safety and subsequently restored to the stream after completion of Project construction.

The Categorical Exclusion documentation is included as Appendix 13 of this document.

5.0 CONSTRAINTS ANALYSIS

5.1 Environmental Screening

The presence of conditions or characteristics that have the potential to hinder restoration activities at the Project was evaluated. Environmental screening of the Project was conducted during field investigations to evaluate the presence of potentially harmful environmental hazards. Environmental concerns under review include past or present storage of hazardous or regulated materials and/or waste, illicit dumping of solids or hazardous waste, and degradation of surface waters that may have a negative impact on the environment. Visual screening for objects such as storage tanks, debris, hazardous materials, and evidence of waste burial was conducted through field reconnaissance. No evidence of storage tanks or elicit dumps were identified during field investigations of the Project area.

A review of environmental databases conducted by Environmental Data Resources, Inc. (EDR) using the EDR Field Check System revealed no known documents within the Project. However, two locations were listed in the Incident Management Database within 0.5 mile of the Project. The incidents include a leaking underground petroleum storage tank in August 2003 at 9436 Harris Road approximately 0.25 mile northeast of the Project and a leaking underground gasoline/diesel storage tank with detected groundwater contamination in October 2004 at 9999 Harris Road approximately 0.5 mile southeast of the Project. Based on field reviews, hazardous materials will not be a hindrance to proposed project activities.

5.2 Utilities and Easements

The Project is crossed by several existing underground utilities. Existing utilities and easements will not be disturbed/impacted by this Project. No other utilities or easements have been identified that will be disturbed/impacted by the Project.

5.3 Property Ownership and Site Access

The large majority of the Site is contained in one parcel owned by Cabarrus County. However, it appears that there are two small pieces of land owned by Ambassador Development NC, LLC, and Motley Bobbie Cannon, respectively along the banks of Rocky River. A formal property boundary survey has not been completed at this point, but all indications are that the two small pieces of property not owned by Cabarrus County run along the top of bank of Rocky River.

The Site is bounded to the north by Moss Farm Street, Harris Road to the East, and Rocky River to the South. There are two potential access points to the Site. The first access point is located off of Moss Farm Street along the eastern boundary of the UT to Rocky River. A second potential access point is located off of Harris Road near the downstream end of the Site. A transportation plan, including the location of access routes and staging areas will be designed to minimize Site disturbance during construction. The number of transportation access points into the floodplain will be maximized to avoid traversing long distances through the Site's interior.

5.4 Hydrologic Trespass

The HEC-RAS analysis indicates that the restoration design will result in a no-rise in the 100-year floodplain water surface elevations outside of the project area. The results of this analysis affirm that hydrologic trespass to adjacent properties will not occur.

6.0 REFERENCES

Amoroso, J. L. 2002. Natural Heritage Program List of the Rare Plant Species of North Carolina. North Carolina Natural Heritage Program, Division of Parks and Recreation, Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. United States Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

LeGrand, H.E. and S. P. Hall. 2001. Natural Heritage Program List of the Rare Animal Species of North Carolina. North Carolina Natural Heritage Program, Division of Parks and Recreation. Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

North Carolina Ecosystem Enhancement Program (NCEEP). 2007. Yadkin-Pee Dee River Basin Restoration Priorities (online). Available: http://www.nceep.net/services/restplans/yadkinpeedee_2007.pdf [March 12, 2007]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.

Rosgen D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

United States Geological Survey (USGS). 1974. Hydrologic Unit Map. Reston, Virginia. United States Geological Society (map scale 1: 500,000).