Zebulon & Wendell

OPEN SPACE & GREENWAY MASTER PLAN

Zebulon & Wendell
OPEN SPACE & GREENWAY PLAN

Prepared for:
Zebulon Planning Department
Wendell Planning Department

Prepared by:
Greenways Incorporated

Open Space & Greenway Plan funded by:
Wake County
Towns of Zebulon & Wendell

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About Greenways Incorporated:

Greenways Incorporated is a multi-disciplinary environmental planning and design firm that specializes in providing consulting services to governmental agencies, for-profit corporations, and non-profit organizations. Their chosen professional focus is in greenway planning, design, and development and management. Greenways Incorporated has provided their services to more than 100 communities in 28 states.

Executive Summary

The Wendell & Zebulon Open Space and Greenway Master Plan is a visionary plan, which identifies potential Open Space and/or Greenway corridors throughout the study area. To realize the vision laid forth in this plan, the following steps will need to be completed for each identified corridor: land protection, master planning, design development, construction, and maintenance.

This vision for open space and greenways in Wendell & Zebulon can be achieved through implementation of this Master Plan. The Plan provides information and steps for establishing open space and greenways in Wendell & Zebulon to provide transportation, environmental, health, recreation, economic, educational, cultural, water quality and quantity, air quality and habitat preservation benefits. Open Space and Greenways can improve the quality of life throughout the community, maintaining Wendell & Zebulon as a desirable place to visit, live, and work. An Open Space and Greenway system can help continue to make Wendell & Zebulon attractive communities for sustainable development well into the 21st Century.

The Towns of Wendell & Zebulon working in conjunction, obtained the services of Greenways Incorporated to assist both communities in developing an Open Space and Greenway Master Plan. The planning process for the Master Plan consisted of :

- A site evaluation of Wendell & Zebulon and potential Open Space lands and greenway corridors.
- The formation of a vision, goals and objectives.
- Public input gathered by public workshops.
- Preliminary recommendations were then developed and presented to members of the Town Planning Staff, Town Council, and participants of the community workshops for review.
- Recommendations were revised by the Town Planning Staff and presented once again for review.
- Presentation of the final plan to the Town Council, Town Departments, other local agencies, non-profit organizations and interested citizens, who provided focused feedback and input throughout the planning process.

The future Open Space and Greenways System in Wendell & Zebulon are envisioned as a multi-objective system which are based largely on community input from the public, businesses, civic and community organizations, and public agencies. Open Space lands and Greenway corridors in Wendell & Zebulon should fulfill multiple objectives, including:

- better floodplain management
- protecting wildlife habitat
- improving water quality
- providing for passive recreation encouraging environmental and cultural education
- promoting personal fitness, and accommodating alternative transporta tion, in addition to serving as recreational resources

Recommendations for a system of multi-objective greenways in Wendell & Zebulon corridors were selected to ensure development of a continuous system of on- and off-road greenways located throughout north, south, east, and west Wendell & Zebulon, which could extend into neighboring jurisdictions of Johnston, Franklin, and Nash Counties.

Several corridors will serve as the Open Space and Greenway System for Wendell & Zebulon. These segments comprise the *green necklace* that will encircle Wendell & Zebulon and provide the foundation of the core system of trails and Open Space lands. (please refer to the Master Plan map):

Little River
Buffalo Creek: Upper and Lower system
Marks Creek
Moccasin Creek
Beaverdam Creek

The remaining corridors will serve neighborhoods that will function as connectors to enhance the primary system. Together, the primary corridors, neighborhood connectors, and targeted open space lands make up the entire proposed Wendell & Zebulon Open Space and Greenway Master Plan System.

This Plan will serve as a *living document* to be used as a reference guide for Open Space and Greenway development in Wendell & Zebulon for years to come. To this end, this Master Plan should be consulted, as open space and/or greenways are developed to ensure a consistent, high quality system.

The Open Space and Greenway Master Plan is divided into the following sections:

- Introduction and brief history of the study area
- The Wendell & Zebulon Community
- The Greenway System: Vision, Goals, and Objectives
- Master Plan Process
- Recommendations
- Greenway Corridors and Descriptions
- Implementation
- Safety and Security
- Design Guidelines
- Estimated Costs
- Funding Sources
- Summary of Public Input

Chapter 1: Introduction

Purpose

The Towns of Wendell and Zebulon, are communities that maintain and celebrate their small town heritage and character as they enter the 21st Century, have prepared this Open Space and Greenways Master Plan in order to protect the natural and cultural resources that each community values 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 each 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, Wendell and Zebulon will have achieved success in enhancing their small town character and charm that is the hallmark of each community. Perhaps most importantly, protecting greenspace that is linked to each community can support natural functions that are important in sustaining a high quality of life for all residents in each 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. To evaluate land comprehensively 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 Spac*e 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, ensure that Wake County is one of the great places to live, work, and raise a family.

Chapter 2: Inventory of Existing Conditions

Brief Histories of Wendell & Zebulon

Wendell and Zebulon are located southeast of Raleigh (approx. 10 miles and 14 miles respectively). The Town of Wendell was named for Oliver Wendell Holmes and was originally incorporated on March 6, 1903. The growing village was named after the famous poet, at the suggestion of M.A. Griffin, who was the Towns' schoolmaster.

When the Town was incorporated, it consisted as an area one-half mile square in size. The advent of the Raleigh-Pamlico Railroad contributed to the growing community, and gave rise to the Town's exaggerated pronunciation as the porters called out "Wen-Dell" stressing both syllables.

Granville Wilt was a tobacco disease that was crippling farmers across the region, Wendell's largest influx of citizens came when farmers moved to the area to start new tobacco farms in Wendell. This in turn became the most important industry in early Wendell, as warehouses and the first Wake County tobacco market were created. In 1977, Whitley High School was merged with the Town of Zebulon, which has long signified the ongoing warm relationship that the two Towns continue to enjoy today in common planning and community goals. Presently Wendell is enjoying the benefits from the economic growth that has occurred in Wake County over the past decade, and from which it was founded, as the Town motto states *Home of progress and opportunity*.

The Town of Zebulon was named after Zebulon B. Vance, the North Carolina Governor during the civil war. Zebulon, like Wendell, owes its existence to the Raleigh and Pamlico Sound Railroad Company, which decided to bring the rail through what, would become Zebulon 1906. That same year, Edgar B. Barbee and Falconer B. Arendell organized the Zebulon Company for development. The company received its charter on February 15, 1906. Shortly thereafter, they began to divide their forty-nine acres into lots, blocks, streets and avenues. The Town was officially incorporated on February 16, 1907. The last three decades in Zebulon have seen tremendous growth. Since the 1970 census, the Town's population grew 45 percent. While it continues to grow and prosper, Zebulon still offers a close-knit community that lives up to its motto, *The Town of Friendly People*.

Due to the close proximity to Raleigh, Wendell and Zebulon expect its residential, commercial, and industrial communities to grow. The Towns of Wendell and Zebulon in anticipation of future growth, will use this plan to help shape the way

FIGURE 2-1: STUDY AREA, ADJOINING MUNICIPALITIES

each Town will grow while preserving Wendell and Zebulon's rural charm.

Study Area Boundary

The study area boundary was determined from the combination of each Towns Extra Territorial Jurisdiction (ETJ) boundary. From the combined Towns (ETJ) land area, it was apparent that a much larger area would need to be included because of the close proximity to and rapid growth occurring Johnston, Nash, and Franklin Counties. A five-mile radius was determined to cover a wide enough area to focus on the regional growth (see Figure 2-1 study area).

Topography

The topography of the study area is made up mostly of farmland, with some hilly terrain that is divided by a series of four ridgelines that follow the creeks and rivers (Little River, Moccasin, Buffalo, and Marks Creek). Each Town is situated in the middle region of the study area, and is located on top of the highest land subdivided by the Little River corridor. Marks Creek divides Wendell and Knightdale and flows north to south and is the western most creek of the four that make up the ridgelines. Buffalo Creek flows through parts of Wendell's western ETJ and is intersected by Highways 64 and Business 64 to the north of Town. The Little River represents the major drainage between both Towns. Although this river divides the Towns, it also serves as a common link to both Towns future with the advent of the proposed Little River Reservoir to the north. Moccasin Creek divides Wake County from Johnston, Nash, and Franklin Counties. The creek forms the eastern most edge of the four ridgelines that define the study area. Elevations range from approximately 150 feet to 385 feet above sea level within the study area (see Figure 2-2: Landform).

Soils

The soils in the study area are on gently sloping to steep, deep, and moderately deep and well drained to excessively drained. Typically the Wendell and Zebulon area is underlain by foliated to massive, granitic rock known as Rolesville Pluton, with portions of both Towns overlaid by terrace deposits and upland sediments. The main characteristic of this type of rock is that it crops out on the land surface, in the form of granitic flatrocks. This extensive Pluton extends slightly into adjacent Johnston County on the south and extends farther northward into Franklin County on the east. Near the stream courses, the soils are primarily of the poorly drained hydric Chewacla or Wehadkee soil associations. Much of the hydric soils are restricted to the immediate creeks and stream and their associated drainage area typical of floodplains (see Figure 2-3: Geology and Hydric Soils; Figure 2-4: Flood Zones). The subsoil consists of very friable coarse sandy loam to firm clay. Essentially all the soils in the Wendell and Zebulon Pluton area are acidic, with a pH generally less than 6. The geology and topography along with the physiographic properties of this area make development difficult due to greater engineering requirements and associated higher construction costs.

Vegetation

Vegetation, composed principally of over story 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. Wendell and Zebulon are predominantly forest-covered along the creeks and streams, featuring southern yellow pine and mixed

Land Form

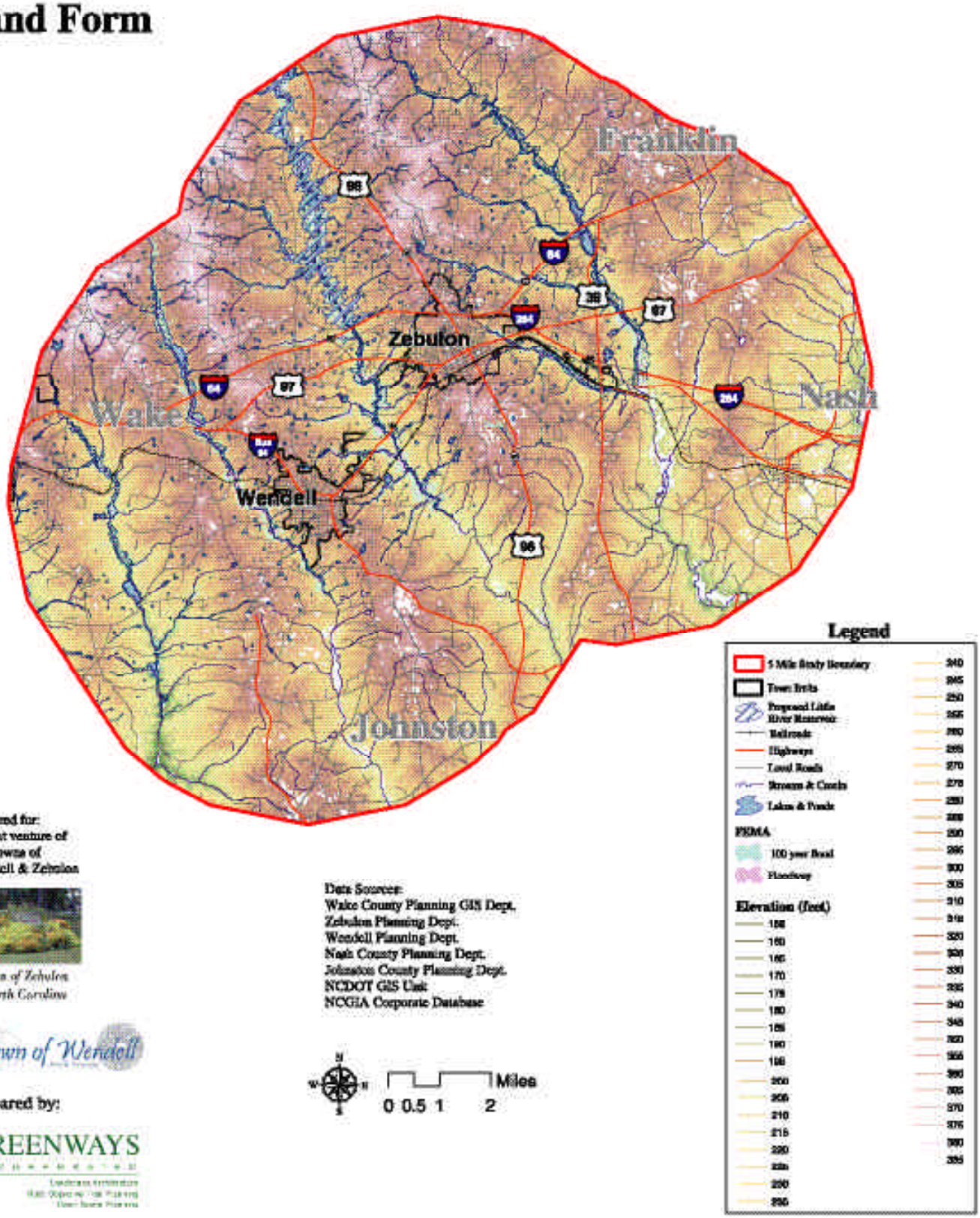


FIGURE 2-2: LAND FORM

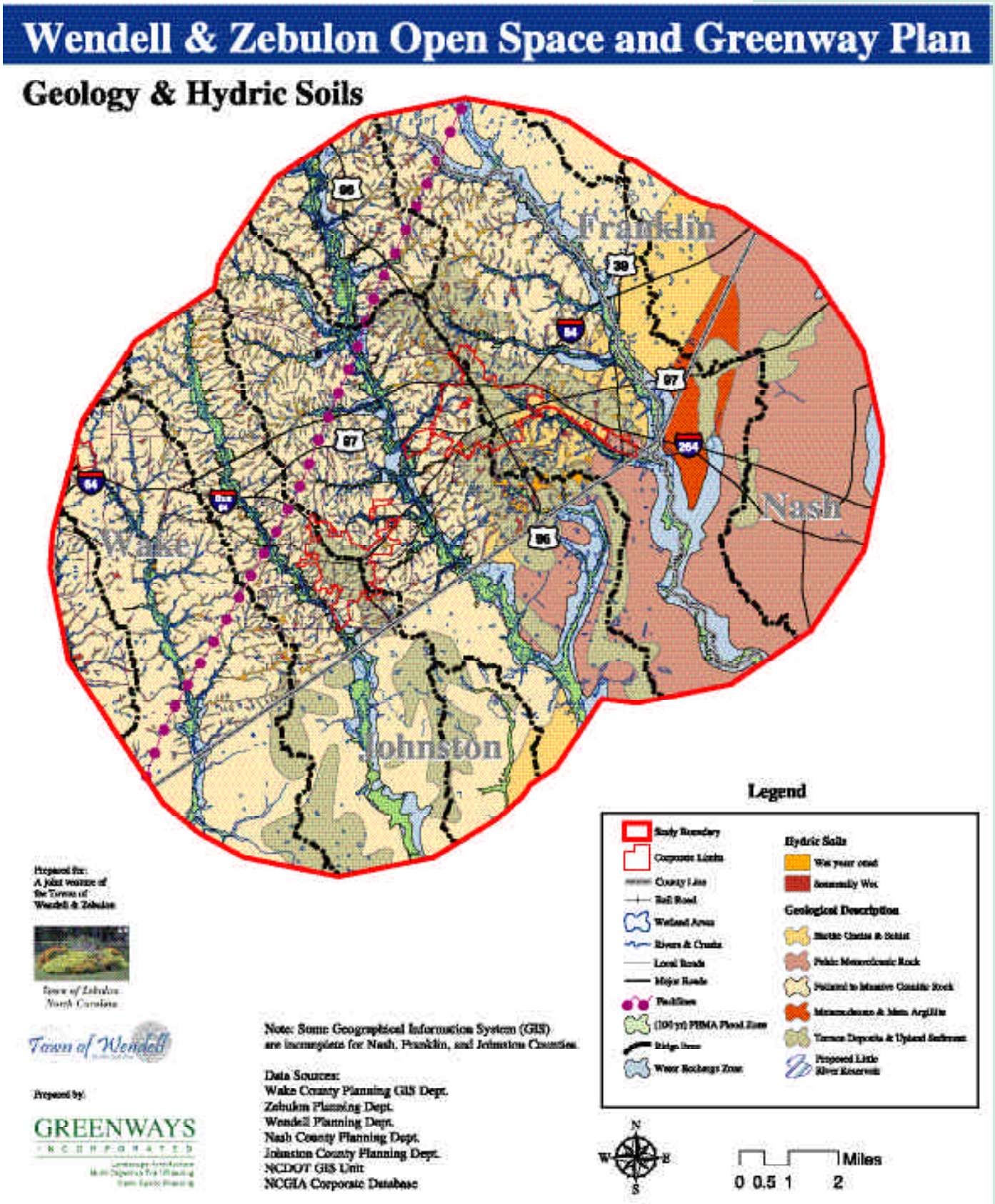
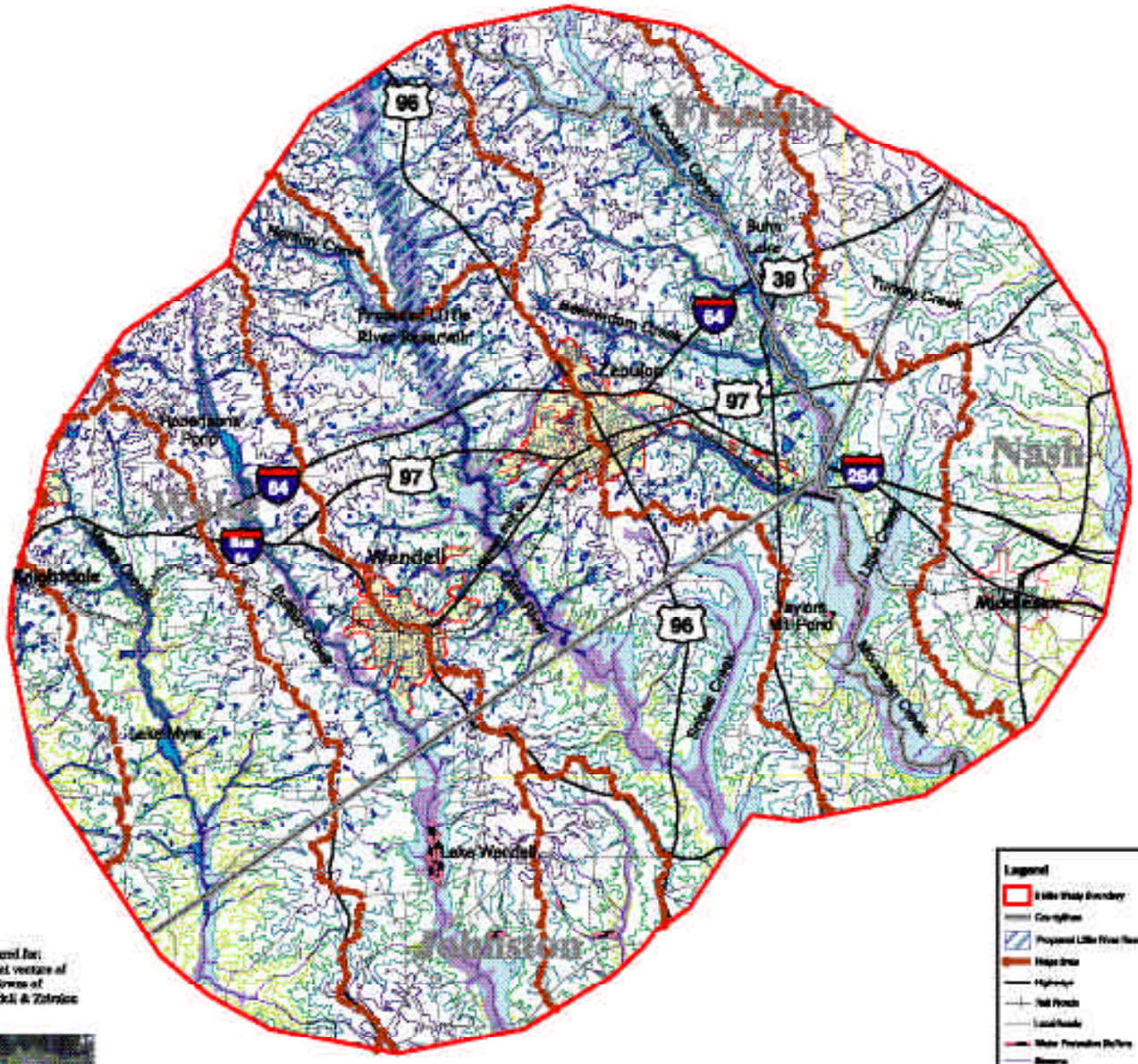


FIGURE 2-3: GEOLOGY AND HYDRIC SOILS

Flood Zones



Prepared for:
A joint venture of the Towns of Wendell & Zebulon

Town of Wendell

Prepared by:
GREENWAYS INCORPORATED

Note: Some GIS data layers are incomplete for Nash, Franklin and Johnston Counties.

Data Sources:
Wake County Planning GIS Dept.
Zebulon Planning Dept.
Wendell Planning Dept.
Nash County Planning Dept.
Johnston County Planning Dept.
NCDOT GIS Unit
NCGIA Corporate Database

FIGURE 2-4: FLOOD ZONES

hardwoods (swamp hardwoods, hardwoods/conifers, upland hardwoods). Farmlands dominate the largest part of the Wendell and Zebulon study area. 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 over story wetland species are red maple (Acer rubrum), willow (Salix spp.), ironwood (Carpinus caroliniana), and river birch. The understory is principally composed of reeds, greenbriar, and small grasses. Due to the shade cast by over story 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

The study area has two significant natural areas that are listed in the 1987 Inventory of Natural areas of Wake County, the Little River Section, and Buffalo Creek Section. Two areas located in the Little River Section, the Rocks, and flatrock area along old highway 64. Both areas represent significant examples of granitic flatrocks. The Rocks location is 4 miles north of Wendell and 4 miles west of Zebulon, and is managed by the Triangle Land Conservancy. This area is 10 acres in size and is an excellent example of the Rolesville Granite Batholithic (Rolesville Pluton). The smaller of the two (200 yards by 50 feet wide) is the flatrocks area along old highway 64, 3 miles northeast of Zebulon on the north side of old 64, and is privately owned. These granitic flatrock areas are part of the largest clusters in the eastern Piedmont and among the most scenic flatrock areas in Wake County. There are good examples of vegetation restricted to this unique environment such as, sandwort (Arenaria glabra), stonecrop (sedum smalli), fameflower (talinum teretifolium) Small's portulaca (Portulaca smalli), a state endangered plant species.

There are two other areas located in the Little River section that have prominence, the Little River-Aquatic Habitat, and Hester Pond area. The Little River - Aquatic Habitat is located 2 miles west of Zebulon and runs for five river miles along both banks of the river corridor until reaching just inside of Johnston County to the south. The Little River is one of the most biologically significant bodies of water for rare aquatic animals in the eastern Piedmont/Fall line area. This area contains numerous rare mollusks such as notched rainbow (Villosa constricta), the rarest of all, the ancient floater (Alasmidonta heterodon), yellow lance (Elliptio lanceolata), and Atlantic pigtoe (Fusconia aepyptera), which are considered as special concern species in North Carolina. All species have been found within a half mile of the US 64 Business and river intersection. Portions of The Little River is slated for a reservoir, however the location will be upstream of the natural heritage site. Most of the land is privately owned along this seg-

ment of the river. Hesters Pond is located about two miles east of Wendell and is a tributary to the little River. This small (10 acres) man-made pond is home to the Hooded Merganser, who rarely breeds in North Carolina, and nesting Wood Ducks. This site is currently privately owned.

The Buffalo Creek section includes the Buffalo Creek Cypress Forest, Robertson's Pond, and Martof's Pond. The Buffalo Creek Cypress Forest encompasses approximately seven miles of the creek on both sides with 225 (+) acres above Robertson's Pond and 375 (+) acres below Robertson's Pond. The area is located 1/2 mile north of State Road 2320 south to State Road 1007 and is within the floodplain of the creek (but not including Robertson's Pond). Typically limited to coastal areas, this area is one of the most prolific locations in Wake County. Distinct vegetation of this ecosystem includes Bald Cypress (Taxodium distichum). Because this area shares an affinity for the species with the coastal plain, the types of fish, amphibians, and reptiles found in the Buffalo Creek section include the Cottonmouth snake (Agkistrodon piscivorus), the four-toed Salamander (Hemidactylium scutatum), Sawcheek Darter (Etheostoma serriferum), Mud Sunfish (Acantharchus pomotis), Bluespotted Sunfish (Enneacanthus gloriosus), Banded Pigmy Sunfish (Elassoma zonatum), Lined Top-minnow (Fundulus lineolatus), Tadpole Madtom (Noturus gyrinus), and Ironcolor Shiner (Notropis chalybaeus).

Robertson's Pond is 60 acres in size and is located 3 miles northwest of Wendell. This Old Mill Pond's shoreline is nearly completely covered with Bald Cypress (Taxodium distichum), which is native to Buffalo Creek. The pond has been heavily studied for the biodiversity created by the cypress forest and associated animal species essentially restricted to the Coastal Plain. The site is currently in private ownership and has been registered as a Natural Heritage Area since April 1983.

Located approximately 5.5 miles northwest of Wendell; on the south side of State Road 2321 lies Martof's Pond. This site has been used as a research site for over 10 years for colleges and Universities, and is named after Dr. Bernard S. Martof, a Zoology professor at N.C. State University. Dr. Martof was the first to recognize its significance for the diversity and numbers of individual amphibian species found nowhere else in Wake County. The pond is relatively shallow which lends itself to a perfect breeding ground for amphibians without the influence of fish. Amphibians that have been studied at the pond include the Red-spotted Newts (Notophthalmus sp.), Barking Treefrog (Hyla gratiosa), Green Treefrog (Hyla cinerea), Marbled Salamanders (Ambystoma opacum), and the Spotted Salamander (Ambystoma maculatum).
Other notable species found within the study area include the Least Brook Lamprey (Lampetra aepyptera) which is a fish species found in local rivers and streams.

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 (updated 3/2001), currently there are four threatened or endangered species and eleven species listed as federal species of concern in Wake County.

Wildlife Habitat

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 Wendell and Zebulon.

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. Water species include turtles, American toad, and a variety of ducks.

Population

Even though Wendell and Zebulon are among the smallest populations of all the Towns in Wake County, they saw a significant population increase. Wendell grew from 2,921 residents in 1990 to 4,247 in 2000, which represents a 45 percent increase. Zebulon had 3,173 residents in 1990, and grew to 4,046 in 2000, or for an increase of 28 percent. 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. The population for Wake County is 627,846 with a projected population in 2019 of 939,753.

Infrastructure

Infrastructure (see Figure 2-5: 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 times, 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 Wendell and Zebulon, the available infrastructure data displays water, power, and sewer lines. Most notable is the lengthy stretch of power line that crosses the Little River and runs parallel (offset by 100's of yards) to the existing railroad tracks. This facility is of special interest because of its potential to link both communities west to east. Also of interest, is the sewer line easement that run along Buffalo Creek to Highway Business 64, and could continue to a possible link to East Wake High in Wendell. In Zebulon, an excellent connection to the proposed Little River Greenway corridor can be made from an existing sewer easement that follows Little Creek a tributary of Little River from highway 64 to the river. These opportunities demonstrate possible urban "in-Town" connections.

It should be mentioned that publicly owned sewer and power easements are already being used by residents (in an unofficial capacity), throughout the study area.

Land Use

Wendell and Zebulon are located in southeastern Wake County, the fastest growing County in North Carolina throughout the 1990's. Wendell and Zebulon's development pattern is divided into distinctive regions (see Figure 2-6: Land Use). In general, residential development is occurring in all of these regions. In Zebulon, development is occurring in the north and between Little River and Moccasin Creek to the east, which have easy access into the Town center of Zebulon.

Wendell is most significant land use is located in the area between eastern Town limits and along Business 64. At the southern edge of the study area development is thriving around the Little River area. Another significant area for development is the Town centers, which contain schools, and a mix of industrial, commercial business, and residential areas. Most of the residential development pressure is coming from the east and south as Raleigh and Knightdale and Johnston County continue to expand.

The remainder of the study area is primarily utilized for farming and pasture land. The majority of the agricultural land is mixed in and around the study area with a few large pockets still thriving to the south, north and east of the study area. The most significant area is the land that lies between Wendell and Zebulon along the Little River corridor that spans from the Johnston County line to Highway 64 to the north.

Park and Recreation Lands

There is currently only one major public park area in each of the communities in Wendell and Zebulon. In Wendell, Wendell Park is located in the west near the center of Town (see Figure 2-7: Existing Parks and Open Space) and is close to Carver Elementary School. East Wake High school to the north west of the Town also provides some limited recreational opportunities to citizens. Zebulon Community Park is located in the south eastern area of downTown. Zebulon also has some smaller parks existing such as Little River, Gill Street, Whitley, and a community garden area near Zebulon Middle School. Zebulon also has an existing unpaved greenway that parallels Little Creek and portions of the Norfolk Southern Rail Road that starts at Old Horton Road and ends near Five County Stadium to the east. In the Towns of Wendell and Zebulon designated parks are the only land considered as open space with public access.

Open Space/ Greenway Resources

In addition to the publicly owned land resources it is necessary to mention the open space resources of Wendell and Zebulon in terms of visual quality. Property does not have to be publicly owned for the public to enjoy the landscape. The Wendell and Zebulon area is surrounded by wonderfully scenic open farmlands with each Town known for their small Town character. 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 the Towns of Wendell and Zebulon are showing signs of the development and economic activity of the county, they are

Infrastructure

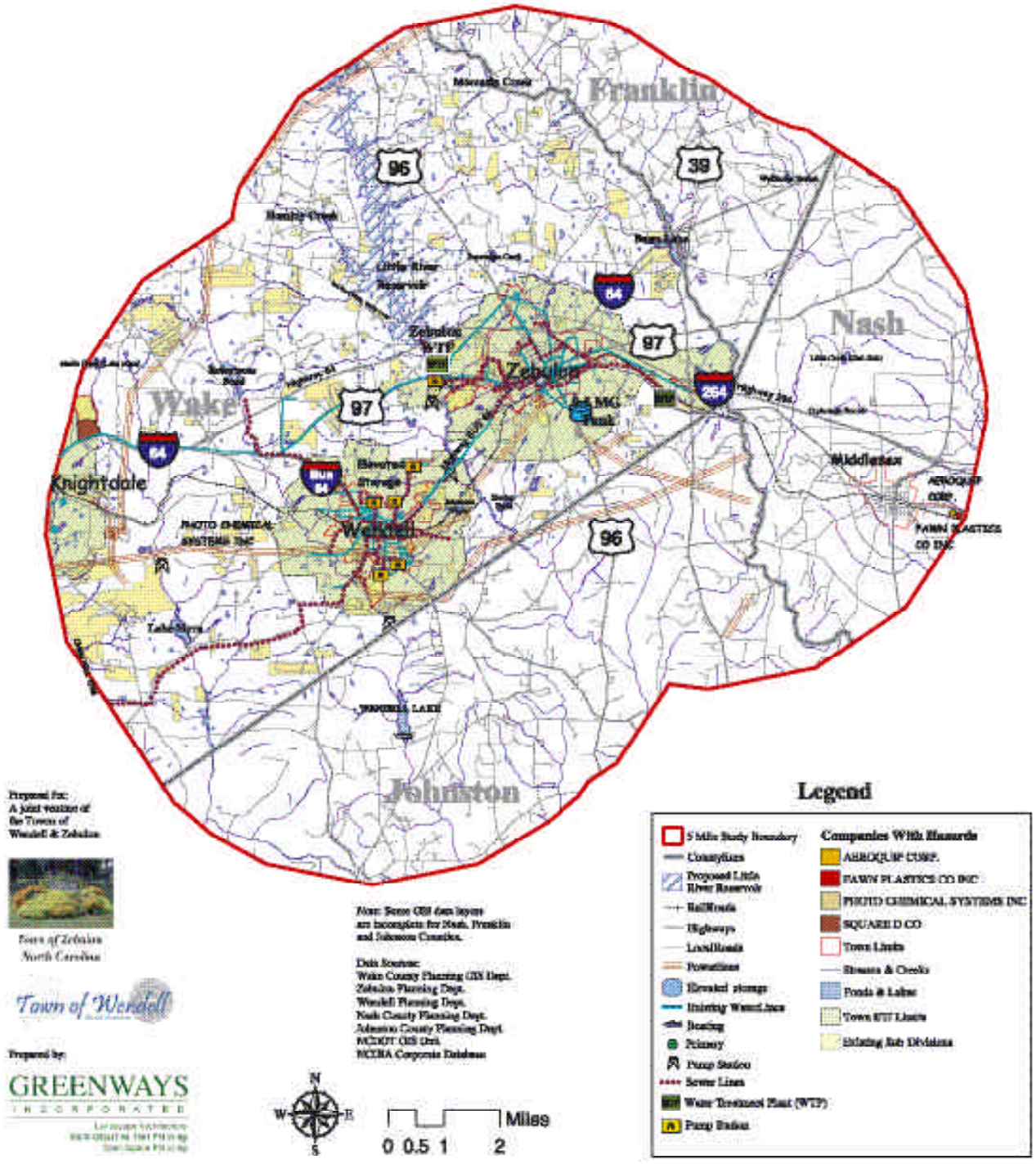


FIGURE 2-5: INFRASTRUCTURE

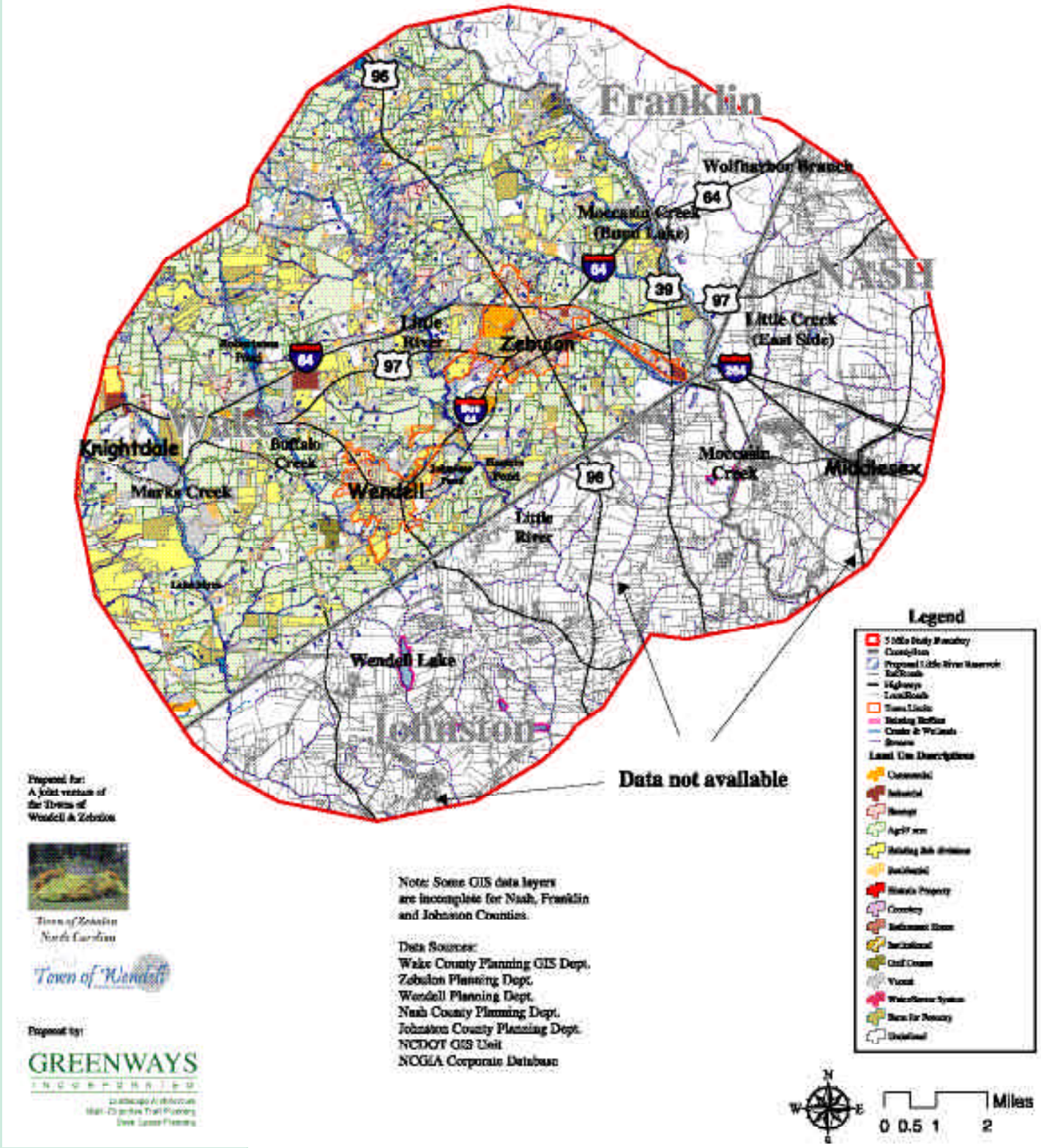


FIGURE 2-6: LAND USE

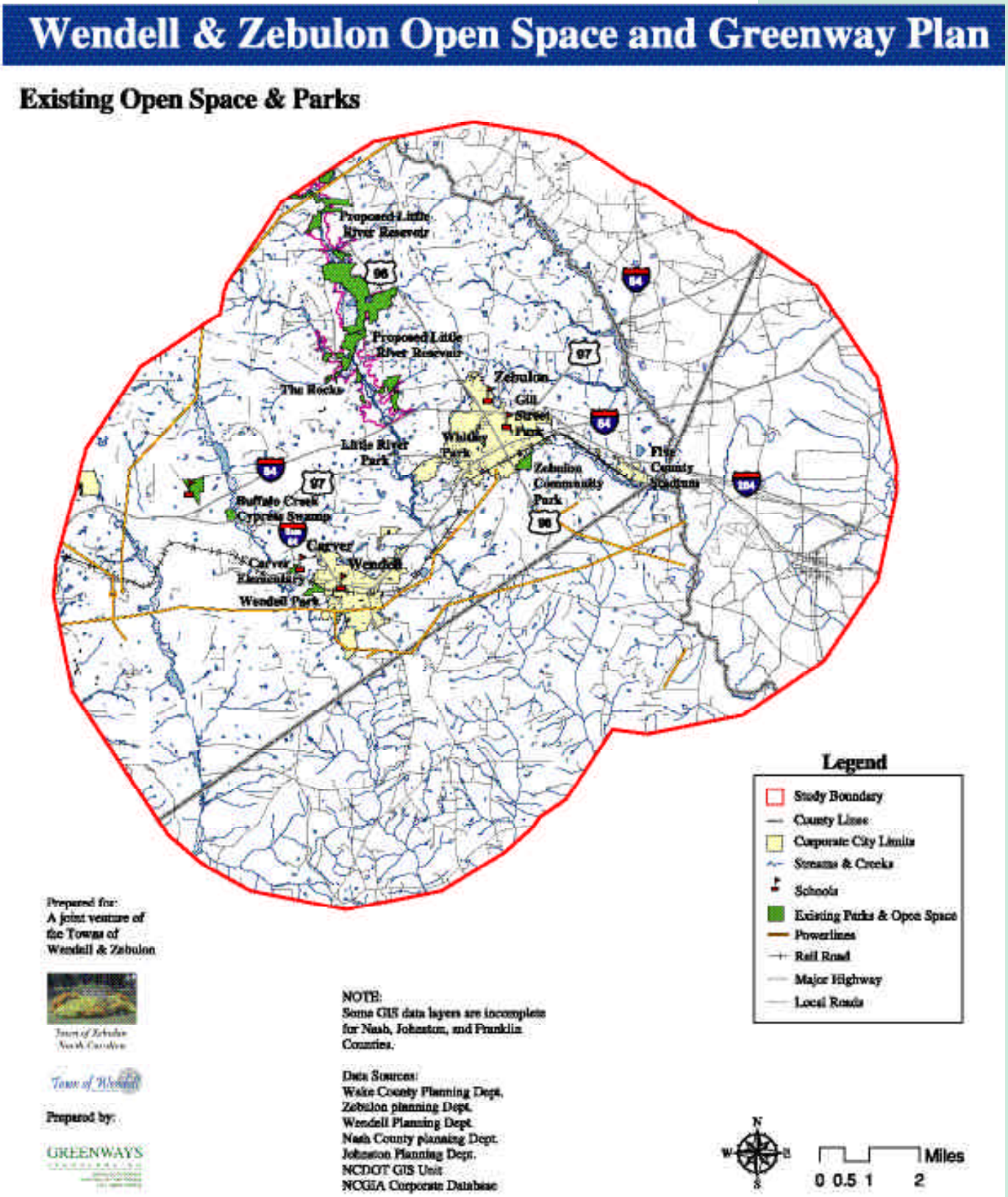


FIGURE 2-7: EXISTING PARKS AND OPEN SPACE

Watersheds & Sub Basins

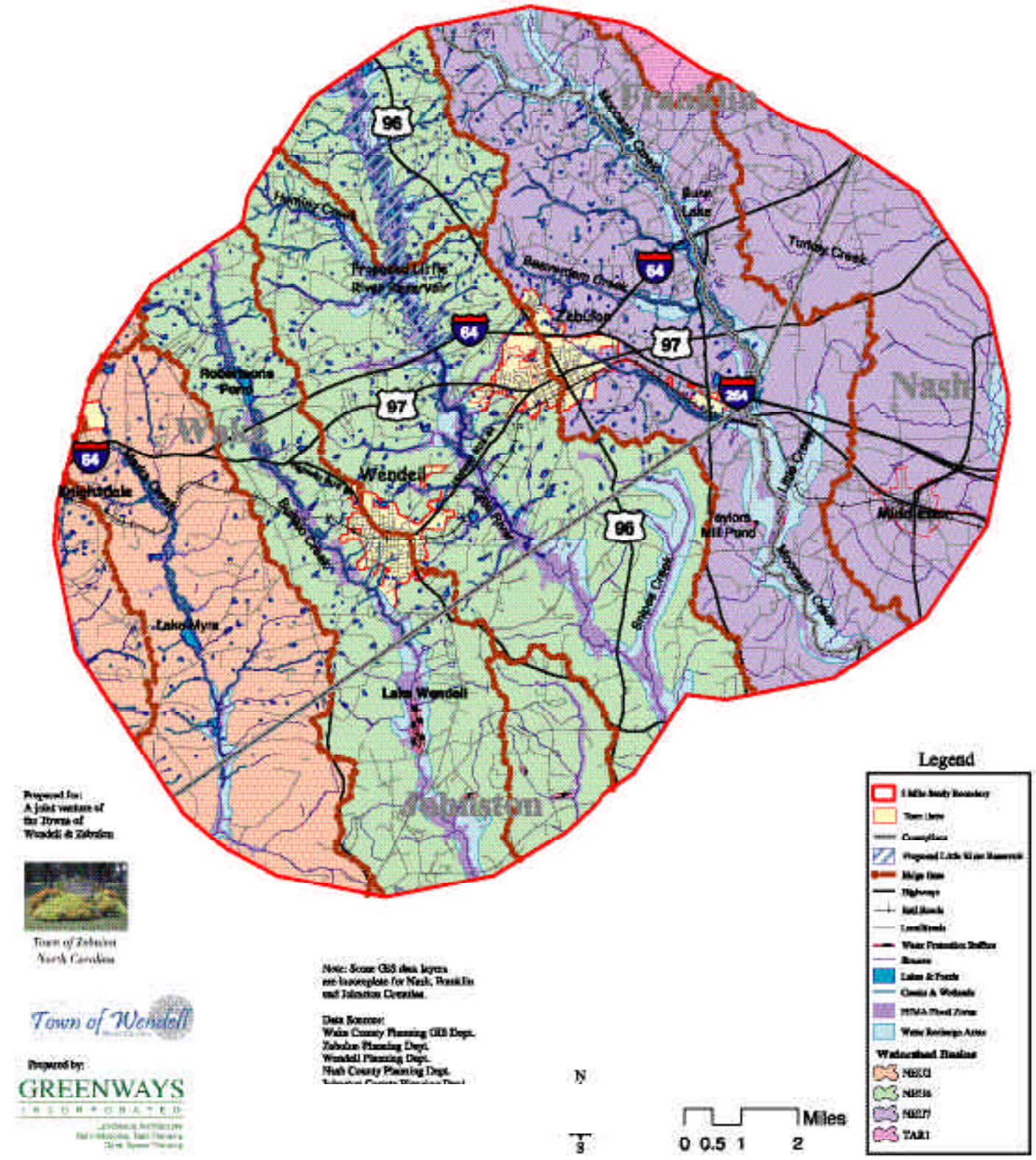


FIGURE 2-8: PROJECT WATERSHEDS

still a visually appealing areas of open space. Strategies to preserve this situation will be discussed later.

Watershed Areas

The study area has been divided into four sub areas that focus upon the watershed boundaries. These areas (from west to east) are the Marks Creek watershed, the Buffalo Creek watershed, the Little River watershed, and the Moccasin watershed (see Figure 2-8: Project Watersheds). Each of the areas was field inspected for ecological health and greenway suitability. Site inspections focused on stream corridors, flood plains, and public utility easements.

Marks Creek Watershed

The Marks Creek corridor is not accessible for walking do to a lack of public easement access. A roadside survey was conducted at all possible access points. Marks Creek is the western most drainage corridor (approximately half the corridor) within the study boundary.

- At Poole Road: Lake Myra is on the north side. Marks Creek is a small creek that extends north-northwest from Lake Myra until reaching its headwaters north of Knightdale. This area is marked by extensive wet lands and a broad floodplain until reaching Lake Myra.
- At the proposed bypass: The proposed bypass will cross Marks Creek near Knightdale Eagle Rock Road and Norfolk Southern Railroad and is the only major access point to Marks Creek. This area is primarily noted for large parcels that back up to the creek (land south of the railroad is zoned R-40).
- Closer to Town there are businesses that back up to the headwaters of the creek, and the creek is bisected by highway 64.

Implementation of a greenway plan along Marks Creek watershed has complicated issues at both the northern (Highway 64) and south ends (Lake Myra and associated wetlands). The lack of a public easement is one issue along the creek with the close proximity to the private residents just northwest of Lake Myra. Highway 64 is a very busy thoroughfare. Extension of a greenway along Marks Creek will need to address a safe pedestrian crossing, either with an elevated crossing or with use of the box culvert. The floodplain and the acquisition of an easement on the western side of the creek could be used to circumvent the wetland area, and allow trail access for the existing Ashley Hills subdivision. Knightdale also needs to implement a greenway plan for their section of Marks Creek or a green space around Lake Myra, which could link to Wendell in this fast growing area.

Buffalo Creek Watershed

The Buffalo Creek corridor is not accessible for walking do to a lack of public easement access. A roadside survey was conducted at all stream crossings. The areas surveyed span from Wendell Park north to Robertson's Pond.

- At Liles Dean Road: At the end of this road, there is a large pond, which empties into Buffalo Creek. To the south of this area is Carver Elementary School and further south is Wendell Park. A short section of a greenway could parallel the existing active railroad corridor to provide

access to a greenway along Buffalo Creek.

- At Old Battle Bridge Road: the creek flows thru a wetland area, which is part of the Buffalo Creek Cypress Swamp area to the north of the road. The land adjacent to this area is zoned R-20.
- At Wendell Boulevard (Business 64): this crossing has a wonderful view of the Buffalo Creek Cypress Swamp area to the north. There are no private residences in proximity to this crossing. The area around the crossing is overgrown with briars and numerous fallen trees. Thickets and trees shade the creek on both sides.
- At Robertson Pond Road: this crossing has the best view of the Buffalo Creek Cypress Swamp area that surrounds Robertson's Pond. There pond and surrounding area is privately owned. The area around the crossing is overgrown with briars and numerous fallen trees. Thickets and trees shade the creek on both sides.

Buffalo Creek has some of the same issues that Marks Creek does. The main issue being a lack of public easement for implementation of a greenway plan. However, Buffalo Creek offers an opportunity to connect Wendell and eastern Knightdale and East Wake High School to the north. In addition, Buffalo Creek provides access to some of most pristine open space and natural ecosystems such as Robertson's Pond and associated cypress forest.

Little River Watershed

We begin a description of the Little River watershed at the Johnston County line, and continue north to the area set aside for a potential reservoir. The benefits and opportunities of preserving this corridor of land are numerous. It would make a wonderful central park with the pond, a greenway trailhead, and a nature preserve/study area for the schools that would link Wendell and Zebulon.
There are only a couple of wet areas on the corridor itself from the time you reach Hester Pond until you reach Business 64. North of this area the floodplain enlarges and contains wetlands along the creek corridor until reaching Privets Pond (Little River Park). These issues can be easily addressed with boardwalk. The surrounding land is zoned primarily R-40 south of Business 64 with a mix of R-20 zoned land to the north.

The corridor is home to many different animals, those discovered were deer, Broad-headed 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, black cherry, and oaks.

The Little River corridor is not accessible for walking do to a lack of public easement access. A roadside survey was conducted at all stream crossings. The areas surveyed span from Earpsboro-Chamblee Road north to Little River Park.

- At Earpsboro-Chamblee Road (also called Morphus Bridge Road to the west of Little River): Along the north eastern side of the river is a large outcropping of massive boulders. To the north and east of Little River is Hesters Pond, a significant NC Natural Heritage Site.
- At Norfolk Southern Railroad: The floodplain is dense with briars and

thickets and is heavily shaded by the riparian forest cover. There are few residents in close proximity to this crossing; most of the adjacent land is farmland. This crossing also offers a significant opportunity to link Wendell and Zebulon together via portions of the railroad corridor and an existing powerline that run east to west between both Towns.

- At Mack Todd Road (Business 64): the north side consists of a wetland area of significant size. The south side is heavily forested. There are some residents in close proximity to this crossing. This area is the closest point to each Towns Extra Territorial Jurisdiction boundary, and develop ment is only hindered by extensive wetlands along the corridor at this point. Tarpley's Pond is one of two old millponds created within this section of the corridor.
- At Highway 97: the north side consists of a wetland area until reaching Little River Park to the north. The south side is covered with briars and dense thickets. There are some residents in close proximity to this crossing on the south side. This area is the most densely developed residential area along the creek corridor. Zebulon and Wendell have purchased some land just south of 97 along the river. However, currently there is no plan for this area nor is there public access. Little River park is an area of land that showcases one of the most accessible and picturesque old mill sites. At Little River Park, Little River flows into a large pond (Privets Pond) that was created by a stone dam. The dam has a small spillway with a steady flow of water flowing over it. On the lower side of the dam is a large collection of granitic flatrock with small streams flowing across them.This area allows visitors an up-close view of the excellent workmen ship needed in constructing the rock retaining wall that holds back Privets Pond.
- At Green Pace Road: the north side consists of a wetland area overgrown with briars and thickets. The busy Highway 64 corridor is to the north. This crossing gives an excellent view of the northern tip of Privets Pond.
- At Highway 64: The north side consists of an area earmarked for the proposed Little River Reservoir. This road intersection faces similar problems to were Highway 64 crosses Marks Creek. A pedestrian cross ing is needed to reach the proposed Little River Reservoir and any proposed greenway.

Little River offers the best opportunity for Wendell and Zebulon to protect a large section of pristine watershed and create a greenway space and educational corridor. The acquisition and/or protection of the river corridor property are key to the preservation of the watershed and would create an educational element for area schools and residents. In addition, the ability to link a greenway in this corridor with the proposed Zebulon-Wendell Greenway will make a wonderful greenway connection to all points east, west, north and south between Towns.

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 Wendell and Zebulon. Both remote research and direct observation were used to analyze the existing Wendell and Zebulon 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 Zebulon Multimodal Transportation Plan (2001), the Inventory of the Natural Areas of Wake County (1987), the Capital Area Greenway Plan – Update (1989), USDA Soil Survey of Wake County North Carolina, North Carolina's 303(d) List of streams deficient in water quality by Clean Water Act standards. Additional information was obtained from web sites maintained by the U.S. Census Bureau, the Neuse River Foundation, and other sites offering environmental and cultural information specific to Wendell and Zebulon. Finally, thematic maps were produced from Wake County Geographic Information Systems (GIS) data, NC Department of Transportation (GIS Unit), and NCGIA Corporate Database to 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 the Wendell and Zebulon study area. 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. Wendell and Zebulon have cultural opportunities to connect to the cities of Raleigh, Wake Forest, Rolesville, and Knightdale, with future connections to Nash, Franklin, and

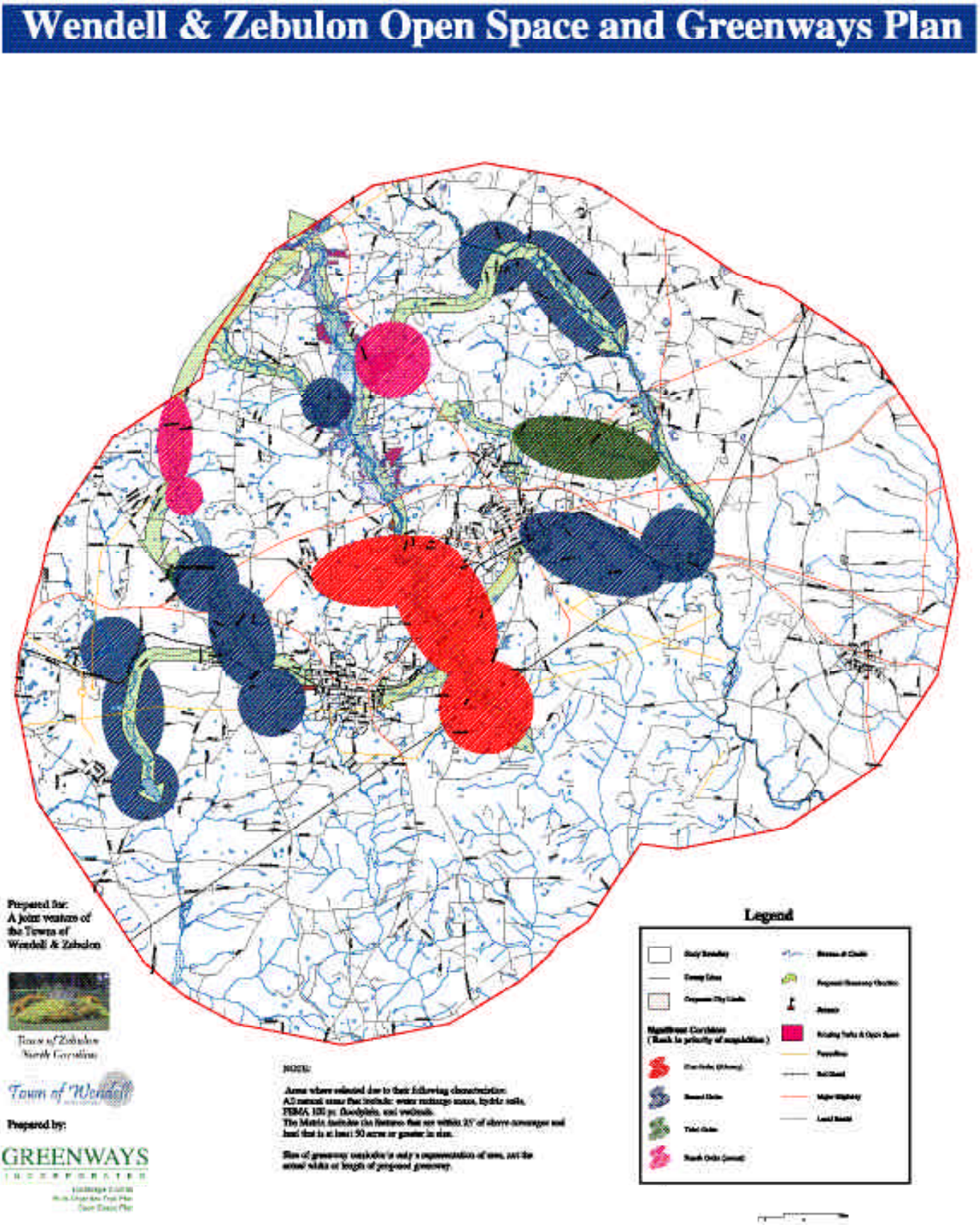


Figure 3-1: Significant Corridors for Open Space and Greenways.

Johnston Counties.

Wendell and Zebulon have a primary consideration of preserving their small town character and quality of life enjoyed by their residents. Providing greenway linkages within each community and to each other 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 Wendell and Zebulon via alternative, slower-paced modes of transportation.

Greenspace Elements

Little River Reservoir Park and Satellite Parks

We recommend the development of a park system that contains one large Little River Reservoir Park and 2-3 satellite parks. The Little River Reservoir Park (Little River Reservoir Park) and the satellite Parks (Lake Myra Park, Hominy Creek Park, Wendell-Zebulon Little River Park, Stadium Park, and Moccasin Park) will be developed with Wake County to ensure that future growth will have access to the recreational opportunities in the study area. The Little River Reservoir Park area (Little River Reservoir Park) will serve as an anchor for the southeastern area of Wake County, and function as a regional park such as Blue Jay Point Park adjacent to Falls Lake. The proposed Little River Reservoir Park would be located in the land along the Little River Reservoir. This park would include new facilities such as, rest rooms, education center, and recreational activity areas. The proposed Little River Reservoir Park would also be the main terminus for the Little River Greenway and all scenic routes (see scenic corridor descriptions).

The 2-3 satellite parks would be of varying size and would come on line as land is acquired. Other locations to consider as park sites could be developed as greenways are implemented. One each along Marks Creek and Buffalo Creek (Lake Myra Park), Hominy Creek (Hominy Creek Park), Little River (Wendell-Zebulon Little River Park), the expansion of Five County Stadium land (Stadium Park), and one in the northern section of Moccasin Creek (Moccasin Creek Park). All of these parks would support passive recreation (picnic, wildlife observation, and serve as greenway links).

Equestrian Areas

The development of equestrian trails and/or areas was discussed in the public workshops both for and against. It is recommended that equestrian areas and trails be developed in the future in conjunction with greenways as interest becomes greater. The west and north side of the Wendell and Zebulon study area is the most suitable area to consider for equestrian trails, because of their low population density and proximity to the Little River Reservoir. 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.

Scenic Corridors

Wendell and Zebulon have two primary vehicular entrances into each community (Highway 64 and Business 64) and a significant thoroughfare coming on-line (Highway 64 Bypass near Wendell). Zebulon also has four major roads Highway 97 (Wendell bypass), and Highway 96 (Arendell Avenue), Highway 264, and Riley Hill Road. Rural roads such as Green Pace and Morphus Bridge Road

Wendell Boulevard

display the beauty of the surrounding countryside. Each of these corridors is significant for the first-impression that visitors receive as they enter Zebulon. Wendell has four major roads that enter the town (Poole Road, Selma Road (Highway 231), Marshburn Avenue, and Old Wilson Road). Rural roads such as Lake Glad Road and Wendell Road (south of Selma Road) highlight the beauty of the surrounding countryside. Each of these corridors represents the small town feel and first-impression that visitors receive as they enter Wendell. 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 Wendell and Zebulon's greatest assets.

Measurement Group Entrance

The Town of Wendell

Business 64/Wendell Boulevard Corridor

The Business 64/Wendell Boulevard Corridor is the oldest of the major connector corridors. It is the major entry into Wendell from Raleigh and is an example the effects of commercial development. This corridor has the desirable character of a true boulevard and good commercial development that respects this view shed such as Measurements Group VISNAY Intertechnology Inc. Protecting the scenic quality and establishing a beautification program (which will require agreements with NCDOT for the highway right-of-way) for this zoned commercial section of the Business 64/Wendell Boulevard corridor is important to Wendell residents. While the commercial growth is certainly going to continue, the vegetated edges of the corridor already in place are a reminder of Wendell's small town character and rural beauty. As an example, Roanoke Island in eastern North Carolina teamed with the NCDOT to require a beautification program along the Highway 64 corridor. This program worked with existing businesses and residential home owners, and it requires that all land within 50 feet of the NCDOT right-of-way be planted with trees and shrubs to buffer the road with a vegetated edge. This beautification is considered a model for highway corridors in the state

Mack Todd/Business 64

Business 64/Mack Todd Road Corridor

The Business 64/Mack Todd Road Corridor is the major east/west link between Zebulon and Wendell. This major connector between both towns is showing the effects of commercial and residential development. While the commercial and residential growth is certainly going to continue the vegetated edges of the corridor already in place, protecting this corridor is a reminder of Wendell's small town character and rural beauty.

Poole Road

Poole Road Corridor

The Poole Road Corridor is possibly as old as the Business 64/Wendell Boulevard Corridor; however, it has not been commercially developed. This corridor is a main connector to Knightdale and Wendell. Due to it being a main crossroad the scenic quality and beautification are important elements to maintaining Wendell's charm and rural beauty.

Selma Road Corridor

The Selma Road Corridor is a major link to Johnston County and points south. Because the corridor location provides this link to rapidly growing Johnston

County, one concern is the future degradation of the landscape because of increased future use. It will be important to buffer the corridor from adjacent neighborhoods. This will be welcomed by the residents and enjoyed by the commuting public. This corridor could also benefit from 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 Wendell both for residents and for the commuting public.


Selma Road

Marshburn Avenue Corridor

The Marshburn Avenue Corridor is a major north to south connector road for northern Wendell to towns such as Rolesville and Wake Forest. Although not commercially developed, this area has seen increased stress from growth related issues. The corridor will also serve as a major link to the proposed Little River Reservoir. Due to it being a mainly rural road north of town, preserving the scenic quality and beauty are important elements to maintaining Wendell's charm and rural character.


Old Wilson Road

Lake Glad Road/Old Wilson Road Corridors

The Lake Glad Road/Old Wilson Road Corridors are beautiful examples of the surrounding countryside of Wendell. Lake Glad Road provides a connection to western Wendell and Knightdale. Old Wilson Road is widely used for connections to eastern Wendell and Johnston County. Preserving open space and buffers along these corridors will help protect the rural quality of Wendell. The implementation of a bike route system along both corridors would provide recreational value to each corridor, an easy environmentally friendly way to connect to Knightdale and Johnston County, and enhance the quality of life.


Lake Glad Road

The Town of Zebulon

Highway 64/Highway 264 Corridor

The Highway 64 Corridor is the major western connector and major entry into Zebulon from Raleigh. This heavily traveled highway is also the main link to the eastern coast of North Carolina. Truck and commuter traffic dominate the four-lane highway. Arendell Avenue (Highway 96) has a mix of residential and businesses (Glaxo Smith Kline) as you travel south, with commercial development becoming prominent as you approach downtown. The Highway 264 corridor is also a four-lane freeway that provides regional access to points east of Zebulon. While the commercial growth is certainly going to continue, enhancing the vegetated edges of the corridors would provide a buffer from these heavily used corridors.


Arendell Ave. (Hwy 96)

Highway 96 (Arendell Avenue/Zebulon Road) Corridor

The Highway 96 Corridor is the major northern to link between Zebulon and Rolesville and Wake Forest, and southern link to Johnston County. It is showing the effects of commercial development at both ends. While the commercial growth is certainly going to continue, the corridor should maintain the vegetated edges of the corridor already in place beyond Riley Hill Road to the north, and Zebulon Community Park to the south. The northern section of highway 96 is also known as Zebulon Road, and has the desirable character of a true boulevard and good commercial development that respects this view shed (such as the Glaxo

Smith Kline campus further south along Arendell Avenue). Protecting the scenic quality and establishing a beautification program for both northern and southern sections of Highway 96 corridor is important to Zebulon residents. Protecting this section of the corridor would allow Zebulon to promote its small town character and rural beauty as visitors and residents enter the town from either end.

Highway 97 (Wendell Bypass/Gannon Avenue) Corridor

The Highway 97/Wendell bypass corridor is a main connector to Wendell, and serves as an important link to the existing Little River Park and proposed Little River Greenway. Due to it being a main crossroad the scenic quality and beautification are important elements to maintaining Zebulon's charm and rural beauty. The Highway 97/Gannon Avenue corridor also provides a regional link to the south of Zebulon. This corridor is primarily a two-lane rural highway that serves large volumes of vehicular traffic that must travel through downtown Zebulon. It is important that the eastern end of this corridor does not take on the appearance of the highway as it enters downtown Zebulon. Care should be taken not to allow construction of multiple driveways that could interfere with future intersections. (ZMT Plan)

Riley Hill Road

Riley Hill Road Corridor

Riley Hill Road provides a major northern link to rural areas of western Zebulon and Wendell. Due to the corridor location (serving as an alternative to Highway 64) and associated farmland, rapid growth is one concern along with the future degradation of the landscape because of increased future use. It will be important to buffer the corridor from adjacent future neighborhoods. This will be welcomed by the residents and enjoyed by the commuting public. This corridor could also benefit from 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 Zebulon for both residents and the commuting public. The consultant agrees with the ZMT plan that this corridor could serve as an eastern and western gateway for the town.

Old Highway 64 East Corridor (Shephard School Road)

The Corridor is a major northeast to southwest connector road for northern Zebulon to areas such as Bunn Lake and Franklin County. Although not commercially developed, this area has seen increased stress from residential growth related issues. The corridor will also serve as a major greenway at Moccasin Creek and provide a link to the proposed Little River Reservoir. Due to it being a mainly residential road north of town, preserving the scenic quality and beauty are important elements to maintaining Zebulon's charm and character.

Morphus Bridge Road Corridor

Business 64/Mack Todd Road Corridor

The Corridor is a major connector for northern Zebulon to Wendell. Although not commercially developed, this area has seen increased stress from residential growth related issues. Due to it being a major road between both towns, preserving the scenic quality and beauty are important elements to maintaining Zebulon's charm and character as you enter town from the west. This corridor could also benefit from a nicely landscaped paved multi-use trail (bikes and pedestrians) on the edge of the right of way, which would help both residents and the commuting public.

Green Pace Road Corridor

The Green Pace Road Corridor is also a beautiful example of the Zebulon countryside close to the western edge of town. This Corridor provides a connection to the northern end of Privets Pond and the proposed northern section of the Little River Greenway and a possible future connection to the proposed Little River Corridor. The implementation of a bike route along this corridor would provide an important connection to downtown Zebulon and residential areas.

Green Pace Road

Morphus Bridge Road Corridor

The Morphus Bridge Road Corridor is the most rural of the of road corridors. It provides a southern connection route and a less congested route than Business 64. This would provide an excellent opportunity for a bike route, and would provide an important connection to southern downtown Zebulon and associated residential areas. Any effort that can be made to preserve and maintain the scenic quality of this rural road will preserve the small town character of Zebulon.

Chambee Road

Horton Street/Chamblee Road Corridor

The Corridor is a beautiful example of the residential Zebulon countryside close to the southern edge of town. This Corridor provides a connection to the existing Zebulon (unpaved) greenway located along Norfolk Southern Railroad, and a possible link to Zebulon Community Park. The implementation of a bike route along this corridor would provide an important connection to downtown Zebulon and residential areas. Any effort that can be made to preserve and maintain the scenic quality of this rural road will preserve the small town character of Zebulon as future growth occurs in Zebulon and Johnston County to the south.

Greenway System Recommendations

The future of open space and greenways in Wendell and Zebulon are envisioned as a system of outdoor spaces that function as healthy, protected ecosystems. Continuity is critical to the concept of preserving open space in the Wendell and Zebulon study area. 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.

Overview

Recommendations for a system of open space and greenways in Wendell and Zebulon are based largely on community input, existing planning efforts by both towns, and a (significant land coverage) Matrix to refine the most targeted areas. The main focus of the Matrix was to find areas of land that would serve to protect water quality issues by generating a simple model using significant GIS land coverage’s and their relationships to each other. The Matrix was generated using the following parameters, all land coverage that is within 30 feet, and at

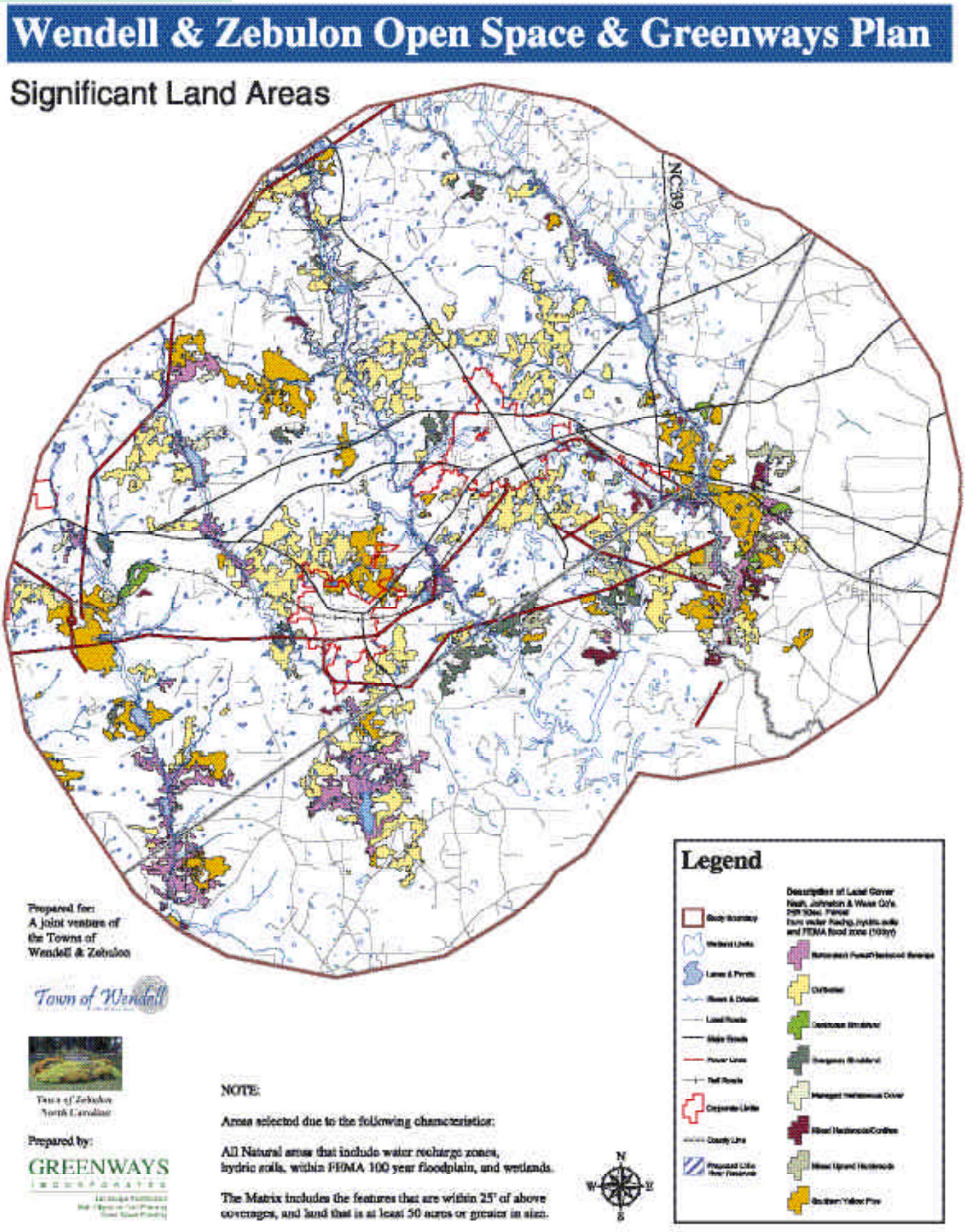


Figure 3-2: Significant Natural Areas determined by a Matrix

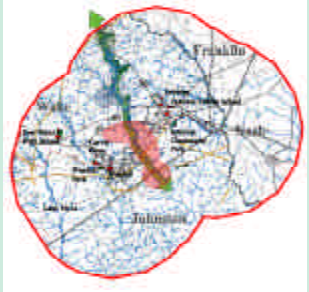
least fifty acres in size that contain: wetlands, FEMA zones (100-year flood zones), water recharge zones and hydric soils (both seasonally and perennially wet). Corridors and open space locations were identified and presented in map form at meetings with Wendell and Zebulon staff and public workshops. 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. These corridors seek to enhance plans already in place such as the Zebulon Multimodal Transportation Plan. Corridors were also selected to ensure development of a continuous system of greenways located throughout Wendell and Zebulon and extending to neighboring jurisdictions.

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 Wendell and Zebulon's natural character and its scenic beauty as well as perform ecological functions. The desire of the citizens of Wendell and Zebulon to have a Little River Reservoir Park (Little River Reservoir Park), as a focal point for their community is a major part of this plan. The proposed Little River Reservoir 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.

Little River



Little River

Corridor Description:

Little River is the major north-south greenway corridor proposed for the Wendell and Zebulon study corridor. The corridor's endpoints are the proposed Little River Reservoir lands to the north (and continuing to future linkages in Rolesville) south to the Johnston County Line. The Little River corridor is the longest feature within the study area, and features predominately in the greenway connection between both towns. The primary land use along the proposed corridor is forested riparian areas with a mix of wetlands.

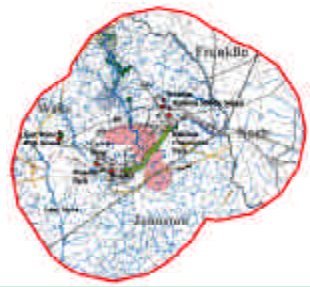
Corridor Objectives:

This corridor is well suited to support a greenway corridor. This offers Wendell and Zebulon the only corridor with such a shared alignment. Due to the planned Reservoir development to the north of Highway 64, the inclusion of a *passive-use* satellite park in this area with the proximity to both towns along the Little River

corridor, have the greatest potential to be used as alternate transportation routes. A greenway with buffers along Little River would also serve to reduce flood damage potential and help preserve water quality. It is recommended that the Towns of Wendell and Zebulon development of this area would include a greenway, and *passive-use* satellite park in partnership with Wake County. The Focus would be to create the *passive-use* park area between Johnsons Pond and Hesters Pond, which would act as a central terminus for the greenway along Little River and a proposed Zebulon-Wendell Greenway along portions of an existing powerline easement. The powerline segment of the greenway would start at Old Wilson Road in Wendell and continue east following the powerline corridor until reaching the Barbee Street Extension in Zebulon.

The Little River 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 those developments - emphasizing Wendell and Zebulon water quality issues; second, a successful greenway project would help preserve natural features; third, a greenway would serve as a connection to the out lying Wendell and Zebulon communities and points north and south.

Zebulon-Wendell Greenway



Zebulon-Wendell Greenway

Corridor Description:

The Zebulon-Wendell Greenway along the powerline easement would start at Old Wilson Road in Wendell and continue east using portions of Old Quarry Road until crossing the railroad (at an existing road crossing) and then begin following the powerline corridor until reaching the Barbee Street Extension in Zebulon.

Corridor Objectives:

The most significant contribution that this greenway corridor can make is connectivity. As mentioned earlier, the Wake County Open Space Program places a premium on connecting natural areas and communities. The greenway would preserve wildlife habitat, contribute to water quality and storm water management, and provide a much-needed pedestrian friendly east west connection for the communities of Wendell and Zebulon. In addition to being a perfect connection between towns, it would provide easy access to the Little River Reservoir Park and the residential neighborhoods of Wendell and Zebulon.

Marks Creek

Marks Creek

Corridor Description:

Marks Creek is the fourth longest stream in the study area. Marks Creek flows from north to south, eventually becoming part of the Neuse River south of Knightdale. It begins as a couple of branches just north of Knightdale and Highway 64, and ends at the merge with the Neuse River. Land use along Marks Creek is primarily forested and agricultural. A greenway that would start at Wendell Park and follow the railroad corridor northwest until reaching Eagle Rock Road, and connect to Marks Creek where it terminates at Lake Myra.

Corridor Objectives:

Marks Creek greenway has the potential to serve multiple objectives. The greatest contribution that the greenway corridor can make is connectivity. As

mentioned earlier, the Wake County Open Space Program places a premium on connecting natural areas and communities. A Marks Creek greenway would contribute to water quality and storm water management, and connect the communities of Wendell and Knightdale. In addition, the greenway would provide access to Carver Elementary School in western Wendell and the growing subdivisions of nearby Knightdale. The greenway corridor flows through some of the most rural land between Wendell and Knightdale. This corridor provides a wonderful opportunity to view the uniqueness of the ecological functions of the wetlands and Lake Myra make this a significant corridor.

Buffalo Creek

Buffalo Creek

Corridor Description:

Buffalo Creek is the most ecologically significant creek corridor within the study area, and is divided into two different sections. The southern section would continue north from Liles-Dean Road and the proposed Marks Creek segment in Wendell to Robertson's Pond, and then East Wake High School. This area is noted for its beautiful tracts of remnant cypress forest swamp. This alignment will have to provide access for the greenway for two major roads (Highway 64 and Business 64) and two minor roads (Old Battle Bridge Road and Robertson's Pond Road). The primary land use is agricultural and residential.

Corridor Objectives:

The greatest potential for this creek is its ability to connect Wendell and Knightdale (via Marks Creek Greenway) to East Wake High School and Robertson's Pond, thus contributing to a county wide effort to link Wake County communities. There are sizeable wetlands north and south of Business 64. The ecological functions of the wetlands and associated cypress forest make this a significant corridor. The connection with Rolesville and Wake Forest is a long-term vision of these two corridors. However, a park associated with the wetlands, and cypress forest could serve as an attractive destination for a greenway corridor to view wildlife. Because Robertson's Pond is privately held, and the owners are reluctant to provide public access to the pond, a northern trail would start at the northern tip of Robertson's Pond and continue to Riley Hill Road and Perry Pond. At this point, the greenway will follow a powerline easement north-northeast to Hominy Creek, finally ending near the Little River Reservoir. The powerline easement will be the biggest challenge along with securing private land easements along Hominy Creek and the powerline. While a trail here might not be a high priority short term for Wendell and Zebulon, and Knightdale, the health of Buffalo Creek should be of concern and the eventual connectively to the Little River Reservoir lands and proposed Rolesville greenway system should be considered.

Moccasin Creek

Corridor Description:

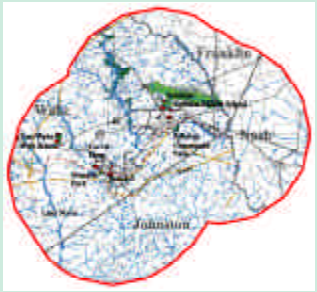
Moccasin Creek flows north to south, within the study area, and constitutes the eastern most stream corridor within the study boundary. The greenway proposed for Moccasin Creek will join the proposed Little Creek Trail Greenway, (which will start at Zebulon Community Park and end at Five County Stadium). The majority of this corridor follows Moccasin Creek and starts from Five County Stadium in Zebulon to Fowler Road. From this point, the trail will continue along

Moccasin Creek

Fowler Road until reaching a small-unnamed creek (at the intersection with Doyle Road) where it will join the Little River Reservoir lands. The primary land use in the area is agricultural and residential.

Corridor Objectives:
Moccasin Creek significance as the only eastern stream in the study area provides a wonderful opportunity for connectivity with Nash and Franklin Counties. Though the long-term vision for Moccasin Creek is connectivity, the establishment of an official corridor will provide protection for wildlife, water quality and the overall scenic beauty from future development.

Beaverdam Creek



Beaverdam Creek
Corridor Description:
Beaverdam Creek flows into Moccasin Creek. The corridor begins east of Highway 39 and its confluence with Moccasin Creek with its end at Old Highway 64 east. From Highway 64 east, the trail would allow users access to downtown and Zebulon Middle and Elementary Schools. Primary land use in this corridor is residential farmland.

Corridor Objectives:
The Beaverdam corridor has the potential to serve multiple objectives. The main objective is connectivity with downtown, Moccasin Creek, and ultimately Zebulon Middle and Elementary Schools. This connection will become important in the future as outlined in the Zebulon Multimodal Transportation Plan. The Beaverdam Creek Corridor is a hidden environmental resource in the northeastern Zebulon area. Establishing a greenway trail will provide the needed connectivity to the Moccasin Creek corridor and Bunn Lake area with downtown. The protection of the scenic land and water quality on Beaverdam Creek and around Moccasin Creek should be vigorously pursued by Zebulon in this corridor and Wake County in the Wake County Open Space Program.

Chapter 4: Implementation Program

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

Phasing Strategy

Phase 1

Phase 1 focuses on the existing infrastructure and on-line planned projects. First, establish stream buffer zones (see pg. 4-5) on the four primary stream corridors: Marks, Buffalo, Little River, and Moccasin. Two secondary stream corridors also merit this action: Beaverdam, and Hominy 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 corridors designation for the Town of Wendell include: Wendell Boulevard, Poole Road, Old Wilson/Morphus Bridge Roads, Marshburn Avenue, Lake Glad Road and Selma Road, and for Zebulon the corridors would be: Morphus Bridge Road/Wakefield Street, Zebulon Road/Arendell Avenue, Riley Hill Road, Old US 64 east, and Green Pace Road. The establishment of these corridors provides a buffer for the scenic viewsheds of Wendell and Zebulon. Establishment of bike routes would also benefit both towns. In Wendell, bike routes would serve Business 64/Mack Todd Road, Selma Road, and Lake Glad Road/Old Wilson Road, by signage and/or bike lanes. In Zebulon, bike routing would complement the Zebulon Multimodal Transportation Plan with routes on Riley Hill Road, Old Highway 64 East, Business 64/Mack Todd Road, Green Pace Road, Morphus Bridge Road, and Horton Street/Chamblee Road, by signage and/or bike lanes. Third, begin establishment of a "Main Street Trail" (Highway 64/Mack Todd Road corridor) thru development of pedestrian and bicycle facilities and a beautification program in both towns. Fourth, establish funding sources for the purchase of easements in these corridors. The Little River corridor is an important piece in the Wendell and Zebulon Greenway Open Space Plan due to its central location between both towns.

Wendell Boulevard

Arendell Avenue (*south*)

Mack Todd/Business 64

Little River Reservoir Park Area near Glory Road

Phase 2

Phase 2 is much broader and involves a number of tasks. The creation of a Little River Reservoir Park (along the northeastern side of the proposed Little River Reservoir; see Open Space and Greenways Map, figure 3-1), which is the focal point of this phase. The Little River Reservoir Park will become an important community amenity for the citizens of Wendell and Zebulon in the future and provide an active/passive recreation park. The park will serve as a central hub for

Zebulon Road (*north*)

Old Quarry Road

Powerline Easement

Existing at-grade RR crossing at Old Quarry Road

Little River near Johnston County Line

Rock outcrop along Little River and Morphus Bridge Road

the Wendell and Zebulon Greenway System. This area will provide the most readily accessible location for the largest amount of local residents, and will have easy access to main Highways 64 and 96 (Zebulon Road). Direct access will be provided off Jack Mitchell Road.

Phase 3

The Zebulon-Wendell Greenway would bridge both towns and be the easiest greenway to develop. The Zebulon-Wendell Greenway Trail will begin at Old Quarry Road and Old Wilson Road in Wendell (near the old Carver Elementary School site), and would continue to a *passive-use* satellite park with connections to the Little River Greenway, and finally providing a connection to Zebulon near Zebulon Community Park. The *passive-use* park concept could be expanded to realize a regional park that could have the possibility of connecting into the future Johnston County Greenway System via the Little River Greenway. In addition, a Nature Trail Loop from Hester Pond, along Little River Greenway Trail, to Lake Johnson could be added. This trail will afford elementary school classes the opportunity to take educational nature walks and provide the Wendell and Zebulon community a shorter trail experience. The benefits the Zebulon-Wendell Greenway Trail will provide are stormwater 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 bypass corridor in eastern Wendell, conversations should begin with NCDOT on providing necessary greenway trail underpasses along the corridor. Development of the Zebulon-Wendell Greenway Trail on the edge of the right of way (ROW) should be explored for the current powerline easement and portions of the railroad ROW as the trail nears Zebulon. The Zebulon-Wendell Greenway Trail provides the opportunity for the two most important greenway trails to be implemented (East/West and Little River). This affords the opportunity to provide the only east west and north-south connection and would be a high profile amenity for Wendell and Zebulon and its surrounding southern neighborhoods.

Phase 4

This phase includes the Little River corridor. This greenway will be the longest corridor in the greenway system. The greenway will start near the Johnston County line and continue north until reaching the proposed Little River Reservoir Lands just past Highway 64. There are two scenarios when the greenway reaches the reservoir, a single tract greenway that would shirt the east shore of the reservoir (linking into the Little River Reservoir Park), and a loop trail that would encircle the reservoir. The loop trail would also provide connections to the western greenway trails along Hominy Creek and the proposed Rolesville greenway that begins at Mitchell Mill Park. In the southern reaches of the greenway, (below Highway 64), the inclusion of Hester Pond and Lake Johnson (along with the recent acquisition of land around Tarpleys Mill Pond) will provide a natural educational learning experience for the area schools as well as a focal point for the Little River Greenway Trail. The highlight of this section will be to show the

history of the creek and the various significant ecosystems. The trail will skirt the fragile natural areas of the creek while allowing a passive recreational greenway to provide access to the Zebulon-Wendell Greenway and Johnston County to the south.

Phase 5

Phase five involves development of the Moccasin Creek Greenway Trail. The Greenway Trail will provide an alternative transportation connection from Zebulon Community Park to Five County Stadium, and ultimately Nash and Franklin Counties. This will require cooperation and on going coordination with the Town of Zebulon, Wake, Nash, and Franklin Counties. In addition, this corridor affords the opportunity to protect some of the pristine land located in northeastern Zebulon. The Moccasin Creek Greenway Trail would begin near Five County Stadium, and continue north along the Moccasin Creek corridor, contend with crossings at Highway 39, and 97, until reaching Bunn Lake. If access were not possible for a Bunn Lake shoreline trail, then the trail would start again at Old Highway 64 East continuing north until reaching Fowler Road. The trail would continue south along the road right-of-way until reaching a small tributary (south of Carpenter Road) of the Little River just south of Zebulon Road and Fowler Road intersection before ending at the Little River. This trail will provide possible future link to Nash and Franklin Counties, while giving northeast Zebulon residents an access to the Little River Reservoir Lands.

Moccasin Creek

Beaverdam Corridor

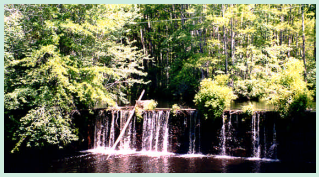
Phase 6

This phase would use the Beaverdam Creek corridor. The trail will start at the Highway 39 crossing, and will provide a link east to the Moccasin Creek Greenway, and ultimately a northwestern connection to downtown Zebulon, and Zebulon Elementary and Middle Schools. The corridor will need to cross Parks Village Road, Highway 64, and will end at Old Highway 64 East. The trail will continue south into downtown Zebulon from this point using a combination of bike routes and sidewalks. It is recommended that the sidewalk system proposed by the ZMT Plan would extend north along Highway 64 East to Tippett Road. This will allow the Beaverdam Creek Greenway easy access to the downtown areas. This trail will afford school classes the opportunity to take educational nature walks and provide the Zebulon community link to the Moccasin Creek Greenway and the Little River Reservoir Lands.

Buffalo Creek at Old Battle Bridge Road

Phase 7

Phase seven involves development of the Buffalo Creek Greenway Trail. The Buffalo Creek Greenway Trail will provide an alternative transportation connection from Wendell to East Wake High School, Robertson's Pond, Knightdale, and ultimately the Little River Greenway via a Town of Rolesville Greenway system along Cedar Fork Creek. This will require cooperation and on going coordination with the Town of Knightdale, Rolesville and Wake County. In addition, this corridor affords the opportunity to protect some of the pristine land in located in northwestern Wendell. The Buffalo Creek Greenway Trail would begin at Wendell Park, cross at the railroad and will cross six roads (Old Battle Bridge Road, Wendell Boulevard, Highway 64, Robertson Pond Road, Riley Hill School Road, Riley Hill Road, and Mitchell Mill Road), before connecting into the Rolesville



Robertson's Mill Pond


Knightdale Eagle Rock Road


Lake Myra


Marks Creek


Riley Hill Road


Hominy Creek

Greenway System. If the railroad corridor is not feasible, the greenway could also continue north along Buffalo Creek to Old Battle Bridge Road where it would continue along this road until reaching Knightdale Eagle Rock Road and an unnamed tributary of Marks Creek to the south.

Phase 8

Phase eight involves development of the Marks Creek Greenway Trail. The Marks Creek Greenway Trail will provide an alternative transportation connection from Wendell to Knightdale, and ultimately the Neuse River via Mingo Creek. This will require cooperation and on going coordination with the Town of Knightdale and Wake County. In addition, this corridor affords the opportunity to protect some of the pristine land in located in western Wendell. The Marks Creek Greenway Trail would begin at Wendell Park and use portion of the Buffalo Creek corridor, cross Buffalo Creek at the railroad and continue following the railroad corridor until reaching Marks Creek, and then end at Lake Myra. If the railroad corridor is not feasible, the greenway could also continue north along Buffalo Creek to Old Battle Bridge Road where it would continue along this road until reaching Knightdale Eagle Rock Road and an unnamed tributary of Marks Creek to the south.

Phase 9

Phase nine establishes two satellite parks and develops their facilities. Both of the parks will be passive recreation areas designed for wildlife watching and picnic activities. Little River Reservoir Park located along the northeastern side of the Little River Reservoir, could be developed to have active recreation. The Little River Reservoir Park concept would complete the triangle (Little River Reservoir Park, Wendell Park, and Zebulon Community Park) of active use parks in the study area. One park would be located on northern Moccasin Creek (with the potential to share with Franklin County), and one on Hominy Creek. Both areas contain large wetland areas, which will provide wildlife protection, wildlife viewing, water quality and storm water management. The park near Hominy Creek lies between Hominy Creek to the north, Lizard Lick Road to the west, Little River to the east, and Riley Hill Road to the south. This park will be adjacent to the Triangle Land Conservancy “The Rocks Natural area”. The focus will be designed around the granitic rock (Rolesville Pluton) featuring one of the largest examples of this natural phenomenon.

A satellite park at Moccasin Creek would provide a much-needed northeastern passive recreational area for the study area. There are large wetland areas associated in the upper reaches of Moccasin Creek, which provide wildlife protection, wildlife viewing opportunities, and educational opportunities for enhancing water quality and storm water management. Because of the location of this park on the boundary of Wake and Franklin Counties, cooperation between the two counties will be paramount. Buffalo Creek and Little River have the most potential for future opportunities for Wendell and Zebulon to establish greenways, however, Marks Creek, Hominy Creek, Moccasin Creek, and Beaverdam Creek could present opportunities sooner than expected depending on funding opportunities, development, and desired connectivity.

All of the parks (existing and proposed) will serve as destination points for the greenway system and provide opportunities to preserve the surrounding beauty, enhance the quality of life, and establish community-gathering places.

Water Quality Buffers

It should be mentioned here the importance of establishing a stream buffer zone for all identified stream corridors in this plan. In establishing these buffers the Neuse River rules for buffers should be followed as a minimum in all cases. This requires that all 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[1]. 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 such as Cary, North Carolina have expanded the buffer recommendations of the Neuse Rules to a 100 foot buffer on all perennial streams, and 50 feet on all intermittent streams. These are taken from the latest version of the USGS 7.5 minute topographic quadrangle for each watershed and/ or stream corridor.

Buffer Recommendations

Because of the potential for further stream and water quality degradation in the stream corridors found within the study area and beyond, we recommend that the towns of Wendell and Zebulon go beyond the Neuse and Cary buffer rules, and require a variable-width 100 foot buffer on both perennial and intermittent streams, lakes, and ponds. This requirement is especially important in the Little River and Buffalo Creek corridors. Studies have shown that the greater the minimum buffer width, the greater the margin of safety in terms of water quality and habitat preservation. Without considering terrestrial habitat, most recommendations for minimum buffer widths range from 15 m (~50 ft) to 30 m (~100 ft)[2] A variable-width buffer will meet or exceed many buffer width recommendations, and therefore should ensure high water quality and support good habitat for native aquatic organisms. This buffer option has the added advantage of being flexible (see options one and two below), and is defensible because it is based on scientific fact and proven public policy (Wenger at.al., 2000).

Variable-Width Buffer Types

<u>Option One:</u>

- Base width: 100 ft (30.5 m) plus 2 ft (0.61 m) per 1% of slope.
- Extend to edge of floodplain.
- Include adjacent wetlands. The buffer width is extended by the width of the wetlands, which guarantees that the entire wetland and an additional buffer are protected.
- Existing impervious surfaces in the riparian zone do not count toward buffer width (i.e., the width is extended by the width of the impervious surface, just as for wetlands).
- Slopes over 25% do not count toward the width.
- The buffer applies to all perennial, intermittent and ephemeral streams.

Option Two:
The same as Option One, except:
• Base width is 50 ft (15.2 m) plus 2 ft (0.61 m) per 1% of slope.
• Entire floodplain is not necessarily included in buffer, although potential sources of severe contamination be excluded from the floodplain.
• Ephemeral streams are not included; affected streams are those that appear on US Geological Survey 1:24,000 topographic quadrangles. Alternatively, the buffer can be applied to all perennial streams plus all intermittent streams of second order or larger.

Figure 1. shows an example of how Option Two can be applied to a theoretical riparian landscape.
All of the buffer options described will provide habitat for many terrestrial wildlife species. However, significantly wider buffers are necessary to provide habitat for

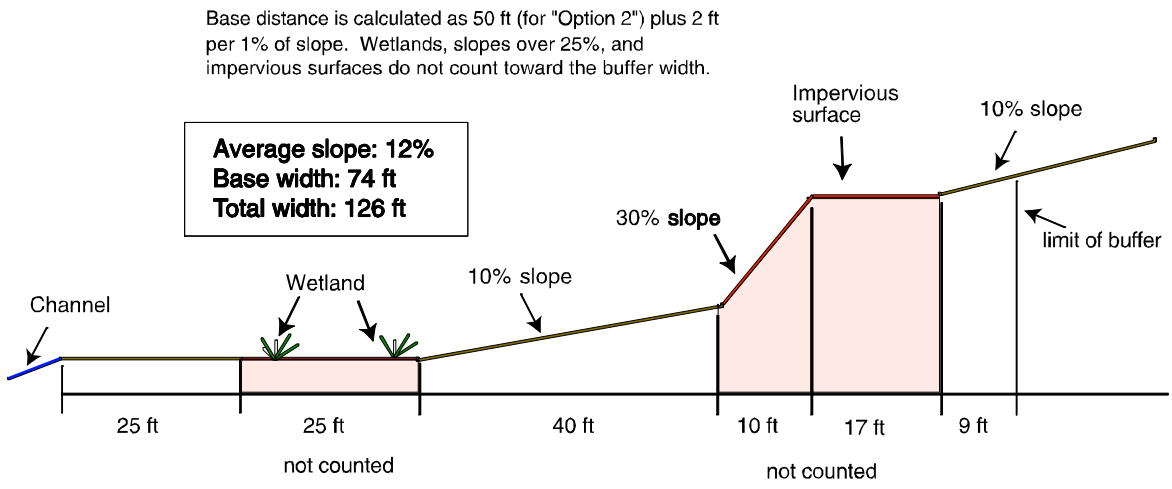


Figure 10. Example of the Application of Buffer Guidelines to a Hypothetical Riparian Landscape.

Base distance is calculated as 50 ft (for "Option 2") plus 2 ft per 1% slope. Wetlands, slopes over 25%, and impervious surfaces do not count toward the buffer width.

forest interior species, many of which are species of special concern. The most common recommendation in the literature on wildlife (most of which focuses on birds) is for a 100 m (300 ft) riparian buffer. Although this is not practical in many cases, local governments should preserve at least some riparian tracts of 300 foot width or greater. Identification of these areas should be part of an overall, county-wide wildlife protection plan.

Activities Prohibited in the Buffer

As a general rule, all sources of contamination should be excluded from the buffer. These include:

- land disturbing activities
- impervious surfaces
- logging roads
- mining
- septic tank drain fields
- agricultural fields
- waste disposal sites
- application of pesticides and fertilizer (except as necessary for buffer restoration)
- livestock

One exemption to this list that Wendell and Zebulon may wish to consider is construction of a single family home. If Wendell and Zebulon choose to develop ordinances more stringent than the minimum standards, they may also wish to make this exemption.

The Three-Zone Buffer System

A three-zone riparian buffer system has been used for agricultural areas to allow some limited use of riparian land while preserving buffer functionality (Welsch 1991). Zone one, which extends from the bank to 15 ft (4.6 m) within the buffer, is undisturbed forest. Zone two is a managed forest, beginning 15 ft (4.6 m) from the bank and extending to 75 ft (22.9 m). Periodic harvesting and some disturbance is acceptable within this zone. Zone 3 is a grassed strip, beginning 75 ft (22.9 m) from the bank and extending to the buffer's edge at 95 ft (29.0 m). Controlled grazing and mowing may be permitted in this zone. While the three-zone system represents a good compromise for buffers on agricultural land, it introduces an added level of complexity to any buffer ordinance, and may not be needed, especially if a variable-width system is used. Wendell and Zebulon may want to encourage the three-zone system as a voluntary practice on agricultural lands. Additional information is available from the Natural Resources Conservation Service for this type of system.

Greenway Trail Types

Important issues for the Town's to consider while designing greenway facilities are the surface types of trails and the width of trails, which not only governed by cost, but also by environmental impact issues. These variables will greatly affect the cost of installing and maintaining this system. As an example, when determining the width of greenways each 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 multi-use facility that also provides bicycle use. This width 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.

Several different surface types could be used to build the Wendell and Zebulon 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. A durable, flexible pavement surface 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 easy to install and inexpensive, 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 Wendell and Zebulon Open Space and Greenway Master 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 longer-range actions, principally that 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 later. 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) Objective: Establish Little River Reservoir Park

A) Initiate acquisition of adjacent land
B) Implement Nature Trail Loop

IV) Objective: Develop multi-purpose recreational trails

A) Acquire land for Zebulon-Wendell Greenway between towns
B) Acquire property for regional trail heads and a water quality demonstration project along Little River Corridor

V) 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

VI) Objective: Restore natural areas

A) Implement restoration and selected demonstration projects
B) Protect streambanks and complete stream bank stabilization projects using environmentally friendly bioengineering techniques along creeks in areas, which have the greatest erosion

VII) 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 land trails along Little River, Buffalo Creek, Hominy Creek, Moccasin Creek and Beaverdam Creek
B) Acquire property for regional trail heads
C) Encourage coordination with developers on trail improvement opportunities
D) Implement multiple use trail heads
E) Implement signage program
F) Install vegetative screening to shield selected land uses

II) Objective: Establish three satellite parks

A) Between Hester Pond and Johnsons Pond along the Little River , Wendell-Zebulon Little River Park.
B) Lake Myra Park
C) Hominy Creek Park
D)Stadium Park
E) Moccasin Creek Park
F) 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

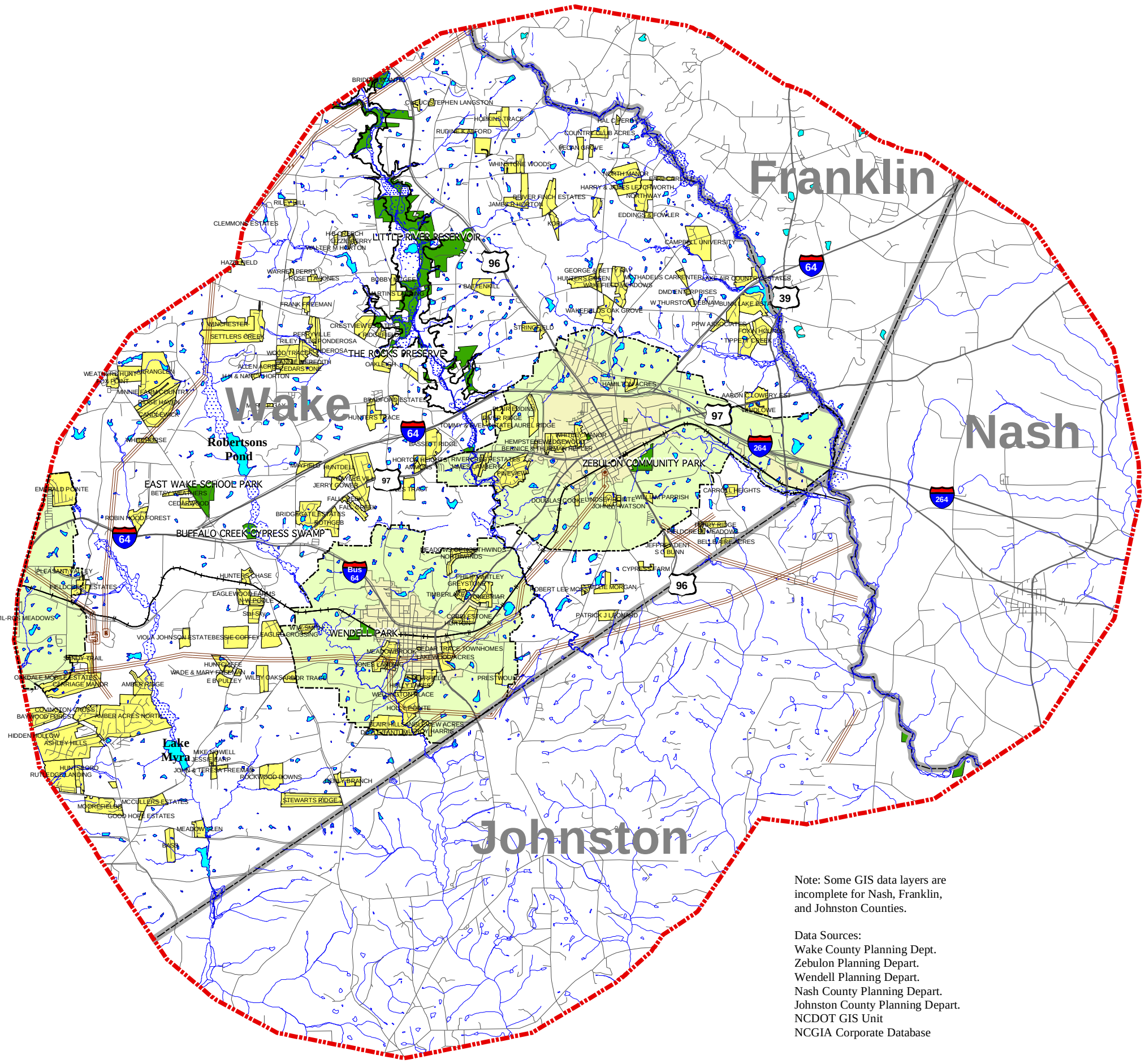
NOTES:

1. (The North Carolina Environmental Management Commission (EMC) has established the goal of reducing the average annual load of nitrogen delivered to the Neuse River Estuary from point and non-point sources by a minimum of 30%. The Neuse rules were developed to achieve this nitrogen reduction goal. They are now law.* for a copy of the rules, contact the state Division of Water Quality at 919 733-5083, extension 558, or http://h2o.enr.state.nc.us/nps/neuse.htm).

2. (S. Wenger and L. Fowler, 2000. Protecting Stream and River Corridors: Creating Effective Local Riparian Buffer Ordinances. pp.(9), The Carl Vinson Institute of Government, University of Georgia. USA).

Wendell & Zebulon Open Space and Greenway Vision

Extra Territorial Limits (ETJ), Corporate Limits and Existing Subdivisions



Note: Some GIS data layers are incomplete for Nash, Franklin, and Johnston Counties.

Data Sources:
Wake County Planning Dept.
Zebulon Planning Depart.
Wendell Planning Depart.
Nash County Planning Depart.
Johnston County Planning Depart.
NCDOT GIS Unit
NCGIA Corporate Database

Extra Territorial Jurisdication (ETJ), Corporate Limits, and Existing Wake County Subdivisions

Prepared for:

Town of Zebulon
North Carolina

Town of Wendell

Prepared by:

Spring 2002

N
W E
S

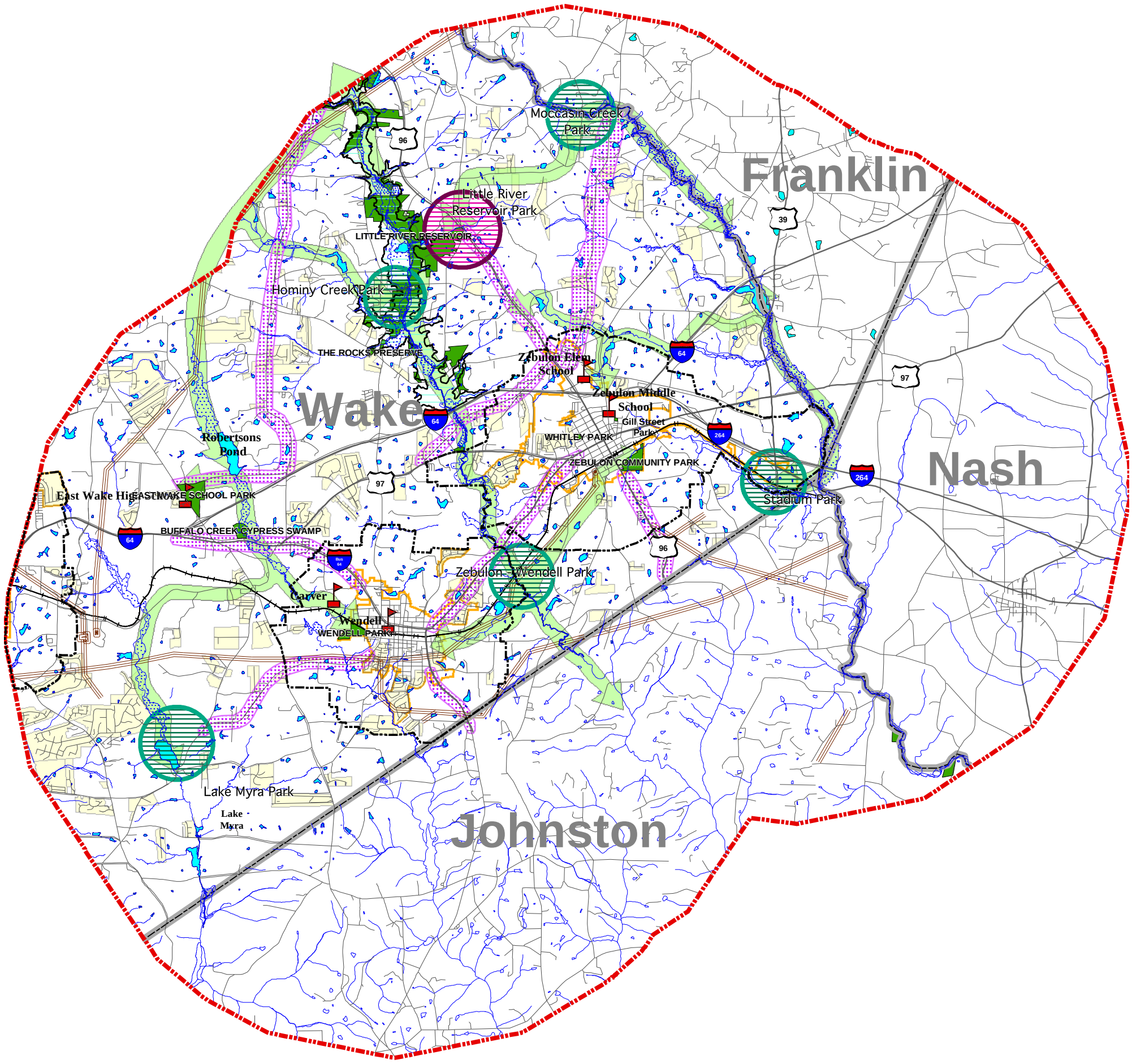
0 1 Miles

Legend

- Study Boundary
- Countylines
- Streams & Creeks
- Ponds & Lakes
- ETJ Limits
- Corporate Limits
- Existing Subdivision
- Railroads
- Powerlines
- Roads
- Highways
- Schools
- Proposed Trailhead
- Proposed Little River Reservoir
- Existing Open Space & Parks

Wendell & Zebulon Open Space and Greenway Vision

Proposed Parks, Protected Corridors, and Scenic Road Corridors



Proposed Parks, Protected Corridors, and Scenic Road Corridors

Prepared for:

Town of Zebulon
North Carolina

Town of Wendell
North Carolina

Prepared by:

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

Data Sources:
Wake County Planning Depart.
Zebulon Planning Depart.
Wendell Planning Depart.
NCDOT GIS Unit
NCGIA Corporate Database (GIS)

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W E
S

Spring 2002

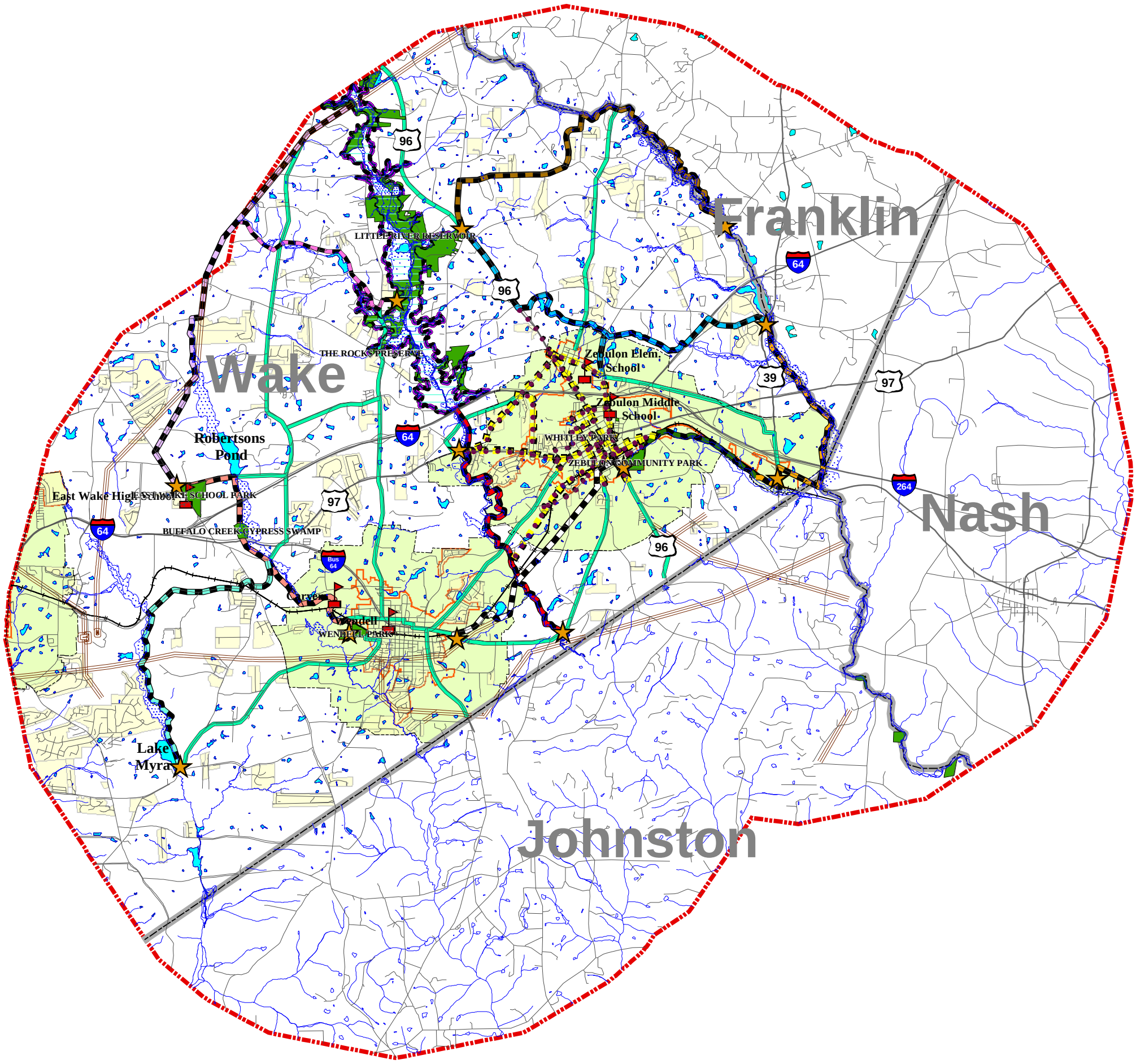
0 1 Miles

Legend

- Study Boundary
- Countylines
- Streams & Creeks
- Ponds & Lakes
- ETJ Limits
- Corporate Limits
- Existing Subdivision
- Proposed Little River Reservoir
- Existing Open Space & Parks
- Railroads
- Powerlines
- Roads
- Highways
- Schools
- Proposed Scenic Road Corridors
- Proposed Protected Corridors
- Proposed Little River Reservoir Park (Passive & Active)
- Proposed Satellite Parks (Passive)

Wendell & Zebulon Open Space and Greenway Vision

Proposed Greenways, Bike Routes and Sidewalks



Proposed Greenways, Bike Routes and Sidewalks

Prepared for:

Town of Zebulon
North Carolina

Town of Wendell
North Carolina

Prepared by:

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

Data Sources:
Wake County Planning Depart.
Zebulon Planning Depart.
Wendell Planning Depart.
NCDOT GIS Unit
NCGIA Corporate Database (GIS)

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Spring 2002

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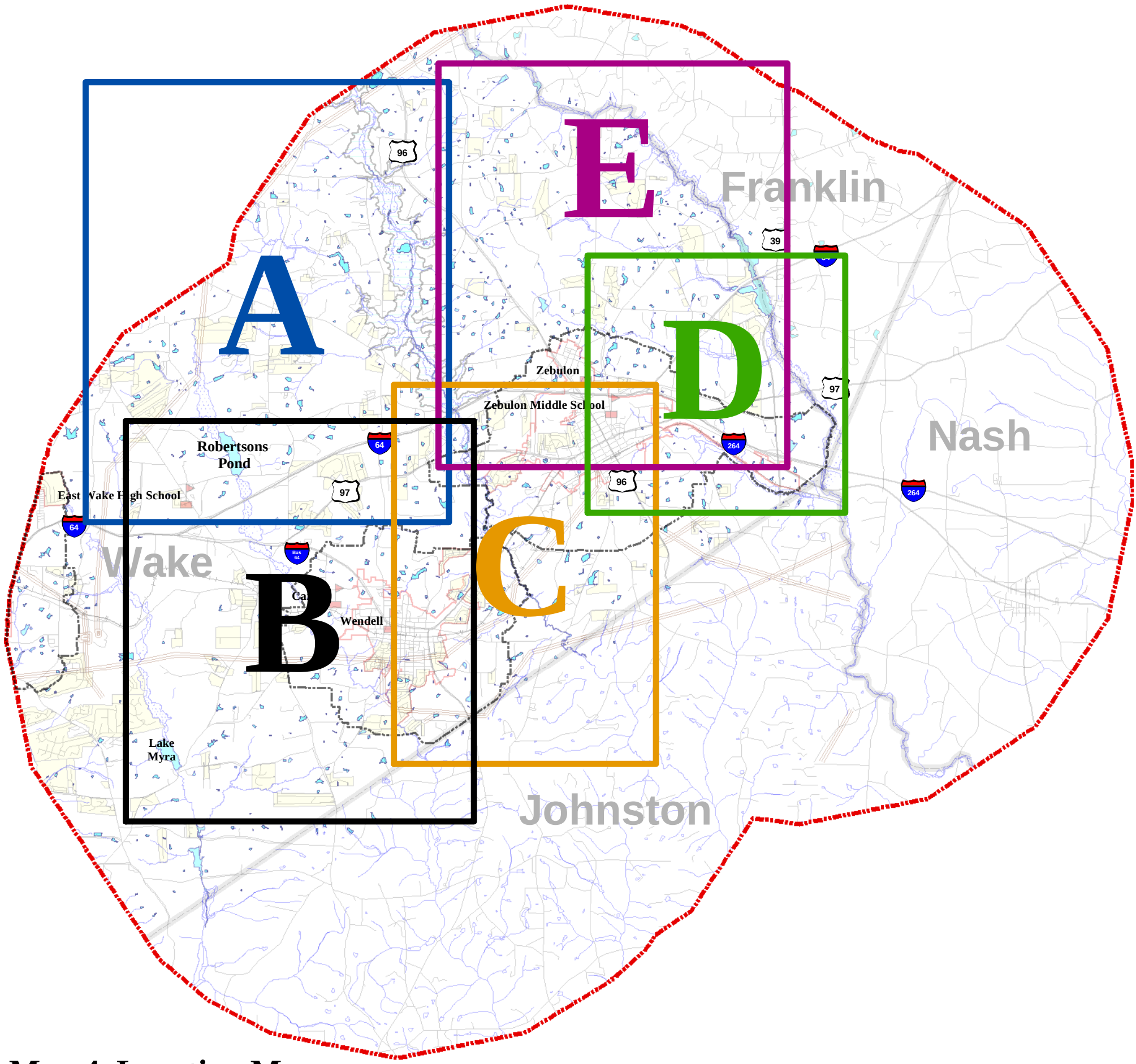
Legend

- Study Boundary
- Countylines
- Streams & Creeks
- Ponds & Lakes
- ETJ Limits
- Corporate Limits
- Existing Subdivision
- Railroads
- Powerlines
- Roads
- Highways
- Schools
- Proposed Little River Reservoir
- Proposed East/West Greenway
- Proposed Lower Buffalo Greenway
- Proposed Upper Buffalo Creek Greenway
- Proposed Hominy Creek Greenway
- Proposed Little River Greenway
- Existing Zebulon Greenway
- Upper Moccasin Creek Greenway
- Beaverdam Creek Greenway
- Lower Moccasin Creek Greenway
- Marks Creek Greenway
- Sidewalks Proposed Zebulon Multi-Modal Transporation Plan 2001
- Bike Routes Proposed Zebulon Multi-Modal Transporation Plan 2001
- Proposed Bikes Routes and Sidewalk Connectors
- Proposed Trailhead
- Existing Open Space & Parks

Wendell & Zebulon Open Space and Greenway Vision

Proposed Parks, Protected Corridors, and Scenic Road Corridors



Map 4. Location Map

Prepared for:

Town of Zebulon
North Carolina

Town of Wendell
North Carolina

Prepared by:

GREENWAYS
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Landscape Architecture
Multi-Objective Trail Planning
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Spring 2002

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Legend

- Study Boundary
- Countylines
- Streams & Creeks
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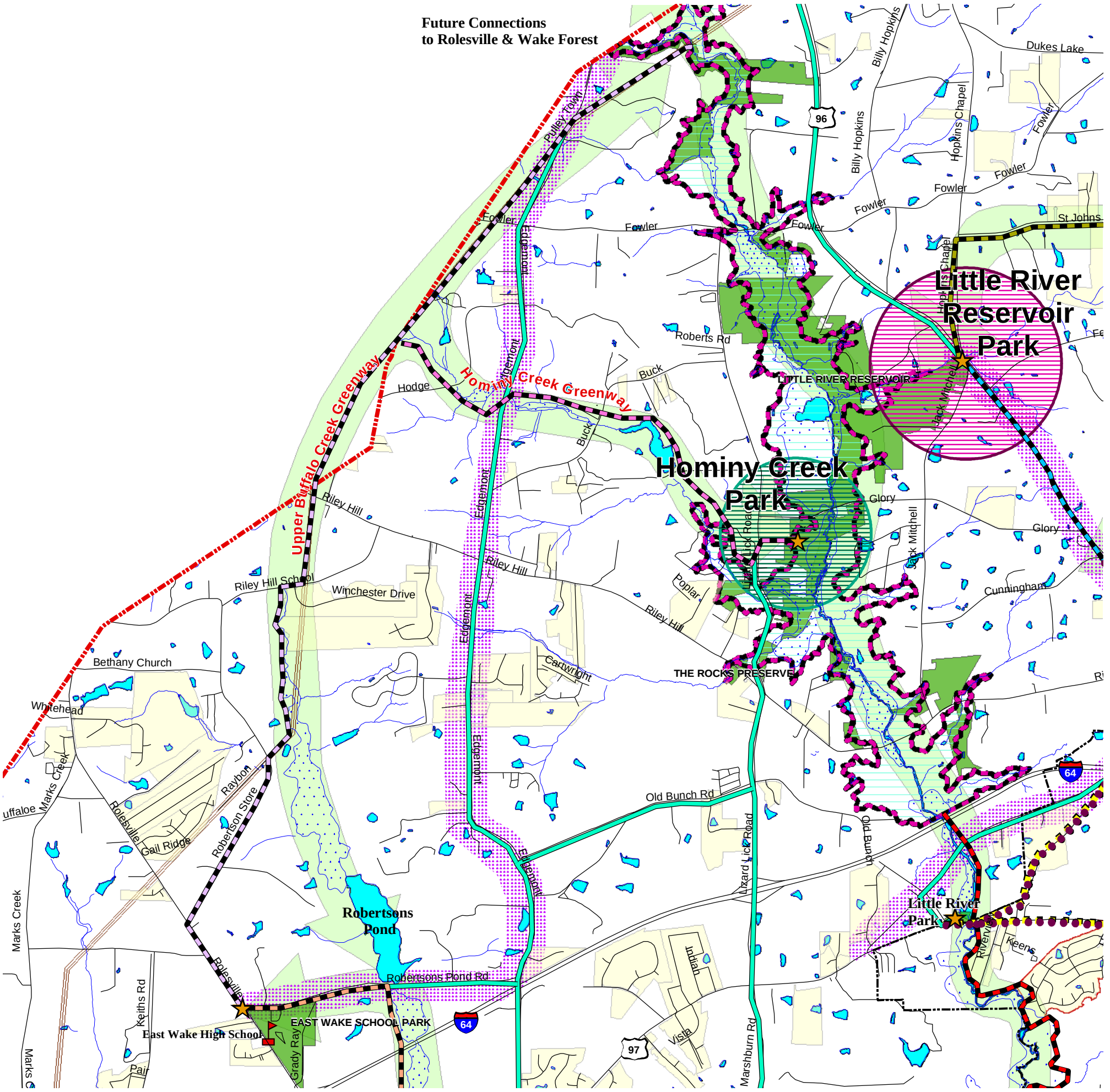
- ETJ Limits
- Corporate Limits
- Existing Subdivision
- Schools
- Proposed Little River Reservoir
- Existing Open Space & Parks
- Railroads
- Powerlines
- Roads
- Highways

Proposed Open Space, Trails, and Connectors Location Maps

- **A** Hominy Creek Greenway, Upper Buffalo Creek Greenway, and Little River Reservoir Greenway.
- **B** Marks Creek Greenway and Lower Buffalo Creek Greenway.
- **C** Little River Greenway and Zebulon-Wendell Greenway.
- **D** Beaverdam Creek Greenway and Lower Moccasin Greenway.
- **E** Upper Moccasin Creek Greenway and Clarks Creek Greenway

Wendell & Zebulon Open Space and Greenway Vision

Proposed Open Space, Trails and Connectors



Location Map A. Hominy Creek and Upper Buffalo Creek Greenways

Prepared for:

Town of Zebulon
North Carolina

Town of Wendell
North Carolina

Prepared by:

GREENWAYS
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Landscape Architecture
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Spring 2002

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Legend

- Study Boundary
- Countylines
- Streams & Creeks
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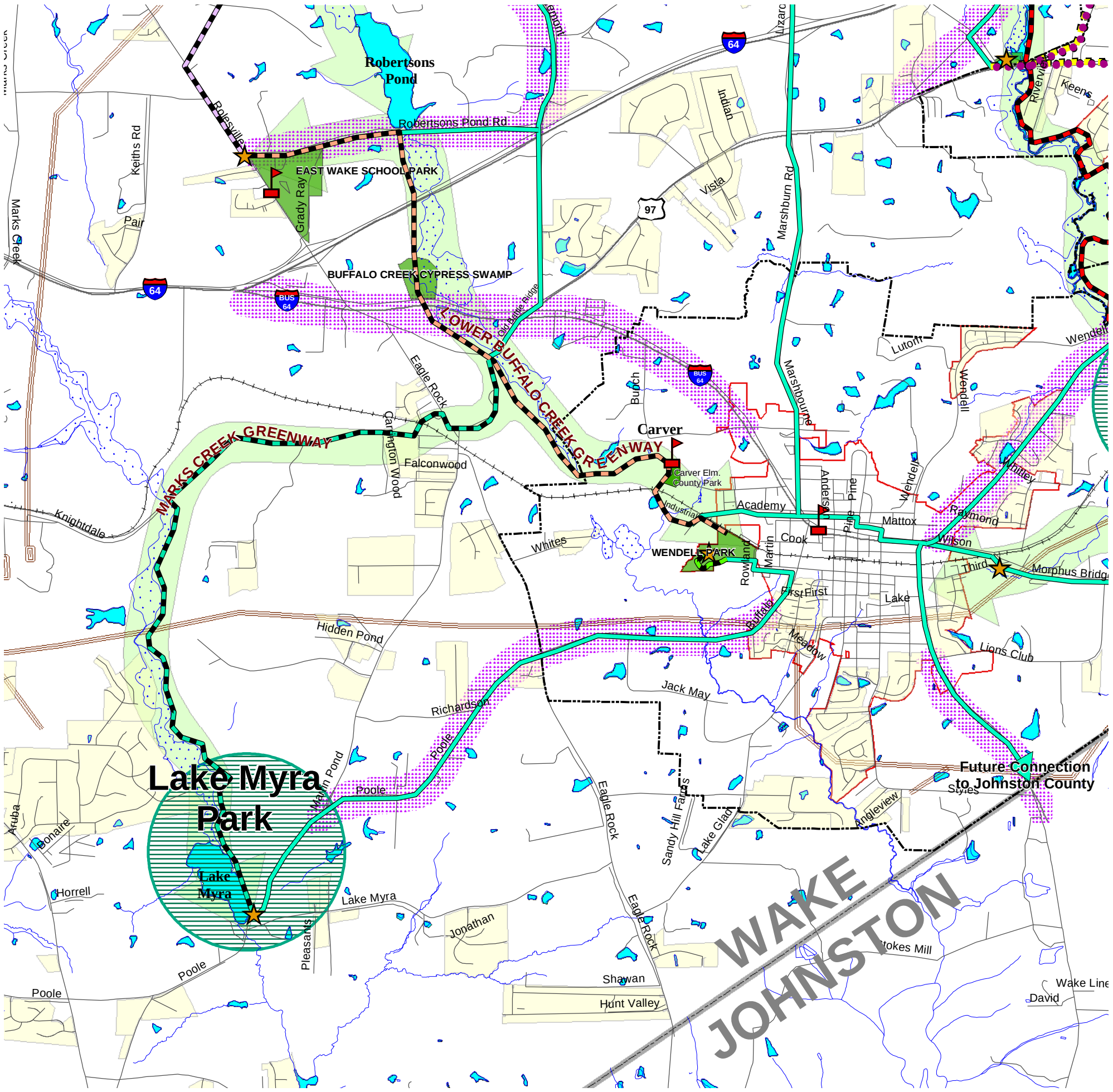
- ETJ Limits
- Corporate Limits
- Existing Subdivision
- Schools
- Existing Open Space & Parks
- Railroads
- Powerlines
- Roads

Proposed Open Space, Trails, and Connectors.

- Proposed Bikes Routes and Sidewalk Connectors
- Proposed Trailhead
- Proposed Upper Buffalo Creek Greenway
- Proposed Hominy Creek Greenway
- Proposed Little River Reservoir Greenway
- Proposed Little River Greenway
- Proposed Lower Buffalo Creek Greenway
- Proposed Little River Reservoir Park
- Proposed Hominy Creek Park
- Proposed Little River Reservoir
- Proposed Protected Corridors
- Proposed Scenic Road Corridors
- Sidewalks Proposed Zebulon Multi-Modal Transporation Plan 2001
- Bike Routes Proposed Zebulon Multi-Modal Transporation Plan 2001

Wendell & Zebulon Open Space and Greenway Vision

Proposed Open Space, Trails and Connectors



Location Map B. Lower Buffalo Creek and Marks Creek Greenways

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Town of Wendell
North Carolina

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Legend

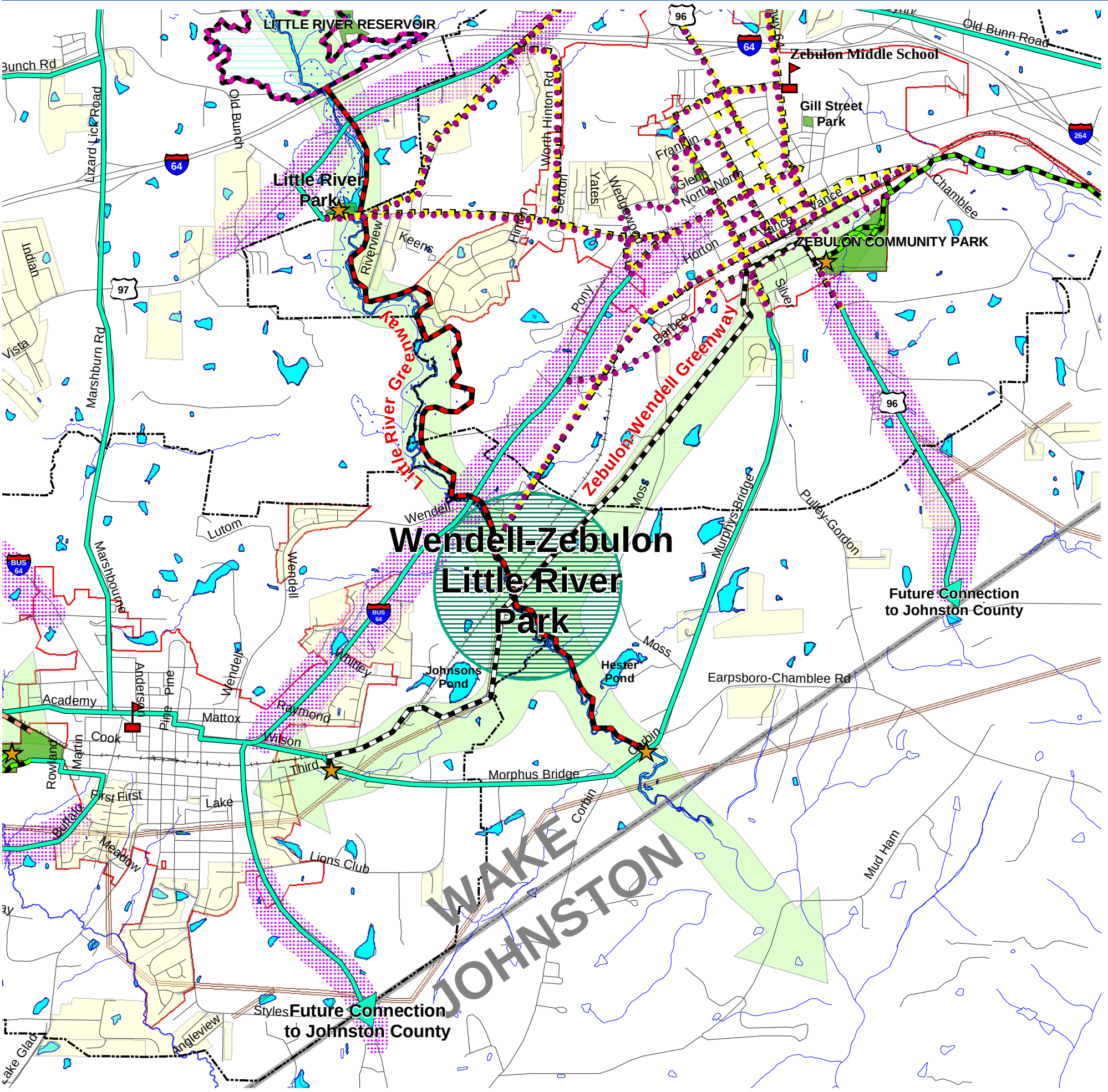
- Study Boundary
- Countylines
- Streams & Creeks
- Ponds & Lakes
- ETJ Limits
- Corporate Limits
- Existing Subdivision
- Schools
- Existing Open Space & Parks
- Railroads
- Powerlines
- Roads

Proposed Open Space, Trails, and Connectors.

- Proposed Bikes Routes and Sidewalk Connectors
- Proposed Trailhead
- Proposed Marks Creek Greenway
- Proposed Lower Buffalo Creek Greenway
- Proposed Upper Buffalo Creek Greenway
- Proposed Little River Greenway
- Sidewalks Proposed Zebulon Multi-Modal Transporation Plan 2001
- Bike Routes Proposed Zebulon Multi-Modal Transporation Plan 2001
- Proposed Lake Myra Park
- Proposed Little River Reservoir
- Proposed Protected Corridors
- Proposed Scenic Road Corridors

Wendell & Zebulon Open Space and Greenway Vision

Proposed Open Space, Trails and Connectors



Location Map C. Little River and Zebulon-Wendell Greenways

Prepared for:

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North Carolina

Town of Wendell
North Carolina

Prepared by:

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Landscape Architecture
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Open Space Planning

Data Sources:
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Wendell Planning Depart.
NCDOT GIS Unit
NCGIA Corporate Database (GIS)

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Spring 2002

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Legend

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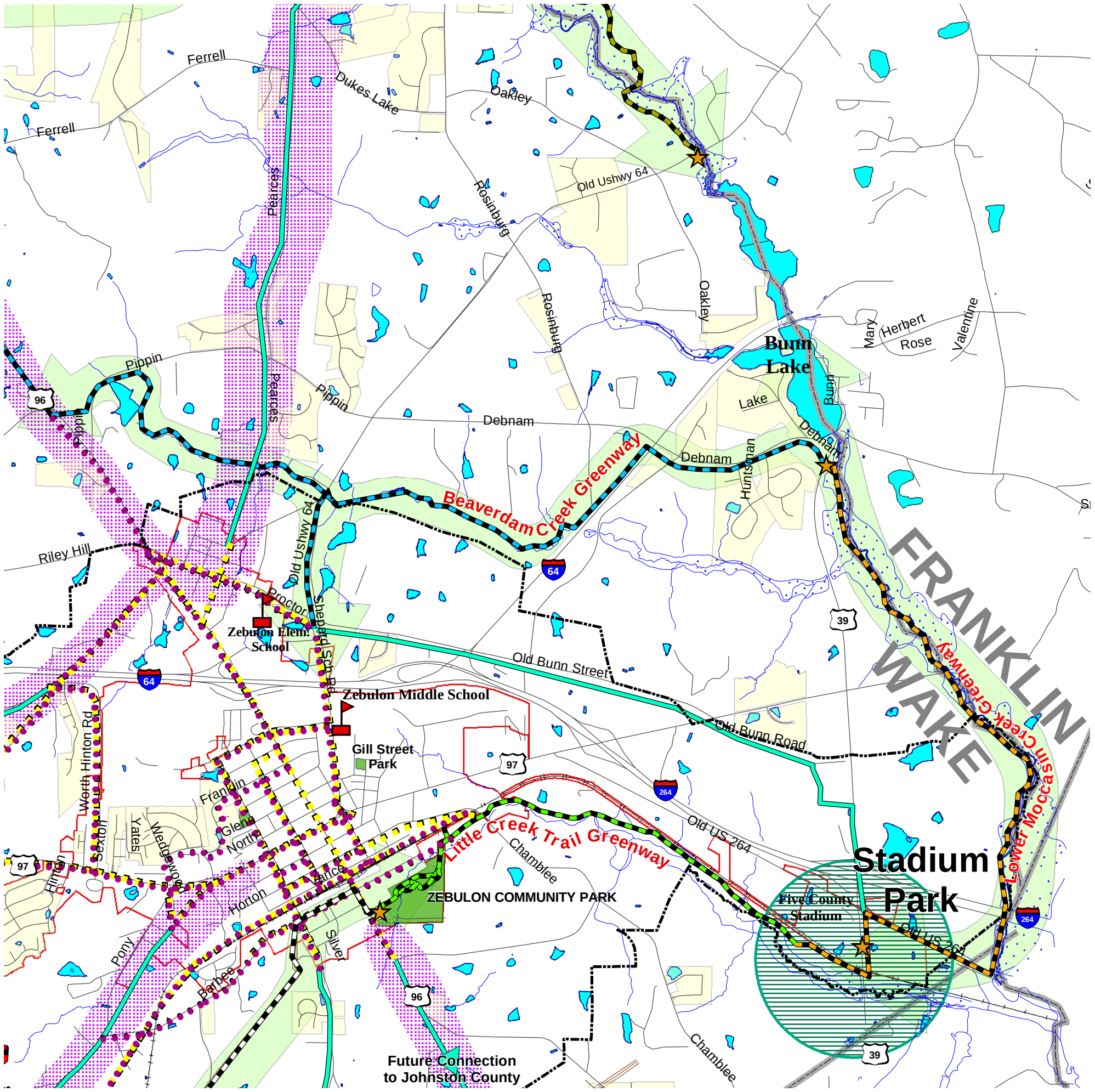
- Corporate Limits
- Existing Subdivision
- Schools
- Existing Open Space & Parks
- Railroads
- Powerlines
- Roads

Proposed Open Space, Trails, and Connectors.

- Proposed Bikes Routes and Sidewalk Connectors
- Proposed Trailhead
- Proposed Zebulon-Wendell Greenway
- Proposed Little Creek Trail Greenway
- Proposed Little River Reservoir Greenway
- Proposed Little River Greenway
- Proposed Zebulon-Wendell Little River Park
- Proposed Little River Reservoir
- Proposed Protected Corridors
- Proposed Scenic Road Corridors
- Bike Routes Proposed Zebulon Multi-Modal Transporation Plan 2001
- Sidewalks Proposed Zebulon Multi-Modal Transporation Plan 2001

Wendell & Zebulon Open Space and Greenway Vision

Proposed Open Space, Trails and Connectors



Location Map D. Little Creek, Beaverdam Creek, and Lower Moccasin Creek Greenways

Prepared for:

Town of Zebulon
North Carolina

Town of Wendell
North Carolina

Prepared by:

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INCORPORATED
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Multi-Objective Trail Planning
Open Space Planning

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Wendell Planning Depart.
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NCGIA Corporate Database (GIS)

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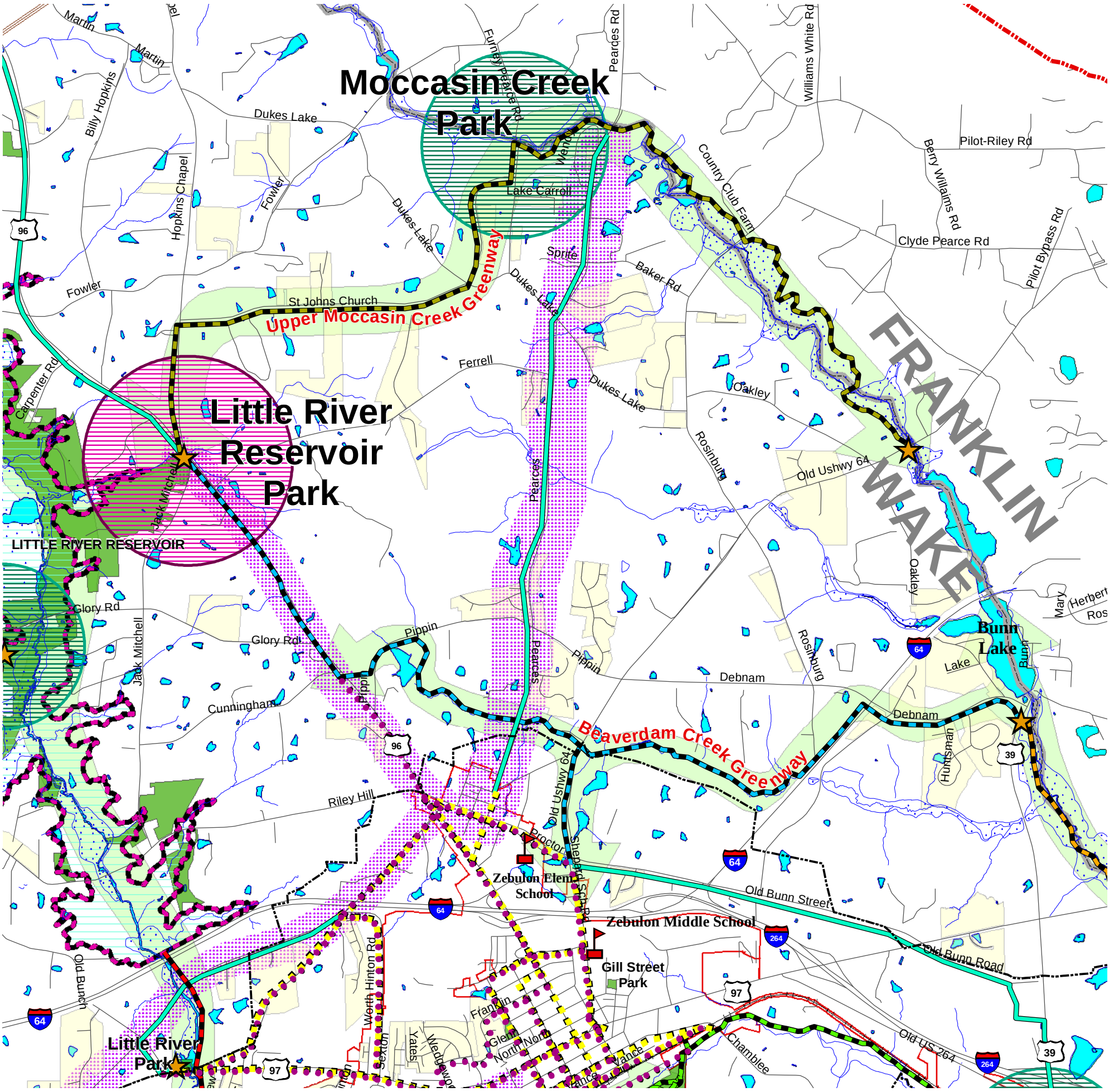
- Ponds & Lakes
- ETJ Limits
- Corporate Limits
- Existing Subdivision
- Schools
- Existing Open Space & Parks
- Railroads
- Powerlines
- Roads

Proposed Open Space, Trails, and Connectors.

- Proposed Bikes Routes and Sidewalk Connectors
- Proposed Trailhead
- Proposed Zebulon-Wendell Greenway
- Proposed Beaverdam Creek Greenway
- Proposed Upper Moccasin Creek Greenway
- Proposed Lower Moccasin Creek Greenway
- Proposed Little Creek Trail Greenway
- Proposed Stadium Park
- Proposed Little River Reservoir
- Proposed Protected Corridors
- Proposed Scenic Road Corridors
- Sidewalks Proposed Zebulon Multi-Modal Transporation Plan 2001
- Bike Routes Proposed Zebulon Multi-Modal Transporation Plan 2001

Wendell & Zebulon Open Space and Greenway Vision

Proposed Open Space, Trails and Connectors



Location Map E. Beaverdam Creek, and Upper Moccasin Creek Greenways

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Town of Wendell
North Carolina

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Multi-Objective Trail Planning
Open Space Planning

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Wendell Planning Depart.
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Legend

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- Ponds & Lakes
- ETJ Limits
- Corporate Limits
- Existing Subdivision
- Schools
- Existing Open Space & Parks
- Railroads
- Powerlines
- Roads

Proposed Open Space, Trails, and Connectors.

- Proposed Bikes Routes and Sidewalk Connectors
- Proposed Trailhead
- Proposed Upper Moccasin Creek Greenway
- Proposed Beaverdam Creek Greenway
- Proposed Little River Reservoir Greenway
- Proposed Little Creek Trail Greenway
- Proposed Lower Moccasin Creek Greenway
- Proposed Little River Reservoir Park
- Proposed Moccasin Creek Park
- Proposed Little River Reservoir
- Proposed Protected Corridors
- Proposed Scenic Road Corridors
- Sidewalks Proposed Zebulon Multi-Modal Transporation Plan 2001
- Bike Routes Proposed Zebulon Multi-Modal Transporation Plan 2001