Little River Corridor Open Space Plan

Adopted by the:
Durham Board of County Commissioners on August 27, 2001
Durham City Council on November 19, 2001

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Preparation of the Little River Corridor Open Space Plan would not have been possible without the support of people who live in the Little River area and contributed to this plan. Many hours of volunteer effort in thinking and talking about Durham's special places provided a sound basis for the Plan.

Special thanks go to **Edgar Johnson** and the **Little River Community Complex** for the use of their fine facility for meetings. Also, special thanks go to the **Eno River Association** and the **Triangle Land Conservancy** for their support of the planning effort and of open space protection in Durham.

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(Cover photo is of the North Fork of the Little River at South Lowell Road by Korest)

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I. Introduction

The Little River corridor and surrounding landscape are one of Durham County's best-kept secrets. The rolling hillsides are comprised of farms, woodlands, pasture lands, historic home sites and meandering streams. Nature's forces have subtly shaped the landscape for the past 600 million years.

The Little River itself is both beautiful and environmentally significant. Upstream from the Little River Reservoir, the river is characterized by scenic gorges, rocky riffle sections, steep rocky bluffs and wooded scenery that delight the senses. Steep north-facing slopes create a cool microclimate that supports rhododendron and mountain laurel groves more typical of the mountains. The river's water quality is exceptional, rated as Water Supply II (WS II) by the NC Environmental Management Commission. The high water quality of the Little River provides habitat for significant riparian animal species, particularly mussels, which are increasingly rare or threatened in the State. As a result, the state's Natural Heritage program has rated the aquatic habitat found in the upper Little River as of "State-significance."

The corridor is threatened by dramatic land use changes over the next decades if special plans are not put in place now. There is very little publicly owned land along the river. As the City of Durham, Research Triangle Park, Treyburn and the surrounding Triangle area continues to grow, increasing development in the Little River area will likely permanently change much of the corridor's natural beauty and character.

A. The Importance of an Open Space Plan

There is much that is already known about the value of the Little River corridor study area—about its history, natural heritage and scenic beauty. The Plan can help to protect these important features of the area by summarizing this different knowledge in one document. It can evaluate the area's most important ecological and cultural features, land ownership patterns and opportunities, and future challenges. The plan can recommend

public and private strategies for protecting the area's most important assets, and provide a focus for both public and private actions over the coming years.

Unlike the Eno and Flat Rivers, there is very little permanently protected open space along the Little River. For instance, the Eno River is relatively well protected with a continuous five-mile open space corridor stretching from Orange County to Roxboro Road. The Eno River corridor has been largely preserved as a state park along much of its length, with additional acquisition by the City of Durham and the Army Corps of Engineers. Similarly, the Flat River also has significant portions of its length in some form of permanent open space, either preserved as part of the NC State Hill Forest or as buffer lands for Lake Michie. In contrast, there is little public or permanently protected open space from the Little River Reservoir upstream except the buffer lands surrounding the reservoir itself. Downstream of the Reservoir, most of the river and surrounding floodplain have been publicly acquired as part of the Falls Reservoir.

The Little River plan will provide a framework and guide for land use decisions and development over the coming decades. The plan can help guide both public policy decisions and private actions along the corridor. Public action alone will be insufficient to preserve the Little River corridor. A partnership is needed between Durham County, landowners along the corridor and non-profit organizations. This plan will provide a framework and focus for these efforts that could be used over the coming decades.

Adoption of the Little River Corridor plan is just the beginning. The plan's success will be measured by its use to guide future decisions, both public and private, within the planning area.

B. What is Open Space?

Open space refers to undeveloped lands that are mainly natural in character. Some open space is publicly owned, such as parks and reservoir buffer lands. Public open space provides an opportunity for people to enjoy natural areas—to hike, bird watch, fish or picnic. Some parks are created for more organized sports, such as softball or soccer. Other public open space is not intended for public recreation use, such as the buffer lands purchased by the City of Durham for water quality around the Little River Reservoir.

Still other open space is privately owned and not open to the public. This type of visual open space may include farms,

woodlots and golf courses. Many people derive great enjoyment from viewing private open space such as pasturelands, farm animals, forested lands and streams. The views of farms and forests around each bend on South Lowell Road are examples of visual open space. As new developments replace former farms and forest with homes, the character of northern Durham will change, and some of its scenic rural character and visual open space will be altered.

Different types of open space serve varying purposes. Farms contribute jobs and money to Durham's local economy. The natural vegetated land adjacent to our rivers and streams helps to reduce sedimentation and runoff into our streams, protecting downstream water quality. Our rivers and streams provide homes for fish and other aquatic species. The lowlands and slopes adjacent to rivers and streams often provide prime habitat for birds and other wildlife since these areas are often the last land to be developed for homes or agriculture.

Open spaces, both public and private, are often well loved by those in the area who use it or see it on a regular basis. Open space helps to form the "heart" of an area's character. Open spaces open to the public such as the Eno River State Park and Duke Forest are favorite places to take visiting friends, and are often cited as reasons that the Triangle region is such an attractive place to live.

C. The Planning Process and Community Involvement

1. Drafting the Plan

The process used for creating an open space plan in Durham is a careful balance of citizen participation and the work of Planning Department professionals. The Durham City-County Planning Department collected information about the Little River Basin during 2000. This information was used to prepare the Existing Conditions section of the Little River Corridor Open Space Plan. Sources of information included the soil survey maps, aerial photographs, botanical, zoological, archaeological and historic information. The Planning Staff conducted field surveys and information was provided by other departments, governmental agencies and local residents.

2. Citizen Participation

The citizen participation process used to develop this Plan involved a series of meetings held in the Little River Community Complex. Staff from the Durham City-County Planning

Community meetings were held with interested citizens and Staff to develop the Plan. *(Luck)*

Department held several meetings with interested citizens between June 2000 and May 2001. Citizens and staff reviewed the natural history of the area, goals for open space preservation and strategies for open space preservation related to each of the key goals identified. A special meeting was held with experts from the Eno River Association and the Triangle Land Conservancy to discuss the benefits of conservation easements. Potential recommendations to elected boards were reviewed and discussed. The full draft plan was reviewed at two community meetings in May 2001.

3. Plan Adoption

The Planning Committee of the Durham Planning Commission reviewed the Little River Corridor Open Space Plan and held a public meeting to receive comments on June 13, 2001. After consideration of citizens' comments and discussion, the Planning Committee voted to recommend that the County Board of Commissioners and the City Council adopt the Little River Corridor Open Space Plan. The Board of County Commissioners and the City Council considered the plan with a presentation and public comment in August 2001. The Board of County Commissioners adopted the Plan on August 27, 2001 and the City Council adopted the Plan on November 19, 2001.

D. Organization of This Plan

The Little River Corridor Open Space Plan is organized into four sections. Section I describes the Plan's overall direction, purpose and format. It describes the process carried out by citizens and planners to create the Plan. Section II summarizes the existing conditions in the Little River area, including its natural and historic setting. Section III of the Plan includes goals and policies intended to guide the preservation of open spaces in the Little River corridor. Section IV identifies specific recommendations that should be carried out.

II. Existing Conditions

A. The Little River Study Area

The Little River watershed begins in northeastern Orange County, as the North and South forks. (See Figure 1, Little River Context and Figure 2, Little River Study Area.) The two forks join to become the Little River in northern Durham County, and the river flows southward about three miles until it becomes inundated as part of the Little River Reservoir. Below the reservoir, the river flows southward another four and a half miles until it joins the Eno River, just east of where the Eno crosses under Old Oxford Road. The Eno soon joins the Flat River to form the Neuse River, which has now been impounded to form the Falls Reservoir. Below Falls Reservoir, the Neuse River continues its southeastward course, eventually reaching the coast. The Little, Eno, and Flat Rivers are all considered major tributaries in the "Upper Neuse River basin." The Little River study area in Durham includes approximately 42 square miles (26,700 acres).

The Durham County portion of the Little River watershed is a mix of rural, suburban and urban uses. Farmland and woodlands are still common throughout the area, but new home sites have replaced many former fields. The southern portion of the watershed is within the City of Durham's Urban Growth Area (UGA) boundary and, as a result, is developing with a mixture of industrial, institutional and smaller lot residential development.

B. Physical and Natural Features of the Corridor

1. Geology and Topography

The northern two-thirds of the Little River study area is within the Carolina slate belt, a geologic unit that was formed by volcanic action over 600 million years ago. Within the study area, the Carolina slate belt extends from the Durham County and Orange County line in the west down to the southern edge of the Little River Reservoir. These meta-volcanic rocks are highly resistant to weathering and the erosive forces of water. As a result, the river

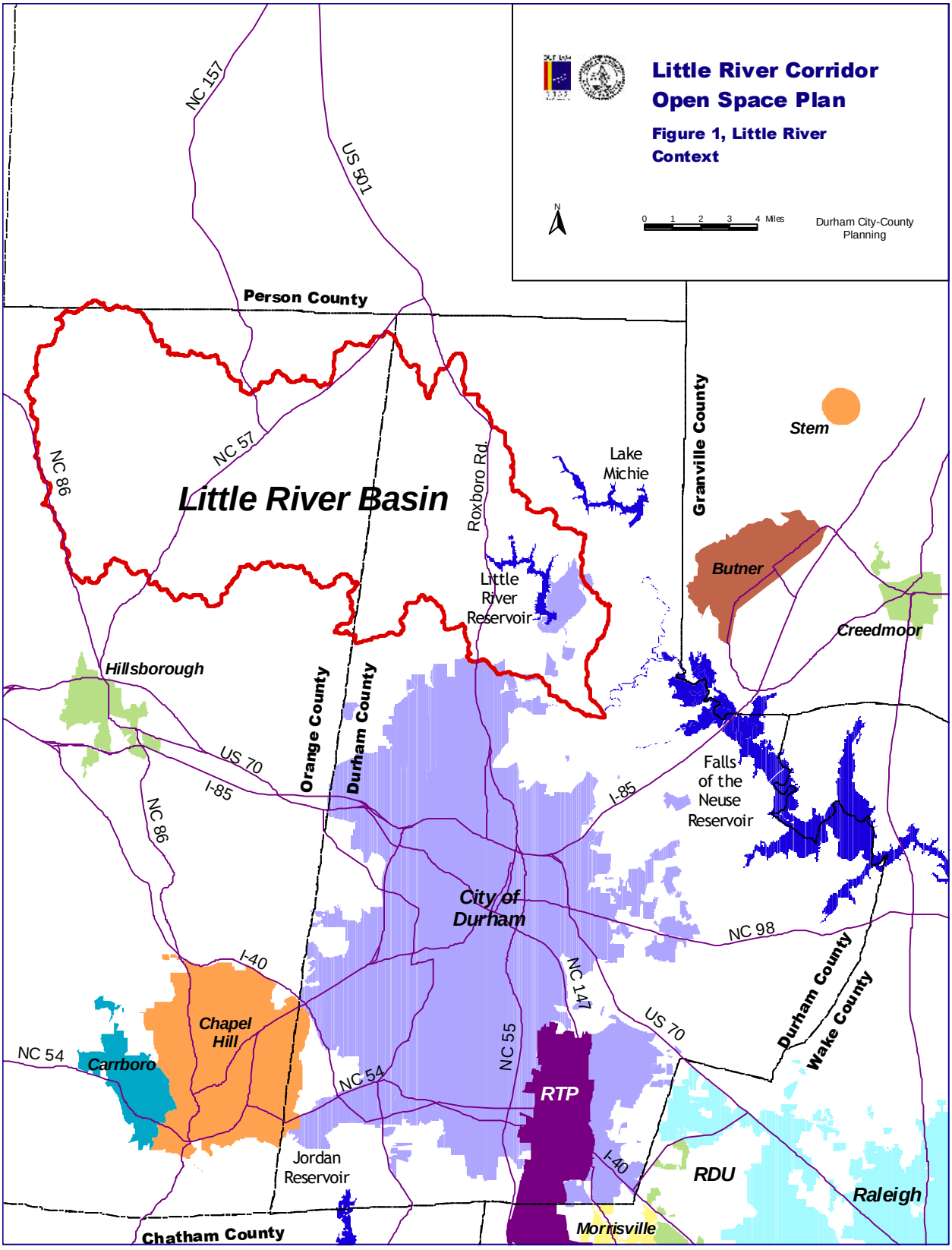
and its tributaries have carved steep channels in places, with rock outcrops and dramatic bluffs overlooking the river. The floodplains are relatively narrow compared with the Triassic basin geology downstream. Approximately eight miles of the river underlain by the Carolina slate belt are now inundated as part of the Little River Reservoir.

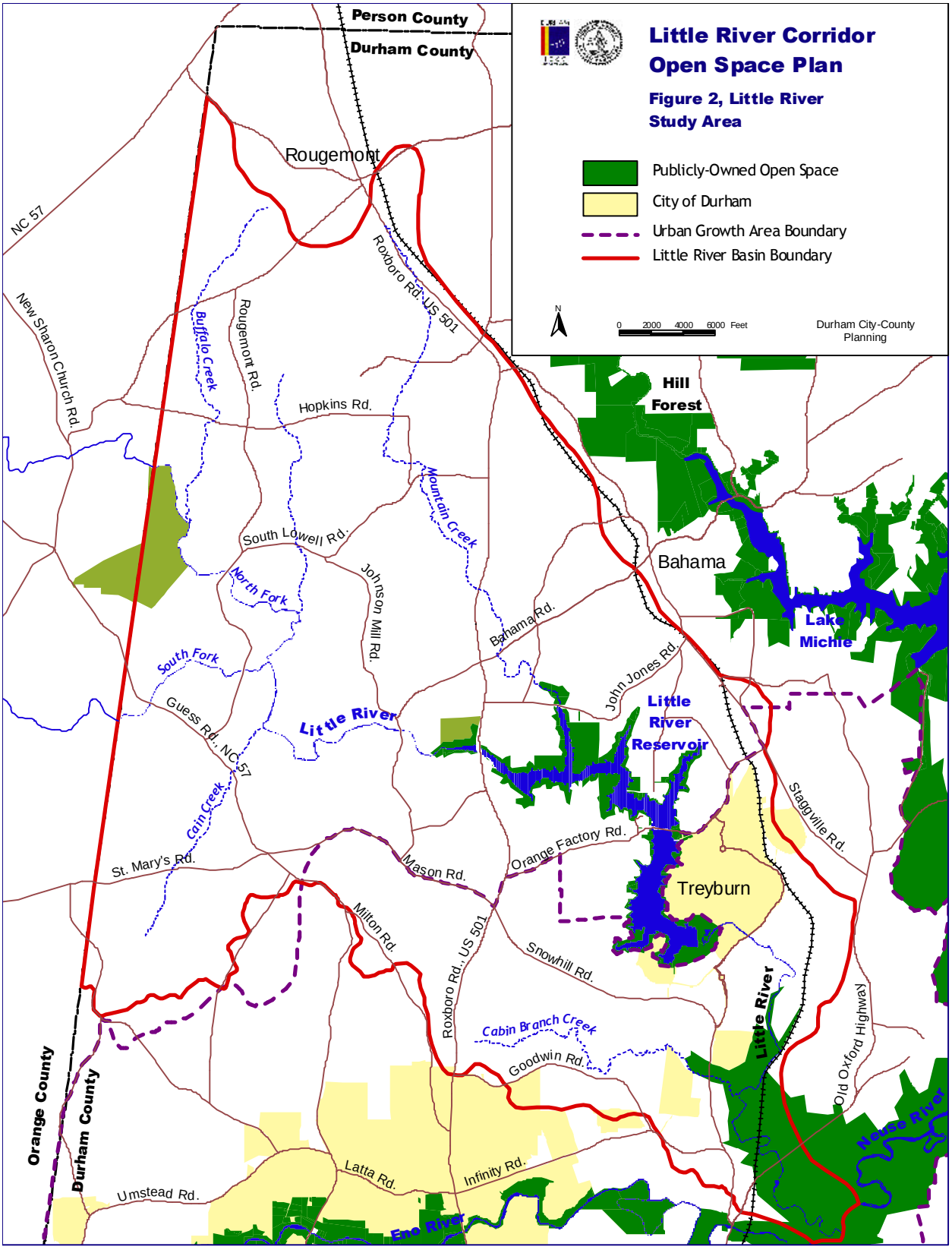
The southern tip of the study area, from about Vintage Hill Parkway south, is part of the Durham Triassic basin. The Triassic basin is made up primarily of sedimentary rocks formed approximately 200 million years ago. The dam for the Little River Reservoir is very near the fault line that divides these two types of geology, as is the dam at West Point on the Eno to the south in the vicinity of Roxboro Road.

Compared with the slate belt, the topography within the Triassic basin is more gently rolling, the rock outcrops fewer and the gradient of the river gentler. The floodplains adjacent to the rivers and creeks are generally much broader and flat. Because sedimentary rocks offer much less resistance to the erosive forces of water, the channel of the river or creek has migrated over the past millions of years, creating broad floodplains. As a result, the Little River floodplain is quite wide here, averaging several hundred feet. The difference is also noticeable with smaller tributaries.

2. Famous Fossils

In 1975, geologists researching the Carolina slate belt discovered fossilized worms within rocks along the North Fork of the Little River. The annelid worms, a form of "metazoa" (multi-celled animal), were sometimes a foot long, and were found in a section of metamorphosed volcanic rock 620 million years old. It was thought that the worms lived on the shores of the volcanic islands that were believed to have existed here in pre-Cambrian times[1]. For several years, the discovery was considered the oldest record of fossils found in North America. The findings were reported in the July 1976 *American Scientist* publication. Dr. Duncan Heron, a geology professor at Duke University, oversaw the quarrying process to remove the rock in which the fossils were found, which was put on display at the Smithsonian Museum in Washington, DC.


Little River Corridor
Open Space Plan
Figure 1, Little River
Context
N
0 1 2 3 4 Miles
Durham City-County
Planning
Person County
Granville County
Stem
Lake
Michie
Roxboro Rd
Little River Basin
Little
River
Reservoir
Butner
Creedmoor
Hillsborough
Orange County
Durham County
Falls
of the
Neuse
Reservoir
City of
Durham
Chapel
Hill
Carrboro
RTP
Jordan
Reservoir
RDU
Raleigh
Morrisville
Chatham County
Wake County
NC 157
US 501
NC 86
NC 57
US 70
I-85
I-40
NC 54
NC 55
NC 147
NC 98


Little River Corridor
Open Space Plan
Figure 2, Little River
Study Area
Publicly-Owned Open Space
City of Durham
Urban Growth Area Boundary
Little River Basin Boundary
N
0 2000 4000 6000 Feet
Durham City-County
Planning
Person County
Durham County
Orange County
Durham County
Rougemont
NC 57
New Sharon Church Rd.
Buffalo Creek
Rougemont Rd.
Roxboro Rd., US 501
Hopkins Rd.
Mountain Creek
South Lowell Rd.
North Fork
Johnson Mill Rd.
South Fork
Guess Rd., NC 57
Little River
Cain Creek
St. Mary's Rd.
Hill
Forest
Bahama
Bahama Rd.
Lake
Michie
John Jones Rd.
Little
River
Reservoir
Staggville Rd.
Orange Factory Rd.
Treyburn
Mason Rd.
Milton Rd.
Roxboro Rd., US 501
Snowhill Rd.
Cabin Branch Creek
Goodwin Rd.
Little River
Old Oxford Highway
Neuse River
Umstead Rd.
Latta Rd.
Infinity Rd.
Eno River

3. Creation of the Little River and Falls Reservoirs

The character of the Little River was permanently altered by the construction of the Little River Reservoir. The reservoir location was intentionally picked to take advantage of a river section characterized by a steep channel carved into the Carolina slate belt. The steeper topography allowed the reservoir to hold significantly more water than an equal sized reservoir built with flatter topography. The surface area of the reservoir is approximately 530 acres, and the average depth is about 27 feet. Approximately eight miles of free flowing river and most of the historic Orange Factory mill town were inundated by the reservoir. The reservoir project required the acquisition of 880 acres and produced around 20.5 miles of new shoreline.

How Reservoirs Affect Aquatic Species

Aquatic species such as fish and mussels are vulnerable to fragmentation of their habitat by the creation of reservoirs along the length of the tributary. "Fragmentation" is a term used to describe when populations become separated and isolated from one another. As this happens, the remaining populations become more vulnerable to being wiped out by disease or other natural events.

The Little River is a classic example of this situation. The creation of the Falls Reservoir downstream isolates the riparian populations of fishes and mussels in the Little River from those living in the Neuse River downstream.

Along the Little River upstream from Falls Lake, the Little River Reservoir further divides this river corridor by isolating the free-flowing stretches above the reservoir from the downstream portions of the river. Lake Michie Reservoir along the Flat River has equally affected the aquatic species along this fellow Neuse River tributary.

The Little River Reservoir construction was begun in the mid 1980's and completed in 1987. The reservoir was needed by the City of Durham to supplement the raw drinking water supplied by the Lake Michie Reservoir on the Flat River. The reservoir essentially doubled the City's raw water supply. Continued population growth has required that the City plan for further water supply expansions. Presently the City has asked the State for permission to use an allocation of water from Jordan Reservoir to the south. If the City were not successful in receiving that allocation, its second alternative would be to expand the size of Lake Michie.

4. The Aquatic Ecology of the Little River and Tributaries

The uplands that drain into the Little River and its tributaries are still relatively wooded and undeveloped compared with other portions of the Triangle region. This includes those portions of the drainage basin within Orange County. The portions of the Little River upstream from the Reservoir also have few, if any, package wastewater plants or other point-source pollutants. As a result, the water quality of the river is very high and supports a wide diversity of aquatic species. The *Durham County Inventory of Important Natural Areas, Plants and Wildlife* ("the Durham Inventory") provides the bulk of the knowledge of the study area's most significant species and habitats. According to the Durham Inventory, the Little River corridor upstream from the reservoir has

been rated by the State's Natural Heritage program as of "State significance" due to the presence of the rare mussel species still surviving there.

Mussels are particularly dependent on high quality water and are vulnerable to the effects of urbanization (see inset box). Mussels found in the upstream sections of the river and North and South Forks include five species that are monitored by the state due to their rarity. Three species - the yellow lampmussel *(Lampsilis cariosa)*, the Atlantic pigtoe *(Fusconaia masoni)*, and the triangle floater *(Alasmidonta undulata)* are listed by the State of North Carolina as "threatened", and which would also be eligible as candidates for the Federal endangered species list. Two other rare species found in the river include the squawfoot *(Strophitus undulatus)*, which is classified by the State as threatened, and the notched rainbow (*Villosa constricta*), which is classified by the State as significantly rare.

The high water quality also provides excellent habitat for other aquatic species that depend on very clean waters or high species diversity. Otter (*Lutra canadensis)* and mink *(Mustela vison)* are known to inhabit the upstream portions of the river and its forks. Both species feed heavily on fish, crayfish and other aquatic animals, so they are found only in rivers and creeks with healthy aquatic populations. Thirty-six species of fish have been recorded within the Little River, including eight species that are indicators

Mussels, the Aquatic "Canaries of the Coal Mine"

Mussels are considered important indicators of high water quality, similar to the way canaries were used historically to indicate good air quality in the coalmines. Unlike land animals and many other aquatic species, a mussel lives in the stream bottom, and can't relocate if the water quality becomes poor. Mussels are "filter feeders", which means they feed off the nutrients they find in the moving waters. They are entirely dependent on a stream's water quality for all aspects of their life cycle. Because of this, they are very sensitive to changes in water quality, including changes resulting from sediment and runoff from upstream construction or clear cutting, pesticides, herbicides, fertilizers from agricultural runoff, and discharges from municipal or private wastewater treatment plants. Studies have shown that as little as a one-quarter of an inch of silt covering the bottom could be lethal to as many as 90% of mussels[2].

In addition, mussels are dependent on fish species for an early part of their life cycle. Fish provide a host for the tiny mussels nymphs, which hitch a ride on fish as they move up and down the river. As reservoir construction has created barriers for fish migration and movement, the long-term survivability of many of our more rare mussel species is further threatened. Because of these multiple vulnerabilities, mussels are some of the most threatened species across the United States. In North Carolina alone, over half of the 63 species still believed to be in existence are State-listed as endangered, threatened, or of special concern. According to Dr. Steve Hall, a zoologist with the State's natural heritage program, "It is no coincidence that the streams that still possess healthy mussel populations are also rich in aquatic insects, possess a high diversity of fish, and support large populations of wood ducks, otter, mink, and muskrats. Likewise, it is no accident that a reduction in the number of the mussels signals a corresponding and inevitable impoverishment of the rest of the river fauna" [3].

of high quality waters. One of these species, the mimic shiner *(Notropis volucellus),* has been found at only a few sites within the Piedmont[4]. The Roanoke bass *(Ambloplites roanokensis)*, considered a valuable game fish, has also been caught in the Little River. It is found only in the Neuse, Tar, and Roanoke River basins. Beaver, and a variety of water birds such as the Great Blue Heron *(Ardea herodias)* are common along waterways throughout the study area.

The species diversity in the river south of the reservoir is not nearly as rich as that found in the upstream portions of the study area. The water quality in this stretch of the river shows evidence of greater siltation and other aspects of urbanization. Despite this, the more common species of mussels can still be found along rocky stretches of the river, indicating at least good water quality. The character of the riparian habitat also changes here because the river and its tributaries now flow through the Triassic basin. Beaver impoundments support populations of wood ducks *(Aix sponsa)* and eastern newts *(Notophthalmus viridescens)* which both benefit from the creation of permanent still water habitats.[5] The Durham Inventory notes that a fairly diverse fish population used to inhabit this stretch of river, but the records were prior to the impoundment of Falls Reservoir, which is assumed to have affected these species. In general, the area south of the reservoir has not been as well researched as the portions of the corridor upstream from the reservoir.

C. Upland Plant Species and Animal Habitats

The lands adjacent to the Little River and its tributaries, and the surrounding uplands within the Little River basin provide excellent habitat for many types of animal and plant species. Due to the lack of publicly accessible lands, most portions of the Little River basin have not been studied in as much detail as the lands surrounding either the Eno or the Flat River corridors. However, the species diversity appears comparable to locations inventoried along those river corridors. The rich variety of both plant and animal species is due in large part to the amount of undeveloped land remaining in the watershed. These less disturbed lands provide important habitats for animals that are less tolerant of humans. While the gently sloping uplands in the area have supported agricultural development for over a century, the steeper topography adjacent to the main streams was not ideal for agriculture or home sites. As a result, these areas have seen relatively little disturbance compared to most lands in Durham.

1. The North and South Forks and Surrounding Lands

The North and South Forks and the portion of the Little River upstream from the reservoir are characterized by sections of rocky bluffs and steep topography typical of the Carolina slate belt. Flatter portions of floodplain link these rocky, steep sections where the underlying rocks were less resistant to the river's weathering forces. Along the steeper north-facing slopes that abut the river, mountain laurel *(Kalmia latifolia)* and wild azaleas *(Rhododendron nudiflorum*) are found. Patches of dwarf crested iris *(Iris cristata),* hepatica *(Hepatica americana*), bloodroot *(Sanguinaria canadensis),* wild geraniums *(Geranium maculata)* and other favorite spring wildflowers are common along the riverbanks up and down the corridor. Occasional patches of more unusual wildflowers such as black cohosh *(Cimicifuga racemosa)* or yellow lady slipper orchids *(Cypripedium calceolus)* may be found throughout the basin.

Since the river and its tributaries are privately owned, many stretches have not yet been studied for significant wildlife and botanical species. For instance, within the recently acquired Little River Regional Park, three large populations of Catesby trilliums *(Trillium catesbaei)* have been found on sloping hillsides, a species previously not documented along the Little River. The Durham Inventory only cites two other Durham County locations for this uncommon trillium, along the Eno and Flat Rivers.

Catesby trilliums are found along the Little River in Durham County. *(NC Natural, Wildflowers of North Carolina)*

According to the Durham Inventory, the upper portion of the Little River study area supports numerous species that require extensive forested areas, including broad winged hawk *(Buteo platypterus*), barred owl *(Strix varia)* and pileated woodpecker *(Dryocopus pileatus*). Wild turkey *(Meleagris gallopavo)* is another species that requires large areas of woodlands and turkeys have been seen along upland tracts that border the Little River, the North Fork of the Little River and Buffalo Creek, a major tributary that flows into the North Fork. Other bird species

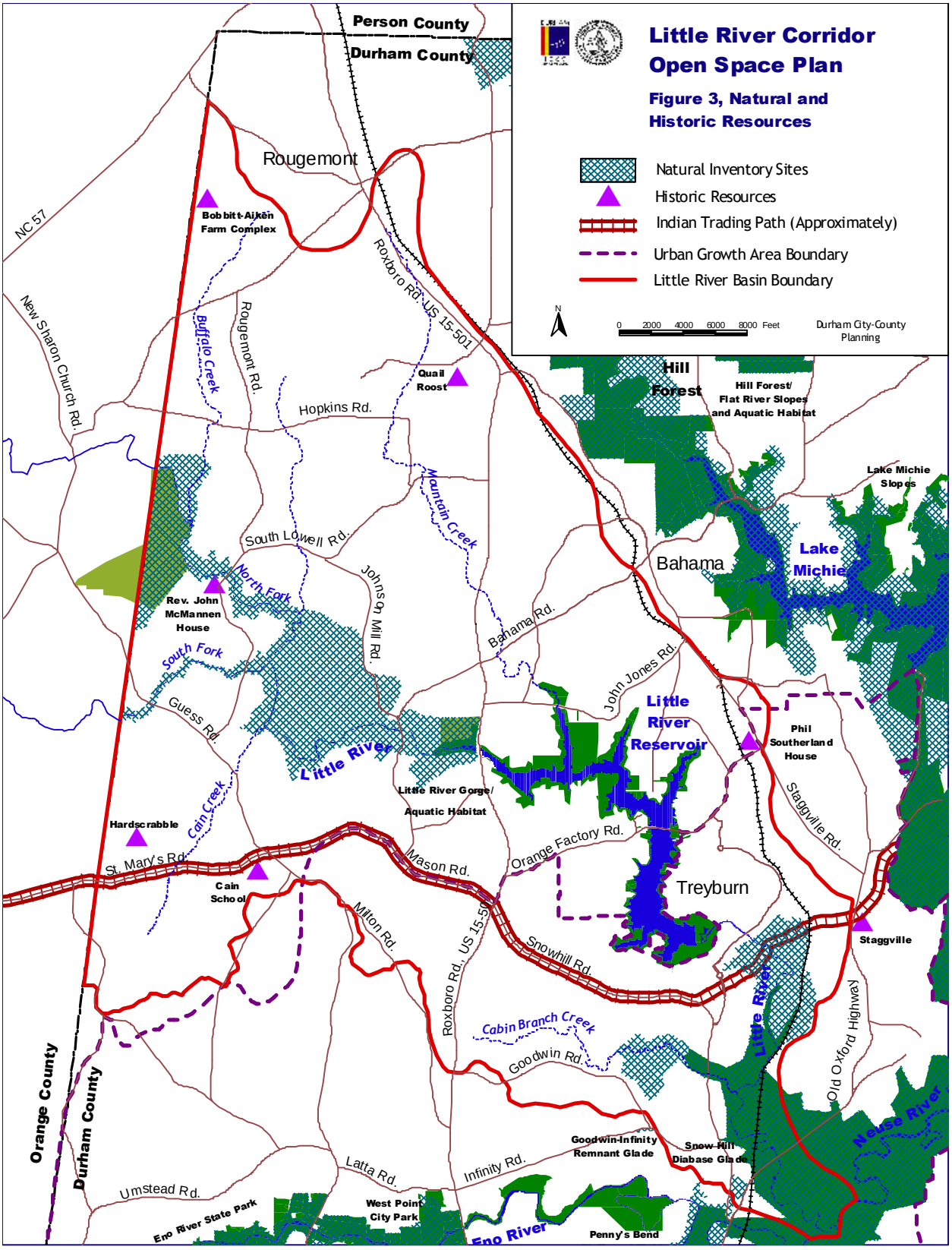
requiring large woodlands that are familiar to local residents include sharp-shinned hawk *(Accipiter striatus),* coopers hawk *(Accipiter cooperii),* whippoorwill *(Caprimulgus vociferous),* yellow-billed cuckoo *(Coccyzus americanus)* and scarlet tanager *(Piranga olivacea).* If these and other forest-interior species are going to continue to survive and thrive in the Little River basin, it is important some large blocks of permanent habitat be preserved.

According to the State's Natural Heritage Program, large upland sites of 400 acres or greater are particularly important for more sensitive species of wildlife which require extensive blocks of wooded land and are intolerant of human disturbance. When suitable habitat is no longer available due to encroachments from new development, some of these species will cease to reproduce in the area, and may disappear from the area over time[6]. The Durham Inventory indicated two large wooded areas as particularly important for habitat due to their sheer size. One area, referred to as the "Little River Uplands," is located on the north side of the Little River and west of Johnson Mill Road. The other site is located on the west side of the North Fork of the Little River, and will be partly preserved as the new Little River Regional Park.

2. The Little River Gorge

The Durham Inventory highlighted the habitat found along the rocky gorges and steep bluffs that line the Little River between Johnson Mill Road and Roxboro Road. Steep bluffs line the river, rising between 60 and 140 feet high in places and creating gorge-like conditions. The south-facing slopes receive sun all day, creating drier and more open conditions, which support "thickets of blueberries and woodlands dominated by post oaks, chestnut oaks, shortleaf pine and other species tolerant of dry conditions"[7].

By contrast, the north-facing slopes create cooler conditions that support large patches of mountain laurel *(Kalmia latifolia*), galax *(Galax aphylla*) and wintergreen *(Gaultheria procumbens*), all species more common to the mountains.[8] During one visit, the zoologist who worked on the Durham County Inventory recorded eleven species of forest interior birds, neo-tropical migrating birds. The steep north-facing slopes are also ideal habitat for regionally rare species such as red-backed salamanders *(Plethodon cinereus*), and worm-eating warblers *(Helmitheros vermivorus).* However, since the area is privately owned, it was not extensively surveyed to confirm the presence of these and other species.


Little River Corridor
Open Space Plan
Figure 3, Natural and
Historic Resources
Natural Inventory Sites
Historic Resources
Indian Trading Path (Approximately)
Urban Growth Area Boundary
Little River Basin Boundary
N
0 2000 4000 6000 8000 Feet
Durham City-County
Planning
Person County
Durham County
Orange County
Durham County
Rougemont
Bobbitt-Aiken
Farm Complex
NC 57
New Sharon Church Rd.
Buffalo Creek
Rougemont Rd.
Roxboro Rd. US 15-501
Quail
Roost
Hopkins Rd.
Hill
Forest
Hill Forest/
Flat River Slopes
and Aquatic Habitat
Lake Michie
Slopes
Mountain Creek
South Lowell Rd.
Bahama
Lake
Michie
North Fork
Rev. John
McMannen
House
Johnson Mill Rd.
Bahama Rd.
South Fork
John Jones Rd.
Guess Rd.
Little
River
Reservoir
Phil
Southerland
House
Little River
Little River Gorge/
Aquatic Habitat
Cain Creek
Hardscrabble
Staggville Rd.
St. Mary's Rd.
Mason Rd.
Orange Factory Rd.
Cain
School
Treyburn
Milton Rd.
Staggville
Snowhill Rd.
Roxboro Rd. US 15-501
Little River
Cabin Branch Creek
Goodwin Rd.
Old Oxford Highway
Neuse River
Goodwin-Infinity
Remnant Glade
Snow Hill
Diabase Glade
Latta Rd.
Infinity Rd.
Umstead Rd.
Eno River State Park
West Point
City Park
Eno River
Penny's Bend

The Inventory concludes that the gorge area can be expected to produce an even richer species list with further field survey work. The Inventory management recommendations note that the gorge area should be protected from further development, and also from the unmanaged human use occurring along this scenic but delicate stretch of river. Topographic maps show similar topography on steep slopes lining the river upstream from Johnson Mill Road. While they were not surveyed during the fieldwork for the Durham Inventory, these additional locations are likely to contain similar unusual habitat along the north-facing steep slopes overlooking the river.

3. The Lower Little River and Cabin Branch Creek

The lower portion of the study area south of the reservoir is characterized by flat, broad floodplains typical of the Triassic basin. The floodplain includes large areas with weedy or non-native species, a typical sign of past agricultural or pasturing use, probably associated with the former plantations that once encompassed this area. The floodplain along the Little River has only two owners in this section, Treyburn and the U.S. Army Corps of Engineers. A number of power line easements have cut though this bottomland wooded habitat, but according to the Durham Inventory, a variety of species that need large, relatively undisturbed forest habitats are still found here. These include red-

Terms used in Planning for Wildlife Habitat

Edge species describe wildlife that can thrive in areas that are a combination of woodland and open areas. Forests bounded by pastures, grassed backyards, or sewer easements are examples of this edge habitat. Raccoons, opossums, cardinals, blue jays, cow birds, red-tailed hawks and deer are all considered edge species.

Interior Species prefer or require large blocks of forestland with few roads, power lines or other intrusions. Box turtles, ovenbirds, barred owls, pileated woodpeckers, scarlet tanagers, wild turkeys, red-shouldered hawks, and bobcats fit into this category. These interior species find their preferred habitat declining as new home sites and roads are built into large blocks of woodland, converting more of the woods from interior habitat into edge habitat. These species particularly benefit from the retention of large Wildlife Habitat Areas.

Wildlife Habitat Area is a term used in this plan to describe a large area of mostly undisturbed forestland that is sizable enough to meet the needs of native woodland species for food, breeding, and other habitat needs. The Habitat Areas emphasize retention of interior habitat for those species that depend on these declining areas. Wildlife ecologists have also described these areas as "islands" or more recently as "patches".

Wildlife Movement Corridors describe the strips of forestland, typically along streams that can link Habitat Areas so that wildlife can safely move between the larger areas. When movement corridors link the larger habitat areas to provide an inter-connected system, the wildlife populations will be healthier and have greater long-term viability**.**

shouldered hawk *(Buteo lineatus)*, barred owl *(Strix varia)*, hairy woodpecker *(Picoides villosus)*, and pileated woodpecker *Dryocopus pileatus*). Ground nesting species that are sensitive to human disturbance, such as woodcock *(Scolopax minor)* and the Louisiana waterthrush *(Seiurus motacilla)*, have been recorded here, although nesting was not confirmed.[9] The Corps of Engineers has built a seasonally flooded sub-impoundment north of Old Oxford Road to provide habitat for wintering waterfowl.

Extensive beaver activity along Cabin Branch Creek in the vicinity of Snow Hill Road has helped to create natural marshes that support species such as wood ducks *(Aix sponsa)*, herons and common yellow-throats *(Geothlypis trichas)*. The marshes are alive in the spring with the mating calls of a variety of frogs. The plant and animal species along Cabin Branch Creek west of Snow Hill Road has not been well studied. Local residents indicate a variety of wildlife thrive in the largely undeveloped floodplain and minor creeks that feed them. The Cabin Branch Creek floodplain is surrounded by residential development and institutional uses. Because of the increased amount of urban development surrounding this tributary, the wildlife inhabiting this area is more likely to be human-tolerant species such as deer, raccoons and opossums.

Significant plant species that have been found along Cabin Branch Creek include Douglas's Bittercress *(Cardamine douglassii*), which is listed as "significantly rare" by the State with only 15 populations recorded for the entire State. It is found only rarely along moist floodplains near creeks. On slightly higher ground, a population of Lewis's heartleaf (*Hexastylis lewisii*) has been recorded in this area. It is a State-listed "candidate" species, and has been found in only 41 locations in Virginia and North Carolina. A green variation of the "Little Sweet Betsy" trillium (*Trillium cuneatum var. luteum*) is found along Cabin Branch Creek near the confluence with the Little River. While not a State-listed plant species, it is rarely found in the Piedmont, and this is the only known Durham County site for this species.

4. Upland Grassland and Early Succession Habitat

The Little River basin area contains many open fields and early successional grasslands that provide important habitat for species that require more open areas and brushy habitats. Locations such as Quail Roost Farms are noted by local birders as places where many field species such as bobolinks, meadowlarks, and grasshopper sparrows are still common. These species, while not as well documented as others in the Durham Inventory, have been

suffering population declines in recent decades that have been attributed to habitat losses.

According to the State of N.C. Wildlife Resources Commission, grassland and early successional species have been hurt by two trends – "Small Farms and frequently disturbed woodlands once provided ideal habitat for 20 to 25 species of birds whose numbers have dwindled, including prairie warblers, field sparrows, and meadowlarks. Bobwhite quail alone have declined 80 percent since 1966. At the same time fields of tall grasses and scrub have been steadily displaced by large clean farms, more mature woodlands, and denser residential developments." [10]The lack of natural fires that set back the field succession and the change in forestry practices have also contributed to species decline.

The decline of grassland habitats has also impacted small mammals such as rabbits, mice and similar animals and the predator species that depend upon them for survival. Management for these important habitats can include co-operative landowner agreements, conservation easements and wildlife management programs through state and local agencies.

D. Historic and Cultural Features

1. Native American Culture Prior to 1600

The Carolina Piedmont shows evidence of habitation by native people for thousands of years. Long before the European explorers began to explore Durham by way of the Great Indian Trading Path, Native Americans inhabited the Little River area and the rest of Durham County. Our knowledge of Native American history in Durham County is still fairly limited. Most of what is known of the Little River study area is gleaned from archaeological studies performed for Falls of the Neuse Reservoir, the Little River Reservoir, the Teer Quarry off of Bacon Road, and for the Treyburn development.

The history of Native American civilizations is divided into generalized time periods. The Paleo-Indian Period is the oldest, generally from 10,000 to 8000 B.C. Little is known about the life of these people, although it is believed they were primarily nomadic hunters and gatherers. The Archaic Period is from approximately 8000 to 1000 B.C. and is divided into Early, Middle, and late Archaic time periods. The Woodland Period from 1000 B.C. to 1600 A.D. is marked by the appearance of farming, ceramics, the bow and arrow and may include the construction of burial and

temple mounds in some locations. The Historic Period from 1540 on includes the time when Native American cultures began interacting with European traders and explorers.

Tool manufacture was a major part of Native American livelihood. Current archaeological evidence suggests that the geographical focus for early archaic lifestyles centered on sources of stone outcrops that yielded valuable raw material suitable for tool manufacture.[11] In the Piedmont, this raw material consisted of high quality meta-volcanic rocks found in the slate belt, in particular, rhyolite and chert. This was true for both the Paleo-Indian Period and the Archaic Period. Much of the rhyolite used in the Piedmont is believed to have come from major sources in and around the Uwharrie Mountains in Stanley and Montgomery Counties. However, when local sources of the stone could be obtained, they were used as source for raw material. Chert is another type of stone used for tool manufacture that is more commonly found in the mountains than the piedmont.

The Little River study area includes some scattered locations where local sources of both rhyolite and chert can be found. Rock outcrops that provide a suitable source of stone for tool manufacture are referred to as "quarries". The North Fork of the Little River contains at least one identified quarrying site that has been studied by archaeologists. The study found that the quarrying site was used over a period of several thousand years as a source of stone for the early stages of tool manufacture. Sites such as these, and others that may be found in the future, are an important part of Durham's cultural heritage and should be protected from harmful impacts.

Additional evidence of Native American presence can be found throughout the Little River study area. Most of the documented sites are scattered and isolated finds, for instance, a chip or piece of stone flaked off during tool manufacture or an isolated arrowhead. Within the study area there have also been some sites that contained a number of artifacts, and which appear to be encampments or other places with more extensive occupation. The sites range in time period from Paleo-Indian to Woodland Period, with most from the Archaic Period. The information from these sites was summarized by archaeologists and sent to the State to be reviewed for their eligibility for the National Register of Historic Places. While this designation is better known for historic homes, archaeological sites are also eligible to be nominated when the site "has yielded, or may be likely to yield, information important in prehistory or history."[12]

Presently, there has been one archaeological site within the Little River Study area that was eligible to be on the study list for the National Register of Historic Places. However, sites that are not significant enough to be eligible for the National Register still have value as a part of Durham's cultural heritage due to the unique information they may contain about Durham's little known earliest inhabitants. The Little River study area is considered by archaeologists to contain excellent conditions for numerous Native American archaeological sites. These conditions include local sources of stone for tool manufacture, upland forests that provided habitat for squirrels, deer and other food sources, and an abundance of year-round streams. As a result, local archaeologists consider the Little River basin an area where considerably more sites could be found with additional fieldwork.

2. Native Americans and The Trading Path

The first Europeans began exploring the Durham area beginning in about 1670. Accounts of their travels report finding numerous Native American tribes and cultural groups in loose alliance. These included the Occaneechee, Adshusheer, Shakori, Tuscarora and Catawba. Archaeological excavations of Ochaneechi Town adjacent to the Trading Path in Hillsborough suggest communities that were protected by palisade walls and thrived on hunting, gathering and agriculture. Surplus was traded along the Indian Trading Path, a significant transportation route of native peoples. The Trading Path extended from east central Georgia to the James River area in southeastern Virginia. Covering almost 500 miles, the Trading Path generally parallels the current route of Interstate 85.

The arrival of Europeans marked the beginning of the decline of Native Americans in this area. The new arrivals brought diseases for which the native peoples harbored no natural immunities. Likewise the arrival of alcohol also had a negative influence. Native American communities throughout the Piedmont migrated away from the edge of the European influence. By the mid-1700s, the Eno and Adshusheer had moved southwest to join the Catawba Indians. However, by this time the Indian Trading Path now served as an important transportation route for Europeans migrating from the Virginia Colony. Although referred to as the Trading Path, the transportation route is believed to have consisted of a number of different paths, with alternate routes chosen based on local conditions, specifically the ability to cross river fords.

As the path continued to be used as a major source for colonial travel over the next 200 years, portions of the main route of the

trail became well worn and sunken. The main route of the Indian Trading Path has been identified through northern Durham County, with notable points where the path crosses the Little and Flat Rivers. The path continued into Orange County to the present day location of the Town of Hillsborough, generally paralleling the route of St. Mary's Road. In Durham, modern roads have covered most of the historic route; while in some places, the sunken roadbed is still clearly visible to the knowledgeable eye. A portion of the path that runs through the Treyburn development has already been protected with permanent preservation easements held by Preservation North Carolina, a non-profit organization. The remainder of the route through Durham has received little attention.

Many people are intrigued by the "living history" that the Great Indian Trading Path represents. The path represents an important symbol and visible reminder of our pre-historic, colonial, and antebellum history. In 1999, Orange County commissioned a historic and archaeological study of the Saint Mary's Road

Sections of the Trading Path are still visible in a few locations in Durham County. *(Luck)*

corridor. The study went from Hillsborough to the Durham County-Orange County border, and assessed the corridor for evidence of intact sections of the Trading Path. The study was undertaken as part of Orange County's long-term goal of developing a St. Mary's Road Corridor Preservation Plan. A new non-profit organization, The Trading Path Preservation Association, was recently formed. Based in Hillsborough, its mission is to "preserve, study and promote the remnants of the historic Trading Path which once connected the Chesapeake country with towns in the Carolinas and Georgia."[13] The organization intends to serve as a central advocacy group, working with the many counties and three states which are linked by the Trading Path.

3. European Settlement

Settlement of what was known as "the backcountry" began in earnest in the mid-1700s. The Scottish and Irish colonists found cheap and abundant land, lush with wildlife, water, and construction materials. They found soil that could produce garden crops, corn, and tobacco. Settlements in the Little River study area centered on the available road network, which linked small crossroads communities to each other, the larger towns, and mill sites. Because bridge building did not begin in North Carolina in earnest until the 1920s, available river fords often dictated the road pattern. Notable locations of early settlement within the Little River study area include portions of South Lowell Road, Bill Poole Road (which was on a route that linked Hillsborough to the community of Rougemont), and St. Mary's Road, which generally follows the same route as the old trading path.

The mills established along the region's numerous waterways were often centers of rural community life. Grinding corn was a necessity of rural life, and mills in northern Durham took advantage of the fall of water through the Carolina slate belt. Small residential communities grew around the mills as families expanded and new immigrants settled. The mill owner might also operate a tavern and inn catering to travelers. As it grew, the surrounding rural population could support a general store and a single-room school. Examples of mill-oriented communities can be found in the history of the Little River area, including South Lowell Mill, and Orange Factory.

Reverend John A. McMannen was instrumental in the history of the South Lowell area. (See Appendix C, A Keepsake For Posterity, by Jean Anderson for more information). Around 1850, he took over a gristmill site on the South Fork of the Little River, a

location where George Newton had built the first mill in the 1770's. Rev. McMannen established a small industry that built machines to improve the milling process. He started a classical academy for boys. By 1855 Rev. McMannen moved his industry to the Durham station on the newly constructed North Carolina Railroad, where the town of Durham would soon begin to develop[14]. His former home is still found on the south side of the South Fork of the Little River.

Other mills in the Little River study area include Cain's Mill, which was located on the Little River just east of Johnson Mill Road.[15] Cain or his heirs operated this mill until it was sold to Samuel Johnson in the 1870s. Remains of the mill are still present. Lipscomb's Mill was located near where Roxboro Road now crosses the northern tip of the Little River Reservoir. During the early part of the 20th century, this mill was known as "Berry's Mill".

The Importance of Mills in Rural Life

(Excerpted from "A History of Durham County" by Jean Anderson)

Mills played more than an industrial and economic role in the building of 18th and 19th century society. They played a social role as well, offering isolated families a place to meet their neighbors and exchange news, opinions, encouragement, and information. The mill provided a place where they could hear the harangues of county politicians and list their taxes with the sheriff's constables. The millpond offered a swimming and fishing hole to the men and boys, and the thunder of the intricate machinery and the glorious rush of water over the wheel added wonder and pleasure to their flat, work-ridden lives. In later decades, as mechanical improvements occurred and the functions of mills multiplied, they would assume an ever-growing importance in the settler's lives.

Quail Roost Farm is another important part of northern Durham's rural heritage. Quail Roost began in the middle 1890's as a hunt club. In 1902, the Quail Roost Shooting Club was formed which included accommodations for the hunters and their families. The corporation was eventually dissolved in 1925, when it became too expensive to maintain. George Watts Hill acquired the land and turned the estate into a prize-winning dairy farm and achieved international repute as a breeder for prize Guernsey cattle, winning many national awards in the 1930's and 40's. Later, in the 1970's the dairy farm was converted to horse stables. The hunting lodge is well kept and visible along the west side of Roxboro Road at the entrance to Quail Roost Farm Road. Another residence formerly associated with Quail Roost was a conference center for University of North Carolina in the 1980's. It has since been sold for private use.

4. African-American History

The history of African-American life in the Little River study area is not well documented. The Cameron Grove cemetery within the Treyburn development contains over 100 graves of the former slaves of the Cameron and Bennehan plantations. It is believed to be the principal burying ground of the Bennehan-Cameron slaves

and their descendents who remained on the land through the first half of the 20th century. The cemetery was associated with Cameron Grove Church, which was located nearby. In the 1950s the church relocated to a new site on Berwyn Avenue in Durham and the former church building no longer exists. The cemetery consists of 4.5 acres owned by Treyburn, which has placed restrictive covenants on the property. The Stagville Preservation Center on Old Oxford Highway has information on the genealogy of black families from this cemetery and the plantations of the Bennehan and Cameron families. The Stagville Preservation Center also features the Horton Grove slave quarters from the 1850s and the Great Barn constructed in the 1860s.

Cains School is located on St. Mary's Road adjacent to Cains Chapel Baptist Church. This one-room schoolhouse was built in approximately 1910 for "colored" students. After it was no longer used for school purposes, the County donated the building to the Cain community for use as a meeting house. Today, it is one of only two one-room schoolhouses remaining in Durham County.

The Little River School on Roxboro Road was also used for "colored" education. Originally constructed in 1937, it was rebuilt in 1939 after the original building burned. The school had kindergarten through high school classes, and its use as an elementary school continued after the Durham school system was integrated. After it ceased to be used for school purposes in 1992, a strong local partnership developed to preserve the school for community purposes as the Little River Community Complex. Since 1994 it has provided community services and a gathering place for northern Durham residents.

5. Historic Resources

A number of historically significant homes and buildings are still standing, and attest to the former lifestyles and history of the Little River study area. Some are publicly recognized and have been placed on the National Register of Historic Places. These include the Hardscrabble Plantation house and Quail Roost.

Several other properties have been placed on the State Study List for consideration for the National Register. These include the Rev. John McMannen House located at the corner of Millers Bend and South Lowell Road, the Phil Southerland House at 2421 Staggville Road and the Cain School on St. Mary's Road. The historic and cultural significance of these resources are briefly described in Appendix B, Significant Historic Resources. The locations of

these historic resources are shown on Figure 3, Natural and Historic Resources.

Numerous other sites of interest still await further research into their historical and cultural significance. They represent untapped resources that, with appropriate interpretation, could offer a wealth of information about early northern Durham and Orange counties. These include un-assessed archaeological sites and several mill sites along the Little River.

E. Land Use and Ownership

The Little River basin in Durham County is situated on the edge of an expanding urban community. Much of the area still appears rural, with farm fields, pastures and woodlands predominant. However, the southern portion of the basin is witnessing the slow but steady growth of suburban subdivisions, offering single-family homes on large lots. In the future, commercial and office centers may emerge to serve these residential neighborhoods. The pressure of expanding suburban development gives rise to the need to protect the important open spaces of the Little River basin.

1. Rural Agriculture

Many long-time residents of the Little River area can remember when farm fields, pastures and woodlands dominated the landscape. However, new home development is occurring throughout the study area on land that used to be croplands and tobacco fields. While there has been a steady conversion of many former agricultural lands to residential development over the past two decades, the Little River study area still includes many active farms. Some of the more visible ones include the Smith Farm along South Lowell Road, which totals 124 acres and raises Angus Beef cattle. Along Roxboro Road, Frances Terry farms 110 acres on the west side at Patrick Road, and Harold Terry farms 126 acres on the east side. Both are participating members of Durham's Voluntary Agricultural District program.

There are presently ten farms in the Little River Study area that have enrolled in the Durham County Voluntary Agricultural Districts, totaling almost 570 acres. The designation is an indication of pride and commitment to farming. To qualify, farmers must have at least 20 acres and agree to forego developing their property for 10 years, although participating farmers may cease to participate at their will. Participating farmers receive a sign identifying the farm, and some additional protections from development or government condemnation. The Durham County

Farmland Protection Board administers the program. Within the Little River study area there are 98 parcels totaling more than 3,900 acres enrolled in the County's present use value program for agriculture. In addition, there are another 63 parcels totaling more than 2,500 acres enrolled for forestry in the present use value program. The present use value program taxes parcels based on the current use being made of the property rather than their full present use designations constitute about a fifth of the Little River study area.

Ten farms in the Little River area have taken advantage of Voluntary Agricultural Districts designation. *(Korest)*

In addition to traditional agriculture, a number of horse-related farms and ranches can be found in the area. The most well known is Quail Roost Farms, which includes over 650 acres. It has been a popular boarding stable and center of northern Durham equestrian life since the 1970's. The boarding stables hold approximately 75 horses, and riding lessons are available. The Complex includes both a large and small animal veterinarian clinic. The Red Mountain Hounds Club sponsors several rides here between September and March.

2. Rural Residential Development

Rural subdivisions are also prevalent in the Little River study area. They are typically developed with wells and septic tanks and have lot sizes between one and four acres. Examples include Black Horse Run off of Roxboro Road, Hardscrabble off of St. Mary's Road, Country Knoll off of Bahama Road, and North Fork on the Little River between Guess and South Lowell Roads. Other subdivisions have lot sizes of 10 acres or greater, providing the owners with more isolation and open space. Examples include Pearce Wynd off of South Lowell Road and Brightwater off of Guess Road.

Suburban developments in the southern portion of the study area are typically developed with smaller lots, and many have access to City water and sewer. These include Milton Forest, Eden Lakes, Northwood Forest, and Brentwood Estates area. The largest suburban development is Treyburn, including more than 5,300

acres. It borders both the east and west sides of the Little River Reservoir and will eventually include up to 3000 homes, as well as commercial, industrial and office uses. The pressure of expanding suburban development gives rise to the need to protect the important open spaces of the Little River basin.

3. Non-Residential Development and Institutional Uses

Only one large industrial area of note exists in the Little River basin upstream from the Reservoir in Durham County. The Rougemont Quarry in the northern corner of the basin occupies a total of 500 acres split between Orange and Durham counties, with approximately 250 acres within Durham. It produces stone and gravel. Although classified as an industrial use, the quarry offers relatively little employment. The impact on surrounding land is relatively minor due to large buffers, and includes noise, dust, and truck traffic.

Other non-residential uses are centered in the southeastern portion of the study area within the Treyburn development or along Snow Hill Road. Durham Technical Community College has a northern campus located on Torredge Road off of Snow Hill Road. The only public school within the study area, the Little River Elementary School, is located just north of the Durham Tech campus. The City of Durham operates the Brown Water Treatment Plant on Infinity Road in the southeastern portion of the basin. The facility takes raw water from the City's water supply sources, treats it to meet stringent State and Federal water quality standards and pumps it into the water distribution system. The Brown Water Treatment Plant has the capacity to treat up to 30 million gallons per day.

The Little River Reservoir was completed in 1987 as the second major source of drinking water for the City of Durham. The reservoir itself covers about 530 acres and the City-owned land around the reservoir accounts for another350 acres. The reservoir and associated lands provide an outstanding open space resource for Durham. They contribute to the scenic beauty of northern Durham, provide a corridor for movement of wildlife across the region, provide a source of high quality drinking water for Durham's water needs, and improve the water quality in the entire Neuse River basin. Its recreational uses are further discussed below.

4. Existing Recreational Land Uses

The Little River study area has few sites that are open for public recreation. The City of Durham operates the Little River Fishing facility on Orange Factory Road at the Little River Reservoir. Bank fishing, picnicking and a small hiking trail are available, and boats are available for rent. No private boats are allowed on the Little River Reservoir, which serves as the primary drinking water supply for the City. Canoeists and kayakers favor the portion of the Little River upstream from the Reservoir during periods of high water. There is no public launching area, but users informally launch their boats at either the North Fork or South Fork crossings of South Lowell Road, or at the Johnson Mill Road Bridge. The take out location is at the northern tip of the Reservoir at the Roxboro Road crossing. In order to legally use this location for boat access, paddlers must get an annual permit from the City.

In the southeastern tip of the study area, the Little River Elementary School has athletic fields that are used by the City of Durham for recreational programming. The floodplain for the Little River is publicly owned by the US Army Corps of Engineers as part of Falls Reservoir. The lands are managed by the North Carolina Wildlife Resources Commission as wildlife mitigation lands and are available for hunting. A sub-impoundment has been constructed on the north side of Old Oxford Road to enhance the area for waterfowl habitat.

The Little River Community Complex (LRCC) on Roxboro Road includes community recreation as one of its core missions. The LRCC has an athletic field and playground available for the community. The playground was funded partly with a Durham County Matching Grant and is open to the public. The Northern Junior Athletic Association is housed at the LRCC and provides recreational softball, basketball and soccer programs for northern Durham youth and adults. The LRCC refurbished the indoor gymnasium with new flooring and other improvements in 2000.

Other private recreation includes Camp Riverlea on South Lowell Road, which is an outdoor summer camp that has been a favorite summer place for Durham youth since 1970. It is strategically located on 85 acres at the confluence of the South Fork and the Little River. Downstream of the reservoir, the Treyburn development includes a private golf course and a private trail system to serve the residents of that community.

Bike riding is popular on the scenic roads within the study area. The local roads have relatively light traffic compared to many

other parts of Durham. The Carolina Tarwheels have adopted South Lowell Road as part of the State's adopt-a-highway program for cleanup-up and beautification. Horseback riding is also popular among some local residents. There are presently no formal horse trails open to the public within the planning area. However, NCSU Hill Forest is located only a short distance to the east, bordering the Flat River. Its primary purpose is a research forest, but it is open to the public and the logging roads are available for hiking, horseback riding, and mountain biking.

F. Planned Facilities

1. Planned Recreational Uses

The City of Durham owns two future park sites located within the southeastern corner of the study area. The City has an 11.6-acre site adjacent to the Durham Technical Community College northern campus and across Torredge Street from the Little River Elementary School. The site is not yet programmed for development and is bordered by the Army Corps of Engineers property to the east. Recently, the City also purchased approximately 50 acres in Treyburn bordering the Little River for a future park. The City is proposing that the park be developed with soccer fields, nature trails, and a kiddie playground. A portion of the Trading Path bisects the site and is protected by permanent easements held by Preservation North Carolina.

Durham County owns two properties that are planned for additional recreation. The Little River Regional Park is a 391-acre park being jointly purchased with Orange County. About 255 acres of the site is within Durham County and the remaining 135

The Little River Regional Park – A Partnership Example

This 391-acre regional park was first envisioned during 1999, and purchased during 2000 and 2001.The Park will provide a wonderful low-impact recreation area for Durham and Orange residents, provide wildlife habitat, and protect water quality. It would not have happened without the partnership of the following organizations and grant funds:

Durham County	$178,400
Orange County	$96,000
Eno River Association and Triangle Land Conservancy	$170,000
N.C. Parks and Recreation Trust Fund	$250,000
N.C. Clean Water Management Trust Fund	$377,000
Federal Land and Water Conservation Grant	$262,000
TOTAL	**$1,333,400**

acres are in Orange County. The property includes over 1¼ miles of frontage on the North Fork of the Little River. The park was made possible by an unusual partnership of Durham and Orange Counties with the Triangle Land Conservancy and the Eno River Association. In 2000, Orange and Durham counties were the successful recipients of a Federal Land and Water Conservation grant to be used for site development. Planning for this joint park is underway, with construction estimated to begin in the spring of 2002.

Durham County also owns 50 acres adjacent to the Little River Community Complex (LRCC). The property is bordered by the LRCC on the north, Roxboro Road to the east, and City-owned buffer lands for the Little River Reservoir to the south. The property does not have direct access on its own to a public street, so the most practical way to provide access for public use is in coordination with the LRCC.

The Durham to Roxboro rail corridor runs from central Durham to the Town of Roxboro in Person County. The line has not been in active rail use since the early 1980's. The corridor would make an excellent rail-trail for hikers, bikers, and equestrians and is shown as a future trail route on Durham's Trails and Greenways Plan. During the 1990's, the City of Durham has twice attempted to purchase this rail corridor in order to convert it to a rail-trail corridor. However, Norfolk and Southern, the present owner, is not interested in selling the corridor at this time, and has also chosen not to abandon the corridor in case it decides to resume rail use in the future.

The City and County have an adopted Trails and Greenways Master Plan for the portions of the planning area within the Urban Growth Area boundary. During the spring of 2001, the Plan was being revised to include trails County-wide. In addition to the potential rail-trail corridor discussed above, the trails plan recommends the following trails within the Little River planning area:

- A creek side trail along Cabin Branch Creek from Old Oxford Road to Barclay Road. This trail could be paved or natural surface depending upon adjacent development at the time the trail is built.

- A natural surface creek side trail along Cain Creek from the headwaters downstream to the Little River.

- An on-road bicycle route along Guess Road from Cain Creek to South Lowell Road and along Rougemont Road from Bill Poole Road into Rougemont.

- A mostly on-road bicycle route along South Lowell Road to Hopkins Road to Quail Roost Farm Road to Moore's Mill Road and State Forest Road.

2. Proposed Thoroughfares

Durham's long-range plan for new and improved thoroughfares shows a new loop road passing through north and east Durham. The Northeast/Northwest Loop was originally planned to connect I-85 in western Durham, I-85 in eastern Durham and US 70 in southern Durham. Community opposition to this route has focused attention on alternate routes, one of which would pass through the Little River basin near the Little River Reservoir. However, significant opposition also exists to this proposed road alignment. However this controversial issue is resolved, any new roads and road improvements should take into account the goals and policies of the Little River Corridor Open Space Plan in their design and implementation.

G. Development Regulations

Zoning is the set of maps and regulations adopted by cities and counties to regulate how land is used. The Durham Zoning Ordinance established various zoning districts with specific rules about what types of land uses are allowed or prohibited. The Durham Subdivision Ordinance sets out rules for how property owners can legally divide large land parcels into smaller ones, usually for re-sale. These and the City's and County's Flood Damage Reduction Ordinances and Sedimentation and Erosion Control Ordinance are the primary land use codes for Durham.

The zoning designation that applies to most of the Little River basin in Durham County is Rural District (RD). The Rural District zone allows agricultural uses and low density residential uses. Also allowed are various community service uses, such as churches, schools, parks and other recreational uses, electronic transmission towers, family care homes and conference centers. Other zoning designations have also been applied in limited amounts to land in the Little River basin. These include:

- Single-family residential zoning of low density scattered throughout the suburban portions of the study area;

- Commercial zoning for shopping centers in two locations within the Treyburn development—on Roxboro Road near Orange Factory Road and along Vintage Hill Parkway;

- Industrial and research zoning for the corporate office and research park portions of the Treyburn development; and

- Industrial zoning for the Teer Quarry in northwestern Durham County.

1. Watershed Protection Zoning Districts

In addition to these zoning classifications, Durham also applies special zoning rules for the purposes of water supply watershed protection. Development in the Little River study area is largely governed by these restrictions, which are applied in an overlay zone. Most of the land in the study area drains to the Little River Reservoir, one of two primary water supplies for the City of Durham. Watershed protection regulations keep the intensity of development relatively low in order to prevent pollution of the reservoir. Preventing water pollution is usually preferable and less costly than removing pollutants from water prior to urban uses.

The Lake Michie/Little River-Critical Area (M/LR-A) and the Lake Michie/Little River-Protected Area (M/LR-B) watershed protection zones apply to the basin. These zoning districts require that new building lots be no smaller than two acres. (A cluster option allows this lot size to be reduced to one acre, with an equal amount of open space provided, if the soils can support smaller lot sizes) The watershed protection zoning requires that development have only six percent of the land area covered with impervious surfaces, including rooftops, parking lots, driveways and sidewalks. They also require that undisturbed vegetated buffers of 50 to 150 feet be preserved along each side of intermittent or perennial streams shown on USGS topographic maps or USDA Soil Survey maps. These regulations ensure that development in the sensitive land around the drinking water reservoirs is maintained in a low-density pattern.

Another important feature of watershed protection regulations is the prohibition of community scale wastewater treatment systems. These are waste treatment systems that rely on waste collection pipes and a single, common septic system. Durham has looked upon community systems unfavorably because of the problems associated with regular inspection and maintenance and the burden of replacing expensive capital equipment.

South of the Little River Reservoir, the study area is mostly covered by watershed protection requirements for the Falls Reservoir, the source of water for the City of Raleigh. The overlay requirements are not as strict, allowing smaller lot sizes, a greater percentage of impervious surfaces and somewhat smaller stream buffers.

2. The Urban Growth Area

For years, Durham has used the Urban Growth Area (UGA) boundary as a tool to manage its physical growth. The UGA includes the portions of Durham County (and the edges of surrounding counties) that are appropriate for urban and suburban land uses. Durham's urban growth policy prohibits the extension of public water and sewer utilities outside of the UGA. The City Code makes exceptions for extensions to schools, industries and properties with existing health hazards from failing wells or septic systems. The fundamental purpose of the UGA is to communicate to community leaders, developers, and citizens where the City intends to grow by providing public water and sewer facilities.

In general, the UGA has been drawn in northern Durham County to keep urban and suburban development out of Durham's drinking water supply watersheds. For the Little River area, this means that new development will not be able to use public sewer treatment and water supply systems, and will instead have to rely on wells and on-site septic systems for waste treatment. The resulting development pattern will rely on large residential lots with sufficient acreage to locate a well and septic drain field.

H. Summary of Existing Conditions

The Little River study area is comprised of some of Durham County's most scenic landscapes. The rolling hillsides are comprised of farms, woodlands, pasture lands, historic home sites and meandering streams. The Little River itself is both scenic and unusually clean. The river's water quality is highly rated by the State and provides habitat for significant aquatic animal species, particularly mussels that are increasingly rare or threatened in the State. Large wooded tracts remain in the area, providing upland habitat for species that require large amounts of contiguous woodland.

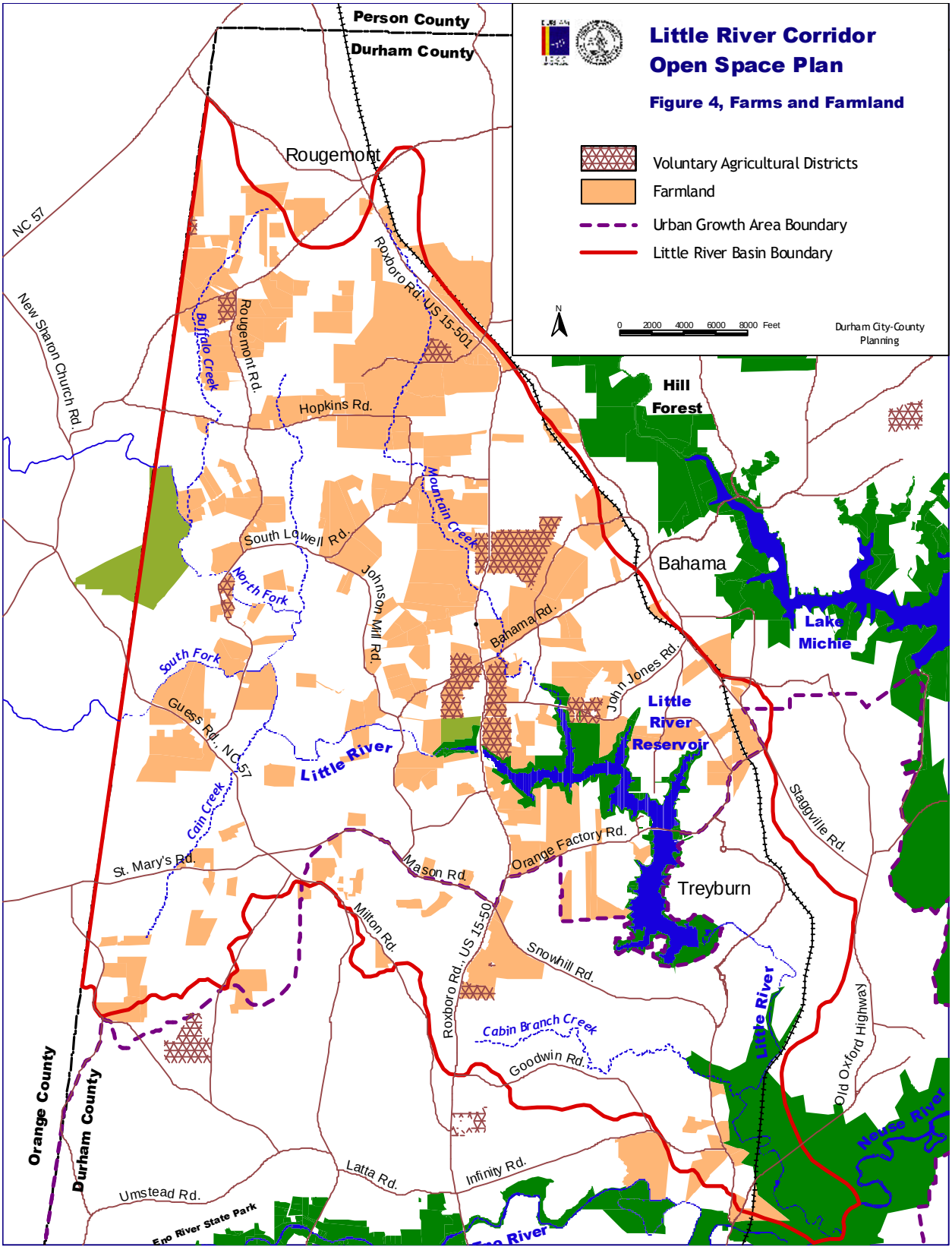
The study area includes archaeological and geologic sites that are important to preserve as part of Durham County's heritage. The Indian Trading Path runs through a portion of the study area. This major travel route during colonial times is a physical reminder of

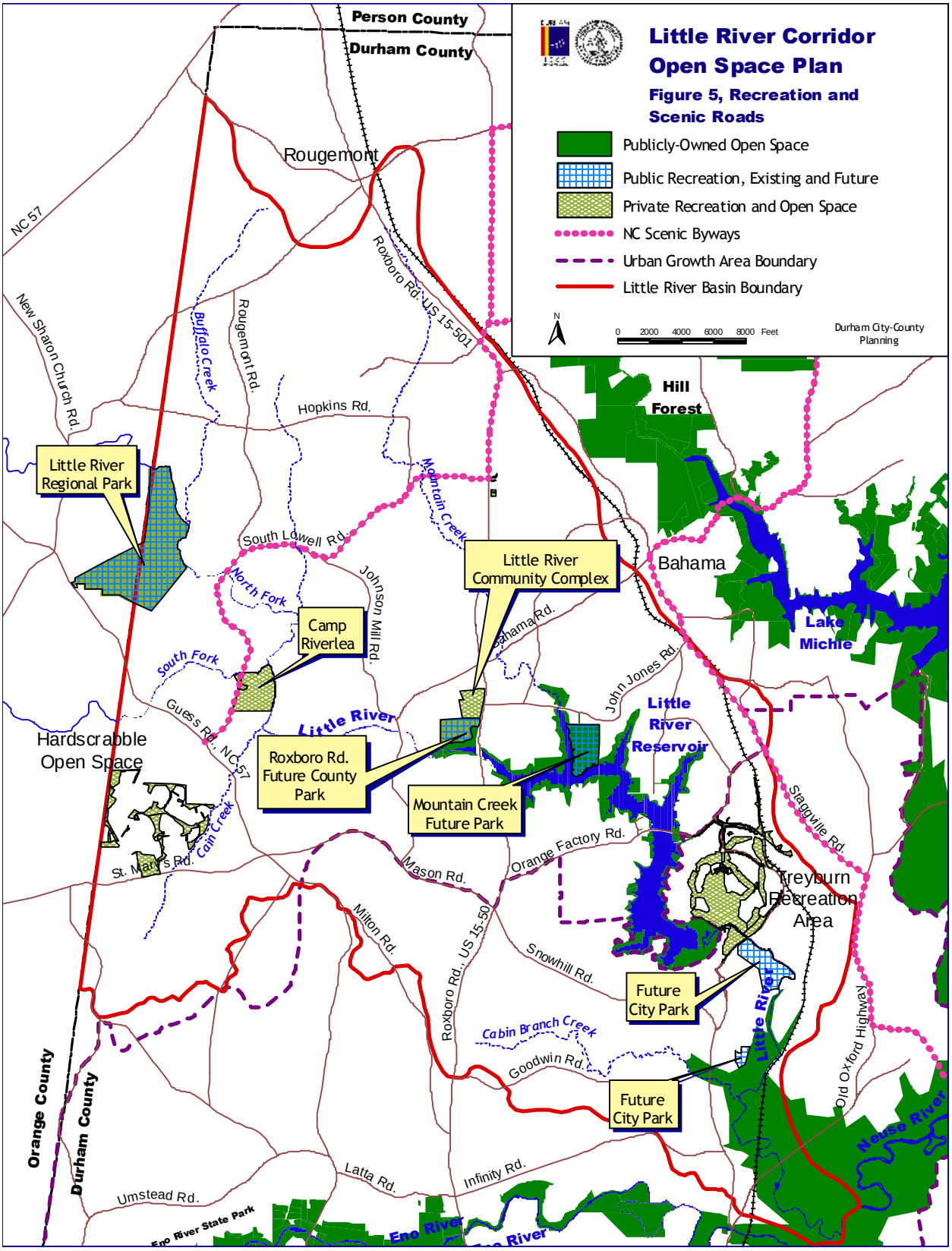
our past history and an important part of Durham's cultural history. Historic homes are reminders of the area's history and add to the attractive rural character along many of area's roadways.

The land use in the area is in a period of transition. Many farms still grace the countryside, lending to the attractive scenic qualities of the area, particularly along South Lowell and Roxboro Roads. Horse farms and large lot residences are becoming more common, as are smaller residential developments with two to five acre lots. The southern portion of the study area is within the City's Urban Growth Area boundary where water and sewer services are available or may be in the future. Non-residential land uses are clustered within this area and the residential development is on smaller lots.

Development regulations to protect the Little River Reservoir will continue to be a strong factor in shaping growth in the area. The majority of the study area outside the Urban Growth Area boundary is required to have two-acre minimum lot sizes, with six percent impervious surface limitations, and large stream buffers adjacent to perennial and intermittent streams.

There is presently little preserved open space within the planning area. Public recreation areas are limited. Increasing development in the Little River study area will likely permanently change much of the corridor's beauty and character unless active steps are taken to preserve some of the area's most important open spaces.


Little River Corridor
Open Space Plan
Figure 4, Farms and Farmland
Voluntary Agricultural Districts
Farmland
Urban Growth Area Boundary
Little River Basin Boundary
N
0 2000 4000 6000 8000 Feet
Durham City-County Planning
Person County
Durham County
Orange County
Rougemont
NC 57
New Sharon Church Rd.
Buffalo Creek
Rougemont Rd.
Roxboro Rd. US 15-501
Hopkins Rd.
Hill Forest
Mountain Creek
South Lowell Rd.
Bahama
North Fork
Johnson Mill Rd.
Bahama Rd.
Lake Michie
South Fork
John Jones Rd.
Guess Rd. NC57
Little River Reservoir
Little River
Cain Creek
St. Mary's Rd.
Staggville Rd.
Orange Factory Rd.
Mason Rd.
Treyburn
Milton Rd.
Roxboro Rd. US 15-501
Snowhill Rd.
Cabin Branch Creek
Goodwin Rd.
Little River
Old Oxford Highway
Neuse River
Umstead Rd.
Latta Rd.
Infinity Rd.
Eno River State Park
Eno River


Little River Corridor
Open Space Plan
Figure 5, Recreation and
Scenic Roads
Publicly-Owned Open Space
Public Recreation, Existing and Future
Private Recreation and Open Space
NC Scenic Byways
Urban Growth Area Boundary
Little River Basin Boundary
N
0 2000 4000 6000 8000 Feet
Durham City-County
Planning
Person County
Durham County
Orange County
Rougemont
NC 57
New Sharon Church Rd.
Buffalo Creek
Rougemont Rd.
Roxboro Rd. US 15-501
Hopkins Rd.
Little River
Regional Park
Mountain Creek
South Lowell Rd.
North Fork
Johnson Mill Rd.
Camp
Riverlea
South Fork
Guess Rd. NC 57
Hardscrabble
Open Space
Cain Creek
St. Mark's Rd.
Little River
Roxboro Rd.
Future County
Park
Little River
Community Complex
Mountain Creek
Future Park
Bahama Rd.
Bahama
Hill
Forest
Lake
Michie
John Jones Rd.
Little
River
Reservoir
Orange Factory Rd.
Mason Rd.
Milton Rd.
Roxboro Rd., US 15-501
Snowhill Rd.
Stagville Rd.
Treyburn
Recreation
Area
Future
City Park
Cabin Branch Creek
Goodwin Rd.
Future
City Park
Little River
Old Oxford Highway
Neuse River
Latta Rd.
Infinity Rd.
Umstead Rd.
Eno River State Park
Eno River
Durham County

III. Goals, Policies and Actions for Open Space Protection

Goals are reasons for taking action. The goals of the Little River Corridor Open Space Plan embody the hopes and desires of the Durham community and Little River residents for preserving valuable open spaces and managing future growth. Goals set the overall tone and direction for public and private actions. Policies address the "how." They describe a general course of action for accomplishing the Plan's goals. Policies help to narrow the focus from the broad goals and point to the types of actions needed to implement them. Policies guide decisions in a manner to effectively implement the goals of the Plan.

Actions provide the details. Actions represent specific steps that the County, City, community groups and private property owners can take to implement the Plan. They can be fiscal or regulatory in nature. Or they can be informational, pointing to public information campaigns or to additional research or planning studies that need to be carried out. Goals, policies and actions make up the heart of the Little River Corridor Open Space Plan. The following pages describe these in some detail in text, tables and maps. For each of the different topics related to open space, the goal is defined, policies are described, and actions recommended. Together, they form the blue print for translating desires for the Little River basin into achievement.

An important element of community involvement in preparing the Little River Corridor Plan was consideration of goals for the Plan. Seven initial goals were presented to community residents at the first meeting in June 2000. After a discussion about the goals and the purpose of the plan, the meeting participants were given seven dots to "vote" however they wished, to indicate which of the goals were most important to them. Community residents also suggested an additional goal to explicitly address a concern of some landowners regarding any property acquisition. The strong message was that any land acquisition that might take place in implementing the Plan should be voluntary and only with the consent of willing landowners. With the addition of this important concern, the community residents endorsed the goals for the plan.

Preservation of wildlife habitat and protection of the Little River area's natural beauty and protection of water quality were the highest-rated goals. The goals are summarized below in the order that the community ranked them.

1. **Habitat Preservation** – 68 votes. Protect significant plant and animal habitats and provide for wildlife movement corridors.

2. **Natural Beauty** – 65 votes. Protect the natural beauty and special places of the Little River Corridor, for present Durham residents and future generations.

3. **Water Quality** – 61 votes. Protect the existing water quality of the Little River, both for the aquatic habitat and for humans.

4. **Voluntary Acquisition and Private Stewardship** – 39 votes. Respect the traditional role that Little River landowners have held as private stewards of the land and their desire to retain their landholdings.

5. **Existing Uses And Future Development** – 21 votes. Accommodate new growth within the Little River basin area while preserving the area's key natural, historic, and scenic features.

6. **Recreation** – 16 votes. Provide additional recreation areas for Durham County residents, especially for the residents of the Little River Corridor area.

7. **Partnership** – 14 votes. Create partnerships between Durham governments, local property owners and other entities to protect and preserve the unique resources of the Little River Corridor.

8. **Human History** – 10 votes. Identify and preserve the important historic and cultural features of the Little River Corridor.

A. Habitat Preservation

Goal

Protect significant plant and animal habitats and provide for wildlife movement corridors.

Every community has a stewardship responsibility to protect its most significant natural resources and to ensure that future generations can also enjoy the community's natural and cultural

heritage. Stewardship responsibility means preserving significant habitats for rare and unusual plant and animal species, as well as for the more common species that make up the natural environment.

Preserving wildlife habitat was the highest ranked goal among Little River community members who provided input on the open space goals for this Plan. Discussions with local residents have made it clear that many residents value the rural large lot lifestyle in large part because of the prevalence of wildlife. Many residents place a high value on retaining significant habitat in the area, both for wildlife and native plants.

As humans alter the natural landscape, it becomes harder for animals to meet their needs for food, water, shelter and movement. Significant wildlife habitat areas may become isolated from one another as new developments break up or "fragment" the former habitat. When this happens, it becomes difficult for many populations of native wildlife to intermix with other populations nearby. Over time, the wildlife species then become more vulnerable to being eliminated from the area due to illnesses, food shortages or predation.

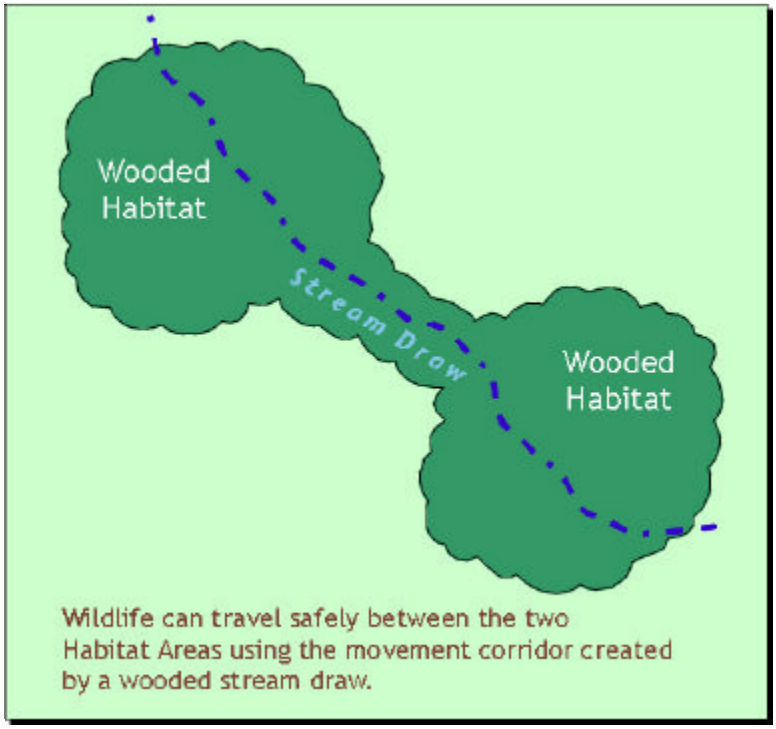
1. Habitat Preservation Concepts

To plan for healthy, viable wildlife habitat in the Little River area, it is important to understand four concepts that come from the study of wildlife and their habitat needs. The first two, e*dge species* and *interior species,* refer to the type of habitat needed by different species. The second two, *Wildlife Habitat Areas* and *movement corridors,* refer to the size of the habitat and how they are connected to one another in the broader landscape.

Some species that inhabit the Little River planning area can co-exist fairly well with humans. They can thrive in areas that are a combination of woodland and open areas, such as pastures or grassed backyards. These species are called *edge species* because they thrive in the edges or boundaries between open places and wooded areas. Raccoons, opossums, cardinals, blue jays, chickadees, red-tailed hawks, and deer all fit into this category. For these species, the woods provide places to hide, while the meadows or backyards provide ready food sources. As new homes are built in formerly rural or undeveloped areas, edge species are better able to adapt to the changes and maintain or increase population levels because they can thrive with increased combination of forest and open areas.

Other species are not so fortunate and require larger undisturbed blocks of forestland with few roads, power lines, or other intrusions. *Interior species* such as box turtles, ovenbirds, barred owls, pileated woodpeckers, scarlet tanagers, wild turkeys, red-shouldered hawks, and bobcats fit into this category. These interior species find their habitat declining as new homes sites and roads are cut into large blocks of woodland, converting more of the woods into edge habitat. As their required habitat becomes reduced, these species are vulnerable to population losses. From the species' perspective, it does not matter whether these wooded habitats are publicly or privately owned. What is important is the size and integrity of the area. For many species, several small habitat areas connected by corridors serve almost as well as one larger habitat area. Given the existing pattern of ownership and property lines within the Little River study area, this concept of many smaller, but well-linked habitat areas is important.

The term *Wildlife Habitat Area* refers to a large area of mostly undisturbed forestland that is sizeable enough to meet the needs of many interior species for food, breeding, and other habitat needs. The size of the Wildlife Habitat Area affects its value for wildlife. Larger tracts of woodland have been shown to have more species diversity than smaller tracts of woodland. Smaller areas of forest typically support fewer individuals of a species. If the smaller tracts are not well connected, the individual species cannot move around easily. Locating adequate food supplies and successful breeding can become more difficult. Habitat Areas that have become isolated from other areas function like islands to many species of wildlife, such as turtles or salamanders, which cannot safely travel to other islands of forestland.



Wildlife can travel safely between the two Habitat Areas using the movement corridor created by a wooded stream draw.

Wildlife moves between different areas of habitat using *movement corridors*. For instance, if two large woodland Habitat Areas were linked by a similarly wooded stretch along a stream, the connection would be referred to as a movement corridor. When movement corridors physically connect larger Habitat Areas, the wildlife populations will be healthier and have greater long-term viability. Smaller habitat

areas that are well linked to other habitat areas have a greater diversity of species than similar habitats that are isolated. Roads, power lines, and sewer easements all break the continuity of a forested movement corridor and their impact should be minimized as much as possible.

The conversion of woodland to residential development is happening across the Triangle and State. Wildlife biologists have expressed concerns over the cumulative losses of habitat and the anticipated impacts that it may have on species that require large patches of interior woodland. In addition, the connectivity of wildlife habitats is an important measure of the overall long-term health of a local ecosystem. Because of these concerns, State wildlife experts have recommended that wildlife habitat efforts in the Piedmont focus on preserving large areas of intact woodlands and on maintaining the corridors that connect them. The most detailed information on Durham's native wildlife is found in the Durham Inventory, which focuses on the long-term vulnerability of interior species and recommends that efforts be made to retain large areas of remaining habitat.

The strategies for wildlife habitat protection in this plan build on the concepts of planning for wildlife discussed above. These concepts can be used to help determine priorities for preserving the most significant wildlife habitats within the Little River Corridor study area. Appendix C. "Planning for Wildlife Habitat" provides more details about these landscape ecology concepts. Figure 6, Habitat Protection Strategies shows where significant wildlife habitat currently exists within the study area that can be interconnected into a system of wildlife Habitat Areas and corridors, using the concepts discussed above.

2. Policies: Wildlife Habitat Areas and Corridors

a. Identify a system for wildlife in the Little River basin based on the existing network of habitat areas linked by corridors as shown in Figure 6. The system should emphasize preservation of interior and hardwood forests of at least 100 acres or greater.

b. Preserve and enhance multiple connections between habitat areas and corridors. Use the existing network of perennial and intermittent streams as the framework for movement corridors.

c. Wildlife corridors should be provided or maintained at a minimum of 300-foot width from both sides of the stream bank to create a total corridor of 600-foot width unless

precluded by existing or approved developments or other unique physical features.

d. Use upland connections as necessary to provide a continuous system of wildlife movement corridors and habitat areas. Upland connections should be designated near property lines to ease placement of the corridors.

e. Protect existing habitat areas and movement corridors by minimizing new roads, power lines or other barriers to wildlife that will cut across vital corridors or Habitat Areas.

f. Where movement corridors are not continuous, attempt to recreate the connection by reestablishing wooded vegetation or by finding an alternate route in order to create a continuous corridor.

g. Maintain or restore regional wildlife corridor connections between the Little River watershed and adjoining watersheds such as the Flat and Eno Rivers.

h. Develop partnerships with interested landowners to preserve wildlife Habitat Areas and Movement Corridors using voluntary wildlife enhancement plans, cost share programs, clustered development, conservation easements, fee simple acquisitions, or combinations of these options.

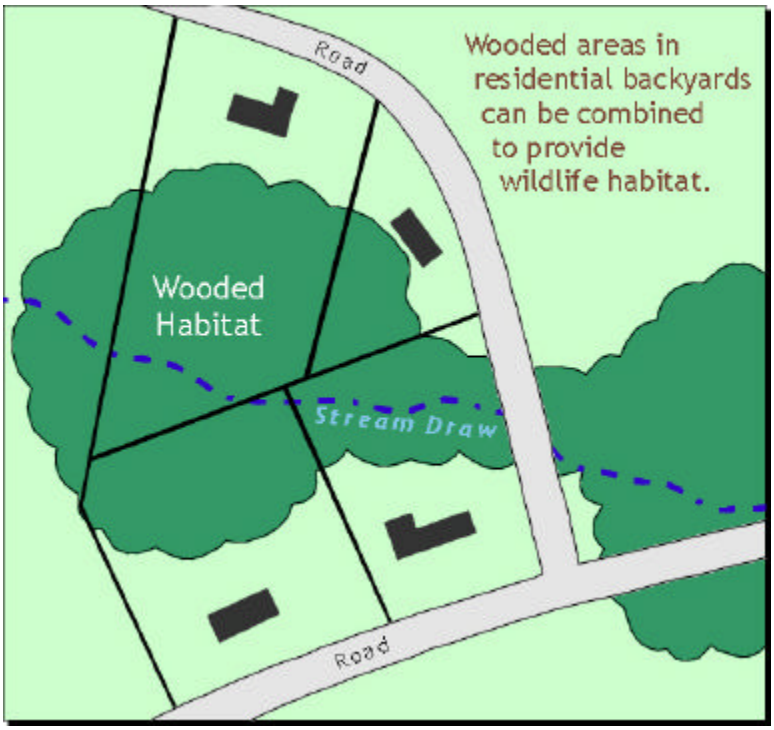
i. Seek out grants to assist with the costs of preserving these areas. The State's Clean Water Management Trust Fund would be ideal for any riparian-based easements or fee simple parcels from willing sellers.

j. Request that any new bridges and future bridge replacements over movement corridors have clearances wide enough to support its functioning as a wildlife movement corridor. Culverts should be replaced with bridges. Request that the use of permanent riprap be avoided, and that bioengineering methods be used to stabilize the soil adjacent to streams and within the construction area.

3. Policies: Enhancing Wildlife Habitat in all Areas

Encourage present and future landowners within the Little River basin to incorporate wildlife habitat principles into their sites.

a. Encourage landowners to retain or create Habitat Areas and movement corridors by using larger stream buffers adjacent to streams and preserving existing wooded areas.



b. Encourage landowners to manage open areas and fallow fields for early succession species by rotational cutting and planting of native seed-bearing grasses, legumes and herbaceous shrubs.

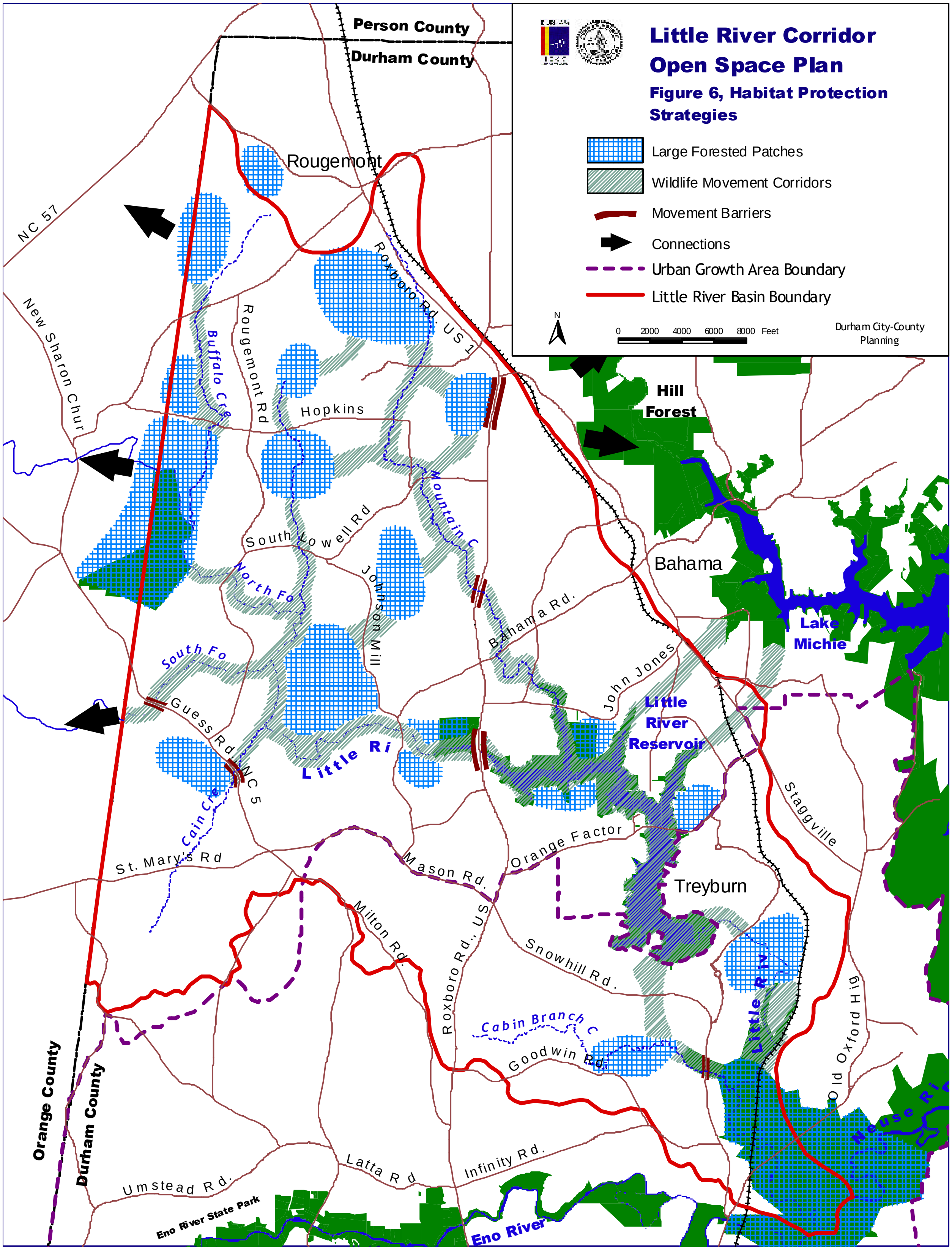
c. Provide technical support for property owners to implement wildlife conservation programs that are identified in the Little River Plan, In addition, assist landowners in obtaining grants and other financial benefits that are available from local, state and federal agencies as well as private land trusts.

d. On individual lots:

- Avoid fencing, walls and other obstructive barriers within movement corridors or Wildlife Habitat Areas.
- Minimize large amounts of grassed lawns, and plantings of non-native species.
- Encourage plantings of native trees, shrubs, and grasses.

e. In new developments:

- Preserve maximum amounts of habitat as common open space by using "Conservation by Design" principles to cluster residential lots on a portion of the site.
- Configure lots to retain or form wildlife habitat by preserving wooded areas along lot lines that can combine with woods on other lots to create larger, privately owned wildlife habitats and contiguous wildlife corridors.
- Request conservation easements on the portions of new residential developments that have the most wildlife value as a way to accommodate new developments while preserving permanent wildlife benefits.


Little River Corridor
Open Space Plan
Figure 6, Habitat Protection Strategies
Large Forested Patches
Wildlife Movement Corridors
Movement Barriers
Connections
Urban Growth Area Boundary
Little River Basin Boundary
N
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Durham City-County Planning
Person County
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Rougemont Rd
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Mountain C
South Lowell Rd
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Johnson Mill
Hill Forest
Bahama
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Lake Michie
John Jones
Little River Reservoir
South Fo
Guess Rd
NC 5
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Cain Cre
St. Mary's Rd
Mason Rd.
Orange Factor
Staggville
Treyburn
Milton Rd.
Roxboro Rd., US
Snowhill Rd.
Cabin Branch C
Goodwin Rd.
Little Riv
Old Oxford Hig
Neuse Ri
Orange County
Durham County
Umstead Rd.
Latta Rd
Infinity Rd.
Eno River State Park
Eno River

4. Policy: Document Terrestrial and Aquatic Habitats

The vast majority of the Little River study area is privately owned. Consequently, less has been documented about the aquatic and terrestrial species in the area, compared to other habitats in Durham County, such as the Flat River, the Eno River and New Hope Creek.

- Support efforts to further document the terrestrial and aquatic species and habitats within the Little River basin.

B. Natural Beauty

Goal

Protect the natural beauty and special places of the Little River basin for present Durham residents and future generations.

Preserving Durham County's natural beauty is important for maintaining our attractiveness for citizens, future residents, businesses, and visitors. Presently, the scenic character is an important asset to the Little River basin, both in terms of scenic enjoyment and enhanced property values. In order to maintain the area's most appealing features, the locations need to be identified and appropriate measures proposed to ensure their scenic qualities will not be lost. If this is not done, incremental development will encroach on largely undeveloped expanses along the river and roadsides, and lessen the areas natural beauty.

In discussions with citizens it was clear that natural beauty meant primarily two things to them:

- The scenic beauty that comes from nature itself - river and stream side views, forests, and area's abundant wildlife including birds, frogs, butterflies and other species that inhabit the area; and

- The views enjoyed from the local roads - views of farms and pastures complete with horses and cows, old tobacco barns, historic homes, and scenes of rural character.

Preserving the natural beauty along the rivers and streams and retaining the area's abundant wildlife will be more specifically addressed in the wildlife and water quality goals of the plan. Therefore, this section will focus on preserving the scenic qualities in the study area.

Community residents were asked which roads had the most scenic value to them and the responses were overwhelmingly focused on South Lowell Road. As one resident voiced, "When you drive South Lowell Road, it's the journey not the destination." Other roads mentioned included Roxboro Road and Orange Factory Road. As discussed in the background section, South Lowell Road, Orange Factory Road, and portions of Roxboro and Staggville Roads have also been designated a State Scenic Byway due to their natural beauty and rural character.

1. Policies: Preservation of Scenic Roadways

Cedar lined fence rows are a distinctive feature of scenic views in the Little River basin in Durham County. *(Korest)*

Preserve and enhance the scenic qualities along South Lowell, Roxboro, Orange Factory, and Staggville Roads.

a. Develop a scenic roads overlay zone that addresses the specific scenic features along these roads. Such an ordinance should be developed in conjunction with the Durham Appearance Commission and should involve landowners along the roads. The ordinance should address the following issues:

- Encourage the use of recommended roadside plantings that emphasize native plant species and traditional fencerow species such as cedars to maintain and enhance the visual character along the corridor when new development takes place.
- Encourage the placement of all modern accessory structures (gazebos, garages, play equipment) behind the line of the house structure.
- Encourage the reduction of large expanses of grass in front yards by supplementing with low-maintenance, visually appealing plantings such as native shrubs and wildflowers.

- Discourage fences and plantings that block scenic views.

- Require the use of clustering and conservation by design for new developments on these identified roads so that new housing remains harmonious with the existing character (once these ordinance provisions have been adopted).

b. The Farmland Preservation Board should place a high priority on acquiring easements for farmlands that add to the scenic character of the identified roads in the Little River study area.

c. Develop incentives to encourage the maintenance and preservation of old tobacco barns and other farm structures that add to the rural character along these roads. Use the expertise of local and statewide non-profit organizations such as the Historic Preservation Society, and Preservation NC. Incentives could include local grants or other financial measures.

d. Place historic markers along the roads to highlight the history of northern Durham and the Little River Area.

e. Investigate options with NC DOT to use more scenic bridge guardrails for crossings of tributaries along the NCDOT scenic byway route. Design new bridges and other transportation improvements so as to protect and enhance the area's scenic and historic character and important environmental features.

f. Reduce the visibility and intrusiveness of new wireless communication facilities through the development of location, siting, and design criteria.

C. Water Quality

Goal

Protect the existing water quality of the Little River, both for the aquatic habitat and for human use.

High quality drinking water is important for the City of Durham's health and economic development. The City is fortunate to have two excellent sources of drinking water, since the drainage basins of Lake Michie and the Little River Reservoir have relatively few

sources of pollution. Consequently, the water drawn from those lakes requires relatively little treatment before it can be used by the City's water customers.

Durham residents not benefiting from the City's public water supply also appreciate the high water quality of the Little River. Both above and below the Reservoir, the River supports abundant plant and animal wildlife. It provides opportunities for fishing and canoeing. The River certainly contributes to Durham's visual quality as it meanders through the basin.

Durham has a long history of protecting drinking water supplies through various techniques. As long-time rural residents are keenly aware, the City has purchased hundreds of acres of land immediately surrounding the reservoirs. Some of this land is needed for the reservoirs themselves, while a portion has been purchased to prevent pollution-causing development on the shoreline. Since the mid-1980s, the City and County have maintained strict watershed protection zoning restrictions around the reservoirs that were further described in the Background Section on pages 31-32.

This Plan recognizes several important values of the Little River in Durham, only one of which is as a water supply for the City of Durham. The Plan should ensure that implementing its recommendations would protect the high quality water of the Little River and the Reservoir.

1. Policies: Stream Buffers

Providing buffers of undisturbed vegetation along streams is one of the most effective means of preserving water quality. Preventing pollution from reaching watercourses is much less costly than trying to clean polluted water. Durham should continue to require the protection of stream buffers in order to maintain high quality in its streams and reservoirs.

a. Locate recreational activities outside of stream buffers as much as possible.

b. Encourage new developments within the Little River basin to provide wider stream buffers when possible. Encourage new developments to provide buffers and wooded vegetation along minor drainage ways that flow into regulated streams.

2. Policies: Priority for Water Quality Protection

This Plan spells out numerous actions that Durham can take to protect and preserve open space. Fortunately, many actions that

support the goal of water quality protection also support other goals, such as habitat protection and recreation. When addressing multiple actions to implement the plan's goals, Durham should give higher priority to the action that best protects water quality.

a. Assign higher priority to those land or easement acquisitions that support water quality goals.

b. Ensure that uses of publicly acquired land minimize negative water quality impacts.

c. Encourage new subdivisions to use clustering to preserve stream buffers in common open space, to design layouts that respect the natural terrain, and to use streams to separate lots.

d. Develop collaborative partnerships with major landowners to reduce any downstream water quality impacts from present land practices. Search out grants and programs to assist these private efforts.

e. Develop educational brochures and other public education materials that focus on water quality issues. Citizens who are knowledgeable about water quality are more likely to take individual private actions that preserve or enhance water quality.

3. Policies: Community Wastewater Treatment

For the past decade, Durham's zoning provisions for water quality protection in the Little River watershed have prohibited the use of community scale wastewater treatment systems. Durham has looked upon community systems unfavorably because of the potential problems associated with regular inspection and maintenance and the burden of replacing expensive capital equipment[16]. While serving the goal of water quality protection, this prohibition has the unintended consequence of restricting the use of an important tool for open space protection. An important strategy of this Plan is to explore ways of balancing the two important public policy goals of water quality and open space protection.

When new development is clustered on a small portion of the site, building sites do not have the land acreage needed to accommodate individual septic systems. Clustered residential development on Durham's soils requires some other form of waste disposal, and the community wastewater treatment systems offer an alternative,

provided their drawbacks can be overcome and that they are used in limited situations and with appropriate protections.

a. Durham should assess solutions that could allow community waste water systems to be used in new developments under strict requirements that would address the perceived problems. Any change would need to be consistent with maintaining the Little River Reservoir's State WS II classification.

D. Voluntary Acquisition and Private Stewardship

Goal

Respect the traditional role that Little River landowners have held as private stewards of the land and their desire to retain their landholdings.

Protection of the special features of the Little River will require a joint effort of the landowners and the County. The Little River Open Space Plan can provide a framework for protection of the basin's most important resources for both the private actions of the present and landowners, as well as initiatives of local government and non-profit organizations.

Open space preservation seeks a finely tuned balance between land as a community resource and property owners' rights. This Plan acknowledges the critical role that landowners have had as private stewards of the land for decades. Any public and private land preservation efforts should respect private property rights.

1. Policies: Voluntary Land Acquisition

Public land acquisition efforts should be voluntary and respect a landowner's private interests in retaining his or her landholdings.

a. Establish priorities for future easement and/ or fee simple acquisitions based on the landowner's interest in pursuing these options with the City or County.

b. Educate landowners about full range of options that can help achieve the plan recommendations, including voluntary land management plans, term easements (easements for a period of years only), cost share programs, permanent conservation easements, fee simple purchases, and a combination of these techniques.

c. Consider obtaining "rights of first refusal" for key parcels where landowners are not interested in easements or fee simple transfers in the short term. This means that the County or City obtains the future right to purchase the property at an agreed upon price (typically appraised value) if the landowner decides to sell the property in the future. If the local government chooses not to purchase the property at that time, the landowner is free to sell to others.

E. Existing Uses and Future Development

Goal

Accommodate new growth within the Little River basin area while preserving the area's key natural, historic, and scenic features.

Farms and rural home sites are an integral part of the Little River community, as well as major new suburban developments such as Hardscrabble and Treyburn. Practical and effective plan recommendations must work with both existing and planned land uses.

Growth and change is inevitable throughout the Little River community, and the plan should seek innovative ways to accommodate anticipated growth while preserving the natural and cultural features that make the Little River corridor such a desirable place to live.

"Conservation by Design" is a term used to describe development ordinances that permit developments to be designed so that the residential lots are clustered in a portion of the site while preserving the majority of the site in common open space. The open space could be located to preserve agricultural lands and wildlife habitat, or to retain scenic vistas. The open space is required to have permanent restrictions placed on it so that no further development is possible. Such ordinances have been effective in other communities to preserve substantial permanent open space. The open space can be retained in private ownership or, at times, dedicated to the public. Presently, the soils in northern Durham County have limitations for traditional septic systems that cause practical difficulties for clustering residential home sites closer together. Appendix D provides additional detail on the concept of Conservation by Design.

1. Policies: Ordinance Flexibility to Preserve Open Space

Durham's zoning and subdivision regulations should provide needed flexibility to support the preservation of open space for water quality, wildlife and agricultural purposes.

"Conservation by design" principles can be used to preserve scenic open space in new developments. *(Korest)*

a. Amend Durham's development regulations to permit greater "Conservation by Design" developments. The provisions should include incentives to encourage its use, such as the ability to have private streets, an alternative wastewater treatment system, or a modest by-right density bonus

b. Amend the Zoning Ordinance to permit developments to meet their watershed district impervious surface requirements with non-contiguous parcels. The non-contiguous parcels would need to be located where it provides additional water quality, wildlife, or scenic benefits. The land used to meet the off-site pervious cover requirement would require recorded deed restrictions or easements to ensure its permanent use as open space.

c. Consider provisions which would permit alternative wastewater treatment systems in lieu of on-site septic systems in limited situations in exchange for larger permanent open spaces provided in the project. The Environmental Affairs Board would be ideal to research new technologies in this area (see discussion on p. 49).

2. Policies: Development Review

Review proposed developments within the Little River planning area and request design changes as necessary to achieve plan recommendations. Approve projects that support the open space goals and recommendations of this plan.

a. Request that subdivisions incorporate wildlife movement corridors and Habitat Areas into the projects through creative design. Work with property owners to obtain permanent easements.

b. Encourage proposed developments to preserve scenic views and to incorporate historic features into their proposed designs.

c. Consider requiring designated wildlife areas and scenic corridors to be retained after Durham's development regulations have been amended to permit alternative wastewater treatment systems and by allowing conservation by design subdivision layouts.

d. Encourage new residential developments adjacent to Army Corps owned property to provide common open space or wooded buffers to create some separation from incompatible Army Corps management activities, such as logging.

F. Recreation

Goal

Provide additional recreation areas for Durham County residents, especially for the residents of the Little River Corridor area.

As Durham continues to grow, so does the local demand for nature trails and nature-based recreation. Existing areas can become stressed and "loved to death" from over-use. Based on projected population growth over the next 25 years, it is particularly important to set aside additional public lands for Durham's residents while open space is still available.

Nature-based recreation needs, such as trails, fishing, and environmental education are the main focus of this Plan. Active recreation needs, such as soccer or baseball fields, have been taken into account on a limited basis based on the interests expressed by the public.

During the Little River community process, participants were asked to provide their input on which types of recreation they most desired. The input received (see side box) indicated that additional nature trails, fishing spots, athletic fields and canoe access points were the recreational amenities most desired by community participants.

1. Policies: Public Ownership and Recreation

Durham should take advantage of the parcels that the City and County presently own for developing new recreational opportunities.

a. Any proposed facilities should be designed to be compatible with other open space goals such as water quality, wildlife habitat, and historic preservation.

b. Special attention should be paid to privacy when locating and designing any public facility that affects adjacent private property.

c. Seek out grants and partnerships as a way to stretch local funds and to maximize community involvement and ownership over public recreation facilities.

2. Policies: Additional low-impact Recreation

Provide additional recreation for the Little River community that takes advantage of the river as a community resource and source of natural beauty where the desired use can be accommodated and managed.

Community Recreation Preferences

(Community members had 6 votes to distribute how they wished among the options or could add their own.)

Hiking and Walking Trails – 36 votes, with 5 additional votes for "ecology enhanced" trails, which have added features to attract birds, butterflies and other nature

Fishing Spots – 21 votes, with two comments specifically requesting that fishing be permitted on the Little River Reservoir

Athletic Fields – 19 votes

Canoe / Kayaking Access Points – 17 votes, with a request that canoes be allowed on the Little River Reservoir

Durham to Roxboro Rail Trail for Non-Motorized Use – 10 votes

Leave Undeveloped – 8 votes

Equestrian Trails – 5 votes

Mountain Biking Trails – 4 votes

"Dog Park" (Off Leash Area for Dogs) – 3 votes

On-Road Bicycle Improvements – 2 votes

ATV / OHV Park (Somewhere) – 2 votes

a. Locate canoe and kayak access points at several strategic locations to increase availability of the Little River for this recreational use.

b. Locate wayside picnic areas and nature trails at scenic locations. Where practical, combine with canoe access points, and permit fishing.

3. Policies: Trails and Bicycle Amenities

Provide additional places for trails and bicycling within the Little River planning area. When planning for such amenities, be sensitive to and respect the privacy of people who own property along the river and do not want public traffic on their land.

a. Develop hiking trails on land along the Little River in selected

locations, not along its entire length through the planning area.

b. The City should continue to work with Norfolk and Southern to permit a rail-trail on, or next, to the unused railroad that runs along the eastern plan boundary through purchase, lease, or shared use agreement.

c. Assist private efforts to develop local trails and preserve informal rural trails, including equestrian "fence row" trails.

d. Support the provision of trails designated on the Durham Trails and Greenways Plan.

4. Policies: Land Management

Additional recreation opportunities can be provided for Durham residents on many publicly acquired lands. Such public use should be carefully managed to protect the environmentally sensitive portions of the tract, and to respect the privacy needs of adjacent landowners.

a. Develop management policies, procedures and the organizational structure to address future open space and land management issues. Management and security issues should be thoroughly considered and addressed when providing any public recreation amenities so that the natural features of acquired properties are not impacted.

b. Maintain good relationships with adjoining landowners by being responsible stewards of any acquired lands, and by addressing any management concerns that may arise from public use.

c. Establish a volunteer site steward program for any lands acquired by Durham County. Site steward programs have been successfully used by non-profit land trusts to use the "eyes and ears" of interested volunteers to help monitor lands managed by the County and to alert staff of management issues.

d. Durham County should consider the creation of a Stewardship Endowment Trust for open space lands. This concept has been widely used by non-profits land trusts to ensure that open space lands will always have a core of sufficient management funds. The endowments are typically managed by an organization like the Triangle Community Foundation. A stewardship trust is a long-term source of management dollars since the yearly

income available from such trusts is based on the interest generated from the principal.

G. Partnerships

Goal

Create partnerships between Durham governments, local property owners, and other entities to protect and preserve the unique resources of the Little River Corridor.

Protection of the special features of the Little River will require a joint effort involving Durham County, the City of Durham, local landowners, other state and local agencies and non-profit organizations. The Little River Corridor Open Space Plan can provide a framework and focus for the protection of the area's most important resources; however, to bring its recommendations into reality will require combined public and private efforts.

1. Policies: Collaborative Partnerships

Develop collaborative partnerships with other community organizations in order to use their expertise and talents to provide open space and recreation amenities within the Little River planning area.

a. Develop collaborative partnerships with other community organizations involved in providing recreation opportunities in northern Durham, including the Little River Community Complex, the Carolina Canoe Club, and others.

b. Continue the history of partnerships with open space non-profit organizations such as the Triangle Land Conservancy and the Eno River Association to preserve critical open spaces within the Little River basin.

c. Use the expertise of local and statewide non-profit organizations such as the Historic Preservation Society, Preservation NC, etc. to find ways to maintain tobacco barns and other structures that represent the area's rural heritage.

d. Design a coordinated approach to landowners that includes local, state and federal programs such as the state's Conservation Reserve Enhancement Program (CREP), forestry, WIP, CWMTF easements, and farmland conservation easements.

e. Encourage the establishment of an on-going community group to be the voice for and advocate of protection of the Little River corridor and basin. The group could be informal, such as the "Friends of New Hope," or a branch of the Eno River Association.

f. Establish a coordinating forum for the organizations involved with preserving open space and providing recreation within the Little River basin and Durham County. The "Durham County Open Space and Parks Exchange" could meet to or three times per year to discuss management issues of mutual concern, and consider opportunities to work together. Agencies would include Durham Soil and Water Conservation, City Parks and Recreation, the Wildlife Resources Commission, NCSU Hill Forest, and others.

g. Encourage programs in the schools such as the National Wildlife Federation's "Wildlife in the Backyard" and sponsor community forums on wildlife / human co-existence with environmental educators

H. Human History

Goal

Identify and preserve the important historic and cultural features of the Little River Corridor.

Humans have depended on river corridors for countless generations. The Little River Planning area is rich in both cultural and historic features, including unusual archaeological sites, vestiges of the Trading Path, and historically significant farmsteads and former mill sites. These cultural and historic features reinforce Durham's present connections with the past and are important to preserve as part of Durham's historic legacy for future generations.

The trading path is an important visual testimony to Durham's Native American and colonial history. Yet the physical evidence of its various routes through most of Durham has never been accurately mapped. New developments could unknowingly destroy any remaining fragments of the route during a time when there is increasing interest in preserving the corridor for its historic and cultural value. Orange County funded an archaeological study of the Saint Mary's Road Corridor in 1996 that could serve as a model.

1. Policies: The Indian Trading Path and Archaeological Resources

Secure preservation of the Trading Path and other sites of archaeological significance. Highlight their presence as cultural features in Durham when feasible without harm to the resource.

a. Work with owners of remaining portions of the Trading Path to secure easements or other protective measures.

b. Rely on the expertise of the State Division of Archives to provide guidance on the publicizing of extant trading path locations.

c. Consider allowing archaeology sites of low sensitivity on public lands to be made available for local youth archaeology training and field studies, in consultation with the North Carolina Office of State Archaeology.

d. Fund an archaeological reconnaissance study to identify the location and any existing remnants of the Indian Trading Path through Durham County.

2. Policies: Historic Preservation

The Little River basin has a wealth of historic resources. They include remnants of gristmills along the River and typical late 19th and early 20th Century homes. While historic preservation is clearly not the focus of this Plan, opportunities do exist for protecting and enhancing the area's historic resources in the course of protecting open spaces. Durham should continue initial efforts to assess and document the significance of historic resources in the Little River corridor and should formally recognize and celebrate the valuable historic buildings and sites. At the same time, Durham should protect those sites that are sensitive and subject to inappropriate public access.

a. Prioritize acquisition of open space sites that include features of historic or archaeological significance. Examples include properties that contain former mill sites.

b. Encourage the owners of historically significant properties in the project area to become designated as local historic landmarks. Encourage owners of historic properties on the Study list of the National Register of Historic Places to have their properties designated.

c. Encourage the placement of historic markers along roadways within the study area to enhance appreciation of the history of the area, particularly along the state's Scenic Byway route.

IV. Implementation Actions

This section of the Little River Corridor Open Space Plan outlines the specific geographic actions that Durham should take to implement the Plan. The policies described in the previous section were organized by the goal they serve; these actions are organized geographically. Many of the specific actions support more than one plan goal, such as the preservation of wildlife movement corridors which are important for both wildlife and water quality.

The Little River basin is divided into six areas. Specific actions in each area are described, providing a guide to those implementing the Plan in the future. The maps in Figures 7 through 13 locate these actions within the basin. At the end of this section, a summary table shows the recommendations at a glance.

It is recognized that some readers may be most interested in a specific recommendation and its accompanying map, and may not review the full document. As a result, the listed actions are intended to stand-alone and may discuss ideas previously mentioned.

A. Lower Little River and Cabin Branch Creek

1. **Cabin Branch Creek Wildlife Habitat Area.** Preserve the wildlife Habitat Area along Cabin Branch Creek. This area comprises a remaining refuge for wildlife within this urbanizing area. This includes portions of several parcels that are adjacent to the Brown Water Treatment Plant to the west and north. Develop cooperative partnerships with landowners to preserve this area using voluntary landowner agreements, cost share programs, clustered development, conservation easements, or fee simple purchase. Retain the city ownership of the parcel on Snow Hill Road adjacent to the U.S. Army Corps property along Cabin Branch Creek as supplemental wildlife habitat and as upland habitat link to the east. Request that NCDOT replace the box culvert for Cabin Branch Creek under Snow Hill Road with a bridge sufficient

for wildlife and trail movement when improvements are made.

2. **Cabin Branch Creek Tributary Wildlife Corridor**
Preserve a wildlife movement corridor along the tributary to Cabin Branch Creek that flows generally from Cabin Branch Creek northward under Torredge and Snow Hill Roads, ending at the ridgeline at the south end of the Little River Reservoir. The corridor should include any floodplain and average a minimum of 300 feet on both sides of the creek unless precluded by existing development. Preserve this area using voluntary landowner agreements, cost share programs, clustered development, conservation easements, or fee simple purchase. The City should consider applying for a CWMTF grant to assist with the permanent protection of this area.

3. **Cabin Branch Creek Greenway and Trail.** Designate a future trail corridor along Cabin Branch Creek from Snowhill Road to Smith /Barclay Road. Design the trail to avoid sensitive plant habitats and wetland areas. If possible, design the trail route to the north or south side of the Army Corps property, which is managed for wildlife mitigation.

4. **Duke Power Easement**. Develop a cooperative partnership with Duke Power to enhance the electric transmission line easement for wildlife habitat between Roxboro Road and Snow Hill Road that runs through the Cabin Branch Creek Habitat Area and movement corridor.

5. **Lower Little River Nature Trail.** Develop a cooperative partnership with the US Army Corps of Engineers and the Wildlife Resources Commission to permit a nature trail adjacent to the Little River Elementary School within the floodplain. With this access, the forest bottomland can be used for educational purposes during non-hunting seasons.

6. **Little River Elementary School Park Site.** Develop a school park site at the 11 acre undeveloped city park site at Torredge Road that utilizes both the facilities at the school and the park site. The School Park could include a small athletic complex with junior soccer fields, and/or wildlife/conservation habitat area. Investigate whether Durham Technical Community College's northern campus has programs that would coordinate well with the development of this park site.

7. **Lower Little River Wildlife Habitat Area and Movement Corridor.** Preserve the remaining undeveloped land south and east of the reservoir within Treyburn for wildlife habitat and water quality purposes. This area is upstream from the Falls Lake Reservoir lands and contributes significantly to the "Lower Eno / Little River Bottomlands" in the *Durham Inventory*. Current wetland mitigation projects underway within this area are compatible and supportive of the use of this area for wildlife habitat. Develop a cooperative partnership to secure permanent preservation for this area. Preserve the wildlife movement corridor from the Little River Reservoir south to the Army Corps property by providing 300-foot forested buffers where possible on each side of the Little River. To improve the functioning of this corridor, encourage wildlife compatible plantings within areas of existing development.

8. **New City Park.** The City has purchased a future park site east of Vintage Hill Parkway close to the south bank of the Little River. Currently the owner, Treyburn, has retained ownership of the 100-foot stream buffer width between the new park site and the river. This overall site is considered important for wildlife habitat and as part of the Lower Little River movement corridor. The site contains approximately 4,700 feet of river frontage and has been identified in the *Durham Inventory* as the "Lower Little River-Eno Bottomlands." The site also contains a visible portion of the old Indian Trading Path, which should be incorporated as a major design feature of the park. In the design for the park, the City should incorporate enhancements for wildlife into the overall park design, including provision of the 300-foot movement corridor adjacent to the river if possible.

   The City should continue working with Treyburn to gain public access to the river portion of this site, which would work best under single ownership. If the city is able to, it should consider providing an access point for canoes and kayaks to paddle the lower Little River. After the park is open, the proposed athletic fields and landscaped areas should be maintained with environmentally friendly fertilizers and pesticides to reduce impacts on wildlife and downstream water quality.

9. **Treyburn Golf Course**. Develop a cooperative partnership with the Treyburn Golf Course to become certified as an "environmentally friendly" golf course in order to enhance the area for wildlife and reduce downstream water quality

impacts. Several programs exist, including the Audubon Cooperative Sanctuary program for Golf Courses and the "Wildlife Links" program of the National Wildlife Foundation. Such programs emphasize landscaping with native plants, biodegradable pesticides, and low-impact fertilizers.

10. **Old Oxford Highway Canoe Access.** Request that the Army Corps of Engineers and Wildlife Resources Commission permit the establishment of a canoe and kayak access point at the Little River adjacent to Old Oxford Highway. The access point could be developed as a take out point of the proposed access point at the City park upstream, and as an upstream access point for the existing Red Mill Road boat access located downstream. The proposed access point could be jointly managed with a cooperative management agreement with the City of Durham, Durham County or a non-profit organization. Signage should be posted about any availability restrictions.

11. **Old Oxford Road Bridge Replacement.** Request that any NCDOT bridge replacement over the Little River at Old Oxford Road incorporate a bridge design that is wide enough and high enough to improve the functioning of this underpass for wildlife movement

B. Little River Reservoir

1. **Reservoir Wildlife Movement Corridors**. Preserve or re-establish larger buffers adjacent to the Little River Reservoir to improve the functioning of the existing buffers as wildlife movement corridors and for enhanced water quality. Where possible, preserve or re-establish vegetation to achieve a 300 foot wide forested strip. With vested development projects, maintain a minimum of 200 feet of forested buffer adjacent to the reservoir, increasing this width where design opportunities permit. Develop partnerships with landowners to provide this critical wildlife link using voluntary landowner agreements, cost share programs, clustered development, or conservation easements. Request that any future bridge replacements along Roxboro Road over the upper tip of the Reservoir provide a wider clearance to improve the functioning of this wildlife movement corridor.

2. **Mountain Creek Reservoir Park**. Develop the City-owned tract north of the Little River Reservoir adjacent to Mountain Creek with compatible low-impact recreation uses. Consider the possibility of opportunities for bank fishing, open meadow play, and nature trails. Reestablish a 300-foot buffer of vegetation along the edge of the Reservoir to improve the movement corridor through this area and to meet the required reservoir watershed buffers.

Large bridge spans over creeks and rivers provide a safe place for wildlife movement under major roadways. *(Luck)*

3. **South Reservoir and John Jones Road Wildlife Habitat Areas**. Preserve the existing wildlife Habitat Area north of Orange Factory Road and bordering the south side of the reservoir, and the wildlife Habitat Area on the wooded portion of the Mountain Creek Park site and on the adjacent property to the east. Preservation of these woodland areas would have both water quality and wildlife benefits. Develop partnerships with the landowners to preserve these lands using voluntary landowner agreements, cost share programs, clustered development, conservation easements, or fee simple purchases. Alternatively, obtain future "rights of first refusal," so that "conservation buyers" may be found for the properties.

4. **Flat River Regional Wildlife Connections**. Preserve or re-establish two wildlife movement corridors that can link the wildlife corridor on the northern side of the Little River Reservoir with the Lake Michie buffer lands and Flat River basin. Where possible, preserve or reestablish vegetation to achieve a 300-foot wide vegetated strip on each side of the stream, using overland wooded connections to cross Staggville Road. Develop partnerships with landowners to provide this critical wildlife link using voluntary landowner agreements, cost share programs, clustered development, or conservation easements.

5. **Additional Little River Recreational Uses.** Study the feasibility of allowing additional fishing and/or canoe uses on

the Little River Reservoir, perhaps in conjunction with the Mountain Creek Park site. This was a request from the community during the public process of developing the Plan. This request needs to be balanced against the City's desire to preserve the Reservoir's high quality water for drinking water and state public water supply regulations related to public access. The City has been concerned about the accidental introduction of aquatic pest weeds to the reservoir and has found that prohibiting any private boat usage is a generally accepted prevention method.

C. Upper Little River

1. **Roxboro Road County Park**. Develop the Roxboro Road County land for public use with a combination of athletic fields and nature trails. Partner with the Little River Community Complex to provide access and management for the fields. Allow the southernmost field to undergo succession to forest in order to support the wildlife habitat in this area. Apply for grants to assist with the development costs for this property.

2. **Canoe/Kayak Access at Roxboro Road Bridge**. Improve the signage at the canoe access point on the south side of the Reservoir at Roxboro Road, clarifying where parking is allowed. Consider improving the available parking in the future if additional demand warrants it.

3. **Little River Wildlife Movement Corridor**. Preserve wildlife movement corridors on both sides of the Little River. Movement corridors of at least 300 feet on both sides are desirable where not precluded by existing development. Greater widths are preferred and support protection of the "Little River Gorge" habitat described in the Durham Inventory sites and provide increased water quality benefits. Develop partnerships with landowners to preserve these lands using voluntary landowner agreements, cost share programs, clustered development, conservation easements, or fee simple purchases.

4. **Johnson Mill Preservation and Canoe Access**. Preserve the remnants of the Johnson Mill site on the east side of Johnson Mill Road at the Little River and the adjoining uplands that comprise part of the "Little River Gorge" habitat described in the Durham Inventory. Develop a partnership with the landowner to preserve this area using voluntary landowner agreements, cost share programs, clustered

development, conservation easements, or fee simple purchases. If any public lands are acquired, consider providing for managed public access and appropriate low-impact recreation. Uses could include a canoe and kayaking access, fishing, a wayside picnic area and short trail.

5. **Little River Uplands Habitat Area.** Preserve the "Little River Uplands," a large core Habitat Area designated in the Durham Inventory as important wildlife habitat. Preservation of majority of this area would also support water quality objectives. Develop partnerships with the landowners to preserve this area using voluntary landowner agreements, cost share programs, clustered development, conservation easements, and/or fee simple purchases. If any public lands are acquired, consider providing for managed public access and appropriate low-impact recreation.

6. **Camp Riverlea.** Support actions to ensure the continued use of Camp Riverlea, a long-standing traditional summer camp for youth strategically located at the confluence of the south Fork with the Little River. Encourage increasing the existing wildlife corridor width where it would not impact camp activities. Develop a partnership with the landowner to preserve this area using cost share programs, or conservation easements.

D. South Fork of the Little River and Cain Creek

1. **Culturally Significant Sites.** Preserve the archaeological quarry site in the South Fork area, the geologic fossil site, and former historic mill locations. Develop partnerships with landowners to preserve these features using voluntary landowner agreements, clustered development, or conservation easements.

2. **South Fork Wildlife Habitat Area and Movement Corridor.** Preserve the wildlife habitat on the south side of the South Fork of the Little River between Guess and South Lowell Roads. Preserve wildlife movement corridors on both sides of the South Fork of the Little River into Orange County. Movement corridors of at least 300 feet on both sides are desirable where not precluded by existing development. Develop partnerships with landowners to preserve these lands using voluntary landowner agreements, cost share programs, clustered development, conservation easements, or fee simple purchases. Request that NCDOT design any future bridges over the South Fork to include a

wider bridge span to improve the functioning of this tributary as a wildlife movement corridor.

3. **Cain Creek Wildlife Habitat Area and Movement Corridor**. Preserve the wildlife Habitat Area on the north side of Cain Creek, just west of Guess Road and link the area via Cain Creek to the Little River. Develop partnerships with landowners to preserve these areas using voluntary landowner agreements, cost share programs, clustered development, or conservation easements. Request that NCDOT, during future road improvements, replace the box culvert for Cain Creek with a bridge span sufficient to improve the functioning of this wildlife movement corridor.

Built in 1910, the Cain School is an important reminder of early education of African-Americans in northern Durham County. *(Korest)*

4. **Cain Creek Greenway and Trail.** Acquire easements and develop a recreational nature trail along Cain Creek between the northern end of the planned Seven Mile Creek greenway trail (vicinity of Bivins Road and Craig Road) and Guess Road. Develop an on-road trail along Guess Road between Cain Creek and South Lowell Road.

5. **Cain School Preservation.** Encourage the owners of the Cain School on Saint Mary's Road to seek designation as a local historic landmark. If appropriate, place this historically significant African-American one room schoolhouse on the study list for National Register of Historic Places.

E. North Fork of the Little River and Buffalo Creek

1. **North Fork and Buffalo Creek Wildlife Habitat Areas.** Preserve the wildlife Habitat Areas on the north and east side of the Little River Regional Park to Buffalo Creek and northwards up to Hopkins Road, and on the west side of Buffalo Creek between Hopkins and Wilson Road. Preservation of the majority of these areas would also support water quality objectives. Develop partnership with the landowners to preserve these lands using voluntary landowner agreements, cost share programs, clustered

development, conservation easements, or fee simple purchases.

2. **North Fork and Buffalo Creek Wildlife Movement Corridors.** Preserve wildlife movement corridors on both sides of the North Fork of the Little River, and on Buffalo Creek upstream to the Rougemont Quarry site north of Cothran Road. Movement corridors of at least 300 feet on both sides are desirable where not precluded by existing development. Develop partnerships with landowners to preserve these lands using voluntary landowner agreements, cost share programs, clustered development, conservation easements, or fee simple purchases. Request that NCDOT design any future bridge improvements across the North Fork and Buffalo Creek to include wider bridges to facilitate safer wildlife movement along these corridors.

3. **North Fork Wayside and Canoe Access.** Consider locating a canoe and kayak access point on the east side of the North Fork River crossing at South Lowell Road. This scenic area is on the State Scenic Byway route and would also be ideal for a wayside picnic area with interpretive signage about the history of the South Lowell area.

4. **Little River Regional Park.** Develop this 391-acre joint Orange and Durham Park based on the recommendations of the Little River Park Advisory Committee. Permit appropriate low-impact recreation and trail use that is compatible with the property's function as one the two most significant wildlife Habitat Areas within the upper Little River basin area.

5. **Rougemont Quarry Wildlife Habitat Area.** Develop a cooperative partnership with Hansen Aggregates to enhance the Rougemont Quarry lands for wildlife and to encourage the designation of permanent wildlife habitat through conservation easements.

6. **Flat River Regional Wildlife Connection.** Preserve a wildlife movement corridor on the Buffalo Creek tributary that heads west into Orange County to provide a regional wildlife connection to the Flat River watershed within Orange County. Movement corridors of at least 300 feet on both sides of the creek are desirable where not precluded by existing development. Develop a partnership with landowners to preserve this area using voluntary landowner

agreements, cost share programs, clustered development, or conservation easements.

7. **Bobbitt-Aiken Farmstead.** Assist Hansen Aggregates to find a suitable place to relocate the historic Bobbitt-Aiken House and associated outbuildings, presently located within the interior portion of the Rougemont quarrying operations.

8. **Lowell Valley Creek and Hopkins Rd Wildlife Habitat Areas and Movement Corridors.** Designate a series of movement corridors and habitat areas for the lands that surround Lowell Valley Creek and extend up to Harris Road. Contact the property owners of the Lowell Valley neighborhood to discuss the importance of this corridor and to encourage the preservation or dedication of conservation easements along the stream. The Lowell Valley Creek Habitat Area is bounded by Rougemont on the west and Hopkins Road on the north. It is linked by the Lowell Valley Creek movement corridor to another Habitat Area north of Hopkins Road, which is then linked by a short upland corridor to the wildlife Habitat Area bounded by Harris and Quail Roost Roads. For these areas contact landowners about the significance of these areas for wildlife, and encourage preservation of these areas using voluntary landowner agreements, cost share programs, clustered development, or conservation easements.

9. **Leathers Cemetery.** Assist in the preservation and stabilization of the Leathers slave cemetery in the Rougemont Road area.

F. Mountain Creek and South Lowell Road Area

1. **Mountain Creek Wildlife Movement Corridor.** Designate a wildlife movement corridor along Mountain Creek from the Little River Reservoir northward to the Quail Roost Farm. Develop partnerships with landowners to preserve or reestablish a minimum 300-foot wide movement corridor of wooded vegetation on both sides of the Creek using voluntary landowner agreements, cost share programs, clustered development, conservation easements, or other methods. As part of this corridor. request that NCDOT replace the box culvert for Mountain Creek with a bridge that includes a sufficiently wide opening to facilitate wildlife movement along Mountain Creek.

Mountain Creek and associate wetlands provide excellent wildlife habitat. *(Korest)*

2. Johnson Mill Rd. Wildlife Habitat Area. Designate a Wildlife Habitat Area between Johnson Mill Road and the west side of Mountain Creek that links the Mountain Creek wildlife corridor with the Little River Uplands Habitat Area. Use an "over land" wooded connection of at least 300 feet width to link the two areas. Develop partnerships with landowners to preserve or reestablish a minimum 300 feet wide movement corridor of wooded vegetation on both sides of the Creek using voluntary landowner agreements, cost share programs, clustered development, conservation easements, or other methods.

3. Quail Roost Wildlife Habitat Area. Designate a Wildlife Habitat Area north of Quail Roost Road and westward over to Harris Road within the existing forestland. Develop partnerships with the landowners to preserve this wildlife area using voluntary landowner agreements, cost share programs, clustered development, conservation easements, or other methods.

4. Quail Roost Farm. Support efforts to preserve Quail Roost Farm as permanent open space. Preservation of this 500-acre farm would provide for water quality protection, important wildlife habitat for both forest and field species, preserve a scenic vista along Roxboro Road, and provide lasting recreation opportunities for northern Durham equestrians.

5. Quail Roost Trail link. Designate a trail corridor from Hopkins Road to Quail Roost Farm Road along existing property lines so that bicyclists and other users can use this trail link to make a safe connection from the South Lowell area across North Roxboro Road to Moore's Mill Road.

6. US 501, Roxboro Road Landscaping. Encourage NCDOT to permit additional landscaping at select locations along the median of US 501, Roxboro Road to add visual appeal that complements the area's rural character. The plantings could be cedar trees or other native species. The plantings could be

sponsored as a service project by a community organization, boy scouts, etc.

G. Basin-Wide Recommended Actions

Regulatory Actions

1. **Scenic Roads Overlay Zone.** Once the scenic roads overlay zone has been created, apply it to South Lowell Road and the portion of Roxboro Road between South Lowell Road and Moore's Mill Road as first priorities. Also consider applying it Orange Factory and Staggville Roads.

2. **Conservation by Design.** Amend the Zoning and Subdivision Ordinances to include "Conservation by Design" guidelines that permit smaller lot sizes in exchange for a large percentage of the site dedicated as permanent, common open space. The provisions should include incentives to encourage its use, such as the ability to have private streets, an alternative wastewater treatment system, or a modest by-right density bonus.

3. **Off-Site Pervious Surface Requirements.** Amend the Zoning Ordinance to permit developments to meet their watershed district impervious surface requirements with non-contiguous parcels. The non-contiguous parcels would need to be located where it provides additional water quality, wildlife, or scenic benefits. The land used to meet the off-site pervious cover requirement would require recorded deed restrictions or easements to ensure its permanent use as open space.

4. **Alternative Wastewater Treatment Systems.** Consider allowing alternative wastewater treatment systems in lieu of on-site septic systems in limited situations in exchange for larger permanent open spaces provided in the project. The Environmental Affairs Board would be ideal to research new technologies in this area (see discussion on p 49).

Open Space Program Actions

1. **Site Steward Program**. Establish a volunteer site steward program for any lands acquired by Durham County. Site steward programs have been successfully used by non-profit land trusts to use the "eyes and ears" of interested volunteers to help monitor lands managed by the County and to alert staff of management issues.

2. **Program Materials.** Develop materials for landowners that describe the range of benefits and programs available to support open space preservation, including local, state and federal conservation programs, tax benefits of easements, and grants.

3. **Farmland Preservation Priority Funding.** The Durham County Farmland Preservation Board should prioritize acquisition of farmland conservation easements along properties that abut designated wildlife corridors, wildlife Core Areas or scenic roadways.

4. **Funding for Easement Preparation Costs**. In order to encourage farmers to consider placing conservation easements on their property, Durham County should allocate a modest amount of farmland preservation funds for financial support for farmers considering such easements, such as fees related to appraisals, surveys and other.

5. **Strategic Acquisition Policy.** The City and County should consider purchasing strategically important open space properties ahead of development pressure, then either reselling the parcel with easement restrictions that achieve the open space objective or subdividing the parcel to retain the important open space portion of the parcel, and then selling the remainder tract. Work with the Homebuilders Association, and the Durham Realtors Association to see how buyers and builders with conservation interests could be identified for such lots.

6. **Stewardship Endowment.** Durham County should consider the creation of a Stewardship Endowment Trust for open space lands. This concept has been widely used by non-profits land trusts to ensure that open space lands will always have a core of sufficient management funds. The endowments are typically managed by an organization like the Triangle Community Foundation. A stewardship trust is a long-term source of management dollars since the yearly income available from such trusts is based on the interest generated from the principal.

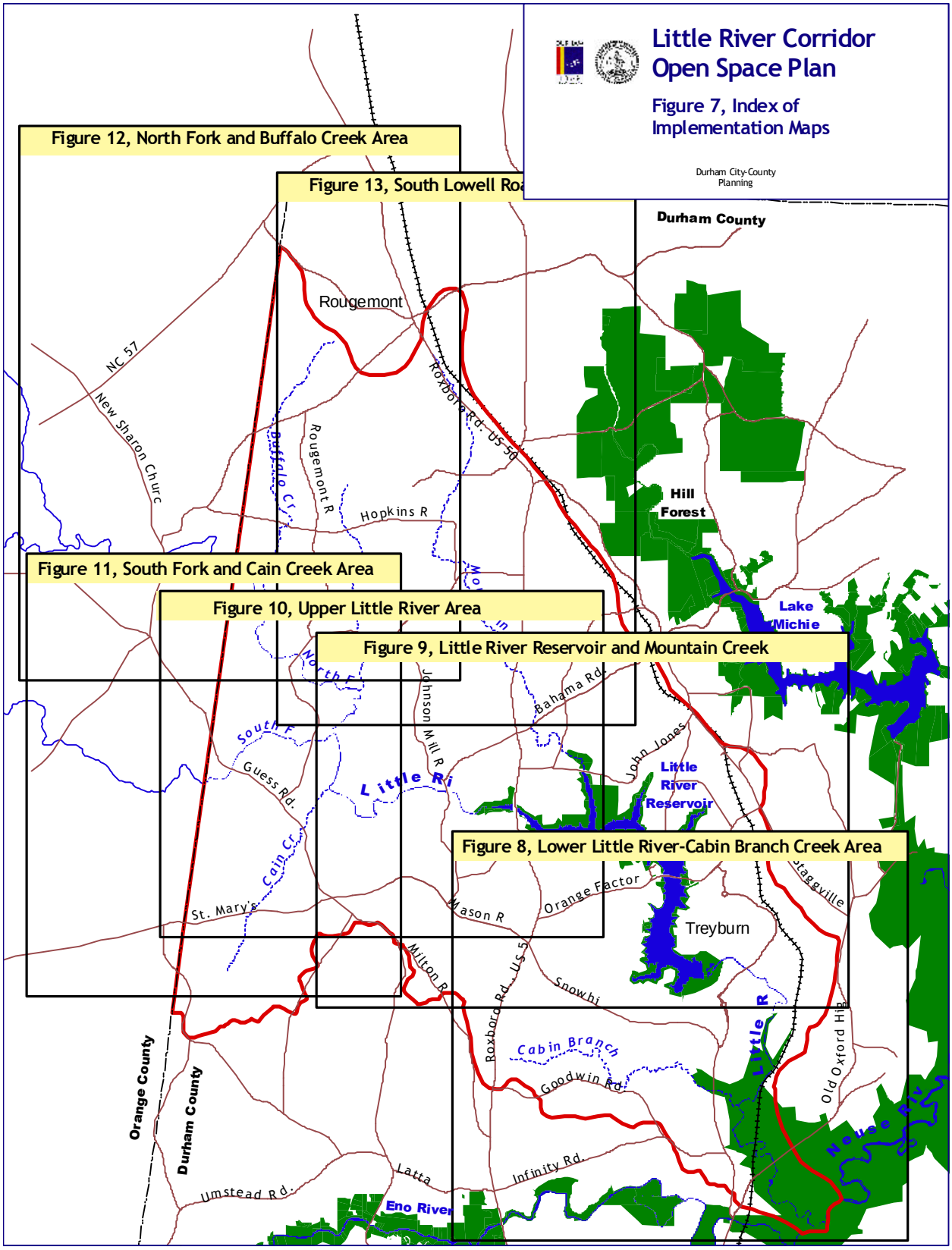
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Figure 8, Lower Little River-Cabin Branch Creek Area
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NC 57
New Sharon Churc
Roxboro Rd. US 50
Buffalo Cr.
Rougemont R
Hopkins R
Hill Forest
Lake Michie
Bahama Rd.
Johnson Mill R
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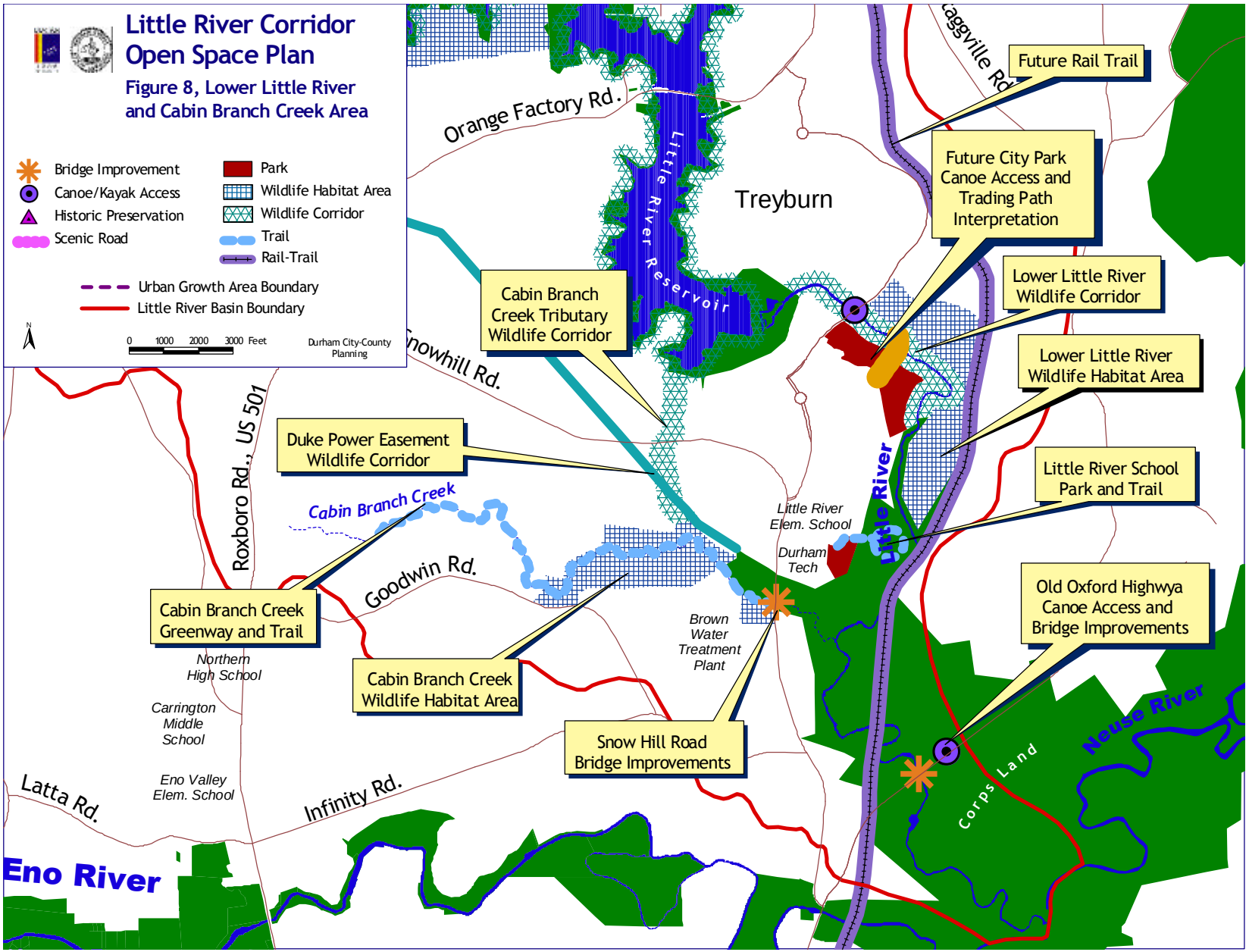
Little River Reservoir
Guess Rd.
Cain Cr.
St. Mary's
Mason R
Orange Factor
Staggville
Treyburn
Milton R
Snow Hi
Roxboro Rd. US 5
Cabin Branch
Goodwin Rd.
Old Oxford Hig
Orange County
Durham County
Latta
Infinity Rd.
Umstead Rd.
Eno River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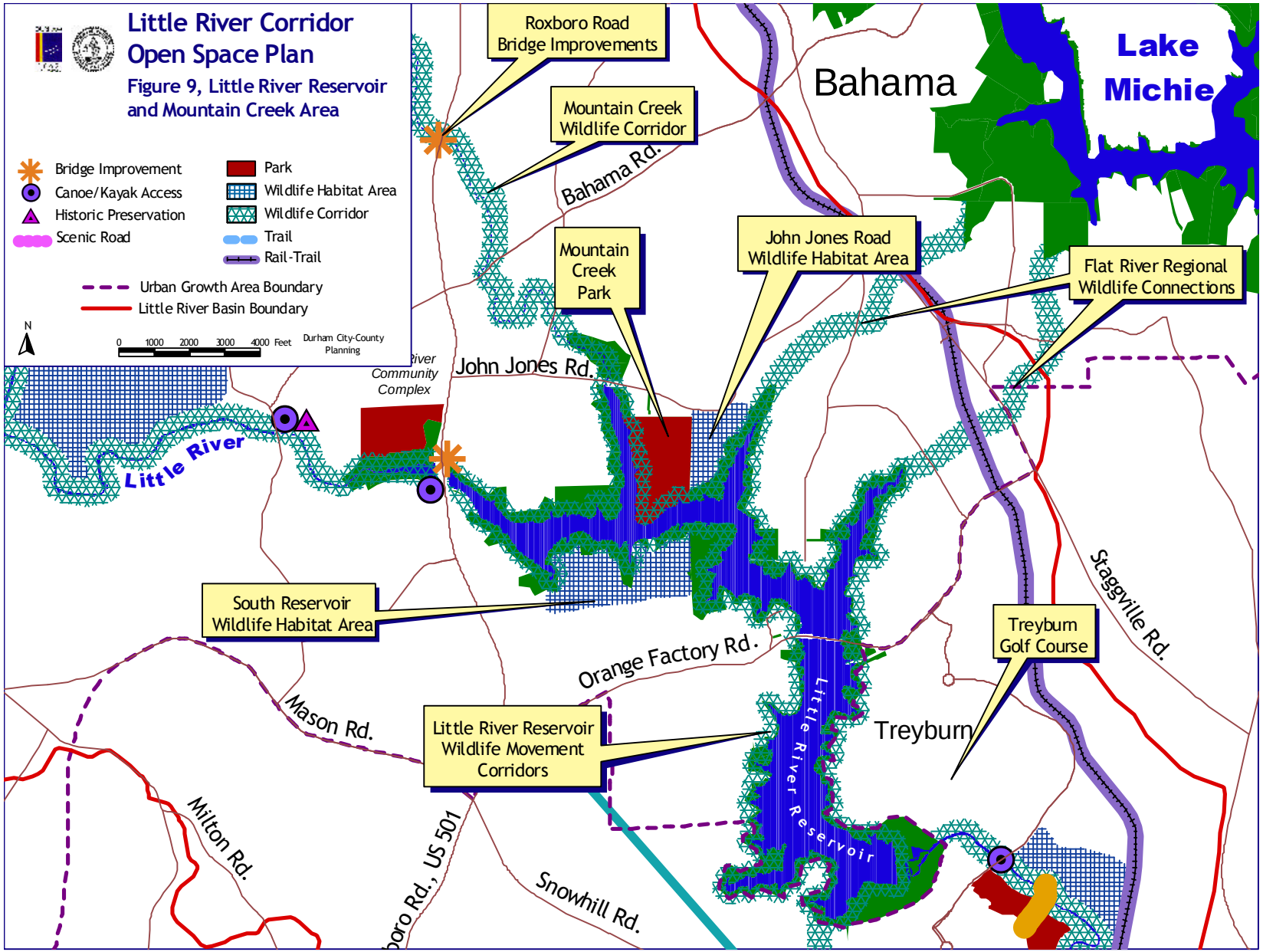
Lower Little River Wildlife Habitat Area
Little River School Park and Trail
Old Oxford Highwya Canoe Access and Bridge Improvements
Cabin Branch Creek Tributary Wildlife Corridor
Duke Power Easement Wildlife Corridor
Cabin Branch Creek Greenway and Trail
Cabin Branch Creek Wildlife Habitat Area
Snow Hill Road Bridge Improvements
Orange Factory Rd.
Treyburn
Little River Reservoir
Snowhill Rd.
Roxboro Rd., US 501
Cabin Branch Creek
Goodwin Rd.
Little River Elem. School
Durham Tech
Little River
Brown Water Treatment Plant
Northern High School
Carrington Middle School
Eno Valley Elem. School
Latta Rd.
Infinity Rd.
Eno River
Neuse River
Corps Land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Lake
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Mountain
Creek
Park
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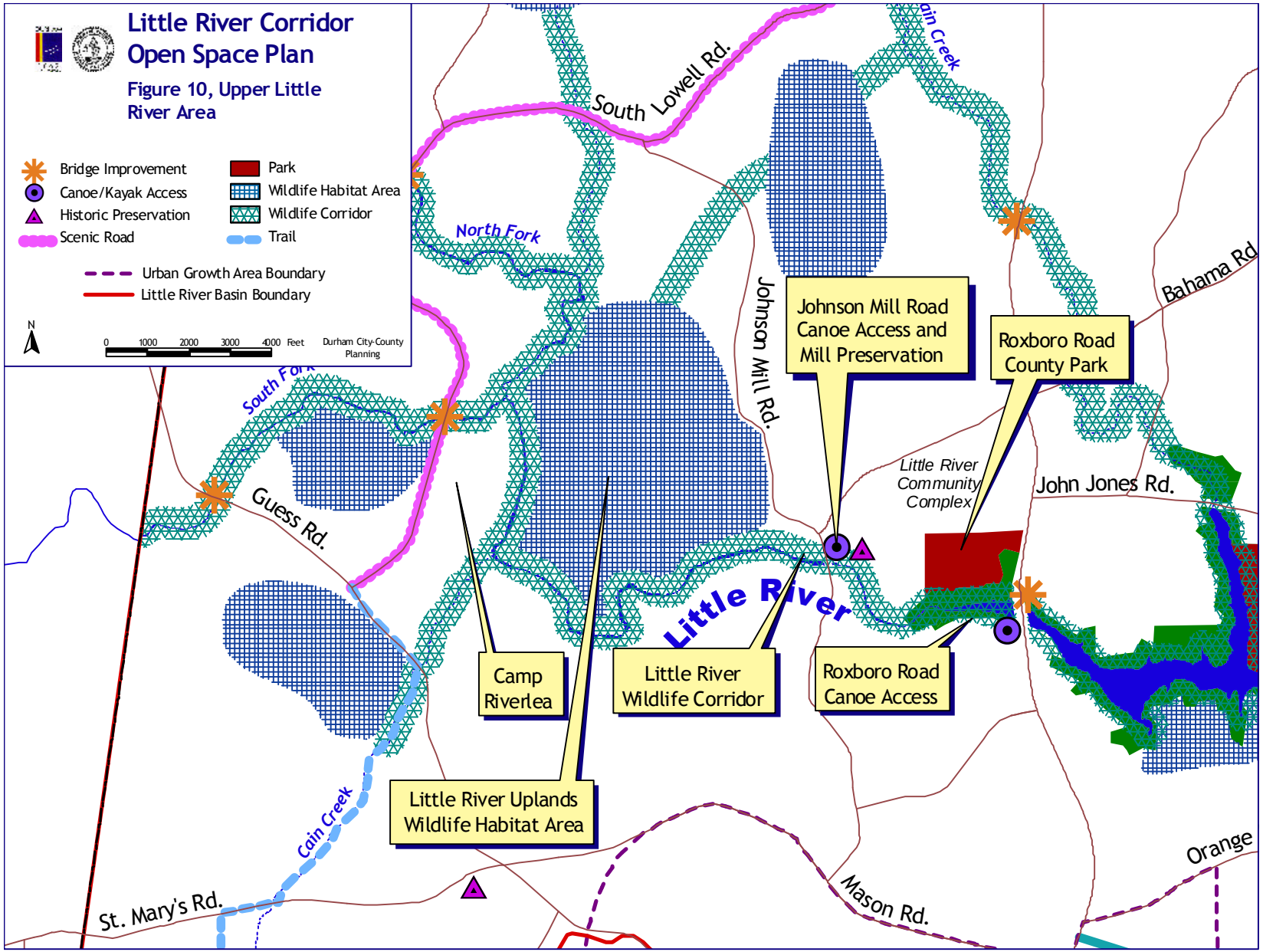
Flat River Regional
Wildlife Connections
John Jones Rd.
Community
Complex
Little River
South Reservoir
Wildlife Habitat Area
Orange Factory Rd.
Staggville Rd.
Treyburn
Golf Course
Mason Rd.
Little River Reservoir
Wildlife Movement
Corridors
Little River Reservoir
Treyburn
Milton Rd.
Snowhill Rd.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South Fork
Guess Rd.
Johnson Mill Rd.
Johnson Mill Road
Canoe Access and
Mill Preservation
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County Park
Bahama Rd
Little River
Community
Complex
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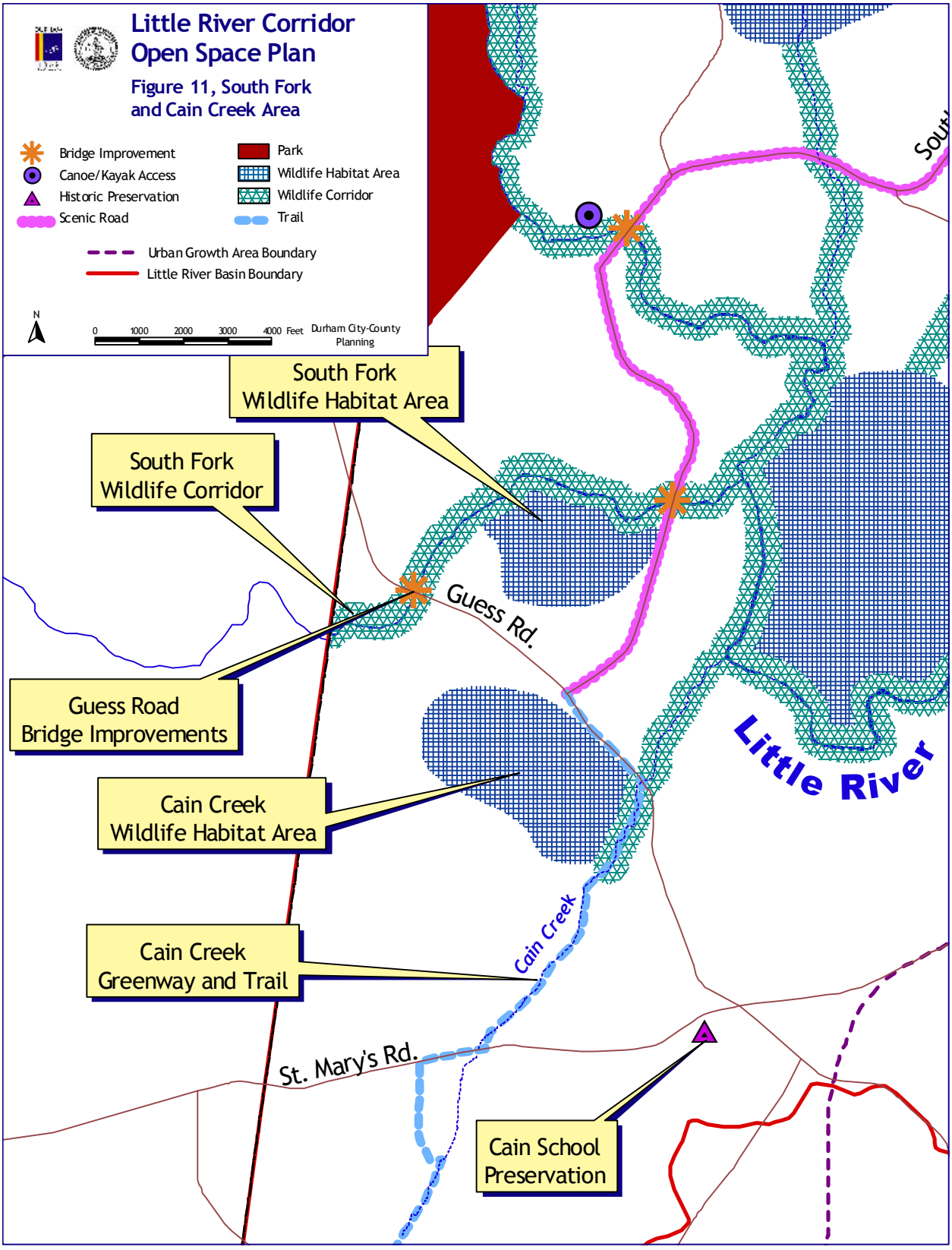
Little River
Camp
Riverlea
Little River
Wildlife Corridor
Roxboro Road
Canoe Access
Little River Uplands
Wildlife Habitat Area
Cain Creek
St. Mary's Rd.
Mason Rd.
Orange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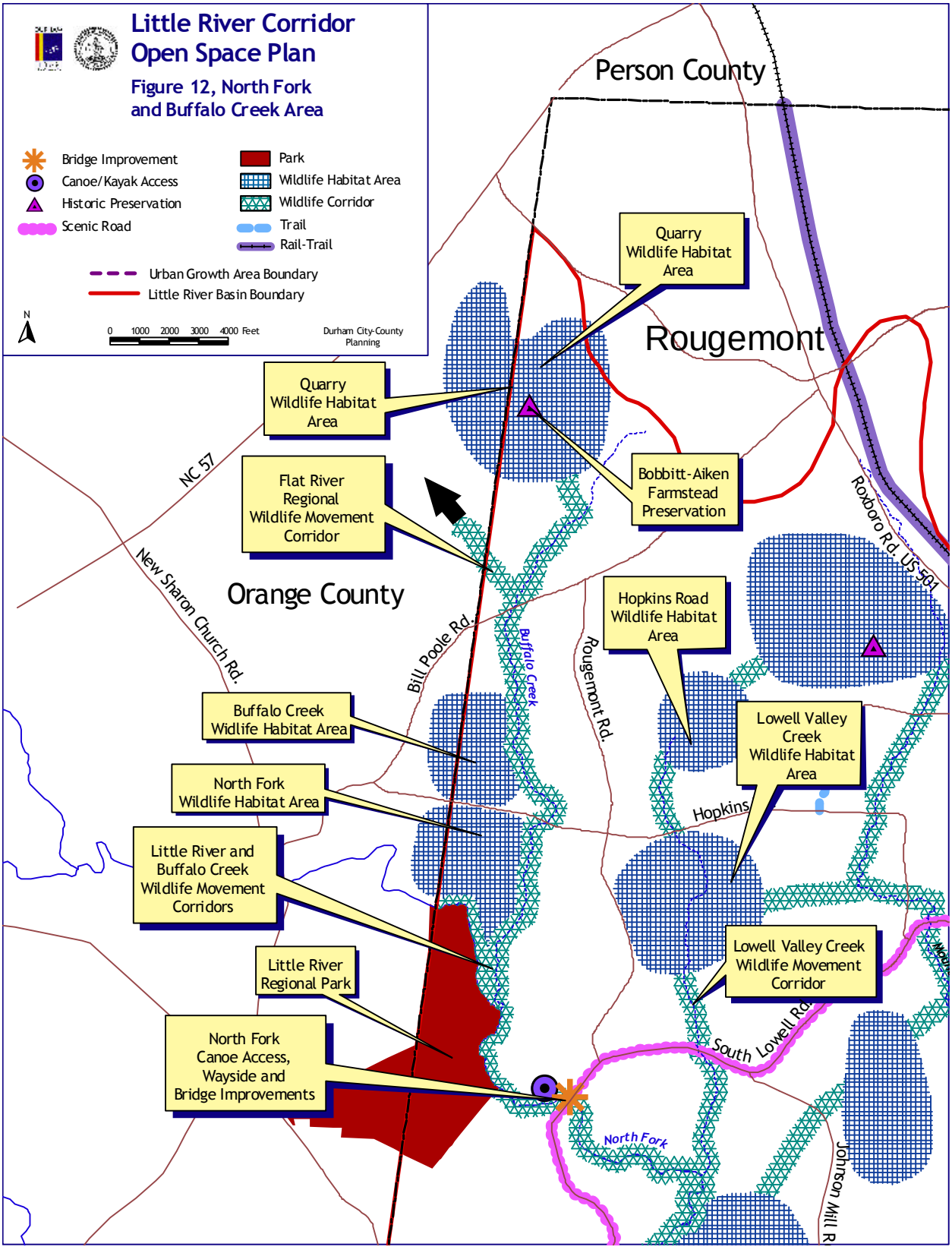
Wildlife Habitat Area
South Fork
Wildlife Corridor
Guess Road
Bridge Improvements
Cain Creek
Wildlife Habitat Area
Cain Creek
Greenway and Trail
Cain School
Preservation
Guess Rd.
St. Mary's Rd.
Cain Creek
Little River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Scenic Road
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Person County
Rougemont
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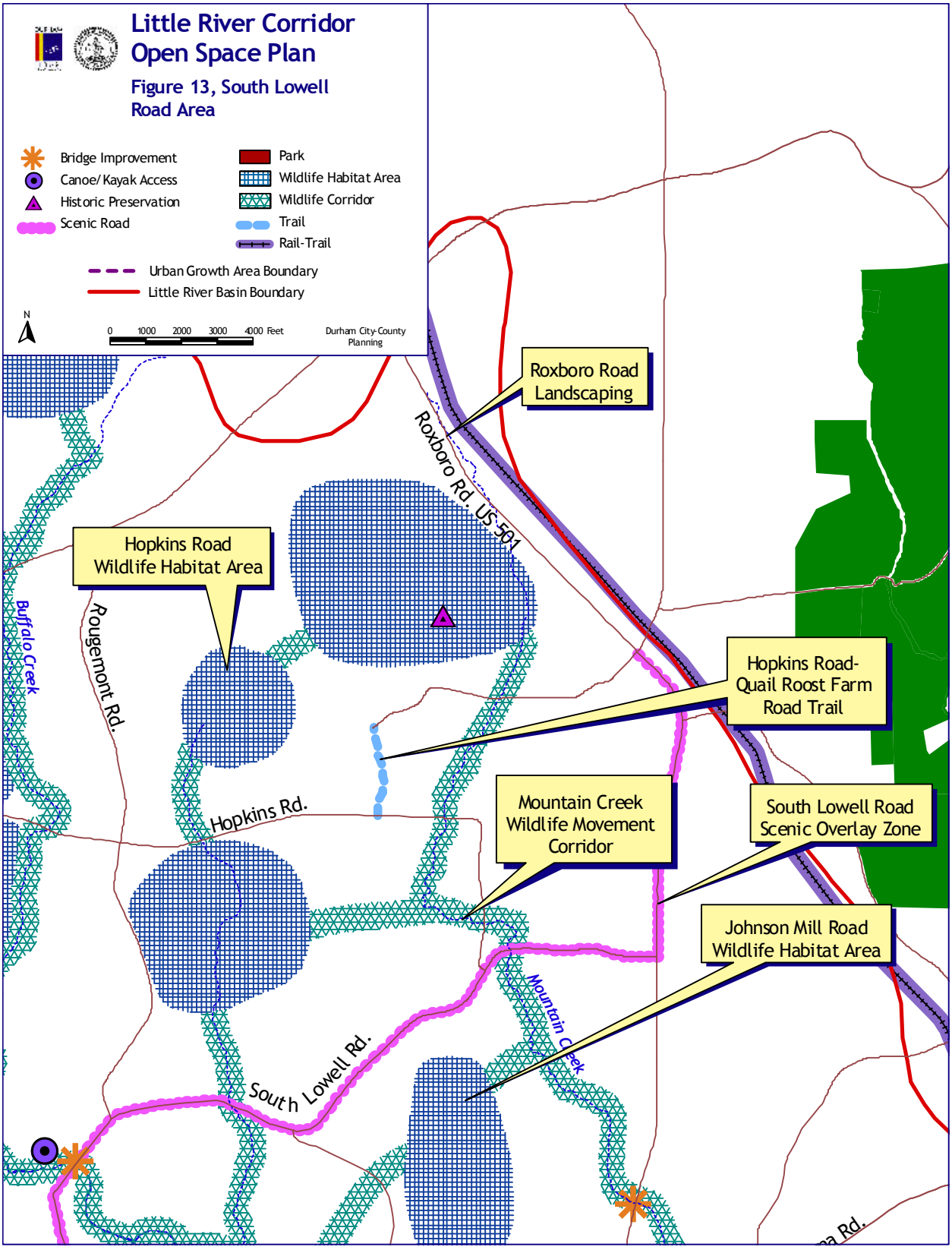
Quarry Wildlife Habitat Area
Quarry Wildlife Habitat Area
Flat River Regional Wildlife Movement Corridor
Bobbitt-Aiken Farmstead Preservation
Hopkins Road Wildlife Habitat Area
Buffalo Creek Widlife Habitat Area
North Fork Wildlife Habitat Area
Lowell Valley Creek Wildlife Habitat Area
Little River and Buffalo Creek Wildlife Movement Corridors
Lowell Valley Creek Wildlife Movement Corridor
Little River Regional Park
North Fork Canoe Access, Wayside and Bridge Improvements
NC 57
New Sharon Church Rd.
Bill Poole Rd.
Buffalo Creek
Rougemont Rd.
Roxboro Rd. US 501
Hopkins
South Lowell Rd.
North Fork
Johnson Mill R


Little River Corridor
Open Space Plan
Figure 13, South Lowell
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Hopkins Road-
Quail Roost Farm
Road Trail
Hopkins Rd.
Mountain Creek
Wildlife Movement
Corridor
South Lowell Road
Scenic Overlay Zone
Johnson Mill Road
Wildlife Habitat Area
Mountain Creek
South Lowell Rd.

H. Summary of Recommendations

Specific timeframes for implementation have not been provided because most implementation actions will depend in large part on the interest of the landowners and their individual timetables. Timing for any public acquisition or site development will also largely be dependent on the funding available, including any grants successfully awarded.

Priorities have been provided as high, medium, or low, taking into consideration the urgency of the implementation and the number of goals that a measure would achieve. For instance, a location with water quality, wildlife habitat and potential recreation benefits would rate as higher priority than an area that provides only wildlife habitat benefits. Cost factors and current management capabilities of the responsible party(s) have also been factored into the priority given.

Implementation Actions	Priority	Responsible Party(s)
Recreation Amenities		
Little River Regional Park	High; (development underway)	Durham County with Orange County, Triangle Land Conservancy and Eno River Association
Roxboro Road County Park	High	Durham County with Little River Community Complex
Little River Elementary Nature Trail	High	County Open Space Program with Wildlife Resources Commission
Norfolk and Southern Rail-Trail	High	City of Durham
Treyburn City Park	Medium	City of Durham
North Fork Wayside and Canoe Access	Medium	Durham County Open Space Program
Johnson Mill Wayside and Canoe Access	Medium	Durham County Open Space Program
Cabin Branch Creek Trail	Medium	City of Durham
Mountain Creek City Park	Low	City of Durham
Little River Elementary School Park	Low	City of Durham with Durham Public Schools
Canoe and Kayaking Facilities on the Little River	Low	City of Durham or Durham County, depending on location; with Non-profits Organization
Little River Reservoir Fishing and Canoeing	Low	City of Durham
Cain Creek Greenway and Trail	Low	Durham County
Quail Roost Trail	Low	Durham County
Wildlife Areas and other Open Spaces		
Little River Uplands Habitat Area	High	Landowners, Durham County, and Non-profit Organizations
North Fork Habitat Area and Movement Corridor	High	Landowners, Durham County, and Non-profit Organizations
Upper Little River Wildlife Corridor	High	Landowners, Durham County, and Non-profit Organizations
Cabin Branch Creek Habitat Area and Movement Corridor	High	Landowners and City of Durham

Reservoir Wildlife Movement Corridors	High	Landowners, Durham County, and Non-profit Organizations
Buffalo Creek Habitat Areas and Movement Corridor	High	Landowners, Durham County, and Non-profit Organizations
Culturally Significant Sites	High	Landowners with County Open Space Program, Non-profit Organizations
John Jones Wildlife Habitat Area	Medium	Landowners, Durham County, and Non-profit Organizations
South Reservoir Habitat Area	Medium	Landowners and City of Durham or Durham County
Lower Little River Habitat Area and Movement Corridor	Medium	Landowners and City of Durham
South Fork Wildlife Habitat Area and Movement Corridor	Medium	Landowners, Durham County, and Non-profit Organizations
Flat River Regional Wildlife Connections	Medium	Landowners, Durham County, and Non-profit Organizations
Rougemont-Harris Wildlife Habitat Areas and Movement Corridor	Medium	Landowners, Durham County, and Non-profit Organizations
Mountain Creek Wildlife Movement Corridor	Medium	Landowners, Durham County, and Non-profit Organizations
Quail Roost-Harris Road Wildlife Habitat Area	Medium	Landowners, Durham County, and Non-profit Organizations
Cain Creek Wildlife Habitat Area	Medium	Landowners, Durham County, and Non-profit Organizations
The Quarry Habitat Area	Medium	Landowner with County Open Space Program
Quail Roost Farm and Wildlife Habitat	Medium	Landowner with Farmland Preservation Board
Camp Riverlea	Medium	Owner with Non-profit Organizations, or Durham County
Treyburn Golf Course	Low	Landowner with County Open Space Program
Johnson Mill Wildlife Habitat Area	Low	Landowners, Durham County, and Non-profit Organizations
Lowell Valley Creek Wildlife Movement Corridor	Low	Landowners, Durham County, and Non-profit Organizations
Duke Power Easement Management at Cabin Branch Creek	Low	Landowner with County Open Space Program
Relocation of Bobbitt-Aiken Farm from Rougemont Quarry	Low	Owner with Non-profit Organizations or Durham County
Cain School Local Historic Designation	Low	Owner with Historic Preservation Commission
Leathers Cemetery	Low	Owner with assistance from others
Roxboro Road Landscaping	Low	NC DOT
Future Bridge Improvements	(As Needed)	NC DOT

Regulatory Provisions and Programs		
Conservation by Design Ordinance	High	Durham Planning Department
On-Site Alternative Waste Water Treatment Systems	High	Durham Planning Department with County Health Department, Environmental Affairs Board
Scenic Roads Overlay Zone	Medium	Durham Planning Department with Appearance Commission
Off-Site Pervious Surfaces	Medium	Durham Planning Department
Programs		
Community Education and Easement Programs	High	County Open Space Program
Site Steward Program for Acquired Lands	High	County Open Space Program
Land Management Stewardship Endowment Trust	Medium	County Open Space Program
Farmland Program Priority for Scenic and Environmentally Significant Farm	Medium	Durham County Farmland Preservation Board
Archaeological Study of the Indian Trading Path	Medium	Durham County
Scenic and Historic Road Signs	Medium	Durham County with Historic Preservation Commission
Preservation of Historic Farm Buildings	Low	Owners with Durham County with Non-profit assistance

Appendices

Appendix A. Significant Historic Resources

1. Hardscrabble

Hardscrabble Plantation is believed to be the oldest continually inhabited home in Durham County and possible the oldest home still standing. The house, known today as Hardscrabble, is actually two distinct houses that were later joined. Records indicate that the first portion of Hardscrabble was built by William and Elizabeth Clenny prior to 1779 and possibly as early as 1775. In March of 1779, the Clenny's sold their home and 227 acres of land to James Cain and his son John. Over the next decades, the land holdings of the Cain family grew to thousands of acres. The Plantation passed through the ownership of numerous family members, including William Cain; William Cain, II and Dr. James F. Cain.

Subsequent owners of Hardscrabble Plantation included Harry W. Fries, R.A. Spaugh, Thomas T. Russell, and Grady T. Hunt. In 1941, Roscoe L. Strickland and his sister, Rachel Strickland acquired the homestead site and ultimately renovated Hardscrabble. The present owners purchased the property in the 1980's and continue to maintain the property as their home. Hardscrabble is in excellent condition inside and out. A recent residential development has taken much of the original acreage of the plantation; however, the immediate site around the house is still significant.

2. Quail Roost

In 1875, the Quail Roost Hunt Club was organized by a group of Duke industrialists, including members of the Duke family, led by their associate, John Sprunt Hill. The acreage purchased by the members continued to be used as a country retreat by these manufacturers and their descendants for half a century. The land was purchased by the Hill family and became a model Golden

Guernsey dairy farm, under the ownership of George Watts Hill, son of John Sprunt Hill.

The Georgian Revival house for the country estate was completed in 1939. In the 1960's, changes in the dairy industry made continued operation of this model farm financially infeasible. The famous herd was dispersed and the farm converted to horse breeding. Much of the large associated acreage was donated to North Carolina State University, as the Hill Demonstration Forest, for research into increasing the productivity of southern woodlands. Mr. and Mrs. Hill moved to Chapel Hill and donated the Georgian Rivival house and ninety acres of land to the University of North Carolina in 1962, for use as a conference center. In the 1990s, the land was sold to a private owner. The hunting lodge is still owned by members of the Hill family and maintained as a residence. It is located at the edge of a hillside across from the stables, and is easily visible from Roxboro Road.

3. Phil Southerland House

When Phil Southerland retired as overseer at the plantation at Fairntosh in the last quarter of the nineteenth century, Bennehan Cameron sold him five hundred acres for a farm of his own. He and his wife, Lucy Bobbitt, then lived in the house that he had built on his new place. The Phil Southerland house constitutes a highly significant architectural resource in Durham County. It is currently in serious need of stabilization.

4. Rev. John McMannen House

During the period of 1830-1840, Reverend John McMannen, a Methodist minister, established and academy to train young men for careers in the ministry. He built his house at the point identified as the John Wade place of the Markham Map of 1780. The remains of small cabins scattered about on the site were associated with the academy. McMannen's daughter became the first wife of Brodie Duke, Washington Duke's son, the Durham tobacco manufacturer and real estate developer. In the late nineteenth century, the property came into the ownership of Sandy Woods, who was a mail carrier in northern Durham County from 1888 to 1901.

5. Cains School

Built in about 1910 for use as a "colored" school building, this one-story weatherboarded frame structure was later donated to the surrounding Cains community for use as a local meeting place.

The building has strongest significance as a result of its association with black history. Since the only similar frame schoolhouse remaining in the County is the one found at Lowe's Grove in southern Durham, the mere survival of the Cains schoolhouse gives it an important place in architectural history as well as social history. The schoolhouse remains essentially unaltered, the only substantial change being the apparent replacement of original wooden steps by flights of concrete block steps. Situated on a slight promontory south of St. Mary's Road, the schoolhouse enjoys and appealing visual setting enhanced by surrounding hardwood trees.

5. Bobbitt-Aiken Farm Complex

Other records are vague, but the 1910 Miller Map of Durham County shows Jas. Bobbitt residing in the large two-story farmhouse built in several stages at the center of the Bobbitt-Aiken Farm. The westernmost section of the dwelling, likely constructed in the early 19th century, is a log house. Bracketed mantels and an interior chimney with a corbelled cap suggest the house had acquired its rear ell by 1932 when Henry Aiken, a recent owner, believes that his father purchased it from a member of the Bobbitt family. Notable dependencies around the dwelling include a log smokehouse, a log barn, a frame tobacco barn, a large two-story frame packhouse, and a frame gable-roofed well enclosure. The house is currently within the site of a stone quarrying operation and its future is uncertain.

Appendix B. A Keepsake For Posterity, by Jean Anderson

This article first appeared in the Eno River Association Newsletter, Summer 2000 edition

Little River is in the news. At its headwaters a new public park, close to 400 acres straddling the Durham-Orange County line, will soon be a keepsake for posterity of our once rural countryside and the way of life the river sustained. If future efforts are successful to expand the new park by salvaging as much acreage for public enjoyment along the river banks as possible--paralleling the development of the Eno River State Park--the Little River valley will have much to offer: geological, archaeological, botanical, and historical sites galore. Visitors will learn about fossilized multi-celled organisms--annelid worms, the oldest yet found in the western hemisphere; about the Triassic Basin; about old mill sites, villages, taverns, churches, and graveyards: and about the old Indian Trading Path--that "highway" between Georgia and Virginia for the Native Americans who traded with the first Europeans.

Little River's name is something of a mystery. Rising in two branches, the North and South forks, in Orange County, with multiple small tributaries along its entire length, the river is no "littler" than its companion streams, the Flat and Eno rivers, which meander roughly from northwest to southeast. Like them its banks were magnets for early settlers and mill-builders Early residents around both forks, stemming largely from Ireland and Scotland, established Little River Presbyterian Church in the 1760s; the Allisons, Halls, Lattas, Raes and Rountrees were among those who settled the area, which still remains primarily a farm community. On the North Fork in the late 1750s, John Embree (or Emery) built one of the earliest mills. Grants in the 1740s to the Woods, Wade, Boggan, Ray, and Dunnagan families identify them as among Little River's earliest settlers.

Because of the river's waterpower, two industrial villages developed downstream in now Durham County —South Lowell and Orange Factory. In 1844 the Rev. John A. McMannen, a cooper, Methodist lay-preacher, and irrepressible entrepreneur, took a leap of faith and bought Young's new patent for a smut and screening machine, a device that separated the diseased from the good grain in the milling process. He made the machines in the backyard of his homestead on the North Fork of Little River. The little industry boomed, at its height employing twenty-two men. (Walter and Denise Newton have restored his house in the bend of South Lowell Road.)

McMannen installed a smut machine in the old gristmill he bought on the South Fork about a mile away. The first mill at that site had been built by George Newton in 1777; it was subsequently owned by Joseph Armstrong and then by his son-in-law John B. Leathers. To this enterprise McMannen gave the name South Lowell Mills. Perhaps it was his mechanic from Massachusetts, G. G. Clement, who suggested the name as a portent for future success—they hoped it would become the Lowell of the South.

McMannen's next inspiration was the establishment in 1848 of a classical academy for boys, a preparatory school for Randolph-Macon College. The headmaster, James A. Dean, was a graduate of Wesleyan University in Connecticut and was later ordained in the Methodist Church. Because the academy, too, was immediately successful, the following year McMannen built a brick dormitory to accommodate the growing number of students and opened a female academy as well. The girls boarded with his own and neighborhood families. South Lowell became a community with all kinds of cultural activities in the improving 1850s: "lyceum" lectures, a debating society, and a temperance society. South Lowell acquired a hotel for visitors, a tailor shop, and a country store. In 1856 Dr. Edward Scott advertised his medical school at South Lowell. Unfortunately Dr. Scott's death during the Civil War brought that ambitious scheme to an end. South Lowell Academy, however, was still in business in the 1880s.

In 1855, however, already propelled by a larger dream, McMannen moved his smut machine operation to a tract of land he bought at Durham's Station on the newly constructed North Carolina Railroad with the intention of selling lots and starting a town. The gristmill on the South Fork continued to grind under new ownership—first A. M. Latta's and later Robert G. Russell's-- until serious flooding destroyed it in 1908.

The other village with a mill as its nucleus was called Orange Factory because it was the first cotton factory to be established in Orange County. In 1852 John C. Douglas and James Huske Webb built a three-story brick building almost one hundred feet long downstream from the gristmill of William Lipscomb, Douglas's father-in-law. They built another dam and mill near the factory to run the machinery. Small houses in two rows were built on the hillside above the factory for the workers, and nearby a store, schoolhouse, and church eventually added their services to the little community.

At first the factory made only yarn, but during the Civil War it switched to weaving cloth for Confederate uniforms and afterwards plaids, ginghams, ticks, and seamless bags. During its last incarnation in the 20th century the mill made yarns and convict cloth. Now much of the remains of the factory and village lie submerged in the waters of Little River reservoir.

Between South Lowell and Orange Factory the river offered two other good millseats where 18th century gristmills once stood. A 1770 map shows Wads mill, probably a misspelling of John Wade's name; his mill was near the confluence of Mountain Creek and Little River, quite possibly at the same site as the later William Lipscomb mill: just east of where Roxboro Road now crosses Little River. About a mile upstream from there, before 1795, stood the mill of William Cain, the builder of Hardscrabble. The Cain family owned many hundreds of acres in the Eno and Little River watersheds. William's grandson Thomas Cain sold the mill in 1860 to his partner, Samuel H. Johnson, who finally lost it to the same heavy floods of 1908. The road across Little River near the mill is still called Johnson Mill Road. Traces of the dam and millraces are visible.

On its final lap from Orange Factory southward, Little River crosses lands that once made up Snow Hill Plantation. William Johnston, a Lowland Scot, settled his family there in the 1760s and in the 1780s built a mill, traces of which could still be seen before the construction of Little River reservoir. The new dam was built at precisely the spot of the old dam. Johnston was a figure of distinction in civic, military, and political affairs of Colonial Orange County.

The old Indian Trading Path, which had become by the mid-eighteenth century the main wagon road to Virginia, also crossed Snow Hill plantation. Beside the path, not far from where it forded Little River, Johnston built his Little River Store in 1767. His young partner, Richard Bennehan, the founder of Stagville Plantation in 1787, and Bennehan's son-in-law, Duncan Cameron, later incorporated Snow Hill into their own larger plantation complex.

Somewhere nearby on the Old Trading Path, Patrick Boggan began to "keep tavern" at his dwelling on Little River in 1753. It attracted the 18th century tourist trade, and a satisfied traveler described his inn as the place "where we put up for the Night, and both ourselves and horses fared well, having good beds and clean sheets. Got good tea and toast and butter in the morning for breakfast and the horses got good Corn and Oats." Boggan's

hospitality was in marked contrast to the traveler's usual fare. His land, like all the other land in the area, was later part of the Cameron plantations, which are today, in large part, the Treyburn development. A portion of the Trading Path through this area, still clearly discernable, has been given protective covenants.

Also within this area lies the Little River graveyard of the Cameron slaves. It covers an area of four and a half acres and contains hundreds of gravesites, many of them of slave descendants. Adjacent to the graveyard, after the Civil War, the freedmen established their own church called Cameron Grove. Still so named, it is now located at Bragtown.

Within the old Cameron plantation area, and incidentally within the geological formation known as the Triassic Basin, Little River joins the Eno, and together they flow into Falls Reservoir. The reservoir, into which the Flat River also flows, now subsumes the three rivers, which emerge downstream as the Neuse and make their meandering way together to the far Atlantic.

Appendix C. Planning for Wildlife Habitat

When European settlers arrived in the New World over 350 years ago, it was said that the eastern forests were so expansive that a squirrel could travel from the Chesapeake Bay to the Mississippi river without ever touching the ground. Each year over 3 million acres are removed from agriculture and forestlands by development pressures.

Today development has reduced the amount of tree cover in North Carolina from approximately 65% to 37% in just the past 25 years. Thousands of acres of wetlands and other fragile habitats have also been lost, and the habitats that remain are so fragmented that they no longer support diverse wildlife populations or perform many other functions such as flood control, erosion control and groundwater replenishment.

Every animal and plant requires a unique combination of environmental conditions and other life forms in order to survive and reproduce. These factors constitute its "niche" or its habitat. For most species, where they live is a sum of habitat "islands" or "core" areas, where living is good, often surrounded by other areas where living is more difficult or impossible. Landscapes and species have evolved together as functioning ecosystems where animals and plants have moved and migrated across landscapes for thousands of years in order to survive and reproduce.

Human alteration in modern times has changed the landscape too rapidly and too extremely for most animals to adapt. As a result, most animals are required to move and travel across landscapes that present more difficulties for them than they are prepared to handle and survive. This required movement exposes animal species to predators, invasive species, and areas where the available requirements for life, food, water, shelter and living space do not exist. In many cases human alteration of the landscape has made the environment so hostile to some wildlife species that they have virtually no chance or opportunity to move or migrate from one necessary habitat area to another to fulfill their life requirements.

In other cases, as in northern Durham County, where the landscape is predominately rural in character, there remains blocks of contiguous habitat areas that are linked or connected by natural vegetated corridors or natural pathways of suitable habitat to sustain species as they move or wander from one habitat area to another. The protection, preservation and management of these

remaining important landscapes is of extreme importance as development pressure and human alteration of the landscape increases at a rapid pace. To allow for a balanced ecosystem where wildlife species can survive, we must manage the land and resources to ensure both wise development uses and the ability of the land to sustain wildlife, natural ecosystems and biodiversity in order to sustain both humans and flora and fauna species. Wildlife habitat includes areas important for the full range of aquatic, terrestrial, game and non-game species.

Core Habitat Areas and Corridor Design

Natural landscapes have an inherent degree of connectivity to which species have adapted over time and as a result of impacts, which can be both natural and human impacts. Habitat alteration practices by humans greatly reduce or alter the connectivity for the majority of wildlife species. In many cases, a narrow corridor is all that remains for the movement of wildlife and the interchange of genetic material. The present challenge then, is to preserve, design and manage habitat areas or "reserves" for wildlife that can sustain wild populations as human impacts continue to increase outside of these habitat areas and corridor links. The design of a habitat area where human activities are limited and the maintenance of wildlife habitat and biodiversity are the primary goals. Surrounding these habitat areas are transitional zones or edges where increasing amounts or human impacts are allowed, but which can also support many species of wildlife. Outside the transitional zones, land is primarily human-oriented and only human-tolerant wildlife species are found such as the white-tailed deer, raccoons and many other edge species.

Tracts of relatively undisturbed habitat exist in Northern Durham County and has been the focus of the state Natural Heritage Program and are identified in the *Durham County Inventory of Wildlife Habitats, Movement Corridors, and Rare Animal Populations*. The Inventory recognizes that these habitat areas and corridors should be allowed to become one of the most important core habitat areas in the state and management of the remaining natural areas should reflect this. Habitat areas have been identified by both state and national agencies as being most effective when the acreage protected is a minimum of at least **300 to 400** acres and are linked by corridors of a minimum of at least **600** feet wide where possible. Research has illustrated that most "interior" forest species need a minimum size habitat area to protect them from disturbances from both human and "edge" wildlife species in order to survive. This "house" so to speak, provides them with the safety and "comfort" zone needed in order to carry on their life habits and

survive. Invasion by edge species interrupts their normal life habitats and eventually forces the species to abandon the site altogether or eventually cease to reproduce because of the intrusion and disturbance.

The ability of wildlife species to survive in this context of habitat areas that is linked and connected by movement corridors is key in the development of land use and management strategies. Ideally the landscape would be comprised of several large key wildlife habitat areas that are connected by movement corridors to smaller areas of at least **50-100** acres in size, which will provide both the diversity and dispersal of habitats to give both generalist or edge species and interior or specialized species the life requirements for survival.

The selection of the location of these habitat areas should be based on (1) their contribution to the overall network and (2) the distinctive characteristics of the habitat area itself and (3) areas and species that are identified in the Durham Inventory and how it is connected to other key components of the landscape. Wildlife corridors should ideally be located along the major perennial streams and waterways that will both provide the necessary life requirement; food, water, shelter and cover, but will also provide for water quality and flood control at the same time. In a broader biological and legal sense, the Ninth Circuit Court of Appeals (1990) provided a good definition of wildlife corridors:

> Avenues along which wide-ranging animals can travel, plants can propagate, genetic changes can occur, populations can move in response to environmental changes and natural disasters and species can be replenished from other areas.

Where possible, these corridors should provide additional space above the minimum **600** feet wide that is recommended and should, where possible, be a minimum of **300** feet on either side of the waterway. These links are extremely important as they provide the pathway where animal species and also plant species can move or relocate to another area due to negative influences in their primary habitat location. Without these links the landscape can become fragmented and eventually result in a less healthy animal populations which is an indicator of a less healthy environment overall.

Both the core habitat areas and the connections should ideally be a combination of diverse plant species, clean water sources, curvy and varied edges to provide for diversity and food sources and

most important be a part of a system or "matrix" that is all connected and interrelated. Without both this diversity and connectivity the system will have parts that function separately and will become an island into itself, which can lead to species decline and eventual extinction. Habitat suitability depends upon the needs of the plant and animal species. These needs include types of vegetation, topography, distance to water, climatic variables, food sources, distance to disturbances, presence of roads or other obstacles, and again the size of the habitat.

Development Management

Human effects upon wildlife can be categorized into two scales identified in landscape ecology principles, which are (1) the much broader "landscape" scale and (2) the more focused "site" scale. At the broad "landscape " scale human activity and development affects distribution, survival, and sustainability of wildlife communities. Human activities and development at the "site" scale influences behavior, survival, and reproductivity of individual species. This plan identifies the key areas that are important and recognizes that wildlife communities are linked by ecological processes (e.g., predation, competition, pollination, reproduction and dispersal) at a given site or habitat area and identifies those crucial links necessary for survival.

Human development that includes residential, commercial and the required infrastructure to support that development can be managed to minimize the negative impacts upon the environment and the plant and animal species that we all depend upon for survival. Animal species have a much lower tolerance to human disturbance and impacts that plants. Animals are sensitive to a much greater range of disturbances and are thereby much more likely to react in a negative way to those impacts. Roads, power line easements, alteration of waterways, fences and other obstacles have a profound effect on animal populations and management of lands and development in rural areas should take those negative effects into consideration. Agricultural practices can have a profound effect on wildlife species and best use management practices should be employed to minimize the impacts upon wildlife and water sources.

Residential development can be designed and managed to have less of an impact upon wildlife if developed with conservation principles. Techniques such as clustering development and conservation by design help to minimize the overall impact that residential housing can have. Individuals can also minimize the impact of their house and landscaping can have on wildlife species.

Things to avoid can include fences, large manicured lawns, use of fertilizers and herbicides, clearing the entire lot especially down to edges of creeks and streams. A minimum or 150 feet of stream buffer should be provided where possible and more is better. Recycling of yard debris, composting, creation of brush piles, nest boxes and natural landscaping are all techniques one can use to minimize and actually help the health of wildlife species.

Landowners who are fortunate to have large contiguous areas of wildlife habitat in their possession can manage that land not only to enhance the value to wildlife but also enhance the overall land value period. The County can assist the landowner in programs that will not only achieve these goals, but also actually help the landowner increase the land value and reduce personal property and estate taxes through conservation and management programs.

Conservation easements, farmland easements, forestry grants and many other local, state and federal programs are available to assist the landowner and local governments in working together in achieving a plan that will benefit both the landowner, the community and Durham County's future livability.

Summary

With the public input and interest in preserving some of the natural character of the Little River Basin, we together must devise partnerships that will achieve these goals. Tools may include all of the following and are all voluntary:

- Conservation Easements
- Fee Simple Purchase
- Management Partnerships
- Wildlife Corridor Districts
- Purchase of Development Rights
- Voluntary Wildlife Districts
- Wildlife Management Assistance Grants
- Conservation By Design
- Farmland Easements
- Forestry Stewardship Grants

- Conservation Reserve Enhancement Program
- Agriculture Cost Share Program
- North Carolina Wetlands Restoration Program
- Wildlife Habitat Incentives Program

These are just a few of the programs that are available and that can assist the landowner in making wise and environmentally sound decisions for the future of his or her property. The Durham County Open Space Program staff will work with each willing participant to construct a program that will meet the land resources and the landowners' needs to insure a high quality of life in the Little River Basin.

Resources

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Appendix D. Conservation by Design

Background

Open Space Subdivisions or Conservation Designs are being widely promoted as an additional tool for local communities to use to help preserve rural character and additional open space, whether it is sensitive wildlife habitat, active farmlands or simply wood lots. This technique is a further evolution of the concept of "clustered development," which has been used for several decades by many jurisdictions across the country, with varying levels of success.

The "Conservation by Design" concept is based on subdivision guidelines that require new projects to prepare two types of plans. The first is called a traditional or "yield plan" and is drafted to show how many lots the site could realistically support under a conventional subdivision design. The second plan is referred to as a "Conservation Plan" and is based on an analysis of the site's most significant features and designating the most sensitive, important environmental areas as open space. The ordinances specify a minimum amount of open space that must be preserved, typically 50%. After the open space areas have been designated, the remaining portion of the site is used for the residential lots, with the number of lots based on the number shown under the conventional yield plan. The resulting subdivision has the same number of new lots, but the smaller lots are clustered on the site in order to preserve significantly more common open space.

The ordinances typically spell out which site features are the highest priority to preserve in the common open space, which usually include site features as floodplains, steep slopes, wetlands, stream buffers, and designated wildlife areas. Other important open space areas such as moderate slopes, farmlands, meadows or woodlots would be designated as also important. Some jurisdictions that adopt Conservation by Design provisions require its use in certain priority areas. In other jurisdictions, the ordinances allow it as an option for new development, with the hope that developers will choose the clustering option after working out the benefits and costs of both type of plan for the site being developed. Some ordinances provide a modest density bonus when developing under a conservation design, with a portion of the additional revenue from the extra lots set aside as a trust fund for the perpetual maintenance of the open space. Others may provide for different incentives, such as narrower streets or the use of community waste water systems, in order to encourage the use of the ordinances.

The Conservation Trust for North Carolina has prepared a brochure further describing how residential developments can use Conservation by Design principles to preserve open space. The example below and on the next four pages is excerpted from this brochure.

The drawing below shows a real example of how an historic farm in Orange County, NC can be developed at the full density allowed by local regulations while using a site layout that incorporates the principles of conservation design. Using the four step process described on the next four pages, 70 percent of this 140 acre parcel could be conserved in its present condition. This allows each future homeowner access to nearly 100 acres of commonly owned land for walking, playing and picnicking. The permanent open space preserves large areas of contiguous woods as wildlife habitat, protects water quality, and preserves the farm and views intact.

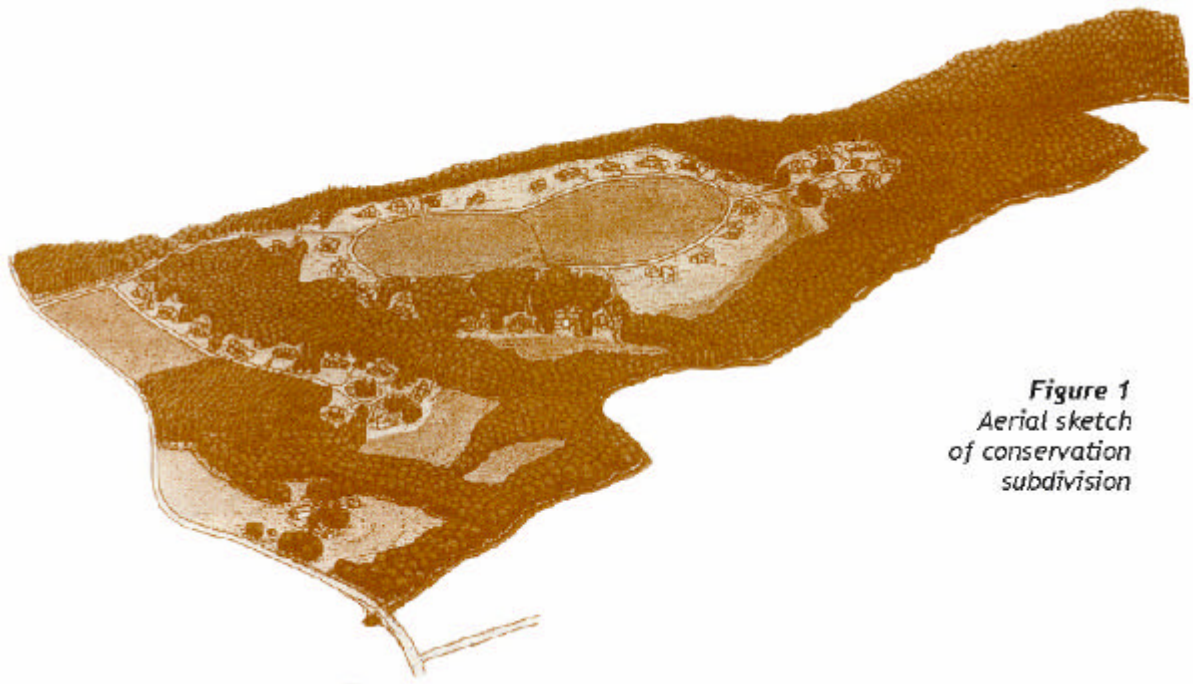


Figure 1
Aerial sketch of conservation subdivision

This graphic and the following four pages are excerpted from "Designing Residential Developments That Conserve Open Space" produced by the Conservation Trust for North Carolina. Assistance provided by NCSU School of Design. Text, sketches and site plans graphics by Anne Valentine as adapted from the Natural Lands Trust.

CTNC
PO Box 33333
Raleigh, NC27636-3333

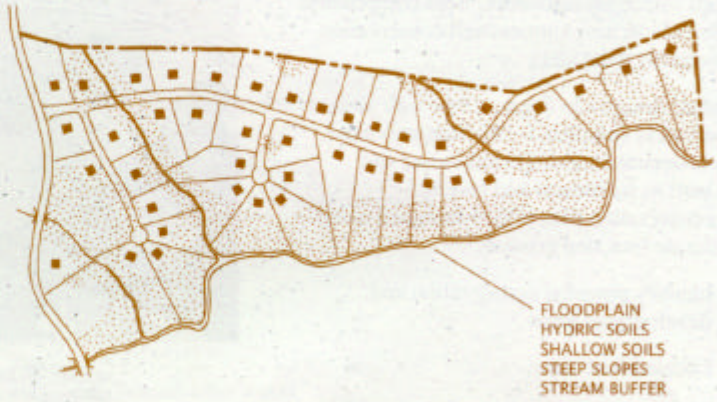
FROM HISTORIC FARM TO NEW SUBDIVISION

CONVENTIONAL DEVELOPMENT

This entire property is currently listed for sale. With increasing development pressure from nearby urban areas, properties such as this one are becoming highly sought after for new home sites.

Figures 3 and 4 illustrate the kind of development that is likely to occur under local zoning and subdivision regulations. The yield plan shows the maximum density allowed using current zoning once the physical constraints of the site are taken into account. Based on a minimum lot size of two acres and an analysis of soil suitability for septic fields, a maximum yield is determined to be 42 lots, averaging 3.2 acres, with none of the land protected as open space.

Figure 3
Yield plan showing maximum density permitted under current zoning.



The resulting plan carves the entire site into streets or house lots. Whereas the traditional landscape is based on wise use of the site's features and capabilities, standard subdivisions are based on meeting minimun standards efficiently. Contrary to popular belief, large lot subdivisions such as this one do not preserve the rural character. Instead, they spread their impact over a wider area, fragmenting the existing woods, spoiling the view from the road, and displacing the historical character of the site. The result is an "everywhere and nowhere" suburban subdivision.

An alternative approach, the four-step "open space design process," allows landowners to meet their financial goals while conserving most of their property's natural and cultural resources.

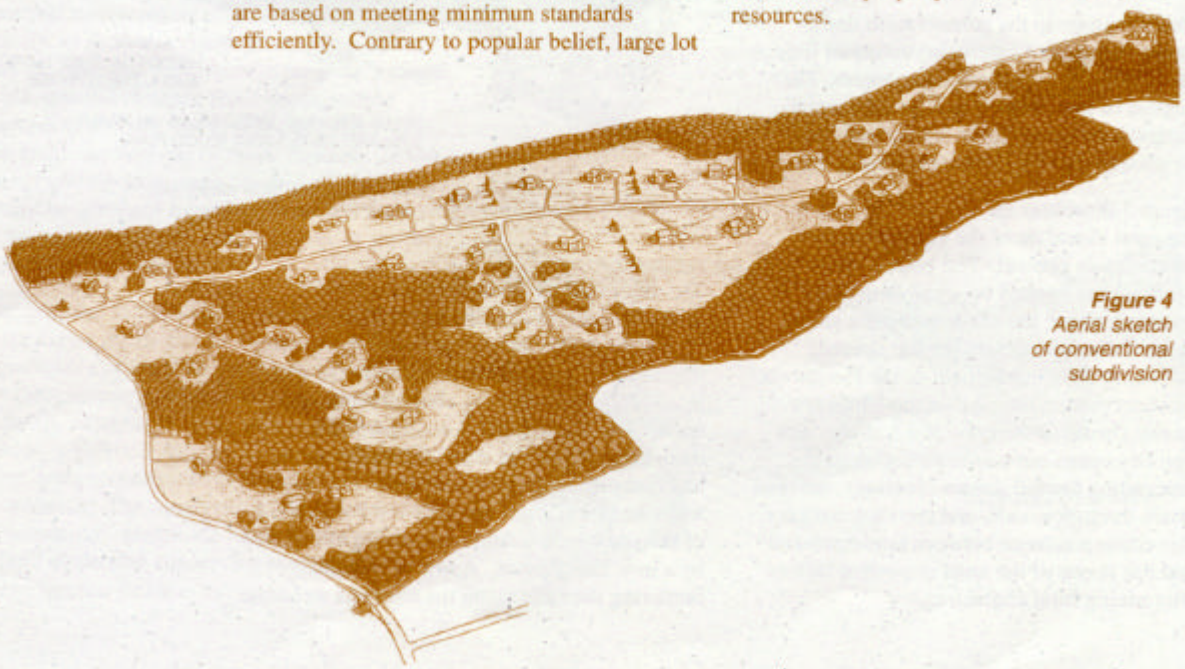


Figure 4
Aerial sketch of conventional subdivision

THE CONSERVATION DESIGN ALTERNATIVE

A SIMPLE FOUR-STEP PROCESS

Using conservation principles and smaller minimum lot sizes, the same net density can be accommodated while conserving most of the site's important resources. This compromise allows both development and conservation objectives to be met.

Before design can begin, a thorough site analysis is completed. This step provides an understanding of the individual site as well as its context and history. A conservation plan is then designed using a simple four step process:

1. Identify potential conservation and development areas
2. Locate house sites
3. Align streets and trails
4. Draw in the lot lines

Notice that the streets and lot lines are the last things to be drawn, exactly the reverse of the conventional subdivision design process. This means that the important features of the site are the first consideration, and hold priority throughout the process.

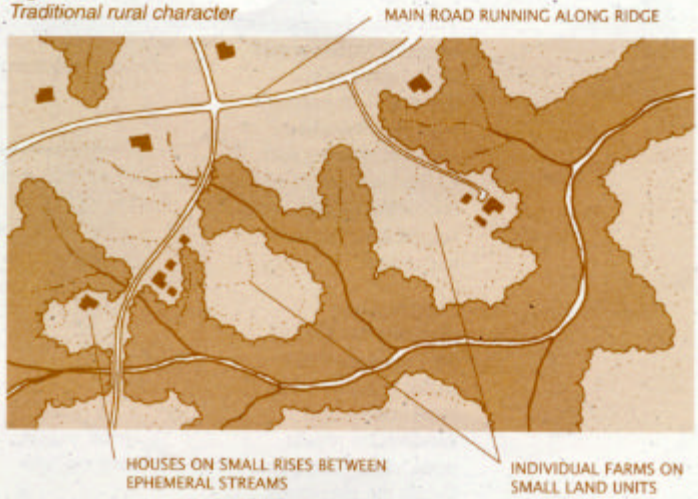
Site Analysis Phase:

The first phase in the conservation design process involves a careful inventory of the site's natural and cultural components. The purpose of this phase is to map the special features of the site and to understand how the site fits into the surrounding landscape.

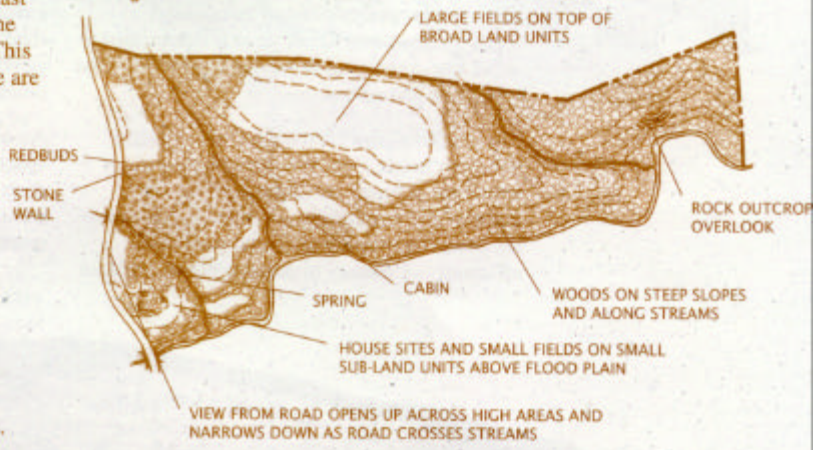
Figure 5 illustrates the site analysis process. The rural character of the site is typical of the county in general. The houses and small meadows are located on small land units, or flat areas, above the water-gathering slopes. Fields and roads occupy the flat uplands. Travelling along rural roads in the Piedmont, a distinct pattern emerges in the landscape. As one climbs to the crest of a hill, the view typically opens out across farm fields. Descending toward stream crossings, the road passes through woods, and the view narrows. This correspondence between land form and land use is one of the most important factors determining rural character.

Figure 5

Traditional rural character



Existing site features and land use



The site's special character results from a unique combination of features. The rich mix of species in the mature hardwood forest offers important upland habitat adjacent to the river. Such links are becoming rarer in suburban areas. The house itself is a unique feature, but its relationship to the small fields, the spring and outbuildings is also important. Old stone walls and farm roads are traces of the past use of the site which would typically be obliterated by a new subdivision. A row of redbuds bordering the field along the road is a welcome

sign of spring. The rocky bluff overlooking the river has value for the larger community, as does the water quality of the river itself.

Even if the house is granted historic status, the property as a whole is at risk of being seriously compromised by development which applies generic standards. On the other hand, a process can be used which protects the unique qualities of the site.

Design Phase:

STEP ONE: Identifying conservation areas and potential development areas

This step uses the information gathered in the site analysis phase to map potential areas for conservation and development. The primary conservation areas, shown in figure 6, are quite simple to identify. They consist of unbuildable lands such as the floodplain, hydric soils, and slopes that are steeper than 25%.

Secondary conservation areas, shown in figure 7, are those special features that would be missed if lost. These include the house, outbuildings and pecan groves, the stream buffers, the woodlands and moderate slopes, and the scenic viewpoint overlooking the river.

Once the primary and secondary conservation areas are mapped, the potential development areas emerge readily, as shown in figure 8. It is important that the potential development areas be located at a respectful distance from the important features of the site, but also located where they can make the best use of those features. In this case, building areas were located where they would be screened from the road, have views of woods or meadows, and conserve as much woodland buffer as possible.

The decision to build in the woods as opposed to the fields is often made by weighing the significance of each. In areas where woods are the rarer resource, houses may be better located in fields, whereas in areas with extensive forests, a meadow may be a unique occurrence. Here, a compromise was determined to be the best choice. The most critical contiguous areas of woods and streamside habitat were preserved while also conserving most of the meadows and fields.

Figure 6
Primary conservation areas

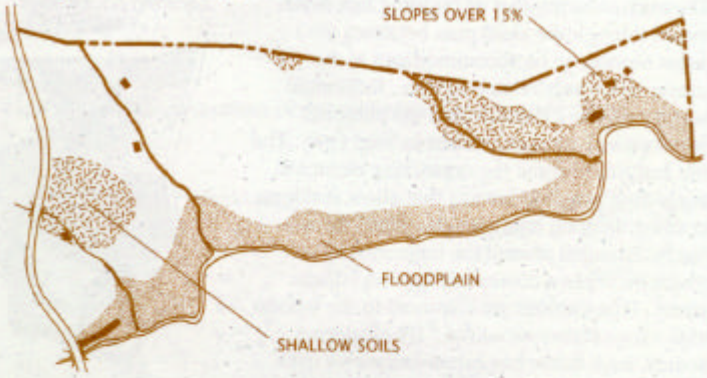


Figure 7
Secondary conservation areas

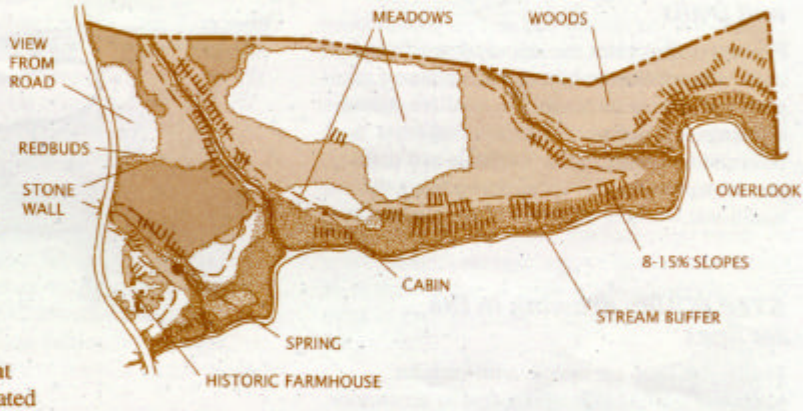
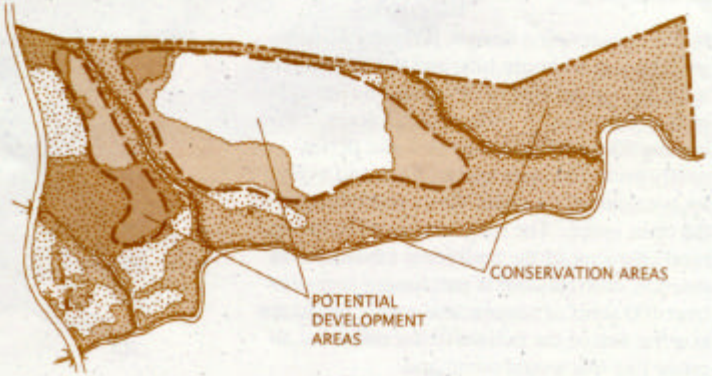


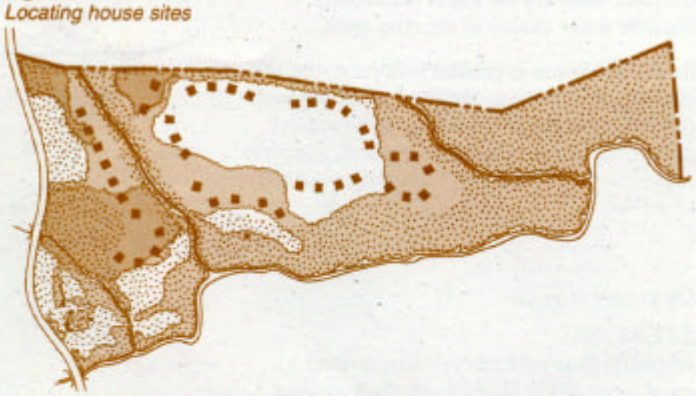
Figure 8
Potential development areas



STEP TWO: locating house sites

The maximum number of building lots determined through the yield plan becomes the target number to be accommodated in the conservation subdivision design. Individual house sites are located within the potential development areas delineated in Step One. The site features become the organizing elements, suggesting possible layouts that allow residents to enjoy them on many levels. Many homes can be arranged around the large meadow which becomes a commonly owned village green. Other homes are clustered in the woods with views across meadows. By clustering houses, each home has expansive views over open space, rather than of the neighbor's garage doors, as well as a sense of community and neighborhood identity.

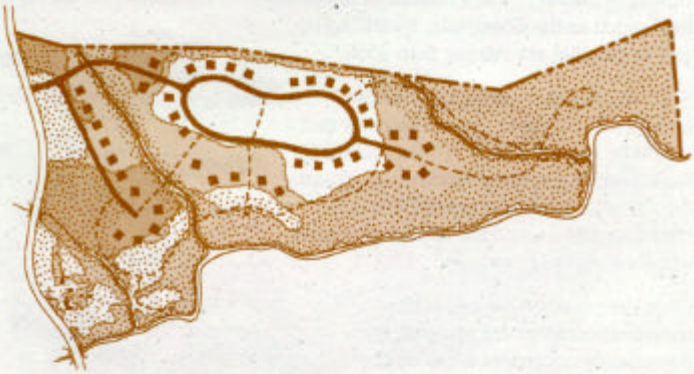
Figure 9
Locating house sites



STEP THREE: aligning streets and trails

Figure 10 illustrates the layout of streets and trails which links the homes. It is planned in such a way as to minimize the need for stream crossings and disturbance to wooded areas. Informal footpaths follow the trails and paths that crisscross the farm, thereby echoing the traditional working structure of the landscape.

Figure 10
Aligning roads and trails

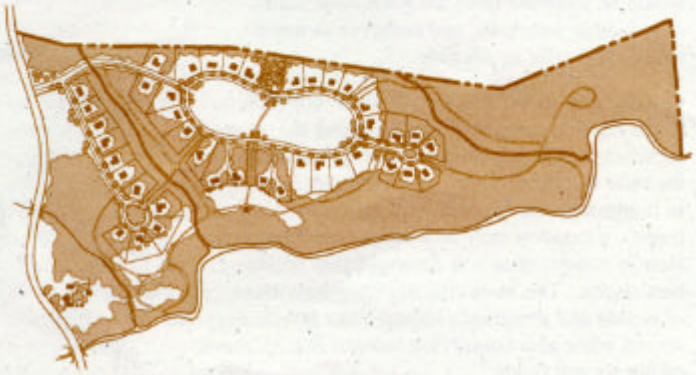


STEP FOUR: drawing in the lot lines

Finally, lot lines are added, with each lot having at least 32,000 square feet to accommodate individual septic fields and wells. Alternatively, individual or shared septic fields and wells could be located in adjacent conservation areas, in areas designated for this purpose on the final plan.

In this conservation design, just over 35 acres are taken up by house lots, and the average size is 36,507 square feet or .84 acres. Street rights-of-way consume an additional 7.3 acres, leaving 97.5 acres as undivided and permanently protected open space. Each and every lot is enhanced by direct views and/or access to the open space. The main entrance retains the rural character of the traditional landscape. In essence, each resident is purchasing access to over 100 acres of historic and scenic landscape at a fraction of the million dollar price that an estate like this would command.

Figure 11
Drawing in the lot lines



Appendix E. Resources

1. Anderson, Jean Bradley. ***Durham County, A History of Durham County***. Durham, NC: Duke University Press, 1990.

2. Dramstad, Wenche E., James D. Olson, Richard T. T. Forman, ***Landscape Ecology Principles in Landscape Architecture and Land Use Planning***, Washington, D. C.: Island Press, Harvard University Graduate School of Design, American Society of Landscape Architects, 1996.

3. Hall, Stephen P. and Robert D. Sutter, ***Durham County Inventory of Important Natural Areas, Plants and Wildlife***, 1999.

4. Little, Dr. Ruth, ***Durham County Extraterritorial Area Historic Inventory***, Durham City-County Planning Department, 1990.

5. Triangle J Council of Governments. ***Durham County Inventory, Critical Lands***. Research Triangle Park, NC, May, 1985.

End Notes

[1] ***Durham County, A History of Durham County***, by Jean Anderson, 1990, pg. 4.

[2] "Freshwater Mussel Distribution and Threat Analysis in the Upper Neuse River Basin in Durham County", by Christopher McGrath. Duke University Master's Thesis. 1991, pg. 31.

[3] "The Hidden Wave of Extinction in our Freshwater Ecosystems," by Steve Hall in Natural Diversity Newsletter, Division of Parks and Recreation, Summer, 1992.

[4] ***Durham County Inventory of Important Natural Areas, Plants and Wildlife***, by Stephen P. Hall and Robert D. Sutter. 1999, pg. 331.

[5] ***Durham County Inventory***, pg. 284.

[6] ***Durham County Inventory***, pg. 328.

[7] ***Durham County Inventory***, pg. 330.

[8] ***Durham County Inventory***, pg. 330.

[9] ***Durham County Inventory***, pg. 284.

[10] "Landowners: Help CURE Grassland Bird Declines", pg. 33 in *Wildlife in North Carolina*, June 2001; Volume 65, no.6.

[11] ***Time before History***, by H. Trawick Ward and R.P. Stephen Davis Jr. 1999, pg 35

[12] US Department of the Interior, Guidelines for National Register Nomination.

[13] The Trading Path Association was incorporated as a non-profit in 1999. It may be contacted at http://www.tradingpath.org.

[14] This history has been summarized from history provide by Jean Anderson in the article "The Little River: A Keepsake

for Posterity," published in the Eno River Association Newsletter, Summer 2000.

[15] Cains Mill was established here by 1795 and was continually operated by Cain, his son and grandson for many decades. Some time in the mid-nineteenth century Cain's grandson sold it to his partner, Samuel Johnson. A flood destroyed the mill in 1908.

[16] Alternative wastewater systems require regular operation and maintenance attention to keep them functioning properly. Without regular maintenance, these systems can contribute to water quality problems. Second, these systems rely on certain critical equipment, such as collection pipes and pumps. As the equipment nears the end of its normal useful life, the risk of a major failure increases significantly. If such failure does occur, the management entity, typically a homeowners association or utility company, may not have the capital resources to be able to respond to clean-up and equipment replacement issues. Given these two potential problems, Durham has opted in the past to prohibit community wastewater treatment systems in the Little River Reservoir and Lake Michie watersheds.