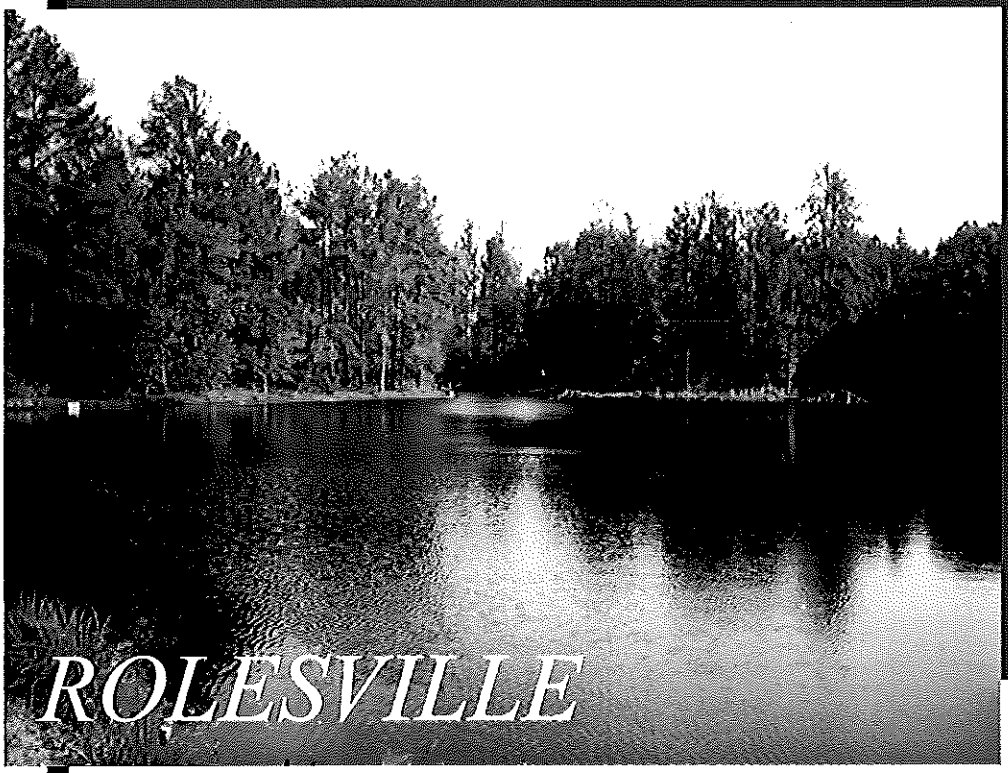


OPEN SPACE and GREENWAY PLAN

January 2002

GREENWAYS
INCORPORATED
Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning

Table of Contents

Acknowledgements

Chapter 1: Introduction

Purpose

The Town of Rolesville, a community that maintains and celebrates its small town heritage and character as it enters the 21st Century, has prepared this Open Space and Greenways Master Plan in order to protect the natural and cultural resources that community residents value most. There are three principal goals of the plan: 1) to identify parcels and corridors of land that are in need of protection and conservation measures; 2) to establish a comprehensive approach that will link greenspace lands and corridors to residential, commercial, institutional and central business areas of the community; and 3) to define a concise set of strategies for protecting and conserving these corridors and at the same time developing public use facilities that would provide residents with access to these lands and corridors.

If the goals of this program are met, Rolesville will have achieved success in enhancing the small town character and charm that is the hallmark of the community. Perhaps most importantly, protecting greenspace that is linked can support natural functions that are important in sustaining a high quality of life for residents of the community.

Consistency with Wake County Program

This Open Space Plan has been prepared to be consistent with a larger comprehensive Open Space Plan for Wake County. The County launched its open space planning efforts in 1999 to preserve natural and cultural landscapes. The County has encouraged and supported the preparation and adoption of municipal open space plans to ensure that there is continuity across jurisdictions. In order to comprehensively evaluate land in Wake County, each municipal government was asked to prepare its own open space plan. Because the character of the land within a municipal area helps define the character of a town, these individual assessments are viewed as critically important for the protection of resources and the way of life throughout the County. Further, the County adopted the following definition for open space to ensure a functional relationship between municipal plans and the county's open space program:

"Open space is a functional system of natural and cultural resources protected and maintained for the benefit of residents, businesses, and visitors."

The County's Open Space Program began with a focus on four key

watersheds within the County: Falls Lake, Neuse River, Swift Creek and Harris Lake. This initial plan was adopted by County government and has led to the passage of a $15 million bond referendum and the establishment of Partners for Open Space and the Environment (POSE). Wake County is currently engaged in a comprehensive open space planning effort that will tie together each of the twelve municipal plans.

As Wake County continues to grow in the 21st Century, it is hoped that these efforts of planning for the protection and conservation of open space will ensure that future generations will have access to the special landscapes and waterways that are unique to the County. Preserving and protecting these resources will also enhance the quality of life for future residents and ensure that Wake County is one of the great places to live, work and raise a family.

2

Chapter 2: Inventory of Existing Conditions

History of Rolesville

Rolesville is the second oldest town in Wake County, located northeast of Raleigh (approx. 14 miles). The town was named for William Roles and was originally incorporated in 1837. Mr. Roles was a landowner, merchant and businessman who founded the first local school, Rolesville Academy in 1832.

The early town limits were four cornerstones enclosed by fencing. The town became a frequent travel stop for stagecoaches on the north-south route from Richmond to Fayetteville. "Roles Half-Way House" and "Roger's Tavern" became popular stops for travelers for rest and refreshments.

In 1913 a fire destroyed parts of the original downtown; however the area was reconstructed and in 1941 was incorporated for the second time. A traffic light was installed in 1967 and remains the only traffic light in Rolesville. The town park is the only park and shares a 20-acre tract of land with the Rolesville Elementary School (built in 1991).

Due to its close proximity to Raleigh, Rolesville expects it's residential, commercial and industrial communities to grow. The town, in anticipation of future growth, has prepared a comprehensive land use plan to guide the growth and preserve Rolesville's rural charm. (Public information for this section was obtained from the Town of Rolesville).

Bounds of the Study Area

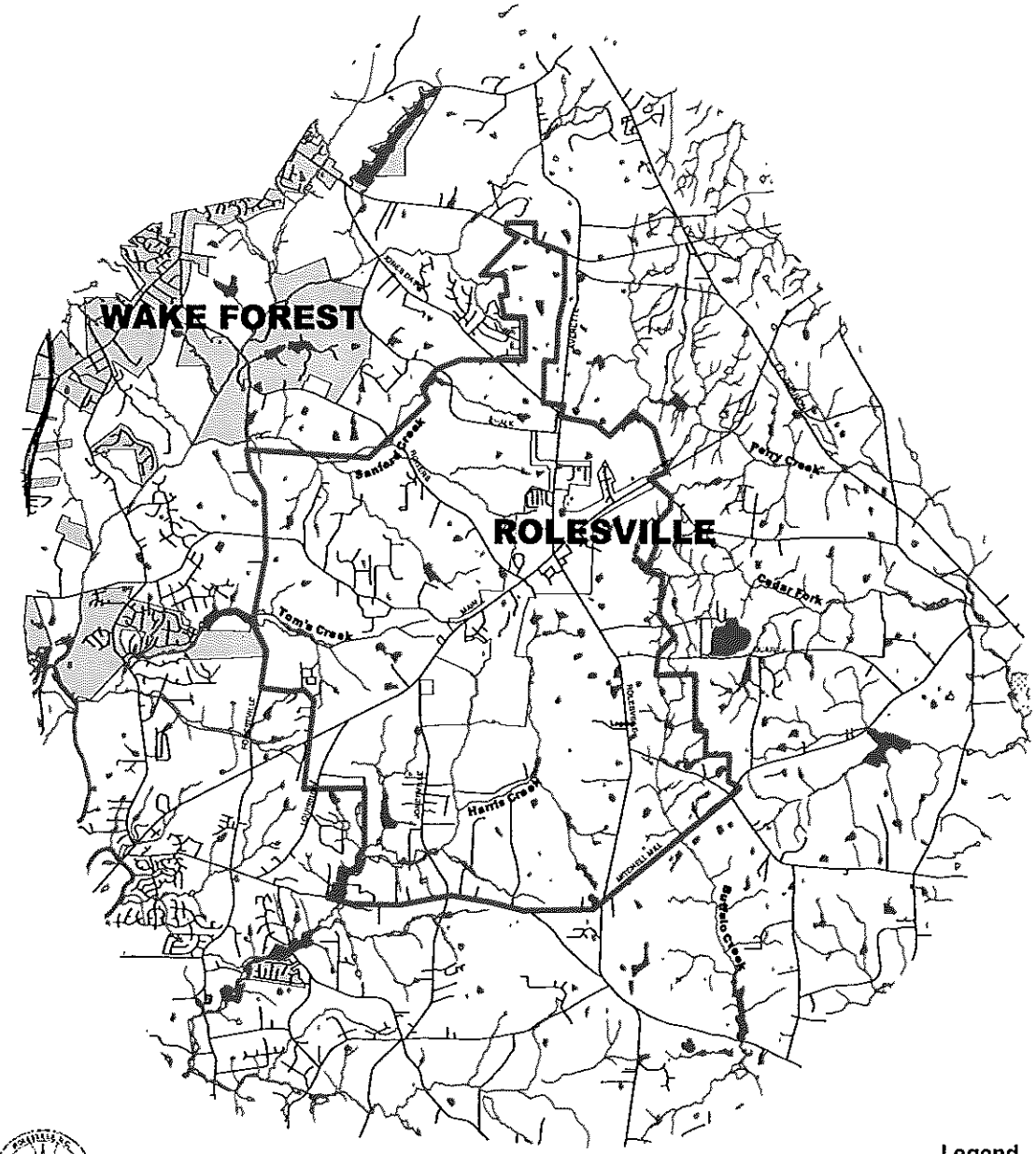
The study area boundary is Fosterville Road (to the west) and Mitchell Mill Road (to the south). The northern boundary runs east from Fosterville Road along Sanford Creek to Jones Dairy Road and includes a small section from Jones Dairy Road to Wait Avenue (NC 98). The Eastern boundary of the study area generally follows Averette Road from Wait Avenue (NC 98) to Jones Dairy Road. From Jones Dairy the boundary follows no specific road; it angles east to N. Main Street and then south to Mitchell Mill Road (see Figure 1 study area).

Topography

The topography of the study area is made up mostly of farmland, with some hilly terrain to the west. The town of Rolesville is situated in the middle of the study area at the headwaters of the six-sub feature creeks (Harris, Toms, Sanford, Buffalo, Perry and Cedar Fork). Harris Creek flows south from town and is a tributary to the Neuse River. Toms and Sanford Creeks, flowing west from town, are tributaries to Smith Creek, which is a tributary to the Neuse River. Cedar Fork and Perry Creek flow

ROLESVILLE OPEN SPACE AND GREENWAY VISION

Study Area



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Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

Prepared:
November 26, 2001

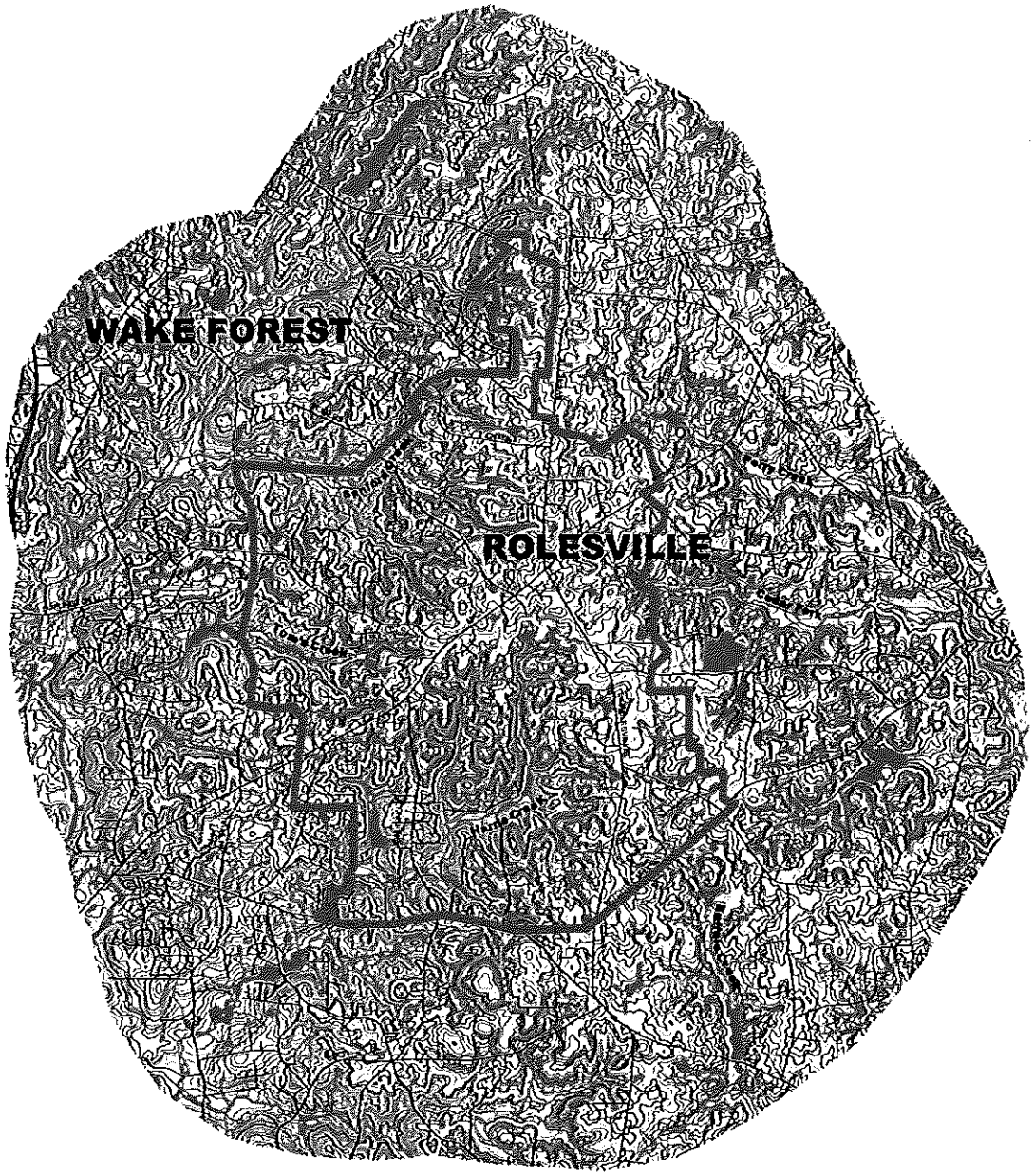
Feet
0 4,450 8,900 17,800

Legend
- Study Area
- Creeks
- Lakes
- Streets
- Rolesville
- Wake Forest
- Raleigh

Figure 1: Study Area

ROLESVILLE OPEN SPACE AND GREENWAY VISION

Land Form



Legend

- Study Area
- Streets
- Creeks
- Lakes
- Topography

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Data Sources:
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Wake Forest Planning Dept.
NCGIA Corporate Database

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0 3,200 6,400 12,800 19,200 Feet

Figure 2: Land Form

east into the Little River and Buffalo Creek flows southeast. Elevations range from approximately 180 to 350 feet above sea level within the study area (see Figure 2: Landform).

Soils

The soils in the study area are gently sloping to steep, deep and moderately deep and well drained to excessively drained. Typically the Rolesville area is underlain by igneous, granitic rock, commonly known as the Rolesville Pluton. The main characteristic of this type of rock is that it crops out on the land surface, in the form of granitic flat rocks. Near the stream courses the soils are primarily of the Chewacla or Wehadkee associations. This area contains hydric and semi-hydric soils (waterlogged soils) typical of floodplains (see Figure 3: Geology and Hydric Soils; Figure 4: Flood Zones). The subsoil consists of very friable coarse sandy loam to firm clay. Essentially all the soils in the Rolesville Pluton area are acidic, with a pH generally less than 6. The properties of these soils make development difficult due to greater engineering requirements and higher construction costs.

Vegetation

Vegetation, composed principally of overstory trees, understory trees, shrubs and groundcovers, is a critically important feature of the natural landscape. Vegetation filters pollutants from the air and surface waters, moderates local climates, offers relief from exposure to sun, wind and rain, and provides habitat for numerous species of wildlife. Rolesville is predominantly forest-covered to the west, featuring southern yellow pine and mixed hardwoods (swamp hardwoods, hardwoods/conifers, upland hardwoods). Vacant farmlands dominate the eastern part of the Rolesville study area, which also include andropogon (Johnson's grass) and sumac (*Rhus* spp.)

Wetlands are typically defined by the presence of three unique, interrelated natural features: hydrology, hydric soils, and vegetation species. Wetlands are critical ecological systems because of their ability to filter pollutants from surface water, recharge underground aquifers, absorb floodwaters, and serve as habitat for a diverse variety of plant and animal life. Most wetlands are protected by Section 404 of the Federal Clean Water Act, which authorizes the U.S. Army Corps of Engineers to regulate the discharge of dredged and fill materials into waters of the United States, including wetlands (called "Jurisdictional Wetlands").

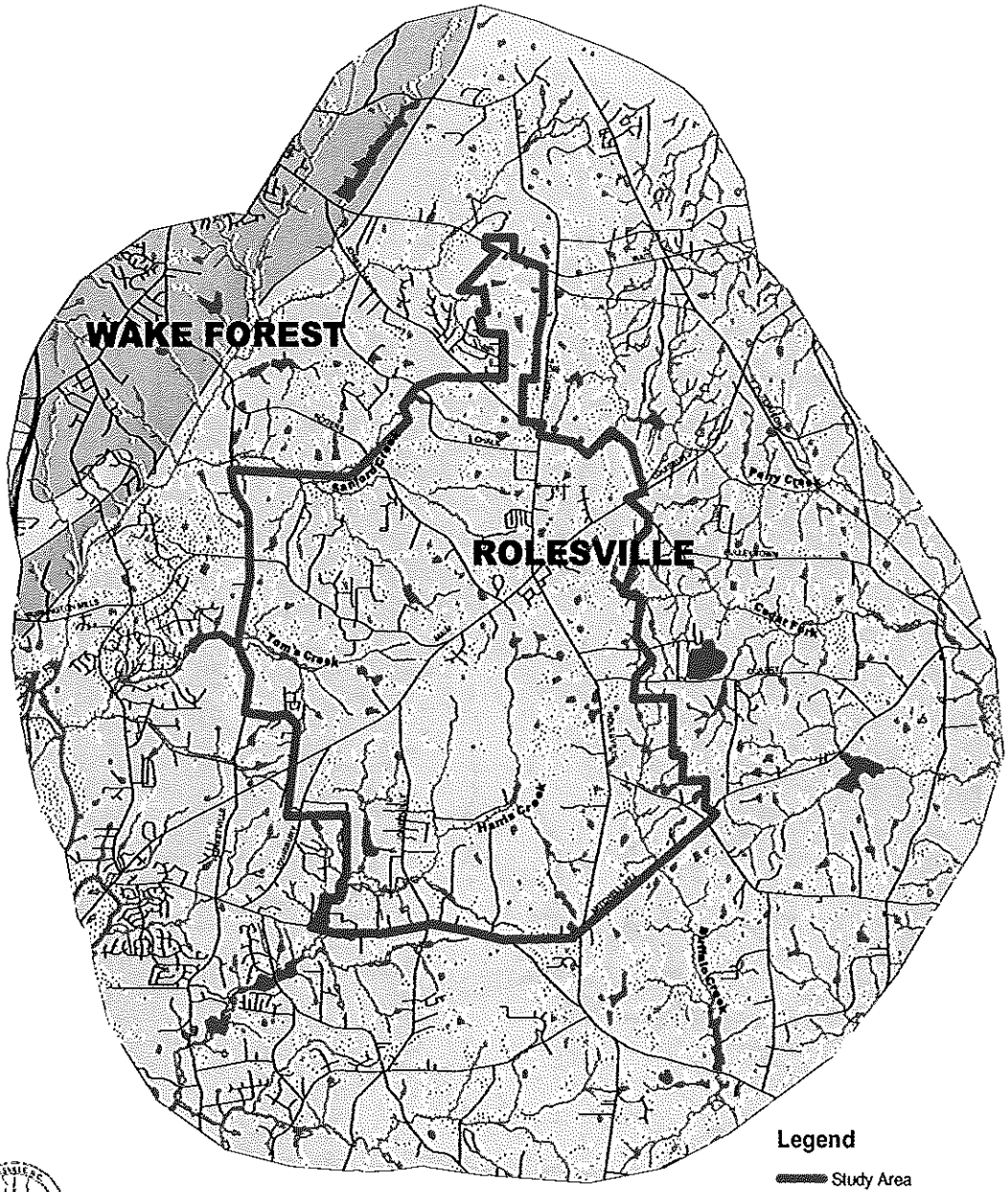
The primary overstory wetland species are red maple (*Acer rubrum*), willow (*Salix* spp.), ironwood (*Carpinus caroliniana*) and river birch. The understory is principally composed of reeds, greenbrier, and small grasses. Due to the shade cast by overstory trees there is very little groundcover. However, along cleared corridors, such as the sewer line easement, enough sunlight penetrates the canopy to support the growth of rye grass, planted to stabilize the soil and permit access along the corridor.

Natural Areas

Rolesville has two sites that are listed in the 1987 Inventory of Natural Areas of Wake County (Figure 5: Natural Areas). Both sites are signifi-

ROLESVILLE OPEN SPACE AND GREENWAY VISION

Geology and Hydric Soils



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Data Sources:
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Wake Forest Planning Dept.
NCGIA Corporate Database

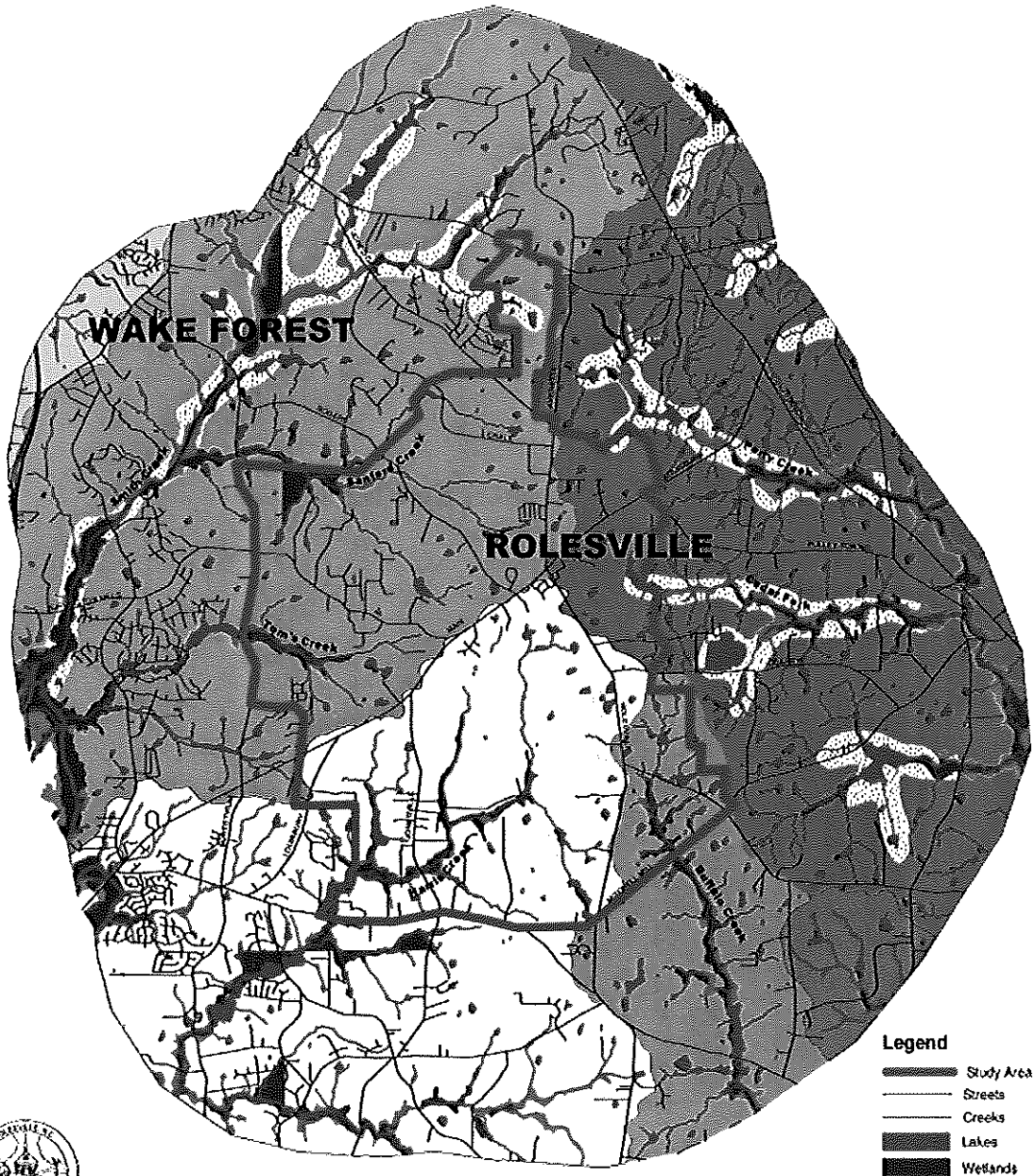
Prepared:
November 26, 2001

0 4,450 8 ,900 17,800 Feet

Figure 3: Geology and Hydric Soils

ROLESVILLE OPEN SPACE AND GREENWAY VISION

Flood Zones



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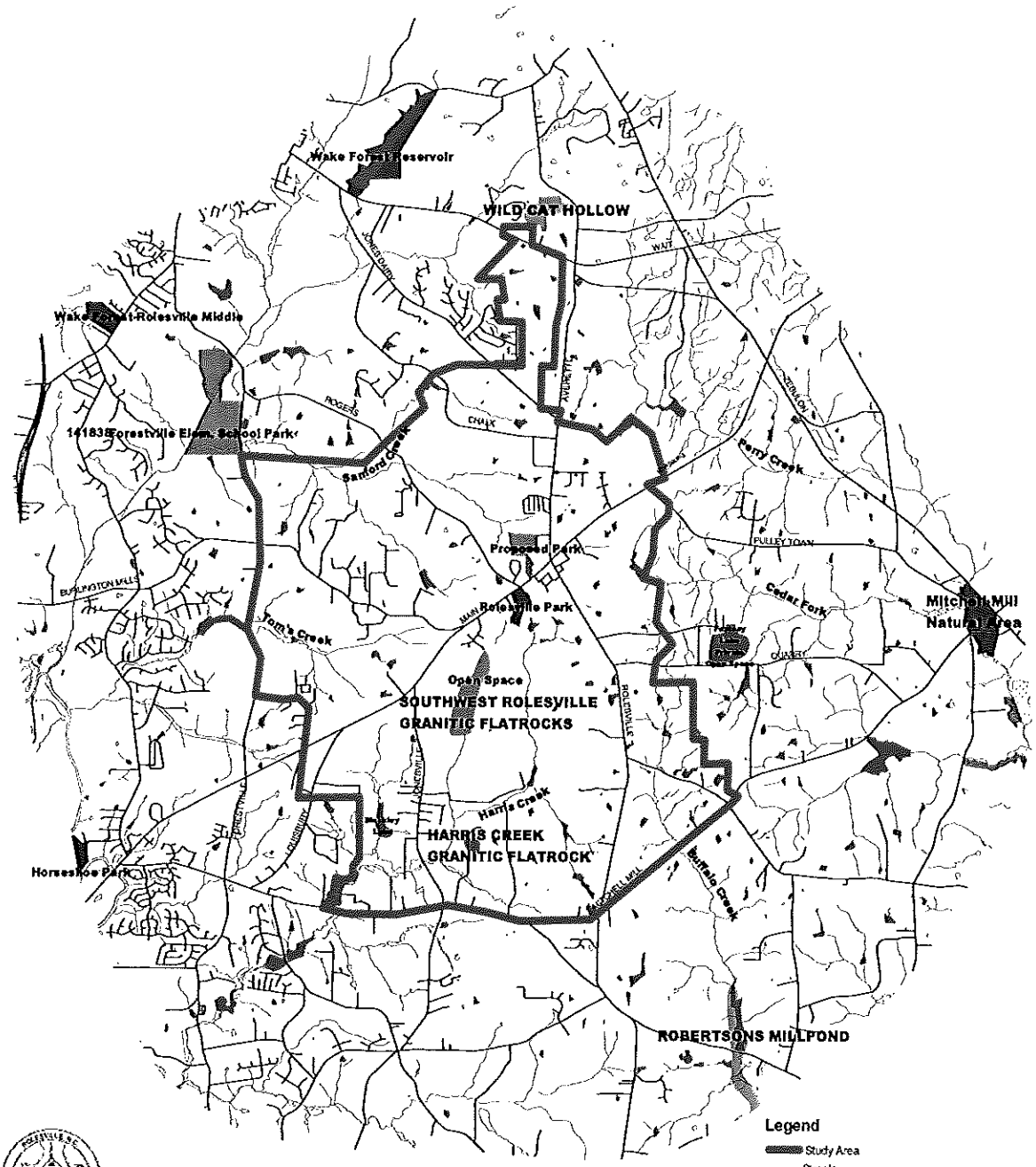
November 26, 2001

0 3,800 7,600 15,200 Feet

Figure 4: Flood Zones

ROLESVILLE OPEN SPACE AND GREENWAY VISION

Natural Areas



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Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

Prepared:
November 26, 2001

Figure 5: Natural Areas

cant examples of granitic flat rocks and are privately owned. The larger of the two (115 acres) has 8 to 10 granitic flat rocks which is one of the largest clusters in the eastern Piedmont and among the most scenic flat rocks in Wake County.

There is a large colony of nestronia (Nestronia umbellula) with several thousand stems of this rare plant located on this site. This is one of the largest colonies in North Carolina.

The smaller site (10 acres) has a large (1 acre) example of granitic flat rock; however, this site has been cut-over which damages the attractiveness of the flat rock and the site.

In addition there are three important natural areas located outside the study area. The first is the Mitchell Mill Natural Area, which is located east of Rolesville at the junction of Cedar Fork Creek and the Little River. Mitchell Mill Natural Area is owned by the State of North Carolina and contains 81.74 acres. Located in or near this area are a number of endangered species ranging from animals to plant life to natural communities.

The second natural area located on the out skirts of the Rolesville study area is Wild Cat Hollow. This designated natural area is located at the northern most tip of the study area, off Wait Avenue. It contains 47.02 acres and is privately owned.

Robertsons Mill Pond is the third designated natural area. This area contains 813.5 acres and includes sections of the Buffalo Creek. The entire area is privately owned.

Wildlife Habitat

There are two broad categories of wildlife that are of concern to this planning effort: "interior" forest species wildlife and "edge" species wildlife. Most species of wildlife that inhabit urban areas are known as "edge" species. These mammals, birds, amphibians and insects have adapted to urbanized landscapes and have developed harmonious relationships with urban residents. However, "interior" species require undisturbed forest environments to survive and because of the human population growth and resulting land development, have experienced significant habitat loss and population declines.

According to the U.S. Fish & Wildlife Service (update 3/2001), currently there are four threatened or endangered species and eleven species listed as federal species of concern in Wake County.

Habitats for rare and common "interior" and "edge" species exist in various forms throughout the study area. Migration corridors that allow plant and animal species to move through the landscape typically connect diverse habitats. The migration corridors most important to the study area are along streams. The open space and greenway master plan is concerned with both remnants of "interior" forest species and the "edge" environments that exist within the floodplains of the study area. Approximately eighty percent of all wildlife depends on riparian corridors for survival.

Therefore, the protection of floodplains is crucial to sustaining a diverse wildlife population in Rolesville.

During site visits, evidence was found of beaver, squirrel and deer populations. Bird species found within the study area are, but not limited to: red-bellied woodpecker, northern cardinal, barred owl, and blue heron. Other species include turtles, American toad, raccoon, copperhead, and a variety of ducks. On the visit to Harris Creek a king snake, skink, and Carolina tree lizard were observed.

Population

Even though Rolesville has the smallest population of all the towns in Wake County, its population has tripled over the last two decades from 381 to 907. Wake County, as a whole, grew 48.3 percent from 1990 to 2000 and for the first time has more than half the Triangle population. Rolesville's population grew almost 60 percent during the same time period. The population for Wake County is 627,846 with a projected population in 2019 of 939,753.

Infrastructure

Infrastructure (see Figure 6: Infrastructure) is the skeleton of a community and a critical determinant of future development. Infrastructure easements can play a significant role in the alignment of greenway facilities. Often, utility companies can be persuaded to grant surface easements for the construction of trails that can be used by the public as well as utility vehicles for easement maintenance. In Rolesville the available infrastructure data displays water, power, and sewer lines. Most notable is the lengthy stretch of sewer line in the floodplain of Harris Creek. This facility is of special interest to greenway planners because of its potential to link the community north-to-south. Also of interest, is the power line easement that runs along Tom's Creek to Harris Creek and the water line on Jones Dairy Road. These opportunities demonstrate east-west connections.

It should be mentioned that publicly owned sewer and power easements are already being used by residents, throughout the study area, for hiking, horseback riding and mountain biking.

Land Use

Rolesville is located in northern Wake County, the fastest growing County in North Carolina throughout the 1990's. Rolesville's development pattern is divided into three distinctive regions (see Figure 7: Land Use). In general, residential development is occurring in two of these regions. To the west of town, development is occurring between Toms Creek and Sanford Creek, which have easy access into the town centers of both Rolesville and Wake Forest. At the southern edge of the study area development is thriving around the Harris Creek and the Upchurch Road pond area. The third region is the town center, which contains the elementary school, industrial and commercial business, and residential. Most of the residential development pressure is coming from the south and west as Raleigh and Wake Forest continue to expand.

The remainder of the study area is primarily utilized for farming and pastureland. The majority of the agricultural land is contained in the

eastern half of the study area with a few large pockets still thriving to the west of town.

Park and Recreation Lands

There is currently only one public park in Rolesville, which is located near the center of town (see Figure 8: Existing Parks and Open Space) and is shared with the elementary school. Rolesville is in negotiations to purchase a large parcel of land on Main Street, just north of the Elementary school that will become a park.

Open Space/ Greenway Resources

The Town of Rolesville currently owns one tract of land designated as open space. This property is 3.7 acres in size and has no public access, however, the planned development that boarders the tract will provide access for greenways and bicycle paths. In addition to the publicly owned land resources it is necessary to mention the open space resources of Rolesville in terms of visual quality. Property does not have to be publicly owned for the public to enjoy the landscape. Rolesville is a wonderfully scenic town not only because of the small town character, but also due to the scenic character of the surrounding landscape. Residents enjoy the undeveloped open spaces composed of woodland, agricultural land, and stream corridors in a part of the county that is still considered rural. While the small town character and scenic beauty of Rolesville are showing signs of the development and economic activity of the county it is still a visually appealing open space. Strategies to preserve this situation will be discussed later.

Watershed Areas

The study area has been divided into six sub areas of focus based upon the watershed boundaries. These areas are the Sanford Creek watershed, the Toms Creek watershed, the Harris Creek watershed, the Buffalo Creek watershed, the Cedar Fork watershed, and the Perry Creek watershed (see Figure 9: Project Watersheds). In Addition, a map of the watershed study conducted by CH2MHILL for Wake County is included (see Figure 10: Watershed Classifications). This study shows the watersheds in the Rolesville study area as being impacted, but restorable, except Buffalo Creek which is considered degraded, but restorable. Each of the six areas was inspected for ecological health and greenway suitability. Site inspections focused on stream corridors, flood plains, and public utility easements.

Tom's Creek Watershed

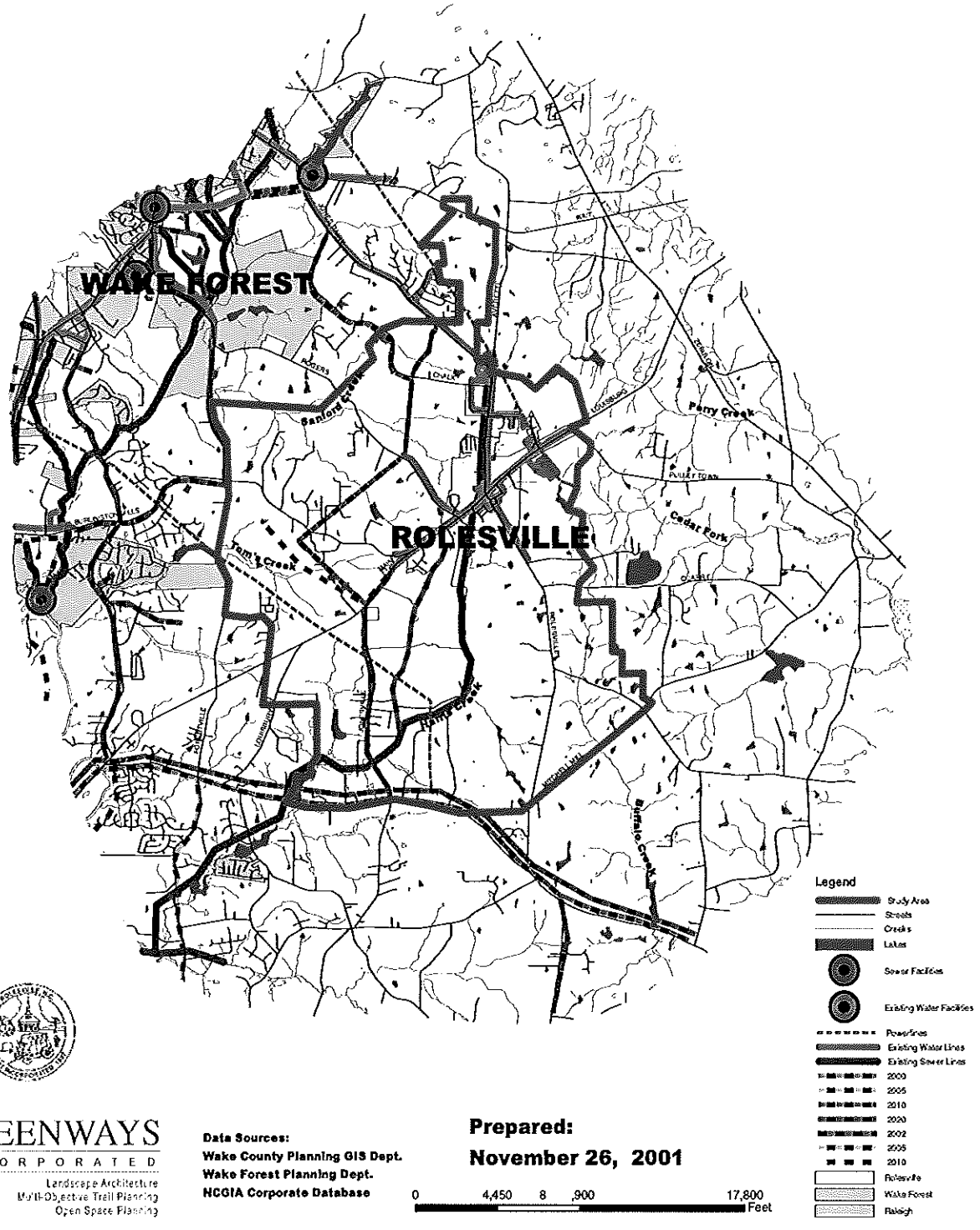
The Toms Creek corridor is not accessible for walking due to a lack of public easement access. A roadside survey was conducted at all possible access points.

- At Fosterville Road: there is a large wetland area on the east side, which extends approximately 3000 feet up stream (approximately half the corridor). There is a power line easement running parallel to the creek on the south side, which has a dirt road on it, which gradually angels away from the creek as it proceeds up stream.

- At Eagleroost Road: this road dead ends at a private lot and is the

ROLESVILLE OPEN SPACE AND GREENWAY VISION

Infrastructure



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Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

Prepared:
November 26, 2001

0 4,450 8,900 17,800 Feet

Figure 6: Infrastructure

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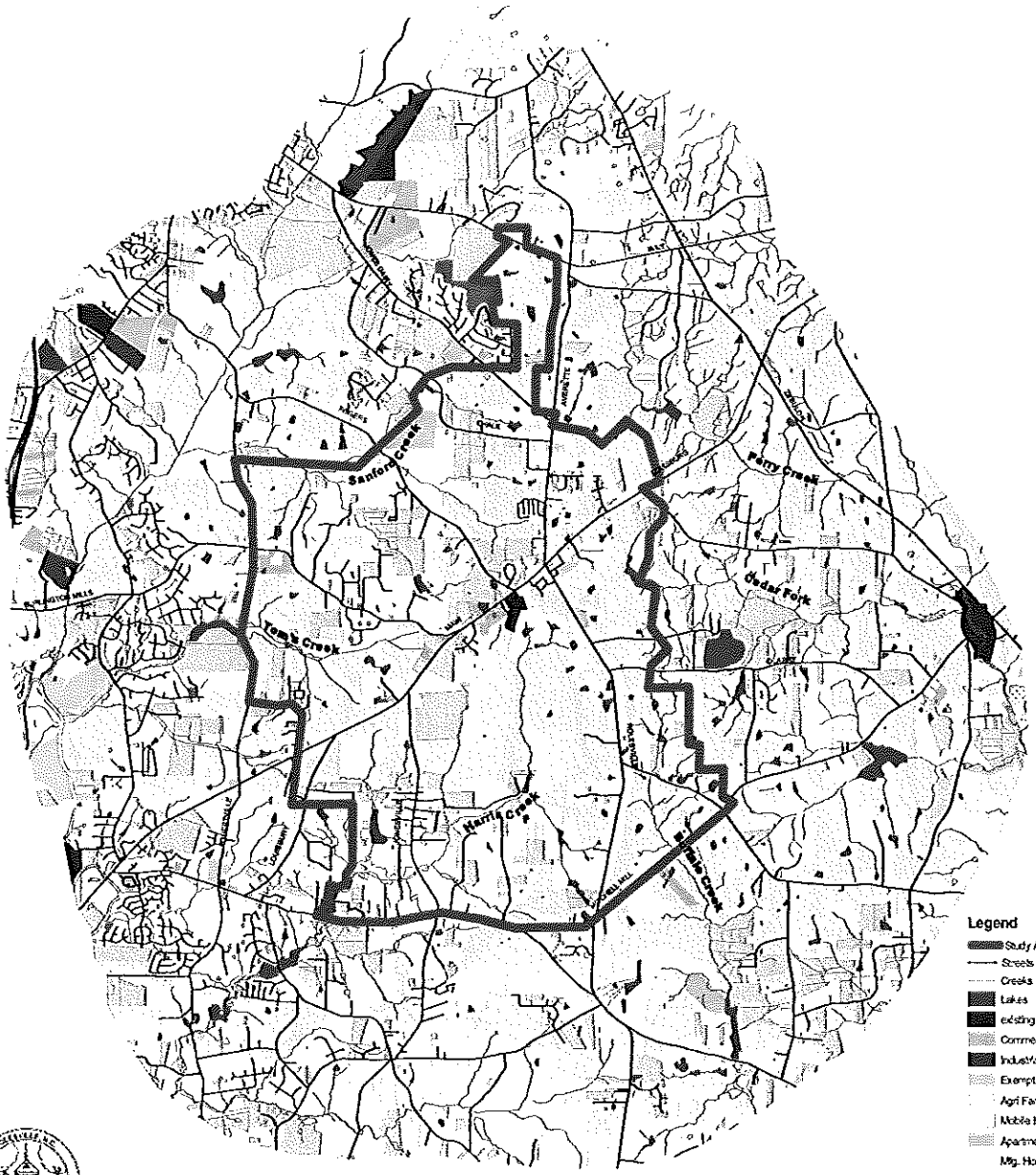
Land Use



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Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning

Data Sources:
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Wake Forest Planning Dept.
NCGIA Corporate Database

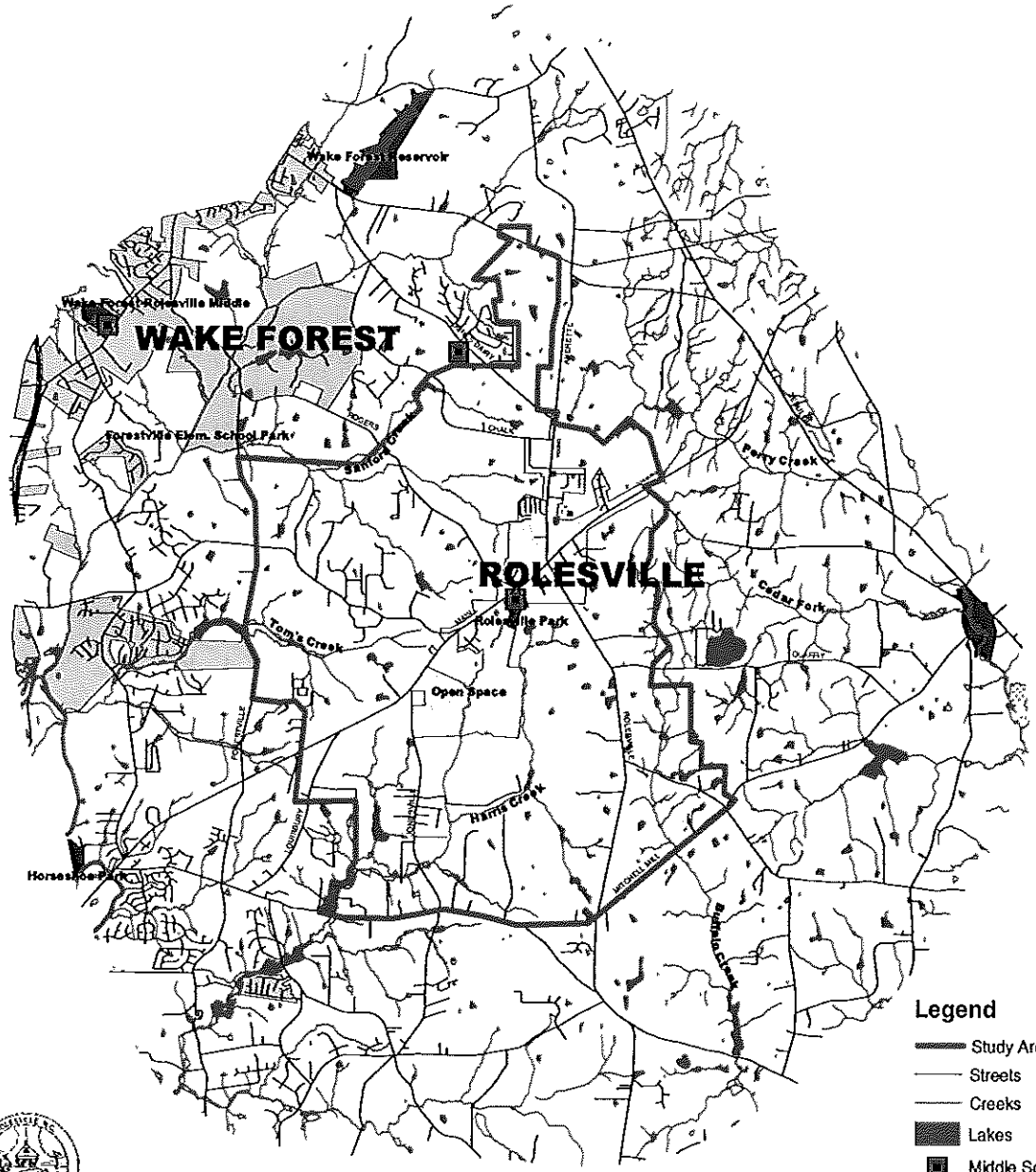
Prepared:
November 26, 2001

0 4,625 9 ,250 18,500 Feet

Figure 7: Land Use

ROLESVILLE OPEN SPACE AND GREENWAY VISION

Existing Parks and Open Space



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Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

Prepared:
November 26, 2001

0 4,250 8,500 17,000 Feet

Figure 8: Existing Parks and Open Space

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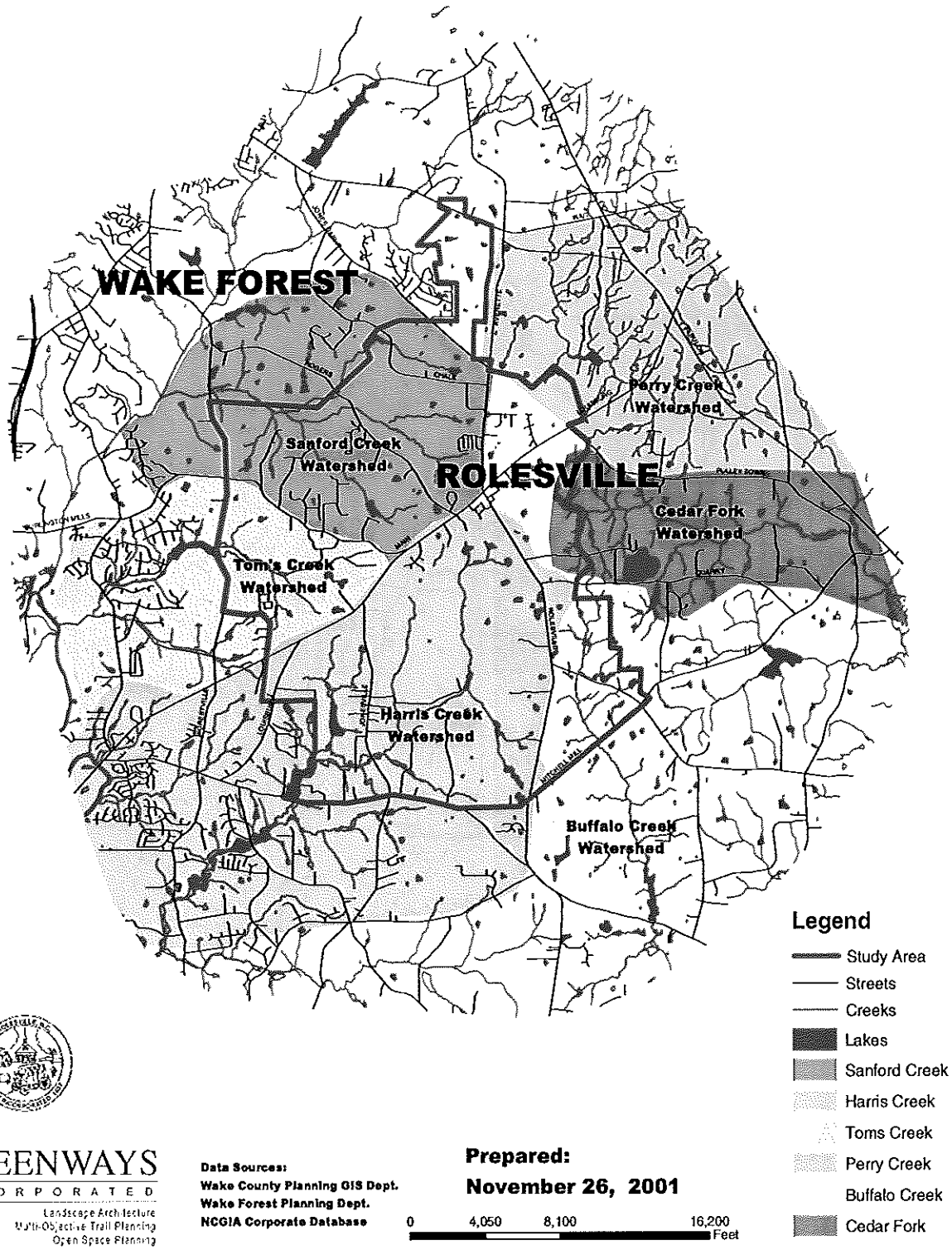
Watersheds



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Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

Prepared:
November 26, 2001

0 4,050 8,100 16,200 Feet

Figure 9: Project Watersheds

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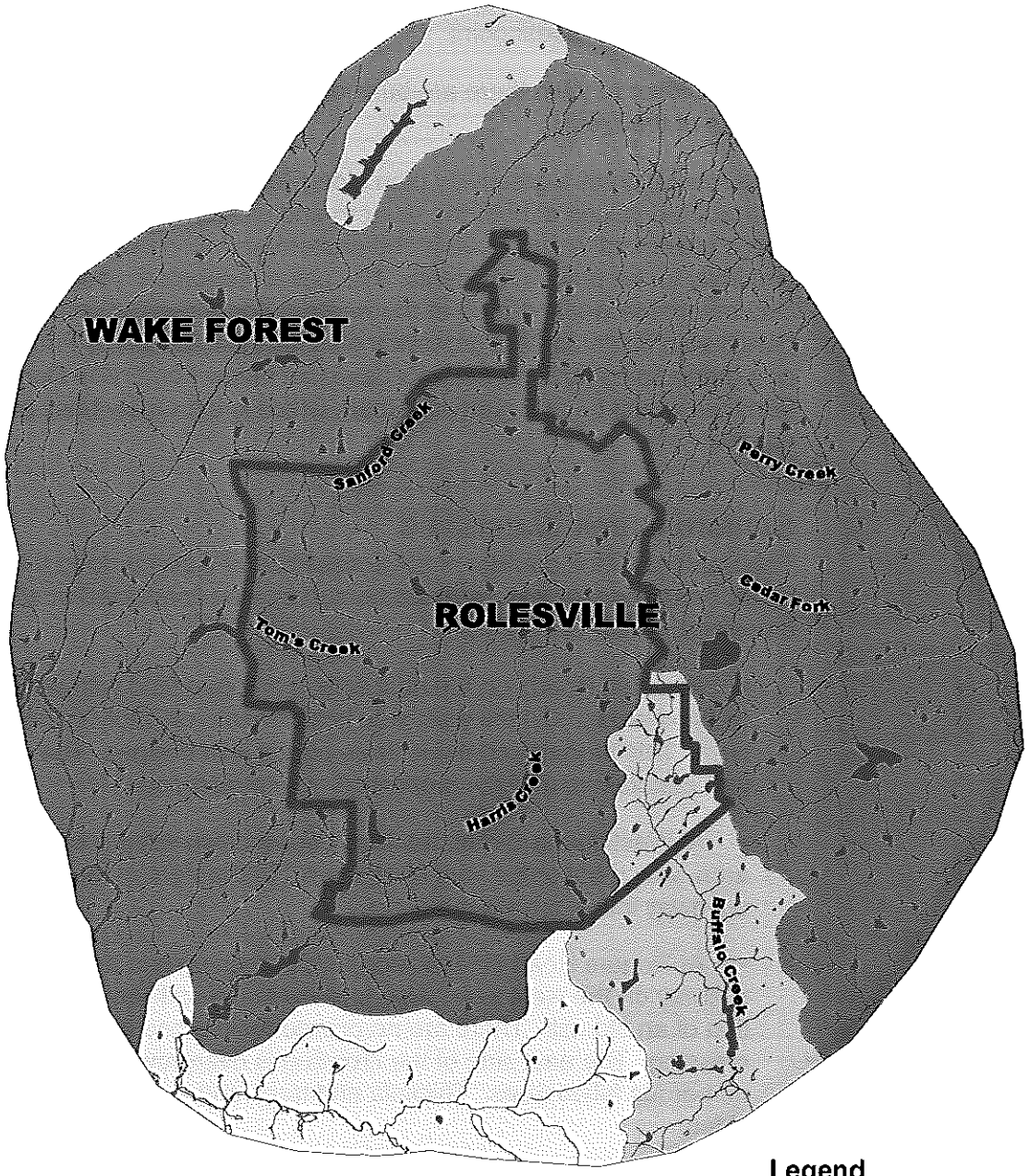
Watershed Classifications



Legend

- Study Area
- Creeks
- Lakes
- Degraded / Restorable
- Healthy / Based on Land Use
- Impacted / Restorable

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Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database
CH2MHILL Watershed Study

Prepared:
November 26, 2001

0 3,950 7,900 15,800 Feet

Figure 10: Watershed Classifications

only other access point to Toms Creek. No attempts were made to access the stream. There are four or five property owners who have the stream running in their backyards. There is approximately a 150' buffer at the closest point.

- Closer to town there are businesses that back up to the headwaters of the creek.

Implementation of a greenway plan along Toms Creek watershed has complicated issues at both the eastern and western ends. The lack of a public easement is one issue at the eastern end along with the close proximity to the private residents. The power easement could be used to circumvent the wetland area at the western end, however unless Wake Forest also implements a greenway plan for their section of Toms Creek or a green space around Brown's Lake just below Fosterville Road the terminus would be at Fosterville Road, which is extremely busy and narrow.

Sanford Creek Watershed

The Sanford Creek corridor is not accessible for walking do to a lack of public easement access. A roadside survey was conducted at all stream crossings.

- At Chalk Road: on the east side is an open field with possible wetland areas. On the west side is a sizeable privately owned horse farm. This property contains three ponds with bridges. The ponds are well maintained and the property is very picturesque.

- At West Young Street: the creek flows down stream thru a grassy area, which becomes very overgrown. To the right of the creek is a driveway into a private residence.

- At Rogers Road (1st crossing): this crossing has a wonderful spillway on the west side. Also located at the spillway is the foundation of an old mill. There are no private residences in proximity to this crossing. The east side of the crossing is overgrown with briars and numerous fallen trees. Thickets and trees shade the creek on both sides.

- At Rogers Road (2nd crossing): both sides of this crossing have thickets and trees shading it. The east side has numerous fallen trees and very thick under brush. The west side is a little more open, but the under brush is also thick. There are pine trees evident along the stream on the west side, but overall the canopy is low compared to the east side.

Sanford Creek has some of the same issues that Tom's Creek does, the main issue being a lack of public easement for implementation of a greenway plan. However, Sanford Creek offers an opportunity to connect Rolesville and Wake Forest and provide access to the Neuse River by

connecting to Smith Creek in Wake Forest. In addition Sanford Creek provides access to some of Rolesville's most pristine open space.

Harris Creek Watershed

We begin a description of the Harris Creek watershed at the Rolesville Elementary School and park. The existing sewer easement extends south from the end of School Street and can easily be accessed at that point. There is one residence that is in close proximity to the end of School Street and the sewer line. A dirt drive also runs from the end of School Street past another private residence and ends at the sewer line at Parker pond.

The walk to Parker pond from the end of School Street along the existing sewer line is across large slabs of rock and a rather quick drop down to the pond. It is a more gradual decent along the dirt road. Once at the pond you find a beautiful and pristine setting. The potential benefits and opportunities of preserving this tract of land are numerous. It would make a wonderful park with the pond, a greenway trailhead, and a nature preserve/study area for the school.

The sewer line continues south along the pond and then across the southern end to the east side. It is apparent that this area is well used due to a trail that runs along the pond's eastern shore, evidence of trash and the road like condition of the sewer line. At the end of Parker pond there is a very steep drop down to the Harris Creek corridor. From here the travel along the sewer line is quick and easy. The sewer corridor is approximately 20 – 25 feet wide and covered with rye grass. There is evidence of horse, bike, and four-wheeler, but it is not heavily used. After descending the slop the sewer line runs along a beautiful flood plain area with large rocks. The sewer line sits higher so introducing a trail would not be an issue.

There are only a couple of wet areas on the corridor itself from the time you drop down from the pond until you reach Upchurch Lane pond. These issues can be easily addressed with boardwalk or a culvert. Once past Parker pond there are no private residences along the corridor until the Upchurch Lane pond. The sewer corridor runs well above and away from the stream so trail construction should not pose a danger to the stream or its habitat.

On the west side there is an old inactive garbage dump that is visible from the sewer line. Garbage has been dumped over a steep bank towards the sewer corridor. The garbage dump covers an area from the steep bank west to a dirt road that we used as our return route. Shortly after the dump there is a dirt road off to the west, which connects to our return route to the elementary school. This would be an ideal opportunity for a shorter greenway loop.

The sewer corridor is open, cleared and remains sunny in most sections. The corridor is home to many different animals, those discovered were

deer, skink, king snake, butterflies, toads, tadpoles, and many species of birds. The sides of the corridor are well wooded with evidence of dogwood, tulip poplar, sweet gum, cedar, and black cherry.

Travel from Parker pond to the Upchurch Lane pond takes approximately 30 minutes. As you approach Upchurch Lane pond there are small rapids, which you can see from the sewer line. This is the first clear look you have of Harris Creek There is a large wet area at the top of the lake and the sewer corridor is quite wet in this area, but not impassable. The lake is of good size with two very large residences visible on the east side. Near the end of the lake there are two residences on the west side in close proximity to the edge of the lake and the sewer line. The closer of the two is approximately 100 yards up a slope. If the residences become an issue with having the greenway run along the lake one possible alternative would be to develop a park at the top of the lake as a halfway point and route the greenway over to the dirt road and back to the school. A second option would be to develop the park as a terminus point.

At the end of the lake we followed Upchurch Lane to the power line easement. There could be an issue for a trail alignment along Upchurch Lane where it narrows due to a pond and a drop off. The return loop follows the power line easement North using a dirt road for approximately .25 miles and then turned northeast onto another dirt road. This dirt road is well traveled by vehicles, especially during hunting season, and leads back to the school. The majority of the road runs on a very large piece of property that abuts the school property. It is flat, easy walking, thru cedar forests and clearings. This piece of property is being considered for a large development that would include a future new town center and the Town of Rolesville has plans for a green space corridor to be included.

South of Upchurch Lane the sewer line continues through a large wetland area. For a trail to be located in this area boardwalk will be needed. Once past this wet area the sewer line is dry and clear until you reach Jonesville Road. Just north of Jonesville Road is a large wetland area with evidence of active beaver. There are a number of good vistas of this wetland area from the sewer line and two blue herons and other bird species were observed at the time of the site visit. The sewer line south of Jonesville Road becomes over grown and was not walked. From information on the GIS maps the corridor from Jonesville Road to Mitchell Mill Road becomes wider, with evidence of large ponds and/or wetland areas. Mitchell Mill Road is the southern most boundary of the study area. There are a number of private residences along the sewer line and around a large pond that parallels the sewer line. No attempt was made to access the sewer line at this point.

Harris Creek offers the best opportunity for Rolesville to protect a large section of watershed and create a greenway space and educational corridor. The protection of the Parker property and pond are important to the preservation of the corridor and would create an educational element for the elementary school. In addition, the ability to find a developer who

will preserve a return corridor west of the sewer line will make for a wonderful greenway loop.

Buffalo Creek Watershed

The Buffalo Creek corridor is not accessible for walking due to a lack of public easement. A road side survey was conducted at all possible access points.

- At Quarry Road: the north side consists of a wetland area of significant size. The south side is over grown with briars and thickets. There are some residents in close proximity to this crossing.

- At Fowler Road: the stretch of creek from Quarry Road to Fowler has a number of ponds of varying size in close proximity. The north side of Fowler Road has a wet area and is over grown. The south side is also over grown with briars and thickets

- At Mitchell Mill Road: the creek is shaded and over grown as it flows from Fowler Road to Mitchell Mill Road. The north side and south side of the crossing at Mitchell Mill Road are over grown and shaded.

Cedar Fork Watershed

Cedar Fork Creek corridor has no utility easements along it and only one road crossing. The road crossing takes place at Pulley Town Road, which is just prior to the Mitchell Mill Natural Area. The creek is free flowing and is over grown on both sides of the road.

At Mitchell Mill Natural Area, Cedar Fork Creek flows into a large pond/ wetland area that is created by a stone dam. The dam has a small spill-way with a steady flow of water flowing through it. On the lower side of the dam is a large collection of granatic flat rock with small streams flowing across them. Cedar Fork Creek continues east from Mitchell Mill Natural Area and flows into the Little River.

Cedar Fork Creek corridor offers an alternative access to Mitchell Mill Natural Area and most importantly an eastern corridor out of Rolesville. Cedar Fork watershed has all three of the criteria used for determining water quality, water recharge, hydric soils, and FEMA flood zone making it a high priority for water quality protection. In addition, this corridor flows thru some of Rolesville's prettiest countryside and affords the opportunity to make a connection to the Little River and the communities of Wendell and Zebulon.

Perry Creek Watershed

Perry Creek is not accessible for walking due to a lack of public ease-ment. There are two road crossings, Louisburg Road and Zebulon Road. A road survey was conducted at all crossings.

At Zebulon Road, Perry Creek flows into a large wetland area that spans both sides of the road. There are signs of beaver activity on the east side and the sound of water flowing over a dam in the distance. From Zebulon Road the creek flows east to the Little River.

The crossing at Louisburg Road provides more of a creek setting with free flowing water and a small rock spill way on the east side. The west side is a large wetland area, but with a defined creek channel as Perry Creek approaches the road.

Perry Creek by far ranks the highest of the six watersheds in this study for water quality protection (see Figures 10, 11, 12 in chapter 3). The amount of water recharge, hydric soils and FEMA flood zone data along this corridor makes Perry Creek a priority for establishing buffers and easements.

Chapter 3: Greenspace System Recommendations

Methodology

It is necessary to address the process of investigation before an in-depth discussion occurs concerning the physical and ecological characteristics of Rolesville. Both remote research and direct observation were used to analyze the existing Rolesville Open Space condition. Combining the graphic representations (of isolated conditions) with direct observation of actual conditions facilitates a more complete picture of the study area. By examining the study area through objective numbers and subjective experience, a more comprehensive understanding is achieved.

Remote research consisted of gathering background data from previous studies as well as recently produced data. Studies and reports made available to the consultant included The Rolesville Community Plan (1999), the Inventory of the Natural Areas of Wake County (1987), the Capital Area Greenway Plan – Update (1989), North Carolina's 303(d) List of streams deficient in water quality by Clean Water Act standards. Additional information was obtained from websites maintained by the U.S. Census Bureau, the Neuse River Foundation, and other sites offering environmental and cultural information specific to Rolesville. Finally thematic maps were produced from Wake County Geographic Information Systems (GIS) data to graphically illustrate important conditions relative to geographic position. The strength of the GIS application is its ability to overlay separate layers of data and reveal patterns of interrelated landscape components.

In addition to the remote research conducted in the office, field research was done to verify the conditions described in text and illustrated in maps, as well as to familiarize the consultant team with the distinct character of Rolesville. Field visits included vegetation identification, observation of water quality and soil conditions, photo documentation, identification of greenway opportunities and constraints, examination of residential and industrial development patterns, and ecological health estimations. Consultant visits to the field verified the office research and will serve to authenticate subsequent recommendations.

Linkages

Central to the Wake County Open Space Program is the concept of connectivity. For each of the municipal plans to function together successfully they must be completed with neighboring landscapes and

municipalities in mind. Rolesville has cultural opportunities to connect to the city of Raleigh, Wake Forest, Wendell, and Zebulon.

Rolesville has a primary consideration of preserving its small town character and quality of life enjoyed by its residents. Providing greenway linkages to the community will accentuate that character. Greenways and open space will provide buffers from adjacent land uses, preserve the character of the landscape, improve water quality, and allow people to access Rolesville via alternative, slower-paced modes of transportation.

Greenspace Elements

Targeted Open Space Acquisition

The first priority for the Town of Rolesville to acquire is the known proposed park property on Main Street. With the location on Main Street this park would become a major focal point for the Town with active use, passive use, and the opportunity to provide a terminus for the Sanford Creek Greenway.

Another immediate priority for acquisition is the expansion of the current Rolesville Park. This area is the central park for the community providing active recreation and the opportunity for a terminus for the Harris Creek Greenway. This area will take on added significance as the new development materializes and new Town government buildings are added.

A significant area for acquisition in the short term is the area around the old mill site on Rogers Road. This area provides an opportunity for historical preservation as well as a greenway focal point on Sanford Creek.

The long term acquisition targets are the wetland areas on Harris and Tom's Creek that would be major parts of a greenway system as well as wildlife preserves. In addition, the joint partnership with Wake Forest on a large community park is an important piece to the future Rolesville Open Space and Greenway plan.

It is important to note that these are all significant areas to the future quality of life in Rolesville whether immediate, short term, or long term priorities. If the conditions are favorable for acquisition Rolesville needs to be pro-active regardless of the priority listed above.

Central Park and Satellite Parks

We recommend the development of a park system that contains one large central park and seven satellite parks. The central park would be located where the current Rolesville Park /Elementary school are located. This park would include the current facilities and would be expanded east to include Parker Pond and south in conjunction with the planned development for the area. The central park would also be the main terminus for the Harris Creek Greenway, Granatic Rock Greenway, and all scenic road bike routes (see scenic corridor descriptions). This park would support active recreation of all kinds.

The seven satellite parks would be of varying size and would come on line as land is acquired. The first is already in the planning process: 1) the proposed park on Main Street, however the land has yet to be acquired by the town. The other locations to consider as park sites could be developed as greenways are implemented; one each along Sanford Creek, Tom's Creek and possibly two sites on Harris Creek. All of these parks would support passive recreation (picnic, wildlife observation). In addition, the development of an active recreation park off Burlington Mills Road and a joint partnership with Wake Forest on a large community park off Jones Dairy Road.

Equestrian Areas

The development of equestrian trails and/or areas was a highly discussed topic in the public workshops both for and against. It is recommended that equestrian areas and trails be developed in the future and perceive an interest in that taking place on the west and north side of Rolesville. We recommend that the equestrian community get together and discuss the feasibility of stringing current equestrian private property together to begin the development of a riding area. The northern area is also being looked at by equestrian interests in Wake Forest and the formation of an area equestrian group could be beneficial in advancing the idea for an equestrian park and/or trails.

Scenic Corridors

Rolesville has two primary vehicular entryways into the community (401/ Main Street and Young St.) and a significant thoroughfare coming on-line (Highway 401 Bypass). The town also has five major rural roads (Rogers, Chalk, Quarry, Jonesville, and Burlington Mills) that show case the beauty of the surrounding country side. Each of these corridors is significant for the first-impression that visitors receive as they enter Rolesville. Many participants in the Open Space and Greenways Workshops have said that they place a high priority on the scenic value present along these roadways. Preserving open space and establishing buffers alongside these corridors will convey the small town character that is one of Rolesville's greatest assets.

Highway 401/Main Street Corridor

The Highway 401/Main Street Corridor is the oldest of the three major connector corridors. It is the major entry into Rolesville from Raleigh and is already showing the effects of commercial development. Protecting the scenic quality and establishing a beautification program for Main Street/ 401 is important to Rolesville residents. While the commercial growth is certainly going to continue the vegetated edges of Highway 401/Main Street are a reminder of Rolesville's small town character and rural beauty.

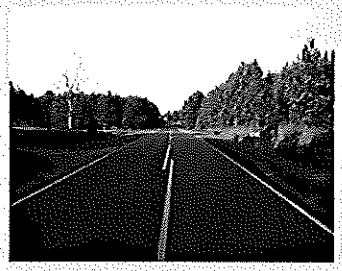
East/West Young Street Corridor

The East/West Young Street Corridor is possibly as old as the 401/Main Street Corridor; however it has not been commercially developed as extensively. This corridor is a main connector to Wake Forest and

Wendell/Zebulon. Due to it being a main cross road the scenic quality and beautification are important elements to maintaining Rolesville charm and rural beauty.

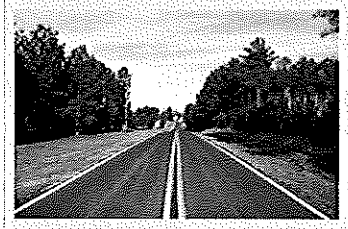
Highway 401 Bypass Corridor

The Highway 401 Bypass is a major concern for many Rolesville residents. Due to the fact that the corridor location, as of this writing, has not been settled on is one concern residents have. Once built, many will welcome the diversion of traffic, but the degradation of the landscape as a result of the construction is a fear residents have. While the highway is designed to move traffic quickly around the downtown core, it does not have to be a highway of convenience, only. It will be important to buffer the sound and sight of the highway from adjacent neighborhoods. This will be welcomed by the residents and enjoyed by the commuting public. It is also not unheard of to build a nicely landscaped paved walking trail on the edge of the right of way, which would help in preserving the character, quality of life, and beauty of Rolesville both for residents and the commuting public. The Town of Rolesville is requesting that NCDOT provide underpasses at intersections for continuity of planned pedestrian greenways and bicycle paths.



Rogers Road Corridor and Chalk Road Corridor

The Rogers and Chalk Road Corridors are beautiful examples of the surrounding country side of Rolesville. Both of these corridors provide connections to Wake Forest and are widely used for that reason. Preserving open space and buffers along these corridors will help protect the rural quality of Rolesville. The implementation of a bike path system along both corridors would provide recreational value to the corridor, an easy environmentally friendly way to connect to Wake Forest, and enhance the quality of life.



Quarry Road Corridor

The Quarry Road Corridor is also a beautiful example of the Rolesville countryside. This Corridor provides a connection to the Mitchell Mill Natural Area and a possible future connection to the Little River Corridor. The implementation of a bike route along this corridor provides an eastern connection from Rolesville.

Burlington Mills Road Corridor

The Burlington Mills Road Corridor provides the main western connection to US 1. Development is already appearing along this corridor and will certainly continue due to the easy access it provides to US 1. It is vitally important for the Town of Rolesville to act immediately to establish this as a scenic corridor thru establishment of a bike route and encouraging future developers to preserve the scenic value of this corridor.

Jonesville Road Corridor

The Jonesville Road Corridor is the least rural of the four rural road corridors. It provides a southern connection and less congested route than Highway 401. Any effort that can be made to preserve and maintain the scenic quality of the rural roads of Rolesville will preserve the small town character of the town.

Overview

The future of open space and greenways in Rolesville is envisioned as a system of outdoor spaces that function as healthy, protected ecosystems. Continuity is critical to the concept of preserving open space in Rolesville. The benefits of open space and greenways are maximized when they are linked together. Contiguous natural areas are better equipped to function as healthy, interrelated ecological systems. As such, they are more stabile, provide more "edge" habitat for wildlife, and allow a place to retain its natural character.

Despite common public perceptions of open space and greenways, this plan does not view these outdoor resources solely as passive recreation areas. Rather, these natural resources should fulfill multiple objectives. Objectives should include progressive floodplain management, wildlife habitat, and improved water quality. Areas that are well-suited to host trails can provide passive recreation facilities, environmental education, and alternative transportation routes.

Water quality is one of the main criteria used to help determine the protected corridors. By using 50 acre land cover that is at least 25 feet from hydric soils (see Figure: 11), water recharge areas (see Figure: 12), and FEMA 100 yr. flood zone areas (see Figure: 13) we are able to determine the corridors that need to be protected for water quality, floodplain management, and overall ecosystem protection.

Recommendations for a system of open space and greenways in Rolesville are based largely on community input. Corridors and open space locations were identified and presented in map form at meetings with Rolesville staff and public workshops. All public comments received from these meetings and workshops were incorporated into the recommendations for the open space and greenways system.

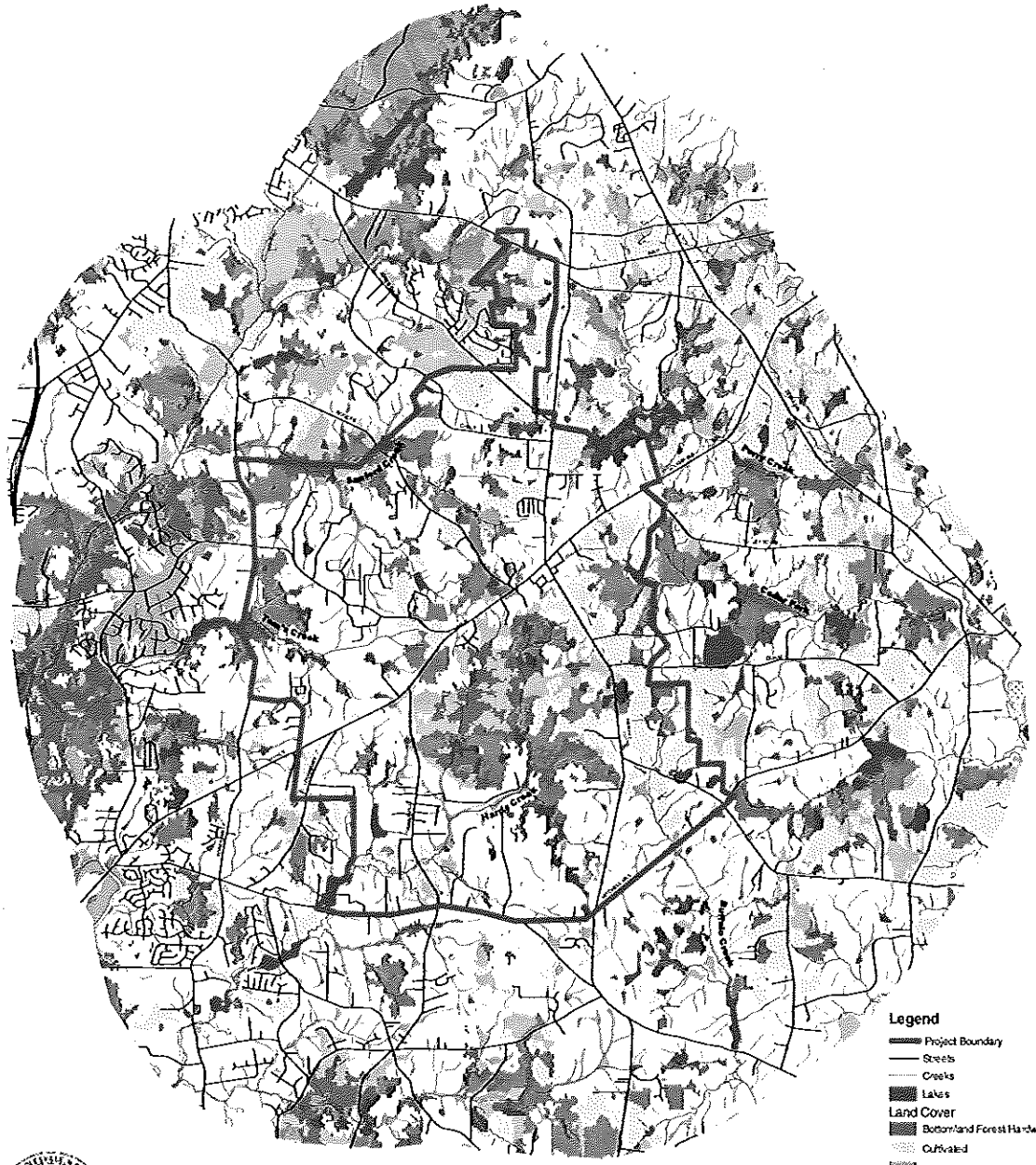
Proposed greenways are located along natural and human-made linear corridors that generally follow streams and roadways within the study area. In this manner, greenways will fulfill objectives related to alternative transportation, natural resource conservation, water quality, and floodplain management, in addition to their function as recreational resources. Corridors were also selected to ensure development of a continuous system of greenways located throughout Rolesville and extending to neighboring jurisdictions.

Greenway System Recommendations

ROLESVILLE OPEN SPACE AND GREENWAY VISION

50 Acre Land Cover

25 Feet from Hydric Soils



GREENWAYS
INCORPORATED
Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

Prepared:
November 26, 2001

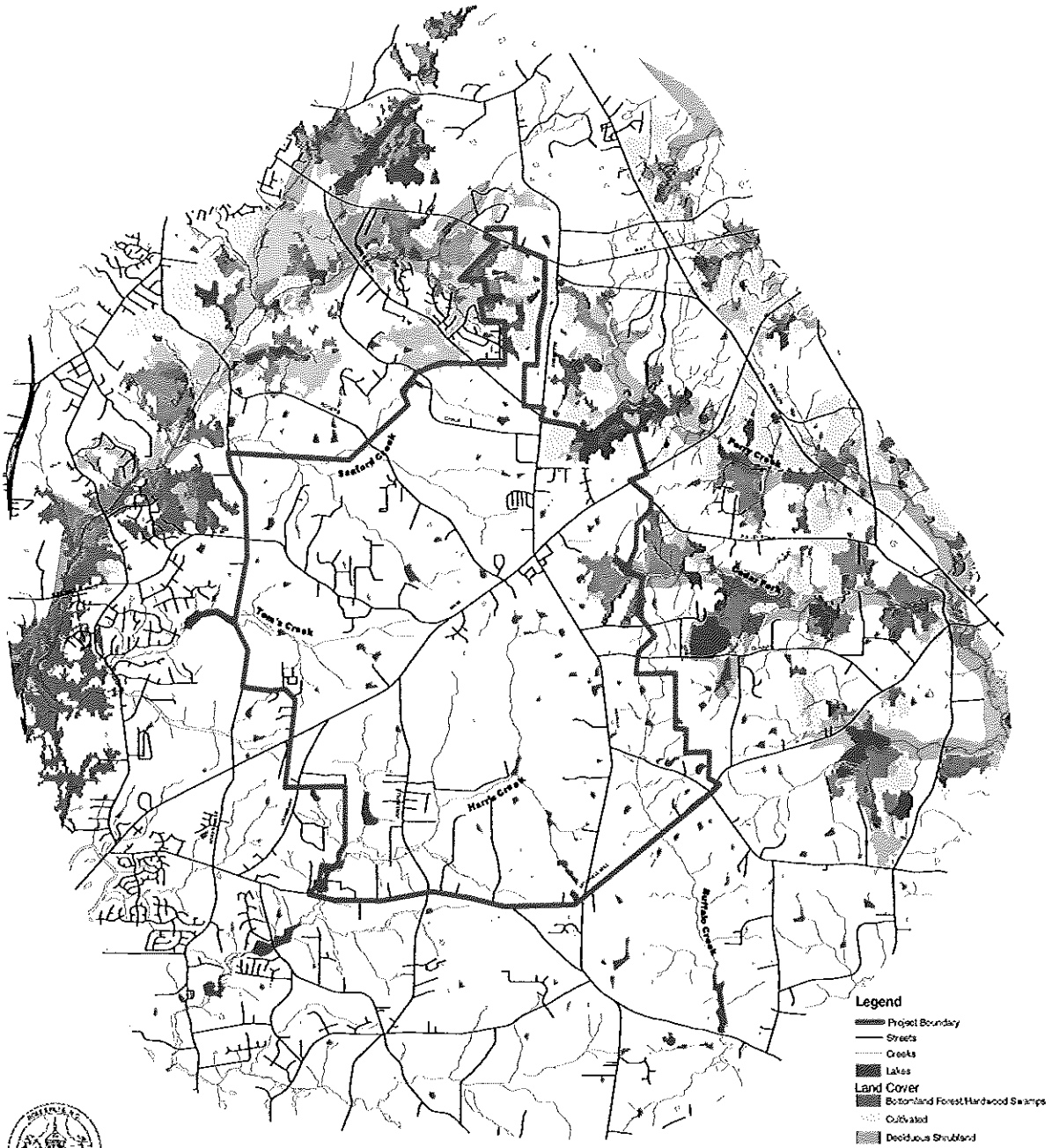
0 4,050 8,100 16,200 Feet

Figure 11:Land Cover from Hydric Soils

ROLESVILLE OPEN SPACE AND GREENWAY VISION

50 Acre Land Cover

25 Feet from Water Recharge



GREENWAYS
INCORPORATED
Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

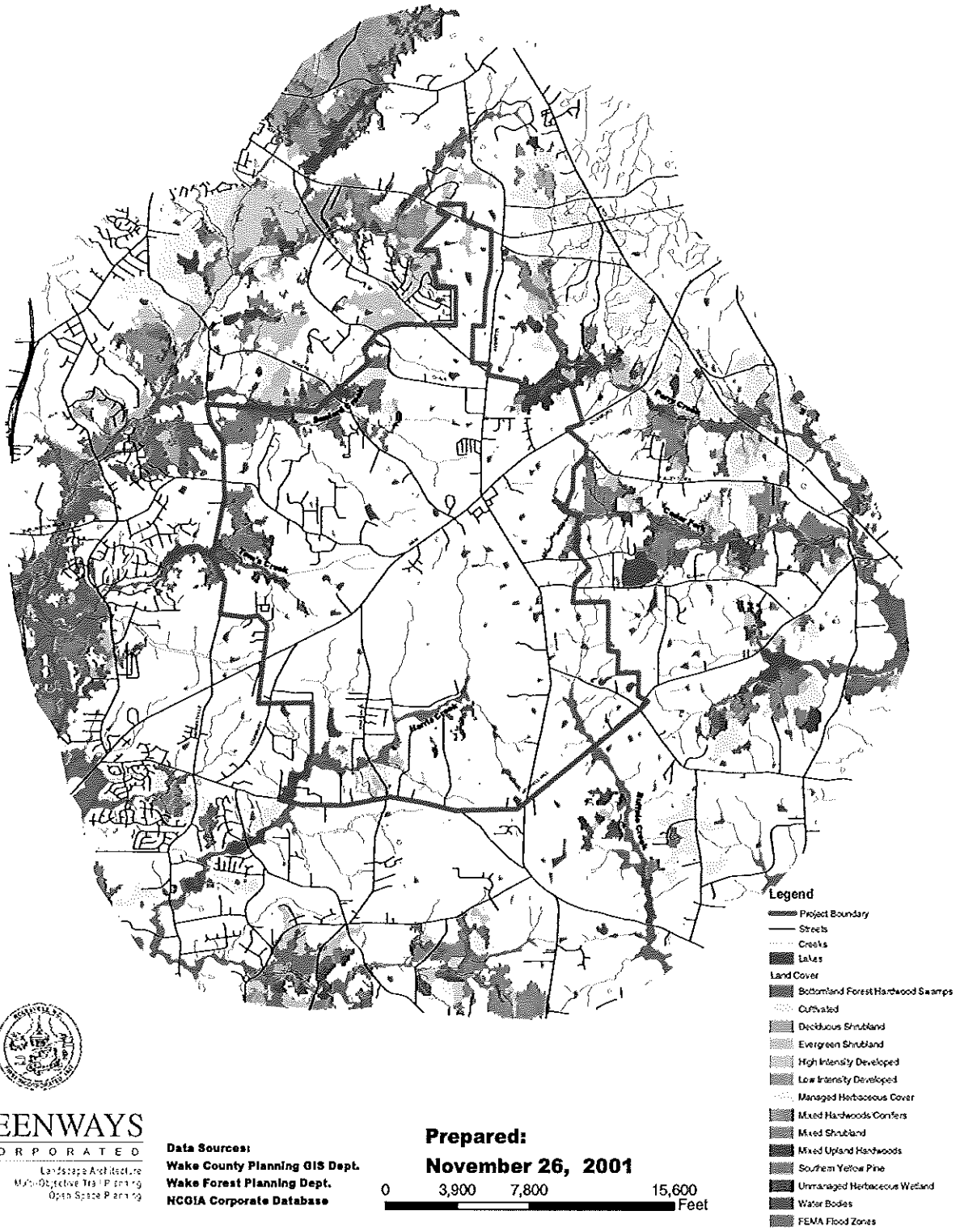
Prepared:
November 26, 2001

0 3,875 7,750 15,500
Feet

Figure 12: Land Cover from Water Recharge

ROLESVILLE OPEN SPACE AND GREENWAY VISION

50 Acre Land Cover
25 Feet from FEMA Flood Zones



GREENWAYS
INCORPORATED
Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

Prepared:
November 26, 2001

0 3,900 7,800 15,600 Feet

Figure 13: Land Cover from FEMA

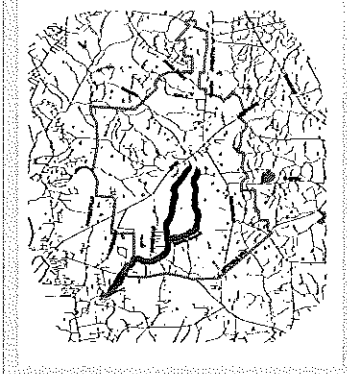
Proposed open space areas (as opposed to greenways) are not necessarily linear corridors. Open spaces identified in this plan are larger properties that contribute to the preservation of Rolesville's natural character and its scenic beauty as well as perform ecological functions. The desire of the citizens of Rolesville to have a central park as a focal point for their community is a major part of this plan. The central park will provide passive and active recreation as well as preserve areas of natural beauty. It should be mentioned that open space preservation does not require public access or ownership in order to meet the desired objectives. Open space protection serves as a cultural resource and/or as an environmental resource.

The strength of executing the open space and greenways system recommendations will be in the continuity of natural resources. However, it is not practical to consider the acquisition of properties and easements and the development of facilities as a single unit. The following pages highlight individual segments of a contiguous system. The segments are described and the objectives for incorporation are discussed.

Harris Creek

Corridor Description:

Harris Creek is the major north-south greenway corridor proposed for Rolesville. The corridor's endpoints are Mitchell Mill Road to the south and the Rolesville Elementary School/Park to the North. The Harris Creek corridor is the longest feature within the study area, contains two branches, and features prominently in the central park concept. The primary land use along the proposed corridor is forested.



Corridor Objectives:

This corridor is well suited to support a greenway corridor. The east branch currently has a sewer line and the west branch is on-line to have one in the near future. This offers Rolesville the only corridor with such an easement. In addition a planned development is being discussed with town leaders that would include buffers to allow for greenway corridors along both branches. Due to the planned development , the inclusion of a central park in this area, and the proximity to the elementary school trails along the Harris Creek corridor have the greatest potential to be used as alternate transportation routes. A greenway along Harris Creek would also serve to reduce flood damage that accompanies the increased impermeable surfaces of a planned development. It is recommended, at this time, that the greenway on the east branch by-pass the Upchurch Lane Gated Community. The sewer line runs thru this property and there is strong opposition to a greenway. It is recommended that the Town of Rolesville and the Upchurch group attempt to come to an agreement on the use of the sewer line. Until such solution is found we suggest two possible solutions: 1) connect the east and west branches of Harris Creek prior to the Upchurch property. This would mean working with the new developer to find a route at the southern end of the development property or using the 401 Bypass corridor as the connection; 2) create a small

satellite park that includes the wetlands at the Upchurch property line. This would provide a temporary terminus for the greenway.

The Harris Creek corridor has the potential to stir community interest in three ways: first, a greenway would serve as a buffer between new neighborhoods that will develop and flood issues from that development - emphasizing Rolesville water quality issues; second, a successful greenway project would enhance the quality of a central park and help preserve natural features; third, a greenway would serve as a southern connection to the out lying Rolesville community and eventually to Raleigh.

Sanford Creek

Corridor Description:

Sanford Creek is the second longest stream in the study area. Sanford Creek flows from east to west, eventually becoming part of the Neuse River south of Wake Forest. It begins as a couple of branches just north of Rolesville and ends at the merge with Smith Creek. Land use along Sanford Creek is primarily forested and agricultural.

Corridor Objectives:

Sanford Creek has the potential to serve multiple objectives. The greatest contribution that Sanford Creek corridor can make is connectivity. As mentioned earlier, the Wake County Open Space Program places a premium on connecting natural areas and communities. A Sanford Creek greenway would preserve wildlife habitat, contribute to water quality and storm water management, and connect the communities of Rolesville and Wake Forest. In addition, the proposed park on Main Street would be a perfect terminus for the greenway and provide easy access to the central park, the businesses of Rolesville, and the elementary school. The Sanford Creek corridor flows through some of the prettiest land in Rolesville, with some historic sites along it. This corridor provides a wonderful opportunity to preserve the uniqueness of Rolesville.

Tom's Creek

Corridor Description:

Tom's Creek is the shortest creek corridor within the study area. The creek flows east to southwest from Rolesville to the Neuse River. The primary land use is agricultural and residential. The creek is listed as a 303(d) stream due to point source pollution, land development nonpoint source pollution, and urban runoff.

Corridor Objectives:

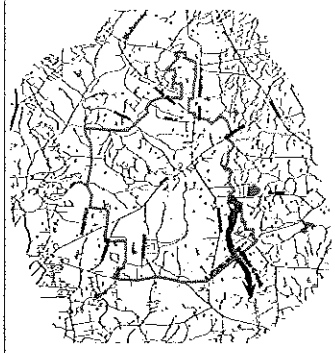
The greatest potential for this creek is its ability to connect Rolesville and Wake Forest thus contributing to a county-wide effort to link Wake County communities. There are sizeable wetlands at Fosterville Road, the edge of the study area. The ecological functions of the wetlands make this a significant corridor. The connection with Wake Forest is a long term vision due to issues in Wake Forest. However, a park associated with the

wetlands could serve as an attractive destination for a greenway corridor to view wildlife. While a trail here might not be a high priority short term for Rolesville, the health of Tom's Creek should be of concern and the eventual connectivity considered.

Buffalo Creek

Corridor Description:

Buffalo Creek flows north to south, within the study area, from east of Rolesville to Mitchell Mill Road. The primary land use is agricultural and residential.



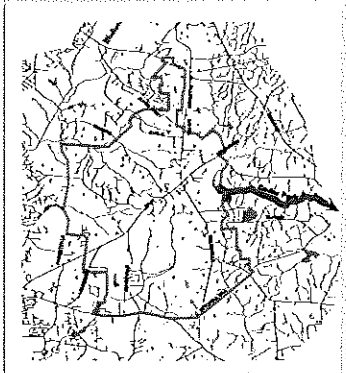
Corridor Objectives:

Buffalo Creek provides a wonderful opportunity for connectivity to Robertsons Mill Pond Natural Area and eventually to Wendell, Zebulon, and Knightdale. Though the long term vision for Buffalo Creek is connectivity the establishment of an official corridor will provide protection for wildlife, water quality and the overall scenic beauty from future development. Buffalo Creek is considered to be a degraded creek corridor, but at this time still restorable. For this reason it is considered a high priority for establishing a greenway buffer.

Cedar Fork Creek

Corridor Description:

Cedar Fork Creek is one of two eastern corridors. The majority of this corridor is outside the study area, but is being included due to water quality issues in relation to the Little River, connectivity, the best eastern corridor for a greenway, and Rolesville's possible future development eastward. The corridor's end points are just east of town and the Little River. The primary land use is agricultural.



Corridor Objectives:

The Cedar Fork corridor has the potential to serve multiple objectives. The main objective is connectivity with Mitchell Mill Natural Area, the Little River, and ultimately Wendell/Zebulon. This connection will become important in the future with the work currently taking place with the Little River corridor. The Mitchell Mill Natural Area is a hidden environmental resource in the Rolesville area. The establishment of a greenway corridor on Cedar Fork will preserve wildlife habitat, water quality and scenic beauty. In addition, establishing a greenway trail will provide the needed connectivity to the Little River corridor and Wendell/Zebulon. Cedar Fork provides an opportunity to protect a corridor that is vital to water quality (Figures: 11, 12, and 13). The protection of the scenic land and water quality on Cedar Fork and around Mitchell Mill Natural Area should be pursued vigorously by Rolesville in this plan and Wake County in the Wake County Open Space Program.

Perry Creek

Corridor Description:

The Perry Creek corridor is the other eastern corridor. Like Cedar Fork it also is outside the study area, but due to water quality issues, the connectivity to the Little River, and the possibility of Rolesville expanding eastward in future growth it is viewed as an important corridor to be protected. The corridor begins east and north of town crossing Louisburg Road and ending at the Little River.

Corridor Objectives:

Perry Creek offers an opportunity to provide connectivity to the Little River and a possible loop with Cedar Fork Creek. This is considered a long range corridor, but establishing buffers on this most important creek will provide wildlife protection, water quality, and protection of the overall scenic beauty from future development. Perry Creek is an important water resource due to water recharge capabilities, hydric soil information and FEMA flood zones and connectivity to the Little River (Figures 11, 12, 13). Due to the large presence of data from the three water quality sources the importance of protecting this corridor can not be overstated.

Chapter 4: Implementation Program

Phasing

Because of the expense, private property issues, and comprehensive nature of this effort a phasing program is required for successful implementation. The Rolesville Open Space and Greenway System can be broken down into three primary phases of future development in order to be executed in a manageable manner.

Phase 1

Phase 1 focuses on the existing infrastructure and on-line planned projects. First, establish stream buffer zones on the six stream corridors: Harris, Sanford, Tom's, Buffalo, Cedar Fork, and Perry Creeks. This buffer zone will protect the water quality, provide protected wildlife corridors, and begin the establishment of greenway corridors. Second, the implementation of scenic road corridor designations for Rogers Road, Chalk Road, Quarry Road, Jonesville Road, Burlington Mills Road, and Main Street. The establishment of these corridors provides a buffer for the scenic view sheds of Rolesville. Included is the establishment of bike routes on Rogers, Chalk, Quarry, and Jonesville by signage and/or bike lanes. Third, purchase parcels for the Main Street Park and develop this facility. This park and facility is an important piece in the Rolesville Greenway Open Space Plan due to its location at the head of Sanford Creek. Fourth, begin establishment of the Main Street Trail thru development of pedestrian and bicycle facilities and a beautification program.

Phase 2

Phase 2 is much broader and involves a number of tasks. The expansion of Rolesville Park into a central park is the focal point of this phase. The central park will become an important community amenity for the citizens of Rolesville in the future and an active recreation park. The inclusion of Parker Pond will provide a natural educational learning center for the elementary school as well as a terminus for the Harris Creek Greenway Trail.

Harris Creek provides Rolesville with the best and easiest option for establishing a greenway. The Harris Creek Greenway Trail will begin at Parker Pond in the central park and have the possibility of connecting into the Raleigh greenway system. In addition, a Nature Trail Loop from Parker Pond, along Harris Creek Greenway Trail, looping back to the central park will be added. This trail will afford elementary school classes

the opportunity to take educational nature walks and provide the Rolesville community a shorter trail experience. The Granatic Rock Greenway Trail will begin at the central park and be part of the planned development along the western branch of Harris Creek. This trail will run south eventually connecting with the Harris Creek Trail. All three of these trails will have connections to any trails planned within the new development. The benefits the Harris Creek Greenway Trail, Granatic Rock Greenway Trail, and the Nature Trail provide are storm water management, buffering for water quality and wildlife, educational opportunities involving the elementary school, and buffering from neighborhoods and pending development.

As a final location is decided on for the 401 bypass corridor conversations should begin with NCDOT on providing four greenway trail underpasses along the corridor and development of the Bypass Greenway Trail on the edge of the right of way. The Bypass Greenway Trail provides the opportunity to easily connect four of the six main greenway trails to be implemented. This affords the opportunity to provide the only east-west connection and would be a high profile amenity for Rolesville and its surrounding southern neighborhoods.

Phase 3

Phase 3 involves development of the Sanford Creek Greenway Trail and establishment of the satellite parks. The Sanford Creek Greenway Trail will provide an alternative transportation connection to Wake Forest and ultimately the Neuse River via Smith Creek. This will require cooperation and on going coordination with the Town of Wake Forest. In addition this corridor affords the opportunity to protect some of the most pristine land in Rolesville. The Sanford Creek Greenway Trail would begin at the proposed park on Main Street, cross Rogers Road at the old mill and continue to Smith Creek.

Phase 3 establishes the seven satellite parks and develops their facilities. Five of the parks will be passive recreation areas designed for wildlife watching and picnic activities, the sixth, off Burlington Mills, could have active recreation. The two parks on Harris Creek and the one on Tom's Creek will include large wetland areas which will provide wildlife protection, wildlife viewing, water quality and storm water management. The park on Sanford Creek at Rogers Road will be designed around the historical significance of the old mill and spillway. The Granatic Rock Park will preserve one of the largest examples of this natural phenomenon. The seventh satellite park is a partnership with Wake Forest to develop an active recreation park off Jones Dairy Road. All of the satellite parks would serve as destination points on the greenway system and provide opportunities to preserve the surrounding beauty, enhance the quality of life, and establish community gathering places.

It should be mentioned here the importance of establishing the stream buffer zone for all five stream corridors. Harris Creek and Sanford Creek

provide the near future opportunities for Rolesville to establish greenways, however, Tom's Creek, Buffalo Creek, and Cedar Fork could present opportunities sooner than expected depending on funding opportunities, development, and connectivity.

Neuse River Buffer Rule

In establishing these buffers the Neuse River rules need to be followed as a minimum in all cases. This requires that new development maintain an existing 50 foot vegetated buffer on both sides of all intermittent and perennial streams, lakes and ponds in the Neuse River Basin. This required buffer consists of two zones: a 30 foot undisturbed zone adjacent to each side of the water body, and a vegetated zone that extends from the outer edge of the 30 foot zone for a distance of at least 20 feet.

Some local governments have expanded the buffer requirements to a 100 foot buffer on all perennial and intermittent streams on the latest version of the USGS 7.5 minute topographic quadrangle. We recommend that the Town of Rolesville go beyond the minimum requirement of 50 foot buffers and continue its progressive planning for the future by adopting an ordinance that requires 100 foot buffers on all intermittent and perennial streams, lakes and ponds.

Greenway Trail Types

Two important issues for the Town to consider while designing greenway facilities are the surface types of trails and the width of trails. These two variables will greatly affect the cost of installing and maintaining this system. When determining the width of greenways the Town should consider the safety of the user groups for which the trail will be built. We recommend a minimum trail width of 10' for any facility intended for bicycle use. This allows enough room for cyclists traveling in opposite directions to pass each other comfortably. An 8' minimum width is recommended for walking/jogging/hiking trails.

There are several different surface types that could be used to build the Rolesville Greenway System. The following descriptions briefly explain some of the trail surface types that can be considered for this greenway system (see design guidelines for specifications).

Asphalt Trail

The most popular surface to use in flood-prone landscapes is asphalt. It is a durable, flexible pavement surface that is cost effective to build, relatively easy to maintain if built correctly and provides a surface that can be used in all seasons.

The key to developing asphalt trails is to make certain that the sub-grade and sub base are properly built. The asphalt surface is a reflection of how well the sub base and sub-grade have been constructed. Asphalt trails can also be cost effectively built by using recycled materials.

Concrete Trail

Concrete trails are an excellent choice in urban landscapes and, again, in flood-prone areas. Concrete trails are generally more expensive to build than asphalt trails, however, they are easier to shape and mold to a particular site. Concrete can be colored, imprinted, shaped, hand formed and poured-in-place. It is a very durable surface and generally has a longer life expectancy than other surfaces.

Natural Surface Trail

Natural surface trails can consist of many different surface materials including gravel, soil cement, wood mulch, or dirt. While they are easily and inexpensively installed, they are not recommended for floodplain environments as they will require more maintenance than asphalt and do not last nearly as long. Natural surface trails often have a wood, brick, or similar edging to help define trail edges and contain surface material.

Boardwalk Trail

Boardwalk trails, while expensive, are often necessary to traverse poorly-drained and wetland areas. They are typically built of pressure treated lumber but can also be constructed of recycled plastic lumber. Boardwalks can be built in a variety of styles depending on the intended user groups. A boardwalk intended for bicyclists and pedestrians should be at least 10' wide (preferably 14' wide) with 42" high safety railings. Boardwalks, intended for pedestrians only and placed low to the ground, do not need to be as wide (8'-10') and can be built without railings, therefore greatly reducing construction cost.

Summary Action Plan

The following Action Plan for the Rolesville Open Space and Greenways Plan describes the Plan's overall implementation strategy, identifies twelve objectives to accomplish that strategy and recommends 33 actions to accomplish those objectives.

Implementation of this plan requires the cooperative effort of a variety of public and private organizations, and involves implementation by landowners and citizens, as well. It is the intent that this plan be fully implemented over the next 10-20 years. However, some of the long range actions, principally those involving water quality, are complex and may take time to implement. Therefore, an important part of this plan's implementation will be identifying which actions should be initiated immediately and which should be pursued at a later date. The following outline fulfills this need by providing a priority for implementation for each action.

It is important to note, however, that many actions can be pursued simultaneously. The list is intended to provide general direction only, and long-range actions should be implemented immediately if conditions are favorable.

Short Range Actions

(Initiated within the first five years of plan implementation)

I) Objective: Establish a greenway corridor and stream buffer zone for all major streams
   - A) Initiate new land acquisitions for greenway preservation and trail development
   - B) Initiate new conservation easements on selected properties
   - C) Initiate acquisition/protection of vacant properties within the greenway boundary
   - D) Increase public education and technical assistance to property owners
   - E) Encourage protection of streamside trees and vegetation

II) Objective: Establish scenic road corridor designations
   - A) Initiate bike route designation for all scenic road corridors
   - B) Establish bike route signs and /or bike lanes on corridors

III) Acquire Main Street park properties
   - A) Develop attractive pocket park on the Main Street parcel.
   - B) Develop second parcel for active recreation
   - C) Develop Recreational Community Center

IV) Objective: Establish central park
   - A) Initiate acquisition of adjacent land
   - B) Implement Nature Trail Loop

V) Objective: Develop multi-purpose recreational trails
   - A) Implement greenway trails along Harris Creek and Sanford Creek
   - B) Acquire property for regional trailheads and a water quality demonstration project

VI) Objective: Improve water quality
   - A) Implement buffers along stream corridors
   - B) Acquire and/or protect parcels in water recharge areas, FEMA flood zones, and hydric soil areas

VII) Objective: Restore natural areas
   - A) Implement restoration and demonstration projects
   - B) Protect stream banks and complete stream bank stabilization projects using environmentally friendly bioengineering techniques along creeks in areas which have the greatest erosion

VIII) Objective: Reduce flood damages
   - A) Remove or relocate repetitively damaged structures from the floodway

B) Limit construction in the floodway by increasing buffers along streams

Long Range Actions

(Initiated and/or completed within 10 years of plan adoption)

I) Objective: Develop a multi-purpose recreational trail
- A) Implement greenway trails along Tom's Creek, Buffalo Creek, and Cedar Fork Creek
- B) Acquire property for regional trailheads
- C) Encourage coordination with developers on trail improvement opportunities
- D) Implement multiple use trailheads
- E) Implement signage program
- F) Install vegetative screening to shield selected land uses

II) Objective: Establish seven satellite parks
- A) Spillway/Old Mill Park on Sanford Creek
- B) Wetland Park on Tom's Creek
- C) Two wetland parks on Harris Creek
- D) Park Partnership with Wake Forest
- E) Granatic Rock Park
- F) Recreation park off Burlington Mill road
- G) Initiate acquisition of land

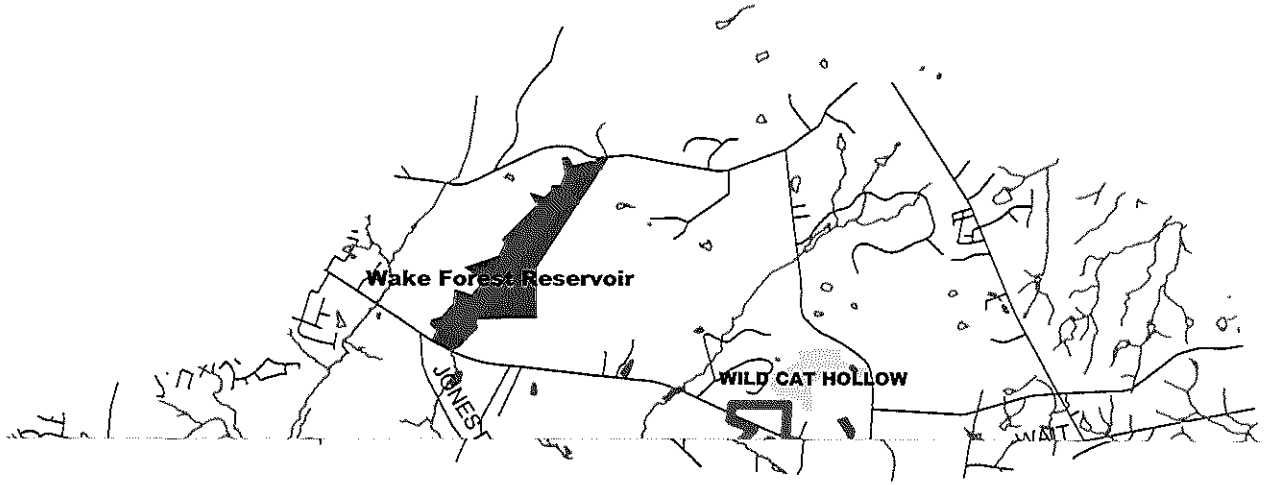
III) Objective: Improve water quality
- A) Increase water quality public education and technical assistance program
- B) Work to minimize impervious surfaces and to improve infiltration
- C) Acquire, restore and/or construct wetlands
- D) Promote use of native vegetation
- E) Use wetland detention basin designs or retrofit existing basins
- F) Enforce erosion and sediment controls

IV) Objective: Restore natural areas
- A) Actively manage riparian zones and natural areas to control non-native species

V) Objective: Reduce flood damages
- A) Provide technical assistance to property owners to minimize impervious surfaces
- B) Conduct annual stream maintenance to maintain stream channel conveyance

ROLESVILLE OPEN SPACE AND GREENWAY VISION

Phase I



Legend

- Study Area
- Creeks
- Lakes
- Rogers Bike Route
- Chalk Bike Route
- Quarry Bike Route
- Jonesville Bike Route
- Main Street Trail
- Streets
- Future Underpass
- Future 401 Bypass
- Middle School
- Elementry School
- Natural Area
- Existing Parks
- Proposed Parks
- Scenic Roads
- Greenway Buffer

0 3,800 7,600 15,200 Feet

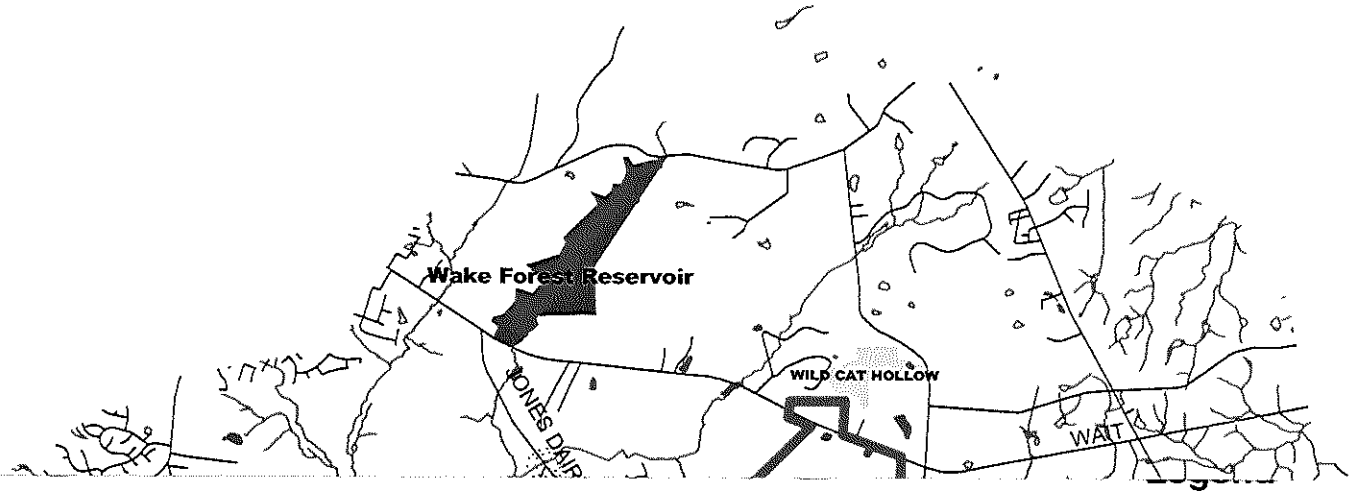
GREENWAYS
INCORPORATED
Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

Prepared:
November 26, 2001

ROLESVILLE OPEN SPACE AND GREENWAY VISION

Phase II



- Study Area
- Streets
- Creeks
- Lakes
- Harris Creek Trail
- Nature Trail Loop
- Bypass Trail
- Granatic Rock Trail
- Future 401 Bypass
- Future Underpass
- Natural Area
- Middle School
- Elementry School
- Existing Parks
- Proposed Parks
- Greenway Buffer
- Scenic Roads
- Central Park

0 3,375 6,750 13,500 Feet

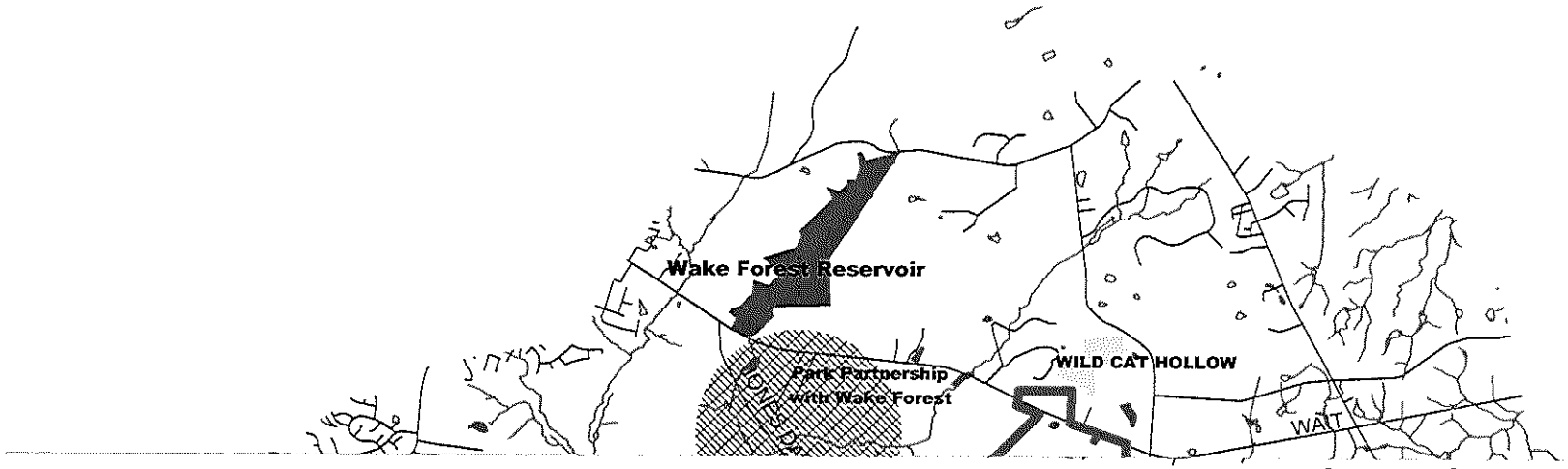
GREENWAYS
INCORPORATED
Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

Prepared:
November 26, 2001

ROLESVILLE OPEN SPACE AND GREENWAY VISION

Phase III



Legend

- Study Area
- Streets
- Creeks
- Lakes
- Buffalo Creek Trail
- Sanford Creek Trail
- Tom's Creek Trail
- Cedar Fork Trail
- Future 401 Bypass
- Future Underpass
- Middle School
- Elementry School
- Existing Parks
- Proposed Parks
- Natural Area
- Scenic Roads
- Greenway Buffer
- Satellite Parks

0 3,625 7,250 14,500 Feet

GREENWAYS
INCORPORATED
Landscape Architecture
Multi-Objective Trail Planning
Open Space Planning

Data Sources:
Wake County Planning GIS Dept.
Wake Forest Planning Dept.
NCGIA Corporate Database

Prepared:
November 26, 2001

Appendix A: Summary of Public Input

Workshop Overview

The Rolesville Open Space and Greenways Plan workshops were well-attended and productive. More than twenty people attended the first workshop held Tuesday, August 7, 2001, from 6:30 P.M. to 8:30 P.M. at the Rolesville Fire Department. The second public meeting was held Tuesday, October 9, 2001, from 6:30 P.M. to 8:30, at the Rolesville Town Meeting Hall. Approximately fifteen people attended the second workshop to contribute their knowledge of the region and to learn more about area efforts to preserve Wake County open space. The meetings attracted neighborhood residents, government officials, environmentalists, developers, and other interested groups.

At the workshops, participants were encouraged to make notations and draw potential trail routes directly on a map of Rolesville produced for the workshops (see figures A-1 and A-2). Comment forms were also available for people to leave written comments and answer questions about their open space and passive recreation area needs. Also, Rolesville staff and Greenways Incorporated personnel were on-hand to answer questions and listen to citizen comments.

Attention focused on the five main stream corridors: Harris Creek, Sanford Creek, Buffalo Creek, Tom's Creek, and Cedar Fork Creek. The streams provide connections to the south, west, and east and are the primary source of wildlife habitat for Rolesville. In addition, participants were interested in the establishment of a central park, development of smaller area parks, establishing equestrian areas, and preserving open space. Establishing greenways that would provide public access to the new parks and open spaces and connectivity to neighboring communities was also a focus. Public input received at the first workshop was incorporated graphically into the working map for the second workshop.

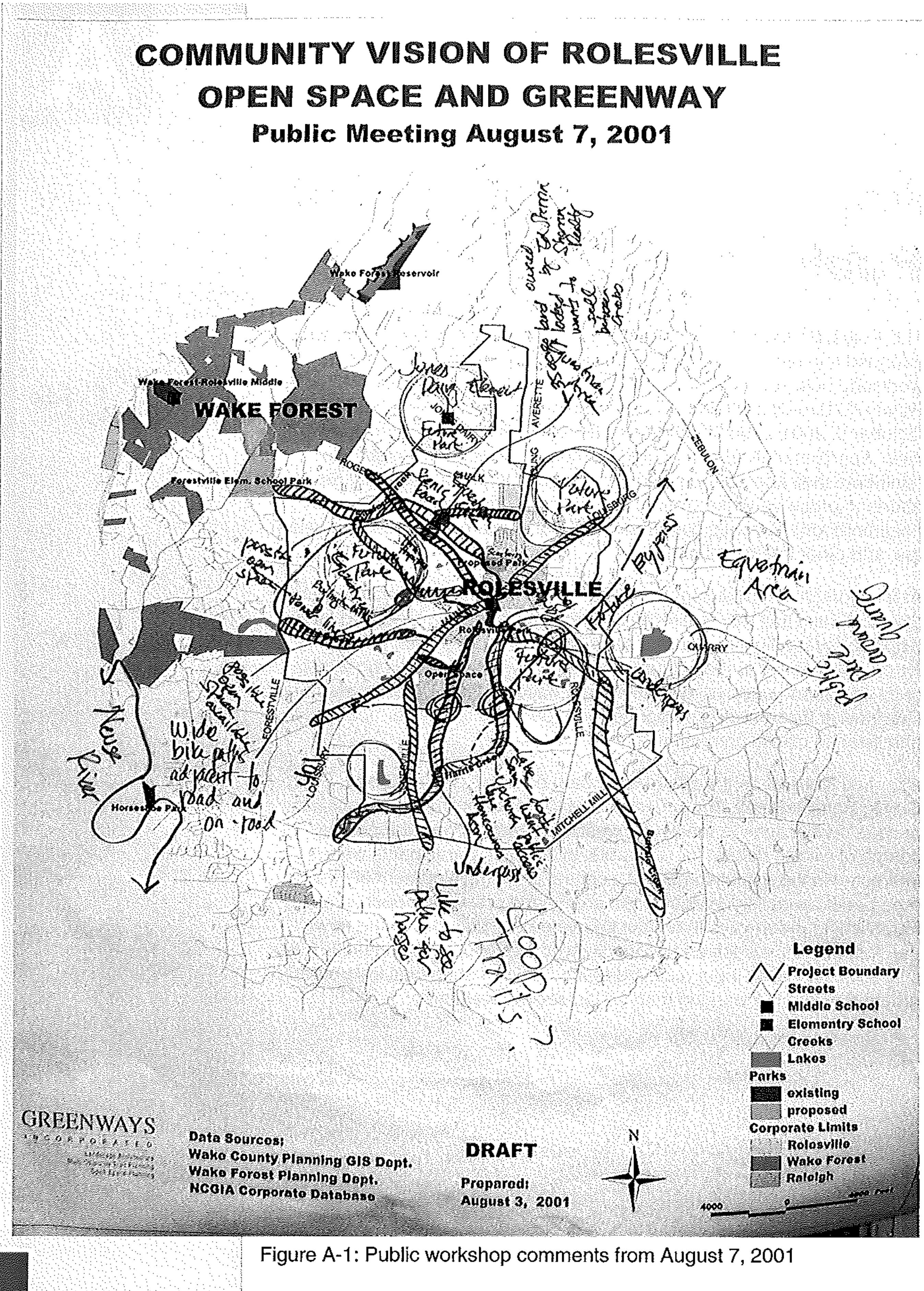


Figure A-1: Public workshop comments from August 7, 2001

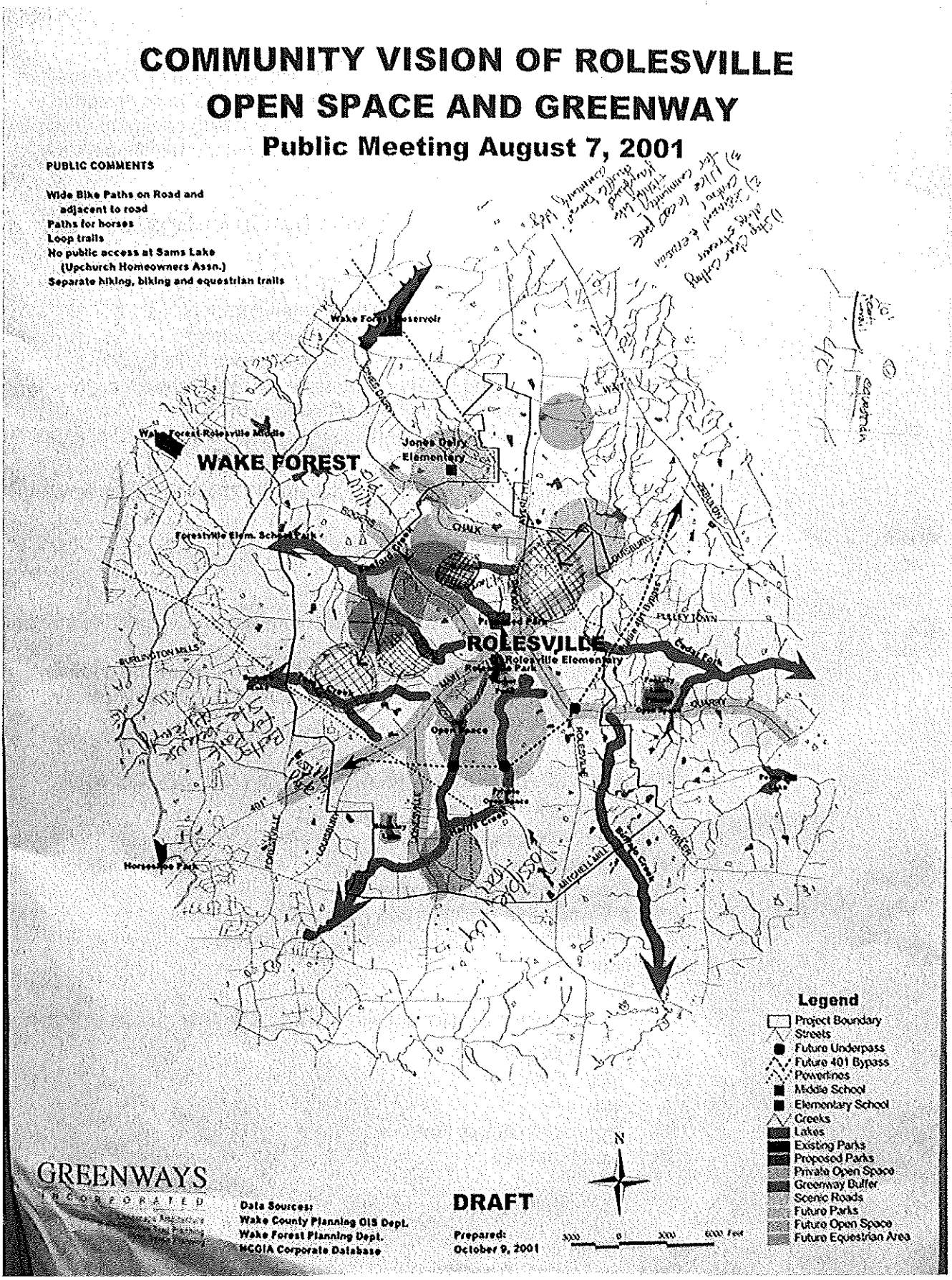


Figure A-2: Public workshop comments from October 9, 2001

Public Opinion Survey

Of the approximately 35 public workshop visitors, a total of 15 completed comment forms were returned. These comment forms were designed to encourage workshop participation and allow people to comment privately, if they chose to do so. The figures below represent the results from the returned forms.

What should be accomplished by Open Space preservation?

60% Acquire more land for public uses
80% Clean the water that flows in the stream corridors
66% Link neighborhoods to the existing park systems
73% Interpret the unique history of the landscapes of Rolesville
60% Acquire more land for improving water quality of the area streams
53% Build a trail system along stream corridors
53% Improve access to surrounding urban, suburban, and rural areas

What activities are you most likely to do in a Greenway?

66% Walk along a stream corridor
60% Ride a bike for fitness and fun
13% Ride a horse on a trail
80% Picnic with friends or family
53% Volunteer to plant native trees and other vegetation near the stream buffers
46% Volunteer to help with clean up of public lands along the corridor
60% Learn about the environment and history of the stream corridor from interpretive signs

Who should manage and care for Open Space and Greenways?

26% The community of Rolesville
0% Wake County
13% The State of North Carolina
40% A Partnership of Public and Private Organizations
0% Private Sector Organizations and Landowners
20% No response

Do you support using public funds for the preservation of Open Space?

66% Yes
6% No
13% Not certain at this time
13% No response

Additional comments were included on some of the forms. Representative samples of the comments are printed below:

- *Stop development that will adversely affect streams and wildlife.*
- *Plan a realistic open space plan reflects existing subdivisions and offers alternatives to problems not addressed in the current Rolesville Community Plan.*
- *Enforce cleanup of waterways while preserving natural wildlife habitat.*
- *Have more safe off road trails for multi-use: bike, horse, and hike.*
- *It is in everyone's interest to have open space and greenways and we should care for them.*
- *As long as our privacy is not compromised.*
- *We need a pool, jungle gym and bike trails to promote more family activities in Rolesville.*
- *I would like to see an open space plan that serves existing community members as well as potential population increases.*
- *Make Rolesville less like Raleigh and more like Cary.*
- *I'd like to find alternative trails that would link my community to Rolesville.*

B

Appendix B: Design Guidelines

Description

The design development guidelines featured in this Appendix have been tailored to meet the specific facility development needs of the Rolesville Open Space and Greenway System. The purpose of these guidelines is to assist the Town and its partnering organizations in developing open space and greenway facilities.

These guidelines provide a variety of trail facility and ecological system restoration concepts and ideas. These guidelines are not a substitute for a more thorough examination and detailed landscape architectural and engineering evaluation of each project segment. These guidelines serve as minimum standards for greenway facility development. The Town of Rolesville disclaims any liability for the use, appropriateness and accuracy of these guidelines as they apply to a specific project.

The following resource materials have been used in the preparation of these guidelines:

- Adherence to national design standards for off-road trails and greenway facilities, as defined by the American Association of State Highway Transportation Officials (AASHTO), the Americans with Disabilities Act, and the Manual on Uniform Traffic Control Devices.

For more in-depth information and design development standards, the following publications should be consulted:

Greenways: A Guide to Planning, Design and Development
Published by Island Press, 1993
Authors: Charles A. Flink and Robert Searns
www.greenways.com

Trails for the Twenty-First Century
Published by Island Press, 2001
Authors: Charles A. Flink, Robert Searns and Kristine Olka
www.greenways.com

Guide to the Development of Bicycle Facilities
Updated in 2000 by the American Association of State Highway Transportation Officials (AASHTO). Available from FHWA or AASHTO. www.aashto.org/bookstore/abs.html

Manual on Uniform Traffic Control Devices (MUTCD)
Published by the U. S. Department of Transportation, Washington, DC

Universal Access to Outdoor Recreation: A Design Guide
Published by PLAE, Inc., Berkeley, CA, 1993

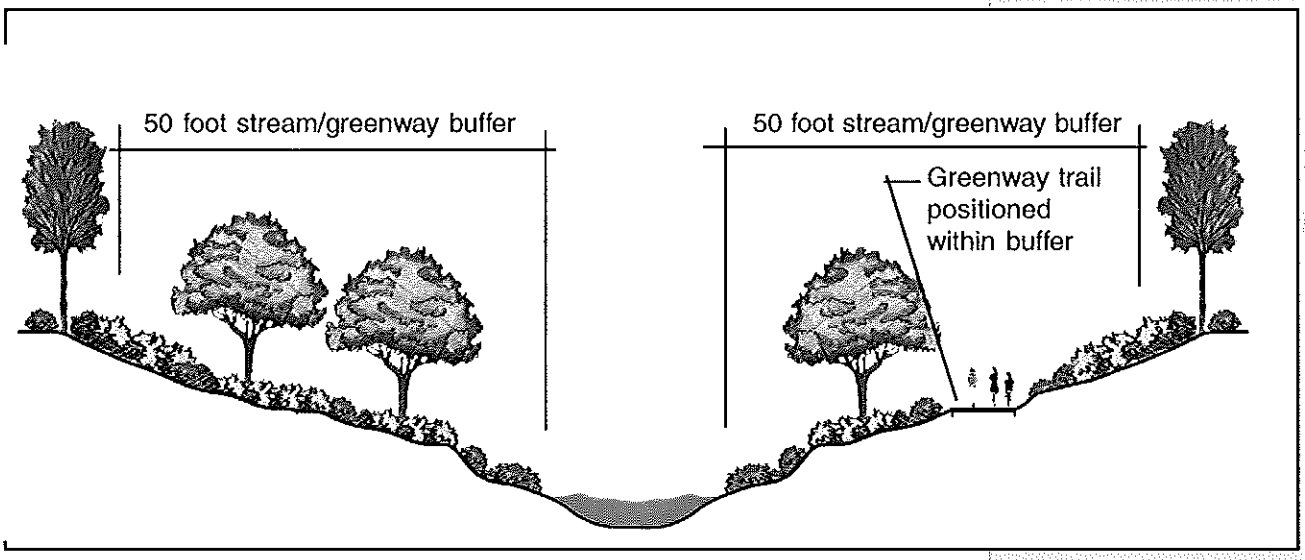
In all cases, the recommended guidelines in this report meet or exceed national standards. Should these national standards be revised in the future and result in discrepancies with this chapter, the national standards should prevail for all design decisions.

Other useful web sites for information include:

Rails-to-Trails Conservancy - www.railtrails.org
National Park Service - www.nps.org
US Department of Transportation - www.walkinginfo.org and www.bicyclinginfo.org
Trails and Greenways Clearinghouse - www.trailsandgreenways.org
National Bicycle and Pedestrian Clearinghouse - www.bikefed.org/clear.htm

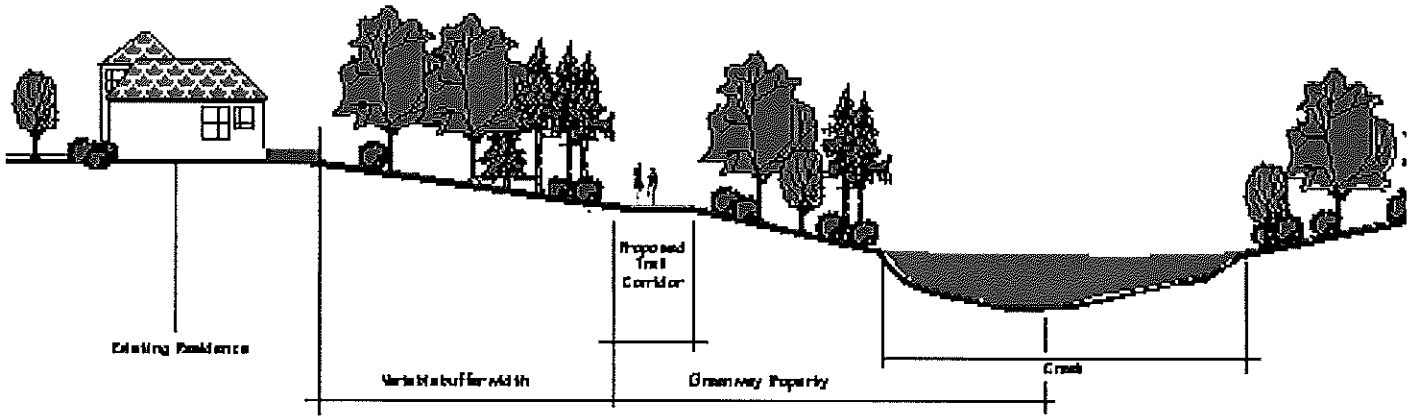
Stream Corridor Buffer

Stream buffers within the Town of Rolesville should be established to protect water quality in streams. For the purpose of greenway facility development, a minimum of 50 feet (100 feet preferred) from the top of stream bank is required in order to mitigate the damaging effects of flooding from storms, filter pollutants from overland water flow and develop appropriately sized greenway trail facilities.

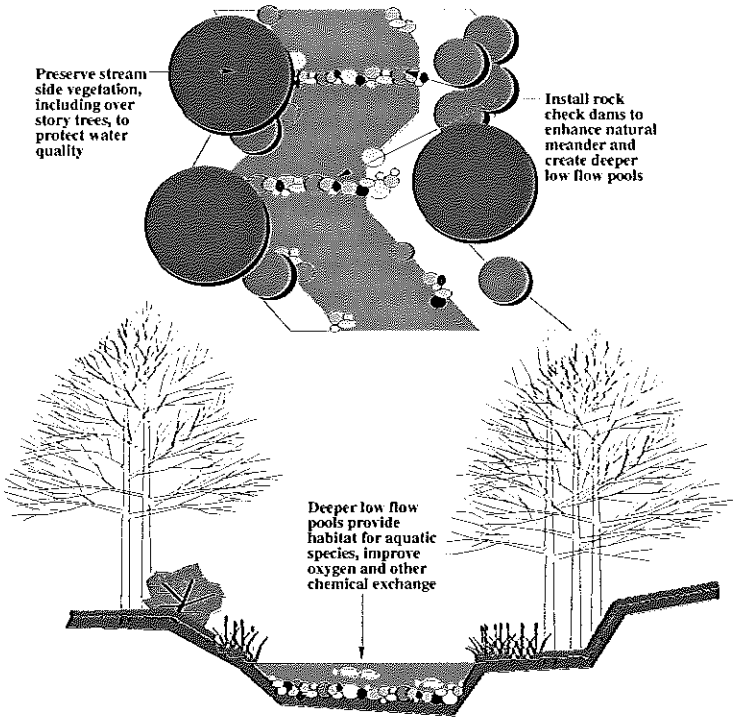


Setback:Trails to Homes

A positive relationship can be established between publicly accessible greenways and adjacent private property. The best way to achieve harmony is to first establish and appropriate width for each and every greenway corridor in Rolesville. As defined in this master plan, some greenway corridors will not contain public access trails, and will be reserved for water quality and floodplain management purposes. Other greenways will contain publicly accessible trails. For greenways with trails, a minimum 50 foot (100 foot preferred) greenway corridor should be established from the top of the stream bank. This will allow for the construction of an appropriately sized trail, and provide enough room to buffer or screen the trail from surrounding private property. The minimum setback from top of stream bank for trail construction should be 20 feet.



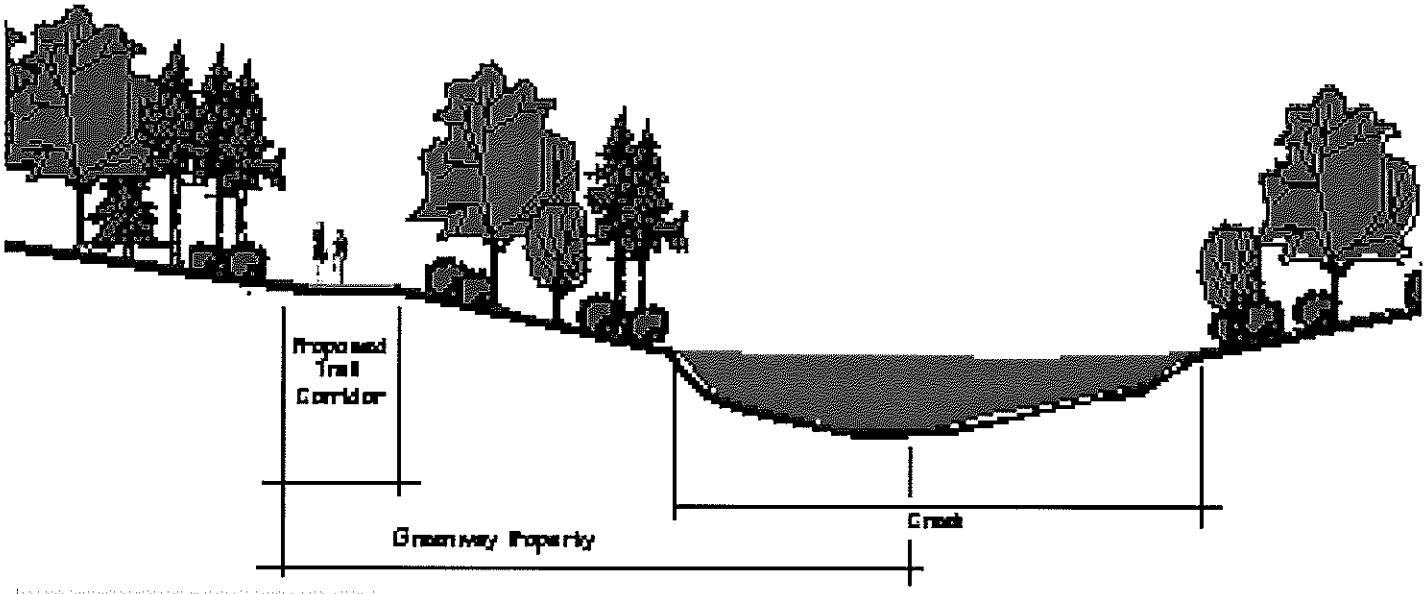
Stream Restoration

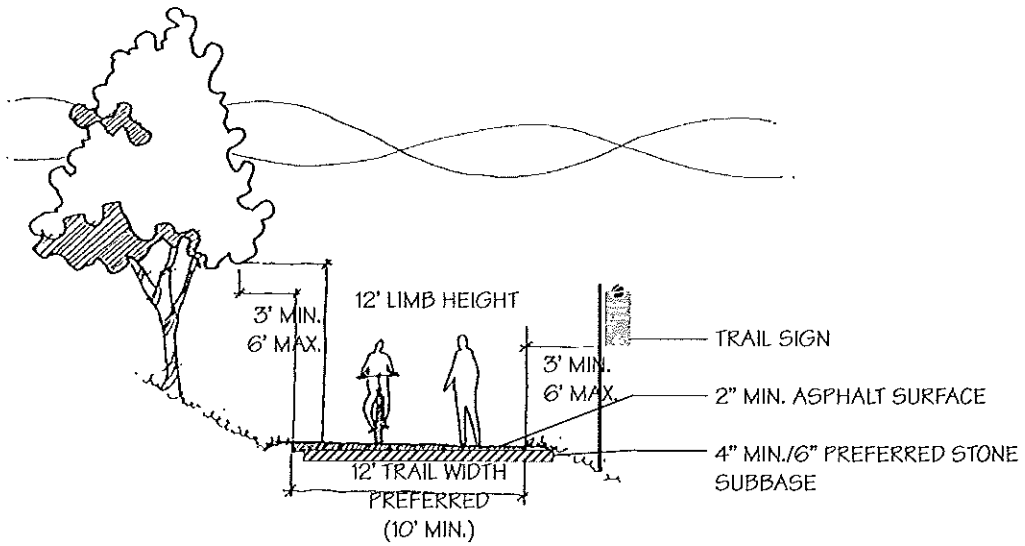


Stream within the Town of Rolesville can be restored to better ecological health through the use of soil bio-engineering techniques. Please refer to bio-engineering details provided later in this Appendix for some of the best management practices that can be employed to maintain good water quality in local streams.

Constructing Trails in Floodplains

Building trails within floodprone landscapes is equal part art, science and engineering. A trail should always be designed to fit the natural contours of the landscape. Trails should be developed in such a manner as to support and highlight the ecological features of the floodplain environment. Finally, trails should be properly engineered to withstand the rigors of frequent flooding. The only surface material suitable for floodplain trails will be asphalt or concrete. It is also critically important to use geotextile fabric in constructing trails. The fabric serves to keep the subbase intact, which will in turn support the trail surface. Hydrostatic pressure can become a problem for trails constructed in floodplains, care and attention must be given to establishing proper surface and subsurface drainage patterns.

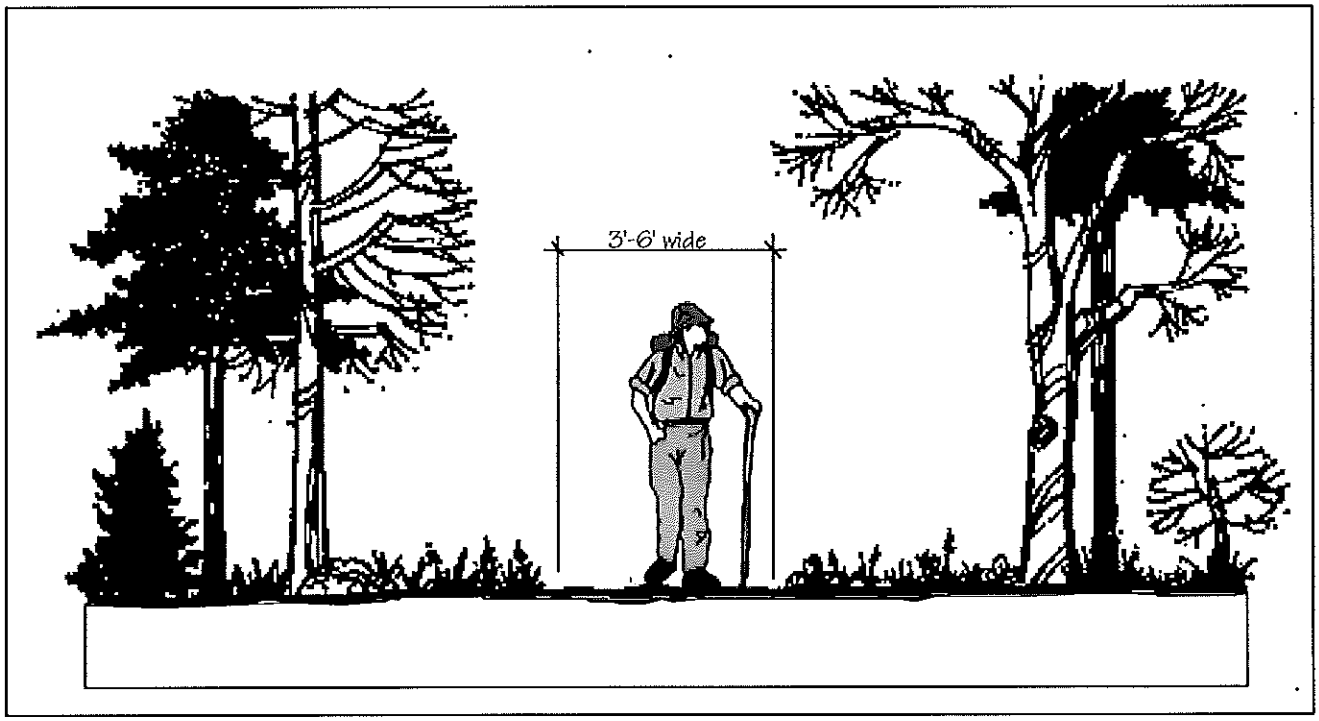




Footpath/Hiking Trail

Footpaths or hiking trails are designed to accommodate pedestrians and are not intended for cyclists or other wheeled users. These natural surface trails typically make use of dirt, rock, soil, forest litter, snow, ice, pine mulch, leaf mulch and other native materials for the trail surface. Preparation varies from machine-worked surfaces to those worn only by usage. This is the most appropriate surface for ecologically sensitive areas.

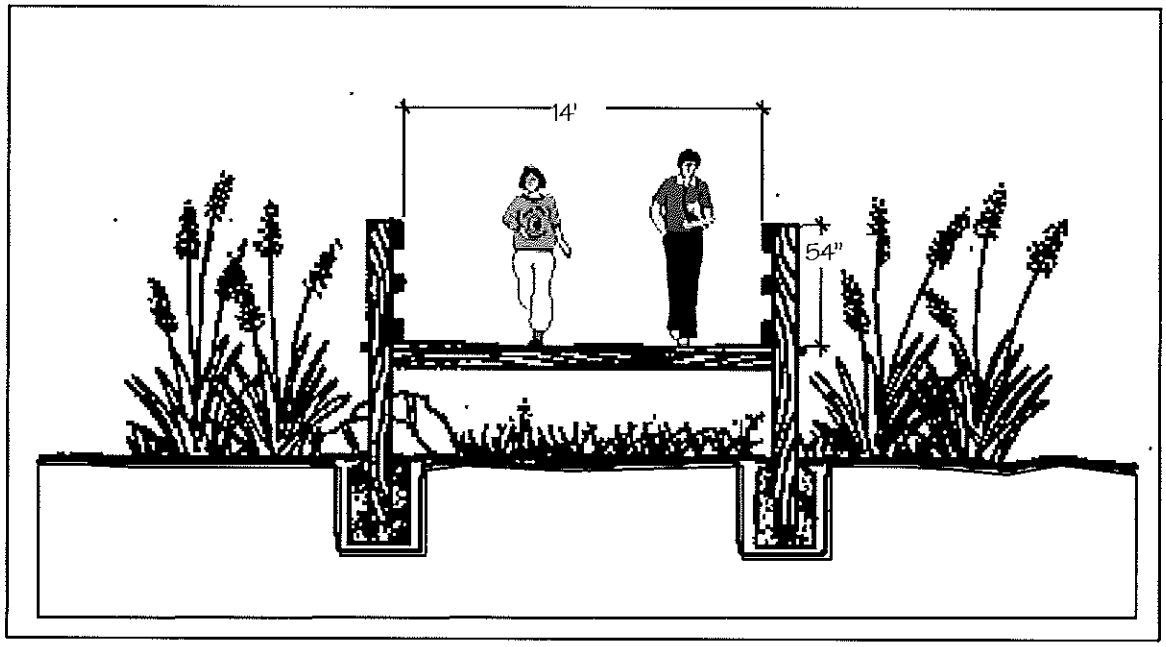
These pathways, often very narrow, sometimes follow strenuous routes and may limit access to all but skilled users. Some hiking trails may permit equestrian use. Construction of these trails mainly consists of providing positive drainage for the trail tread and should not involve extensive removal of existing vegetation. These trails vary in width from 3' to 6' and vertical clearance should be maintained at 9' (12' when equestrian use is allowed).



Boardwalk Trail

Boardwalks, or wood surface trails, are typically required when crossing wetlands or poorly drained areas. While boardwalks can be considered multi-use trails, the surface tends to be slippery when wet, and not best suited for wheeled users. Boardwalks intended for use by bikes, pedestrians, in-line skaters, etc. should be a minimum of 14' wide. However, boardwalk trails limited to pedestrian use can be as narrow as 8'.

Wood surfaced trails are usually composed of sawn wooden planks or lumber that forms the top layer of a bridge, boardwalk or deck. The most commonly used woods for trail surfacing are exposure- and decay- resistant species such as pine, redwood, fir, larch, cedar, hemlock and spruce. Wood is a preferred surface type for special applications because of its strength and comparative weight, its aesthetic appeal and its versatility. However, wood can be very slippery when wet. Synthetic wood, manufactured from recycled plastics, is now available for use as a substitute in conventional outdoor wood construction. While these product are more expensive than wood lumber, recycled plastic lumber lasts much longer, does not splinter or warp and will not discolor.

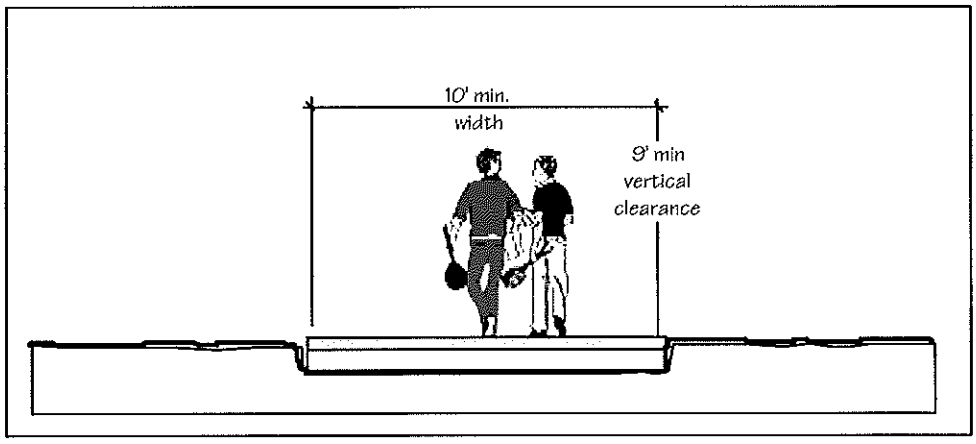


Unpaved Multi-Use Trail

The unpaved multiuse path is intended to accommodate a variety of users, including walkers, joggers, bicyclists, and others. These pathways, intended for use in upland environments with grades that do not exceed 5% running slope and 2% side slope. While less expensive to install, unpaved trails typically have higher maintenance costs than paved trails and require more frequent repairs. Careful consideration should be given to the amount of traffic the specific trail will generate, as these surfaces tend to deteriorate with excessive use. These trails must also meet all other standards within this manual, and within AASHTO's Guide for the Development of Bicycle Facilities (2000).

Materials that can be used to surface a trail include natural materials, soil cement, graded aggregate stone, granular stone, and shredded wood fiber. The soft surface materials are less expensive to install and compatible with the natural environment, however, they do not accommodate certain users, such as roller-bladers and disabled persons. Soft surface trails are preferred, however, by some runners and mountain bicyclists.

Soil cement will support most user groups, though bicyclists and horseback riders should have only restricted use. Soil cement surfaces last longer if installed on top of a properly prepared subgrade and subbase. Graded aggregate stone material suitable for trail surfacing includes colored rock, pea gravel, river rock, washed stone and coarse sand. This surface will often need to be kept in place with wood or metal edging. Because it is a loose, uncompacted surface, graded aggregate stone is limited in application to flatter slopes. Granular stone includes a broad range of aggregate stone, such as limestone, sandstone, crushed rock, pit gravel, chat, cinders, chert, sand and fine gravel. This is one of the best surface types for greenway trails because it can be densely compacted and is compatible with the natural environment. If properly constructed, granular stone can support bicycle and handicapped accessible trail development. Shredded wood fiber is usually composed of mechanically shredded hardwood and softwood pulp, pine bark chips or nuggets, chipped wood pieces, or other by-products of tree trunks and limbs. This type of surface is favored by joggers and runners, equestrians and walkers because it is soft and blends with the natural environment. However, shredded wood fiber decays rapidly and must be installed on flat subgrades.



Paved Multi-Use Trail

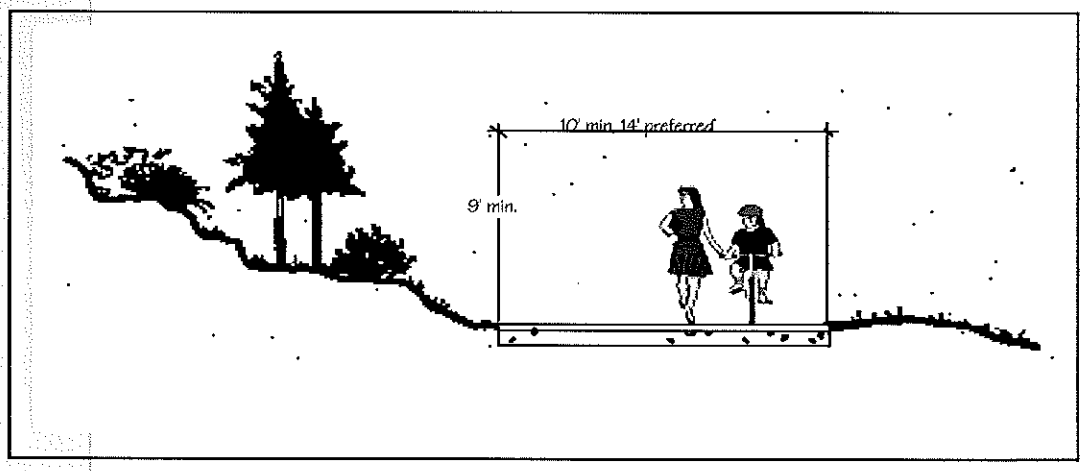
Typical pavement design for paved, off-road multi-use trails should be based upon the specific loading and soil conditions for each project. These trails, typically composed of asphalt or concrete, should be designed to withstand the loading requirements of occasional maintenance and emergency vehicles. In areas prone to frequent flooding, it is recommended that concrete be used for its excellent durability.

One important concern for asphalt multi-use trails is the deterioration of trail edges. Installation of a geotextile fabric beneath a layer of aggregate base course (ABC) can help to maintain the edge of a trail. It is also important to provide a 2' wide graded shoulder to prevent trail edges from crumbling.

The minimum width for two-directional trails is 10', however 14' widths are preferred where heavy traffic is expected. Centerline stripes should be considered for paths that generate substantial amounts of pedestrian traffic. Possible conflicts between user groups must be considered during the design phase, as cyclists often travel at a faster speed than other users.

Asphalt concrete is a hard surface material that is popular for a variety of rural, suburban and urban trails. It is composed of asphalt cement and graded aggregate stone. It is a flexible pavement and can be installed on virtually any slope.

Concrete surfaces are capable of withstanding the most powerful environmental forces. They hold up well against the erosive action of water, root intrusion and subgrade deficiencies such as soft soils. Most often, concrete is used for intensive urban applications. Of all surface types, it is the strongest and has the lowest maintenance requirement if it is properly installed.



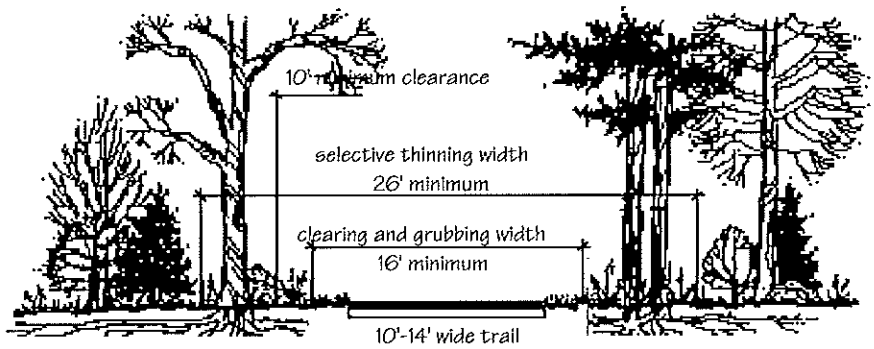
Vegetation Clearing

Off-road multi-use trails are physically separated from motor vehicle traffic (except at crossings with streets) and built either within an independent right-of-way (such as a utility or railroad right-of-way), or along specially acquired easements across private lands. Such trails cater to a variety of users, including cyclists, pedestrians, joggers, rollerbladers and individuals confined to wheelchairs.

Vegetative clearing refers to the amount of vegetation removal that is required for various levels of trail development. The amount of vegetative clearing required for any one trail will depend on the type of trail being developed. While footpaths or hiking trails require little or no vegetation removal, paved pathways may require significantly more.

Single-tread, multi-use trails are the most common type of trail in the nation. These trails vary in width, can accommodate a wide variety of users, and are especially popular in suburban and urban areas. While the vegetative clearing needed for these trails varies with the width of the trail, the graphic below outlines typical requirements.

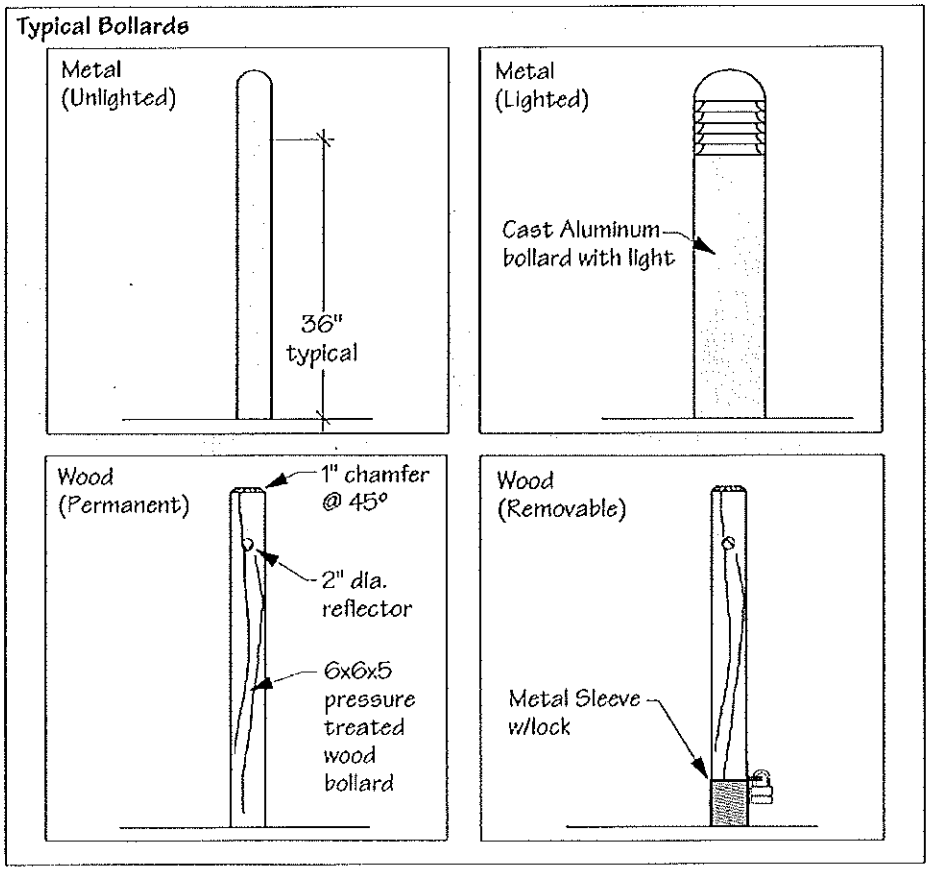
Typical Vegetative Clearing



Trail Bollards

Bollards are intended to provide separation between vehicles and trail users. They are available in a variety of shapes, sizes, and colors and come with a variety of features. Lighted bollards are intended to provide visitors with minimum levels of safety and security along trails which are open after dark. Bollards should be chosen according to the specific needs of the site and should be similar in style to the surrounding elements. The graphic below illustrates several typical bollard examples.

The contractor is to provide proper footings and achors for bollard installation, according to manufacturers specifications. Typical construction materials for bollards include painted steel or aluminum, with halogen or metal halide lights in weather tight casings. Removable bollards can be installed to provide trail access for emergency and maintenance vehicles.



Bicycle Racks

It is important to choose a bicycle rack design that is simple to operate. Bicycle racks should be designed to allow use of a variety of lock types. It may be difficult initially to determine the number of bicycle parking spaces needed: bicycle racks should be situated on-site so that more racks can be added if bicycle usage increases.

The design shown above has proven popular and effective in numerous communities. It is inexpensive to fabricate locally, easy to install, vandal resistant, and works well with the popular high-security locks. In addition, it can be installed as a single unit, on a sidewalk, or in quantity, as at a major recreation center.

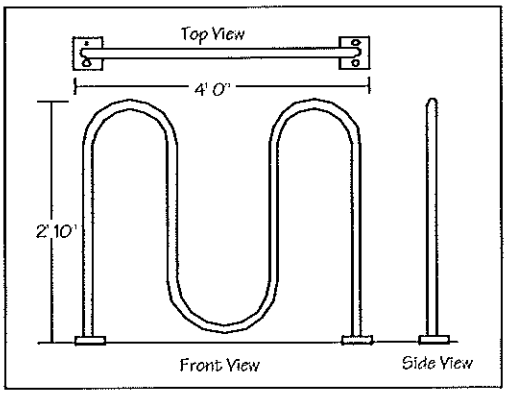
The location criteria included below are a mix of those developed by other cities for siting bicycle racks, and are recommended for the Town of Rolesville:

• Racks should be located within 50' of building entrances (where bicyclists would naturally transition into pedestrian mode).

• Racks should be installed in a public area within easy viewing distance from a main pedestrian walkway, usually on a wide sidewalk with five or more feet of clear sidewalk space remaining (a minimum of 24" clear space from a parallel wall, and 30" from a perpendicular wall).

• Racks are placed to avoid conflicts with pedestrians. They are usually installed near the curb and at a reasonable distance from building entrances and crosswalks.

• Racks should be installed at bus stops or loading zones (only if they do not interfere with boarding or loading patterns and there are no alternative sites). Lexington Transit buses already have installed racks on their buses to facilitate bike-on-transit travel.



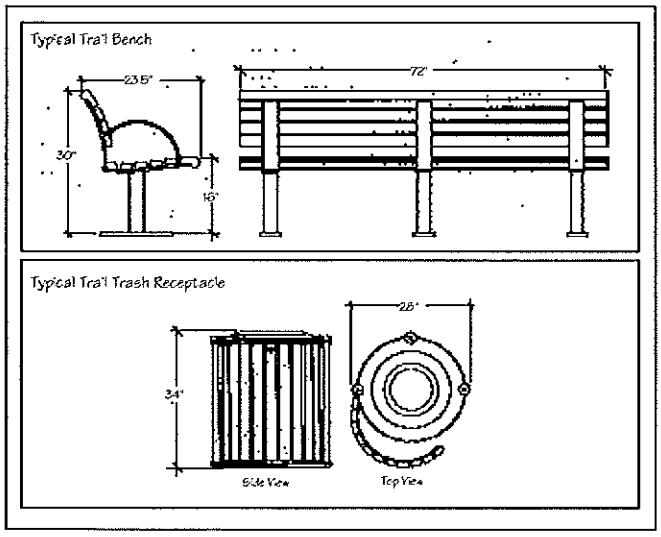
Trail Benches/Trash Cans

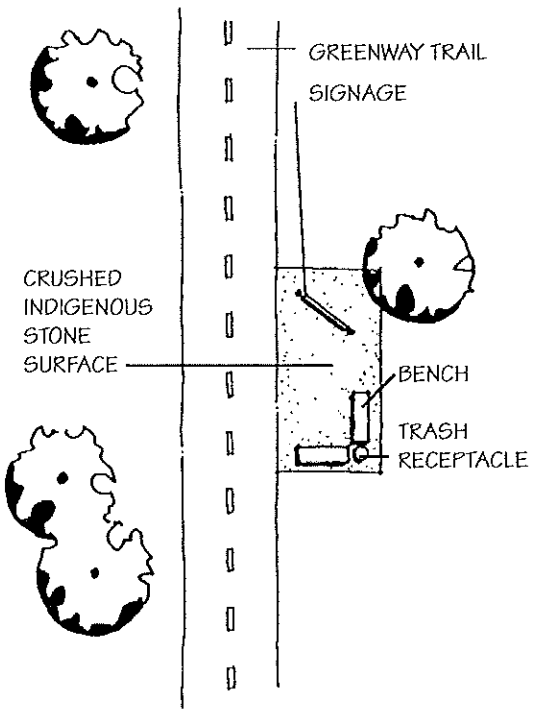
Trash receptacles

Trash containers are necessary along all trails. They can be attractive as well as functional and should be selected based on the amount of trash expected, overall maintenance program of the trail, and types of users. Trash cans need to be accessible to both trail users and maintenance personnel. At a minimum, 22-gallon or 32 gallon containers should be located at each entranceway and at each bench seating area. They should be set back three feet from the edge of the trail. The location of additional trash cans will depend upon the location of concessions, facilities adjacent to the trail and areas where trail users tend to congregate.

Benches

Benches along trails allow users to rest, congregate or contemplate. Trail benches should comfortably accommodate the average adult. They should be located at the primary and secondary entrances to the trail and at regular intervals, and should be set back three feet from the trail edge.

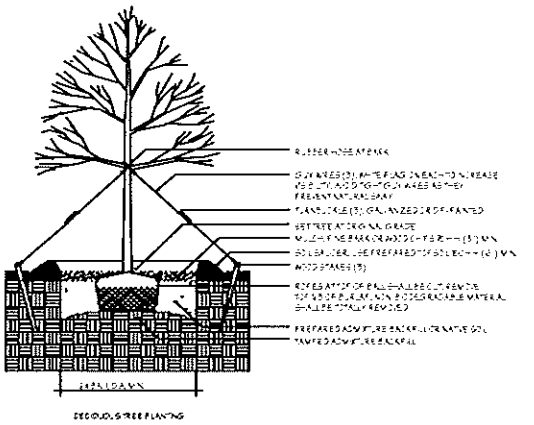


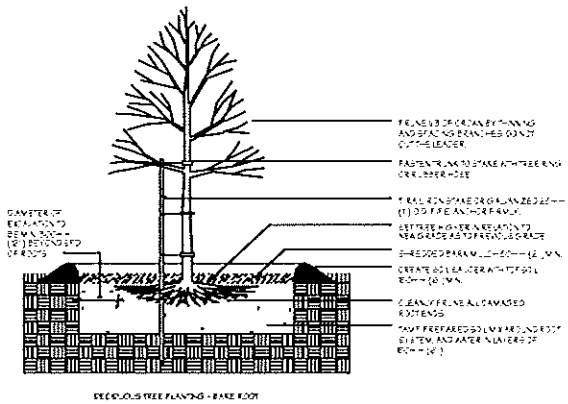


TRAIL REST AREA PLAN VIEW

Tree Plantings

Typical deciduous tree planting techniques for ball & burlap and bare root trees.





Sidewalks

Sidewalks are a critical component of the Rolesville Open Space and Greenways Plan. They not only encourage walking, but they also improve the safety of pedestrians. An individual's decision to walk is as much a factor of convenience as it is the perceived quality of the experience. Pedestrian facilities should be designed with the following factors in mind:

• Sufficient width
Sidewalks should accommodate anticipated volumes based on adjacent land uses, and should at a minimum allow for two adults to walk abreast (min. 5 feet, prefer 6 feet).

• Protection from traffic
High volume and/or high speed (>35 mph) motor vehicle traffic creates dangerous and uncomfortable conditions for pedestrians. Physical (and perceptual) separation can be achieved through a combination of methods: a grassy planting strip with trees, a raised planter, bicycle lanes, on-street parallel parking, and others.

• Street trees
Street trees are an essential element in a high quality pedestrian environment. Not only do they provide shade, they also give a sense of enclosure to the sidewalk environment which enhances the pedestrian's sense of a protected environment.

• Pedestrian-scaled design
Large highway-scale signage reinforces the general notion that pedestrians are out of place. Signage should be designed to be seen by the pedestrian. Street lighting should likewise be scaled to the level of the pedestrian (14' tall), instead of providing light poles that are more appropriate on high-speed freeways.

• Continuity
Pedestrian facilities are often discontinuous, particularly when private developers are not encouraged to link on-site pedestrian facilities to adjacent developments and nearby sidewalks or street corners. New development should be designed to encourage pedestrian access from nearby streets. Existing gaps in the system should be placed on a prioritized list for new sidewalk construction.

• Clearances
Vertical clearance above sidewalks for landscaping, trees, signs and similar obstructions should be at least 10'. In commercial areas and the downtown, the vertical clearance for awnings should be 10'. The vertical clearance for building overhangs which cover the majority of the sidewalk should be 12'.

• Conformance with national standards
Sidewalk design should be consistent with Americans with Disabilities Act requirements and/or ANSI requirements. Specific guidance is provided by the Architectural and Transportation Barriers Compliance Board's American's with Disabilities Act Accessibility Guidelines.

• Sidewalk Obstacles
Street furniture and utility poles create obstacles to pedestrian travel when located directly on the sidewalk. At a minimum, there should be 36" of sidewalk width to allow wheelchairs to pass. Where possible, utilities should be relocated so as not to block the sidewalk. Benches should not be sited directly on the sidewalk, but set back at least 3'
The design of new intersections or re-design of existing intersections presents an opportunity to improve pedestrian circulation. Street furniture located near intersections can block sight lines. In general, the designer should consider the impact on sight distance for all features located in the vicinity of roadway intersections.
• Sidewalk Pavement Design

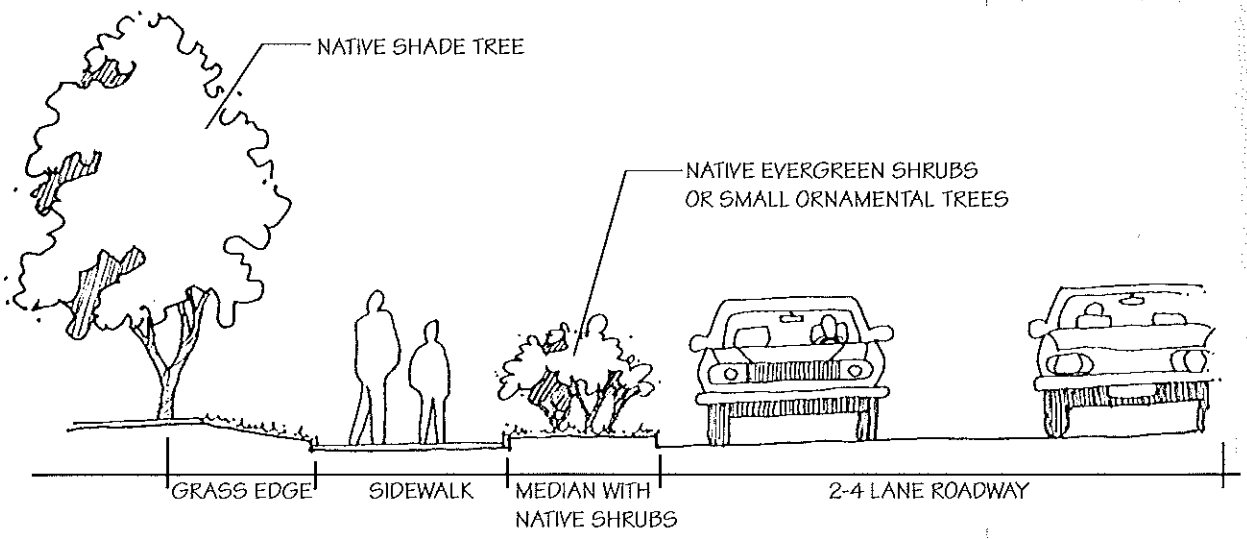
Sidewalks and roadside pathways should be constructed of a solid, debris-free surface. Regardless of the type of surface chosen, it must be designed to withstand adequate load requirements. Depth of pavement should consider site specific soil conditions, but in no case less than 4.5 inches. Brick and concrete pavers are popular materials for more decorative sidewalks. The use of stylized surfaces is encouraged, however they must be installed properly or they will deteriorate over time.

• Sidewalk Width and Setback Guidelines
The following are recommended guidelines for sidewalk width and setback in Wake Forest. It is important to note that there are some areas that warrant wider sidewalks than the minimum. For example, sidewalks in and around local universities and colleges must accommodate a much higher volume of pedestrians, and therefore warrant additional width. The recommendations below are based upon standards used by other pedestrian-friendly communities in the U.S.

By following the recommendations below, Rolesville can ensure that basic needs of pedestrians are addressed in developing areas. In existing residential and commercial areas that lack sidewalks, new sidewalk construction (independent of new development) should occur first in locations that demonstrate the most need, according to the recently completed pedestrian and sidewalk study.

• Sidewalks on local streets in residential areas:
Five foot wide sidewalks are recommended on at least one side of the street, with a 5' wide planting strip. The planting strip may need to be slightly wider to accommodate the roots of street trees, if they are included in the design. Sidewalks are not necessary on cul-de-sacs that are less than 500' in total length.

• Sidewalks on collector streets in residential and commercial areas:
Five foot wide sidewalks are recommended on both sides of the street. Another option is to install a 6' wide sidewalk on just one side of the street (in this case, the sidewalk should be installed on the side that generates the most activity). A 7' wide planting strip is recommended.



• Sidewalks on arterial streets in residential and commercial areas:
Six foot wide sidewalks are recommended on both sides of the street, with 8' wide planting strips.

• Sidewalks on streets within 2000' of schools:
Width and setback should be based on the specific roadway type as described above. For all roadway types, however, sidewalks should be installed on both sides of the road, and should include well-marked crosswalks and school crossing signs.

Sidewalks on streets with no curb and gutter:
The setback requirements in this section are based on roadway cross sections that include curb and gutter. Sidewalks located immediately adjacent to "ribbon pavement" (pavement with no curb and gutter) are not recommended. However, if no other solution is possible, sidewalks adjacent to ribbon pavement have a much greater setback requirement, depending on roadway conditions. Engineers should consult the AASHTO Policy on Geometric Design of Highways and Streets for more specific guidelines.

• Sidewalks in rural areas:
In most rural areas, the low volume of pedestrians does not warrant sidewalk construction. In most cases, 4'-6' wide paved shoulders can provide an adequate area for pedestrians to walk on rural roadways, while also serving the needs of bicyclists. Exceptions should be made in areas where isolated developments such as schools, ballparks, or housing communities create more pedestrian use. For example, motorists might regularly park along a rural road to access a nearby ballpark. A sidewalk may be warranted in this circumstance so that pedestrians can walk separately from traffic. Sidewalks in rural areas should be provided at a width based on anticipated or real volume of pedestrians, with 5' being the minimum width.

Wide Curb Lanes

There are three types of on-road bicycle facilities: wide curb lanes, paved shoulders, and bike lanes. Wide curb lanes, or outside lanes, are wider than the standard 12' travel lane and can provide more space for cyclists and easier passing for motorists. Under most conditions, automobiles and bicycles can coexist in a 14' wide curb lane, without the need for the motorist to move into the next adjacent lane.

Location and Width
Wide curb lanes best accommodate advanced cyclists, as these riders are more comfortable operating directly in traffic. The wide curb lane is always the furthest right-hand lane, and should optimally be 14' - 16' wide, not including the gutter pan (curb lanes that are wider than 16' are not recommended). Wide curb lanes are not required to have curb and gutter.

In order to achieve the extra space needed for a 14' wide outside lane, the roadway may either be physically widened or restriped to reduce the lane width of inner lanes and increase the width of outer lanes. Re-striping proposals should be reviewed by a transportation engineer to ensure adequate safety for the motorists as well as bicyclists.

Signage
There is no special "wide curb lane" sign, however on high volume urban arterials, the designer may choose to install "Share the Road" warning signs (standard bicycle warning plate with a subplate stating SHARE THE ROAD).

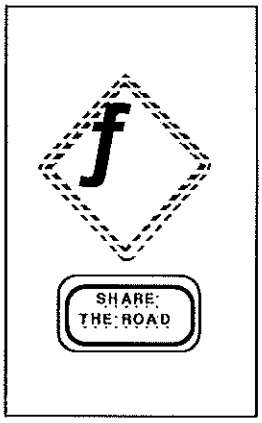
Intersection Design
When wide curb lanes approach intersections with turning lanes, the 14' wide lane should continue through the intersection as the outside through-lane.

Design Issues
Acceptance: Bicycle programs in numerous communities have found that less experienced bicyclists seldom see a difference when wide curb lanes are provided. Therefore, if the desired outcome is greater numbers of bicyclists or a visible "Pro Bicycle" statement, this option will not satisfy the need.

Traffic speeds: Wider curb travel lanes may tend to increase motorist speeds. Whether a marginal increase in speeds is important in a particular situation should be a subject for analysis.

Rural Road Bike Facilities

Paved roadway shoulders along rural roads are not only an excellent way to accommodate bicycles, they are also beneficial to the motoring public. Paved shoulders eliminate problems caused when the pavement edge begins to deteriorate - therefore extending the life of the road surface and requiring less maintenance. Paved shoulders also provide a breakdown area for motor vehicles.



Location and Use

Paved shoulders for bicycles serve the needs of all types of cyclists in rural areas. In urban areas, paved shoulders may be preferable to riding in a traffic lane for advanced cyclists on arterial roadways with high speeds (over 45 mph). Paved shoulders in rural areas have the additional benefit of providing an area for pedestrian use.

Width

Shoulders should be a minimum of 4' wide to accommodate cyclists, depending upon the speed and volume of motor vehicle traffic. Paved shoulders for bicycles can be designed according to typical roadway cross sections for bicycle lanes, with the exception that no pavement decals or bicycle lane signage is used for paved shoulders.

Although 4' of width is preferable, certainly any additional shoulder width is preferable to none at all. Shoulders that are 2'-3' wide can improve conditions and are recommended in cases where 4' widths cannot be achieved. However, shoulders less than 4' wide should not be designated as bicycle facilities with signage or on official bicycle route maps. "Share the Road" signs would be acceptable in these locations, as they would serve to warn motorists of the likely presence of bicyclists.

As with bicycle lanes, paved shoulders should have the same pavement thickness and subbase as the adjacent roadway, and should be regularly swept and kept free of potholes.

Signage

Paved shoulders can be designated as bikeways by erecting standard bicycle route warning signs, such as depicted to the right. As described above, these "Share the Road" signs may be installed on roads with paved shoulders that are less than 4' in width.

Bicycle Lanes

Bicycle lanes in Rolesville should conform to the standards in AASHTO and NCDOT manuals Bicycle lanes are an on-road type of facility. They should not be separated from other motor vehicle lanes by curbs, parking lanes, or other obstructions. General standards for width, striping, and intersections are provided below.

Location and Use

Bicycle lanes serve the needs of experienced and inexperienced bicyclists in urban and suburban areas, providing them with their own travel lane. Bicycle lanes are always located on both sides of the road (except when they are constructed on one-way streets). By this design, cyclists are encouraged to follow the rules of the road, which require them to travel in the same direction as adjacent motor vehicle traffic. During the repair and reconstruction of roads, consideration should be given to the installation of bicycle lane facilities as designated on the Greenway Master Plan map. Additionally, collector roads, existing and proposed, should be considered for bicycle lane facilities.

Width

The minimum width of bike lanes should be 5', exclusive of the gutter pan. On roads with parallel parking, bike lanes should be a minimum of 5' wide, and should be installed adjacent to the motor vehicle lanes, rather than between the parking lane and the curb.

Signage

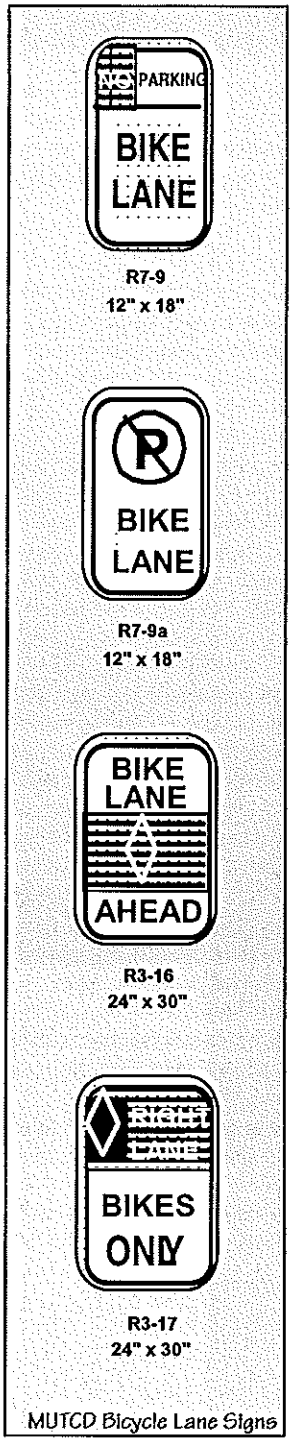
The MUTCD specifies standard signage for bicycle lanes. According to section 9B-8, the R3-16 sign should be used in advance of the beginning of a designated bicycle lane to call attention to the lane and to the possible presence of bicyclists. The MUTCD requires that the diamond lane symbol be used with both the R3-16 and R3-17 signs.

According to Section 9B-11 of the MUTCD, the R7-9 or R7-9a signs can be used along streets where motorists are likely to park or frequently pull into the bike lane.

Striping

Bicycle lane stripes should be solid, 6" wide white lines. Care should be taken to use pavement striping that is skid resistant. Bicycle-shaped pavement symbols and directional arrows should be placed in the bicycle lane to clarify its use. Pavement letters that spell "ONLY BIKE" are also highly recommended. Symbols should be installed at regular intervals, immediately after intersections, and at areas where bicycle lanes begin.

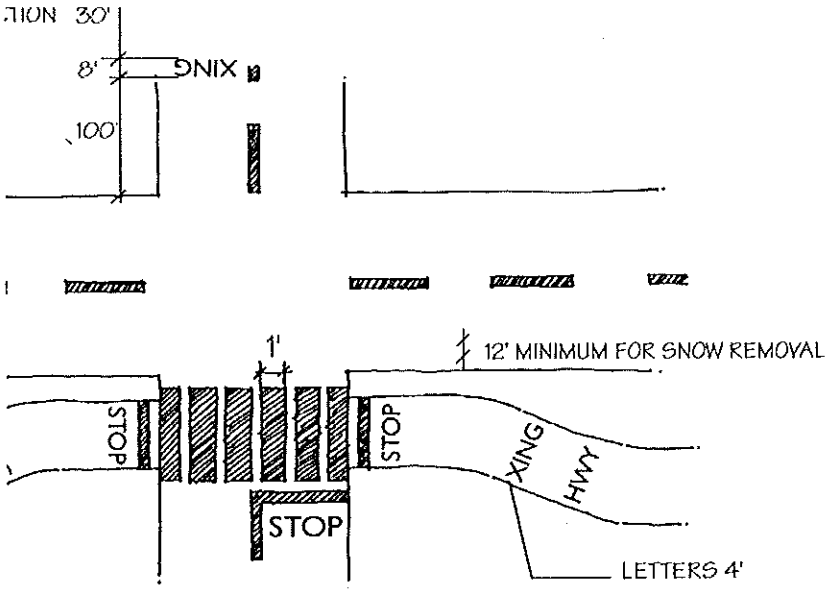
Bike lane striping at intersections is challenging. Traffic has a tendency to mix at intersections: motorists who are turning right must cross paths with cyclists who wish to continue straight, and cyclists who wish to turn left must cross into left-hand turn lanes. Several intersection striping patterns are provided by AASHTO's Guide for the Development of Bicycle Facilities (2000) and the MUTCD.

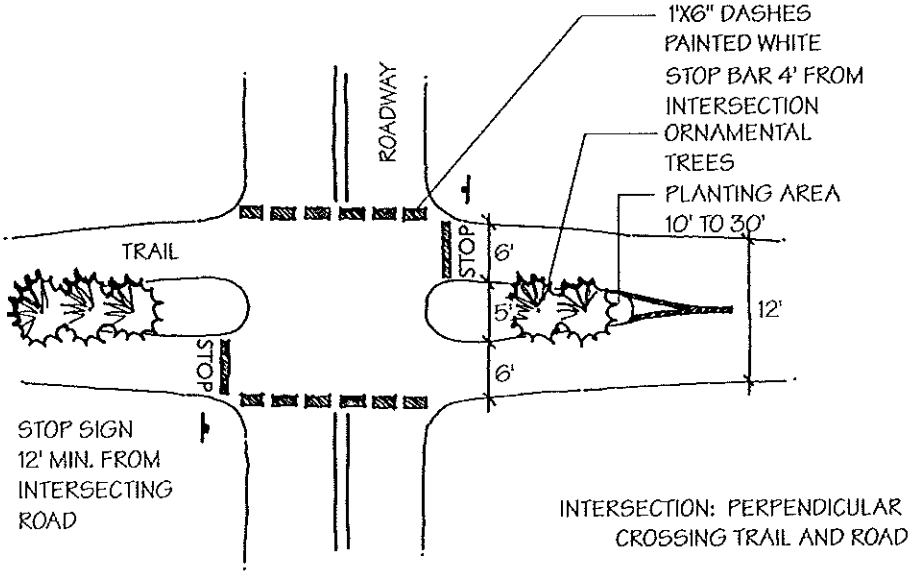


MUTCD Bicycle Lane Signs

Trail/Roadway Intersections

The intersection of trails and roadways is one particular area of concern in the Greenway system development. The drawings below illustrate two ways of properly resolving trail and roadway intersections. The first drawing shows a trail facility parallel to a roadway and intersecting with a road. The second drawing provides one method for intersecting with a road.





Soil Bioengineering

As part of a natural stream channel design, soil bioengineering applications are used since they are a natural means of providing stabilization and enhancing habitat. Soil bioengineering utilizes the combination of living and nonliving materials to provide soil reinforcement and prevent erosion. Streambanks can be stabilized with live branch layering, root wads, tree plantings, rock, live fascines, and coir fiber rolls among others. Stream beds can be stabilized with vortex rock weirs, cross vanes, and boulder drop structures among others. These materials can be categorized as living or nonliving.

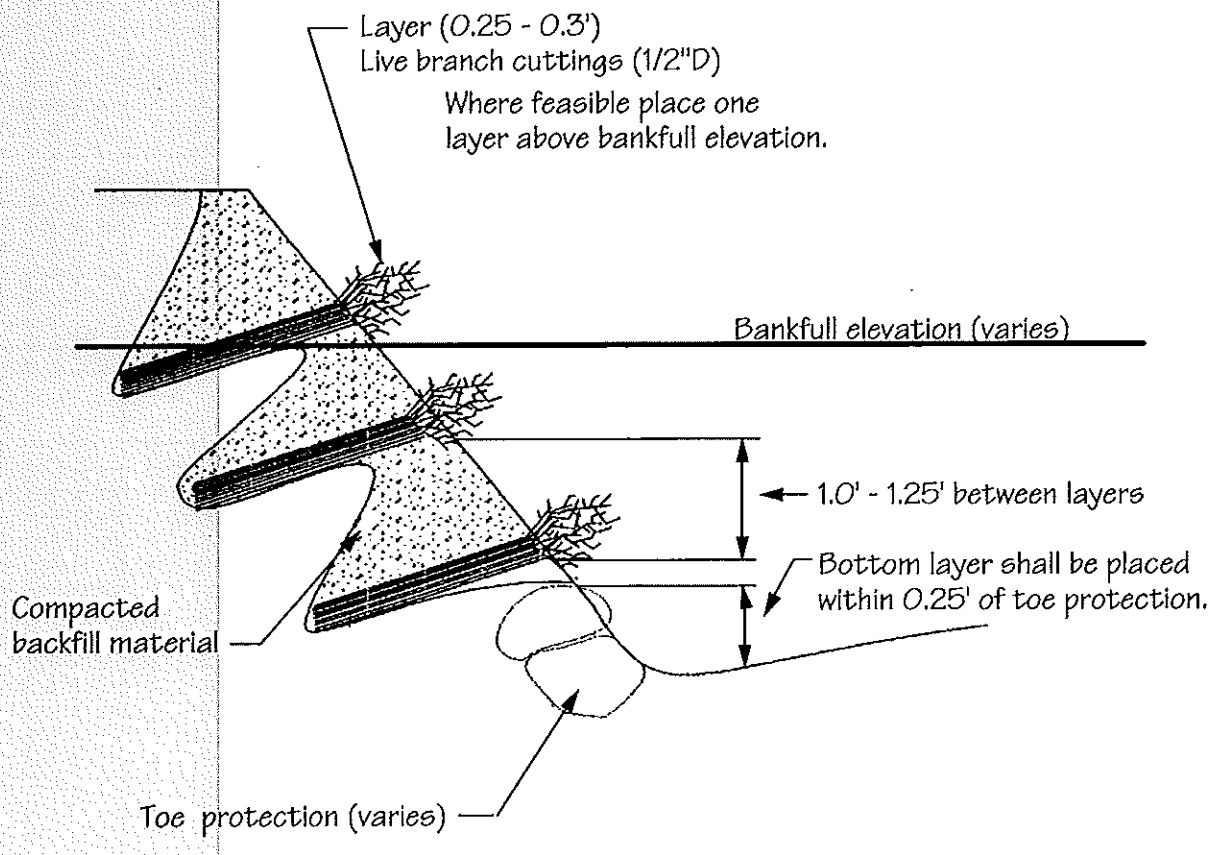
Living materials used in soil bioengineering include grasses, forbs, shrubs, trees and vines. Installation techniques include: plugging/transplanting, branch layering, live fascines and brush mattresses. Ecological considerations associated with living materials are soil moisture, soil fertility, temperature and sunlight. Propagation/procurement includes: propagating from seed, harvesting hardwood cuttings, and seasoning to ensure the highest success rate.

Nonliving materials used in soil bioengineering are: root wads, coir fiber rolls, cribwalls, rock and stone. These materials may be installed anytime throughout the year. Construction details for applications mentioned above are included in the following pages.

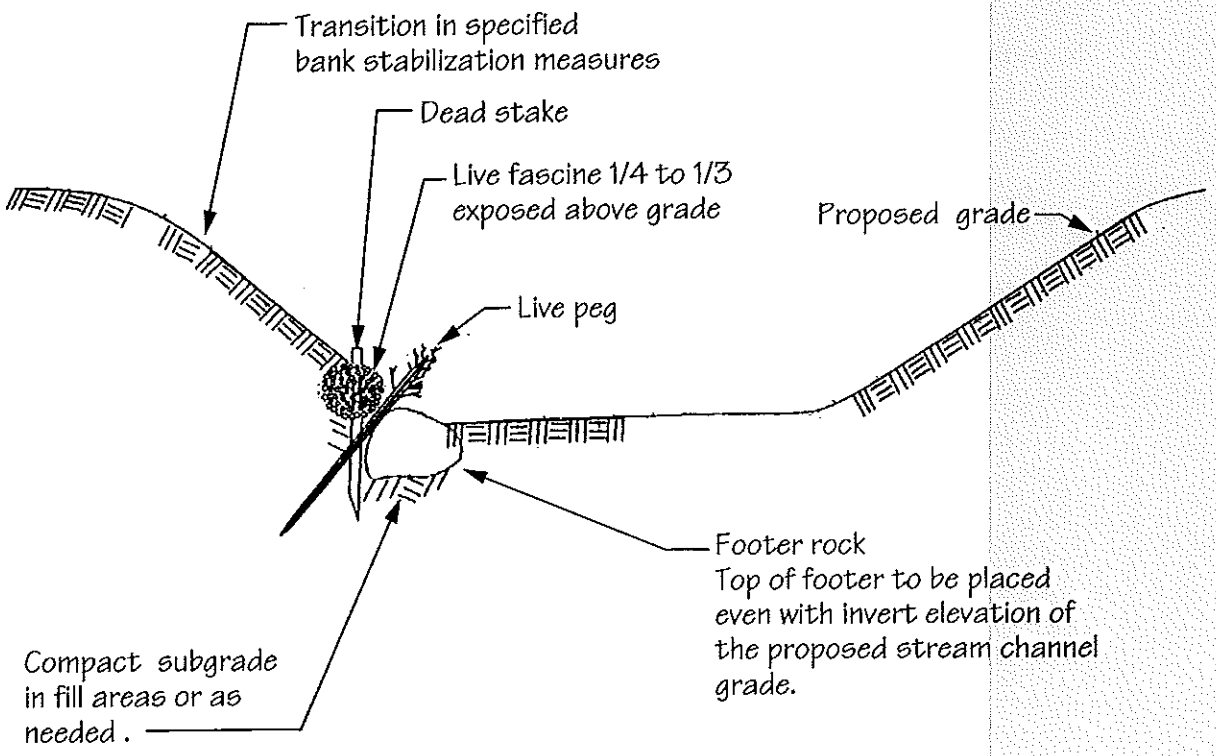
The written and graphic information regarding stream restoration design techniques was provided courtesy of Biohabitats, Inc., and environmental consulting firm specializing in the natural restoration of streambanks and streambeds. For more information, they can be contacted at:

Biohabitats, Inc.
15 West Aylesbury Road
Timonium, MD 21093
(410)337-3659

Streambank Restoration: Live Branch Layering Cross Section

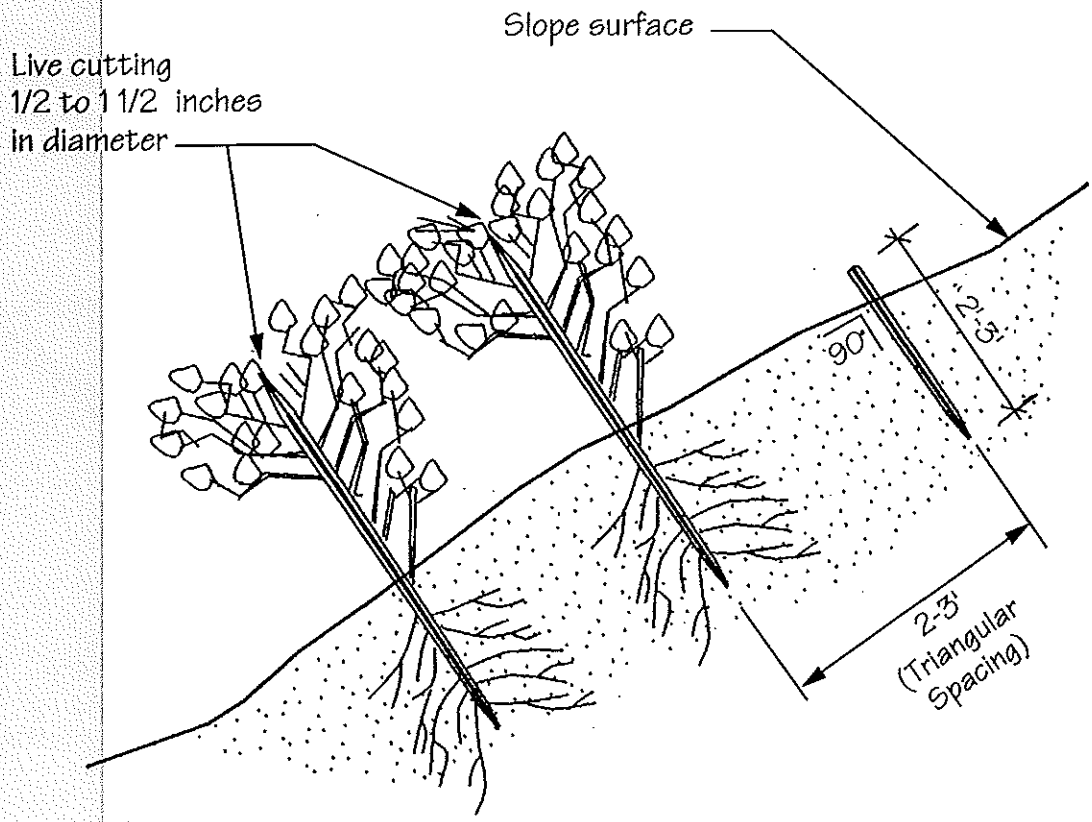


Streambank Restoration:
Live Fascine Toe Protection (FTP)
Cross Section
Streambank Restoration:

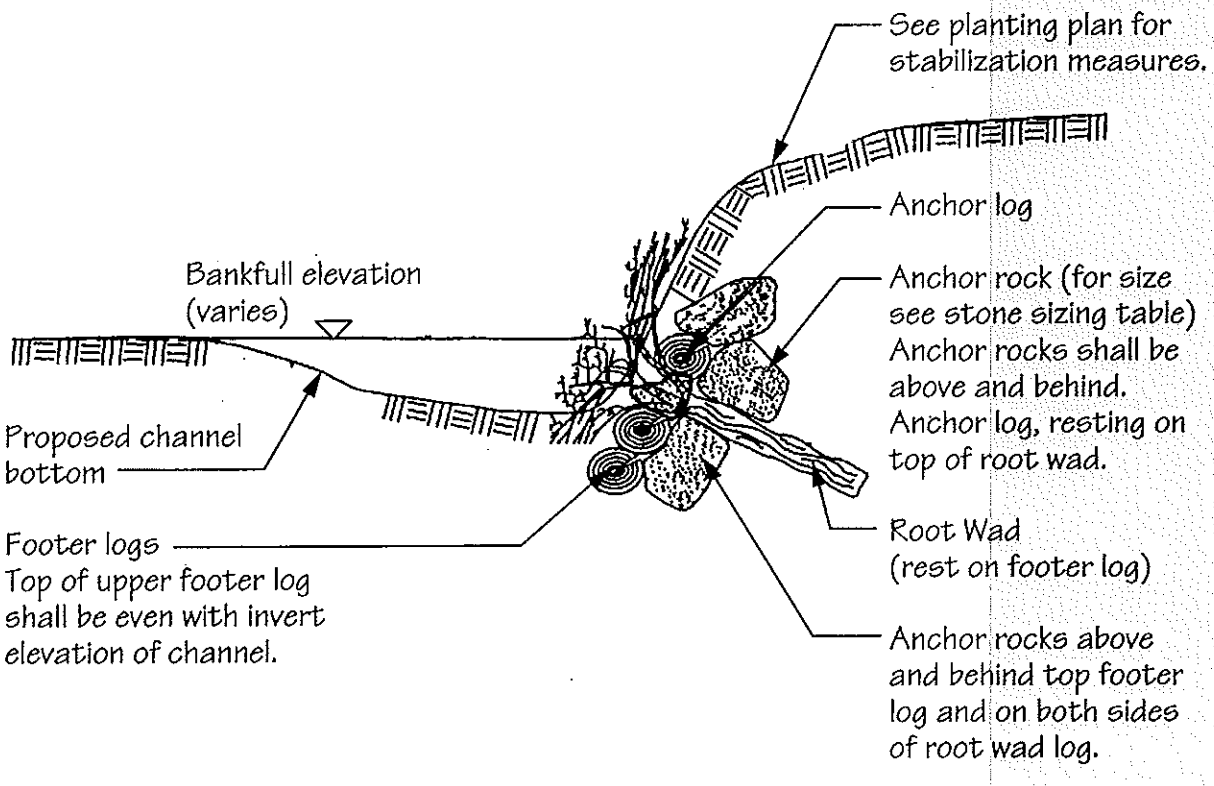


Note:
Refer to the toe protection dimension table for footer rock & live fascine size.

Live Stake Installation Cross Section Streambank Restoration:



Root Wads
Cross Section



C

Appendix C: Estimated Costs

Cost Estimates

Itemized below are some rough cost estimates that could be associated with trail development for the Rolesville greenway system. These costs are divided into major elements of the project. These prices are based on North Carolina greenway averages for similar projects currently in operation throughout the state and assume that the Town will employ professional contractors appropriate to build the project. Greenways Incorporated offers these estimates as a guide to future decision making and cannot guarantee their accuracy.

Because the greenways can be built using a variety of different trail widths, materials, and surfaces, the costs for installation can vary widely . Volunteer labor and donations of materials can help to significantly lower the price of trail installation. A representative sample of costs (in 2001 dollars) associated with trail types follows.

Greenways with No Facility Development (Type 1):

Vegetation	**Unit cost**
Trees (3" caliper)	$ 350 each
Shrubs (3 gallon)	$ 25 each

*Costs include plant and installation.

Streambank Stabilization (Bioengineering)

$ 25 - 75 / lin. foot
$ 45 - 60 / lin. foot (ave.)

Greenways with Limited Facility Development (Type 2):

Trail Treads	**Unit cost**
4-foot Bare Earth Hiking/Mtn. Bike Trail	$ 2 / lin. foot
10-foot Wood Deck/Boardwalk Trail	$ 150 / lin. foot

*Costs include site preparation, clearing, grading, and mobilization.

Signage

Information Signs	$ 250 each
Direction Signs	$ 250 each
Warning Signs	$ 250 each
Mile Markers	$ 50 each

Greenways with Multi-Use Unpaved Trail Facility Development (Type 3):

Trail Treads	**Unit cost**
10-foot Aggregate/Stone Trail	$ 12 / lin. foot
10-foot Wood Deck/Boardwalk Trail	$ 150 / lin. foot
Signage	
Information Signs	$ 250 each
Direction Signs	$ 250 each
Warning Signs	$ 250 each
Mile Markers	$ 50 each
Furniture/Furnishings	
Benches	$ 600 each
Trash Receptacles	$ 200 each
Security Bollards	$ 250 each
Bicycle Racks	$ 550 each
Fencing (Board-on-Board)	$ 20 / lin. foot
Gates	$ 750 each
911 Emergency Phones (w/ infrastructure)	$ 800 each
911 Emergency Phones (w/o infrastructure)	$ 3,500 each
Pre-fabricated Steel Bridges	$ 1,000 / lin. foot

Greenways with Multi-Use Paved Trail Facility Development (Type 4):

Trail Treads	**Unit cost**
10-foot Asphalt Multi-Purpose Trail	$ 50 / lin. foot
10-foot Concrete Multi-Purpose Trail	$ 75 / lin. foot
10-foot Wood Deck/Boardwalk Trail	$ 150 / lin. foot
Signage	
Information Signs	$ 250 each
Direction Signs	$ 250 each
Warning Signs	$ 250 each
Mile Markers	$ 50 each
Furniture/Furnishings	
Benches	$ 600 each
Trash Receptacles	$ 200 each
Security Bollards	$ 250 each
Bicycle Racks	$ 550 each
Fencing (Board-on-Board)	$ 20 / lin. foot
Gates	$ 750 each
911 Emergency Phones (w/ infrastructure)	$ 800 each
911 Emergency Phones (w/o infrastructure)	$ 3,500 each
Pre-fabricated Steel Bridges	$ 1,000 / lin. foot

The following estimate for developing the Rolesville Greenway trail system has been prepared based on the itemized costs above.

On-road trail construction estimates consist of establishing sidewalks in the Rolesville business district and as connectors between off-road trails.

Phase I (as delineated on the Rolesville Vision Map) trails are estimated to take 2-3 years to complete. These include approximately 7.70 miles of on-road bike routes, and 2.77 miles of on-road trail. It is estimated that two-thirds of the off-road trail will require an asphalt or concrete surface. Acquisition and development of the Main Street Park.

• Acquisiton and development of Main Street Park (50/50 matching grant program).	
Town of Rolesville	$215,000
Matching Grant	$215,000
• On-road trail (14,665 linear ft. @ $25.00 per /ft.)	$293,300
• Signage allowance (1 sign per 1,000 linear ft. @ $250 each)	$3750
• Furniture allowance ($2,000 per mile of trail - off-road only)	$2000
• Design fees and Construction Documentation (@15% of Total Cost)	$45,607
• Total Cost	$774,657

Cost options for phase I bike routes:

Option 1: Share the road signage (6 signs per route @ $250 each sign)	$6,000
Option 2: Restriping ($7200 per mile)	$55,440
Option 3: Rural Bike Lanes (4' wide, both sides $110,000 per mile)	$847,000

Phase II trails are estimated to take 1-5 years to complete. These include approximately 9.07 miles of off-road trail. It is estimated that two-thirds of the off-road trail will require an asphalt or concrete surface.

• Natural surface trail (15,975 linear ft. @ $12.00 per /ft.)	$191,700
• Paved asphalt trail (31,950 linear ft. @ $50.00 per /ft.)	$1,597,500
• Signage allowance (1 sign per 1,000 linear ft. @ $250 each)	$11,750
• Furniture allowance ($2,000 per mile of trail)	$18,000
• Design fees and Construction Documentation (@15% of Total Cost)	$272,842
• Total Cost	$2,091,792

Facility Mainenance Costs

Phase III trails are estimated to take 5-10 years to complete. These include approximately 10.20 miles of off-road trail and 1.06 miles of on-road trail. It is estimated that two-thirds of the off-road trail will require an asphalt or concrete surface.

• Natural surface trail (17,943 linear ft. @ $12.00 per /ft.)	$215,316
• Paved asphalt trail (35,886 linear ft. @ $50.00 per /ft.)	$1,794,300
• On-road trail (5,611 linear ft. @ $25.00 per /ft.)	$112,220
• Signage allowance (1 sign per 1,000 linear ft. @ $250 each)	$14,750
• Furniture allowance ($2,000 per mile of trail)	$20,400
• Design fees and Construction Documentation (@15% of Total Cost)	$323,547
• Total Cost	$2,480,533

The following maintenance costs are provided as a guide to establishing a budget for the operation, maintenance and management of each trail segment within the greenway system. These costs are derived from national industry averages and have not been adjusted to reflect unique labor, material and cost issues specific to Rolesville.

It may be possible to lower the cost of maintaining one mile of paved trail through the development of an Adopt-a-Greenway Program. Volunteers have been proven effective in performing some of the routine maintenance activities that are listed below. Savings of 50% of the estimated cost per mile defined below are possible through a coordinated and well-run Adopt-a-Greenway Program, and some of these costs are already being covered along highways, roads and parks and other areas.

Typical Maintenance Costs (for a 1-mile paved trail)

Drainage and storm channel maintenance (4 x / year)	$ 500
Sweeping/blowing debris off trail tread (20 x / year)	$ 1,200
Pick-up and removal of trash (20 x./ year)	$ 1,200
Weed control and vegetation management (10 x / year)	$ 1,000
Mowing of 3-ft grass safe zone along trail (20 x / year)	$ 1,200
Minor repairs to trail furniture / safety features	$ 500
Maintenance supplies for work crews	$ 300
Equipment fuel and repairs	$ 600
Total Maintenance Costs per Mile of Paved Trail	$ 6,500
Re-surfacing of paved trail tread (20-year cycle)	$ 50 / lin. foot

D

Appendix D: Funding Sources

Federal Government Funding Sources

Some Federal programs offer financial aid for projects that aim to improve community infrastructure, transportation, housing and recreation. Some of the Federal programs that could be used to support the development of Rolesville open space and greenways include:

The Intermodal Surface Transportation Efficiency Act (ISTEA)

The primary source of federal funding for greenways is through the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). This money is targeted at greenway projects that serve a transportation purpose, and is administered through the state Department of Transportation. All funded projects must meet certain design standards set forth by the state, which may add to the cost of the project. Therefore, this funding source should be investigated carefully before an application is completed. There are many sections of the Act that support the development of bicycle and pedestrian transportation corridors. Those sections that may be of particular interest to Rolesville include:

•Section 1302: Symms National Recreational Trails Fund Act (NRTFA)

A component of ISTEA, the NRTFA is a funding source that assists with the development of non-motorized and motorized trails. The Act uses Highway Trust Fund fees from non-highway recreation fuel used by off-road vehicles and camping equipment. States can grant funds to private and public sector organizations. NRTFA projects are 80 percent federally funded; grant recipients must provide a 20 percent match. Projects funded must be consistent with the Statewide Comprehensive Outdoor Recreation Plan.

Surface Transportation Program (STP) Funds

These funds can be used for bicycle and pedestrian facility construction or non-construction projects such as brochures, public service announcements, and route maps related to bicycle safety. The projects must involve bicycle and pedestrian transportation and must be part of the Long Range Transportation Plan.

•STP Transportation Enhancements Program

Ten percent of North Carolina's annual STP funds are available for transportation enhancements, which include projects such as scenic byways, historic transportation preservation, landscaping and the development of bicycle and pedestrian facilities. These funds are available to all cities and counties in the state. There are several key requirements that projects must meet in order to receive these funds. Contact the State Bicycle and Pedestrian Coordinator for more information.

Community Development Block Grant Program

The U.S. Department of Housing and Urban Development (HUD) offers financial grants to communities for neighborhood revitalization, economic development, and improvements to community facilities and services, especially in low and moderate-income areas. Several communities have used HUD funds to develop greenways, including the Boscobel Heights' "Safe Walk" Greenway in Nashville, TN.

Land and Water Conservation Fund (LWCF) Grants

This Federal funding source was established in 1965 to provide "close-to-home" parks and recreation opportunities to residents throughout the United States. Money for the fund comes from the sale or lease of nonrenewable resources, primarily federal offshore oil and gas leases along with surplus federal land sales. LWCF grants can be used by communities to build a variety of park and recreation facilities, including trails and greenways.

LWCF funds are distributed by the National Park Service to the states annually. Communities must match LWCF grants with 50 percent of the local project costs through in-kind services or cash. All projects funded by LWCF grants must be used exclusively for recreation purposes, in perpetuity.

Watershed Protection and Flood Prevention (Small Watersheds) Grants

The USDA Natural Resource Conservation Service (NRCS) provides funding to state and local agencies or nonprofit organizations authorized to carry out, maintain and operate watershed improvements involving less than 250,000 acres. The NRCS provides financial and technical assistance to eligible projects to improve watershed protection, flood prevention, sedimentation control, public water-based fish and wildlife enhancements and recreation planning. The NRCS requires a 50 percent local match for public recreation, and fish and wildlife projects.

Urban and Community Forestry Assistance Program

The USDA provides small grants of up to $10,000 to communities for the purchase of trees to plant along city streets, greenways and parks. To qualify for this program, a community must pledge to develop a street-tree

inventory; a municipal tree ordinance; a tree commission, committee or department; and an urban forestry-management plan.

Small Business Tree Planting Program

The Small Business Administration provides small grants of up to $10,000 to purchase trees for planting along streets and within parks or greenways. Grants are used to develop contracts with local businesses for the planting.

Design Arts Program

The National Endowment for the Arts provides grants to states and local agencies, individuals and nonprofit organizations for projects that incorporate urban design, historic preservation, planning, architecture, landscape architecture and other community improvement activities, including greenway development. Grants to organizations and agencies must be matched by a 50 percent local contribution. Agencies can receive up to $50,000.

State Funding Sources

North Carolina Department of Transportation (NCDOT)

NCDOT is the state agency that administers federal funding from the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. Along with the federal requirements for this money, NCDOT has application policies and procedures. Contact the state Bicycle and Pedestrian Coordinator for more details.

North Carolina Division of Parks and Recreation

The state Division of Parks and Recreation currently offers limited funding for greenway projects. The Adopt-a-Trail program provides funding (approximately $135,000 annually) to trail projects, with priority given to volunteer groups. There is also a state trails program that offers technical assistance in the planning, design and maintenance of trails.

North Carolina Wildlife Resources Commission

The Commission, through small grants, annually funds projects that increase wildlife habitat or improve public access and education related to wildlife. This money can be used for interpretive signage on local wildlife habitat along greenways.

North Carolina Department of Corrections

Low security prison labor can be used to construct and maintain greenways. Amenities such as picnic tables, signs and benches can be constructed using prison labor. An example of where this has been successful is in Guilford County, where prisoners regularly maintain the Bicentennial Greenway.

Local Funding Sources

North Carolina Division of Water Resources

Greenway projects involving stream restoration or recreation can receive money from the Water Resources Development Grant Program, administered by the Division of Water Resources.

• PL 566—Watershed Protection and Flood Prevention Act

Local communities can receive funding for greenway projects that incorporate flood prevention and watershed protection through this Act.

Local Private-Sector Funding

Local industries and private businesses may agree to provide support for development of Rolesville open space and greenways through:

- donations of cash to a specific greenway segment or open space parcel;
- donations of services by large corporations to reduce the cost of greenway implementation, including equipment and labor to construct and install elements of greenways;
- reductions in the cost of materials purchased from local businesses which support open space preservation/ greenway implementation and can supply essential prod ucts for facility development.

One example of a successful endeavor of this type is the Swift Creek Recycled Greenway in Cary, NC. A total of $40,000 in donated construction materials and labor made this trail an award-winning demonstration project. This method of raising funds requires a great deal of staff coordination. (Note: Some materials used in the "recycled trail" were considered waste materials by local industries!)

Greenway Sponsors

A sponsorship program for greenway amenities allows for smaller donations to be received both from individuals and businesses. The program must be well planned and organized, with design standards and associated costs established for each amenity. Project elements which may be funded can include wayside exhibits, benches, trash receptacles, entry signage, and picnic areas.

Volunteer Work

Community volunteers may help construct open space or greenway facilities, as well as conduct fund-raisers. Individual volunteers can be recruited, as well as those from local organizations such as church groups, civic groups, scout troops, and environmental groups.

A case in point is Cheyenne, Wyoming's volunteer greenway program. The

Greater Cheyenne Greenway has motivated an impressive amount of community support and volunteer work. The program had to insist that volunteers wait to begin landscaping the trail until construction is completed. A manual for greenway volunteers was developed in 1994 to guide and regulate volunteer work. The manual includes a description of appropriate volunteer efforts, request forms, waiver and release forms, and a completion form (that asks volunteers to summarize their accomplishments). Written guidelines are also provided for volunteer work in 100-year floodplains.

To better organize volunteer activity, Cheyenne developed an "Adopt-a-Spot" program. Participants who adopt a segment of trail are responsible for periodic trash pickup, but can also install landscaping, prune trail-side vegetation, develop wildlife enhancement projects, and install site amenities. All improvements must be consistent with the Greenway Development Plan and must be approved by the local Greenway Coordinator. Adopt-a-Spot volunteers are allowed to display their names on a small sign along the adopted section of greenway.

"Buy-a-Foot" Programs

"Buy-a-Foot" programs have been successful in raising funds and awareness for trail and greenway projects within North Carolina. Under local initiatives, citizens are encouraged to purchase one linear foot of the greenway by donating the cost of construction. An excellent example of a successful endeavor is the High Point Greenway "Buy-a-Foot" campaign, in which linear greenway "feet" were sold at a cost of $25/foot. Those who donated were given a greenway T-shirt and a certificate. This project provided over $5,000 in funds.

Private Foundations and Corporations

Many communities have solicited funding from a variety of private foundations and other conservation-minded benefactors.

Walking Magazine Trail Restoration Fund

Walking Magazine, hoping to encourage more volunteer efforts among trail users, established this fund for the restoration of urban, suburban or rural walking trails. The magazine provides small grants, generally from $200 to $500, to help walking clubs and other groups purchase trail maintenance equipment or supplies.

Coors Pure Water 2000 Grants

Coors Brewing Company and its affiliated distributors provide funding and in-kind services to grassroots organizations that are working to solve local, regional and national water-related problems. Coors provides grants, ranging from a few hundred dollars to $50,000, for projects such as river cleanups, aquatic habitat improvements, water quality monitoring, wetlands protection, pollution prevention, water education efforts, groundwater protection, water conservation and fisheries.

World Wildlife Fund Innovative Grants Program

This organization awards small grants to local, regional and statewide nonprofit organizations to help implement innovative strategies for the conservation of natural resources. Grants are offered to support projects which:

1. Conserve wetlands;
2. Protect endangered species;
3. Preserve migratory birds;
4. Conserve coastal resources; and
5. Establish and sustain protected natural areas.

Innovation grants can help pay for the administrative costs for projects including planning, technical assistance, legal and other costs to facilitate the acquisition of critical lands; retaining consultants and other experts; and preparing visual presentations and brochures or other conservation activities. The maximum award for a single grant is $10,000.

E

Appendix E: Operations, Maintenance and Management

Overview

Operating, maintaining and managing a system of open space and greenways in Rolesville will require a coordinated effort among all Town departments, private sector organizations and individuals. The following text defines key aspects of Open Space and Greenway System management, beginning with a discussion of a governance structure for the system, followed by definition of operational policies, facility management, land management, safety and security, trail user rules and regulations, an emergency response plan, and risk management program.

Governance Structure

For a successful Open Space and Greenway System to be developed it is critical for the players to understand their role in supporting and managing the system.

Role of Rolesville

The Rolesville Open Space and Greenway System will be developed and managed by the Town and its departments. Listed below and on the following pages are the key departments and organizations that will play a role in this implementation.

Role of Department of Parks and Recreation

As the primary developer of greenways, the Parks and Recreation Department is the most prominent participant in the Open Space and Greenway Plan. The Department will be responsible for the design, management and maintenance of the greenway system. The Parks and Recreation Department will need to work closely with the planning Department in the siting of greenways.

Role of the Planning Department

The Planning Department should provide support for the Open Space and Greenway Plan and assistance with future implementation of the system. This can be accomplished by defining future greenways within related planning efforts; utilizing the rezoning process to encourage dedication of lands, including sidewalks and bicycle facilities for the Open Space and Greenway System; and planning transportation improvements in coordination with greenways.

Role of Department of Public Utilities

The Department of Public Utilities is an important player in the implementation strategy for the Open Space and Greenway System. The Department manages the system of sanitary and stormwater sewers which offer enormous potential for shared use with greenway development objectives. For the expansion and development of new sanitary sewer lines, the Department should consider the use of a joint-use easement document during right-of-way negotiations to acquire subsurface and surface rights from willing sellers. The Department could function as a greenway developer in partnership with the Parks and Recreation Department. Additionally, stormwater management objectives can be enhanced through the development of the Open Space and Greenway System through the use of funds obtained from federal and state grants.

Role of Department of Police Services

The Department of Police Services should assist the Parks and Recreation Department with patrolling and law enforcement for Open Space and Greenway System lands and facilities.

Role of Private Sector

The private sector throughout Rolesville is the primary beneficiary of the Rolesville Open Space and Greenway System. As such, private organizations, businesses and individuals can and should play an important role in the development and management of the system. Private sector groups and businesses can sponsor implementation projects for open space and greenways as a partner of the Town. These groups can also help to maintain open space and greenway lands through cooperative management agreements with the Town.

Role of Local Businesses and Corporations

Rolesville businesses and corporations might choose to sponsor a segment of greenway for development or maintenance. Businesses and corporations can work with the Parks and Recreation Department to give money, materials, products and labor toward the development of a greenway facility. Businesses can also consider installing facilities, such as bike racks or lockers, benches, and signage that links their operations to the Open Space and Greenway System.

Role of Civic Organizations

Local civic groups and organizations, including the Junior League, Boy Scouts and Girl Scouts, garden clubs, YMCA, Kiwanis and Rotary Clubs, to name a few, can be participants in the Rolesville Open Space and Greenway System. These organizations can play a vital role in building sections of greenway trails, maintaining and managing greenway lands and facilities, and co-hosting events that raise money for the Open Space

and Greenway System. There are many ways in which civic organizations can participate in the development of the Open Space and Greenway System. The most appropriate involvement can be determined by matching the goals and objectives of each organization to the needs of the greenway program.

Role of Individual Citizens

Local residents who are interested in the development of Rolesville's Open Space Greenway System can participate by agreeing to donate their time, labor, and expertise to the Parks and Recreation Department. Residents might choose to partner with a friend or form a local neighborhood group that adopts a section of greenway for maintenance and management purposes. As an adopt-a-greenway organization, individuals might help pick-up trash, plant flowers and trees, care for newly planted vegetation and serve as additional "eyes and ears" for safety and security on open space and greenway lands. All volunteer efforts would be recognized by the Parks and Recreation Department through a community-wide program.

Open Space and Greenways Operations

Over the course of time, Rolesville will encounter a variety of issues that are important to the successful management and operation of the Open Space and Greenway System. The following operational policies are defined to assist the Town in responding to typical greenway implementation issues. More specific problems and issues may arise during the long-term development of the system that results in additional policies being considered and adopted.

Land Acquisition Procedures

The protection of stream corridors from urban encroachment is essential in order to permit stream channels and their floodplains to perform natural infrastructure functions. Stream corridors are best protected by first delineating the landscape boundaries of the 100-year (regulatory) floodplain and then by encouraging landowners to engage in land stewardship practices that limit encroachment and preserve the native landscape.

This section of the Plan defines land acquisition procedures that can be used to conserve, protect, and preserve the stream corridors of Rolesville. This Plan recommends a voluntary land acquisition program for protecting the streams and floodplains of the Town. The text in this section offers a menu of tools that landowners, land conservation organizations and local government can use to establish the physical boundaries of the Open Space and Greenway System. In the event that certain parcels of land within the floodplain are considered vital to the overall efforts of the Open Space and Greenway System, mechanisms defined herein enable Rolesville to purchase or negotiate for the dedication of certain property rights. Dedication should be negotiated in a manner that is consistent with local, state and Federal laws that permit and govern such action.

Methods for Acquisition of Land Through Management

Management is a method of conserving the resources of a specific greenway parcel through either an established set of policies called Management Plans, or through negotiated agreements or easements with private property owners.

Management Plans

Management plans are prepared for Town-owned greenway lands. Management plans should identify valuable resources; determine compatible uses for the parcel; determine administrative needs of the parcel, such as maintenance, security and funding requirements; and recommend short-term and long-term action plans for the treatment and protection of the resources.

Easements

Land management agreements in which Rolesville receives less than full interest in a parcel of land in order to protect a valuable resource. The purpose of these agreements is to establish legally binding contracts or a mutual understanding of the specific use, treatment and protection that these greenway lands will receive. Property owners who grant easements retain all rights to the property except those which have been granted by the easement. The property owner is responsible for all taxes associated with the property, less the value of the easement granted. Easements are generally restricted to certain portions of property, although in certain cases an easement can be applied to an entire parcel of land. Easements are transferable through title transactions, thus the easement remains in effect in perpetuity. Three types of greenway easements are:

Conservation Easements

This type of easement generally establishes permanent limits on the use and development of land to protect the natural resources of that land. Dedicated conservation easements can qualify for both federal income tax deductions and state tax credits. Tax deductions are allowed by the Federal government for donations of certain conservation easements. The donations may reduce the donor's taxable income.

Preservation Easements

This type of easement is intended to protect the historical integrity of a structure or important elements of the landscape by sound management practices. Preservation easements may qualify for the same federal income tax deductions and state tax credits as conservation easements.

Public Access Easements

Right of public access easements provide the general public with the right to access and use a specific parcel of property. Both conservation easements and preservation easements may contain clauses for the right of public access and still be eligible for tax incentives.

Methods for Acquisition of Greenways Through Regulation

The second method of protecting stream corridor/greenways is through government regulation. Regulation is defined as the government's ability to control the use and development of land through legislative powers. The following types of development ordinances are regulatory tools that can meet the challenges of projected suburban growth and development and, at the same time, conserve and protect greenway resources.

Dedication/Density Transfers

Also known as incentive zoning, this mechanism allows greenways to be dedicated for density transfers on the development of a property. The potential for improving or subdividing part or all of a parcel of real property, as permitted under land use development laws, can be expressed in dwelling unit equivalents or other measures of development density or intensity. Known as density transfers, these dwelling unit equivalents may be relocated to other portions of the same parcel or to contiguous land that is part of a common development plan. Dedicated density transfers can also be conveyed to subsequent holders if properly noted in transfer deeds.

Negotiated Dedications

The Town may ask a landowner to enter into negotiations for certain parcels of land that are deemed beneficial to the protection and preservation of specific stream corridors. The Town may ask for the dedication of land for greenways when landowners subdivide property (a minimum size would be determined). Such dedications would be proportionate to the relationship between the impact of the subdivision on community services and the percentage of land required for dedication - as defined by the US Supreme Court in Dolan v Tigard.

Fee-in-Lieu

To complement negotiated dedications, a fee-in-lieu program may be necessary to serve as a funding source for other land acquisition pursuits of the Greenway Program. Based on the density of development, this program allows a developer the alternative of paying money for the development/protection of greenways in lieu of dedicating land for greenways. This money is then used to implement greenway management programs or acquire additional greenway lands.

Reservation of Land

A reservation of land does not involve any transfer of property rights but simply constitutes an obligation to keep property free from development for a stated period of time. Reservations are normally subject to a specified period of time, such as 6 or 12 months. At the end of this period, if an agreement has not already been reached to transfer certain property rights, the reservation expires.

Buffer/Transition Zones

This mechanism recognizes the problem of reconciling different, potentially incompatible land uses by preserving greenways that function as buffers or transition zones between uses. Care must be taken to ensure that use of this mechanism is reasonable and will not destroy the value of a property.

Overlay Zones

An overlay zone and its regulations are established in addition to the zoning classification and regulations already in place.

Subdivision Exactions

An exaction is a condition of development approval that requires a developer to provide or contribute to the financing of public facilities at their own expense. For example, a developer may be required to build a greenway on-site as a condition of developing a certain number of units because the development will create need for new parks or will harm existing parks due to overuse. The mechanism can be used to protect or preserve a greenway which is then dedicated to the Town. Consideration should be given to including greenway development in future exaction programs.

Methods for Protection of Greenways through Acquisition

The third method of protecting stream corridor/greenways is through the acquisition of property. A variety of methods can be used to acquire property for greenway purposes.

Donation/Tax Incentives

A government body, public agency or qualified conservation organization agrees to receive full title or a conservation easement to a parcel of land at no cost or at a "bargain sale" rate. The donor is eligible to receive a federal tax deduction of up to 30 to 50 percent of their adjusted gross income. Additionally, North Carolina offers a tax credit up to 25 percent of the property's fair market value (up to $5000). Any portion of the fair market value not used for tax credits may be deducted as a charitable contribution. Also, property owners may be able to avoid inheritance taxes, capital gains taxes and recurring property taxes.

Fee Simple Purchase

This is a common method of acquisition where a local government agency or private greenway manager purchases property outright. Fee simple ownership conveys full title to the land and the entire "bundle" of property rights including the right to possess land, to exclude others, to use land and to alienate or sell land.

Easement Purchase

This mechanism is the fee simple purchase of an easement. Full title to the land is not purchased, only those rights granted in the easement agreement. Therefore the easement purchase price is less than full title value.

Purchase/Lease Back

A local government agency or private greenway organization can purchase a piece of land and then lease it back to the seller for a specified period of time. The lease may contain restrictions regarding the use and development of the property.

Bargain Sale

A property owner can sell property at a price less than the appraised fair market value of the land. Sometimes the seller can derive the same benefits as if the property were donated. Bargain Sale is attractive to sellers when the seller wants cash for the property, the seller paid a low cash price and thus is not liable for high capital gains tax, and/or the seller has a fairly high current income and could benefit from a donation of the property as an income tax deduction.

Option/First Right of Refusal

A local government agency or private organization establishes an agreement with a public agency or private property owner to provide the right of first refusal on a parcel of land that is scheduled to be sold. This form of agreement can be used in conjunction with other techniques, such as an easement, to protect the land in the short term. An option would provide the agency with sufficient time to obtain capital to purchase the property or successfully negotiate some other means of conserving the greenway resource.

Purchase of Development Rights

A voluntary Purchase of Development Rights (PDR) involves purchasing the development rights from a private property owner at a fair market value. The landowner retains all ownership rights under current use, but exchanges the rights to develop the property for cash payment.

Condemnation

The practice of condemning private land for use as greenways is viewed as a last resort policy. Using condemnation to acquire property or property rights can be avoided if private and public support for the Greenway Program is present. Condemnation is seldom used for the purpose of dealing with an unwilling property owner. In most cases, condemnation for greenway purposes has been exercised when there has been absentee property ownership, when title to the property is not clear, or when it becomes apparent that obtaining the consent for purchase will be difficult

because there are numerous heirs located in other parts of the United States, or in different countries. The community must exercise caution in using Eminent Domain.

It is recommended that the right of eminent domain for a specific property be exercised by the community only if all of the following conditions exist:

a) that the property is valued by the community as an environ mentally sensitive parcel of land, significant natural resource, or critical parcel of land, and as such has been defined by the community as irreplaceable property;
b) that written scientific justification for the community's claim that the property possesses such value should be prepared and offered to the property owner;
c) that all efforts to negotiate with the property owner for the management, regulation and acquisition of the property have been exhausted and that the property owner has been given reasonable and fair offers for compensation and has rejected all offers;
d) that due to the ownership of the property, the timeframe for negotiating the acquisition of the property will be unreason able, and in the interest of pursuing a cost effective method for acquiring the property, the community has deemed it necessary to exercise the right of eminent domain.

Right of Public Access and Use of Trail Lands

The general public should have access to and use of those greenway lands that support public use (i.e. trail development), and that are owned by Rolesville or on land that the Town has secured the right of public access and use. All access and use is governed by existing Town policies and should also be governed by a Greenway Trail Ordinance. The use of all trails is limited to non-motorized uses, including hiking, bicycling, running, jogging, wheelchair use, skateboarding, in-line skating (rollerblading), equestrian use, mountain biking, and other uses that are determined to be compatible with the Town's greenway trails.

Naming of Greenways

Greenways are named for the significant natural features that are found within the corridor. Greenways can also be named after an individual or individuals if these persons are truly distinguished within the community, or if these persons have contributed a gift equal to more than 50% of the value of greenway development within that corridor segment.

Fencing and Vegetative Screening

Rolesville should work with each landowner on an individual basis to determine if fencing and screening is required and appropriate. The Town may agree to fund the installation of a fence or vegetative screen; however, it should be the responsibility of the adjacent property owner to maintain the fence or vegetative screen in perpetuity, including the full replacement of such fence or screen in the event of failure or deterioration due to any circumstances.

Adopt-a-Greenway Program

An Adopt-a-Greenway Program should be established by Rolesville to encourage community groups, families, businesses, school groups, civic clubs and other organizations to join in managing the Open Space and Greenway System. Rolesville should implement this program for every greenway corridor in the system, and work closely with local organizations to ensure that these groups manage and maintain trails in a manner that is consistent with Town objectives. The Town should develop written agreements for each Adopt-a-Greenway entity and keep a current record of this agreement on file. Adopt-a-Greenway entities will be assigned a specific section of the Open Space and Greenway System, defined by location or milepost. The activities of each organization should be monitored by the Town or its designee. Agreements for management can be amended or terminated at any time by either party, giving 30 days written notice.

Management Agreements

Management Agreements will be established between Rolesville and specific public or private organizations wishing to assist with the management of designated segments of the Open Space and Greenway System. The objective of these agreements is to define areas of maintenance and management that are compatible with existing land management activities, especially where greenways intersects with public or private properties and/or rights-of-way. Management agreements spell out specific duties, responsibilities and activities of Rolesville and public or private organization that wishes to assist with management activities. They can be amended or terminated at any time by either party, giving 30 days written notice.

Cross Access Agreements

Rolesville can use cross access agreements to permit private landowners that have property on both sides of a greenway corridor access to and use of a greenway corridor to facilitate operation and land use activities.

Cross access agreements are based on case law of the United States and specific experiences from other greenway trail systems throughout the United States. Adjacent landowners generally have the right to use the access at any time. However, access cannot block the right-of-way for trail users, other than for temporary measures such as permitting livestock to cross, or transporting equipment. Adjacent landowners are responsible for acts or omissions that would cause injury to a third party using the trail. If a landowner must move products, materials, livestock or equipment across the trail on a regular basis, appropriate signage should be installed to warn users of the trail to yield for such activities.

Crossing of abandoned or active rail lines, utility corridors and/or roads and highways will require the execution of agreements with companies, local, state or federal agencies and organizations that own the rights-of-way. These crossings must provide clearly controlled, recognized, and

defined intersections in which the user will be warned of the location. In accordance with the American Association of State Highway Transportation Officials (AASHTO) and the Manual on Uniform Traffic Control Devices (MUTCD), the crossing will be signed with appropriate regulatory, warning and information signs.

Greenway Facility Management

Greenway facilities shall be maintained in a manner that promotes safe use. All trail facilities should be managed by Rolesville or its designee. Trail maintenance should include the removal of debris, trash, litter, obnoxious and unsafe man-made structures, and other foreign matter so as to be safe for public use. Trailheads, points of public access, rest areas and other activity areas should be maintained in a clean and usable condition at all times. The primary concern regarding maintenance should always be public safety.

All trail surfaces should be maintained in a safe and usable manner at all times. Rough edges, severe bumps or depressions, cracked or uneven pavement, gullies, rills and washed out treads should be repaired immediately. Volunteer vegetation occurring in the tread of the trail should be removed in such a manner so that the trail surface is maintained as a continuous, even and clean surface.

Land Management

Property owned or used by Rolesville for the Open Space and Greenway System shall be maintained in a condition that promotes safety and security for greenway users and adjacent property owners. To the extent possible, the property shall also be maintained in a manner that enables the corridor to fulfill multiple functions (i.e. passive recreation, alternative transportation, stormwater management and habitat for wildlife). Property that is owned or managed by other entities should be managed and maintained in accordance with the policies of that public body responsible for the affected parcel.

Private lands and neighborhood groups wanting to connect to the Rolesville system will need to seek permission from the Rolesville Parks and Recreation Department. Efforts to connect to the system will require the approval of the Department and will be decided on a case-by-case basis. Development expenses will not be covered by the Rolesville Parks and Recreation Department. Connecting to the Rolesville municipal system does not relieve neighborhood greenways management bodies of their responsibilities of safety, security, and/or maintenance.

Vegetation adjacent to trails shall be managed as necessary to maintain clear and open lines of sight along the edge of the trail, and eliminate potential hazards that could occur due to natural growth, severe weather or other unacceptable conditions. To promote safe use of any greenway trail, all vegetation should be clear cut to a minimum distance of three (3) feet from each edge of a trail. Selective clearing of vegetation should be conducted within a zone that is defined as being between three (3) to ten (10) feet from each edge of a trail. At any point along a trail, a user should have a clear, unobstructed view, along the centerline of a trail, 300 feet

ahead and behind his/her position. The only exception to this policy should be where terrain or curves in a trail serve as the limiting factor.

Rolesville or their designated agent should be responsible for the cutting and removal of vegetation. Removal of vegetation by an individual or entity other than the Town of Rolesville or its designee shall be deemed unlawful and subject to fines and/or prosecution.

It may also be necessary for Rolesville to conduct wildlife management programs on lands that are publicly owned. This shall be accomplished in a manner that is in keeping with accepted laws, professional practices and/or recommended strategies that are provided to Rolesville by wildlife management experts.

Safety and Security

In order to provide a standard of care that offers reasonable and ordinary safety measures, Rolesville shall cooperatively develop and implement a Safety and Security Program for the Open Space and Greenway System. This program will consist of well-defined safety and security policies; the identification of trail management, law enforcement, emergency and fire protection agencies; the proper posting, notification and education of the trail user policies; and a system that offers timely response to the public for issue or problems that are related to safety and security. The safety and security of the Open Space and Greenway System will need to be coordinated with local law enforcement officials, local neighborhood watch associations, and Adopt-a-Greenway organizations.

Important components of the safety and security program include the following. Rolesville should:

1) Work with law enforcement agencies to establish a Greenway Safety and Security Committee that can meet periodically to discuss management of the Open Space and Greenway Sys tem.
2) Prepare a Greenway Safety Manual and distribute this to man agement agencies and post it at all major trailheads.
3) Post User Rules and Regulations at all public access points to greenway trails.
4) Work with the management agencies to develop Trail Emer gency Procedures.
5) Prepare a Safety Checklist for the Open Space and Greenway System, and utilize it monthly during field inspection of greenway facilities.
6) Prepare a Greenway User Response Form for complaints and complements and provide copies at all trailheads.
7) Work with management agencies to develop a system for accident reporting analysis.
8) Conduct a regular Maintenance and Inspection Program, and share the results of these investigations with all management agencies.
9) Coordinate other Public Information Programs that provide

User Rules and Regulations

information about greenway events and activities that Town residents can participate in.

10) Have an ongoing evaluation of greenway program objectives.

Trails within greenway corridors shall be operated like all other parks within Rolesville open for public use from sunrise to sunset, 365 days a year, except as specifically designated. Individuals who are found to be using unlighted facilities after dusk and before dawn should be deemed in violation of these hours of operation and treated as trespassers. Where trails are lighted for nighttime use, the rules established within the Trail Ordinance should govern permitted uses and activities.

Rolesville shall enforce trespassing laws as defined under North Carolina General Statutes for publicly owned lands and facilities.

Rolesville should always discourage the general public from using any segment of a greenway trail that is under construction. Trail segments should not be considered officially opened for public use until such time as a formal dedication ceremony and official opening has been completed. Individuals who use greenway segments that are under construction, without written permission from the Town should be deemed in violation of this access and use policy and treated as a trespasser.

Trail Ordinance

Multi-use conflict is a national problem for community and regional Open Space and Greenway Systems. Typically, conflicts are caused by overuse of a greenway trail; however, other factors may be problematic including poorly designed and engineered trail alignments, inappropriate user behavior, or inadequate facility capacity. The most effective conflict resolution plan is a well-conceived safety program that provides the individual user with a Code of Conduct for the greenway trail, sometimes called a Trail Ordinance. Several communities across the United States have adopted progressive trail ordinances to govern public use and keep trails safe for all users. The following Rules and Regulations are recommended for the Rolesville Greenway System. These rules should be displayed both on brochures and information signs throughout the Open Space and Greenway System.

1) Be Courteous: All Trail users, including bicyclists, joggers, walkers, wheelchairs, skateboarders and skaters, should be respectful of other users regardless of their mode of travel, speed, or level of skill. Never spook animals; this can be dangerous for you and other users. Respect the privacy of adjacent landowners! No trespassing allowed from trails, remain on trails at all times.
2) Keep Right: Always stay to the right as you use the Trail, or stay in the lane that has been designated for your user group. The exception to this rule occurs when you need to pass another user.

3) Pass on the Left: Pass others going in your direction on their left. Look ahead and behind to make sure that your lane is clear before you pull out an around the other user. Pass with ample separation. Do not move back to the right until you have safely gained distance and speed on the other user. Faster traffic should always yield to slower oncoming traffic.
4) Give Audible Signal When Passing: All users should give a clear warning signal before passing. This signal may be produced by voice, bell or soft horn. Voice signals might include "Passing on your left!" or "Cyclist on your left!" Always be courteous when providing the audible signal - profanity is unwarranted and unappreciated.
5) Be Predictable: Travel in a consistent and predictable manner. Always look behind before changing position on the Trail, regardless of your mode of travel.
6) Control Your Bicycle: Lack of attention, even for a second, can cause disaster - always stay alert! Maintain a safe and legal speed at all times.
7) Do not Block the Trail: When in a group, including your pets, use no more than half the trail, so as not to block the flow of other users. If your group is approached by users from both directions, form a single line or stop and move to the far right edge of the Trail to allow safe passage by these users.
8) Yield when entering or Crossing Trails: When entering or crossing the Trail at an uncontrolled intersection, yield to traffic already using the other trail.
9) Do not Use this Trail Under the Influence of Alcohol or Drugs: It is illegal to use this Trail if you have consumed alcohol in excess of the statutory limits, or if you have consumed illegal drugs. Persons who use a prescribed medication should check with their doctor or pharmacist to ensure that it will not impair their ability to safely operate a bicycle or other wheeled vehicle.
10) Clean-up Your Litter: Please keep this Trail clean and neat for other users to enjoy. Do not leave glass, paper, cans or any other debris on or near the Trail. Please clean up after your pets. Pack out what you bring in - and remember to always recycle your trash.
11) Keep Pets on Leashes: All pets must be kept on secure and tethered leashes. Keep pets off of adjacent private property. Failure to do so will result in a fine.
12) Prohibition on Camp Fires: Fires, for any purpose, are prohibited within the Trails System. Any person caught lighting a fire for any purpose will be prosecuted to the fullest extent of the law.

In order to effectively patrol the Open Space and Greenway System and

Emergency Response Plan

respond to the potential for fire, flash floods and other natural or human-caused disasters, Rolesville shall adopt a greenway emergency response plan. This plan defines a cooperative law enforcement strategy for greenways based on services required and those that are typically provided by police, sheriff, fire and EMS agencies. Specifically, all trails should be provided with an address system that denotes specific locations along the length of a trail corridor. A site plan that illustrates points of access to each trail corridor should be produced and kept on file and provided to each agency. Trails in flash flood areas shall be appropriately signed to warn users. Each trail should be designed to permit access for law enforcement, fire and EMS agencies and vehicles that are not in excess of 6.5 tons gross vehicle weight. Typically, inter-governmental agreements are executed for this. A system of cellular-type emergency phone should be located in remote sections of the system, providing users with access to the area 911 Emergency System. All emergency phones should be placed above the flood elevation to ensure long term usage.

The emergency response plan should also define the agencies that should respond to 911 calls, and provide easy to understand routing plans and access points for emergency vehicles. For long distance trails, access points for emergency and maintenance vehicles should be located at reasonable distances from trailheads (approximately every 2-3 miles). Local hospitals should be notified of these routes so that they may also be familiar with the size and scope of the project. The entire Open Space and Greenway System should be designed and develop to support a minimum gross vehicle weight of 6.5 tons.

Risk Management Plan

The purpose of a Risk Management Plan is to increase safety for the users of the Rolesville Open Space and Greenway System and reduce the potential for accidents to occur within the system or on lands adjacent to the system. While it is impossible to guarantee that all risk will be eliminated by a Risk Management Plan, implementation of a plan is in fact a critical step to reduce liability and improve safety. A Risk Management Plan establishes a methodology for greenway management that is based on current tort liability and case law in the United States related to the development, operation and management of public use greenway lands and facilities.

The ultimate responsibility for managing the Open Space and Greenway System, as defined within this Plan, rests with Rolesville. The Risk Management Plan has as its major goals:

1) Risk Identification: determining where risk (threat to safety or potential loss) exists within the corridor.
2) Risk Evaluation: conducting appropriate examination of areas defined as a risk and determining the factors that contribute to risk.
3) Risk Treatment: defining and implementing an appropriate

solution to the area of risk in accordance with one of the four options:

a) Risk avoidance: prohibiting use of a risk area.
b) Risk reduction: limit use of area and repair risk area immediately.
c) Risk retention: obtain waivers from all potential users of the risk area.
d) Risk transfer: transfer risk area (property) to an agency better suited to manage the area.

The following sixteen step plan should be implemented by Rolesville to establish a Risk Management Plan for the Rolesville Open Space and Greenway System.

1) Develop a policy statement about risk management.
2) Conduct a needs assessment for the greenway program.
3) Determine goals and objectives for risk management - what are acceptable and not acceptable management levels.
4) Develop specifications for site and facility development.
5) Establish a clear and concise program for risk management.
6) Define supervision and responsibility for risk management.
7) Define appropriate rules and regulations that govern the use of the trail system.
8) Conduct routine/systematic inspections and investigations of the trail system.
9) Develop an accident reporting and analysis system.
10) Establish procedures for handling emergencies.
11) Develop appropriate releases, waivers and agreements for use and management.
12) Identify best methods for insuring against risk.
13) Develop a comprehensive in-service training program for employees of the Town.
14) Implement a public relations program that can effectively describe the risk management program and activities.
15) Conduct periodic reviews of the Risk Management Plan by outside agents to ensure that the Plan is up to date.
16) Maintain good legal and insurance representation.

Liability

The design, development, management, and operation of the Rolesville Open Space and Greenway System must be carefully and accurately executed in order to provide a resource that protects the health and welfare of the public. Liability may occur when a facility has been under-designed to handle its intended volume of use; when management of the facility is poor; or when unexpected accidents occur because the trail manager failed to recognize the possibilities of a potentially hazardous situation. To reduce the possibility and exposure to liability, the Town should have in operation the following measures prior to opening the first segment of greenway:

1) a thorough Maintenance Program that provides the appropriate duty or level of care to greenway users;
2) a Risk Management Plan that appropriately covers all aspects of the Open Space and Greenway System, and as necessary adjacent landowners;
3) a comprehensive working knowledge of public use laws and recent case history applicable in North Carolina.

Rolesville's existing program may be adequate to protect the Town government from financial loss that might occur through the development and operation of the Open Space and Greenway System. Trails are no greater liability to the Town than park and recreation, sidewalk or urban open space resources. The Town should review its current policy and check coverages to be certain that all aspects of its policies are up to date.

Rolesville should exercise reasonable care in the design and construction of all greenway facilities to reduce hazardous, public nuisance and life threatening situations. In fact, it is very difficult to find any case law in the United States where an adjacent property owner has been sued because a trail user strayed onto the adjacent private property and fell victim to an accident that was caused by the adjacent landowner. Some landowners have claimed that their insurance rates will go up because of the presence of a trail abutting their property. Once again, there is no case history among insurance companies to support this claim — provided the landowner has not gone out of their way to create an attractive nuisance and lure trail users onto their property.

It is also important that a fee not be charged to use any portion of the Open Space and Greenway System, because typically this may impact the way in which the recreational use statutes in North Carolina apply to the use of the system. A voluntary donation applied to the Open Space and Greenway System will generally not affect the recreational use statute.