

**MILL BRANCH
STREAM AND WETLAND
MITIGATION FEASIBILITY STUDY**

Columbus County, North Carolina

TIP No. R-0513 WM

**North Carolina Department of Transportation
Office of Natural Environment**



February 2003

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February 2003

TABLE OF CONTENTS

SECTION	PAGE
1.0 INTRODUCTION	1
1.1 PURPOSE	1
1.2 STUDY AREA	1
2.0 ENVIRONMENTAL SCREENING	3
2.1 ENVIRONMENTAL HAZARDS	3
2.2 SOILS.....	3
2.3 STREAMS AND WETLANDS	3
2.4 CULTURAL AND ARCHITECTURAL RESOURCES	4
2.5 WATER QUALITY	4
2.6 RARE, THREATENED AND ENDANGERED SPECIES AND COMMUNITIES	4
2.6.1 <u>Federal Listings</u>	4
2.6.2 <u>State Rare and Protected Species</u>	6
2.7 LAND USE.....	6
2.8 WATERSHED REVIEW.....	6
2.9 ENVIRONMENTAL SCREENING SUMMARY	6
3.0 MILL BRANCH SITE	7
3.1 EXISTING CONDITIONS	7
3.1.1 <u>Site Characteristics</u>	8
3.2 CONSTRAINTS	15
3.3 RECOMMENDATIONS	16
3.4 PROPERTY OWNER COORDINATION	17
3.5 MITIGATION CONCEPT	17
3.6 COST ESTIMATE	19
4.0 REFERENCES	20

APPENDICES

- A. Exhibits
- B. EDR Report
- C. Prior Converted Croplands
- D. Agency Response Letters
- E. Site Photographs and Locations
- F. Data Forms
- G. Construction Cost Estimate

TABLES

Table 1	Federally Listed Species and Species of Concern
Table 2	Soil Plug 1
Table 3	Soil Plug 2
Table 4	Soil Plug 3
Table 5	Soil Plug 4
Table 6	Summary of Potential Mitigation

GRAPHS

Graph 1	Mill Branch Water Surface
Graph 2	Mill Branch Cross-section
Graph 3	Unnamed Tributary Cross-section 1
Graph 4	Unnamed Tributary Cross-section 2
Graph 5	Unnamed Tributary Priority 1 Proposed Cross-section

1.0 INTRODUCTION

As part of a statewide program, the North Carolina Department of Transportation (NCDOT) is in the process of identifying and developing stream restoration sites in order to mitigate for impacts resulting from roadway construction projects. In 2002 a search for potential stream and wetland restoration sites in the Lumber River Basin was conducted to address mitigation of current and future impacts associated with road projects within the Basin.

A site known as the Mill Branch Site was identified in the Lumber River Wetland and Stream Mitigation Search. The following report documents all findings and conclusions from a stream and wetland mitigation feasibility study conducted on the Site. All exhibits are located in Appendix A.

The Site is comprised of two properties (Exhibit 1). Ms. Nancy Watts Hall and Ms. Sandra Sellers own the property on the northwestern portion of the Site. This property is 20 acres and will be referred to as the Hall Property in the report. Mr. J. P. Jones owns the larger property that comprises the remaining land within the Site. This property is 245 acres and will be referred to as the Jones Property in the report. The portions of the properties where data was gathered and potential mitigation may occur will be referred to as the study area. The original scope of the study was two fold: 1) conduct a stream and wetland restoration feasibility study on Mill Branch and adjacent agricultural fields on the Hall Property, and 2) study wetlands adjacent to Mill Branch on the Jones Property to determine their potential for preservation and/or enhancement. However, the scope of the study was expanded to conduct a stream restoration feasibility study on an unnamed tributary to Mill Branch that was discovered on the Jones Property during the first site visit.

The purpose of the study, a description of the study area, and the methodology used are provided below. The body of the report summarizes the findings and recommendations and includes existing and proposed channel cross-sections. All exhibits, including site maps and site photographs are included in the Appendices.

1.1 PURPOSE

The purpose of this study is to evaluate the feasibility of restoring and/or enhancing the disturbed reach of Mill Branch and its associated unnamed tributary. Additionally, agricultural fields adjacent to Mill Branch and existing riparian wetlands were studied for their mitigation potential. Data collected during the study was analyzed to: 1) determine if any "fatal flaws" exist at the Site that could prevent the successful restoration, enhancement and/or preservation of any portions of the site; 2) develop a mitigation concept that can be presented to the landowner to obtain their input into mitigation on their properties; and 3) develop a feasibility-level cost estimate for the NCDOT.

1.2 STUDY AREA

The Mill Branch Site is located off of HWY 701 just northeast of its intersection with Lebanon Road (SR 1141). The Site is approximately six miles south of the Town of Whiteville in Columbus County. Land use within the watersheds for Mill Branch and its unnamed tributary is rural in nature; dominated by row crops and pastures. Both Mill Branch and its unnamed tributary are located within USGS hydrologic unit 03040206 and DWQ subbasin 030757. A total of approximately 8,900 linear feet of stream was evaluated at the Site.

Approximately 1,500 linear feet of Mill Branch and 10 acres of agricultural fields, lying completely within the Hall Property, were evaluated for restoration potential. The drainage area for this reach of Mill Branch is approximately 1.5 square miles (960 acres) at the eastern property boundary. Existing land use surrounding this reach of Mill Branch is dominated by row crops. Much of the land west of HWY 701 remains forested.

Approximately 3,000 linear feet of the unnamed tributary, lying completely within the Jones Property was evaluated for restoration potential. The drainage area for the tributary on the Jones Property is approximately 0.28 square miles (179 acres) at its confluence with Mill Branch. Existing land use surrounding the tributary is comprised almost entirely of pastureland. An additional 4,400 linear feet of Mill Branch and associated riparian wetlands on the Jones Property were evaluated for enhancement and preservation potential. Section 3.1 provides a more detailed discussion of the existing conditions at the site.

2.0 ENVIRONMENTAL SCREENING

An environmental screening of the Site was conducted to evaluate existing conditions and to ensure that no "fatal flaws" exist that could deter or severely limit the potential for restoration. This screening consisted of the following: a review of federal and state environmental regulatory databases, a review of protected species, an investigation into the existence of cultural resources, and an evaluation of local planning elements that may affect the Site.

Federal and state environmental regulatory databases were reviewed to determine if there are any "recognizable environmental conditions" that could affect potential site development options or which could pose liabilities to NCDOT through acquisition of easements or new properties.

State and federal databases were also reviewed for the presence of protected species or cultural resources, which could limit the use of the Site for stream and wetland mitigation purposes.

2.1 ENVIRONMENTAL HAZARDS

Field reconnaissance of the Site yielded no evidence of either above ground or underground storage tanks. No manufacturing facilities or other dischargers were observed in the vicinity of the Site. The Environmental Data Resources (EDR) Report (Appendix B) completed on November 4, 2002, listed no environmental hazards on any Property within a ½ mile radius of the Mill Branch Site.

2.2 SOILS

Hydric soils (Exhibit 2) extend back from both banks of the studied reaches for their entire length according to the *Columbus County Soil Survey* (1984). These soils vary in the distance they extend out from the channels. The soils are:

Meggett fine sandy loam, frequently flooded - a poorly drained soil found on floodplains and low stream terraces. Slopes are less than 2%. Permeability is slow and available water capacity is high. The seasonal high water table is within one foot of the surface. This soil's limiting factors are wetness, flooding, slow permeability and high shrink-swell potential.

Muckalee sandy loam, frequently flooded - a poorly drained soil found on floodplains of shallow meandering streams. Slopes are less than 2%. Permeability is moderate and available water capacity is low to moderate. The seasonal high water table is 0.5 to 1.5 feet below the surface. This soil's limiting factors are wetness and flooding.

2.3 STREAMS AND WETLANDS

National Wetland Inventory (NWI) mapping (Exhibit 3) shows four wetland types occurring on-site. The large majority of wetlands identified by the NWI are located on the northern portions of Mr. Jones' Property adjacent to Mill Branch and the unnamed tributary. The wetland types identified on Mill Branch and the tributary are PFO1A (Palustrine, forested, broadleaved deciduous, temporarily flooded), PFO1/4C (Palustrine, forested, broadleaved deciduous/needle-leaved evergreen, seasonally flooded) and PFO1/C (Palustrine, forested, broadleaved deciduous, seasonally flooded). Two additional wetland types are identified within the properties comprising the Site, however, both wetland types are outside of the study area.

Mapping from the local Natural Resources Conservation Service (NRCS) confirms that land immediately adjacent to both Mill Branch and the unnamed tributary are Prior Converted (PC) agricultural fields (Appendix C).

Mill Branch, within the study area, is shown as a second order perennial stream on the Tabor City USGS Quadrangle Map and a second order intermittent stream on the *Columbus County Soil Survey*. The *Columbus County Soil Survey* shows the unnamed tributary as a second order intermittent stream within the study area. The unnamed tributary is not shown as a stream on the Nakina USGS Quadrangle Map, but topographic lines on the map indicate a natural drainage way.

2.4 CULTURAL AND ARCHITECTURAL RESOURCES

The State Historic Preservation Office (SHPO) was contacted to identify any known historic resources on-site that could be affected by the project. SHPO's response letter (Appendix D) states that there are no known recorded archaeological sites, which would be affected by the project.

2.5 WATER QUALITY

Mill Branch and the unnamed tributary to Mill Branch have a use support rating of Fully Supporting but Threatened as published in the *Lumber River Basin Wide Water Quality Plan* (May, 1999). Mill Branch and its unnamed tributary are not 303(d) listed waters because both are Fully Supporting.

DWQ's classification for both water bodies is C;SW. Class C is designated to freshwaters protected for secondary recreation, fishing, and aquatic life including propagation and survival, and wildlife. A supplementary designation of SW (Swamp Waters) is designated to waters that have low velocities and other natural characteristics, which are different from adjacent streams.

2.6 RARE, THREATENED AND ENDANGERED SPECIES AND COMMUNITIES

The North Carolina Natural Heritage Program (NHP) was contacted to determine the presence of, or potential for rare, threatened and/or endangered species to occur on the subject properties and any listings of unique or rare natural community types in surrounding areas. Additionally, the United States Fish and Wildlife Service (USFWS) was contacted to request comments on the Site. A response phone call from Mr. Howard Hall of the USFWS on October 7, 2002 yielded no concerns regarding the establishment of mitigation on the Hall or Jones Properties.

2.6.1 Federal Listings

The USFWS protects plants and animals with the federal status designations of Endangered, Threatened, Proposed, or Experimental (either essential or non-essential) under the 1973 Endangered Species Act. Six federally protected species are listed by the USFWS (Table 1) as occurring in Columbus County (<http://web.ncusfws.org/es/cntylist/columbus.html>). **A letter of response (Appendix D) from NHP indicates that there is no record of federally listed rare species, significant natural communities or priority natural areas, neither at the site nor within one mile of the site.**

Table 1 Federally Listed Species and Species of Concern for Columbus County

SCIENTIFIC NAME	COMMON NAME	STATUS	HABITAT
Vertebrates			
<i>Alligator mississippiensis</i>	American alligator	T(S/A)	Yes
<i>Aimophila aestivalis</i>	Bachman's sparrow	FSC	No
<i>Elassoma boehlkei</i>	Carolina pygmy sunfish	FSC	Yes
<i>Ammodramus henslowii</i>	Henslow's sparrow	FSC	No
<i>Ophisaurus mimicus</i>	Mimic glass lizard	FSC	No
<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat	FSC	Yes
<i>Picoides borealis</i>	Red-cockaded woodpecker	E	No
<i>Acipenser brevirostrum</i>	Shortnose sturgeon	E	No
<i>Fundulus waccamensis</i>	Waccamaw killifish	FSC	No
<i>Menidia extensa</i>	Waccamaw silverside	T	No
Invertebrates			
<i>Triodopsis soelneri</i>	Cape Fear threetooth	FSC	Yes
<i>Procambarus lepidodactylus</i>	Pee Dee lotic crayfish	FSC	Yes
<i>Toxolasma pullus</i>	Savannah lilliput	FSC	Yes
<i>Lampsilis fullerkati</i>	Waccamaw fatmucket	FSC	No
<i>Elliptio</i> Sp. 5	Waccamaw lance pearlymussel	FSC	Yes
<i>Elliptio waccamawensis</i>	Waccamaw spike	FSC	No
Vascular Plants			
<i>Tofieldia glabra</i>	Carolina asphodel	FSC	No
<i>Macbridea caroliniana</i>	Carolina bogmint	FSC	Yes
<i>Parnassia caroliniana</i>	Carolina grass-of-parnassus	FSC	No
<i>Carex chapmanii</i>	Chapman's sedge	FSC	Yes
<i>Thalictrum cooleyi</i>	Cooley's meadowrue	E	No
<i>Fimbristylis perpusilla</i>	Harper's fimbry	FSC	Yes
<i>Plantago sparsiflora</i>	Pineland plantain	FSC	No
<i>Eupatorium resinotum</i>	Resinous boneset	FSC	Yes
<i>Lysimachia asperulaefolia</i>	Rough-leaved loosestrife	E	No
<i>Oxypolis ternata</i>	Savannah cowbane	FSC	No
<i>Amorpha georgiana</i> var. <i>confusa</i>	Savanna indigo-bush	FSC	No
<i>Solidago verna</i>	Spring-flowering goldenrod	FSC	No
<i>Rhynchospora decurrens</i>	Swamp forest beaksedge	FSC	Yes
<i>Dionaea muscipula</i>	Venus flytrap	FSC	Yes
<i>Sporobolus teretifolius</i> <i>sensu stricto</i>	Wireleaf dropseed	FSC	No

"E"-- An Endangered species is one, which is in danger of extinction throughout all or a significant portion of its range.

"FSC"-- A Special Concern species is one, which requires monitoring but may be taken or collected and sold under regulations adopted under the provisions of Article 25 of Chapter 113 of the General Statutes (animals) and the Plant Protection and Conservation Act (plants). Only propagated material may be sold of Special Concern plants that are also listed as Threatened or Endangered.

"T"-- A Threatened species is one, which is likely to become endangered species within the foreseeable future throughout all or a significant portion of its range.

2.6.2 State Rare and Protected Species

Plants and animals with state designations of Endangered (E), Threatened (T), Candidate (C) or Special Concern (SC) are protected under the State Endangered Species Act (G.S. 113-331 to 113-337) (administered and enforced by the NC Wildlife Resources Commission) and the State of North Carolina Plant Protection and Conservation Act of 1979 (G.S. 196: 106-202.12 to 106-202.19) administered and enforced by the NC Department of Agriculture. **As noted in section 2.6.1, a letter of response (Appendix D) from NHP indicates that there is no record of state listed rare species, significant natural communities or priority natural areas, either at the site nor within one mile of the site.**

2.7 LAND USE

Row crops and pastureland dominate the Mill Branch Site (Exhibit 4). Listed below are more detailed descriptions of land uses adjacent to potential mitigation areas on-site.

Mill Branch (Hall Property): Agricultural fields lie adjacent to both the left and right banks of Mill Branch through the large majority of the property. Soybeans were noted as the crop in the north field. The south field was not in crop production and seems to have lain fallow for at least one season. A forested buffer composed of mature (over 40 years old) trees is located along 400 feet of the right bank at the upstream edge of the property. This forested area is the only portion of the stream that is not surrounded on both sides by agricultural fields. Mill Branch exits the Hall Property on the property's eastern edge. A forested swamp exists along the property boundary where Mill Branch exits the Hall Property and flows onto the Jones Property.

Mill Branch (Jones Property): A hardwood swamp forest dominates the landscape surrounding Mill Branch on the Jones Property. Trees within this forest are somewhat young (approximately 25 to 30 years old) indicating that the forest has been clear-cut in the past.

Tributary to Mill Branch (Jones Property): Active pastureland dominates the landscape surrounding the tributary. Numerous cows have been observed in and around the tributary during all site inspections. The tributary flows north under an access road into the forested swamp surrounding Mill Branch on the Jones Property. Cattle access a small portion of the forested swamp area adjacent to the tributary north of the access road.

2.8 WATERSHED REVIEW

According to the Columbus County Manager's Office, the County has no zoning ordinances except in the town of Whiteville, Columbus County Community College, and within the Riegelwood Sanitary District. Therefore, land within the Site and within the Mill Branch watershed is not zoned.

No development within the Mill Branch watershed is planned according to the Columbus County Economic Development Commission. Therefore, the watershed land use upstream of and within the Site should not change significantly in the near future.

2.9 ENVIRONMENTAL SCREENING SUMMARY

Based on the information presented above, there are no known environmental factors that could be considered as fatal flaws, which would prohibit stream and wetland restoration, enhancement or preservation on this site.

3.0 MILL BRANCH SITE

Site visits to evaluate existing conditions and collect pertinent data were conducted on September 6, 2002, October 29, 2002, November 1, 2002, and November 22, 2002. Data collected during these site visits included:

- Rosgen Level 1 stream classification
- Level of stream degradation
- Causes of degradation
- Evaluation of slope stability problems
- DWQ and USDA stream evaluation forms
- Hydrologic trespass potential
- Potential wetland limits
- Existing wetlands
- Soils analysis
- Existing riparian vegetation
- Adjacent land use
- Potential protected species habitat
- Access to properties for construction
- Photographs

The property owners were notified by phone prior to field investigations to inform them that personnel would be on their respective properties conducting field studies. Follow up phone conversations and on-site coordination with the owners were also conducted to discuss the study and ascertain owners' attitudes toward mitigation on their properties.

3.1 EXISTING CONDITIONS

As stated previously, the Mill Branch Site contains two streams (Mill Branch and an unnamed tributary to Mill Branch), a swamp forest and agricultural land that were studied for mitigation potential. Dominant land use on-site is swamp forest, row crops and pastureland (Exhibit 4). Dominant land use within both the watershed of Mill Branch and the unnamed tributary is agriculture with scattered residences. Photographs showing existing conditions were taken during site visits. Site photographs, including an exhibit of photograph locations and existing culvert locations, are shown in Appendix E.

The study area for Mill Branch encompasses the entire length of the stream that flows through the Hall Property, and its entire length flowing through the Jones Property. Mill Branch enters the western portions of the Hall Property from under HWY 701 and exits the Jones Property on its northeastern corner. A total of approximately 5,900 linear feet of Mill Branch was studied.

The study area for the unnamed tributary lies entirely with the Jones Property. The unnamed tributary enters the Jones Property from the south and flows north until its convergence with Mill Branch. A total of approximately 3,000 linear feet of the unnamed tributary was studied.

3.1.1 Site Characteristics

Mill Branch (Hall Property)

Mill Branch enters the western portions of the Hall Property from a culvert crossing under HWY 701 (Exhibit 3). The stream flows due east through the property. Agricultural fields are located on both sides of Mill Branch with the only exception coming in the first 400 feet of the reach where a bottomland hardwood forest is located south of the channel.

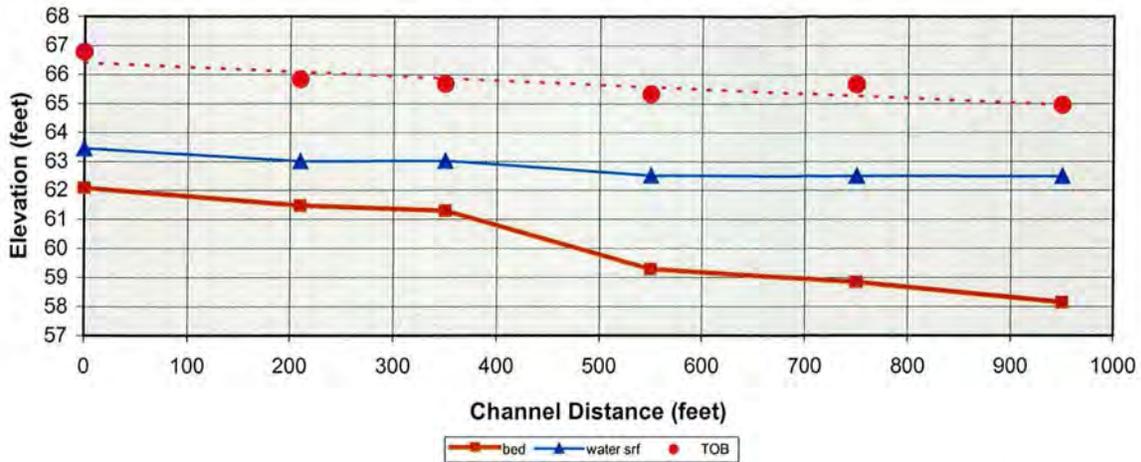
A pipe culvert (size undeterminable) is located approximately 500 feet east of HWY 701 and serves as a crossing from the north field to the south field. The crossing has established vegetation on top and has started to collapse. Investigations could not determine if the pipe under the crossing is deteriorating. A drainage ditch from the northern fields converges with Mill Branch immediately downstream of the crossing.

The only riparian buffer adjacent to Mill Branch is located south of the first 400 feet of the stream. The channel's banks have historically been maintained as evidenced by the absence of mature vegetation on its banks. Existing vegetation on the stream's banks is very young (less than 5 years old) indicating frequent maintenance of the channel. Dominant vegetation that is presently reestablishing itself on the banks includes red maple (*Acer rubrum*), privet (*Ligustrum sinense*), black willow (*Salix nigra*), tulip poplar (*Liriodendron tulipifera*), tag alder (*Alnus serrulata*), and elderberry (*Sambucus canadensis*).

Mill Branch appears to have been relocated north from its natural location in the landscape, and channelized for its entire length through the Hall Property. The channel is now situated along the northern edge of its relic floodplain, adjacent to a sandy ridge that is situated parallel to Mill Branch. The current channel displays no meander pattern or noticeable riffle-pool sequence. The channel has vertical banks and a relatively flat bottom. No noticeable areas of bank degradation were observed, but the depth and murkiness of the water may have covered areas of slumping or otherwise degraded banks.

During site inspections it was noted that the water in Mill Branch seemed to be stagnant east of the HWY 701 culvert. A thick layer of detritus in the bottom of Mill Branch indicates that water flow is stagnant or very slow flowing. Preliminary water surface elevations (Graph 1) obtained on Mill Branch suggest that water is backed up from a point further downstream, causing low flow or stagnate conditions within the channel. An examination of Mill Branch upstream (west of HWY 701) of the Hall Property revealed flowing water in the entire reach. **This flowing water provides evidence that water is backed up from a point downstream (east) of the study area.**

Graph 1. Mill Branch Water Surface



Mill Branch was examined upstream of the Hall Property (west of HWY 701) on November 22, 2002 and a channel with relatively stable pattern and profile was found. The channel seems to be entrenched, but evidence of flow escaping the banks was found in the floodplain. The channel displayed good sinuosity with stable banks, a recurring riffle-pool sequence for the entire length examined, and a mature vegetated riparian buffer. The substrate of the channel was sand dominated but clay components were evident. Water flow was constant at a depth of approximately six to eight inches in most riffles. This reach of Mill Branch provides a reference to the pattern and profile that Mill Branch may have exhibited on the Hall Property prior to channelization.

Three data forms, the Habitat Assessment Field Data Sheet (Coastal Plain Streams) (North Carolina Department of Environment and Natural Resources (NCDENR), DWQ), Stream Visual Assessment Protocol (United States Department of Agriculture (USDA)), and the NCDWQ Stream Classification Form (NCDENR, DWQ) were completed for all reaches studied in addition to the reach of Mill Branch west of HWY 701 (Appendix F). Because this reach of Mill Branch exhibits a relatively stable pattern, profile, and vegetative cover, data collected on the reach can be used to compare existing conditions on Mill Branch (Hall Property) and the unnamed tributary (Jones Property).

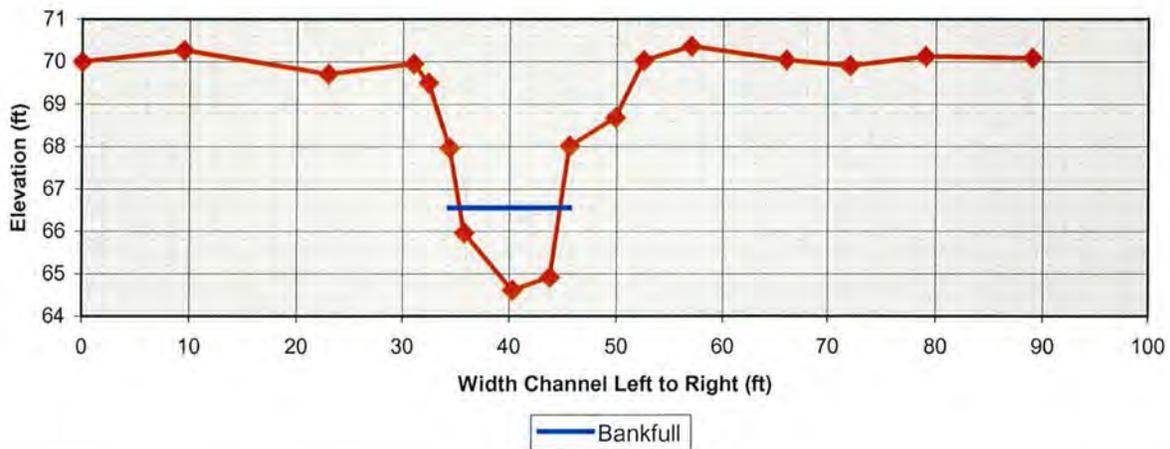
The Habitat Assessment Field Data Sheet for the reach of Mill Branch west of HW 701 yielded a score of 86 out of a possible 100 points. This score does not necessarily signify that the reach displays good habitat because DWQ has not published the relevance of the scoring system for this data sheet up to completion of this report. Because the reach displays relatively stable conditions though, the score of 86 will be used as a reference score to compare the scores of Mill Branch (Hall Property) and the unnamed tributary (Jones Property). The Stream Visual Assessment form yielded a score of 8.3, which placed it in the Good rating. The NCDWQ Stream Classification Form yielded a score of 29.25, which signifies that the stream is at least an intermittent stream.

Channel Characteristics and Classification

A Rosgen Level 1 stream assessment of Mill Branch was completed to help determine its stability and restoration potential. Only one cross-section (Graph 2) of Mill Branch was required to classify the entire reach because of the channel's uniform pattern, profile and dimension. The location of the cross-section is shown in Exhibit 5. No bankfull indicators were observed while conducting the cross-sectional measurements. The Coastal Plain Regional Curve developed by EcoScience for the Mid-Atlantic Coastal Plain Ecoregion was utilized to help determine where bankfull should reasonably be located. The drainage area of Mill Branch where the cross-section was conducted is approximately 900 acres (1.4 square miles). The bankfull cross-sectional area was calculated to be approximately 12.7 square feet using the Coastal Plain Regional Curve.

Water was filling the channel well above where bankfull should be based on the Regional Curve, suggesting that water is backed up in the channel from a point downstream. Beaver dams located in and downstream of the study area are believed to be the main cause of water backing up in the channel.

Graph 2. Mill Branch Cross-section



Cross-Sectional Area	Width	Maximum Depth	Bank Height	Width Flood-Prone	Mean Depth	Width-to-Depth Ratio	Entrenchment Ratio	Bank-Height Ratio
12.8 sq. ft	9.4 ft	1.9 ft	4.9 ft	15.5 ft	1.4 ft	7	1.7	2.6

The blue line on the graph indicates calculated bankfull from the Coastal Plain Regional Curve. Classification of Mill Branch was based strictly off of the Regional Curve because bankfull indicators could not be located in the field.

Stream Classification - The existing stream is an entrenched straightened channel with a low width-to-depth ratio. The estimated sinuosity is 1.0 because Mill Branch has been straightened and follows its valley in a straight line. As stated previously, bankfull was located below the water surface upon all site inspections. The measured cross-section parameters, which are consistent for the entire reach, yield a **Rosgen G** classification for this reach of Mill Branch. A

Rosgen G classification signifies an entrenched stream (ratio > 1.4) with a low width-to-depth ratio (< 12) and moderate sinuosity (>1.2).

The Habitat Assessment Field Data Sheet for Mill Branch (Hall Property) yielded a score of 46 out of a possible 100 points. A score of 46 is only 53% of the 86 points scored on the reach of Mill Branch west of HWY 701. A score of 46 would indicate that habitat along Mill Branch on the Hall Property is severely degraded. The Stream Visual Assessment form yielded a score of 5.09, which placed it in the Poor rating. The NCDWQ Stream Classification Form yielded a score of 27.5, which signifies that the stream is at least an intermittent stream.

Agricultural Fields (Hall Property)

Agricultural fields adjacent to Mill Branch were studied to determine their potential for wetland restoration. As stated previously it is believed that Mill Branch was moved north from its natural position in the landscape to the point where it currently flows. It is believed that lands immediately adjacent to Mill Branch would have been considered swamplands prior to its channelization and relocation. Conversations with the landowner seemingly support this theory because they have indicated that the land adjacent to Mill Branch was "swampy" before the channel was dug out and straightened.

Soil plugs were extracted and analyzed from fields both north and south of Mill Branch (Exhibit 5). Information collected on the soils extracted includes dominant matrix color (hue, value and chroma), texture, and profile depth. In addition, mottle color; contrast and abundance were collected for each profile. Additional soil plugs were extracted throughout the fields to confirm hydric status. The following Tables show information collected from soil plugs taken from the Hall Property.

Table 2 Soil Plug 1, ~ 50' North of Mill Branch, ~ 150' West of Eastern Property Boundary

DEPTH	MATRIX COLOR	MOTTLE COLOR	MOTTLE ABUNDANCE/CONTRAST	TEXTURE
0-5"	10 YR 3/2	-	-	Loam
5-9"	10 YR 4/2	10 YR 7/6 2.5 YR 3/6	Few/Distinct Few/Distinct	Clay loam
9-18"	2.5Y 5/3	7.5 YR 5/8 10 YR 3/1	Common/Distinct Common/Distinct	Sandy clay loam

Table 3 Soil Plug 2, ~ 50' North of Mill Branch, ~ 150' East of Feeder Ditch

DEPTH	MATRIX COLOR	MOTTLE COLOR	MOTTLE ABUNDANCE/CONTRAST	TEXTURE
0-9"	10 YR 3/2	-	-	Sandy loam
9-14"	2.5 Y 5/3	10 YR 5/8	Common/Distinct	Sandy clay loam
14-past 20"	2.5Y 5/4	10 YR 5/8	Common/Distinct	Sandy loam

Table 4 Soil Plug 3, ~ 20' South of Mill Branch, ~ 300' West of Eastern Property Boundary

DEPTH	MATRIX COLOR	MOTTLE COLOR	MOTTLE ABUNDANCE/CONTRAST	TEXTURE
0-6"	10 YR 3/2	-	-	Loam
6-past 20"	2.5 Y 6/2	10 YR 7/8	Common/Distinct	Sandy loam

Table 5 Soil Plug 4, ~ 100 ' South of Mill Branch, ~ 300' West of Eastern Property Boundary

DEPTH	MATRIX COLOR	MOTTLE COLOR	MOTTLE ABUNDANCE/CONTRAST	TEXTURE
0-4"	10 YR 3/2	-	-	Clay loam
4-past 20"	10 YR 3/1	5 YR 3/4	Few/Distinct	Silty clay loam

Data compiled from the soil plugs seems to confirm the theory that Mill Branch was moved north from its original alignment. The new channel lies just south of a sandy upland and the soils found immediately north of the channel (Tables 2 and 3), although marginally hydric, have to be considered non-hydric soils because their chroma is higher than two at 12 inches. The opposite can be said for the soils immediately south of the channel (Tables 4 and 5). These soils are hydric to a depth past 20 inches, and can be found throughout the field south of Mill Branch. This would suggest that the large majority of Mill Branch's remnant "swampy" floodplain is located immediately south of the existing channel.

Unnamed Tributary (Jones Property)

The unnamed tributary enters the southwestern portion of the Jones Property and generally flows north until its convergence with Mill Branch (Exhibit 3). The tributary enters the property as two branches. The branches converge approximately 200 feet north of Mr. Jones' southern property boundary and flow north from the convergence point. The tributary flows through a pipe that maintains a dirt access road on the northern part of the property.

Numerous cows were observed in and adjacent to the tributary during all site inspections. The large majority of land surrounding the tributary is cleared pastureland. Exceptions to this can be found in two small wooded areas that are located approximately 50 feet east of the channel, and a wooded area at the northern extent of the tributary prior to its convergence with Mill Branch. Cattle access all of these wooded areas. The channel has been blocked by fill material approximately 400 feet north of the dirt access road to provide a pond for cattle. Blocking of the channel has an effect on the water slope to approximately 300 feet south of the access road. Blocking the channel has additionally created or enhanced wetlands adjacent to the ponded area. A nick point, approximately 150 feet downstream of the pond, signifies the obvious reformation of the tributary's channel. The channel's bed has an elevation change of approximately 2.5 feet at the nick point. An additional pond used by cattle is located approximately 65 feet east of the unnamed tributary south of the dirt access road. The pond is approximately 200 feet long and 30 feet wide and is situated parallel to the tributary.

There is no vegetated riparian buffer on the tributary with the exception of the sparsely wooded area surrounding the pond at the north end of the tributary. The dominant vegetation along the banks is blackberry (*Rubus argutus*), which provides minimal bank protection.

The unnamed tributary seems to have been channelized and straightened as evidenced by the channels lack of sinuosity, abrupt bends and vertical banks. Small low-lying swales can be found in some areas both east and west of the current channel. These swales and dark signatures on historical aerial photography indicate the stream may have been straightened from its natural location in the landscape. Although in the Coastal Plain, the surrounding topography can be characterized as gently rolling upland areas. The tributary's valley is relatively narrow for the Coastal Plain and acts to confine the channel to its general landscape position.

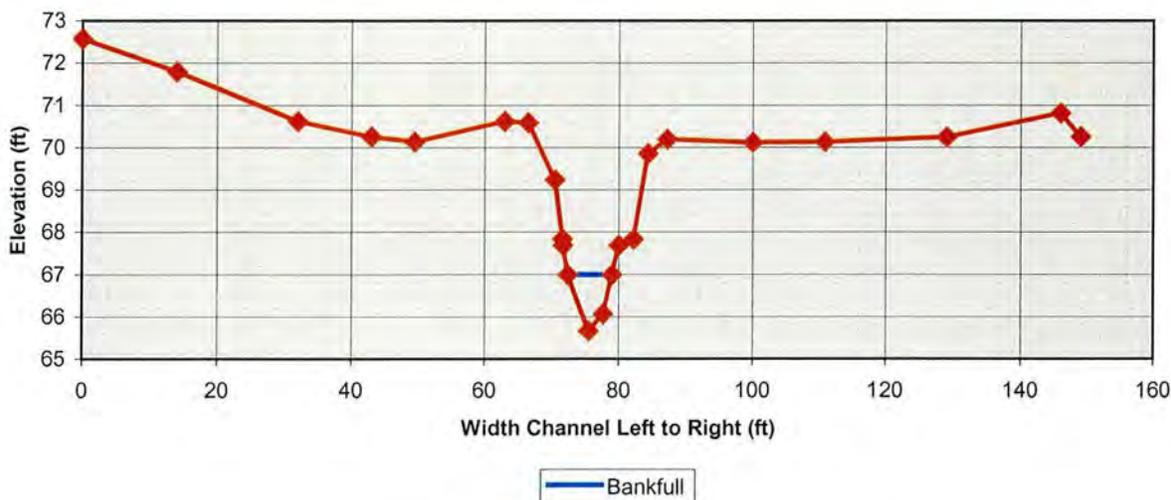
Water was flowing in the unnamed tributary during three of the four site visits. No flow was observed during the September 6th site visit, which was during abnormally dry conditions (<http://drought.unl.edu/dm/archive/2002/drmon0903.htm>, December 11, 2002). The channel's substrate is dominated by sand and clay and riffle-pool sequences were observed in most of the channel's length. Severe bank erosion was found throughout the channel and can be attributed to cows accessing the tributary and the lack of mature riparian vegetation. Large pools have formed in the channel where cattle congregate. High amounts of sedimentation and nutrient loading can be attributed to cattle accessing the tributary.

Both branches of the unnamed tributary flow through agricultural fields prior to entering the Jones Property. The branches were evaluated to determine their potential for reference data but yielded no viable information because they were not stable and had questionable perenniality.

Channel Characteristics and Classification

A Rosgen Level 1 stream assessment of the unnamed tributary was completed to help determine its stability and restoration potential. Two cross-sections were completed (Graphs 3 and 4) to classify the tributary. The drainage area of the unnamed tributary where Cross-section 1 was conducted is approximately 135 acres (0.21 square miles). The bankfull cross-sectional area was calculated to be approximately 3.1 square feet using the Coastal Plain Regional Curve.

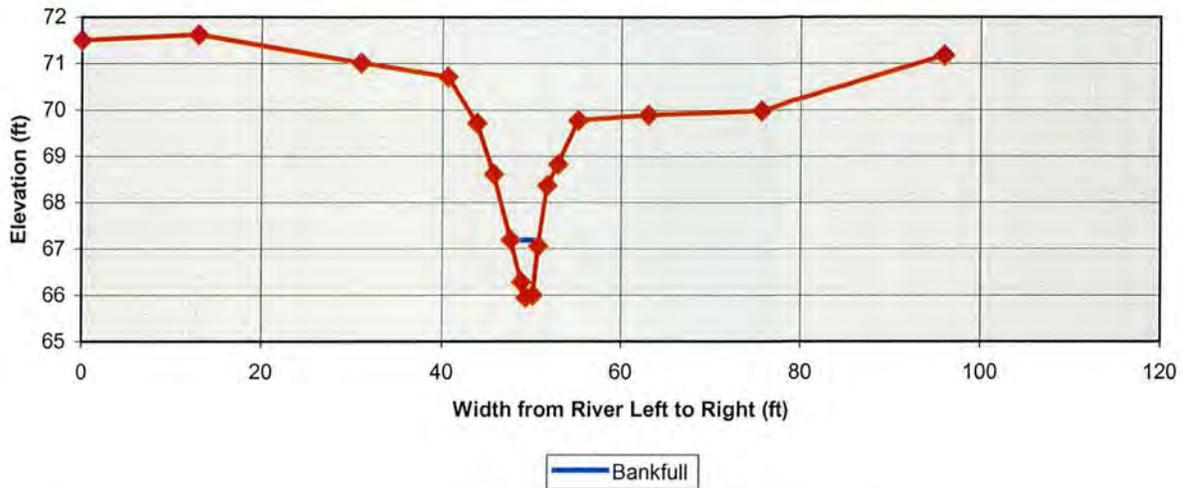
Graph 3. Unnamed Tributary Cross-section 1



Cross-Sectional Area	Width	Maximum Depth	Bank Height	Width Flood-Prone	Mean Depth	Width-to-Depth Ratio	Entrenchment Ratio	Bank - Height Ratio
5.1 sq ft	6.6 ft	1.3 ft	4.5 ft	9 ft	0.8 ft	8.3	1.4	3.5

The drainage area of the unnamed tributary where Cross-section 2 was conducted is approximately 110 acres (0.17 square miles). The bankfull cross-sectional area was calculated to be approximately 2.6 square feet using the Coastal Plain Regional Curve.

Graph 4. Unnamed Tributary Cross-section 2



Cross-Sectional Area	Width	Maximum Depth	Bank Height	Width Flood-Prone	Mean Depth	Width-to-Depth Ratio	Entrenchment Ratio	Bank-Height Ratio
2.4 sq. ft	3.2 ft	1.2 ft	3.8 ft	6 ft	0.8 ft	4	1.9	3.2

Stream Classification - The existing stream is an entrenched straitened channel with a low width-to-depth ratio. The estimated sinuosity of the tributary is 1.1 because the channel has been straightened and follows its valley in a relatively straight line with the exception of some abrupt bends. The measured cross-section parameters yield a **Rosgen G** classification for both cross-sections completed on the unnamed tributary.

The Habitat Assessment Field Data Sheet for the unnamed tributary yielded a score of 41 out of a possible 100 points. A score of 41 is only 48% of the 86 points scored on the reach of Mill Branch west of HWY 701. A score of 41 would indicate that habitat along the unnamed tributary is severely degraded. The Stream Visual Assessment form yielded a score of 2.67, which placed it in the Poor rating. The NCDWQ Stream Classification Form yielded a score of 30.5, which signifies that the stream is at least an intermittent stream.

Mill Branch and Adjacent Wetlands (Northern Portions of Jones Property)

Mill Branch and its floodplain were examined to determine their mitigation potential. The reach of Mill Branch on the northern portions of the Jones Property is primarily surrounded by a forested floodplain that extends at least 100 feet out from each bank. The only break in the forested floodplain is a small clear-cut located on a parcel just north of Mill Branch and the Jones Property. A riparian buffer of approximately 50 feet is left on Mill Branch although the parcel has been clear-cut.

Soils immediately adjacent to Mill Branch are listed as Muckalee sandy loam. These soils are frequently found on floodplains and are classified as hydric soils. A United States Corps of Engineers Routine Wetland Determination Data Form was completed in the floodplain (Appendix F). Information collected to complete the data form confirms that lands immediately adjacent to Mill Branch are wetlands. The wetland community immediately adjacent to Mill

Branch can be classified as a Coastal Plain Small Stream Swamp (Blackwater Subtype) (*Classification of the Natural Communities of North Carolina*, 1990).

A relic millpond was found adjacent to Mill Branch. Numerous saplings and scrub/shrub vegetation were becoming established although no mature vegetation was observed in the relic pond. An embankment on the east end continues to retain water in the relic pond although the dam has been breached. Just downstream beavers have constructed a series of dams that back water up into the relic pond. Beaver activity along the entire reach of Mill Branch was evident.

3.2 SITE CONSTRAINTS

Elements of concern that should be considered in the restoration of this site are described below:

Environmental Constraints (Hall and Jones properties) - As described in Section 2.0, an analysis of existing databases and coordination with local planning staff yielded no environmental constraints or fatal flaws which would deter restoration.

Physical Constraints (Hall Property) - Existing constraints for any grade-related (profile) work or horizontal (plan-view) improvements include: 1) a concrete culvert under HWY 701 where Mill Branch enters the Hall Property and 2) stagnant and backed up water in Mill Branch.

Physical Constraints (Jones Property) - Existing constraints for any grade-related work of horizontal improvements include: 1) a pipe culvert and dirt access road crossing the unnamed tributary on the northern portions of the property, which must be maintained or replaced according to the landowner, 2) a ponded area on the tributary where the landowner has filled a portion of the unnamed tributary, and 3) an irrigation pond located approximately 65 feet east of the tributary south of the dirt access road.

Other Constraints - During the field survey several beaver dams were noted in Mill Branch below the Hall Property. Beavers are active in the area and could create long-term maintenance issues such as constructing dams on or near structures and backing up water.

Construction Constraints - A degraded pipe culvert crossing over Mill Branch on the Hall Property serves as the only access point to the southern fields. A new crossing will be required if equipment is need for excavation and other construction activities.

Design Considerations - An easement will take watering areas and other lands away from the livestock operation. Therefore, installation of watering structures and additional stream crossings will be required to maintain the livestock operation.

3.3 RECOMMENDATIONS

Hall Property

Based on data collected and described in this report, the Hall Property is considered not feasible for the restoration of Mill Branch but is feasible for the creation of riverine wetlands adjacent to Mill Branch within the southern agricultural field.

Mill Branch is determined to be not feasible for stream restoration because of the previously stated complication with water backing up in the channel. Mill Branch's current conditions indicate that elevated water levels in the channel are well above the bankfull stage of flow because of a beaver dam system downstream. It is not believed that temporary eradication of the beavers and dam removal will lead to long-term normal flow regimes in the channel. Stream restoration would be unwarranted if normal flow cannot be reestablished in this portion of Mill Branch. Additionally, removal of the beaver dams may adversely affect valuable wetland areas adjacent to Mill Branch on the Jones Property.

Creation of riverine wetlands within the southern portions of the property can be accomplished by grading the soil surface to an elevation able to capture and retain water during high flow events in Mill Branch. Approximately seven to eight acres could reasonably be created to provide riverine wetlands. This acreage amount is based on information obtained in soil profiles, general topographical data and field observations. A more detailed study, which must include, but not be limited to, collection of groundwater data within the agricultural fields and site specific topographical data, will be required to determine accurate acreages for creation.

Mitigation credits may be obtained for creation of riverine wetlands, but restoration of riverine wetlands will not be feasible because Mill Branch cannot be reconnected to its historic floodplain. It is recommended that NCDOT conduct a cost analysis and review the need for riverine wetland credits in this watershed to determine if this property should be used for mitigation credits. It assumed that DOT would purchase the full compliment of land within the Hall Property to maximize potential mitigation.

It is recommended that further studies and property owner coordination proceed towards developing a mitigation plan and design for the creation of riverine wetlands.

Jones Property

Based on data collected and described in this report, the Jones Property is considered feasible for the restoration of the unnamed tributary to Mill Branch. Additionally, Mill Branch and the adjacent Coastal Plain Small Stream Swamp are considered feasible for preservation.

Restoration of the unnamed tributary could reasonably result in over 3,000 linear feet of stream restoration. A conservation easement totaling an estimated 8.5 acres would be required to encompass the channel improvements and riparian buffer. Additionally, land immediately adjacent to restoration areas of the unnamed tributary could potentially be reverted to wetlands if a Priority I restoration is constructed. For this reason, any areas reverted to wetlands as a result of stream restoration will be required to be placed under the conservation easement.

The northern portions of the Jones Property offers approximately 4,400 linear feet of stream preservation on Mill Branch and 50 acres of Coastal Plain Small Stream Swamp wetland preservation. Both Mill Branch and the adjacent Coastal Plain Small Stream Swamp currently

display somewhat stable conditions. Although neither Mill Branch nor the Swamp are pristine, preserving them would help to further enhance the ecological connection with the unnamed tributary on the Jones Property and lands on the Hall Property that may be converted to wetlands.

It is recommended that further studies and property owner coordination proceed towards developing a mitigation plan and design for the restoration of the unnamed tributary and preservation of Mill Branch and adjacent wetlands.

Table 6 Summary of Potential Mitigation

STREAM RESTORATION	STREAM PRESERVATION	WETLAND CREATION	WETLAND PRESERVATION
~ 3,000 linear feet	~ 4,400 linear feet	~ 7-8 acres	~ 50 acres

3.4 PROPERTY OWNER COORDINATION

Landowner's of both properties have been contacted about the potential for mitigation on their properties. Additionally, a meeting with each landowner was conducted to present to them potential mitigation concepts and acreages that may be placed into a conservation easement, and to answer any questions they may have regarding mitigation. Although willing to allow a feasibility study to be completed neither landowner would commit to allowing their properties to be used for mitigation purposes. The landowners instead decided to allow the completion of the feasibility study and await the NCDOT's response to questions concerning possible compensation for a conservation easement.

3.5 MITIGATION CONCEPT

Hall Property (Agricultural Fields)

As stated previously, creation of riverine wetlands within the southern portions of the Property can be accomplished by grading the soil surface to an elevation capable of capturing and retaining water during high flow events in Mill Branch. A more detailed study, which must include, but not be limited to, collection of groundwater data within the agricultural fields and site specific topographical data will be required to determine accurate cut limits to obtain the desired soil surface elevation.

Jones Property (Unnamed Tributary)

Based on the topography, region, and hydrologic characteristics, a judgement was made as to which stream type (Rosgen classification) would satisfy the goals of restoration and provide a stable, natural stream form consistent with the surrounding topography and vegetation.

The recommended stream restoration for the unnamed tributary will include channel modifications (plan, profile, and dimension), bank stabilization through earthwork and vegetation plantings, riparian buffer establishment and fencing. Additionally, watering locations and stream crossings for cattle will be required to accommodate the landowner's livestock operation.

The recommended restoration methodology is described below. Exhibit 6 shows a plan view of the conceptual recommendations.

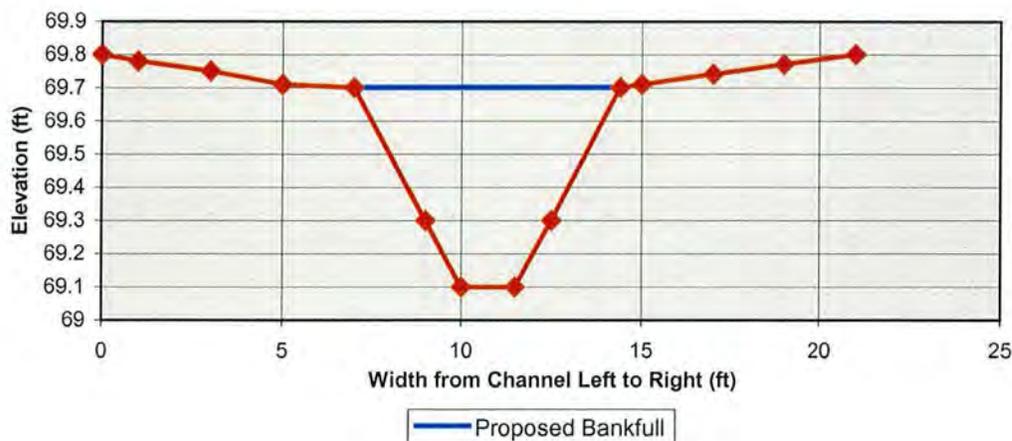
The proposed restoration involves converting the existing **G** channel to a **C** channel through Priority I and II restoration techniques. The project limits will extend from Mr. Jones' southern property line to the unnamed tributary's convergence with Mill Branch.

A Priority I restoration of the majority of the tributary is recommended. A Priority I restoration would reconnect the tributary to its historic floodplain, which is now the terrace above the streambed at relatively the same elevation of the top of bank. To accomplish this though, a Priority II restoration of the tributary would be required at both the upstream (southern) and downstream (northern) ends of the tributary. A Priority II restoration on the upstream end of the tributary would be required to allow the streambed to gradually rise through the landscape until the bankfull stage of flow would empty onto the historic floodplain. A Priority II restoration would be required on the downstream end of the unnamed tributary to gradually lower the elevation of the unnamed tributary's bed to meet the bed of Mill Branch at their convergence.

The current sinuosity of the unnamed tributary is 1.1. A restored sinuosity of 1.2 can be expected for C channels in this topographic setting. The resulting channel length with a 1.2 sinuosity would yield approximately 3,300 linear feet of restored stream.

Graph 5 depicts a proposed cross-section for the Priority I restored channel. Proposed cross-section measurements were obtained by utilizing the Coastal Plain Regional Curve with an assumed drainage area of 122 acres (0.20 square miles). The proposed cross-section will provide an approximate view of the new channel's dimensions. It is noted though, that these measurements are only approximations of what the channel's dimensions may be and will change upon data collection at reference sites prior to design.

**Graph 5. Unnamed Tributary
Priority I Proposed Cross-section**



Cross-sectional Area	Width	Depth	Entrenchment Ratio	Bank-Height Ratio
2.7 square feet	7.4 feet	0.4 feet	> 3	1

Log/rock vanes, log/rock cross-vanes and rootwads will be used as instream structures for bank and grade stabilization. A riffle-pool sequence will be incorporated in the profile consistent with the plan-view locations of meanders. More detailed profile-related recommendations will be developed if this site proceeds beyond the feasibility stage and reference reach data are gathered.

A riparian buffer of at least 50 feet will be planted out from the top of the bank (bankfull channel) to promote the establishment of mature riparian vegetation. Exhibit 6 shows the conceptual plan view of the new bankfull channel, location of potential limits of excavation for the created wetlands and approximate extents of a conservation easement on the Jones Property.

3.6 COST ESTIMATE

A preliminary cost estimate was developed based on the mitigation concept described above. This estimate is based on construction only. It does not include design, property owner compensation, or conservation easements. The calculations are included as Appendix G. The estimated construction cost for 3,000 feet of stream restoration at this site is approximately \$417,000 or \$140.00 per linear foot. The construction cost for creating seven to eight acres of riverine wetlands may vary drastically depending on the amount of excavation that will be required to capture overland flow for primary hydrology. The estimated construction cost for seven to eight acres of riverine wetland creation at this site is approximately \$210,000 or \$28,000 per acre.

4.0 REFERENCES

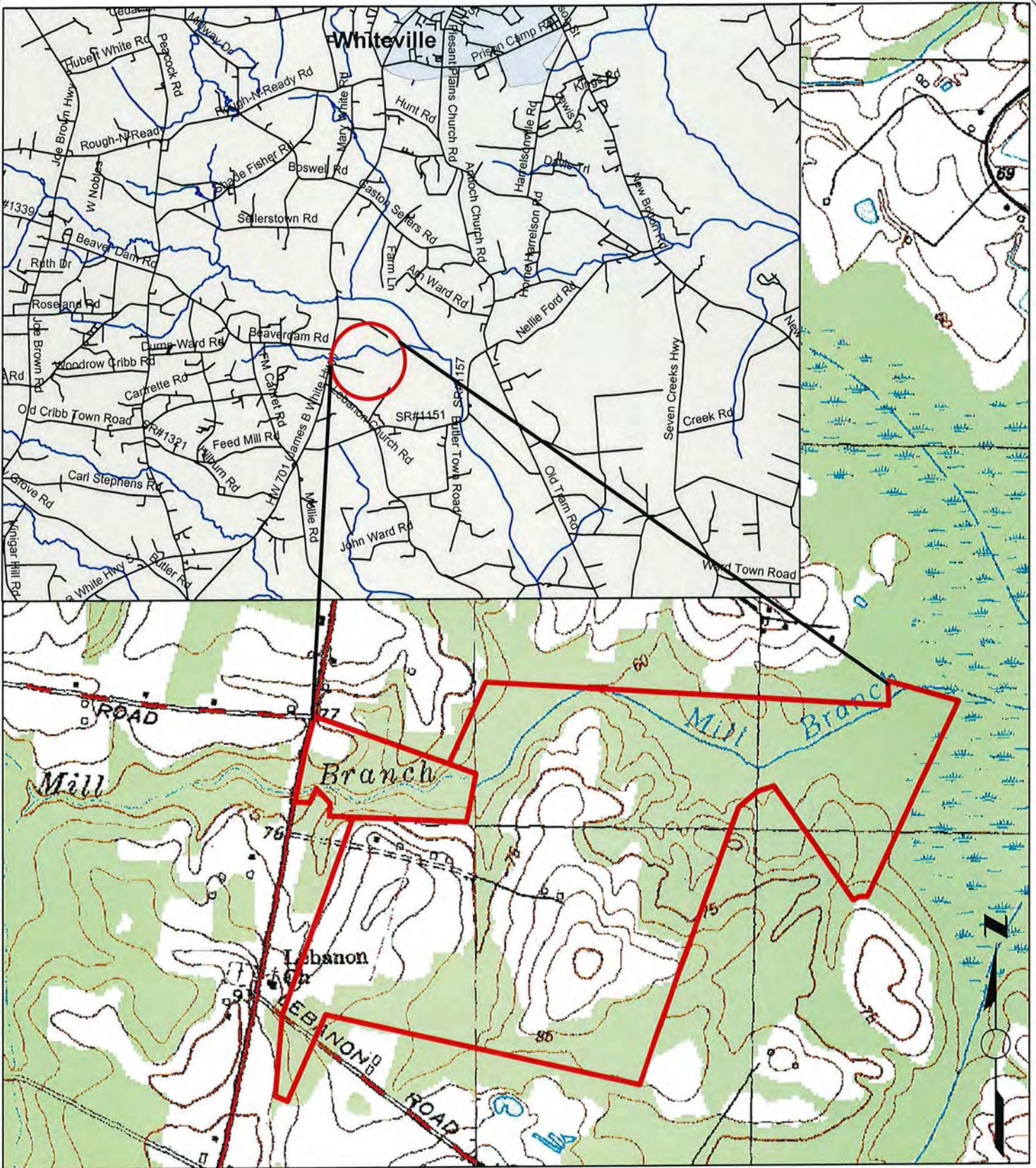
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APPENDICES

APPENDIX A

Exhibits

Exhibit 1	Vicinity Map
Exhibit 2	Soils Map
Exhibit 3	NWI and Location Map
Exhibit 4	Land Use
Exhibit 5	Cross-section and Soil Plug Location
Exhibit 6	Mitigation Concept



 Mill Branch Site

Legend



Columbus County



North Carolina
Department of Transportation

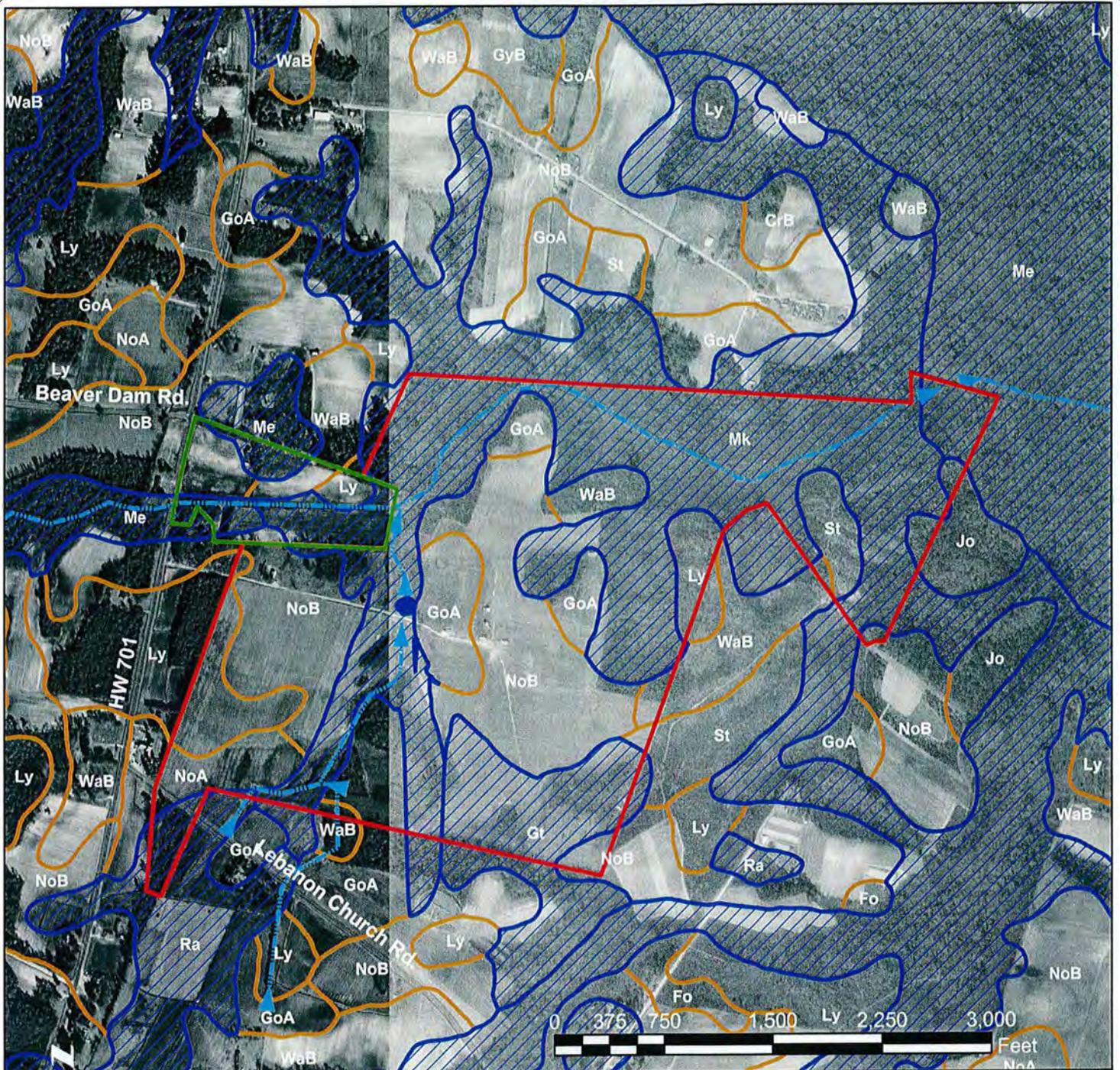
Mill Branch Stream And Wetland
Restoration Feasibility Study

Columbus County, NC

Vicinity Map

Not to Scale

Exhibit 1



Hydric Soils	Nonhydic Soils
Mk: Muckalee sandy loam	GoA: Goldsboro fine sandy loam
Me: Meggett fine sandy loam	LyB: Lynchburg fine sandy loam
Gt: Grifton fine sandy loam	NoB: Norfolk loamy fine sand
	WaB: Wagram loamy fine sand

Legend

- Hall Property
- Jones Property
- Hydric Soils
- Nonhydic Soils
- ➔ Hydrology
- Pond

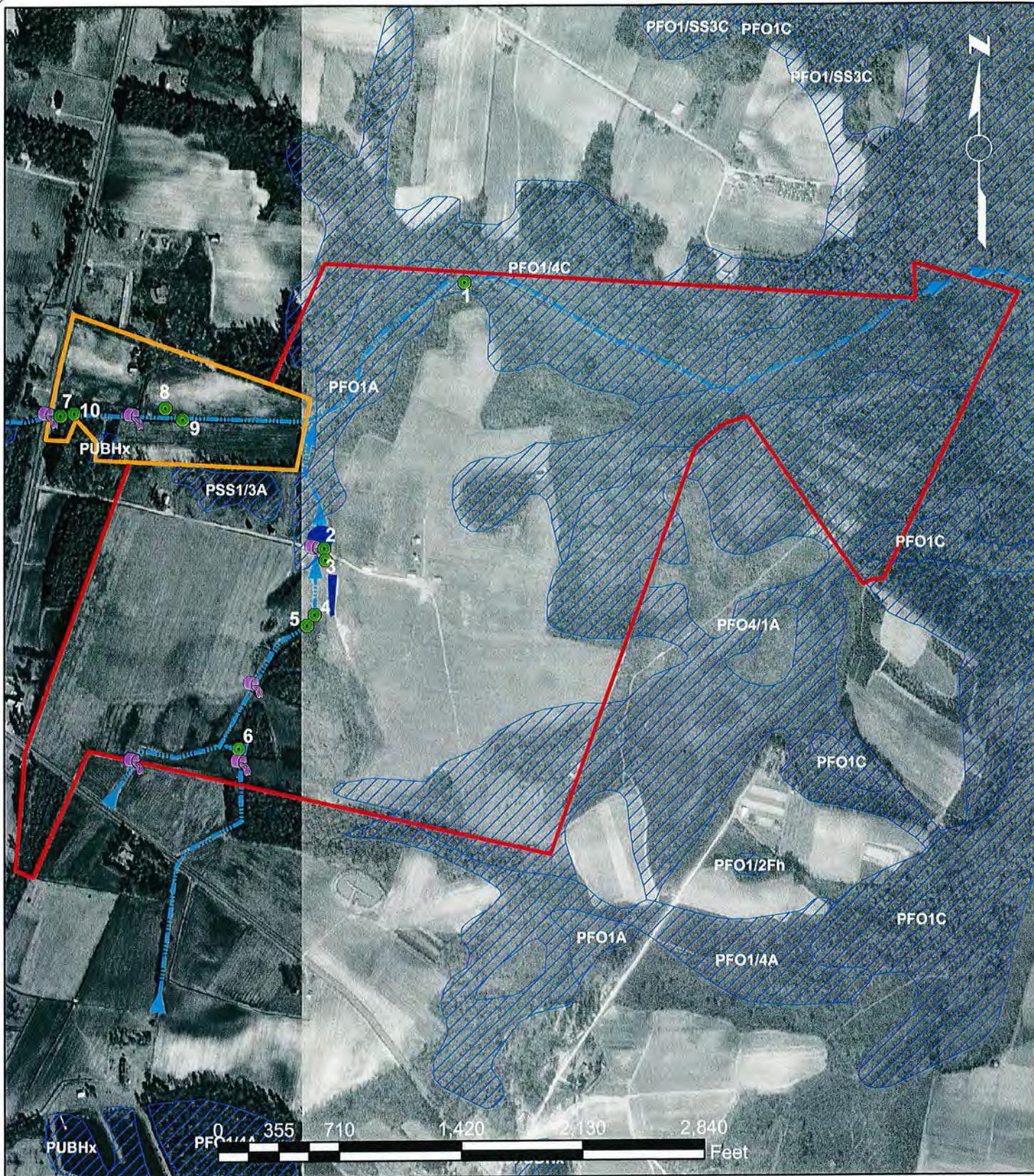
North Carolina
Department of Transportation

Mill Branch Stream And Wetland
Restoration Feasibility Study

Columbus County, NC

Soils Map

Exhibit 2



Legend

- Jones Property
- Hall Property
- Photo
- ⦿ Culvert
- Pond
- NWI
- ➔ Hydrology

North Carolina
 Department of Transportation

Mill Branch Stream And Wetland
 Restoration Feasibility Study

 Columbus County, NC

 NWI and Location Map
 Exhibit 3



Legend

- Hall Property
- Jones Property
- Swamp Forest
- Hardwood Forest
- Row Crops
- Pasture

North Carolina
 Department of Transportation

Mill Branch Stream And Wetland
 Restoration Feasibility Study

 Columbus County, NC

 Land Use

 Exhibit 4



Legend

-  Hall Property
-  Jones Property
-  Soil Plugs
-  Cross-sections
-  Hydrology

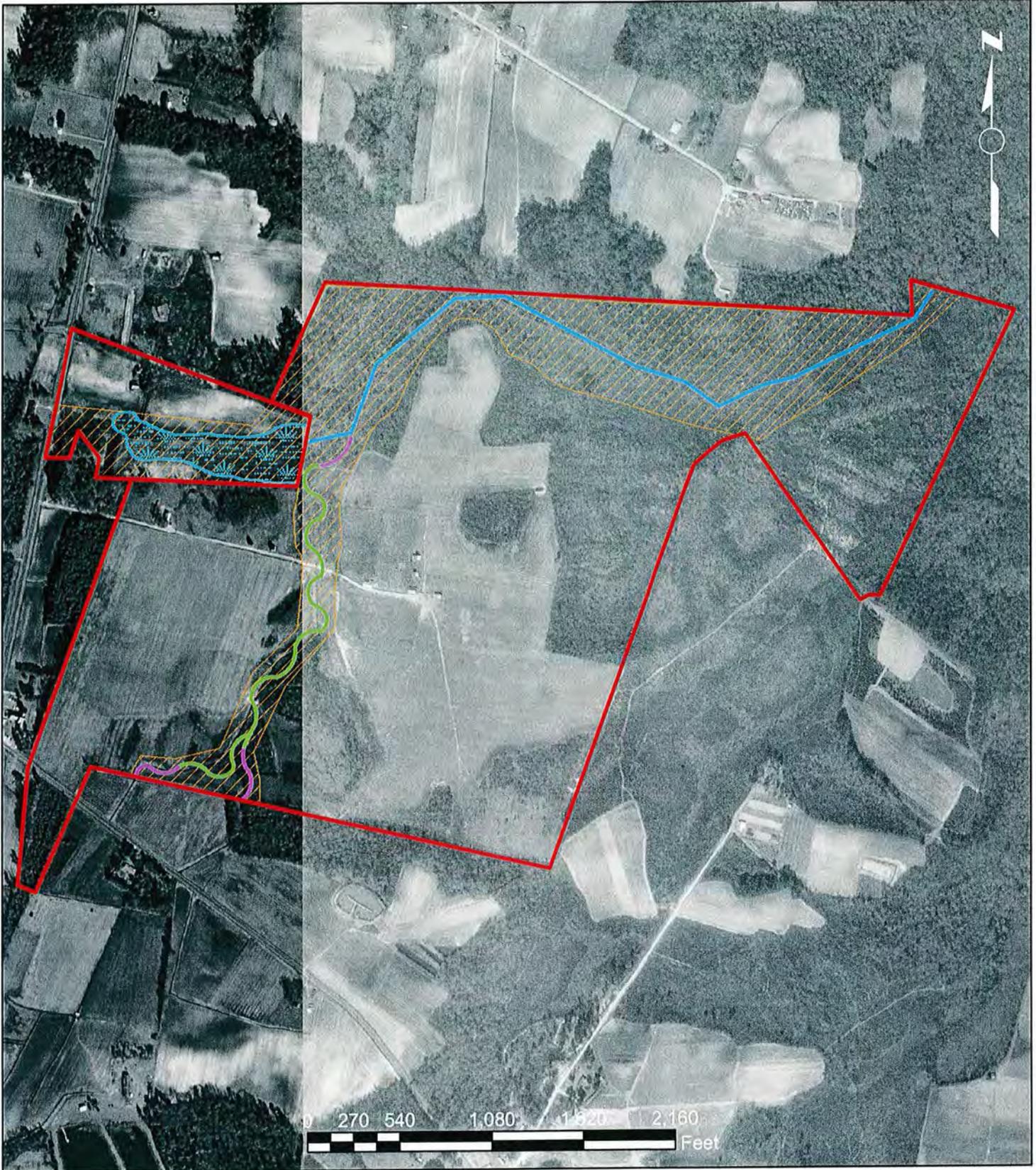
 North Carolina
Department of Transportation

Mill Branch Stream And Wetland
Restoration Feasibility Study

Columbus County, NC

Cross-section and Soil Plug Location

Exhibit 5



Legend

- Jones Property
- Hall Property
- Priority I Restoration
- Priority II Restoration
- Created Wetland
- Conservation Easement
- Stream Preservation

North Carolina
 Department of Transportation

Mill Branch Stream And Wetland
 Restoration Feasibility Study

 Columbus County, NC

 Mitigation Concept
 Exhibit 6

APPENDIX B

EDR Report



The EDR Radius Map with GeoCheck[®]

**Hall/Jones
Highway 701
Clarendon, NC 28472**

Inquiry Number: 875186.3s

November 04, 2002

The Source For Environmental Risk Management Data

3530 Post Road
Southport, Connecticut 06890

Nationwide Customer Service

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

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
Executive Summary.....	ES1
Overview Map.....	2
Detail Map.....	3
Map Findings Summary.....	4
Map Findings.....	5
Orphan Summary.....	6
Government Records Searched/Data Currency Tracking.....	GR-1

GEOCHECK ADDENDUM

Physical Setting Source Addendum.....	A-1
Physical Setting Source Summary.....	A-2
Physical Setting Source Map.....	A-6
Physical Setting Source Map Findings.....	A-7
Physical Setting Source Records Searched.....	A-12

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

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The report meets the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances are per ASTM standard or custom distances requested by the user.

TARGET PROPERTY INFORMATION

ADDRESS

HIGHWAY 701
CLARENDON, NC 28472

COORDINATES

Latitude (North): 34.221800 - 34° 13' 18.5"
Longitude (West): 78.749300 - 78° 44' 57.5"
Universal Transverse Mercator: Zone 17
UTM X (Meters): 707329.9
UTM Y (Meters): 3788845.0

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property: 2434078-B6 NAKINA, NC
Source: USGS 7.5 min quad index

TARGET PROPERTY SEARCH RESULTS

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

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

FEDERAL ASTM STANDARD

NPL..... National Priority List
Proposed NPL..... Proposed National Priority List Sites
CERCLIS..... Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP..... CERCLIS No Further Remedial Action Planned
CORRACTS..... Corrective Action Report
RCRIS-TSD..... Resource Conservation and Recovery Information System
RCRIS-LQG..... Resource Conservation and Recovery Information System
RCRIS-SQG..... Resource Conservation and Recovery Information System
ERNS..... Emergency Response Notification System

STATE ASTM STANDARD

SHWS..... Inactive Hazardous Sites Inventory
SWF/LF..... List of Solid Waste Facilities
LUST..... Incidents Management Database
UST..... Petroleum Underground Storage Tank Database

EXECUTIVE SUMMARY

OLI..... Old Landfill Inventory

FEDERAL ASTM SUPPLEMENTAL

CONSENT..... Superfund (CERCLA) Consent Decrees
ROD..... Records Of Decision
Delisted NPL..... National Priority List Deletions
FINDS..... Facility Index System/Facility Identification Initiative Program Summary Report
HMIRS..... Hazardous Materials Information Reporting System
MLTS..... Material Licensing Tracking System
MINES..... Mines Master Index File
NPL Liens..... Federal Superfund Liens
PADS..... PCB Activity Database System
RAATS..... RCRA Administrative Action Tracking System
TRIS..... Toxic Chemical Release Inventory System
TSCA..... Toxic Substances Control Act
SSTS..... Section 7 Tracking Systems
FTTS..... FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

STATE OR LOCAL ASTM SUPPLEMENTAL

NC HSDS..... Hazardous Substance Disposal Site
AST..... AST Database
LUST TRUST..... State Trust Fund Database
IMD..... Incident Management Database

EDR PROPRIETARY HISTORICAL DATABASES

Coal Gas..... Former Manufactured Gas (Coal Gas) Sites

SURROUNDING SITES: SEARCH RESULTS

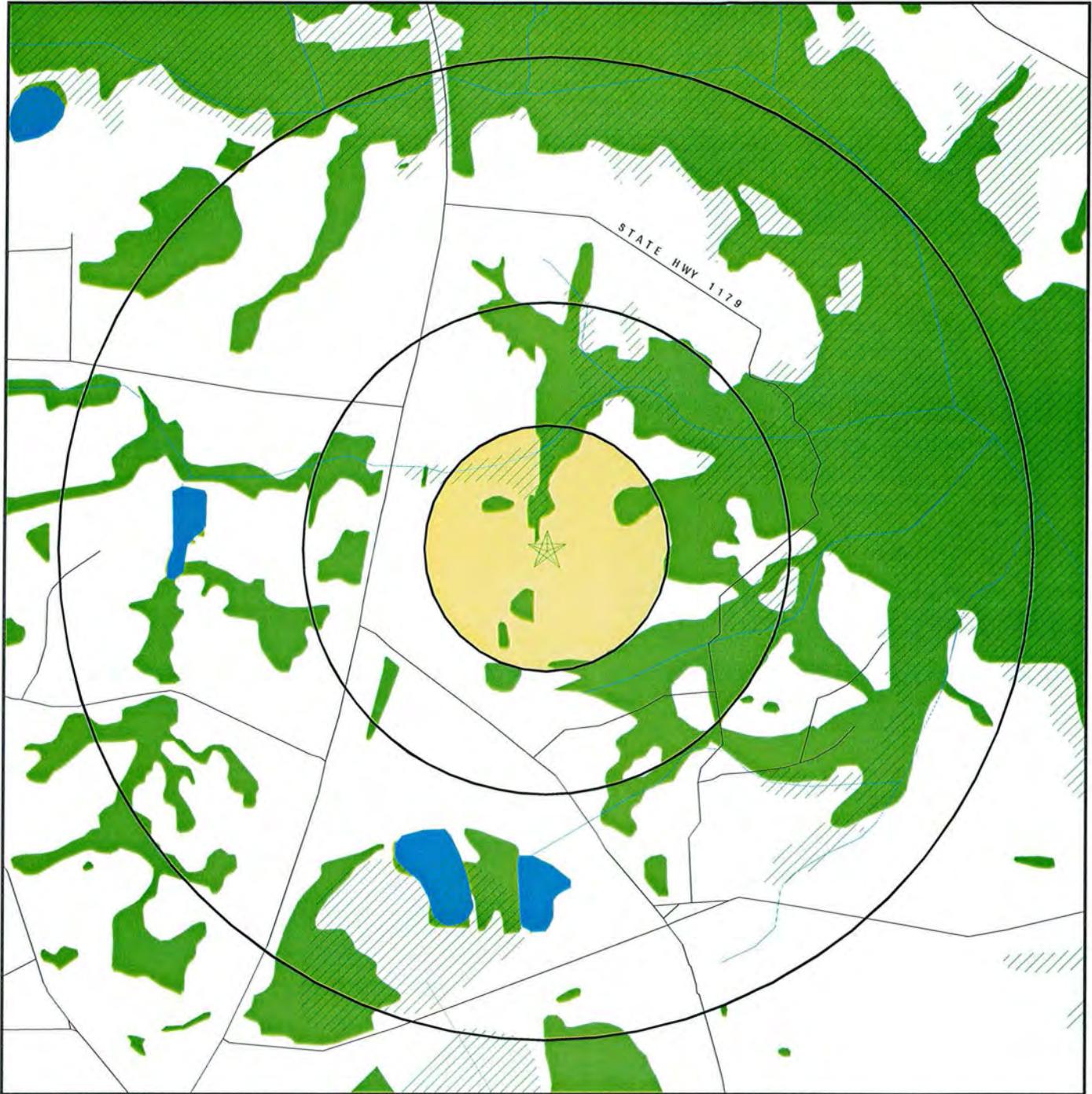
Surrounding sites were not identified.

EXECUTIVE SUMMARY

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

<u>Site Name</u>	<u>Database(s)</u>
GA-PACIFIC CORP/TIMBER	SHWS
GA-PACIFIC WHITEVILLE PLYWOOD	UST, SHWS
USS AGRI-CHEMICALS FARM SERVICE CE	RCRIS-SQG, FINDS, CERC-NFRAP
COLUMBUS COUNTY T. S.	SWF/LF
COLUMBUS COUNTY LANDFILL	SWF/LF
COLUMBUS COUNTY C&D STOCKPILE	SWF/LF
BURROUGHS RESIDENCE	IMD, LUST
ELLIOTT IMPLEMENT CO. UST	IMD, LUST
QUICKIE II	LUST TRUST
FRANKLIN BAKING CO. - SUNBEAM TERM	LUST TRUST
CORNER STORE	LUST TRUST
BILLY AND SIAN COX PROPERTY	UST
B & B SHELL	UST
NCDA-BORDER BELT TOBACCO RESE	UST
BEACH WAY MINI MART	UST
SESSIONS FARM MACHINERY	UST
AMERICAN BAKERIES CO.	UST
BALDWIN EXXON	UST
WHITEVILLE APPAREL	UST
M.D. BUTLER	UST
GRAHAM SELLERS	UST
OLD DOCK ELEMENTARY SCHOOL	UST
GORE'S CONVENIENCE STORE	UST
MARLOWE OIL CO.. INC.	UST
COUNTRY CLUB	UST
INMANS	UST
D & D QUICK MART	UST
MEMORY TWINS	UST
FOX'S HOLSUM BAKERY INC	UST
ERNEST W. SMITH	UST
FRANKLIN BAKING-SUNBEAM TERMI	UST
SELLERS SERVICE STATION	UST
FHA DPT SOCIAL SERVICES	UST
DAWSEY'S 701 S PROPERTY	UST
COLUMBUS COUNTY	UST
SUPPORT SERVICE	UST
CREECH'S TEXACO	UST
W. D. BROOKS. INC.	UST
BRUNSWICK ELECTRIC MEMBERSHIP	UST
BALDWIN OIL CO. INC.	AST
COLUMBUS FCX SERVICE (FCX INC.)	AST
LOWES OF WHITEVILLE	RCRIS-SQG, FINDS
KAISER AGRICULTURAL CHEMICALS	RCRIS-SQG, FINDS
JIMMY DEAN FOODS	IMD
WATTS FARM CENTER	IMD
COLLINS & SON AUTO SERVICE & S	IMD

OVERVIEW MAP - 875186.3s - Stantech



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Coal Gasification Sites
- National Priority List Sites
- Landfill Sites
- Power transmission lines
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Wetlands
- Hazardous Substance Disposal Sites

TARGET PROPERTY: Hall/Jones ADDRESS: Highway 701 CITY/STATE/ZIP: Clarendon NC 28472 LAT/LONG: 34.2218 / 78.7493	CUSTOMER: Stantech CONTACT: Ryan Smith INQUIRY #: 875186.3s DATE: November 04, 2002 2:25 pm
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DETAIL MAP - 875186.3s - Stantech



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Coal Gasification Sites
- ⚡ Sensitive Receptors
- ☒ National Priority List Sites
- ☒ Landfill Sites

- ⚡ Power transmission lines
- ⚡ Oil & Gas pipelines
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- Wetlands

☒ Hazardous Substance Disposal Sites



TARGET PROPERTY: Hall/Jones
 ADDRESS: Highway 701
 CITY/STATE/ZIP: Clarendon NC 28472
 LAT/LONG: 34.2218 / 78.7493

CUSTOMER: Stantech
 CONTACT: Ryan Smith
 INQUIRY #: 875186.3s
 DATE: November 04, 2002 2:26 pm

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
<u>FEDERAL ASTM STANDARD</u>								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
CERCLIS		0.500	0	0	0	NR	NR	0
CERC-NFRAP		0.500	0	0	0	NR	NR	0
CORRACTS		1.000	0	0	0	0	NR	0
RCRIS-TSD		0.500	0	0	0	NR	NR	0
RCRIS Lg. Quan. Gen.		0.500	0	0	0	NR	NR	0
RCRIS Sm. Quan. Gen.		0.500	0	0	0	NR	NR	0
ERNS		0.500	0	0	0	NR	NR	0
<u>STATE ASTM STANDARD</u>								
State Haz. Waste		0.500	0	0	0	NR	NR	0
State Landfill		0.500	0	0	0	NR	NR	0
LUST		0.500	0	0	0	NR	NR	0
UST		0.500	0	0	0	NR	NR	0
OLI		0.500	0	0	0	NR	NR	0
<u>FEDERAL ASTM SUPPLEMENTAL</u>								
CONSENT		0.500	0	0	0	NR	NR	0
ROD		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
FINDS		0.500	0	0	0	NR	NR	0
HMIRS		0.500	0	0	0	NR	NR	0
MLTS		0.500	0	0	0	NR	NR	0
MINES		0.500	0	0	0	NR	NR	0
NPL Liens		0.500	0	0	0	NR	NR	0
PADS		0.500	0	0	0	NR	NR	0
RAATS		0.500	0	0	0	NR	NR	0
TRIS		0.500	0	0	0	NR	NR	0
TSCA		0.500	0	0	0	NR	NR	0
SSTS		0.500	0	0	0	NR	NR	0
FTTS		0.500	0	0	0	NR	NR	0
<u>STATE OR LOCAL ASTM SUPPLEMENTAL</u>								
NC HSDS		1.000	0	0	0	0	NR	0
AST		0.500	0	0	0	NR	NR	0
LUST TRUST		0.500	0	0	0	NR	NR	0
IMD		0.500	0	0	0	NR	NR	0
<u>EDR PROPRIETARY HISTORICAL DATABASES</u>								
Coal Gas		1.000	0	0	0	0	NR	0
AQUIFLOW - see EDR Physical Setting Source Addendum								

TP = Target Property

NR = Not Requested at this Search Distance

* Sites may be listed in more than one database

MAP FINDINGS

Map ID
Direction
Distance
Distance (ft.)
Elevation

Site

Database(s)

EDR ID Number
EPA ID Number

Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.

NO SITES FOUND

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CLARENDON	U003147155	BILLY AND SIAN COX PROPERTY	STATE ROAD 1141	28432	UST
TABOR CITY	U003144345	B & B SHELL	HWY 701 BUSINESS	28472	UST
WHITEVILLE	U003146022	NCDA-BORDER BELT TOBACCO RESE	ROUTE 1 BOX 198	28472	UST
WHITEVILLE	U001201019	BEACH WAY MINI MART	HIGHWAY 130 E	28472	UST
WHITEVILLE	U001194155	SESSIONS FARM MACHINERY	HIGHWAY 130	28472	UST
WHITEVILLE	S105425819	JIMMY DEAN FOODS	HIGHWAY 130 EAST	28472	IMD
WHITEVILLE	1004744393	LOWES OF WHITEVILLE	HWY 130 E	28472	RCRIS-SQG, FINDS
WHITEVILLE	U001193895	AMERICAN BAKERIES CO.	HWY 130, RT 6, BOX 37	28472	UST
WHITEVILLE	S104913954	WATTS FARM CENTER	HWY. 1331 / 701 SOUTH INTERS	28472	IMD
WHITEVILLE	U001202581	BALDWIN EXXON	ROUTE 2 BOX 44	28472	UST
WHITEVILLE	A100186824	BALDWIN OIL CO. INC.	RT. 2 BOX 44	28472	AST
WHITEVILLE	U001206105	WHITEVILLE APPAREL	ROUTE 2, BOX 35	28472	UST
WHITEVILLE	U003562500	M.D. BUTLER	ROUTE 3	28472	UST
WHITEVILLE	U003562452	GRAHAM SELLERS	ROUTE 3	28472	UST
WHITEVILLE	S105120005	BURROUGHS RESIDENCE	ROUTE 3 BOX 233	28472	IMD, LUST
WHITEVILLE	A100186834	COLUMBUS FCX SERVICE (FCX INC.)	RT. 3 BOX 482	28472	AST
WHITEVILLE	U001205933	OLD DOCK ELEMENTARY SCHOOL	ROUTE 4, HWY 130	28472	UST
WHITEVILLE	U001194041	GORE'S CONVENIENCE STORE	ROUTE 4, (HWY. 130 EAST)	28472	UST
WHITEVILLE	U001193973	MARLOWE OIL CO., INC.	ROUTE 4, BOX 234-A	28472	UST
WHITEVILLE	U003144344	COUNTRY CLUB	RT 7 BOX 149	28472	UST
WHITEVILLE	U003836410	INMANS	HWY 701	28472	UST
WHITEVILLE	U003562475	D & D QUICK MART	HWY 701	28472	UST
WHITEVILLE	U001194484	MEMORY TWINS	HIGHWAY 701 NORTH	28472	UST
WHITEVILLE	U001186646	FOX'S HOLSUM BAKERY INC	HIGHWAY 701 SOUTH	28472	UST
WHITEVILLE	S105217839	QUICKIE II	HIGHWAY 701 S BYPASS	28472	LUST TRUST
WHITEVILLE	S103916647	ELLIOTT IMPLEMENT CO. UST	1400 HWY. 701 BYPASS	28472	IMD, LUST
WHITEVILLE	1004746470	KAISER AGRICULTURAL CHEMICALS	HWY 701	28472	RCRIS-SQG, FINDS
WHITEVILLE	1003868229	USS AGRI-CHEMICALS FARM SERVICE CE	HWY 701 - RTE 3, BOX 212	28472	RCRIS-SQG, FINDS, CERC-NFRAP
WHITEVILLE	U001194034	ERNEST W. SMITH	P.O. BOX 241 / HWY 701 BY-PASS	28472	UST
WHITEVILLE	U001193545	FRANKLIN BAKING-SUNBEAM TERMI	701 BY-PASS, POWELL BOULEVARD	28472	UST
WHITEVILLE	U001206489	SELLERS SERVICE STATION	701 BYPASS	28472	UST
WHITEVILLE	S105218949	FRANKLIN BAKING CO. - SUNBEAM TERM	701 BYPASS - POWELL BLVD.	28472	LUST TRUST
WHITEVILLE	U003561915	FHA DPT SOCIAL SERVICES	HEALTH CENTER RD HWY 74-76	28472	UST
WHITEVILLE	U003295318	DAWSEY'S 701 S PROPERTY	US HIGHWAY 701 S BY-PASS	28472	UST
WHITEVILLE	S105219136	CORNER STORE	US HWY 701 BUSINESS	28472	LUST TRUST
WHITEVILLE	U001193626	COLUMBUS COUNTY	LANDFILL OVER SR 1451	28472	UST
WHITEVILLE	S105163767	COLUMBUS COUNTY T. S.	107 LANDFILL ROAD	28472	SWF/LF
WHITEVILLE	S105163766	COLUMBUS COUNTY LANDFILL	354 LANDFILL RD./SR 1428	28472	SWF/LF
WHITEVILLE	S105163765	COLUMBUS COUNTY C&D STOCKPILE	354 LANDFILL ROAD	28472	SWF/LF
WHITEVILLE	S104918997	GA-PACIFIC CORP/TIMBER	WEST MAIN STREET	28472	SHWS
WHITEVILLE	U001202823	SUPPORT SERVICE	701 NORTH	28472	UST
WHITEVILLE	S105425830	COLLINS & SON AUTO SERVICE & S	OLD HIGHWAY 130, RT. 6	28472	IMD
WHITEVILLE	U001193877	CREECH'S TEXACO	701 SOUTH, RT 1 BOX 98	28472	UST

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
WHITEVILLE	U001187562	GA-PACIFIC WHITEVILLE PLYWOOD	SECONDARY ROAD 1436	28472	UST, SHWS
WHITEVILLE	U001193938	W. D. BROOKS. INC.	701 SOUTH	28472	UST
WHITEVILLE	U001201025	BRUNSWICK ELECTRIC MEMBERSHIP	WAREHOUSE-ROUTE 4, BOX 406	28472	UST

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.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

FEDERAL ASTM STANDARD RECORDS

NPL: National Priority List

Source: EPA

Telephone: N/A

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: 07/18/02

Date Made Active at EDR: 09/20/02

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 08/01/02

Elapsed ASTM days: 50

Date of Last EDR Contact: 08/01/02

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 6

Telephone: 214-655-6659

EPA Region 8

Telephone: 303-312-6774

Proposed NPL: Proposed National Priority List Sites

Source: EPA

Telephone: N/A

Date of Government Version: 05/29/02

Date Made Active at EDR: 09/20/02

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 08/01/02

Elapsed ASTM days: 50

Date of Last EDR Contact: 08/01/02

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

Source: EPA

Telephone: 703-413-0223

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: 08/15/02

Date Made Active at EDR: 10/28/02

Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 09/23/02

Elapsed ASTM days: 35

Date of Last EDR Contact: 09/23/02

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Source: EPA

Telephone: 703-413-0223

As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 09/15/02
Date Made Active at EDR: 10/28/02
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 10/03/02
Elapsed ASTM days: 25
Date of Last EDR Contact: 09/23/02

CORRACTS: Corrective Action Report

Source: EPA
Telephone: 800-424-9346
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 05/02/02
Date Made Active at EDR: 07/15/02
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 05/06/02
Elapsed ASTM days: 70
Date of Last EDR Contact: 09/09/02

RCRIS: Resource Conservation and Recovery Information System

Source: EPA/NTIS
Telephone: 800-424-9346
Resource Conservation and Recovery Information System. RCRIS 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).

Date of Government Version: 09/09/02
Date Made Active at EDR: 10/28/02
Database Release Frequency: Varies

Date of Data Arrival at EDR: 09/24/02
Elapsed ASTM days: 34
Date of Last EDR Contact: 09/24/02

ERNS: Emergency Response Notification System

Source: EPA/NTIS
Telephone: 202-260-2342
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/01
Date Made Active at EDR: 07/15/02
Database Release Frequency: Varies

Date of Data Arrival at EDR: 07/02/02
Elapsed ASTM days: 13
Date of Last EDR Contact: 07/24/02

FEDERAL ASTM SUPPLEMENTAL RECORDS

BRS: Biennial Reporting System

Source: EPA/NTIS
Telephone: 800-424-9346
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: 12/31/99
Database Release Frequency: Biennially

Date of Last EDR Contact: 09/16/02
Date of Next Scheduled EDR Contact: 12/16/02

CONSENT: Superfund (CERCLA) Consent Decrees

Source: EPA Regional Offices
Telephone: Varies
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: N/A
Database Release Frequency: Varies

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

ROD: Records Of Decision

Source: EPA
Telephone: 703-416-0223
Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 12/21/01
Database Release Frequency: Annually

Date of Last EDR Contact: 10/07/02
Date of Next Scheduled EDR Contact: 01/06/03

DELISTED NPL: National Priority List Deletions

Source: EPA
Telephone: N/A

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: 07/18/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 08/01/02
Date of Next Scheduled EDR Contact: 11/04/02

FINDS: Facility Index System/Facility Identification Initiative Program Summary Report

Source: EPA
Telephone: N/A

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: 06/13/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 10/07/02
Date of Next Scheduled EDR Contact: 01/06/03

HMIRS: Hazardous Materials Information Reporting System

Source: U.S. Department of Transportation
Telephone: 202-366-4555

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

Date of Government Version: 05/31/02
Database Release Frequency: Annually

Date of Last EDR Contact: 10/21/02
Date of Next Scheduled EDR Contact: 01/20/03

MLTS: Material Licensing Tracking System

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169

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: 07/12/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 10/08/02
Date of Next Scheduled EDR Contact: 01/06/03

MINES: Mines Master Index File

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959

Date of Government Version: 09/10/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 09/30/02
Date of Next Scheduled EDR Contact: 12/30/02

NPL LIENS: Federal Superfund Liens

Source: EPA
Telephone: 205-564-4267

Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (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 receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 10/15/91
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 08/26/02
Date of Next Scheduled EDR Contact: 11/25/02

PADS: PCB Activity Database System

Source: EPA
Telephone: 202-564-3887

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: 06/28/02
Database Release Frequency: Annually

Date of Last EDR Contact: 08/02/02
Date of Next Scheduled EDR Contact: 11/11/02

RAATS: RCRA Administrative Action Tracking System

Source: EPA
Telephone: 202-564-4104

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: 04/17/95
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 09/10/02
Date of Next Scheduled EDR Contact: 12/09/02

TRIS: Toxic Chemical Release Inventory System

Source: EPA
Telephone: 202-260-1531

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: 12/31/00
Database Release Frequency: Annually

Date of Last EDR Contact: 09/24/02
Date of Next Scheduled EDR Contact: 12/23/02

TSCA: Toxic Substances Control Act

Source: EPA
Telephone: 202-260-5521

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: 12/31/98
Database Release Frequency: Every 4 Years

Date of Last EDR Contact: 09/09/02
Date of Next Scheduled EDR Contact: 12/09/02

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

Source: EPA
Telephone: 202-564-2501

Date of Government Version: 04/25/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/24/02
Date of Next Scheduled EDR Contact: 12/23/02

SSTS: Section 7 Tracking Systems

Source: EPA
Telephone: 202-564-5008

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: 12/31/00
Database Release Frequency: Annually

Date of Last EDR Contact: 10/22/02
Date of Next Scheduled EDR Contact: 01/20/03

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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

Source: EPA/Office of Prevention, Pesticides and Toxic Substances

Telephone: 202-564-2501

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: 04/25/02

Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/24/02

Date of Next Scheduled EDR Contact: 12/23/02

STATE OF NORTH CAROLINA ASTM STANDARD RECORDS

SHWS: Inactive Hazardous Sites Inventory

Source: Department of Environment and Natural Resources

Telephone: 919-733-2801

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: 07/09/02

Date Made Active at EDR: 08/09/02

Database Release Frequency: Annually

Date of Data Arrival at EDR: 07/15/02

Elapsed ASTM days: 25

Date of Last EDR Contact: 10/18/02

SWF/LF: List of Solid Waste Facilities

Source: Department of Environment and Natural Resources

Telephone: 919-733-0692

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: 08/01/02

Date Made Active at EDR: 09/23/02

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 08/20/02

Elapsed ASTM days: 34

Date of Last EDR Contact: 08/20/02

LUST: Incidents Management Database

Source: Department of Environment and Natural Resources

Telephone: 919-733-1315

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 09/06/02

Date Made Active at EDR: 10/04/02

Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 09/09/02

Elapsed ASTM days: 25

Date of Last EDR Contact: 09/09/02

UST: Petroleum Underground Storage Tank Database

Source: Department of Environment and Natural Resources

Telephone: 919-733-1308

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: 05/03/02

Date Made Active at EDR: 07/19/02

Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 06/10/02

Elapsed ASTM days: 39

Date of Last EDR Contact: 09/09/02

OLI: Old Landfill Inventory

Source: Department of Environment & Natural Resources

Telephone: 919-733-4996

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 07/10/02
Date Made Active at EDR: 08/01/02
Database Release Frequency: Varies

Date of Data Arrival at EDR: 07/12/02
Elapsed ASTM days: 20
Date of Last EDR Contact: 07/12/02

STATE OF NORTH CAROLINA ASTM SUPPLEMENTAL RECORDS

HSDS: Hazardous Substance Disposal Site

Source: North Carolina Center for Geographic Information and Analysis
Telephone: 919-733-2090

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: 06/21/95
Database Release Frequency: Biennially

Date of Last EDR Contact: 09/03/02
Date of Next Scheduled EDR Contact: 12/02/02

AST: AST Database

Source: Department of Environment and Natural Resources
Telephone: 919-715-6170

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

Date of Government Version: 07/01/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 10/21/02
Date of Next Scheduled EDR Contact: 01/20/03

LUST TRUST: State Trust Fund Database

Source: Department of Environment and Natural Resources
Telephone: 919-733-1315

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

Date of Government Version: 07/26/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 08/02/02
Date of Next Scheduled EDR Contact: 11/11/02

IMD: Incident Management Database

Source: Department of Environment and Natural Resources
Telephone: 919-733-1315

Groundwater and/or soil contamination incidents

Date of Government Version: 07/22/02
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/29/02
Date of Next Scheduled EDR Contact: 10/28/02

EDR PROPRIETARY HISTORICAL DATABASES

Former Manufactured Gas (Coal Gas) Sites: The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. ©Copyright 1993 Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

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The information contained in this report has predominantly been obtained from publicly available sources produced by entities other than Real Property Scan. While reasonable steps have been taken to insure the accuracy of this report, Real Property Scan does not guarantee the accuracy of this report. Any liability on the part of Real Property Scan is strictly limited to a refund of the amount paid. No claim is made for the actual existence of toxins at any site. This report does not constitute a legal opinion.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

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.

Oil/Gas Pipelines/Electrical Transmission Lines: 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 and electrical transmission lines.

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.

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 from the U.S. Fish and Wildlife Service.

STREET AND ADDRESS INFORMATION

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GEOCHECK® - PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

HALL/JONES
HIGHWAY 701
CLARENDON, NC 28472

TARGET PROPERTY COORDINATES

Latitude (North):	34.221802 - 34° 13' 18.5"
Longitude (West):	78.749298 - 78° 44' 57.5"
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	707329.9
UTM Y (Meters):	3788845.0

EDR's GeoCheck Physical Setting Source Addendum has been developed to assist the environmental professional with the collection of physical setting source information in accordance with ASTM 1527-00, Section 7.2.3. Section 7.2.3 requires that a current USGS 7.5 Minute Topographic Map (or equivalent, such as the USGS Digital Elevation Model) be reviewed. It also requires that one or more additional physical setting sources be sought when (1) conditions have been identified in which hazardous substances or petroleum products are likely to migrate to or from the property, and (2) more information than is provided in the current USGS 7.5 Minute Topographic Map (or equivalent) is generally obtained, pursuant to local good commercial or customary practice, to assess the impact of migration of recognized environmental conditions in connection with the property. Such additional physical setting sources generally include information about the topographic, hydrologic, hydrogeologic, and geologic characteristics of a site, and wells in the area.

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. 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.

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.

USGS TOPOGRAPHIC MAP ASSOCIATED WITH THIS SITE

Target Property: 2434078-B6 NAKINA, NC
Source: USGS 7.5 min quad index

GENERAL TOPOGRAPHIC GRADIENT AT TARGET PROPERTY

Target Property: General ENE

Source: General Topographic Gradient has been determined from the USGS 1 Degree 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.

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

<u>Target Property County</u> COLUMBUS, NC	<u>FEMA Flood Electronic Data</u> YES - refer to the Overview Map and Detail Map
Flood Plain Panel at Target Property:	3703050150B
Additional Panels in search area:	3703050250B 3703050275B

NATIONAL WETLAND INVENTORY

<u>NWI Quad at Target Property</u> NAKINA	<u>NWI Electronic Data Coverage</u> 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.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

AQUIFLOW®

Search Radius: 2,000 Miles.

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.

<u>MAP ID</u>	<u>LOCATION FROM TP</u>	<u>GENERAL DIRECTION GROUNDWATER FLOW</u>
Not Reported		

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

GEOLOGIC AGE IDENTIFICATION

Era:	Mesozoic	Category:	Stratified Sequence
System:	Cretaceous		
Series:	Navarro Group		
Code:	uK4 (decoded above as Era, System & Series)		

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).

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. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name:	NORFOLK
Soil Surface Texture:	loamy sand
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.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: MODERATE

Depth to Bedrock Min: > 60 inches

Depth to Bedrock Max: > 60 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Permeability Rate (in/hr)	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	14 inches	loamy sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COURSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 20.00 Min: 6.00	Max: 6.00 Min: 3.60
2	14 inches	38 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COURSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 2.00 Min: 0.60	Max: 5.50 Min: 3.60
3	38 inches	70 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COURSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 2.00 Min: 0.60	Max: 5.50 Min: 3.60
4	70 inches	99 inches	variable	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: loam
sandy loam
mucky - loam

Surficial Soil Types: loam
sandy loam
mucky - loam

Shallow Soil Types: fine sandy loam
sandy clay loam
clay loam

Deeper Soil Types: sandy clay loam
stratified
sandy clay

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

ADDITIONAL ENVIRONMENTAL RECORD SOURCES

According to ASTM E 1527-00, Section 7.2.2, "one or more additional state or local sources of environmental records may be checked, in the discretion of the environmental professional, to enhance and supplement federal and state sources... Factors to consider in determining which local or additional state records, if any, should be checked include (1) whether they are reasonably ascertainable, (2) whether they are sufficiently useful, accurate, and complete in light of the objective of the records review (see 7.1.1), and (3) whether they are obtained, pursuant to local, good commercial or customary practice." One of the record sources listed in Section 7.2.2 is water well information. Water well information can be used to assist the environmental professional in assessing sources that may impact groundwater flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

<u>DATABASE</u>	<u>SEARCH DISTANCE (miles)</u>
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
A1	NC0424517	1/4 - 1/2 Mile WSW

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

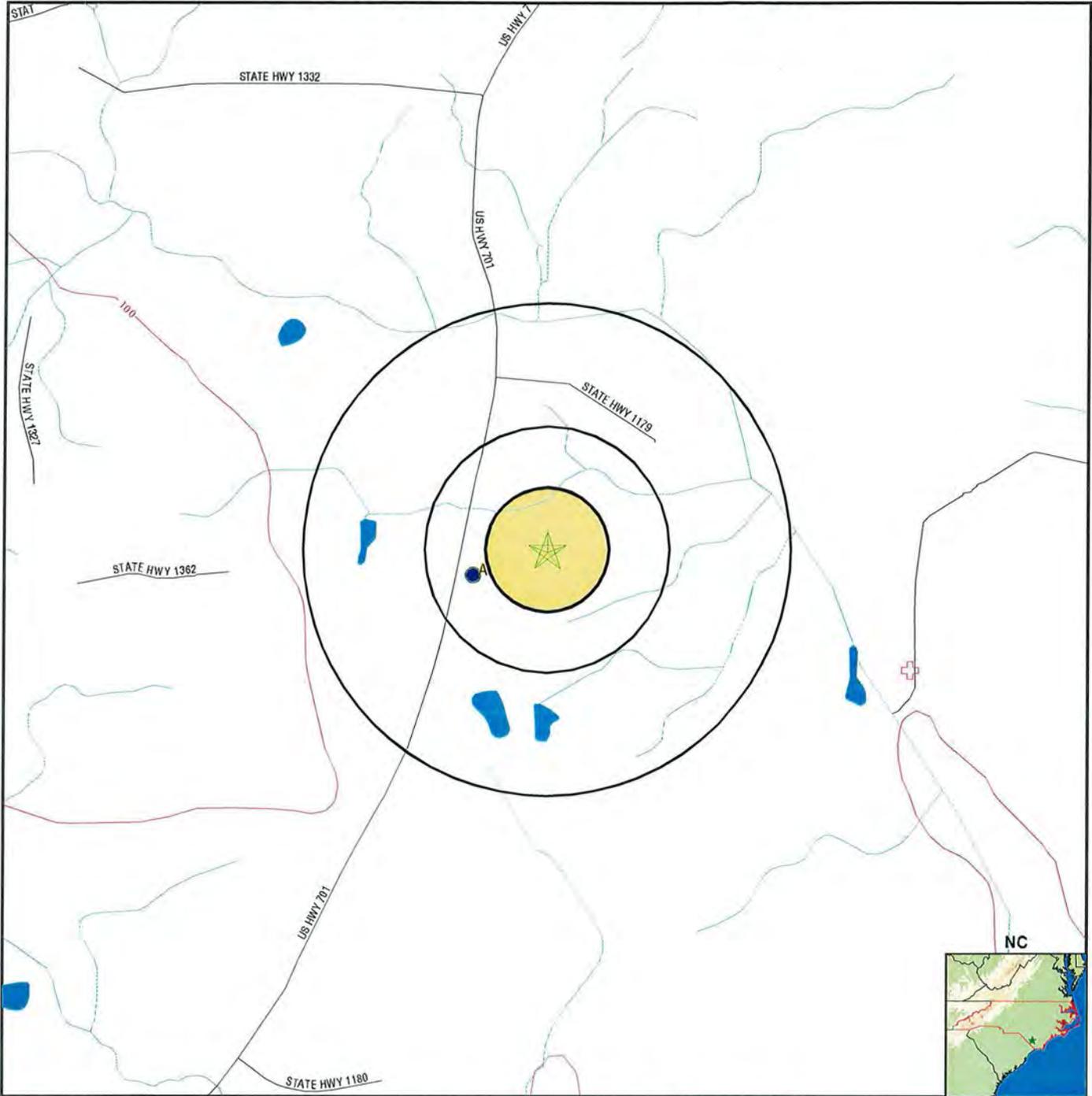
<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
A2	NCWS008107	1/4 - 1/2 Mile WSW

OTHER STATE DATABASE INFORMATION

NORTH CAROLINA LOCATIONS OF NATURAL HERITAGE DATABASE

<u>ID</u>	<u>Class</u>
0032820	Plants

PHYSICAL SETTING SOURCE MAP - 875186.3s



- County Boundary
- Major Roads
- Contour Lines
- Water Wells
- Public Water Supply Wells
- Groundwater Flow Direction
- Indeterminate Groundwater Flow at Location
- Groundwater Flow Varies at Location
- Cluster of Multiple Icons
- Earthquake epicenter, Richter 5 or greater
- Wildlife Areas
- Natural Areas
- Rare & Endangered Species

TARGET PROPERTY:	Hall/Jones	CUSTOMER:	Stantech
ADDRESS:	Highway 701	CONTACT:	Ryan Smith
CITY/STATE/ZIP:	Clarendon NC 28472	INQUIRY #:	875186.3s
LAT/LONG:	34.2218 / 78.7493	DATE:	November 04, 2002 2:26 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

ENFORCEMENT INFORMATION:

System Name:	LEBANON UNITED METH CHURCH		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	2001-01-01 - 2001-03-31	Analytical Value:	0000000.000000000
Violation ID:	0108265	Enforcement ID:	0116092
Enforcement Date:	2001-05-01	Enf. Action:	State Formal NOV Issued
System Name:	LEBANON UNITED METH CHURCH		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	2001-01-01 - 2001-03-31	Analytical Value:	0000000.000000000
Violation ID:	0108265	Enforcement ID:	0116093
Enforcement Date:	2001-05-01	Enf. Action:	State Public Notif Requested
System Name:	LEBANON UNITED METH CHURCH		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	2001-04-01 - 2001-06-30	Analytical Value:	0
Violation ID:	0109729	Enforcement ID:	0119415
Enforcement Date:	2001-08-08	Enf. Action:	State Formal NOV Issued
System Name:	LEBANON UNITED METH CHURCH		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	2001-04-01 - 2001-06-30	Analytical Value:	0
Violation ID:	0109729	Enforcement ID:	0119416
Enforcement Date:	2001-08-08	Enf. Action:	State Public Notif Requested
System Name:	LEBANON UNITED METH CHURCH		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	1999-04-01 - 1999-06-30	Analytical Value:	0000000.000000000
Violation ID:	9910066	Enforcement ID:	Not Reported
Enforcement Date:	Not Reported	Enf. Action:	Not Reported
System Name:	LEBANON UNITED METH CHURCH		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	1999-07-01 - 1999-09-30	Analytical Value:	0000000.000000000
Violation ID:	0001847	Enforcement ID:	Not Reported
Enforcement Date:	Not Reported	Enf. Action:	Not Reported
System Name:	LEBANON UNITED METH CHURCH		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	2001-07-01 - 2001-09-30	Analytical Value:	0
Violation ID:	0201519	Enforcement ID:	0202773
Enforcement Date:	2001-11-07	Enf. Action:	State Formal NOV Issued
System Name:	LEBANON UNITED METH CHURCH		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	2001-07-01 - 2001-09-30	Analytical Value:	0
Violation ID:	0201519	Enforcement ID:	0202774
Enforcement Date:	2001-11-07	Enf. Action:	State Public Notif Requested
System Name:	LEBANON UNITED METH CHURCH		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	1999-10-01 - 1999-12-31	Analytical Value:	0000000.000000000
Violation ID:	0001847	Enforcement ID:	0008736
Enforcement Date:	2000-02-04	Enf. Action:	State Formal NOV Issued

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

ENFORCEMENT INFORMATION:

System Name:	LEBANON UNITED METH CHURCH		Analytical Value:	0000000.000000000
Violation Type:	Monitoring, Routine Major (TCR)		Enforcement ID:	0008737
Contaminant:	COLIFORM (TCR)		Enf. Action:	State Public Notif Requested
Compliance Period:	1999-10-01 - 1999-12-31			
Violation ID:	0004666			
Enforcement Date:	2000-02-04			
System Name:	LEBANON UNITED METH CHURCH		Analytical Value:	0
Violation Type:	Monitoring, Routine Major (TCR)		Enforcement ID:	0215034
Contaminant:	COLIFORM (TCR)		Enf. Action:	State Formal NOV Issued
Compliance Period:	2002-01-01 - 2002-03-31			
Violation ID:	0207319			
Enforcement Date:	2002-04-26			
System Name:	LEBANON UNITED METH CHURCH		Analytical Value:	0
Violation Type:	Monitoring, Routine Major (TCR)		Enforcement ID:	0215035
Contaminant:	COLIFORM (TCR)		Enf. Action:	State Public Notif Requested
Compliance Period:	2002-01-01 - 2002-03-31			
Violation ID:	0207319			
Enforcement Date:	2002-04-26			
System Name:	LEBANON UNITED METH CHURCH		Analytical Value:	0000000.000000000
Violation Type:	Monitoring, Routine Major (TCR)		Enforcement ID:	0017101
Contaminant:	COLIFORM (TCR)		Enf. Action:	State Formal NOV Issued
Compliance Period:	2000-01-01 - 2000-03-31			
Violation ID:	0009601			
Enforcement Date:	2000-05-03			
System Name:	LEBANON UNITED METH CHURCH		Analytical Value:	0000000.000000000
Violation Type:	Monitoring, Routine Major (TCR)		Enforcement ID:	0017102
Contaminant:	COLIFORM (TCR)		Enf. Action:	State Public Notif Requested
Compliance Period:	2000-01-01 - 2000-03-31			
Violation ID:	0009601			
Enforcement Date:	2000-05-03			

**A2
WSW
1/4 - 1/2 Mile
Higher**

NC WELLS NCWS008107

Site Name:	WELL #1	Source code:	W01
PWS ID:	0424517		
City:	CLARENDON		
County:	Columbus		
Latitude:	341310.581	Longitude:	784518.913
Availability:	Permanent		
Type:	Ground	Depth:	0
Owner:	LEBANON UNITED METH CHURCH		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Direction _____ Database _____ EDR ID Number _____
Distance _____

NC_NHEO 0032820

Site ID: 0032820
Latitude / Longitude: 34.2147 / -78.7236
Classification by Type: Plants
Degree of Accuracy associated with coordinate: Minutes
Occurrence Status: Historic, no evidence of destruction
State Status: Significantly Rare

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for COLUMBUS 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 Zip Code: 28472

Number of sites tested: 2

<u>Area</u>	<u>Average Activity</u>	<u>% <4 pCi/L</u>	<u>% 4-20 pCi/L</u>	<u>% >20 pCi/L</u>
Living Area - 1st Floor	0.000 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

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 from the U.S. Fish and Wildlife Service.

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

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. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

ADDITIONAL ENVIRONMENTAL RECORD SOURCES

FEDERAL WATER WELLS

PWS: Public Water Systems

Source: EPA/Office of Drinking Water

Telephone: 202-260-2805

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: 202-260-2805

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: In November 1971 the United States Geological Survey (USGS) implemented a national water resource information tracking system. 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 more than 900,000 wells, springs, and other sources of groundwater.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STATE RECORDS

North Carolina Wildlife Resources/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 for North Carolina Game Lands, 1989-90.

North Carolina Rare/Endangered Species and Natural Areas

Source: Natural Heritage Occurrence Sites Center for Geographic Information and Analysis

Telephone: 919-733-2090

North Carolina Public Water Supply Wells

Source: Department of Environmental Health

Telephone: 919-715-3243

RADON

Area Radon Information

Source: EPA

Telephone: 303-236-1525

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.

EPA Radon Zones

Source: EPA

Telephone: 202-564-9370

Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Epicenters: World earthquake epicenters, Richter 5 or greater

Source: Department of Commerce, National Oceanic and Atmospheric Administration

APPENDIX C

Prior Converted Croplands

J-10

J 10
1993

of
Farms

T4551 PC

T4552 PC

T3318 PC

T4553 PC

T4554 PC

T4564 PC

T4561

LEBANON CHURCH

LEBANON CHURCH

PC

L

5

12.5

3
2.0

2.7

17.7

2
5.9

3
6.6

6
11.0

PC

2
5.3

4306

T4550

1
1.9

2
2.1

3
1.0

3
3.8

5
39.8

3
4.0

3
0.6

2
9.7

4
7

4
7

T4558 2
7

3
0.7

4
11.3

5
2.5

6
2.7

4
0

3
1.4

2
12.8

3
19.1

8
1

T4561

3
17.0

7
5.0

1
2.7

4
15.6

APPENDIX D

Agency Response Letters



North Carolina Department of Cultural Resources
State Historic Preservation Office

David L. S. Brook, Administrator

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

Division of Historical Resources
David J. Olson, Director

October 17, 2002

Ryan Smith
Environmental Scientist
Stantec Consulting Services, Inc.
801 Jones Franklin Road, Suite 300
Raleigh, NC 27606

Re: Mill Branch Stream Restoration Feasibility Study, Columbus County, ER 02-10910

Dear Mr. Smith:

Thank you for your letter of September 9, 2002, concerning the above project.

We have conducted a review of the proposed undertaking and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the undertaking 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, contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

David Brook

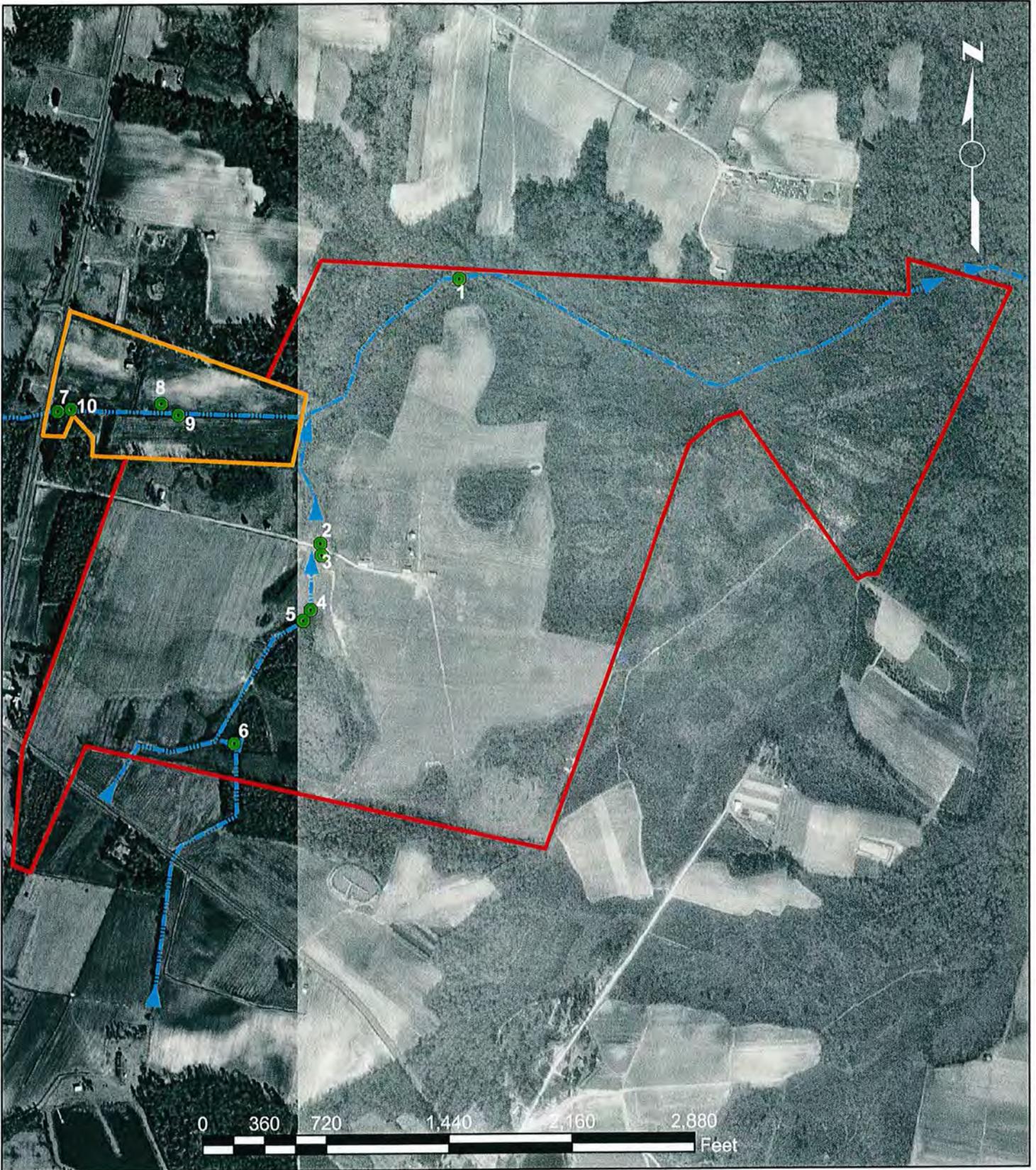
DB:kgc

cc: Mary Pope Furr, NCDOT

	Location	Mailing Address	Telephone/Fax
Administration	507 N. Blount St. Raleigh, NC	4617 Mail Service Center, Raleigh 27699-4617	(919) 733-4763 • 733-8653
Restoration	515 N. Blount St. Raleigh, NC	4613 Mail Service Center, Raleigh 27699-4613	(919) 733-6547 • 715-4801
Survey & Planning	515 N. Blount St. Raleigh, NC	4618 Mail Service Center, Raleigh 27699-4618	(919) 733-4763 • 715-4801

APPENDIX E

Site Photographs and Locations



Legend

- Jones Property
- Hall Property
- Photo
- Hydrology


 North Carolina
 Department of Transportation

Mill Branch Stream And Wetland
 Restoration Feasibility Study

Columbus County, NC

Photograph Locations



Photograph 1. A forested buffer is located adjacent to both banks of Mill Branch on the Jones Property.



Photograph 2. A dammed section of the unnamed tributary north (downstream) of the access road has created a pond used by cattle.



Photography 3. The pond immediately downstream is backing water up in the unnamed tributary.



Photograph 4. Cattle crossings in the unnamed tributary have caused over widening and bank instability.



Photograph 5. Cattle crossings in the unnamed tributary have caused overwidening of the stream and severe bank degradation.



Photograph 6. A pipe culvert utilized for a cattle crossing is located upstream on the unnamed tributary.



Photograph 7. Water is stagnant downstream of the culvert crossing under HWY 701 on the Hall Property.



Photograph 8. Agricultural fields are adjacent to both banks of Mill Branch on the Hall Property. Young, thick vegetation is growing on Mill Branch's banks.



Photograph 9. Thick vegetation along the entire reach of Mill Branch does not allow a clear picture of channel dimensions.



Photograph 10. Duckweed is evidence of low flow or stagnant water in Mill Branch.

APPENDIX F

Data Forms

DATA FORM

**ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)**

Project/Site: Jones Property, adjacent to Mill Branch	Date: 11-1-02
Applicant / Owner: NCDOT	County: Columbus
Investigator: RVS	State: NC
Do Normal Circumstances exist on the site? YES NO	Community ID:
Is the site significantly disturbed (Atypical Situation)? YES NO	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse) YES NO	Plot ID: Plot #1

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1) <i>Acer rubrum</i>	Tree/Sap	FAC	9) <i>Woodwardia virginica</i>	Herb	OBL
2) <i>Liriodendron tulipifera</i>	Tree/Sap	FAC	10) <i>Woodwardia areolata</i>	Herb	OBL
3) <i>Quercus michauxii</i>	Tree	FACW -	11) <i>Smilax rotundifolia</i>	Vine	FAC
4) <i>Ilex opaca</i>	Sap	FAC -	12) <i>Persa borbonia</i>	Shrub/Sap	FACW
5) <i>Ligustrum sinense</i>	Shrub	FAC	13) <i>Asplenium</i> sp.	Herb	FACU
6) <i>Liquidambar styraciflua</i>	Tree/Sap	FAC +			
7) <i>Magnolia virginiana</i>	Sap/Shrub	FACW +			
8) <i>Nyssa aquatica</i>	Tree	OBL			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 85%

Remarks:

HYDROLOGY

<input type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Guage <input type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Recorded Data Available	<p align="center">WETLAND HYDROLOGY INDICATORS</p> <p>Primary Indicators:</p> <input type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 Inches <input checked="" type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input checked="" type="checkbox"/> Drainage Patterns in Wetlands
FIELD OBSERVATIONS	<p>Secondary Indicators (2 or more Required)</p> <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input checked="" type="checkbox"/> Water-stained Leaves <input checked="" type="checkbox"/> Local Soil Survey Data <input checked="" type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
Depth of Surface Water	-- (in)
Depth of Free Water in Pit	4 (in)
Depth to Saturated Soil	6 (in)

SOILS

Map Unit Name (Series and Phase): Muckalee, sandy loam	Drainage Class: Poorly
Taxonomy (Subgroup): Typic Fluvaquents	Field Observations Confirm Mapped Type? YES NO

PROFILE DESCRIPTION					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2		10YR 3/1			Silt loam
2-8		2.5Y 3/1	10YR 3/4	Common/faint	Sandy clay loam
8-20		10YR 4/1	10 YR 5/8	Common/faint	Loamy Sand

HYDRIC SOIL INDICATORS:	
<input type="checkbox"/> Histosol	<input type="checkbox"/> Concretions
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils
<input type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Aquic Moisture Regime	<input type="checkbox"/> Listed on Local Hydric Soils List
<input checked="" type="checkbox"/> Reducing Conditions	<input checked="" type="checkbox"/> Listed on National Hydric Soils List
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

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

Remarks:

Habitat Assessment Field Data Sheet
Coastal Plain Streams

Directions for use of this Assessment: The observer is to survey a minimum of 100 meters of stream, preferably in an upstream direction starting above the bridge pool and the road right-of-way. The stream segment which is assessed should represent average stream conditions. In order to perform a proper habitat evaluation the observer needs to get into the stream. All meter readings need to be performed prior to walking the stream. When working the habitat index, select the description which best fits the observed habitats and then circle the score. If the observed habitat falls in between two descriptions, select an intermediate score. There are seven different metrics in this index and a final habitat score is determined by adding the results from the different metrics.

Stream Mill Branch Location/Road Hall Property County Columbus
Date 11-1-02 CC# _____ Subbasin _____ Basin _____

Observer(s): RVS Office Location Raleigh Agency _____

Type of Study: Fish Benthos Basinwide Special Study (Describe) Feasibility Study

Latitude _____ Longitude _____ Ecoregion (circle one) CA CB Swamp Distance Surveyed _____ meters

Physical Characterization: Land use refers to immediate area that you can see from sampling location - include what you see driving thru the watershed in the remarks section.

Land use: Forest _____% Active Pasture _____% Active Crops 60% Fallow Fields 40% Commercial _____%
Industrial _____% Residential _____% Other _____% Describe: _____

Width: (meters) Stream _____ Channel _____ Average Stream Depth: (m) _____ Velocity _____ m/sec

Flow conditions (circle one): High Normal Low

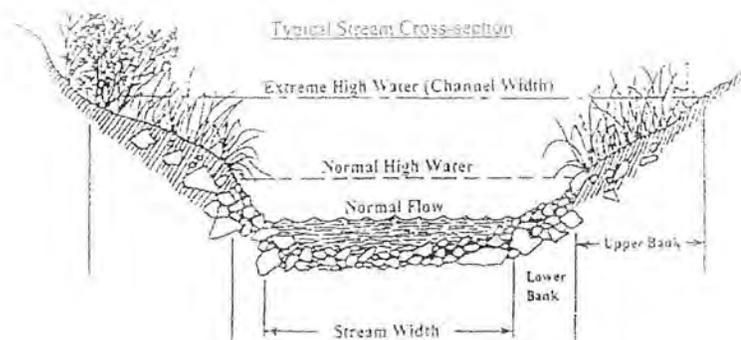
Manmade Stabilization: Y [] N [] Describe: _____

Water Quality: Temperature _____ °C Dissolved Oxygen _____ mg/l Conductivity _____ umhos/cm pH _____

Turbidity: (circle) Clear Slightly Turbid Turbid Tannic

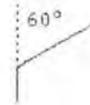
Weather Conditions: _____ Photo # _____

Remarks: _____



I. Channel Modification (Use topo map as an additional aid for this parameter)

(channelized)	Natural Channel	Modified Channel
A. Frequent bends	<u>Score</u>	<u>Score</u>
1. bends > 60°.....	15.....	12
2. bends < 60°.....	13.....	10
B. Infrequent bends		
1. bends > 60°.....	11.....	7
2. bends < 60°.....	8.....	⑤
Remarks.....		Subtotal <u>5</u>



II. Instream Habitat: Consider the percentage of the reach that is favorable for benthos colonization or fish cover. Circle the habitats which occur- (Rocks) (Macrophytes) (sticks and leaf packs) (snags and logs) (undercut banks or root mats) Definition: leafpacks consist of older leaves that are packed together and have begun to decay. Piles of leaves in pool areas are not considered leaf packs. EXAMPLE: If >70% of the reach is rocks, 1 type is present, circle the score of 17.

AMOUNT OF REACH FAVORABLE FOR COLONIZATION OR COVER

	>50%	30-50%	10-30%	<10%
	<u>Score</u>	<u>Score</u>	<u>Score</u>	<u>Score</u>
4 or 5 types present.....	20	16	12	8
3 types present.....	19	15	11 → ⑨ ←	7
2 types present.....	18	14	10	6
1 type present.....	17	13	9	5
No types present.....	0			

Remarks..... Subtotal 9

III. Bottom Substrate (silt, sand, detritus, gravel, cobble, boulder) look at entire reach for substrate scoring, but only look at riffle for embeddedness.

A. substrate types mixes	<u>Score</u>
1. gravel/rocks dominant.....	15
2. sand dominant.....	13
3. detritus dominant.....	7 ⑥
4. silt/clay dominant.....	4
B. substrate homogeneous	
1. substrate nearly all gravel.....	12
2. substrate nearly all sand.....	7
3. substrate nearly all detritus.....	4
4. substrate nearly all silt/clay.....	1

Remarks..... Subtotal 6

IV. Pool Variety Pools are areas of deeper than average maximum depths with little or no surface turbulence. Water velocities associated with pools are always slow. Pools may take the form of "pocket water", small pools behind boulders or obstructions, in large high gradient streams.

A. Pools present	<u>Score</u>
1. Pools Frequent (>30% of 100m area surveyed)	
a. variety of pool sizes.....	10
b. pools same size.....	8
2. Pools Infrequent (<30% of the 100m area surveyed)	
a. variety of pool sizes.....	6
b. pools same size.....	4
B. Pools absent	
1. Runs present.....	③
2. Runs absent.....	0

Remarks..... Page Total 3

V. Bank Stability and Vegetation

	Lft. Bank Score	Rt. Bank Score
A. Banks stable		
1. no evidence of erosion or bank failure, little potential for erosion	(10)	(10)
B. Erosion areas present		
1. diverse trees, shrubs, grass; plants healthy with good root systems.....	9	9
2. few trees or small trees and shrubs; vegetation appears generally healthy.....	7	7
3. sparse vegetation; plant types and conditions suggest poorer soil binding.....	4	4
4. mostly grasses, few if any trees and shrubs, high erosion and failure potential at high flow	2	2
5. no bank vegetation, mass erosion and bank failure evident.....	0	0
		Total <u>20</u>

Remarks _____

VI. Light Penetration (Canopy is defined as tree or vegetative cover directly above the stream's surface. Canopy would block out sunlight when the sun is directly overhead).

	Score
A. Stream with good shading with some breaks for light penetration	10
B. Stream with full canopy - breaks for light penetration absent.....	8
C. Stream with partial shading - sunlight and shading are essentially equal.....	7
D. Stream with minimal shading - full sun in all but a few areas.....	2
E. No shading.....	0

Remarks _____ 2

VII. Riparian Vegetative Zone Width

Definition: A break in the riparian zone is any area which allows sediment to enter the stream. Breaks refer to the near-stream portion of the riparian zone (banks), places where pollutants can directly enter the stream.

	Lft. Bank Score	Rt. Bank Score
A. Riparian zone intact (no breaks)		
1. zone width > 18 meters.....	5	5
2. zone width 12-18 meters.....	4	4
3. zone width 6-12 meters.....	3	3
4. zone width < 6 meters.....	2	2
B. Riparian zone not intact (breaks)		
1. breaks rare		
a. zone width > 18 meters.....	4	4
b. zone width 12-18 meters.....	3	3
c. zone width 6-12 meters.....	2	2
d. zone width < 6 meters.....	1	1
2. breaks common		
a. zone width > 18 meters.....	3	3
b. zone width 12-18 meters.....	2	2
c. zone width 6-12 meters.....	1	1
d. zone width < 6 meters.....	(0)	(0)
		Total <u>0</u>

Remarks _____

TOTAL SCORE 46

Stream Visual Assessment Protocol

Owners name Hall/Sellers Evaluator's name RVS Date 11-1-02

Stream name Mill Branch Waterbody ID number _____

Reach location ~6 mi. South of Whiteville, NC on HW 701

Ecoregion Coastal Plain Drainage area ~900 ac Gradient _____

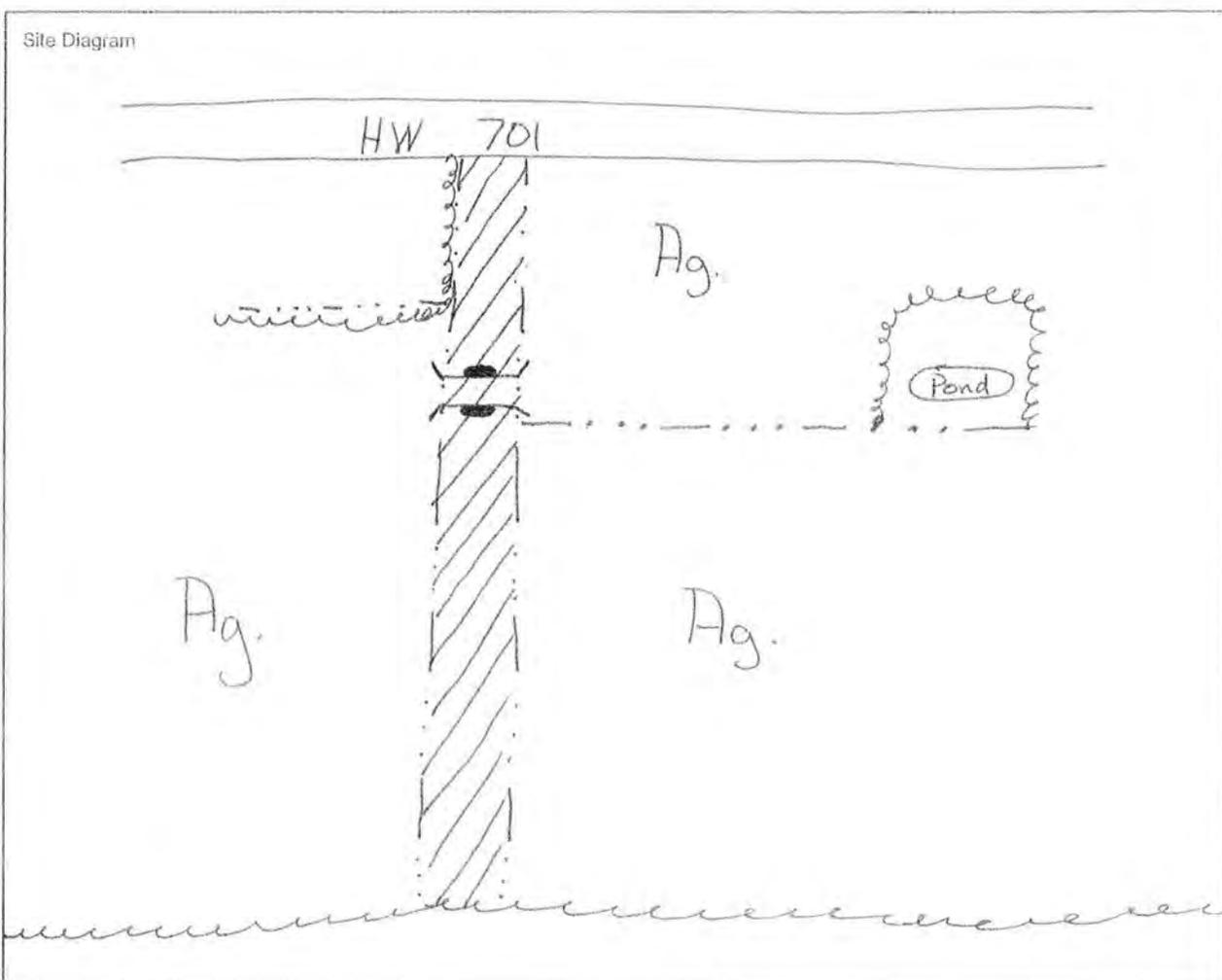
Applicable reference site _____

Land use within drainage (%): row crop 40 hayland _____ grazing/pasture 20 forest 20 residential 20

confined animal feeding operations _____ Cons. Reserve _____ industrial _____ Other: _____

Weather conditions-today _____ Past 2-5 days _____

Active channel width _____ Dominant substrate: boulder _____ gravel _____ sand _____ silt _____ mud _____



NCDWQ Stream Classification Form

Project Name: Mill Branch River Basin: Lumber County: Columbus Evaluator: P. Colwell

DWQ Project Number: _____ Nearest Named Stream: _____ Latitude: _____ Signature: _____

Date: 11-1-02 USGS QUAD: _____ Longitude: _____ Location/Directions: Hall Property

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 Created 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: (1) No=0

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: 11

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?	(5)	2	1	0
2) Are Rooted Plants Present In Streambed?	5	(3)	1	0
3) Is Periphyton Present?	(0)	1	2	3
4) Are Bivalves Present?	(0)	1	2	3

PRIMARY BIOLOGY INDICATOR POINTS: 5

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: 1.5

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaf/Litter Present In Streambed?	(1.5)	1	.5	0
2) Is Sediment On Plants (Or Debris) Present?	(0)	.5	1	1.5
3) Are Wrack Lines Present?	(0)	.5	1	1.5
4) Is Water In Channel And >48 Hrs. Since Last Known Rain? (*NOTE: If Ditch Indicated In #9, Above Site To, Stop And #1 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: 6

III. Biology	Absent	Weak	Moderate	Strong		
1) Are Fish Present?	0	(5)	1	1.5		
2) Are Amphibians Present?	0	(5)	1	1.5		
3) Are Aquatic Turtles Present?	(0)	.5	1	1.5		
4) Are Crayfish Present?	0	(5)	1	1.5		
5) Are Macroinvertebrates 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?	SAV	Mostly OBL	Mostly FACW	Mostly FAC	Mostly FACU	Mostly UPL

(*NOTE: If Total Absence Of All Plants In Streambed

As Noted Above Skip This Step UNLESS SAV Present*)

2 1 .75 .5 0 0

SECONDARY BIOLOGY INDICATOR POINTS: 2

TOTAL POINTS (Primary + Secondary) = 27.5 If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent

Habitat Assessment Field Data Sheet
Coastal Plain Streams

Directions for use of this Assessment: The observer is to survey a minimum of 100 meters of stream, preferably in an upstream direction starting above the bridge pool and the road right-of-way. The stream segment which is assessed should represent average stream conditions. In order to perform a proper habitat evaluation the observer needs to get into the stream. All meter readings need to be performed prior to walking the stream. When working the habitat index, select the description which best fits the observed habitats and then circle the score. If the observed habitat falls in between two descriptions, select an intermediate score. There are seven different metrics in this index and a final habitat score is determined by adding the results from the different metrics.

Stream Tributary Location/Road Jones Property County Columbus

Date 11-1-02 CC# _____ Subbasin _____ Basin _____

Observer(s): RVS Office Location Raleigh Agency _____

Type of Study: Fish Benthos Basinwide Special Study (Describe) Stream Feasibility

Latitude _____ Longitude _____ Ecoregion (circle one) CA CB Swamp Distance Surveyed _____ meters

Physical Characterization: Land use refers to immediate area that you can see from sampling location - include what you see driving thru the watershed in the remarks section.

Land use: Forest 5 % Active Pasture 95 % Active Crops _____ % Fallow Fields _____ % Commercial _____ %
Industrial _____ % Residential _____ % Other _____ % Describe: _____

Width: (meters) Stream _____ Channel _____ Average Stream Depth: (m) _____ Velocity _____ m/sec

Flow conditions (circle one): High Normal Low

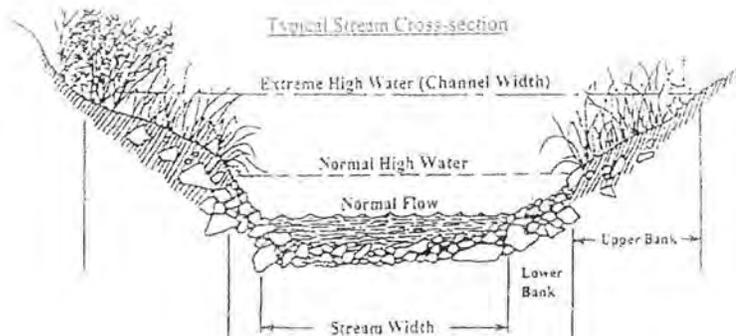
Manmade Stabilization: Y[] N[] Describe: _____

Water Quality: Temperature _____ °C Dissolved Oxygen _____ mg/l Conductivity _____ umhos/cm pH _____

Turbidity: (circle) Clear Slightly Turbid Turbid Tannic

Weather Conditions: _____ Photo # _____

Remarks: _____



V. Bank Stability and Vegetation

	Lft. Bank Score	Rt. Bank Score
A. Banks stable		
1. no evidence of erosion or bank failure, little potential for erosion	10	10
B. Erosion areas present		
1. diverse trees, shrubs, grass; plants healthy with good root systems.....	9	9
2. few trees or small trees and shrubs; vegetation appears generally healthy.....	7	7
3. sparse vegetation; plant types and conditions suggest poorer soil binding.....	4	4
4. mostly grasses, few if any trees and shrubs, high erosion and failure potential at high flow	②	②
5. no bank vegetation, mass erosion and bank failure evident.....	0	0
	Total <u>2</u>	

Remarks Only bank vegetation is black cherry

VI. Light Penetration (Canopy is defined as tree or vegetative cover directly above the stream's surface. Canopy would block out sunlight when the sun is directly overhead).

	Score
A. Stream with good shading with some breaks for light penetration	10
B. Stream with full canopy - breaks for light penetration absent.....	8
C. Stream with partial shading - sunlight and shading are essentially equal.....	7
D. Stream with minimal shading - full sun in all but a few areas.....	②
E. No shading.....	0

Remarks Almost no bank vegetation.

2

VII. Riparian Vegetative Zone Width

Definition: A break in the riparian zone is any area which allows sediment to enter the stream. Breaks refer to the near-stream portion of the riparian zone (banks); places where pollutants can directly enter the stream.

	Lft. Bank Score	Rt. Bank Score
A. Riparian zone intact (no breaks)		
1. zone width > 18 meters.....	5	5
2. zone width 12-18 meters.....	4	4
3. zone width 6-12 meters.....	3	3
4. zone width < 6 meters.....	2	2
B. Riparian zone not intact (breaks)		
1. breaks rare		
a. zone width > 18 meters.....	4	4
b. zone width 12-18 meters.....	3	3
c. zone width 6-12 meters.....	2	2
d. zone width < 6 meters.....	1	1
2. breaks common		
a. zone width > 18 meters.....	3	3
b. zone width 12-18 meters.....	2	2
c. zone width 6-12 meters.....	1	1
d. zone width < 6 meters.....	①	①
	Total <u>0</u>	

Remarks _____

TOTAL SCORE 41

NCDWQ Stream Classification Form

Project Name: To. history to Mill Branch

River Basin: Lumber

County: Columbus

Evaluator: P. Colwell

DWQ Project Number:

Nearest Named Stream:

Latitude:

Signature:

Date: 11-1-02

USGS QUAD:

Longitude:

Location/Directions: 2.6 mi. South of Wk. Kenille off of HW 70

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 2 nd Order Or Greater Channel (As Indicated On Topo Map And/Or In Field) Present?	(Yes=3)	No=0		
PRIMARY GEOMORPHOLOGY INDICATOR POINTS: <u>11</u>				

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is There A Groundwater Flow/Discharge Present?	0	1	(2)	3
PRIMARY HYDROLOGY INDICATOR POINTS: <u>2</u>				

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: <u>7</u>				

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: <u>2.5</u>				

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: <u>6.5</u>				

III. Biology	Absent	Weak	Moderate	Strong		
1) Are Fish Present?	0	(.5)	1	1.5		
2) Are Amphibians Present?	0	(.5)	1	1.5		
3) Are Aquatic Turtles Present?	(0)	.5	1	1.5		
4) Are Crayfish Present?	(0)	.5	1	1.5		
5) Are Macroinvertebrates 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?	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: <u>1.5</u>						

TOTAL POINTS (Primary + Secondary) = 30.5 (If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)

Habitat Assessment Field Data Sheet
Coastal Plain Streams

Directions for use of this Assessment: The observer is to survey a minimum of 100 meters of stream, preferably in an upstream direction starting above the bridge pool and the road right-of-way. The stream segment which is assessed should represent average stream conditions. In order to perform a proper habitat evaluation the observer needs to get into the stream. All meter readings need to be performed prior to walking the stream. When working the habitat index, select the description which best fits the observed habitats and then circle the score. If the observed habitat falls in between two descriptions, select an intermediate score. There are seven different metrics in this index and a final habitat score is determined by adding the results from the different metrics.

Stream M. H Branch Location/Road West of HW 701 County Columbus

Date 11-22-02 CC# _____ Subbasin _____ Basin _____

Observer(s) RVS Office Location Raleigh Agency _____

Type of Study: Fish Benthos Basinwide Special Study (Describe) Stream Feasibility Study

Latitude _____ Longitude _____ Ecoregion (circle one) CA CB Swamp Distance Surveyed _____ meters

Physical Characterization: Land use refers to immediate area that you can see from sampling location - include what you see driving thru the watershed in the remarks section.

Land use: Forest 100 % Active Pasture _____ % Active Crops _____ % Fallow Fields _____ % Commercial _____ %
Industrial _____ % Residential _____ % Other _____ % Describe: _____

Width: (meters) Stream _____ Channel _____ Average Stream Depth: (m) _____ Velocity: _____ m/sec

Flow conditions (circle one): High Normal Low

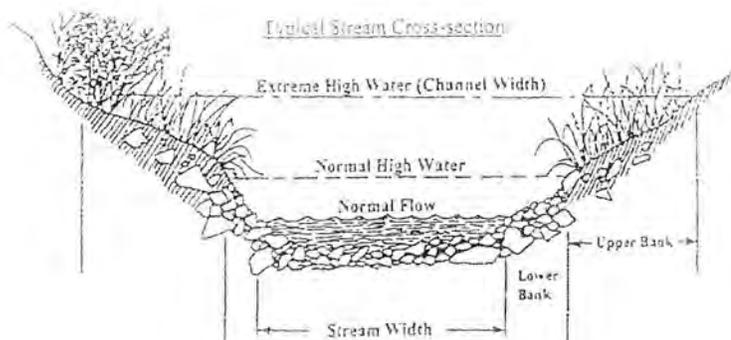
Manmade Stabilization: Y [] N [] Describe: _____

Water Quality: Temperature _____ °C Dissolved Oxygen _____ mg/l Conductivity _____ $\mu\text{mhos/cm}$ pH _____

Turbidity: (circle) Clear Slightly Turbid Turbid Tannic

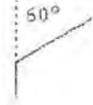
Weather Conditions: _____ Photo # _____

Remarks: _____



I. Channel Modification (Use topo map as an additional aid for this parameter)

(channelized)	Natural Channel	Modified Channel
A. Frequent bends	<u>Score</u>	<u>Score</u>
1. bends > 60°.....	15	12
2. bends < 60°.....	13	10
B. Infrequent bends		
1. bends > 60°.....	11	7
2. bends < 60°.....	8	5
Remarks.....		Subtotal <u>15</u>



II. Instream Habitat: Consider the percentage of the reach that is favorable for benthos colonization or fish cover. Circle the habitats which occur- (Rocks) (Macrophytes) (sticks and leaf packs) (snags and logs) (undercut banks or root mats) Definition: leafpacks consist of older leaves that are packed together and have begun to decay. Piles of leaves in pool areas are not considered leaf packs. EXAMPLE: If >70% of the reach is rocks, 1 type is present, circle the score of 17.

AMOUNT OF REACH FAVORABLE FOR COLONIZATION OR COVER

	>50%	30-50%	10-30%	<10%
	<u>Score</u>	<u>Score</u>	<u>Score</u>	<u>Score</u>
4 or 5 types present.....	20	16	12	8
3 types present.....	19	15	11	7
2 types present.....	18	14	10	6
1 type present.....	17	13	9	5
No types present.....	0			

Remarks..... Subtotal 19

III. Bottom Substrate (silt, sand, detritus, gravel, cobble, boulder) look at entire reach for substrate scoring, but only look at riffle for embeddedness.

A. substrate types mixes	<u>Score</u>
1. gravel/rocks dominant.....	15
2. sand dominant.....	13
3. detritus dominant.....	7
4. silt/clay dominant.....	4
B. substrate homogeneous	
1. substrate nearly all gravel.....	12
2. substrate nearly all sand.....	7
3. substrate nearly all detritus.....	4
4. substrate nearly all silt/ clay.....	1

Remarks..... Subtotal 13

IV. Pool Variety Pools are areas of deeper than average maximum depths with little or no surface turbulence. Water velocities associated with pools are always slow. Pools may take the form of "pocket water", small pools behind boulders or obstructions, in large high gradient streams.

A. Pools present	<u>Score</u>
1. Pools Frequent (>30% of 100m area surveyed)	
a. variety of pool sizes.....	10
b. pools same size.....	8
2. Pools Infrequent (<30% of the 100m area surveyed)	
a. variety of pool sizes.....	6
b. pools same size.....	4
B. Pools absent	
1. Runs present.....	3
2. Runs absent.....	0

Remarks..... Page Total 10

V. Bank Stability and Vegetation

	Lft. Bank Score	Rt. Bank Score
A. Banks stable		
1. no evidence of erosion or bank failure, little potential for erosion	10	10
B. Erosion areas present		
1. diverse trees, shrubs, grass; plants healthy with good root systems.....	9	9
2. few trees or small trees and shrubs; vegetation appears generally healthy.....	7	7
3. sparse vegetation; plant types and conditions suggest poorer soil binding.....	4	4
4. mostly grasses, few if any trees and shrubs, high erosion and failure potential at high flow.....	2	2
5. no bank vegetation, mass erosion and bank failure evident.....	0	0
		Total <u>9</u>

Remarks _____

VI. Light Penetration (Canopy is defined as tree or vegetative cover directly above the stream's surface. Canopy would block out sunlight when the sun is directly overhead).

	Score
A. Stream with good shading with some breaks for light penetration	10
B. Stream with full canopy - breaks for light penetration absent.....	8
C. Stream with partial shading - sunlight and shading are essentially equal.....	7
D. Stream with minimal shading - full sun in all but a few areas.....	2
E. No shading.....	0

Remarks _____

10

VII. Riparian Vegetative Zone Width

Definition: A break in the riparian zone is any area which allows sediment to enter the stream. Breaks refer to the near-stream portion of the riparian zone (banks); places where pollutants can directly enter the stream.

	Lft. Bank Score	Rt. Bank Score
A. Riparian zone intact (no breaks)		
1. zone width > 18 meters.....	5	5
2. zone width 12-18 meters.....	4	4
3. zone width 6-12 meters.....	3	3
4. zone width < 6 meters.....	2	2
B. Riparian zone not intact (breaks)		
1. breaks rare		
a. zone width > 18 meters.....	4	4
b. zone width 12-18 meters.....	3	3
c. zone width 6-12 meters.....	2	2
d. zone width < 6 meters.....	1	1
2. breaks common		
a. zone width > 18 meters.....	3	3
b. zone width 12-18 meters.....	2	2
c. zone width 6-12 meters.....	1	1
d. zone width < 6 meters.....	0	0
		Total <u>10</u>

Remarks _____

TOTAL SCORE 86

Stream Visual Assessment Protocol

Owners name ? Evaluator's name RVS Date 11-22-02

Stream name Mill Branch West of HW 701 Waterbody ID number _____

Reach location ~6 Miles South of Whiteville, on west side of HW 701

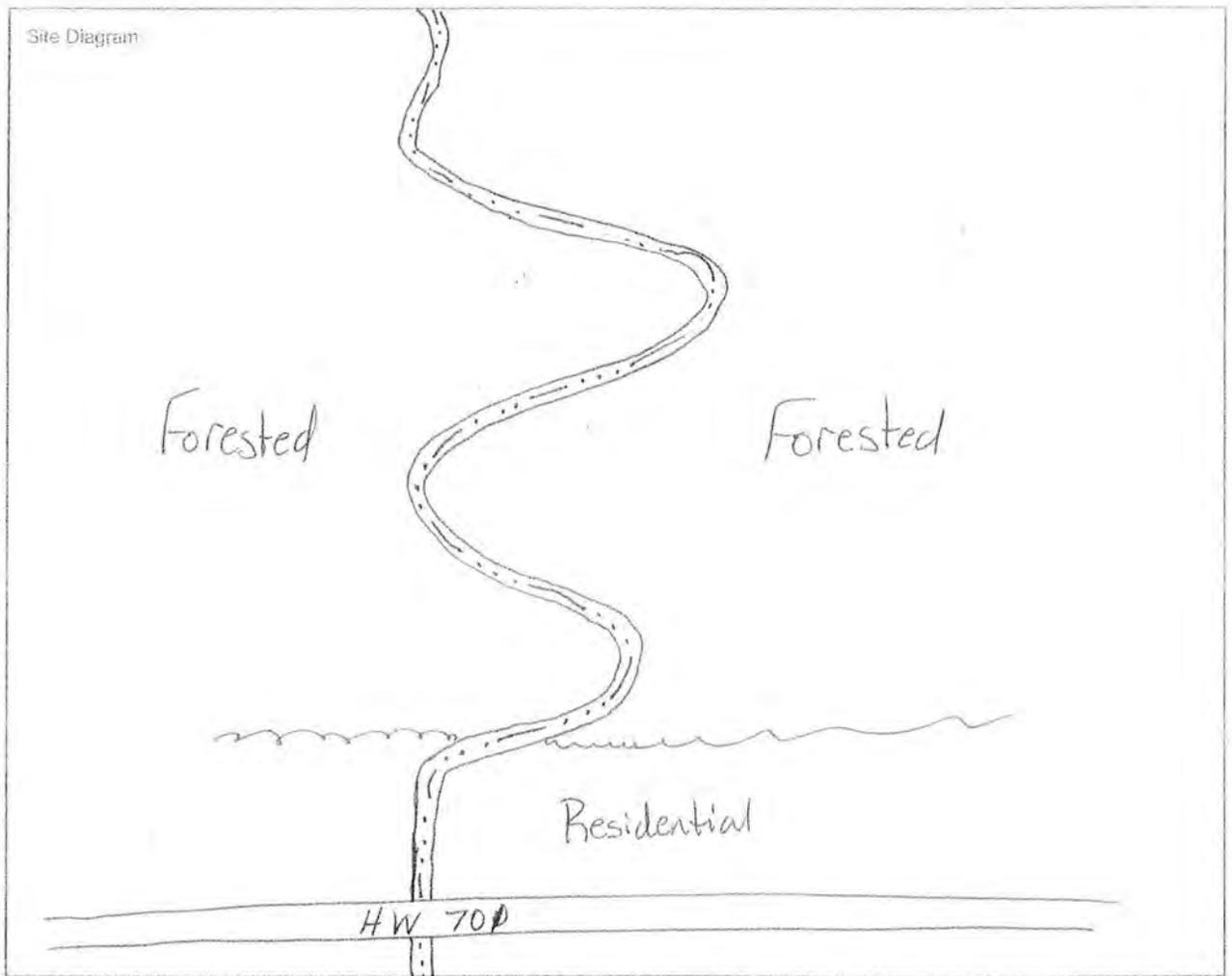
Ecoregion Coastal Plain Drainage area ~850 Gradient _____

Applicable reference site _____

Land use within drainage (%): row crop 30 hayland _____ grazing/pasture _____ forest 60 residential 10
confined animal feeding operations _____ Cons. Reserve _____ industrial _____ Other: _____

Weather conditions-today _____ Past 2-5 days _____

Active channel width _____ Dominant substrate: boulder _____ gravel _____ sand _____ silt _____ mud _____



NCDWQ Stream Classification Form

Project Name: M:11 Branch West of HW 701 River Basin: Lumber County: Columbus Evaluator: RVS
 DWQ Project Number: _____ Nearest Named Stream: _____ Latitude: _____ Signature: _____

Date: 11-22-02 USGS QUAD: _____ Longitude: _____ Location/Directions: ~ 6 mi. South of Whiteville off of HW 701

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

PRIMARY GEOMORPHOLOGY INDICATOR POINTS: 14

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: 3

Secondary Field Indicators: (Circle One Number Per Line)

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

SECONDARY GEOMORPHOLOGY INDICATOR POINTS: 2.5

II. Hydrology	Absent	Weak	Moderate	Strong
1) Is This Year's (Or Last's) Leaf litter Present In Streambed?	1.5	1	.5	0
2) Is Sediment On Plants (Or Debris) Present?	0	1	1	1.5
3) Are Wrack Lines Present?	0	1	1	1.5
4) Is Water In Channel And >48 Hrs. Since Last Known Rain? (*NOTE: If Ditch Indicated In #9 Above Skip To: 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: 6

III. Biology	Absent	Weak	Moderate	Strong		
1) Are Fish Present?	0	.5	1	1.5		
2) Are Amphibians Present?	0	1	1	1.5		
3) Are Aquatic Turtles Present?	0	.5	1	1.5		
4) Are Crayfish Present?	0	.5	1	1.5		
5) Are Macroinvertebrates Present?	0	1	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?	SAV 2	Mostly OBL 1	Mostly FACW 1.5	Mostly FAC 5	Mostly FACU 0	Mostly UPL 0

(*NOTE: If Total Absence Of All Plants In Streambed As Noted Above Skip This Step UNLESS SAV Present*)

SECONDARY BIOLOGY INDICATOR POINTS: 1.75

TOTAL POINTS (Primary + Secondary) = 29.25 (If Greater Than Or Equal To 19 Points The Stream Is At Least Intermittent)

