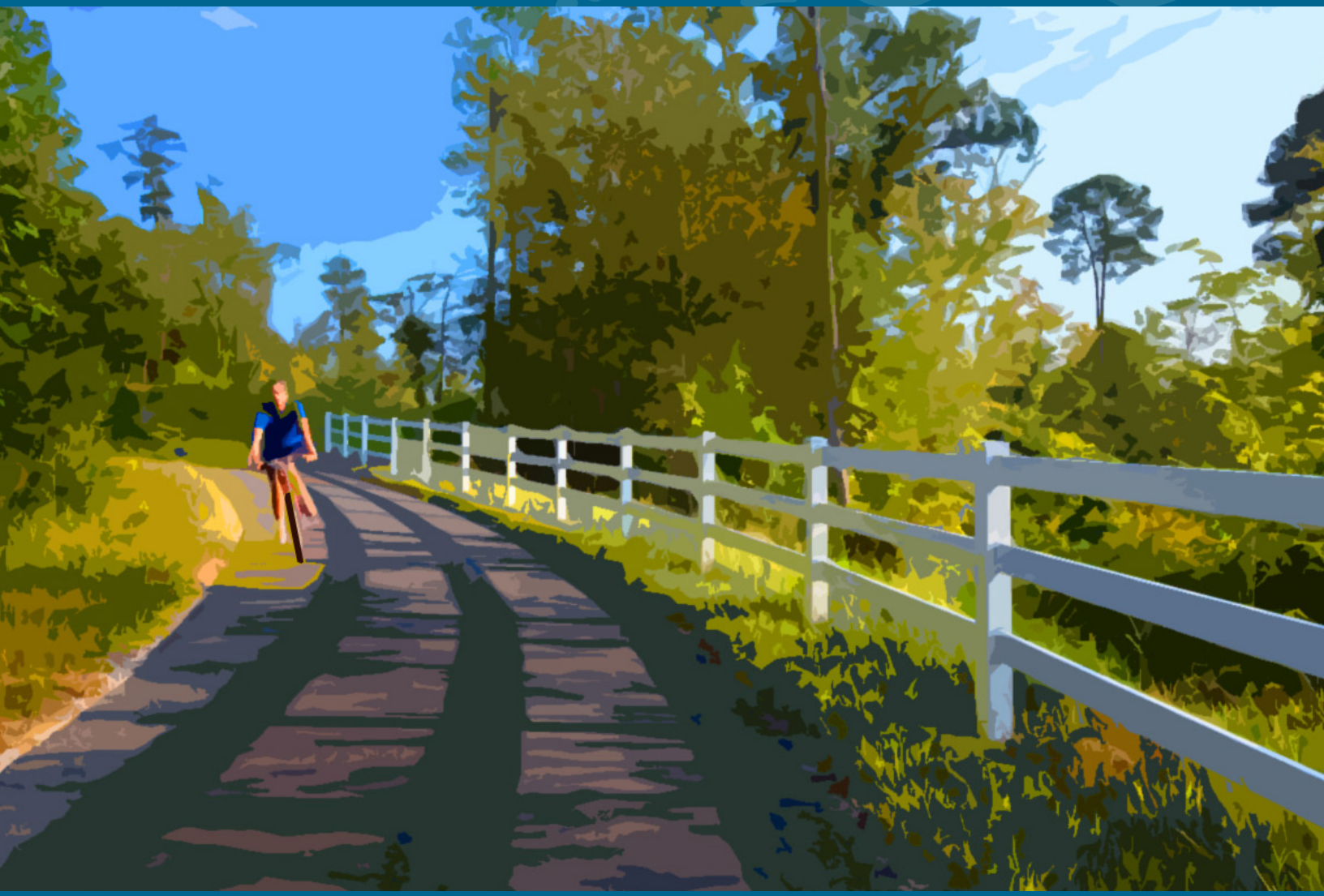
WAKE COUNTY
GREENWAY SYSTEM PLAN

2017



Prepared for Wake County Parks, Recreation and Open Space (PROS)
Prepared by Alta Planning + Design, with Stewart

WAKE COUNTY
NORTH CAROLINA

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PLANNING + DESIGN

STEWART

Acknowledgements

Thank you to the 2,300+ local residents, business leaders, developers, and government staff that participated in the development of this Plan through meetings, events, comment forms, and plan review. Special thanks to those who participated as project stakeholders, advisors, and committee members, listed below (project steering committee members are noted by asterisks).

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INTENDED AUDIENCES

The intended audience for this document includes residents, elected officials, government planners, developers, and all people interested in active transportation, recreation, health, wellness, environmental stewardship, economic development, tourism, and overall quality of life in Wake County and North Carolina.

ADDITIONAL INFORMATION

Please contact Wake County for additional information on this Plan and planning process:
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919-856-6670 | www.wakegov.com/parks

Executive Summary

Plan Vision

The vision for this Plan is to create a connected and comprehensive system of greenway trails that enhances quality of life throughout Wake County. There is no other single type of investment that can be made on a local and regional scale that provides such a wide range of positive impacts. Greenways improve quality of life by providing opportunities for transportation, recreation, public health, economic development, and environmental stewardship. This Plan serves as a clear guideline for trail planning and development, providing a framework for local governments and project partners to create a connected system of cross-county greenway trails.

WHAT IS A GREENWAY?

Greenways are defined as linear, natural areas which may be suitable for access. Some greenways benefit the community by remaining as undeveloped open space, protecting water quality, providing valuable buffers, environmental preserves, or wildlife corridors. Wake County has a well-established Open Space Plan and Program that is dedicated to the protection of these types of natural corridors and systems throughout the County.

Some greenways also contain trails. These "greenway trails" enhance existing recreational opportunities, provide routes for active transportation, and improve the overall health and quality of life in an area. They can be paved or unpaved, and can be designed to accommodate a variety of trail users.

FOCUS OF THIS PLAN

This particular plan is focused on establishing greenway trail connections. When planning trail routes, natural greenway corridors (such as those along waterways) are preferred over man-made corridors (such as roadways). However, roadway corridors are often necessary for routing trails to certain destinations and population centers, where other opportunities do not exist. The preference for using natural corridors for trails is due not only to the preferred experience of the trail user (to be in nature), but also due to the many benefits associated with protecting our natural lands and waterways (see pages 16-17).

Plan Goals

The projected impact of the proposed trail system is summarized on pages 57-59 (and quantified in Appendix A), based on several of these trail benefits/goals:

IMPROVE ACCESS TO OUTDOOR RECREATION FOR HEALTH AND WELLNESS

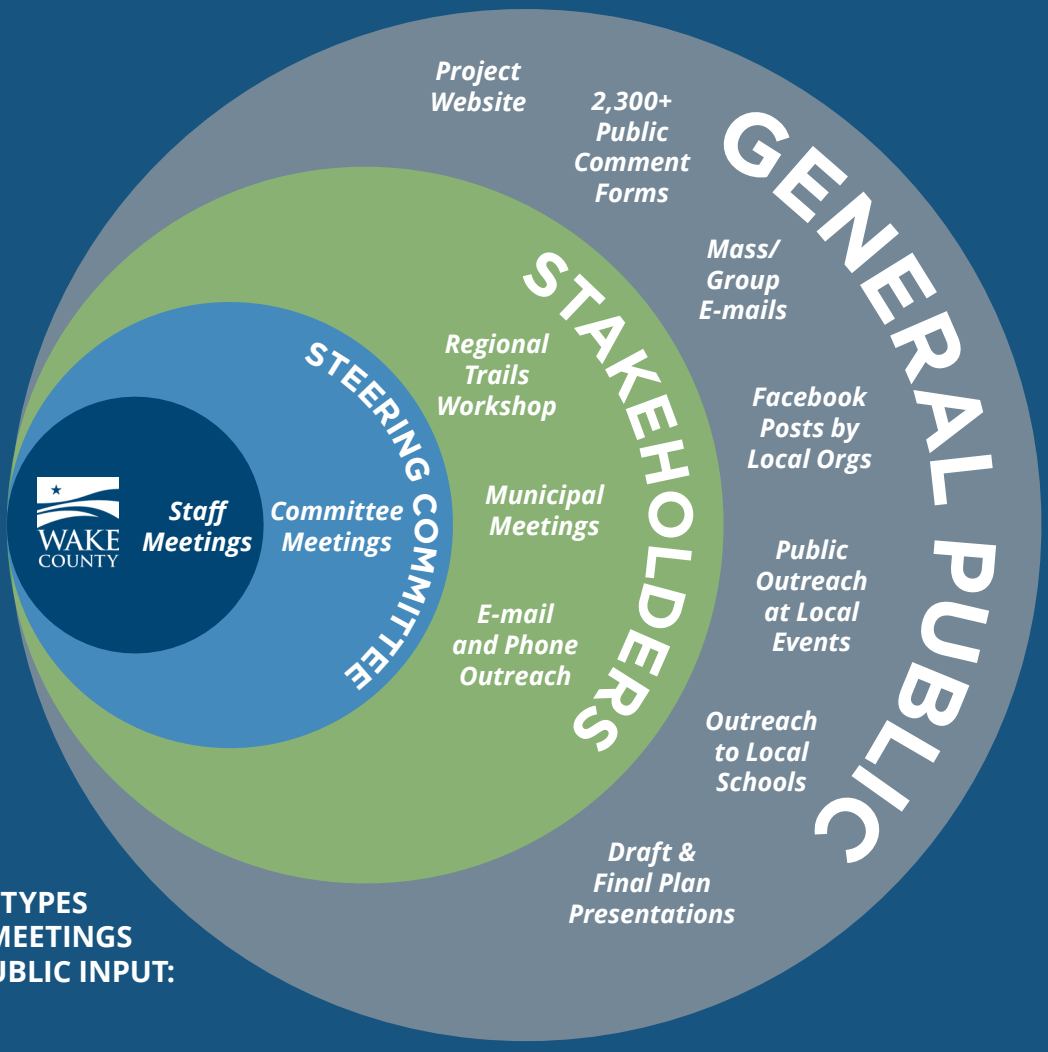
INCREASE CONNECTIVITY FOR MULTI-MODAL TRANSPORTATION

SUPPORT ECONOMIC DEVELOPMENT AND CAPITALIZE ON TRAIL-BASED TOURISM

PROTECT WATERWAYS, WILDLIFE HABITAT, AND NATURAL AREAS ALONG GREENWAYS

Public Process Overview

The planning process began with a stakeholder workshop in late 2015. The draft plan was developed with input from the public and a Steering Committee in early 2016. The final plan was developed with further input and presentations throughout 2016.



KEY TYPES OF MEETINGS & PUBLIC INPUT:

THE COUNTYWIDE GREENWAY SYSTEM

The Countywide Greenway System (opposite page and Map 3.0) was developed with these key steps:

1. *Collect data.*
2. *Map all existing trails and trails proposed in previous plans.*
3. *Identify a system of regional connector trails.*
4. *Prioritize the overall system into sets of recommendations.*

Rather than including all proposed trails from all existing plans (Map 3.0-B), this system focuses instead on corridors that offer the best potential for regional trail connectivity. It is based primarily upon connections between existing trails and the ability to connect to destinations such as parks, lakes, and downtown/town centers.

THE GREENWAY SYSTEM BY PROJECT CATEGORIES

The overall system of recommendations is organized into the following set of project categories in Chapter 3:

MAP 3.1 BRIDGE THE GAPS

The focus of these "Bridge the Gaps" priority projects is connectivity, featuring 48 miles of trail in 23 segments. The projects are spread throughout the county, with at least one project in each of Wake County's 12 municipalities. These fill critical gaps within the existing network of trails, and serve as catalyst projects where trails are currently lacking. For more on these projects, see the project cutsheets in Chapter 3 of the Plan.

MAP 3.2 CONNECT PARKS AND LAKES

This group of projects features 60 miles of trail in 12 segments, connecting to 15 parks (seven of which feature lakes). The idea of connecting to parks and lakes was driven by public feedback on desired destinations, in which people indicated a desire to connect with existing trails, parks, and natural areas as the top choices out of a range of destination types (see the public comment form results in Chapter 2).

MAP 3.3 CONNECT THE COMMUNITIES

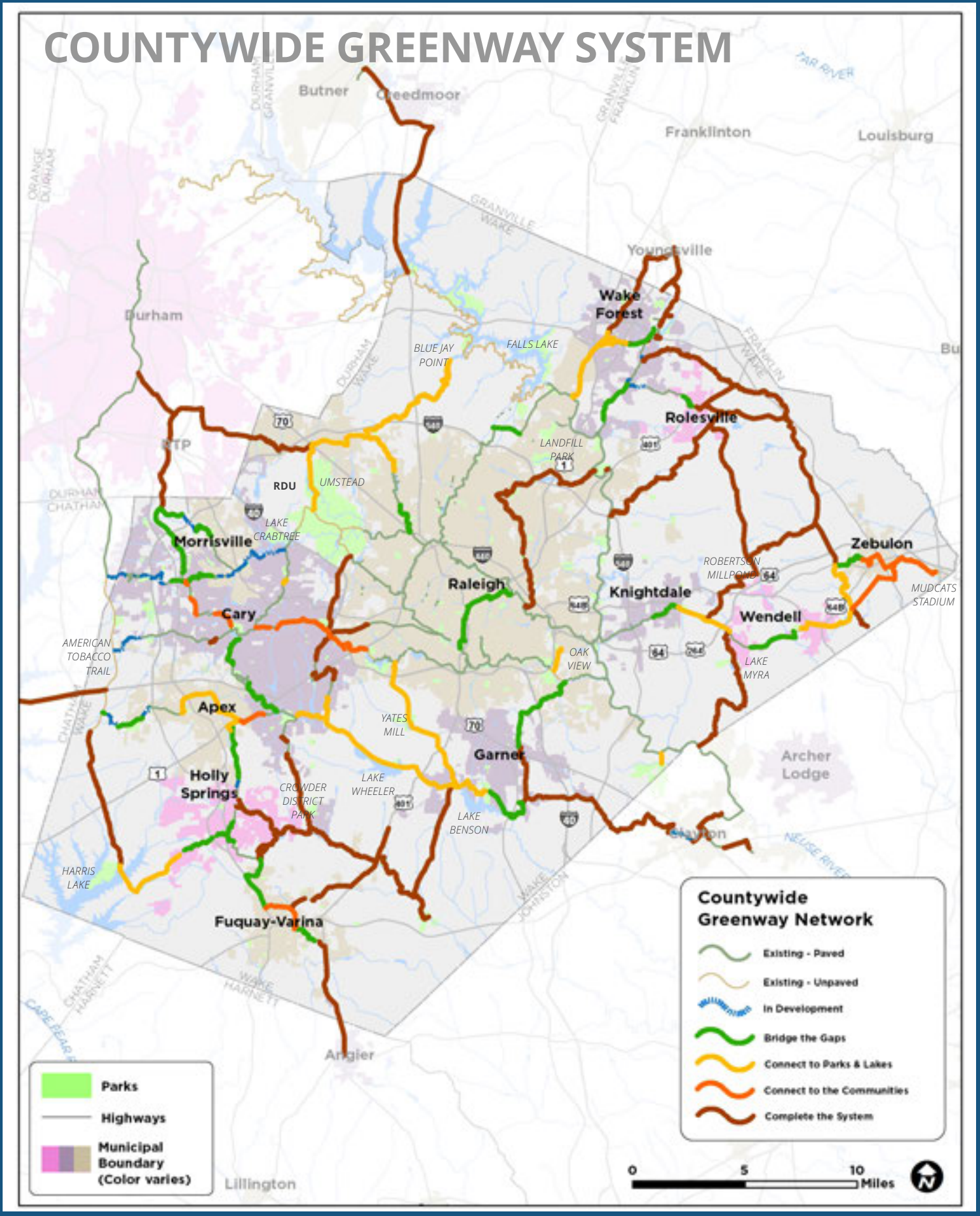
With this group of projects, all 12 municipalities will be connected into the greenway system, with 19 miles of trail in six segments. These projects allow for key connections in Fuquay-Varina and Zebulon, plus more direct greenway trail connections between Raleigh, Cary, Apex, and Morrisville.

MAP 3.4 COMPLETE THE SYSTEM

There are 147 miles of proposed trail in this group, made up of over 30 project segments. These longer-term projects (like all projects) could be completed sooner, depending on how they are implemented and on the opportunities that arise to complete the system in the coming years and decades. See Chapter 4 for more on the overall implementation strategy.

IMPLEMENTATION RESOURCES

Chapter 4 features information on the recommended organizational framework for implementation. funding strategies, policy guidance, and detailed action steps.


COUNTYWIDE GREENWAY SYSTEM
Butner
Creedmoor
Franklinton
Louisburg
Youngsville
Wake Forest
Durham
BLUE JAY POINT
FALLS LAKE
Rolesville
LANDFILL PARK
RTP
RDU
UMSTEAD
LAKE CRABTREE
Morrisville
Zebulon
ROBERTSON MILLPOND
MUDCATS STADIUM
Raleigh
Knightdale
Wendell
Cary
AMERICAN TOBACCO TRAIL
OAK VIEW
LAKE MYRA
Apex
YATES MILL
Garner
Archer Lodge
Holly Springs
CROWDER DISTRICT PARK
LAKE WHEELER
LAKE BENSON
Clayton
HARRIS LAKE
Fuquay-Varina
Angier
Lillington
Countywide Greenway Network
Existing - Paved
Existing - Unpaved
In Development
Bridge the Gaps
Connect to Parks & Lakes
Connect to the Communities
Complete the System
Parks
Highways
Municipal Boundary (Color varies)
0
5
10
Miles

1 Introduction

"Greenways highlight the best we have to offer as a vibrant, growing community. Supporting economic development, promoting active lifestyles, providing transportation options, allowing a connection with nature and giving us the opportunity to connect with our neighbors. We love our greenways as a representation of the active, loving, caring community we are." - Sig Hutchinson, Wake County Commissioner

American Tobacco Trail in Wake County

PURPOSE

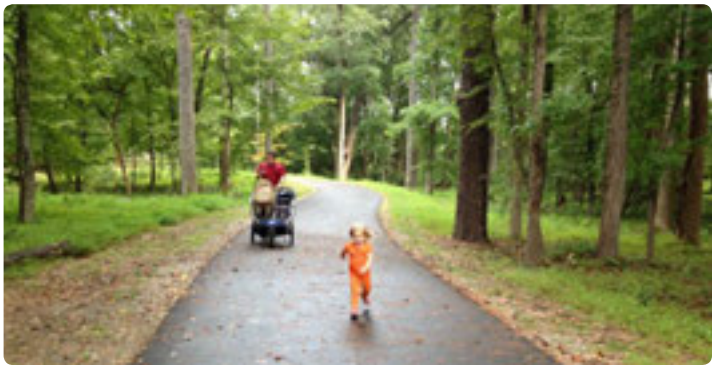
Wake County's overall vision is to be a great place to live, work, learn and play! The purpose of this Plan is to provide a clear guideline for the development of a countywide network of greenway trails, furthering the benefits of greenway trails for all of Wake County.

PROJECT OVERVIEW

Wake County is one of the fastest growing counties in the United States (US Census Bureau 2012). As its population continues to grow, the overall demand on community resources and facilities also grows. With a growth rate of 62 people per day, the County and its municipalities must look to the future to be strategic about how it will preserve and enhance quality of life for current and future generations. The Wake County Division of Parks, Recreation and Open Space (PROS) is doing its part through the service areas of open space, recreation and leisure, and environmental and cultural education. Their mission is, *"To provide outdoor recreation and educational opportunities while promoting environmental and cultural stewardship through a managed system of parks and open spaces."* The Division operates nine park and trail facilities with a combined annual visitation of more than one million patrons. They also manage an open space program, which has protected about 6,000 acres of land across Wake County to preserve water quality.

In recent years, Wake County has also been involved as a key partner in local greenway planning and development. The need for such partnerships comes from a desire for greater connectivity between greenway trails, as evident in the hundreds of miles of proposed trails in the adopted plans of the County's municipalities. In order to be more proactively involved in this process, and to address the growing interest in greenway trails, PROS is stepping forward as the lead agency for this Greenway System Plan. This Plan establishes and communicates a broad vision for a countywide system of greenway trails, and provides guidance to Wake County and its partners, so that all involved can collaboratively work towards and benefit from realizing that vision.

Clockwise from top left: *Little Rock Trail (Raleigh), Abbotts Creek Trail (Raleigh), Rocky Branch Greenway (Raleigh), and the White Oak Greenway (Cary).*

DEFINITIONS FOR THIS PLAN

As the leading municipality in Wake County for greenway planning, design, and construction, the City of Raleigh offers a valuable framework to build upon, not only in terms of trail infrastructure, but also in terms of core concepts. Therefore, this Plan draws upon Raleigh's definitions of greenways and greenway trails. The following are adapted from the City of Raleigh's 2014 *Capital Area Greenway Planning and Design Guide.*

Greenways are defined as linear, natural areas which may be suitable for access. Some greenways may not be suitable for greenway trail development and benefit the community by remaining as undeveloped open space, providing valuable buffers, environmental preserves, or wildlife corridors. "Greenways" in this sense are covered in Wake County by PROS, through their open space program.

Greenway trails are the primary focus of this Plan. They are constructed public access facilities within greenways or public utility rights-of-way (where an easement is present). Combined together, individual greenway trails make up a larger network that connects neighborhoods, schools, parks, downtown, and commercial areas. Examples include the Neuse River Trail and the Crabtree Creek Greenway. These are also sometimes referred to as "multi-use trails", "shared-use trails", and in the case of trails along roadways (as pictured above, bottom-right), "side paths".

On-road bicycle facilities and sidewalks outside greenway trail corridors can connect users from residential, civic, social, and employment areas to the greenway trail network. These connections are generally located on or along the streets. They include bicycle lanes, signed bicycle routes, sharrows, bicycle boulevards, sidewalks, paved shoulders, and separated bicycle lanes. For definitions of these on-road facilities, visit www.walkbikenc.com/plan-resources. On-road facilities that connect directly to greenway trails complement the network and are not intended as an alternative to greenway trail development.

Plan Vision

The vision for this Plan is to create a connected and comprehensive system of greenway trails that enhances quality of life throughout Wake County. There is no other single type of investment that can be made on a local and regional scale that provides such a wide range of positive impacts. Greenway trails improve quality of life by providing opportunities for transportation, recreation, public health, economic development, and environmental stewardship. This Plan serves as a clear guideline for greenway planning and development, providing a framework for local governments and project partners to create a connected system of cross-county greenway trails.

Plan Goals

IMPROVE ACCESS TO OUTDOOR RECREATION FOR HEALTH AND WELLNESS Improve health and wellness of residents by increasing access to trails, thereby offering more opportunities for recreation, physical activity and time spent outdoors and in nature.

INCREASE CONNECTIVITY FOR MULTI-MODAL TRANSPORTATION Increase transportation options by expanding upon existing trails, connecting key destinations, such as downtowns, parks, schools, shopping centers, transit hubs, employment centers, and neighborhoods.

SUPPORT ECONOMIC DEVELOPMENT AND CAPITALIZE ON TRAIL-BASED TOURISM Support economic development by marketing, promoting, and maintaining greenway trails in a way that increases tourism, enhances property values, and makes Wake County the centerpiece of North Carolina's growing legacy as "The Great Trails State."

PROTECT WATERWAYS, WILDLIFE HABITAT, AND NATURAL AREAS ALONG GREENWAYS Protect our water supply by keeping the land around our waterways in their natural state, thereby filtering pollutants from storm water runoff, while also providing essential plant and wildlife habitat as the region continues to grow.

A comprehensive and connected system of greenway trails will not only serve basic functions like those mentioned above, but it will also set the region apart from other fast-growing metropolitan areas. This type of initiative represents the forward-thinking planning that is needed to create a truly livable region. People value this region's natural beauty, the function of natural lands and waters, and the connectivity provided by greenway trails. This is why a connected system of greenway trails is important to Wake County and the region.

Background image: American Tobacco Trail in Wake County

BENEFITS OF GREENWAY TRAILS

Communities across the U.S. and throughout the world are investing in greenway trails as a key factor of overall livability. They do this because of their obligation to promote health, safety, and welfare, and also because of the growing awareness of the many benefits of having a connected system of greenway trails.

GREENWAYS CREATE VALUE AND GENERATE ECONOMIC ACTIVITY

The economic benefits of trails are generated in several ways. First, trails increase adjacent property values, which benefits property owners, developers, and local government agencies that see increased property tax revenues. Second, trails attract both businesses and tourists, spurring economic development that benefits all residents. Third, improved trail access near businesses has been shown to increase sales while reducing the need for expensive parking. Fourth, if planned in a way that also protects water quality through vegetated buffers along streams, greenways can also reduce costs associated with water treatment and flood damages. Finally, trails are far less expensive to construct than roadways.

Greenways and Walkable, Bicycle-friendly, Mixed-use Communities Are Valued by Homebuyers

Businesses, residents, and visitors consider quality of life factors like walkability and bikability when choosing locations to settle. According to a 2013 survey by the National Association of Realtors (NAR), the demand for the conventional suburban development patterns that predominated in the second half of the 20th century is shifting to more walkable, mixed-use communities—especially

Bicycles mean business in Raleigh. Left: Bicycle parking on Hargett St. Below: Bicyclists at Crank Arm Brewing; photos by ITRE Bicycle and Pedestrian Program.

"Building our network of trails is an essential investment that enables the Research Triangle Park to remain globally competitive by allowing us to attract the type of workers that companies want with amenities professional workers demand."
- Liz Rooks, Former Executive Vice President of the Research Triangle Foundation

among the higher-educated work force that Triangle-area businesses aim to attract and retain in the region. **The NAR survey also showed that walkability and shorter commutes are key to community preference,** indicating that as the demand for automobile-dependent development decreases, communities should be built (and retro-fitted) with greenway trail connectivity in mind.

Greenways Increase Real Property Values

There are many examples, both nationally and locally, that affirm the positive connection between trails, walkability, and property values. For example, **the report "Walking the Walk" by CEO's for Cities, which looked at 94,000 real estate transactions in 15 markets, found that in 13 of those markets, higher levels of "walkability" were directly linked to higher home values.** For other examples, see the Trust for Public Land's 'Economic Benefits of Parks and Open Space' and the Rails-to-Trails Conservancy's 'Economic Benefits of Trails and Greenways,' illustrating how trails have positively impacted property values across the country.

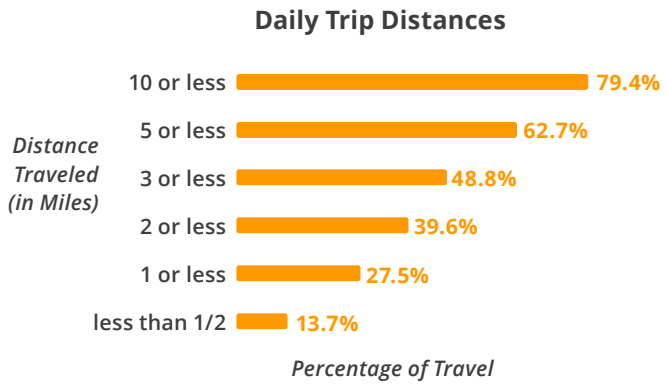
Greenway Trails Offer Transportation Cost Savings

When looking at the returns on investment noted above, it is also important to put into perspective the massive differences in costs inherent in the transportation decisions we make, both as individuals and as a region. Consider the individual costs associated with various forms of transportation. Walking is virtually free and the cost of operating a bicycle is far less than operating a car. A study cited by the Victoria Transport Policy Institute found that **households in automobile-dependent communities devote 50 percent more of their income to transportation (more than $8,500 annually) than households in communities with more accessible land use and more multi-modal transportation systems (less than $5,500 annually).** Bicycling and walking are affordable forms of transportation, and with the relatively low cost and high return on investment for trails, it is hard to argue against developing a regional system that creates value and generates economic activity.

On a broader scale, consider the regional costs of our transportation infrastructure investments. According to the Federal Highway Administration, the basic cost of a single mile of urban, four-lane highway is between $20 million and $80 million. For example, the Triangle Expressway cost $1 billion, going roughly 20 miles from the Research Triangle Park to Holly Springs, coming to $50 million per mile. By contrast, the Neuse River greenway cost about $1.2 million per mile, in 2016 dollars.

GREENWAYS ENHANCE BICYCLE & PEDESTRIAN TRANSPORTATION OPTIONS

Surveys by the Federal Highway Administration show that Americans are willing to walk as far as two miles to a destination and bicycle as far as five miles. A complete system of trails in Wake County, combined with other bicycle and pedestrian infrastructure, will offer viable opportunities for walking and biking to nearby destinations. Choosing to bike or walk rather than to drive, however, is often made difficult by the way our cities and towns have developed. The sprawling land use patterns of many communities in Wake County, combined with roadway corridors designed for cars only, leaves many residents with little choice but to drive, even for short trips. This is not unique to Wake County, as much of the urban and suburban growth in the U.S. of the past half-century has been automobile-dependent. In fact, **about 40% of all driving trips made in the U.S. are shorter than two miles,** indicating an opportunity to accommodate those trips by providing the right environment for people to make them by foot or by bicycle.



Most driving trips in the U.S. are for a distance of five miles or less. Chart from the Bicycle and Pedestrian Information Center, www.pedbikeinfo.org

GREENWAYS IMPROVE HEALTH THROUGH ACTIVE LIVING

The physical design of communities can provide permanent, sustainable environments that support physical activity. For example, when people are able to live near and get to destinations such as work, shopping, and entertainment without using automobiles, opportunities for physical activity through active transport are increased. The Centers for Disease Control (CDC) determined that **by creating and improving places in our communities to be physically active, there could be a 25 percent increase in the percentage of people who are physically active at least three times a week.** The CDC also reviewed 12 studies on the effectiveness of community scale urban design and land-use policies and practices in supporting physical activity and found an overall median effect size of 161% for some aspects of physical activity, such as increases in the number of walkers or bicyclists. This is significant considering that for people who are inactive, even small increases in physical activity can bring measurable health benefits. **In Wake County, for example, almost two out of three adults (59.9%) is either overweight or obese, and 10% of residents do not engage in any physical activity. At the same time, 95 percent of respondents to this Plan's public comment form said they would use greenways more often if they were closer to them or if there were more of them.**

Some related findings from the field of health include:

- "An estimated 10.8 percent of all deaths in the United States is attributable to physical inactivity." (Lee, et al.)

Neuse River Trail (Raleigh); photo from the Triangle Greenways Council.

- "Every $1 spent building biking trails and walking paths can save about $3 in medical expenses. Through GO NC!, BCBSNC hopes to improve health and reduce obesity-related medical costs in North Carolina." (Brad Wilson, BCBSNC president and CEO)
- "Every $1 investment in trails for physical activity led to $2.94 in direct medical benefit. The sensitivity analyses indicated the ratios ranged from 1.65 to 13.40. Therefore, building trails is cost beneficial from a public health perspective." (Cost-Benefit Analysis of Physical Activity Using Bike/Pedestrian Trails)
- "From current evidence, we find that urban river parkways can improve physical, mental, and community health, and that they are particularly important in offering opportunity for 'green exercise'—physical activity in the presence of nature." UCLA's Center for Occupational and Environmental Health

Greenways Provides Opportunities for Solace in Nature

Another way in which greenways affect health, particularly psychological health, is through exposure to nature. Contact with nature has been linked to a greater ability to cope with life stressors, improve work productivity, reduce job-related frustration, increase self-esteem, reduce levels of attention deficit disorder in children, improve cognitive ability, reduce aggressive behavior, and provide greater life satisfaction (Frumkin) (Louv).

GREENWAYS PROTECT WATERWAYS, WILDLIFE HABITAT, AND NATURAL AREAS

There are many environmental benefits from greenways and open space that help to protect the essential functions performed by natural ecosystems. Some of these benefits include carbon sequestration, airborne particulate capture, oxygen generation, urban heat-island temperature moderation, and surface water filtration & infiltration. As an educational tool, greenway trail signs can be designed to educate people about their environment, on topics such as the water cycle and native plant and animal species. Similarly, a greenway can serve as a hands-on environmental classroom for people of all ages to experience natural landscapes, conduct river clean-ups, and further environmental awareness. Some of the largest benefits, however, are those directly related to water quality, wildlife, and reduced fuel consumption, as described below.

Water Quality Benefits

Natural open spaces around greenway trails help to protect water quality by creating a natural buffer zone around streams, rivers, and lakes, preventing soil erosion and filtering pollution caused by agricultural and road runoff.

We need water for drinking, boating, swimming and fishing, so improving our water quality by buffering wetlands and streams is one of the most powerful benefits of preserving open space. Rivers become polluted when rainwater picks up motor oils, fertilizers, litter, pesticides and other pollutants and then "runs off" into streams and creeks, which empty into rivers, lakes, estuaries and the ocean. Every time a site is developed with parking lots, roads and buildings, the amount of water that soaks into the ground is reduced, and the amount running off increases. Any land that remains undisturbed does not contribute pollutants to our streams and lakes. Open space, particularly open space surrounding streams, lakes and rivers, usually contains natural grasses and other vegetation that serve as filters, removing pollutants before they are deposited into our water bodies.

Sign from a conservation campaign in North Carolina. According to the Trust for Public Land, the number one reason that voters support open space measures across the country is to protect water resources.

Biodiversity & Wildlife Benefits

Greenways can protect and link fragmented habitats and provide opportunities for protecting plant and animal species. Biodiversity is simply the diversity among and within plant and animal species in an environment. Biodiverse systems provide a wide range of ecosystem services, and have a greater ability to withstand natural and/or human caused disturbance (resiliency).

Many of the benefits of greenways and open space depend upon biodiverse systems and the resulting ecosystem services they provide, such as:

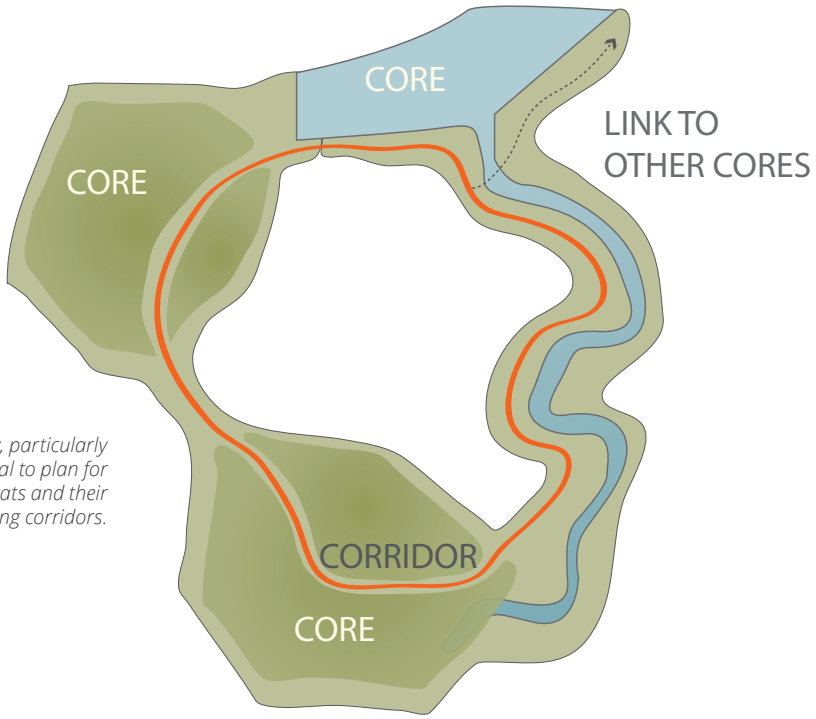
- Soil formation and protection
- Pollution breakdown and absorption
- Water resource protection
- Erosion and flood control
- Nutrient storage and recycling
- Climate stability
- Ecosystem resilience from unpredictable events/disturbances

- Breeding stocks, population reservoirs
- Food production
- Medicinal resource production – pharmaceutical drugs
- Wood production
- Genetic diversity

In the 1960's, ecologists began intensively studying how habitats in disturbed or urbanized areas function. The concept of habitat "cores" and "corridors" has become an accepted model for disturbed habitats. The physical geometry of habitat cores and corridors affects their overall habitat quality. Large cores with wide, forested or naturally vegetated corridors provide the best habitat in developed/ disturbed areas. As core size and corridor width decreases, so does habitat quality. While corridors that have no vegetative cover are poor in quality, they are better than no corridor at all. Generally speaking, the better the connectivity across cores provided by corridors, the greater the possibilities for higher biodiversity. The illustration below summarizes this concept.

Environmental Benefits Of Bicycling And Walking

Bicycling and walking are the two major non-fuel-consuming, non-polluting forms of transportation. According to a national walking and bicycling study by the U.S Department of Transportation (Publication No. FHWA-PD-93-015), the greatest environmental benefits of bicycling and walking are that they conserve roadway and residential space; avert the need to build, service, and dispose of autos; and spare users of public space the noise, speed, and intimidation that often characterize motor vehicle use, particularly in urban areas. By far the greatest environmental benefit of bicycling and walking, according to the study, is that they bypass need for fossil fuel, and the environmental issues associated with the use of fossil fuel. Thus, to the extent that bicycling and walking displace trips that otherwise would have involved use of motor vehicles, they enable society to reduce consumption of fossil fuels and the associated pollution and other environmental damage.



To ensure species diversity, particularly for native species, it is critical to plan for and protect intact core habitats and their connecting corridors.

Greenways Protect People and Property from Flood Damage

The protection of open spaces associated with greenway development can also protect natural floodplains along rivers and streams. According to the Federal Emergency Management Agency (FEMA), the implementation of floodplain ordinances is estimated to prevent $1.1 billion in flood damages annually. By restoring developed floodplains to their natural state and protecting them as greenways, many riverside communities are preventing potential flood damages and related costs.

GREENWAYS ENHANCE CULTURAL AWARENESS AND COMMUNITY IDENTITY

Trails, greenways, and open space can serve as connections to local heritage by preserving historic places and by providing access to them. They provide a sense of place and an understanding of past events by drawing greater public attention to historic and cultural locations and events. Trails often provide access to historic sites such as battlegrounds, bridges, buildings, and mills that otherwise would be difficult to access or interpret.

Each community or region has its own unique history, its own features and destinations, and its own landscapes. For example, historic sites in Wake County include Historic Oak View County Park, Historic Yates Mill County Park, and more than 200 sites on the National Register of Historic Places. Cultural and historic groups like the Wake County Historic Preservation Program could assist in trail design and programming near historic sites. By recognizing, honoring, and connecting these features, the combined results serve to enhance cultural awareness and community identity, potentially attracting tourism. Being aware of the historical and cultural context when naming parks and trails and designing features will further enhance the overall trail and park user experience.

Finally, greenways and trails provide opportunities for people to interact with one another outside of work and their immediate neighborhood. Positive interaction (such as through exercising, strolling, or even just saying 'hello') among people from a wider community helps to build trust and awareness of others, which strengthens the overall sense of community.

Historic Yates Mill County Park, photo by Gary D. Knight.

THE PLANNING PROCESS

The planning process included participation and direction from project committee members, stakeholders, input from the public, and public hearing presentations to the Wake County Board of Commissioners. The timeframe for these and other steps are outlined at right.

Steering Committee and Stakeholders

The Steering Committee was made up of representatives from the following agencies and organizations:

- Capital Area Metropolitan Planning Organization
- City of Raleigh
- Town of Apex
- Town of Cary
- Town of Holly Springs
- Town of Knightdale
- Town of Morrisville
- Town of Wake Forest
- Triangle J Council of Governments
- Wake County

Other project stakeholders also included representatives from Fuquay-Varina, Garner, Rolesville, Wendell, Zebulon, the Research Triangle Foundation, surrounding counties, surrounding municipalities, and organizations and agencies related to public health, recreation, transportation, and tourism.

Key Steps in the Process:

OCTOBER 2015 - Data Collection: GIS analysis, Steering Committee kick-off meeting, and launch of project website and public comment form.

NOVEMBER 2015 - Opportunities & Constraints: Research existing conditions, base map production, and two public input events.

DECEMBER 2015 - Countywide Trail Coordination Workshop: 47 stakeholders meet to discuss plan vision and opportunities for a county-wide network of trails.

JANUARY 2016 - Preliminary Draft Plan: Development of draft plan chapters, project prioritization based on input to-date, and the second Steering Committee meeting.

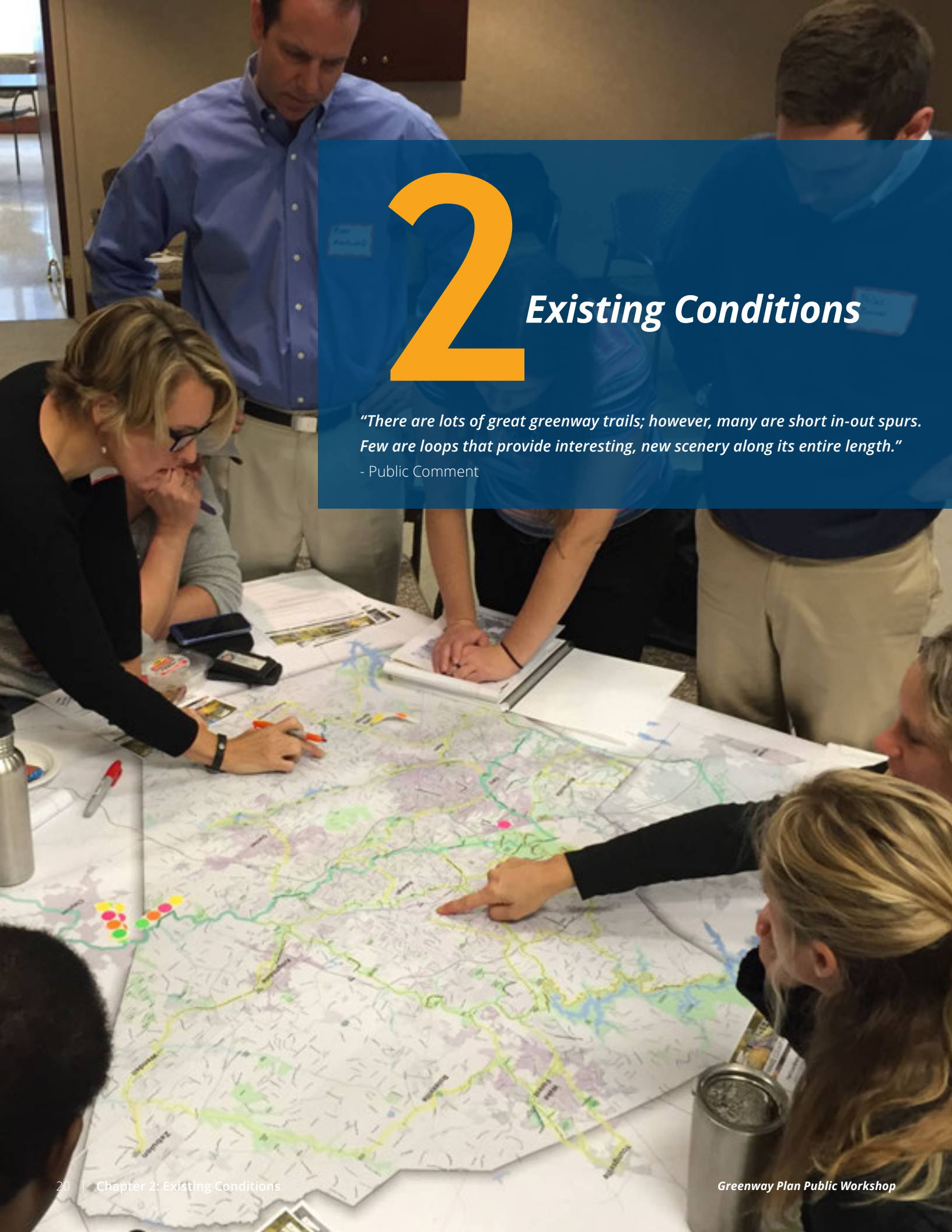
FEBRUARY & MARCH 2016 - Draft Plan Review: Municipal coordination meetings; Draft Plan released to public for review, and additional input events.

APRIL-JUNE 2016 - Final Plan: Revisions based on input to-date, third Steering Committee; Final Plan presentations in Spring & Summer 2016.

2 Existing Conditions

"There are lots of great greenway trails; however, many are short in-out spurs. Few are loops that provide interesting, new scenery along its entire length."

- Public Comment

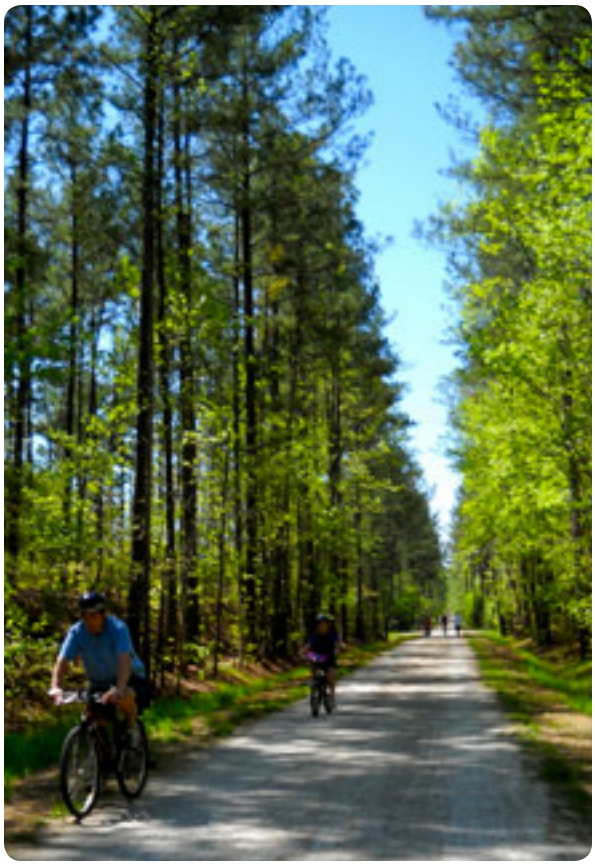


Greenway Plan Public Workshop

OVERVIEW

This chapter summarizes the existing conditions for greenway trails in Wake County, through a regional snapshot, existing conditions maps, public comments, stakeholder feedback, and a summary of support for greenway trails in local and regional existing plans.

Most people feel safe and comfortable using greenway trails in Wake County because they are separated from traffic, wide, well-maintained, and are usually very scenic. In fact, as illustrated in the summary on the following pages, residents in Wake County and its municipalities enjoy one of the most extensive greenway trail systems in the country. However, the key to a successful greenway trail network is connectivity; as more greenway trails are connected to one other, the benefits of any particular greenway are greatly enhanced, whether considering the transportation, recreation, health, or economic aspects of the system. **The current inventory of existing trails (see Map 2.4, page 29) shows nearly 300 miles of trail in Wake County, but much of that mileage is in smaller, disconnected sections** of local trail, or trails that are isolated within parks. The exceptions to this include several large portions of continuously connected trail, such as the Neuse River Greenway and the East Coast Greenway route through Wake County.



The American Tobacco Trail in Wake County is a popular section of the East Coast Greenway.

BOOMING GREENWAY TRAILS IN NORTH CAROLINA'S RESEARCH TRIANGLE

Contributed by John Pucher, Professor Emeritus, Rutgers University

The Research Triangle of North Carolina (Raleigh-Durham-Chapel Hill) has been one of the fastest-growing metropolitan areas in the country. Its population increased seven-fold between 1970 (317,563) and 2014 (2,132,523). The area has experienced a corresponding economic boom, thanks largely to the three renowned universities at each corner of the Triangle: NC State University in Raleigh, Duke University in Durham, and the University of North Carolina at Chapel Hill. The many research institutions and high-tech firms in the area have attracted highly-educated professionals from all over the country, so that the Triangle currently has the highest ratio of doctorates per capita in the United States.

Accompanying this stunning population and economic growth, there has been increasing public support for shared-use greenways. In numerous surveys conducted in the Triangle, investment in greenway expansion and improvement has consistently topped the ranking of citizen preferences for government expenditures. The widespread support for greenway trails has also been reflected in voter approval of virtually all bond referenda to fund more greenway trails. City governments and the two metropolitan planning organizations in the area (CAMPO and DCHC MPO) have also dedicated increasing amounts of their capital budgets for greenway trails. The NC Department of Transportation has contributed to funding, often derived from federal funds for pedestrian/bicycling projects. In Cary, Knightdale, and Chapel Hill, developers have been required to build greenways as part of new developments, and virtually all communities require the dedication of easements on privately owned land along rivers, creeks, and lakes to allow greenway construction.

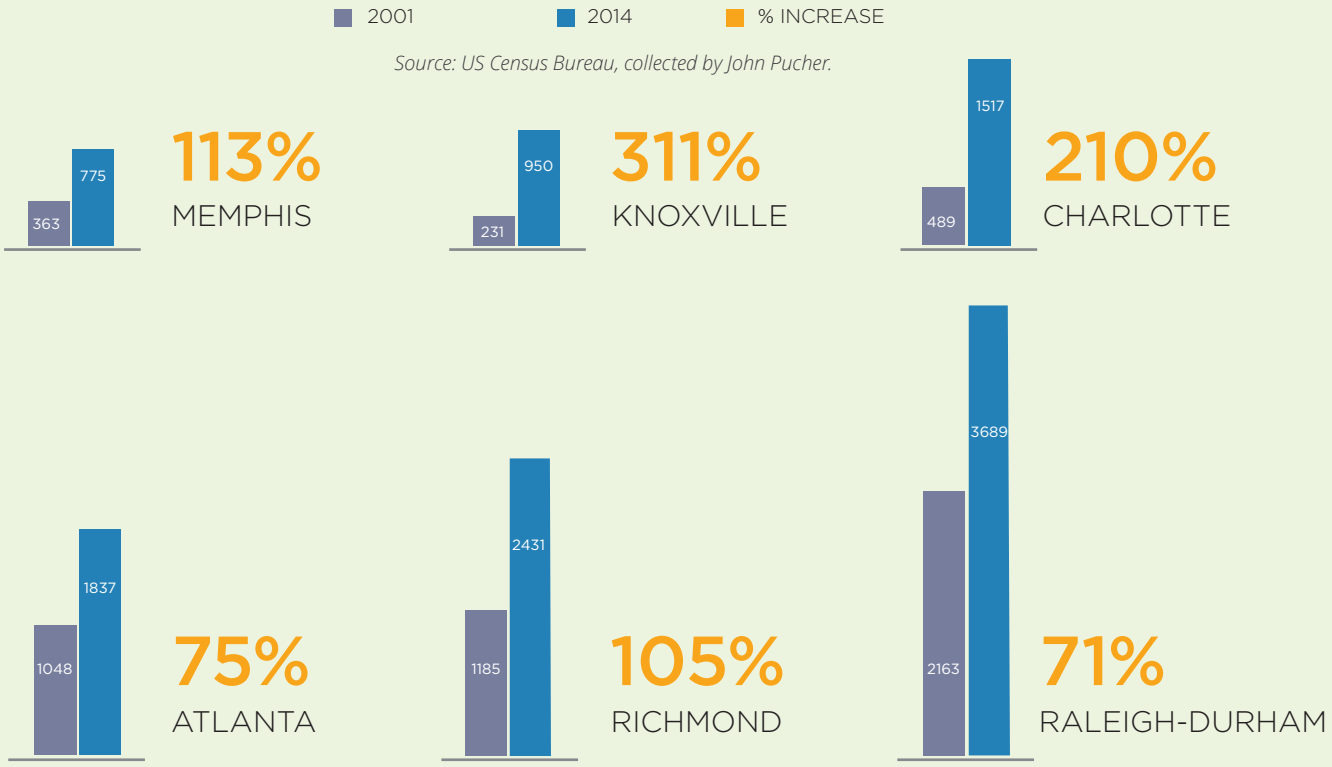
The result of increased funding and staffing for greenway planning and construction is one of the largest greenway networks in the country. In 2015, the Raleigh-Durham- Chapel Hill metropolitan area had almost 300 miles of paved off-road, shared-use trails. The cities of Raleigh (115 miles), Cary (71 miles), and Durham (30 miles) have the most greenways, but virtually every community in the Triangle has one or more greenways, and all of them have ambitious plans for future growth.

The increase in recreational cycling on greenways has helped generate more on-road cycling as well, and growing public support for more on-road cycling facilities. In 2000, there were less than 10 miles of on-road bike lanes in the Triangle, but by 2015, total center-line mileage of bike lanes (blue lines on map) had grown to 93 miles, mostly in Durham (36 miles), Chapel Hill-Carrboro (32 miles), Cary (20 miles), and Raleigh (18 miles). Significant expansion is planned. For example, Raleigh is planning to double its mileage of on-road bike facilities by the end of 2016. Cary will increase its mileage of bike lanes from 20 miles to 27 miles by 2017.

Given the polycentric, decentralized nature of the Research Triangle, it is crucial to provide regional connections between the greenway networks of individual cities. The most important of these connecting routes is the East Coast Greenway (ECG), which connects Durham to Cary and Raleigh, and which connects the Triangle Region to the rest of the East Coast via the 2,900- mile ECG route that runs from Maine to Florida. Of all metropolitan areas the ECG route runs through, the Triangle has the most complete stretch (95%) of off-road, shared-use trails on the entire ECG route.

Triangle greenways are typically 10-14 feet-wide paved trails in 50-150 feet-wide corridors of protected greenspace, running along rivers, creeks, and lakes. They were developed as part of flood management plans, but equally important, they preserve greenspace adjacent to all major waterways and tributaries, protect aquatic and edge habitats, and prevent development of ecologically sensitive lands. The greenways provide a series of linear parks throughout each city, providing recreational opportunities for residents and visitors. Many greenways include playing fields, picnic areas, boating

NUMBER OF BICYCLE COMMUTERS IN THE SOUTHEAST U.S.



facilities, fishing spots, bird watching, nature trails, outdoor sculpture, and community centers.

Only partial data are available on usage levels, but an in-person survey of the 71-mile Cary greenways estimated at least 1.1 million annual users just on weekends, not including weekday use. Since Cary has about a fourth of the total mileage of Triangle Area greenways, that suggests over 4 million annual users overall, which might be an underestimate since the Cary survey only counted weekend use. Indeed, on weekends with good weather, many parts of the Triangle greenways are overcrowded, not only with pedestrians, runners, and bicyclists but also with dog walkers, parents with strollers, skateboarders, in-line skaters, bird watchers, and people fishing in the adjacent lakes from the extensive wooden walkways and bridges.

A before-and-after study conducted by the Institute for Transportation Research (ITRE) at NC State University found more than a doubling (133% growth) in walking and bicycling trips on the American Tobacco Trail in Durham only three months after the bicycle and pedestrian bridge over Interstate 40 was completed, thus connecting the northern and southern portions of the trail. That dramatic jump in use between 2013 and 2014 demonstrates the importance of such connections over roadways and waterways for the success of greenways.

With widespread public support, it seems certain that the Research Triangle will continue to have one of the most extensive and best-integrated greenway systems in the country, supplemented by a growing network of on-road cycling facilities.

Sources: City departments of transportation and parks and recreation in Raleigh, Durham, Cary, Knightdale, Chapel Hill, and Carrboro; the Capital Area Metropolitan Planning Organization (CAMPO); the Triangle J Council of Governments (TJCOG); county parks, recreation, and transportation departments in Wake County, Orange County, and Durham County; East Coast Greenways; the Institute for Transportation Research and Education (ITRE) at NC State University; and the NC Department of Transportation.

EXISTING CONDITIONS MAPS

The existing conditions maps on the following pages provide insight into the demographic, environmental, and existing trail makeup of Wake County, for purposes of a bigger picture understanding of regional need and opportunities.

Map 2.0 Wake County Study Area

The study area for this project, Wake County, is 857 square miles and just over 1 million in population. Opportunities exist to connect the County's municipalities, regional parks, and lake features. Challenges include trail connectivity across major roadway corridors such as I-40/440, I-540, US 1, US 70, and others.

Map 2.1 Social Equity/Community Assessment Index

When evaluating the need for greenway infrastructure, it is important to understand the makeup of vulnerable populations and populations in need. Greenway trails can serve multiple purposes for these areas including access to transportation choice for those without vehicles and opportunities for healthy living for those who may trend towards inactive lifestyles. This assessment was used to help inform the overall list of trail recommendations, as shown in Table 3.1 Summary of Projects, in Chapter 4.

Map 2.2 Environmental Features

This map features the wide variety of land uses ranging from undeveloped forests to higher density development in cities. Sprawling development has occurred in the county, leaving undisurbed land as the exception to the rule. Retrofitting greenway trails will be a challenge in built-out landscapes. However, because of the work of County and municipal planners, many corridors have been protected for open space and future greenway trail use.

In lesser developed areas and farmlands, such as eastern Wake County, a desire for environmental protection and maintaining the rural heritage will be an important aspect of consideration for greenway theming and development.

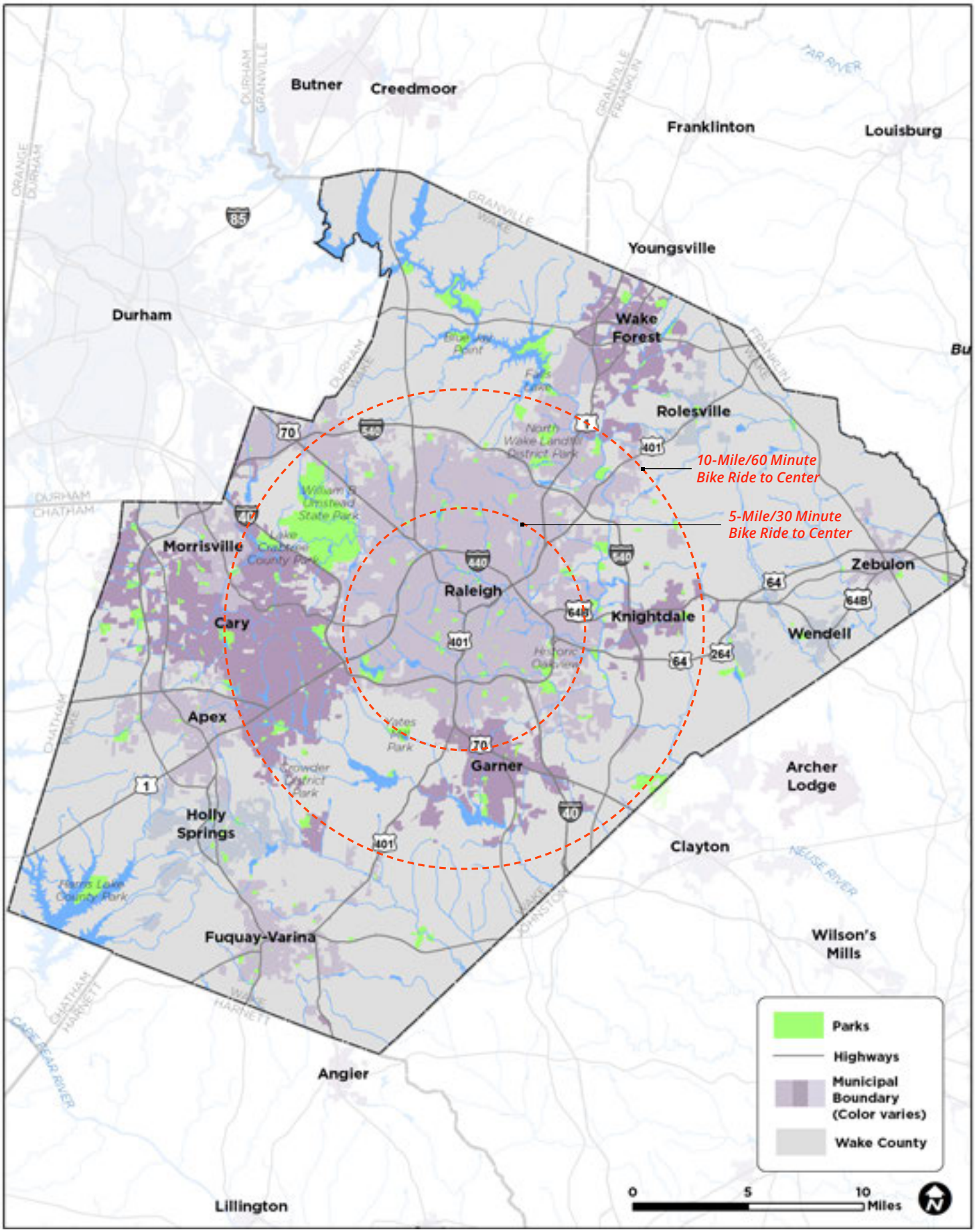
Map 2.3 Population and Destinations

Connecting population centers, where people live, work, and play, is essential for consideration in the development of a successful greenway system. It will also be important to connect greenway trails to key destinations when possible to promote tourism. There are a number of municipal downtowns, historic sites, transportation hubs, colleges, parks, schools, shopping centers, and employment centers that would benefit from greenway connections.

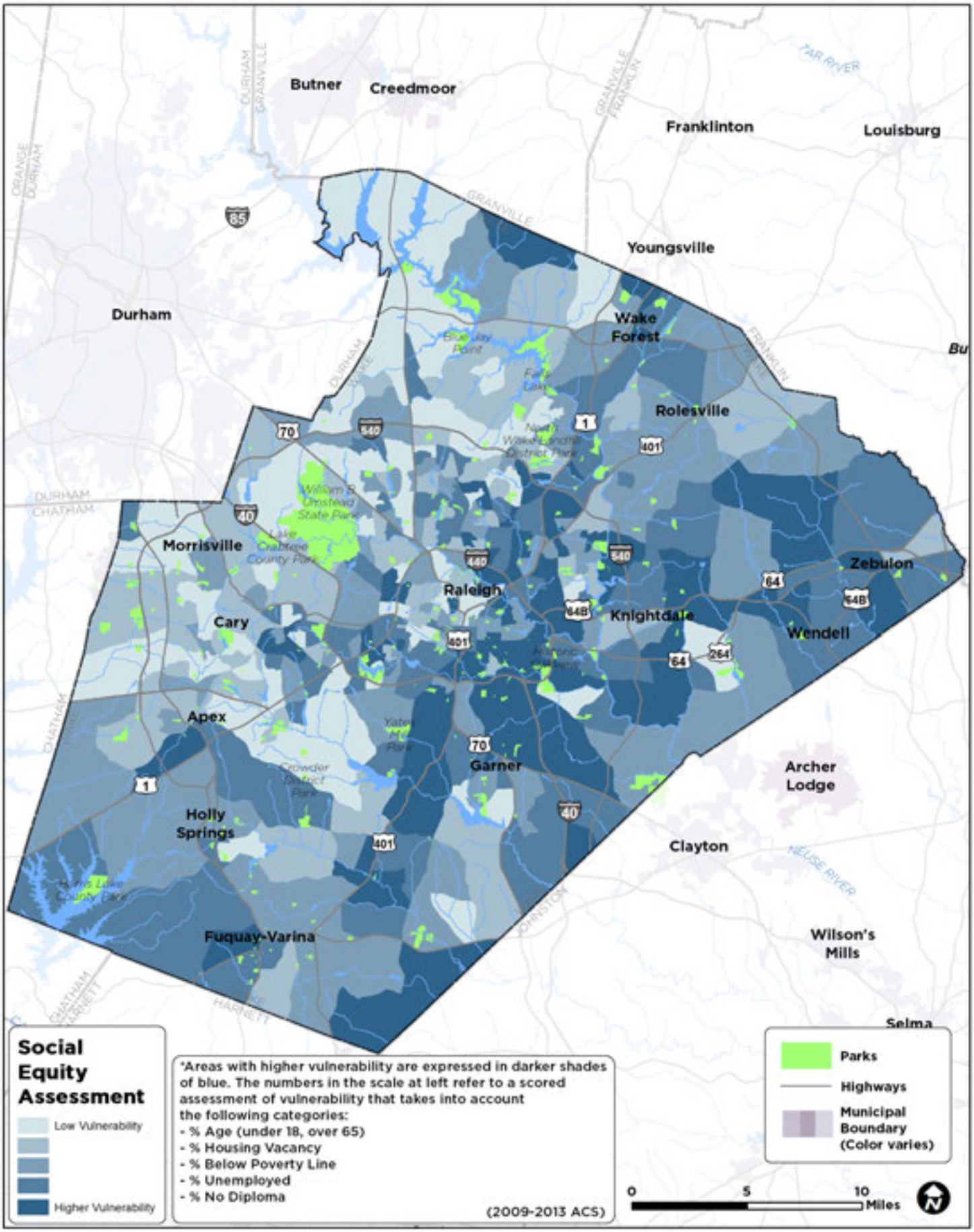
Map 2.4 Existing Trails

Wake County features almost 300 miles of existing greenway trails, including over 100 miles in the City of Raleigh and over 70 miles in the Town of Cary alone. The East Coast Greenway spine traverses the Triangle region, coming through Durham as the American Tobacco Trail, and extending through Cary and Raleigh, to the Neuse River Greenway. Only a couple short sections are remaining to complete the East Coast Greenway through this region. At 33 miles, the Neuse River Greenway is the longest continuous trail in the state of North Carolina, connecting Wake County to Johnston County. Dozens of miles of trail can also be found in Umstead State Park and Falls Lake.

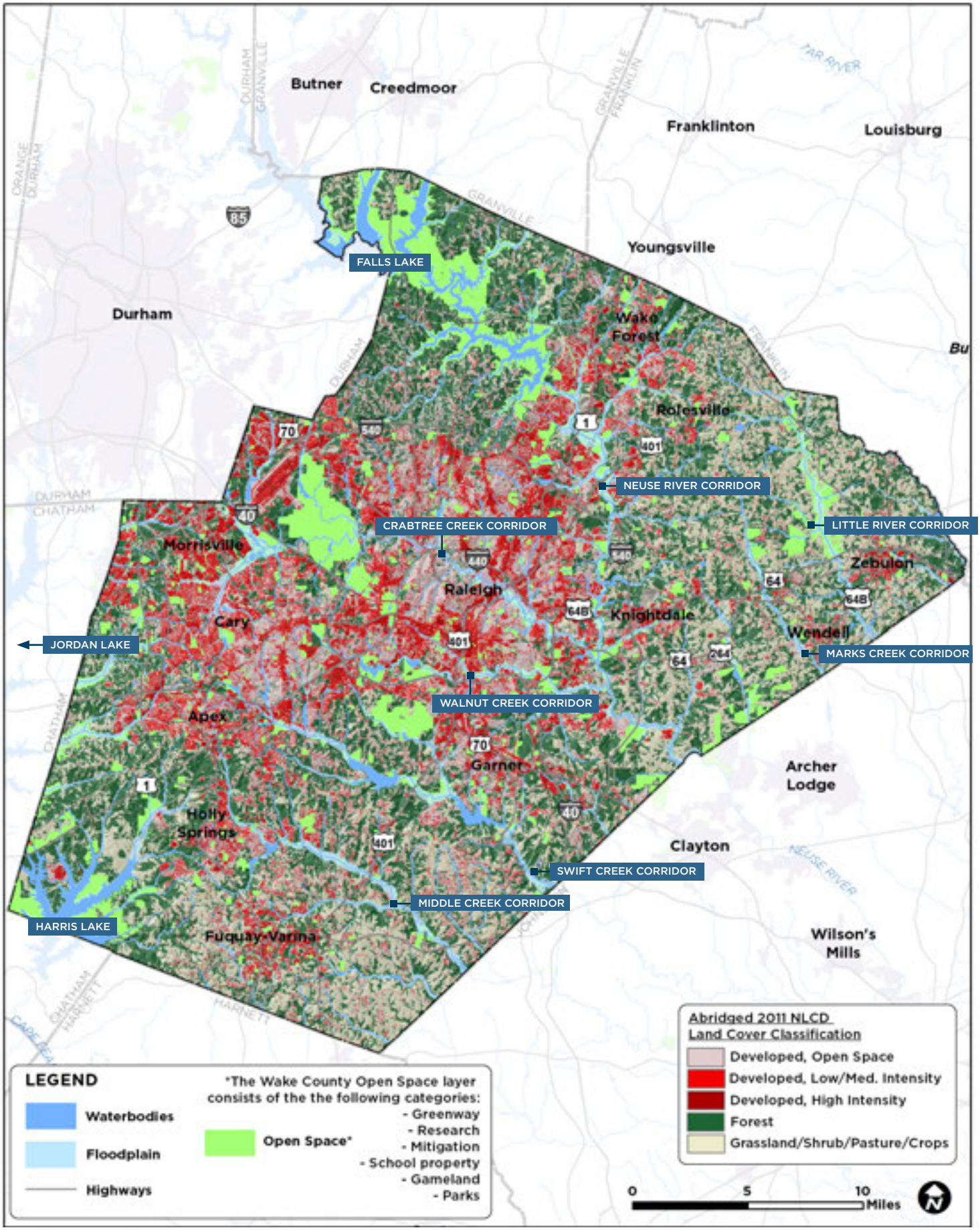
MAP 2.0 WAKE COUNTY STUDY AREA



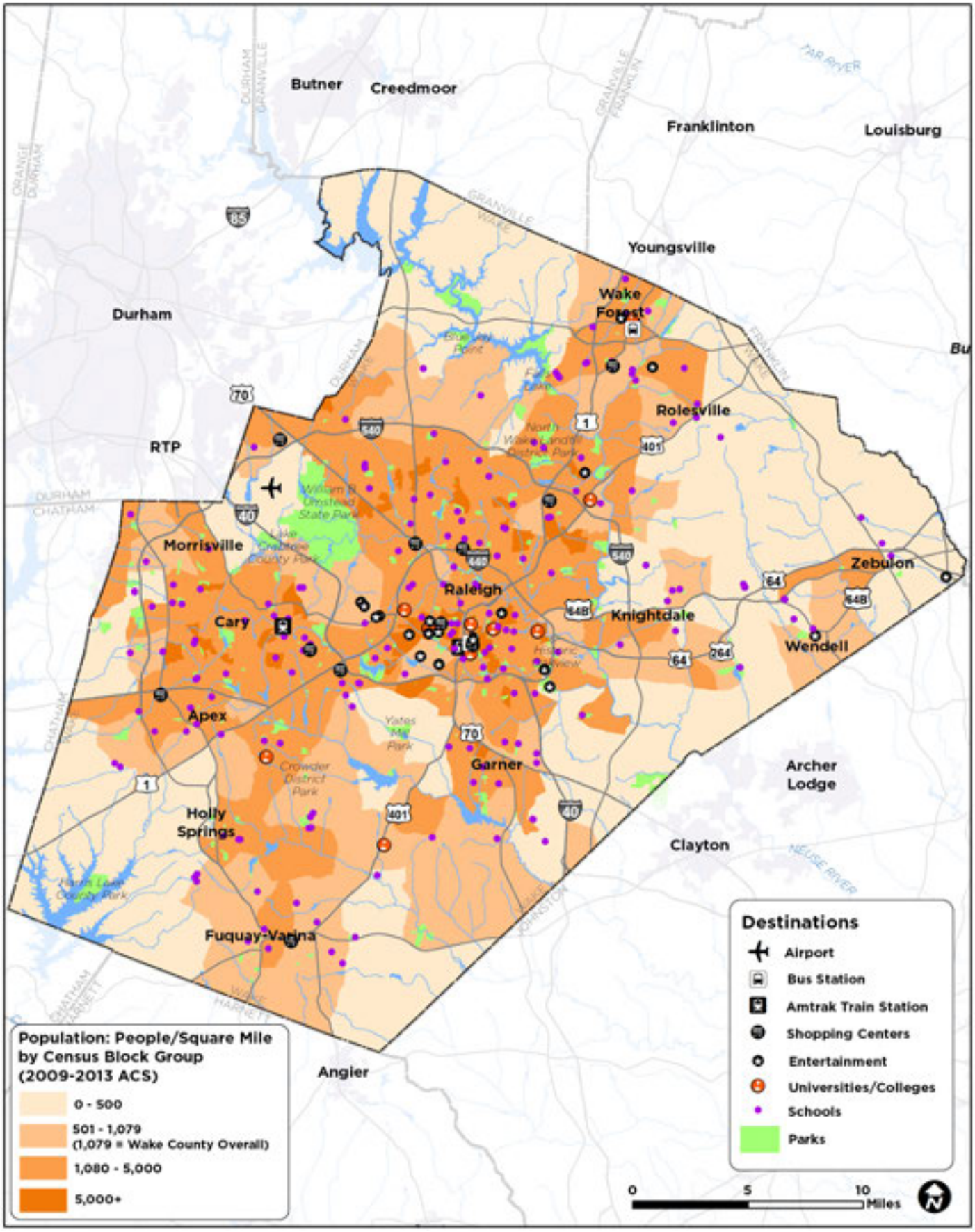
MAP 2.1 SOCIAL EQUITY/VULNERABILITY ASSESSMENT



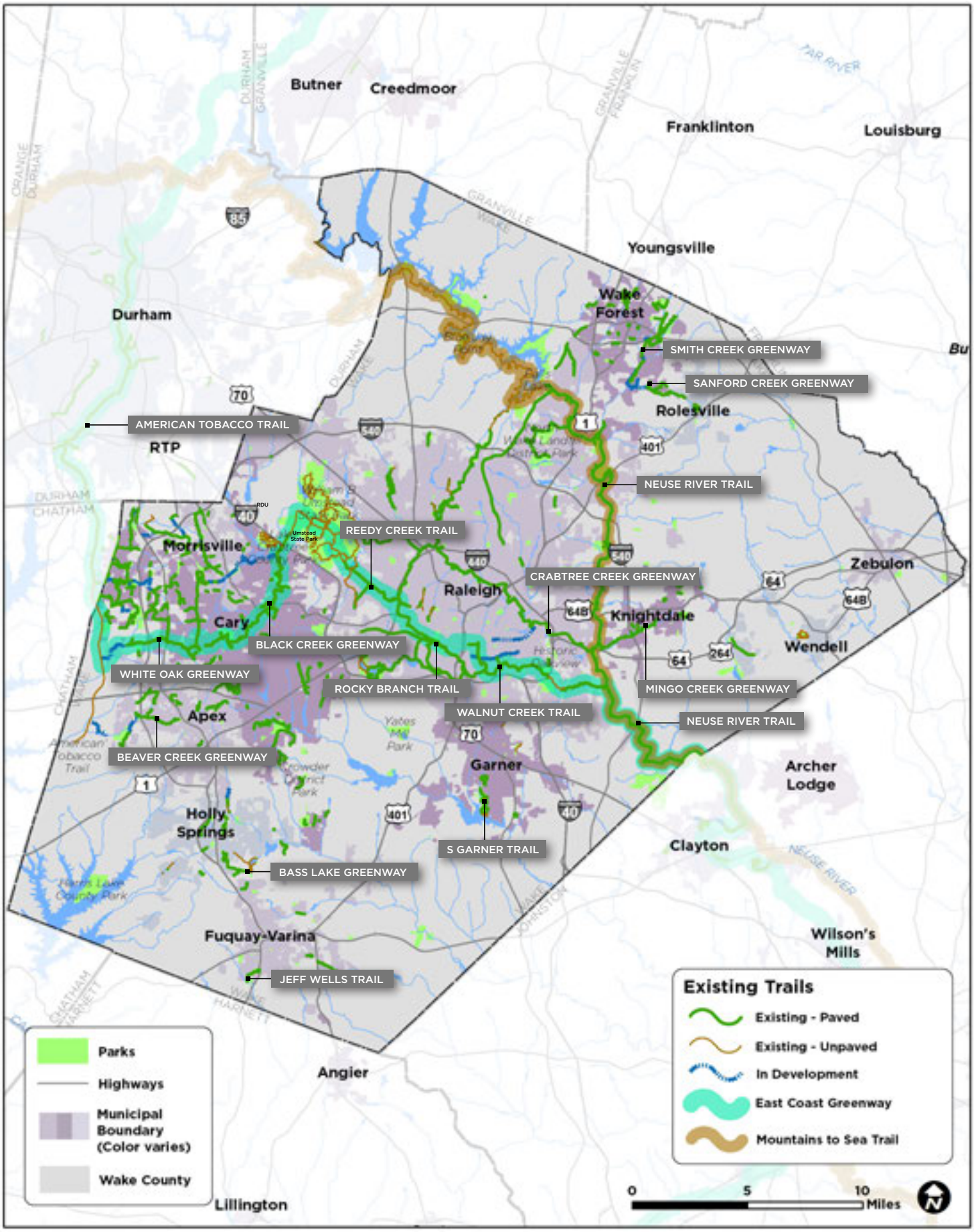
MAP 2.2 ENVIRONMENTAL FEATURES



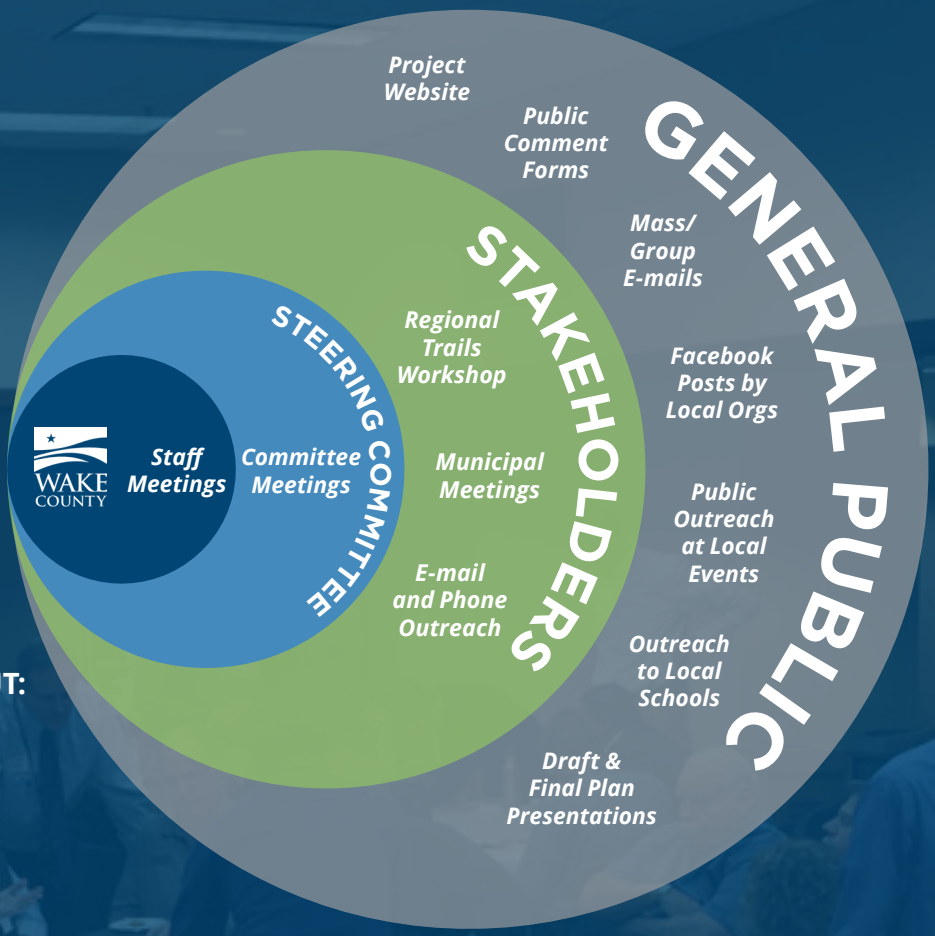
MAP 2.3 POPULATION AND DESTINATIONS



MAP 2.4 EXISTING TRAILS



Public Process Overview



KEY TYPES OF MEETINGS & PUBLIC INPUT:

16	STEERING COMMITTEE MEMBERS, WITH 3 OFFICIAL MEETINGS
47	STAKEHOLDERS AT THE REGIONAL TRAILS COORDINATION WORKSHOP
5	OUTREACH SESSIONS AT LOCAL EVENTS
27	PUBLIC HIGH SCHOOLS CONTACTED FOR PLAN OUTREACH
25	LOCAL ORGANIZATIONS CONTACTED THROUGH FACEBOOK
4	DRAFT AND FINAL PLAN PRESENTATIONS
2,300+	PUBLIC COMMENT FORMS
1,400+	UNIQUE VISITORS TO THE PROJECT WEBSITE

"We live in one of the most beautiful places on earth, and yet our past successes provide no assurances of future successes. If we don't start planning now and protect our great quality of life in Wake County, it will slowly start slipping away."
- Sig Hutchinson, Wake County Commissioner

Images from the December 2015 Regional Trails Coordination Workshop.

STAKEHOLDER COMMENTS ON EXISTING CONDITIONS

In December 2015, nearly 50 project stakeholders met for a countywide trail coordination workshop. The purpose of this inter-jurisdictional workshop was to better understand local priorities and opportunities for greenway connectivity. The meeting was introduced by Wake County Commissioner Sig Hutchison, highlighting a successful and challenging history in greenway trail development in Wake County. Greenway expert Chuck Flink (FASLA) gave the opening presentation, which focused on the emergence of regional trail systems in other parts of the United States, and touched on funding and partnership strategies for implementation. After the opening presentation, project consultants then facilitated discussions in small groups, covering how to build support for greenways, the challenges and opportunities related to trail development, and the key factors to consider for trail project prioritization.

Building Support for Greenway Trails in Wake County

For the first discussion topic, stakeholders were asked, ***"What are the key messages needed to build public support for greenway trails in Wake County?"*** Stakeholder responses focused on communicating the benefits of trails and how trails will make the region's communities more livable. Some stakeholders pointed out that the public support for greenways is already there now, and that trail proponents could be more aggressive in building upon the current levels of support. "Connectivity" was suggested as an overarching theme to focus on, with the following other benefit-related topic areas:

- *Health, Wellness, and Happiness:* Stakeholders suggested the message should be very positive, highlighting health, wellness, and happiness.
- *Safety:* Examples included teaching how to ride bicycles safely and communicating the need for more "off-road" bicycle and pedestrian facilities that do not require sharing space with automobiles.
- *Environmental Protection:* Locals and visitors alike should know this is a place that cares about the environment, and the trail system could be a way to promote that. The trail system could be a tool for education in nature, and for actual protection of water resources and habitat along greenway corridors.
- *Social Equity:* Greenways should be places that bring people together and build community. Trail-related outreach and programming events should be used to promote greenways as inclusive public places for a diverse range of people. Local art, history, culture, and native plants could all be incorporated into certain trail features or trail programs.
- *Economic Benefits:* Greenway planners should focus on property values and how trails can support local businesses. Mobile apps, paper maps, wayfinding, and strategically located trail heads (parking), can be used to promote trail tourism in the region, and to direct trail users to nearby businesses. Planners should quantify the return on investment for the trail system and communicate it to potential funding partners, decision-makers, and voters.
- *Communications:* Salient examples of successful greenway trails should be communicated, focusing on what is already happening in Wake County with respect to greenways. Key

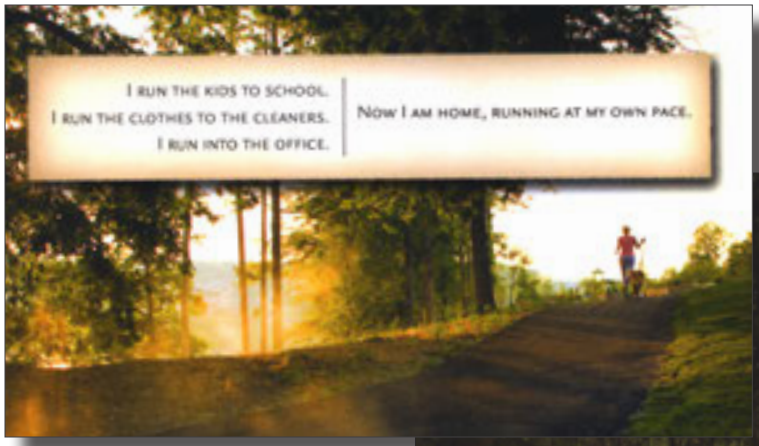
outreach efforts could center around a coordinated campaign among local and regional tourism and visitor bureaus, including a strong social media component and an overall branding of the trail system for "brand recognition." Special effort should be made to reach out to smaller communities to build support for trails.

Challenges and Opportunities for Trail Development in Wake County

The second discussion topic was on the key challenges and opportunities to trail development in Wake County. Key themes in stakeholder responses included the topics of trails and development, funding, and overcoming physical and social barriers to trail development.

- *Trails and Development:* With several representatives from the residential development community, some discussions focused on how developers can play a more active role in greenway trail development. Some developers want to include greenway trails in development, but some are still not interested. A desire for mutual benefit was expressed, using each other's interests to find a solution. Developers want to be compensated, credited, or recognized for dedicating greenway space, and dislike being singled-out to bear the costs of greenway trail dedication. For example, impervious surface calculations can limit trails within some new developments, and a credit or exception for trails would help offset that barrier. Some developers also feel that

Many developers understand the positive impact of trails on property values, and they use them to market their projects; left and below are examples of two magazine advertisements from developers that focus their marketing on greenways. These images are from ads in North Carolina and Florida.



At the award-winning Fishhawk Ranch, nearly 30 miles of trails weave throughout the community, connecting the many parks, amenities, villages and neighbors. Soon to be one of the largest community trail systems in the country, each pathway was carefully positioned to minimize the impact on the existing plant life.

existing landowners, in places that are already developed, should somehow contribute to the cost of providing the facility. From the municipal perspective, they would like to see more developers providing greenway trail infrastructure, the same way they are required to provide sidewalks and roadways. Ultimately, both local governments and developers want to see burden shared in some way – which speaks to the inter-stakeholder effort needed to create a regional greenway system. One potential solution could be to highlight model developer partnerships, model community policies, and model incentives for developer-driven construction. Communicating the potential developer benefits was also mentioned, such as the potential increase in property values and sales.

- *Funding:* The role of Wake County was brought up several times in the discussion of funding, and whether or not they would be able to play a role in filling the gaps between municipalities and between existing trails. The challenge of "the last mile" was brought up, referring to the difficulty in completing trail segments on the fringes of communities (between municipalities and between Wake and surrounding counties). There may be an opportunity for Wake County to play a role in incentivizing those connections at the edges of jurisdictions, and at the very least, facilitating communication and coordination across jurisdictions
- *Physical Barriers:* The discussion of physical barriers revolved around both natural and man-made factors in trail development. Natural barriers, such as crossing wetlands and waterways present design challenges, particularly in finding solutions that are cost-effective. Similarly, man-made barriers, such as railroads and major highways, present their own design challenges, which are also often expensive, such as trail overpasses and underpasses. For example, the "Complete 540" project is an example of a potential physical barrier for trail connectivity, and US 64 is an example of an existing barrier in connectivity (for Apex and Cary). Other man-made features may present opportunities for connectivity, such as utility corridors. Public sewer corridors are used as a key part of many trail systems, and private utilities, such as power and gas, have their own guidelines for trail development within their corridors.
- *Barriers Related to Operations, Management, and Programming:* Community trails sometimes face skepticism because of a lack of understanding regarding the safe opportunities that trails offer residents for recreation and transportation, and the need to address this misconception was brought up by project stakeholders (see the opposite page for more on trail safety and crime prevention). The most common "not in my backyard" sentiments towards trail development can be offset in several ways. First and foremost, if trails are built as part of new development, they are a known factor from the start, and are seen as an asset from the beginning. In the case of "retrofitting" trails, or planning and constructing them in a place that is already developed, a comprehensive outreach and education effort is often needed. In addition to the typical communication about the benefits of trails and the reality of crime on greenways, these efforts could include testimony from residents in other parts of the region that currently live near trails and enjoy them. Particularly helpful are those that were previously opposed to trails that now support them in their own community. For example, trail planners in Wilmington, North Carolina, use video testimony from such residents as a communication tool.

TRAIL SAFETY AND CRIME PREVENTION

The rate of crime on trails and greenways does not exceed the rate of crime in the communities that surround trails and greenways. In fact, a national study of 372 trails demonstrated that serious and minor crimes were much lower on urban, suburban and rural trails than the national crime rates for urban, suburban and rural areas. For example, a study in Charlotte, North Carolina, examined properties neighboring fourteen Charlotte greenways and found the rates of property crimes to be either insignificantly different or lower than the rates in the surrounding neighborhoods.

Still, working with police remains an important part of ensuring that a trail is safe to use. Regular police involvement—especially patrols by bike—can deter crime in many types of public spaces, including trails. See this Plan's Chapter 3, Recommendations, for more on programs related to trail design and trail safety.

Sources:

- *Martin, W., Ludden, T., Furuseth, O., and Nixon, S. "Preliminary assessment of crime risk along greenways in Charlotte, North Carolina." 2004. Unpublished UNC-Charlotte study.*
- *Tracy, T., and Morris, H. "Rail-trails and safe communities: The experience on 372 trails". 1998. National Rails-to-Trails Conservancy. Web. 4 December 2015.*
- *Rails-to-Trails Conservancy. "Police Work and Safety". 2015. Web. 4 December 2015.*

Stakeholder Input on Prioritization

The third discussion topic was about greenway planning priorities, and what factors to consider in prioritization. The main theme from stakeholder responses to this question centered on the need to make shorter, local connections first, filling gaps in the existing trails system. This would be followed by connections to downtowns and population centers. The general consensus was to focus on the "spokes" of the overall countywide greenway system first, with at least one main artery through each municipality, followed by the "outer rings" of the system.

Another theme of the prioritization discussions was on greenways for transportation versus recreation, and destination-based priorities in rural versus urban areas. Context-dependent criteria was discussed, in which urban area priorities could focus on trails as transportation, closing gaps and making connections from neighborhoods to trails and trailheads, so people do not have to drive. Rural communities could then focus on low-hanging fruit and trails as recreation, making connections to local parks, schools, or day trip destinations, such as regional parks and neighboring towns.

Stakeholder Input on Mapping and North Carolina as the "Great Trails State"

After the stakeholder group discussions, project consultants then facilitated mapping exercises in small groups, gathering input on a working draft of proposed county connectors that was based on existing trails and proposed trails from existing plans. Input from that exercise is reflected in this Plan's existing conditions maps and recommendations maps. The meeting concluded with a presentation from greenway expert Iona Thomas (AICP), focusing on North Carolina's potential as a "Great Trails State," with emphasis on local successes and the need for trail marketing.

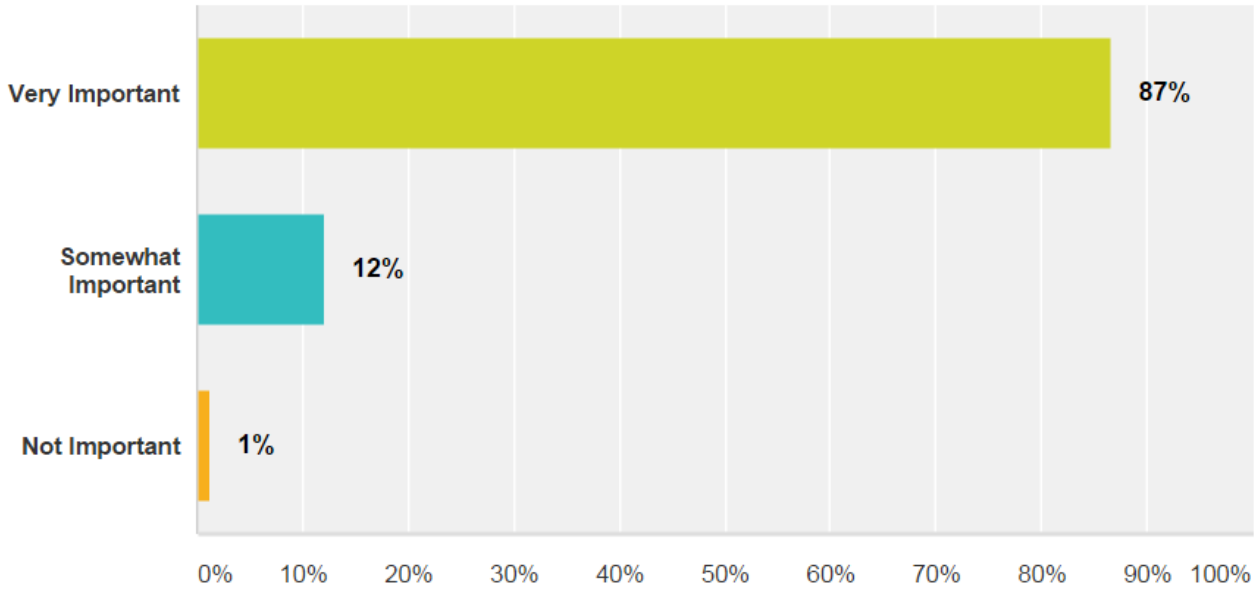
PUBLIC COMMENTS ON EXISTING CONDITIONS

The public comment form was active between November 2015 and March 2016. It was available online through the project website and in hardcopy at outreach events and meetings. People throughout Wake County were encouraged to fill-out these forms through the mass-email lists of project committee members and stakeholders, through social media (Facebook), and through municipal website announcements.

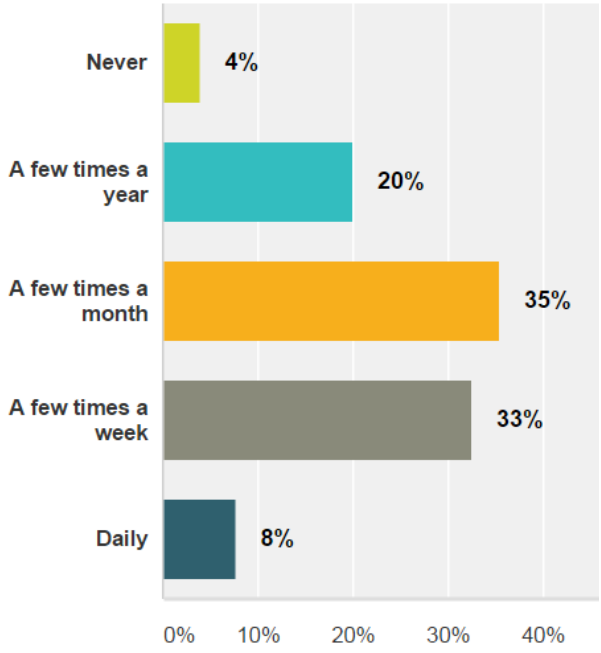
There were more than **2,300 respondents** to the public comment form. Although not statistically valid, the results that follow still reflect the voices of 1000s of Wake County residents who have an interest in the region's greenway trails. Summary responses are displayed below; for full results, please contact Wake County Parks, Recreation and Open Space (PROS).

Public input through maps and public comment forms in Fall 2015.

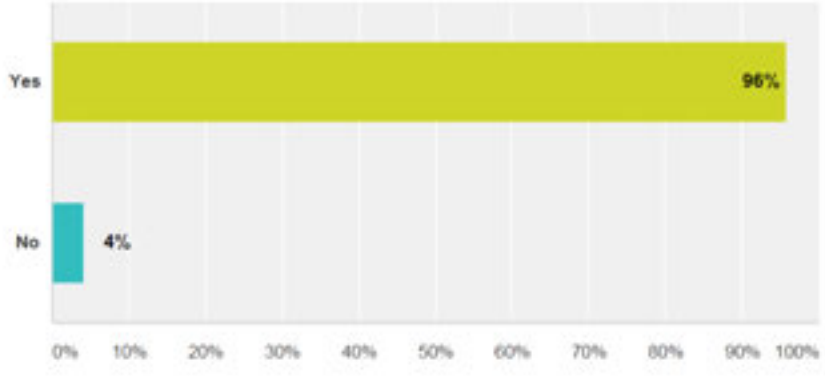
How important to you is the goal of creating more greenways in Wake County?



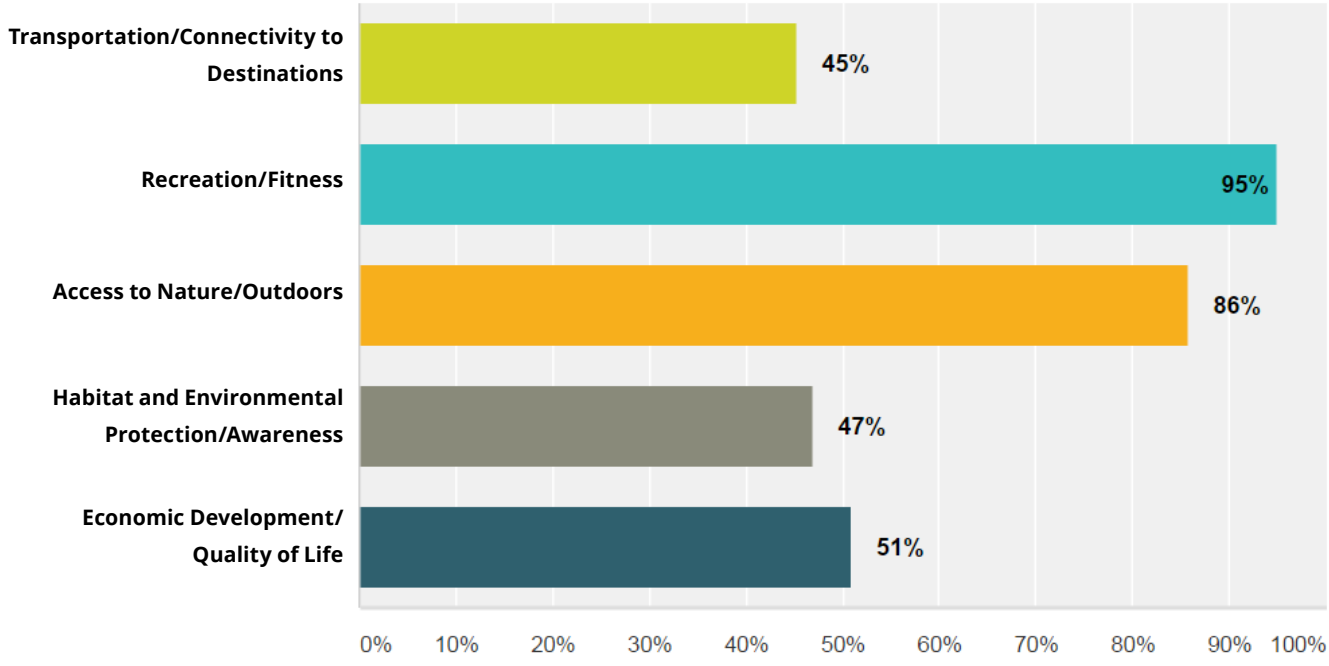
How often do you use a greenway now?



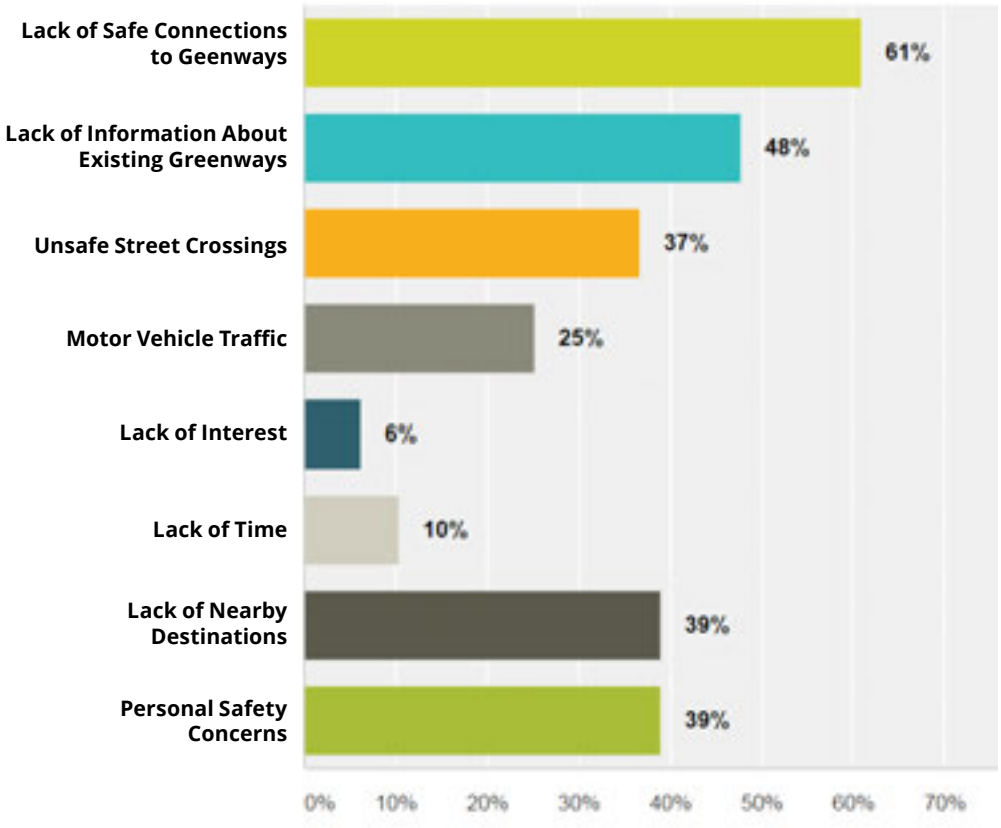
Would you use greenways more often if you were closer to them, or if there were more of them?



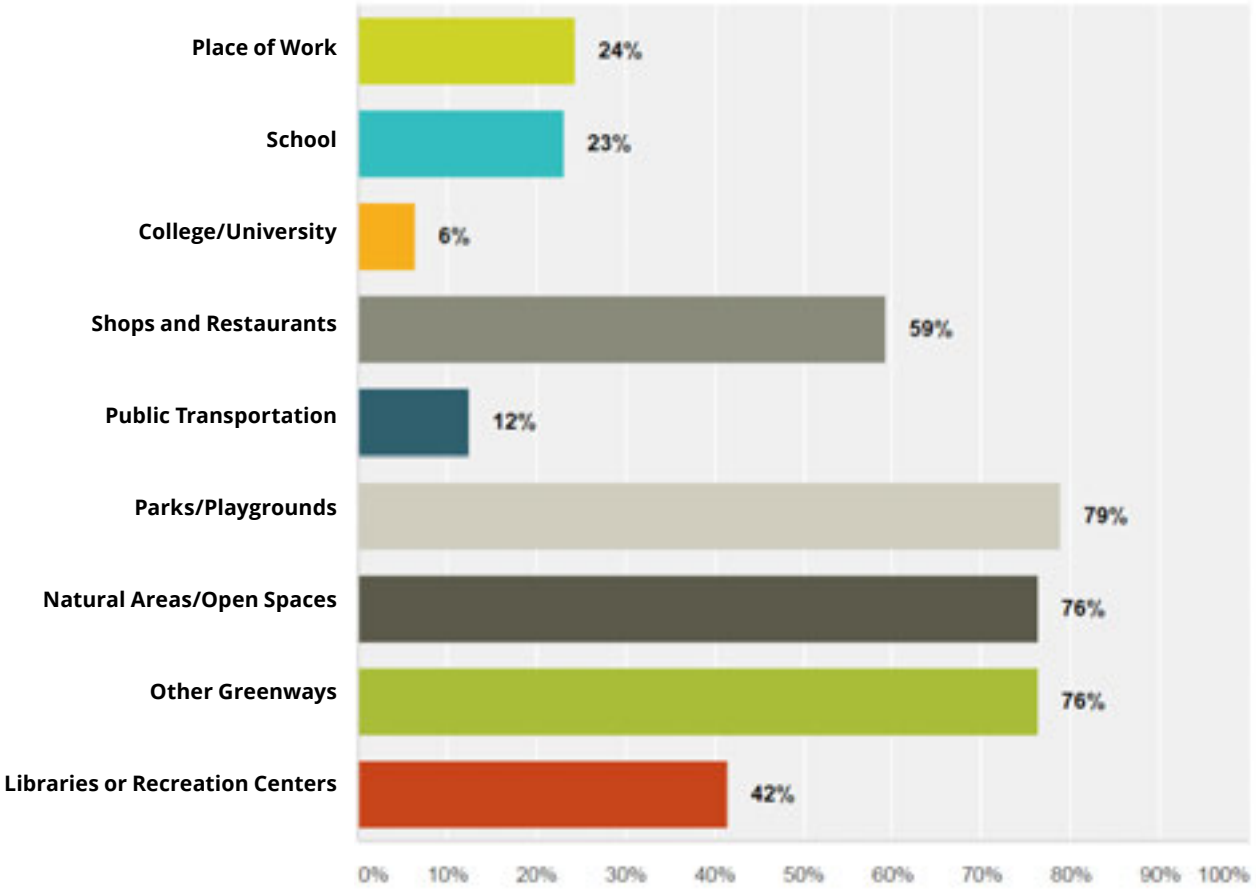
In your opinion, what are the most important benefits and uses of a greenway system? Select all that apply.



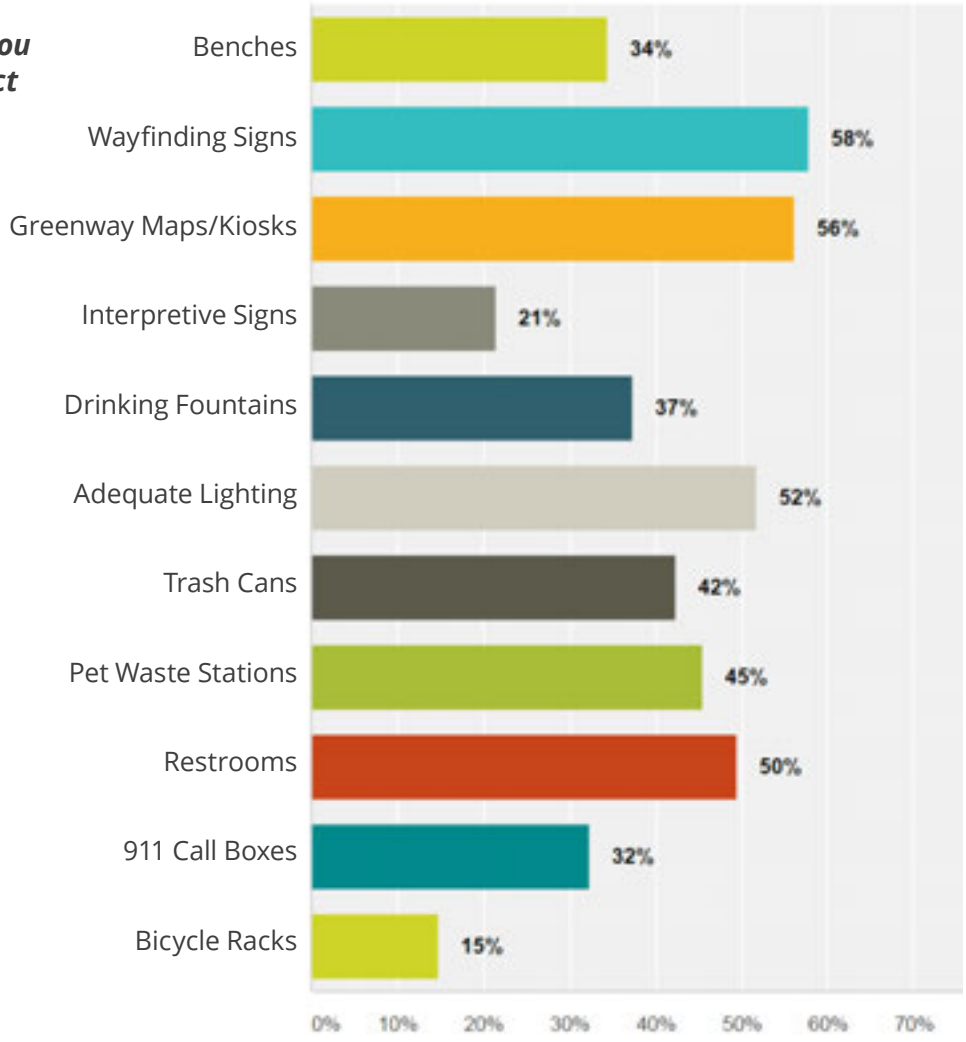
What do you think are the biggest factors that discourage greenway use? Select all that apply.



What destinations would you most like to get to by greenway? Select all that apply.



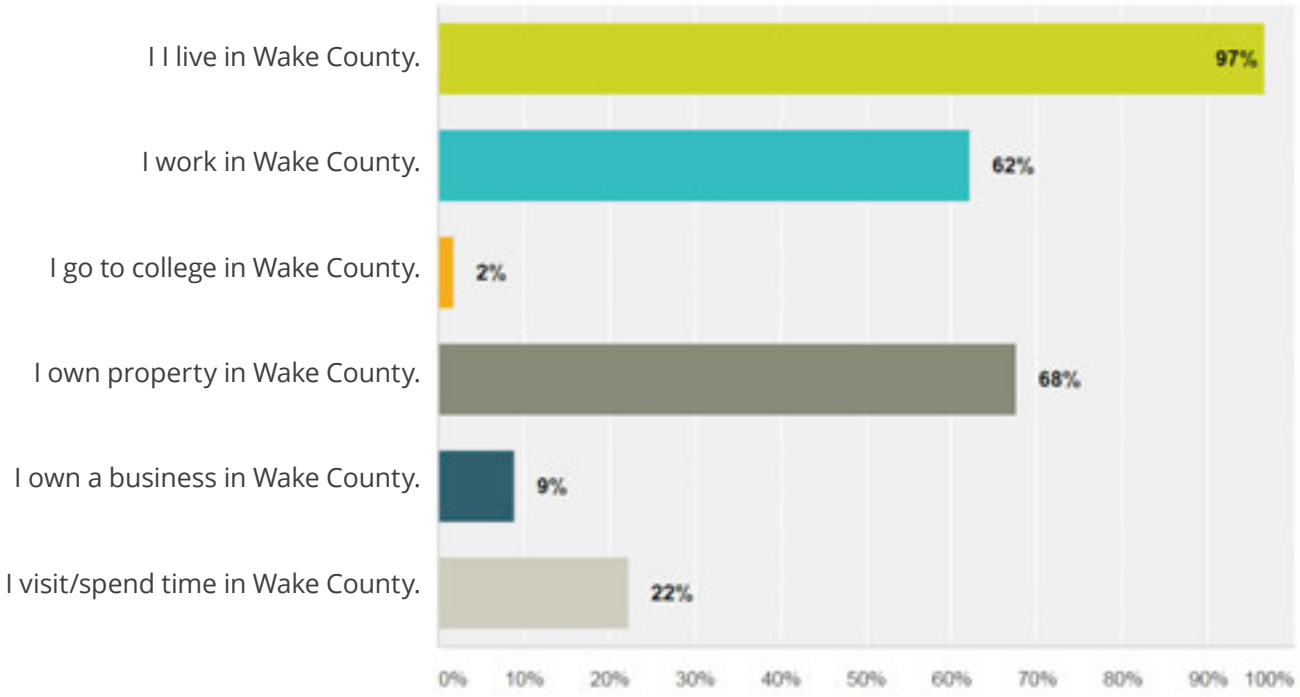
What amenities are most important to you for greenways? Select all that apply.



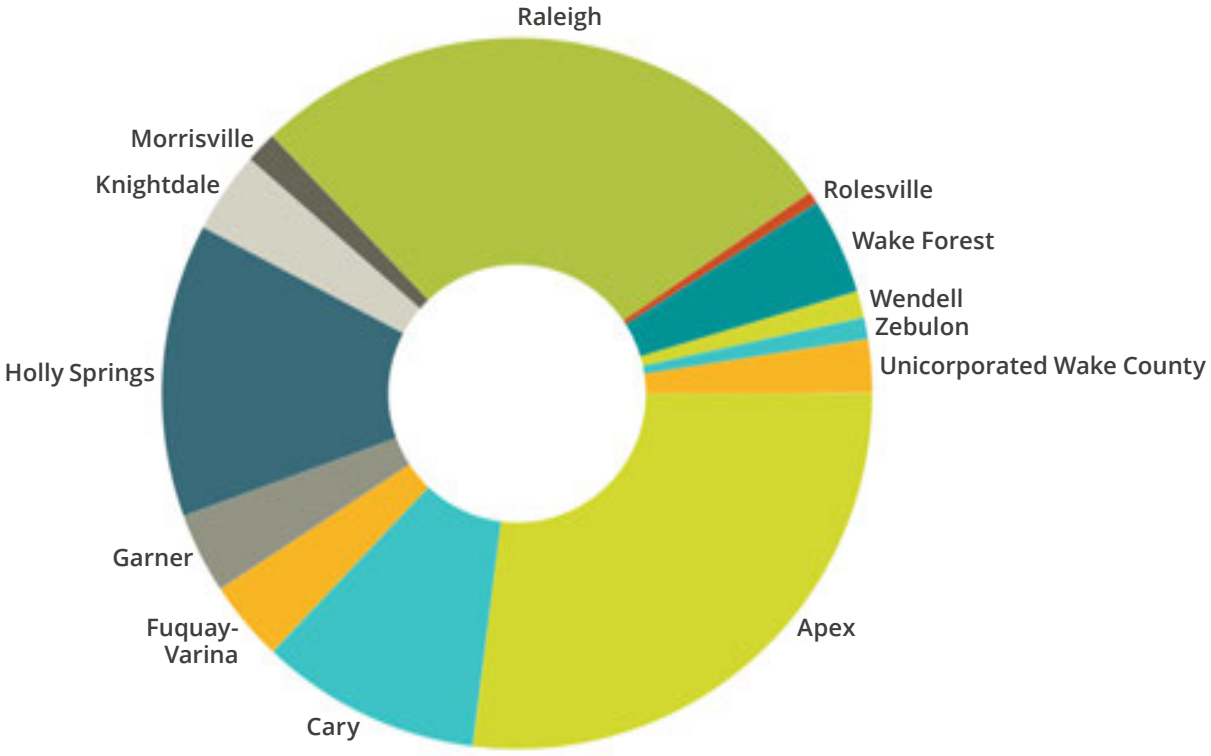
Are there specific locations within Wake County (and its municipalities) that you believe would be ideal for greenway trails, or greenway trail extensions? (summary of responses below)

Respondents overwhelmingly identified Holly Springs, Cary, Fuquay-Varina, and Apex as areas where more greenways are desired. Garner and Knightdale were also mentioned. Within Holly Springs, specific locations that were identified include the 12 Oaks neighborhood, Middle Creek High School, Sunset Lake Road, and Highway 55. Respondents emphasized the importance of connectivity of greenways in terms of connecting to existing trails as well as to neighborhoods and other municipalities. Recommendations include connections from Cary and Apex to the American Tobacco Trail, connections to the Crabtree Creek greenway, and connections from Wake Forest to the Neuse River Trail. Within Raleigh, respondents felt that it was important to have safe connections to and from downtown Raleigh as well as greenways that connect to Renaissance Park and Six Forks Road. Within Apex, the Beaver Creek greenway system was mentioned as an existing greenway that should be extended. Respondents indicated that Apex needs more greenways, preferably ones that connect to neighborhoods and Apex Nature Park. While there are existing greenways in Cary, respondents noted that they don't connect to major destinations and would prefer connections to downtown Cary and other greenways.

What is your connection to Wake County? Select all that apply.



Please share where you live, so we can better ensure broad participation in the comment form.



Are there other comments you would like to share about the greenway plan?

Almost 30% of survey respondents provided additional comments about the greenway plan. Overall, responses were positive and respondents are eager to see continued progress towards improving and building more greenways in Wake County. A major theme was the emphasis on connectivity, especially in terms of connecting existing greenways in Wake County. Due to increasing traffic congestion, respondents indicated that they would like to use the greenways for commuting to work if they connected to major destinations and residential areas. Respondents believe that greenways are a safer and more accessible option for biking, but indicated that they would prefer greenways to be separated from traffic or busy roads. Another major theme that emerged was the recognition that greenways are a major boon for tourism as well as property values. While there weren't many negative comments, respondents indicated that maintenance of greenways could be improved. In particular, wooden bridges and boardwalks tend to become slippery when they are wet and pose safety hazards for bicyclists. Below are sample quotes from the responses to this question:

"My husband and I were just talking about how we would love to ride our bikes from home to downtown, the library, etc., but there is no safe way for us to get there. We currently live near Sunset Lake and Holly Springs Roads, and both include spots that are too dangerous for bikes so a greenway would be perfect."

"Southern wake county (Garner) has little to no greenways or parks. The majority of these are centered around areas with higher income populations like Holly Springs, Cary, etc. The middle and lower income residents could benefit greatly to having a greenway connected to the larger system for use, recreation, and health benefits."

"There are lots of great greenway trails; however, many are short in-out spurs. Few are loops that provide interesting, new scenery along its entire length. Also, many cross busy roads that are dangerous to get children across safely."

"I would like more to connect in Cary. There are a few nice ones but most of them are short and don't really go anywhere."

"Apex does not have a continuous system of greenways so would love to see them extended and joined into one large greenway."

"I would love to see better connections around schools. It just makes sense for students and school staff to be able to use greenways to walk/bike to school. The issue at the moment is that our greenways are not necessarily laid out with active student transportation in mind. I would especially love to see more of this around high schools, but all schools."

"I think Raleigh has done a fabulous job with the greenway system and look forward to it expanding more."

"More greenways where we can cycle or walk to the grocery store, restaurants etc are welcomed."

"With traffic getting heavier through Fuquay, it would help to have increased connectivity through an extended greenway network. It would also help the area grow more sustainably."

"The Greenway is one aspect of living in Raleigh that has increased my standard of living significantly. Please keep expanding, because I love to bike, but not on the road!"

"I'm very pleased to learn of expansion plans for the greenway system. As an active cyclist, I enjoy riding the greenways far more than the roads due to the enhanced safety compared to riding with vehicular traffic."

"I really like the greenways. The more the greenways the better it is for the community."

"Greenways are a great way to promote the outdoors and provide a safer place to walk, run, and bike."

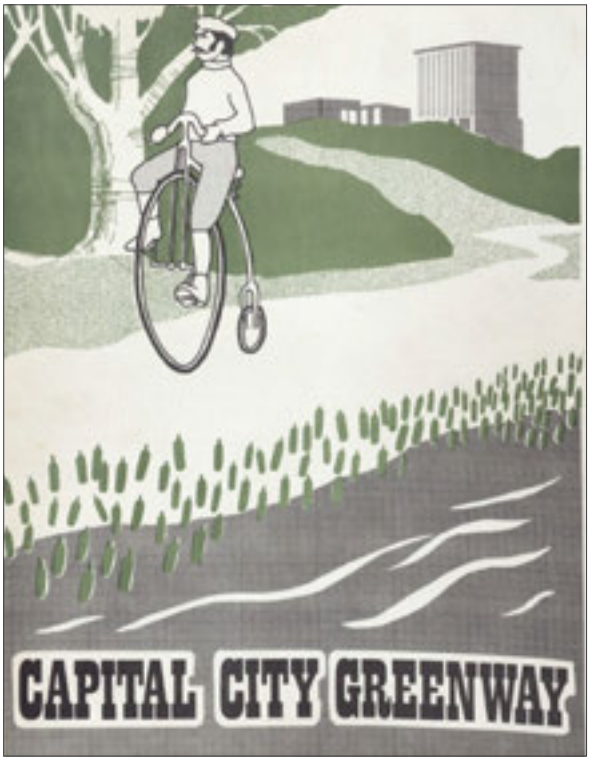
"I love the greenways and it's a huge part of why I live here. Please connect more of them to increase the riding distance."

"Greenways are a tremendous asset. Keep investing in them."

SUPPORT FOR GREENWAYS IN EXISTING PLANS

Wake County and its municipalities have a long history of greenway planning. The City of Raleigh's 1972 Capital City Greenway report, by Bill Flournoy, explained the greenway concept as it could be implemented in Raleigh, and suggested how a program might be created. Today, each of Wake County's 12 municipalities have their own plans for greenways, some in stand-alone citywide greenway master plans, others as part of larger citywide transportation or recreation planning initiatives. The table below provides brief summaries and highlights from the most relevant and current greenway planning initiatives in each community, including some plans that are regional in nature, or from neighboring jurisdictions.

These do not represent *all* plans in these communities, but rather the *most relevant and recent* plans that address issues related to this Wake County Greenway System Plan.



Cover of the 1972 Capital City Greenway report by Bill Flournoy.

SUPPORT FOR GREENWAYS IN EXISTING PLANS	
WAKE COUNTY	
Parks and Recreation Master Plan (2008)	The plan outlines goals and strategies for Wake County to focus on in order to protect the environment and provide recreational opportunities for its residents. Results from the citizen survey indicated that Lake Crabtree County Park was the most visited park. In addition, walking and hiking trails were the highest rated new facilities that citizens want. Three major trail projects were identified: Swift Creek Greenway, Neuse River Greenway, and extension of the American Tobacco Trail South. In this plan, Wake County also identified four potential future County Park facilities. They are Lake Myra County Park, Little River County Park, Southeast Wake County Park, and the Brady Jefcoat Property.
Park Facility Master Plan Updates (2016)	The purpose of this plan is to update the Master Plans for each of the County's parks. One of the goals is to participate in the planning and collaboration of municipal and regional trail and greenway plans. The plan includes an existing conditions analysis of Wake County's 6.5-mile portion of the American Tobacco Trail, along with recommendations for improving the trail. Potential recommended improvements for the ATT include: User orientation and wayfinding, access to water, parking, lighting, shelters, and bike repair stations.

Open Space Plan (2006)	This plan promotes the protection of at least 30% of Wake County's land and water as permanent open space. Five types of greenways are proposed: 1) no facility development, 2) limited development, low-impact uses, 3) Multi-Use Unpaved Trail Development, 4) Multi-Use Paved Trail Development, 5) bike and pedestrian facilities in rights-of-way. Recommendations are outlined according to those adopted in open space, greenways, and/or park plans for each municipality in Wake County.
Transit Plan (2015)	The transit plan focuses on enhanced transit within the county. Recommendations include strengthening cross-county connections via a commuter rail line and enhanced bus service, connecting all 12 municipalities, expanding the network and BRT service, and increasing the frequency of service. There is no mention of connecting transit service to greenways or trails, although the plan prioritizes enhancing transit service in urban cores and employment centers.
Trails and Greenways of Wake County: pocket guide and community resource	This resource provides a listing of all the trails and greenways in each of the 12 municipalities of Wake County and provides maps of the parks, greenways, and trails. This resource is currently out of print, but demand for these hardcopy maps has remained consistently high.
CITY OF RALEIGH	
Capital Area Greenway Planning & Design Guide (2014)	This plan, by the Parks, Recreation and Cultural Resources Department, identifies existing and proposed portions of the Capital Area Greenway System. The Capital Area Greenway Trails Composite Map shows existing and proposed greenway trails. The plan's "Cross City Greenway Trails" are particularly relevant to regional connectivity, including the Reedy Creek Trail, Rocky Branch Trail, Crabtree Creek Trail, and the Neuse River Trail.
TOWN OF APEX	
Parks, Recreation, Greenways, and Open Space Master Plan Map (2015)	According to this plan, "Greenways are the highest priority for Apex residents. They desire easy access to greenways from their homes, and want to be able to travel to parks, commercial centers, work, and schools on a system of well connected paths and bicycle facilities." Top trail priorities from this plan include: 1) American Tobacco Trail (ATT) connections, including: Jaycee Park to Downtown (1,500 LF); Kelly Road Park to Apex Nature Park (1.2 miles); and Apex Nature Park to American Tobacco Trail (2.3 miles), 2) Middle Creek Greenway connection to ensure safe crossing at the future I-540, and 3) White Oak Creek Greenway through Apex and to the ATT, working in collaboration with the Town of Cary.

TOWN OF CARY	
Parks, Recreation, and Cultural Resources Master Plan (2012)	This plan details key trail connection corridors that link parks, schools, cultural and business centers, open space, other trails, and adjacent jurisdictions. Primary Greenway Trail Recommendations include: 1) Umstead to ATT, 2) RTP to Middle Branch, 3) Umstead to Hemlock Bluffs, 4) Downtown to Raleigh, and 5) Crabtree to ATT.
TOWN OF FUQUAY-VARINA	
Community Pedestrian Master Plan (2013)	In this plan, the top priority shared use path project is the Angier Road Sidepath (all other top projects are for sidewalks). This path would provide access to Fuquay Mineral Spring Park, Fuquay-Varina Public Library, and the proposed Town walking loop route.
TOWN OF GARNER	
Comprehensive Parks, Recreation, and Greenways Master Plan (2007)	This plan serves as a guide for expansion of future parks and recreation facilities and programs. Residents who participated in the planning process listed walking and pedestrian-related facilities as their highest priority. Walking is the highest ranked activity that respondents would like to see the Town of Garner provide facilities for over the next 10 years. Immediate greenway and sidewalk needs are: 1) North Garner Greenway, 2) Downtown Pedestrian Route, 3) Garner Loop, and 4) North-South Greenway. Near-term greenway and sidewalk needs include: 1) Timber Drive Sidewalk Connector, 2) West Garner Connector, 3) East Garner Schools Connector, 4) Mahler's Creek Greenway, and 5) Swift Creek Greenway Phase 1.
TOWN OF HOLLY SPRINGS	
Parks, Recreation, and Open Space Master Plan (2007)	Greenway corridors have been identified along the Colonial Pipeline, along Sunset Lake and Sunset Lake Road, from the White Oak greenway trail to Apex municipal trails and to New Hill-Holleman Road at Friendship Park. Greenway trails would be established from the Fuquay-Varina railroad corridor to other Fuquay-Varina greenway trails and to Buckhorn Creek. Trails will also be established from Friendship Road and New Hill-Holleman Road to the American Tobacco Trail corridor.
TOWN OF KNIGHTDALE	
Knightdale Parks, Recreation, and Open Space Master Plan (2010)	The overaching goal of Knightdale is to be an active, engaged community and the objectives outlined in this plan support this goal. The following greenway corridors are recommended for improvement with a minimum 10-foot wide multi-purpose paved trail: Mingo Creek, Beaverdam Creek, Mark's Creek, Poplar Creek, Clark's Branch.
TOWN OF MORRISVILLE	
Parks and Recreation Master Plan (2011)	The 2011 Parks and Recreation Master Plan focuses on the recreational needs of the community and how to accommodate them for the next ten years. The main proposed greenways are along Chapel Hill Road, McCrimmon Parkway, and Morrisville Parkway.

TOWN OF ROLESVILLE	
Rolesville Open Space and Greenways Plan (2002)	The purpose of the plan is to protect natural and cultural resources. The plan calls for stream buffer zones, greenway corridors, bike routes, and scenic road designation for at least five corridors. Trails identified in the adopted map include the Buffalo Creek Trail, Sanford Creek Trail, Toms Creek Trail, Cedar Fork Trail, and Perry Creek Trail.
TOWN OF WAKE FOREST	
Wake Forest Open Space & Greenways Plan Update (2009)	The greenway system recommendations of the Wake Forest Open Space and Greenways Plan are broken down into two primary phases for future development: Phase 1 - Smith Creek and Dunn Creek Corridors (key north/south corridors that connect Wake Forest with the Neuse River), and Phase 2 - Richland Creek, Sanford Creek, and the NC 98 Bypass Corridors.
TOWN OF WENDELL	
Zebulon & Wendell Open Space Plan (2002)	This document is meant to be a visionary plan, which identifies potential open space and greenway corridors throughout the study area. It is the Town of Wendell's desire to update this plan in the near future to account for changes which have occurred since its adoption in 2002. One of the plan's top objectives is to develop multi-purpose recreational trails, specifically to acquire land for a Zebulon-Wendell Greenway between the towns, and to acquire property for regional trail heads and a water quality demonstration project along the Little River Corridor.
TOWN OF ZEBULON	
Zebulon Greenways Master Plan (2015)	Ten greenway corridors are recommended in this plan. The two priority projects are Corridor 1 - Spiderlily Court cul-de-sac in the Taryn Meadows neighborhood to Pippin Road (including the trail around Hendricks Pond in the Weavers Pond neighborhood); and Corridor 3 - Wake County Branch Library and Eastern Regional Center to the Zebulon Elementary School and the Boys and Girls Club (and adjacent residential development).
REGIONAL PLANS/STAKEHOLDER ORGANIZATIONS & AGENCIES	
2040 Long Range Transportation Plan	The 2040 Long Range Transportation Plan (2040 LRTP) lists future highway, bus transit, light rail, bicycle, pedestrian and other transportation projects to be implemented through the year 2040. One of the goals of the plan focuses on the pedestrian and bicycle system that will support recreational opportunities and includes off-road trails. The 2040 MTP recommends extensive integration of bicycle needs into the design and construction of new highways and future and ongoing transportation projects. Maps included in the plan display off-road bicycle and pedestrian facilities in conjunction with on-road facilities that will receive bicycle-pedestrian accommodations only.
Capital Area MPO Northeast Area Study (NEAS) (2014)	The Northeast Area study evaluated the multi-modal network and land use scenarios for northeastern Wake County, southern Franklin County, and Knightdale, Wendell, Zebulon, Rolesville, Youngsville, Franklinton, Bunn, and parts of Raleigh and Wake Forest.

Capital Area MPO Southeast Area Study (SEAS)	This study includes portions of Wake County, including Garner and part of Raleigh. The plan will update CAMPO's overall Comprehensive Transportation Plan and will produce project priorities to be included in the next Metropolitan Transportation Plan. The study is currently underway. The top three planning themes that were identified during the first public symposium are network connectivity, active transportation, and economic vitality. Among the priorities identified, a common theme was that "sidewalks, greenways, and bike facilities are needed to connect to activity centers."
Capital Area MPO Southwest Area Study	The study seeks to create a long-term sustainable transportation strategy for the area. The study area includes the southwestern portion of Wake County and northern portion of Harnett County including the towns of Angier, Apex, Fuquay-Varina, and Holly Springs. Key recommended greenways displayed in the proposed greenways map are along Middle Creek, Highway 55, Kenneth Creek, and Neills Creek.
Center of the Region Enterprise (CORE) Pedestrian, Bicycle, Green Space Plan (2012/2016 Update)	This plan was prepared by the Triangle J Council of Governments (TJCOG). It is intended to help the municipalities, counties and organizations, like the Research Triangle Foundation, located in the CORE area of the Triangle, create a linked network of pedestrian, bicycle, and green space facilities. According to the Plan's Map 6: Bike Top Priorities, the top projects in Wake County include the following (from north to south): TW Alexander, Briar Creek/Lumley, Crabtree Creek Greenway, Davis Drive, and the White Oak/Black Creek Greenway. A plan update was completed in February 2016.
WalkBikeNC (2013)	WalkBikeNC, North Carolina's Bicycle and Pedestrian Plan, was adopted by the NCDOT Board of Transportation in 2013. An evaluation of the existing NC bike route system was conducted as part of the 18-month statewide planning effort. The following state bike routes go through Wake County: Route 1 - The Carolina Connection, Route 2 - The Mountains to Sea, and Route 5 - The Cape Fear Run. More information on these routes can be found at www.ncbikeways.com.
East Coast Greenway	The East Coast Greenway (ECG) is a developing trail system, linking many of the major cities of the Eastern Seaboard between Canada and Key West. Over 30 percent of the route is already on traffic-free greenways, creating safe, accessible routes for people of all ages and abilities. Of all metropolitan areas the East Coast Greenway (ECG) route runs through, the Triangle has the most complete stretch (95%) of off-road, shared use trails on the entire ECG route. Current goals for the ECG in North Carolina include: Signing the route with ECG trail markers to raise awareness and enhance the trail experience, designating trails, supporting connections between existing greenway trails and gap areas, and hosting events.
Research Triangle Park Master Plan (2011/2015)	The master plan's initiatives include providing green open spaces as integral areas of the development clusters at Triangle Commons, Park Center and Kit Creek Center. The planning process for the RTP Park Center Master Plan is currently underway and guiding principles were published in 2015.

Mountains-to-Sea North Carolina State Trail Master Plan (2015)	The vision for the MST is an off-road hiking trail connecting Clingmans Dome on North Carolina's western border to Jockey's Ridge State Park on its eastern Outer Banks. In this master plan, the North Carolina Division of Parks and Recreation (DPR) is focused on completing the trail. The designated segment of trail through Wake County is complete, and is routed as follows: Unpaved trails in Falls Lake in east Durham County and northern Wake County connect with the paved Neuse River Greenway at the eastern edge of Falls Lake. The Neuse River Greenway travels south alongside the Neuse River for 28 miles until it terminates near Clayton in Johnston County at a trailhead parking lot.
NCDOT: Complete 540	The proposed "Complete 540" project, also known as the Southeast Extension, would extend the Triangle Expressway from the N.C. 55 Bypass in Apex to the U.S. 64/U.S. 264 Bypass in Knightdale, completing the 540 Outer Loop around the greater Raleigh area. As of early 2016, the Federal Highway Administration has approved the Draft Environmental Impact Statement prepared for the Complete 540 project, and NCDOT has selected a preferred alternative (see Map 3.0 of this Plan). Construction will likely be done in phases, and the time line for each phase will depend on available funding.
ADJACENT COUNTIES/COMMUNITIES	
Durham Trails and Greenways Master Plan (2011)	Goals for the greenway system include connectivity, accessibility, right-of-way preservation, water quality protection, open space preservation, community education and community involvement. The North/South Greenway has remained a top priority.
Town of Clayton Strategic Growth Plan (2008)	The Mountains-to-Sea Trail is a major proposed trail and it connects to downtown Clayton. Several greenways and trails are proposed in Clayton to connect existing parks and neighborhoods with the Mountains-to-Sea Trail. These proposed trails include Sam's Branch, Little Creek, Mark's Creek, and Glen Laurel. The MST and other proposed trails generally follow streams and rivers.
Johnston County Mountains-to-Sea Trail Master Plan (2006)	The plan outlines why the trail is needed, what the trail will entail, and steps for implementation. It is anticipated that the trail will be developed in phases, with initial phases occurring in Clayton and Smithfield. Subsequent phases will occur in more rural areas of Johnston County after trail right-of-way has been secured.
Granville County Greenway Master Plan (2006)	The goal of this plan was to develop an inventory of existing utility and rail easements, assess them for feasibility as greenways, and seek public input. Proposed greenway corridors are listed in Section 2 of the plan. Local governments are encouraged to integrate the greenway master plan into their own plans as well as their local land ordinances.
Nash County Parks and Recreation Comprehensive Master Plan (2014)	This plan provides a ten-year vision for the Parks and Recreation Department. The plan states that "the county may consider developing greenways in the future." Currently there are no greenways in the county, "but the Tar River offers great opportunities for trail development."

3 Recommendations

"In the past decades, all 12 municipalities, led by the City of Raleigh, have realized and embraced the enormous social, economic and environmental benefits of greenways. With this Wake County led plan, the process of "connecting the dots" can result in a long standing goal of having a truly regional greenway system." - Robert Hinson, Chair of the Wake County Open Space and Parks Advisory Committee (OSAPAC)

OVERVIEW

This chapter translates the vision for a regional system of connected greenway trails into a strategic set of recommendations, with proposed strategies for the development of wayfinding, trail amenities, and trail marketing.

GUIDING PRINCIPLES FOR GREENWAY TRAIL DEVELOPMENT IN WAKE COUNTY

The vision for this Plan is to create a connected and comprehensive system of greenway trails that enhances quality of life throughout Wake County. In order to begin transforming this vision into reality, it is useful to start by identifying the principles upon which the future greenway system will be built. The following guiding principles are derived from past planning efforts throughout the U.S., and reflect some of the best practices that can help guide future decisions about the greenway system in Wake County.

- ***The greenway system should be safe.*** Bicycling and walking routes should be physically safe and perceived as safe by users. Safe means minimal conflicts with vehicular traffic, and use of clear pavement markings and directional signage. Safe also means education about trail safety and etiquette, and crime prevention through environmental design.
- ***The greenway system should be accessible.*** Trails and trail crossings should permit the mobility of residents of all ages and abilities, employing principles of universal design. Bicyclists have a range of skill levels, and trails should be designed with a goal of providing for inexperienced bicyclists (especially children and seniors) to the greatest extent possible.
- ***Greenway system improvements should be economical.*** Trail improvements should achieve the maximum benefit for their cost, including initial cost and maintenance cost, as well as a reduced reliance on more expensive modes of transportation. Where possible, improvements in the right-of-way should stimulate, reinforce and connect with adjacent private improvements.
- ***Greenway trails should connect to places people want to go.*** The greenway system should provide continuous direct routes and convenient connections

between destinations such as downtowns, parks, schools, shopping centers, transit hubs, employment centers, and neighborhoods. A complete network of trails should connect seamlessly to existing and proposed sidewalks and bicycle lanes to complete recreational and commuting routes.

- ***Navigating the greenway system should be easy.*** As trails throughout the region are constructed and connected, the regional routes among them should use a comprehensive and consistent wayfinding system. Wayfinding tools should include directional signage, kiosks with detailed maps, hand-held paper maps, online components such as a website and/or app, and the overall design and branding should be consistent across the tools that are used.
- ***The greenway system should be attractive and enhance community livability.*** Greenway trails should be compatible with the nature, history and character of the environment. Context and scale should be given thoughtful consideration. Good design should integrate with and support the development of complementary uses and should encourage preservation and construction of art, landscaping and other items that add value to communities. These components might include open spaces such as plazas, courtyards and squares, and amenities like street furniture, banners, art, plantings and special paving. These, along with historical elements and cultural references, should promote a sense of place. Public activities should be encouraged and local codes should permit commercial activities such as dining, vending and advertising when they do not interfere with safety and accessibility.
- ***Greenway trail design guidelines should aim for consistency.*** With the overall goal of consistency, guidelines used should also be flexible enough to allow for the professional judgment of the design and engineering staff of local communities. This Plan references specific national guidelines for trail facility design, as well as several adopted state and local community guidelines. Statutory and regulatory guidance may change. For this reason, the guidance and recommendations in this Plan function to complement other resources considered during a design process, and in all cases, sound engineering judgment should be used.

METHODOLOGY FOR GREENWAY SYSTEM PLANNING

The main steps for developing the recommended system of greenway trails in this plan depended upon the input and involvement of community and agency representatives throughout the region (listed in the acknowledgements page), and upon the years of planning and community outreach that went into the locally adopted community plans that informed the process. The public input received from this Plan's comment forms was useful as well, both in determining the types of destinations people are interested in, and in terms of the types of amenities and uses that are most desired.

The key steps in developing this Plan's recommendations are described on the following page, including data collection, mapping existing and proposed trails, identifying a regional system, and identifying proposed recommendations.

Key Steps in Developing Recommendations for this Plan

1

COLLECT DATA: Collect and assemble GIS data, existing community plans, and maps; gather Steering Committee input on primary existing challenges and opportunities; ask for public opinions on greenways through the comment form.

2

MAP ALL EXISTING TRAILS AND TRAILS PROPOSED IN PREVIOUS PLANS: Conduct outreach for all 12 of Wake County's municipalities, neighboring jurisdictions, and regional entities; research into existing plans and studies for proposed greenway routes on adopted plans.

3

IDENTIFY A SYSTEM OF REGIONAL CONNECTOR TRAILS: Examine proposed routes from existing local and regional plans and identify routes that offer the best potential for regional connectivity, based on connections to existing trails and the ability to connect to destinations such as parks, lakes, city and town centers; solicit input on the draft network from a large group of stakeholders at a countywide trail coordination workshop; follow up with individual community planners and park system managers to confirm regional routes in their own communities.

The planning process incorporated input from nearly 50 local and regional stakeholders, and dozens of local and regional plans.

4

PRIORITIZE THE OVERALL SYSTEM INTO SETS OF RECOMMENDATIONS: Divide proposed system into segments based on logical end-points such as existing trails, parks, and town centers; Assign segments into project categories based on stakeholder and committee feedback (filling trail system gaps first) and the results of public feedback on the types of desired destinations (connecting to existing trails, parks, and natural areas).

THE COUNTYWIDE GREENWAY SYSTEM

Map 3.0 features the Countywide Greenway System, which represents the overall recommended system of regional connector trails in Wake County. Rather than including all proposed trails from existing plans, this system features only those corridors that offer the best potential for regional trail connectivity, based primarily upon connections between existing trails and the ability to connect to destinations such as parks, lakes, and downtown/town centers. The Countywide Greenway System is designed to make walking and bicycling for both transportation and recreation more accessible, practical, and enjoyable for more people, allowing the region as a whole to benefit in terms of quality of life and economic impact. These projected impacts are quantified in Appendix A and are presented and summarized on the following pages.

BY THE NUMBERS

145

MILES OF EXISTING GREENWAYS IN THE COUNTYWIDE SYSTEM: This figure includes only the existing trails in the countywide system (shown in dark green on Map 3.0). Most of this mileage consists of well-established greenway trail corridors, such as the Neuse River Trail, Reedy Creek Trail, the Walnut Creek Trail, and the Black Creek Greenway. There are also an additional approximately 150 miles of other local existing trails (shown in light green on Map 3.0), but most of those are relatively short segments, trail spurs, and trails within parks.

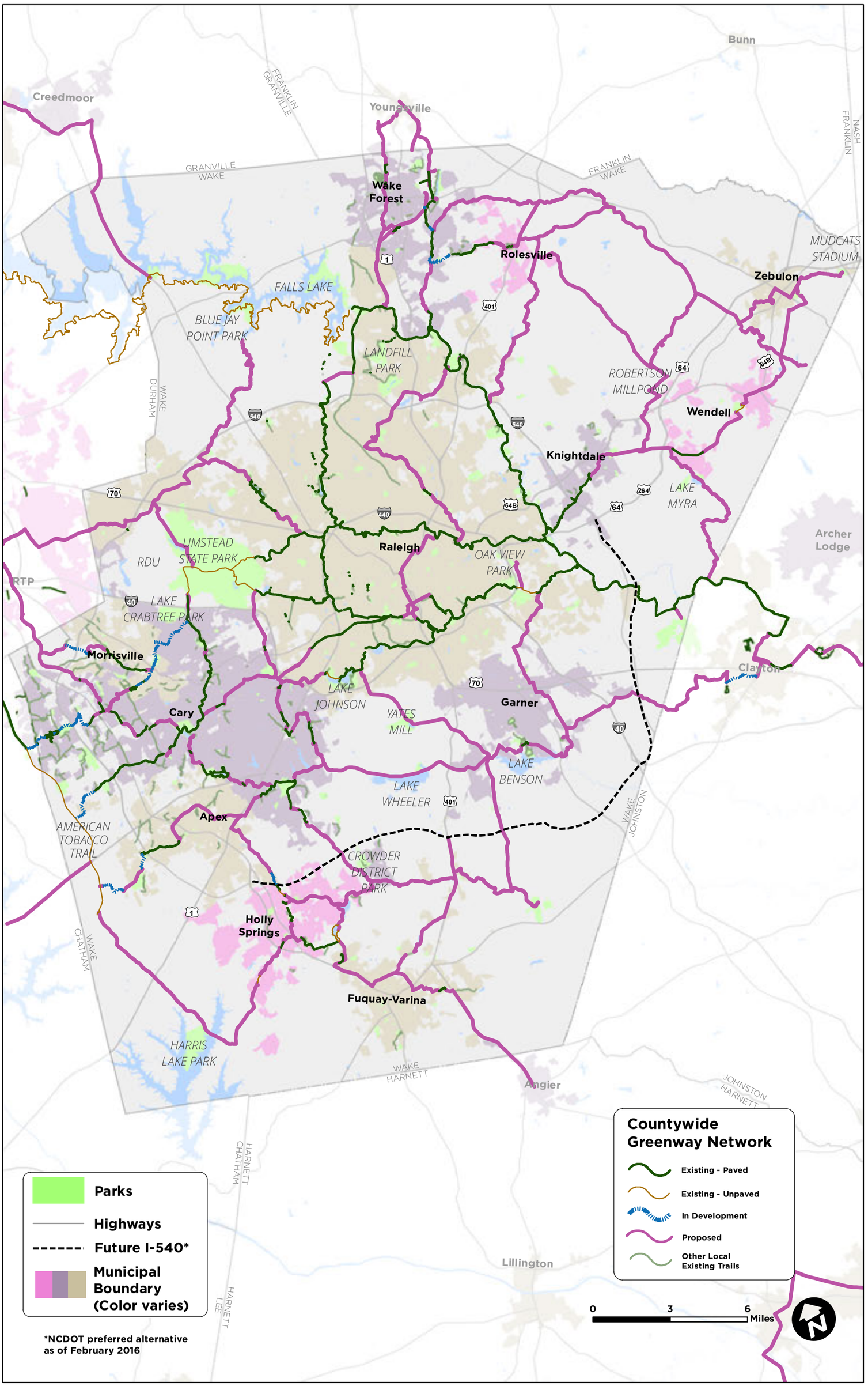
274

MILES OF TOTAL PROPOSED GREENWAYS IN THE COUNTYWIDE SYSTEM: This figure includes the proposed trails in the countywide system (shown in pink on Map 3.0). These proposed trails are broken into four categories of recommendations, described in the following maps and pages.

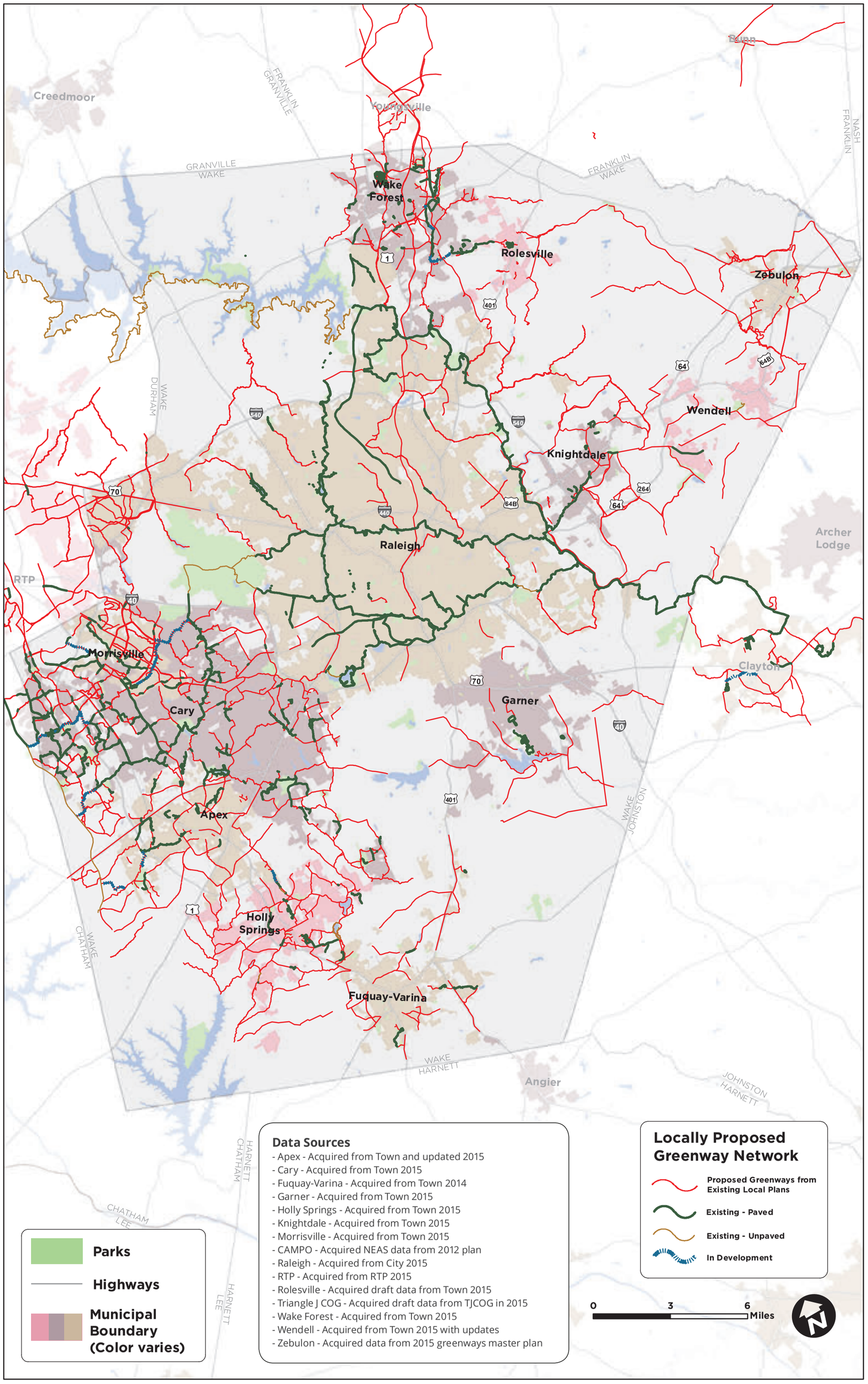
25

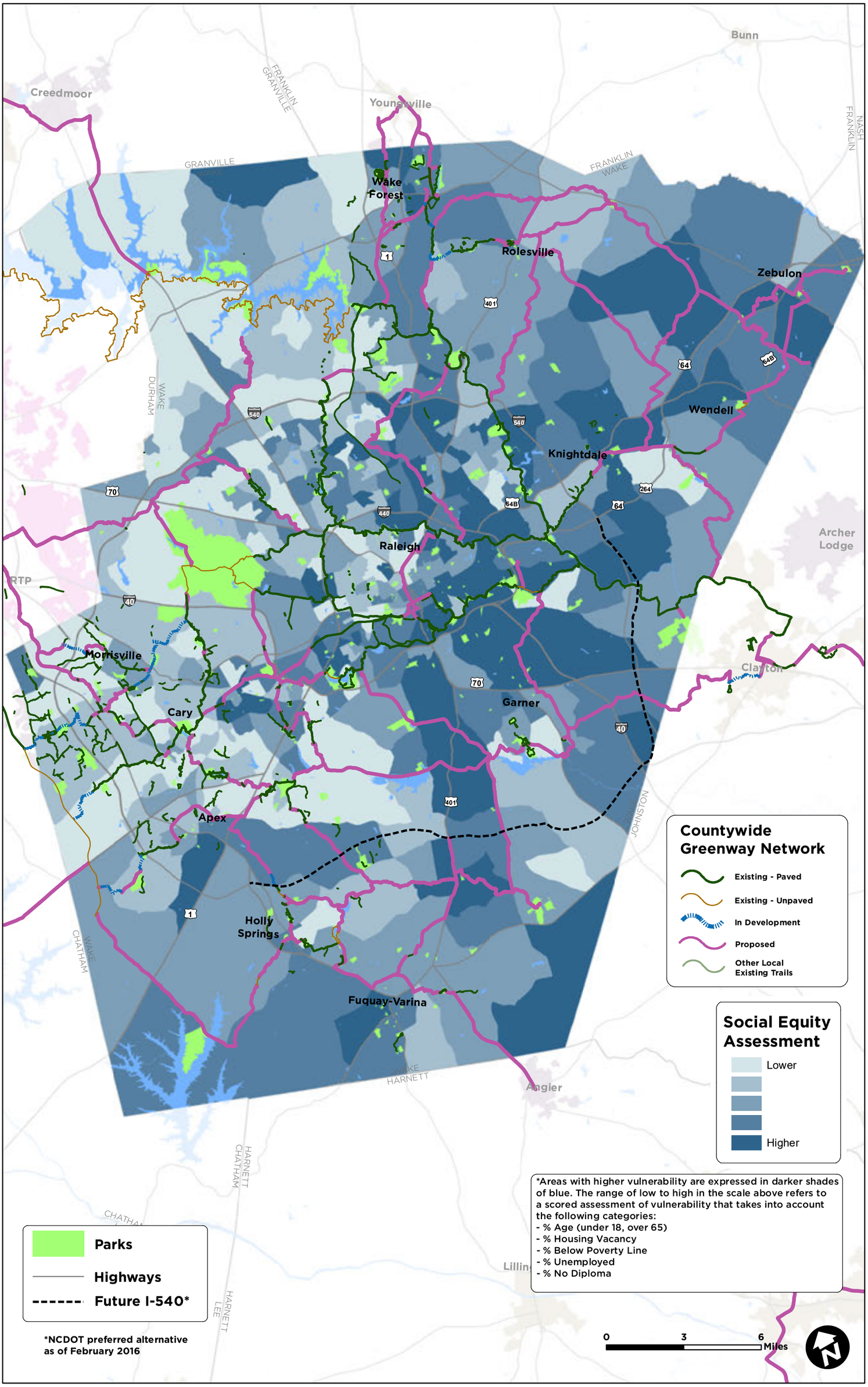
MILES OF GREENWAYS IN DEVELOPMENT: This figure includes all trails that were reported as funded, in design, or under construction as of early 2016 (shown in blue on Map 3.0). These "in development" trails are mostly within the towns of Morrisville, Cary, Apex, and Wake Forest, among others.

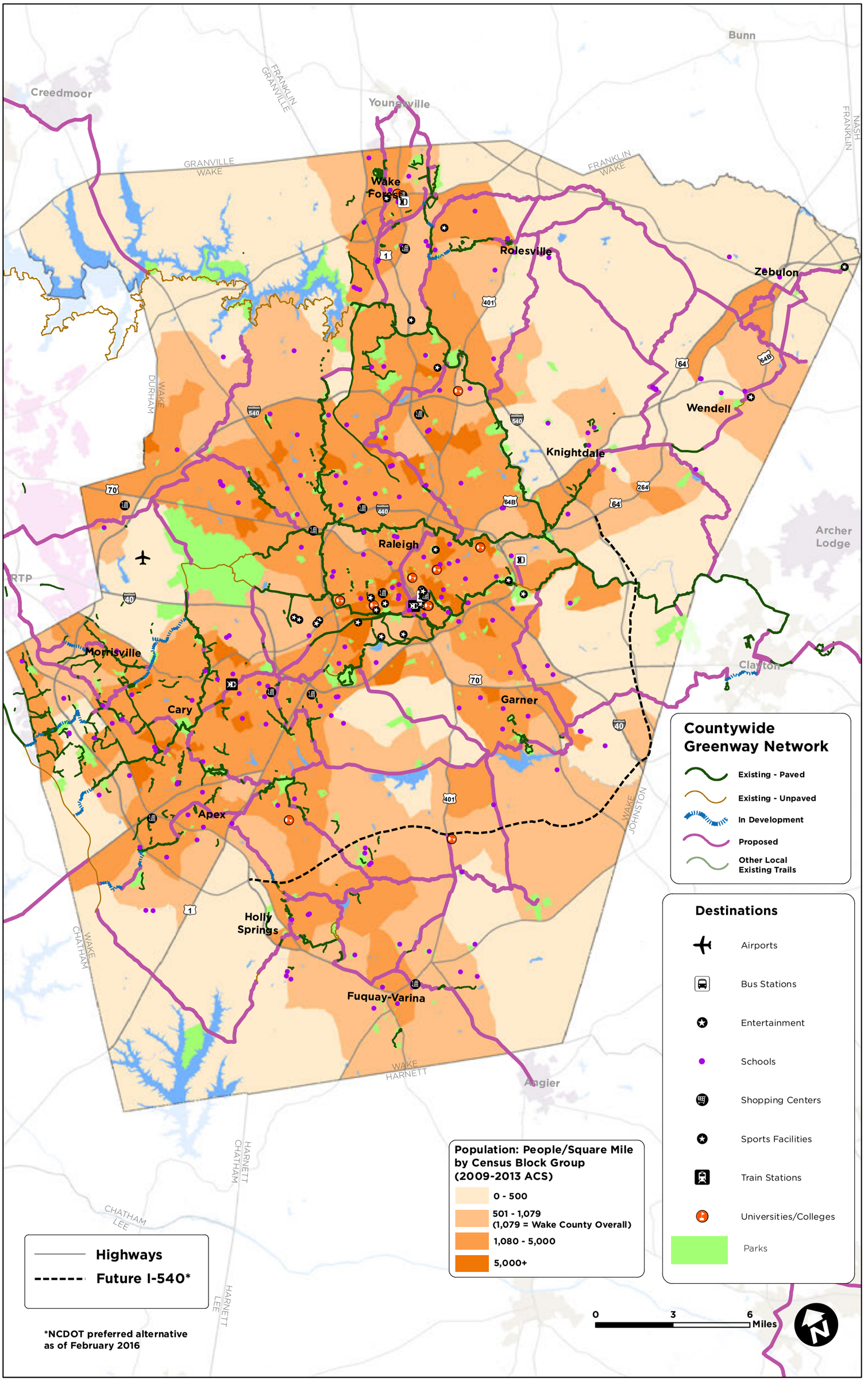
MAP 3.0 COUNTYWIDE GREENWAY SYSTEM (11X17 FOLD OUT MAP)



MAP 3.0–B **LOCALLY PROPOSED GREENWAYS** (11X17 FOLD OUT MAP)




Bunn
Creedmoor
Youngsville
FRANKLIN
GRANVILLE
NASH
FRANKLIN
GRANVILLE
WAKE
FRANKLIN
WAKE
Wake Forest
Rolesville
Zebulon
Wendell
Knightdale
WAKE
DURHAM
Raleigh
RTP
Archer Lodge
Clayton
Morrisville
Cary
Garner
Apex
JOHNSTON
Holly Springs
WAKE
CHATHAM
Fuquay-Varina
WAKE
HARNETT
Angier
HARNETT
CHATHAM
Lillington
HARNETT
LEE
1
401
540
64
64B
70
440
264
40
Countywide Greenway Network
Existing - Paved
Existing - Unpaved
In Development
Proposed
Other Local Existing Trails
Social Equity Assessment
Lower
Higher
Parks
Highways
Future I-540*
*NCDOT preferred alternative as of February 2016
*Areas with higher vulnerability are expressed in darker shades of blue. The range of low to high in the scale above refers to a scored assessment of vulnerability that takes into account the following categories:
- % Age (under 18, over 65)
- % Housing Vacancy
- % Below Poverty Line
- % Unemployed
- % No Diploma
0
3
6
Miles
N


Bunn
Creedmoor
FRANKLIN
GRANVILLE
Youngsville
NASH
FRANKLIN
GRANVILLE
WAKE
FRANKLIN
WAKE
Wake Forest
Rolesville
Zebulon
WAKE
DURHAM
Wendell
Knightdale
Raleigh
Archer Lodge
RTP
Morrisville
Clayton
Cary
Garner
Apex
WAKE
JOHNSTON
Holly Springs
WAKE
CHATHAM
Fuquay-Varina
WAKE
HARNETT
Angier
HARNETT
CHATHAM
CHATHAM
LEE
HARNETT
LEE
Countywide Greenway Network
Existing - Paved
Existing - Unpaved
In Development
Proposed
Other Local Existing Trails
Destinations
Airports
Bus Stations
Entertainment
Schools
Shopping Centers
Sports Facilities
Train Stations
Universities/Colleges
Parks
Population: People/Square Mile by Census Block Group (2009-2013 ACS)
0 - 500
501 - 1,079 (1,079 = Wake County Overall)
1,080 - 5,000
5,000+
Highways
Future I-540*
*NCDOT preferred alternative as of February 2016
0
3
6
Miles
N

Weighing Social Equity and Distribution of the Greenway System

Map 3.0-C, *Social Equity Data - Countywide Greenway System Overlay*, uses U.S. Census data to show how the proposed greenway system connects to and within areas of varying degrees of equity. The data is organized around geographic areas used by the Census, called 'block groups'. For each block group, certain factors are analyzed such as the percentages for people under age 18 and over 65, housing vacancy, people below the poverty line, the unemployed, and people with no diploma. Together, this information is used to form the social equity assessment, with higher areas of vulnerability shown in darker shades of blue. The map is used to show how and where these areas are served by the existing and proposed system of greenways.

Map 3.0-D, *Population & Destination Data - Countywide Greenway System Overlay,* is very similar in purpose to the previous map, but rather than displaying social equity information, it shows how the existing and proposed system relates to the County's most populated areas, and several types of destinations.

Shelly Lake in Raleigh, by ITRE Bicycle and Pedestrian Program.

Quantifying the Benefits of the Countywide Greenway System

The full build-out of the Countywide Greenway System will impact a variety of health, environmental, and transportation factors that directly affect the quality of life of Wake County residents and visitors (see Chapter 1 for an overview of these types of benefits). This Plan's Benefit Impact Analysis (Appendix A) uses a standard methodology for calculating health, environmental, economic, and transportation-related benefits in monetary terms. The estimated monetary values (benefits) of building the proposed system of greenways in Wake County, are presented on the following two pages, and should be considered order of magnitude estimates, rather than exact amounts. As described in Appendix A, the benefit analysis draws upon comparisons to Wake County's peer communities in order to develop low, medium, and high range projections for total benefits. The figures that follow represent the mid-range of those projects, under the argument that Wake County and its municipalities should (and could) reach the goal of performing at an at least average rate of its peer communities.

It is also important to note that there are many benefits of a connected and comprehensive greenway system in addition to those noted on the following pages. These include protected wildlife habitat, water quality protection from the preservation of vegetated buffers along waterways, the mental health benefits and reduced stress from increased exercise and spending time in nature, the positive impacts of access to parks and greenways on property values and quality of life, and the potential for increases in tourism associated with a world-class system of greenways.

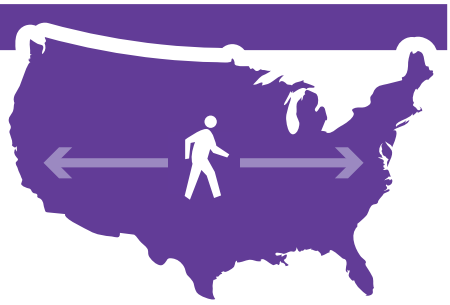
Below: Annual estimated benefits of a fully built-out greenway system in Wake County. See previous page and Appendix A form more information.

ANNUAL MILES WALKED

23 MILLION
MILES WALKED PER YEAR

That's the equivalent of

8,000
CROSS-COUNTRY ROAD TRIPS



ANNUAL MILES BIKED

2.2 MILLION
MILES BIKED PER YEAR

That's the equivalent of

85
TRIPS AROUND THE EARTH!

REDUCED HEALTHCARE COSTS

$4 MILLION
IN ANNUAL HEALTHCARE COST SAVINGS

That's the equivalent of 2,400 trips to the doctor!

ANNUAL PHYSICAL ACTIVITY FROM BIKING & WALKING

9.5%

OF WAKE COUNTY RESIDENTS MEETING THE CDC RECOMMENDED HOURS OF PHYSICAL ACTIVITY JUST FROM BICYCLING

(~30 minutes/day)

REDUCED VEHICLE EMISSIONS

$600,000
SAVINGS FROM REDUCED VEHICLE EMISSIONS PER YEAR

Below: Annual estimated benefits of a fully built-out greenway system in Wake County. See page 57 and Appendix A form more information.

HOUSEHOLD VEHICLE OPERATION COSTS

$11 MILLION

IN REDUCED HOUSEHOLD VEHICLE OPERATION COSTS PER YEAR

CONGESTION COSTS

$1.6 MILLION

IN COST SAVINGS FROM REDUCED TRAFFIC CONGESTION

VEHICLE MILES TRAVELED

20 MILLION

FEWER MILES TRAVELLED BY AUTOMOBILES EVERY YEAR

COLLISION COSTS

$7 MILLION

IN REDUCED MOTOR VEHICLE COLLISION-RELATED COSTS

MAINTENANCE COSTS

$3 MILLION

IN REDUCED ROAD MAINTENANCE COSTS

GREENWAY SYSTEM RECOMMENDATIONS BY PROJECT CATEGORY

The overall system of recommendations is organized into the following set of project categories. Project stakeholder feedback, public comment, and committee input all stressed the importance of trail connectivity, hence the focus on bridging the gaps between existing trails. **These project categories will be approached by Wake County and its municipal partners with flexibility, taking into account the importance of both countywide connectivity and local priorities.** Projects that bridge gaps between communities for regional connectivity may do well in attracting funding from regional partners, such as CAMPO. See Chapter 4 for more on project funding strategies.

1

BRIDGE THE GAPS: **The focus of these "Bridge the Gaps" priority projects is connectivity, featuring 48 miles of trail in 23 segments. The projects are spread throughout the county, with at least one project in each of Wake County's 12 municipalities. These fill critical gaps within the existing network of trails, and serve as catalyst projects where trails are currently lacking. For more on these projects, see the project cutsheets starting on page 66.**

48 mi.

2

CONNECT TO PARKS & LAKES: **This group of projects features 60 miles of trail in 12 segments, connecting to 15 parks (seven of which feature lakes). The idea of connecting to parks and lakes was driven by public feedback on desired destinations, in which people indicated a desire to connect with existing trails, parks, and natural areas as the top choices out of a range of destination types (see the public comment form results in Chapter 2).**

60 mi.

3

CONNECT THE COMMUNITIES: **With this group of projects, all 12 municipalities will be connected into the greenway system, with 19 miles of trail in six segments. These projects allow for key connections in Fuquay-Varina and Zebulon, plus more direct greenway trail connections between Raleigh, Cary, Apex, and Morrisville.**

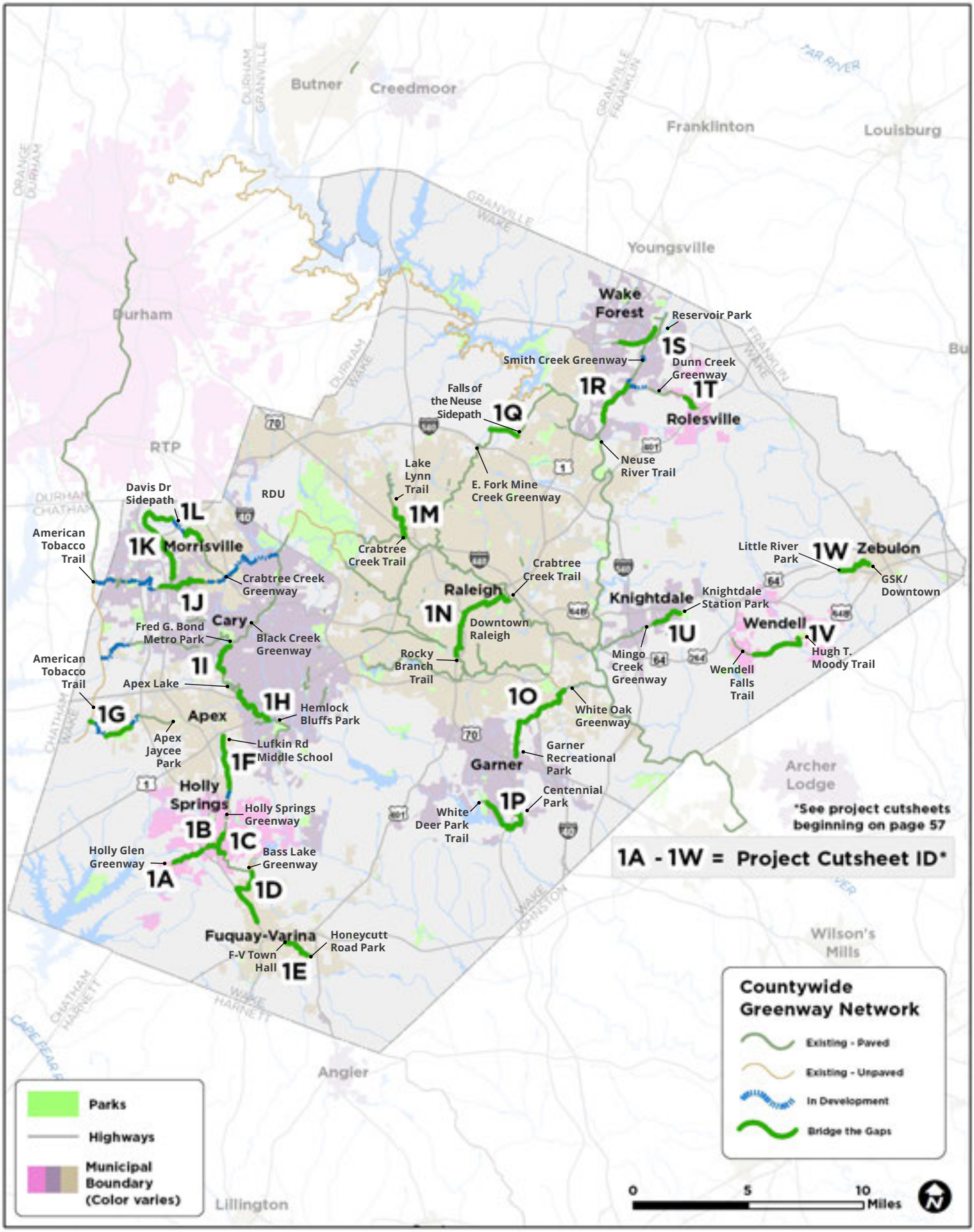
19 mi.

4

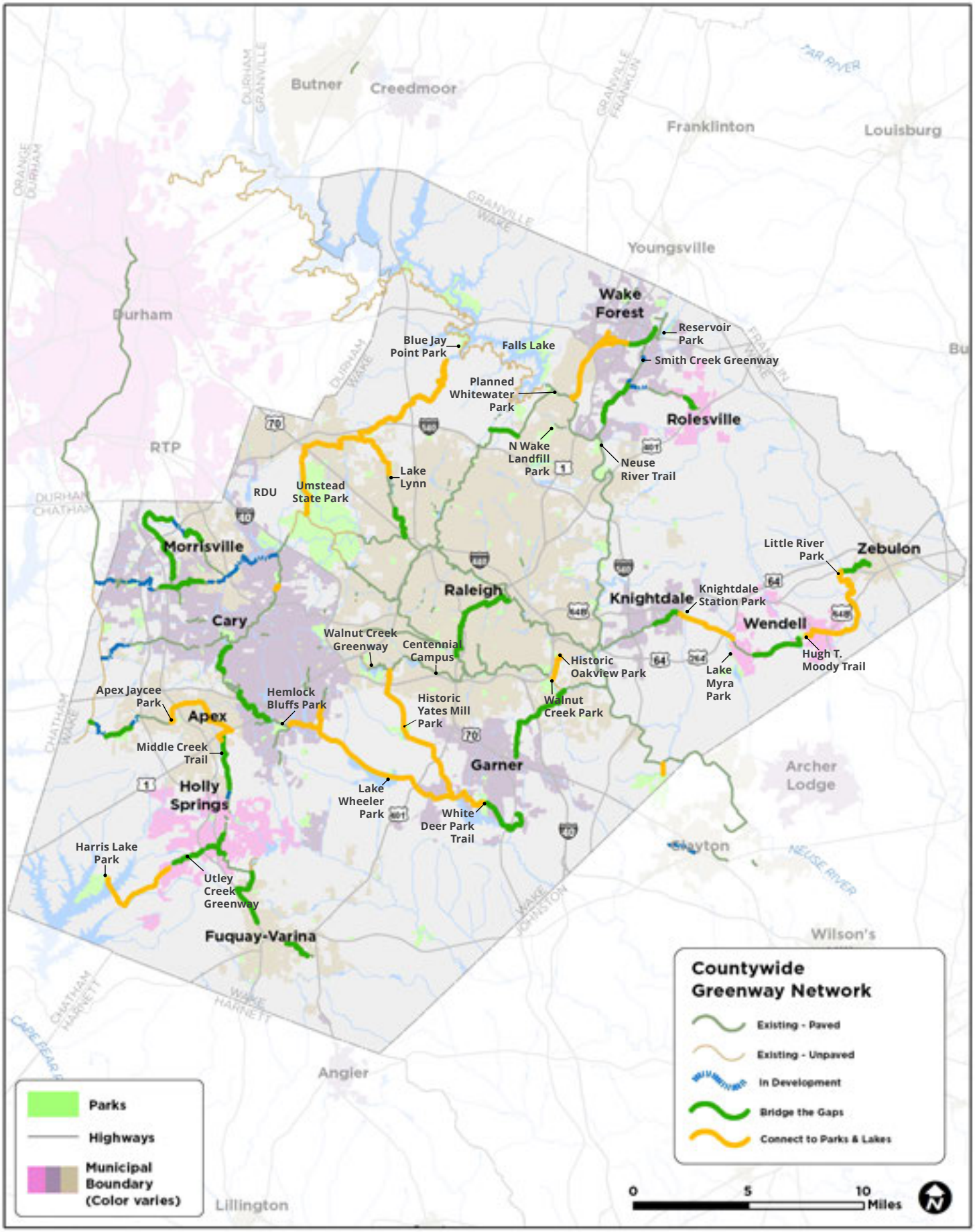
COMPLETE THE SYSTEM: **There are 147 miles of proposed trail in this group, made up of over 30 project segments. These longer-term projects (like all projects) could be completed sooner, depending on how they are implemented and on the opportunities that arise to complete the system in the coming years and decades. See Chapter 4 for more on the overall implementation strategy.**

147 mi.

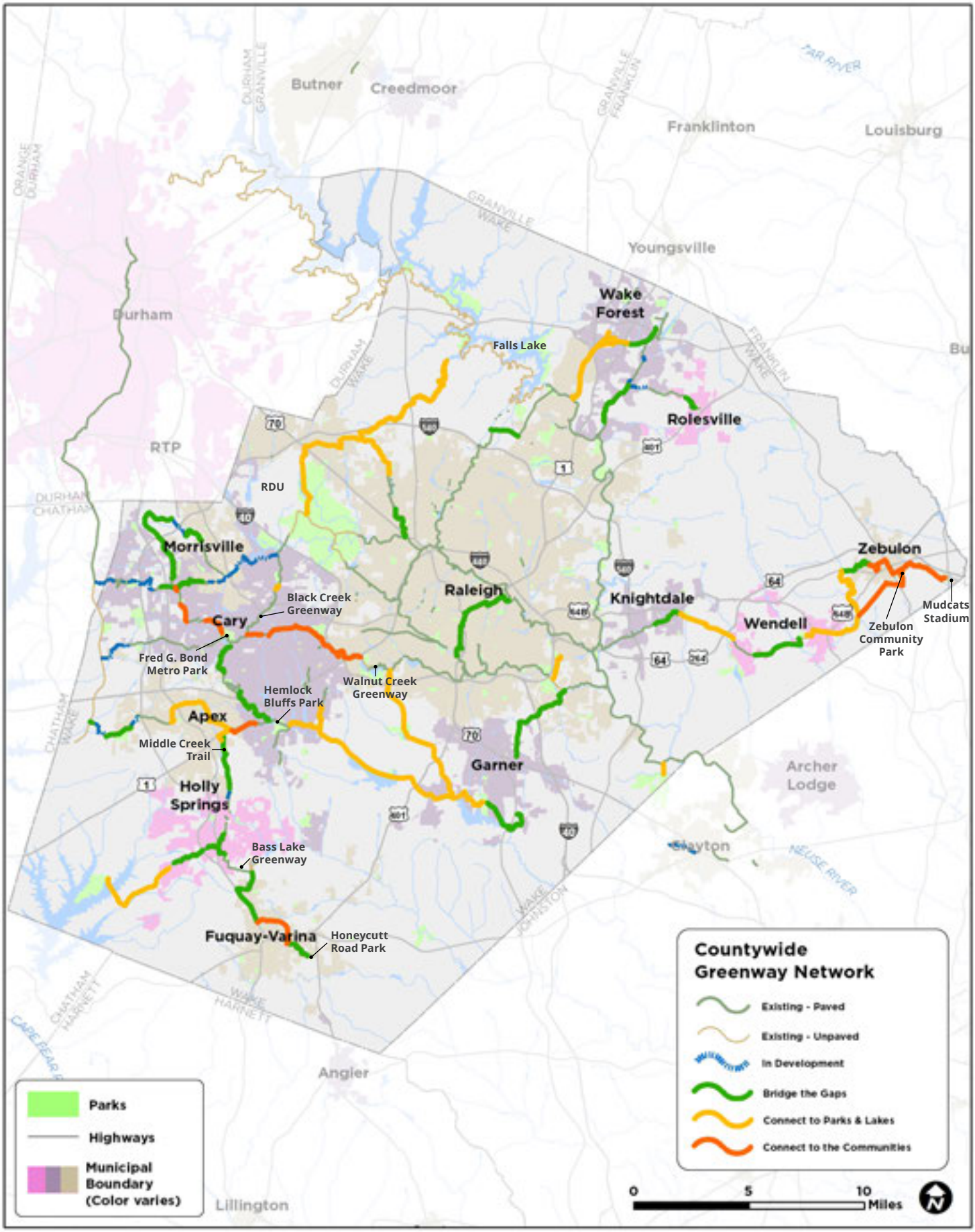
MAP 3.1 BRIDGE THE GAPS



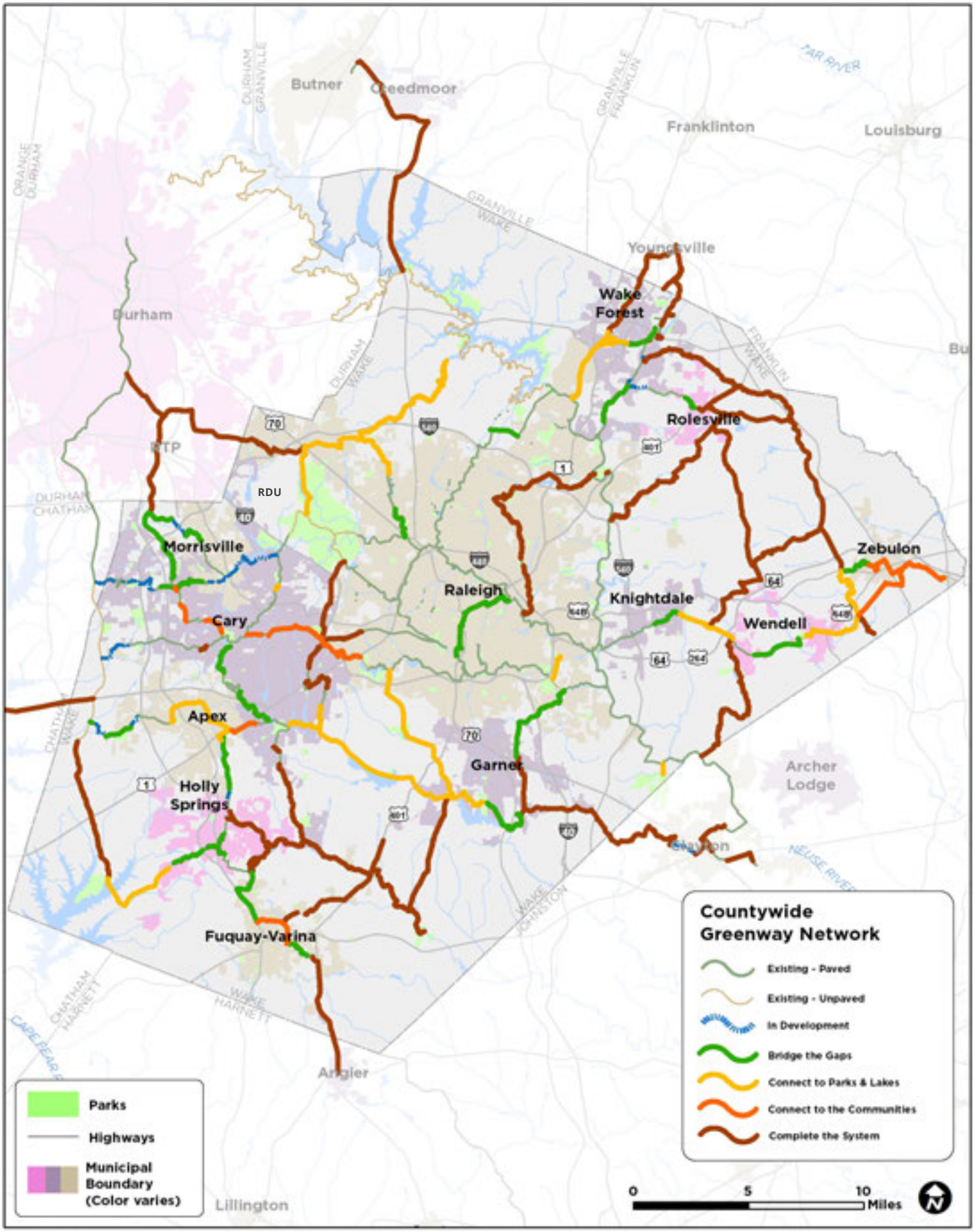
MAP 3.2 CONNECT TO PARKS AND LAKES



MAP 3.3 CONNECT THE COMMUNITIES



MAP 3.4 COMPLETE THE SYSTEM



PRIORITIZATION TOOLS

This plan is deigned as a long-term visionary document that provides a general framework for Wake County to move forward as a leader in trail coordination and development. To that end, the plan identifies the groups of projects described on the previous page as a way of prioritizing the overall system. Within each group of projects, the order of actual project development may vary depending upon available funding from local municipalities, and upon funding awarded from state, federal, or other sources (see Chapter 4 for more on funding and implementation). Still, in order to make more informed decisions about project development, more detail is provided for each trail segment in the sections that follow.

Cut-Sheets for Priority Projects

The following pages offer detailed information on each of the "Bridge the Gaps" priority projects, including individual project maps. These sheets were designed based on the types of information required by potential funding partners, such as the Capital Area Metropolitan Planning Organization (CAMPO), which uses similar sheets in their own transportation planning.

Summary of Projects Table

The project table that follows the cutsheets is designed to offer more information about all projects. Although not as detailed as the project cut-sheets, it does offer valuable information to project partners as they make decisions about individual project selection.

How to Use the Estimated Costs on the Following Pages:

When reviewing the the estimated construction and land acquisition costs in the following cut sheets, please take into account the following important notes and caveats:

- The cost estimates represent a planning-level of analysis and therefore are listed in ranges.
- Costs will likely change as more information becomes available in the design phase.
- Costs are listed in the base year of 2016, and should be escalated at a rate of 5% each year thereafter.
- Cost estimates for land acquisition/ ROW needs are based on Wake County assessed property values, and are an approximation only.
- Design costs are not listed per cut-sheet, but they can range between 10-15% of construction costs. Higher ranges will be encountered on projects utilizing federal funds that require a high level of regulatory compliance and on projects that impact FEMA regulated floodways that require detailed flood modeling and permitting. Small projects will also see higher percentages for design cost.

1A. HOLLY SPRINGS SOUTHWEST GREENWAY

BALLENRIDGE GREENWAY TO BRAXTON VILLAGE GREENWAY

This project connects the developing Ballenridge and Braxton Village greenways in the southwest section of Holly Springs. Half of the proposed greenway connection follows Utley Creek. A key to this project is an under crossing of NC 55 at the southwestern edge of the Ballenridge neighborhood and existing greenway. Regionally, this project will help to link Holly Springs and Harris Lake County Park with further connectivity potential to Jordan Lake and the American Tobacco Trail.

PROJECT AT A GLANCE

- Project location: Holly Springs, Wake County
- Project type: Shared use path, on-road connection (wayfinding and sidewalks)
- Length: 7,600 ft (1.4 miles)
- Total Connected Network: 1.7 miles
- Trip Generators:
  - » Holly Springs Cultural Center and Community Library
  - » Future Park at Mims Property
  - » Ballenridge Neighborhood
  - » Braxton Village
  - » Harris Lake County Park (Connect Parks + Lakes)

PREVIOUS PLANNING

- *Holly Springs Parks, Recreation, and Open Space Master Plan (2007)*
- *Holly Springs BIcycle Plan (2011)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 2.6 acres estimated right-of-way acquisition
- 9 impacted parcels
- 8 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/Holly Springs Floodplain Development Permit
- Wake County/Holly Springs Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/Holly Springs Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- FEMA Letter of Map Revision (LOMR)
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Holly Springs
- Ballenridge Homeowner's Association
- Braxton Village Homeowner's Association
- Duke Energy

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $1.6 million to $1.9 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $63,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Holly Springs CIP
- Clean Water Management Trust Fund
- Duke Energy Water Resources Fund
- Duke Energy easement or land donation

OPPORTUNITIES & CONSTRAINTS

The segment would connect neighborhoods outside of NC 55 to the existing Ballenridge Greenway and destinations in central Holly Springs.

The existing culvert under NC 55 can be formalized as a trail underpass. The cost estimate shown assumes lighting and other minor improvements are needed, but the size of the culvert is sufficient.

Two bridge crossings of Utley Creek are required due to the proximity of the Creek to the Town's wastewater treatment plant.

Interim route would be along this funded greenway section (from CAMPO/LAPP funds) that connects to sidewalks along Avent Ferry Road.

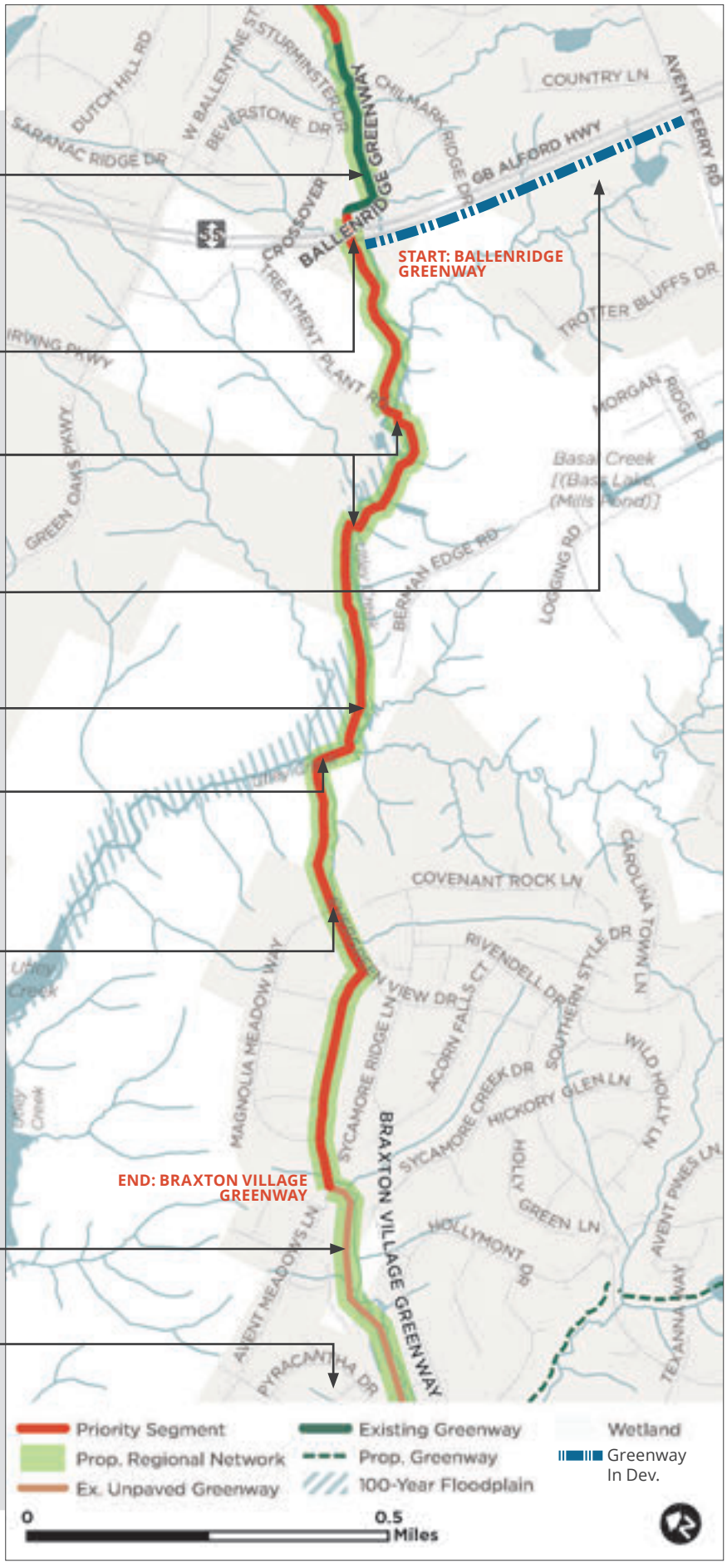
The trail's location in the floodplain will increase permitting requirements.

A third bridge crossing of the creek is required to connect the trail to Holly Glen.

An on-road connection using sidewalks and wayfinding signage is recommended along Evergreen View Drive and Avent Meadows Lane to complete the connection to the Braxton Village Greenway corridor at the southwest end of the segment.

The Braxton Village Greenway corridor is not currently maintained as a trail, yet the easement is in place. Consider continuing the on-road connection (sidewalk and wayfinding signage on Avent Meadows Lane) as an alternative to Braxton Village Greenway, if necessary.

Ultimately, this corridor supports regional connectivity to Harris Lake County Park.



1B. HOLLY SPRINGS CENTRAL GREENWAY

FROM BALLENRIDGE GREENWAY TO RALEIGH STREET

This project completes a link between the developing Ballenridge greenway toward central Holly Springs. The eastern terminus at Raleigh Road links to the proposed north/south connection between Jones Park (north Holly Springs) and Womble Park (south Holly Springs). This proposed trail through central Holly Springs is a key component in connecting the heart of Holly Springs to Apex, Fuquay-Varina, and Harris Lake County Park.

PROJECT AT A GLANCE

- Project location: Holly Springs, Wake County
- Project type: Shared use path, on-street connection (wayfinding, shared lane markings, sidewalk)
- Length: 2,800 ft (0.5 miles)
- Total Connected Network: 0.8 miles
- Trip Generators:
  - » Ballenridge Neighborhood
  - » Holly Springs Cultural Center and Community Library
  - » Future Park at Mims Property
  - » Downtown Holly Springs Business District
  - » Town of Holly Springs offices
  - » Jones Park, Womble Park, Sugg Farm, and Bass Lake

PREVIOUS PLANNING

- *Holly Springs Parks, Recreation, and Open Space Master Plan (2007)*
- *Holly Springs BIcycle Plan (2011)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 0.3 acres estimated right-of-way acquisition
- 3 impacted parcels
- 3 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/Holly Springs Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/Holly Springs Land Disturbance Permit
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Holly Springs
- Ballenridge Homeowner's Association
- Holly Springs Chamber of Commerce
- Rex Hospital
- Avent Acres Community Association

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $340,000 to $410,000*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $7,200*

POTENTIAL FUNDING MECHANISMS

- Wake County CIP funding
- Holly Springs CIP
- Avent Acres Community Association easement or land donation

OPPORTUNITIES & CONSTRAINTS

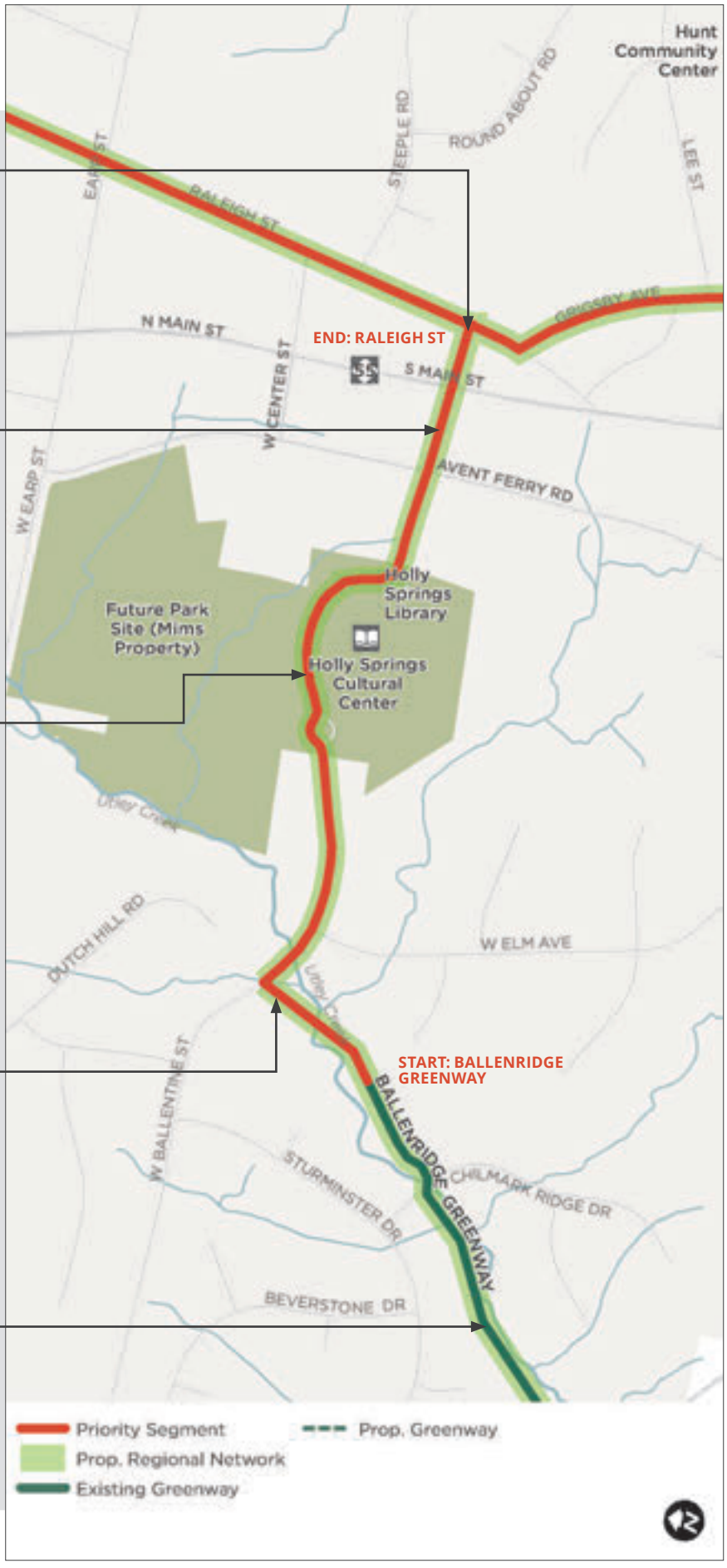
The segment connects to the proposed Holly Springs North/South Greenway on the east end, which connects Jones Park, Womble Park, Sugg Farm, and Bass Lake.

Ballentine Road is a low-traffic, low-speed street with on-street parking between Avent Ferry Road and Raleigh Street. An on-street connection using wayfinding signage, shared-lane markings, and existing sidewalks will allow the Town to maintain this configuration while guiding trail users through the area.

Ballentine Road is a calm local street between Elm Road and Avent Ferry Road and is already comfortable for cyclists and pedestrians. Constraints to a side-path include right-of-way in the residential section and lighting and landscaping in the Town section. An on-street connection using wayfinding signage and existing sidewalks is recommended.

A small pedestrian bridge is required to cross Utley Creek where the segment transitions to a shared use path south of Ballentine Street.

The segment connects to the existing Ballenridge Greenway on the west end.



1C. HOLLY SPRINGS NORTH/SOUTH GREENWAY

FROM JONES PARK TO WOMBLE PARK

This project completes a north/south link through Holly Springs between Jones Park (north Holly Springs) and Womble Park (south Holly Springs). Existing trails through Jones Park extend north through the Bridgewater subdivision toward a developing connection to Apex. Existing trails connecting through Womble Park and Sugg Farm serve as key regional links for proposed connectivity to Fuquay-Varina.

PROJECT AT A GLANCE

- Project location: Holly Springs, Wake County
- Project type: Sidepath, on-street connection (bike boulevard and sidewalk), shared use path
- Length: 6,300 ft (1.2 miles)
- Total Connected Network: 4.1 miles
- Trip Generators:
  - » Holly Springs Elementary
  - » Jones Park
  - » Downtown Holly Springs Business District
  - » Womble Park
  - » Sugg Farm
  - » Bass Lake Park, Retreat Center, and Trails

PREVIOUS PLANNING

- *Holly Springs Parks, Recreation, and Open Space Master Plan (2007)*
- *Holly Springs BIcycle Plan (2011)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 0.4 acres estimated right-of-way acquisition
- 5 impacted parcels
- 5 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/Holly Springs Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/Holly Springs Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit

POTENTIAL PARTNERSHIPS

- Town of Holly Springs
- Holly Springs Chamber of Commerce
- Rex Hospital
- Wake County Board of Education
- Windward Pointe Homeowners Association

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $560,000 to $670,000*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $31,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Holly Springs CIP
- Windward Pointe Homeowners Association easement or land donation

OPPORTUNITIES & CONSTRAINTS

The segment will connect to the Jones Park Trail at Holly Springs Elementary and supports regional connectivity to Apex.

Space and right-of-way create an easy opportunity for a sidepath connection along School Days Lane.

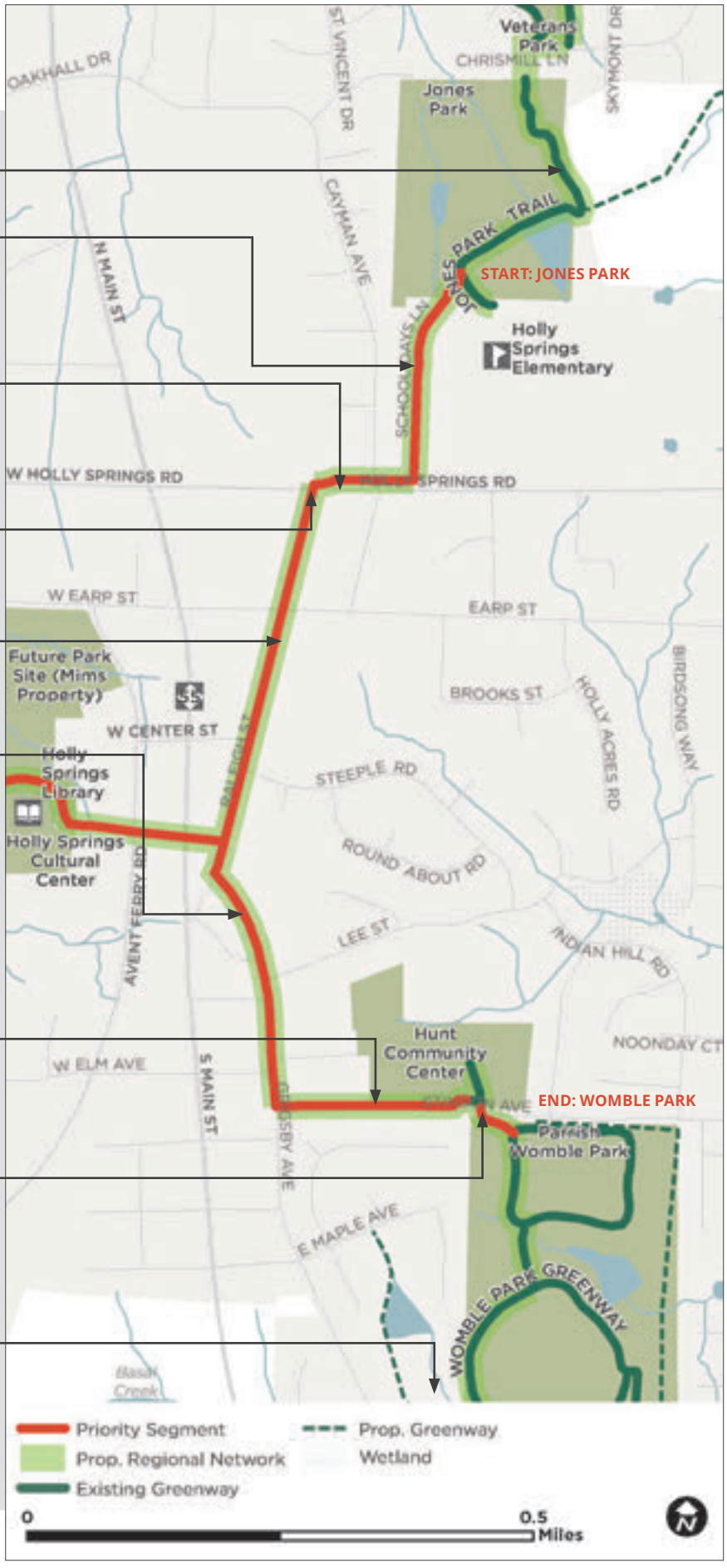
Utility and sign relocations may be required to construct a sidepath along Holly Springs Road.

Existing crossing at Holly Springs Road and Raleigh Street should be considered for enhancement, such as installation of Rectangular Rapid Flash Beacons (RRFB).

A high-quality sidewalk is in place along Raleigh Street and Grigsby Avenue, complete with crosswalks at all crossings, but its expansion to a sidepath is constrained by utility poles and right-of-way. Bike boulevard enhancements and wayfinding are recommended to build on the existing sidewalk investment and ensure a calm environment for bicycling.

A new section of sidepath on the North side of Stinson Avenue takes advantage of Town-owned land and few physical obstacles.

An improved crossing is needed at Stinson Avenue. There is also an opportunity to widen the sidewalk connection between existing greenways here so a shared use path facility is continuous along the corridor. The segment terminates at Womble Park.
The segment links central Holly Springs to Sugg Farm and Bass Lake via an existing greenway connection and supports regional connectivity to Fuquay-Varina.



1D. BROAD STREET GREENWAY

FROM JUDD PARKWAY TO BASS LAKE

This project connects from Judd Parkway in northwest Fuquay-Varina to Bass Lake in southeast Holly Springs. From Judd Parkway, the route follows NC 55 to the Alston Pond neighborhood and connects through a wooded area to existing trails at Sugg Farm and Bass Lake. This project provides a direct link to between Fuquay-Varina and Holly Springs.

PROJECT AT A GLANCE

- Project location: Fuquay-Varina, Holly Springs, Wake County
- Project type: Sidepath, Shared-use path
- Length: 15,000 ft (2.8 miles)
- Total Connected Network: 8.8 miles
- Trip Generators:
  - » Bass Lake Park, Retreat Center, and trails
  - » Alston Ridge Park
  - » Alston Ridge, Springhill, Woodchase, and Sandy Springs Townhomes neighborhoods
  - » Broad Street Market shopping center
  - » Retail at Broad Street and Dickens Road

PREVIOUS PLANNING

- *Holly Springs Parks, Recreation, and Open Space Master Plan (2007)*
- *Fuquay-Varina Community Pedestrian Master Plan (2013)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 3.5 acres estimated right-of-way acquisition
- 36 impacted parcels
- 26 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/ Fuquay-Varina/ Holly Springs Floodplain Development Permit
- Wake County/ Fuquay-Varina/ Holly Springs Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/ Fuquay-Varina/ Holly Springs Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- FEMA Letter of Map Revision (LOMR)
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Fuquay-Varina, Town of Holly Springs
- Fuquay-Varina Chamber of Commerce, Holly Springs Chamber of Commerce

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $2.7 million to $3.2 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $180,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Fuquay-Varina CIP, Holly Springs CIP

OPPORTUNITIES & CONSTRAINTS

The segment supports trail connectivity toward Holly Springs via the existing Bass Lake Outfall Greenway.

The alignment follows the edge of the Basal Creek floodplain but careful routing allows minimal impacts and no overlap with wetlands in this area. The segement traversing the floodplain will increase permitting requirements.

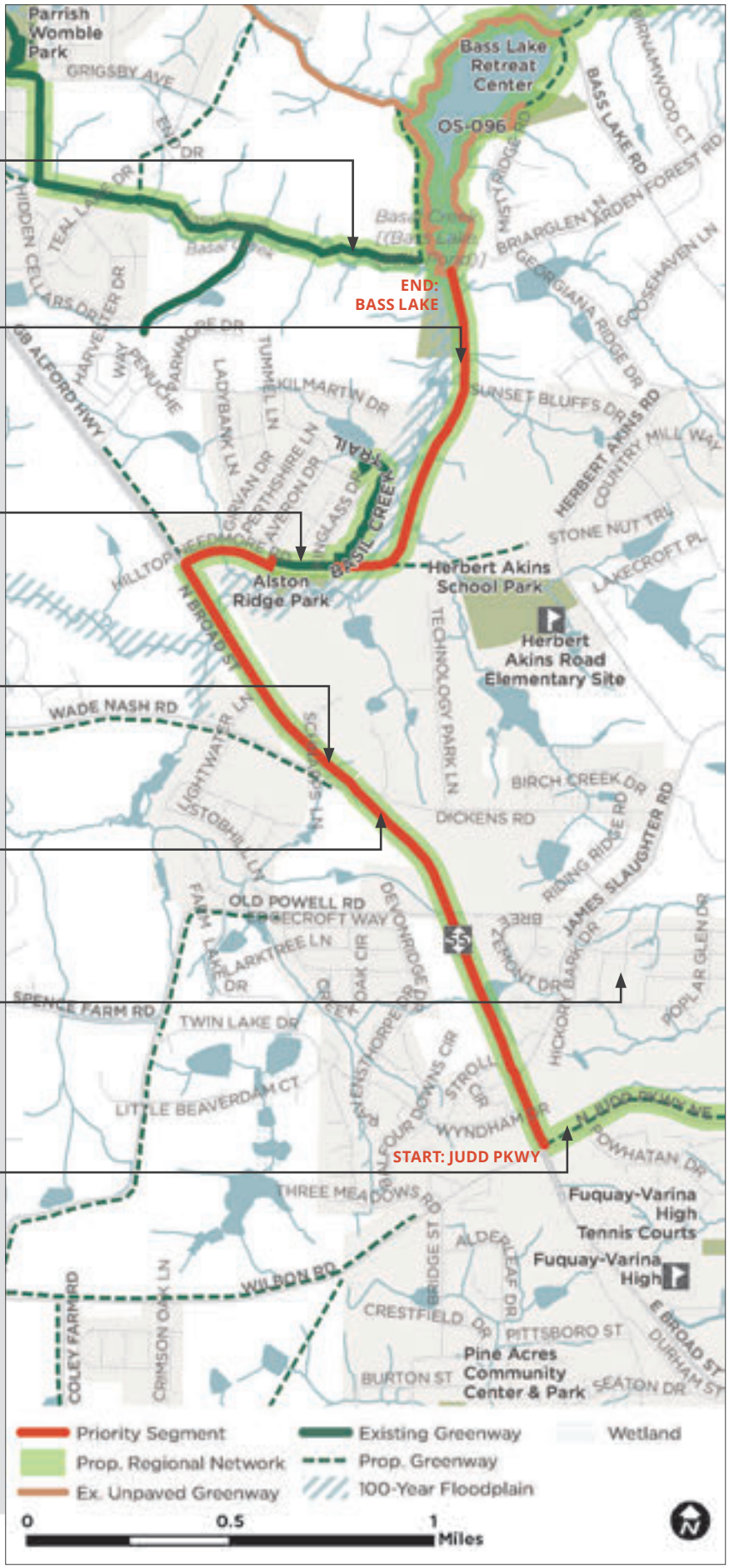
The project connects to the existing Basil Creek Trail and the Alston Pond neighborhood.

The alignment follows Broad Street between Hilltop Needmore Road and Judd Parkway.

South of Wade Nash Road, an existing sidewalk can be widened to a multi-use sidepath. Because of proximity to the current sidewalk, many utility poles will require relocation at significant cost.

The project connects the Woodchase neighborhood.

The segment supports connectivity toward Fuquay-Varina via the proposed Judd Parkway greenway.



1E. FUQUAY-VARINA GREENWAY

FROM JUDD PARKWAY TO HONEYCUTT PARK

This project connects Honeycutt Park trails to Judd Parkway. This will enhance regional connectivity through proposed sidepaths along Judd Parkway and NC 55 that will extend toward greenways at Sugg Farm and Womble Park in southeast Holly Springs. To the southeast of this project, developing connectivity to the Depot Trail from Honeycutt Park will serve regional connectivity toward Angier and Harnett County.

PROJECT AT A GLANCE

- Project location: Fuquay-Varina, Wake County
- Project type: Shared use path, sidepath
- Length: 6,500 ft (1.2 miles)
- Total Connected Network: 1.7 miles
- Trip Generators:
  - » Fuquay-Varina Town Hall
  - » Southern Regional Center
  - » Food Lion shopping center
  - » Residential neighborhoods (Sunset Forest, Meadow Woods, Willow Creek South)
  - » Honeycutt Road Park
  - » ClubWorx and Crossfit Fuquay-Varina

PREVIOUS PLANNING

- *Fuquay-Varina Community Pedestrian Master Plan (2013)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 3.1 acres estimated right-of-way acquisition
- 15 impacted parcels
- 15 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/Fuquay-Varina Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/Fuquay-Varina Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Fuquay-Varina
- ClubWorx and Crossfit Fuquay-Varina
- Fuquay-Varina Chamber of Commerce

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $1.2 million to $1.4 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $280,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Fuquay-Varina CIP

OPPORTUNITIES & CONSTRAINTS

A redesign of Judd Parkway is under construction.

Town Hall anchors the west end of the project, along with the nearby Southern Regional Center and Food Lion shopping center.

A sidepath on the north side of Old Honeycutt Road takes advantage of some Town-owned land and opportunities to set the sidepath back into the trees, creating a pleasant environment and avoiding the installation of curb and gutter.

Trail crossing improvements are needed at Old Honeycutt Road and Purfoy Road.

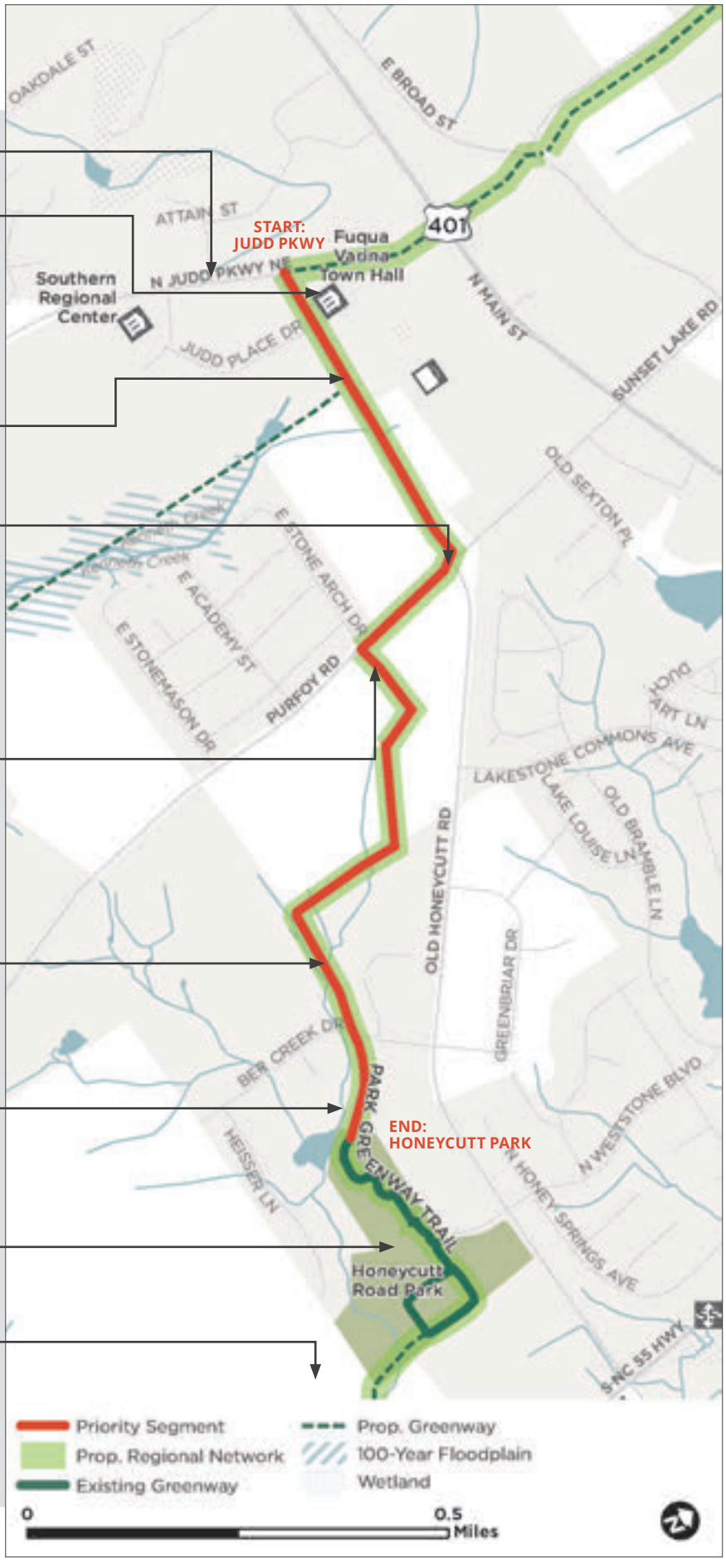
The alignment follows the east side of Purfoy Road as a sidepath and then cuts across several undeveloped properties to Ber Creek Drive. This section could likely be built as part of future development of this property.

A Town easement is in place for this section.

East of Ber Creek Drive, there is an 80' wide strip of land between water bodies that allows for a connection to existing trails at Honeycutt Road Park.

Honeycutt Park, with a variety of athletic facilities, anchors the east end of the project.

The segment supports connectivity toward Angier and Harnett County.



1F. MIDDLE CREEK GREENWAY

FROM LUFKIN ROAD MIDDLE SCHOOL TO SUNSET HILLS GREENWAY

The Middle Creek Greenway will complete a key link in the developing connection between downtown Apex and Holly Springs. To the north (the center of Apex), future trail connectivity will include a sidepath along Lufkin Road to Center Street and the Apex Peakway, eventually linking to the Beaver Creek Greenway. To the south, the Middle Creek greenway will link into the Holly Springs greenway system at Sunset Lake Road.

PROJECT AT A GLANCE

- Project location: Apex, Wake County
- Project type: Shared use path, sidepath
- Length: 12,900 ft (2.4 miles)
- Total Connected Network: 2.4 miles
- Trip Generators:
  - » Lufkin Road Middle School
  - » Classic Road industrial and office park
  - » Residential developments (Pemberley, Miramonte, Camden Reunion Park Apartments, Sunset Hills, Twisted Creek Townhomes, Arbor Creek, Bridgewater)
  - » Veterans Park
  - » Holly Springs greenway system

PREVIOUS PLANNING

- *Apex Parks, Recreation, Greenways, and Open Space Master Plan (2015)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 7.7 acres estimated right-of-way acquisition
- 17 impacted parcels
- 16 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/Apex Floodplain Development Permit
- Wake County/Apex Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/Apex Land Disturbance Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- FEMA Letter of Map Revision (LOMR)
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Apex
- Town of Holly Springs
- Wake County Board of Education
- Miramonte Homeowners Association

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $3.4 million to $4.0 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $330,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Apex CIP
- Clean Water Management Trust Fund
- Duke Energy Water Resources Fund
- Miramonte Homeowners Association easement or land donation

OPPORTUNITIES & CONSTRAINTS

A short trail extension off of the regional network connects the project to Lufkin Road Middle School at the north end. The segment supports regional connectivity toward Apex and Cary to the north.

A new crossing is required at Classic Road.

An existing sidewalk along Burma Drive can be expanded into a sidepath.

A short section of sidepath and an on-road crossing are needed at Pristine Water Drive.

The alignment follows the east side of Middle Creek between Pristine Water Drive and the southern end.

The trail's location in the floodplain will increase permitting requirements.

Boardwalk is required where the trail traverses wetlands near the second bridge. The alignment is generally located far enough east of Middle Creek to avoid wetlands wherever possible because of the high cost of boardwalk.

A bridge crossing of Middle Creek is required.

The segment supports regional connectivity between Apex and Holly Springs.

Segment connects directly to a greenway trailhead at Sunset Lake Rd in Holly Springs.

1G. APEX WEST GREENWAY

FROM THE AMERICAN TOBACCO TRAIL TO BEAVER CREEK GREENWAY

This project is a key link in the connection between the American Tobacco Trail and the Town of Apex. The eastern half of this project is an extension of the Beaver Creek Greenway, which connects east toward the center of Apex, through Apex Nature Park. The western terminus links to the American Tobacco Trail at Olive Chapel Road near Jordan Lake.

PROJECT AT A GLANCE

- Project location: Apex, Wake County
- Project type: Shared use path, sidepath
- Length: 6,900 ft (1.3 miles)
- Total Connected Network: 31.3 miles
- Trip Generators:
  - » American Tobacco Trail
  - » Residential neighborhoods (Holland Crossings, Madden Crossing, Crocketts Ridge, Bella Casa, Parkside on the Creek)
  - » Apex Nature Park
  - » Olive Chapel Elementary School
  - » Kelly Road Park
  - » Jaycee Park

PREVIOUS PLANNING

- *Apex Parks, Recreation, Greenways, and Open Space Master Plan Map (2013) (2015 update)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 3.5 acres estimated right-of-way acquisition
- 8 impacted parcels
- 5 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/Apex Floodplain Development Permit
- Wake County/Apex Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/Apex Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- FEMA Letter of Map Revision (LOMR)
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Apex
- Apex Downtown Business Association
- Holland Crossings Homeowners Association
- Wakemed Healthplex Apex
- Arcadia West and Saddleback

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $3.4 million to $4.1 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $31,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Apex CIP
- Parks and Recreation Trust Fund
- Clean Water Management Trust Fund
- Duke Energy Water Resources Fund
- Holland Crossings Homeowners Association easement or land donation

OPPORTUNITIES & CONSTRAINTS

The segment terminates at the American Tobacco Trail, connecting the Apex trail system to this regional amenity.

A short sidepath segment is needed along Olive Chapel Road to link the American Tobacco Trail and the portion of the greenway already under development.

A section of the greenway is being funded and constructed through private development.

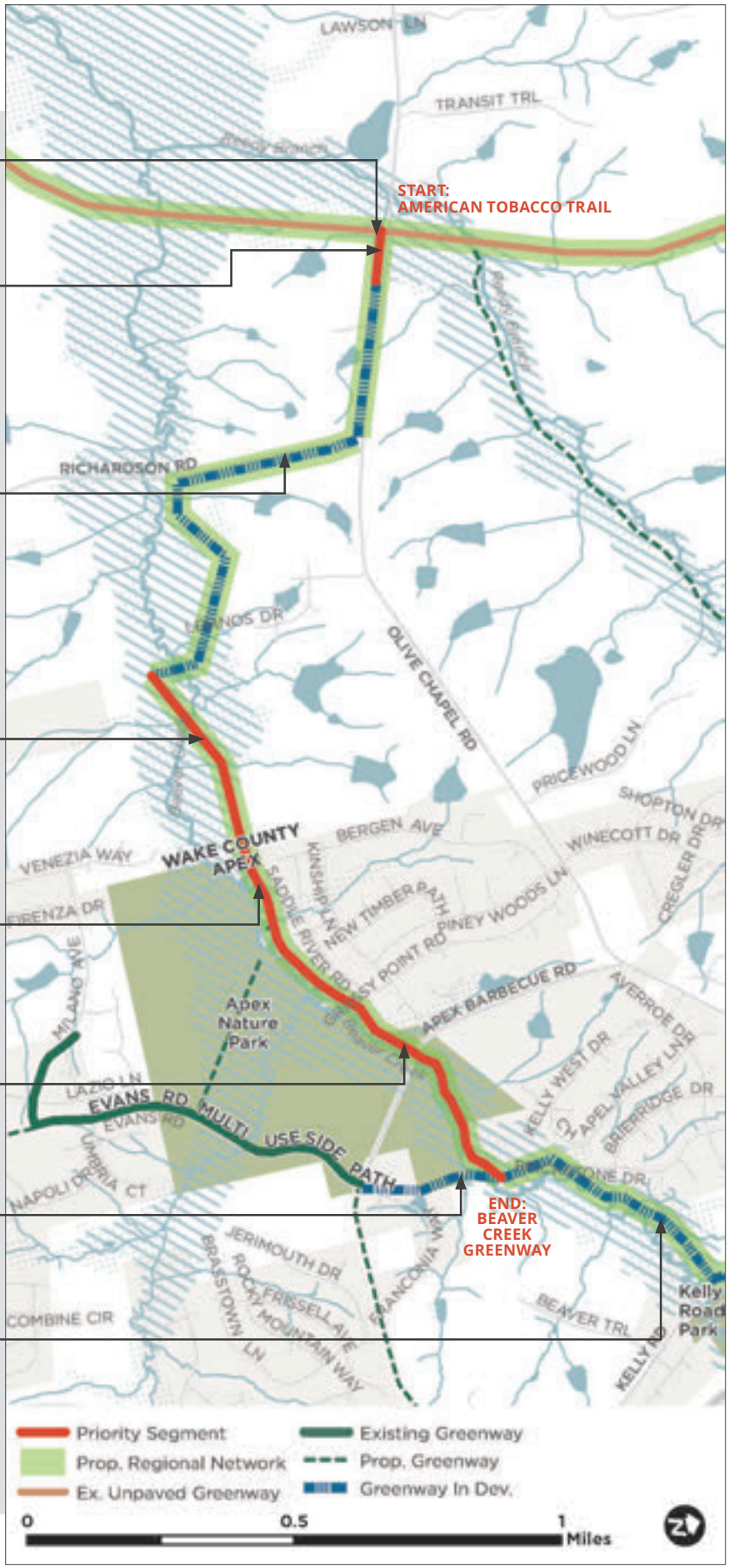
Boardwalk is recommended for the majority of the greenway to reduce impacts on the wetlands it traverses. The trail's location in the floodplain will increase permitting requirements.

The alignment follows the south side of Beaver Creek, south of the Hollands Crossing neighborhood, with opportunities to connect into the Apex Nature Park.

The alignment takes advantage of the Town-owned Apex Nature Park, reducing the required amount of property or easement acquistions.

The segment terminates at a segment of the Beaver Creek Greenway currently under development.

The segment supports connectivity between the American Tobacco Trail and downtown Apex via the proposed network and greenways in development.



1H. LOWER WILLIAMS CREEK GREENWAY (SWIFT CREEK)

FROM LAKE PINE DR TO SYMPHONY LAKE GREENWAY

This segment of greenway is approximately 2.6 miles connecting Apex Community Park to the North and Regency Park/Koka Booth Ampitheater to the South. This project includes major bridge crossings of US-1 and US-64. Although not currently a top priority project in Cary, this segment could become one with significant new funding sources.

PROJECT AT A GLANCE

- Project location: Town of Cary, Wake County
- Project type: Greenway
- Length: 12,900 ft (2.4 miles)
- Total Connected Network: 11.6 miles
- Trip Generators: Apex Community Park, Regency Park and Koka Booth Amphitheater

PREVIOUS PLANNING

- *Town of Cary Parks, Recreation and Cultural Resources Master Plan (2012)*
- *Construction plans completed from Apex Community Park to US-1. (final bridge designs for crossing US-1 and US-64 outstanding)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 9.4 acres of right of way needed.
- There will be six privately owned parcels impacted by the greenway.

POTENTIAL PERMITTING NEEDS

- North Carolina Department of Transportation Encroachment Permit
- NC Department of Environmental Quality
- US Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Cary
- Town of Apex
- CAMPO
- Cary Auto Park

ESTIMATED CONSTRUCTION COST

Cost estimate for construction

- *2016 construction estimates are in the range of $7.5 million to $9 Million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $800,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/Local Adminstered Projects Program (LAPP) funding
- NCDOT/STI funding
- Wake County CIP funding

OPPORTUNITIES & CONSTRAINTS

This trail creates a vital recreational link between two of the larger parks in the region, Apex Community Park and Regency Park.

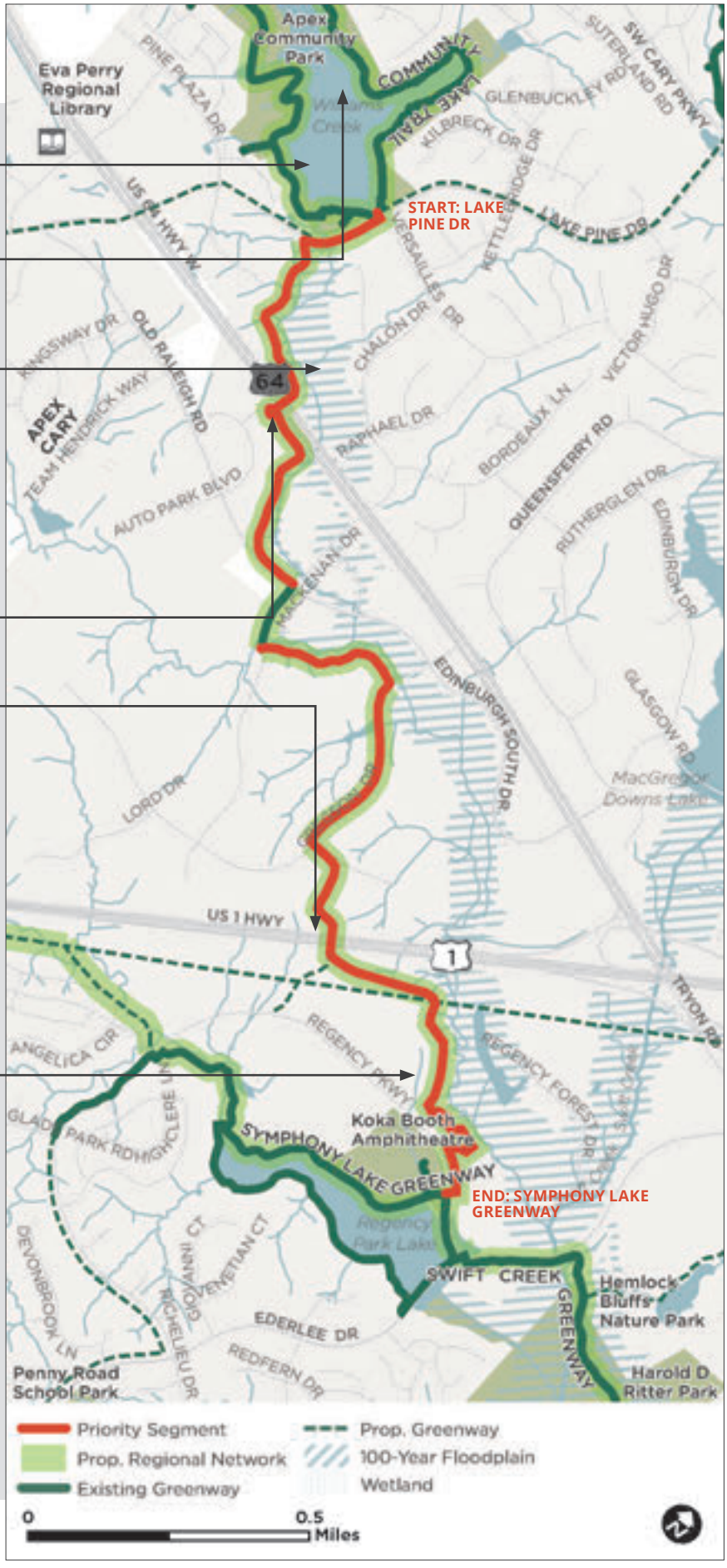
Joint partnerships opportunities may be available between the Town of Apex and the Town of Cary.

The Town of Cary owns a parcel of property located at the end of MacGregor Pines Drive that may be an ideal location for a trailhead.

Construction plans were completed in 2012 from Apex Community Park to US-1 (final bridge designs for crossing US-1 and US-64 outstanding.

Two major road crossings of US-1 and US-64 will require a large pedestrian bridge

Much of the alignment is located in non-residential areas. Easement acquisition may cost more than typical.



1I. SWIFT CREEK GREENWAY (UPPER WILLIAMS CREEK GREENWAY)

FROM FRED BOND METRO PARK TO OLD APEX ROAD

The Swift Creek Greenway, also known as Upper Williams Creek Greenway, connects two of the larger parks in the Cary/Apex area. Fred Bond Metro Park and Apex Communnity Park are large recreational destinations therefore this stretch of trail is a vital recreational link. This 1.5 mile stretch of greenway provides access to a large number of residential neighborhoods in addition to Laurel Park Elementary School. Although not currently a top priority project in Cary, this segment could become one with significant new funding sources.

PROJECT AT A GLANCE

- Project location: Town of Cary and Town of Apex Wake County
- Project type: Shared use path
- Length: 8,500 ft (1.6 miles)
- Total Connected Network: 147 miles
- Trip Generators: Apex Community Park, Fred Bond Metro Park and Laurel Park Elementary School

PREVIOUS PLANNING

- *Town of Cary Parks, Recreation and Cultural Resources Master Plan (2012)*
- *Town of Apex Parks, Recreation, Greenways and Open Space Master Plan (2015)*

POTENTIAL RIGHT-OF-WAY NEEDS

- An estimated 2 acres of easements and/or right of way will be needed
- There will be seven properties impacted by the greenway.

POTENTIAL PERMITTING NEEDS

- North Carolina Department of Transportation Encroachment Permit
- NC Department of Environmental Quality
- US Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Cary
- Town of Apex
- Wake County Public Schools

ESTIMATED CONSTRUCTION COST

Cost estimate for construction

- *2016 construction estimates are in the range of $1.8 million to $2.2 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $51,000.*

POTENTIAL FUNDING MECHANISMS

- CAMPO/Local Adminstered Projects Program (LAPP) funding
- NCDOT/STI funding
- Wake County CIP funding
- Parks and Recreation Trust Fund

OPPORTUNITIES & CONSTRAINTS

This trail creates a vital recreational link between two of the larger parks in the region, Fred Bond Metro Park and Apex Community Park.

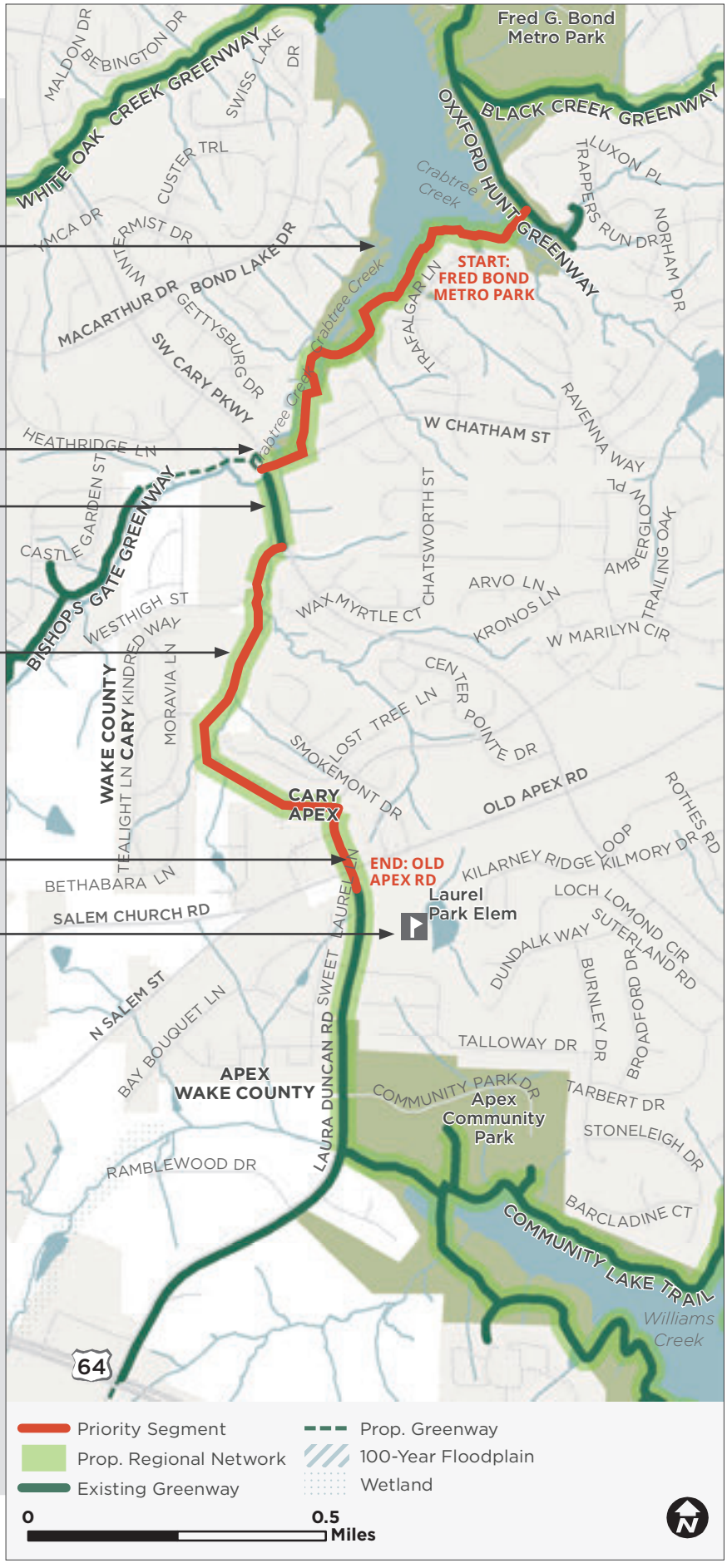
A safe pedsestrian crossing will be needed at Cary Parkway. A possible rapid flashing beacon may be needed.

Wide multiuse path already exists on Cary Parkway.

Much of the trail can utilize existing utility easements.

Upgrades to the intesection at Old Apex Road will be needed.

Crossing the railroad and Old Aex Road presents a challenge for this project. Due to the proximity to Laurel Park Elementary School it is very important to provide a safe crossing.



1J. HATCHER CREEK GREENWAY

FROM EXISTING TRAIL ON SEDGEFIELD PARK LANE TO MORRISVILLE COMMUNITY PARK

Hatcher Creek Greenway connects a large high density area in western Wake County to the American Tobacco Trail. This segment runs from NC55 eastward to Davis Drive. This portion of trail includes off road greenway and side street multiuse trail. The total length of this project is 1.7 miles. Just under 1/2 of a mile will be streetside multiuse trail on Morrisville Parkway. The primary challenge to this project is crossing the railroad at the west end of the project. Carpenter Elementary School and West Regional Library will have direct benefits from this project. Although not currently a top priority project in Cary, this segment could become one with significant new funding sources.

PROJECT AT A GLANCE

- Project location: Town of Cary, Wake County
- Project type: Shared use path
- Length: 11,100 ft (2.1 miles)
- Total Connected Network: 141 miles
- Trip Generators: American Tobacco Trail, Carpenter Elementary, West Regional Library, Morrisville Community Park, Panther Creek Greenway

PREVIOUS PLANNING

- *Town of Cary Greenway Parks, Recreation and Cultural Resources Master Plan. (2012)*
- *Center of the Region Enterprise Plan (CORE) (2016)*

POTENTIAL RIGHT-OF-WAY NEEDS

- An estimated 3.8 acres of easements and/or right of way will be needed
- There will be nine properties impacted by the greenway.

POTENTIAL PERMITTING NEEDS

- North Carolina Department of Transportation Encroachment Permit
- NC Department of Environmental Quality
- US Army Corps of Engineers Section 401/404 Permit
- FEMA Conditional Letter of Map Revision (CLOMR)

POTENTIAL PARTNERSHIPS

- Town of Cary
- Wake County Public Schools
- Wake County Public Library
- Carpenter Village HOA

ESTIMATED CONSTRUCTION COST

Cost estimate for construction

- *2016 construction estimates are in the range of $2.2 million to $2.8 million*
- *Grade separations at Davis Drive and NC 55 could add about $10 million to the project cost*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $680,000.*

POTENTIAL FUNDING MECHANISMS

- CAMPO/Local Adminstered Projects Program (LAPP) funding
- NCDOT/STI funding
- Wake County CIP funding
- Parks and Recreation Trust Fund
- Safe Routes to Schools

OPPORTUNITIES & CONSTRAINTS

The crossing of Davis Drive already has a full traffic signal. Minor upgrades will be needed to accomodate pedestrian movement.

The Town of Cary owns a tract of land at Davis Drive that may be an opportunity for a trailhead.

This trail creates a connection to the trails in the Town of Morrisville to the east and eventually the American Tobacco Trail to the west.

Obtaining easements from Carpenter Village and Lakegrove Townhomes will be difficult.

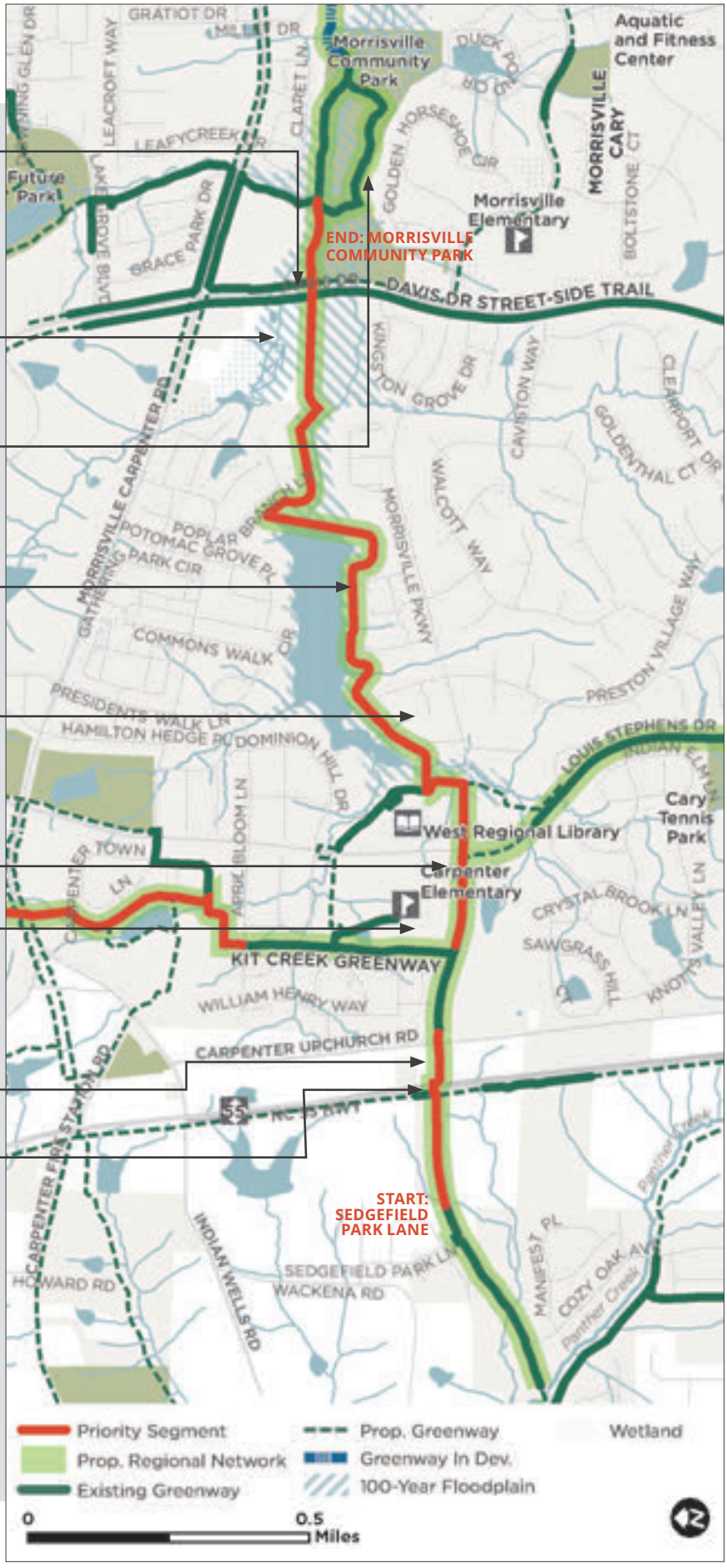
A large portion of this project will be located witin the floodplain which will require a FEMA/CLOMR study.

Wetlands are located in the proximity of West Regional Library.

The project allows connection to Carpenter Elementary School and West Regional Library.

Crossing the existing railroad at grade presents the major challenge for this project.

The trail can use existing right of way along Morrisville Parkway.



1K. LOUIS STEPHENS DRIVE GREENWAY

FROM KIT CREEK ROAD TO KIT CREEK GREENWAY

This project connects RTP from the Louis Stephens Drive/Kit Creek Road intersection to Cary at the existing Kit Creek Greenway. From Kit Creek Road, the route follows Louis Stephens Drive to its present terminus to the south, then connects to the existing Kit Creek Greenway by passing under the Triangle Expressway and through wooded areas between neighborhoods at the northern edge of Cary. This project serves as a regional north/south link connecting Cary and RTP. Although not currently a top priority project in Cary, this segment could become one with significant new funding sources.

PROJECT AT A GLANCE

- Project location: Cary, Wake County
- Project type: Sidepath, Shared-use path
- Length: 19,200 ft (3.6 miles)
- Total Connected Network: 12.3 miles
- Trip Generators:
  - » Northwest Park
  - » Breckenridge, Wexford, Legacy at Carpenter Village, Carpenter Village, and Olde Carpenter neighborhoods
  - » Carpenter Elementary School
  - » West Regional Library
  - » Lake Betz
  - » Employers (NetApp, Cisco Systems)

PREVIOUS PLANNING

- *Center of Regional Enterprise (CORE) Pedestrian, Bicycle, and Greenways Update (2016)*
- *Cary Comprehensive Transportation Plan*

POTENTIAL RIGHT-OF-WAY NEEDS

- 7.6 acres estimated right-of-way acquisition
- 21 impacted parcels
- 16 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/ Cary Floodplain Development Permit
- Wake County/Cary Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/Cary Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- FEMA Letter of Map Revision (LOMR)
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Research Triangle Park (RTP)
- Town of Cary, Town of Morrisville
- Cary Chamber of Commerce, Morrisville Chamber of Commerce
- McCrimmon at the Park HOA, McCrimmon at the Park HOA, Magnolia Estates HOA, Phillips Place HOA
- NetApp

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $3.3 million to $4.0 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $550,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Cary CIP
- Magnolia Estates HOA, Phillips Place HOA easement or land donation

OPPORTUNITIES & CONSTRAINTS

The segment supports trail connectivity toward Research Triangle Park.

The alignment terminates at the intersection of Kit Creek Road and Louis Stephens Drive. Crossing improvements are needed here.

The alignment traverses floodplain, which will increase permitting requirements. A bridge is required at this stream crossing.

The alignment includes upgrading an existing 8 foot-wide path along Louis Stephens Drive at the north end of the alignment to a 10 foot-wide multi-use path.

A bridge is required at this location.

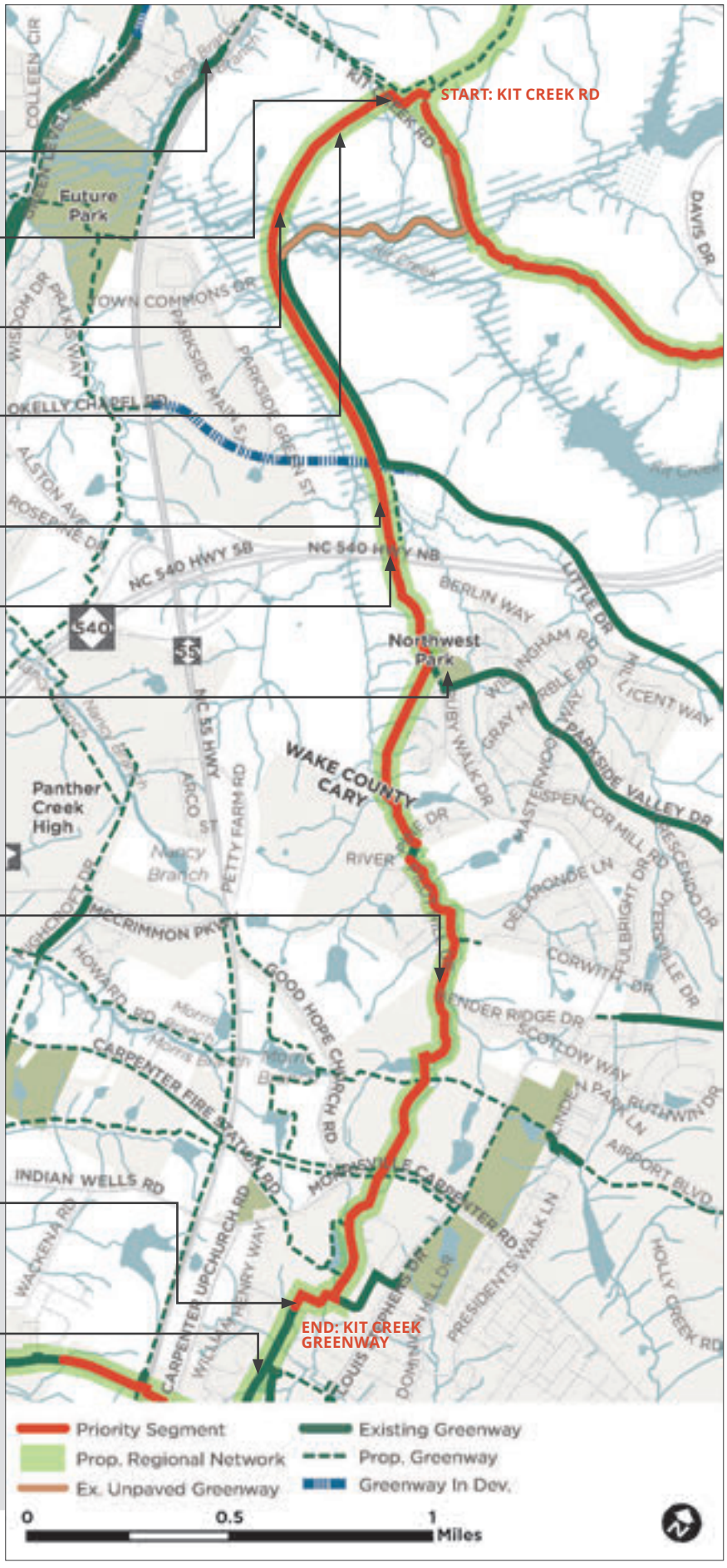
The alignment passes under NC 540 at an existing underpass.

The alignment connects Northwest Park and the Parkside Valley Drive greenway.

Between Parkside Valley Drive and April Bloom Lane, the alignment follows a stream corridor.

The segment terminates at an existing greenway at the intersection of April Bloom Road and Grant Fores Lane.

The segment supports connectivity toward Cary's Panther Creek Trail corridor.



1L. KIT CREEK ROAD GREENWAY

FROM LOUIS STEPHENS DRIVE TO SHILOH GREENWAY

This project runs from the Kit Creek Road/Louis Stephens Drive intersection in RTP to the Shiloh Greenway in Morrisville. From Louis Stephens Drive, the route follows Kit Creek Road to the trail in development along Davis Drive. The last section of this project connects from Davis Drive at the Little Drive intersection through a patch of woods to the Shiloh Greenway. This project links RTP, Cary, and Morrisville in the western edge of Wake County.

PROJECT AT A GLANCE

- Project location: Morrisville, Wake County
- Project type: Sidepath, Shared-use path
- Length: 11,500 ft (2.2 miles)
- Total Connected Network: 15.8 miles
- Trip Generators:
  - » Employers (NetApp, Cisco Systems)
  - » Church Street Park
  - » Shiloh Park
  - » Shiloh Grove and Hamlet in the Park neighborhoods

PREVIOUS PLANNING

- *Center of Regional Enterprise (CORE) Pedestrian, Bicycle, and Greenways Update (2016)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 4.5 acres estimated right-of-way acquisition
- 7 impacted parcels
- 6 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/ Morrisville Floodplain Development Permit
- Wake County/ Morrisville Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/ Morrisville Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- FEMA Letter of Map Revision (LOMR)
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Research Triangle Park (RTP)
- Town of Morrisville, Town of Cary
- Morrisville Chamber of Commerce, Cary Chamber of Commerce
- Shiloh Grove HOA
- Duke Energy
- Research Triangle Foundation

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $1.8 million to $2.1 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $230,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Wendell CIP
- Duke Energy and Research Triangle Foundation easement or land donation

OPPORTUNITIES & CONSTRAINTS

The segment supports trail connectivity toward Research Triangle Park.

Lake Betz creates a constrained cross-section for 525 feet where a sidewalk is in place. This section is proposed to remain as-is with signage warning users as they approach the narrow section.

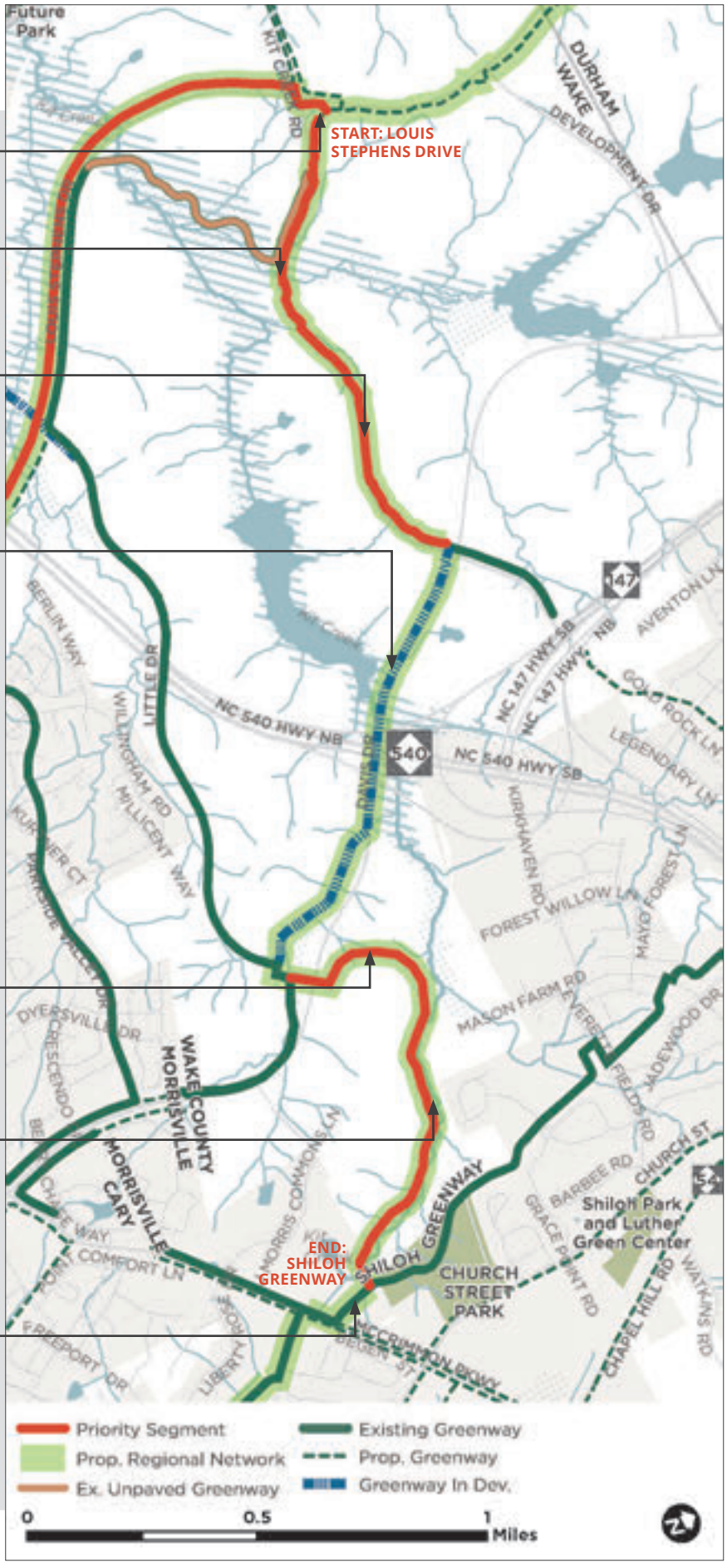
An existing 8 foot-wide paved path exists along the east side of Kit Creek Road between Louis Stephens Drive and Davis Drive. The project includes upgrading this section to a 10 foot-wide multi-use path to meet current standards.

A multi-use path is currently under development between Davis Drive and Little Drive.

The alignment follows a future roadway corridor between Davis Drive and Kit Creek. Coordination should occur between greenway and roadway development.

The alignment follows Kit Creek down to the existing Shiloh Greenway and Church Street Park.

The segment supports connectivity to Morrisville.



1M. HARE SNIPE CREEK TRAIL

FROM WOOTEN MEADOW PARK TO CRABTREE CREEK GREENWAY

This 1.6 mile segment of Hair Snipe Creek Trail connects Lake Lynn and Wooten Meadow Park to Crabtree Creek Greenway. Most of the alignment within Wooten Meadow Park is wetland, therefore a low level boardwalk will be needed. The alignment as a whole is within the flood plain. The major challenge to the project is crossing Glenwood Avenue. A tunnel crossing of at least 180 feet will be necessary.

PROJECT AT A GLANCE

- Project location: City of Raleigh, Wake County
- Project type: Shared use path
- Length: 9,000 ft (1.7 miles)
- Total Connected Network: 147 miles
- Trip Generators: Lake Lynn, Wooten Meadow Park, Crabtree Greenway, Brookhaven Nature Park and Crabtree Valley Mall

PREVIOUS PLANNING

- *City of Raleigh Parks, Recreation and Cultural Resources System Plan (2014)*

POTENTIAL RIGHT-OF-WAY NEEDS

- An estimated 4.7 acres of easements and/or right of way will be needed
- There will be five properties impacted by the greenway on of which is non-residential thus a higher acquisition value. Fortunately the remaining properties are undeveloped.

POTENTIAL PERMITTING NEEDS

- North Carolina Department of Transportation Encroachment Permit
- NC Department of Environmental Quality
- US Army Corps of Engineers Section 401/404 Permit
- FEMA Conditional Letter of Map Revision (CLOMR)

POTENTIAL PARTNERSHIPS

- City of Raleigh
- Crabtree Valley Mall

ESTIMATED CONSTRUCTION COST

Cost estimate for construction

- *2016 construction estimates are in the range of $9 million to $10.8 million*
- *Cost estimates should be escalated at a rate of 5% each year*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $490,000. Acquisition of easements on non-residential property along Glenwood Avenue increases acquisition costs*

POTENTIAL FUNDING MECHANISMS

- CAMPO/Local Adminstered Projects Program (LAPP) funding
- NCDOT/STI funding
- Wake County CIP funding
- Parks and Recreation Trust Fund

OPPORTUNITIES & CONSTRAINTS

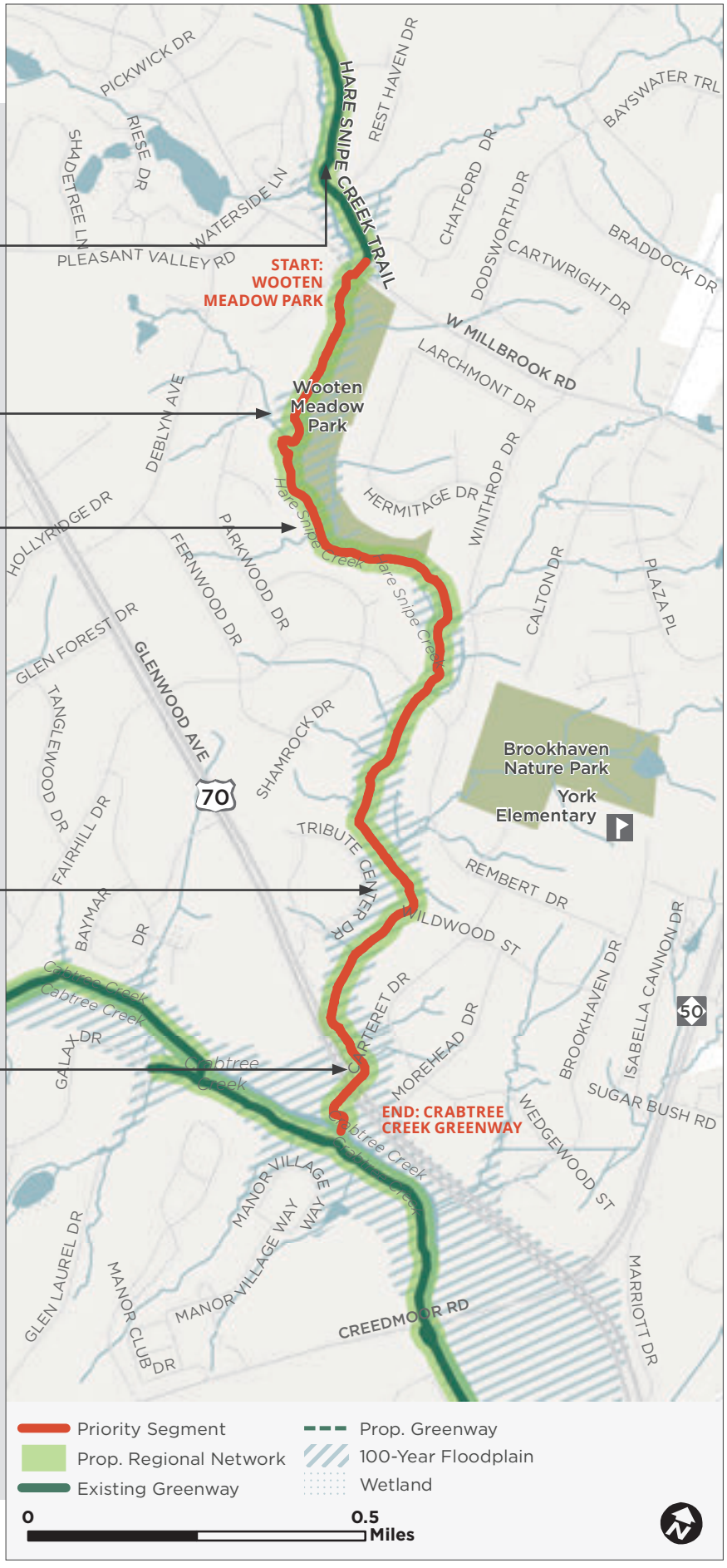
This trail creates a link from Lake Lynn and Wooten Meadow Park to Crabtree Creek Greenway.

The northern most portion of the trail is within wetlands requiring low level boardwalk.

A large portion of this project will be located within the floodplain which will require a detailed study area for FEMA/CLOMR.

The City already has several greenway easements north of Glenwood Avenue.

Crossing Glenwood Avenue will be that greatest challenge for the project. A 180 foot long tunnel will be need to get across Glenwood Avenue.



1N. RALEIGH PIGEON HOUSE TRAIL CONNECTOR

FROM CRABTREE CREEK TRAIL TO ROCKY BRANCH TRAIL

This project connects the existing Crabtree Creek Trail to the Rocky Branch Trail near downtown Raleigh. From the Rocky Branch Trail, the route follows through the Boylan Heights neighborhood, along West Street and eventually following the Capital Boulevard Corridor to the Crabtree Creek Trail. This project includes significant stream restoration and would serve as a critical regional link through the heart of Raleigh. Greater detail on the section between Crabtree Creek Boulevard and Peace Street is provided in the *Capital Boulevard Corridor Study*, which analyzed that area in depth and recommended a greenway as part of broader improvements.

PROJECT AT A GLANCE

- Project location: Raleigh
- Project type: Sidepath, Shared-use path, On-road connection (separated bike lanes and sidewalks)
- Length: 24,700 ft (4.7 miles)
- Total Connected Network: 143 miles
- Trip Generators:
  - » Capital Boulevard/Crabtree Boulevard commercial corridors
  - » William Peace University
  - » Downtown Raleigh
  - » Downtown Raleigh neighborhoods
  - » Raleigh Amtrak Station

PREVIOUS PLANNING

- *Raleigh Capital Area Greenway Planning and Design Guide (2014)*
- *Raleigh Bike Plan Update (2016)*
- *Raleigh Capital Boulevard Corridor Study (2012)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 9.6 acres estimated right-of-way acquisition
- 67 impacted parcels
- 48 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/ Raleigh Floodplain Development Permit
- Wake County/ Raleigh Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/ Raleigh Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- FEMA Letter of Map Revision (LOMR)
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- City of Raleigh
- Raleigh Chamber of Commerce, Raleigh Downtown Alliance
- Amtrak
- Boylan Heights Neighborhood Organization
- Businesses along West Street and Capital Boulevard

ESTIMATED CONSTRUCTION COST

- *This greenway project should be implemented as part of comprehensive corridor improvements to Capital Boulevard. See the Capital Boulevard Corridor Study for more information on costs and codependent projects.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $2,000,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Raleigh CIP
- Land easements/donations

OPPORTUNITIES & CONSTRAINTS

The segment terminates at the existing Crabtree Creek Trail on the northeast end.

Boardwalk is recommended north of Crabtree Boulevard.

The alignment along Capital Boulevard is proposed as part of a stream restoration and park project.

Pedestrian crossing improvements are needed at the intersection of WAke Forest Road and Old Louisburg Road.

A super street is proposed for Capital Boulevard through this section. This reconfiguration will allow installation of a greenway along the existing commercial service road paralleling the boulevard.

The alignment continues along Pigeon House Branch to Peace Street through the proposed Devereux Meadows Park and Stream Restoration.

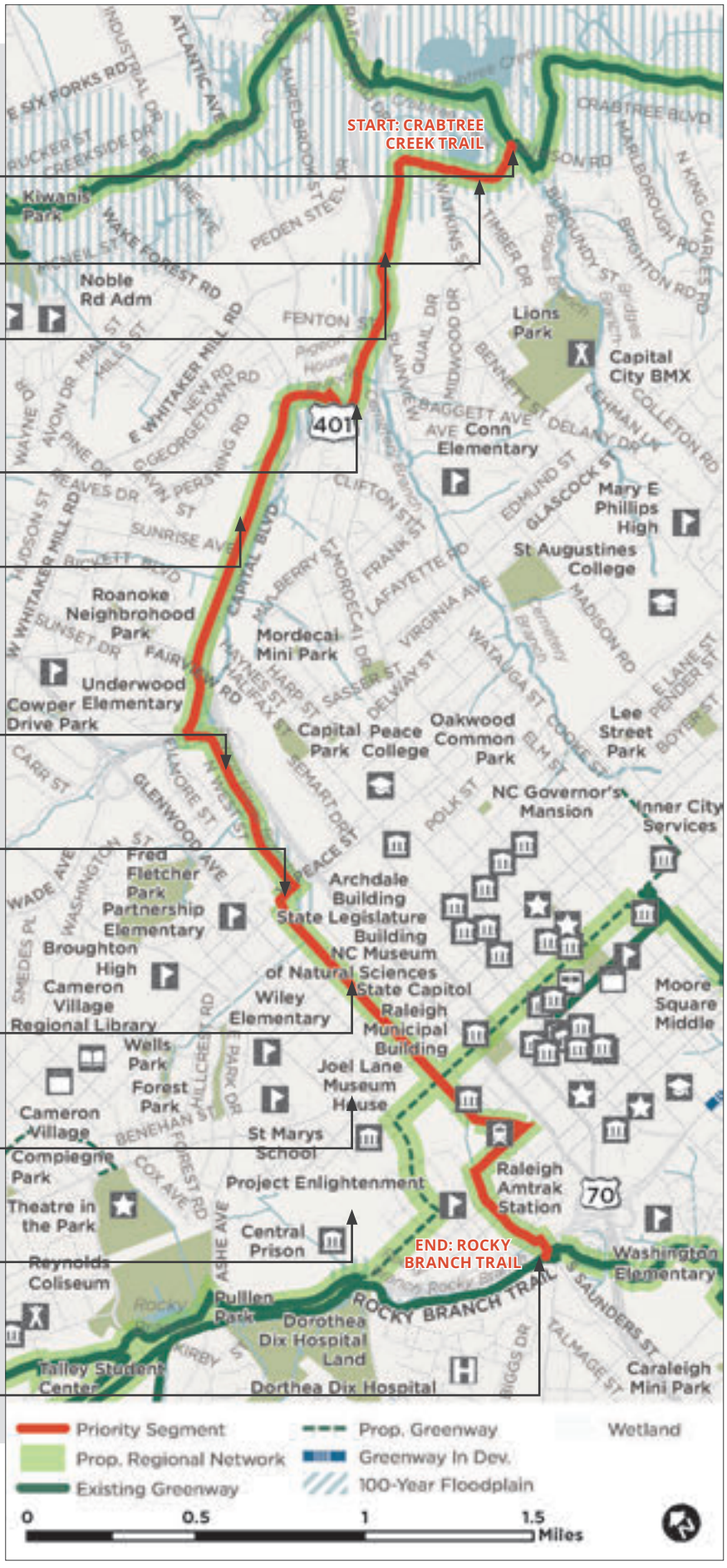
A short sidepath is proposed along Peace Street between Pigeon House Branch and West Street.

South of Peace Street, an on-road alignment is proposed along West Street including a separated bikeway and sidewalks, given constrained right-of-way. This section of the alignment links the heart of downtown Raleigh.

The alignment connects the Raleigh Amtrak Station, and then follows Cabarrus Street for two blocks with on-road bike markings, signage, and sidewalks.

The alignment follows a Rocky Branch tributary for the remaining portion and links the Lenoir Street Park. This section requires negotiation with several property owners.

The segment terminates at the existing Rocky Branch Trail.



10. CREECH ROAD GREENWAY

FROM GARNER ROAD TO WALNUT CREEK GREENWAY

This project links the center of Garner to the Walnut Creek Greenway in southeast Raleigh. From Garner Road, the route travels past the Garner Senior Center, through Garner Recreation Park to Creech Road Elementary School and Creech Road before connecting to, and following, a Walnut Creek tributary to the Walnut Creek Trail. This project provides a direct link to Raleigh's existing greenway system and the heart of Garner.

PROJECT AT A GLANCE

- Project location: Raleigh, Garner, Wake County
- Project type: Sidepath, Shared-use path
- Length: 23,200 ft (4.4 miles)
- Total Connected Network: 142 miles
- Trip Generators:
  - » Walnut Creek Park
  - » Walnut Creek Amphitheatre
  - » Creech Road Elementary School & Park
  - » Garner Recreational Park
  - » Green Valley, Parrish Meadows, Quarry Pointe, Gatewood neighborhoods

PREVIOUS PLANNING

- *Garner Comprehensive Parks, Recreation, and Greenways Master Plan (2007)*
- *Raleigh Capital Area Greenway Planning and Design Guide (2014)*
- *Raleigh Bike Plan Update (2016)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 12.3 acres estimated right-of-way acquisition
- 51 impacted parcels
- 42 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/ Garner/ Raleigh Floodplain Development Permit
- Wake County/ Garner/ Raleigh Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/ Garner/ Raleigh Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- FEMA Letter of Map Revision (LOMR)
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Garner, City of Raleigh
- Garner Chamber of Commerce, Raleigh Chamber of Commerce
- Hunter's Mark HOA, Riverbrooke Community Watch, Quarry Pointe HOA
- South Citizens Advisory Council
- Federal Highway Administration (FHWA)

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $8.2 million to $9.8 million (excluding the proposed grade-separated crossing of I-40).*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $110,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Garner CIP, Raleigh CIP
- Riverbrooke Homeowner's Association easement or land donation

OPPORTUNITIES & CONSTRAINTS

The segment supports trail connectivity between Garner and the Walnut Creek entertainment complex in southeast Raleigh. It terminates at the existing Walnut Creek Trail

A bridge is required over Walnut Creek.

An underpass is proposed at Rock Quarry Road. This location requires further study. As an alternative, the trail could cross at the intersection with Jones Sausage Road.

The alignment traverses wetlands and floodplain between the Walnut Creek Greenway and I-40. Boardwalk is proposed to reduce wetland impacts at significant cost. Additional bridges may be required in this section.

A grade-separated crossing of I-40 is required. This crossing requires further study and is not included in the planning level cost estimate provided.

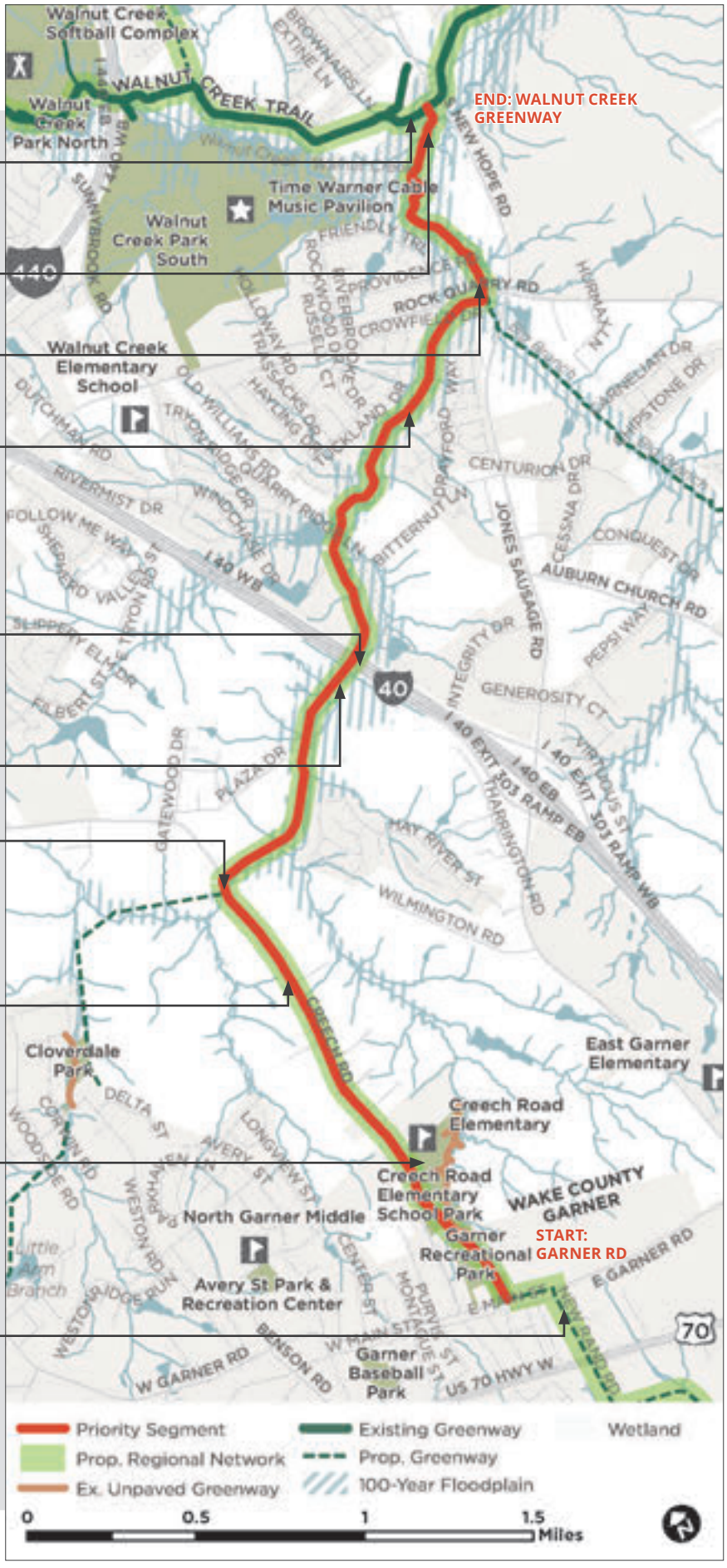
A bridge is required west of the I-40 crossing.

A bridge is required where the alignment meets Creech Road and heads south.

Curb and gutter is recommended along Creech Road in order to reduce right-of-way acquisition through this residential section.

The project connects Creech Road Elementary School Park and Garner Recreational Park before terminating at Main Street.

The segment supports connectivity toward the heart of Garner.



1P. BUFFALOE ROAD GREENWAY

FROM WHITE DEER PARK TO CENTENNIAL PARK

This project provides a connection between existing trails at Garner's White Deer Park and Centennial Park. From White Deer Park, the route follows Buffaloe Road before connecting to the eastern end of Lake Benson, eventually following Mahlers Creek toward Centennial Park. This corridor will eventually serve as a key regional link connecting Cary, Lake Wheeler, Lake Benson, Garner, and Johnston County.

PROJECT AT A GLANCE

- Project location: Garner, Wake County
- Project type: Shared use path, sidepath
- Length: 15,800 ft (3 miles)
- Total Connected Network: 7.1 miles
- Trip Generators:
  - » White Deer Park
  - » Lake Benson Park
  - » Residential neighborhoods (Summer Walk, Autumn Oaks, Scarborough Ridge, Lynnshire, Dunhaven, Woodsdale, Jamestowne)
  - » Centennial Park

PREVIOUS PLANNING

- *Garner Comprehensive Parks, Recreation, and Greenways Master Plan (2007)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 3.6 acres estimated right-of-way acquisition
- 29 impacted parcels
- 25 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/Garner Floodplain Development Permit
- Wake County/Garner Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/Garner Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- FEMA Letter of Map Revision (LOMR)
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Garner
- Garner Chamber of Commerce
- Rosemoor Place Homeowners Association

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $3.4 million to $4.1 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $81,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Garner CIP
- Clean Water Management Trust Fund
- Duke Energy Water Resources Fund
- Rosemoor Place Homeowners Association easement or land donation

OPPORTUNITIES & CONSTRAINTS

The segment terminates at White Deer Park, linking into the extensive trail network in this park and the adjacent Lake Benson Park, and ultimately connecting west Garner and Lake Wheeler. The existing striped crosswalk at Aversboro Road should be updated with a pedestrian signal.

There's an opportunity to partner with a homeowner's association to site a sidepath farther from Buffaloe Road through existing trees.

Numerous residential driveways and lansdscaping within road right-of-way will complicate sidepath development for some sections of Buffaloe Road. Curb and gutter will be required to construct the sidepath within existing right-of-way.

The existing shoulder of the berm through Lake Benson is not wide enough for a sidepath. The berm must be widened to accommodate the sidepath.

Right-of-way for a sidepath is constrained at the end of Bufflaoe Road where the roadway widens to accommodate a left turn lane. An on-road facility with a physical separator may be required in this location.

An underpass of NC-50 is required where the alignment moves off-road to follow Swift Creek and then Mahlers Creek.

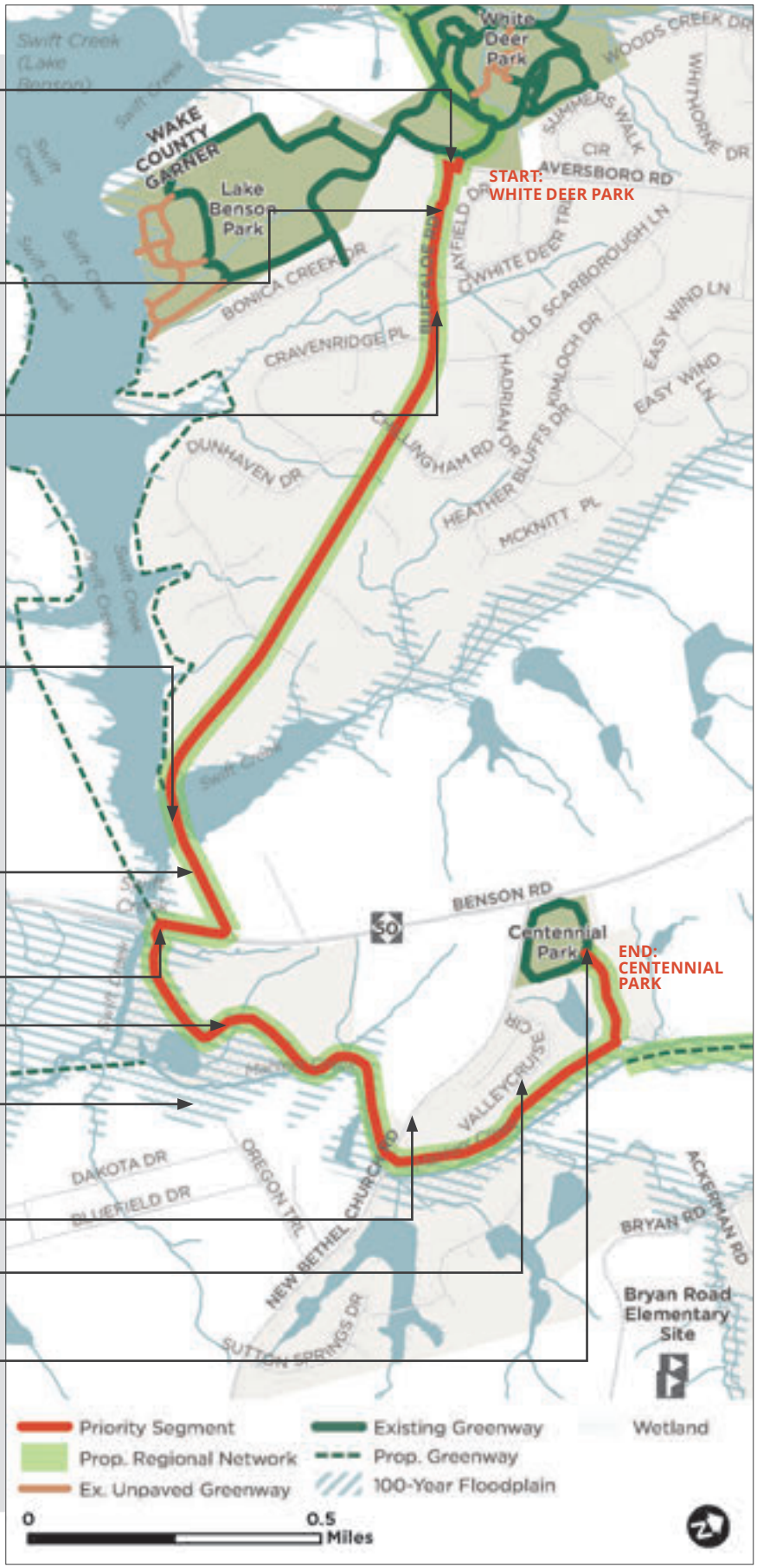
Publicly owned land provides right-of-way between Benson Road and New Bethel Church Road.

The trail's location in the floodplain will increase permitting requirements.

An improved trail crossing is required at New Bethel Church Road.

There is potential for connections to the Glens at Bethel neighborhood.

The segment connects Centennial Park on the east end. It also supports regional connectivity to downtown Garner and eastern Wake County.



1Q. DURANT ROAD TRAIL

FROM HONEYCUTT ROAD TO FALLS OF THE NEUSE ROAD

This trail will be one of the few opportunities in North Raleigh to go east-west. Durant Road street side multi-use trail is approximately 1.3 miles long.

PROJECT AT A GLANCE

- Project location: Northern Wake County
- Project type: Street side Multi-Use path
- Length: 6,900 feet (1.3 miles)
- Total Connected Network: 139 miles
- Trip Generators: This trail links the Honeycutt Creek Trail to Falls of Neuse Road.

PREVIOUS PLANNING

- None

POTENTIAL RIGHT-OF-WAY NEEDS

- The project will need up to 6.6 acres along the frontage of Durant Road
- There will be ten properties impacted by this project.

POTENTIAL PERMITTING NEEDS

- North Carolina Department of Transportation Encroachment Permit
- NC Department of Environmental Quality
- US Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- City of Raleigh
- NCDOT
- Wake County

ESTIMATED CONSTRUCTION COST

Cost estimate for construction

- *2016 construction estimates are between $1.6 million and $1.87 million.*
- *Cost estimates should be escalation should be 5% per year*

Cost estimate for land acquisition

- *Based upon Wake County assessed property values acquisition estimates are approximately $450,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/Local Adminstered Projects Program (LAPP) funding
- NCDOT/STI funding
- Wake County CIP funding

OPPORTUNITIES & CONSTRAINTS

A pedestrian bridge will be needed at the creek crossing.

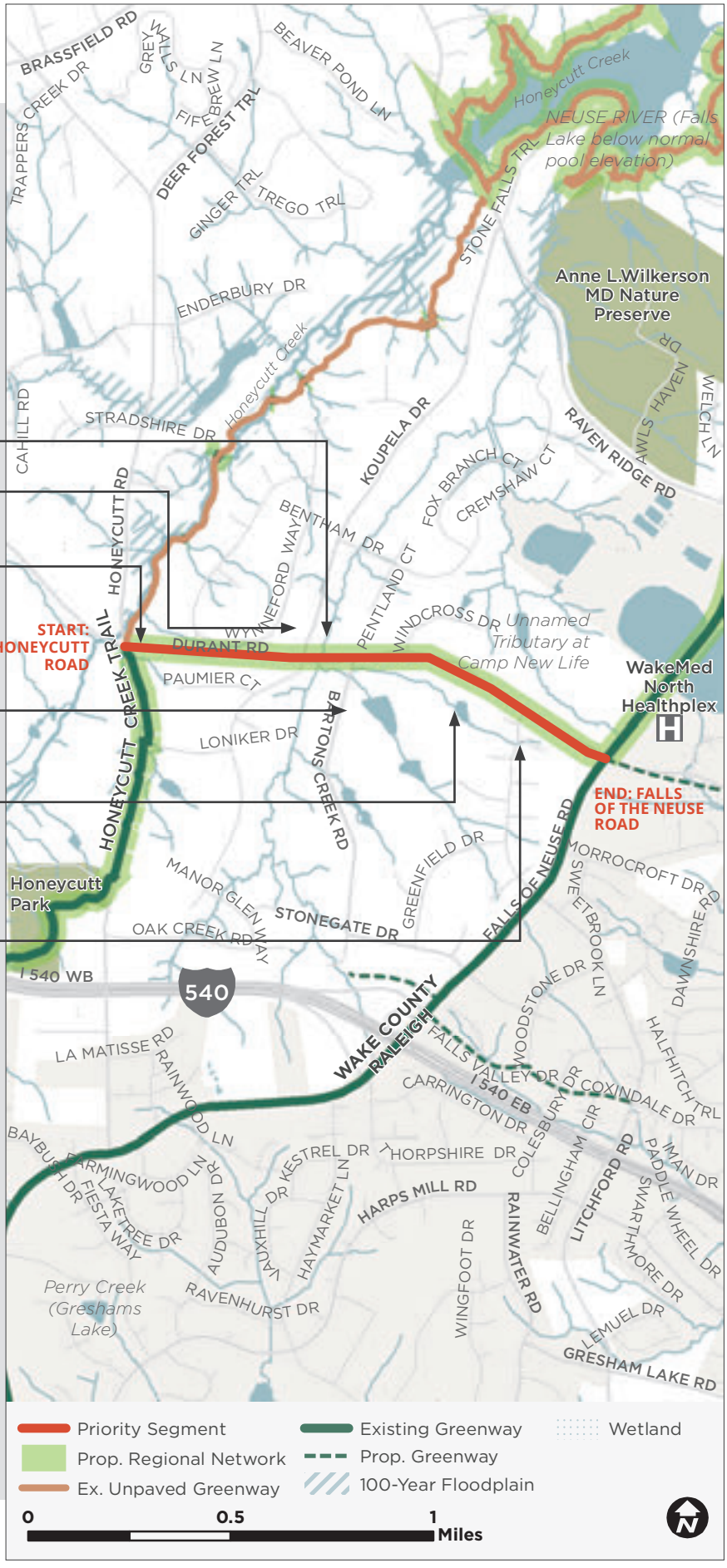
Additional right of way may be needed depending on the design.

There is a significantly steep grade approaching Honeycutt Road.

This project will likely trigger curb and gutter with closed drainage.

There are a variety of utilities on both sides of the road.

The corridor is primarly filled with valuable residential real estate. Many of the developments have existing landscaping buffers that may need to be replaced as a result of construction.



1R. SMITH CREEK GREENWAY

FROM HERITAGE SCHOOLS TO BURLINGTON MILLS ROAD

The next phase of Smith Creek Greenway runs from the existing terminus near Heritage High southward to Burlington Mills Road. The segment is approximately 2.2 miles long, has multiple creek crossings and at least one bridge structure. Much of the trail can utilize existing sanitary sewer easement. There may be long stretches of boardwalk due to the presence of wetlands. South of this segment of Smith Creek Greenway there is a bridge which directly connects to the Neuse River Greenway.

PROJECT AT A GLANCE

- Project location: Town of Wake Forest, Wake County
- Project type: Asphalt Greenway
- Length: 11,600 ft (2.2 miles)
- Total Connected Network: 142 miles
- Trip Generators: Heritage Elementary, Heritage Middle School, Heritage High School and connection to Neuse River Greenway

PREVIOUS PLANNING

- *Town of Wake Forest Open Space and Greenways Plan (2009)*

POTENTIAL RIGHT-OF-WAY NEEDS

- An estimated 4 of acres of easement and right of way will be needed for this project.
- This project impacts 7 properties, 4 of which are owned by the Town.

POTENTIAL PERMITTING NEEDS

- North Carolina Department of Transportation Encroachment Permit
- NC Department of Environmental Quality
- US Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Wake County Public Schools
- Town of Wake Forest

ESTIMATED CONSTRUCTION COST

Cost estimate for construction

- *2016 construction estimates are in the range of $3.2 million to $3.9 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $113,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/Local Adminstered Projects Program (LAPP) funding
- NCDOT/STI funding
- Wake County CIP funding
- Parks and Recreation Trust Fund
- Land and Water Conservation Fund
- Clean Water Management Trust Fund
- Safe Routes to Schools

OPPORTUNITIES & CONSTRAINTS

Heritage Elementary, Middle and High School anchor the north end of the project.

There are segments of the trail already completed and more in design.

Much of the needed right of way is either in place or owned fee simple by the Town of Wake Forest.

NCDOT is in the design stage for a new bridge across Smith Creek on Ligon Mill Road. Construction scheduled for 2018.

A pedestrian culvert will be needed at Ligon Mill Road.

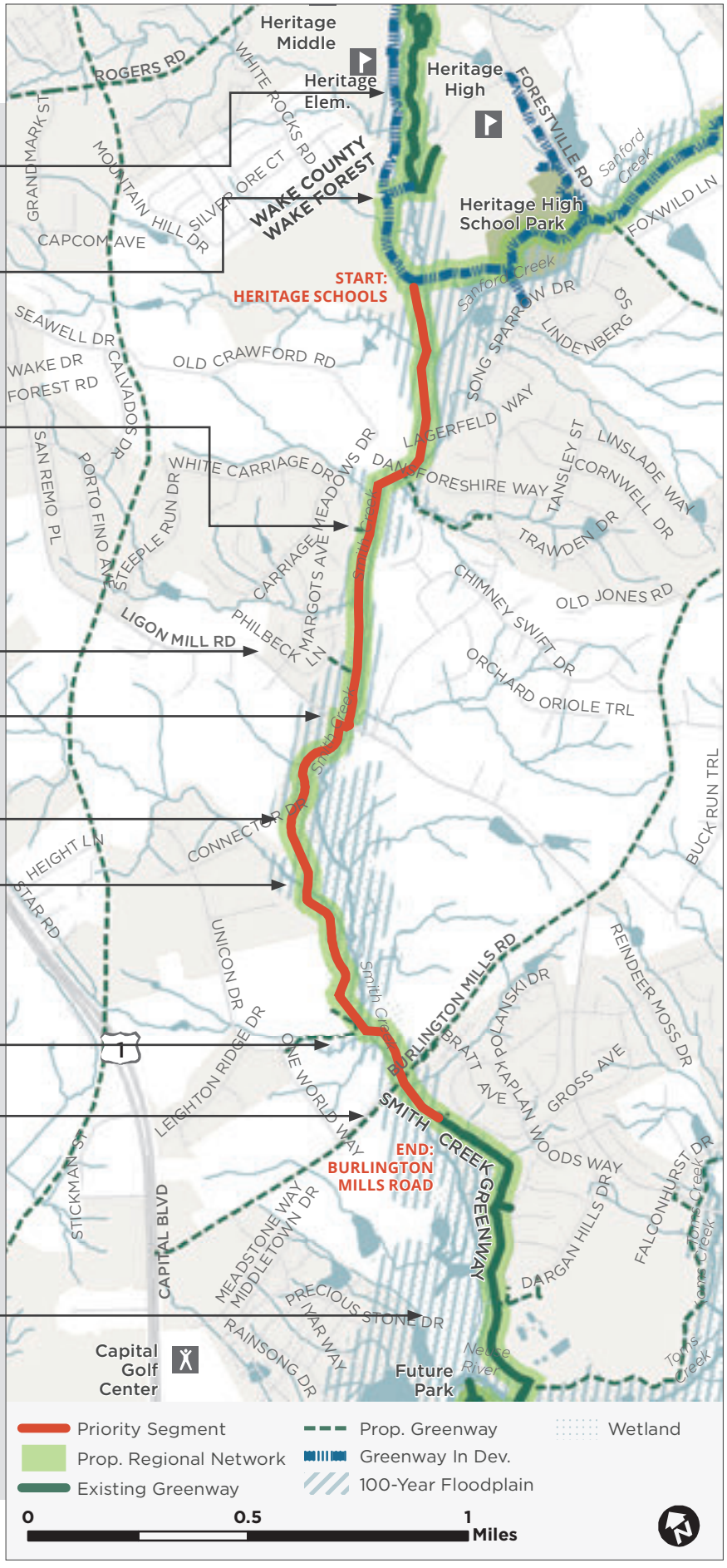
There are large wetland areas along the corridor requiring elevated boardwalks.

A large portion of the project is located within the floodplain. A CLOMR study will be needed.

There is a vacant tract of land at the intersection of Burlington Mills Road and One World Way. This property is an ideal location for a trailhead with parking

A tunnel underneath Burlington Mills Road is already in place.

There is an existing segment of the trail completed at the south end which connects to a future park site.



1S. DR. CALVIN JONES GREENWAY/ DUNN CREEK GREENWAY

FROM CORPORATE CHAPLAIN MULTIUSE PATH TO LEMON GRASS LN

This project offers an off road safe bicycle and pedestrian movement parallel to Dr. Calvin Jones Highway. The trail is approximately 1.7 miles connecting the Corporate Chaplain Multiuse Path to the Dunn Creek Greenway, then north to Lemongrass Lane. Wake Forest has limited greenways opportunities to move east-west across Town. The trail will need two bridges, one over the railroad and one over Spring Branch.

PROJECT AT A GLANCE

- Project location: Town of Wake Forest, Wake County
- Project type: Shared use path
- Length: 9,000 ft (1.7 miles)
- Total Connected Network: 9.7 miles
- Trip Generators: Heritage Development and Dunn Creek Greenway

PREVIOUS PLANNING

None

POTENTIAL RIGHT-OF-WAY NEEDS

- 5.6 acres of right of way needed.
- There will be eight privately owned parcels impacted by the greenway.

POTENTIAL PERMITTING NEEDS

- North Carolina Department of Transportation Encroachment Permit
- NC Department of Environmental Quality
- US Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Wake Forest

ESTIMATED CONSTRUCTION COST

Cost estimate for construction

- *2016 construction estimates are in the range of $2.5 million to $2.9 million.*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $200,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/Local Adminstered Projects Program (LAPP) funding
- NCDOT/STI funding
- Wake County CIP funding

OPPORTUNITIES & CONSTRAINTS

Extension of Dunn Creek Greenway toward northern Wake Forest.

At grade crossing needed at Wait Avenue.

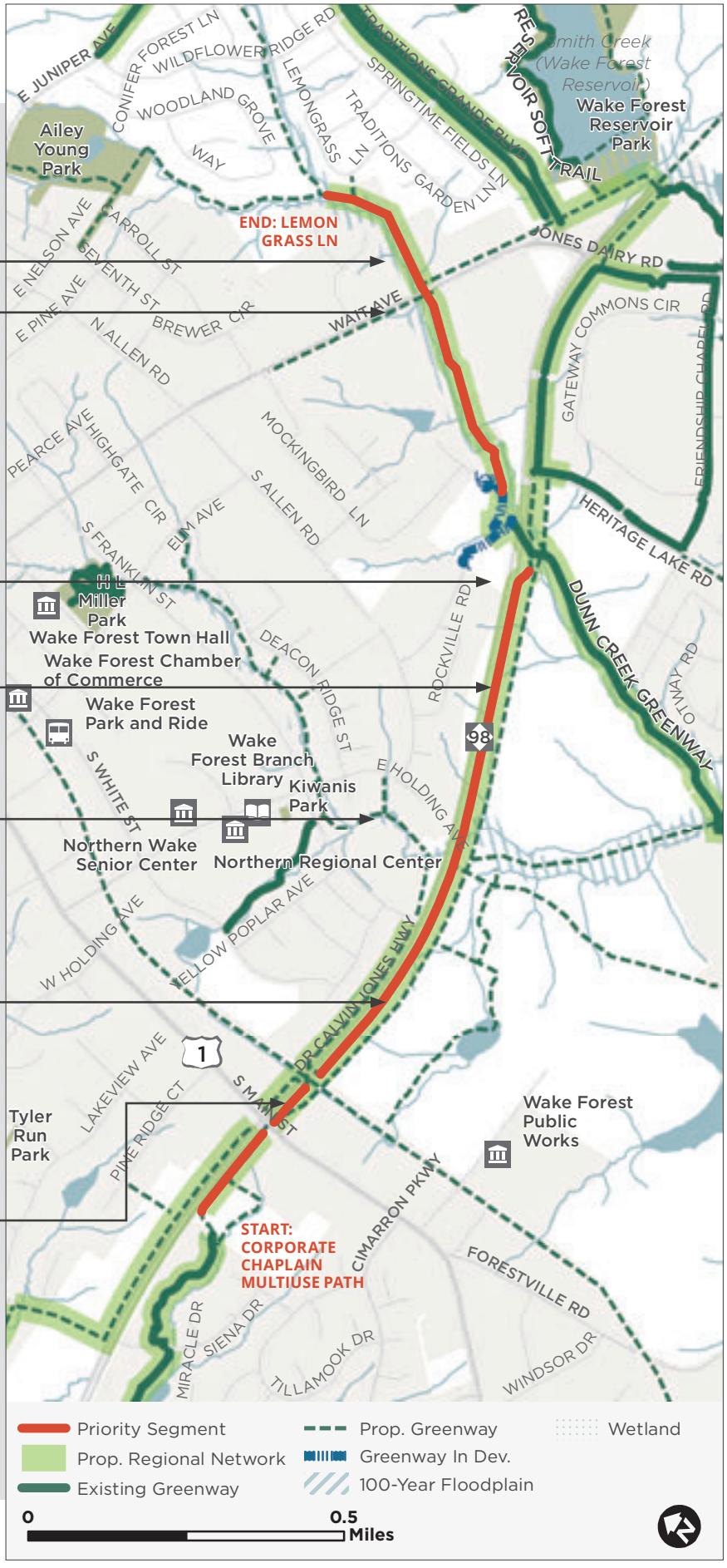
The Dunn Creek Greenway crossing underneath Dr. Calvin Jones Hwy is already constructed.

This trail creates a safe east-west off road bicycle and pedestrian opportunity through Wake Forest.

The alignment crosses a jurisdictional stream which will require a detailed study area for FEMA/CLOMR.

The alignment should be considered for placement on the south side of the road, in order to connect with existing trail to the east and west. Grading at the toe of the slope or benching into the slope will be necessary. The north side could also be considered if opportunities or constraints revealed through further study make it more feasible.

Crossing the railroad will require a 100' long prefabricated bridge.



1T. SANFORD CREEK GREENWAY

FROM EXISTING SANFORD CREEK GREENWAY TO MAIN STREET PARK

The Town of Wake Forest has already completed almost 1.4 miles of Sanford Creek Greenway. The total length of the proposed greenway when complete will be approximately 2.4 miles. This proposed segment is approximately one mile. There are two crossing of the creek requiring bridges approximate 30' -40' long with approach boardwalk and a few small creek crossings.

PROJECT AT A GLANCE

- Project location: Town of Rolesville, Wake County
- Project type: Asphalt Greenway
- Length: 5,280 ft (1 mile)
- Total Connected Network: 9.9 miles
- Trip Generators: Sanford Creek Elementary School, Heritage High School, Rolesville Main Street Park, Mill Bridge Nature Park

PREVIOUS PLANNING

- *The Town of Rolesville Open Space and Greenway Plan (2002)*

POTENTIAL RIGHT-OF-WAY NEEDS

- An estimated 5.5 acres of easements and/or right of way will be needed
- There will be five properties impacted by the greenway on of which is non-residential thus a higher acquisition value. Fortunately the remaining properties are undeveloped.

POTENTIAL PERMITTING NEEDS

- North Carolina Department of Transportation Encroachment Permit
- NC Department of Environmental Quality
- US Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Wake Forest
- Town of Rolesville
- Wake County Public Schools
- This project will ultimately connect several residential developments to the nearby schools and parks.

ESTIMATED CONSTRUCTION COST

Cost estimate for construction

- *2016 construction estimates are in the range of $1.25 million to $1.6 million.*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $98,000.*

POTENTIAL FUNDING MECHANISMS

- CAMPO/Local Adminstered Projects Program (LAPP) funding
- NCDOT/STI funding
- Wake County CIP funding
- Parks and Recreation Trust Fund
- Land and Water Conservation Fund
- Clean Water Management Trust Fund
- Safe Routes to Schools

OPPORTUNITIES & CONSTRAINTS

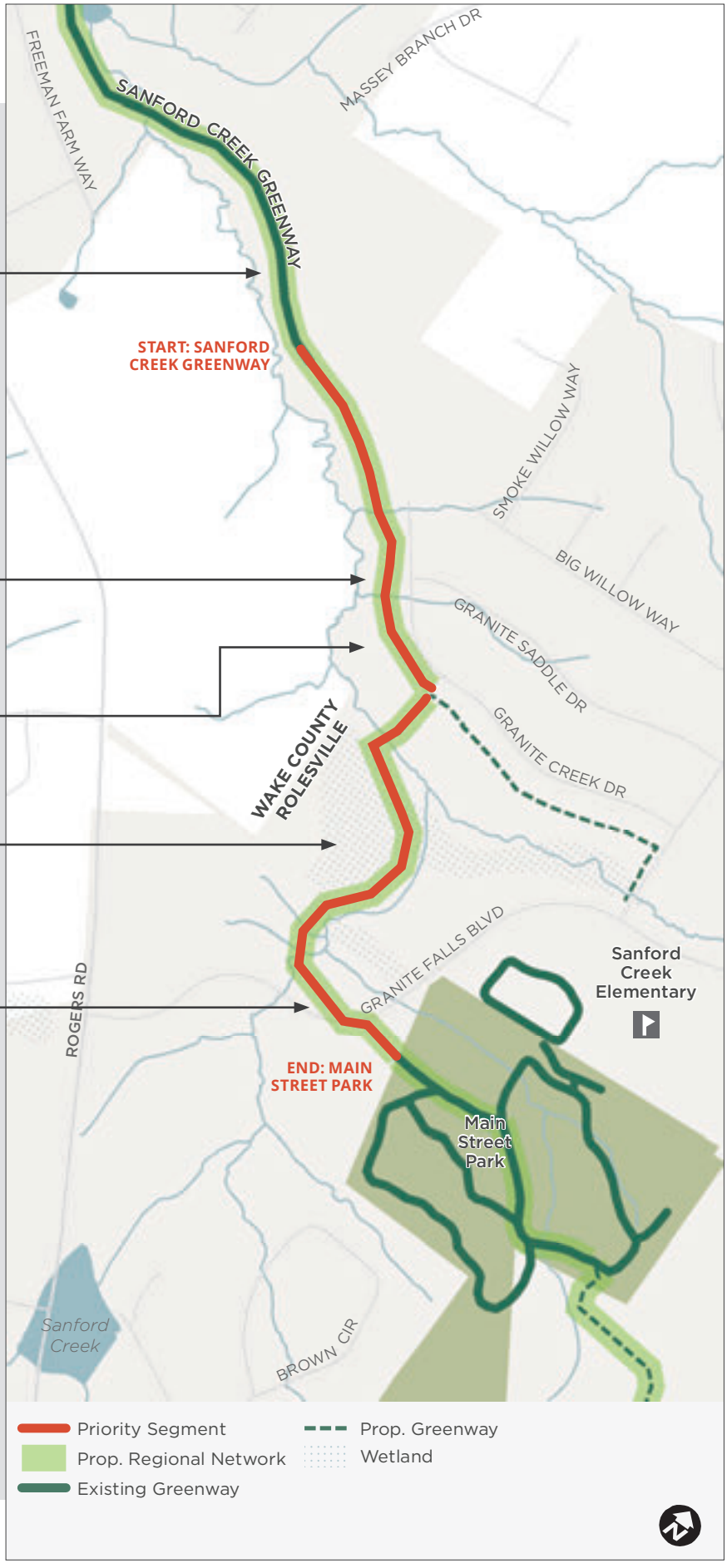
Once completed there will be a connection from the existing section of Sanford Creek Greenway in Wake Forest to Main Street Park in Roleseville and Sanford Creek Elementary School.

Two stream crossings will likely require prefabricated bridges up to 40 feet long.

Sewer easements along the creek can be used for the location of the trail.

Rock identified near the south end of the trail.

Crossing Granite Falls Blvd will likely require a pedestrian safe haven.



1U. MINGO CREEK GREENWAY

FROM MINGO CREEK PARK TO KNIGHTDALE STATION PARK

This next section of Mingo Creek Greenway is approximetely 1.3 miles. Mingo Creek Greenway is the primary cross Town greenway corridors. It connects the existing Mingo Creek Greenway trail to the new Knightdale Station Park. Much of the corridor is within wetlands and floodprone property. Although not currently the top priority project in Knightdale, this segment could become one with significant new funding sources.

PROJECT AT A GLANCE

- Project location: Town of Knightdale, Wake County
- Project type: Shared use path
- Length: 6,900 ft (1.3 miles)
- Total Connected Network: 138 miles
- Trip Generators: Existing Mingo Creek Greenway, Knightdale Station Park

PREVIOUS PLANNING

- *Town of Knightdale Parks, Recreation and Open Space Plan (2010)*

POTENTIAL RIGHT-OF-WAY NEEDS

- An estimated 4.6 acres of easements and/or right of way will be needed
- There will be seven properties impacted by the greenway.

POTENTIAL PERMITTING NEEDS

- North Carolina Department of Transportation Encroachment Permit
- NC Department of Environmental Quality
- US Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Knightdale

ESTIMATED CONSTRUCTION COST

Cost estimate for construction

- *2016 construction estimates are in the range of $2.5 million to $3 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $285,000. Using the existing power easement would lower acquisition costs.*

POTENTIAL FUNDING MECHANISMS

- CAMPO/Local Adminstered Projects Program (LAPP) funding
- NCDOT/STI funding
- Wake County CIP funding
- Parks and Recreation Trust Fund

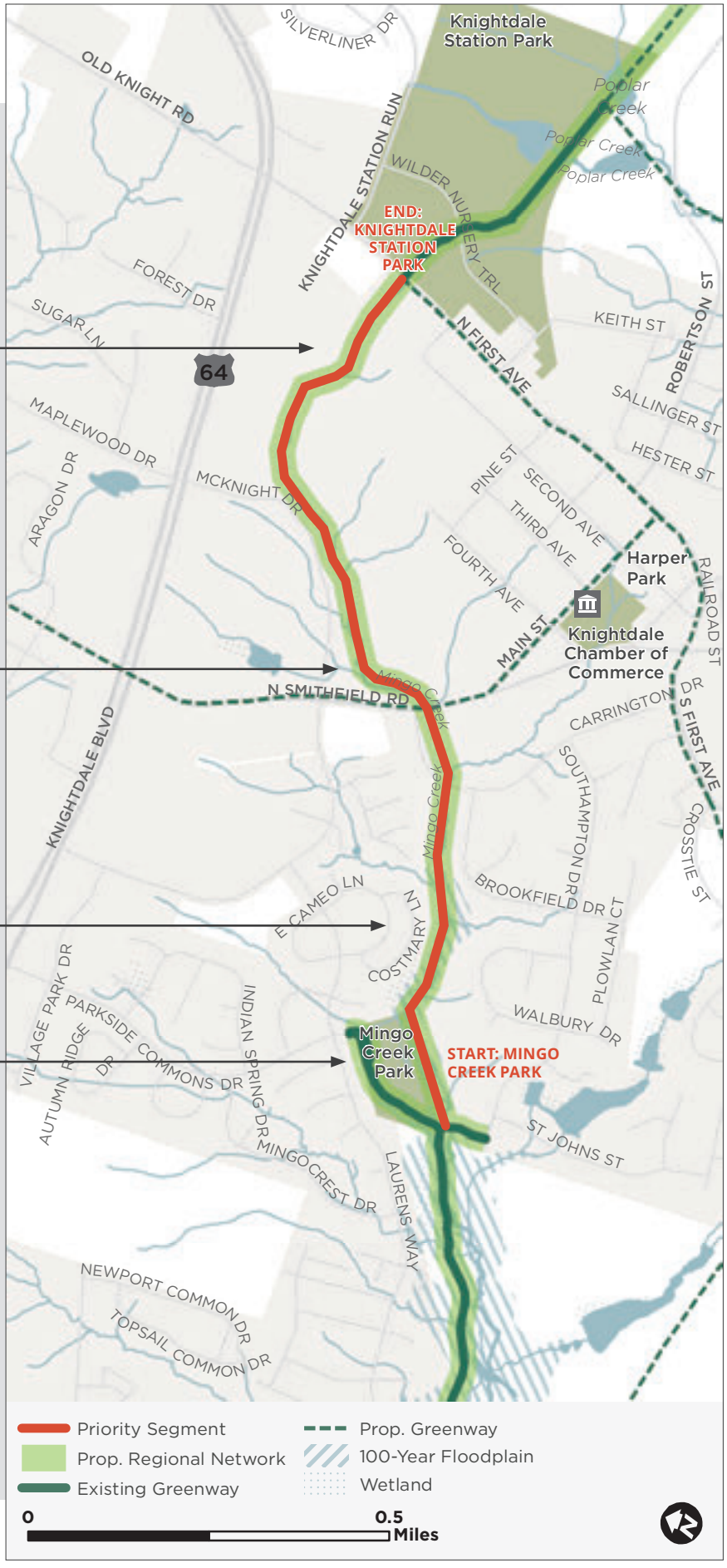
OPPORTUNITIES & CONSTRAINTS

Modifying the alignment slightly towards the power easement minimizes clearing and possibly uses more suitable soils for construction. This would save time and money during construction. Using the power easement will also save money for acquisition.

An at grade crossing on Smithfield Road presents site distance visibility conflicts. The crossing should be strategically placed for better visibility for the user.

A portion of the alignment as shown is located within wetlands and flood prone areas where low level boardwalk will be needed.

This project creates a wonderful connection between Mingo Creek Park and Knighdale Station Park. In addition to many residences along the route.



1V. WENDELL FALLS PARKWAY TRAIL

FROM MARTIN POND ROAD TO WENDELL PARK

This project connects the existing sidepath along Wendell Falls Parkway with Wendell Park, serving as a key east/west connection towards the center of Wendell. This project enhances connectivity between Knightdale and Wendell and will serve as a key artery in eastern Wake County.

PROJECT AT A GLANCE

- Project location: Wendell, Wake County
- Project type: Shared use path, sidepath
- Length: 12,800 ft (2.4 miles)
- Total Connected Network: 8.9 miles
- Trip Generators:
  - » Wendell Falls
  - » Wendell Park
  - » Lake Myra County Park (Future)
  - » Lake Myra Elementary School

PREVIOUS PLANNING

- *Zebulon & Wendell Open Space Plan (2002)*

POTENTIAL RIGHT-OF-WAY NEEDS

- 6.6 acres estimated right-of-way acquisition
- 34 impacted parcels
- 18 distinct property owners

POTENTIAL PERMITTING NEEDS

- Wake County/ Wendell Floodplain Development Permit
- Wake County/Wendell Stormwater Management (National Pollutant Discharge Elimination System General Permit)
- Wake County/Wendell Land Disturbance Permit
- North Carolina Department of Transportation Encroachment Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- FEMA Letter of Map Revision (LOMR)
- U.S. Army Corps of Engineers Section 401/404 Permit

POTENTIAL PARTNERSHIPS

- Town of Wendell
- Wendell Falls Development – Newland Communities (Newland Real Estate Group, LLC) and Wendell Falls Homeowners Association

ESTIMATED CONSTRUCTION COST

- *2016 construction estimates are in the range of $2.0 million to $2.4 million*
- *Cost estimates should be escalated at a rate of 4% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $180,000*

POTENTIAL FUNDING MECHANISMS

- CAMPO/LAPP funding
- NCDOT/STI funding
- Wake County CIP funding
- Wendell CIP

OPPORTUNITIES & CONSTRAINTS

The segment supports trail connectivity between Wendell Falls and downtown Wendell.

The segment is anchored by Wendell Park and its trail network at the east end.

The alignment follows the east side of Buffalo Creek for ~1,500 feet.

A bridge crossing of Buffalo Creek is required.

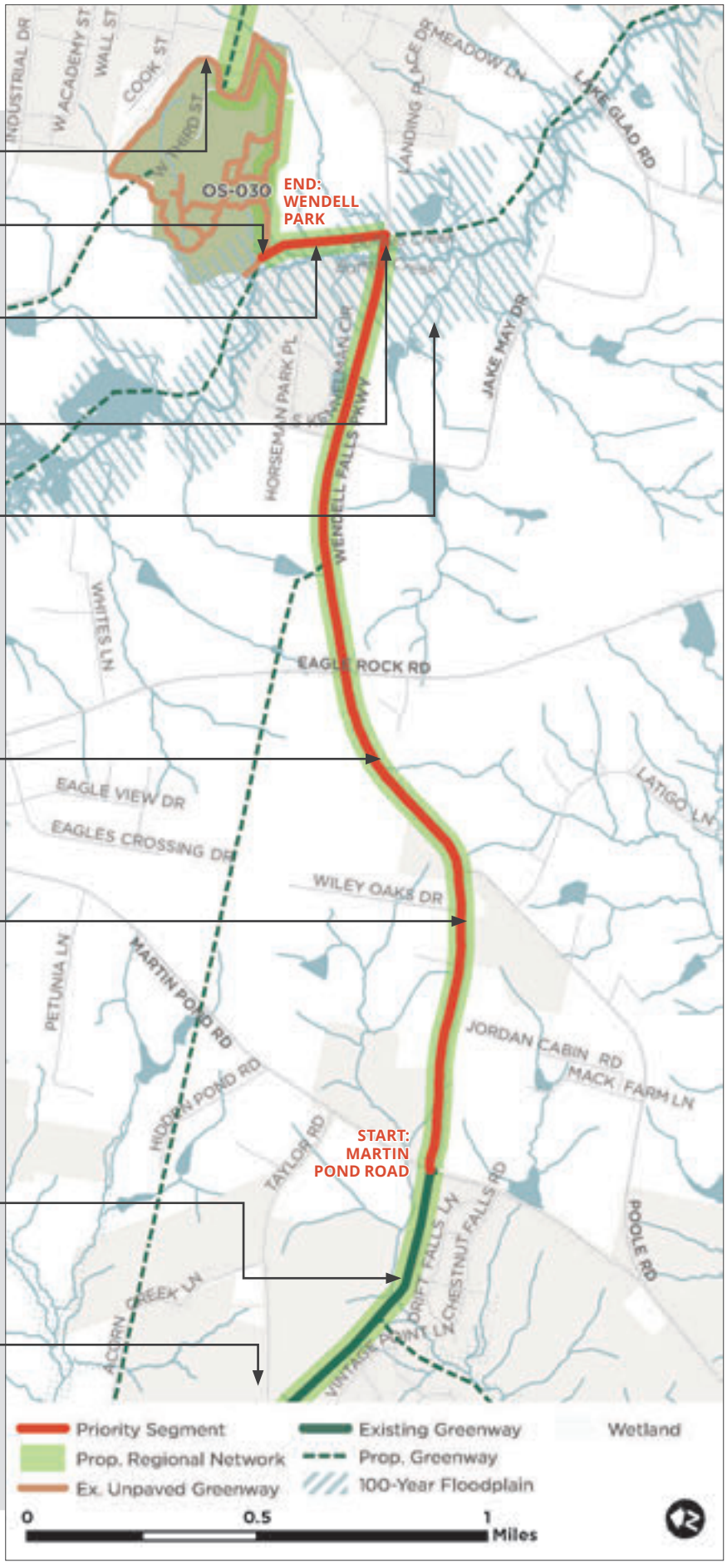
The trail's location in the floodplain will increase permitting requirements.

Much of the corridor along Wendell Falls Parkway is rural, so driveway conflicts and the number of property owners are minimized.

Significant right-of-way acquisition will be required along Wendell Falls Parkway.

Segment terminates at the existing section of the Wendell Falls Parkway greenway, which was built with the Wendell Falls development.

The segment supports connectivity toward Knightdale.



1W. LITTLE RIVER CONNECTOR

FROM WEDGEWOOD AVENUE TO LITTLE RIVER PARK

The Little River connector trail is approximately 1.6 miles of asphalt and boardwalk. The trail runs parallel to a tributary of Little River and partially within a sewer easement to W Gannon Avenue. From there a multiuse trail will be along W Gannon Avenue connecting to Little River Park. This project will also provide access to GlaxoSmithKline, one of the largest employers in the area.

PROJECT AT A GLANCE

- Project location: Zebulon, Wake County
- Project type: Shared use path, sidepath
- Length: 1.6 miles
- Total Connected Network: 1.6 miles
- Trip Generators: The trail will have direct connection to several neighborhoods, Little River Park and one of the largest employers in the area, GlaxoSmithKline.

PREVIOUS PLANNING

- *This project is identified within the Town of Zebulons 2015 Greenway Master Plan.*
- *The Town's plan does not consider this a priority corridor*

POTENTIAL RIGHT-OF-WAY NEEDS

- An estimated 4 of acres of easement and right of way will be needed for this project.
- This project will impact nine property owners.

POTENTIAL PERMITTING NEEDS

- North Carolina Department of Transportation Encroachment Permit
- NC Department of Environmental Quality
- US Army Corps of Engineers Section 401/404 Permit
- FEMA Conditional Letter of Map Revision (CLOMR)
- CLOMR

ESTIMATED CONSTRUCTION COST

Cost estimate for construction

- *2016 construction estimates are in the range of $2 million to $2.5 million*
- *Cost estimates should be escalated at a rate of 5% each year.*

Cost estimate for land acquisition/ROW needs.

- *Based upon Wake County assessed property values acquisition estimates are approximately $60,500.*

POTENTIAL FUNDING MECHANISMS

- CAMPO/Local Adminstered Projects Program (LAPP) funding
- NCDOT/STI funding
- Wake County CIP funding
- Parks and Recreation Trust Fund
- Land and Water Conservation Fund
- Clean Water Management Trust Fund

OPPORTUNITIES & CONSTRAINTS

This trail creates a direct connection to GlaxoSmithKline, the major employer in the area.

Wetland areas will require elevated boardwalk.

Most of the easements needed are located on undeveloped property or within existing sanitary sewer easements.

A large portion of this project will be located within the floodplain which will require a detailed study area for FEMA/CLOMR.

Adequate right of way is available along West Gannon Ave to construct a multiuse path.

South end is anchored by Little River Park.

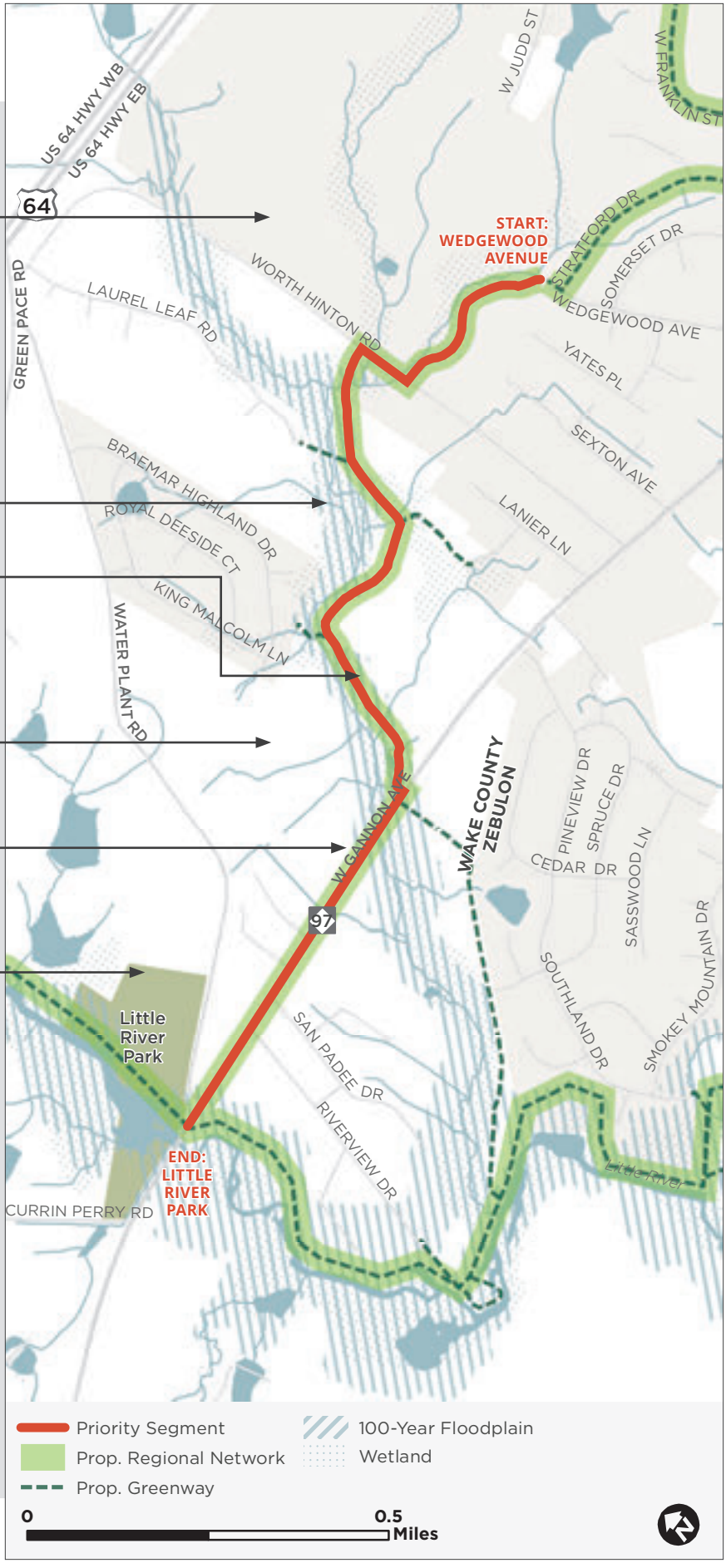


TABLE 3.1 SUMMARY OF PROJECTS

**Based on 2010 Census block level data (sum of all blocks that are completely or partially within 1/2 mile radius); includes Wake County only.*
***Based on 2014 LEHD Origin-Destination Employment Statistics (LODES) block level data (sum of all blocks that are completely or partially within 1/2 mile radius); includes Wake County only.*
****Block groups from Wake County's vulnerability assessment scoring 274 or higher. A distance of '0' signifies the location of the segment within or adjacent to a block group scoring 274 or higher.*

Trail ID	Trail Name	From	To	Jurisdictions	Miles	Parks Connected	Connects to existing trails (y/n)	Residents within 1/2 mile*	Employees within 1/2 mile**	Distance from proposed greenway to block groups of higher vulnerability***
Projects from Map 3.1 Bridge the Gaps										
1A	Holly Springs Southwest Greenway	Ballenridge Greenway	Braxton Village Greenway	Holly Springs/Wake County	1.4	0	Y	5,663	1,209	0
	Notes: An improvement will be needed on the existing culvert underneath NC-55. There are three creek crossings that will require bridges. The project is located within the floodplain.									
1B	Holly Springs Central Greenway	Ballenridge Greenway	Raleigh Street	Holly Springs	0.5	1	Y	5,027	1,789	0
	Notes: This trail is a wonderful opportunity to connect the Holly Springs Library and Cultural Center. Existing sidewalks in place along West Ballentine Road. A pedestrian Bridge will be needed over Utley Creek.									
1C	Holly Springs North/South Greenway	Jones Park	Womble Park	Holly Springs	1.2	2	Y	7,157	1,953	0
	Notes: The proposed trail provides connections between Jones Park, Hunt Community Center and Parrish Womble Park. Existing sidewalks are located along most of the proposed alignment, however, they will need to be widened to be considered a street side-path. Utility poles and signage will be impacted and relocated as a result of widening.									
1D	Broad Street Greenway	Judd Parkway	Bass Lake	Fuquay-Varina/Wake County	2.8	2	Y	6,168	1,787	0
	Notes: The alignment is located within the floodplain. Some sections along NC-55 will require additional right of way. Existing sidewalks along NC-55 can be widened to meet street side trail requirements. This trail creates a nice connection from Bass Lake to Fuquay-Varina.									
1E	Fuquay-Varina Greenway	Judd Parkway	Honeycutt Park	Fuquay-Varina/Wake County	1.2	1	Y	3,964	3,836	0
	Notes: Much of the alignment is on undeveloped property and can be constructed by future developers. Pedestrian improvements need to be made at the intersection of Purfoy Rd and Old Honeycutt Road. The trail offers a connection from down-town Fuquay-Varina to Honeycutt Road Park.									
1F	Middle Creek Greenway	Lufkin Road Middle School	Sunset Hills Gwy	Apex/Wake County	2.4	0	Y	4,846	4,687	0
	Notes: The northern end connects to Lufkin Road Middle School. The alignment is within the floodplain and wetlands, therefore boardwalk will be needed for a large portion of the trail.									
1G	Apex West Greenway	American Tobacco Trail	Beaver Creek Greenway	Apex/Wake County	1.3	1	Y	5,534	324	1.5
	Notes: The trail provides an opportunity to connect multiple residential neighborhoods with a direct connection to the American Tobacco Trail and Apex Nature Park. Boardwalk will be needed within the floodplain and wetland areas.									
1H	Lower Williams Creek Gwy (Swift Creek)	Lake Pine Drive	Symphony Lake Greenway	Cary	2.4	2	Y	5,768	10,453	1
	Notes: The Town of Cary owns property at the end of MacGregor Pines Drive which would be an opportunity for a trailhead parking lot. Two large pedestrian bridges are needed over US-1 and US-64. Construction plans were completed in 2012 from Apex Community Park to US-1. Plans for the bridges are still needed.									
1I	Swift Creek Greenway (Upper Williams Creek Greenway)	Fred Bond Metro Park	Old Apex Road	Cary/Apex/Wake County	1.6	1	Y	10,250	1,766	1.1
	Notes: This trail provides a connection from Fred Bond Metro Park to Apex Community Park. A rapid flashing beacon likely needed at Cary Parkway. The southern section of the trail crosses the railroad and Old Apex Road.									
1J	Hatcher Creek Greenway	Existing trail on Sedgefield Park Ln	Morrisville Community Park	Morrisville/Cary/Wake County	2.1	1	Y	9,735	1,967	2.3
	Notes: The Town of Cary owns property at Davis Drive which may be an opportunity for a trailhead. The alignment provides a connection to Carpenter Elementary and West Regional Library. The western end of the project will require a grade sepa-rated crossing of the railroad and NC-55.									
1K	Louis Stephens Drive Greenway	Kit Creek Road	Kit Creek Greenway	Morrisville/Cary/Wake County	3.6	1	Y	9,437	8,359	0.3
	Notes: Plenty of right of way along Louis Stephens Road north of NC-540. The trail is proposed to use the existing underpass of NC-540 when the road is constructed. There is an existing sewer easement along the creek that can be used as part of the alignment.									
1L	Kit Creek Greenway	Louis Stephens Drive	Shiloh Greenway	Morrisville/Wake County	2.2	1	Y	5,266	8,631	0.5
	Notes: The proposed trail links the Town of Morrisville greenway system to the Research Triangle Park. A street side trail can be constructed as part of the potential future Town Hall Drive extension.									
1M	Hare Snipe Creek Trail	Wooten Meadow Park	Crabtree Creek Greenway	Raleigh	1.7	1	Y	1,338	13,366	0
	Notes: The northern end of the project is located within the floodplain and wetlands which will require boardwalk. Crossing Glenwood Avenue will require significant tunnel.									
1N	Raleigh Pigeon House Trail Connector	Crabtree Creek Trail	Rocky Branch Trail	Raleigh	4.7	1	Y	19,734	51,528	0
	Notes: Grade separated crossings will be needed over the railroad. Pedestrian treatments needed at the crossing at Peace Street. Some of the greenway can be included within the development of Devereux Meadows Park and upgrades to Capital Boulevard. Pedestrian improvements will be needed at the intersection of Old Louisburg Road and Wake Forest Road.									

TABLE 3.1 SUMMARY OF PROJECTS

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Trail ID	Trail Name	From	To	Jurisdictions	Miles	Parks Connected	Connects to existing trails (y/n)	Residents within 1/2 mile*	Employees within 1/2 mile*	Distance from proposed greenway to block groups of higher vulnerability***
1O	Creech Road Greenway	Garner Road	Walnut Creek Greenway	Raleigh/Garner/Wake County	4.4	2	Y	9,688	2,362	0
	Notes: The trail will require multiple bridges over creeks and boardwalks within wetlands. It will also need an underpass of Rock Quarry Road and a bridge over I-40.									
1P	Buffaloe Road Greenway	White Deer Park	Centennial Park	Garner/Wake County	3	2	Y	3,882	655	0
	Notes: The trail is proposed to be a street side path along Buffaloe Road which has many driveway crossings to accommodate. Buffalo Road across Lake Benson must be reconstructed to accommodate a trail. An underpass will be needed at NC-50.									
1Q	Durant Road Trail	Honeycutt Road	Falls of the Neuse Road	Raleigh/Wake County	1.3	0	Y	4,014	1,303	1
	Notes: A pedestrian bridge or boardwalk crossing will be needed at the creek. Additional right of way will be needed or a closed drainage system. The corridor primarily consists of valuable residential developments with extensive landscaping that would be impacted by the project.									
1R	Smith Creek Greenway	Heritage Schools	Burlington Mills Road	Wake Forest/Wake County	2.2	0	Y	6,096	1,491	0
	Notes: Much of the needed right of way is already in place. A pedestrian culvert will be needed at Ligon Mill Road. The project is located within the floodplain and wetland areas which will require boardwalk.									
1S	Dr. Calvin Jones Greenway/Dunn Creek Greenway	Corporate Chaplin Multiuse Path	Lemongrass Lane	Wake Forest/Wake County	1.7	0	Y	7,329	2,108	0
	Notes: Crossing the railroad will require a 100 foot long prefabricated bridge. Much of Calvin Jones Road is elevated with significant slopes on the sides. The greenway will need to be either benched into the slope or constructed at the toe of the slope.									
1T	Sanford Creek Greenway	Existing Sanford Creek Greenway	Main Street Park	Rolesville	1	1	Y	2,061	770	0
	Notes: The trail provides a continued connection between Rolesville and Wake Forest. There are two creek crossings that will require pre fabricated bridges up to 40 feet long. Significant rock was identified at the southern end of the trail.									
1U	Mingo Creek Greenway	Mingo Creek Park	Knightdale Station Park	Knightdale	1.3	2	Y	6,360	2,353	0
	Notes: This project will create a nice connection between Mingo Creek Park and Knightdale Station Park. The trail is located within the floodplain and wetland areas which will require boardwalk.									
1V	Wendell Falls Parkway Trail	Martin Pond Road	Wendell Park	Wendell/Wake County	2.4	1	Y	1,964	159	0
	Notes: A bridge will be needed over Buffalo Creek. Right of way will be needed along Wendell Falls Parkway or a closed drainage system will be needed. Much of the street frontage along Wendell Falls Parkway is undeveloped and the trail can be built as part of the development of that corridor.									
1W	Little River Connector	Wedgewood Avenue	LIttle River Park	Zebulon/Wake County	1.6	1	N	3,225	576	0
	Notes: The trail provides a direct connection to Glaxo-Smith-Kline, one of the major employers in the area. The floodplain and wetlands areas will require boardwalk. A prefabricated structure may be needed over the creek at West Gannon Road.									
Projects from Map 3.2 Connect Parks and Lakes										
2A	Lower Barton Ck/Hare Snipe Ck Greenway/Umstead Park Link	Lake Lynn Park	Six Forks Road & Umstead Park	Raleigh/Wake County/NC Parks	16.5	2	Y	22,247	9,989	0
	Notes: Easements will be needed in older and valuable residential neighborhoods along the Hare Snipe Creek corridor. Westgate Road has two creek crossings that are prone to flooding. There are several industrial driveways on Westgate Road which create safety concerns for bicycle and pedestrian users. A grade separated crossing will be needed at I-540. Significant sight distance challenges crossing Creedmoor Road and Mt. Vernon Church Road. See the TJCOG CORE Bike/Ped Plan for more on the proposed Sycamore Greenway connection.									
2B	Richland Creek Greenway	Neuse River Trail	South Main Street	Raleigh/Wake Forest/Wake County	5.5	0	Y	16,190	6,543	0
	Notes: Grade separated crossings are needed at Capital Blvd and NC-98. A high visibility signalized crossing will be needed on Falls of Neuse Road. The trail corridor is almost entirely within the floodplain.									
2C	Little River Greenway	Southland Drive	West Third Street	Wendell/Zebulon/Wake County	6.2	2	N	6,374	1,244	0
	Notes: The Little River corridor has a wide floodplain and significant wetlands which will require boardwalk. Three at grade railroad crossings from Little River to downtown Wendell. Trail through downtown Wendell will have several driveway crossings.									
2D	Wendell Falls North Greenway	North First Avenue	Wendell Falls Greenway	Knightdale/Wendell/Wake County	2.6	2	Y	3,365	1,135	0
	Notes: The trail follows an active railroad corridor. There is not enough shoulder on Wendell Falls Parkway bridge at US-264 for a bike/ped path, an independent bridge will be needed.									
2E	Dowling Road Sidepath	Walnut Creek Trail	Poole Road	Raleigh/Wake County	1.1	1	Y	3,073	2,062	0
	Notes: Majority of the needed right of way is in place. Sidewalks and an at grade high visibility crossing will be needed on Old Poole Road.									

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Trail ID	Trail Name	From	To	Jurisdictions	Miles	Parks Connected	Connects to existing trails (y/n)	Residents within 1/2 mile*	Employees within 1/2 mile*	Distance from proposed greenway to block groups of higher vulnerability***
2F	Apex Loop Greenway	Beaver Creek South Trail	Burma Drive	Apex/Wake County	4.9	2	Y	18,478	12,896	0
	Notes: Adequate right of way is available along Apex Peakway for a street side trail. A pedestrian bridge will be needed across US-1.									
2G	Swift Creek Greenway	Kildaire Farm Road/Cary Parkway	Lake Wheeler Road	Cary/Wake County	6.9	2	Y	13,731	32,365	0
	Notes: Limited right of way available along Lochmere Drive and Lilly Adkins Road. Crossing the damn requires coordination with the ACOE. Trail alignment encroaches into the floodplain near Swift Creek.									
2H	Lake Johnson to Lake Benson Greenway	Upper Walnut Creek Trail	Old Stage Rd	Raleigh/Garner/Wake County	6.9	1	Y	16,040	27,131	0
	Notes: Lake Dam Road over I-40 has a safe shoulder for bike/ped though some guardrails will be needed. Alignment crosses NC State property. A grade separated crossing will be needed at Fayetteville Road. Boardwalk needed at southern section of the project.									
2I	Braxton Village Greenway	Harris Lake County Park	Elm Stone Way	Holly Springs/Wake County	4.1	1	N	3,770	165	0
	Notes: New Hill-Holloman Road does not have adequate right of way for a bike/ped trail. A widening or separate structure will be needed to cross the lake.									
2J	Black Creek Greenway	North Cary Park	West Dynasty Drive	Cary	0.3	1	Y	6,722	1,909	0.7
	Notes: Bridge will be needed to cross Black Creek, triggering a flood study.									
2K	Clemmons Connector Trail	Neuse River Trail	Clemmons Educational Forest	Wake County	0.4	1	Y	918	96	1.5
	Notes: There will be two tributary crossings and high visibility crossing on Old Baucom Road.									
2L	Swift Creek Greenway	Lake Wheeler Road	White Deer Park	Garner/Wake County	4.9	1	Y	7,907	25,159	0
	Notes: Trail alignment is located within a floodplain which will trigger a flood study. See Swift Creek Greenway Master Plan.									
Projects from Map 3.3 Connect the Communities										
3A	Apex Cary Greenway	Ten Ten Road	Regency Parkway	Apex/Cary/Wake County	1.2	0	Y	5,897	11,434	0
	Notes: Alignment encroaches a Duke Power easement and power transfer station.									
3B	Fuquay-Varina North Greenway	North Broad Street	East Academy Street	Fuquay-Varina/Wake County	2.1	0	N	7,074	4,630	0
	Notes: Bike/ped signalization will be needed at intersections and driveway crossings along Judd Parkway. Special treatments needed at the railroad crossing.									
3C	Walnut Creek Greenway	Black Creek Greenway	Lake Johnson Metro Park	Cary/Raleigh	5.8	4	Y	31,397	14,977	0
	Notes: Special pedestrian treatments will be needed at the railroad crossing on Old Apex Road. A high visibility crossing with beacon and pedestrian safe haven will be needed at SE Maynard Road. Bridge will be needed over both I-40 and I-440.									
3D	North Bond Park Connector Trail	Morrisville Parkway	Crabtree Creek Greenway	Cary/Wake County	2.1	3	Y	15,335	4,365	1.6
	Notes: A street side trail along Louis Stephens Road will trigger a closed drainage system.									
3E	Zebulon Greenway	Wedgewood Avenue	Carolina Mudcats Stadium	Zebulon/Wake County	4.6	2	N	4,375	4,084	0
	Notes: Franklin Street will need curb and gutter. A road diet may be needed on North Arendell Avenue. An at grade crossing with the railroad will need special bike/ped crossing treatments. Southern end in located within the floodplain and wetland areas which will require boardwalk.									
3F	South Zebulon Greenway	Proposed Little River Greenway	Zebulon Community Park	Zebulon/Wake County	3.2	1	N	2,625	1,541	0
	Notes: Trail can utilize existing power easement.									

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Trail ID	Trail Name	From	To	Jurisdictions	Miles	Parks Connected	Connects to existing trails (y/n)	Residents within 1/2 mile*	Employees within 1/2 mile*	Distance from proposed greenway to block groups of higher vulnerability***
Projects from Map 3.4 Complete the System										
4A	Creedmoor Road Sidepath	East Lyon Station Road	Falls Lake Recreation Area	Butner/Creedmoor/Granville County/Wake County	11.7	1	Y	774	24	2.7
	Notes: There is limited right of way along Creedmoor Road for a street side trail. The existing Creedmoor Road causeway over Falls Lake is not wide enough for bike/ped lanes, a separate structure will be needed. Several creek crossings may require individual structures. An independent bridge over the Lake Rogers Dam will be needed.									
4AA	Mahlers Creek Greenway	Garner Recreational Park	Centennial Park	Garner/Wake County	2.9	2	N	5,666	1,986	0
	Notes: The project is located within the floodplain and wetlands possibly located at the southern end. A grade separated crossing over US 70 and the railroad will be needed.									
4B	Richland Creek Greenway	West Holding Avenue	Youngsville Boulevard	Youngsville/Franklin County/Wake Forest	4.9	1	Y	7,381	2,153	0
	Notes: The project is located within the floodplain which will trigger a flood study. The trail can utilize the existing power easement to minimize clearing costs. This project allows for a joint effort with the Town of Wake Forest and the Town of Youngsville.									
4BB	Whiteoak Creek Greenway	Mahlers Creek Greenway	Amelia Church Road	Garner/Clayton/Wake County/Johnston County	8.9	0	Y	5,027	1,257	0
	Notes: A grade separated crossing will ne needed over I-40. White Oak Creek is within a floodplain which will require a flood study. A portion of the alignment in Clayton is within an established residential neighborhood, this makes easement acquisition difficult.									
4C	Gilcrest Farm Road Sidepath	Winston Street	Oak Grove Church Road	Youngsville/Franklin County/Wake Forest/Wake Co	6.3	2	Y	3,617	588	0
	Notes: This is a great opportunity for joint effort between Wake County and Franklin County. A closed drainage system would likely be needed within Franklin County.									
4CC	Front Street Greenway	Sam's Branch Greenway	East Clayton Community Park	Clayton/Johnston County	4.7	0	Y	-		N/A Johnston Co.
	Notes: At grade crossing of the railroad needed in downtown Clayton. In order to accommodate a full sized street-side trail the road profile needs reconfiguring on a few roads.									
4D	NC 98 Sidepath Gaps	South Main Street	Traditions Grande Boulvard	Wake Forest/Wake County	0.8	1	Y	5,844	2,080	0
	Notes: A bridge would be needed to cross over the railroad. Crossing Wait Avenue will require a push button flashing beacon.									
4DD	Camp Branch Greenway	Anchor Creek Way	Fayetteville Road	Holly Springs/Cary/Fuquay-Varina/Wake County	8.4	2	Y	19,095	2,188	0
	Notes: Proposed alignment crosses within Devils Ridge Golf Course. Much if the trail is within the flood plain. Acquisition of easements for the trail within Sunset Lake HOA will be difficult. A grade separated crossing will be needed for Fayetteville Road and the railroad.									
4E	Austin Creek Greenway	Smith Creek Greenway	Zebulon Road	Wake Forest/Rolesville/Wake County	8.9	2	Y	8,807	756	0
	Notes: The alignment travels through Heritage Golf Course. A signalized push button crossing needed at Jones Dairy Road. A grade separated crossing will ne needed at Louisburg Road. A signalized push button crossing or grade separation needed at Hwy 96. Portions of the trail are located within the floodplain.									
4EE	Bass Lake Trail	Bass Lake Outfall Greenway	Camp Branch Greenway	Holly Springs/Wake County	4.1	1	Y	4,015	830	0.7
	Notes: Alignment is within Sunset Lake HOA property. A high visibility crossing will be needed at Bass Lake Road.									
4F	North Main Street Sidepath	Cedar Fork Corridor	Austin Creek Greenway	Rolesville/Wake County	1.7	0	N	1,812	324	0.2
	Notes: Isolated areas may require closed drainage.									
4FF	Terrible Creek Greenway	Judd Parkway	Old McCullers Road	Fuquay-Varina/Wake County	6.0	0	N	11,409	4,493	0
	Notes: Alignment is located within the floodplain which will require a flood study. Johnson Pond and adjoining properties are privately owned. Adequate right of way along Fayetteville Road for a separated street-side trail. A separate structure may be needed at the crossing of Middle Creek. Multiple crossings will require bike/ped crossing treatments.									
4G	Neuse River Trl/Smith Creek Gwy Gaps	Burlington Mills Road	Louisburg Road	Wake Forest/Raleigh/Wake County	0.2	1	Y	6,365	1,370	0
	Notes: As of this final plan (mid-2016), segment will be completed as part of Smith Creek Greenway (1S).									
4GG	Middle Creek Greenway	Fayetteville Road	Southeast Regional Park	Fuquay-Varina/Wake County	4.8	2	N	5,818	515	0
	Notes: Special treatments for the grade crossing of the railroad tracks along Banks Road. Middle Creek is within the floodplain and wetlands which will require low level boardwalk.									

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Trail ID	Trail Name	From	To	Jurisdictions	Miles	Parks Connected	Connects to existing trails (y/n)	Residents within 1/2 mile*	Employees within 1/2 mile*	Distance from proposed greenway to block groups of higher vulnerability***
4H	Cedar Fork Greenway	Main Street Park	MItchell Mill Park	Rolesville/Wake County	4.5	2	Y	4,022	872	0
	Notes: A grade separated crossing will be needed over US-401. The project is located within the floodplain and likely wetland areas.									
4HH	Old Stage Road Sidepath	Swift Creek Greenway	Middle Creek Greenway	Garner/Wake County	5.5	1	N	10,185	629	0
	Notes: The project has adequate right of way for a street side trail. Much of the project will need closed drainage to construct the trail. Creek crossings may need a headwall to construct the trail.									
4I	Park Center Extension	American Tobacco Trail	Glenwood Avenue	Durham/Durham County/Raleigh/Wake County	10.5	0	Y	6,634	12,803	1.9
	Notes: Several creek crossings that require flood studies. Grade separated crossings needed at Glenwood Avenue and I-540. North of Brier Creek Parkway easements will be needed through residential areas of the golf course community.									
4II	South NC 55 Side Path	Honeycutt Road Park	Depot Street	Fuquay-Varina/Angier/Wake County/Harnett County	5.8	1	Y	3,769	483	0
	Notes: Constructing a street side trail along NC-55 will require additional right of way or a closed drainage system with curb and gutter will be needed.									
4J	Perry Creek Greenway	Marsh Creek	Neuse River Trail	Raleigh/Wake County	6.0	3	Y	22,789	12,840	0
	Notes: Grade separated crossings needed at Capital Boulevard, I-540 and the Railroad. The alignment goes through an older developed residential area and golf course community. Obtaining easements for construction may be challenging.									
4K	Harris Creek Greenway	Neuse River Trail	Cedar Fork Greenway	Raleigh/Rolesville/Wake County	8.8	0	Y	9,037	888	0.2
	Notes: The trail is proposed to parallel Rolesville Bypass (US-401) which will require a separate easement or right of way. Cedar Fork is a jurisdictional floodplain.									
4L	Buffalo Creek Greenway	US 401	East Wake High Trail	Rolesville/Wake County	7.1	0	N	3,401	396	0
	Notes: This corridor is in a rural setting without any major road crossings. The alignment is almost entirely in the floodplain requiring a flood study.									
4M	Little River Greenway	Fowlers Mill Creek	Riverview Drive	Zebulon/Wake County	8.6	2	N	4,362	313	0
	Notes: The Little River greenway is located entirely within the floodplain. A grade separated crossing will be needed over US 64. Little River has been studied for a potential reservoir. If the reservoir moves forward a detail study of recreational opportunities on the lake including greenway trails should be prepared.									
4N	Park Center Loop	Cornwallis Road	Kit Creek Road	Durham County/Wake County	4.6	0	N	150	7,265	0.4
	Notes: As of this final plan (mid-2016), segment is now complete.									
4P	East Wake High Trail	Knightdale Eagle Rock Road	LIttle River	Knightdale/Wake County	8.9	0	N	3,403	730	0
	Notes: The alignment crosses multiple jurisdictional creeks. Each creek will require flood studies.									
4Q	Marsh Creek Greenway	Spring Forest Road	Buckeye Trail	Raleigh/Wake County	6.0	2	Y	27,532	27,024	0
	Notes: There are many road crossings that will required grade separations including Capital Blvd and I-440. Additionally the trail crosses two separate railroad corridors. The trail also is located in the floodplain which will require a flood study.									
4R	Trinity Rd Street-Side Trail	Walnut Creek Greenway	Reedy Creek Road	Cary/Raleigh/Wake County	3.6	2	Y	7,966	3,795	0
	Notes: Crossing Wade Ave/I-440 will require an individual structure. Trenton Road will require a closed drainage system or additional right of way. The crossing of the railroad should be grade separated. Crossing Walnut Creek will trigger a flood study.									
4S	Pirates Cove Greenway	Greenwood Circle	Johnes Franklin Road	Cary/Raleigh/Wake County	3.1	2	Y	15,645	6,936	0
	Notes: The road profile on Western Blvd overpass of I-40 would have to be redesigned to accommodate a greenway. Further up Western Blvd may require a closed drainage system. A portion of this project will likely be constructed as part of the Western Blvd extension.									
4T	White Oak Creek Greenway	Davis Drive	MacArthur Drive	Cary	0.4	1	Y	7,218	1,133	2.2
	Notes: The trail will be fully constructed within HOA common space. There is also a crossing of a railroad that will impact the constructability project.									
4U	Glengarry Sidewalk Connector	Pirates Grove Greenway	Macedonia Lake Loop Trail	Cary/Wake County	1.7	2	Y	8,309	8,395	0
	Notes: Crossing the creek will require a flood study. The greenway should utilize the existing power easement.									

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Trail ID	Trail Name	From	To	Jurisdictions	Miles	Parks Connected	Connects to existing trails (y/n)	Residents within 1/2 mile*	Employees within 1/2 mile*	Distance from proposed greenway to block groups of higher vulnerability***
4V	Marks Creek Greenway	Neuse River Trail	Wendell Falls Parkway	Clayton/Wendell/Wake County	7.9	1	Y	4,726	133	0.8
	Notes: This corridor is in a rural setting without any major road crossings. The a portion of the trail is within the floodplain which will require a flood study.									
4W	Jordan Lake Sidepath Connector	Farrington Road	American Tobacco Trail	Chatham County/Wake County	4.1	0	N	262	104	3.6
	Notes: Adequate right of way is available along US-64 for a street side path.									
4X	New Hill Holleman Road Sidepath	American Tobacco Trail	Harris Lake County Park	Wake County	6.3	1	N	1,018	1,088	0
	Notes: This project has an opportunity to use the existing rail bed thus extending the American Tobacco Trail. Once along New Hill -Holleman Road, there is an at-grade crossing of the railroad. Crossing US 1 will require an independent structure or reconstruction of the existing vehicular bridge to include a street side path. Additional right of way likely be needed along New Hill-Holleman Road.									
4Y	Camp Branch Greenway	Kildaire Farm Road	Moneta Lane	Cary/Holly Springs/Wake County	4.5	1	Y	12,851	2,403	0
	Notes: The route is within mostly an undeveloped corridor adjacent to the floodplain. Easements should be dedicated as the property is developed. A grade separation should be planned for the future I-540 extension.									

IMPROVING TRAIL USERS' EXPERIENCE

Once more of the greenway projects outlined on the previous pages have been put in place, and once key gaps in the system have been filled, further work should be done to promote the use of greenways to both residents and visitors. With increasing investment in greenways and trails, North Carolina is poised to become a top destination for recreational tourism. The majority of Wake County residents may be aware of improvements to the greenway system, but those living outside the county and even some county residents may not be aware of all the greenways that Wake County has to offer. As a regional leader, Wake County can play a key role in coordinating efforts across three main areas of trail development in addition to the actual trail projects featured in the first part of this chapter. Wake County should work with its partners to establish a regional trail branding and wayfinding program that can be used to promote the system regionally and nationally, and encourage the placement of key amenities along and throughout the greenway system.

Regional Branding and Wayfinding

In order for greater numbers of people to enjoy the greenways, Wake County should consider a branding strategy that will market the greenways to residents, visitors, and potential funders. A brand tends to communicate what the user will experience and is applied consistently throughout all materials, messaging, and representation. It creates an emotional association and incorporates the inherent nature of an entity – its personality, character, and style. Lastly, a brand enables an entity to distinguish itself from similar options. For a greenway, a brand includes user experience, logo, signage, purpose, safety, comfort, programming, funding, sponsors, and supporters.

Branding the greenway system has multiple benefits, including:

- Creating awareness of the greenways
- Increased numbers of bicycle and walking trips
- A greater sense of security and comfort
- Improving navigation of the greenway system
- Defining the system within the larger context of trails, bicycle routes, and pedestrian routes

One component of branding is to establish a logo for the greenway system. The creation of a logo to be placed on signs, brochures, and maps would give the system a distinct identity. Branding of the greenways would reflect the uniqueness of Wake County and its municipalities. It will simultaneously set the greenway system apart from trails and greenways in other regions while also serving to improve connectivity and navigation. Part of this branding strategy would be to explore the character of the greenway system and project an image of how it should be represented. It is also critical that it be designed and implemented in a way that works well for both the County and the municipal partners.

Aside from the benefit of increased of tourism, branding the greenway system offers benefits from a transportation perspective. Having signage in place to alert motorists of crossings will improve safety for pedestrians and bicyclists who use the greenway. Once a branding strategy has been identified, the next step would be to develop comprehensive wayfinding for the system. Wayfinding is generally considered to be a system of visual cues that help to orient people and give them a sense of place. As the Wake County greenway system expands, residents and visitors will have increased access to longer recreation routes, schools, commercial centers, and green spaces. Wayfinding elements such as signage and mile markers will help to draw visitors, help users to identify the best routes, and enhance their ability to connect to major destinations.

The main challenge of branding and wayfinding for a regional system in Wake County is the number of municipalities, each with their own varying degree of existing branding and signage. One way to address this would be to identify several cross-county routes (again, after at least the priority gaps are filled) and develop a memoradum of agreement among jurisdictions that outlines the agreed upon branding and wayfinding to be used for just those cross-county routes. Other local trails and trail sigange could then either remain as-is, or could follow a minimum set of standards for local trails, should one be adopted regionally.

The overall experience of greenway users will be enhanced with wayfinding that ties the whole system together. Wake County could choose to conduct a wayfinding study to evaluate existing conditions as well as determine appropriate wayfinding elements, placement of signage, and design. Wayfinding elements could include off-site elements, such as printed user maps (an update to Wake County's trail map is already overdue), digital user maps, gateway signs, and bicycle guide signs. On-site elements would include direction signs, map kiosks, and confirmation signs. A wayfinding plan would also provide guidance for design standards and installation of signs.

For trails signs within the highway right-of-way, the Manual on Uniform Traffic Control Devices (MUTCD), developed by the Federal Highway Administration (FHWA), provides standards for signs, signals, and pavement markings. While standards exist for signage, there is still opportunity to customize signage to match the character and feel of the communities in which those signs are placed.

This example signage for the Great Rivers Greenway trail system in St. Louis County shows a simple, yet effective use of signage and branding that lets the user know the name of the trail, distance to nearby destinations, the types of uses permitted, and has a reminder to share the trail. Photo by the Great Rivers Greenway.

Trail Amenities

Functional greenway trails must feature appropriate amenities to create a complete, accessible, and comfortable experience for a wide variety of expected users. As longer, connected segments of trail are built in Wake County, it will be important to accommodate longer-distance trips as well. Elements such as restrooms, lighting, benches, and other amenities create a unique identity but also provide important functions. It is important that the details work together to create a positive experience for users. The following key amenities are described briefly with more information found in the design resources listed at the end of Chapter 4.

Trailheads

Trailheads are arguably the most important amenity of a greenway trail. Trailheads provide essential access to the greenway and can include many amenities in one location: automobile parking, bicycle parking, restrooms, drinking fountains, trash and recycle receptacles, dog waste stations, bicycle repair stations, and greenway trail wayfinding and informational signage. While there is no widely accepted prescription for the frequency of trailheads, a report by the National Park Service (North Country National Scenic Trail Handbook) suggests a frequency of about 5-10 miles, depending on the level of trail usage. User counts and surveys should be conducted to analyze effectiveness of existing trailheads in Wake County, and to determine current levels of parking demand. Major trailheads should be established where they are highly accessible and visible, usually along a major transportation corridor. Minor trailheads can be found at locally known parks or at connections to residential or commercial development.

Restrooms

Public restrooms are a critical building amenity because they need to be responsive to a wide range of human needs and abilities. Restrooms are often selected as the most important trail amenity of the general population. Careful consideration must be given to a number of factors before locating restrooms, including available land, size of trailhead, utility availability, and user need. When locating restrooms, prioritize them at trailheads within existing parks and review gaps for placement at other trailheads or locations within the system (trailheads, as noted above, are suggested at about 5-10 mile intervals). Composting toilets, similar to what is found at the current southern end of the American Tobacco Trail, should be considered in remote areas where utility connections are unavailable.

The New Hope Church Road Trailhead Park in northwest Cary.

Composting restroom at the current southern end of the American Tobacco Trail in Wake County.

Drinking Fountains

Drinking fountains provide opportunities for users to hydrate and potentially extend their trip. Long distance runners and bicyclists require replenishment and depend upon fountains to refill their water bottles. Fountains are also particularly desired by the elderly and come in handy for pets as well. Drinking fountains should be located near restrooms, at trailheads, parks, and other public gathering places along the greenway trail. Space drinking fountains 10-15 miles when potable or treatable water is not otherwise available.

Drinking fountains are key amenities for a wide variety of the population including pets.

Seating

Seating along greenway trails provides a place for users to rest, congregate, and/or reflect. Benches can be designed to create identity along the greenway trail or be strictly utilitarian. Benches should be located along the greenway where appropriate, or where there is demand by users. Seating should be provided at a minimum, every mile, and within 1/2 mile of trailheads.

Utilitarian bench along the American Tobacco Trail. Seating placed in the shade is appropriate for users in warm weather.

Lighting

Lighting for greenway trails can improve visibility along the greenway and at intersection crossings. Lighting spacing along trails depends on the type and intensity of lights, but 30-50 ft spacing is common for pedestrian scale lighting. It may also be necessary for day-time use in greenway tunnels or underpasses. Lighting should be considered on a case-by-case basis due to its expense and maintenance commitment required. It is typically not appropriate for greenway trails in remote areas, trails with low use, or where there is little to no development. Care should be taken to ensure lighting does not negatively impact nearby residents in the form of light pollution.

Lighting is useful in areas where usage is expected to be higher and along trails that commuters typically use.

Bike Repair Stations

Bike repair stations provide cyclists with an air pump for filling up tires and tools for basic repairs and adjustments. The City of Raleigh features two bike repair stations currently. Ideal locations would be at trailheads or adjoining parks.

Repair stations provide basic amenities for bicyclists.

MIle Markers

Mile markers serve two main purposes and are often one of the most requested components of a trail system. First, mile markers serve as important information for decision-making, especially for those exercising and tracking their progress. In addition, mile markers can provide a form of "addressing" or locating for emergency response. For the Wake County Greenway System, establishing mile markers should occur after longer distance cross-county connections can be made by filling gaps between existing trails. This type of amenity could be combined with an overall signage plan. Mile markers are often placed every quarter mile, although placement at tenth-mile intervals may be preferable.

Mile marker on the American Tobacco Trail.

Edible Plants Along Greenways

Low maintenance edible plantings along greenways are supported as an amenity to add to Wake County residents' experience of the greenways. Planting edibles, primarily trees and berry bushes, in strategic and visible areas of greenways is a way to both minimize long term maintenance and management, and add value to user experience. This plan recommends a focus on native or locally adapted plants which flourish in our Piedmont region, and grow well and easily, requiring limited maintenance and resources. There are already a number of edible plants along Wake County greenways, and municipalities are encouraged to explore pilot projects to incorporate these into greenways being installed or upgraded. While there are many opportunities for edibles along greenways, they are not recommended within gas or electric easements, or near utility service boxes or septic lines. Edibles can be included as part of the overall project cost, especially as new greenway segments are built and connections made with existing greenways. Benefits include:

- Ecological benefit – edible plantings are sustainable. They are likely to flourish with limited maintenance and without the use of chemicals.
- Improving the recreational experience – edibles are one more tactile and sensory experience of connecting greenway users with nature.
- Educational benefit – connecting kids with nature is key to their healthy physical, mental and emotional development. Data shows children who engage with nature develop stronger executive functioning skills. Edible plantings provide one more way for kids to engage with nature on the greenways.
- Health benefit – eating more fruits and vegetables is one of 3 key chronic disease prevention recommendations from the US Center for Disease Control. Providing more visible ways to do this can have a health benefit for our communities, even if the volume is small.
- Economic benefit – edible plantings do not need to cost more than traditional plantings, if installed at the time a greenway is put in. Whenever the installation occurs, native or locally adapted plants may reduce maintenance and eliminate chemicals needed, reducing costs for responsible jurisdictions. Finally, in the long term, berry bushes and fruit trees that greenway users can actually eat from will have a minor economic benefit in terms of free food. While the volume may be small initially, long term this could be thousands of pounds of food a year.

At least one pilot project is planned within Wake County (at NC State), and strong interest has been expressed in Holly Springs and Wake Forest. Other communities already have such programs in place, such as in Black Mountain, NC.

4 IMPLEMENTATION STRATEGY

"Greenways throughout Wake County are truly for everyone. I use the greenways almost every single day, and I see every conceivable age group, as many women as men, lots of different uses, every conceivable ethnicity and racial group, every income group. It is probably THE most important recreational/exercise/sports resource in Wake County " - John Pucher, national leader on research for walking, bicycling, and urban transport, and local resident of Wake County.

OVERVIEW

The proposed greenway system in this plan represents a major investment with enormous positive impacts for Wake County residents, businesses, and visitors. The effort put forth to implement this plan will require a high level of determination, coordination, and leadership on behalf of those who champion the plan.

This chapter lays the groundwork for implementation efforts, with a recommended framework and set of action steps for establishing funding and carrying out implementation. The **organizational chart** on the follow page outlines the suggested key roles for project partners and stakeholders involved in implementation. The actual roles and responsibilities of each group will be more diverse and may vary depending on how this Plan is implemented over time.

The page opposite the organizational chart outlines an **funding considerations** and includes goals for a project timeline. The basic strategy is to establish a sum of "seed" funding that can then be leveraged through local, state, Federal, and private sources, with a goal of a 2:1 leverage on the original sum.

Several key considerations went into developing the recommended timing of the projects. These include:

- The desire among project stakeholders and the general public to complete these projects in their lifetime, and ideally well-within their lifetimes;
- The constraints involved with funding such a large infrastructure investment (though small relative to highway projects); and the time needed to coordinate the leveraging of funds;
- The ability of local and regional agencies and staff to manage and administer the amount of trail construction; and
- The need to at least maintain the current level of service for trails in Wake County over time.

The last bullet above can be explained further by taking the current amount of existing trails in Wake County (295 miles), and comparing that to the current population (998,691). **With a projected population of 1,203,335 by 2025, Wake County would need to add about 61 miles of new trail over the next nine years**.

ORGANIZATIONAL FRAMEWORK FOR IMPLEMENTATION

Wake County Board of Commissioners

Recognize the value of greenways by adopting this plan, thereby supporting quality of life for all in Wake County

Wake County Parks, Recreation & Open Space

- Work with regional and municipal partners on funding and development of priority greenway projects
- Lead on funding, as part of CIP and public-private partnerships
- Coordinate implementation of this Plan's Action Steps, working directly with project partners

Private Sector Partners

Meet with project leadership & learn about partnership opportunities

Wake County Facilities Design & Construction

- Provide continuity from planning to implementation
- Planning and implementation of Capital Projects including land acquisition

CAMPO

Coordinate with Wake County and municipal partners on leveraging funding opportunities through the LAPP program and the STI process; Incorporate this Plan's projects into long-range transportation plans

NCDOT Division 5 & NCDOT-DBPT

Technical support and review for trail-roadway crossings and trails in NCDOT right-of-way

Regional Partners

Continued support, coordination, & outreach for trails from:

- **Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC-MPO)**
- **Triangle J Council of Governments**
- **Research Triangle Foundation**
- **Triangle Greenways Council**
- **East Coast Greenway Alliance**
- **North Carolina State Parks**
- **Tourism & Visitors Bureaus**
- **Healthcare Providers and Advocates**
- **Private Developers**
- **Duke Energy Corporation**
- **NCSU & Other Academic Partners**
- **Neighboring Jurisdictions**

Wake County GIS

Maintain GIS database of trails that are existing, proposed, and in-development

Wake County Planning, Development & Inspections

Consider trail development policies & assist with public outreach for trail projects

Wake County Human Services

Lead in outreach to potential private sector partners in the public health sector; communicate health benefits of trails

Wake County Open Space and Parks Advisory Committee

Trails sub-committee to assist county staff with certain action steps of this plan

Local Residents and Civic Organizations

Help build public support for trails and trail funding

Municipal Partners

- Coordinate with Wake County and CAMPO to leverage local trail project funding
- Provide GIS updates to Wake County Community Services for trail projects in-development, and completed trail projects
- Promote public awareness and use of local and regional trails through and local tourism and economic development agencies
- After priority gaps are completed, coordinate with Wake County and other partners on a comprehensive regional wayfinding system and branding/marketing strategy for greenways

Consultants

Assist county & municipal partners by providing guidance on project development, and by providing trail design and construction services

PROJECT FUNDING CONSIDERATIONS

These timeline targets are aspirational, reflecting what is needed to meet the vision and goals of this plan, ideally during the lifetime of the residents and visitors that stand to benefit from these projects. **The strategies below are provided as an illustration, for consideration only. During actual implementation, projects will likely be built from any of the four categories below, depending on changing local needs, priorities, and opportunities.**

1

BRIDGE THE GAPS: YEARS 1-5

- **48 miles of trail in 23 project segments**
- **Cost per project is approximately $2M/mile based on 2015 dollars**
- **County funding (through limited obligation bonds, as one option), with a goal of 2:1 leveraging from these sources: Local municipal matching funds, CAMPO/LAPP project funding, and potential funding through private investment.**
- ***Note:* Plan adoption signals intent to complete projects over time, but *does not* commit the County to funding.**

2

CONNECT TO PARKS & LAKES: YEARS 5-9

- **60 miles of trail in 12 project segments**
- **Cost per project is approximately $2M/mile based on 2015 dollars**
- **Submit projects for CAMPO/STI funding, supplement with local and county funding as available. Consider additional County funding based on performance of initial investment above.**
- **Align "shovel-ready", high-impact projects with future U.S. DOT TIGER Grant funding (or similar), if available.**

YEAR 10: FULL PLAN UPDATE TO RECONFIRM GOALS AND PRIORITIES

3

CONNECT THE COMMUNITIES: YEARS TBD

- **19 miles of trail in 6 project segments**
- **Funding Strategy: TBD based on and success of program to-date and plan update in year 10**

4

COMPLETE THE SYSTEM: YEARS TBD

- **147 miles of trail in over 30 project segments**
- **Funding Strategy: TBD based on and success of program to-date and plan update in year 10**

FUNDING STRATEGIES

County Funding as Leverage for Federal, State and Local Funding

Traditionally, Wake County has funded greenway facility development using public sector funds, typically County funds matched with municipal, state and federal funds. Below are several opportunities for matching county funds. **See Appendix B for more on Funding Resources.**

- **The Capital Area Metroplitain Planning Organization (CAMPO) Locally Administered Projects Program (LAPP)**: LAPP is the process the MPO uses to allocate the federal dollars that are the direct responsibility of the MPO. Each year, MPO members submit project applications to compete for these funds. The Locally Administered Project Program includes the MPO's Surface Transportation Program - Direct Allocation (STP-DA) funds and the Congestion Mitigation for Air Quality (CMAQ) funds. For more information on the LAPP process, contact Danna Widmar of CAMPO.
- **The CAMPO Transportation Improvement Program (TIP)**: The TIP outlines ten years of planned capital expenditure on transportation projects in the region. The TIP is adopted by the MPO's Executive Board and is amended as needed to stay consistent with the State Transportation Improvement Program (STIP) adopted by the NCDOT Board of Transportation. For more information on the TIP, contact Alex Rickard of CAMPO.
- **The TIGER VIII Grant:** The U.S. Department of Transportation announced $500 million for transportation projects across the country under an eighth round of Transportation Investment Generating Economic Recovery (TIGER) competitive grant program. Like the first seven rounds, FY 2016 TIGER discretionary grants will fund capital investments in surface transportation infrastructure and will be awarded on a competitive basis for projects that will have a significant impact on the nation, a metropolitan area, or a region. The 2016 TIGER grant program will focus on capital projects that generate economic development and improve access to reliable, safe and affordable transportation for communities, both urban and rural. It is likely that the FY 2016 TIGER is out of reach for projects in this Plan as of Spring 2016, but it is noted here as a resource to look out for in future years, should the TIGER program be continued. Other regions have successfully obtained TIGER funding for greenway trails (see opposite page), and Wake County could do the same if a coordinated approach is taken to getting key projects through the design phase, making them more attractive for grants as "shovel-ready" projects.

Engaging Private Funding

Across the United States, one of the fastest emerging funding sources for greenway development is the private sector. Philanthropic organizations, corporate and family foundations, non-profit organizations and corporations have stepped up their involvement in greenway facility development in the form of financial support. Why has this occurred? There are many varied reasons including support for improvements to quality of life, health and wellness, alternative transportation, conservation of natural resources and economic development. Most importantly, private financial support has enabled the greenway development process to move faster, so that facilities can be completed more efficiently. Two exemplary projects illustrate how this works:

1. In Northwest Arkansas, the Razorback Regional Greenway was conceived by the Northwest Arkansas Regional Planning Commission as a network of primarily on-road

Grand opening of the Razorback Greenway, a regional trail project that benefited from $15M in USDOT funding.

trails spanning the two-county region (Benton and Washington counties). In 2009, the Walton Family Foundation stepped in and spearheaded a public-private partnership that resulted in the development of a 36-mile, primarily off-road, world class regional greenway. The Razorback Regional Greenway was funded from a combination of public and private funds, including a USDOT TIGER 2 grant of $15 million, and a dollar for dollar gift from the Walton Family Foundation of $15 million. Other grant funds were added later bringing the total funding to more than $40 million. Without the lead gift from the Family Foundation, the project would never have happened. The Foundation based its gift on two community goals: 1) improve the health of local residents, and 2) support economic development throughout the region to keep Northwest Arkansas competitive for years to come. The 36-mile Razorback Regional Greenway was officially completed and opened for use in May 2015.

2. In Memphis, Tennessee, the 36-mile Wolf River Greenway has been the brainchild of the Wolf River Conservancy (a non-profit land trust based in Memphis) for more than 35 years. Using a traditional approach of relying on public sector leadership and funding to build the project, the Conservancy became frustrated with the glacial pace of greenway facility development – in 35 years, approximately 5 miles of trail had been completed. In 2014, the Conservancy decided to fund the development of 22 miles of the trail within the Memphis city limits using private sector funds. As of January 2016, the Conservancy has raised approximately $45 million in support of facility development, with almost half of that coming from private sector sources. The Conservancy has then leveraged the private sector support to gain public sector support from the City of Memphis and Shelby County. The Conservancy expects to design, permit and build the entire 22 mile Memphis portion of the Greenway by 2019.

These are just two examples of ways in which private sector funding is used to support greenway facility development. There are many more examples just like the ones mentioned above occurring across the United States. What are the important lessons learned from this approach? Assuming that a worthy greenway project has been identified, there are four key steps in the process: 1) develop the "pitch", 2) make the ask, 3) leverage the lead gift, and 4) invite private sector and public sector groups to participate.

Step One: Develop the "Pitch"

The first step is to finalize the vision and scope of the project, along with its benefits to the community. The "pitch" is typically summarized in the form of marketing materials, such as reports, digital media presentations, and informational handouts that define the important elements of the greenway project.

The Carolina Thread Trail in the Charlotte Metro Region offers an excellent example for "developing the pitch." The Catawba Land Conservancy (CLC) and the Trust for Public Land (TPL) worked with Greenways Incorporated to prepare a vision statement and economic case statement that together defined the goals and objectives of "The Thread Trail," a regional greenway project. The "pitch" was carefully crafted so that it could be distilled into simple terms and delivered through a concise presentation. CLC and TPL worked with other Charlotte based firms to develop graphic elements of the pitch, including a logo that defined the "brand" for the project. The combination of these materials constituted "the pitch," and enabled CLC and TPL to take the next step in the process – making the ask for financial support.

Likewise, both the Razorback Regional Greenway in Northwest Arkansas and the Wolf River Greenway in Memphis, Tennessee, undertook similar efforts in developing the pitch. In Northwest Arkansas, a compressed timeframe, centered around a design charrette, produced the pitch. The Walton Family Foundation funded the design charrette process that resulted in the preparation of a vision, conceptual framework and economic case statement for the Razorback Regional Greenway. In Memphis, the Wolf River Conservancy used a similar approach, and also commissioned Alta Planning + Design to prepare an economic study regarding the benefits of the Greenway to the regional community.

Step Two: Making the Ask

Once the pitch has been prepared, it is time to "make the ask." For greenway projects, making the ask can occur in different ways. Generally, two different strategies can be employed, one that targets public funding sources and the other that targets private funding sources.

For the Carolina Thread Trail, the major "ask" occurred during a breakfast meeting of philanthropic and corporate groups. The invitation only breakfast generated more than $15 million in support of the Thread Trail project, and was the catalytic event that launched the project. Both CLC and TPL worked extremely hard in advance of the breakfast to deliver the pitch to participants so that when the time came for the ask, the results were more or less expected.

Other "asks" can be more complicated. The Razorback Regional Greenway went through a protracted ask that involved an application for federal funding. The Northwest Arkansas community applied for and received a TIGER 2 grant of $15 million to build the project. The federal grant was matched dollar for dollar by the Walton Family Foundation, creating the opportunity for full project development. In Memphis, the Wolf River Conservancy has raised $24 million in private sector funding to support an additional $16 million in public sector funding. Sometimes, the "ask" can stretch for months and more than a year.

Depending on the size of the greenway project, raising large sums of money to support greenway development takes time.

Step Three: Leverage the Lead Gift

All three of the projects used as examples in this chapter utilized a "lead gift" as leverage for raising additional funds. A lead gift is important for several reasons. First, a lead gift from a prominent and respected local project sponsor signifies the importance of the project throughout the entire community. Second, a lead gift is often used to leverage other private funds. The lead sponsor will often call upon other private funders to support the greenway. Third, a lead gift may be used as a matching source of funding for public sector grants.

To secure a lead gift, it will be necessary to spend time with a potential project sponsor to thoroughly explain the merits and benefits of the greenway project. Most importantly, the greenway benefits must align with the interests and goals of the sponsor, and represent an opportunity to fulfill a specific mission of the sponsor.

Lead gifts typically are significant in order to be effective. Some project sponsors will pledge a lead gift premised on the ability to raise the balance of funds within a defined time period. Some project sponsors will specify that the lead gift must be matched in a defined proportion to the balance of funds raised.

Lead gifts are very important to the success of fund raising as they typically establish credibility for the greenway initiative and provide the first tangible evidence of financial support.

Step Four: The Invite List

Which groups, organizations and entities are on the "short list" of invitees to help fund greenway projects in Wake County? The following is not a complete list, but helps to narrow the field of likely candidates for consideration.

- *Foundation for the Carolinas:* This foundation strengthens regions through innovative community initiatives. Since 1958, Foundation for the Carolinas has served as a catalyst for charitable good, connecting individuals, companies and organizations to needs and philanthropic opportunities across the region and beyond. This community foundation is dedicated to the collective strength of communities, working in close partnership with donors, civic leaders and nonprofits to help achieve a wide variety of charitable goals and to inspire philanthropy that will benefit generations to come. Today, Foundation for the Carolinas is one of the largest community foundations in the United States.
- *City of Oaks Foundation:* The City of Oaks Foundation is a nonprofit conservation and youth development organization closely aligned with Raleigh's Parks, Recreation and Cultural Resources Department. The Foundation runs two programs: "Raleigh, Naturally" land conservation to work with landowners on a voluntary basis for long-term stewardship of important natural areas; and "Give Play" which underwrites scholarships for children from low-income families to participate in summer camps and nature programs. By focusing on land and water conservation as well as connecting youth to nature, they aim to keep green space in a rapidly-growing Raleigh and instill a love of nature for generations to come.
- *Trust for Public Land (TPL):* TPL's mission is to create parks and protect land for people, ensuring healthy, livable communities for generations to come. Every park, playground, and public space they create is an open invitation to explore, wonder, discover, and play. TPL has been connecting communities to the outdoors—and to each other—since 1972. Today, millions of Americans live within a 10-minute

walk of a park or natural area they helped create, with more visitors every year.

- *The Conservation Fund*: The Conservation Fund practices conservation to achieve environmental and economic outcomes. Their staff throughout the country create and implement innovative, practical ways to benefit the natural world and the well-being of Americans from every walk of life. Conservation takes many forms, and The Fund's programs interpret and practice conservation in a mutually-reinforcing way - working in concert to make sure the value of natural resources in America remain essential to our prosperity. The Fund's focus is on conservation and communities - creating as many pathways possible for people and organizations to protect their natural resources and save the places that matter most - properties with ecological, historic and/or cultural significance. They deliver conservation and economic vitality through strong partnerships with government, business and colleague organizations.
- *Blue Cross Blue Shield Foundation of North Carolina:* Their mission is to improve the health and well-being of all North Carolinians. They recognize that a North Carolina with healthy people living in active communities reduces health risks and improves health outcomes. Health is a complex equation that is as much determined by the environment as it is by the individual. Their strategy is to look ahead to get at the core drivers of poor health and to support lasting system-wide changes.
- *North Carolina Community Foundation*: The NCCF is the single statewide community foundation serving North Carolina and has made $101 million in grants since its inception in 1988. With more than $237 million in assets, the NCCF sustains 1,200 endowments established to provide long-term support of a broad range of community needs, nonprofit organizations, institutions and scholarships.
- *Duke Energy Foundation*: The Duke Energy Foundation provides philanthropic support to address the needs vital to the health of communities. Annually, the Foundation funds more than $25 million in charitable grants, with a focus on education, environment, economic and workforce development and community impact.

TRAIL POLICY GUIDANCE

The establishment of policy ordinances is essential for the successful development and expansion of the countywide greenway system, especially considering the continued overall growth and development in Wake County. The following are general considerations for Wake County and its municipalities regarding essential policies related to greenway planning and development. These represent best practices, and may vary upon implementation locally, depending on political will and public interest in each of Wake County's 12 municipalities and surrounding communities. Wake County and the 12 municipalities should work with developers when possible to provide incentives and strong partnership. When updating requirements, it will also be important to communicate to developers the many benefits to them to provide greenways for their prospective buyers.

Developer Dedication of ROW and Construction for Trails

Wake County and its municipalities should strive for consistency in their respective land use, subdivision, zoning, and/or UDO ordinances related to the requirement to set aside and construct greenway trails, in addition to sidewalks. A summary of current County and municipal policies is described below with recommended guidance for consideration.

Wake County

Wake County provides requirements for pedestrian, bicycle, and trail facilities but requirements and standards differ between Short-Range Urban Service Areas, Long-Range Urban Services Areas, and Non-Urban Areas in recognition of the different physical and built environments that exist across the County. Also, this requirement is only in place for residential subdivision development.

For the Short-Range Urban Services area, the County requires off-road trail improvements when 1) improvements are shown on a Transportation Plan and/or the Consolidated Open Space Plan, 2) subject subdivision has access to or is adjacent to existing or designated greenway corridors, or 3) the subject subdivision is adjacent to another development that includes off-road trail improvements.

For both the Long-Range Urban Services Area and the Non-Urban Areas, the off-road trail improvements MAY be required, under the same circumstances as described for the Short-Range Urban Services Area, but must be authorized by the Planning Director or Planning Board.

Guidance:

- Wake County should update the requirement to include commercial development.
- Wake County should update the language to include greenway requirements when improvements are shown on this Wake County Greenway Plan (in addition to the Transportation Plan and Consolidated Open Space Plan).
- Wake County should consider a mandatory requirement for development outside the Short-Range Urban Services areas, especially in the circumstance of a recommended greenway corridor through the site.

Municipalities

At the time of this study, the City of Raleigh, Town of Cary, Town of Wake Forest, and Town of Knightdale, as examples, have requirements for residential greenway dedication only. The Town of Morrisville and Town of Holly Springs, as examples, have greenway requirements for both residential and commercial dedication and construction. Example UDO language from the Town of Holly Springs is provided on the following page. The Town of Morrisville, for example, requires all new development, except individual lot development, incorporate into its required open space, any greenway path or multi-use path called for across the development site by a Comprehensive Plan.

Guidance:

- Municipalities should require greenway dedication and construction as part of standard development practice, irregardless of whether a greenway is proposed through the area. In addition, municipalities should require construction of any proposed greenway corridor segments that are part of a local plan or this Wake County Greenway Plan along with providing high-quality pedestrian/bicyclist connections from the development to the main greenway corridor.
- Municipalities should require greenway dedication and construction for all types of development, not just residential. The same requirements as the above bullet would apply.

Utility and Sewer Easements and Provision of Public Access within the Right-of-Way

With new development often comes expansion of services such as water, sewer, electrical, and gas. Wake County and its municipalities should make it standard practice to allow public access (trails) within those right-of-way corridors. It is much easier to build this into future expansion of systems as opposed to retroactively allowing public access to easements.

Additional Greenway-Related Policy Considerations for Wake County and Municipalities:

- Use of native plants in greenway landscaping;
- Wildlife-friendly landscaping and maintenance
- Complete Street policies that would address on-street connections, trail crossings, and sidepaths
- Requirement of additional bicycle/pedestrian friendly features in development to encourage more walking and bicycling such as street connectivity, strong bike/ped connectivity from the subdivision/development to surrounding destinations and greenways, minimization of cul-de-sac streets, pedestrian/bicyclist cut-through path connections, and greenway connections to adjacent existing and proposed greenways.

TRAIL MAINTENANCE GUIDANCE

Maintenance Overview

Greenway maintenance is essential to the long-term viability and sustainability of regional greenway trail networks. Construction of greenway trails cannot take place without a maintenance plan and priority in place. Similar to national roadway maintenance issues that have been well-documented, trails constructed over the past twenty years are in varying states of needing maintenance. Monies have poured into new roadways and trails across the United States but maintenance has been a lower priority. This Plan recommends a strong, collaborative approach to maintenance.

Parks and recreation volunteers in Raleigh, NC.

Maintenance Principles

The regional greenway trail system should be viewed and maintained as a public resource, serving generations to come. The following guiding principles will help assure the preservation of a first class system:

- Good maintenance begins with sound planning and design.
- Foremost, protect life, property and the environment.
- Promote and maintain a quality outdoor recreation and transportation experience.
- Develop a management plan that is reviewed and updated annually with tasks, operational policies, standards, and routine and remedial maintenance goals.
- Maintain quality control and conduct regular inspections.
- Include field crews, police and fire/rescue personnel in both the design review and on-going management process.
- Maintain an effective, responsive public feedback system and promote public participation.
- Be a good neighbor to adjacent properties.
- Operate a cost-effective program with sustainable funding sources.

Maintenance Responsibilities

Recommended greenways in this Plan traverse twelve municipalities and unincorporated Wake County. Most of the greenway trail corridors will be off-road though some portions will be on-road accommodating bicyclists and pedestrians on sidepaths or bicycle lane/sidewalk combinations. Because the network 1) traverses multiple municipal boundaries and unincorporated Wake County, 2) includes a combination of street, stream, parks, utility easements and other properties, and 3) includes both on-road and off-road treatments, multiple agencies within North Carolina, Wake County, and the jurisdictions must play a role, be

engaged, and be coordinated in ongoing trail operations and maintenance.

While each major jurisdiction has its own operations and maintenance departments, a key to sustainable quality greenways will be a consistency of standards, cooperation and coordination amongst the communities and building enduring partnerships engaging both public and private sector leadership. Growing a successful greenway system in Wake County will take capacity building and diversification of skills and resources to meet this challenge in those communities.

In order to meet the challenges, an intergovernmental organization and/or intergovernmental agreement regarding the Wake County greenway system is recommended. An organization or an agreement would be in place to address not just maintenance, but also funding, facilitating cooperation, organizing volunteer groups, adopting/implementing standards, etc. Agencies to be involved would include appropriate Wake County departments, municipalities, CAMPO, and NCDOT.

A comprehensive and cooperative maintenance management program will determine the activities, maintenance levels and maintenance frequency of the trail system based on expected trail use. The program will identify tasks, operational policies and procedures, standards, and routine and remedial maintenance goals. At a minimum, the program must identify cost estimates, funding sources, and the party responsible for performing the work on the trails. This will provide the basis for determining annual funding and assignment of personnel and equipment from trail to trail while providing for necessary adjustments.

At the time of this study, it is recommended that municipalities play the largest maintenance role to expand upon their existing operations and resources. However, Wake County could consider offering financial assistance (on a case-by-case basis) to supplement those municipal maintenance crews when the trail traverses unincorporated Wake County.

Types of Greenway Maintenance: Routine and Remedial

The remainder of this section focuses on general routine and remedial maintenance responsibilities for all greenway and trail facilities.

Routine Maintenance

Routine maintenance refers to the day-to-day regimen of litter pick-up, trash and debris removal, weed and dust control, trail sweeping, sign replacement, tree and shrub trimming, and other regularly scheduled activities. Routine maintenance also includes minor repairs and replacements such as fixing cracks and potholes or repairing a broken hand railing.

Routine Maintenance Tasks

The following tasks should be performed on a regular basis to keep all network facilities in good, usable condition. Maintenance tasks should be conducted more frequently for greenway, bike, and pedestrian facilities where use is the most concentrated. Methods such as pedestrian and bicycle counts, sketch plan analysis methods for estimating pedestrian and bicycle demand, public survey results, and public meeting comments can be used to determine which resources are the most heavily used and may require the most maintenance attention. The frequency of required maintenance tasks should be established as new facilities are implemented and should be reviewed and updated annually to reflect any changes in usage, safety issues, etc.

Facility Maintenance

Basic housekeeping of greenway and trail facilities will ensure that the network is clean and functional and will also improve the life of each facility. Volunteer efforts should be utilized in the performance of sweeping and trash removal.

Vegetation Management

To maintain a high quality network, regular attention should be given to the surrounding landscape, both natural and man-made. This not only improves the aesthetic quality of the network but also improves the users' sense of safety, as well. Vegetation management tasks include the following:

- Tree and shrub trimming and pruning
- Mowing of vegetation
- Mulching and edging
- Invasive species control

Remedial Maintenance

Remedial Maintenance refers to correcting significant defects in the network, as well as repairing, replacing or restoring major components that have been destroyed, damaged, or significantly deteriorated from normal usage and old age. Some items ("minor repairs") may occur on a five to ten year cycle such as repainting, seal coating asphalt pavement or replacing signage. Major reconstruction items will occur over a longer period or after an event such as a flood. Examples of major reconstruction remedial maintenance include stabilization of a severely eroded hillside, repaving a trail surface or a street used for biking, or replacing a footbridge. Remedial maintenance should be part of a long-term capital improvement plan.

Remedial Maintenance Tasks

The following tasks should be performed on an as needed basis to keep network facilities in good, usable condition. The table below depicts the average life of each facility type, as well as general ancillary facilities, with normal wear and tear. The repair or replacement of existing facilities should be reflected in a projected budget for future maintenance costs.

Longevity of Facilities

• Mulch	2-3 years
• Granular Stone	7-10 years
• Asphalt	7-15 years
• Concrete	20+ years
• Boardwalk	7-10 years
• Bridge/Underpass	100+ years

Facility Repair or Replacement

All facilities will require repair or replacement at one time or another. The time between observation and repair/replacement will depend on whether the needed repair is deemed a hazard, to what degree the needed repair will affect the safety of the user, and whether the needed repair can be performed by an in-house maintenance crew or if it is so extensive that the needed repair must be done by outside entities or replaced completely. Some repairs are minor, such as repainting or resurfacing bicycle lanes and can be done in conjunction with other capital projects, such as repaving the adjacent street. The following are facility repair or replacement activities:

- Replenish gravel, mulch, or other materials
- Repaint/restripe/stain
- Repave/seal
- Replace asphalt or concrete
- Remove encroaching debris along paved trail/sidewalk edges
- Regrade to prevent or eliminate low spots and drainage issues
- Add culverts, bridges, boardwalks, retaining walls, etc. to prevent or eliminate drainage/erosion issues
- Reroute trail, if necessary, to avoid environmentally sensitive or overused areas and any safety issues

Seasonal Maintenance

Seasonal tasks should be performed as needed. When conditions cannot be improved to provide for safe use, the facility should be closed to prevent the risk of injury to facility users. Designated maintenance crews would remove leaf debris, snow, and ice from all network facilities as soon as possible. Leaf debris is potentially hazardous when wet and special attention should be given to facilities with heavier usage. Ice control and removal of ice build-up is a continual factor because of the freeze-thaw cycle. Ice control is most important on grade changes and curves. Ice can be removed or gravel/ice melt applied. After the ice is gone, leftover gravel should be swept as soon as possible.

Habitat Enhancement & Native Species

The presence/absence of vegetation and the type of vegetation present in a greenway affects habitat quality, the greenway's effectiveness as a wildlife corridor, ecological sustainability, and the aesthetic experience for the trail user. Greenways are more effective at providing wildlife habitat and corridors when they have trees and shrubs present. Planting native vegetation along greenways can enhance the trail user's feeling of "getting back to nature." However, planting woody vegetation may not be an option on greenways whose alignments are on sewer or power line rights-of-way based on planting depth requirements. In locations where trees and shrubs are lacking and can be planted, native species are the most ecologically sustainable choice. As a group, native species require less maintenance than horticultural plantings and often provide wildlife with a food source.

The following activities and tasks should be utilized to enhance and control wildlife habitats:

- Plant vegetation, such as trees and shrubs, using native species whenever possible; consider prohibiting the introduction of non-native plants altogether
- Take preventative measures to protect landscape features from wildlife, such as installing fencing around sensitive or newly planted materials
- Use herbicides sparingly, to eliminate problem plant species only when necessary
- Deter interaction between facility users and facility inhabitants, such as feeding the wildlife, etc.
- Consider launching a "pollinator species initiative". By supporting pollinators' need for habitat, we support our own needs for food and support biodiversity in Wake County. See here for more information: www.pollinator.org
- See recommendations for edible plants along greenways, on page 123.

RANGE OF TRAIL MAINTENANCE COSTS

Reported annual maintenance costs from cities and regions for shared-use trails range widely, from just $500/mile to over $15,000/mile. As a local example, **the Town of Cary uses $6,000/mile** for annual mowing and trash pick up, and minor repairs like replacing a fence rail; they budget asphalt and drainage repairs separately on case by case basis. Some key factors affecting these wide ranges include:

- Quality of materials used, and frequency of sealing and reconstruction of the path
- Amount of leaf drop affecting the trail that requires concentrated sweeping
- Amount of flooding of the trail that has to be cleaned up
- Amount of snow removal/grooming needed
- Whether or not mowing, irrigation, and other care of adjacent open space is calculated in the cost
- Presence of waste receptacles

The largest factor affecting the annual maintenance figures of different cities is whether or not the eventual trail reconstruction is accounted for in annual maintenance budgets, as opposed to being considered as separate capital item.

Source: Alta Planning + Design, 2016.

TRAIL DESIGN REFERENCES AND RESOURCES

The following standards and guidelines may be referred to for details on greenway design:

Capital Area Greenway Planning and Design Guide

Raleigh's Capital Area Greenway Planning and Design Guide (adopted in 2015) incorporates existing City procedures with the standards and best practices of public agencies and municipalities nationwide. The document is designed to ensure that the Capital Area Greenway System continues to be a safe and accessible multi-use trail system providing recreation and transportation opportunities, while preserving thousands of acres of natural areas. The document will be reviewed regularly and updated to meet new needs and priorities generated by the area's growth, changing demographics and shifts in development patterns. Wake County should look to this document as a local reference point for greenway design standards from one of the leading municipal greenway systems in the country.

AASHTO Guide for the Development of Bicycle Facilities, 4th Edition

Published by the American Association of State Highway and Transportation Officials, this guide provides information on how to accommodate bicycle travel and operations in most riding environments. The guide is intended to present sound planning and design guidelines by referencing a recommended range of design values and describing alternative design approaches. Some flexibility is permitted to encourage designs that are sensitive to local context and incorporate the needs of bicyclists, pedestrians, and motorists. The guide contains sections specific to shared-use paths.

The North Carolina Department of Transportation Complete Streets Planning and Design Guidelines

Released in 2012, these guidelines provide NCDOT and municipality staff with a guide to planning and designing streets that meet the needs of all users, including pedestrians, bicyclists, and motor vehicles. The guidelines include detailed information on the processes, street types, and recommendations for creating complete streets in North Carolina, and also includes sections on shared-use paths.

NACTO Urban Bikeway Design Guide

Most relevant to on-road bicycle facility connectors for Wake County's regional greenway system, the NACTO Urban Bikeway Design Guide is based on the experience of the best cycling cities in the world. The designs in the guide were developed specifically for urban settings, since unique urban streets require innovative solutions. Most of these treatments are not directly referenced in the current version of the AASHTO Guide, although they are virtually all permitted under the Manual on Uniform Traffic Control Devices (MUTCD). All of the NACTO Urban Bikeway Design Guide treatments are in use internationally and in many cities around the US.

Manual on Uniform Traffic Control Devices (MUTCD)

Most relevant to greenway trail and roadway crossings, the Federal Highway Administration's MUTCD is the primary source for guidance on lane striping requirements, signal warrants, and recommended signage and pavement markings.

Public Rights-of-Way Accessibility Guidelines (PROWAG)

Meeting the requirements of the Americans with Disabilities Act (ADA) is an important part of any bicycle facility project. The United States Access Board's proposed PROWAG and the 2010 ADA Standards for Accessible Design (2010 Standards) contain standards and guidance for the construction of accessible facilities.

IMPLEMENTATION ACTION STEPS TABLE

POLICY ACTION STEPS					
#	Task	Lead Agency	Support	Details	Phase
1	Present Plan to Board of Commissioners for adoption	Planning Consultants	Wake County PROS & FDC	The plan should be presented to elected officials in Spring 2016. Focus on the health and economic benefits of greenways (Chapter 1 & Appx A) and key trail recommendations (Chapter 3). Adoption signals intent to implement the plan over time; it *does not* commit County to funding the plan.	Short Term (2016)
2	Meet with NCDOT to introduce the Plan and coordinate on key recommendations	Wake County PROS & FDC Staff + NCDOT Division 5	NCDOT-DBPT	This plan and the recommended trail routes should be officially recognized by NCDOT. For example, NCDOT should refer to this document when assessing the impact of future projects and plans, such as future trail crossings needed in relation to the "Complete 540" project (see page 53). Effort should be made between state and local partners to include parallel trail facilities on planned future roadways and roadway reconstruction projects, especially where they appear on adopted plans.	Short Term (2016)
3	Amend county and local development ordinances and technical standards	Wake County Planning, Development & Inspections; Municipal Partners	Wake County Planning Board; Local Planning Boards	County and local development ordinances should be considered for amendment to ensure that, as developments are planned and reviewed, the recommended greenway trail corridors identified in this plan are protected. This would entail amending development regulations to have developers set aside land for trails whenever a development proposal overlaps with the proposed routes, as adopted. Local governments should also consider requirements and tools like dedicating easements, connections to adjacent land uses, issuing credits, and offering some form of recognition to developers who go above and beyond the requirements for trail development.	Short Term (2016)
4	Revise sewer, stormwater and utility easement policies	Wake County Planning, Development & Inspections	Wake County Planning Board	All new sewer, stormwater and utility easements should be considered for allowing public access as a matter of right. Such a consideration should allow for access that does not require landowner approval for each parcel the easement overlaps. As trails are developed, also review applicable existing easements for similar revision considerations.	Short Term (2016)
5	Develop a corporate sponsorship policy	Wake County PROS	Local Private Sector Partners	For a comprehensive sponsorship policy example, see that of Portland Parks and Recreation: www.portlandonline.com/shared/cfm/image.cfm?id=155570 . For a sponsorship brochure example, see that of the 'Mountains to Sound Greenway': http://mtsgreenway.org/events-calendar/greenway-365-sponsorship-brochure	Short Term (2016)
6	Develop a coordinated operations & maintenance plan	Wake County PROS & FDC	Municipal Partners	This plan will help to apportion responsibility between agencies where facilities cross jurisdictional boundaries or where pooled efforts can reduce costs. See the maintenance section of this chapter for more information about best practices for operations and maintenance. See recommendations for use of native plants, pollinator plants, and edible landscaping along greenways on page 137.	Short Term (2016)

PROGRAM ACTION STEPS					
#	Task	Lead Agency	Support	Details	Phase
1	Update and re-release the "Trails & Greenways of Wake County Pocket Guide and Community Resource" booklet	Wake County PROS	Planning Consultant or In-House Design	This popular booklet is one of the most highly requested resource materials by the public. Wake County PROS has distributed all current printed copies and the content is now also in need of an update for accuracy. Note that Raleigh and Cary are currently using a mobile app system for user maps; Wake County should consider providing a similar web-based and/or mobile component.	Short Term (2016)
2	Establish a directory of greenway stakeholder contacts for Wake County	Wake County PROS	All Project Stake-holders	The group could include members from multiple Wake County departments, local municipalities, neighboring jurisdictions, CAMPO, TJCOG, and others listed in the acknowledgments of this plan. Individuals who participated in this planning process at the Stakeholder Workshop, the Steering Committee Meetings, and municipal meetings, should be including in the contact list. This list of contacts could either be maintained privately by those included, or could be made public, on a County-hosted greenways web page.	Short Term (2016)
3	Host a semi-annual Countywide Greenway Trails Workshop	Wake County PROS & FDC	All Project Stake-holders	The purpose of this event is to establish regional coordination for trail development with the members listed above. Meetings should evaluate implementation progress and set goals to be achieved before the following meeting. The group should also make necessary plan updates. Meetings could also feature tours of recently completed sections of trail, and special presentations by stakeholders and invited guests.	Short Term (Fall 2016); Semi-annual meetings thereafter
4	Share GIS data with the PBIN as updates are made to both existing and planned trail facilities in the County	Wake County Community Services	Municipal Partners	The Pedestrian and Bicycle Infrastructure Network (PBIN) is a statewide Geographic Information System (GIS) inventory of existing and planned bicycling and walking facilities in North Carolina. The PBIN is maintained by the North Carolina Department of Transportation Division of Bicycle and Pedestrian Transportation and Institute for Transportation Research and Education (ITRE). More information can be found here: www.itre.ncsu.edu	Ongoing; Consider quarterly updates to match county zoning updates
5	Conduct regular trail user counts	Wake County PROS	Planning Consultant or Using In-House Equipment	Trail usage data is needed to strengthen grant requests and influence policy and funding decisions. A complete picture of trail-user characteristics can be developed and outcomes can help to identify if additional amenities would improve the trail-user experience.	Short Term (2016-2017)
6	Coordinate with school system on greenway issues	Wake County PROS & Municipal Partners	Wake County Schools	Need better coordination with Wake County Schools, particularly around the topics of school siting and greenways as 'essential' versus simply 'bonus'. Greenway connectivity must be considered on the front end of school site development.	Short Term (2016-2017)
7	Continue efforts to reduce crime on greenways	Municipal Partner's Police Departments	Volunteer Groups	Address personal safety concerns on trails. Continue, expand, and emulate programs such as the Raleigh Police Department's Greenway Volunteer Program for personal safety: Any citizen interested in helping keep a watchful eye on greenway trails by reporting back to Parks officials any breach in safety, security or maintenance concerns is invited to apply to become a Greenway Volunteer.	Short Term (2016-2017)

8	Establish a greenway branding and wayfinding system for trails and other points of interest throughout the region	Wake County PROS & Municipal Partners	Planning Consultant or In-House Design	A wayfinding system is recommended to create a cohesive and easy-to-use platform for navigating the regional trail system, once more of the longer-distance trails are connected throughout the County. The system should be designed so that it is flexible enough to be updated as new projects are completed, and should be implemented in conjunction with a statewide and national marketing strategy. See Chapter 3 for more information about signage, wayfinding, and marketing.	Medium Term (2017 -2018)
INFRASTRUCTURE ACTION STEPS					
#	**Task**	**Lead Agency**	**Support**	**Details**	**Phase**
1	Identify and secure specific funding sources for trail corridors (from "Bridge the Gap" projects OR other projects in this report) & begin design and construction phases as possible.	Wake County PROS	CAMPO and Municipal Partners	Partnerships for joint funding opportunities should be pursued, such as through CAMPO's LAPP program. Combine financial and management resources for trail development with surrounding municipalities, regional entities (such as CAMPO), and private sector partners (see Private Sector Engagement section of this Chapter). **Potential TIGER ready projects should be identified for the 1-5 year time frame. "Shovel-ready" designed projects should be prepared in the event that future federal stimulus funds become available.**	Short Term (2016); Ongoing
2	Gather further public support and input during the design phase for trail projects.	Wake County PROS & Municipal Partners	OSAPAC and Local Advisory Committees	Involve the general public and advisory groups, such as OSPAC and Raleigh's Citizens Advisory Councils (CACs), in the design stage for trail development. Some such groups can help with both trail routing ideas and public support from specific neighborhoods.	Short Term (2016); Ongoing
3	Develop a long term funding strategy; Consider limited obligation bonds to fund Wake County PROS projects, including trails.	Wake County PROS	CAMPO and Municipal Partners	To allow continued development of the overall system, capital funds for trail construction should be set aside every year, even if only a small amount; small amounts of local and county funding can be matched to outside funding sources, such as state, Federal, and private funds. Funding for an ongoing maintenance program should also be included in the local operating budgets. Cross-jurisdictional trail projects lend themselves well to collaboration on funding as coordinated multi-jurisdictional projects are looked upon more favorably by outside funding sources than single-jurisdiction applications.	Short Term (2016); Ongoing
4	Make improvements to existing trails & expand marketing efforts for existing trails	Wake County FDC	Municipal Partners	Make improvements to existing trails that enhance the overall experience for trail users. See the regional branding and trail amenities sections of this Plan in Chapter 3 for recommendations. Other examples include evaluating bicyclist speeds in certain areas, and enforcing trail speed limits for safety (Example: Neuse River Trail between Falls of the Neuse Rd and Capital Blvd, as reported through public input). Centerline striping could also be useful in certain areas, with occasional signage indicating that both walkers and cyclists (and everyone else) should keep to the right except when passing.	Medium Term (2016 -2017)
5	Re-evaluate and re-confirm the near-term top priorities	Wake County PROS	CAMPO and Municipal Partners	Every year, reevaluate near-term top priorities based on what has been completed, and reconfirm the agenda of "priority" projects. Consider sticking with earlier projects that were not successful to-date, versus new trail opportunities that may have arisen or become more feasible since 2016.	Medium Term (2017-ongoing)
6	Update this Plan	Wake County PROS & FDC	Project Consultants	In 2021, reassess overall system-wide goals and reevaluate the overall approach to implementation. In 2026, complete a full plan update.	Long Term (2021 & 2026)

Background image, back cover: Bridge over the Neuse River, by Kristy Jackson of the Institute for Transportation Research and Education (ITRE).

WAKE COUNTY

GREENWAY SYSTEM PLAN

2017