



Capital Area Greenway Master Plan

Update / 2022

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Executive Summary



Planning a World-Class System

The Capital Area Greenway Master Plan (CAG Plan) celebrates the history and success of the Capital Area Greenway System (CAG System) while ensuring there is a clear path to serving users' needs years to come. The Executive Summary serves as a snapshot of the entire CAG Plan. It begins by establishing the document's purpose, clarifying key terms, noting key City of Raleigh policies that are directly relevant to the CAG Plan, and providing a history of the CAG System. After providing this context, the Executive Summary provides an overview of how the project team developed the CAG Plan, including its evaluation of existing conditions, engaging with the public to ensure that community voices shaped the effort. Finally, the Executive Summary gives a synopsis of the recommendations contained in the CAG Plan and the path to implementing them.

Purpose

The Capital Area Greenway Master Plan Update (CAG Plan) is a policy document developed to assist the City of Raleigh staff, stakeholders, and elected officials with direction and continued implementation of the Capital Area Greenway Program (CAG Program). Key elements of the CAG Plan include planning and prioritization, operations and maintenance, land securement, funding, design, and implementation. In addition, the purpose of the CAG Plan is to reflect the CAG System's environmental, recreational, and transportation benefits and establish clear recommendations and actions that will prioritize and guide CAG System investment to meet the Raleigh community's needs. The recommendations contained within the CAG Plan are intended to refine the vision for the CAG Program and provide guidance for future policies, projects, programs, and work plans.

Since its inception in the 1970s, the CAG System has been maintained and expanded by Raleigh's Parks, Recreation and Cultural Resources Department (PRCR). It comprises a combination of trails and open space corridors, and it is among Raleigh's most valuable assets because of the way it moves people, preserves ecological habitats, and manages flood-prone areas.

Throughout the CAG Plan, the following key terms describe two distinct elements of the CAG System:

- **Trails** are defined as linear facilities that people can move through and travel along. Colloquially referred to as "greenways," trails

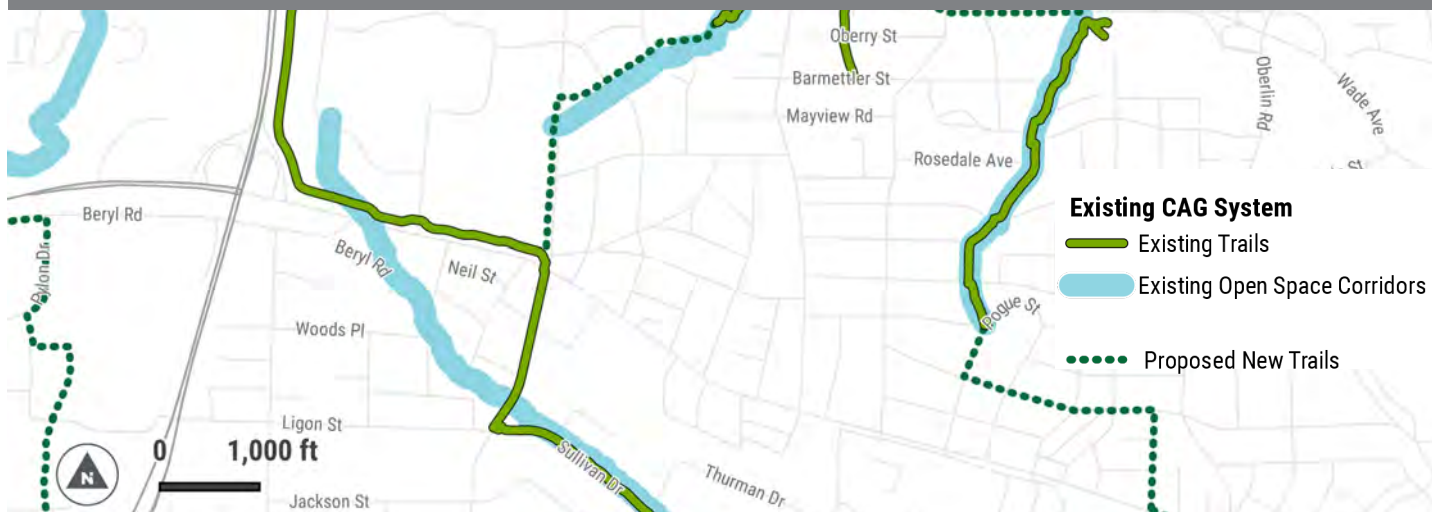
may be paved or unpaved depending on context and trail purpose (e.g., recreation, active transportation, wildlife observation, etc.). Existing and recommended trails run along open space corridors, as well as adjacent to streets and utility corridors. This document uses the term "trail network" to refer to the trails in the CAG System; "trail network" may not include all of the open space corridors that are part of the CAG System.

- **Open space corridors**, which previous planning documents often refer to as greenway corridors, are located exclusively along streams. They have been identified to protect Raleigh's natural green infrastructure, establish places for recreation and transportation, preserve valuable environmental resources, and enhance quality of life. Open space corridors contain many existing trails and areas established for future trail construction, however, due to site-specific constraints some open space corridors may not be appropriate for trail development.

The CAG Plan is a supplement to the 2019 PRCR System Plan Update (System Plan), and it references the following City of Raleigh plans, guidance documents, and policy and legislative resources:

- City of Raleigh FY21-FY25 Strategic Plan
- The City of Raleigh Unified Development Ordinance (UDO)
- The City of Raleigh 2030 Comprehensive Plan (Comprehensive Plan)
- Capital Area Greenway Planning & Design Guide (Design Guide)
- Bike Raleigh Plan

Figure 1: CAG System Elements – Trails and Open Space Corridors



History

In the 1970s, the CAG System began as a planning effort to effectively manage stormwater runoff and flood-prone areas. From the start, the CAG System was used to protect the primary waterways and tributaries throughout Raleigh, defining the early corridors of the system and adding opportunities for recreation along a series of linear parks for residents and visitors. The first Capital Area Greenway Master Plan was created in 1976, and it was most recently updated in 1989. Staff, residents, land developers, and community groups used these early planning documents to identify opportunities for new CAG System trails and corridors. Consequentially, building onto the system helped support environmental and conservation efforts while providing space for recreation. In addition to the original 1976 plan and subsequent update, multiple other formative planning documents influence or are influenced by the CAG Plan and were reviewed as part of the development of this document.



Image 1: 1973 Newspaper Clipping

The City of Raleigh has long understood the CAG System as both a tool for environmental conservation and a place for residents and visitors to recreate. This document adds a new point of focus: ensuring that the CAG System serves as an extension of Raleigh's larger transportation system. Beyond being a tool for flood protection and a place for a fun walk, ride, or roll, the CAG System can be a true transportation asset if the City of Raleigh requires alignments, amenities, and design elements that connect people to places in an equitable and safe manner.

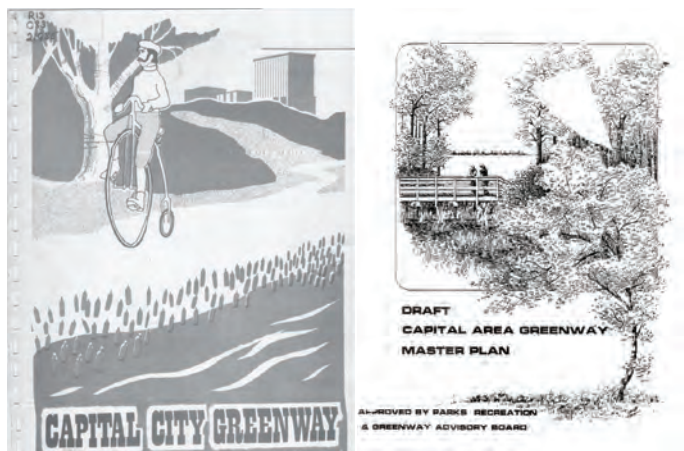


Image 2: Previous Capital Area Greenway Plans



Image 3: Lake Johnson Loop

Existing Conditions

The CAG System includes 117 miles of trails and 371 miles of corridors. The system connects people across Raleigh and has established the city as home to one of the nation's premier greenway systems. People use the CAG System in a variety of ways, including walking, running, wheeling, bicycling, skating, and more. In developing the CAG Plan, the project team assessed existing conditions to gain a clear understanding of both elements that are meeting current needs as well as opportunities for improvements, and to make new recommendations. Existing conditions were organized into the following categories:

- **Environmental Significance:** the importance of the CAG System for preserving the natural characteristics of land, preserving stream corridors to manage stormwater runoff, preserving riparian corridors as a means of protecting water quality, preserving wildlife corridors, providing buffers between land uses, cooling air temperature, and reducing noise and air pollution.
- **Mobility Access:** the degree to which the CAG System is connected to Raleigh's larger transportation system, which impacts quality of life and user experience. The project team evaluated multiple elements that impact mobility access, including sidewalks, on-street bikeways, transit, compliance with the Americans with Disabilities Act (ADA), equity, and safety.
- **Amenities:** the type, quality, and quantity of amenities along the CAG System impacts the overall user experience. The CAG

Plan's review of the location and frequency of existing amenities, such as wayfinding signage, restrooms and drinking fountains, seating, refuse receptacles, bicycle parking and repair, and public art, was based on previous recommendations in the Design Guide, which was completed in 2014. More detailed information on the Design Guide can be found in [Appendix A](#).

- **Existing Policies:** policies and regulatory documents that govern the land securement, design, easement dedication, funding, and construction of the CAG System provide a solid foundation for recommendations.



Image 4: Shelley Lake Trail

Trails and open space corridors throughout the city give users the opportunity to spend time outside, exercise, and explore Raleigh. Findings from the existing conditions analysis highlight the CAG System's multiple success stories while also clarifying gaps and opportunities for enhancements.

The following is a summary of findings related to those opportunities:

- Safety and accessibility for the CAG System and integration into the larger transportation network will require more complete sidewalks near trail access points, improvements to at-grade street crossings for trails, and new separated on-street bikeways that provide seamless transitions from the CAG trail network to schools, parks, and transit along the city's street network.
- Wayfinding signage is limited near access points and trail-to-trail intersections. Additional wayfinding would increase awareness for people on the system and direct people to local and regional destinations.
- Existing policies and standards for street design and access should maximize the benefits of future trails developed near new development. However, these policies as written today lack direction on increasing connectivity for trails that are adjacent to property with little potential for new development.
- A variety of trail features are included in the Design Guide (e.g., lighting, increased hours of operation, and striping trails to separate users), all of which could impact user comfort and encourage non-recreational trail trips. However, there is not a clear policy on implementation.

Community Voices



Image 5: Public Outreach

Hearing from and incorporating input from the public was a top priority as the project team began work on the CAG Plan. Outreach and engagement were guided by the steering committee, which comprised representatives with an array of backgrounds and interests (i.e., biking advocates, economic development, social equity). The committee, along with a design review team of staff from various City departments, worked with the project team to provide multiple opportunities for meaningful public engagement.

During the CAG Plan development process, the COVID-19 pandemic surged throughout the United States and across the world, resulting in widespread social distancing and restricted public gatherings. This required an unforeseen shift in the approach to all aspects of the CAG Plan's development, especially public outreach. Despite obstacles related to the COVID-19 pandemic, the

project team continued to engage the community through online surveys, virtual meetings with the project steering committee and a number of focus groups, and outreach to community-based organizations to provide ample opportunity for the public to get involved. The planning process involved three phases of outreach:

- **Listen:** this phase focused on gaining a more comprehensive understanding of what it's like to use the CAG System as it is today.
- **Update + Check-in:** the project team shared findings from the existing conditions assessment with the public to ensure their voice was heard accurately before recommendations were developed.
- **Reveal + Refine:** the draft of the CAG Plan, including its recommendations, were shared with the public for review. The project team used feedback to refine content and ensure that the final CAG Plan reflects community values and desires.

Recommendations and Implementation

The CAG Plan provides a clear path forward for expanding and reinvesting in the CAG System and, ultimately, creating a connected, safe, and convenient network of trails and open space corridors. Forward-looking recommendations will serve all users, from the recreational birdwatcher to the avid bicycle commuter to the first-time trail visitor, all the while preserving natural areas that provide ecosystem and that are important to Raleigh's overall character and livability.

The CAG Plan's categories for recommendations are grouped as follows:

- System-wide
- Trail Classifications
- New Trails and Prioritization
- Open Space Corridors
- Existing Trail Reinvestments
- Trail Amenities
- Maintenance and Operations
- Program Funding
- Planning and Development
- Environmental Stewardship
- Trail Security
- Collaboration and Partnerships

It will take time to implement the recommendations; some recommended actions will happen during a 100-day action plan after the CAG Plan is adopted, while others will be accomplished within 5 years. Accordingly, the CAG Plan includes an implementation plan that categorizes recommendations as ongoing, immediate term (0-2 years), or short term (3-5 years). Additionally, the 100-day action plan outlines valuable actions the City of Raleigh and the PRCR staff can take to maintain momentum.

This document has been developed to reflect national standards and best practices while also speaking directly to the Raleigh community's needs and desires. With every future CAG Plan update, recommendations and the implementation plan should be reassessed. Items that have been completed should be removed, and new actions that are necessary to further the CAG Program's success should be added.



CHAPTER 1

Introduction



Purpose

The City of Raleigh is renowned for the CAG System, which has been expanding since its first segment was constructed in the 1970s. Comprising multiple trails and corridors, the CAG System consistently encourages both new and long-time users to get outside and explore. It is one of Raleigh's greatest assets.

As part of the PRCR System Plan Update, the CAG Plan focuses on the future of the CAG System. This document lays out a path for addressing the needs of a growing community—equitable access, recreational opportunities, environmental conservation, active transportation, connections to transit, and more—through strategic and thoughtful recommendations. The CAG Plan balances two key needs: updating and enhancing the existing trail network and expanding the system to new parts of the city. In addition to weighing existing and future user needs, the CAG Plan considers the critical role that the trail system has played through the COVID-19 pandemic. The CAG Plan's recommendations integrate findings that will shape trail construction and reinvestment.

History

Since the CAG System's inception, a number of planning efforts and associated documents have influenced where trails and open space corridors are and what they look like. More than that, these efforts have also laid out the framework that PRCR

has used to plan, design, construct, and maintain the CAG System. These extant planning documents provide the context of why the CAG System was developed, what the vision was for the future of the CAG System at that time, and what challenges the CAG System has encountered throughout its history.

GREENWAY COMMISSION REPORT

- Touted benefit to the entire Raleigh metro area
- Suggested the Parks and Recreation Department manage greenways

GREENWAY COMMISSION REPORT

- Emphasized public education and increased maintenance needs
- Suggested leases and easements as acquisition alternatives

GREENWAY COMMISSION REPORT

- Expressed need for maintenance and more efficient construction
- Recommends study of mandatory greenway easement dedications

The Greenway Commission

Raleigh's City Council created the Greenway Commission in 1974 to oversee the development of the CAG System. Today, this group is called the Greenways Committee and is part of the Parks, Recreation and Greenway Advisory Board.

1976

CAG MASTER PLAN

- Promoted greenways as land use buffer, growth management tool, and alternative transportation
- Targeted flood-prone areas
- Focused on how the CAG benefits urban areas
- Established hierarchical stream classifications
- Established policy and legal authority to acquire land and construct the CAG System
- Developed methods for determining trail widths to fit varying situations

1983

1984

1986

CAG MASTER PLAN

- Established Crabtree Creek, Walnut Creek, and the Neuse River as the backbone of the CAG System
- Provided acquisition criteria; recommended against purchasing new land

1989

CAG MASTER PLAN UPDATE

- Defined greenway components
- Prioritized accessibility and connectivity
- Specified acquisition strategies with focus on easements and dedication during plan review

Vision & Guiding Principles

The CAG Plan's vision and guiding principles align with those established during the PRCR System Plan Update. The CAG Plan's vision and guiding principles align with those established during the PRCR System Plan Update. More detailed information on the PRCR System Plan can be found in [Appendix A](#).

Vision

The City of Raleigh's vision for its parks, recreation and cultural resources system is "bringing people to parks and parks to people."

Guiding Principles

- Connectivity and Accessibility
- Equitable Distribution
- Continuous Reinvestment
- Collaboration and Coordination
- Balanced Experience
- Innovation
- Communication and Engagement

Greenways 101

User Groups

Greenway trails attract many types of users, all of which have unique needs and expectations—they may want to explore nature, exercise vigorously, or just take a breath of fresh air. Broadly speaking, the reasons people use trails fit into the following categories:



Greenway Benefits

The CAG System provides numerous benefits to people who live, work, and play in Raleigh. Trails provide places for physical activity, contribute to a multimodal transportation network, connect people with nature, and spur economic development. Open space corridors preserve the city's natural environment and provide dedicated space for wildlife and vegetation.



OPEN SPACE PRESERVATION

Conserving natural resources is an important piece of the legacy we will leave for Raleigh's future generations. Open space corridors preserve natural areas in the face of rapid development, protecting habitat for the many animals, insects, and plants that are important and unique to our region. Open space corridors also improve water and air quality, as they mitigate stormwater runoff, encourage water table recharge, and provide space for trees that reduce carbon dioxide in the atmosphere.



HEALTH

The United States Centers for Disease Control and Prevention has found that moderate physical activity can substantially improve one's physical health, mental health, and quality of life.¹ Trails provide inexpensive opportunities for active lifestyles by dedicating space for people to walk, wheel, jog, and bike. Trails also offer access to nature where people can relax and recharge.



RECREATION

Trails provide a dedicated space for people to exercise outdoors and enjoy the natural environment. Many trails are also connected to parks, water-based activities, and other areas for play.



ACTIVE TRANSPORTATION

Trails that are integrated with the sidewalk, bikeway, and public transit network can serve as active transportation corridors, connecting people to the places they need and want to go. As trails are physically separated from vehicular traffic, they also often provide a more comfortable active transportation experience for people of all ages and abilities.



ECONOMIC DEVELOPMENT

As a desired community asset, trails often increase adjacent property values, which benefits property owners, developers, and local government agencies. They also attract businesses and tourists, spurring economic investment and activity. Trail access near businesses has been shown to increase sales revenue.^{2,3} For example, one year after the Swamp Rabbit Trail opened in Greenville, SC, nearby businesses reported increases in sales and revenue ranging from 30% to 85%.

Planning Context

In developing the CAG Plan, the project team reviewed multiple plans and documents. These included guiding documents for PRCR staff that influence trail and open space corridor planning and applicable construction along with documents that impact work plans and strategies for constructing and maintaining the CAG System. In addition to PRCR plans, documents developed by other City of Raleigh departments highlight trails as transportation assets and vital community resources. City-wide documents, such as the Comprehensive Plan, establish a vision for Raleigh and guide development, which impact development patterns and overarching goals and objectives. County-level plans do not guide development within Raleigh, but they supplement the City's planning efforts and may be factors in decisions related to changes within the CAG System. The full list of plans and documents reviewed include:

- 1976 Greenway Commission Report
- 1976 Capital City Greenway Master Plan
- 1983 Greenway Commission Report
- 1984 Greenway Commission Report
- 1986 Capital Area Greenway Master Plan
- 1989 Capital Area Greenway Master Plan Update
- City of Raleigh Strategic Plan
- 2030 Comprehensive Plan Update
- Unified Development Ordinance
- PRCR Departmental Business Plan
- PRCR Departmental System Plan
- Capital Area Greenway Planning & Design Guide
- Bike Raleigh Plan

- Public Participation Policy for Park Planning
- Wake County Greenway Plan
- Capital Area Greenway System Operations and Management Plan
- Avent Ferry Corridor Study
- Avent West Area Plan
- Buffalo-New Hope Area Plan
- Cameron Village & Hillsborough Street Small Area Plans
- Arena Blue-Ridge Area Plan
- King Charles Neighborhood Plan
- New Bern Avenue Corridor Study
- Southern Gateway Corridor Study
- Wake Crossroads Area Plan
- Crabtree Valley Transportation Study
- Falls North Small Area Plan
- Downtown West Gateway Area Plan

Table 1, on the following page, highlights particularly formative plans. A full list of how each above-listed plan impacts the CAG System's objectives and goals is available in [Appendix A](#).

Table 1: Formative Plans Review

PLAN NAME	DESCRIPTION
2030 Comprehensive Plan Update (2019)	<ul style="list-style-type: none"> Promotes greenways for environmental protection with some policies to boost use for transportation (supports connectivity, wayfinding, use of rail corridors) No guidance on identifying greenway corridors outside stream corridors Contains area plans with specific recommendations for trail projects
PRCR Department Business Plan FY 19-21 (2018)	<ul style="list-style-type: none"> Focus on aligning projects with city-wide efforts (transit, affordable housing) Calls for improved access among vulnerable communities
City of Raleigh Strategic Plan FY 21-25 (2020, annual updates)	<ul style="list-style-type: none"> Supports trails as transportation options and added amenities for improved user experience Supports completing, adopting, and implementing the CAG Master Plan
Unified Development Ordinance for the City of Raleigh, NC Update (2016)	<ul style="list-style-type: none"> Requires land reservation in proposed greenway corridors; encourages greenways for open space requirements Majority of street typologies require sidewalks, but do not require multi-use trail or bicycle facilities
Wake County Greenway Plan (2017)	<ul style="list-style-type: none"> Shows Wake County's potential to facilitate and complete trail development at jurisdictional boundaries; states preference for natural surface trails
Bike Raleigh (2016)	<ul style="list-style-type: none"> Bike commuters emphasized need for extended greenway operating hours Recommends lighting on key routes along with maintenance and signage to reduce travel time on main commuter routes
Capital Area Greenway Planning & Design Guide (2015)	<ul style="list-style-type: none"> Focuses on safe user experience and environmental stewardship Provides facility and material selection guidance, but lacks comprehensive overview of potential bicycle facilities
Capital Area Greenway System Operations and Management Plan (2014)	<ul style="list-style-type: none"> Provides maintenance and operations guidance Lacks specific requirements and frequencies of maintenance tasks
PRCR Department System Plan (2014)	<ul style="list-style-type: none"> Promotes linking greenways to live, work, play destinations Creates greenway corridor hierarchy; identifies need to diversify funding sources
Public Participation Policy for Park Planning Update (2014)	<ul style="list-style-type: none"> Establishes PRCR procedures with goal of consensus-based decision-making

CHAPTER 1 REFERENCES

1. The Centers for Disease Control and Prevention, *Physical Activity and Health: A Report of the Surgeon General*, (1999). <https://www.cdc.gov/nccdphp/sgr/pdf/execsumm.pdf>
2. Greenville Health System, *Swamp Rabbit Trail: Year 2 Findings*, (2014). https://www.rutherfordcountync.gov/document_center/Outdoor%20Recreation%20-%20Economic%20Impact%20Analysis/SRT%20Impact%20Study%20Year%202%20Final.pdf
3. West Virginia University Health Research Center, *Business Impact of Monongalia River Trails System (West Virginia)*, (2017). <https://www.americantrails.org/images/documents/BusinessImpact-MonongaliaRiverTrails.pdf>



CHAPTER 2

The Capital Area Greenway System Today



CAG System Overview

The CAG System is a combination of corridors and trails that are popular among residents and visitors alike. Many enjoy the abundant opportunities trails provide to appreciate nature, engage in active recreation, and bicycle or walk to destinations throughout the city. Even still, there are opportunities for the system to more equitably serve Raleigh residents while continuing to preserve the natural environment. This chapter summarizes key findings from the Existing Conditions Analysis ([Appendix B](#)), including:

- An overview of the existing trail network, including how the City currently classifies trails.
- A description of the environmental significance of the CAG System.
- An analysis of the unique experiences of people who walk, bicycle, or wheel to, from, and along the trail network, whether for transportation or recreational purposes.
- An inventory of amenities available to trail users.
- An evaluation of policies related to trail construction and corridor preservation.
- A summary of key findings that informed recommendations.

Existing System

The CAG System has grown to just over 117 miles of trails and 371 miles of open space corridors since the early 1970s, when plans for a city-wide system started to take shape.

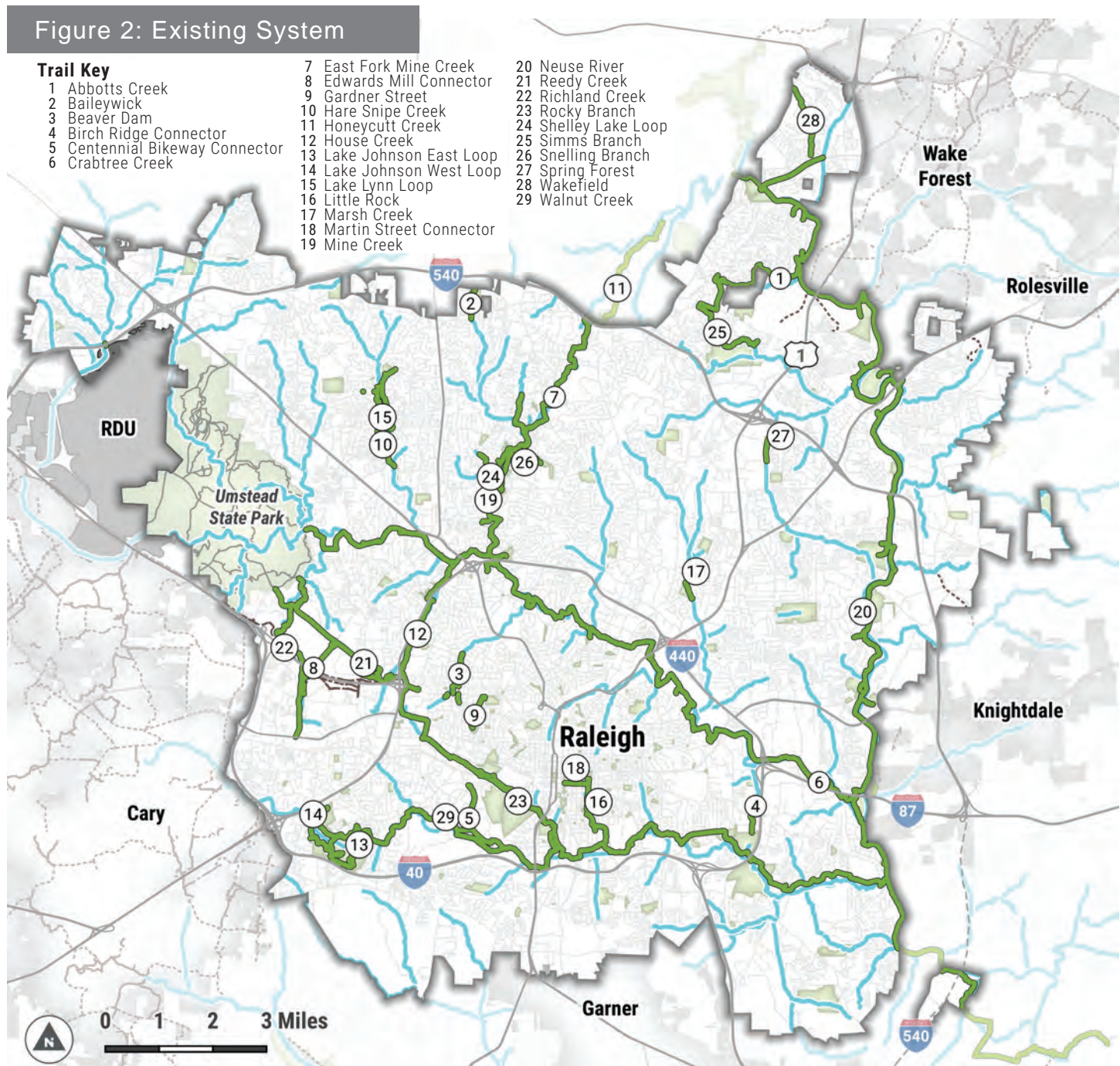


Table 2: Capital Area Greenway System Trails, Mileage, Surface, and Width

TRAIL KEY ID	TRAIL	MILEAGE	SURFACE	MIN. TRAIL WIDTH (FT)	MAX. TRAIL WIDTH (FT)
1	Abbotts Creek	3.3	Paved	5	10
2	Baileywick	0.6	Paved	10	10
3	Beaver Dam	1.1	Unpaved	4	8
4	Birch Ridge Connector	0.3	Paved	8	8
5	Centennial Bikeway Connector	2.5	Paved	5	10
6	Crabtree Creek	15.9	Paved	4	14
7	East Fork Mine Creek	2.5	Paved	5	12
8	Edwards Mill Connector	2.1	Paved	10	10
9	Gardner Street	0.8	Unpaved	3	12
10	Hare Snipe Creek	2.3	Paved	4	8
11	Honeycutt Creek	3.8	Paved & Unpaved	2	12
12	House Creek	3.2	Paved	5	11
13	Lake Johnson East Loop	2.8	Paved	4	12
14	Lake Johnson West Loop	2.1	Unpaved	4	12
15	Lake Lynn Loop	1.2	Paved	10	10
16	Little Rock	1.8	Paved	5	10
17	Marsh Creek	0.4	Paved	6	8
18	Martin Street Connector	0.4	Paved	5	5
19	Mine Creek	4.2	Paved & Unpaved	2	12
20	Neuse River	31.5	Paved	4	12
21	Reedy Creek	5.0	Paved	10	12
22	Richland Creek	3.1	Unpaved	2	15
23	Rocky Branch	3.9	Paved	5	10
24	Shelley Lake Loop	2.3	Paved	8	12
25	Simms Branch	1.9	Paved	4	10
26	Snelling Branch	0.9	Paved	6	8
27	Spring Forest	0.3	Paved	10	10
28	Wakefield	1.4	Unpaved	5	8
29	Walnut Creek	15.6	Paved	4	14
TOTAL		117.1	--	--	--

Regional Connections

Although the CAG System includes trails and opens space corridors throughout the City of Raleigh, it ties into a regional network of trails extending into Wake County and the surrounding communities of Cary, Garner, Wake Forest, Knightdale, and Rolesville. The following four larger regional trails also connect to and incorporate trails within the CAG System:

- Wake County Greenways: 300+ miles of trails surrounding the City of Raleigh and over 70 miles of trails in Cary alone.
- Triangle Bikeway: 17-mile shared-use path linking Raleigh, Cary, Research Triangle Park (RTP), Durham, and Chapel Hill.
- Mountains-to-Sea Trail: 1,175-mile hiking trail stretching from the Great Smoky Mountains to the Outer Banks.
- East Coast Greenway: 3,000 miles of trails and roads connecting 450 cities and towns from Maine to Florida.



Image 6: Bike-packer on the Mountains-to-Sea Trail

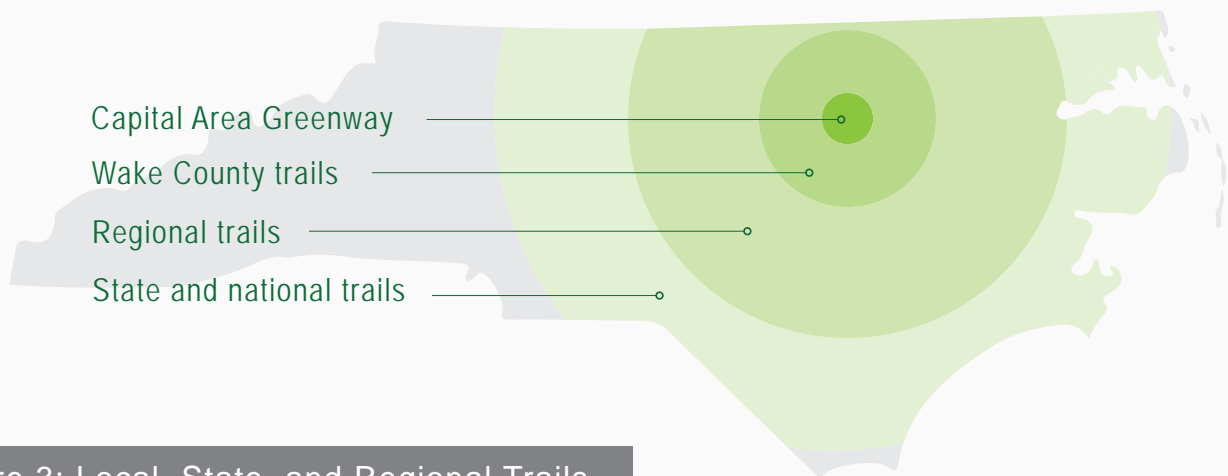
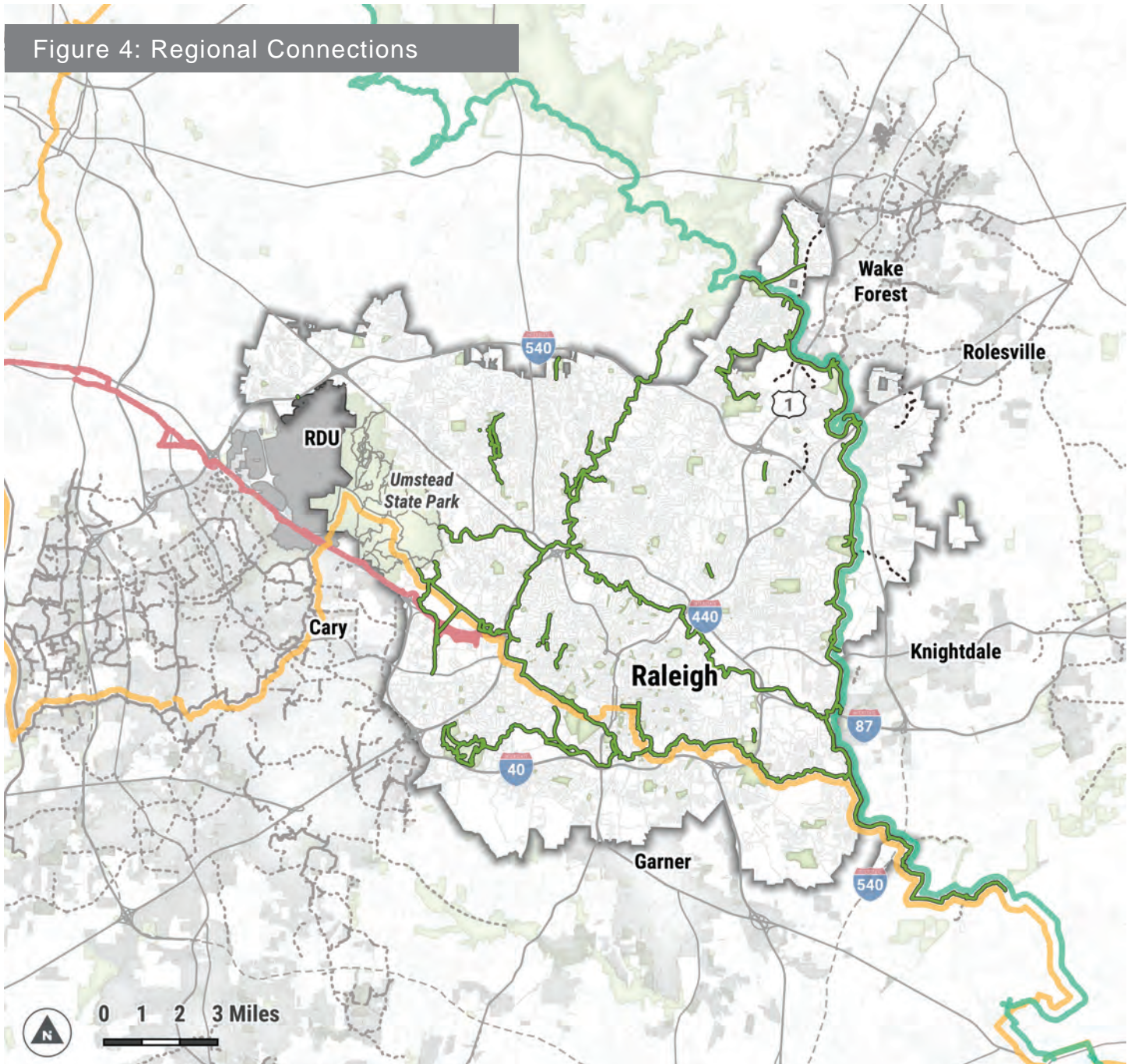


Figure 3: Local, State, and Regional Trails

Figure 4: Regional Connections



Existing CAG System

— Trails

Trails in Adjacent Jurisdictions

— Existing/Funded

- - - - - Proposed

— Mountains-to-Sea Trail

— East Coast Greenway

— Triangle Bikeway

■ Parks

Trail Classifications

Trails serve a wide variety of users and trip purposes. The Design Guide includes a trail classification system for the CAG System that reflects the wide range of trail function and character. This system uses location, purpose, user type and potential conflicts to classify trail types, and the Design Guide includes specific design

guidance for each classification. It is important to note that while trails differ by classification, there are shared design features and amenities between classifications. Most existing trails fall under the Cross City Greenway Trail classification, while most planned trails fall under Greenway Collector Trail. [Appendix B](#) includes more information on the existing trail classification system.

Table 3: Existing Capital Area Greenway System Trail Classifications

TRAIL TYPE	DESCRIPTION	LOCATION	WIDTH	SURFACE
Cross City Greenway Trails	Main routes crossing the city with connections to adjacent jurisdictions	Streams, utility easements, roadways	<ul style="list-style-type: none"> 10-14 ft. 12 ft. preferred 	Asphalt or concrete
Greenway Collector Trails	Connections with many access points to larger residential, employment, & retail centers	Streams, utility easements, roadways	<ul style="list-style-type: none"> 10 ft. preferred 12 ft. maximum 	Asphalt or concrete
Greenway Collector Trails - Loop Trail (subcategory)	Destination-oriented trails around lakes and other destinations	--	<ul style="list-style-type: none"> 10-14 ft. 12 ft. preferred 	Asphalt, concrete, granite fines, bare earth
Neighborhood Greenway Trails	Connections with many access points into neighborhoods, parks, retail centers, and employment centers	In-between lot connectivity typical	<ul style="list-style-type: none"> 8-10 ft. preferred 12 ft. maximum 	Asphalt, concrete, granite fines, bare earth
Greenway Connectors	Transportation-oriented sidepaths linking trail corridors	Road right-of-way, utility easements	<ul style="list-style-type: none"> 10 ft. preferred 	Asphalt or concrete

Environmental Significance



Image 7: Boardwalk Over Walnut Creek

The CAG Program is a crucial protector of Raleigh's natural environment now, and it will be as the city continues to grow. The 1976 Capital Area Greenway Master Plan underscored the CAG System's environmental benefits, noting that it would help preserve the following: the natural characteristics of the land, stream corridors (in order to manage stormwater runoff), riparian corridors (as a means of protecting water quality), and wildlife corridors. The CAG System was also established to reduce noise pollution and air pollution and to cool air temperature. The CAG System also prevents thermal shock to stream wildlife, which occurs when stormwater heats up on hot pavement and then runs into streams, quickly transferring that heat and threatening fish and other creatures.

As areas of Raleigh continue to develop and impervious surfaces increase, it will be important to ensure protection of stream buffers and flood-

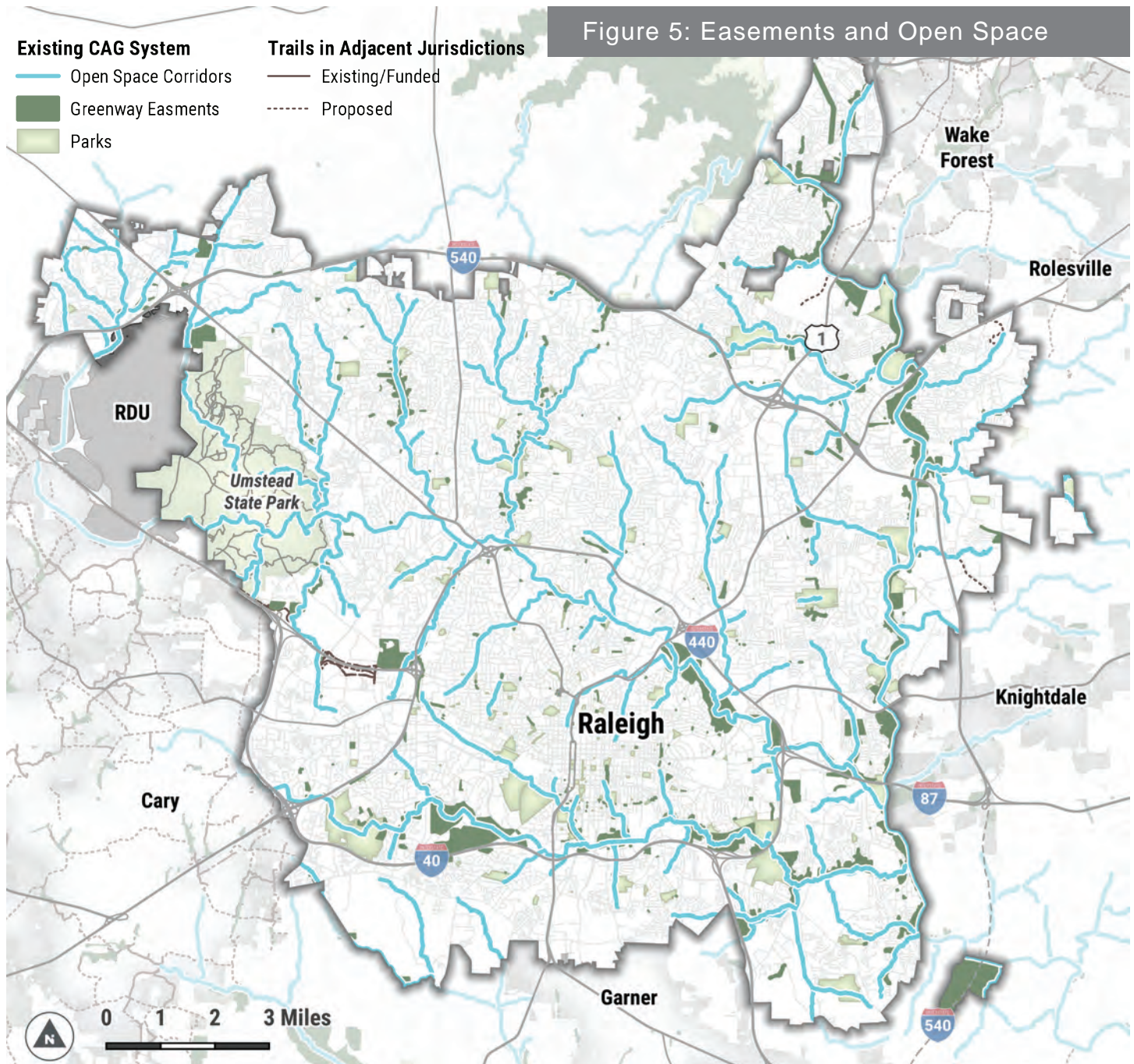
prone areas by continuing to protect adjacent natural resources through policy and other requirements. In the time since its corridors were originally established, the CAG System has preserved 3,900 acres of land. The CAG System and its connections to large areas of undeveloped land also contribute to the creation of wildlife corridors, where animals can move freely between habitats without barriers or risks associated with development. The many native species that dwell within land protected by the CAG System include gray foxes, ebony jewelwings, downy woodpeckers, green herons, river cooters, Eastern box turtles, crawdads, white tail deer, and luna moths. The flora of the CAG System is equally diverse, with such species as hearts-a-bustin', crane-fly orchids, American beech trees, elderberry, swamp rose mallow, Jack in the pulpit, Christmas fern, and sensitive fern. The seasonal changes to flora and fauna contribute to the overall CAG System user experience.



Image 8: Blue Heron Near Trail

Protecting Open Spaces

The CAG System includes 270 miles of Open Space Corridors and 3,900 acres of conserved land in Greenway easements.



Open Space Benefits

Greenway easements and open space corridors designate and set aside land areas where future greenways may be built. While easements may include manmade utilities, such as power or gas lines, open space corridors are located solely along streams. This means open space corridors create an interconnected web of protected land around some of Raleigh's most biodiverse areas.

The interconnectedness of the CAG System's open space corridors contributes to their environmental significance because open spaces that are linked to one another benefit wildlife more than small, isolated patches of open space. Additionally, open space corridors provide opportunities for environmental monitoring and stream restoration efforts, which can improve habitat and reduce risk of erosion. Image 10 shows stream restoration in an open space corridor that crosses Kentwood Park.

The CAG System's open space corridors also complement other state-mandated environmental regulations. Many of the streams that are designated as open space corridors are also subject to the Riparian Buffer Rules for the Neuse and Tar-Pamlico River Basins. These rules require a 30' buffer of undisturbed vegetation from the top of the streambank with an additional 20' buffer of managed vegetation. Low-impact uses such as greenways are allowed in this outer buffer. This makes open space corridors one of the CAG System's most important environmental assets.



Image 9: Power Easement Near Anderson Point



Image 10: Open Space Corridor Along Bushy Branch with Engineered Weir

Mobility Access

Trails connect parks, neighborhoods, businesses, and other important community destinations, strengthening residents' quality of life and visitors' experience in Raleigh through mobility and outdoor recreation opportunities. A user's ability to access the trail network directly impacts their experience. Factors that influence bicyclist and pedestrian access to the trail network include presence and quality of a multimodal transportation network (sidewalks, bikeways, and transit), accessibility, equity, and safety (street crossings and crashes). This section describes each of these components and why they are important, highlights successes along the CAG trail network today, and identifies opportunities for improvement. [Appendix B](#) contains a complete Existing Conditions Analysis.

Sidewalks

Significance

Whether or not a user is able to walk or wheel to the trail network is dependent on the existence and quality of the city's sidewalk network. Figure 6 illustrates where sidewalk exists and where there are gaps within 2 miles of trail access points. To determine how well trails are connected to the sidewalk network, the project team looked at the number and percentage of access points that touch sidewalk within 100 feet (defined as direct access), half a mile, 1 mile, 1.5 miles, and 2 miles of each access point. The project team also measured the percentage of complete sidewalk (i.e., sidewalk on

both sides of the street) within 100 feet, half a mile, 1 mile, 1.5 miles, and 2 miles of each access point.

What is Going Well

Many trail access points are within 100 feet of existing sidewalk (67.3%) and even more connect to sidewalk within increasing half mile increments. The most robust sidewalk network can be found downtown.

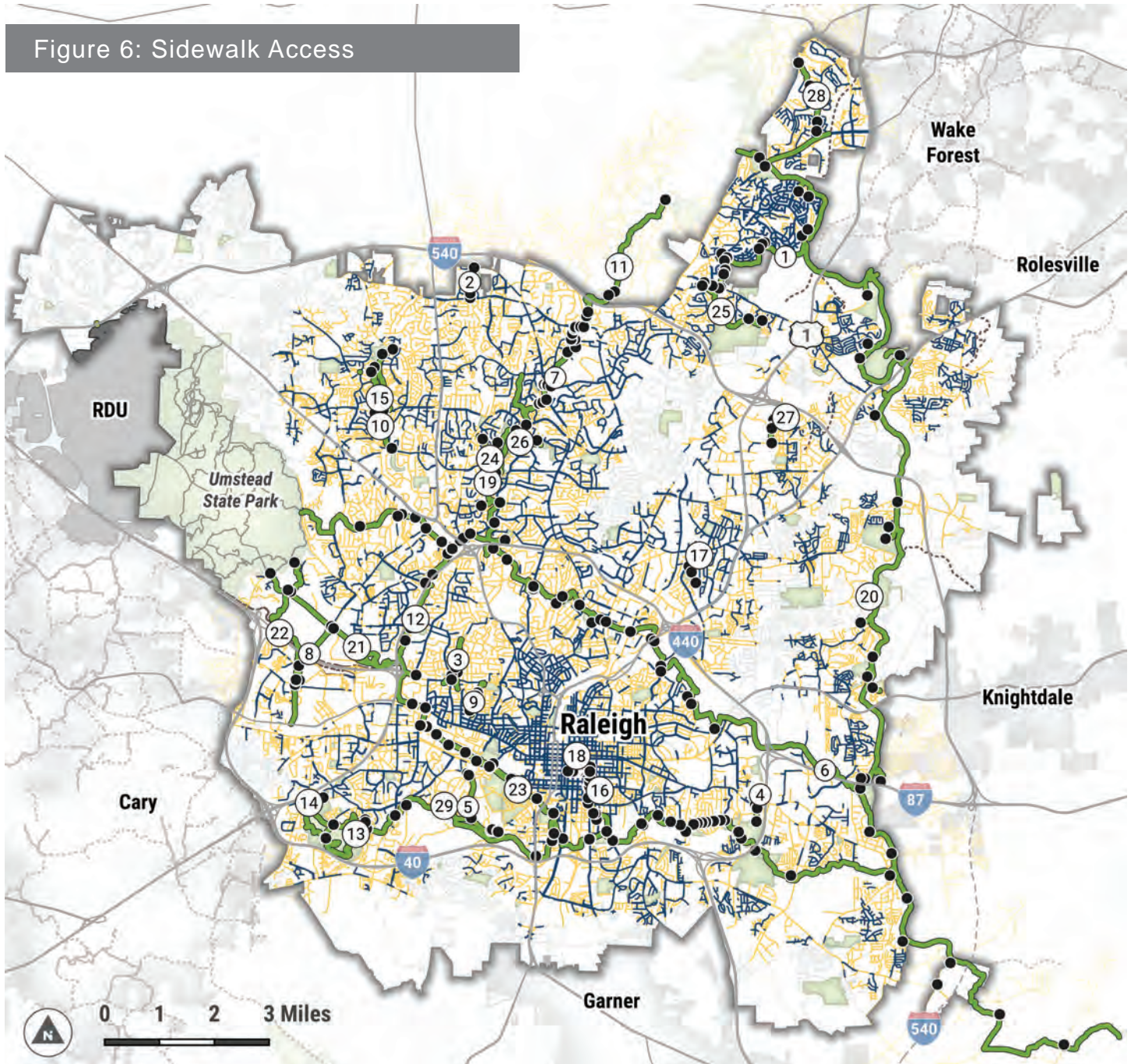
Room for Improvement

While many trail access points connect directly to sidewalk, this does not mean there is a complete sidewalk network—where there is sidewalk on both sides of the street—surrounding these access points. Only 30% of the city's sidewalk network that falls within a half mile of trail access point is complete.



Image 11: Sidewalk Connection

Figure 6: Sidewalk Access



2-Mile Sidewalk Access

- Existing Sidewalk
- Sidewalk Gap
- Trail Access Point
- Existing Trails

Parks

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
| 4 Birch Ridge Connector | 13 Lake Johnson East Loop | 23 Rocky Branch |
| 5 Centennial Bikeway Connector | 14 Lake Johnson West Loop | 24 Shelley Lake Loop |
| 6 Crabtree Creek | 15 Lake Lynn Loop | 25 Simms Branch |
| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Springfield |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Bikeways

Significance

For people of all ages and abilities to choose bicycling as their way of accessing the CAG System, a well-connected network of bikeway facilities that makes people feel safe and comfortable is essential. Figure 7 shows how the bikeway network interacts with the trail network. For the purposes of this analysis, the project team did not include bicycle facilities categorized as “shared lane markings” or “wide outside lane,” as these facilities provide less separation or roadway dedication and are often not facilities designed for people of all ages and abilities. In addition, trails were not included as a “bikeway,” as excluding them allowed for a better understanding of the relationship between the trail network and bikeways on or adjacent to the street network.

What is Going Well

Segments of the bikeway network do connect to some trails. For example, Little Rock Creek Trail is connected to bicycle lanes in downtown, which comprise the most robust section of Raleigh’s existing bikeway network. Other trails that connect to a portion of the city’s bikeway network include the following: Wakefield Trail, East Fork Mine Creek Trail, Crabtree Creek Trail, House Creek Trail, Edwards Mill Connector, Reedy Creek Trail, Beaver Dam Trail, Rocky Branch Trail, and Walnut Creek Trail.

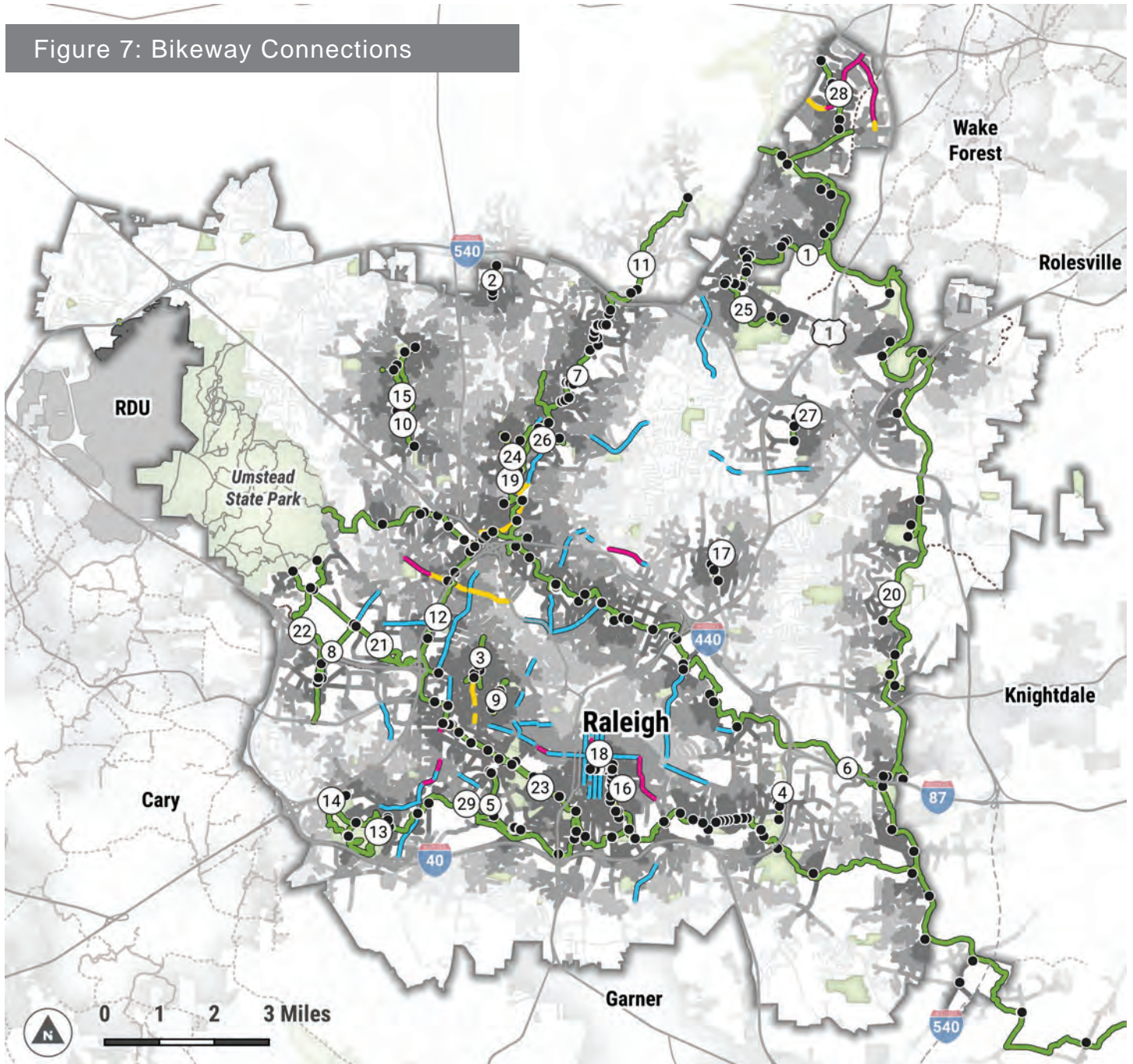
Room for Improvement

Few of the CAG System’s trail access points (8.5%) are directly accessible by an existing bikeway. Furthermore, while some trails are connected to a bikeway, on-street bikeways do not necessarily provide safe and comfortable connections for people to move between the places they live, work, and play and the trail network.



Image 12: Protected Bikeway

Figure 7: Bikeway Connections



Bikeway Access

- Trail Access Point
- 0.5 Mile Access
- 1 Mile Access
- 1.5 Mile Access
- 2 Mile Access
- Existing Trails
- Parks

On-Street Bikeways

- Buffered Bike Lanes
- Bike Lanes
- Sharrows

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
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| | 19 Mine Creek | 29 Walnut Creek |

Transit

Significance

Trail access by public transit is important for those who may be unable to walk or bicycle to a trail access point. In addition, transit stops near access points connect CAG System users with areas of the city that may not be reachable by walking or bicycling. Nearby stops allow transit-dependent populations to easily use the CAG trail network for mobility and may provide a link to employment and education opportunities, as well as other key community resources. Figure 8 shows how Raleigh's transit network interacts with the existing trail network.

What is Going Well

Just over half of trail network's access points are within a half mile of a transit stop. These transit stops connect users to the majority of GoRaleigh routes. Most trail access points near downtown Raleigh—specifically along Western Boulevard and along Walnut Creek Trail between South Raleigh Boulevard and Sunnybrook Road—are within 500 feet of a transit stop.

Room for Improvement

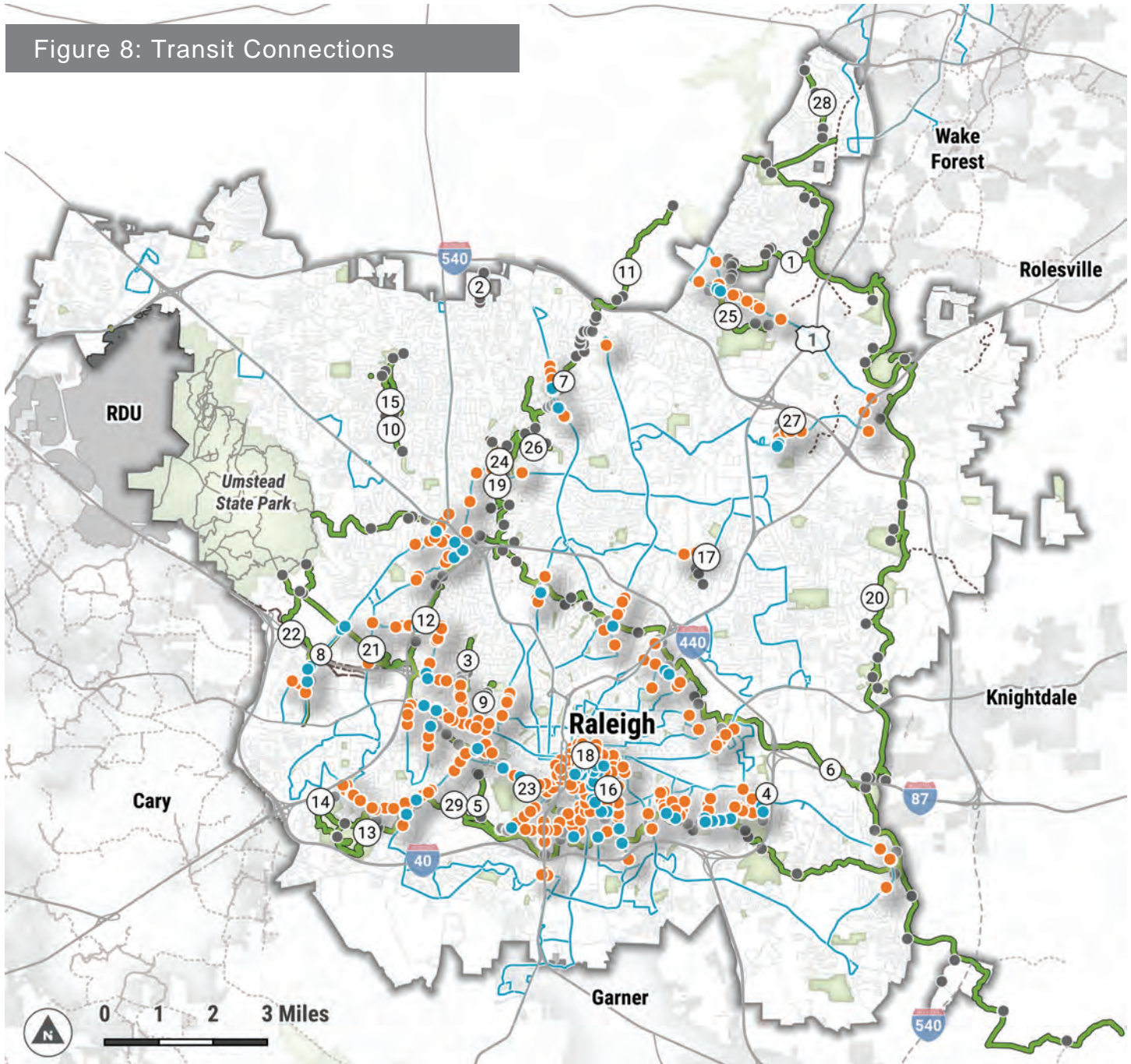
Only a third of the trail network's access points are within 500 feet of a transit stop. Notably, trail access points along the Neuse River Trail either have no transit access or have a bus stop within a half mile, and there are no transit stops within 500 feet of an access point to the Neuse River Trail. In addition,

none of the Loop trails (Shelley Lake Loop, Lake Johnson East Loop, Lake Johnson West Loop, or Lake Lynn Loop) have transit access within 500 feet.



Image 13: Bus Stop on Trail

Figure 8: Transit Connections



Bus Stop Distance to Access Point

- Trail Access Point
- Bus Stop Within 500 Feet
- Bus Stop Within 1/2 Mile
- GoRaleigh Routes
- Parks

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
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| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Curb Ramps

Significance

People that use wheelchairs or other mobility devices benefit from Americans with Disabilities Act (ADA)-compliant curb ramps when accessing trails. Curb ramps with appropriate slopes, adequate width, and other universal design features can facilitate, rather than hinder, wheel-based pedestrian travel. For this analysis, the project team assessed the presence of ADA-compliant curb ramps within 25 feet of trail access points. Figure 9 highlights how ADA-compliant curb ramps are distributed around trail access points.

What is Going Well

Trails with a higher density of ADA-compliant curb ramps near their access points include the following: Martin Street Connector, Walnut Creek Trail between Rose Lane and Worthdale Park, Abbotts Creek Trail adjacent to Raven Ridge Road and along Durant Road, Crabtree Creek Trail near Blue Ridge Road, and East Fork Mine Creek Trail at Strickland Road and Six Forks Road. Rocky Branch Trail has ADA-compliant curb ramps scattered throughout its entirety.

Room for Improvement

Only 35% of trail access points have ADA-compliant curb ramps within 25 feet. Trails with notable gaps in ADA compliance include Crabtree Creek east of Raleigh Boulevard and Walnut Creek Trail east of I-440 and between South Wilmington Street and

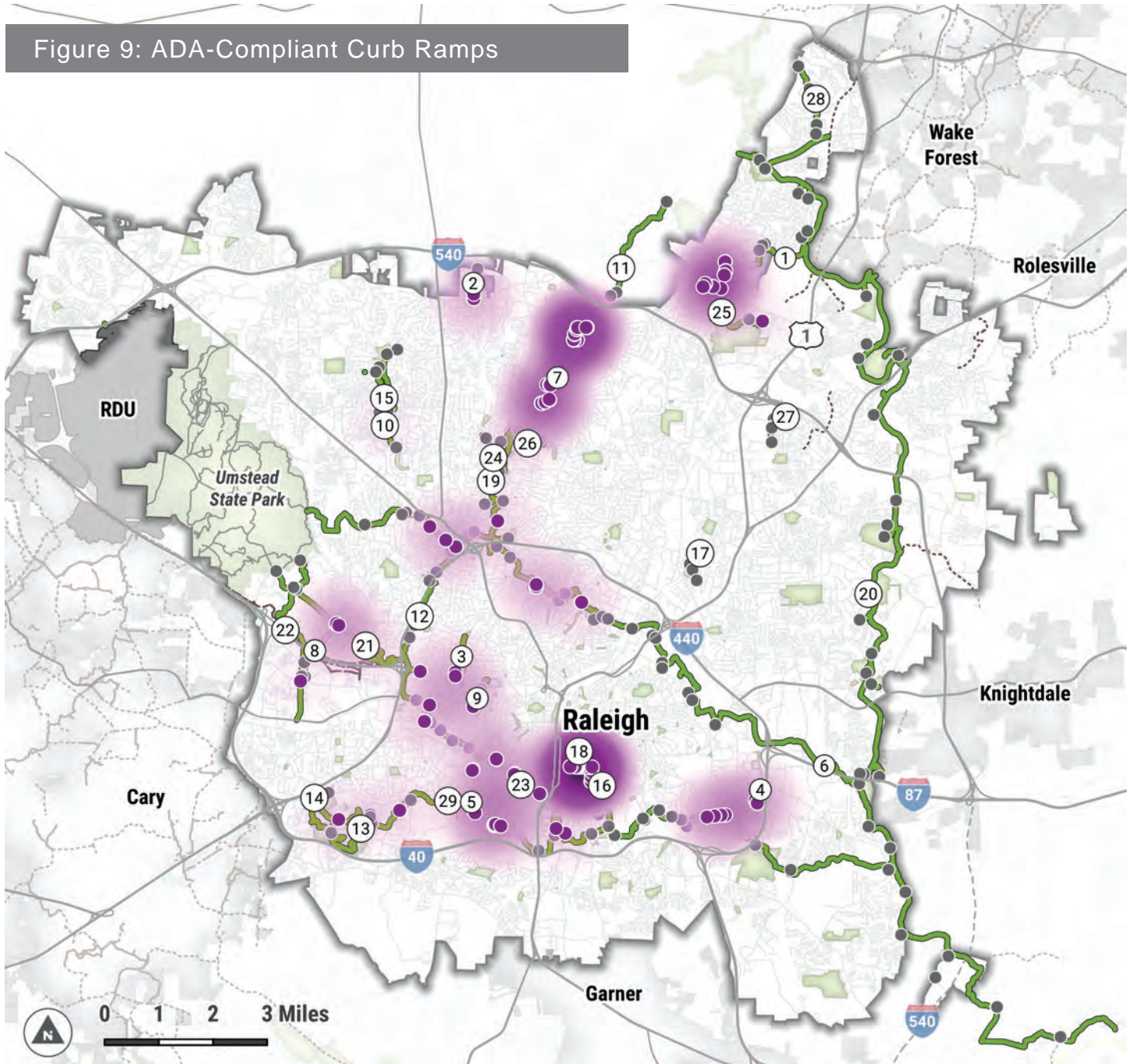
Rose Lane. The Neuse River Trail has only one access point near ADA-compliant curb ramps, and Marsh Creek Trail has none.

ADA-compliant curb ramps alone do not create a comfortable, convenient, or accessible trip for people using wheelchairs or other personal mobility devices. The completeness and quality of the sidewalk network are other important factors in determining how challenging it can be to reach destinations by wheeling. As shown previously in Figure 6, key access points, particularly those near the edges of Raleigh's city limits, lack a sidewalk network to safely guide residents and visitors to the trail network.



Image 14: Curb Ramp on Trail

Figure 9: ADA-Compliant Curb Ramps



Curb Ramp Density Near Trail Access

- Curb Ramps
- Lowest Density
- Highest Density

- Trail Access Point
- Parks
- Existing Trails

Trails in Adjacent Jurisdictions:

- Existing/Funded
- Proposed

Trail Key

- 1 Abbotts Creek
- 2 Baileywick
- 3 Beaver Dam
- 4 Birch Ridge Connector
- 5 Centennial Bikeway Connector
- 6 Crabtree Creek
- 7 East Fork Mine Creek
- 8 Edwards Mill Connector
- 9 Gardner Street

- 10 Hare Snipe Creek
- 11 Honeycutt Creek
- 12 House Creek
- 13 Lake Johnson East Loop
- 14 Lake Johnson West Loop
- 15 Lake Lynn Loop
- 16 Little Rock
- 17 Marsh Creek
- 18 Martin Street Connector
- 19 Mine Creek

- 20 Neuse River
- 21 Reedy Creek
- 22 Richland Creek
- 23 Rocky Branch
- 24 Shelley Lake Loop
- 25 Simms Branch
- 26 Snelling Branch
- 27 Spring Forest
- 28 Wakefield
- 29 Walnut Creek

Trail Slope

Significance

A variety of factors can influence user experience along existing trails. For wheel-based mobility, trail slope and surface type are major factors that contribute to comfort and access. Cracks in asphalt, roots, and certain wooden bridges also present accessibility challenges but were not evaluated as part of the CAG Plan process. Figure 10 illustrates the varying slopes along the existing trail network; Figure 10 also shows existing ADA-compliant picnic tables as well as stairs that may limit accessibility.

What is Going Well

Most existing trails have gentle slopes that people who wheel as a primary form of mobility can traverse easily. Just over 85% (86.4%) of the CAG trail network's existing trail miles have a gentle slope. Additionally, where sections of trail with steep slopes exist, they are generally short in length. For new trails, the City of Raleigh does as much as it can to ensure that slope is 5% or below.

Room for Improvement

While only 6% of trail miles fall within the steepest slope category, nearly all the trails along the network have at least one short segment with a steep slope. Clusters of steep trail slopes exist along Lake

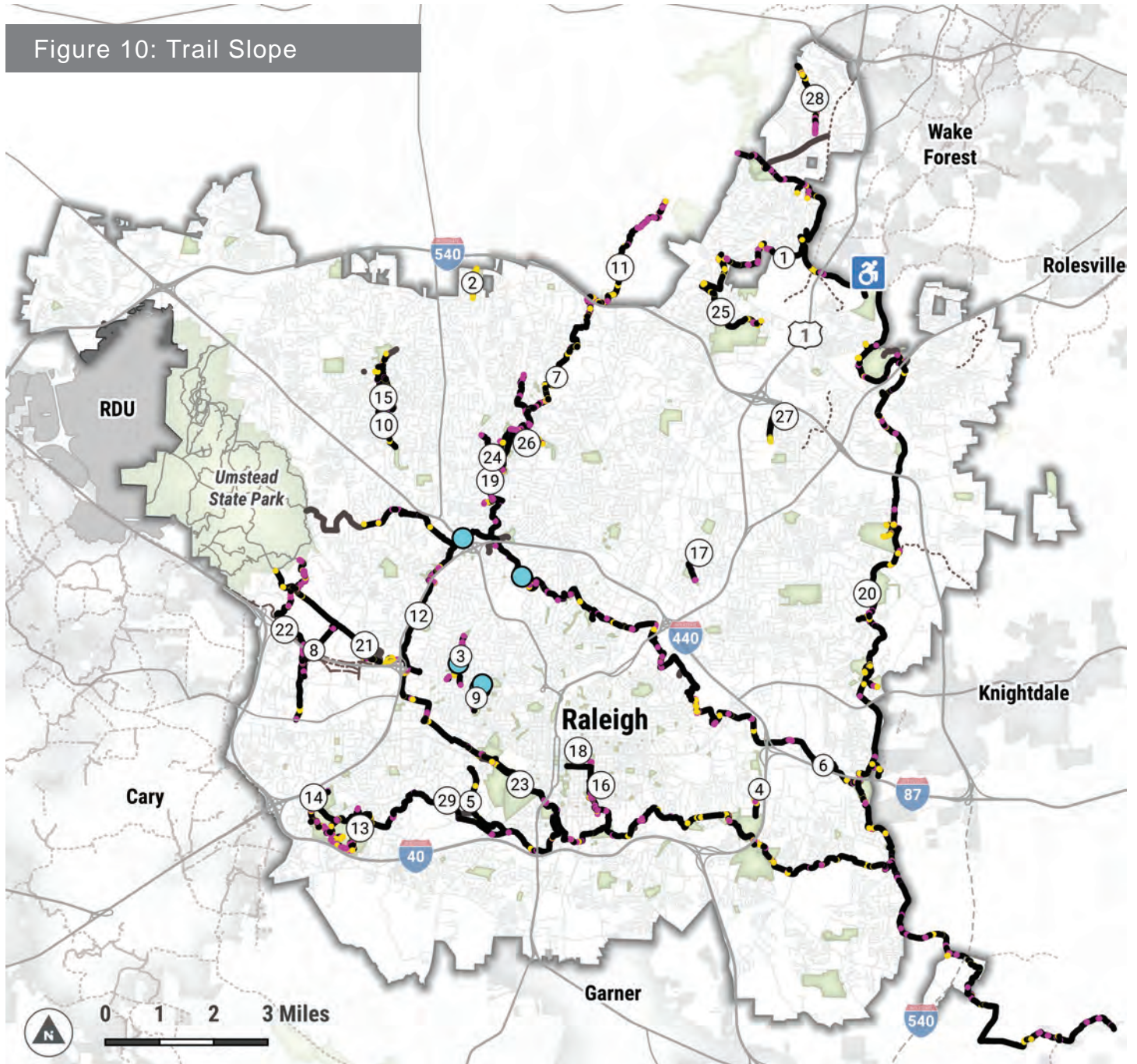
Johnson East Loop, Lake Johnson West Loop, Wakefield Trail, House Creek Trail, Honeycutt Trail, and Richland Creek Trail.

There are a few locations where stairs are necessary for accessing trails. These create more substantial barriers to wheeling. Stairs are located along the following trails:

- Crabtree Creek Trail: near Glenwood Avenue north of I-440
- Beaver Dam Trail: near Leonard Street
- Gardner Street Trail: near Ashley Court and Winterbury Court

Finally, only four ADA-compliant picnic tables exist within the CAG System, and they are all located at the same location along the Neuse River Trail.

Figure 10: Trail Slope



Slope of Existing Trails

- < 5% (Relatively Flat)
- 5 - 8.3% (Moderate)
- > 8.30% (Very Steep)
- Parks
- ♿ ADA Picnic Tables

Trails in Adjacent Jurisdictions

- Existing/Funded
- - - Proposed

Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
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| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Equity

Significance

It is important to understand how the CAG System today serves people whose voices and needs have not historically been included in planning efforts. In 2017, Wake County created a Community Vulnerability Index that identified “vulnerable populations” aggregated by census block group. The project team used this analysis to gain a deeper understanding of whether the CAG System’s benefits serve the Raleigh community equitably.

Sociodemographic factors used in this analysis included:

- **Unemployment:** defined as the population aged 16 and over who are unemployed in the civilian labor force.
- **Age Dependency:** the population under the age of 18 and over the age of 64.
- **Low Educational Attainment:** the population of people age 25 and over who have less than a high school diploma.
- **Housing Vacancy:** the total number of vacant or unoccupied housing units in a block group.
- **Below Poverty Level:** the population living below the federal poverty threshold in Wake County.

Figure 11 shows vulnerability scores for every census block group in the City of Raleigh.

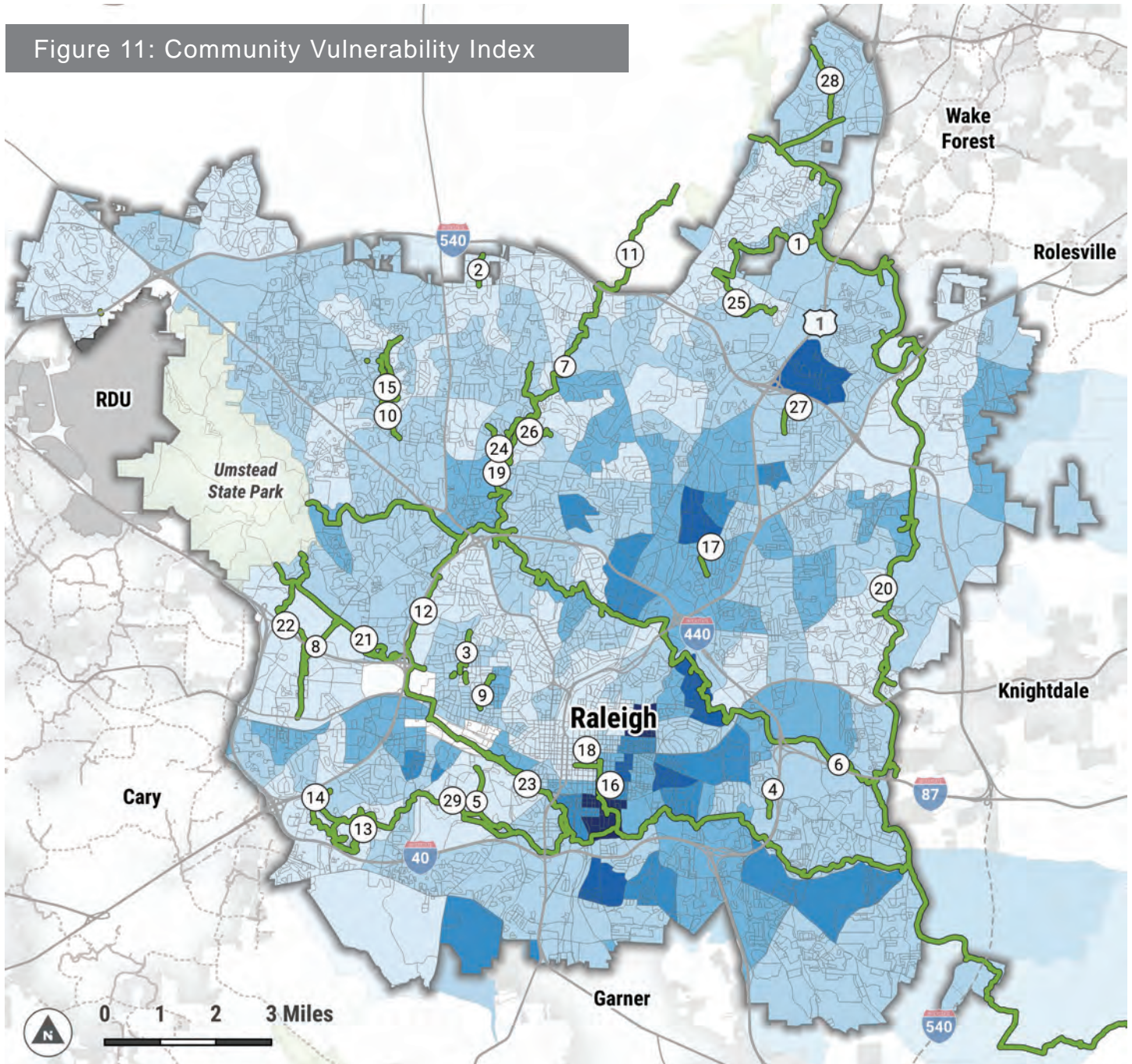
What is Going Well

Census blocks identified as “more vulnerable” in downtown Raleigh currently enjoy access to the Little Rock Trail, Walnut Creek Trail, and Rocky Branch Trail.

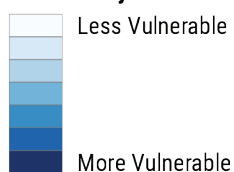
Room for Improvement

Census block groups identified as “more vulnerable” just east of downtown, south of I-40, and along Capital Boulevard do not have easy access to the CAG System. In addition, for the “more vulnerable” census block groups that are near the CAG System, residents of these areas of Raleigh may not live near sidewalk, bikeway, and transit infrastructure that would allow them to reach trails safely or comfortably. Communities south, east, and north of downtown do not have access to sidewalk and bicycle facilities that could make connections more convenient to the CAG System.

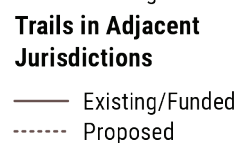
Figure 11: Community Vulnerability Index



Community Vulnerability Index



Trails in Adjacent Jurisdictions



Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
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| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Crossings

Significance

Crossing a street of any type to reach a CAG System access points contributes to a user's overall experience. Even when a robust sidewalk and bikeway network is present, crossings of high-volume and/or high-speed streets may discourage existing and potential CAG System users from walking or bicycling to a trail. Figure 12 shows how at-grade trail crossings of streets are distributed throughout the CAG System.

Each crossing is assigned a "level of comfort" score based upon traffic volumes, crossing distances, presence of a pedestrian refuge island, type of signalization, speed limits, and crash history. It is important to emphasize the relativity of the crossing comfort scores. This analysis intends to compare at-grade street crossings of the trail network to one another rather than conclude how safe or comfortable the street crossings are for CAG System of all ages and abilities. Higher scoring street crossings may still feel unsafe or uncomfortable for some trail users.

What is Going Well

Higher comfort street crossings are primarily clustered in residential areas with lower traffic volumes and speed limits. All crossings along Gardner Street Trail and Beaver Dam Trail received higher comfort scores.

Room for Improvement

The least comfortable streets crossings within the CAG System fall along high-speed and high-volume streets. These include Western Boulevard, Durant Road, Lake Wheeler Road, Blue Ridge Road, and Wade Avenue, where long crossings increase exposure for non-motorized users, resulting in higher crash risks.

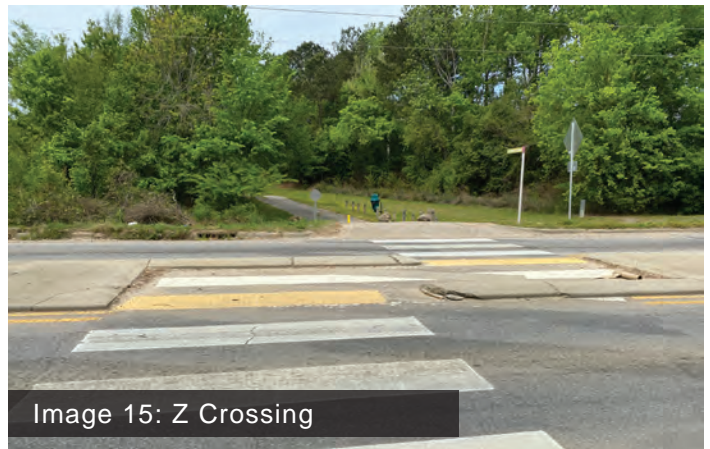
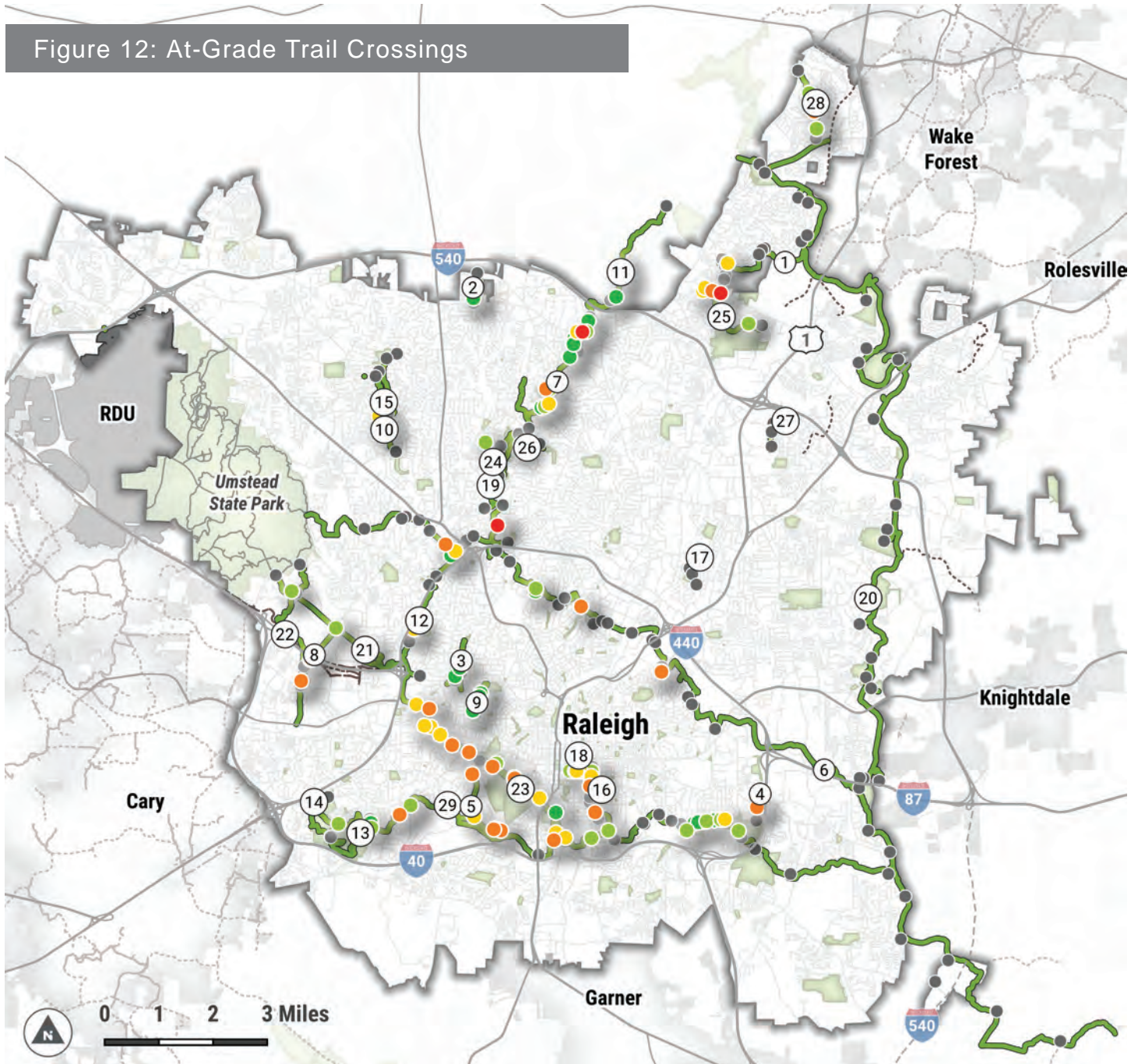


Image 15: Z Crossing

Figure 12: At-Grade Trail Crossings



Trail Crossing Comfort Level

- Lowest
- Moderate
- Highest
- Trail Access Point

Existing Trails

— Parks

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
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| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Crashes

Significance

All CAG trail network users should have safe access to the system, regardless of mode choice. In the development of the CAG Plan, the project team used crash data collected between 2007 and 2018 to summarize pedestrian- and bicycle-related crashes near trail access points. A crash was considered to have occurred near a trail access point if it was within 250 feet of the access point. It is important to note that these crashes do not necessarily involve people who were on or were planning to be on the trail system, as that information is not readily available. Figure 13 demonstrates how these crashes are distributed throughout the CAG System.

What is Going Well

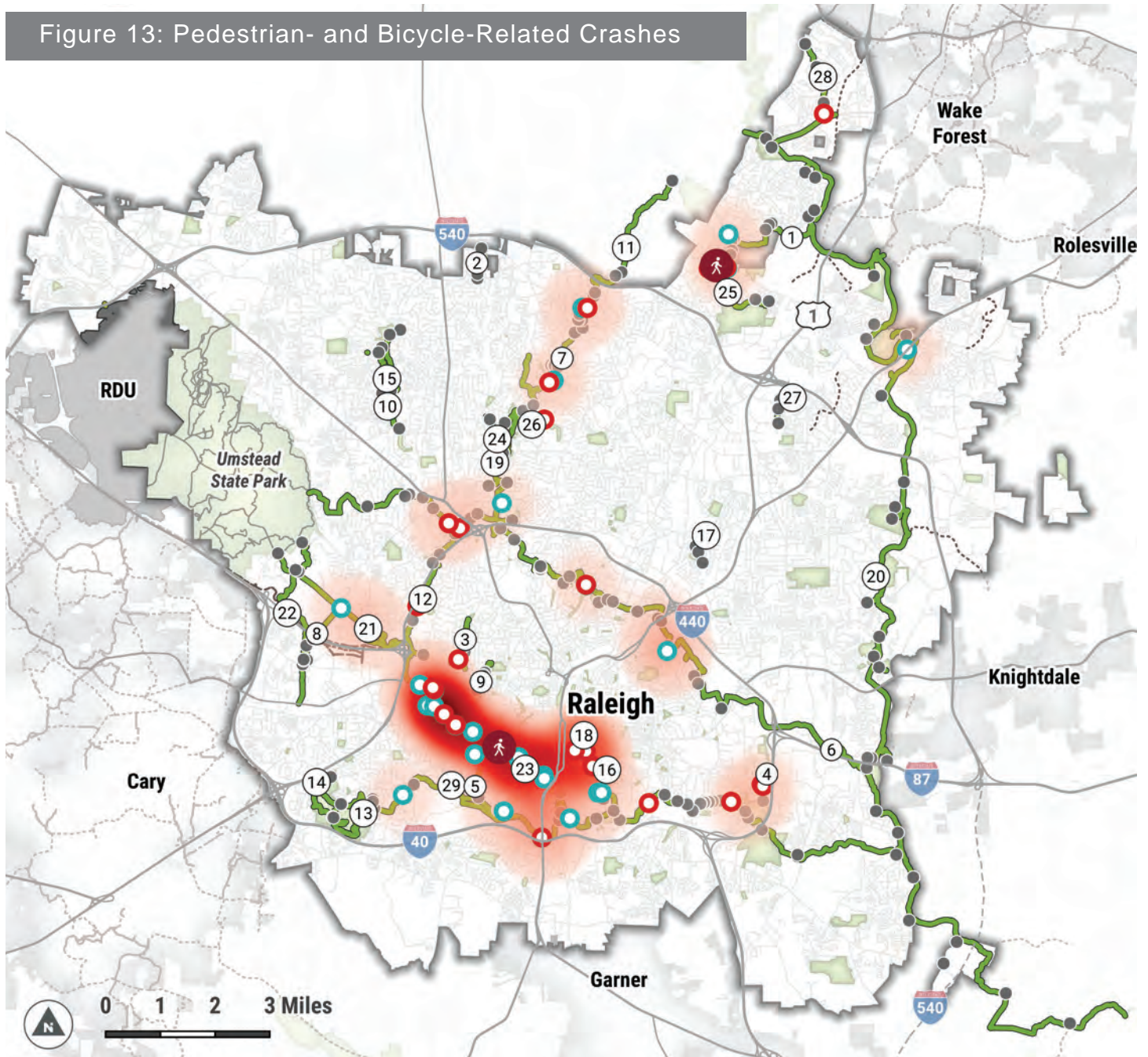
Many trails have had few or no bicycle or pedestrian crashes occur nearby, including Hare Snipe Trail, Baileywick Trail, Spring Forest Trail, Marsh Creek Trail, Richland Creek Trail, and all of the Loop trails (Shelley Loop, Lake Johnson East Loop, Lake Johnson West Loop, and Lake Lynn Loop). The Neuse River Trail, one of the CAG System's most popular, has relatively fewer nearby crashes than others of a similar level of popularity and length.

Room for Improvement

Most pedestrian- and bicycle-related crashes near trail access points are concentrated along the Rocky Branch Trail adjacent to Western Boulevard. Other areas with concentrated crashes include

downtown Raleigh and where Abbotts Creek Trail crosses Durant Road. Higher crash locations may require additional evaluation based on crash types, including but not limited to conflicts between trail users, limited sight distances, or dangerous street design at trail crossings. Of note, many areas with concentrated crashes are also locations that where trail at-grade street crossings received low comfort scores (Figure 12).

Figure 13: Pedestrian- and Bicycle-Related Crashes



Serious/Fatal Crashes Near Trails

- Fatality (Pedestrian)
- Serious/Minor Injury (Pedestrian)
- Serious/Minor Injury (Bicyclist)
- Parks
- Trail Access Point
- Existing Trails

Crash Density

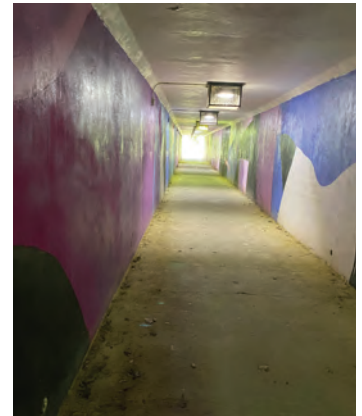
- Fewest Crashes
- Most Crashes
- Trails in Adjacent Jurisdictions**
 - Existing/Funded
 - Proposed

Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
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| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Springfield |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Amenity Assessment

As part of the development of the CAG Plan, amenities along the system were evaluated based on previous recommendations in the Design Guide and the goals in the City's Strategic Plan. The type, quantity, and quality of amenities available to trail users contributes to their overall experience using the system. Understanding where amenities are currently placed throughout the trail network provides context to public feedback on desired amenities, which is necessary in developing recommendations.



Wayfinding Signage

Wayfinding signage, which can include traditional signs or incorporate the use of colors, artwork, paint, etc., is critical to ensuring that the CAG System is useful. The Master Sign Program developed for the CAG System in 2006 identifies sign type and guidance for placement. Signage types include directional, regulatory, etiquette, interpretive, and informational kiosk signage. In particular, additional wayfinding signage at decision-making locations can increase the comfort and access for the CAG System as a whole. Currently, there is minimal wayfinding near access points and at trail intersections.

Restroom Facilities

Restrooms and drinking fountains are desirable amenities along the CAG System and within parks across Raleigh. Restroom facilities refers to a location that includes both restroom and drinking fountain amenities.

Half of the existing restroom facilities and 55% of standalone drinking fountains are located within a quarter mile of existing trails and serve park patrons; the rest are located within parks and are more than a quarter mile from the nearest trail. Placing new restrooms and drinking fountains can be difficult due to the existing floodplain and alignment of existing and proposed trails. Restrooms and drinking fountains are not installed below base flood elevations.

Bicycle Parking and Repair Stations

Bicycle parking and repair stations are valuable amenities for bicyclists. Bicycle repair stations help ensure that bicyclists reach their destination safely, and bicycle parking allows bicyclists to protect their bicycle. There are two bike repair station on the trail network, one located near the intersection of the Neuse River and Walnut Creek trails and one at Walnut Creek Wetland Park. Five bike racks are located along trails, including the Neuse River Trail, Crabtree Creek Trail, and Shelley Lake Loop.

Seating and Refuse Receptacles

Seating along trails can enhance the user experience and attract people of all ages and abilities by providing a place for users to rest, relax, and enjoy the CAG System at their own pace. Co-locating refuse receptacles with seating areas—at an appropriate distance to minimize odors near where people sit—can help maintain cleanliness throughout the system and protect the natural habitats that exist. Additionally, a “pack it in, pack it out” culture related to trash cleanup is a goal along the entire CAG System.

The Design Guide recommends seating within a half mile of an access point, as well as it one-mile intervals along trails. Many trails have seating areas within a half mile of an access point, but there are still gaps. These include:

- Crabtree Creek Trail between New Bern Avenue and North New Hope Road
- Walnut Creek Trail between I-440 and Neuse River Trail
- Rocky Branch Trail near Dix Park
- Little Rock Trail near Chavis Park

Public Art

Public art can create a sense of place and provide a unique user experience. Installations can serve as landmarks throughout the CAG System and in some cases function as an aesthetic and utility pieces (e.g., a sculpture that can also be used for seating).

Public art installations are currently limited along the trail system. However, installations are increasing due to popularity and interest from artists. There have been numerous art installations on sewer manholes—known as “sewer ups”— along the Neuse River Trail and Rocky Branch Trail, and there are murals lining a tunnel on the Walnut Creek trail. There is also a tunnel lighting art project currently underway at Rocky Branch Trail and Dawson Street which incorporates new lighting and an abstract mural. Installations of public art along floodplains are also underway, and artists have proposed artwork and native meadow plantings along

a stretch of the greenway near the intersection of Crabtree Valley Avenue and Blue Ridge Road; the goal of the latter is to educate users about historical flood levels and add plantings which help both beautify and remediate stormwater issues. Finally, the Reedy Creek Trail connects to and through the North Carolina Museum of Art (NCMA), which contains a large display of public art. Future installations can build on the success of local and regional artists and reflect Raleigh's character. At the time this document was being written, an effort to develop a Public Art Plan for the City of Raleigh was also underway that encourages the use of trails as locations for future public art installations.

Maintenance & Operations

Types of Maintenance

There are two categories of trail maintenance, routine and capital.

Routine Maintenance

Routine trail maintenance is conducted regularly and involves activities like mowing, amenity cleaning and repair, litter removal, asphalt inspection and repair, flood event response, windstorm response, structure inspection and repair, culvert and riprap repair, natural resource management, hazard tree identification and removal, vegetation trimming for trail clearance and sightlines, minor trail surface repairs, and preventative measures to lengthen the lifetime of the CAG System.

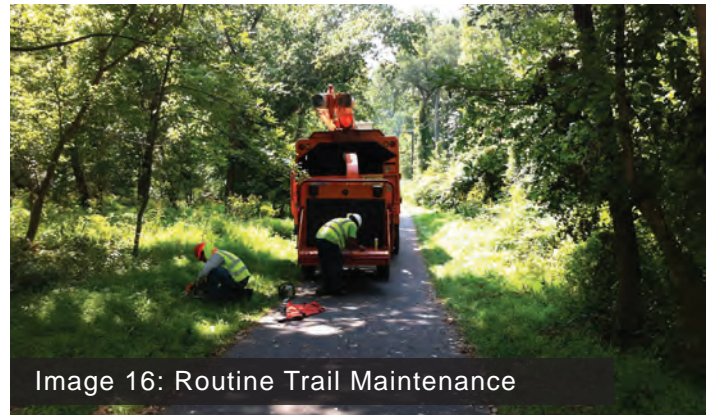


Image 16: Routine Trail Maintenance

Capital Maintenance

Capital maintenance are projects that involve more time, effort, funding, and resources. Some examples include replacing bridges and boardwalks, realigning trails, and trail resurfacing. These projects are less common and often take more time to complete than routine maintenance activities. Capital maintenance projects are initiated when they exceed the operating capacity of in-house maintenance staff. These projects are contracted out because of their immediate and acute resource demands. Maintenance crews currently resurface trails and replace bridges when operationally feasible.



Image 17: Trail Construction

Maintenance Process

Greenway maintenance staff conduct a comprehensive inventory of issues and concerns across the entire system twice a year for vegetation and twice a year for structures. Multiple staff over the course of several weeks utilize a mobile application to catalog issues for each inventory. Maintenance data provided by the PRCR Department included the inventory information from the City's maintenance, vegetation, construction, and urban forestry crews conducted in the Fall of 2019.

During this inventory over 1,600 maintenance items were identified. Collecting data comprehensively allows maintenance staff to have a more complete understanding of one-time and ongoing maintenance needs. The goal of each inventory is to assess current conditions and begin to prioritize maintenance. Between the inventory collection periods, maintenance staff diligently work to address and resolve all issues. Any issues not addressed are noted for the next inventory.

The public can also report maintenance issues through the City's See-Click-Fix website. However, this system is in the process of being updated, and the public lacks information on how to report maintenance issues.

A Snapshot of Maintenance Issues

Most maintenance issues recorded between October and December 2019 regarded vegetation or trail surface issues. Unsurprisingly, the greenway system's longest trails—Walnut Creek Trail, Neuse

River Trail, and Crabtree Creek Trail—have the highest number of maintenance needs. The Reedy Creek and Hare Snipe Trails also have high numbers of maintenance needs despite their smaller sizes. Higher volumes of maintenance needs for individual trails may be the result of a variety of factors, including environmental conditions unique to that trail such as frequent flooding and type of adjacent vegetation. A more detailed analysis of maintenance issues uncovered during this timeframe is provided in [Appendix B](#).



Image 18: Cracked Trail Surface



Image 19: Greenway Flood Damage

Greenway Policy Evaluation

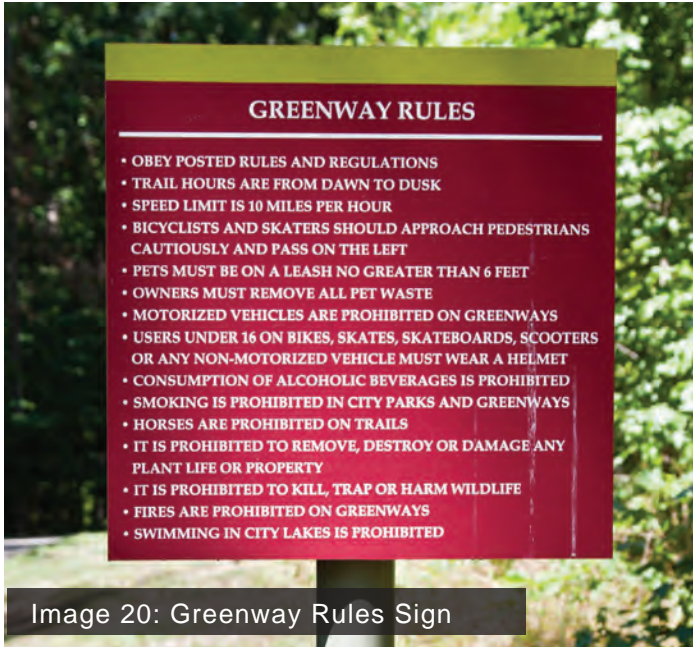


Image 20: Greenway Rules Sign



Image 21: Abbots Creek Trail

The City of Raleigh has established a forward-thinking vision that supports the CAG System as a thriving network of trails—accessible to all residents and visitors regardless of their travel mode or trip purpose—and open space corridors, which will preserve the City’s natural ecosystem for decades to come. The Comprehensive Plan and Strategic Plan detailed in [Chapter 1](#) and [Appendix A](#) contain a host of goals, initiatives, and objectives that will guide the CAG System’s future. However, these documents do not contain legal or regulatory requirements that can be leveraged to build trails or preserve open space corridors. The City’s Unified Development Ordinance (UDO) and Raleigh Street Design Manual (RSDM) contain requirements for connectivity to trails and the dedication of land for trail construction or open space corridors.

Beyond the requirements within the UDO and RSDM, policies that require the construction of trails and applicable amenities adjacent to or through private development do not currently exist. Stronger policy language, combined with additional development regulation through the UDO, would be necessary to guarantee that all new development adjacent to trail corridors provides the infrastructure necessary to ensure safe, convenient, and public access to the trail network. In addition, there are no policies that address the need for private developers to construct trail segments within currently undeveloped corridors on-site. This prevents the trail network from expanding in concert with new development in the way that the City’s street and sidewalk infrastructure does.

Summary of Findings

- Open space corridors offer crucial protection of Raleigh's natural environment by providing stream buffers, floodwater storage, water quality benefits, and wildlife habitat.
- Sidewalks are not complete near most trail access points.
- At-grade street crossings would benefit from updated crossing design or changes to street characteristics to increase safety for all users.
- On-street bikeway connections can link trail trips to more destinations, but more attention should go to intersections of trails and on-street facilities; however, this may require additional coordination with agencies such as NCDOT.
- Trails that are farther from Raleigh's downtown core (e.g., Neuse River Trail) or from commercial areas (e.g., Lake Lynn Loop Trail) are not accessible by transit.
- Wayfinding signage is limited near access points and trail-to-trail intersections. Additional wayfinding would increase awareness for people on the trail network and direct people to local and regional destinations.
- There are many opportunities for public art along trails. Possible focus areas include tunnels and underpasses, creative interpretive signage for wayfinding, education related to stormwater and the environment, and community storytelling.
- Additional access to the trail network through formal access points and neighborhood connections can provide more of the Raleigh's residents and visitors with convenient access to the CAG System without the use of a vehicle.
- Existing policies and standards for street design and access will offer the most benefit to trails developed in the future or trails adjacent to new development; however, they lack direction on increasing connectivity for trails that are adjacent to property with little potential for new development.
- The UDO does not address Trail-oriented development (TOD), which seeks to encourage development along trails to support non-motorized transportation and activate trails.
- A variety of trail features are included in the Design Guide without clear policy on implementation—specifically features such as lighting, increased hours of operation, and striping trails to separate users— all which could impact user comfort and encourage non-recreational trail trips.
- The UDO lacks design guidance and/or regulation regarding development along trails and open space corridors.



Image 22: Trail-oriented Development in Bentonville, Arkansas



CHAPTER 3

Community Voice



Valuing the Community

Engagement with the community regarding its vision for the CAG System is crucial to ensuring the recommendations presented within the CAG Plan reflect the Raleigh community's needs and wants. The planning process involved three phases of outreach: 1) Listen, 2) Update + Check-in, and 3) Reveal + Refine. This chapter summarizes the activities conducted for each phase, along with the primary stakeholders engaged and the feedback received. It also explains how the COVID-19 pandemic impacted the public outreach process and alternative approaches pursued as a result. [Appendix C](#) contains additional information related to each phase of public outreach.

Engagement and COVID-19



During the development of the CAG Plan, the COVID-19 pandemic spread rapidly throughout the United States and across the world, bringing public gatherings to an unprecedented halt. This required a drastic shift in the approach to the CAG Plan's development, especially public outreach. Beginning in March 2020, the community-based components of the

CAG Plan's outreach process used a new, socially distanced format. For example, to replace planned attendance at in-person festivals and community events, the project team contacted 39 community-based organizations to discuss opportunities to collaborate, such as attending their physically distanced meetings or providing materials for online and in-person distribution. Specific community-based organizations were selected because they serve communities that were under-represented in the online survey results, such as people of color, people with low incomes, and people who did not attend college.

Other methods to spread the word about the development of the CAG Plan during the pandemic included giving local businesses cards with a survey QR code for their patrons, posting yard signs along trails, placing advertisements with a survey QR code on all GoRaleigh buses, and advertising the survey in a Spanish language newspaper. Equitable engagement was a central aim in developing the

CAG Plan (this was true before and after the pandemic, and is the goal moving forward as well).

Framework

There were three primary public outreach phases for engaging people who live, work, and play in Raleigh throughout the development of the CAG Plan: Listen, Update + Check-In, and Reveal + Refine.

LISTEN

This phase focused on gaining a more comprehensive understanding of what it's like to use the current trail network.

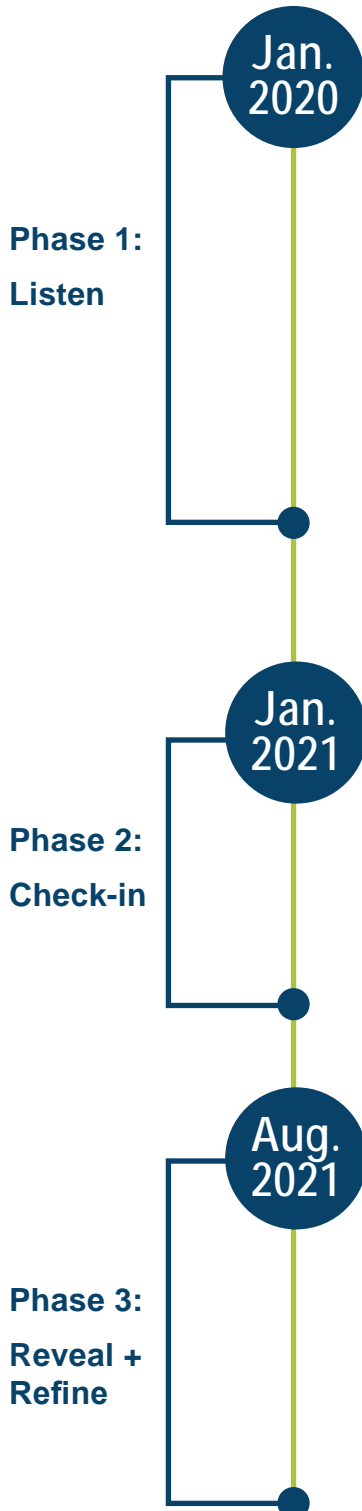
UPDATE + CHECK-IN

After gathering information from community members and analyzing the CAG System's existing conditions, findings were shared with the public to ensure their voices were heard accurately before recommendations were developed.

REVEAL + REFINE

During this phase, the project team shared a draft of the CAG Plan and its recommendations with the public. Feedback from this phase was used to refine content and ensure that the final CAG Plan reflected community values and desires.

Engagement Timeline



COMMUNITY ENGAGEMENT BY THE NUMBERS

7

Steering Committee Meetings

4,300+

Survey Participants

3,000+

Comments (surveys, virtual open houses)

14

Focus Groups

39

Community-Based Organizations Engaged

Outreach Process

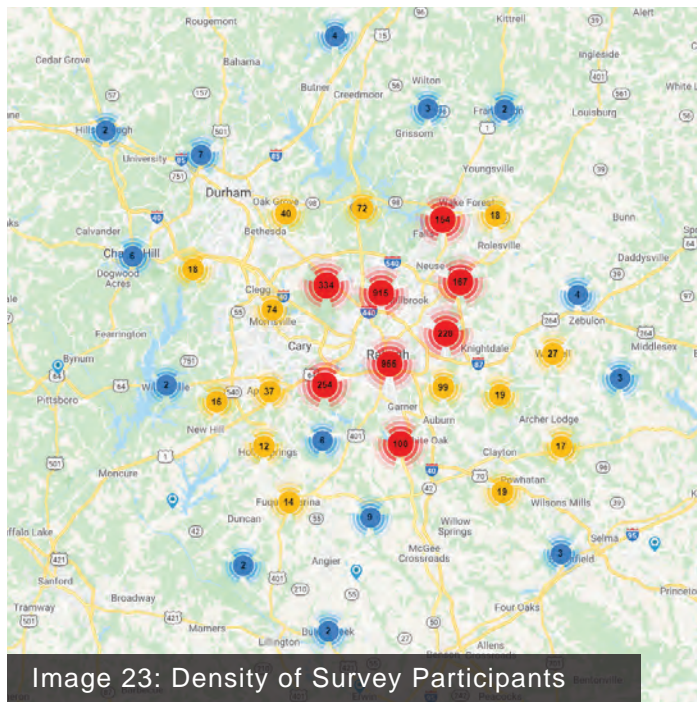
The following section uses direct quotes and more general summaries to outline the feedback collected throughout the outreach process. See [Appendix C](#) for summaries of public outreach from all phases.

Phase 1: Listen

Phase 1 included the following elements:

- Online survey
- Tabling at Raleigh Half Marathon
- Focus groups
- Community-based organization outreach
- Steering committee meetings

The online survey conducted during Phase 1 was active between February 19th and July 31st, 2020, with several targeted promotions through social media, email blasts from partner organizations, and signage along the trails and on GoRaleigh buses. The survey asked several questions about participants' use of and opinions about the CAG System. Over 4,000 people participated in the survey.



Multiple focus groups were held during Phase 1 with the following groups and agencies:

- Neighboring community partners, including Triangle J Council of Governments, Research Triangle Park, Town of Knightdale, Wake County, Town of Rolesville, Town of Wake Forest, Town of Clayton, Capital Area Metropolitan Planning Organization, Raleigh-Durham Airport Authority, Town of Cary, Town of Fuquay-Varina, and Town of Apex.
- Bicycle and Pedestrian Advisory Commission (BPAC)
- North Carolina State Parks staff
- Bicycle and running groups, including Oaks and Spokes and Raleigh Galloway.
- Parks, Recreation and Greenways Advisory Board
- Development community
- City of Raleigh staff, including representatives from the following departments: Parks, Recreation and Cultural Resources; Planning and Development; Raleigh Arts; Engineering Services; Transportation; and Public Utilities.



Phase 1 Themes

The following themes emerged throughout all engagement activities during Phase 1.

Community Asset

"The Capital Area Greenway System is the city's largest park." - Focus Group Attendee

Raleigh residents and visitors enjoy the CAG System, particularly the opportunity it provides to connect with the environment and bicycle and walk while separated from vehicular traffic.

Connectivity

"Gaps, temporary or permanent, have a dramatic impact on usability." - Focus Group Attendee

Within Raleigh, many focus group and survey participants pointed to gaps in the trail network in downtown, Northeast Raleigh, Southeast Raleigh, and Brier Creek.

Transportation Corridors

"The [trail network] is a victim of its own success. Everybody loves the [trail network]. This causes it to become over-populated and increases user conflicts." -Focus Group Attendee

There is a desire to ensure that trails serve as both recreation and transportation corridors that connect where people live, work, and play. In addition, more than 80% of survey respondents support building new trails throughout the CAG System outside of stream corridors.

Accessibility

"Getting to them can be a challenge. When you're with your kids you think twice about crossing busy and dangerous roads." - Focus Group Attendee

A key barrier for people who walk, bike, and wheel to the trail network is the lack of a robust sidewalk and bikeway network around trail access points. Trail users also often feel unsafe when crossing high-volume and high-speed roads while using a trail.

Maintenance

"We have a great network. You can go from Anderson Point to Clayton and anywhere in between. We have to work on the resiliency of it." - Focus Group Attendee

Many trail users feel that maintaining existing trails should be a priority over building new ones. People are frustrated with how often and how long trails are closed. Those who use trails for transportation find the trail network unreliable and difficult to use. In addition, many feel that the trails are too narrow to comfortably accommodate all user types..

Signage, Wayfinding, and Awareness

"You have to discover them. It takes a while to find them, and you have to seek them out." - Focus Group Attendee

Trail users overwhelmingly feel it is easy to get lost on the system; this is particularly true for newer users. People feel signs should contain more information about community destinations and nearby parks, neighborhoods, and amenities. In addition, trail users also desire more signage and communication about repairs and maintenance.

Phase 2: Update + Check-In

Phase 2 included the following elements:

- Online survey
- Community-based organization outreach
- Steering committee meetings

The online survey was the primary focus of Phase 2, and the project team used community-based organization outreach and steering committee meetings to promote the survey and make requests to share the survey link within their networks. The survey was active between January 27th and March 3rd, 2021. The survey provided participants with the Formative Plans Review ([Appendix A](#)), Existing Conditions Analysis ([Appendix B](#)), Public Outreach Summaries ([Appendix C](#)), and Prioritization Criteria ([Appendix D](#)) for review and comment. More than 200 people participated in the survey.

Survey Results

- 86% feel the Existing Conditions Analysis ([Appendix B](#)) captures the state of the CAG System.
- 74% believe public engagement methods adequately engaged Raleigh residents. Ideas for future engagement include the following:
 - More emphasis on media (social, print, TV, and radio)
 - More signs on trails
 - More neighborhood-specific engagement around future trail sites
- 88% support the prioritization criteria (see

[Chapter 4](#) for more detail). Those that do not support the criteria desire more emphasis on communication with property owners who may be impacted by future trail construction.

Phase 3: Reveal + Refine

Phase 3 included the following elements:

- Online survey
- Tabling at three in-person events
- Steering committee meetings
- Virtual open houses
- On-demand content

During this phase community members had the opportunity to review the entire draft plan and appendices. An overview of the plan background, process, and recommendations was presented in three virtual open houses in September 2021 as well as to the Parks Board. The survey was advertised on the project website, through email lists, and with QR codes on signs along the greenway system. The survey was open from August 27 to September 27, 2021 and received more than 1,250 responses.

Survey results

- Outreach and advertisements for the survey in Phase 3 reached many people who had not yet participated in the CAG Master Plan process. 68% of respondents said this was their first time giving feedback.
- 73% said they felt the prioritization criteria ensured a fair and balanced approach to project implementation.
- Respondents reemphasized the importance of

balancing constructing new trails with reinvesting and maintaining the existing system. When asked what was MOST important to the future success of the CAG System, there was a near even split between building new trails (42%) and maintenance and operations (39%).

- The survey also provided space for general comments. Key themes from these comments included:
 - Improved signage and wayfinding, especially at on-street connections

- Invasive species removal
- Requirements for developers to construct new trails and leave a buffer along existing trail
- Maintenance needs, including removal of trash, undergrowth, and downed trees

When this process began, what excited you the most about the update to the Capital Area Greenway Plan?

Mentimeter



Image 25: Steering Committee Comments

Engagement Summary:

Phase 1: ***Listen***

- Online survey with 4,000+ participants
- Tabling at Raleigh Half Marathon
- Focus groups with City of Raleigh, the development community, bicycle and running groups, and more
- Steering committee meetings

Phase 2: ***Update + Check-In***

- Online survey with 200+ participants
- Community-based organization outreach
- Parks Board meeting
- Steering committee meetings

Phase 3: ***Reveal + Refine***

- Full draft plan shared with the public
- Online survey with 1,200+ participants
- Three virtual open house meetings
- Steering committee meetings
- In-person tabling at events
- Parks Board meeting



Trail
Classifications



Prioritized
New Trails



Open Space
Corridors



Trail
Reinvestment



Maintenance &
Operations

Key Themes from Public Input:

Ensuring that trails can serve as transportation corridors that connect people to where they live, work, and play is a valuable goal of the CAG System.

Working with developers to construct new trails and protect existing corridors is important as the City grows.

Constructing new trails is important to address key gaps in the system.

Prioritizing maintenance of the existing system will add to the user experience.

Making the greenway system safe and accessible for all trail users is essential.

Adding more signage and wayfinding at decision points along trails and especially at on-street connections will help both residents and visitors.



Program
Funding



Planning &
Development



Trail
Security



Environmental
Stewardship



Collaboration
& Partnerships



CHAPTER 4

Recommendations



Recommendations Overview

The CAG Plan provides a set of recommendations that respond to the needs and desires of the public, balance expanding the system with reinvesting in existing trails, contribute to additional open space preservation and environmental protection, and align with goals of the PRCR System Plan to provide a network of trails that is accessible and that feels safe for people of all ages and abilities. Recommendations were categorized into the following:

- System-Wide
- Trail Classifications
- New Trails and Prioritization
- Open Space Corridors
- Existing Trail Reinvestments
- Trail Amenities
- Maintenance and Operations
- Program Funding
- Planning and Development
- Environmental Stewardship
- Trail Security
- Collaboration and Partnerships

This chapter provides an overview of recommendations and describes the prioritization process for new trails to be built and reinvestments in existing trails. A comprehensive list of recommendations and future considerations can be found in [Chapter 5](#) and [Appendix D](#).

System-Wide Recommendations

Specific recommendations from the CAG Plan will guide future decisions for Raleigh's system of trails and open space corridors. In addition to containing site-specific recommendations, the CAG Plan is a living document that should be reviewed and updated routinely to successfully maintain, protect, and construct the entire CAG System. The following general recommendations will ensure the CAG Plan continues to be a tool for serving mobility needs, preserving the environment for generations to come, prioritizing projects and policies that reflect community values, and maintaining a network that makes Raleigh inclusive for all residents and visitors:

- Update CAG Plan every five years.
- Update CAG Design Guide concurrently with routine CAG Plan updates.
- Expand the trail user data collection program. Supplement data counters with in-person, mailed, and online surveys.
- Continue to improve trail connectivity to jurisdictions neighboring the City of Raleigh.
- Add bike share stations at key trail access points and trailheads.
- Establish and grow industry, economic development, and tourism partners.

- Continuously evaluate needs for active transportation, recreation, and open space preservation.
- Prioritize reinvestment for existing trails while strategically building new trails.
- Evaluate extending hours of operation to support active uses of the trail network.
- Prioritize safety of trail users and evaluate trail planning and design elements that enhance safety.
- Continue to promote trail safety education, awareness, and outreach.
- Explore a range of operating and capital funding sources to support the growing needs and public expectations of the CAG System.
- Integrate new trail development as part of private development and research standards to encourage trail-oriented development.
- Encourage opportunities for public art along the CAG System.

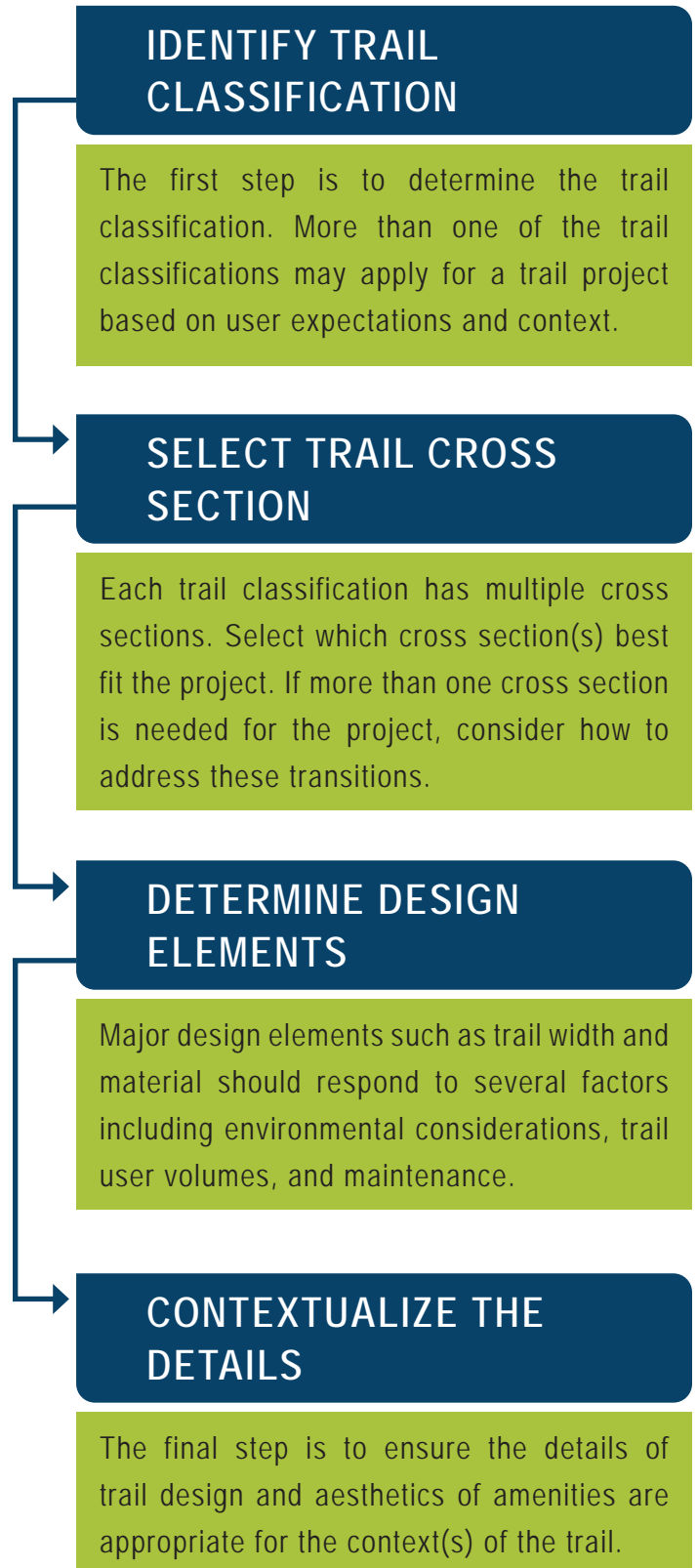


Image 26: Safety Campaign Messaging

Trail Investment Framework

A variety of factors will influence the future expansion and enhancement of the CAG System's trail network. Before such projects are implemented, it is important to understand the project context and feasibility, applicable trail amenities and design details, and ongoing maintenance needs. Using this framework will help to address trail specific decisions related to surface materials, street crossing infrastructure, desired amenities, and more on a project-by-project basis, resulting in more accurate cost estimates and trails that meet user expectations. The graphic to the right provides a framework to guide decision-making related to the construction of new trails or re-investment in existing trails. Every step in the framework is important to developing a network of trails that accomplishes the vision and goals established by the CAG Plan and other guiding city documents.

The following pages (63-72) provide specific information regarding user expectations, trail classifications, trail cross sections, design elements, and amenities.



Trail Classifications

People with a wide range of ages and abilities often seek out the CAG System for walking, wheeling, or bicycling trips. User needs and desires vary based on the objective of each trip. For example, commute trips to work may benefit from more access points at street level, while recreational users may enjoy less frequent intersections and grade-separated street crossings. The purpose of trail classifications is to categorize trails that range in location, surface, design, amenities, and more based on user expectations and trip types.

The following pages contain updated trail classifications, which the CAG Plan project team developed to leverage and simplify previous work completed in the Design Guide. The proposed classifications will guide construction of new trails along with upgrades to existing trails (see Trail Investment Framework).

The classifications below replace the previous classifications from the Design Guide and capture broad characteristics that trails can be expected to have:



Oak City Trails



Scenic Trails and Loops



Neighborhood Trails

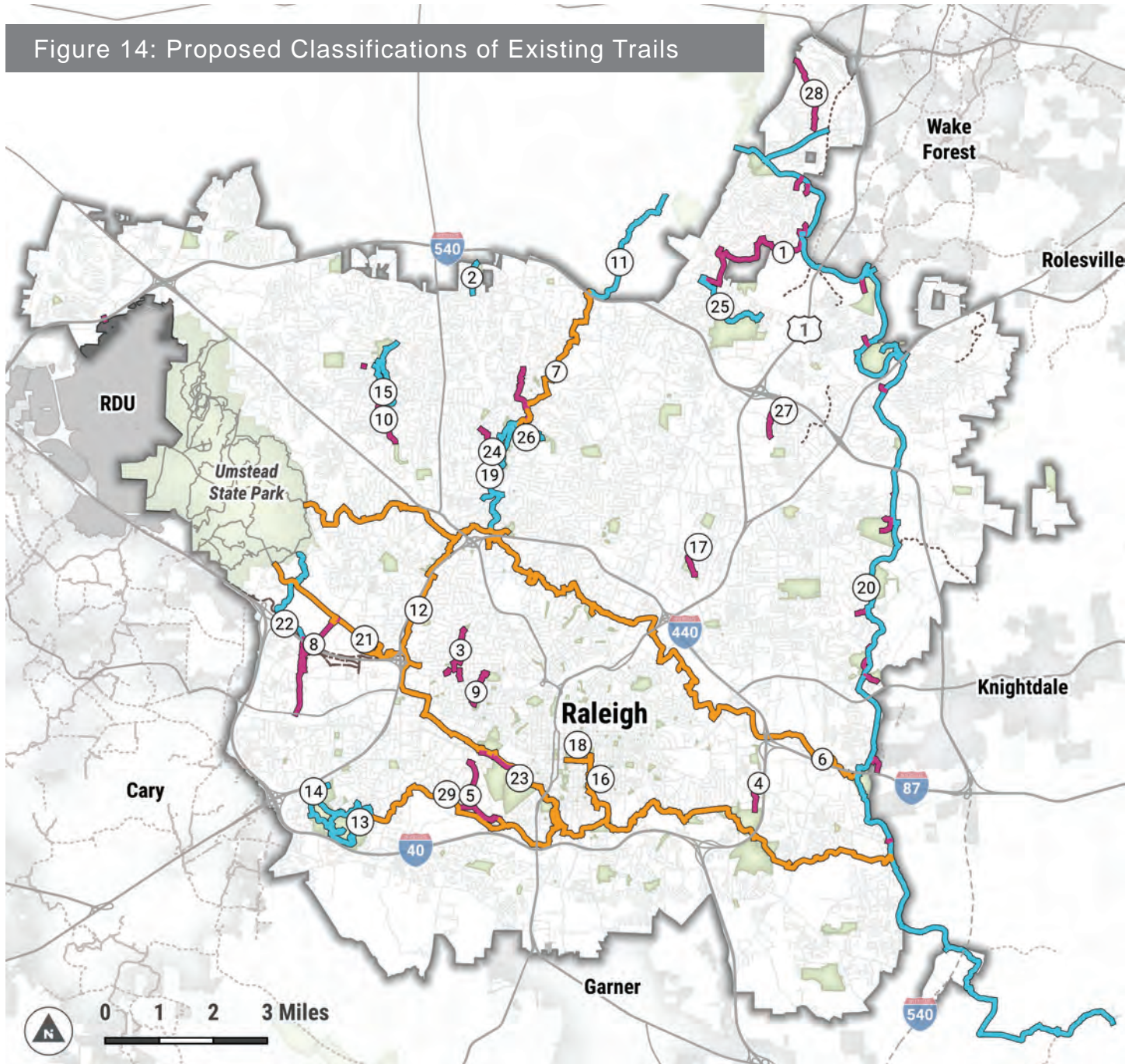
Figure 14 on the following page shows the proposed classification of all existing trails. Trail classification details, including illustrative examples and expectations for each type, are included on the following pages.

Flexibility Within Application

Trail classifications are intended to illustrate the preferred design and amenities as new trails are developed and existing trails are upgraded. However, because the development of each trail is unique, there is flexibility in design treatments within each classification. Specific design elements (e.g., material, width, signage) will need to be decided on a trail-by-trail basis. Existing amenities in proximity to the trail can also play a role in expectations and use. Street lighting that illuminates trails within roadway corridors could effectively extend that trail's hours of operation.

While several of the user expectations are present across classifications, the primary trail purpose along with notable design features are key differentiators. Although all user expectations associated with any individual classification may not be accomplished, the primary trail purpose associated with each trail should be a critical consideration during planning, design, and construction.

Figure 14: Proposed Classifications of Existing Trails



Existing Trail Classifications

- Oak City Trails
- Scenic Trails & Loops
- Neighborhood Trails

Parks

Trails in Adjacent Jurisdictions

- Existing/Funded
- - - - - Proposed

Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
| 4 Birch Ridge Connector | 13 Lake Johnson East Loop | 23 Rocky Branch |
| 5 Centennial Bikeway Connector | 14 Lake Johnson West Loop | 24 Shelley Lake Loop |
| 6 Crabtree Creek | 15 Lake Lynn Loop | 25 Simms Branch |
| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

System-Wide User Expectations

The following represent user expectations in common across all trail classifications:

- Seating every half mile (see page 85 for recommendations on specific seating spacing)
- Trash receptacles at trailheads and access points for effective maintenance
- Wayfinding/signage at decision points that detail distances to destinations and amenities
- Grade separated crossings or high-comfort street crossings
- Tree shade, where possible
- Context-appropriate public art



Image 28: Wayfinding on the Neuse River Trail



Image 27: High-comfort Trail Crossing



Image 29: Public Art Along Trail



Image 31: Trail with Tree Shade



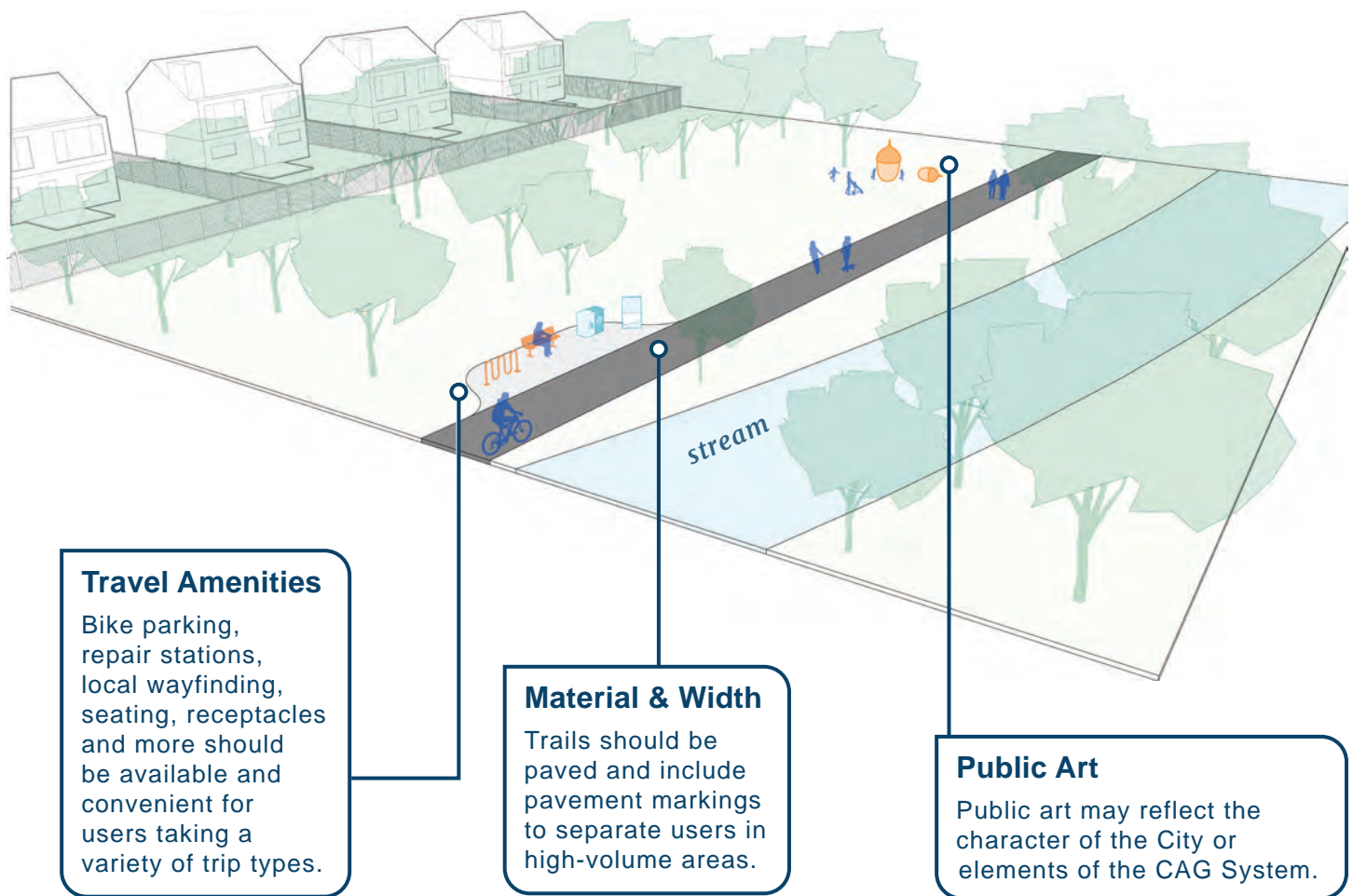
Image 30: High-Intensity Activated Crosswalk (HAWK)

Oak City Trails

Oak City Trails meet user needs for a variety of daily outings. Trail users, especially commuters, will likely use these high-capacity trails for longer trips. Oak City Trails provide the most direct routes to destinations throughout Raleigh and are intentionally integrated into the larger multimodal transportation network. Consistency of trail characteristics and maintenance practices is critical to meet expectations regardless of setting. Specific details and aesthetics may vary from natural to more urban settings, as shown in the graphics below.

Oak City Trail Expectations (continued on the following page)

- Expanded operating hours to provide safe and comfortable connections for active transportation
- Maintenance needs are prioritized over the needs of other trail classifications
- Re-routes and detours provided during maintenance, system improvements, or storm response
- Convenient bicycle parking



Oak City Trails

Locations for Oak City Trails include roadway corridors as sidepaths or as urban trails, stream corridors, and utility corridors. Examples of existing high-capacity trails that generally align with this classification include Rocky Branch, Walnut Creek, and Crabtree Creek Greenway Trails.

Oak City Trail Expectations

- Connected to sidewalk, bikeway, transit networks
- Universal accessibility
- Public art
- Bikeshare stations and micromobility hubs, as appropriate
- Trail-oriented development, as appropriate
- Bicycle repair stations
- Pavement markings (i.e., centerline striping)
- Lighting along trails (Provision and placement of lighting will be determined during trail design and construction and will be dependent upon context and environmental characteristics)

Lighting

Where lighting is appropriate, passive detection and full cut off style lighting can minimize light pollution and enhance sense of security.

Urbanized Amenities

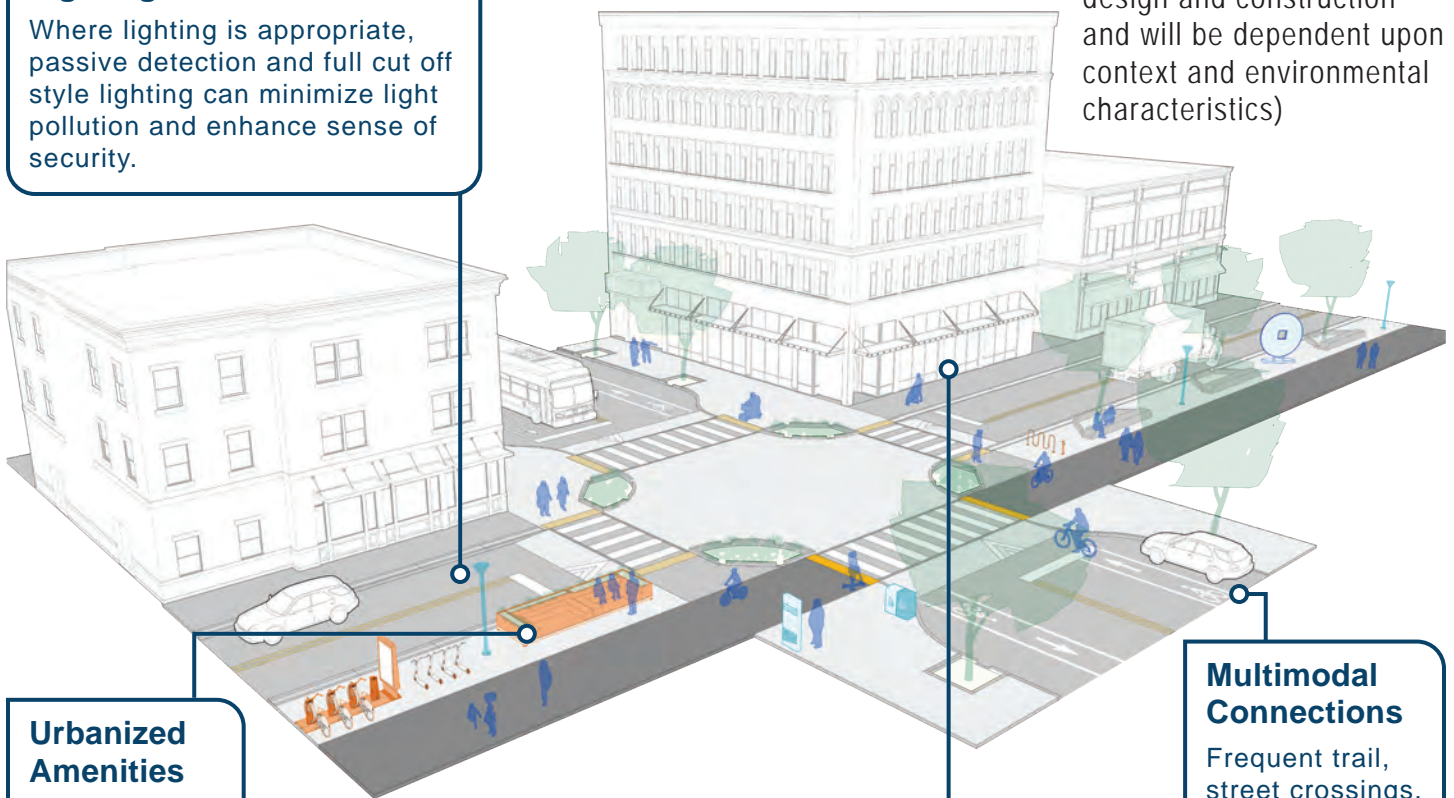
Trailside hubs may offer trail specific amenities (e.g., parklets for seating, food trucks).

Trail-Oriented Development (TOD)

Where appropriate, adjacent development should provide direct access to/from trails. TOD includes residential, office, retail, and food/beverage services that face adjacent trails for easy access. Ample wayfinding signage is critical to direct local residents or one-time visitors.

Multimodal Connections

Frequent trail, street crossings, and intuitive wayfinding connects trails to the larger mobility network to reach destinations.

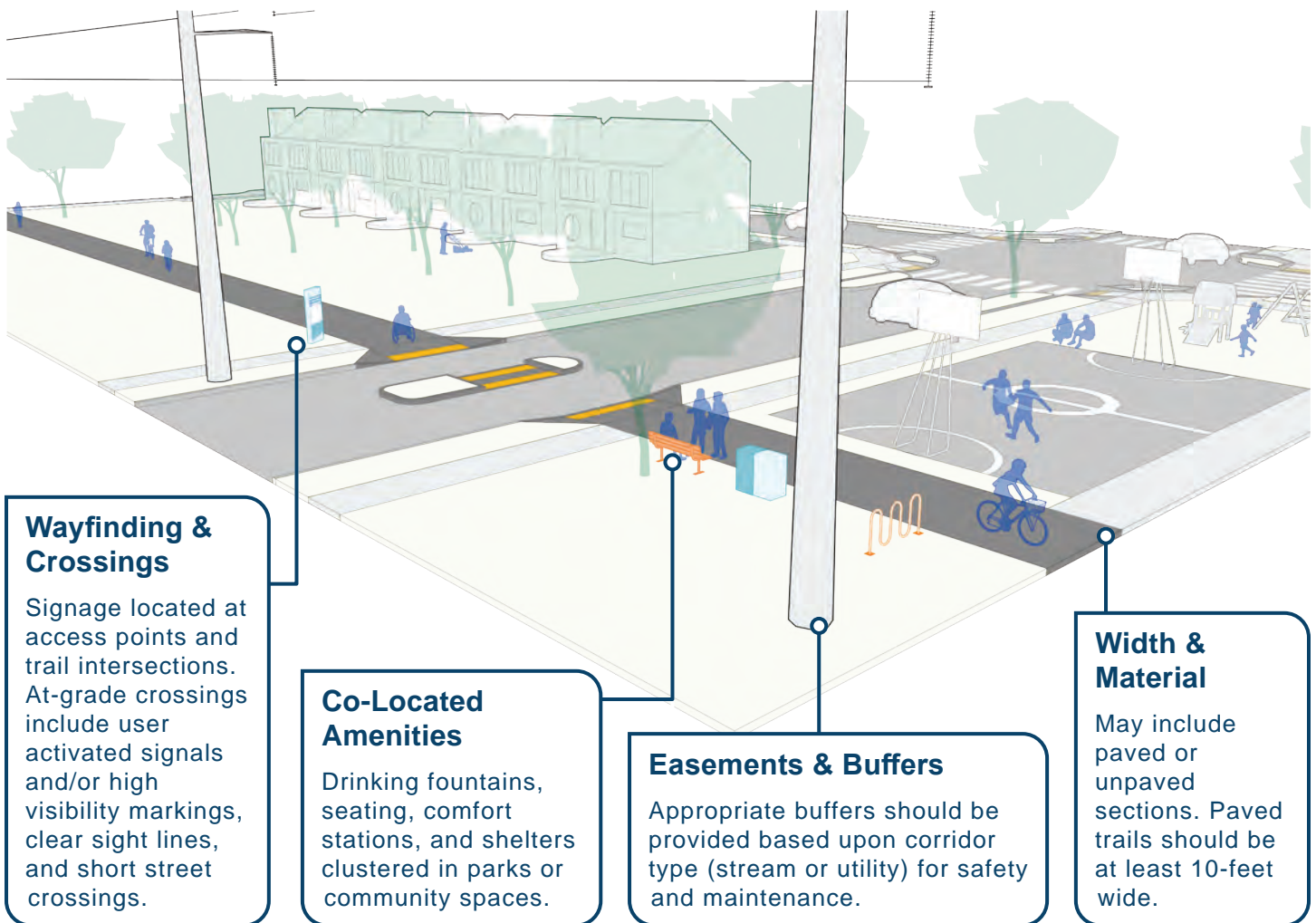


Neighborhood Trails

Neighborhood Trails should connect Oak City and Scenic Trails to nearby activity centers, schools, green spaces, parks, or other neighborhood destinations. Neighborhood Trails may be located within stream corridors, utility corridors, and/or roadway corridors as sidepaths. Existing trails that align with this classification include Abbotts Creek Trail and Spring Forest Trail.

Neighborhood Trail Expectations

- Community-oriented art
- Amenities at parks
- Lighting along trails (Provision and placement of lighting will be determined during trail design and construction and will be dependent upon context and environmental characteristics)

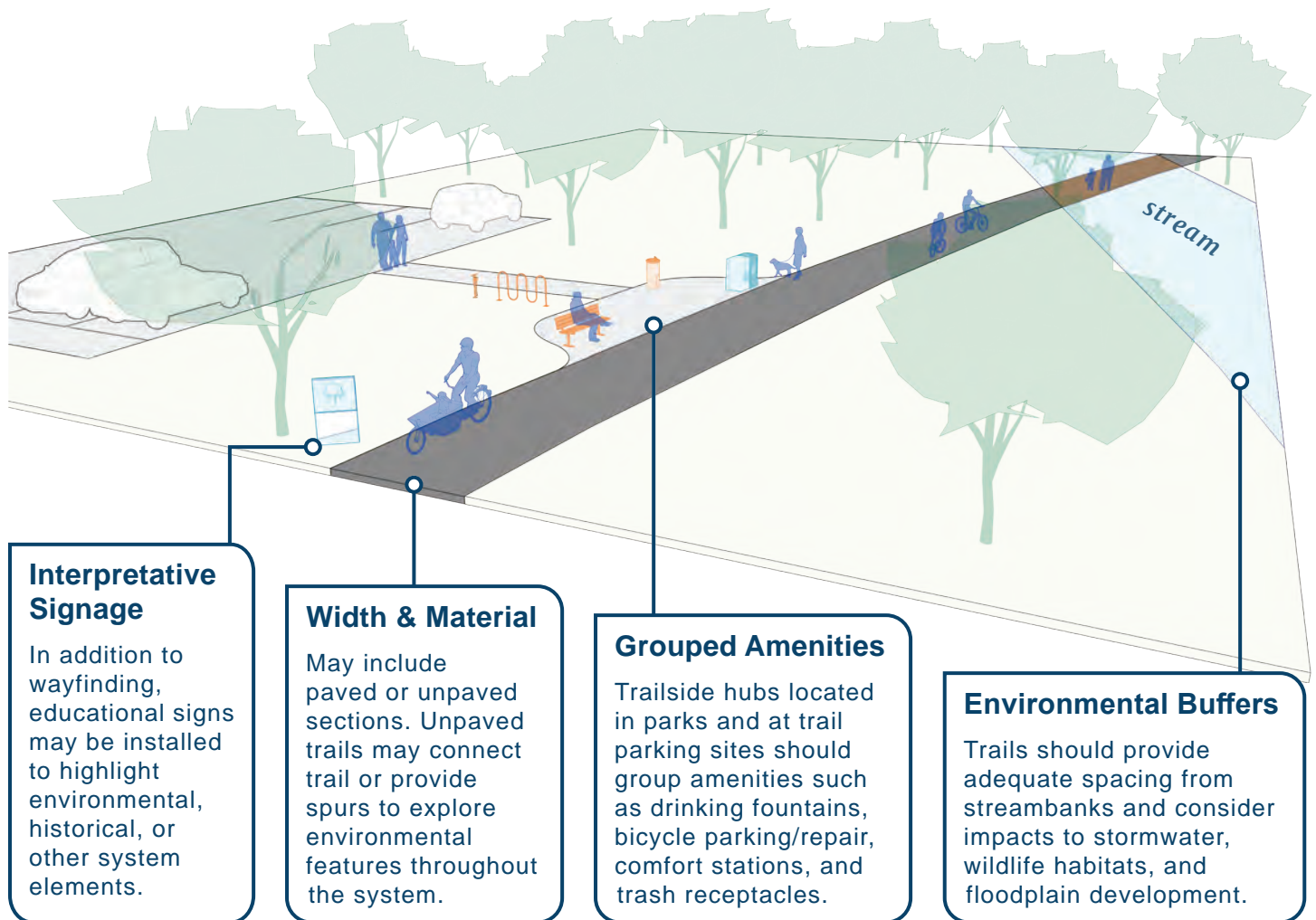


Scenic Trails and Loops

Scenic Trails and Loops provide opportunities for trail users to connect with the natural environment while being active. Scenic Trails may be located within stream corridors or utility corridors and, occasionally, adjacent to roadways as sidepaths. Existing trails that generally align with this classification include Lake Johnson East and West Loop, Shelley Lake Loop, and the Neuse River Trail.

Scenic Trail Expectations

- Amenities at trailside hubs
- Less frequent trail/roadway crossings
- Pavement markings in high traffic areas
- Remote vehicle parking areas
- Public Art
- Recreation-focused establishments, as appropriate (e.g., snack kiosks)
- No lighting



Trail Cross Sections

The following cross sections should be used as existing trails are upgraded and new trails are constructed. Cross sections may apply to more than one trail classification and will be determined on a project-by-project basis. Additionally, opportunities for green infrastructure and the use of sustainable materials should be considered for all trail projects throughout the CAG System.



Oak City Trails

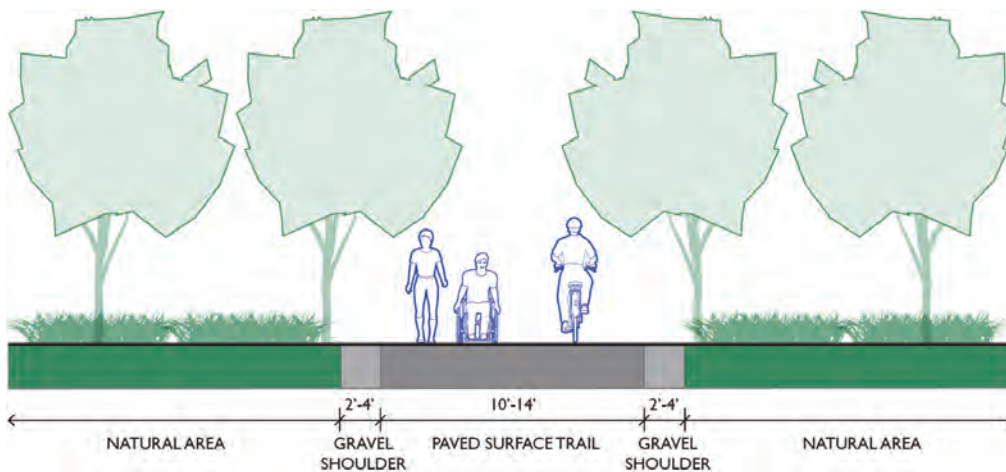


Neighborhood Trails



Scenic Trails and Loops

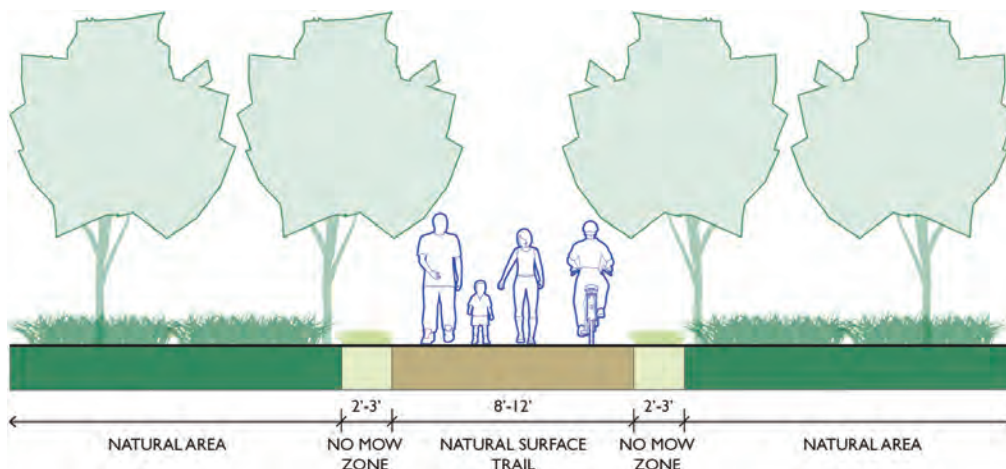
CROSS SECTION A



Major Design Elements

- **Material:** concrete or asphalt
- **Standard width:** 10'-14' (8' minimum for short distances within constrained areas)
- **Signage:** wayfinding, informational, etiquette, and regulatory
- **Tree Buffer Zone:** natural screening and shade

CROSS SECTION B



Major Design Elements

- **Material:** granite fines or bare earth
- **Standard width:** 8'-12' with gravel or no mow (low-growing) groundcover shoulder
- **Signage:** wayfinding, informational, educational, etiquette, and regulatory
- **Tree Buffer Zone:** natural screening and shade

Right-of-way (ROW) acquisition or an alternative alignment should be sought if minimum widths are not feasible for cross sections A, B, or D due to constraints. If constraints exist that prohibit implementation of cross section C and ROW acquisition or alternative alignment is not feasible, omission of the furnishing zone may be considered as long as amenities are provided per recommendations for Oak City Trails.



Oak City Trails

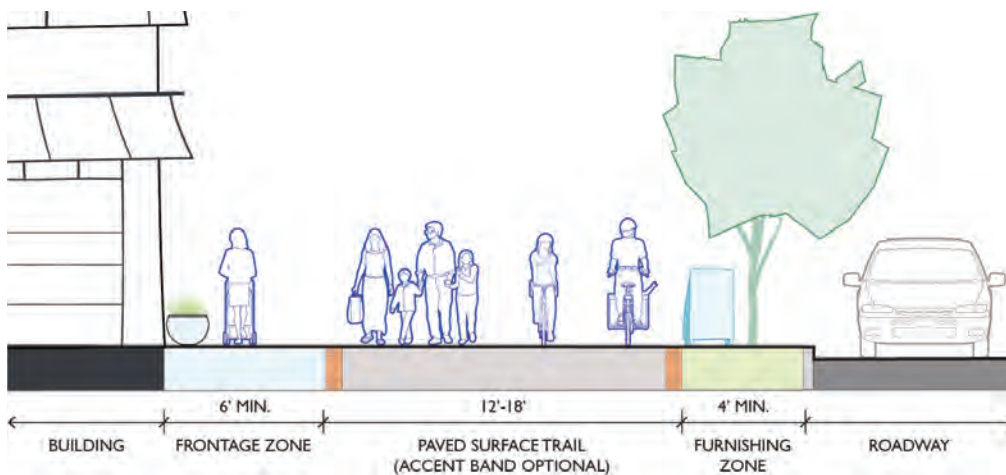


Neighborhood Trails



Scenic Trails and Loops

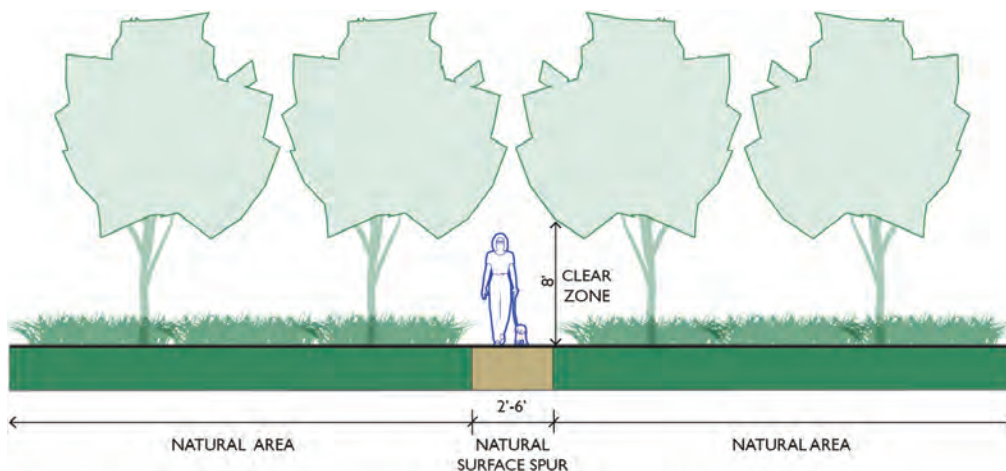
CROSS SECTION C



Major Design Elements

- **Material:** concrete, asphalt, or slipfree paving material (includes detectable edge)
- **Standard width:** 12'-18' to provide sufficient space for all modes in the urban context
- **Lighting:** pedestrian scale
- **Signage:** wayfinding, information kiosks

CROSS SECTION D



Major Design Elements

- **Material:** granite fines or bare earth
- **Standard width:** 2'-6' with existing groundcover
- **Signage:** wayfinding, educational, and etiquette
- **Tree Buffer Zone:** natural screening and shade

Trail Prioritization

Recommended trails provide additional connectivity throughout Raleigh by filling system gaps, linking new neighborhoods and parks, creating connections to high-frequency transit, and increasing access for those they need it most. This section clarifies the level of priority for each recommendation, a critical step for implementing new trails and reinvesting in existing trails in ways that add value to the system and provide the greatest benefits to residents and visitors.

The criteria that the CAG Plan uses to prioritize recommended trail projects are based on national best practices and public input that is specific to trail development; they also build on criteria previously used for the City's Parks Bond referendum projects. A maximum value or weight is associated with each criteria to indicate level of importance in accordance with both best practices and goals established by the PRCR System Plan.

The following page includes the criteria and scoring weights used to prioritize new trail projects and locations for reinvestment on existing trails. For a detailed description of all criteria along with full project lists, refer to [Appendix D](#).

Prioritization Shift

This set of prioritization criteria and its associated values present a shift from a solely recreational emphasis to a more integrated approach to CAG System planning and construction. This shift recognizes the CAG System as both a recreational asset and a fundamental piece of the larger transportation network.



Population Density

Trail segment connects to areas with higher density based on Census Block – 10 points



Greenway Access Priority

Trail segment increases access based upon Greenway Access Priority score by Census Block – 20 points



Social Equity

Trail segment provides equitable distribution based upon Social Equity Score (combination of demographic data that includes Age Dependency, Education, Poverty, Unemployment, and Vacancy) – 20 points



Racial Equity

Trail segment provides access to neighborhoods of color (“BIPOC” neighborhoods) – 5 points



Adopted Plans

Trails or trail segments are identified in adopted planning documents (e.g., Bike Raleigh, small area plans) – 5 points



Future Density

Trail segment connects to areas planned for increased density based upon Growth Framework Map in the City’s Comprehensive Plan – 10 points



Transit

Trail segments provide connections to or near existing and/or proposed high-frequency bus routes (15-minute headways or less during peak hours) – 10 points



Overall Park Level of Service

Trail segment increases greenway access for less-served areas of the city – 10 points



Active Transportation

Trail segment links to the larger network of existing bikeways and proposed infrastructure defined by the Bike Raleigh priority network – 10 points

New Trails

Expanding the existing 117-mile CAG System by constructing new trails will provide additional access to residents and visitors while also increasing connectivity to existing destinations and the larger transportation network. New trail construction should be strategic, focus on equitable distribution, link to high-frequency transit, and provide comfortable connections to and from parks, activity centers, and other destinations. The following items informed recommendations for new trails:

- Trails planned in previous CAG Plan documents
- Public input
- Specific corridors that align with priority criteria

All new trail recommendations were scored based on the criteria outlined in [Appendix D](#), and the highest scoring 20% are shown in Figure 15 as Highest Priority Trails. A full table of proposed trails with associated scores and rankings can also be found in [Appendix D](#). Balancing new construction with existing trail reinvestment is critical to the sustainability of the CAG System. As proposed, the full CAG System will provide 280 linear miles of trails for active transportation, recreation, and open space preservation.

Scoring Results

While not every project can be in the highest level, each project on the proposed network is a critical piece of increasing connectivity and safety for greenway trail users in Raleigh. Projects that rank lower but fill essential gaps in the network may be considered for implementation sooner or in conjunction with adjacent projects.

Additionally, while levels have been established, these designations are for planning purposes only. It is understood that there will be “projects of opportunity,” and that projects should be implemented when opportunities arise or funding is available.

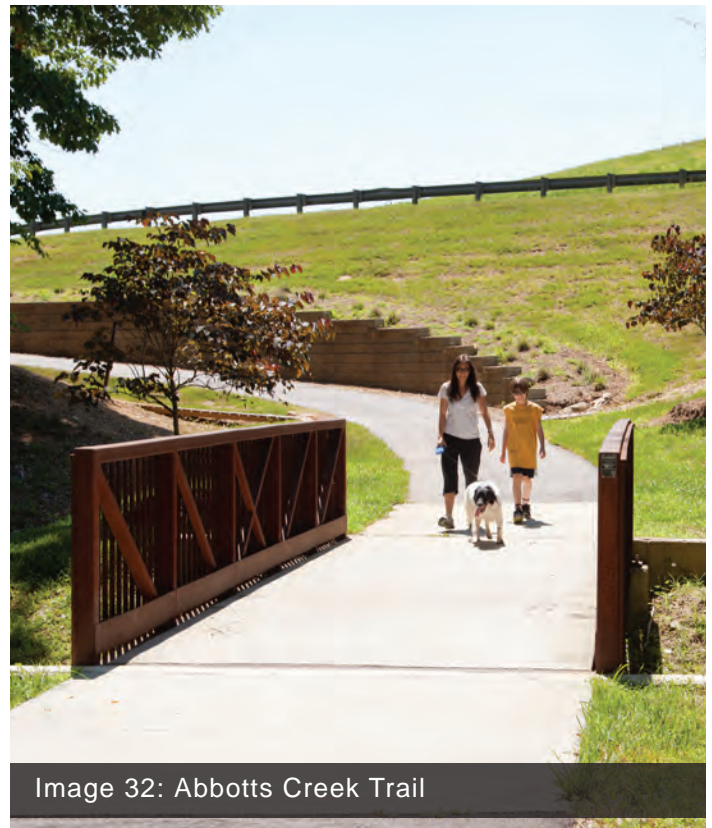
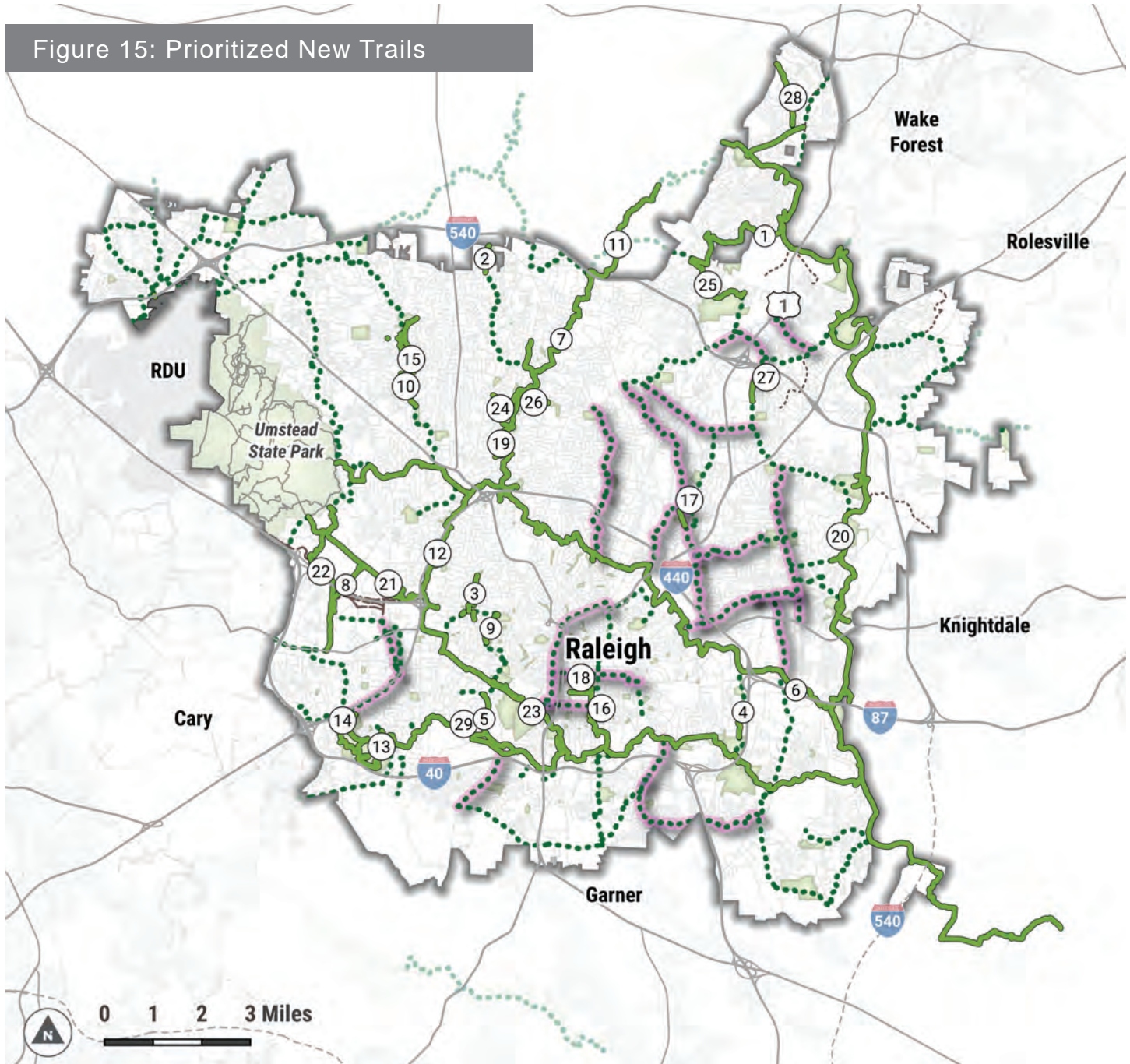


Image 32: Abbotts Creek Trail

Figure 15: Prioritized New Trails

**CAG Trail Network**

- Proposed Trail
- Highest Priority Trail
- Existing Trail

Parks**Trails in Adjacent Jurisdictions**

- Existing/Funded
- Proposed

Existing Trails Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
| 4 Birch Ridge Connector | 13 Lake Johnson East Loop | 23 Rocky Branch |
| 5 Centennial Bikeway Connector | 14 Lake Johnson West Loop | 24 Shelley Lake Loop |
| 6 Crabtree Creek | 15 Lake Lynn Loop | 25 Simms Branch |
| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Crossing the Beltline

Crossing design is a crucial determinant of the real and perceived safety for trail users, particularly for trails that cross highways with high speeds and traffic volumes. Twelve of the CAG Plan's proposed trails would cross I-540, I-440, and I-40. Figure 16, on page 79, shows the general locations for each of these trail and corridor crossings. Note that these locations are not finalized; feasibility studies are needed and may result in changes to trail alignment and crossing location. There are four crossing types that are applicable to I-540, I-440, and I-40:

- Roadway Overpass
- Trail Bridge (non-vehicular)
- Roadway Underpass
- Trail Tunnel (non-vehicular)

Design Considerations

Key design considerations for each crossing type, along with examples and best practices, are identified in the sections below. All crossing types should be ADA-compliant and will require professional engineering services.



Image 34: Trail Bridge over I-440



Image 35: Roadway Underpass at Wade Ave.

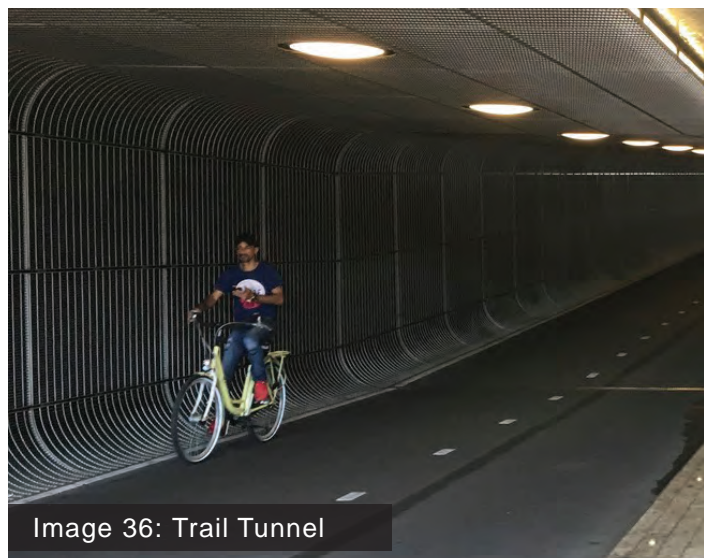


Image 36: Trail Tunnel



Image 33: Roadway Overpass

Crossing Type

Roadway Overpass/Trail Bridge

- Width: Consistent with trail approach and trail classification (10' minimum)
- Street buffer (if adjacent to travel lane): 6' preferred (2' minimum)
- Horizontal Clearance: 2' preferred (1' minimum)
- Vertical Clearance: 10' minimum from any overhead features
- Railing height: 42" minimum
- Vertical curved fencing required; consult local specifications.
- Centerline stripe on bridge and trail approach
- Non-slip decking material and bicycle-friendly expansion joints with 0.25" maximum gap
- Lighting: Where applicable, and based on trail classification, ensure the entire trail is lit. For a roadway overpass, adequate lighting may be provided by street lights, but requires assessment on a case-by-case basis. Follow guidance from the latest *AASHTO Guide for the Development of Bicycle Facilities*
- Trail bridges should also follow guidance from *AASHTO LRFD Bridge Design Specifications* and the *AASHTO LRFD Guide Specifications for Design of Pedestrian Bridges*

Roadway Underpass

- Width: Consistent with trail approach and trail classification (10' minimum)
- Street Buffer (if adjacent to travel lane): 6' preferred (2' minimum)
- Horizontal Clearance: 2' preferred (1' minimum)
- Vertical Clearance: 10' minimum from any overhead features
- Centerline stripe in underpass and on trail approach
- Lighting: Incorporate natural light through

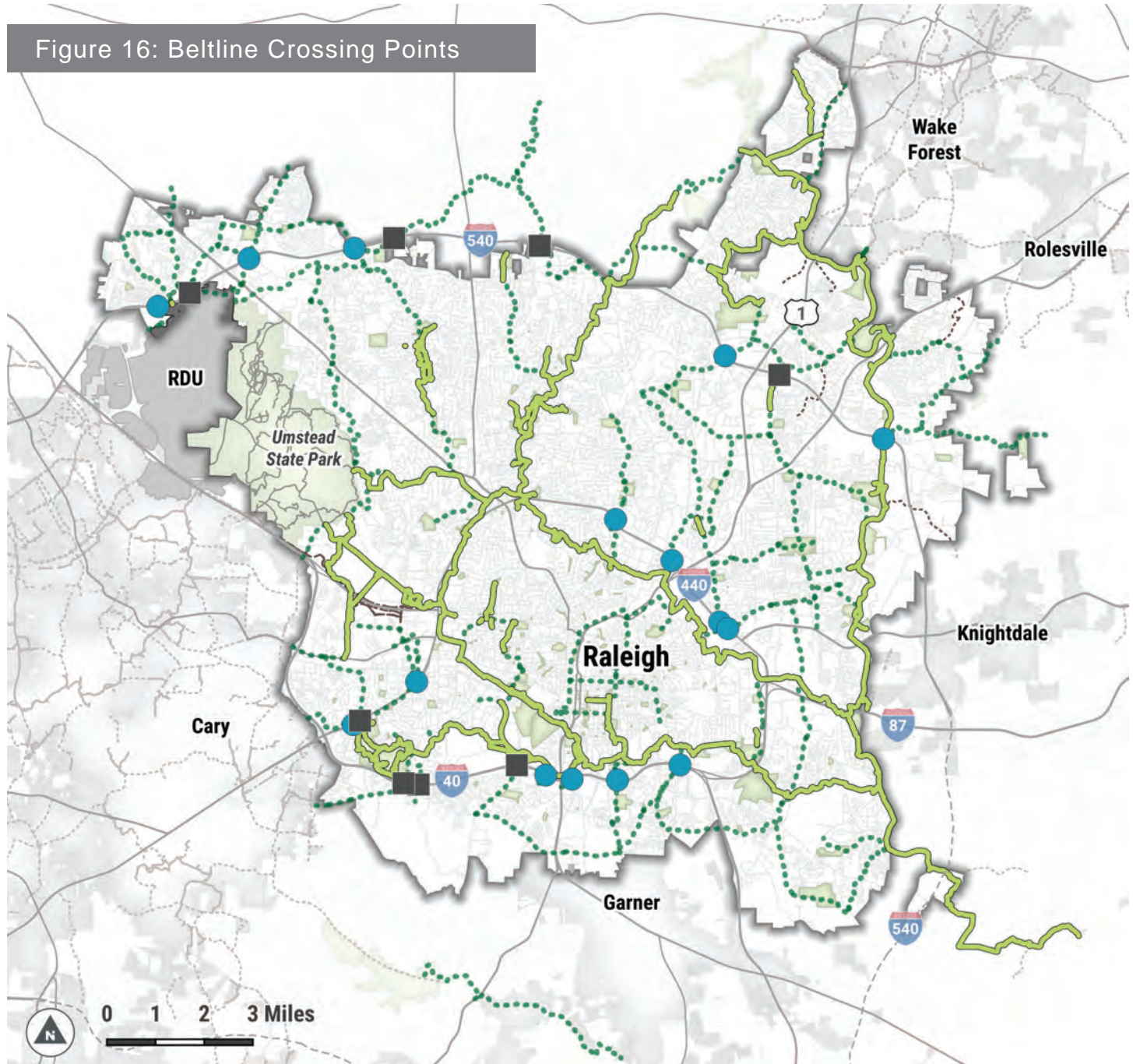
daylighting and adding light shafts where feasible. Bridge supports and fixed objects should be lit. An example is light placement at tunnel walls. Similarly, for fixed objects or supports, lighting should be provided for users to navigate in all conditions. Follow guidance from the latest *AASHTO Guide for Development of Bicycle Facilities*

- Advanced warning signs on trail approach
- Convex mirrors provided at blind curves and trail approach where sightlines are compromised

Trail Tunnel

- The longer the tunnel, the wider it should be to give users a sense of security and comfort when passing
- Height: 10' minimum
- Width: 15' preferred (minimum 1.5 times tunnel height). Wider when tunnel length exceeds 60'
- Horizontal Clearance: 2' preferred (1' minimum)
- Centerline stripe in tunnel and on trail approach
- Lighting: Incorporate natural light through daylighting sections of tunnel or adding light shafts where feasible. Walls and fixed objects should be lit. Follow guidance from the latest versions of the *AASHTO Guide for Development of Bicycle Facilities* and *Roadway Lighting Design Guide*
- Walls: light colored walls for increased brightness and/or art that provides a sense of progression
- Advanced warning signs on trail approach.
- Convex mirrors provided at blind curves and trail approach where sightlines are compromised
- Multiple drainage features required, such as trench drains to intercept stormwater

Figure 16: Beltline Crossing Points



Future Trail Crossings of I-40/I-440/I-540

- Along a Stream Corridor
- Along a Street Corridor
- Parks
- ⋯ Prioritized New Trails

Existing Trails

Trails in Adjacent Jurisdictions

- Existing/Funded
- ⋯ Proposed

Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
| 4 Birch Ridge Connector | 13 Lake Johnson East Loop | 23 Rocky Branch |
| 5 Centennial Bikeway Connector | 14 Lake Johnson West Loop | 24 Shelley Lake Loop |
| 6 Crabtree Creek | 15 Lake Lynn Loop | 25 Simms Branch |
| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Crossing Locations

Future trails are proposed to cross I-540, I-440 and I-40 at 26 locations. While these locations are not finalized, they fall along the following general areas:

Street crossings include:

- I-40 and Lake Wheeler Road
- I-40 and Gorman Street
- I-40 and Lake Dam Road
- I-440 and Jones Franklin Road
- I-540 and Triangle Town Boulevard
- I-540 and Six Forks Road
- I-540 and Ray Road
- I-540 and Lumley Road

Stream crossings include:

- I-440 and Big Branch
- I-440 and Marsh Creek
- I-440 and Bushy Branch
- I-440 and Walnut Creek
- I-540 and Perry Creek
- I-540 and Sycamore Creek
- other unnamed stream tributaries



Open Space Corridors

New open space corridors also present an opportunity to expand the CAG System. Open space corridors preserve natural areas throughout Raleigh, providing valuable vegetative buffers and wildlife corridors where animals can move freely between habitats without barriers or risks associated with development. They slow down and absorb rainfall, improve water quality, provide habitat for plants and animals, reduce noise pollution, cool the air, and absorb air pollution.

Open space corridors are one of the frameworks of the trail network. For the purpose of planning efforts with other agencies, it should be assumed that all open space corridors will need to accommodate trail development at some point in time. However, not every proposed open space corridor will lead to trail construction. Trail construction within open space corridors depends on future growth, connectivity needs, development patterns, and ecological factors. Thus, future trail construction may include projects not yet identified in the CAG Plan's New Trails section.

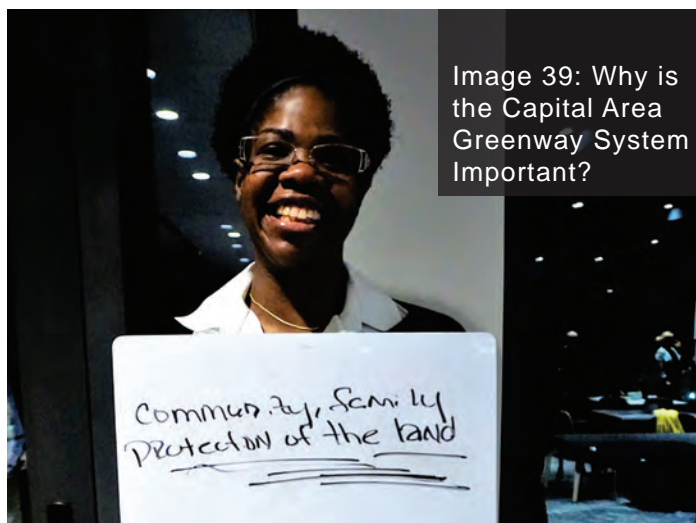


Image 39: Why is the Capital Area Greenway System Important?

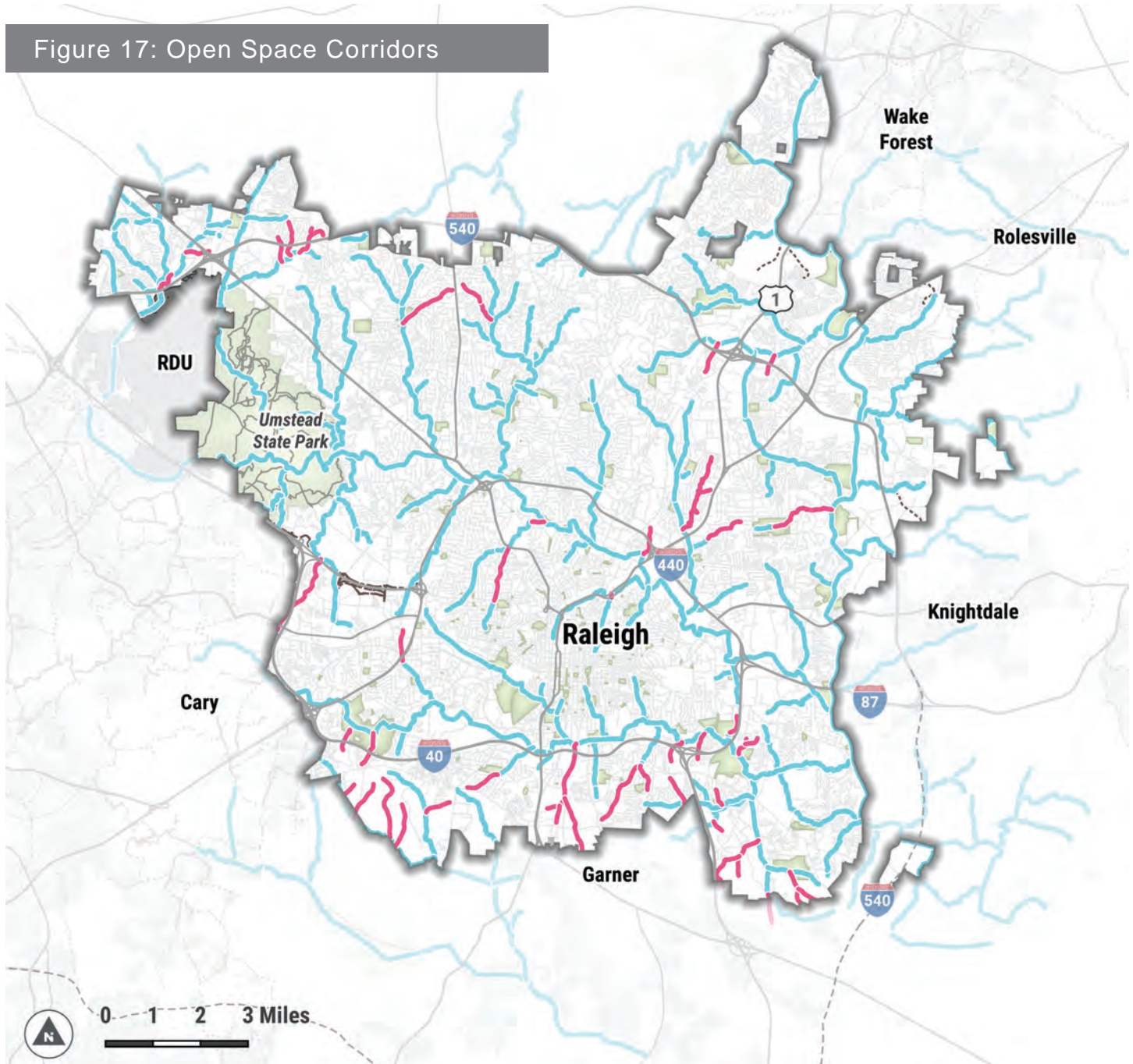


Image 40: Why is the Capital Area Greenway System Important?



Image 41: Why is the Capital Area Greenway System Important?

Figure 17: Open Space Corridors

**Open Space Corridors**

- Existing
- Proposed
- Parks

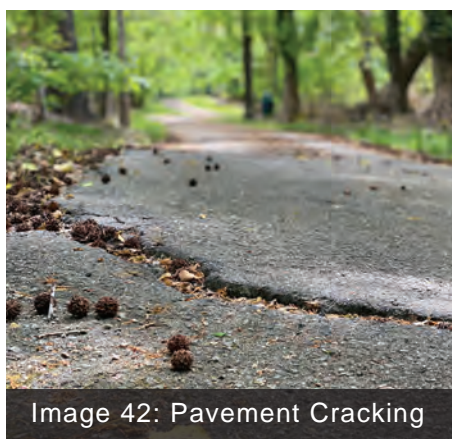
Trails in Adjacent Jurisdictions

- Existing/Funded
- - - Proposed

Existing Trail Reinvestments

In addition to equitable and strategic expansion of the CAG System, it is important to continue to invest in the existing trails so they can meet the needs of present and future trail users. Specifically, trails constructed decades ago need to be updated to current design standards and the new trail classification system should be applied to all existing trails to help prioritize investments like renovations and amenities.

The images below provide examples of recommended upgrades. Note that these are only examples and are not comprehensive of all recommendations provided for these trails or the CAG System as a whole. For a full list of existing trail upgrade recommendations, refer to [Appendix D](#).



Trail surface cracks reduce accessibility and impact the experience of people with wheelchairs, bikes, strollers, etc.



Some trail sections are too narrow to accommodate current volumes and user types, increasing potential for user conflict.



Trail access points without safe street crossings negatively affect trail users' real and perceived safety.



Clear wayfinding equips trail users with the information they need to make decisions about their trip.

Key Considerations

When reinvesting in trails, key considerations include:

- Wayfinding at key decision-making points
- Trail width
- Trail surface material
- Opportunities to fill amenity gaps
- Appropriateness of lighting

Other items to consider when reinvesting:

- Safety of at-grade crossings
- Traffic calming measures near street adjacent trail segments
- Public art opportunities

The Trail Investment Framework presented on page 62 should inform design decisions (e.g., trail width) for trail reinvestment projects.

Example Trail Reinvestment Projects

Little Rock Trail (Bragg Street to Walnut Creek Trail intersection)

- Provide additional wayfinding and signage at trail intersections

Rocky Branch Trail (Walnut Creek Trail intersection to Pullen Park)

- Increase safety of at-grade trail

crossing at Jamaica Drive

- Pave trail segment east of Fayetteville Street
- Widen trail
- Resurface trail segments in poor condition
- Enhance wayfinding and signage along entirety of trail
- Add curb cuts to trail entrances near Pullen Park

Rocky Branch Trail (adjacent to Gorman Street)

- Enhance wayfinding and signage
- Resurface trail segments in poor condition
- Widen trail or create dedicated separated on-street bicycle infrastructure
- Walnut Creek Trail (Dacian Road Park to Apollo Heights Park)
- Widen trail
- Walnut Creek Trail (Little Rock Trail intersection to Summit Avenue)
- Increase safety of at-grade trail crossing of Garner Road

Walnut Creek Trail (adjacent to Avent Ferry Road)

- Add curb cuts to trail access points at intersections

For a full list of existing trail reinvestment recommendations, refer to [Appendix D](#).

Trail Amenities

The following amenity recommendations reflect public comment and inventory of existing amenities along trail segments that received the highest scores during the prioritization process. Note that not all trails had segments that scored high. Similarly, not all segments that scored high have amenity gaps identified by the public or during the inventory of amenities conducted during the Existing Conditions Analysis ([Appendix B](#)).

System-wide Recommendations

Different users will have varying preferences and needs regarding trail amenities. The ideal distance between trail amenities also depends on factors such as adjacent land use and maintenance schedules. As such, there is no national standard or well-established best practice for distance between trail amenities. Trail access points, trail intersections, and adjacent parks are all places where users may naturally pause to rest or plan their route. These locations should serve as primary locations for placement of trail amenities.

Trail amenities that respond to user behavior and make maintenance convenient will create a more logical, attractive greenway system. Where possible, amenities should be grouped together at trailside hubs— destinations adjacent to the trail that may offer users the opportunity to play, rest, eat, shop, gather, and more. This will provide more comfort

and convenience for users while streamlining maintenance responsibilities

The following are recommended goals for establishing the locations for amenities where appropriate, based on context and feasibility:

- **Bicycle Parking** should be located at all destinations along the trail, including but not limited to parks, trail-oriented development, transit stops, and trail access points with vehicle parking.
- **Bicycle Repair Stations** should be located near all bicycle parking locations, as well as at high-volume trail intersections.
- **Drinking Fountains** should be located every 2-3 miles where feasible, at parks, trailside hubs, trail access points with parking (bicycle or vehicle), and at any restroom facility.
- **Restrooms** should be located every 3-5 miles where feasible, at parks and trailside hubs.
- **Trash Receptacles** should be located at all trail access points where they can be maintained and serviced.
- **Seating** should be located at parks, trailside hubs, trail access points. Additional seating should be considered every quarter mile within a mile of a trail access point and where gaps exceed a half-mile in other parts of the systems.

High Priority Amenity Gaps

Baileywick Trail

Section: entirety

- Provide additional seating along trail

Crabtree Creek Trail

Section: Industrial Drive to Atlantic Avenue

- Provide additional seating along trail

Section: bridge #107 to Lockwood Park

- Increase awareness of existing parking lot #67
- Increase signage and awareness of existing water fountain at Lockwood Park
- Add bikeshare station near Raleigh Boulevard access point
- Invest in public art
- Add lighting to Capital Boulevard underpass
- Add lighting at Raleigh Boulevard access point

Section: Culpepper Lane to South New Hope Road

- Provide lighting at New Bern Avenue underpass
- Provide trash receptacle near New Bern Avenue underpass
- Provide a bicycle repair station near New Bern Avenue underpass
- Invest in public art

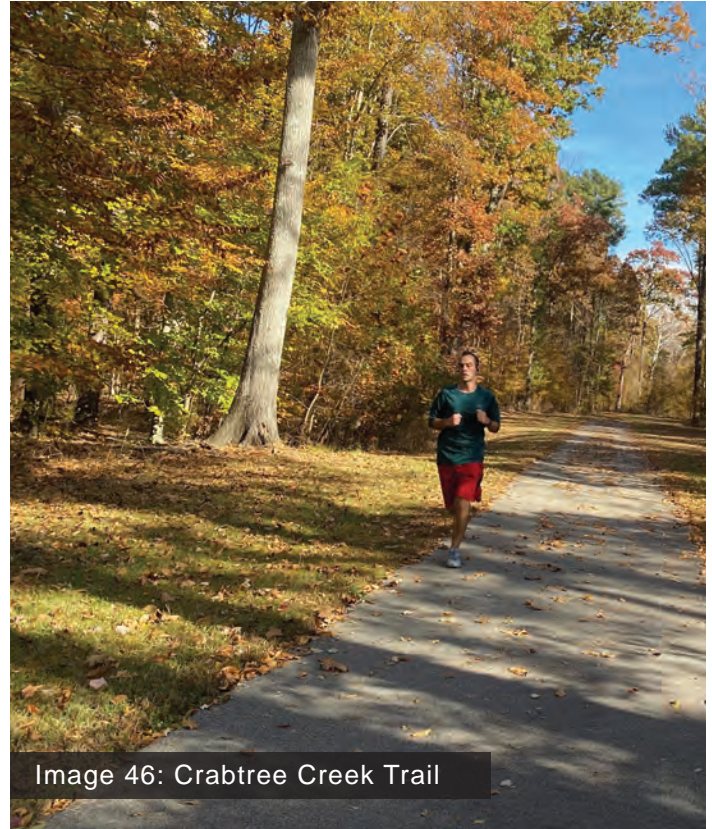


Image 46: Crabtree Creek Trail

Little Rock Trail

Section: Hargett Street to Martin Street

- Provide additional seating at this location or in adjacent trail segments

Section: Martin Street to Davie Street

- Provide additional seating at this location or in adjacent trail segments
- Add water fountain at Martin Street entrance
- Provide a bicycle repair station at Martin Street entrance



Image 47: Little Rock Trail Unpaved Section



Image 48: Little Rock Trail

Section: Davie Street to Cabarrus Street

- Provide additional seating at this location or in adjacent trail segments

Section: Martin Luther King Junior Boulevard to Bragg Street

- Invest in public art at trail entrances near MLK Jr. Blvd
- Provide a trash receptacle and recycling

Mine Creek Trail

Section: bridge #3 to Sawmill Road

Provide additional seating at this location or in adjacent trail segments

Marsh Creek Trail

Section: entirety

- Provide water fountain at Brentwood Park
- Provide additional seating along trail

Neuse River Trail

Section: Thornton Road parking area (lot #95)

- Add sign along Neuse River alerting canoers, kayakers, and tubers of the location of the Thornton Road parking area
- Provide lighting at Thornton Road parking area
- Provide water fountain and restroom at Thornton Road parking area on southern section of lot outside of floodway



Image 49: Mine Creek Trail

Reedy Creek Trail

Section: North Carolina Museum of Art Blue Loop to Blue Ridge Road

- Collaborate with North Carolina Museum of Art (NCMA) to provide public restrooms for trail users
- Provide additional seating
- Invest in public art and explore possibilities to partner with NCMA

Rocky Branch Trail

Section: Walnut Creek Trail intersection to Hunt Drive

- Provide a water fountain, restroom, and seating adjacent to trail at Dorothea Dix Park

Section: Bilyeu Street to Gorman Street

- Increase signage and awareness of existing comfort station at Pullen Park



Image 50: Rocky Branch Trail

Wakefield Trail

Section: Old Falls of Neuse Road to Dunard Street

- Evaluate need to increase parking capacity for vehicles at lots #72 and #79

Walnut Creek Trail

Section: Rose Lane to Belmont Drive

- Evaluate need to increase parking capacity for vehicles at Dacian Road Park (lot #38)
- Increase signage and awareness of existing comfort station at Dacian Road Park
- Provide a map at Dacian Road Park with information on distance to Worthdale Park and other nearby destinations
- Invest in public art

Section: Belmont Drive to Lunar Drive

- Increase signage and awareness of existing water fountains at Apollo Heights Park
- Invest in public art

Section: Little Rock Trail intersection to Summit Avenue

- Evaluate need to increase parking capacity for vehicles at Eliza Pool Park (lot #76)
- Add comfort station at Eliza Pool Park
- Add mirrors to South State Street
- Invest in public art

Section: North Carolina State University Main Campus Drive to boardwalk #369

- Collaborate with North Carolina State University (NCSU) to explore providing a water fountain along trail segment



Image 51: Walnut Creek Trail

Maintenance & Operations

Trail maintenance plays a critical role in user experience. As the CAG System simultaneously ages and grows, both routine and strategic maintenance will be essential. As resources vary, both funding and staff can often fall short with respect to maintenance needs. Routine inventory and addressing needs systematically have been successful and continue to improve annually. In addition, the City's volunteer program for trail and stream clean-up efforts has been successful in recruiting citizen support for and help with maintenance of the CAG System. The CAG Plan's proposed maintenance recommendations prioritize maintaining access for active transportation corridors, investments in additional staff and technology, communication with the public, and coordination with other City departments.

Recommendations for maintenance include the following:

- Enhance communication efforts about trail closures, detours, and maintenance projects.
- Clearly communicate how trail users can report maintenance issues.
- Establish a more resilient trail network that supports recreation and transportation uses even during flooding events.
- Educate trail users about the value of Raleigh's stream corridors and floodplains.
- Integrate maintenance needs with volunteer programming efforts.
- Strengthen the rapid response maintenance plan that guides the clearance of debris and detour provision.
- Use Operations Manual and update manual every five years.
- Evaluate how to address trail- and open space-adjacent issues where no current policy or procedure is clarified. Issues can include graffiti removal, stormwater debris removal, trash in waterways, and plans for unhoused encampments.
- Develop comprehensive invasive plant management plan to protect existing natural resources and forests in greenway parcels and easements.



Program Funding

The success of implementing the recommendations within this plan will depend, in part, on funding. The City currently relies on a variety of funding sources for the CAG System, including:

- Bond referendums
- General fund
- Impact fees
- Grants
- Donations
- Wake County

The following recommendations aim to build on the funding mechanisms the City has already

established and bolster efforts to maintain and enhance the existing system while strategically implementing new trails and open space corridors.

Recommendations for funding include:

- Establish more consistent City funding for CAG System development.
- Diversify funding sources for CAG System development.
- Increase funding for trail maintenance.
- Be mindful of existing resources and collaborate with other City departments to solve maintenance needs.
- Continue to leverage grant opportunities, particularly ones that support multi-modal facilities such as trails, street side paths, trail connections.

Planning and Development

The CAG System is a cherished community resource. Establishing policies and procedures that expand where trails can be located and that strengthen the City's ability to acquire land can foster a more accessible trail network that connects people to the places they need and want to access while continuing to provide recreational opportunities and promote environmental stewardship.

Recommendations for development include:

- Clarify CAG System definitions and processes within the UDO.

- Support greenway construction and easement dedication outside of a floodplain or flood hazard area.
- Provide flexibility for developers through a fee-in-lieu program that directly contributes to CAG System funding.
- Strengthen requirements for developers to contribute to trail construction.
- Establish mechanisms to ensure quality of developer-built trails and amenities.
- Incentivize trail-oriented development where appropriate given land use context.
- Leverage residential development to enhance sidewalk connectivity.
- Require development to provide connections to existing and proposed trails.
- Bolster requirements for easement dedication to better prepare the City for trail design and construction.
- Explore the development of a neighborhood trail request program.
- Incorporate place making and activity hubs (trailside hubs) along the existing and future network for both public and private development.

Trail Security

Designing and programming the CAG System to be safe and secure is paramount to providing a network that is accessible and attractive for people

throughout the City. User security, both real and perceived, impacts decisions for the individual user and the collective community on if, when, and where to use the trail network. For this reason, trail design and effectively using the built environment is valuable for reducing criminal occurrences and the fear of crime that can impact the quality of trails and the sense of security. Crime Prevention Through Environmental Design (CPTED) should be considered throughout the CAG System to create spaces that deter criminal acts and behaviors while supporting inclusivity and the opportunity for environmental discovery. Foundational principals for CPTED include:

- **Natural Surveillance:** increasing visibility between trail users and adjacent streets, parks, and other common areas.
- **Territorial Reinforcement:** placing physical elements that distinguish between public and private spaces.
- **Natural Access Control:** using landscape elements to limit access and eliminate blind spots.
- **Maintenance:** cleaning trails and amenities, managing vegetation, and prompt repair of vandalism.

The following recommendations for security provide an opportunity to be transparent about criminal activity along the CAG System while also being proactive through design and communication to address security concerns—both real and perceived.

- Compile crime, emergency response, and

other incident data including location-specific information for routine reporting and identification of opportunities to improve trail safety, security and overall management.

- Engage the community about trail security to inform departmental policies and trail operations, design, and programming.
- Consider ways trail design and amenities can increase real and perceived trail safety. Continue to prioritize trail user security in routine trail maintenance.
- Prioritize safety of trail users and evaluate trail planning and design elements that enhance safety.

CPTED: Issues & Limitations

While CPTED guidance should be considered for trail reinvestment and construction, design alone cannot address all issues related to user security along the CAG System. As the City implements policies, programs, and projects, it must acknowledge racism, systemic oppression, and bias (historical and current), and actively work to mitigate it; thus, creating spaces where all feel heard, engaged, included, comfortable, safe, and secure.



Environmental Stewardship

The CAG System has a storied environmental legacy, contributing to open space conservation, preservation of nature features, control of

stormwater runoff, floodplain management, and protection of habitat for wildlife and plants. As Raleigh continues to attract more residents and development, the CAG System's environmental benefits will be of utmost importance to maintain the health of natural resources, plants, and animals, as well as a strong quality of life for residents.

Environmental recommendations include:

- Promote a culture of shared stewardship where the PRCR Department, trail users, volunteers, agency partners, and other stakeholders form a collective community of stewards who provide support to and receive shared benefits from trails and open space corridors.
- Explore opportunities to expand environmental conservation efforts (i.e., habitat mapping bioblitzes, citizen science opportunities, periodic monitoring of habitat and species) by leveraging partnerships and trained volunteers.
- Identify and designate protected natural areas (using existing PRCR definition) to proactively support eventual trail routing and permitting.
- Provide forward-thinking, ecologically just, and sustainable trails and amenities using industry best-practices.
- Enhance stream clean-up efforts at specific trail locations.
- Increase awareness of the environmental benefits and history around trails by increasing interpretive signage and/or programming opportunities.
- Continue to protect sensitive ecological areas.



Collaboration & Partnerships

While the City's PRCR Department administers the CAG System, the work of many other City, County, and State departments impacts the system's operations, maintenance, and expansion. For example, some trails and open space corridors cross streets, are located within utility easements, or span jurisdictional boundaries. Nonprofit and private partners also contribute to the CAG System through programming, funding, and advocacy. Fostering cross-departmental and cross-jurisdictional collaboration, as well as deepening relationships with community partners, is integral for the CAG System's success.

Recommendations related to collaboration and partnerships include:

- Continue to work across departments to further the success of the CAG System.
- Establish an inter-departmental working group to discuss topics related specifically to trails and open space corridors.
- Take a more active role in community conversations about people experiencing homelessness.

For a list of all recommendations along with key action items, refer to [Chapter 5](#).

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CHAPTER 5

Implementation



The Path Forward

The CAG Plan provides a clear path forward for expanding and reinvesting in the CAG System and, ultimately, creating a connected, safe, and convenient network of trails and open space corridors that serve all users, from the recreational birdwatcher to the avid bicycle commuter to the first-time trail visitor. However, the CAG Plan is only the beginning; momentum built through the planning process must result in action.

While completing the CAG Plan document is important and necessary to build the groundwork for a more active community, the desired outcome is the implementation of recommendations that result in more equitable access to trails, parks, and open space throughout Raleigh. This chapter outlines a plan for implementation, classifying actions related to the recommendations outlined in [Chapter 4](#) as ongoing, immediate term (0-2 years), or short term (3-5 years). A 100-day action plan, which outlines valuable actions the PRCR Department should aim to complete within the first 100 days of adopting the CAG Plan to maintain and showcase momentum, is also included. With every future CAG Plan update, the implementation plan should be reassessed. Items that have been completed should be removed, and new actions that are necessary to further the success of the system should be added.

Summary

Table 4, shown on the following pages, provides all action items and associated details related to implementing the recommendations presented in Chapter 4.

The table encompasses action items that should happen within a given timeframe, including ongoing, immediate term (0 to 2 years), and short term (3 to 5 years). While individual recommendations may span multiple timeframes, specific action items change over time. The “category” column corresponds to the categories highlighted in Chapter 4. All recommendations and action items presented within this chapter support the benefits highlighted in Chapter 1.

The 100-Day Action Plan, presented in Table 5 later in this chapter, follows a similar format.

Table 4: Recommendations and Action Items

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Prioritize reinvestment for existing trails while strategically building new trails.			
Ongoing	Continue to identify high priority trails for new construction.	Development; General; Funding	N/A
	Continue to identify high priority existing trails for reinvestment and/or redesign.	Development; General; Funding	N/A
Immediate (0-2 years)	Identify three high-priority new trails for construction and conduct 30% feasibility studies for more accurate cost estimates.	General; Development	N/A
	Identify five high priority trail reinvestments and assess necessary resources.	General; Development	N/A
	Complete at least one new trail construction project.	General; Development	N/A
Short (3-5 years)	Complete four trail reinvestment projects.	General; Development	N/A
	Identify three additional high-priority new trails for construction and conduct 30% feasibility studies for more accurate cost estimates.	General; Development	N/A
	Identify five additional high priority trail reinvestments and assess necessary resources.	General; Development	N/A

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Support Ongoing trail and stream corridor clean-up efforts.			
Ongoing	Continue to evaluate trail and stream corridor clean-up needs.	Environmental	N/A
Establish a more resilient trail network that supports recreation and transportation uses even during flooding events.			
Ongoing	Invest in other recommendations within the CAG Plan to build trails outside of the City's floodplains.	Development; Maintenance and Operations	Planning and Development Department
	Support the Raleigh Transportation Department in the development of separated on-street bikeways that connect to the CAG System and can be used for effective detours during flood events.	Development	Transportation Department
Annually update the greenway trail and open space corridor maps.			
Ongoing	Develop a task force or interdepartmental work group to formalize a process for mapping updates.	Development	Planning and Development Department; Communications Department
Update CAG Plan every five years.			
Ongoing	Track recommendations that should be updated based on changing City goals or innovative best practices. As trails are upgraded and new trails are developed, review prioritization to guide future investment.	General	N/A
Update CAG Design Guide and Operations Manual.			
Ongoing	At each five-year update of the CAG Plan, update the CAG Design Guide and Operations Manual concurrently.	General	N/A
Immediate (0-2 years)	Update CAG Design Guide for new and renovated trails to provide increased safety, comfort, convenience, maintenance, and amenities for users, and a consistent identity across the entire system.	General	N/A
Continuously evaluate trail needs for active transportation, recreation, and open space preservation.			
Ongoing	Regularly evaluate community needs for recreational and active transportation trails.	General	N/A
	Regularly assess the equitable distribution of trails.	General	N/A
	Determine resource needs and feasibility of completing an active management plan for forests and wetlands and inventory the quality of protected ecosystems.	General	N/A

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Continue to promote Trail Safety Education, Awareness and Outreach.			
Ongoing	Continue to promote and bring awareness of the importance of physical safety when using trails.	General; Development; Security	Communications Department; Trail Users
	Continue to communicate and bring awareness of greenway alerts, closures, and project status.	General; Development; Security	Communications Department; Trail Users
Immediate (0-2 years)	Increase communication efforts –on social media, webpages, text alerts, closures/detours.	General; Security	Communications Department; Technology and Information Department
	Continue to implement the Safety and Etiquette Campaign on an annual basis at a minimum.	General; Security	Communications Department; Raleigh Police Department
	Collaborate with Stormwater on Flood Monitoring Program to provide surveillance that can help monitor need for communications of trail closures and maintenance.	General; Collaboration; Maintenance and Operations; Security	Engineering Services Department (Stormwater Division)
Increase accessibility of CAG System.			
Immediate (0-2 years)	Develop policy that address Other Power-Driven Mobility Devices (OPDMD) to accommodate individuals with mobility disabilities.	General	N/A
Explore the development of a neighborhood trail request program. Build this program off of the Neighborhood and Community Connections Program.			
Immediate (0-2 years)	Identify all neighborhoods that fall within program eligibility criteria.	Development	N/A
	Identify eligibility criteria for neighborhoods (e.g., near utility corridor or existing easement).	Development	N/A
	Create a process for requests; the process should consider social equity, trail length, feasibility, and neighborhood support.	Development	Planning and Development Department
	Create a menu of amenities that could potentially be included in trail projects.	Development	N/A

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Prioritize safety of trail users and evaluate trail planning and design elements that enhance safety.			
Ongoing	Collaborate with other city departments, government agencies, businesses, nonprofit groups, and volunteers.	Collaboration; Security	Transportation Department; Engineering Services Department; Raleigh Water; Raleigh Police Department; Volunteer Groups
	Support planning, design and improvement projects that increase greenway user safety.	Collaboration; Maintenance and Operations; Security	Transportation Department; Engineering Services Department; Raleigh Water
	Continue to utilize best practices for safety.	Development; Maintenance and Operations; Security	Transportation Department; Engineering Services Department; Raleigh Water
	Continue to engage with programs that promote Public Art, Programs, and Events.	Development; Maintenance and Operations; Security	Raleigh Arts, PRCR Recreation Division, City Manager's Office (Office of Emergency Management and Special Events)
	Continuously review Ongoing trail safety practices annually.	Development; Maintenance and Operations; Security	Raleigh Police Department; Raleigh Water
Immediate (0-2 years)	Increase signage and wayfinding along the CAG System that improves user safety based on standards in the 2021 Greenway Safety Report.	Collaboration; Security	Transportation Department; Raleigh Water; Raleigh Police Department; Volunteer Groups
	Evaluate areas that would benefit from pavement markings such as centerline striping, outer edge pavement markings, trail object markings and implement improvements.	Development; Security	N/A

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Immediate (0-2 years)	Conduct a system-wide lighting study to evaluate strategic locations for trail lighting that improve visibility, increase overall trail access and convenience, and provide users a sense of security.	Development; Maintenance and Operations; Security	Engineering Services Department; Transportation Department
	Identify lighting options/recommendations that will have the least negative impacts to the surrounding natural environment.	Development; Maintenance and Operations; Security	Engineering Services Department (IFS Division)
	Identify hazardous wooden structures where a retrofit to cast in place concrete would reduce slip accidents.	Maintenance and Operations; Security	N/A
	Complete trail underpass (Tunnel) lighting.	Development; Security	Engineering Services Department (IFS Division)
Short (3-5 years)	Implement trail lighting projects that improve visibility, increase overall trail access and convenience, and provide users a sense of security.	Development; Maintenance and Operations; Security	Engineering Services Department; Transportation Department
Continue to prioritize trail user security in routine trail maintenance.			
Ongoing	Continue maintenance of vegetation and other amenities that may impede clear sight lines along the trail system (see Maintenance Recommendations).	Security; Maintenance and Operations	N/A
Continue to develop and expand trail counting program.			
Immediate (0-2 years)	Continue to evaluate and update equipment management and maintenance protocols; develop data management protocols; archive and publish data annually.	General	Transportation Department, North Carolina Department of Transportation (NCDOT); North Carolina Capital Area Metropolitan Planning Organization (NC CAMPO); Institute for Transportation and Research (ITRE)

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Continue to protect sensitive ecological areas.			
Ongoing	Prevent trail construction from impacting wetlands, lakes, rivers, streams, habitats of rare and endangered species, public water supplies, sensitive forest areas, steep slopes, soils identified as restricted for trail and road development, and unique or important geologic features or formations.	Environmental	N/A
	Use low-impact design and construction methods.	Environmental	N/A
Immediate (0-2 years)	Create a plan for open space corridors, outlining which will likely involve trail construction and which will serve as permanent preservation corridors. Routinely review and update this plan based upon growth patterns and anticipated City needs.	Environmental	N/A
Short (3-5 years)	Establish a tree buffer zone for new trails and preserve the tree buffer on existing trails to enhance the natural experience, increase shade, and provide natural screening from adjacent land uses.	Environmental	N/A
	Develop a program to increase awareness of, contain, and possibly eradicate the problem of invasive plants and insects.	Environmental	N/A
	Develop an invasive plant management program to protect the forests, wetlands and meadows on the greenway and the environmental benefits these areas provide to citizens.	Environmental	N/A
Explore partnership opportunities with nonprofit and private organizations.			
Immediate (0-2 years)	Expand the Adopt-A-Trail Program to allow for monetary sponsorship from individuals, businesses, and groups.	Development; Funding	Department of Human Relations (Equity and Inclusion Division)
	Support a Friends of the Trails group.	Development; Funding	Department of Human Relations (Equity and Inclusion Division)
	Bolster relationships with nonprofit and private organizations, such as Oaks and Spokes, Wake County Habitat for Humanity, Triangle Land Conservancy, Trail Rails to Trails Conservancy, Triangle Greenways Council, Downtown Raleigh Alliance, BikeWalk NC, and local HOAs and neighborhood groups.	Development; Funding	Department of Human Relations (Equity and Inclusion Division)

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Establish an interdepartmental working group to discuss topics related specifically to trails and corridors.			
Immediate (0-2 years)	Solicit participation from each City department and convene regular meetings.	Collaboration	Transportation Department, Engineering Services Department, Planning and Development Department, City Attorney's Office
	Continue to convene an inter-department working group with the Parks, Recreation and Greenway Advisory Board's Greenways Committee at least two times a year.	Collaboration	Greenway Committee, PRGAB, BPAC
	Develop an annual work plan to organize working group efforts.	Collaboration	Transportation Department; Raleigh Water
Continue to improve trail connectivity to jurisdictions surrounding the City of Raleigh.			
Immediate (0-2 years)	Continue to participate in and lead regional planning initiatives with groups and organizations whose goals are to promote linkages needed to enhance regional trail connectivity.	General	Triangle J Council of Governments; Triangle Trails Initiative, Wake County
Communicate how greenway users can report maintenance issues.			
Short (3-5 years)	Make information for users reporting maintenance issues more prominent on City websites	Maintenance and Operations	Communications Department
	Advertise and spread the word about how users can report maintenance issues that include trails, litter/ debris, and stream blockages/flooding through the City's Marketing departments and social media channels.	Maintenance and Operations	Communications Department
	Place signage along trails and at access points informing users how they can report maintenance issues. Signage may include websites and/or QR codes.	Maintenance and Operations	Communications Department
Explore a range of operating and capital funding sources to support the growing needs and public expectations of the CAG.			
Immediate (0-2 years)	Provide funding and other staff resources for additional Planning staff that can carry out the recommendations and action items set forth in this Plan.	General; Funding	N/A

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Educate trail users about the value of the City's stream corridors and floodplains.			
Immediate (0-2 years)	Create educational materials about the City's waterways and the environmental benefits of floodplains. Note how trails may be impacted during flooding events.	Maintenance and Operations	Engineering Services Department (Stormwater Division); Sustainability Department; Communications Department; Raleigh Arts
	Promote CAG beautification and encourage users to get involved in keeping waterways and floodplains clean and free of debris.	Maintenance and Operations	Engineering Services Department (Stormwater Division); Sustainability Department; Communications Departments
Establish and grow industry, economic development, and tourism partners.			
Immediate (0-2 years)	Partner with the Chamber of Commerce, the City's Economic Development and Innovation Department, Downtown Raleigh Alliance, and others to develop support for CAG Plan implementation. Reach out to City, County and State tourism agencies to ensure that trails are promoted as a top attraction in Raleigh.	General	Chamber of Commerce; Economic Development and Innovation Department; Downtown Raleigh Alliance; others
Integrate new trail development as part of private development.			
Immediate (0-2 years)	Research standards and design guidelines to encourage trail-oriented development and address gaps in regulation for trail-oriented design.	General	Planning and Development Department
Enhance communication efforts about trail closures, detours, and maintenance projects.			
Immediate (0-2 years)	Make every effort to provide a safe, convenient walking and bicycling detour for every maintenance closure that will last longer than 24 hours. Detours may require on-street routing and should prioritize designated and separated bikeways for detour routes.	Development; Maintenance and Operations	Transportation Department; Raleigh Water
	Advertise on the greenway alerts webpage. Consider a banner on other greenway webpages users can click that navigates them to the alerts and closures webpage.	Development; Maintenance and Operations	Communications Department

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Strengthen the rapid response maintenance plan that guides the clearance of debris and detour provision.			
Immediate (0-2 years)	Communicate identified priority trail segments and maintenance expectations to the public for existing and newly constructed trails that connect people to transit, employment centers, and have a higher number of active transportation trips.	Maintenance and Operations	N/A
	Establish protocols for debris removal and providing detours after storm events for priority trail segments.	Maintenance and Operations	Transportation Department
	Coordinate with the city's Flood Early Warning Pilot Program.	Maintenance and Operations	Emergency Communications Department
Be mindful of existing resources and collaborate with other City departments to solve maintenance needs.			
Immediate (0-2 years)	Coordinate maintenance, and associated funding for maintenance, with other City departments.	Funding; Maintenance and Operations	Transportation Department; Engineering Services Department; Raleigh Water
Establish more consistent City funding for CAG System development.			
Immediate (0-2 years)	Develop a toolkit of funding options for greenway construction.	Funding	Budget and Management Services Department
Short (3-5 years)	Increase annual funding from general fund that corresponds to a per capita investment, proposed greenway miles, active transportation mode split, or some other quantifiable measure.	Funding	Budget and Management Services Department
	Include a dedicated allocation for greenway construction in future bond packages.	Funding	N/A
	Establish a dedicated funding source for greenway construction.	Funding	Budget and Management Services Department
Integrate maintenance needs with volunteer programming efforts.			
Immediate (0-2 years)	Coordinate with local volunteer groups to assist with maintenance tasks as appropriate.	Maintenance and Operations	Housing and Neighborhoods Department
Short (3-5 years)	Establish a trail stewardship/ ambassador program or Friends of the Trails group.	Maintenance and Operations; Environmental	N/A

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Evaluate extending hours of operation to support active uses of the trail network.			
Immediate (0-2 years)	Evaluate the need and resource needs of extended hours of operation within the CAG System particularly those classified as Oak City Trails.	General	Emergency Communications Department; City Attorney's Office; Emergency Management and Special Events Department; Raleigh Police Department
	Evaluate the need for updating signage to inform the public of any changes to hours of operations.	General	N/A
	Evaluate the need for additional staff resources to respond to trail emergencies after dark and to track and maintain lighting outages.	General	N/A
	Evaluate design features that could make trails safer after dusk, such as reflective pavement markings.	General	N/A
	Evaluate how to address after dark policies, bike light initiatives, police monitoring, and night-time use etiquette.	General	N/A
	Evaluate lighting impacts on the environment and design options that could mitigate adverse environmental impacts.	General	N/A
Increase funding for trail maintenance.			
Immediate (0-2 years)	Assess funding approved each year in the general fund and determine the gap in reaching maintenance needs, particularly as additional trail construction is pursued.	Development; Maintenance and Operations; Funding	Budget and Management Services Department
Short (3-5 years)	Establish an annual dedicated budget for trail reconstruction and maintenance.	Funding	Budget and Management Services Department
Consider ways trail design and amenities can increase real and perceived trail safety.			
Immediate (0-2 years)	Update the Master Sign Program to incorporate Help Locator codes to all non-mile marker signage.	Security	N/A
Short (3-5 years)	Evaluate the appropriateness of CEPTD throughout the CAG System	Security	N/A

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Consider ways trail design and amenities can increase real and perceived trail safety.			
Immediate (0-2 years)	Update the Master Sign Program to incorporate Help Locator codes to all non-mile marker signage.	Security	N/A
Short (3-5 years)	Evaluate the appropriateness of CEPTD throughout the CAG System	Security	N/A
Provide flexibility for developers through a fee-in-lieu program that directly contributes to CAG System funding.			
Immediate (0-2 years)	Consider updating the UDO to provide developers an alternative option to required trail construction, such as a fee-in-lieu.	Development	City Attorney's Office; Planning and Development Department
	Consider eliminating the 10% open amenity area requirement for development along trails in favor of a fee-in-lieu program to pay for greenway maintenance and reconstruction.	Development	City Attorney's Office; Planning and Development Department
Clarify CAG System definitions and processes within the UDO.			
Immediate (0-2 years)	Include definitions of open space corridors, greenway, trails, and reservation in the UDO.	Development	Planning and Development Department
	Replace all instances of "greenway corridor" with "open space corridor" in the UDO and other relevant City-wide documents.	Development	N/A
	Clarify the appropriate method for adding or revising corridors, trails, and easement widths.	Development	Planning and Development Department
	Clarify the use of facility fee credits.	Development	Planning and Development Department
	Explore the use of facility fee funds to reimburse private developers for constructing greenway connections.	Development	Planning and Development Department
	Research what structures would need to be established to use facility fee funds to reimburse developers for constructing public trail connections during construction of private development projects.	Development	Planning and Development Department
	Clarify reimbursement procedures when land is dedicated.	Development	Planning and Development Department

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Require development to provide connections to existing and proposed trails.			
Immediate (0-2 years)	Update the UDO to require private development to build connections, provide easements, and/or pay a fee-in-lieu to connect to existing and proposed trail corridors and street-side/urban trails.	Development	City Attorney's Office; Planning and Development Department
Strengthen requirements for developers to contribute to trail construction.			
Immediate (0-2 years)	Update the UDO to require developers to build trails within their property (along stream corridors or on-street connectors) identified by the Greenway Master Plan. Consider providing an alternative for developers to pay a fee-in-lieu instead of constructing the trail.	Development	Planning and Development Department
	Consider updating the UDO to provide staff with the authority to consider alternative locations or dimensions of required greenway easement dedications in order to maximize public benefit and improve flexibility in the development process.	Development	Planning and Development Department
	Update the UDO to provide incentives for developer-built greenway trails through reduced greenway trail easement width requirements (or other design standards), required open space credits, or density bonus.	Development	Planning and Development Department
	Offer a graduated density bonus for developers that exceed the greenway dedication requirement or construct a greenway trail that is wider and/or offers additional amenities for users.	Development	Planning and Development Department
	In the UDO, establish redevelopment criteria for land containing existing or planned greenway trails.	Development	Planning and Development Department
	Update the UDO to modify section 8.3.2 (Blocks) to permit an extension of the otherwise applicable 'Dead-End Street (max)' where said dead-end street terminates with a greenway connection to a developer constructed greenway identified on the City's adopted plan.	Development	Planning and Development Department
	Update the UDO to require developers building within in specific overlay zoning districts to provide trail amenities (such as benches, water fountains, comfort stations) on-site or within the overlay district.	Development	Planning and Development Department

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Immediate (0-2 years)	Offer an express development review cycles for development applications which propose to construct priority greenway trails of a set length.	Development	Planning and Development Department
	In the UDO, add the ability for administrative modifications to street cross-sections to permit sidewalk on one-side rather than both sides, where parallel/within a set distance of a developer constructed greenway.	Development	Planning and Development Department
Provide forward-thinking, ecologically just, and sustainable trails and amenities using industry best-practices.			
Immediate (0-2 years)	Adopt sustainable design principles for urban trails.	Environmental	N/A
Short (3-5 years)	Review and update trail design standards for inclusion of additional sustainability measures in the design of trails, selection of amenities, and maintenance of the CAG System.	Environmental; Maintenance and Operations	N/A
Support greenway construction and easement dedication outside of a floodplain, or flood hazard area.			
Immediate (0-2 years)	Evaluate removing language from the UDO that limits requirements for greenway dedication only to floodplain, flood-prone, and flood hazard areas.	Development	"City Attorney's Office; Planning and Development Department"
	Update the UDO by making the "land for parks" and "trails and open space" primary open space categories, rather than tertiary.	Development	City Attorney's Office; Planning and Development Department
	Update the UDO to allow for the provision of publicly accessible open space to meet the outdoor amenity area requirements.	Development	City Attorney's Office; Planning and Development Department
	Evaluate updating the UDO to require greenway easement dedication for land uses beyond residential.	Development	"City Attorney's Office; Planning and Development Department"
	In the UDO, consider establishing different standards for trail width dependent whether the trail is built within or outside of a stream corridor.	Development	Planning and Development Department
	Clarify the definition and interpretation of 'reservation' within the UDO. (Sec. 8.1.6)	Development	Planning and Development Department

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Establish mechanisms to ensure quality of developer-built trails and amenities.			
Immediate (0-2 years)	In the UDO, add reference to the Council-adopted Capital Area Greenway Master Plan and any future updates for standards and requirements associated with land dedication and easement widths.	Development	Planning and Development Department
	Develop standards for trail design and development.	Development	Engineering Services Department (Roadway Design and Construction Division); Planning and Development Department
Short (3-5 years)	Update UDO language to provide consistent design requirements between the Greenway Master Plan and on-street trail cross sections within the Street Design Manual.	Development	Planning and Development Department
Bolster requirements for easement dedication to better prepare the City for trail design and construction.			
Immediate (0-2 years)	Evaluate updating the UDO to require developers to produce stormwater calculations for impervious surface and nutrient load when greenway easements are dedicated, anticipating a future 10-12' minimum trail width.	Development	City Attorney's Office; Planning and Development Department
	Update the UDO to require a minimum easement dedication width of 75', instead of 50'. All corridors currently assigned a 50' required dedication width should be updated to 75'.	Development	City Attorney's Office; Planning and Development Department
	In cases where a trail connection is not being made by required development ordinance, update the UDO to require developers to demonstrate that a trail could be constructed by the City within the dedicated easement area by showing the necessary grading, engineering, and other documentation required by the PRCR Department.	Development	Planning and Development Department
Add bike share stations at key trail access points and trailheads.			
Short (3-5 years)	Work with Citrix Cycles and bike share planners to identify appropriate station locations. Monitor trail usage to note any correlation between increased trail users and bike share users.	General	Transportation Department; Citrix Cycles

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Promote a culture of shared stewardship where the PRCR Department, trail users, volunteers, agency partners, and other stakeholders form a collective community of stewards who provide support to and receive shared benefits from trails and open space corridors.			
Immediate (0-2 years)	Bolster carry in/carry out campaigns to reduce trash along trails and reduce burden on maintenance staff.	Maintenance and Operations; Environmental	Engineering Services Department (Stormwater Division); Sustainability Department
	Continue to involve volunteers in stream clean-up efforts.	Maintenance and Operations; Environmental	N/A
	Provide additional opportunities for volunteers to assist with trail repairs and maintenance, as appropriate.	Maintenance and Operations; Environmental	N/A
	Evaluate the training provided to volunteers and stewards for trail maintenance volunteering. Update as needed.	Maintenance and Operations; Environmental	N/A
	Collaborate with stewards to explore grant opportunities or potential for financial donations	Maintenance and Operations; Environmental	N/A
	Partner with neighborhoods, HOAs, and community groups to communicate the availability and benefits of adopt-a-park and trail programs on their adjacent trails and open space.	Environmental; Collaboration	N/A
	Work with adjacent landowners when combating non-native plant invasions.	Environmental; Collaboration	N/A
	Form a working group of stakeholders (e.g., DOT, utilities, private landowners, HOAs) to communicate and collaborate on active management and protection of natural resources.	Environmental; Collaboration	N/A
	Improve working relations with other City departments on shared easements by coordinating maintenance and construction projects.	Environmental; Collaboration	N/A

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Identify and designate protected natural areas (using existing PRCR definition) to proactively support eventual trail routing and permitting.			
Immediate (0-2 years)	Utilize existing data/institutional knowledge, habitat mapping and continued field monitoring and observation to identify ecologically unique or sensitive areas in support of future trail routing and permitting processes.	Environmental	Engineering Services Department (Stormwater Division) Wake Nature Preserve Partnership
Establish an inter-departmental working group to discuss topics related specifically to trails and open space corridors.			
Immediate (0-2 years)	Solicit participation from each City department and convene regular meetings.	Collaboration	Transportation Department; Engineering Services Department; Planning and Development Department; City Attorney's Office
	Develop an annual work plan to organize working group efforts.	Collaboration	N/A
	Continue to convene an inter-department working group with the Parks, Recreation and Greenway Advisory Board's Greenways Committee at least two times a year.	Collaboration	BPAC
Continue to work across departments to further the success of the CAG System.			
Immediate (0-2 years)	Collaborate with Transportation and Engineering Services Departments on the prioritization of at-grade trail street crossing and street resurfacing improvements.	Collaboration	Transportation Department; Engineering Services Department
	Coordinate with Engineering Services Department to complete trail and stream restoration projects in tandem.	Collaboration; Environmental	Engineering Services Department (Stormwater Division)
	Coordinate with Raleigh Water Department to plan and design water, sewer, and trail projects in tandem.	Collaboration	Raleigh Water Department
	Follow-up with the Transportation Department to define roles and responsibilities for planning and maintenance of Greenway connectors - current and new.	Collaboration	Transportation Department
	Coordinate with the City's Strategic Plan initiatives focused on enhancing greenways (GNR 2.1, 2.2, 2.3, T&T 2.1).	Collaboration	N/A

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Short (3-5 years)	Continue to coordinate with Urban Forestry on the removal of tree hazards on developed greenway corridors when trees are determined to be diseased or otherwise a safety hazard.	Maintenance and Operations; Environmental; Collaboration	N/A
	Collaborate with relevant City departments to discuss trail-oriented development opportunities.	Collaboration; Development	Transportation Department; Planning and Development Department
	Coordinate with relevant City departments to improve requirements for trail detours as part of public and private development projects.	Collaboration; Development	Transportation Department; Planning and Development Department
	Ensure integration of trail planning and design efforts with the Bike Raleigh Plan.	Collaboration	Transportation Department
	Collaborate with relevant City departments to limit on-street parking near at-grade trail street crossings to support sight lines for trail users and drivers.	Collaboration	Transportation Department; Planning and Development Department
	Collaborate with relevant City departments to determine the best way to address safety issues for trail users.	Collaboration; Security	City Manager's Office (Office of Emergency Management and Special Events); Raleigh Police Department; Emergency Operations Center (EOC); Transportation Department
Develop comprehensive invasive plant management plan to protect existing natural resources and forests in greenway parcels and easements.			
Short (3-5 years)	Expand invasive vegetation inventories and monitoring to include all greenway parcels and easements and develop an integrated management plan to control invasive plants for the conservation of natural resources.	Environmental	N/A

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Take a more active role in community conversations about people experiencing homelessness.			
Immediate (0-2 years)	Commit to taking part in conversations already happening around homelessness.	Collaboration	Housing and Neighborhoods Department; Raleigh Police Department; Wake County Health and Human Services; Raleigh/Wake Partnership to End Homelessness; North Carolina Coalition to End Homelessness
	Re-evaluate current practices related to people experiencing homelessness who take shelter on the trail network. Involve community partners in this reevaluation effort if possible.	Collaboration	Housing and Neighborhoods Department; Raleigh Police Department; Wake County Health and Human Services; Raleigh/Wake Partnership to End Homelessness; North Carolina Coalition to End Homelessness
Enhance stream clean-up efforts at specific trail locations.			
Short (3-5 years)	Prioritize clean-ups in the following areas: Crabtree Creek Trail between Wake Forest Road and Atlantic Avenue, Crabtree Creek Trail between Capital Boulevard to Raleigh Boulevard, Crabtree Creek Trail near New Bern Avenue, and Little Rock Trail between Bragg Street and Walnut Creek Wetland Center.	Environmental; Maintenance and Operations	Volunteer Groups
	Conduct a system-wide inventory and score with equity metrics to determine additional stream and trail clean-up locations and goals.	Environmental; Maintenance and Operations	Volunteer Groups
Incentivize trail-oriented development where appropriate given land use context.			
Short (3-5 years)	Provide density bonuses for trail-oriented development.	Development	Planning and Development Department

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Explore opportunities to expand environmental conservation efforts (i.e., habitat mapping bioblitzes, citizen science opportunities, periodic monitoring of habitat and species) by leveraging partnerships and trained volunteers.			
Immediate (0-2 years)	Evaluate requiring developers to dedicate the full floodplain for trails and/or open-space corridors along streams.	Environmental; Development	City Attorney's Office; Planning and Development Department
	Review the impacts of lighting to the natural environment, particularly for trails along stream corridors that are classified as Oak City Trails and are designated to support active transportation.	Environmental	Engineering Services Department (Integrated Facility Services Division); Sustainability Department
Short (3-5 years)	Conduct a detailed environmental analysis of the greenway system, including vegetation and wildlife characteristics, stream water quality, and tree canopy cover.	Environmental	North Carolina Department of Environmental Quality; Universities; Wake Nature Preserves Partnership
	Consider developing a partnership with local universities and/or the North Carolina Department of Environment Quality to monitor health and vibrancy of plants and animals along the trails and corridors.	Environmental	Local Universities; North Carolina Department of Environmental Quality
	Prioritize areas for habitat restoration and conservation activities within open space corridors and collaborate with conservation partners on funding, grant opportunities staffing, acquisition and project management.	Environmental	Land and Water Conservation Fund; City of Oaks Foundation
	Prioritize areas for stream enhancements and restoration.	Environmental	Engineering Services Department (Stormwater Division); Wake Nature Preserve Partnership
Leverage residential development to enhance sidewalk connectivity.			
Short (3-5 years)	Assess a fee for development in residential neighborhoods to be used for sidewalk development on residential streets that connect to greenway trails.	Development	Planning and Development Department

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Continue to leverage grant opportunities, particularly ones that support multi-modal facilities such as trails, street side paths, trail connections.			
Short (3-5 years)	Pursue federal grants, such as RAISE, Transportation Alternatives Program (TAP), Recreational Trails Program (RTP), Locally Administered Projects Program (LAPP), Congestion Management and Air Quality (CMAQ) Improvement Program, Land and Water Conservation Fund (LWCF).	Funding	Budget and Management Services Department; Transportation Department
	Pursue state grants, such as Parks and Recreation. Trust Fund (PARTF), NC Land and Water Fund (NCLWF), Water Resources Development Grant Program, State Street-Aid (Powell Bill) Program, and Governor's Highway Safety Program.	Funding	Budget and Management Services Department; Transportation Department
	Pursue private grants, such as AARP Livable. Community Initiatives Grant and the variety of grant programs through the Rails-to-Trails Conservancy.	Funding	Budget and Management Services Department
Expand the trail user data collection program.			
Immediate (0-2 years)	Supplement data counters with in-person, mailed, and online surveys.	General	Communications Department
Compile crime, emergency response, and other incident data including location-specific information for routine reporting and identification of opportunities to improve trail safety, security, and overall management.			
Short (3-5 years)	Coordinate with applicable departments, agencies, and local jurisdictions to develop reporting forms that include specific location and incident details. Link forms to searchable database.	General; Security	Raleigh Police Department; Local Jurisdictions
Engage the community about trail security to inform departmental policies and trail operations, design, and programming.			
Short (3-5 years)	Host routine community conversations to hear about security concerns and communicate actions taken by the City.	Security	Community Partners
	Develop and distribute an annual survey for Raleigh residents to collect feedback on trail and park safety and security.	Security	N/A
Encourage opportunities for public art along the CAG System.			
Ongoing	Consider temporary and permanent art installations as opportunities for education and community storytelling.	General	Planning and Development Department; Raleigh Arts

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Increase awareness of the environmental benefits and history of the CAG System by increasing interpretive signage and/or programming opportunities.			
Short (3-5 years)	Celebrate the cultural heritage and environmental benefits of areas surrounding trails through signage, public art, and programming.	Environmental	Raleigh Arts; Engineering Services Department (Stormwater Division); Wake Audubon Society; Conservation Trust for North Carolina; Historic Resources
Incorporate place making and activity hubs (trailside hubs) along the existing and future network for both public and private development.			
Immediate (0-2 years)	Identify locations along the existing system for potential trailside hubs.	Development	Planning and Development Department
	Explore public private partnerships.	Development	Planning and Development Department
Short (3-5 years)	Develop guidance and standards for trailside hubs along existing and future trails.	Development	Planning and Development Department

100-Day Action Plan

The 100-Day Action Plan consists of momentum-building and low-cost action items from the recommendations outlined in Chapter 4. These are crucial first steps to realizing the community's vision for the CAG System implementing the CAG Plan. All action items within the 100-Day Action Plan can be started and/or completed within 100 days of CAG

Plan adoption, though some may take longer than that period to be accomplished.

The intent of the 100-Day Action Plan is to provide strong first steps for PRCR Department staff to carry out the CAG Plan's recommendations and to maintain momentum. Throughout the 100-day period, and as it concludes, staff should celebrate accomplishments with the community, keeping them engaged on progress and next steps.

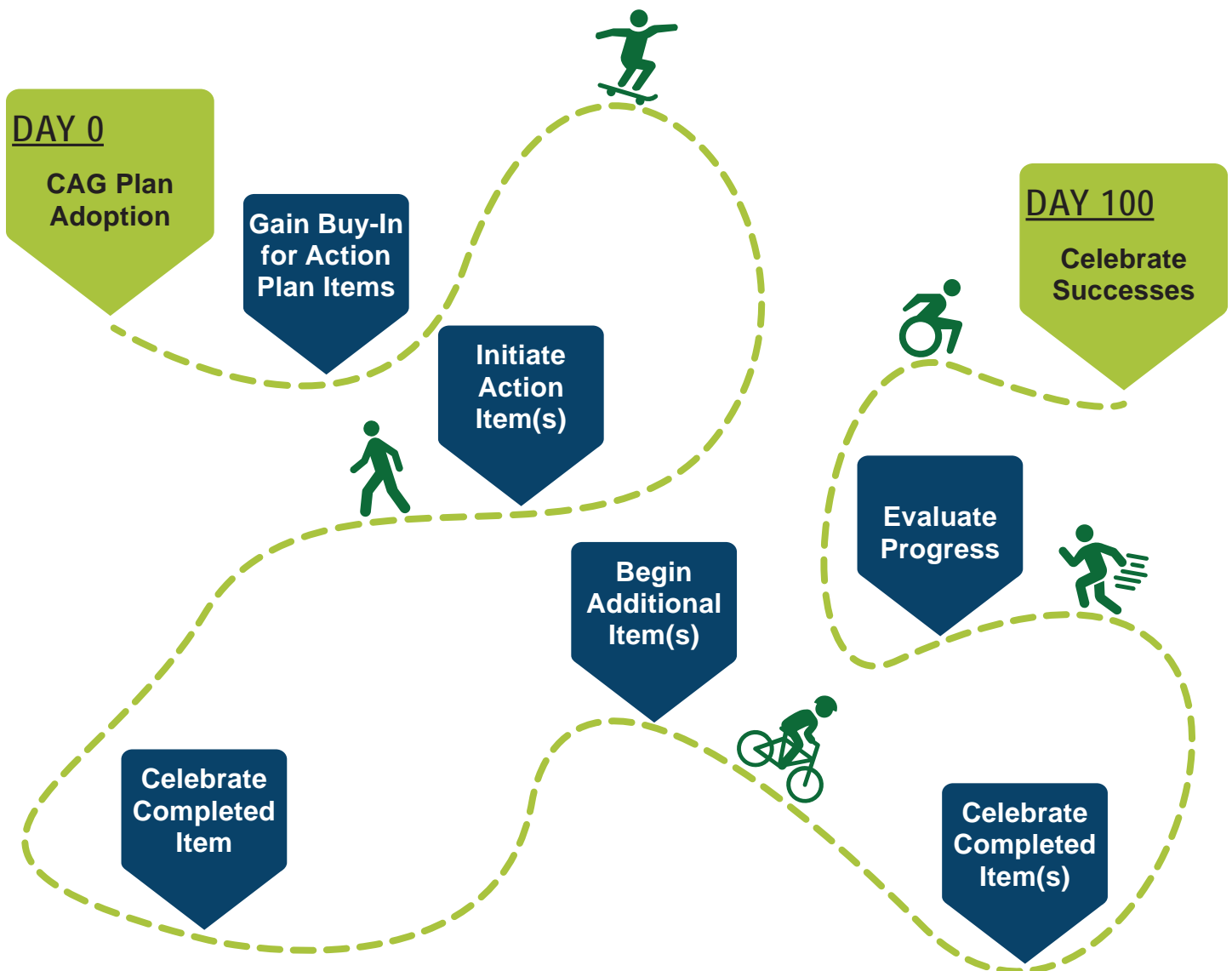


Table 5: 100-Day Action Plan

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Prioritize reinvestment for existing trails while strategically building new trails.			
Ongoing	Continue to identify high-priority trails for new construction.	Development; General; Funding	N/A
	Continue to identify high-priority existing trails for reinvestment and/or redesign.	Development; General; Funding	N/A
Immediate (0-2 years)	Identify three high-priority new trails for construction and conduct 30% feasibility studies for more accurate cost estimates.	General; Development	N/A
	Identify five high-priority trail reinvestments and assess necessary resources.	General; Development	N/A
Continue to promote Trail Safety Education, Awareness and Outreach.			
Immediate (0-2 years)	Increase communication efforts –on social media, webpages, text alerts, closures/detours.	General; Security	Communications Department; Technology and Information Department
	Collaborate with Stormwater on Flood Monitoring Program to provide surveillance that can help monitor need for communications of trail closures and maintenance.	General; Collaboration; Maintenance and Operations; Security	Engineering Services Department (Stormwater Division)
Explore the development of a neighborhood trail request program. Build this program off of the Neighborhood and Community Connections Program.			
Immediate (0-2 years)	Identify eligibility criteria for neighborhoods (e.g., near utility corridor or existing easement).	Development	N/A
	Create a process for requests; the process should consider social equity, trail length, feasibility, and neighborhood support.	Development	Planning and Development Department
	Create a menu of amenities that could potentially be included in trail projects.	Development	N/A
Explore partnership opportunities with nonprofit and private organizations.			
Immediate (0-2 years)	Expand the Adopt-A-Trail Program to allow for monetary sponsorship from individuals, businesses, and groups.	Development; Funding	Department of Human Relations (Equity and Inclusion Division)

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Prioritize safety of trail users and evaluate trail planning and design elements that enhance safety.			
Ongoing	Collaborate with other city departments, government agencies, businesses, nonprofit groups, and volunteers.	Collaboration; Security	Transportation Department; Engineering Services Department; Raleigh Water; Raleigh Police Department; Volunteer Groups
	Support planning, design and improvement projects that increase greenway user safety.	Collaboration; Maintenance and Operations; Security	Transportation Department; Engineering Services Department; Raleigh Water
	Continue to utilize best practices for safety.	Development; Maintenance and Operations; Security	Transportation Department; Engineering Services Department; Raleigh Water
Immediate (0-2 years)	Increase signage and wayfinding along the CAG System that improves user safety based on standards in the 2021 Greenway Safety Report.	Collaboration; Security	Transportation Department; Raleigh Water; Raleigh Police Department; Volunteer Groups
	Evaluate areas that would benefit from pavement markings such as centerline striping, outer edge pavement markings, trail object markings and implement improvements.	Development; Security	N/A
	Evaluate strategic locations for trail lighting to improve visibility, increase overall trail access and convenience that also provides users a sense of security.	Development; Maintenance and Operations; Security	Engineering Services Department; Transportation Department
Strengthen the rapid response maintenance plan that guides the clearance of debris and detour provision.			
Immediate (0-2 years)	Communicate identified priority trail segments and maintenance expectations to the public for existing and newly constructed trails that connect people to transit, employment centers, and have a higher number of active transportation trips.	Maintenance and Operations	N/A

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Be mindful of existing resources and collaborate with other City departments to solve maintenance needs.			
Immediate (0-2 years)	Coordinate maintenance, and associated funding for maintenance, with other City departments.	Funding; Maintenance and Operations	Transportation Department; Engineering Services Department; Raleigh Water
Increase funding for trail maintenance.			
Immediate (0-2 years)	Assess funding approved each year in the general fund and determine the gap in reaching maintenance needs, particularly as additional trail construction is pursued.	Development; Maintenance and Operations; Funding	Budget and Management Services Department
Provide flexibility for developers through a fee-in-lieu program that directly contributes to CAG System funding.			
Immediate (0-2 years)	Consider updating the UDO to provide developers an alternative option to required trail construction, such as a fee-in-lieu.	Development	City Attorney's Office; Planning and Development Department
	Consider eliminating the 10% open amenity area requirement for development along trails in favor of a fee-in-lieu program to pay for greenway maintenance and reconstruction.	Development	City Attorney's Office; Planning and Development Department
Require development to provide connections to existing and proposed trails.			
Immediate (0-2 years)	Update the UDO to require private development to build connections, provide easements, and/or pay a fee-in-lieu to connect to existing and proposed trail corridors and street-side/urban trails.	Development	City Attorney's Office; Planning and Development Department
Establish an inter-departmental working group to discuss topics related specifically to trails and open space corridors.			
Immediate (0-2 years)	Solicit participation from each City department and convene regular meetings.	Collaboration	Transportation Department; Engineering Services Department; Planning and Development Department; City Attorney's Office
	Develop an annual work plan to organize working group efforts.	Collaboration	N/A

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Strengthen requirements for developers to contribute to trail construction.			
Immediate (0-2 years)	Update the UDO to require developers to build trails within their property (along stream corridors or on-street connectors) identified by the Greenway Master Plan. Consider providing an alternative for developers to pay a fee-in-lieu instead of constructing the trail.	Development	Planning and Development Department
	Consider updating the UDO to provide staff with the authority to consider alternative locations or dimensions of required greenway easement dedications in order to maximize public benefit and improve flexibility in the development process.	Development	Planning and Development Department
Clarify CAG System definitions and processes within the UDO.			
Immediate (0-2 years)	Include definitions of open space corridors, greenway trails, and reservation in the UDO.	Development	Planning and Development Department
	Replace all instances of "greenway corridor" with "open space corridor" in the UDO and other relevant City-wide documents.	Development	N/A
	Clarify the appropriate method for adding or revising corridors, trails, and easement widths.	Development	Planning and Development Department
	Clarify the use of facility fee credits.	Development	Planning and Development Department
	Explore the use of facility fee funds to reimburse private developers for constructing greenway connections.	Development	Planning and Development Department
	Research what structures would need to be established to use facility fee funds to reimburse developers for constructing public trail connections during construction of private development projects.	Development	Planning and Development Department
	Clarify reimbursement procedures when land is dedicated.	Development	Planning and Development Department

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Support greenway construction and easement dedication outside of a floodplain, or flood hazard area.			
Immediate (0-2 years)	Evaluate removing language from the UDO that limits requirements for greenway dedication only to floodplain, flood-prone, and flood hazard areas.	Development	"City Attorney's Office; Planning and Development Department"
	Update the UDO by making the "land for parks" and "trails and open space" primary open space categories, rather than tertiary.	Development	City Attorney's Office; Planning and Development Department
	Update the UDO to allow for the provision of publicly accessible open space to meet the outdoor amenity area requirements.	Development	City Attorney's Office; Planning and Development Department
	Evaluate updating the UDO to require greenway easement dedication for land uses beyond residential.	Development	"City Attorney's Office; Planning and Development Department"
	In the UDO, consider establishing different standards for trail width dependent whether the trail is built within or outside of a stream corridor.	Development	Planning and Development Department
	Clarify the definition and interpretation of 'reservation' within the UDO. (Sec. 8.1.6)	Development	Planning and Development Department
Strengthen requirements for developers to contribute to trail construction.			
Immediate (0-2 years)	Update the UDO to require developers to build trails within their property (along stream corridors or on-street connectors) identified by the Greenway Master Plan. Consider providing an alternative for developers to pay a fee-in-lieu instead of constructing the trail.	Development	Planning and Development Department
	Consider updating the UDO to provide staff with the authority to consider alternative locations or dimensions of required greenway easement dedications in order to maximize public benefit and improve flexibility in the development process.	Development	Planning and Development Department
	Update the UDO to provide incentives for developer-built greenway trails through reduced greenway trail easement width requirements (or other design standards), required open space credits, or density bonus.	Development	Planning and Development Department

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Immediate (0-2 years)	Offer a graduated density bonus for developers that exceed the greenway dedication requirement or construct a greenway trail that is wider and/or offers additional amenities for users.	Development	Planning and Development Department
	In the UDO, establish redevelopment criteria for land containing existing or planned greenway trails.	Development	Planning and Development Department
	Update the UDO to modify section 8.3.2 (Blocks) to permit an extension of the otherwise applicable 'Dead-End Street (max)' where said dead-end street terminates with a greenway connection to a developer constructed greenway identified on the City's adopted plan.	Development	Planning and Development Department
	Update the UDO to require developers building within in specific overlay zoning districts to provide trail amenities (such as benches, water fountains, comfort stations) on-site or within the overlay district.	Development	Planning and Development Department
	Offer an express development review cycles for development applications which propose to construct priority greenway trails of a set length.	Development	Planning and Development Department
	In the UDO, add the ability for administrative modifications to street cross-sections to permit sidewalk on one-side rather than both sides, where parallel/within a set distance of a developer constructed greenway.	Development	Planning and Development Department
Establish mechanisms to ensure quality of developer-built trails and amenities.			
Immediate (0-2 years)	In the UDO, add reference to the Council-adopted Capital Area Greenway Master Plan and any future updates for standards and requirements associated with land dedication and easement widths.	Development	Planning and Development Department
	Develop standards for trail design and development.	Development	Engineering Services Department (Roadway Design and Construction Division); Planning and Development Department

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RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Bolster requirements for easement dedication to better prepare the City for trail design and construction.			
Immediate (0-2 years)	Evaluate updating the UDO to require developers to produce stormwater calculations for impervious surface and nutrient load when greenway easements are dedicated, anticipating a future 10-12' minimum trail width.	Development	City Attorney's Office; Planning and Development Department
	Update the UDO to require a minimum easement dedication width of 75', instead of 50'. All corridors currently assigned a 50' required dedication width should be updated to 75'.	Development	City Attorney's Office; Planning and Development Department
	In cases where a trail connection is not being made by required development ordinance, update the UDO to require developers to demonstrate that a trail could be constructed by the City within the dedicated easement area by showing the necessary grading, engineering, and other documentation required by the PRCR Department.	Development	Planning and Development Department
Establish an inter-departmental working group to discuss topics related specifically to trails and open space corridors.			
Immediate (0-2 years)	Solicit participation from each City department and convene regular meetings.	Collaboration	Transportation Department; Engineering Services Department; Planning and Development Department; City Attorney's Office
	Develop an annual work plan to organize working group efforts.	Collaboration	N/A

RECOMMENDATION			
TERM	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Explore opportunities to expand environmental conservation efforts (i.e., habitat mapping bioblitzes, citizen science opportunities, periodic monitoring of habitat and species) by leveraging partnerships and trained volunteers.			
Immediate (0-2 years)	Evaluate requiring developers to dedicate the full floodplain for trails and/or open-space corridors along streams.	Environmental; Development	City Attorney's Office; Planning and Development Department
	Review the impacts of lighting to the natural environment, particularly for trails along stream corridors that are classified as Oak City Trails and are designated to support active transportation.	Environmental	Engineering Services Department (Integrated Facility Services Division); Sustainability Department
Take a more active role in community conversations about people experiencing homelessness.			
Immediate (0-2 years)	Commit to taking part in conversations already happening around homelessness.	Collaboration	Housing and Neighborhoods Department; Raleigh Police Department; Wake County Health and Human Services; Raleigh/Wake Partnership to End Homelessness; North Carolina Coalition to End Homelessness
	Re-evaluate current practices related to people experiencing homelessness who take shelter on the trail network. Involve community partners in this reevaluation effort if possible.	Collaboration	Housing and Neighborhoods Department; Raleigh Police Department; Wake County Health and Human Services; Raleigh/Wake Partnership to End Homelessness; North Carolina Coalition to End Homelessness



CHAPTER 6

Glossary of Terms & Abbreviations



Glossary Summary

The CAG Plan includes a variety of words and acronyms to describe existing conditions and future recommendations for trails and open space. This chapter defines terms and lists acronyms used in the CAG Plan that are associated with planning, design, construction, maintenance, and operation of the CAG System.

Terms

Access

The ability to reach desired goods, services, routes, activities, and destinations.

Accessibility

The degree of access for people of all ages and abilities through a variety of modes of travel.

Active Transportation

Any form of human-powered transportation, such as walking, bicycling, using a wheelchair/mobility device (wheeling), or skating.

Active Recreation

Activities such as walking, running, bicycling, wheeling, and sports, which promote health and wellbeing by encouraging movement, physical exercise, and relaxation.

Amenity

Facilities in a park or along a trail that enhance public enjoyment and make those spaces more inviting to the general public. These include restrooms, trash receptacles, drinking fountains, seating, wayfinding, and more.

At-grade Street Crossing

A junction where greenway trail or sidewalk users cross a roadway over the same surface as motor vehicle traffic, as opposed to a grade-separated crossing where users cross over or under the

roadway using a bridge or tunnel (Capital Area Greenway Planning and Design Guide).

Bikeshare

A system of public rental bicycles located within and adjacent to the street right-of-way and in public spaces.

Bikeways

Any road, path, or facility intended for bicycle travel which designates space for bicyclists distinct from motor vehicle traffic. A bikeway does not include shared lanes, sidewalks, signed routes, or shared lanes with shared lane markings, but does include bicycle boulevards.

Bikeway Network

A network of bikeway facilities along streets and trails (existing and planned) where people feel safe and comfortable riding their bicycles to and from a variety of destinations (BikeRaleigh Plan, 2016).

Bond Referendums

A voting process that gives voters the power to decide if a municipality should be authorized to raise funds through the sale of bonds (Town of Wake Forest, 2014).

Capital Area Greenway System

A system of trails and open space corridors that is maintained by the City of Raleigh.

Capital Maintenance

Capital maintenance projects involve more time, effort, funding, and resources than routine maintenance. Examples include replacing bridges and boardwalks, realigning trails, and trail resurfacing. These projects are less common and often take more time to complete than routine maintenance activities.

City Council

The City of Raleigh's elected legislative body. City Council is responsible for enacting ordinances, imposing taxes, making appropriations, and establishing city policy. Council is responsible for adopting/approving plans, zoning, and subdivision ordinances.

Comprehensive Plan

The City of Raleigh's long-range policy document adopted and amended by the City Council. The Comprehensive Plan establishes a vision for the City, provides policy guidance for growth and development, and contains action items directed at the City to implement the vision.

Connectivity

The degree to which trails and streets are interconnected and easily accessible to one another by direct routes.

Conservation

Protection of a community's natural green infrastructure, providing places for recreation,

preserving important environmental and ecological functions, and enhancing quality of life.

Design Review Team

City staff from multiple departments responsible for providing input and comments on elements of the CAG Plan Update.

Economic development

The process of local wealth creation, manifested by growth in jobs, income, and investment, and supported by improvements in the social, built, and natural environment (City of Raleigh 2030 Comprehensive Plan Update).

Equity

Justice, fair treatment, and opportunity for the advancement of all people while addressing and prioritizing issues for those that have been historically disadvantaged across all systems (housing, education, economics, healthcare, environmental, social and community) (Raleigh Office of Equity and Inclusion, 2020).

Equitable Access

See Equity.

Equitable Distribution

The equitable provision of services, investments, infrastructure, etc. These may be geographically allocated or distributed by jurisdiction, community, etc.

Easement

An easement is the grant of property rights which authorizes the easement holder permission to use another person's land for a specific use.

Environmental Conservation

See Conservation.

Environmental Protection

Policies and practices intended to ensure clean air, land, and water in order to protect human health and the environment.

Environmental Stewardship

The responsible use and protection of the natural environment through conservation and sustainable practices to enhance ecosystem resilience and human well-being (NOAA, 2021).

Feasibility

The degree to which a project or program can be constructed or implemented and the level of impact, including but not limited to environmental, financial, and private property.

Floodplain

The maximum area adjoining a river, stream, watercourse, or lake which is likely to be flooded by the base flood or the future conditions flood. The flood-plain, -prone, and/or -hazard area includes "floodway" areas, "floodway fringe" areas, and future conditions flood hazard areas. (City of Raleigh Unified Development Ordinance).

Flood Prone Areas

See Floodplain.

Frontage Zone

The frontage zone describes the section of the sidewalk that functions as an extension of the building, whether through entryways and doors or sidewalk cafes and sandwich boards. The frontage zone consists of both the structure and the facade of the building fronting the street, as well as the space immediately adjacent to the building (NACTO Urban Street Design Guide).

Furnishing Zone

The section of the sidewalk between the curb and the through zone in which street furniture and amenities such as lighting, benches, newspaper kiosks, utility poles, tree pits, and bicycle parking are provided. The street furniture zone may also consist of green infrastructure elements, such as rain gardens or flow-through planters (NACTO Urban Street Design Guide).

Future High-Density Locations (Planned)

The anticipated increase in population density and development density in designated locations by the Comprehensive Plan.

General Fund

The City of Raleigh's basic operating fund and account for everything not accounted for in another fund.

Grade-Separated Street Crossing

A bridge or tunnel allowing pedestrians and bicyclists to cross a major roadway without conflict (Capital Area Greenway Planning and Design Guide).

Greenway

The term colloquially used to refer to trails within the Capital Area Greenway System. See Trail; see Capital Area Greenway System.

Greenway Easement

Greenway easements conserve public space for potential greenway trails and enhance environmental benefits. Greenway easements can be co-located with existing City of Raleigh easements or must be acquired from the current fee-simple title owner of the land (Capital Area Greenway Planning and Design Guide).

Greenway Maintenance

Operations assuring the preservation of greenways as a public resource including capital maintenance and routine maintenance (e.g., mowing, amenity cleaning, asphalt inspection and repair, flood event response and more).

Greenway Trail

See Trail.

High-frequency Transit

Transit routes with service every 15 minutes or less.

Impact Fees

A fee, also called a development fee or facility fee, levied on the developer of a project by a city, county, or other public agency as compensation for otherwise unmitigated impacts of new development on a community (Greenbelt Alliance).

Mobility

The ability to travel safely and unimpeded along single or linked transportation facilities (Connect NCDOT).

Multimodal Transportation Network

A network of connected streets and trails which support the use of more than one type of transportation, particularly pedestrians, bicyclists, and users of public transit, in addition to personal vehicles.

Neighborhood and Community Connections Program (N&CC)

A City of Raleigh program to identify, prioritize, and build new walkable connections to parks and greenways. The N&CC Program promotes health equity throughout the City of Raleigh, using geo-spatial modeling and data analysis to guide investment to those communities which are most at risk of negative health outcomes and most in need of improved access to public parks and recreation opportunities.

Network

A framework of connected routes and corridors within a system.

On-street Bikeway

Designated exclusively for bicycle travel, on-street bikeways are distinguished from vehicle travel lanes by striping and can include pavement stencils and other treatments (BikeRaleigh Plan, 2016).

Open Space Corridors

Previously referred to as greenway corridors, open space corridors are located exclusively along streams. They have been identified to protect Raleigh's natural green infrastructure, establish places for recreation and active transportation, preserve valuable environmental resources, and enhance quality of life. Open space corridors designated in the Greenway Master Plan will be reflected in the City of Raleigh Comprehensive Plan and Future Land Use Map. The City of Raleigh will pursue the acquisition of property or easements along designated Open Space Corridors through development requirements, donations, or fee simple acquisition. All open space corridors could potentially be developed with trails; however, due to site-specific constraints, some open space corridors may be appropriate for trail constructions while others may not.

Open Space Preservation

The preservation of land that is undeveloped (has no buildings or other built structures).

Park Access Level of Service (LOS)

A measure of how well residents in Raleigh are currently served by the city's system of parks and greenway trails. Census blocks are given a park access LOS score based on distance to the nearest park, distance to the nearest greenway, acres of nearby open space, and the number and variety of nearby parks.

Preservation

The act or process of applying measures necessary to sustain the existing form, integrity, and materials of a given property (National Park Service).

Population Density

Number of people per square mile of land (US Census).

Racial Equity

The condition where race no longer predicts a person's quality of life and outcomes (Raleigh Office of Equity and Inclusion, 2020).

Refuge Island

A median with a protected area that is intended to help protect pedestrians and bicyclists who are crossing a roadway (FHWA, 2019).

Reinvestment

Dedication of resources to existing trails, structures, amenities, and corridors

Roadway Corridor

The linear space for a street or road.

Riparian Corridor

The area of transition between land features and water features, such as a stream bank, shoreline, or the border of a wetland. Riparian areas are characterized by frequently waterlogged soils and distinct types of vegetation adapted to these soils (City of Raleigh 2030 Comprehensive Plan Update).

Sidepath

A bikeway physically separated from motor vehicle traffic by open space or a barrier and located adjacent and parallel to a roadway. Sidepaths are often within the street right-of-way.

Safety

The degree to which trail users are free from injury or harm.

Security

The degree to which trail users are free from the fear and incidence of crime.

Social Equity

The condition where social status and demographics no longer predict a person or group's quality of life and outcomes.

Steering Committee

A group of stakeholders, including the Design Review Team, responsible for shaping the priorities for the CAG Master Plan Update and guiding the Plan Update process.

Storm Water Runoff

Runoff of water resulting from precipitation in any form (City of Raleigh Unified Development Ordinance).

Stream Corridor

An ecosystem that usually consists of a stream channel and a floodplain (USDA).

Traffic Calming Measures

The use of physical measures, such as speed humps, traffic circles, narrow lane widths, or similar devices, intended to discourage speeding and improve the usability of a street for bicycles and pedestrians (City of Raleigh 2030 Comprehensive Plan Update).

Trail

Linear facilities that people can move through and travel along. Trails may be paved or unpaved depending on context and trail purpose (e.g., recreation, active transportation, wildlife observation, etc.). Existing and recommended trails run along open space corridors, adjacent to streets, and along utility corridors.

Trail Access

See Access.

Trail Classification

The grouping of existing and planned trails based upon shared context, function, and user expectations.

Trail Network

A network of existing and planned trails that provide opportunities for active transportation and recreation.

Trail Segment

A portion of a trail.

Trail-Oriented Development

Development adjacent to trails with direct access to/from trails. Trail-oriented development can include residents, offices, retail, and food/beverage services that face adjacent trails for easy access.

Transportation Corridor

The linear space for travel by a variety of modes, most often a street or trail.

Urban Trail

A sidepath in a densely developed area, often an urban context.

User Experience

The perceptions, feelings, and reactions for users.

Utility Corridor

The linear rights-of-way or easements for utilities on either publicly or privately owned property.

Vulnerable Populations

Those at higher risk for poor health as a result of social, economic, political, and environmental factors, as well as limitations caused by illness, disability, or aging (Wake County).

Wayfinding

Directional guidance and information about destinations for bicyclists and pedestrians.

Wayfinding Signage

See Wayfinding.

Wheeling

The act of using a wheel-based mobility device.

Wheel-Based Mobility

The use of personal mobility devices for travel for people with limited or no mobility. This includes wheelchairs and walkers.

Acronyms & Abbreviations

AADT

Annual Average Daily Traffic

AASHTO

American Association of State Highway and Transportation Officials

ADA

Americans with Disabilities Act

BIPOC

Black, Indigenous, and People of Color

BRT

Bus Rapid Transit

BPAC

Bicycle and Pedestrian Advisory Commission

CAG

Capital Area Greenway

CAG Design Guide

Capital Area Greenway Planning & Design Guide

CAG Plan

Capital Area Greenway Plan Update

CAG System

Capital Area Greenway System

COVID-19

Novel Coronavirus SARS-CoV2

CPTED

Crime Prevention Through Environmental Design

HAWK

High-intensity Activated crossWalk Beacon

NCDOT

North Carolina Department of Transportation

NEPA

National Environmental Policy Act

PRCR

Parks, Recreation and Cultural Resources

ROW

Right-of-Way

RSDM

Raleigh Street Design Manual

UDO

Unified Development Ordinance



APPENDIX A

Formative Plans Review



Appendix Summary

Guiding documents that influence greenway planning and construction have been reviewed as part of the CAG Plan. This appendix contains the Formative Plans Review, a comprehensive scan of City of Raleigh and regional planning documents that impact the CAG System. The review is organized into three sections:

- How did we get here? This section reviews historic plans and documents that led to the creation of the CAG System and have directly influenced its development over time.
- How do we make decisions? This section explores City-wide documents that establish a vision for the City and guide decision-making for all City services, including the CAG System. This section also includes documents specific to the Parks, Recreation and Cultural Resources Department, which provide a framework for departmental decision-making.
- Where is the impact of those decisions? This section highlights specific small area and community plans that include recommendations for the CAG System.

How did we get here?

The Capital Area Greenway System (CAG System) has a rich history of planning efforts, and associated documents, that have influenced not only where greenway trails are and what they look like today, but also has established the framework for the City's Parks, Recreation and Cultural Resources (PRCR) Department to plan, design, construct, and maintain the network of trails and open space corridors. These previous planning documents provide context for why the CAG System was developed, what the vision was for the future of the greenway system at that time, and what challenges the greenway system has encountered throughout its history. Each document's purpose is briefly described, and its goal and key takeaways are outlined.

Greenway Commission Report (1976)

After the establishment of the greenway commission, the commission worked to develop the greenway program, prior to the adoption of a master plan. This report is the result of those efforts. The purpose of this report was to update the Raleigh City Council on the status of the greenway program and to make recommendations for the following: 1) the completion of land acquisition for the Garner Branch and Leadmine Creek pilot greenway projects, 2) the completion of development work (e.g., signage) of greenway trails around Shelley Lake and Lake Johnson, 3) the completion of development of a greenway trail segment on the

Garner Branch Greenway near Chavis Park, and 4) the implementation of a planning process for identifying potential greenway areas around Raleigh and including them into the greenway system.

Key Takeaways

- Recommendation that the greenway system be named the "Capital Area Greenway." This name was chosen to emphasize that the system as planned will extend to areas beyond the city limits and will benefit all residents of the metropolitan area. A logo is also recommended.
- A map of the greenway plan is provided. This plan includes greenway corridors and connectors.
- Recommendation to adopt the "Capital City Greenway" report as the official greenway plan of the City to establish the CAG System in the framework of the City's government and make the plan part of Raleigh's Comprehensive Plan.
- States that the City's Parks and Recreation Department is best suited to perform the maintenance of greenway corridors and trails.
- Recommends the prohibition of "minibikes" on the trail network, as they are already prohibited in the City's parks.
- An acquisition priority list is provided and includes:
 - Crabtree Creek – Beltline (south of New Bern Avenue Interchange) to Atlantic Avenue
 - Walnut Creek – Lake Wheeler Road to Raleigh-Cary Highway
 - Crabtree Creek – Atlantic

Avenue to US 70 West

- Walnut Creek – Sunnybrook Road to Rock Quarry Road
- House Creek – Crabtree Creek to Meredith College
- Walnut Creek – Rock Quarry Road to Lake Wheeler Road
- Marsh Creek – New Hope Church Road to Spring Forest Road
- Rock Branch – Hillsborough Street to Walnut Creek
- Unnamed tributaries – Walnut Creek to Crabtree Creek
- Big Branch – Crabtree Creek to Sandy Forks Road

Capital City Greenway Master Plan (1976)

“Capital City Greenway” is a report to the City Council on the benefits and potential of establishing a greenway system in Raleigh. Partially in response to a series of flooding events that afflicted Raleigh in the early 70s, the report proposes the City’s first greenway system to be centered around Raleigh’s stream system as a method for flood management. In addition, greenway widths and other design concepts, a right-of-way computation process, funding sources, and responsible parties are recommended. After this report was presented to Raleigh’s City Council in 1972, the Council approved the concept of a greenway plan and ultimately adopted the report as the City’s first greenway plan in 1976.

Goals

- Promote the strategic use of the flood prone lands for an open-space corridor system.
- Establish a linear park network, left primarily in its natural state.
- Complement the existing and future park system through the introduction of a linear park network which will accommodate public recreation desires which are now unmet.
- Enhance private development by giving a common structural system to the elements of urban amenity.
- Introduce a trail system which connects compatible land uses.
- Buffer conflicting land uses.
- Give alternative to the automobile for shorter commuter trips by developing a safe passageway for bicycles and pedestrians.
- Retain natural ecological functions in the urban environment.
- Allow more effective planning for future growth.
- Elevate the livability of the urban environment.
- Stimulate the more beneficial expenditure of public funds through the multiple use of public property.

Key Takeaways

- Idea that greenway trails could accommodate activities that have been excluded from urban recreation programs since most

small urban parks couldn't effectively accommodate all activities (such as walking for pleasure, biking, picnicking, fishing, nature walks, hiking, horseback riding).

- Greenways would help conserve last remaining open spaces and stabilize the density of a growing city. In addition, the City can use greenways as a buffer between contrasting land use types as Raleigh continues to develop.
- Greenways can minimize flooding in Raleigh by accommodating public facilities, such as sanitary sewer lines, and acting as a natural extension of the urban storm sewer system.
- Greenway widths should be related to the potential impact of adjacent land uses. For example, more ROW should be added to mitigate heavier uses.
- Greenways separated as major vs. minor loops. Major loops should maintain a community-wide character. "Penetrators" follow the tributaries to major loops and should aim to reach into all parts of the urban area, distributing greenway benefits equally among the total population.
- Recommends three phases of greenway development. Phase 1 projects would take up to five years to complete and include areas in most immediate danger of development, those already owned by the state of NC, and remaining areas needed to complete Major Loop A. Phase 2 projects would be completed by 1980 and include: completing Major Loop B and extending the greenway into areas which are urbanizing. Phase 3 projects would be implemented after 1980 and include Major Loop C. Major Loops A, B, and C involve parts of Crabtree and Walnut

creeks and the connectors between these that form a loop. Major Loop A includes House Creek, and unnamed connector, and Bushy Branch as connectors; Major Loop B includes the Neuse River and a Richland Creek to Walnut Creek trail as connectors; and details were not provided for connectors to make Major Loop C.

- The importance of the availability and accessibility of parking lots for the success of the trail network is emphasized.

Greenway Commission Report (1983)

This report was presented to the Raleigh City Council, summarizes greenway development accomplishments, and provides recommendations to further grow the CAG System. At the time of this report, the trail network included 16.9 miles of trails and 468 acres of land. Greenway development, expenditures, and acquisitions for the year 1983 are summarized. Objectives for 1984 are included, as well as recommendations to achieve those objectives.

Objectives for 1984

- Complete and dedicate the Little Rock Trail Extension.
- Complete the 30-car parking area on Raleigh Boulevard near Phase 1 of the Buckeye Trail.
- Construct a handicap ramp to the observation deck on the Buckeye Trail.
- Construct 4150 feet jogging trail along

the NW side of Lake Johnson.

- Construct 1000 feet trail, 15-car parking area, and related site development at Lassiter's Mill and relocate the steel truss bridge to another stream crossing
- Construct 2 pedestrian bridges on the Lakepark Greenway.
- Construct a short nature trail in cooperation with the Sierra Club at Drewry Hills Park.
- Construct a 3000 feet trail from Anderson Drive and Fallon Park to Kiwanis Park including one bridge.
- Begin construction of the 5300 feet Rocky Branch Trail from Pullen Park to South Saunders Street.
- Review the plans for the 5300 feet trail along Walnut Creek from Rock Quarry Road to Worthdale Park and begin construction.
- Begin construction of a 2700 feet trail along Marsh Creek and a tributary creek from New Hope Church Road to Green Road Park.
- Continue to inform the public about the CAG System.

Key Takeaways

- The most desirable form of land acquisition is fee or absolute ownership. Absolute ownership would allow the City to use the land as they saw fit. However, leases and easements are other options for greenway acquisition.
- Emphasizes the importance of public education of the benefits of the CAG System and

suggests avenues for reaching the public.

- As the CAG System expands (in both mileage and acreage), a corresponding growth in labor and equipment is necessary to maintain the trails and corridors.
- Proposed that the City Council consider revising City ordinances to ensure the continuity of major corridors of the CAG System.

Greenway Commission Report (1984)

This report was presented to the Raleigh City Council summarizes greenway development accomplishments and provides recommendations to further grow the CAG System. At the time of this report, the CAG System included 20.4 miles of trails and 604 acres of land. System-wide achievements, specific trail construction activities, and property acquisition for the year 1984 are summarized. Objectives for 1985 are included, as well as recommendations to achieve those objectives.

Objectives for 1985

- Complete construction and dedicate the Lassiter Mill Trail.
- Complete construction and dedicate the Fallon Creek Trail.
- Complete plans, specifications, and construction contract/dedication of West Millbrook Trail.
- Begin construction on the Walnut Creek Trail.
- Work with the Brentwood Exchange Club to

construct a 2700 feet trail along Marsh Creek.

- Complete plans and construct 2 hiking trails along Lake Johnson.
- Construct a 60 feet bridge at the NW point of Shelley Lake.
- Work with Public Utilities to obtain joint greenway/sanitary sewer easement along the Perry Creek Corridor and Neuse River Corridor.
- Computerize all property files and produce listings based upon major and minor corridors to speed identification of parcels and landowners and subsequently property acquisition.

Key Takeaways

- 3.5 miles of trails were added between 1983 and 1984, accounting for 17% of the trail system.
- Reiterates the need for more labor and equipment to maintain greenway lands and trails expressed in the 1983 Greenway Commission Report.
- Desire to increase public safety of the trail network by increasing the size of the Park Ranger's staff for the system to be perceived as safe.
- Recommends studying mandatory dedication of greenway easements, joint development of greenway trails with area developers, and reservation of floodway lands for open space purposes.
- Encourages the use of joint sanitary sewer/greenway easements along major and minor stream corridors, specifically

Turkey Creek Outfall and the Crabtree and Walnut Creek parallel lines.

- Desire to evaluate existing construction methods to discover how construction activities can be increased to reach the goal of constructing 200 miles of greenway by the year 2000.

Capital Area Greenway Master Plan (1986)

Rapid urbanization of the greater Raleigh area brought attention to needs for more greenways both in the City's urban core and its extraterritorial jurisdiction. This document updates Raleigh's 1976 Greenway Plan and serves as a guide for greenway development in the near-term (0-2 years) and intermediate-term (3-5 years). The Plan was also updated with an overarching vision of attaining 200 miles of paved greenway trails by the year 2000.

Goals

HUMAN OBJECTIVES

- Preserve Greenspace
- Provide Transportation Alternatives
- Extend Parks and Recreational Opportunities

LAND USE OBJECTIVES

- Soil Erosion Control
- Flood Control
- Co-location with Sanitary Sewers
- Buffer Zones Between Regions

- Habitat Preservation
- Improved Air Quality
- Reduced Noise Pollution
- Increased Nearby Property Values

Key Takeaways

- Crabtree and Walnut creeks form the nucleus of the CAG System.
- The following prioritization criteria were used to guide acquisition of parcels: need of immediate action, neighborhood support for the greenway, availability for acquisition, area's use potential, and aesthetics of area.
- The following criteria were used to identify areas for trail development: serve all regions of the City, provide linkage to adjacent communities by extending trails through high-use areas, provide long stretches of trail linking high-use areas, initially utilize land parcels already acquired, minimize total cost, produce a mix of developed and undeveloped trails serving most regions of the City, connect points of interest within the City (especially schools and parks), interface with trail developments surrounding the City, initiate trails in high growth regions of the City, recognize neighborhood support of greenways, provide opportunities for developer participation, and interface with designated bicycle routes.
- City's reservation ordinance, which requires subdivision plans to reserve an easement consistent with any part of the Capital Area Greenway Plan, has proved inadequate in several instances. The City is considering a new ordinance that would require dedication of the greenway easement by subdivision. In addition, dedication of a greenway easement should be required during site plan approval process. The Plan proposes that these development regulations be incorporated as additional ordinances.
- Recommend that the City do not pursue purchasing land as it presents an enormous future liability for the City and residents should not absorb future costs associated with land ownership.
- A naming convention for trails that are not near creeks is provided. This suggests that trail names reflect a unique natural feature or prominent native trees, shrubs, or terrain.
- Recommends that the City adopts a goal of 200 miles of greenway trails by the year 2000. To achieve this goal, the Plan recognizes that the City must add 12 miles of new trail per year over the following 15 years.
- Recommends that the City identify segments of the CAG System for which no access exists and develop plans to acquire such access.

Capital Area Greenway Master Plan Update (1989)

The Capital Area Greenway Master Plan was updated to address future growth of Raleigh in outlying areas and increased greenway use. This update focuses on extending, adding, or removing greenway corridors. In addition, major and minor loops within the system are identified. The concept

of 'nodes' is introduced, and previous nomenclature is expanded upon to better identify and locate minor and penetrator corridors. Lastly, standard minimum corridor widths are revised to more accurately reflect the natural stream order and easement acquisition potential.

Key Takeaways

- Greenways are defined as being comprised of corridors, connectors, nodes, and loops.
 - Corridors: linear park areas located within stream corridors that provide linkage to major nodes. Classified as major, minor, or penetrator.
 - Connectors: necessary to provide continuity along a corridor or link two corridors together. These can be sidewalks, bridges, pedestrian tunnels, underpasses, designated bicycle routes, or trails within utility easements.
 - Nodes: existing and proposed parks, schools, major shopping centers, commercial areas, employment centers, college campuses, and recreation centers. These are classified as major nodes or minor nodes. Minor nodes are further broken down into three categories: terminal, lateral, and auxiliary.
 - Loops: exist within nodes and provide important trail circuits for many recreational activities. They are classified as regional, quadrant, district, or internal.
- Overall focus on the accessibility and connectivity of the CAG System. Recommendations are focused on completing gaps and ensuring access to greenways from "nodes."
- There is a significant push for acquiring land for greenway extensions and trail-oriented development. Four strategies are provided accomplish this:
 - System-wide Greenway Acquisition: includes previously designated parcels and on-going dedication of greenway easements in new residential development through the subdivision and plan review process
 - Greenway Reservations: involves negotiating for greenway easement through non-residential properties as part of the subdivision and plan review process. Typically, specified greenway area is reserved by developer/owner for 12 months from date of submittal during which time city negotiates for greenway easement or property.
 - Targeted Acquisition: acquisition of specified properties/easements along corridors for purpose of trail construction over the next several years. Major emphasis along Neuse River and Crabtree, Walnut, and Leadmine Creeks in attempt to complete acquisition and link existing trails to form longer trail routes.
 - Coordinated Acquisition: obtaining joint-use easements by acquiring greenway easements over or in addition to required sewer easement, road ROW, wetlands required for mitigation, etc.
- Watershed restrictions can prohibit potential trail development (e.g., Watershed Protection Areas for Falls Lake).

- Honeycutt Creek corridor is located within the Primary and Secondary Watershed Protection Areas for Falls Lake
- Development restrictions impact acquisition and development
- Primary and secondary watercourse buffers are required adjacent to existing creeks and streams; prohibit any clearing of vegetation or development of impervious surface area.
- Recent text change (133 TC 305, adopted 3-1-88) 1) allows the establishment of unpaved natural footpaths within primary watercourse buffer areas and 2) suggests width of buffers be increased by adding 4 times the average percent of slope adjacent to the watercourse
- The North Wake Expressway (I-540) presents an obstacle in connecting the Leadmine Creek corridor with the Honeycutt Creek corridor. The need to construct a major connectivity facility is identified and options are proposed, which include underpass with a box culvert or a pedestrian overpass with a ramp system.
- Issues in greenway development along Neuse River are identified. The Plan recommends continued coordination of acquisition efforts internally between the Real Estate and Parks and Recreation departments. In addition, the City should continue planning efforts with Wake County to acquire greenway on east side of Neuse River. Lastly, greenway connectors should be established in areas where corridors have been deleted.
- Emphasizes the need to establish formal lines of communication with Wake County

and neighboring municipalities to coordinate regional greenway efforts, to preserve the Neuse River Greenway corridor, and secure tributary greenway connectors.

How do we make decisions?

The following are summaries of plans and other guiding documents that influence how decisions about greenway development made today. Some of these plans have been developed within the City of Raleigh's Parks, Recreation and Cultural Resources Department (PRCR), while others were created by other departments within the City or the City's leadership. Plans created by other departments within the City highlight the importance of greenway trails outside of the PRCR department, as avenues of transportation and vital community resources. City-wide guidance establishes the vision for each department, including PRCR, as well as the steps they should take to accomplish that vision. County-level plans, such as the Wake County Greenway Plan, do not guide greenway development within the City of Raleigh specifically; however, they have been included in this section because their contents supplement the City's planning efforts and may contribute to decisions made about greenway development within the City of Raleigh. Each guiding document is accompanied by a brief description and a table that outlines the document's goals, major themes that detail how this Plan is related to the greenway network today, and potential opportunities and/or barriers to greenway development.

City of Raleigh Strategic Plan FY 21-25 (2020, with annual revisions)

This Plan provides actionable strategies that guide the City of Raleigh's focus, work, and resource alignment. There are six key focus areas: Arts & Cultural Resources, Economic Development & Innovation, Growth & Natural Resources, Organizational Excellence, Safe, Vibrant & Healthy Community, and Transportation & Transit. Each year, City staff submit a performance report to the City Council to document and evaluate progress towards the objectives and initiatives outlined in the Plan. Two key focus areas were reviewed to assess influence on the greenway trail system: Growth & Natural Resources and Transportation & Transit.

Goals

GROWTH & NATURAL RESOURCES

Encourage a diverse, vibrant built environment that preserves and protects the community's natural resources, strives for environmental equity and justice, and encourages sustainable growth that complements existing development.

TRANSPORTATION & TRANSIT

Develop an equitable and accessible citywide transportation network for pedestrians, cyclists, automobiles and transit that is linked to regional municipalities, rail, and air hubs.

Major Themes

- Focus on conserving existing natural resources, increasing green space, and optimizing public infrastructure projects to include green infrastructure and renewable energy sources.
- Aims to ensure changes to the built environment preserve neighborhood character, while increasing the desirability of neighborhoods.
- Desire to unify the transportation and land use visions for the City and coordinate on planning efforts. In addition, the Plan aims to connect the City's transportation network to the region.
- Stresses the importance of giving people more transportation choices, as well as making the user experience of the overall transportation network more enjoyable and innovative.

Opportunities/Barriers

OPPORTUNITIES

- Growth/Natural Resources Initiative 2.1 supports policy recommendations, operational considerations, and capital investments that position greenways as transportation options.
- Growth/Natural Resources Initiative 2.2 supports expanded greenway connectivity and accessibility, with a focus on connections between residential areas, activity centers, and green spaces.
- Growth/Natural Resources Initiative 2.3 supports additional amenities on greenway trails for a better user experience.
- Growth/Natural Resources Initiative 4.1

supports the development of a Community-wide Climate Action Plan with the aim of reducing greenhouse gas emissions, which the CAG System could support.

- Transportation Initiative 2.1 supports pursuing projects that strengthen connections between modes.
- Transportation Initiative 2.2 supports pursuing strategies that incentivize alternative transportation.

BARRIERS

- N/A

2030 Comprehensive Plan Update (2019)

The 2030 Comprehensive Plan is a long-range policy document that establishes a vision for the City of Raleigh, provides policy guidance for growth and development, and contains action items to implement the vision. This document supports the City's Strategic Plan, which establishes a framework for City operations, by providing targeted objectives to accomplish the City's vision. In addition, this Plan guides priorities that relate to the City's physical and economic growth for all City departments.

Goals

The Plan contains six strategic vision themes:

- Economic Prosperity and Equity
- Expanding Housing Choices

- Managing Our Growth
- Coordinating Land Use and Transportation
- Greenprint Raleigh – Sustainable Development
- Growing Successful Neighborhoods and Communities

Major Themes

- Growth will be fostered through more integrated land uses, alternative transportation options, green building technologies and development practices, open space acquisition, and resource conservation.
- Higher density residential and mixed-use development will contribute to the success of new public transit services.
- Institutionalization of environmental sustainability and stewardship.
- Roadway investments must be balanced with investments in other transportation modes, including public transportation, bicycling, and walking.
- Primarily discusses greenways as opportunities for environmental protection, but includes some policies and actions aimed at increasing the use of greenway trails as a form of transportation.

Opportunities/Barriers

OPPORTUNITIES

- Support for greenway trail connections to surrounding greenway corridors to establish a regional greenway network

(Policy PR 3.6 and Action PR 1.4).

- Advocates for closing gaps in pedestrian and bicycle network connectivity. As part of this, states that development along Greenway Connector trails should provide public access and infrastructure necessary to serve the needs of trail users (Policy PR 3.8).
- Promotes the greenway trails as transportation alternatives and supports multimodal accessibility to trailheads (Policy PR 1.8, 3.11, Action PR 3.8, Policy T 5.7).
- Supports establishing a sense of identity throughout the trail network through consistent wayfinding (Policy PR 3.12, Action PR 3.11).
- States that development adjacent to greenway corridors or greenway connectors should link pedestrian infrastructure internal to the development with the greenway network, as well as incorporate and maintain greenway stormwater management and flood control benefits (Policy PR 3.13, Action PR 3.12).
- Requires greenway dedication whenever a section of land within a proposed residential subdivision or site plan includes any part of a designated greenway. Additionally, this action item states dedication or reservation of non-residential development should be pursued (Action PR 3.5).
- Emphasis on increasing connectivity of the CAG System (Action PR 3.7).
- Promotes public education about and engagement with the greenway trail system (Policy PR 3.2, Action PR 3.10, 3.13).

- Encourages the development of greenway trails along existing rail corridors (Policy T 5.14).

BARRIERS

- There are no mechanisms for identifying greenway corridors, and thereby triggering easement dedication/reservation requirements, outside of stream corridors.
- Support for greenway trail development is limited to the definition of greenway corridors in the Capital Area Greenway Master Plan and the Capital Area Greenway Planning and Design Guide. However, Policy PR 3.10 does emphasize identifying new corridor alignments as necessary to further the goals of the greenway trail system.
- Raleigh has approximately 43,000 acres available for future annexation and expansion. No additional land is available due to annexation agreements with neighboring jurisdictions.

Unified Development Ordinance (2013, updated 2016)

The UDO regulates the use and development of land and buildings, including zoning, subdivision, stormwater, and natural resource conservation. As it relates to the CAG System, the primary objectives are to secure additional land through dedicated easements, protect sensitive land, mitigate flooding, and increase pedestrian and bicycle facilities citywide.

Goals

- Implement the policies and goals contained within officially adopted plans, including the Comprehensive Plan.
- Improve the built environment and human habitat.
- Conserve and protect the City's natural beauty and setting, including trees, scenic vistas, and cultural and historic resources.
- Ensure that new development conserves energy, land, and natural resources.
- Protect water quality within watershed critical areas, the general watershed areas of designated water supply watersheds, and other watershed districts.
- Encourage environmentally responsible development practices.
- Promote development patterns that support safe, effective, and multi-modal transportation options, including auto, pedestrian, bicycle, and transit and therefore minimize vehicle traffic by providing for a mixture of land uses, walkability, and compact community form.
- Provide neighborhoods with a variety of housing types to serve the needs of a diverse population.
- Promote the greater health benefits of a pedestrian-oriented environment.
- Reinforce the character and quality of neighborhoods.
- Remove barriers and provide incentives for walkable projects.
- Protect and promote appropriately located commercial and industrial activities in order to preserve and strengthen the City's economic base.
- Encourage compact development.
- Ensure that adequate facilities are constructed to serve new development.
- Provide for orderly growth and development of suitable neighborhoods with adequate transportation networks, drainage and utilities, and appropriate buildings sites.
- Save unnecessary expenditures of funds by requiring the proper initial construction of transportation networks, sidewalks, drainage facilities, and utilities.
- Provide land records for the convenience of the public and for better identification and permanent location of real estate boundaries.

Major Themes

ALLOCATING SPACE FOR GREENWAYS

- Where a proposed greenway shown in the Comprehensive Plan is in a development, the City Council may require the reservation of the land for future use. (Sec. 8.1.6; Sec. 8.6.1)
- Within floodplains, flood prone, or flood hazard areas, greenway dedication is required. Required area to be dedicated for greenway easement based on length of watercourse and 100-150' buffer, depending on type of watercourse (Sec. 8.6.1.B)
- Outside of floodplains, flood prone, or flood hazard areas, a greenway area designated in the Comprehensive Plan may be reserved for possible City acquisition within 1 year from the date of the preliminary plan or site plan approval (Sec. 8.1.6; Sec. 8.6.1.C)
- There are limits to the amount of greenway land required for dedication, which shall not exceed the relevant threshold outlined in Article 8.9 Facility Fees (Sec. 8.6.1.C)
- The City will reimburse property owners for greenway dedications that exceed the required open space area for their zoning (Sec. 8.6.1.D)
- To secure vested rights protections granted by N.C. Gen. Stat. 160A-385.1, the site plan must coordinate with public greenway plans (Sec. 10.2.19)
- As with other dedicated public ROW, a density transfer may be allowed for portions of a property dedicated to greenways to properties under the same ownership and in the same development as the property with the dedicated ROW (Sec. 1.5.2.F)
- There are several regulations that encourage private developments to incorporate greenways in addition to what has been designated in the Comprehensive Plan. Because these are dependent on individual property owner development applications and site plan negotiations, these are not as useful for establishing a predictable greenway plan, but they may help contribute to the CAG System over time. Greenways are generally presented as one of several ways to meet open space or pedestrian/bicycle circulation requirements. These provisions include:
 - The City requires common open spaces for developments using their conservation standards or compact standards. They specify types of allowable common open space as primary, secondary, and tertiary, some of which are applicable to greenways. The most relevant are floodway areas (primary), watercourse buffers (primary), and connections to trails or greenways (tertiary). The minimum width for required open space is 50'; an exception may be granted for trails or linear parks. (Sec. 2.5)
 - Greenways/pathways are one of the recommended uses in the required transition zone (Zone B) for mixed-use developments that border residential districts. (Sec. 3.5.2)
 - Planned Development (PD) applications require bicycle circulation on streets or dedicated paths/greenways. Open

space is also required as a significant element of PD projects and may include greenways. (Sec. 4.7.5)

ALLOWABLE USES

- Parks, open space, and greenways are permitted in all zoning districts (Sec. 6.1.4)

SITE REQUIREMENTS

- No vehicle parking requirements for parks, open space, and greenways. Additional vehicle parking may be required for specific facilities within a park. Short-term bicycle parking required for parks and open spaces, but not for greenways. Long-term bicycle parking not required. (Sec. 7.1.2.C)
- Site lighting regulations (Article 7.4) do not apply to greenways.
- Where the block pattern is interrupted by public parkland, including greenways, that is open and accessible to the public, pedestrian access points shall be provided with a minimum spacing equal to 1/2 of the maximum block perimeter. (Sec. 8.3.2.B)
- Pedestrian access requirements (Sec. 8.3.5.B) do not apply to parks, open space, and greenways (exempt)

STREET STANDARDS

- The City has standards for 22 designated street types for new streets and substantial reconfigurations (Sec. 8.4.2). Few street types require bicycle facilities, which may reduce system-wide access to the greenway for cyclists.

- Of these, only one (Sensitive Area Parkway) requires the inclusion of a multi-use trail (min. 10'). Permeable pavement may be appropriate. (RSDM Sec. 3.2.1.B)
- The Pedestrian Passage street type specifications may also apply to standalone greenways (mentioned in RSDM but not UDO). Requires min. 20' public access easement, min. 10' paved area, 25 mph design speed, 5-10' curb radii (RSDM 3.2.6.B)
- Some other street types require 10' sidewalks, but do not designate them as multi-use facilities even though they do not include separate bicycle facilities (Main Street, Parallel Parking; Main Street, Angled Parking; Avenue 4-lane; Multi-way boulevard, parallel parking; Multi-way boulevard, angled parking)
- Several street types require separate bicycle lanes (Avenue 2-lane undivided; Avenue 2-lane, divided; Avenue 3-lane, parallel parking; Avenue 4-lane, parallel parking; Avenue 4-lane, divided; Avenue 6-lane divided).
- Most local street types only require 5-6' sidewalks and do not require any bicycle facilities, which may limit greenway access for cyclists (Sensitive area avenue; Sensitive area residential street; Neighborhood yield; Neighborhood local; Neighborhood street; Multifamily street)

SIDEWALKS

- Sidewalks are required for all streets and must connect to greenway access points (RSDM Sec. 11.2.2)

- Sidewalk access ramps shall be provided at all intersections where curb and gutter are provided and where sidewalks and/or greenway trails intersect any street (RSDM Sec. 11.2.4)

NATURAL RESOURCE PROTECTION

- The City requires tree conservation areas for all districts (percent of site area varies by district). Certain areas are considered primary tree conservation areas (e.g. champion trees, protective yards) and must be the first areas used to meet the requirement. Greenways may be used to meet remaining tree conservation requirements after primary tree conservation areas have been established, but an area of 25' x the length of the greenway is excluded for trail construction. (Sec. 9.1.3)
- Almost every lot within the Watershed Protection Overlay Districts (UWPOD, FWPOD, and SWPOD) is required to set aside at least 40 percent of the lot area for tree conservation, with some exceptions. (Sec. 9.1.9)
- Additional stormwater runoff controls (beyond the baseline requirements) are in place if stormwater runoff from a site could have an adverse effect on greenways (Sec. 9.2.2.E.3)
- Greenways must be located outside of a primary watercourse buffer or be unpaved. Watercourse buffers vary by overlay district and watercourse type. Special permits are required for work within a watercourse buffer. (Sec. 9.2.3)
- Greenways are an allowed use within floodways, non-encroachment areas, floodway fringe, and future hazard areas (Sec. 9.3.4; Sec. 9.3.5)

- There are specific standards for streets/ infrastructure crossing a watercourse to prevent additional flooding (Sec. 9.3.6)
- General provisions for erosion, sedimentation control, and land disturbing activity apply (Article 9.4)

Opportunities/Barriers

OPPORTUNITIES

- Ensuring the Comprehensive Plan identifies all potential greenways is the strongest way to maximize opportunities for additional greenway land. If a segment is removed from the plan, the City will no longer be able to require this easement as properties redevelop, rezone, or apply for annexation. It may be more beneficial to categorize low-priority segments as long-term than to remove them from the plan entirely for this reason. There is a required easement for land within floodplains/flood prone/hazard areas and the City has the option to purchase land within 1 year from the date of the preliminary plat or site plan approval if outside a flood area.
- The City recently required greenway dedication to get an easement on a parcel being annexed into the city. May consider including nearby extraterritorial segments on the plan for this purpose.
- Several street types require 10' sidewalks but no bicycle facilities; could be used as multi-use paths.
- Some street types do not have bicycle facilities and have sidewalks <6' but have 4' paved shoulders; may be considered for bike

lanes, depending on speed/other factors.

BARRIERS

- Pedestrian access requirements (Sec. 8.3.5.B) for private development do not apply to parks, open space, and greenways.
- Greenways must be located outside a primary watercourse buffer or be unpaved (Sec. 9.2.3).
- Of the 22 street types, only one requires the inclusion of a 10' multi-use path and only six require dedicated bicycle facilities of any kind.
- A significant portion of designated greenway area (25' x watercourse length) does not count toward tree protection area requirements because of trail construction disturbance. This may discourage some private property owners from using their open space for a greenway, if they are tight on meeting their tree protection area requirements elsewhere on the site, especially in locations where tree protection area is as high as 40% of the site.

Parks, Recreation and Cultural Resources Departmental Business Plan FY19-21 (2018)

This document serves as a three-year road map for the City of Raleigh's PRCR Department. The Plan focuses on analyzing the department's strengths, weaknesses, opportunities, and threats, assessing departmental resources, and establishing objectives and initiatives. The primary concentration of this Plan is how the PRCR Department operates organizationally and supplements the department's

Strategic Plan, which focuses more on the services, facilities, and programs the department provides.

Goals

- Align technology investments with customer, department and staff needs.
- Support city-wide priorities, including affordable housing development, transit, and economic development initiatives, by raising awareness of the many ways PRCR can positively impact these projects.
- Continue to prioritize and allocate resources that align with community needs.

Major Themes

- Commitment to assigning resources based on citizen-focused priorities, better aligning with city-wide initiatives, and use data to make decisions on resource allocations.
- Rapid technology advancements impact how the department interacts with citizens. This puts pressure on the department because of its service-oriented nature.

Opportunities/Barriers

OPPORTUNITIES

- Identified department strengths include passionate staff, volunteers, and stakeholders, as well as wide community support.
- Interest in integrating PRCR projects with affordable housing, transit, and economic development initiatives.

- Desire to support a multimodal transportation system and improve greenway wayfinding and community connections to increase usage.
- Interest in improving access to PRCR facilities and services to vulnerable communities with an emphasis on “nontraditional” means of delivery (e.g., mobile programming).
- Performance measures were developed for each initiative. Greenway-specific initiatives included the following performance measures: greenway trail counters to determine trail usage, percent of people who have access to greenway or park, and a community survey.

BARRIERS

- The age and size of the park system requires additional maintenance and operational resources, limiting the ability to be innovative/creative in new infrastructure and programming.
- The PRCR department feels that it is challenging to affect change because of bureaucratic procedures and citizen expectations.

Parks, Recreation and Cultural Resources Department System Plan (2014)

The System Plan supplements the City of Raleigh's 2030 Comprehensive Plan and is meant to shape the direction, development, and delivery of PRCR facilities and services over the next 20 years. It assists in developing programming and project needs and priorities. In addition, it serves as a guide for long-range visioning for the planning and design

of new and existing greenways. The document details public opinion of PRCR facilities and what should be prioritized.

Goals

The Plan identified 25 goals that fall under 8 areas: Parks, Natural Environments, Greenways, Athletics, Programs and Services, Arts, Historic Resources, and Growth Centers. Goals pertinent to greenways include the following:

- Expand residents' awareness of the environmental, economic and social benefits of natural areas
- Protect, enhance, and expand natural environment areas
- Balance the protection of natural environments while continuing to provide appropriate public access and use
- Provide access to outdoor recreation and adventure opportunities throughout the city
- Protect and enhance vegetation, wildlife and wildlife habitat and the waterways along linear natural environment areas
- Improve connectivity and accessibility to greenway corridors and greenway trails throughout the city
- Enhance existing greenway trails to provide a high-quality system consistent with trail user needs and priorities
- Provide adequate park and open spaces within urbanizing areas of the city

- Respond to urban lifestyle needs with attractive, flexible, high quality functional urban parks, plazas and open spaces

Major Themes

- The City needs to identify and secure land for parks and facilities now to accommodate anticipated urbanization and demand from population growth.
- Objectives were identified for each of the chosen goals. Each of these objectives has specific action items, as well as a proposed timeline for completion. These can be found on pages 180-182 of the PDF. Greenway-specific objectives included:
 - Expanding protection of greenway lands to full width of the flood plain
 - Greenway acquisition as a method of preserving watercourses
 - Prioritize “completion” of CAG System with a focus on interconnectivity of neighborhoods, schools, commercial areas, etc.
 - Create a hierarchy of greenway corridors and trail classifications based on user needs
 - Strengthen connections to public transportation and sidewalks
 - Provide adequate parking
 - Develop a regional trail system (Cary, Durham)
 - Update design guidelines for better safety, comfort, convenience, maintenance, amenities, and a consistent identity
- Promote the trail network as a transportation alternative
- Enhance maintenance standards
- Develop a programming plan for the greenways
- Implement the master sign program and improve to include wayfinding to nearby destinations and using traditional and advanced technology methods
- The wayfinding project from the Master Sign Plan (2006) is being implemented “as funding allows,” but is not present in all park facilities. The Plan proposes that the Master Sign Program be conformed to allow for signs indicating proximity to shopping, dining, grocery stores, parks, etc. and walk/bike timing/ mileage to improve “perceived access and connectivity.” Greenway wayfinding was also a common theme highlighted by the public in community meetings, focus groups and online engagement. Focus groups highlighted the need for signage to be bilingual (Spanish) and maps should highlight “plain people” attractions.
- Greenway access was a primary theme of the community meetings and focus groups
- Online engagement results asked specifically for more greenways in NE Raleigh and Capital Blvd areas, as well as to finish the greenway connection to Umstead State Park. In the online survey, the highest park and greenway development priority identified was “more emphasis on development of greenway

trails and connections close to my home.”

- The public identified “inadequate connections to trails/gaps in network” and “inadequate connections to adjacent businesses/neighborhoods” as the biggest barriers to using the trail network.
- Prioritized greenway projects include:
 - Miscellaneous greenway improvements (\$7.2 million)
 - Neighborhood/community connections (\$1 million)
 - Trenton Rd Greenway Trail (\$1 million)
 - Lassiter Mill/ Allegheny Trail improvements (\$2 million)
 - Crabtree Creek Connection to Umstead State Park (\$4.4 million)

Opportunities/Barriers

OPPORTUNITIES

- Greenway trails were observed and rated in terms of their access/connectivity, types of greenway use and conflict potential, user safety, trail amenities, and infrastructure. This information can be used for prioritization decisions.
- The public prioritized better coordination with schools for greenway connection options.
- Interest in including the trail network more in parks programming to increase awareness and use.

- The Plan recommends coordination with the Visitor’s Bureau to disseminate the Leisure Ledger and developing a “Welcome Packet” for new residents, which could include information about the greenways. Currently the PRCR only sends the ledger to residents who have registered for programs in the past year.
- The Nature and Environment focus group highlighted need for a docent program for the greenways and natural areas.
- Stakeholder interviews with elected officials and appointed City leadership revealed that they felt that voter-approved bond referendums would be successful and would be the preferred funding mechanism for PRCR system improvements.
- When asked which actions they would be willing to fund with city tax dollars, the most selected action was “develop new greenways and connect existing trails” (21%). The next action with the most votes was purchasing land to preserve open space and natural areas. (20%).
- One of the action items for greenway-specific goals/objectives was to develop a policy for private connections to greenway trail.

BARRIERS

- Wake County will see more growth than the City of Raleigh, meaning that comparatively the City will have less tax revenue from the county for service provision.
- The Plan mentioned that, historically, PRCR has relied heavily on a Park Bond to fund most capital improvement projects. The bond was nearing completion in 2014 and the

department felt pressure to find additional funding sources and support to keep up with growth and unaddressed needs.

- Recommended timing of some action items in this Plan may lead to missed opportunities and does not facilitate the level of coordination that will be necessary between departments to foster true multimodal connectivity to the trail network. For example, Identification of connectivity gaps between greenway network and other transportation systems/facilities is only recommended every 5 years. Similarly, coordinating with public transit providers is also only recommended every 5 years.

Capital Area Greenway Planning & Design Guide (2015)

This document serves as a guide for selecting appropriate facilities and treatments for existing and proposed greenway trails. Recommendations are included for the location, alignment, surface material, grading, width, accessibility features, landscaping, barriers, drainage, crossings, signage, and amenities for existing and future greenway trails and trailheads. While the guide primarily focuses on the aesthetics and user experience of the greenway trail system, it also proposes a greenway classification system according to anticipated user types.

Goals

Same as the PRCR Department System Plan (2014).

Major Themes

- Emphasis on designing for a safe user experience. There is a section dedicated to “crime prevention through environmental design,” which advocates for design that creates visibility, anti-graffiti walls, and adequate lighting.
- Emphasis on environmental stewardship in greenway design. Recommends using native plant species, natural/dispersed infiltration systems, and providing additional buffering to protect natural areas. Additionally, advocates for limiting greenway development in sensitive ecological areas and provides low impact design and construction methods when greenway development will occur in a sensitive ecological area.
- Proposes a greenway classification system based on user types and needs.

Opportunities/Barriers

OPPORTUNITIES

- Guidance provided for signage not included in the original Master Sign Program (2006).

BARRIERS

- Refers to the Capital Area MPO Bicycle Facility Planning and Engineering Guidelines (2006) for bicycle facility design, which does not provide a complete overview of all potential bicycle facilities (e.g., no information on SBLs).
- Permit requirements for greenway construction.
- Necessary coordination when developing greenway trails within utility corridors may

cause delays or unexpected challenges.

BikeRaleigh (2016)

Building off the previous Bicycle Transportation Plan (2009), this Plan updates the City's long-term bicycle network and outlines a five-year strategy for infrastructure, programming, and policy with the goal of moving Raleigh from a bronze-level to a silver-level Bicycle Friendly Community. New research, peer city experiences, and advances in facility design best practices since 2009 are included to develop a bicycle plan that will serve Raleigh in the future.

Goals

- Build priority projects to serve cyclists of All Ages and Abilities.
- Launch/participate in four new programs in four years.
- Attain designation as a "Silver Level Bicycle Friendly Community" in three years.

Major Themes

- The public emphasized a need for greenway operating hours to be extended for bicycle commuters.
- Includes a variety of greenway-specific recommendations:
 - Prioritize future greenway trail construction using demographics with a methodology using need and equity factors with a focus on areas with low current bicycle facility service.

- Prioritize key routes where lighting should be installed.
- Designate main commuting routes and introduce policies to allow these routes to remain open past the current closing time at dusk.
- Develop strategies to reduce the travel time along main commuting routes, especially cross-city trails (additional trail clearing activity, trail widening, user conflict signage, and education are examples to consider).
- Integrate BikeRaleigh wayfinding signage (Chapter 5) with greenway wayfinding standards to ensure a cohesive user experience from the greenway network to the on-road bikeway network.
- Add signage to avoid user conflicts such as "On Your Left" for bicyclists to communicate, like the American Tobacco Trail in Durham.
- Downtown, SE Raleigh, South of 440, NE of 540, and North of Hillsborough St have the highest rates of households with zero cars. Of note, this largely mirrors the areas with the highest percentage of households below 200% of the poverty line and the highest percentage of non-white populations (except the area around NCSU).

Opportunities/Barriers

OPPORTUNITIES

- The public emphasized a need for better connectivity to home, work, the store, school, greenways, etc.

- Park and Greenway access received highest weighting in prioritization process.
- Mentions “branded routes” as a wayfinding strategy. This could supplement existing wayfinding to/from trail network. The Plan acknowledges the need to coordinate the various wayfinding systems for a seamless user experience.
- BikeRaleigh.org website and/or BikeRaleigh app could be used as an interface for the public beyond the Bike Raleigh planning process (e.g., greenway closures/maintenance). Potential for having a “one-stop-shop” for information for cyclists around Raleigh.
- The Plan recommends joining efforts with the Chamber of Commerce and Downtown Raleigh to leverage bicycling events for tourism. The trail network could be an integral part of this.
- Plan proposes electronic bike counter, either permanent or moved from corridor to corridor.
- States Bike Raleigh should coordinate with greenway and pedestrian plan implementation to install SUP where appropriate, building one facility to serve multiple purposes and save capital.

BARRIERS

- Note that all the greenway projects listed as “priority” in this Plan do not connect with areas identified as “high-need” (high-priority areas in terms of working towards equity).
- No policy or strategy for on-street bicycle facility maintenance is provided. This has potential impacts for access to trail network.

Public Participation Policy for Park Planning (2012, updated 2014)

Three documents were developed to guide public engagement in park planning and ensure an effective and efficient process that equitably maximizes public input and support for the planning and development of the CAG System. The Public Participation Guidelines for Park Planning include best practices for the department and the public to work together on planning, design, and development projects.

These guidelines form the basis for the Public Participation Policy for Park Planning which outlines principles of public engagement and identifies responsible parties for park planning activities. Lastly, the Public Participation Manual for Park Planning establishes procedures for the department to involve the public in park planning and development.

Note that the barriers mentioned below are being addressed through the 2020 update to this document.

Major Themes

- There are multiple ‘pathways’ for public participation that will determine which specific activities are most appropriate a given project or initiative.
- Public participation processes should be inclusive, transparent, and timely.
- The planning and implementation of

public participation processes should follow specific procedures.

Opportunities/Barriers

OPPORTUNITIES

- The Guidelines categorize best practices under 4 pathways of public participation – Outreach, Information Exchange, Feedback & Consultation, and Consensus Seeking – which can be used by staff based on the desired level of public involvement and influence over decision-making. Tools to understand what pathway an involvement effort should fall under are also provided.

BARRIERS

- The Policy aims for consensus recommendations for new Master Plans, in addition to amendments and revisions to existing Master Plans, from a City Council-approved planning committee.
- While evaluation of public participation processes is mentioned briefly in the documents, more guidance on how to conduct evaluation data not only after but also during the public participation process could be provided to ensure that staff have the tools/resources necessary to gather the information they need.
- ADA accessibility of public participation opportunities, such as open houses, is not included in these documents.
- Methods to increase accessibility for people whose first language is not English are not provided.

Wake County Greenway Plan (2017)

The objective of this Plan is to create a connected and comprehensive system of greenway trails that enhances the quality of life throughout Wake County. It aims to serve as a guide for trail planning and development by providing a framework for local governments and project partners to create a connected, cross-country greenway trail system. The Plan specifies that natural greenway corridors are preferred over man-made corridors because they allow users to be in nature and assist in protecting natural lands and waterways. Recommendations were broken into priority projects that fit one of the following needs: bridge gaps, connect to parks and lakes, connect to communities, or complete the system. Details for potential facility type, length, permitting needs, right-of-way needs, partnerships, construction costs, and funding mechanisms, as well as other planning efforts that included the project, were provided for each priority project.

Goals

- Improve access to outdoor recreation in order to increase wellbeing of residents
- Incorporate multi-modal transportation into the network with increased connectivity
- Establish trail-oriented development and tourism to increase economic development
- Connect parks and lakes via greenway network
- Protect wildlife habitats, natural resources,

and waterways along the greenway network

Major Themes

- Stakeholders wanted to see shorter, local connections prioritized first, followed by connections to downtowns and population centers, when filling gaps in the existing trail system.
- Focus on the benefits of the CAG System overall, as well as specifically in Wake County.

Opportunities/Barriers

OPPORTUNITIES

- During public engagement, discussions unfolded around how developers can play a more active role in greenway trail development. The desires of the development community were highlighted, as well as the need for collaboration and burden-sharing between developers and municipalities.
- Potential for Wake County to incentivize completing trail connections at the ends of jurisdictions, as well as facilitate coordination across jurisdictions.
- Opportunities to match Wake County funding through municipal, state, and federal sources are outlined in detail. In addition, methods for engaging private funding are provided.

BARRIERS

- The “Complete 540” project and US 64 are physical barriers to trail connectivity.
- Stakeholders felt there were misconceptions regarding trail safety and crime

leading to skepticism of trails.

Capital Area Greenway System Operations and Management Plan (2014)

This Plan is intended to ensure the CAG System is well-maintained, safe, secure and pleasant to use. It details policies and programs to be undertaken by the City of Raleigh’s PRCR Department to operate, manage, and maintain the CAG System. For the purpose of this Plan, operations and maintenance refers to both day-to-day and long-term tasks that assure the CAG System’s resources and facilities are kept in usable condition. While this Plan doesn’t specifically guide greenway development, it does provide guidance for the maintenance and operations of the CAG System. Maintenance and operations considerations are key to decision-making about future greenway expansion and trail development.

Major Themes

- Table 3.2.1 outlines specific maintenance tasks, any specific requirements, and task frequency.
- Estimated capital costs and the anticipated life cycle of greenway components are provided.

Opportunities/Barriers

OPPORTUNITIES

- The Road Race Policy allows road races, parades, bike races, and charity walks to use public roads or the trail

network. This can generate interest in and familiarity with the trail network.

- The Adopt-A-Trail Program and the Greenway Volunteer Program provide opportunities for the public to get involved and develop a sense of ownership of the greenway trail system.

BARRIERS

- The specific requirements and frequencies of maintenance tasks in Table 3.1.2. are not detailed and appear to still be in development.

Where is the impact of those decisions?

Decisions guided by the plans and documents in the previous section impact specific communities throughout Raleigh. Corridor studies and small area plans demonstrate how those impacts have funneled down to specific streets and neighborhoods. The following corridor studies and small areas places were reviewed:

- Avent Ferry Corridor Study (2018)
- Avent West Area Plan (2009)
- Buffalo-New Hope Area Plan (2014)
- Cameron Village & Hillsborough Street Small Area Plans (2018)
- Arena Blue-Ridge Area Plan (2019)
- King Charles Neighborhood Plan (2009)
- New Bern Avenue Corridor Study (2012)

- Southern Gateway Corridor Study (2016)
- Wake Crossroads Area Plan (2009)
- Crabtree Valley Transportation Study (2011)
- Falls North Small Area Plan (2018)
- Downtown West Gateway Area Plan (2009)

The studies and plans reviewed share a focus on mobility and connectivity both within the study/plan area and to other parts of Raleigh, while striving to leverage area assets to increase economic growth and create a sense of identity unique to each area. Transportation and land use are viewed as key components in addressing connectivity and mobility issues, as well as impacting economic development. Most studies and plans strive to integrate public transit, the on-street pedestrian and bicycle network, and the trail network. Many people advocate for a Complete Streets approach to street design, promoting the safety, convenience, and comfort of people of all ages and abilities. In addition, most areas endeavor to balance a transition towards more high-density, mixed-use development and growth, with environmental protection and sustainability. The CAG System is a key resource in managing this balance, providing direct environmental stewardship (and opportunities for residents and visitors to connect with nature) and potentially leading to increased economic prosperity. Recognizing this, most corridor studies and small area plans reviewed incorporate action items or recommendations for connections to the existing trail network.

Avent Ferry Corridor Study (2019)

The Avent Ferry Corridor Study was launched to prepare Avent Ferry Road to meet its future redevelopment potential. In addition, the Study aimed to plan for and implement a safe, vibrant corridor for all people, regardless of transportation mode, that helps enhance livability and economic viability.

Goals

- Enhance economic vitality along the corridor
- Use complete street designs to improve access and mobility in the area surrounding the corridor and along the corridor
- Identify redevelopment opportunities within the study area
- Created mixed-use developments at key points along the corridor, encouraging walking with highly walkable conditions and facilities
- Provide feasible recommendation strategies
- Keep existing commercial services and grow commercial base
- Better connect the corridor with surrounding areas
- Successfully utilize public infrastructure
- Improve aesthetics of the roadway and building facades and typologies

Major Themes

- Greenway additions, BRT stations, improved pedestrian crossings, and bicycle facilities were recommended and suggested locations for each were provided.
- Connecting pedestrians to Western Boulevard and future BRT stations.
- Land use is recommended to change from low-density residential to medium-density residential. Higher-density development will increase walkability and encourage the commercial, mixed-use development that is also proposed.

Impacted Locations

- Athens Drive to Tryon Road – recommendation to focus on closing gaps in the sidewalk and greenway network

Specific proposed greenway locations include:

- Bilyeu Street from Western Boulevard to Centennial Parkway
- Centennial Parkway from Bilyeu Street to Avent Ferry Road, and connecting to existing greenway on west side of NCSU Centennial Campus
- Avent Ferry Road to existing Walnut Creek Greenway, through the Avent Ferry Shopping Center
- Avent Ferry Road to existing Lake Johnson Greenway west of Lake Ferry Trail

Avent West Area Plan (2009)

This small area plan was conducted to supplement the City of Raleigh's 2030 Comprehensive Plan. Its purpose is to communicate the unique and valuable characteristics of the Avent West neighborhood to the City, with the intent of gaining the City's support to preserve and promote the area. In addition, the Plan guides neighborhood initiatives that take place outside the authority of the City of Raleigh. Lastly, the Plan serves as the basis for adopting a Neighborhood Conservation Overlap District for the Avent West neighborhood to further ensure the realization of its goals and objectives.

Goals

- Beautify the stretch of Western Boulevard and Avent Ferry Road along Avent West neighborhood.
- Locate parking lots behind buildings.
- Rebuild or repair Simmons Branch Dam.
- Provide sidewalks that connect the Avent West Neighborhood and the Greenway.

Major Themes

- Proposes zoning all properties within the Plan area to R-4. At the time of the Plan, some of the areas were zoned R-6 or R-10. This proposal would decrease the number of residential "units" that could be built per acre of land.

Impacted Locations

- No specific locations provided, but Action

AP-AW 5 proposes providing sidewalk/paved access from the Avent West neighborhood to the trail network.

Buffaloe-New Hope Area Plan (2014)

In 2013, the northeast corner of Buffaloe and New Hope Road was the subject of a controversial rezoning petition that stirred community interest in the future development of the area. As a result, this small area plan was conducted to generate a vision for future development that would address community concerns while allowing economic growth. The Plan presents policies to guide building form and development. Additionally, recommendations to increase safety and accessibility for all transportation modes throughout the area are provided.

Goals

- Identify the vision of the community
- Identify issues the community is facing
- Identify opportunities to benefit the area

Major Themes

- Through a public workshop, the community stated they would like to see a greenway connector to the Neuse River Greenway/ Buffaloe Road Park. However, this was not included in the Plan's recommended action items.
- Proposed recommending NCDOT to install pedestrian signals and crosswalks at the

intersection of Buffalo Road and New Hope Road, as well as repairing existing sidewalk damage throughout the area.

- Proposed evaluating Buffalo Road for designation as a high-priority bicycle route during the 2015 Bicycle Plan Update.

Impacted Locations

N/A

Cameron Village & Hillsborough Street Small Area Plans (2018)

In response to increasing development pressure and demands to the transportation system, the Cameron Village and Hillsborough Street Small Area Plans were created. These plans build off previous planning efforts and guide investment in completing bicycle, pedestrian, and transit networks. In addition, traffic operations and retail parking accessibility are addressed.

Goals

- Increase destinations within walkable distance. (increasing infrastructure for access)
- Accommodate development in a way that reduces travel demand and encourages sustainability
- Maintain and enhance the character of existing neighborhoods
- Improve connectivity of neighborhoods
- Increase diversity of architecture, housing types,

residents, visitors, businesses, and amenities,

- Rethink parking solutions through innovative strategies and partnerships
- Capitalize and build on existing strengths of Hillsborough Street
- Calm traffic
- Increase transit options
- Manage parking supply for efficiently

Major Themes

- Proposed zoning changes to increase density for the area.
- Complete Streets are proposed to accommodate all modes.
- Prioritizes addressing outstanding maintenance issues of existing parks.
- Focus on increasing transit options by implementing the Wake Transit Plan and facilitating partnerships with employers to encourage transit use.
- Proposes realignment of roads and reassignment of lanes to enhance connectivity and better accommodate turning movements, parking, people on bikes, and pedestrians.
- Recommends expansion of on-street parking and encouraging provision of public parking into new private developments.
- Designates Clark Avenue (west of Dixie Trail), Everett Avenue, Kilgore Avenue, Oberlin Road, Chamberlain Street, and Gardner

Street as pedestrian/bicycle corridors. Specific action items are included for each street, in addition to cost estimates, a timeline, and responsible agencies.

Impacted Locations

Supports the proposed greenway trails detailed in the 2014 Capital Area Planning and Design Guide:

- Neighborhood greenway trail connecting Beaver Dam and Reedy Creek Trail along Faircloth Street
- Greenway connector trail connecting the Rose Garden and Raleigh Little Theatre to Pullen Park along a possible combination of Clark Avenue and Enterprise Street.

Arena Blue-Ridge Area Plan (2019)

This small area plan builds upon four previous small area planning efforts: Arena (2001), Blue Ridge (2012), Jones Franklin/Asbury Village (2011), and Raleigh-Cary Rail Crossing (2016) and was conducted to supplement the City of Raleigh's 2030 Comprehensive Plan Update. It envisions a vibrant, mixed-use urban Blue Ridge Road corridor, with a well-connected street network, easily accessible natural features, and a set of distinct character districts. The Plan also includes guidance for Asbury Village, with a focus on balancing the area's suburban character with a need to accommodate growth. Policies are included to guide development and provide for future growth in the Arena-Blue Ridge area.

Major Themes

- Focus on complete streets and linking greenway, bicycle and pedestrian paths, as well as utilizing creative multimodal solutions to crossing major roads (Policies AP-AB 1 and 2).
- Focus on access to transit and TOD (Policies AP-AB 3, 7, 8 and 11).
- Policy recommendation aimed at enhancing the functionality and quality of recreational trails with district-specific programming, public art, and improving infrastructure (Policy AP-AB 4).
- Preservation of wetlands and maintaining evergreen landscape (Policies AP-AB 5 and 12).
- Includes greenway-specific actions:
 - Assess the feasibility of greenway connections to Centennial Biomedical Campus
 - Connect greenway at the NCMA over or under Wade Avenue to NCSU College of Veterinary Medicine campus

Impacted Locations

- NCMA greenway is proposed to connect over/under Wade Avenue to NCSU College of Veterinary Medicine campus.
- Centennial Biomedical Campus is desired location for greenway connectivity.

King Charles Neighborhood Plan (2009)

The King Charles Neighborhood Plan area is located just east of downtown Raleigh and is generally bounded by Raleigh Boulevard, Poole Road, Peartree Lane, and Crabtree Boulevard. The Plan derives its name from King Charles Road, which runs the entire length of the plan area. This small area plan was conducted to supplement the City of Raleigh's 2030 Comprehensive Plan. Its purpose is to provide a vision for future growth, preserve the unique character of neighborhoods, protect and enhance property values through stabilization of neighborhood assets, and increase the sense of community among residents. The policies and actions outlined in the Plan serve as a guide for future development in the Plan area.

Major Themes

- Proposed re-zoning properties in the central and northern sections of the study area from R-10 to R-6, which will decrease the number of units available to develop per acre.
- Interest in revitalizing existing parks in the study area, particularly the greenway and the traffic circle on Culpepper Drive (Action AP-KC 3).
- Suggests streetscape and landscape changes to increase aesthetic appeal of Raleigh Boulevard and New Bern Avenue.

Impacted Locations

- Crabtree Creek Trail (suggested revitalization of trail segment in study area)

New Bern Avenue Corridor Study (2012)

The goal of this study was to identify specific issues along the corridor, opportunities to enhance the appearance and function of the corridor, and suggest actions necessary to implement improvements that will present New Bern Avenue to visitors and residents as a model gateway that communicates Raleigh's pride in its cultural and architectural history. The study area includes the roadway and property frontage along a 3.5-mile segment of New Bern Avenue and Edenton Street from Swain Street to Crabtree Creek and the adjacent I-440 interchange. It is important to note that this corridor study is currently going through an update to prepare New Bern Avenue for a future bus rapid transit route.

Goals

- Maintain cultural landscape
- Protect trees within the study area
- Implement a proactive approach to stormwater quantity and quality management
- Reduce crime through "Prevention through Environmental Design"
- Define public space throughout the corridor
- Increase pedestrian safety throughout the corridor

Major Themes

- Recommended several amendments to the Comprehensive Plan, including:
 - Future Land Use Map Amendments
 - Thoroughfare Plan Amendments
- Propose extending sidewalk on Sunnybrook Road from New Bern Avenue to Milburnie Road and the existing greenway (Action SD3 A.3).
- Suggest evaluating the former nightclub site on Milburnie Road to determine if it should be acquired by the City as a greenway access of canoe launch to Crabtree Creek (Action LU A.4).

Impacted Locations

- Crabtree Creek Trail (sidewalk connections are proposed)
- Potential greenway access area at former nightclub site on Milburnie Road

Southern Gateway Corridor Study (2016)

The Southern Gateway Corridor study area encompasses a large land area, extending south from downtown Raleigh from MLK Boulevard to the intersection of S. Wilmington and Tryon Road, and from Lake Wheeler Road east to Hammond Road. This study outlines the process, analysis, overarching framework, and development strategies that resulted from an iterative design effort between the City of Raleigh's Urban Design Center, various city departments, members of the Southern Gateway district business community, and area residents.

The recommendations reflect the potential for transformation with new private development and infrastructure investments. The overarching objective of this plan is to develop a vision for roadway character and future of land used adjacent to the corridor.

Goals

- Build on the 2013 Vision Document
- Engage in targeted community outreach
- Establish an urban identity for the corridor
- Emphasize market-driven development opportunities
- Identify strategic infrastructure investments
- Integrate transportation, transit, urban design, and land use recommendations
- Strengthen connections to established neighborhoods
- Provide implementable solutions
- Align recommendations with the City's Strategic and Comprehensive Plans

Major Themes

- I-40 and MLK Boulevard make the Southern Gateway district very accessible by car but are barriers to new development and greenway connectivity.
- There is a lack of greenway connections south of I-40, particularly to Walnut Creek and Rocky Branch Trails.

- The homeless shelter on S. Wilmington Street has increased perceptions of criminal activity and loitering along the trails.
- Potential to use utility easement for greenway connection from Renaissance Park to NCSU.
- Supports Greenway Goal #2, objectives 2A, C, D, and F in the Parks, Recreation and Cultural Resources Department's System Plan.
- Supports the Downtown Plan's BREATHE Goal BG-3, Action BA-22 to improve bicycle and pedestrian access from downtown to the Rocky Branch Greenway and the Dix Hill Property.
- Hertford Village desires an improved greenway connection.

Impacted Locations

- Rocky Branch Trail (make more bicycle and pedestrian accessible in general and specifically to the area south of I-40)
- Walnut Creek Trail (study area south of I-40 desires access)

The following greenway connections were proposed:

- From Walnut Creek Trail across MLK Boulevard
- From Walnut Creek Trail, adjacent to Mt. Hope cemetery, to Green Street (where bike/ped infrastructure has also been proposed)
- From Walnut Creek Trail across I-40 to Pecan Road
- From Carolina Pines Park to Carolina Pines Avenue

- From Walnut Creek Trail to Carolina Pines Park
- Between Carolina Pines Avenue to Illeagnes Road

Wake Crossroads Area Plan (2009)

The Wake Crossroads Plan area includes about 40 acres along Mitchell Mill Road between Forestville Road and Watkins Road. This Plan was conducted to supplement the City of Raleigh's 2030 Comprehensive Plan and aims to coordinate future development patterns with individual property owners to address identified growth issues and to help create a neighborhood center as a focus for community activities.

Major Themes

- Suggests providing a connector greenway from the Harris Creek greenway north along the western side of Watkins Road to create a greenway loop through the Neighborhood Center and back to the Neuse River (Action AP-WC 1).
- Streetscapes should enhance the pedestrian user experience and incorporate street trees, pedestrian level lighting, wide sidewalks, and seating areas.
- Recommends sidewalks be provided on both sides of all streets.

Impacted Locations

- New connector greenway, a loop, suggested to link the Harris Creek greenway with the Neuse River by way of the Neighborhood Center.

Crabtree Valley Transportation Study (2011)

The Crabtree Valley Transportation Study is a comprehensive analysis of travel demand and transportation needs for the Crabtree Valley area, with a focus on access to Crabtree Valley Mall. Located in northwest Raleigh, the study area is defined along Glenwood Avenue between I-440 and Moorehead Drive including Crabtree Valley Avenue, Blue Ridge, Edwards Mill, Creedmoor and Lead Mine Roads. The area is a growth center in the City's Comprehensive Plan. This report details the area's long-range strategy and suggests a variety of methods for relieving traffic.

Major Themes

- Public emphasized traffic congestion and difficult moving through Glenwood Ave intersections. Suggested synchronized signals and better multi-modal access.
- Crabtree Valley Mall is a key bus transfer location; the 5 routes that serve the area carry about 17% of GoRaleigh ridership.
- Plan very focused on changes to roadway to decrease delays and relieve traffic congestion, such as road widening and extensions.
- Many of the proposed roadway projects will occur within the Crabtree Creek floodplain. Challenges of trail access during construction/maintenance.
- Focus on greenway maintenance: monitor/repair gaps between bridges and greenway paving, repainting center strip of Crabtree

Greenway, and removing debris.

- One of the listed projects is to label overpasses of greenways (at Glenwood Ave and Creedmoor Rd) to assist in wayfinding.
- Another listed project is to monitor and repair gaps between pedestrian bridges and paving on greenway.

Impacted Locations

- Crabtree Creek Trail (proposed labeling overpasses of greenways to assist in wayfinding).
- Any pedestrian bridges that connect with paved greenway trail surfaces in the Crabtree Valley study area.

Falls North Small Area Plan (2018)

This Plan updates the previous Falls North Small Area Plan completed in 2006. It provides land use, transportation, and urban design policy guidance for the study area with an emphasis on improving transportation and park facilities, as well as creating a stronger identity for the area. The study area extends along the Falls of Neuse Road corridor north from Durant Road to the Neuse River.

Goals

Public support for the overarching goals and direction of the 2006 Plan is emphasized. The original plan included the following goals:

- Minimize redevelopment impacts to

properties fronting Falls of Neuse Road and properties backing the frontage lots.

- Protect the character of the corridor. Maintain the sense of place created by the extensive roadside vegetation, the Falls Lake dam and Falls Community.
- Provide for safe, convenient, and connected travel for automobile, bicycle and pedestrian travel.
- Expand the opportunity for restaurants, shopping and other services.
- Protect environmentally significant areas to include the Falls Lake watershed, the Neuse River, slopes greater than 15% and the 100-year floodplain along the Neuse River.

Other goals highlighted in the 2018 Plan Update include:

- Enhance natural resources
- Carefully consider the scale, appearance, and uses involved in future development
- Accommodate active recreation

Major Themes

THERE IS A STRONG DESIRE TO MAINTAIN THE AREA'S HISTORICAL AND RECREATIONAL CHARACTER WITH CLOSE TIES TO ITS NATURAL RESOURCES.

- The area also includes a watershed protection overlay zoning district. Illustrating the importance placed on water quality, both Raleigh and Wake County have created watershed

protection overlay districts in recent years. The districts govern impervious surfaces and seek to limit runoff into the lake and Neuse River.

- A market study conducted as part of the area plan identified that the area would best support residential development, particularly low-rise apartments or townhomes.
- The current roadway design of Falls of Neuse Road does not facilitate on-street bicyclists.
- Proposes a pedestrian and bicycle connection from Lowery Farm Lane to the multi-use path alongside Falls of Neuse Road (Action FN 7).
- Support for bicycle wayfinding along Lowery Farm Lane, Wide River Drive, and Wake Bluff Drive to tie into City's existing bike network (Action FN 9).
- Suggests studying the extension and improvement (on the east side) and creation (on the west side) of multi-use paths along Falls of Neuse Road between Durant Road and at least Watertow Park Lane. The study should take place in conjunction with the study of park facilities on the Leonard Tract (Actions FN 8 and 15).
- Proposes additional vehicle parking at or near entrances to the Neuse River Greenway (Action FN 17).

Impacted Locations

- Falls of Neuse Multi-Use Path (recommended bicycle and pedestrian connections, wayfinding, and studying extension potential).
- Neuse River Greenway (recommends

additional parking).

Downtown West Gateway Area Plan (2009)

The purpose of this Plan is to guide redevelopment between the Raleigh Convention Center and the Boylan Heights neighborhood through specific policy and action recommendations. This area of the City is expected to experience significant redevelopment, as it is situated at the crux of downtown entertainment and employment centers, residential areas, and future parks and open space opportunities. It was conducted to supplement the City's 2030 Comprehensive Plan. In addition, the area includes a unique character contributed to by the Depot National Register Historic District and the Boylan Heights Historic Residential District.

Major Themes

- Anticipates significant redevelopment and identifies the Raleigh Convention Center, RUS-BUS, and the Jamaica Drive and Saunders North Redevelopment Areas as catalysts for change.
- Focus on mixed-use development.
- Importance of historic preservation is emphasized.
- There is an emphasis on pedestrian connectivity throughout the area. Action AP-DWG 10 suggests exploring the feasibility of pedestrian connection between Boylan Ave, through RUS-BUS, to S. West St. It also shows mid-block pedestrian link through the block between Hargett/Martin Streets.

- Policy AP-DWG 3 prioritizes improved connectivity of transportation network, including pedestrian, greenway, and bicycle linkages (particularly to RUS-BUS).
- Policy AP-DWG 5 focuses on creating urban parks and open spaces with connections to greenways.
- Call to implement the Rosengarten Urban Greenway, as well as improve and expand existing park on N. side of Lenoir Street as part of implementation (Action AP-DWG 11).

Impacted Locations

- Rosengarten Urban Greenway (recommendation to implement from Dorothea Drive to Cabarrus Street, connecting to the Rocky Branch Greenway).
- RUS-BUS as a desired area for greenway connectivity.

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APPENDIX B

Existing Conditions & Policy Evaluation



Appendix Summary

The CAG System is a combination of corridors and trails that are popular among residents and visitors alike, with many enjoying the abundant opportunities greenway trails provide to enjoy nature and engage in active recreation. Even still, there are opportunities for the system to serve Raleigh's residents more equitably while continuing to preserve open space. This appendix includes the Existing Conditions Analysis and Policy Evaluation, which contains the following sections:

- State of the System
- Trail Classifications
- Barriers to Access
- Amenity Inventory
- Policy Evaluation
- Unified Development Ordinance Analysis and Peer Review
- System-Wide Findings

State of the System

Raleigh's Capital Area Greenway System (CAG System) has grown to just over 117 miles of greenway trails since the early 1970s, when plans for a city-wide greenway system were starting to take shape. Table 6 provides an overview of each trail in the CAG System, including its mileage, width, and surface type characteristics. The CAG System is a combination of corridors and trails that are popular among residents and visitors alike, with many enjoying the abundant opportunities greenway trails provide to enjoy nature and engage in active recreation. Even still, there are opportunities for the CAG System to serve the city's residents more equitably while continuing to preserve open space. A diverse and growing population creates challenges and opportunities for the City's Parks, Recreation and Cultural Resources (PRCR) Department to meet the needs of current users while simultaneously planning for future greenway development. Through both suburban and urban development, Raleigh has experienced a rising interest in using the trail network for transportation. Balancing the CAG System's initial and continued purpose of environmental conservation with active transportation uses will require strategically balancing ecological benefits and user mobility.

It is essential to assess the user experience getting to and from the trail network, as well as traveling along it, as those who are using the system for active transportation may walk or bicycle to the trail network. This Existing Conditions Analysis serves as an initial inquiry to understanding the unique

experiences of people who walk, bicycle, or wheel (i.e., use wheelchairs or other personal mobility devices) to/from and along the trail network, whether for transportation or recreational purposes.

Amenities along the system have also been evaluated based upon previous recommendations in the Capital Area Greenway Planning and Design Guide (Design Guide) and goals of the City's Strategic Plan. The type, quantity, and quality of amenities available to greenway users contributes to their overall experience using the system. Understanding where amenities are currently placed throughout the trail network provides context to public feedback on desired amenities that is necessary in developing recommendations.

Table 6: Capital Area Greenway System Trails, Mileage, Surface, and Width

TRAIL	MILEAGE	SURFACE	AVG. TRAIL WIDTH (FT)	MIN. TRAIL WIDTH (FT)	MAX. TRAIL WIDTH (FT)
Abbotts Creek	3.3	Paved	8.2	5	10
Baileywick	0.6	Paved	10	10	10
Beaver Dam	1.1	Unpaved	4.9	4	8
Birch Ridge Connector	0.3	Paved	8	8	8
Centennial Bikeway Connector	2.5	Paved	7.9	5	10
Crabtree Creek	15.9	Paved	9.7	4	14
East Fork Mine Creek	2.5	Paved	8	5	12
Edwards Mill Connector	2.1	Paved	10	10	10
Gardner Street	0.8	Unpaved	5.2	3	12
Hare Snipe Creek	2.3	Paved	7.2	4	8
Honeycutt Creek	3.8	Paved & Unpaved	7.5	2	12
House Creek	3.2	Paved	9.6	5	11
Lake Johnson East Loop	2.8	Paved	7.8	4	12
Lake Johnson West Loop	2.1	Unpaved	7.8	4	12
Lake Lynn Loop	1.2	Paved	10	10	10
Little Rock	1.8	Paved	9.2	5	10
Marsh Creek	0.4	Paved	7.8	6	8
Martin Street Connector	0.4	Paved	5	5	5
Mine Creek	4.2	Paved & Unpaved	7.4	2	12
Neuse River	31.5	Paved	10	4	12
Reedy Creek	5.0	Paved	10.1	10	12
Richland Creek	3.1	Unpaved	10.1	2	15
Rocky Branch	3.9	Paved	8.8	5	10
Shelley Lake Loop	2.3	Paved	10	8	12
Simms Branch	1.9	Paved	8.3	4	10
Snelling Branch	0.9	Paved	7.8	6	8
Spring Forest	0.3	Paved	10	10	10
Wakefield	1.4	Unpaved	6.9	5	8
Walnut Creek	15.6	Paved	9.5	4	14
TOTAL	117.1	--	8.4	2	15

Trail Volumes

Greenway trails throughout Raleigh are used for a variety of trip purposes. Monitoring the volume of trips is valuable for understanding trail use patterns, highlighting which trails could be more difficult to access or are less well-known. In addition, trail volume data is useful to evaluate existing capacity and to plan for future updates or strategic maintenance. The trail network currently has nine bicycle and pedestrian counters located along the following trails:

- Neuse River Trail (1)
- Rocky Branch Trail (1)
- Mine Creek Trail (1)
- House Creek Trail (1)
- Walnut Creek Trail (2)
- Reedy Creek Trail (1)
- Crabtree Creek Trail (1)
- Shelley Lake Loop (1)

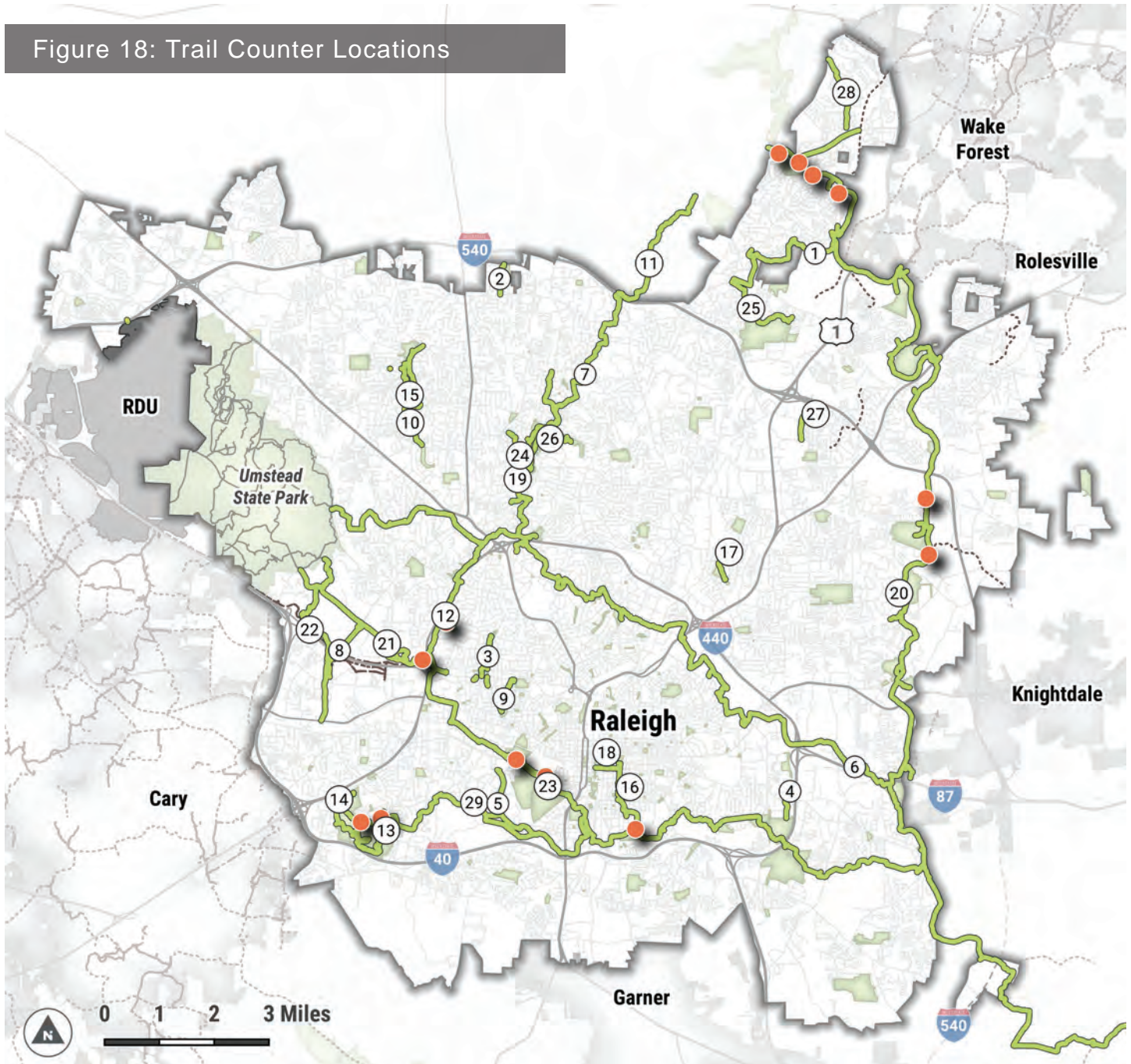
The City of Raleigh counts pedestrian and bicyclist use of the trail network quarterly. Table 7 details total user counts, as well as bicyclist and pedestrian counts, by counter location for 2019. This data shows that the Walnut Creek Trail at Lake Johnson is a busier trail section than areas where the other counters are placed. In addition, loop trails have higher utilization than linear trails. When comparing bicyclists and pedestrians, the data demonstrates that pedestrians seem to prefer loop trails while

bicyclists more frequently use linear trails. User counts can help the City better understand where potential conflicts between pedestrians and bicyclists could most frequently occur and where to place user-specific amenities (e.g., bike repair stations, bike racks, benches, pet waste stations, etc.).

Weekday bicycle volumes during peak work commute hours were also assessed to identify common trails used for commuting. Table 8 highlights peak bicycle volume times during the weekday for each trail counter. Crabtree Creek Trail and Reedy Creek Trail likely have higher commuter volumes, Neuse River Trail and Mine Creek Trail at Shelley Lake likely have higher recreational volumes, and Walnut Creek Trail likely has a balance of commuters and recreational users. Understanding user types along trails can help the City prioritize commuter-oriented amenities (e.g., lighting, signage, connections to transit).

Figure 18 shows the locations of the nine bicycle and pedestrian counters located along greenway trails. They are located along the following trails: Neuse River Trail (1), Rocky Branch Trail (1), Mine Creek Trail (1), House Creek Trail (1), Walnut Creek Trail (2), Reedy Creek Trail (1), Crabtree Creek Trail (1), and Shelley Lake Loop (1). At the time of this report, no counters were located along the Crabtree Creek Trail due to ongoing closures related to stormwater projects. When the projects are complete, counters will be added to Crabtree Creek Trail.

Figure 18: Trail Counter Locations



- Existing Trail Counter
- Existing Trails
- Parks

Trails in Adjacent Jurisdictions

- Existing/Funded
- - - - - Proposed

trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
| 4 Birch Ridge Connector | 13 Lake Johnson East Loop | 23 Rocky Branch |
| 5 Centennial Bikeway Connector | 14 Lake Johnson West Loop | 24 Shelley Lake Loop |
| 6 Crabtree Creek | 15 Lake Lynn Loop | 25 Simms Branch |
| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Table 7: 2019 Trail User Count Data

COUNTER LOCATION	TOTAL USER COUNT	PEDESTRIANS		BICYCLISTS	
		#	%	#	%
Neuse River Trail at Royal Forest Drive	173,400	83,059	48	90,341	52
House Creek Trail at Lake Boone Trail	74,122	42,787	58	31,335	42
Crabtree Creek Trail at Crabtree Boulevard	32,194	18,954	59	13,240	41
Mine Creek Trail at North Hills Drive	105,000	70,744	67	34,256	33
Reedy Creek Trail at NCMA	168,456	114,624	68	53,832	32
Rocky Branch Trail at Pullen Park	187,242	155,929	83	31,313	17
Mine Creek Trail at Shelley Lake	260,085	229,015	88	31,070	12
Walnut Creek Trail at Walnut Creek Wetland Park	206,554	189,395	92	17,159	8
Walnut Creek Trail at Lake Johnson Park	581,402	559,122	96	22,280	4
TOTAL	1,788,455	1,463,629	82	324,826	18

Table 8: 2019 Weekday Bicycle Volume Peak Times

COUNTER LOCATION	MORNING PEAK	EVENING PEAK
Neuse River Trail at Royal Forest Drive	10:00 a.m.	6:00 p.m.
House Creek Trail at Lake Boone Trail	-	-
Crabtree Creek Trail at Crabtree Boulevard	6:00 a.m.	5:30 p.m.
Mine Creek Trail at North Hills Drive	-	-
Reedy Creek Trail at NCMA	8:00 a.m.	6:00 p.m.
Rocky Branch Trail at Pullen Park	-	-
Mine Creek Trail at Shelley Lake	10:00 a.m.	6:00 p.m.
Walnut Creek Trail at Walnut Creek Wetland Park	-	5:30 p.m.
Walnut Creek Trail at Lake Johnson Park	-	6:00 p.m.

Maintenance

Greenway maintenance staff conduct a comprehensive inventory of issues and concerns across the entire system twice a year for vegetation and twice a year for structures. Multiple staff over the course of several weeks utilize a mobile app to catalog issues for each inventory. Maintenance data provided by the PRCR Department included the inventory information from the City's maintenance, vegetation, construction, and urban forestry crews conducted in the fall of 2019. During this inventory over 1,600 maintenance items were identified. Collecting data comprehensively allows maintenance staff to have a more complete understanding of one-time and ongoing maintenance needs. The goal of each inventory is to assess current conditions and begin to prioritize maintenance. Between the inventory collection periods, maintenance staff diligently work to address and resolve all issues. Any issues not addressed are noted for the next inventory. Maintenance concerns were grouped into the following categories:

- Amenity – greenway trail amenities that need to be replaced or repaired.
- Drainage – drainage system damage or blockages, standing water on trails, and shoulder cut back needs for proper drainage off trail.
- Safety – damaged fencing, bollards, and structures (e.g., bridges, boardwalks), illegal dumping, and graffiti.
- Signage – damaged, faded, missing, or dirty signage.
- Trail Surface – damage to trail surfaces, including the following:
 - root intrusion
 - cracking
 - erosion
 - sub-grade failure
 - shoulder/backfill needs
 - potholes
 - rough transitions between trail and structures
- Vegetation – vegetation obstructing greenway trails, threatening the safety of users, or otherwise impeding the user experience. Includes the following:
 - vegetative debris
 - dead vegetation
 - encroachment
 - leaning or fallen trees
 - hanging branches
 - invasive species
 - low-hanging canopy
 - sightline issues due to vegetation

Most maintenance issues recorded between October and December 2019 pertained to vegetation or trail surface issues. Unsurprisingly, the trail network's longest trails—Walnut Creek Trail, Neuse River Trail,

and Crabtree Creek Trail—have the highest number of maintenance needs. The Reedy Creek and Hare Snipe Trails also have high numbers of maintenance needs despite their smaller sizes. Higher volumes of maintenance needs for individual trails may be the result of a variety of factors, including environmental conditions unique to that trail such as frequent flooding and type of adjacent vegetation.

Data in Table 9 provides a snapshot of maintenance needs of the CAG System based on the inventory conducted in the fall of 2019. Specific maintenance issues are continually being addressed and certain issues may require more time and/or funding to be resolved. In addition to routine inventories, the public has an opportunity to bring maintenance issues to the City's attention through SeeClickFix, an interactive map on the City's website, and the Raleigh Greenspace mobile app.

Table 9: Capital Area Greenway System Trails, Mileage, Surface, and Width

TRAIL NAME	MAINTENANCE INVENTORY						TOTALS
	AMENITY	DRAINAGE	SAFETY	SIGNAGE	TRAIL SURFACE	VEGETATION	
Abbotts Creek	-	-	-	-	-	19	19
Baileywick	-	-	1	1	14	12	28
Beaver Dam	1	-	-	-	1	10	12
Birch Ridge Connector	-	-	2	1	2	3	8
Centennial Bikeway Connector	-	4	-	-	22	16	42
Crabtree Creek	3	1	14	15	100	74	207
East Fork Mine Creek	-	-	3	-	4	16	23
Edwards Mill Connector	-	-	-	1	10	6	17
Gardner Street	-	-	1	-	-	6	7
Hare Snipe Creek	2	-	2	11	73	27	115
Honeycutt Creek	-	-	-	-	8	10	18
House Creek	-	-	1	7	4	7	19
Lake Johnson East Loop	-	-	-	-	-	-	0
Lake Johnson West Loop	-	-	-	-	-	-	0

TRAIL NAME	MAINTENANCE INVENTORY						TOTALS
	AMENITY	DRAINAGE	SAFETY	SIGNAGE	TRAIL SURFACE	VEGETATION	
Lake Lynn Loop	-	-	-	-	-	-	0
Little Rock	-	5	-	3	21	31	60
Marsh Creek	-	2	1	1	2	4	10
Martin Street Connector	-	-	-	-	-	-	0
Mine Creek	-	1	2	3	110	62	178
Neuse River	1	3	23	14	39	156	236
Reedy Creek	-	2	3	7	62	41	115
Richland Creek	1	-	1	2	1	10	15
Rocky Branch	2	7	3	1	62	37	112
Shelley Lake Loop	-	-	-	-	-	-	0
Simms Branch	1	5	4	-	14	12	36
Snelling Branch	-	-	-	1	4	1	6
Spring Forest	-	-	-	-	-	3	3
Wakefield	-	-	1	-	1	-	2
Walnut Creek	1	17	27	25	169	108	347
TOTALS	12	47	89	93	723	671	1,635

Trail Classifications

Trail Classification Purpose

Greenway trails serve a wide variety of users and trip purposes. Function and character are two of the primary factors that can impact greenway trail design and influenced the current greenway trail classifications. The value of trail classifications is noted in the Design Guide:

"Greenway trail classifications can help elected officials, advisory board members, and staff make decisions involving the expenditure of public funds and the enhancement of public safety. Decisions related to acres of land or easements to be

purchased, the types of greenway trails to construct, and the location of greenway trails can be facilitated by incorporating standards and guidelines in the greenways planning and decision-making process." (p. 23)

Existing Trail Classification Review

The Design Guide established a trail classification system that categorized trails by user types, potential conflicts, and guidance on design standards and amenities (Table 10). These classifications have been used to define existing and proposed greenway trails throughout the system. Understanding the current classification definitions, along with alignments of existing and planned trail

Table 10: Capital Area Greenway Trail Classifications

TRAIL TYPE	DESCRIPTION	LOCATION	WIDTH	SURFACE
Cross City Greenway Trails	Main routes crossing the city with connections to adjacent jurisdictions	Streams, utility easements, roadways	10-14 ft. 12 ft. preferred	Asphalt or concrete
Greenway Collector Trails	Connections with many access points to larger residential, employment, & retail centers	Streams, utility easements, roadways	10 ft. preferred 12 ft. maximum	Asphalt or concrete
Greenway Collector Trails - Loop Trail (subcategory)	Destination-oriented trails around lakes & other destinations	--	10-14 ft. 12 ft. preferred	Asphalt, concrete, granite fines, bare earth
Neighborhood Greenway Trails	Connections with many access points into neighborhoods, parks, retail centers, & employment centers	In-between lot connectivity typical	8-10 ft. preferred 12 ft. maximum	Asphalt, concrete, granite fines, bare earth
Greenway Connectors	Transportation-oriented sidepaths linking trail corridors	Road right-of-way, utility easements	10 ft. preferred	Asphalt or concrete

Table 11: Existing and Planned Trail Lengths by Classification

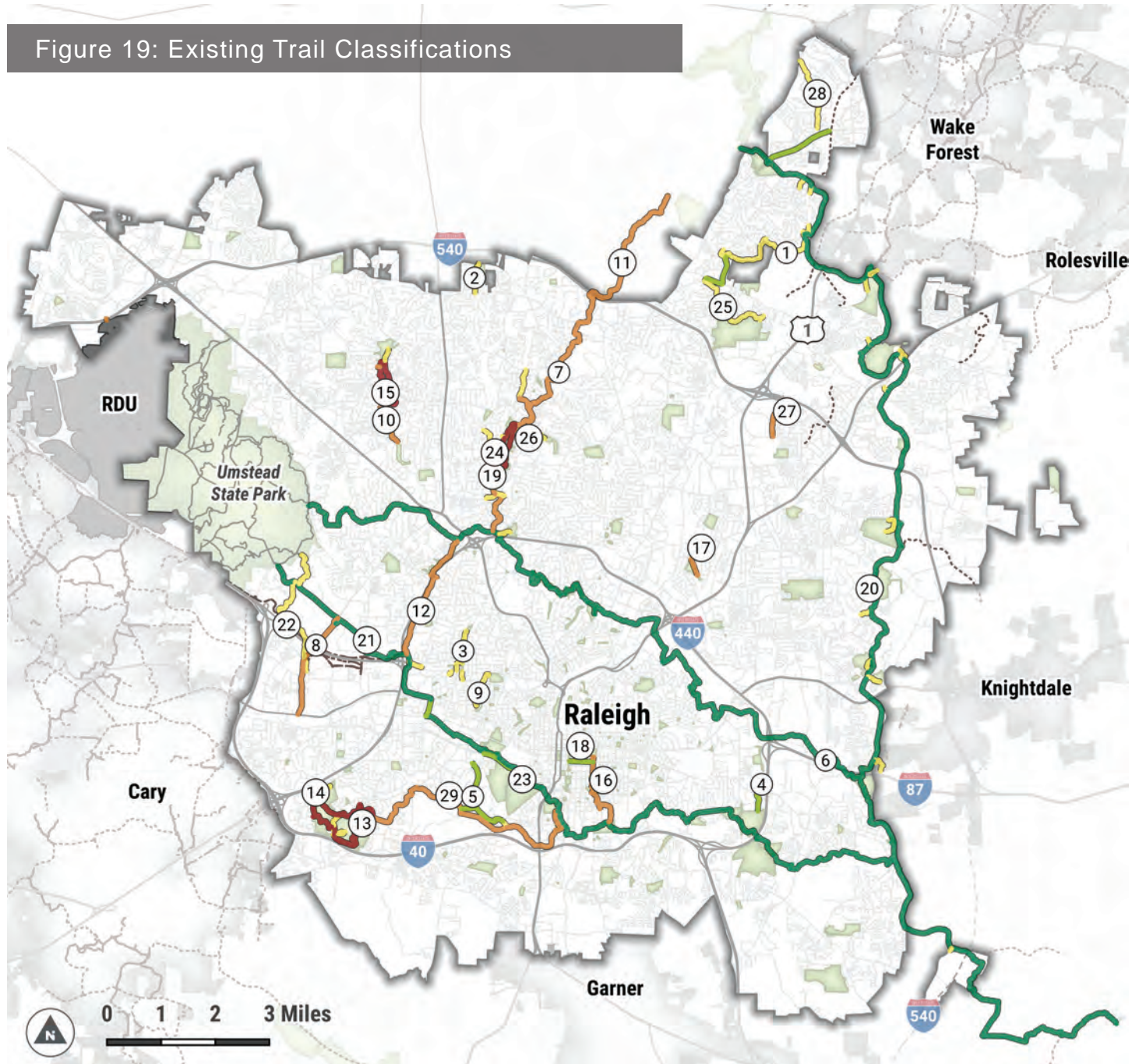
TRAIL CLASSIFICATION	EXISTING TRAIL MILES	PLANNED TRAIL MILES	TOTAL MILES
Cross City Greenway Trails	61.3	9.3	70.6
Greenway Collector Trails	23.2	67.4	90.6
Greenway Collector Trails - Loop Trail (subcategory)	9.2	N/A	9.2
Neighborhood Greenway Trails	18.9	19.8	38.7
Greenway Connectors	4.5	33.8	38.3
TOTALS	117.1	130.3	247.4

classifications, provides insight into how, and if, the trail classification system developed in Design Guide is being used or if there is a need to revise the description or number of categories. Table 11 identifies the mileage of existing and proposed trails by classification.

While CAG System is expansive in many respects, the City envisions doubling it by implementing proposed trails. Greenway Collector and Greenway Connector trails are the classifications that are proposed to see the most significant growth—approximately 77% of the total proposed. Similarities in descriptions, user types, and guidance for these two trail classifications indicate that the greatest need for future trails is connecting people to destinations and accommodating a variety of trip types—both active transportation and recreation. The Greenway Master Plan Update will assess the

utility of the existing trail classification system to determine whether it adequately meets the needs of existing and potential greenway users, as well as the needs of the City. The Update will also clarify greenway, bicycle, and pedestrian terminology use between the Transportation Planning and PRCR departments. Figure 19 highlights the City's existing trail network symbolized by trail classification.

Figure 19: Existing Trail Classifications



Existing Trail Classifications

- Neighborhood Trail
- Collector Trail
- Cross City
- Greenway Connector
- Collector Loop

Parks

Trails in Adjacent Jurisdictions

- Existing/Funded
- - - - - Proposed

trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
| 4 Birch Ridge Connector | 13 Lake Johnson East Loop | 23 Rocky Branch |
| 5 Centennial Bikeway Connector | 14 Lake Johnson West Loop | 24 Shelley Lake Loop |
| 6 Crabtree Creek | 15 Lake Lynn Loop | 25 Simms Branch |
| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Barriers to Access

Greenway trails connect parks, neighborhoods, businesses, and other important community destinations, strengthening residents' quality of life and visitors' experience in the City of Raleigh through mobility and outdoor recreation opportunities. The ability to access the CAG System directly impacts user experience. Access to and from the trail network is dependent on the presence and quality of people-oriented infrastructure. Those who drive their personal vehicles to and from the trail network rely on a street network that connects them to greenway access points (City-operated trailheads) and parking areas. Others who walk, bicycle, or wheel to the trail network—either by necessity or choice—rely on sidewalks and bikeway facilities that are built for users of all ages and abilities. Greenway trails offer current transit users, and those who will use the City's future bus rapid transit (BRT) system, a valuable part of their commute, seamlessly connecting to bus stops and future BRT stations. Beyond merely relying on their existence, people who walk, bicycle, or wheel depend on quality sidewalk and bikeway networks for a safe, comfortable, and convenient way to get to and from the trail network.

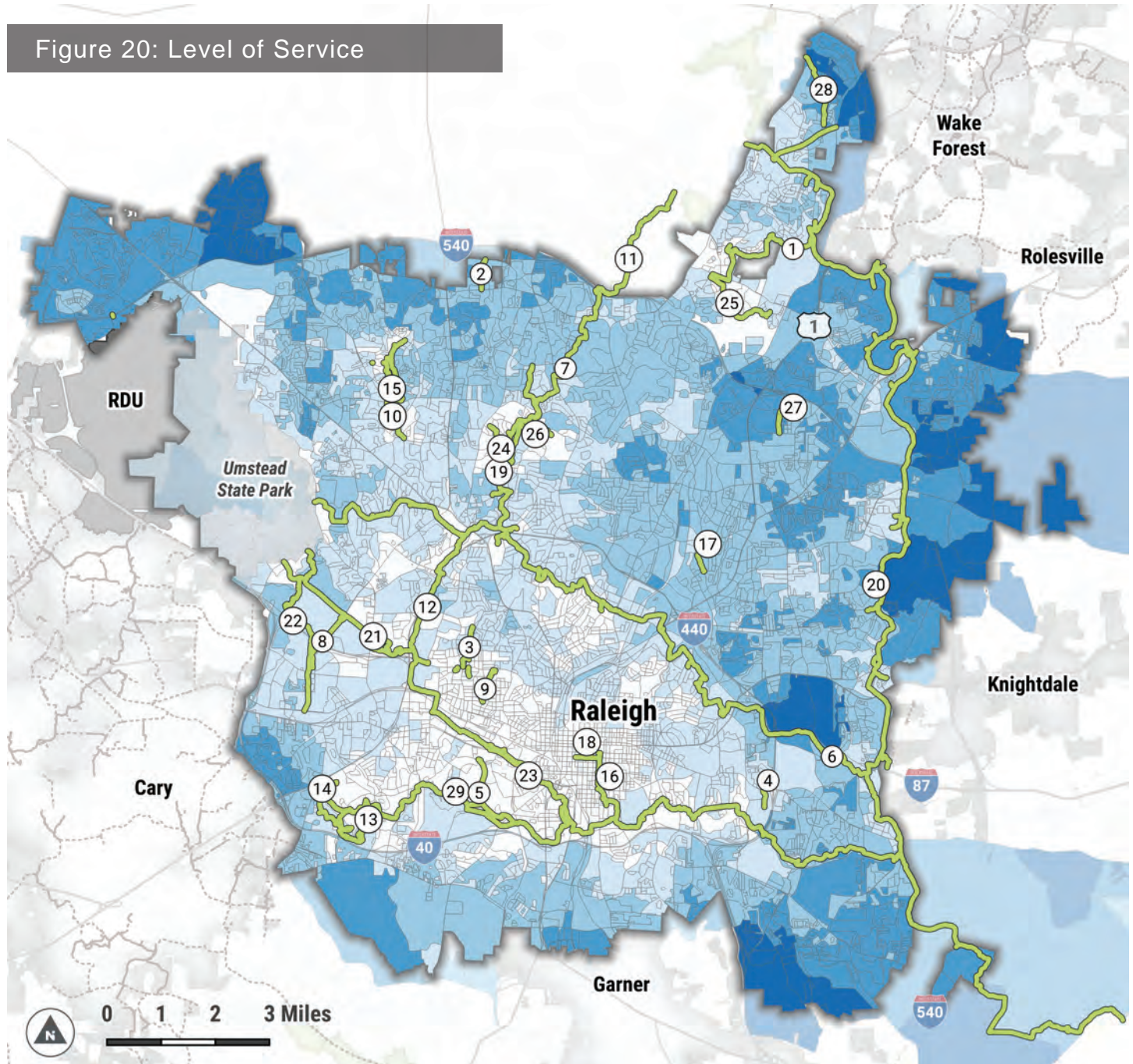
People using non-motorized modes are inherently more vulnerable road users than their peers who drive to the trail network. The following analyses focus on barriers to accessing the trail network specific to pedestrians and bicyclists by examining the City's existing sidewalk, bicycle, and transit networks along with at-grade street crossings,

pedestrian- and bicycle-related crashes, and ADA-accessible infrastructure around greenway trail access points.

Level of Service

The City of Raleigh's PRCR Department has developed a level of service (LOS) analysis to quantify how well the parks and trail network are meeting the needs of residents through acreage, facilities, and access. This analysis focused on the City's assessment of accessibility of the existing trail network to Raleigh residents. For their LOS, access to greenways is defined as distance or travel time. Census blocks were analyzed in half-mile increments to assess which communities are physically closer to greenway access points. Figure 20 highlights the results of this analysis. Results of this analysis highlight the gaps for greenway trail access; however, many of the proposed trails will make connections that can increase LOS for more people throughout Raleigh. Strategically placing access points will be a key consideration for proposed trail implementation to ensure access that will benefit users effectively.

Figure 20: Level of Service



Park Level of Service

- A (Highest)
- B
- C
- D
- F (Lowest)

Existing Trails

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
| 4 Birch Ridge Connector | 13 Lake Johnson East Loop | 23 Rocky Branch |
| 5 Centennial Bikeway Connector | 14 Lake Johnson West Loop | 24 Shelley Lake Loop |
| 6 Crabtree Creek | 15 Lake Lynn Loop | 25 Simms Branch |
| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Sidewalks, Bikeways & Transit

Sidewalks

Whether or not one is able to walk or wheel to the trail network is dependent on the existence and quality of the City’s sidewalk network. Table 12 details the number and percentage of existing access points that have sidewalk within 100 feet (defined as direct access), ½ mile, 1 mile, 1 ½ mile, and 2 miles. The table also describes the sidewalk coverage within each distance category from greenway trail access points. Over two-thirds of the greenway trail access points (67.3%) have sidewalk within 100 feet, meaning that most are directly connected to a sidewalk facility on at least one side of the street. Forty-nine (nearly 14%) of greenway trail access points are within ½ mile of sidewalk, but do not have any sidewalk within 100 feet. Another 48 (14%) are only within 1 mile of sidewalk; five (1.4%) are only within 1 ½ miles; and one greenway trail access point is only within 2 miles of the nearest sidewalk.

However, significant gaps in the sidewalk network remain. This is clear when assessing the sidewalk coverage of an area. Sidewalk coverage is calculated by comparing the miles of existing sidewalk to the miles of possible total sidewalk for a given area. The miles of possible total sidewalk are estimated by doubling the length of the street network within the given area (100 feet, ½ mile, 1 mile, 1 ½ mile, or 2 miles of each access point) to account for sidewalk on both sides of the street. Within 100 feet of all greenway trail access points,

only slightly more than a quarter (27.5%) of the potential sidewalk coverage is complete. This number is slightly higher when looking ½ mile from access points (28.4%), but decreases when assessing sidewalk networks within 1 mile, 1 ½ miles, and 2 miles of the greenway trail access points. This demonstrates that the further someone is walking to reach a greenway access point, the less likely they are to have a well-connected and easy-to-navigate network of sidewalk along which to walk or wheel. A robust sidewalk network is not even guaranteed for those traveling shorter distances to the trail network. Figure 21 shows how the sidewalk network is dispersed around the greenway trail network.

It is important to note that data on sidewalk quality was not available for this review. Sidewalk quality is a key factor in determining whether sidewalk networks increase mobility and often comfort for users. Future review of the sidewalk network should consider quality of sidewalks when possible.

Table 12: Greenway Trail Sidewalk Access

DISTANCE FROM ACCESS POINT	ACCESS POINTS WITH SIDEWALK		SIDEWALK COVERAGE (%)
	#	%	
Direct Access (100 feet)	237	67.3	27.5
1/2 Mile	49	13.9	28.4
1 Mile	48	13.6	22.3
1 1/2 Miles	5	1.4	20.9
2 Miles	1	0.3	19.7

Many greenway trail access points are within 100 feet of existing sidewalk, and even more connect to sidewalk within increasing ½ mile increments. However, the sidewalk coverage connecting with greenway trail access points is always below 30%. In other words, the existing sidewalk network is less than a third of the potential sidewalk network (sidewalk on both sides of the street) in all of the service area distances reviewed. This signifies considerable gaps in the sidewalk network that impact pedestrian safety and comfort, specifically for direct access and within a half mile of an access point.

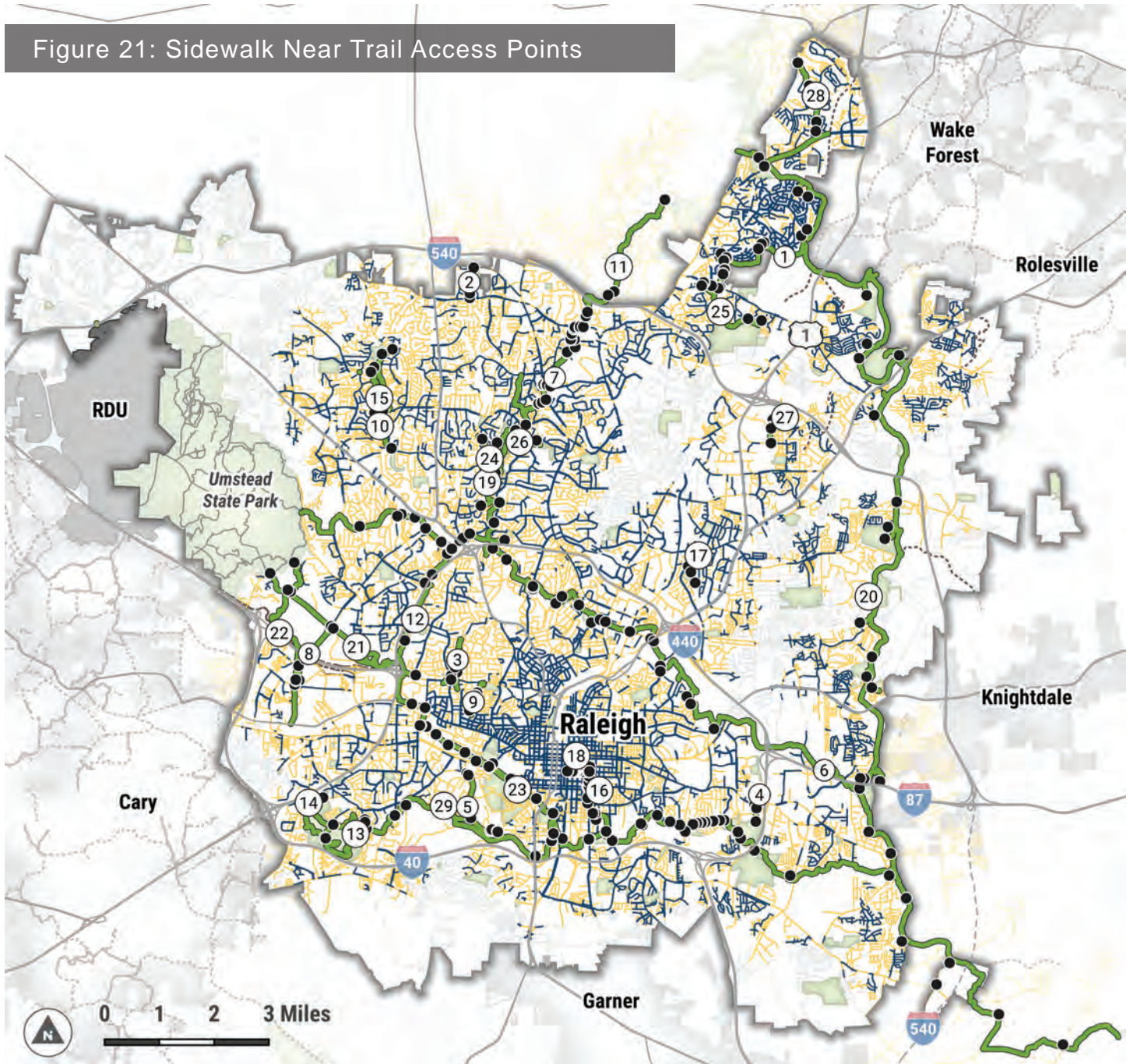


Image 52: Pedestrians in Downtown Raleigh



Image 53: Rocky Branch Trail Sidewalk Connection

Figure 21: Sidewalk Near Trail Access Points



2-Mile Sidewalk Access

- Existing Sidewalk
- Sidewalk Gap
- Trail Access Point
- Existing Trails

Parks

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
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| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Springfield |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Bikeways

The type of bicycle facility available, and particularly the level of separation from vehicular traffic that it provides, is a major indicator of individual comfort riding a bicycle; other road characteristics are, as well. Though comfort riding a bicycle varies from person to person, estimates show that the US population can be generally separated into four distinct categories of bicyclists. Most of the US population—about 51 to 56 percent—would like to bicycle but are uncomfortable interacting with high vehicular traffic; this group falls under the “Interested but Concerned” category and is most comfortable cycling separated from motorized vehicles.¹ Conversely, roughly 4-7% of the US population indicate they are “Highly Confident” bicyclists, comfortable sharing the road with motorized vehicles. In the middle, approximately 5-9% are in the “Somewhat Confident” category, and they may be comfortable cycling for short distances with motorized vehicles. The rest are uninterested in riding a bicycle within the foreseeable future regardless of what type of infrastructure is in place.

A well-connected network of safe and comfortable bicycle facilities is essential for bicycling to be a mode of choice for people of all ages and abilities when accessing the trail network. Bikeways include facilities that are bicycle-specific, such as bike lanes, buffered bike lanes, and separated bike lanes, in addition to facilities where space is shared with pedestrians, such as shared use paths, sidepaths, and greenway trails. To evaluate the relationship between the trail network and bikeways on or

adjacent to the street network, greenway trails have not been included as a “bikeway” in this analysis. Table 13 details the number and percentage of access points that have a bikeway within 100 feet (defined as direct access), ½ mile, 1 mile, 1 ½ mile, and 2 miles. The table also describes the bikeway coverage within each distance category from greenway trail access points. Bikeway coverage is determined by calculating the ratio of the existing bikeway network to the existing street network. Few greenway trail access points (8.5%) have direct access to a bikeway facility. Almost 30% are only

Table 13: Greenway Trail Bikeway Access

DISTANCE FROM ACCESS POINT	ACCESS POINTS WITH BIKEWAY		BIKEWAY COVERAGE (%)
	#	%	
Direct Access (100 feet)	30	8.5	6.1
1/2 Mile	101	28.7	4.0
1 Mile	67	19.0	2.5
1 1/2 Miles	54	15.3	2.1
2 Miles	25	7.1	1.8



Image 54: Bicyclist on Hillsborough Road

1. Dill, D. and N. McNeil. Revisiting the Four Types of Cyclists. In Transportation Research Record 2587. TRB, National Research Council, Washington, DC, 2016.

within ½ mile of a bikeway facility, while 19% are only within 1 mile, 15.3% are only within 1 ½ miles, and 7% are only within 2 miles. While collectively, many greenway trail access points fall within a 2-mile radius of a bikeway facility, these access points are not necessarily linked to a bikeway network that allows users to seamlessly, safely, and conveniently reach destinations in Raleigh. Only 6.1% of streets within 100 feet of greenway trail access points have a bikeway network on them. These numbers dwindle upon examining farther distances, with only 4%, 2.5%, 2.1%, and 1.8% of streets supporting bikeway infrastructure within ½, 1, 1 ½, and 2 miles, respectively.

Figure 22 shows how the bikeway network interacts with the greenway trail network. For the purposes of this analysis, bicycle facilities categorized as “shared lane markings” or “wide outside lane” were not included, as these facilities provide less separation or roadway dedication and are often not facilities designed for people of all ages and abilities.

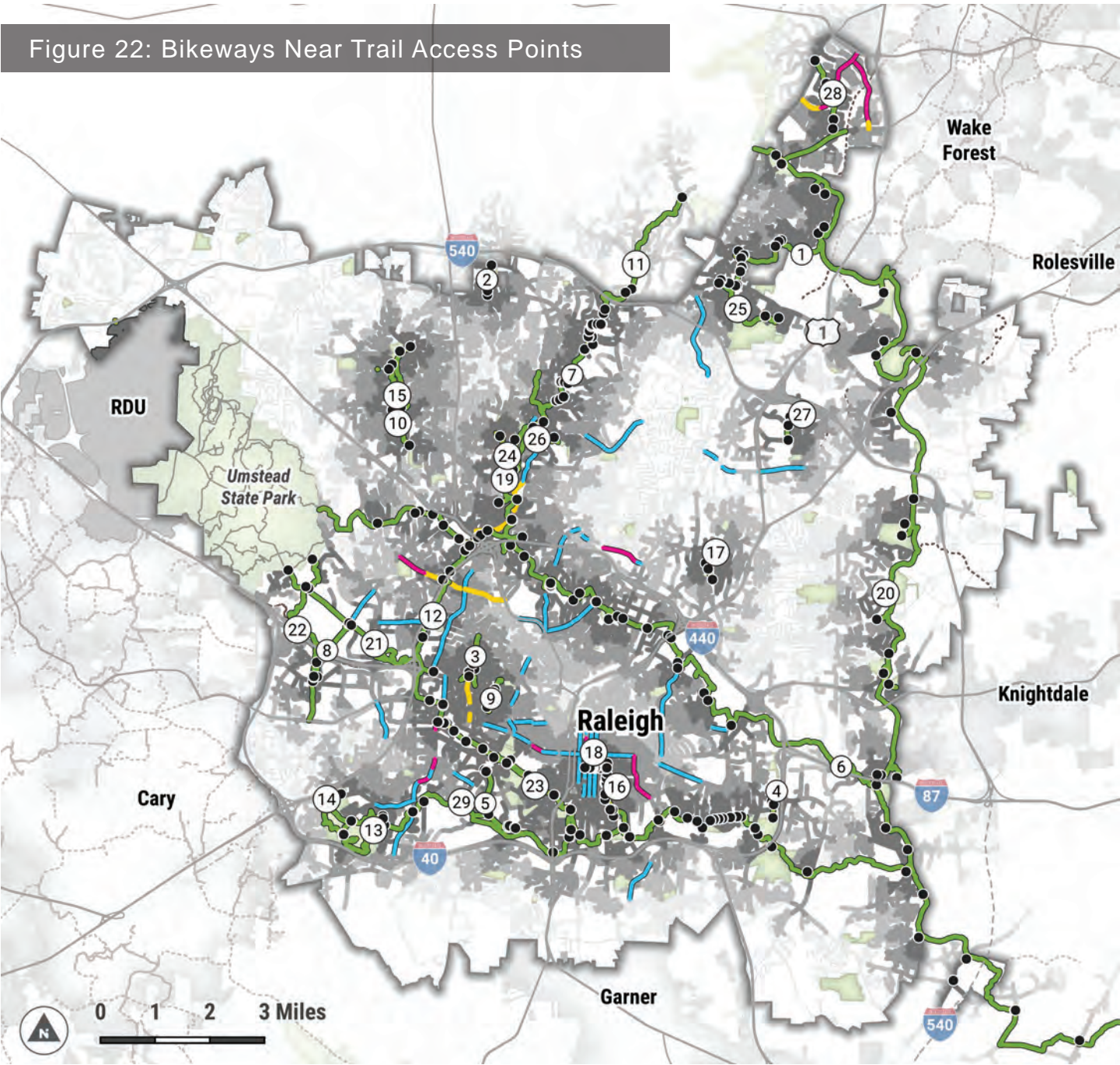
Segments of the bikeway network do touch some greenway trails. Little Rock Creek Trail is connected to bicycle lanes in downtown Raleigh that comprise the most robust section of Raleigh’s existing bikeway network. Other trails that touch a portion of Raleigh’s bikeway network include the following: Wakefield Trail, East Fork Mine Creek Trail, Crabtree Creek Trail, House Creek Trail, Edwards Mill Connector, Reedy Creek Trail, Beaver Dam Trail, Rocky Branch Trail, and Walnut Creek Trail. Even

still, few greenway trail access points are directly accessible by an existing bikeway.

Furthermore, while some greenway trail access points may be within ½, 1, 1 ½, or 2 miles of a bikeway, that doesn’t mean that there is a bikeway network connecting people from the places they live, work, and play to the trail network. While some people who bicycle in Raleigh may be comfortable riding with traffic on higher-volume streets to get to and from a greenway trail, many are not. A well-connected bikeway network designed for people of all ages and abilities will allow bicycling to be safer, more comfortable, and more convenient for those who need to and choose to bicycle.



Image 55: Bicyclists on House Creek Trail



Bikeway Access

- Trail Access Point
- 0.5 Mile Access
- 1 Mile Access
- 1.5 Mile Access
- 2 Mile Access
- Existing Trails
- Parks

On-Street Bikeways

- Buffered Bike Lanes
- Bike Lanes
- Sharrows

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
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Transit

Trail network access by public transit is important for those who may be unable to walk or bike from their origin to a greenway access point. In addition, transit stops near greenway access points connect greenway users with areas of Raleigh that may not be feasibly reachable by walking or by bike. Nearby stops allow transit-dependent populations to utilize the greenway trail network for mobility and may provide a link to employment and education opportunities, as well as other key community resources.

Table 14 details the number and percentage of access points that have a transit stop within 500 feet and ½ mile. The table also describes the number and percentage of transit stops within these distance categories from greenway trail access points. Lastly, the table outlines the number and percentage of GoRaleigh routes served by the transit stops within each distance category. Figure 23 shows how the transit network interacts with the greenway trail network.

A third of greenway trail access points are within 500 feet of a transit stop, and just over half are

within a half mile of a transit stop. However, these transit stops near access points throughout the trail network connect greenway users to the majority of GoRaleigh routes. Within 500 feet of a greenway access point, only four routes are not serviced: the 15L (Trawick Connector), 24L (North Crosstown Connector), 7L (Carolina Pines Connector), and WFL (Wake Forest Loop). Bus stops that service route 24L are within a half mile of greenway trail access points.

Most greenway trail access points near downtown Raleigh, along Western Boulevard, and Walnut Creek Trail between South Raleigh Boulevard and Sunnybrook Road have access to transit stops within 500 feet. Notably, greenway trail access points along the Neuse River Trail either have no transit access or have a bus stop within ½ mile; there are no transit stops within 500 feet of an access point to the Neuse River Trail. In addition, none of the Loop trails (Shelley Lake Loop, Lake Johnson East Loop, Lake Johnson West Loop, Lake Lynn Loop) have transit access within 500 feet. A few Neighborhood Greenway trails are also lacking transit access within 500 feet, such as Gardner Street Trail, Beaver Dam Trail, and Richland Creek Trail.

Table 14: Transit Stops Near Greenway Trail Access Points

DISTANCE FROM ACCESS POINT	ACCESS POINTS		TRANSIT STOPS		ROUTES SERVED	
	#	%	#	%	#	%
500 Feet	116	8.5	87	6.3	33	89.12
1/2 Mile	189	28.7	395	28.8	34	91.9

Of note, four bus rapid transit (BRT) lines are included in the Wake Transit Plan. These routes will provide more frequent service to downtown Raleigh along New Bern Avenue from WakeMed and New Hope Road, along Western Boulevard from Cary, from the North South Station and Purser Drive in Garner, and along Capital Boulevard or West Street. When operational, BRT could allow GoRaleigh to reallocate existing routes that duplicate BRT routes to parts of the city that currently lack service. Future connections to BRT stations should be considered for greenway trail development to assist with mobility options for people throughout Raleigh

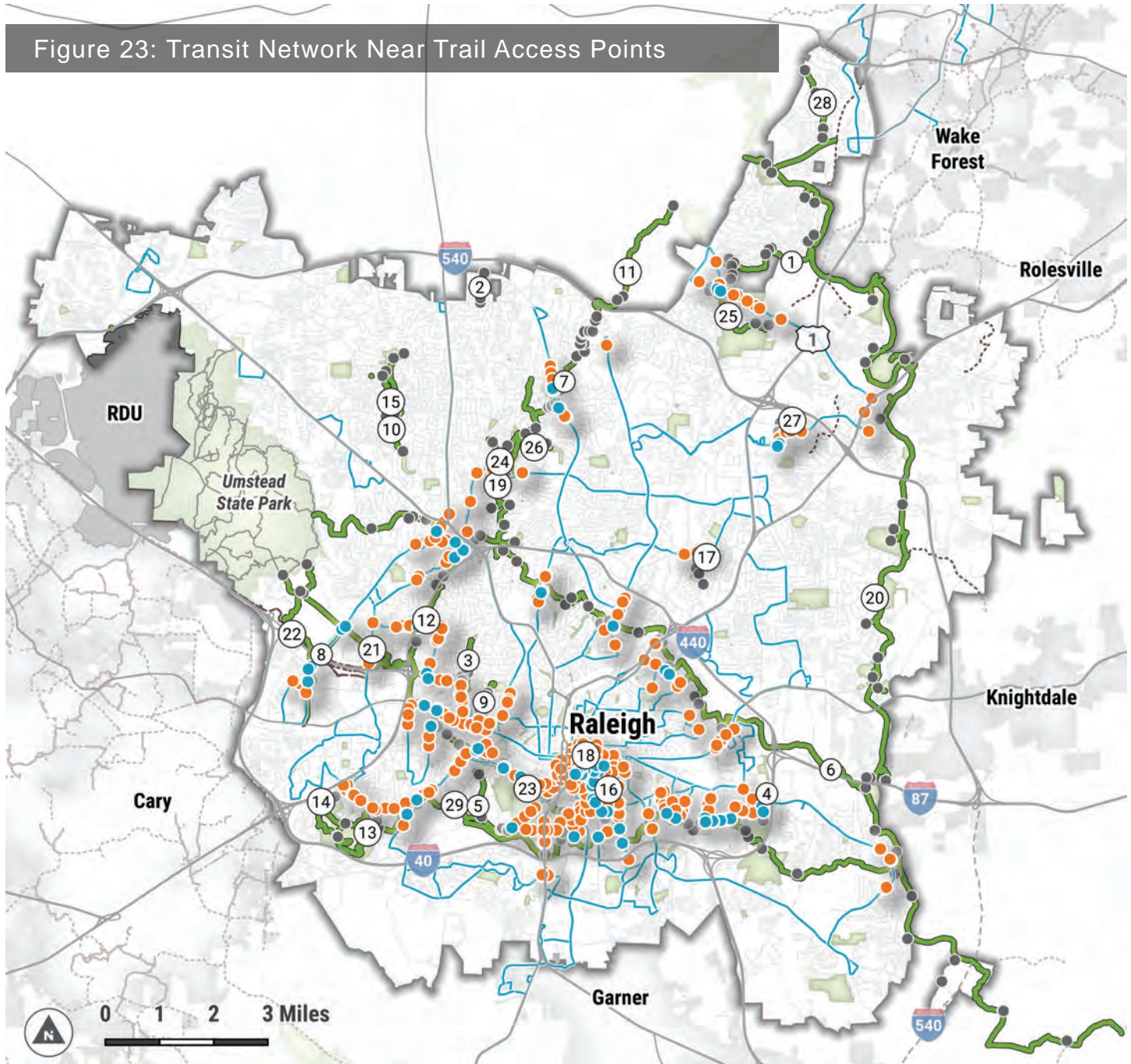


Image 56: GoRaleigh Bus



Image 57: Passenger Boarding GoRaleigh

Figure 23: Transit Network Near Trail Access Points



Bus Stop Distance to Access Point

- Trail Access Point
- Bus Stop Within 500 Feet
- Bus Stop Within 1/2 Mile
- GoRaleigh Routes
- Parks

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

Trail Key

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Equity

It is important to understand how the CAG System today serves people whose voices and needs have not historically been included in planning efforts, including people with lower incomes, children, and older adults. In 2017, Wake County created a Community Vulnerability Index that identified “vulnerable populations” by census block group. Sociodemographic factors used in their analysis include:

- **Unemployment** – defined as the county population age 16 and over who are unemployed in the civilian labor force
- **Age Dependency** – the population under the age of 18 and over the age of 64 combined
- **Low Educational Attainment** – the population of ages 25 and over who have less than a high school diploma
- **Housing Vacancy** – the total number of vacant or unoccupied housing units in a block group
- **Below Poverty Level** – the population living below the federal poverty threshold in Wake County

Wake County’s Community Vulnerability Index is included as a factor in the PRCR Department’s Level of Service Analysis to determine how Raleigh’s parks and greenways are serving all residents equitably. Figure 24 shows vulnerability scores for every census block group in the City of Raleigh.

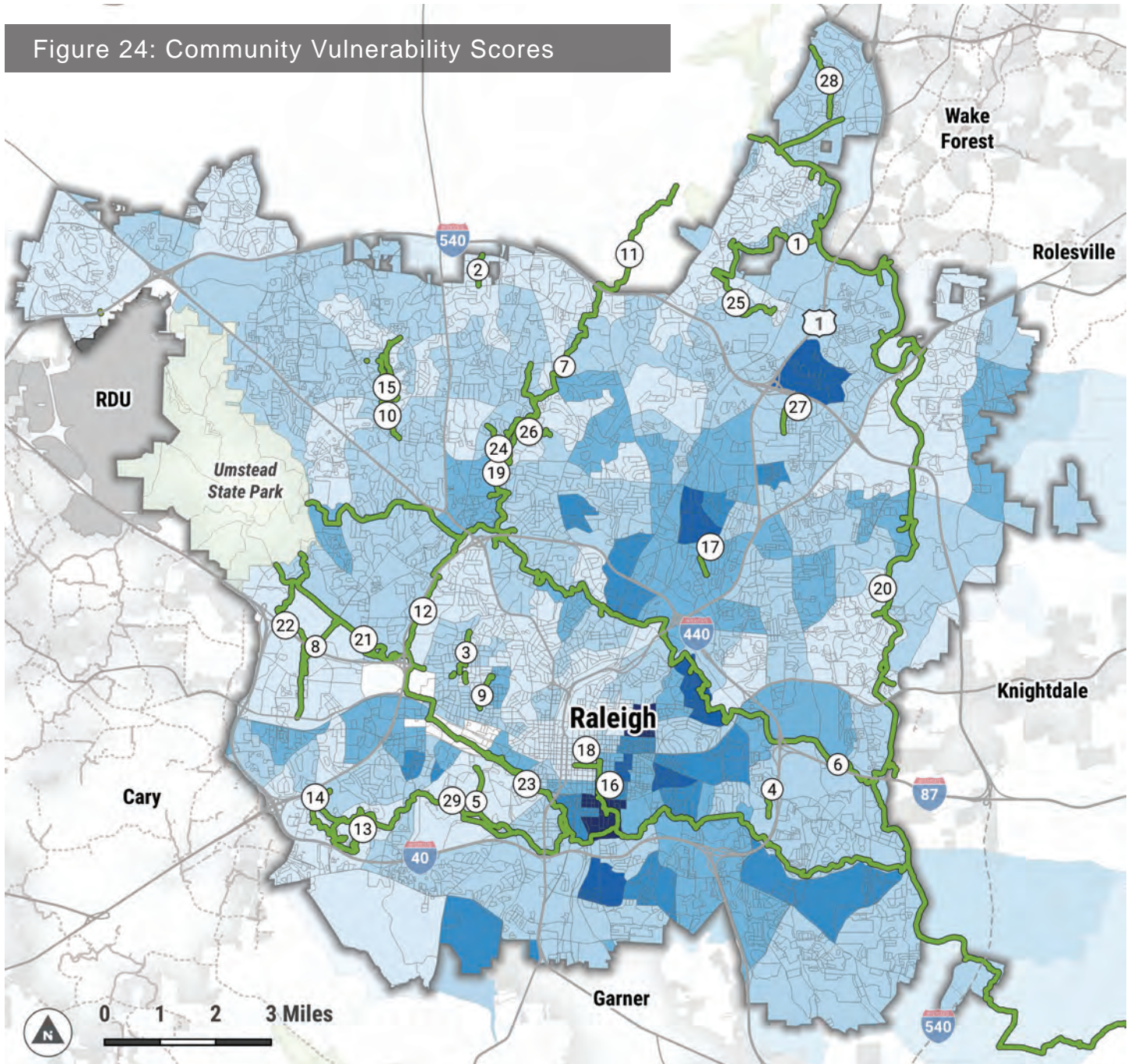
While many census block groups identified as “more vulnerable” are near greenway trails, residents of these areas of Raleigh may not benefit from pedestrian, bicyclist, and transit infrastructure to reach the trails safely or comfortably.

Census block groups near downtown, regardless of level of vulnerability, currently have a more complete sidewalk network, more bicycle infrastructure, and greater access to transit. More vulnerable communities south, east, and north of downtown Raleigh do not have access to bicycle facilities that could connect them to the trail network. In addition, these communities do have sidewalk on at least one side of all major streets (with the exception of New Bern Avenue), though many residential areas and smaller streets lack sidewalk completely.

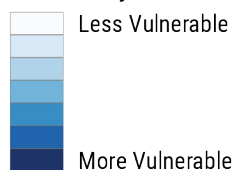
As Raleigh continues to grow and develop, high costs of housing may drastically impact what lower income communities can afford to live in, particularly in and around downtown Raleigh. The City should continually monitor demographic shifts to assess changes in where vulnerable populations live and, as a result, what infrastructure is available for residents to walk, bicycle, or use transit to and from the trail network.

It is important to note that Wake County’s Community Vulnerability Index did not include data related to race or ethnicity. This is an important consideration for determining equitable distribution of any City services, including the CAG System. Future efforts to target communities for more equitable City investments should consider incorporating race/ethnicity data, such as areas of linguistic isolation or concentrated poverty for people of color, when available.

Figure 24: Community Vulnerability Scores



Community Vulnerability Index



Existing Trails

Trails in Adjacent Jurisdictions

Existing/Funded
Proposed

Trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
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At-Grade Street Crossing Safety & Crashes

At-Grade Street Crossings

What happens while crossing a street of any type to reach greenway trail access points is a major factor in a trail network user's overall experience. Even when a robust sidewalk and bikeway network is present, street crossings of high-volume and/or high-speed streets may discourage existing and potential greenway users from walking or bicycling to a greenway trail. The PRCR Department collaborates with the Transportation Department in determining appropriate at-grade trail crossing design. The following analysis identifies all at-grade street crossings along the trail network and evaluates them based on the crossing comfort scoring criteria outlined in Table 15.

The existing greenway trail network contains 115 at-grade street crossings. Table 16 describes the number and percentage of at-grade crossings within a crossing comfort category. Comfort scoring categories were the result of the sum score as it relates to the criteria listed in Table 15. Scores for greenway trails ranged from 30 to 80 points for crossings throughout the trail network. The table also identifies which trails have at-grade street crossings within each scoring criteria. Figure 25 shows how the at-grade crossings are distributed throughout the trail network. Lower scores indicate more uncomfortable crossings, while higher scores indicate more comfortable crossings.

It is important to emphasize the relativity of the crossing comfort scores. This analysis intends to compare at-grade street crossings of the trail network to one another; it does not aim to conclude how safe or comfortable the street crossings are for greenway users of all ages and abilities. Higher scoring street crossings may still feel unsafe or uncomfortable for some greenway users. As the City works to address concerns around greenway trail at-grade street crossings, changes that benefit the safety and comfort of greenway users of all ages and abilities should be prioritized.

Most at-grade street crossings of the trail network scored between lower-medium comfort and medium-higher comfort. In addition, a majority of these crossings are on Greenway Collector, Neighborhood Greenway, and Greenway Connector trail classifications. Fewer at-grade street crossings exist along Cross-City trails, with concentrated areas of street crossings on Rocky Branch Trail and Walnut Creek Trail between Rose Lane and Worthdale Park. Clusters of lower comfort street crossings are located at Rocky Branch Trail along Western Boulevard, Abbotts Creek Trail near Durant Road, Little Rock Creek Trail near downtown Raleigh, Centennial Bikeway Connector near Lake Wheeler Road, Reedy Creek Trail near Blue Ridge Road, and Edwards Mill Connector at Wade Avenue. Higher-comfort street crossings can be found along Gardner Street Trail and Beaver Dam Trail, and Neighborhood Greenway trails along low-speed, low-volume streets in primarily residential areas.

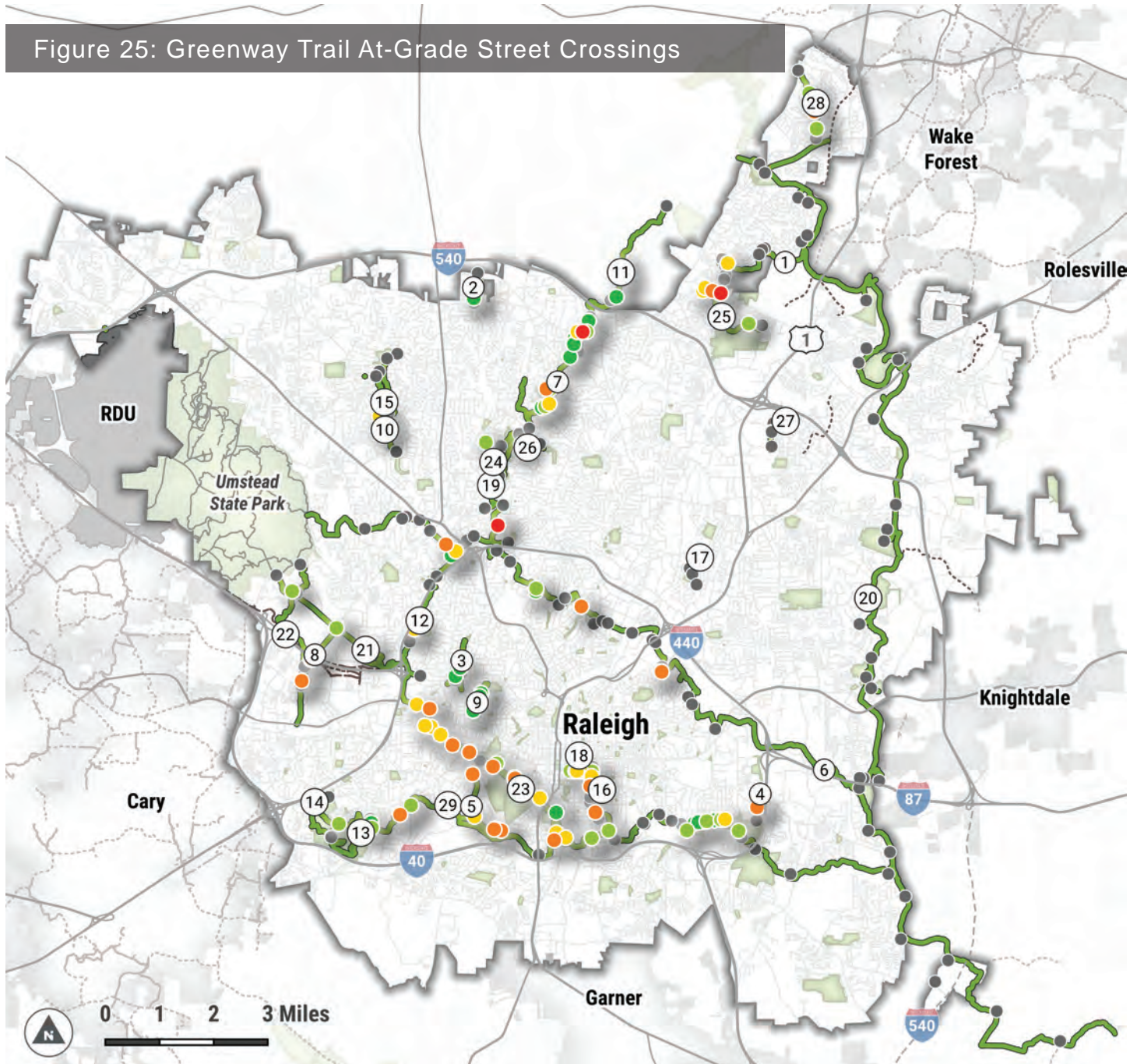
Table 15: Crossing Comfort Scoring Criteria

CATEGORY	RATIONALE	SCORE
Traffic Volume	Highly trafficked crossings can be a barrier for people to access the greenway system. Traffic volume is measured in annual average daily traffic (AADT) which is calculated by dividing the total volume of vehicle traffic on a road for a year by 365 days.	Less than 6,600 vehicles – 5 points 6,601 – 13,000 vehicles – 4 points 13,001 – 20,500 vehicles – 3 points 20,501 – 34,000 vehicles – 2 points More than 34,000 vehicles – 1 point
Crossing Distances	Shorter crossing distances are safer and more comfortable for people crossing.	Less than 48 feet – 20 points 48 to 63 feet – 15 points 64 to 87 feet – 10 points 88 to 109 feet – 5 points More than 110 feet – 0 points
Pedestrian Refuge Island	Destination-oriented trails around lakes & other destinations	Presence of refuge island – 5 points
Signalization	While longer crossings are less desirable in general, those that incorporate crossing refuges provide more safety and comfort for pedestrians.	Pedestrian Signals – 25 points Stop sign – 15 points Marked crosswalk – 10 points Pedestrian crossing signage, but no crosswalk markings – 5 points No signage – 0 points
Speed Limits	Vehicles traveling on roads with higher posted speed limits take longer to come to a full stop, lowering the chances a pedestrian or cyclist will leave a crash unharmed.	lower than 25 mph – 20 points 25 to 29 mph – 15 points 30 to 34 mph – 10 points 35 to 44 mph – 5 points 45 mph or higher – 0 points
Crash History	The number and severity of crashes that occurred at a crossing directly impacts how safe and comfortable a crossing is to a person walking or bicycling.	No crashes – 25 points No crashes resulting in an injury – 20 points Crashes resulting in possible injury – 15 points Crashes resulting in minor injury – 10 points Crashes resulting in a serious or fatal injury site – 0 points

Table 16: Crossing Comfort Scores

CROSSING COMFORT SCORES	CROSSINGS		TRAILS (# OF CROSSINGS)
	#	%	
Low (< 40)	5	4.3	Mine Creek Trail (1), Abbotts Creek Trail (1), Honeycutt Creek Trail (1), Reedy Creek Trail (1), Rocky Branch Trail (1)
Low-Medium (40-49)	29	25.2	East Fork Mine Creek Trail (1), Birch Ridge Connector (1), Edwards Mill Connector (5), Rocky Branch Trail (4), Snelling Branch Trail (1), Crabtree Creek Trail (4), Reedy Creek Trail (1), Walnut Creek Trail (2), Centennial Bikeway Connector (3), Abbotts Creek Trail (2), Little Rock Trail (2), Rocky Branch Trail Extension (1), Spring Forest Trail (1), Wakefield Trail (1)
Medium (50-59)	27	23.5	Walnut Creek Trail (1), Abbotts Creek Trail (1), Centennial Bikeway Connector (2), East Fork Mine Creek Trail (2), Eliza Pool Connector (1), Falls River Connector (2), Gorman Street Connector (1), Hare Snipe Creek Trail (2), Honeycutt Creek Trail (2), House Creek Trail (2), Little Rock Trail (1), Martin Street Connector (2), NCMA (1), Reedy Creek Trail (1), Rocky Branch Trail (5), Rocky Branch Trail Extension (1)
Medium-High (60-69)	25	21.7	Crabtree Creek Trail (1), Simms Branch Trail (1), East Fork Mine Creek Trail (2), Honeycutt Creek Trail (1), Walnut Creek Trail (8), Mine Creek Trail (1), Little Rock Trail (3), Richland Creek Trail (1), Martin Street Connector (3), Reedy Creek Trail (1), Wakefield Trail (2), Rocky Branch Trail (1)
High (>70)	29	25.2	Crabtree Creek Trail (1), Baileywick Trail (1), Beaver Dam Trail (2), Simms Branch Trail (1), East Fork Mine Creek Trail (6), Eliza Pool Connector (1), Gardner Street Trail (4), Honeycutt Creek Trail (2), House Creek Trail (1), Walnut Creek Trail (5), Little Rock Trail (1), Martin Street Connector (3), Rocky Branch Trail (1)
TOTALS	115	100	

Figure 25: Greenway Trail At-Grade Street Crossings



Trail Crossing Comfort Level

- Lowest
- Moderate
- Highest
- Trail Access Point

Existing Trails

Parks

Trails in Adjacent Jurisdictions

- Existing/Funded
- - - - - Proposed

trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
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Pedestrian- and Bicycle-Related Crashes

Access to the trail network should emphasize the safety of all users, despite mode choice. Crash data collected during a 10-year period (2007 to 2018) has been used to summarize pedestrian- and bicycle-related crashes near greenway trail access points (defined as within 250 feet of the access point). It is important to note that these crashes don't necessarily involve people who were on or were planning to be on the trail network, as that information is not readily available. While the crash analysis does not definitively establish pedestrian- and bicycle-related crash rates among greenway users, it does demonstrate which streets and intersections near greenways have higher crash rates and/or more severe crashes. Crashes reviewed represent those that occurred between a pedestrian/ bicyclist and a motor vehicle. Table 17

compares crashes for pedestrians, people on bikes, and total pedestrian- and bicycle-related crashes that are near greenway access points within the City of Raleigh. Figure 26 demonstrates how pedestrian- and bicycle-related crashes that resulted in minor, serious, or fatal injuries near the trail network are distributed.

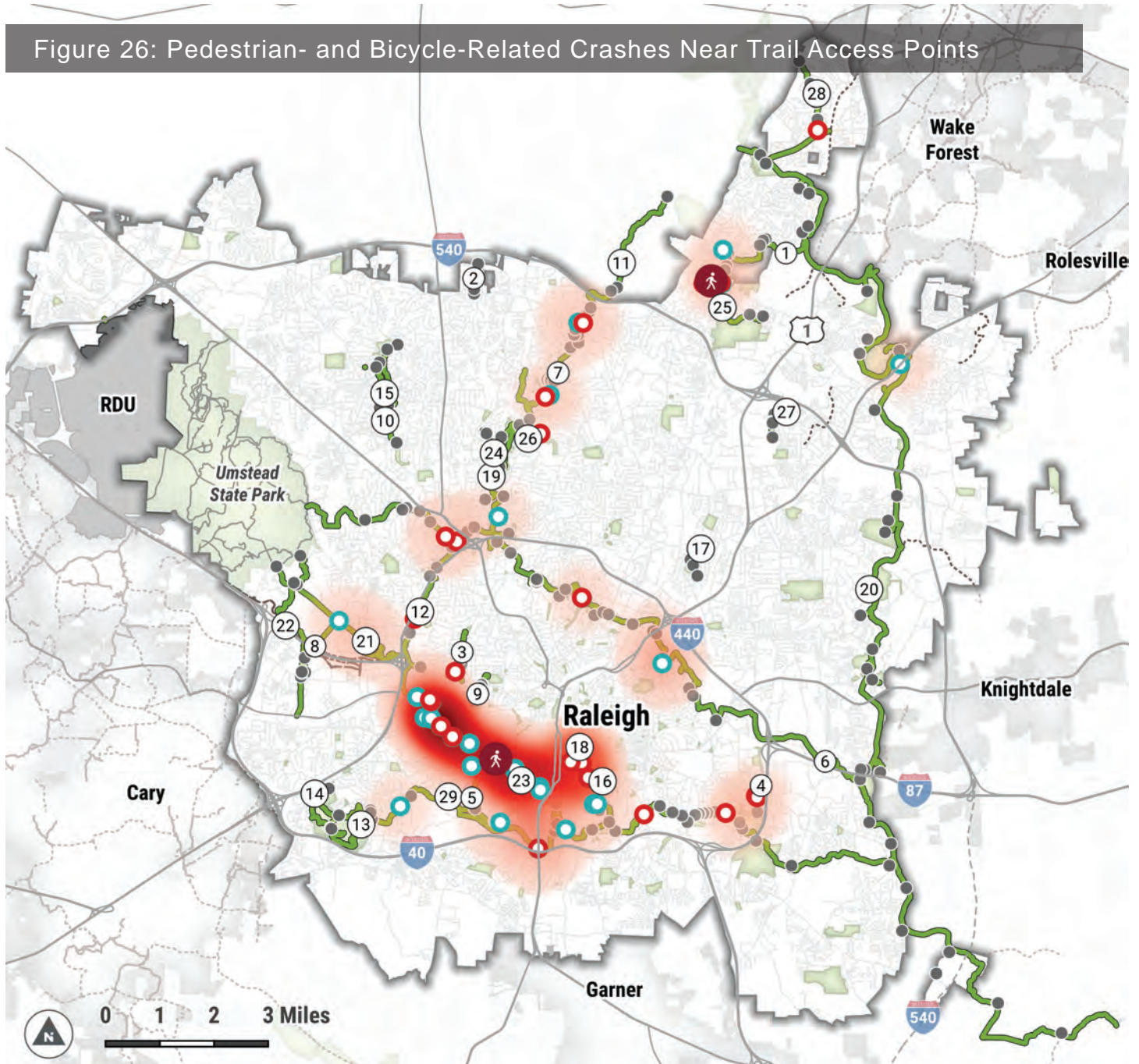
Most pedestrian- and bicycle-related crashes near greenway access points (including one pedestrian fatality) are concentrated along the Rocky Branch Trail adjacent to Western Boulevard. In addition, downtown Raleigh has concentrated crashes involving pedestrians. Another pedestrian injury and fatality cluster is located where Abbotts Creek Trail crosses Durant Road. Of note, locations are in the same area where greenway trail at-grade street crossings received low crossing comfort scores in the Crossing Comfort Analysis (Figure 25).

Table 17: Pedestrian- and Bicycle-Related Crashes by Severity







CRASH SEVERITY	PEDESTRIAN CRASHES				BICYCLE CRASHES				TOTAL PEDESTRIAN & BICYCLE CRASHES			
	IN RALEIGH		NEAR TRAIL ACCESS POINT		IN RALEIGH		NEAR TRAIL ACCESS POINT		IN RALEIGH		NEAR TRAIL ACCESS POINT	
	#	%	#	%	#	%	#	%	#	%	#	%
Killed	100	4	2	3	12	1	0	0	112	3	2	2
Serious Injury	171	6	2	3	45	5	3	5	216	6	5	4
Minor Injury	1,010	39	22	37	408	39	35	54	1,418	39	57	45
Possible Injury	1,070	41	28	47	376	36	20	31	1,446	40	48	38
No Injury	219	8	6	10	180	17	7	11	399	11	13	10
Unknown	46	2	0	0	19	3	0	0	65	1	1	1
TOTALS	2,616	100	60	100	1,040	100	65	100	3,656	100	126	100

Data Source: North Carolina Department of Transportation, Bicycle and Pedestrian Crashes 2007-2018.


Figure 26: Pedestrian- and Bicycle-Related Crashes Near Trail Access Points



Serious/Fatal Crashes Near Trails


-  Fatality (Pedestrian)
-  Serious/Minor Injury (Pedestrian)
-  Serious/Minor Injury (Bicyclist)
-  Parks
-  Trail Access Point
-  Existing Trails

Crash Density Near Trails

 Fewest Crashes

 Most Crashes

Trails in Adjacent Jurisdictions

 Existing/Funded

 Proposed

Trail Key

- 1 Abbotts Creek
- 2 Baileywick
- 3 Beaver Dam
- 4 Birch Ridge Connector
- 5 Centennial Bikeway Connector
- 6 Crabtree Creek
- 7 East Fork Mine Creek
- 8 Edwards Mill Connector
- 9 Gardner Street

- 10 Hare Snipe Creek
- 11 Honeycutt Creek
- 12 House Creek
- 13 Lake Johnson East Loop
- 14 Lake Johnson West Loop
- 15 Lake Lynn Loop
- 16 Little Rock
- 17 Marsh Creek
- 18 Martin Street Connector
- 19 Mine Creek

- 20 Neuse River
- 21 Reedy Creek
- 22 Richland Creek
- 23 Rocky Branch
- 24 Shelley Lake Loop
- 25 Simms Branch
- 26 Snelling Branch
- 27 Spring Forest
- 28 Wakefield
- 29 Walnut Creek

ADA Accessibility

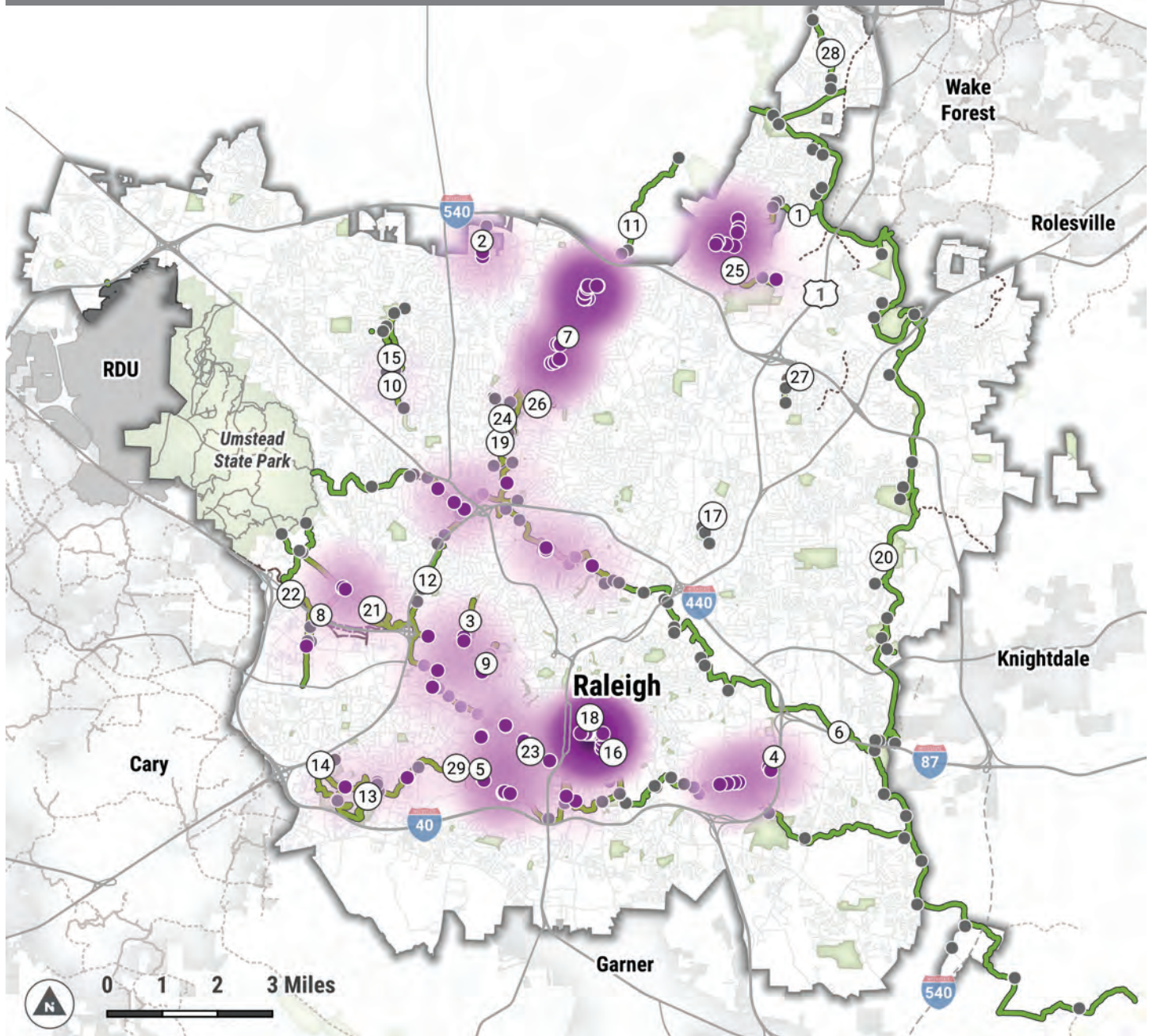
For all users to enjoy access to the trail network, regardless of age or ability level, the necessary facilities must be provided for people to connect to and travel along the trail network. To assist with connecting to existing trails, users that require wheelchairs or other mobility devices to get around benefit from ADA-accessible curb ramps. Curb ramps with appropriate slopes, adequate width, and other universal design features can facilitate, rather than hinder, wheel-based pedestrian travel. For this analysis, the presence of ADA-accessible curb ramps within 100 feet of greenway trail access points was assessed. Curb ramp planning, design, and construction is the responsibility of the City's Office of Transportation Planning and the Engineering Services Department. The PRCR Department does not currently have a policy related to curb ramp access to greenway trails. Figure 27 highlights how ADA-accessible curb ramps are distributed around greenway trail access points.

Nearly 35% (120/352) of greenway trail access points have ADA-accessible curb ramps within 25 feet. Trails with a higher density of ADA-accessible curb ramps near their access points include the following: Martin Street Connector, Walnut Creek Trail between Rose Lane and Worthdale Park, Abbotts Creek Trail adjacent to Raven Ridge Road and along Durant Road, Crabtree Creek Trail near Blue Ridge Road, and East Fork Mine Creek Trail at Strickland Road and Six Forks Road. Rocky Branch Trail has ADA-accessible curb ramps scattered throughout its entirety. Some trails have gaps in ADA

accessibility, particularly Crabtree Creek Trail east of Raleigh Boulevard and Walnut Creek Trail east of I-440 and between South Wilmington Street and Rose Lane. Others have few or no access points near ADA-accessible curb ramps; the Neuse River Trail has only one and the Marsh Creek Trail has none.

ADA-accessible curb ramps alone do not create a comfortable, convenient, or accessible trip for people using wheelchairs or other personal mobility devices. Sidewalk network completeness and quality are other important factors in determining how challenging it can be to reach destinations by wheeling. As shown previously in Table 12 and Figure 21, key access points, particularly those near the edges of Raleigh's city limits, lack a sidewalk network to safely guide residents and visitors to the trail network.

Figure 27: ADA-Accessible Curb Ramps Near Trail Access Points



Curb Ramp Density Near Trail Access

- Curb Ramps
- Lowest Density
- Medium Density
- Highest Density

- Trail Access Point
- Parks
- Existing Trails

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
| 4 Birch Ridge Connector | 13 Lake Johnson East Loop | 23 Rocky Branch |
| 5 Centennial Bikeway Connector | 14 Lake Johnson West Loop | 24 Shelley Lake Loop |
| 6 Crabtree Creek | 15 Lake Lynn Loop | 25 Simms Branch |
| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Trail Slope

User experience along existing greenways trails can be influenced by a variety of factors. For wheel-based mobility, trail slope and surface type are major factors that contribute to comfort and access. Trail amenities that meet the needs of all trail users are valuable in developing trails that appeal to all users. ADA-accessible amenities along the trail network can ensure an enhanced user experience for people regardless of ability level. Figure 28 illustrates the varying slopes along the existing trail system as well as the few ADA-accessible picnic tables. Some trails present barriers such as stairs that limit accessibility and are highlighted below.

A majority of existing trail segments have gentle slopes that people who wheel as a primary form of mobility can traverse easily. However, small steep sections along trails can still create barriers due to existing topography. Below are the percentages of total trail that are with each slope category:

- 0-5% Slope – 86.4%
- 5.01-8.3% Slope – 7.5%
- >8.3% Slope – 6.1%

There are a few locations where stairs exist for trail access. This can create more substantial barriers to wheeling. Stairs are located along the following trails:

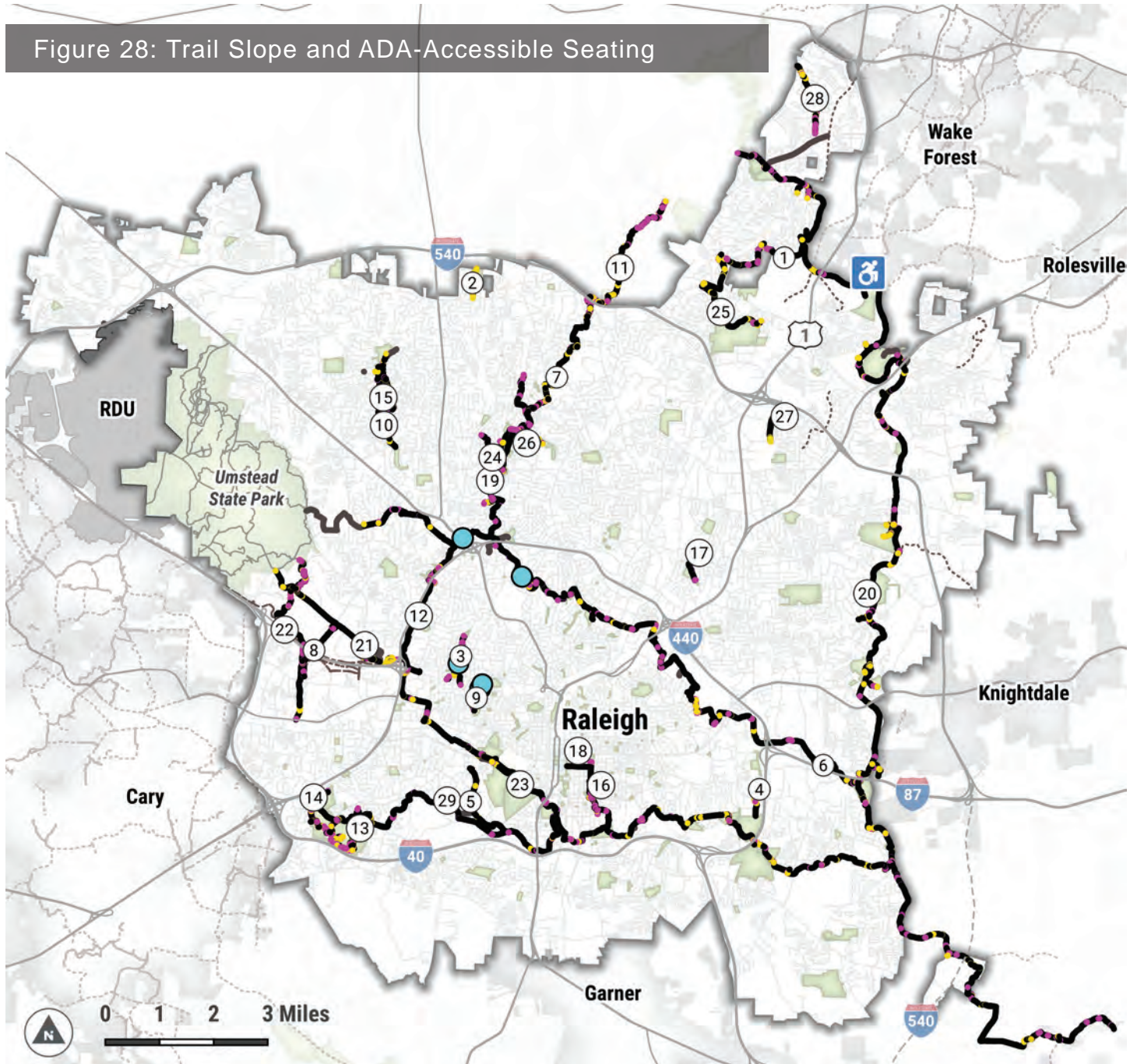
- Crabtree Creek Trail – near Hertford Street
- Crabtree Creek Trail – near Glenwood Avenue north of I-440

- Beaver Dam Trail – near Leonard Street
- Gardner Street Trail – near Ashley Court and Winterbury Court

Note that the stairs on Crabtree Creek Trail near Hertford Street will be removed as a part of a current project.

Existing data identified four ADA-accessible picnic tables as amenities within the trail network. All ADA-accessible tables are along the Neuse River Trail in the same location, according to existing data.

Figure 28: Trail Slope and ADA-Accessible Seating



Slope of Existing Trails

- < 5% (Relatively Flat)
- 5 - 8.3% (Moderate)
- > 8.30% (Very Steep)
- Parks
- ADA Picnic Tables

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
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| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Amenity Inventory

Analyses for the gaps and barriers previously described in this report have focused on the safety, comfort, and user experience of getting to and from the trail network. The variety and dispersion of amenities along the trail network may impact the user experience after arrival and throughout the system. This section provides an inventory of the existing amenities based upon the recommendations in the Design Guide and the Growth and Natural Resources Key Focus Area of the Strategic Plan.

Understanding the placement of amenities provides a basis for further analysis of public feedback related to amenities and, ultimately, recommendations to enhance the user experience on the trail network. The following inventories and analyses focus on existing amenities based upon available data. Data that is not currently available has been noted in individual analysis sections.

The following analyses assessed amenities across the trail network:

- Signage – review of signage types with a focus on wayfinding signage at decision points throughout the system
- Comfort Stations – evaluation of the distribution of comfort stations along with complimentary amenities such as standalone water fountains, bicycle parking, and bicycle repair
- Lighting – review of the purpose for lighting along greenway trails and distribution of existing light poles along the trail network
- Seating and Refuse Receptacles – assessment of the locations and gaps along the trail network
- Public Art – identification of existing public art amenities

Signage

Providing comprehensive signage along the trail network aligns with the goals and objectives noted in the System Plan (Objective 2 and Objective 3E). Existing signage along the system communicates information and regulations and helps users with directions. The Master Sign Program (2006) has established more uniform signage that is functional and is intended to elevate the sense of identity for the CAG System. The effort to assess signage focused on signage condition by type and the presence of wayfinding signage at decision-making locations throughout the trail network. Signage categories noted in the available data for the existing system are comparable to those that were recommended in the Design Guide and serve a similar purpose. Table 18 identifies the signage categories and descriptions that were recommended within the Design Guide along with the existing signage types that meet the intent of the category. Existing signage may meet the intent of multiple categories based upon the signage category descriptions found in the Design Guide.

Table 18: Signage Categories and Function by Type

DESIGN GUIDE CATEGORY	DESIGN GUIDE DESCRIPTION	EXISTING SIGNAGE TYPE
Destination/ Directional Signs	Wayfinding signs through the CAG System indicate: Directional of travel Location of destinations Location of access points	Pedestrian Directional Informational Kiosks Mile Markers Confidence Markers Trail Marker Trailhead Identifier Miscellaneous
Regulatory Signs	Regulatory signs give a direction that must be obeyed, and apply to intersection control, speed, vehicle movement and parking.	Regulatory Traffic
Etiquette Signage	Informing greenway trail users of acceptable etiquette is a common issue when multiple user types are anticipated. Yielding the right-of-way is a courtesy and yet a necessary part of a safe greenway trail experience. The message must be clear and easy to understand. The most common greenway trail etiquette systems involve yielding of bicyclists to pedestrians.	Regulatory
Interpretive Signage	Interpretive displays provide greenway trail users with information about the surrounding environment or site, wildlife, vegetation, history and the significance of cultural elements. Interpretive displays may also be combined with public art and sculpture opportunities along the greenway trail.	Interpretive Miscellaneous
Informational Kiosks and Message Centers	Kiosks and message centers provide greenway trails users with information to orient themselves, learn of areas of interest, read the rules and regulations of the trail network, and find the hours of operation.	Information Kiosks
Pavement Markings	Pavement markings are commonly used to reinforce signs along a greenway trail, but they should not be used to replace signs altogether. Center line striping is the most common form of pavement marking, but warning, regulatory, and directional messages can be used. Use pavement markings sparingly and only where necessary to attract additional attention to a possible problem area.	Pavement markings are not included in the existing data.

Signage Condition

For signage to communicate effectively, signs should be in good to fair condition. Maintaining signage to this level ensures legibility for users along the system. The condition for each of the existing signage types is identified in Table 19 below. Of the 1,710 signs on the trail network, 85% are in good to fair condition.

Table 19: Condition of Existing Signage by Type

SIGNAGE TYPE	SIGNAGE CONDITION						TOTALS
	MISSING	POOR	DAMAGED	FAIR	GOOD	OTHER	
Pedestrian Directional	2	2	-	3	150	1	158
Confidence Marker	1	5	1	31	79	-	117
Information Kiosk	3	-	-	3	7	3	16
Interpretive	2	1	-	3	19	-	25
Mile Marker	35	16	5	41	311	-	408
Regulatory/Traffic*	63	38	18	97	507	2	723
Trail Marker	13	6	-	18	14	1	52
Trailhead ID	8	6	15	52	72	-	153
Miscellaneous**	1	7	-	14	33	1	56
TOTALS	128	81	39	262	1,192	8	1,710

* Regulatory and Traffic signage was combined due to similar signs in both categories.

** Designated miscellaneous signs ranged in messages but included park maps, fitness trail identification, destination signs, mirrors, etc.

Wayfinding Signage

Wayfinding signage, which can include traditional signs or incorporate the use of colors, artwork, paint, etc., is critical to the utility of the trail network. It can provide information on access to the trail network, help users understand where they are located within the system, and direct users to local or regional destinations. The Design Guide notes that destination and directional sign placement typically occurs in places that lead to and are along trail routes, including trail-to-trail intersections. Wayfinding signage at decision-making locations can increase comfort on and access to the system as a whole. Both pedestrian directional signs and information kiosks—sign types currently identified along the trail system—provide specific information that can help with the decision-making process for users and were specifically used to assess wayfinding.

Both access points (352) and trail-to-trail intersections (176) were reviewed to determine the extent of wayfinding signage along the system at decision-making locations (Table 20). Wayfinding signage within 100 feet of an access point was determined to be adequate due to varying scale that could be associated with these locations based upon factors such as parking, park features, etc. A smaller analysis buffer of 50 feet was assigned to trail-to-trail intersections because the signage best serves users who are in close proximity to the intersection itself.

Table 20: Wayfinding at Access Points and Trail-to-Trail Intersections

EXISTING WAYFINDING COVERAGE (%)	
Access Points	17.6% (63/352)
Trail-to-Trail Intersections	47.2% (83/176)



Image 58: Neuse River Trail Information Kiosk

Wayfinding signage along the trail network—both pedestrian directional signs and information kiosks—is invaluable. With over a hundred miles of greenway trails, wayfinding signage can provide a sense of certainty along with clearly identifying destinations. Current wayfinding near access points and at trail intersections is minimal. Cohesive signage that communicates clearly and is well maintained can increase user comfort. While a variety of signage—regulatory, confidence markers, interpretive, and others—exists along the trail network, wayfinding signage adds to the legibility for users. Figure 29 illustrates both access points and trail-to-trail intersections and the adjacency of wayfinding signage. Several access points and trail-to-trail intersections are in close proximity and there may be opportunity to add wayfinding that serves both.

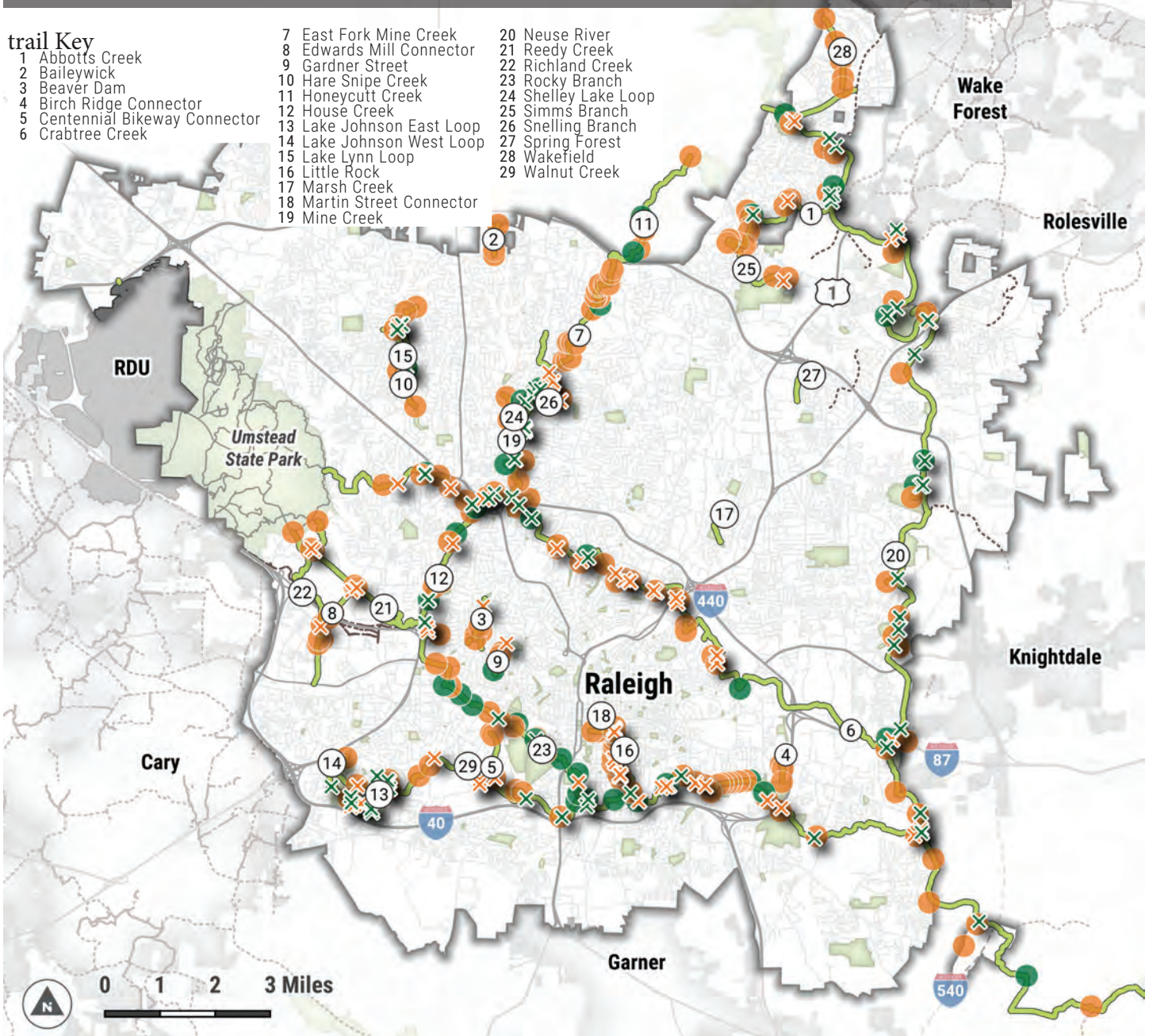


Figure 29: Wayfinding at Access Points and Trail-to-Trail Intersections

trail Key

- 1 Abbotts Creek
- 2 Baileywick
- 3 Beaver Dam
- 4 Birch Ridge Connector
- 5 Centennial Bikeway Connector
- 6 Crabtree Creek

- 7 East Fork Mine Creek
- 8 Edwards Mill Connector
- 9 Gardner Street
- 10 Hare Snipe Creek
- 11 Honeycutt Creek
- 12 House Creek
- 13 Lake Johnson East Loop
- 14 Lake Johnson West Loop
- 15 Lake Lynn Loop
- 16 Little Rock
- 17 Marsh Creek
- 18 Martin Street Connector
- 19 Mine Creek
- 20 Neuse River
- 21 Reedy Creek
- 22 Richland Creek
- 23 Rocky Branch
- 24 Shelley Lake Loop
- 25 Simms Branch
- 26 Snelling Branch
- 27 Spring Forest
- 28 Wakefield
- 29 Walnut Creek



Trail-to-Trail Intersection Wayfinding

- ✕ Adjacent to Intersection
- ✕ Not Adjacent to Intersection

Trail Access Point Wayfinding

- Adjacent to Access Point
- Not Adjacent to Access Point

Parks

Existing Trail

Trails in Adjacent Jurisdictions

Existing/Funded

Proposed

Comfort Stations

Restroom facilities and drinking fountains are desirable amenities along the trail network and within parks across Raleigh. Comfort stations combine restroom and drinking fountain amenities. Based upon existing data, there are 50 comfort stations throughout Raleigh. While comfort stations are located within parks, these facilities serve many greenway trail users that begin/end greenway trips in a park or travel through park facilities in route to their destination. The Design Guide recommends that comfort stations be located near greenway trail access points within existing parks. Additionally, grouping comfort stations with other amenities such as bicycle parking and bicycle repair along Cross City or Collector Trail classifications is also recommended in the Design Guide. While the current distribution of comfort stations leaves gaps along the trail network, proposed trails that connect to parks with existing comfort stations can provide both additional connectivity and this desirable amenity. Table 21 notes the number of comfort stations, bicycle racks/repair stations, and standalone drinking fountains—those not co-located with restroom facilities—that are adjacent to existing and proposed greenway trails. Adjacency has been defined as a trail that intersects with a park boundary where one of the amenities exists.

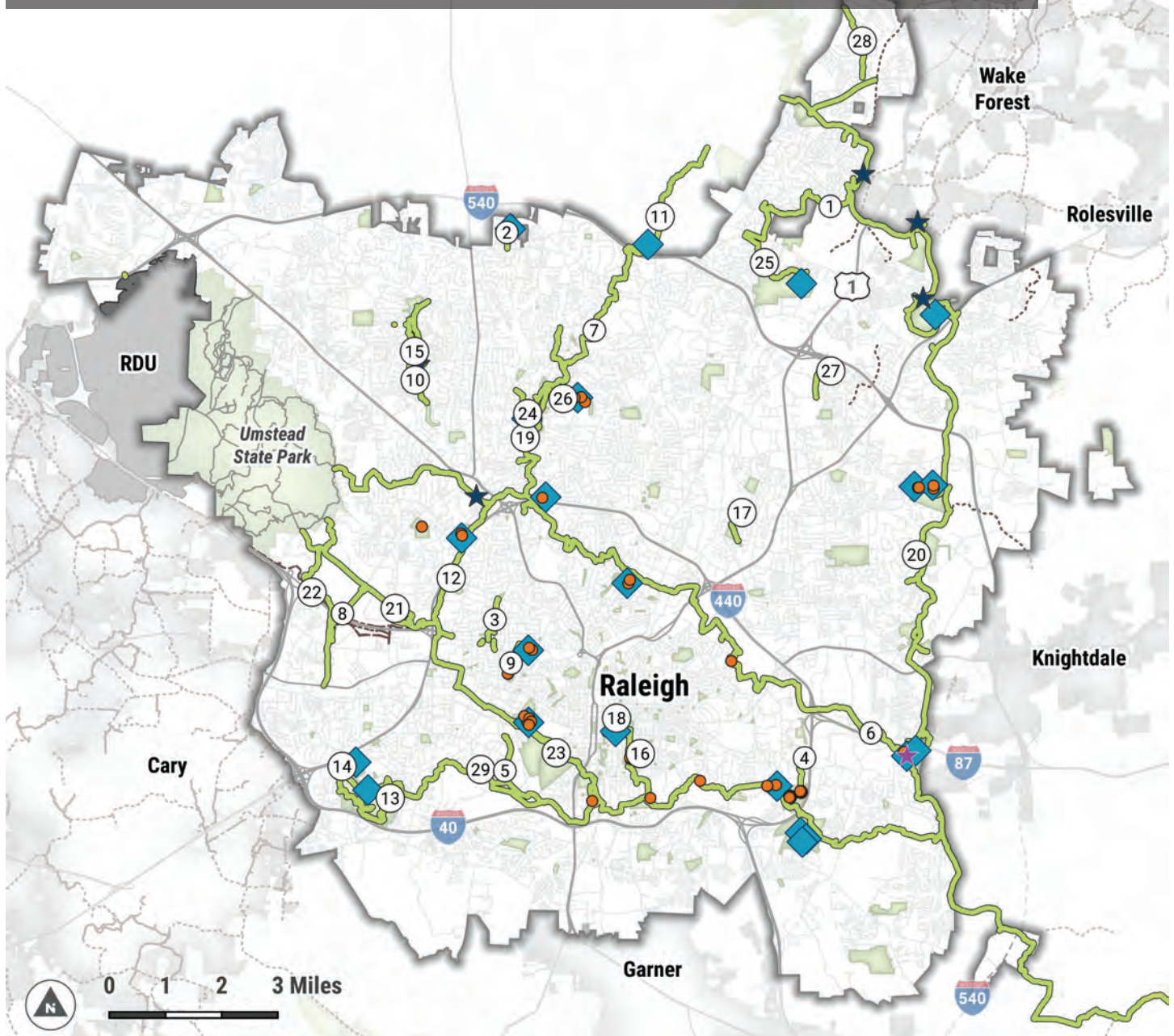
Table 21: Comfort Stations, Drinking Fountains, and Bicycle Amenities Inventory

	ADJACENT TO AN EXISTING GREENWAY TRAIL
Comfort Station	25
Bike Parking	5
Bike Repair Station	1
Drinking Fountain (standalone)*	63

*Standalone drinking fountains are more than 50 feet from existing comfort stations.

Half of the existing comfort stations and 55% of standalone drinking fountains are located along existing greenway trails and serve park patrons (Figure 30). Future implementation of proposed trails could increase comfort stations and drinking fountains that are adjacent to trails without constructing new restroom or drinking fountain facilities. Increasing access to existing comfort stations and drinking fountains is valuable for the system. Placement of new restrooms and drinking fountains can be difficult due to the existing floodplain and alignment of existing and proposed trails. Restrooms and drinking fountains are not typically installed below base flood elevations.

Figure 30: Comfort Stations, Drinking Fountains, and Bicycle Amenities



Lighting

Current policy on the hours of operation for the trail network—from dawn to dusk—is one reason for the lack of lighting along many trail segments. Additionally, one of the key purposes of greenway corridors has been for open space conservation; the addition of light may not benefit wildlife that is present along the corridors and could cause light pollution unpleasant to adjacent residential areas. Greenway corridors within flood-prone areas can also present challenges for installation and ongoing maintenance. The Design Guide considers the ecological impacts and advises against lighting greenway trails in remote areas, with low user volumes, or where there is little development.

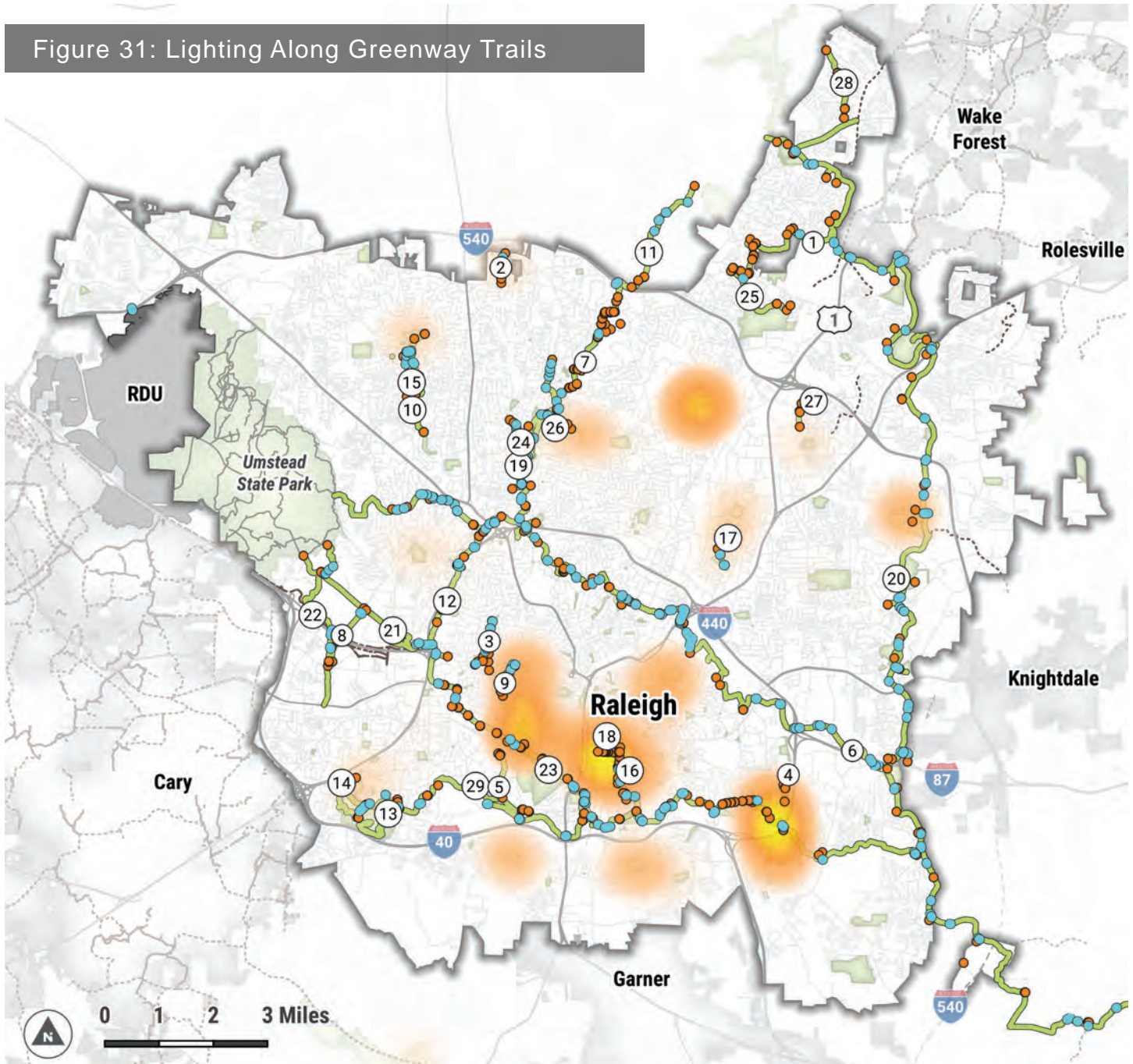
Lighting encourages use of greenway trails in otherwise low light conditions. Lighting extends the utility of the trail network by connecting people to places before or after daylight. Additionally, as a matter of safety, lighting enables users to see the greenway trail, each other, and potential hazards. It also influences user security and perceived security. While lighting may benefit a variety of users, it can present key benefits for active transportation trips.

While lighting along segments of greenway trails may enhance the experience for users in low light conditions—specifically in winter months when days are shorter—lighting for key locations such as access points, trail-to-trail intersection, comfort stations, at-grade street intersections, and grade-separated crossings such as bridges and tunnels are priorities according to the Design Guide. Figure 31

identifies these key locations along with illustrating where existing light poles are concentrated. Light pole density does not include streetlights that already serve to illuminate many of the at-grade trail crossings.

Existing lighting along the trail network is limited and is focused near comfort stations and grade-separated crossings. The higher densities of light poles that Figure 31 illustrates are within existing parks that may have more programmed activities and hours that extend beyond dusk. Limited lighting is beneficial to wildlife habitats along the greenway corridors; however, it reduces active transportation and recreational use of the greenway trails, specifically when daylight is shortened during winter months.

Figure 31: Lighting Along Greenway Trails



Light Pole Density

- Low
- Medium
- High

Trail Structures/ Crossings

Existing Trails

Parks

Trails in Adjacent Jurisdictions

Existing/Funded

Proposed

trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
| 4 Birch Ridge Connector | 13 Lake Johnson East Loop | 23 Rocky Branch |
| 5 Centennial Bikeway Connector | 14 Lake Johnson West Loop | 24 Shelley Lake Loop |
| 6 Crabtree Creek | 15 Lake Lynn Loop | 25 Simms Branch |
| 7 East Fork Mine Creek | 16 Little Rock | 26 Snelling Branch |
| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Springfield |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Seating and Refuse Receptacles

Seating along greenway trails and in natural greenway corridors can enhance the user experience and attract people of all ages and abilities by providing a place for users to rest, relax, and enjoy the trail network at their own pace. Co-locating refuse receptacles with seating areas—at an appropriate distance to minimize odors—can help maintain cleanliness throughout the system and protect the natural habitats that exist. Provision of refuse receptacles is only part of keeping the system free of litter; human behavior is another key consideration that may be more difficult to alter. Currently, the City of Raleigh uses Bigbelly smart waste and recycling receptacles in some areas of the trail network. Of note, while the Design Guide includes guidance for recycling receptacles, data received for this inventory did not include locations for this type of refuse receptacle.

Table 22: Seating Areas within Half Mile of Access Points

	TOTAL SEATING ALONG SYSTEM	% WITHIN 1/2 MILE OF ACCESS POINT
Benches	207	91%
Picnic Tables	18	100%

Table 23: Refuse Receptacles Adjacent to Access Points and Seating Areas

	WITHIN 100 FEET OF ACCESS POINT	WITHIN 50 FEET OF SEATING
Trash Receptacles	9.1%	13.8%

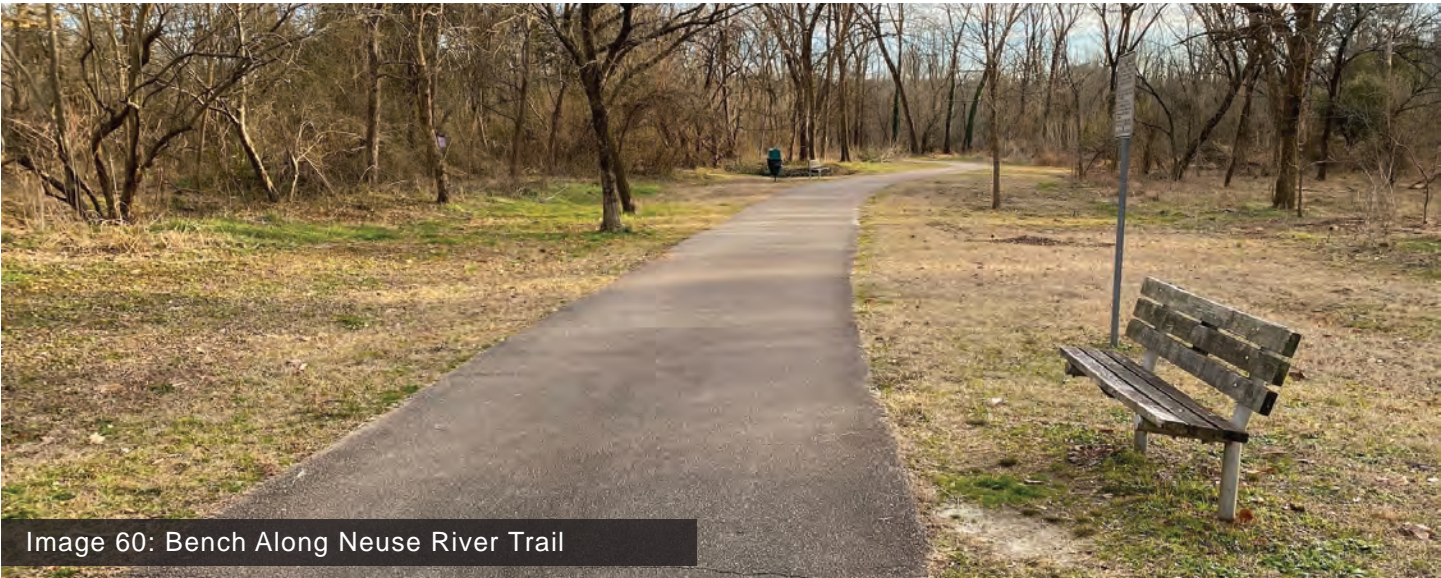


Image 60: Bench Along Neuse River Trail

Seating is defined by the existence of either a bench or a picnic table. The Design Guide recommends seating to be within a half-mile of trail access points and within one-mile gaps along the trail network. A review of existing benches within a half-mile of access points determined that 91% of existing benches were within a half mile of an access point (Table 22). Additionally, the recommendations to locate receptacles at access points and at each seating area has been reviewed. Receptacle distribution was evaluated in light of both recommendations. Table 23 identifies the percentage of access points that currently have refuse receptacles within 100 feet along with the percentage of seating areas that also have a refuse receptacle present.



Image 61: Little Rock Trail Access Point



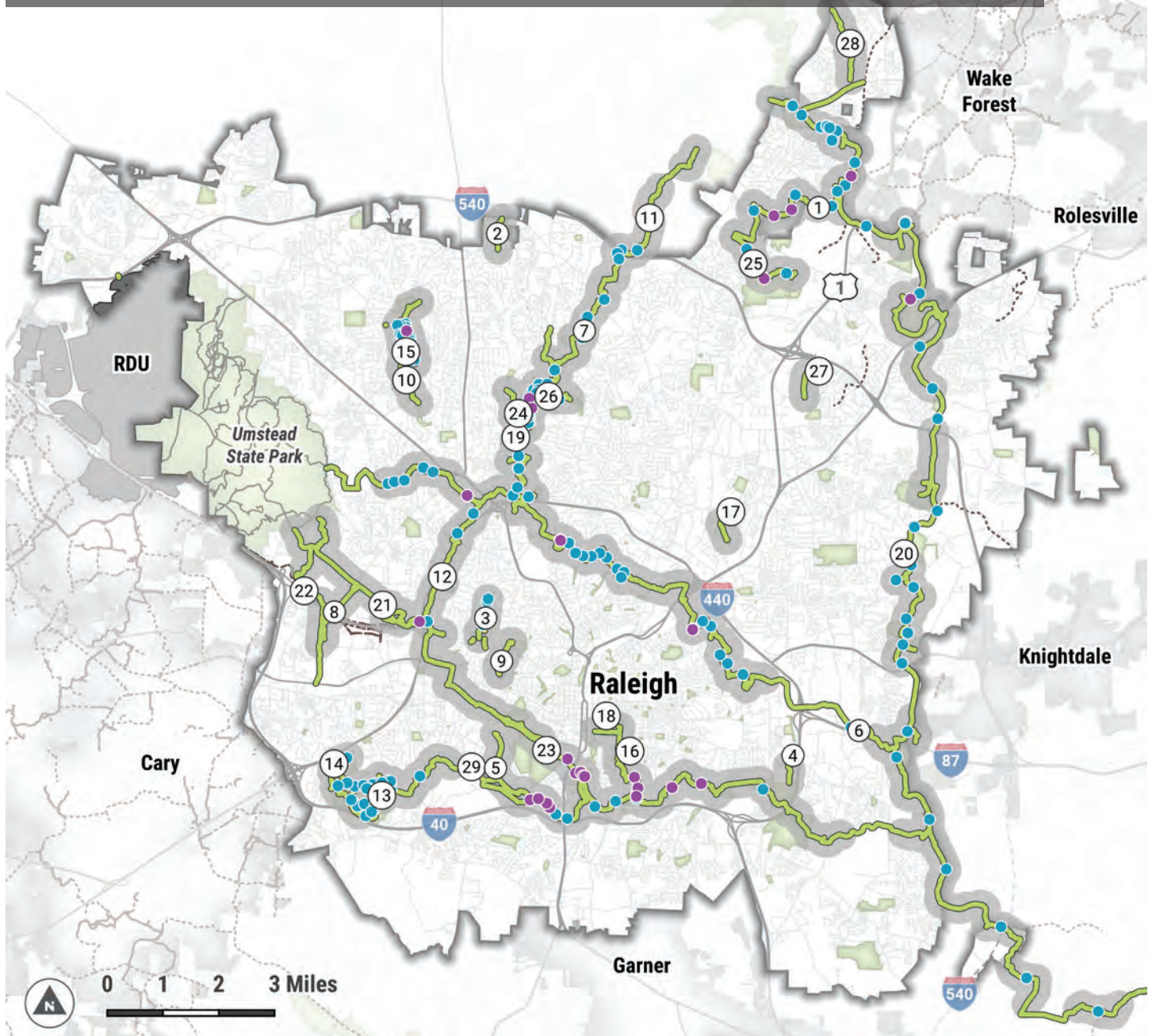
Image 62: Trash Receptacle

While many of the existing greenway trails have seating areas within a half mile of an access point, there are still gaps in the system (Figure 32).

Seating, specifically benches, is installed by the City or through the Donor Bench Program, which gives the public an opportunity to purchase benches to be placed along the system. A seating gap has been identified for the following greenway trails. While many trails are listed, specific portions of the trail are noted where the gaps exist.

- Edwards Mill Connector
- Reedy Creek Trail (western portion)
- Baileywick Trail
- Honeycutt Creek Trail (northern portion)
- Spring Forest Trail
- Brentwood Trail
- Rocky Branch Trail (near Dix Park)
- Centennial Bikeway Connector/Walnut Creek Trail (on Centennial Campus)
- Little Rock Trail (near Chavis Park)
- Walnut Creek Trail (between I-440 and Neuse River Trail)
- Crabtree Creek Trail (between New Bern to N. New Hope Road)
- Wakefield Trail

Figure 32: Seating Areas and Refuse Receptacles Along Greenway Trails



Seating/Refuse Receptacle Locations

- Seating Area with Refuse Receptacle
- Seating Area
- 0.5 Mile Access Point Buffer
- Parks

Trails in Adjacent Jurisdictions

- Existing/Funded
- - - Proposed

trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
| 2 Baileywick | 11 Honeycutt Creek | 21 Reedy Creek |
| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
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| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Public Art

Installations can serve as landmarks throughout the trail network and, in some cases, function for both aesthetic and utility (e.g., a sculpture that can also be used for seating). The Raleigh Arts Commission and the City’s Public Art Policy have contributed to public art throughout the community. Figure 33 illustrates the public art installations across the City and highlights those pieces that are within 100 feet of existing trails. Each art piece and the trail that it is adjacent to is listed in Table 24.

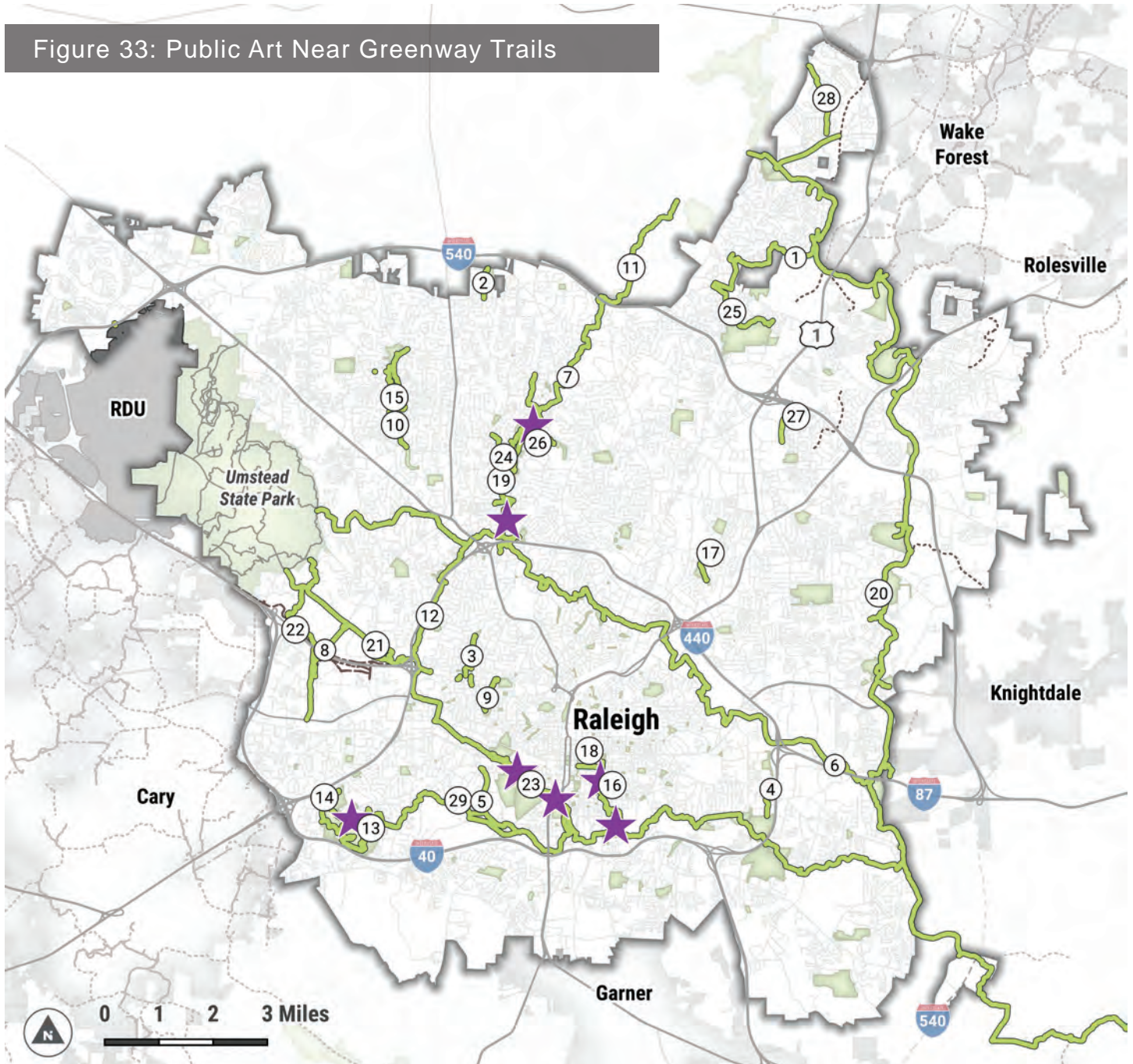
Public art installations are limited along the trail network; however, the Reedy Creek Trail connects to and through the North Carolina Museum of Art (NCMA). Visitors to this regional destination can

observe installations and explore the greenway trail. Of note, existing NCMA art adjacent to greenway facilities are not shown on the map, as these are not considered public art installations. There is also a tunnel lighting art project currently underway at Rocky Branch Trail and Dawson Street. Future installations can build on the success of local and regional artists and reflect the character of Raleigh.

Table 24: Public Art Along Existing Greenway Trails

INSTALLATION TITLE	ARTIST	CLASSIFICATION	TRAIL
Alphabet Project	Morgan Cook	Mural	Centennial Bikeway Connector
Alphabet Project	Morgan Cook	Mural	Centennial Bikeway Connector
Butterflies on Sewer-Ups	Laurie Neilson & Roberts Park Teen Outreach Program Participants	Mural	Mine Creek Trail
City Grown	Sarahlaine Calva	Mural	Mine Creek Trail
Mother Earth	Sarahlaine Calva	Mural	Little Rock Trail
Baskets in Open Space	Jan Chenoweth	Sculpture	Walnut Creek Trail
Sky Rift	Taylor White	Mural	Rocky Branch Trail
Sun Shower	Sarahlaine Calva	Mural	Walnut Creek Trail

Figure 33: Public Art Near Greenway Trails



Public Art Adjacent to Trail

Existing Trails

Parks

Trails in Adjacent Jurisdictions

Existing/Funded

Proposed

trail Key

- | | | |
|--------------------------------|----------------------------|----------------------|
| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
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| 3 Beaver Dam | 12 House Creek | 22 Richland Creek |
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Policy Evaluation

This section summarizes current policies that influence the CAG System's accessibility, user experience, and open space preservation for three overarching categories relevant to this Existing Conditions Analysis:

- Barriers to access
- Amenities
- Environmental conservation

In addition, it highlights existing plans and documents that include goals, initiatives, and other non-policy mechanisms that support each category. Where formal policy does not exist, there is an opportunity to build upon the existing goals, initiatives, guidelines, and strategies for future policy development. The Formative Plans Review (Appendix A) takes a deeper dive into relevant City tools, plans, and studies and focuses on how these documents have historically impacted the CAG System and how they continue to do so today, from greenway development and use to amenities and maintenance priorities.

The City of Raleigh implements an array of legal and regulatory requirements that guide the planning, design, development, and preservation of corridors and trails along the CAG System. Some of these requirements are set by the City of Raleigh, while others are established at the state and federal levels. At the City level, ordinances mandate specific standards and practices for all development, including the construction of greenway trails and

associated development. For the purposes of this document, "policy" refers to regulatory mechanisms that institute requirements that can be leveraged for greenway trail development and preservation of greenway corridors. The City also uses guidelines, goals, and strategic initiatives that support the development and preservation of greenway trails. These mechanisms set a vision for the CAG System and provide guidance for the Parks, Recreation and Cultural Resources Department's focus, work, and resource alignment; however, unlike policies, these guidelines, goals, and strategic initiatives are not regulatory. City documents that establish guidelines, goals, and strategic initiatives are reviewed in greater detail in the Formative Plans Review (Appendix A).

Barriers to Access

Existing Goals, Guidelines, Strategies, and Initiatives

Multiple City departments oversee roadway and transportation projects that interface with the trail network (e.g., bikeways, sidewalks, curb ramps, street crossings, transit stops, etc.) and ultimately impact the safety and comfort for users who walk, bicycle, or wheel to and along greenway trails. Most often, oversight of these projects is conducted by the Transportation and/or Engineering Services departments. In addition, the Design Guide includes considerations for at-grade street crossings of greenway trails.

The 2030 Comprehensive Plan and Raleigh Strategic Plan provide a host of visionary "Policy Items"

and “Action Items” that apply to the integration of the trail network with the City’s overall bicycle and pedestrian network and the transit network. Note that while the Comprehensive Plan has titled elements “Policy Items,” they do not fit within this document’s definition of policy. Similarly, the “Action Items” detailed in the Comprehensive Plan also do not fall within this document’s definition of policy. The Comprehensive Plan and the Raleigh Strategic Plan do the following:

- Emphasize the importance of connecting sidewalks, bikeways, transit stops, and greenway trails
- Highlight the City’s interest in ensuring accessibility for people of all ages and abilities for pedestrian and bicyclist infrastructure, as well as all recreational facilities
- Call for wider crosswalks with durable paint and other investments to increase pedestrian safety and visibility at crossings City-wide, which also applies to at-grade street crossings of greenway trails
- Focus on enhancing the City’s multimodal transportation network to reduce reliance on single-occupancy vehicles
- Direct the Capital Area Greenway Master Plan to support a balance of environmental, multimodal transportation, and recreational uses

Current Policies

The Raleigh Street Design Manual (RSDM) includes requirements for sidewalk on both sides of the street on all future public roadways (Sec. 11.2.2).

While required to provide sidewalk connections to certain public uses, private development is not required to provide sidewalk connections to greenway trails (Sec. 9.4.B). It also specifies that sidewalk along future public roadways must also connect with greenway access points (Sec. 11.2.2). As written, the RSDM does not specify whether these requirements are for existing greenway access points only or if they also include future greenway access points. Standards and policy are unclear on when, how, and if upgrades are required for public roadways with greenway access points that have no connecting sidewalk or existing sidewalk that is not ADA-compliant. The only standard for at-grade street crossings of greenway trails in the RSDM is that sidewalk access ramps be provided (Sec. 11.2.4).

The Unified Development Ordinance (UDO) requires all existing and proposed development for subdivisions to provide ADA-compliant pedestrian access connecting main building entrances with public entrances (e.g., transit stops, sidewalks, parking); parks, open space, and greenways, however, are listed as exempt from this requirement (Sec. 8.3.5.B). Site development for manufactured housing, however, is required to provide sidewalks that connect with public sidewalks, streets, and greenway access points (Sec. 4.5.2.B). Separate from specific greenway requirements, the UDO also contains other articles that address overall pedestrian and bicycle connectivity, such as the requirement for sidewalks to connect to transit stops (Sec. 8.11.4.D) and bicycle parking requirements (Sec. 7.1.8).

Amenities

Existing Goals, Guidelines, Strategies, and Initiatives

The Design Guide provides guidance for amenity placement to allow for flexibility and context-driven greenway trail design. The Greenway Master Sign Program provides guidance for signage and wayfinding at greenway access points and along greenway trails. The 2030 Comprehensive Plan also includes items related to greenway amenities, particularly wayfinding, signage, and art. The Raleigh Strategic Plan also includes objectives and initiatives that support incorporating an array of amenities into the trail network to enhance the user experience.

Current Policies

City policies related to amenities that impact the CAG System are limited. The City has established hours of operation of the greenway trails from dawn to dusk, which varies depending on the time of year and can impact users' ability to rely on the trails for commuting purposes or for other trips that they may take before or after common work hours in months with shorter hours of daylight. Additionally, the UDO contains requirements for bicycle parking (Sec. 7.1.2.C) and lighting (Sec. 7.4); however, greenways are exempt from both.

Environmental Conservation

Existing Goals, Guidelines, Strategies, and Initiatives

The importance of greenway corridors for environmental conservation efforts is emphasized throughout various City documents. The 2030 Comprehensive Plan includes a "Public Parks and Open Space" future land use category intended for permanent open space for recreational or resource conservation uses. The Comprehensive Plan envisions how the CAG System can continue to protect native landscapes, water quality, and areas of ecological significance for years to come. In addition, the Raleigh Strategic Plan aims to increase the connected network of green spaces throughout the City to conserve natural resources and promote outdoor activity. The PRCR Department's Business Plan, PRCR Department System Plan, and Greenway Master Plan all underscore the environmental benefits of the CAG System and highlight strategies for continued emphasis on environmental protection through maintaining and expanding the CAG System.

Current Policies

The UDO contains many requirements related to environmental conservation that are relevant to the CAG System, including the following:

- Greenway easement dedication (Sec. 8.6.1) and reservation of public land for proposed greenway trails and/or corridors (Sec. 8.1.6). These include specific easement width requirements.

- Greenway use as tree conservation areas, provided that portions of the land are conserved and excluded from trail construction activities (Sec. 9.1.4.D). Specific requirements are established for the Neuse River Riparian Buffers, in which shade trees must be planted if trees do not already exist in greenway tree conservation areas (Sec. 9.1.4.E).
- Stormwater runoff control measures for projects if stormwater runoff from the site could cause adverse effects on greenways (Sec. 9.2.2.E).
- Greenways, sidewalks, and walkways are required to be located outside of a primary watercourse buffer and meet specific design requirements or be unpaved (Sec. 9.2.3.B).
- Site plan or plot plan compliance with existing and planned public facilities, including greenways (Sec. 10.2.19.C).

Other Topics

In addition to those reviewed above, safety/security and funding are relevant to the CAG System and can impact trail planning, design, and development. A summary of existing policies, as defined above, is provided for each topic.

Safety and Security

The 2030 Comprehensive Plan provides action items for two topics related to the safety/security of the trail network: maintenance and trail user safety and etiquette. Notably, greenway crime prevention policies have not been adopted into any of the City's guiding documents or by the PRCR Department;

however, the Design Guide does include a brief section on Crime Prevention Through Environmental Design (CPTED). Guidance for increase security includes but is not limited to fencing, access points, emergency contacts, signage, maintenance, and lighting.

Funding

The City of Raleigh utilizes a variety of sources to fund greenway development and maintenance, including bond referendums, the general fund, impact fees, grants, and donations. Currently, greenway development is primarily funded by voter-approved bond referendums. Projects are approved by the Raleigh City Council and put on a ballot for voters to approve. Raleigh voters approved Parks and Recreation bonds in 2003 (\$47.25 million), 2007 (\$88.6 million), and 2014 (\$91.775 million) for parks and greenway projects. The timing of future bond referenda is yet to be determined. In the past, greenway projects have also been funded through the 2011 Transportation Bond and, in 2012, a two-thirds general obligation bond. In addition, the PRCR Department receives a nominal annual amount from the City's General Fund to develop and maintain greenway trail facilities. Since Fiscal Year (FY) 2015, \$300,000 has been allocated for greenways in the City's General Fund each year.

Conclusion

The City of Raleigh has established a host of visionary, forward-thinking goals, initiatives, objectives, and guidelines that support the CAG System as a thriving network of trails—accessible to all residents and visitors regardless of their travel mode or purpose—and open space corridors, which will preserve the City’s natural ecosystem for decades to come. The UDO and RSDM establish some requirements for connectivity to greenway trails and the dedication of land for trail or corridor development.

Existing policies have been insufficient to compel the construction of greenway trails and applicable amenities adjacent to or through private development. Stronger policy language, combined with additional development regulation through the UDO, would be necessary to guarantee that all new development adjacent to greenway corridors provides the infrastructure necessary to ensure safe, convenient, and public access to the greenway network. In addition, there are no policies that address the need for private developers to construct greenway trail segments within currently undeveloped greenway corridors on-site. This prevents the trail network from expanding in concert with new development in the way that the city’s street and sidewalk infrastructure does.

The Greenway Master Plan is an opportunity to leverage the existing goals, initiatives, strategies, and guidelines to develop strategic policies for the future. Additionally, the Greenway Master Plan will

build on and update existing policy to provide the tools necessary to overcome barriers to access, increase trail amenities that add value to users, and preserve vital open space corridors.



Image 63: Bicyclist on House Creek Trail

Unified Development Ordinance Analysis & Peer Review

The Capital Area Greenway System was conceptualized and planned from its beginning to effectively manage Raleigh's floodways. Land adjacent to major waterways and tributaries within Raleigh has been preserved to prevent potential flood damage, prohibit the development of ecologically sensitive lands, and protect natural habitats. This objective continues to guide greenway development today as Raleigh's waterways define corridors in the greenway system.

While flood management and environmental stewardship should continue to be fundamental elements of the CAG System, Raleigh has experienced growth and development since the first Capital Area Greenway Master Plan was adopted in 1976 and subsequently updated in 1986 and in 1989. Since 1976, the City's population has grown by over 250% and its land area has more than quadrupled. Expanding city limits and a growing, diversifying population have prompted an emphasis on accessibility to the greenway system for all of Raleigh's residents and visitors. In addition, increasing public interest and investment in bicycling and walking as modes of transportation have altered how greenway trails are used and where community members desire them. Greenway trails offer more comfortable mobility than existing on-street facilities for active transportation. Sometimes, this results in higher user volumes and potentially more conflicts

between mobility modes. Updated policies and procedures are necessary to adapt the greenway system to address these changes.

The CAG System is a cherished community resource. Establishing policies and procedures that expand where greenways can be located, strengthen the City's ability to acquire land, and diversify funding sources can foster a more accessible greenway trail network that connects people to the places they need and want to access; doing so can also provide recreational opportunities and promote environmental stewardship. This section provides an overview of the development policies and procedures the City of Raleigh is following today and presents best-practice options from peer communities across North Carolina and throughout the country. As Raleigh's context is unique, there is not one correct answer as to how the City should move forward with greenway development; rather, the City has a menu of options to choose from that can be tailored to ensure the CAG System is meeting the needs of all of Raleigh's residents and visitors.

Note that specific code language from peer communities can be found in Appendix E.

Greenway Trail Placement

Several communities within North Carolina have expanded their greenway systems through strategic investments and by codifying development standards to assist with new trail implementation. Raleigh's UDO does not require greenway easement

dedication for area lying outside of any floodplain, flood-prone,

or flood hazard area in Raleigh (see Sec. 8.6.1.C). These areas can only be reserved in accordance with section 8.1.6 of the City's UDO; however, easement reservation is limited to one year from the time of approval of the preliminary plan/site plan. The reservation period can be extended by submission of a letter to City Council of intent to purchase by the appropriate government agency (no more than 2-year extension). Further extension can be permitted upon mutual agreement between the landowner and the City Council (no more than 2-year extension). (Sec. 8.1.6.B)

None of the peer communities reviewed limit greenway development to certain lands based on any environmental characteristic. Cary has developed "side-street trails" to allow for differing dedication and development requirements between off-street greenway trails and trails adjacent to streets that connect with the off-street greenway system. (Sec. 7-10-4-C). Of note, the Cary designates its Transportation and Facilities Department as the entity responsible for establishing design and construction standards and specifications for side-street trails.

Funding

The following funding sources are used for greenway development and maintenance in Raleigh:

- **Bond Referendum:** Currently, greenway development is primarily funded by voter approved bond referendums. Projects are
- **General Fund:** The Parks, Recreation and Cultural Resources (PRCR) Department receives a nominal annual amount from the City's General Fund to develop and maintain facilities. Since FY 2015, \$300,000 has been allocated for greenways in the City's General Fund each year.
- **Impact Fees:** The City assesses impact fees to residential developers when new homes are being built in Raleigh. These funds are used for Transportation and Parks and Recreation projects. The City must spend \$1 for every \$0.50 collected in the geographic area the impact fees were collected in. These fees are used to pay debt service but are not specific to greenway project development.
- **Grants:** PRCR actively applies for federal, state, local, private, and non-profit grant opportunities. In the past, the department has received Clean Water Management Trust Fund, Parks and Recreation Trust Fund, Land and Water Conservation Fund, Congestion Mitigation and Air Quality, and Recreational Trails Program grants. These grants usually require a 20% local match.
- **Donations:** PRCR manages programs for tree

approved by the Raleigh City Council and put on a ballot for voters to approve. Raleigh voters approved Parks and Recreation bonds in 2003 (\$47.25 million), 2007 (\$88.6 million), and 2014 (\$91.775 million) for parks and greenway projects. The timing of future bond referenda is yet to be determined. In the past, greenway projects have also been funded through the 2011 Transportation Bond and, in 2012, a two-thirds general obligation bond.

and bench donations, as well as a general parkland enhancement donation program. The City of Oaks Foundation is a 501(c)(3) private foundation formed to accept major donations (e.g., land, monetary).

While the peer communities have varied funding methods and sources, they all use varied funding sources to plan and construct greenway trails, as well as to acquire greenway easements. Cary and Asheville both use bonds to fund greenway projects, but bonds do not appear to be greenway projects' main funding source. Additionally, all peer communities have non-profits or foundations that collect donations to benefit the greenway system at-large or a specific greenway trail; however, these funding sources are not contributing to a large portion of greenway-related costs. One exception is the City of Pittsburgh, whose current funding model relies heavily on independent nonprofits, particularly for greenway maintenance. The City's reliance on these organizations has created issues when nonprofits disband, causing greenways to fall into disrepair. Pittsburgh's most recent greenway planning efforts recommend the City diversify its funding beyond relying on nonprofit organizations.

Raleigh's peer communities are leveraging transportation funding sources through their local MPO, NCDOT, and other federal sources (USDOT, FHWA) to cover most greenway projects. These grants are often supplemented by a smaller portion of matching funds from the municipality, which varies depending on the grant source. For example, in 2012, the City of Asheville made greenways the

responsibility of the Transportation Department to qualify for more than \$3 million from USDOT. While Raleigh does use transportation funding sources, other communities rely on these for their greenway projects much more than Raleigh does. Cary and Morrisville also use funding from their fee-in-lieu programs to cover costs associated with greenway land acquisition. Of note, Morrisville's most recent budget introduces a Parks & Greenway Improvements Capital Project Fund to dedicate funding beyond the General Fund to construct greenway projects (in addition to enhancing park amenities and upgrading ADA-accessibility).

Easement Dedication Requirements & Incentives

The following section summarize the strategies peer communities use to require greenway easement dedication and connections to existing greenway trails, the alternatives and incentives they provide developers, and the parties responsible for managing and maintaining greenway trails. Language is pulled directly from the municipalities' ordinances to demonstrate their approaches and to serve as examples for how the City of Raleigh could introduce similar requirements into its UDO.

Land Dedication

Raleigh's current Unified Development Ordinance requires greenway easement dedication for residential development on land that has been designated as greenway in the Comprehensive Plan. However, land with non-residential development

is not required to be dedicated as a greenway easement.

Subject to limitations of Sec. 8.6.1.C, whenever a tract of land included within any proposed residential subdivision or residential site plan includes any part of greenway designated on the Comprehensive Plan, the greenway shall be platted and dedicated as a greenway easement. (Sec. 8.6.1.A)

In addition, any land that lies outside of a floodplain area (regardless of land use) is not required to be dedicated. Planned greenway areas that cross land outside of floodplains and/or not in a floodplain area may only be reserved for future development by the City Council. Note that this reservation has time limits that may impact the feasibility of land acquisition.

No dedication shall be required for greenway lying outside of any floodplain, floodprone or flood hazard area, but such area shall be reserved in accordance with Sec. 8.1.6. for possible City acquisition. (Sec. 8.6.1.C)

Raleigh's current policies limit the greenway system's ability to serve as a reliable transportation option. Peer communities, throughout North Carolina and across the country, require greenway dedication or development/provision regardless of land use type and whether land is flood-prone status or not.

Easement Widths

Raleigh's current Unified Development Ordinance establishes minimum easement widths for required greenway easement dedication. These widths only consider greenway placement within stream corridors and do not provide for greenway trails that are outside of flood-prone lands.

Subject to limitations of Sec. 8.6.1.C. below, the greenway required to be platted shall at a minimum be the product of the following dimensions:

- 1. Minimum standard width multiplied by the length of the boundary along the banks of the adjoining watercourse;*
- 2. Plus that portion of the watercourse contained within the development when property lines extend to the centerline of the watercourse:*
 - a. Neuse River: 150 feet from each bank.*
 - b. Crabtree & Walnut Creeks: 100 feet from each bank.*
 - c. All other tributaries: As established by the current City Council-approved Raleigh Parks Plan. (Sec. 8.6.1.B)*

Few peer communities limit greenway dedication requirements to flood-prone lands; thus, many of their development ordinances do not establish easement requirements related to watercourses. Colorado Springs, CO has established a streamside overlay zone district to guide the development and maintenance of the property adjacent to stream corridors. Guidance is provided for trails developed

within the stream overlay zone. The following is a selection from Colorado Springs' development code:

The streamside overlay zone encompasses all land within the stream channel, including stream adjacent wetlands, and within a specified distance from the toe of the channel bank of specific intermittent and perennial streams within the City, as represented by the official streamside overlay zone as shown on the City zoning map. Streamside overlay zone requirements are not applicable to those wetland areas that extend beyond the mapped streamside overlay zone district boundary. However, wetlands that are wholly or partially outside of the mapped streamside overlay shall be analyzed and protected as indicated or recommended by a land suitability analysis, when required...

Within the City three (3) stream types are identified and are represented on the streamside overlay zone as shown on the City zoning map. The typical characteristics of the stream types are as follows:

Type 1: Typical channel width less than twenty five feet (25'). Buffers measure seventy feet (70') wide on both sides of channel.

Type 2: Typical channel width twenty five (25) to seventy five feet (75'). Buffers measure ninety feet (90') wide on both sides of channel.

Type 3: Typical channel width greater than seventy five feet (75'). Buffers measure one hundred twenty feet (120') wide on both sides of channel.

Streamside Buffer Zones: Streamside buffer zones are established within a specified distance of the edge of the stream channel (toe of the channel bank) for each of the specific stream types within the City. Specific buffer zones have been identified as significant based upon their typical size, natural and vegetative characteristics, wildlife habitat suitability, open space and recreational opportunities and permitted and/or prohibited land use potential.

All streamside zoned land falls within one of three (3) regulatory categories: a) stream channel, b) inner buffer zone, or c) outer buffer zone. Uses, landscaping standards, grading and impervious surface limitations vary depending on buffer zone.

(A) Stream Channel: The protection of the stream channel is critical for flood mitigation, water quality, and wildlife habitat. It is identified as the area between the toe of both channel banks. All proposed uses for the stream channel are subject to the review and approval of City Engineering. Wetland areas which are between defined channel banks and are contiguous to the stream itself are to be considered as part of the stream channel regulatory category. Stream bank stabilization, restoration activities, trail crossings and flood control activities are typically the only permitted activities within the stream channel.

(B) Inner Buffer Zone: The inner buffer zone is measured outward from the toe of the channel bank. It is considered a preservation area where uses are restricted to flood control, stormwater BMPs, landscaping, utility corridors and recreational trails. Impervious surfaces are not permitted within the

inner buffer zone. Specific permitted, prohibited and/or conditional uses, impervious surface limitations, grading limitations and landscaping standards apply within the inner buffer zone.

(C) Outer Buffer Zone: The outer buffer zone extends from the outward edge of the inner zone to the outer extent of the overlay area. The full range of uses that are permitted in the base zone (unless listed in subsection E2d(1) of this section) are permitted in the outer buffer zone. The outer buffer zone may often be an area of increased activity to improve the human relationship with adjacent stream areas. Specific permitted, prohibited and/or conditional uses, impervious surface limitations, grading limitations and landscaping standards apply within the outer buffer zone. (Sec. 7.3.50)

Other peer communities have established minimum easement widths for greenway trails that are not within stream corridors. Appendix E includes code language from each of these peer communities.

Dedication Alternatives

Raleigh does not currently provide dedication alternatives for developers who are required to dedicate a greenway easement.

Many of Raleigh's peer communities provide a fee-in-lieu of dedication option for developers. In Cary, NC, the Town decides whether or not a subdivision, a master land use plan, or preliminary development plan may choose to pay a fee-in-lieu of land dedication. While the Town only requires greenway land dedication from subdivisions (regardless of land use), Cary also requires multi-

family residential developments that do not require subdivision approval to provide funds to the Town to be used for future land acquisition. Similarly, San Jose, CA, and Minneapolis, MN allow developers to pay a fee-in-lieu of their required dedication. The City of Asheville allows property owners to elect whether or not they will dedicate open space or pay a fee-in-lieu; however, the City has ultimate approval of whether or not a fee-in-lieu of open space is acceptable. The Town of Morrisville, NC provides the option of fee-in-lieu for public recreation area requirements. This option is not provided to developers for open space requirements. Morrisville also allows for off-site provision for public recreation area or open space requirements. Some areas—including Austin, TX, Colorado Springs, CO, and Prince George's County, MD—allow for fee-in-lieu of parkland dedication, but do not allow it for trail easement dedication unless approved by the municipality. Appendix E highlights the code language used in each of the aforementioned municipalities.

Developer-Built Trails

Raleigh's current Unified Development Ordinance does not require, provide incentives for, or outline guidance on greenway trails built by developers.

The peer communities of Morrisville, NC, Portland, OR, and Prince George's County, MD, require developers to build any planned greenway trails that overlap with their property. Prince George's County in Maryland requires that subdivision developers (of all land use types) include all bicycle and pedestrian facilities on their preliminary plans and final plat.

Under these authorities, the Maryland- National Capital Park Planning Commission condition the approval of the subdivision on whether the master planned trail is to be built by the time the building permits are requested for development. Sometimes the agency requires that the land is dedicated to either the Department of Public Works and Transportation or the Department of Parks and Recreation, or that a public use easement is provided.

Prince George's County also includes a provision for pedestrian-bicycle adequacy for specific parts of the county, such as designated urban centers and development corridors, in which developments are subject to "off-site" bicycle and pedestrian projects. This legislation requires developers to build bicycle and pedestrian infrastructure that is not on their property. There is a cap on the cost that the Planning Board can require, which often prevents a developer from building an entire trail; however, the County has gained enhanced sidewalk and trailheads as a result of this requirement.

Portland, OR requires developers to construct trails based on which zoning area their property is within. Developers are required to construct trails in the following situations:

- Subdivisions and planned unit developments within single-dwelling residential zones that involve the creation of a street
- Sites in the Columbia South Shore Slough Trail area and Cross-Levee Trail area
- Sites in the South Waterfront subdistrict
- All other zones when there is new development, when exterior alterations to existing development are 35 percent or greater of the assessed improvement value of the total improvements on the site, and when streets are constructed in a subdivision, industrial park, or PUD.

Morrisville, NC, requires most, but not all, new development to incorporate planned greenway trails in the Comprehensive Plan into the site's open space. In addition, the Town elaborates that "incorporation" includes installation of the path and recording of an associated pedestrian access easement.

Other peer communities, such as Cary, NC, and San Jose, CA, incentivize—but do not require—developer-built greenway trails. These incentives take the form of reduced easement width requirements and credits towards future parkland dedication obligations. Specific code language from each community is provided in Appendix E.

Management and Maintenance

Raleigh's UDO does not include language directing specific entities to manage and maintain the trail network. As a result, the City assumes maintenance responsibility for the trail network, and regulations related to property ownership are flexible to meet the needs of developers and the City.

A few peer communities provide detailed guidance on who should own and maintain greenway trails. Asheville, NC, mandates that property owners of the designated open space are responsible for its maintenance. Cary, NC, requires that the Town

maintain all public greenway trails, except for locations within private development where the developer is required by the Comprehensive Plan to build greenways instead of sidewalks. In these cases, the trails shall be privately maintained by the Homeowner's Association (HOA) and open to the public. Portland, OR, establishes criteria that must be met in order for the City to accept maintenance and liability over a developer-built greenway. Appendix E provides the exact code language for each of these peer municipalities.

Connections to Existing and Proposed Greenway Trails

The City of Raleigh does not currently require developers to provide connections to existing or planned greenway trails. The City's UDO states that greenways are exempt from pedestrian access requirements for new development. (Sec. 8.3.5.B) Of note, the Common Open Space requirements categorize connections to neighboring trails or greenways as tertiary, meaning they must be included in the open space requirements only after primary and secondary open space areas are exhausted. (Sec. 2.5.2.C)

Various peer communities require that developers connect to existing or planned greenway trails. The Town of Cary requires that sidewalks and/or greenways are provided within developments to provide an on-site pedestrian network. In addition, the Town mandates that development plans provide private, paved trail connections to existing and planned public greenways. In Minneapolis, MN,

City staff can require greenway dedication for the purpose of connecting existing greenway trails to one another. Austin, TX, provides a variety of options for site developments to meet open space requirements, including providing a multi-use trail connection to existing or proposed greenway trails. Lastly, Colorado Springs, CO, requires bicycle and pedestrian connectivity from mixed use developments to existing and designated future greenway paths adjacent to the site. Appendix E provides the exact code language for each of these peer communities.

Developer Incentives

There are a few incentives for Raleigh developers to dedicate land for greenways. Greenway dedication can assist developers in meeting the Tree Conservation Area requirement. In addition, Raleigh's UDO allows for a density transfer for developers dedicating greenway land provided they meet certain criteria.

Transfers are restricted to properties under the same ownership which are located outside any Watershed Protection Area and in the same development as the dedication for right-of-way less than 60 feet in width...

No density transfer shall be allowed if the developer has executed a reimbursement contract...

The density transfer is applicable to all those portions of greenway dedicated after September 1, 2013 provided that the dedicators waive their statutory right to withdraw the dedication. (Sec. 1.5.3.F)

The City of Asheville provides a density bonus to developers who dedicate open space for greenway development above the required amount. Cary, NC provides credits towards park land dedication and payment-in-lieu requirements. San Jose, CA credits developers who dedicate greenway land with credit equal to the square footage of the land dedicated. Land uses are awarded differing incentives for greenway land dedication in the City of Nashville. The City of Portland, OR provides floor area and height bonuses, as well as height transfers, to developers with property in the Central City zoning district who comply with the Central City Plan, which includes projects along the Willamette River Greenway. Specific code language from each of these examples is detailed in Appendix E.

Considerations

Trail Definition

Raleigh should consider including a definition for greenways and greenway trails in the UDO to promote alignment between PRCR and other City agencies, and continuity in planning documents generated by the department following the Greenway Master Plan Update. Definitions of greenway trails and corridors should align across the UDO, Comprehensive Plan, and PRCR Department planning documents. Unlike the UDO and Comprehensive Plan, PRCR planning documents currently do not limit greenway placement to flood-prone areas, and the agency's provided definitions for greenways and greenway trails do not include language specifying that they are

placed only in floodplains. Modifying the UDO and Comprehensive Plan language in this way will better align with the community and PRCR Department vision for the Capital Area Greenway System. This vision promotes environmental stewardship while providing recreational opportunities and addressing transportation needs for all the City's residents and visitors.

Updating the UDO language in particular is significant in ensuring that the greenway system meets user needs. The definition should consider street-side or urban trails specifically in the UDO and highlight a department such as PRCR or Transportation as the entity responsible for design standards and specifications.

Funding

The PRCR Department should consider changes to funding that establish more dedicated annual funds to maintain and enhance the existing system while strategically implementing new greenway trails and corridors. The PRCR Department may consider the following funding considerations:

- Increase annual funding from the general fund that corresponds to a per capita investment, proposed greenway miles, active transportation mode split, or some other quantifiable measure
- Establish specific capital improvement project funds that are reserved for greenway development
- Continue to leverage transportation-related federal, state, and local grant opportunities in collaboration with the

City's Transportation Department

- Explore partnership opportunities with nonprofit organizations and private foundations to aide in greenway funding
- Consider establishing a Municipal Service District (pursuant to N.C. GS § 160A-536 (b)) in collaboration with other City Departments for Downtown Revitalization that could include trail development for bicycle and pedestrian use to connect nearby destinations such as Dix Park into Downtown Raleigh
- Consider using tax increment financing for greenway development
- Assess the amount provided each year in the general fund and determine the gap in reaching maintenance needs, particularly as additional greenway trail construction is pursued
- Implement a penny tax specifically for greenway development and/or maintenance
- Establish a dedicated budget for trail reconstruction and maintenance
- Consider eliminating the 10% open amenity area requirement for development along greenway trails in favor of a fee-in-lieu program to pay for greenway maintenance and reconstruction
- Coordinate maintenance, and associated funding for maintenance, with the City's Department of Transportation

Land Dedication and Easement Width

The PRCR Department should consider recommending changes to the UDO to provide more flexibility in greenway placement, allow greenway trail development outside of the City's stream corridors, and leverage private development for land dedication and/or trail construction. The PRCR Department might consider the following potential UDO changes:

- Remove language from the UDO that limits requirements for greenway dedication to flood-prone lands
- Require greenway easement dedication for land uses beyond residential
- Require developers to demonstrate that a trail could be constructed by the City within the dedicated easement area by showing the necessary grading, engineering, and other documentation required by the PRCR Department
- Provide developers an alternative option to easement dedication, such as a fee-in-lieu
- Consider eliminating the 10% open amenity area requirement for development along greenway trails in favor of a fee-in-lieu program to pay for greenway maintenance and reconstruction
- Add reference to the Council-adopted Capital Area Greenway Master Plan and any future updates for standards and requirements associated with land dedication and easement widths. This would avoid the need for individual UDO amendments in the future, instead

relying on Greenway Master Plan updates for these standards and requirements

- Expand easement dedication to the full floodplain width for greenway trails and open space corridors in stream corridors

Developer-Built Trails

The PRCR Department should consider recommending changes to the UDO to leverage private development for trail construction. The PRCR Department might consider the following potential UDO changes:

- Require developers to build trails (along stream corridors or on-street connectors) identified by the Greenway Master Plan
- Provide incentives for developer-built greenway trails through reduced greenway trail easement width requirements (or other design standards), required open space credits, or density bonus
- Consider establishing different design width standards dependent whether the greenway is built within a stream corridor or in conjunction with development
- Require development in specific overlay zoning districts to provide trail amenities on-site or within the overlay district
- Provide and require standard installation specifications for developers to ensure branding continuity with the City's system and uphold maintenance requirements
- Update language to provide consistent requirements between the Greenway Master

Plan and on-street trail cross sections within the Street Design Manual

Management and Maintenance

The PRCR Department may consider clarifying greenway trail management and maintenance expectations and options within the UDO. The UDO should establish clear criteria for developer-built trails to be transferred to the City for future maintenance and liability. If the Department intends to allow private developers, homeowners' associations, or other non-public entities to own and/or maintain greenway trails, the associated procedures and expectations should be outlined in the City's UDO. In addition, the City should also establish redevelopment criteria for these sites to ensure that existing greenways are preserved and maintained in any future redevelopment projects. Alternatively, if the City would like to maintain ownership and maintenance responsibilities, that should be stated clearly in the UDO. In making this decision, the City should carefully consider the inequities inherent in policing and surveilling privately-owned space.

Connecting to Greenway Trails

The PRCR Department should consider updates to the UDO that would require private development to build connections, provide easements, and/or pay a fee-in-lieu to connect to existing and proposed greenway trail corridors and street-side/urban trails. This recommendation builds upon those listed in the Land Dedication Considerations section above. Private development should connect

building entrances with internal paths to existing or proposed greenway trails that are adjacent to the site. If gaps exist between the developing property and the existing or proposed greenway trail, a fee-in-lieu may be preferred to ensure development of a more connected network. Another option is for development in residential neighborhoods to be assessed a fee to be used for sidewalk development on residential streets that connect to greenway trails.

Developer Incentives

Building on the density transfer, the PRCR should consider a graduated density bonus for developers that exceed the greenway dedication requirement or construct a greenway trail that is wider and/or offers additional amenities for users. Density bonuses may also be considered for future greenway trail-oriented development. Collaboration between the City Departments such as PRCR, Planning, Urban Design Center, and Transportation should be considered if updates to zoning or development standards are pursued for trail-oriented development.



System-Wide Findings

Cumulatively, this Existing Conditions Analysis indicates that the CAG System has a variety of gaps and barriers relating to the network along with several opportunities. It should be noted that not all areas of Raleigh are impacted equally. Amenities along the system can give users a sense of comfort along with provide guidance and information. The following system-wide findings are notable based upon the assessment of gaps and barriers, amenities, and existing policies:

- Sidewalks are not complete surrounding most existing greenway trail access points and limit pedestrian access.
- Greenway trail at-grade street crossings would benefit from updated crossing design or changes to street characteristics to increase safety for all users (e.g., lowering speed limits, raised crossings, more signage, stop signs).
- On-street bikeway connections can link greenway trail trips to more destinations but require more attention to intersections of greenway trails and on-street facilities.
- Connections to the transit network are strongest near downtown Raleigh and other community destinations (e.g., near NCSU, the NC Museum of Art and PNC Arena, Crabtree Valley Mall, Gateway Plaza, along Durant Road). Greenway trails that are further from Raleigh's downtown core (e.g., Neuse River Trail) or are further from commercial areas (e.g., Lake Lynn Loop Trail) are not transit-accessible.
- Wayfinding signage is limited near access points and trail-to-trail intersection and additional wayfinding would increase awareness for people on the system and direct people to local and regional destinations.
- Amenities such as comfort stations and lighting are concentrated near access points and would provide benefits to users placed strategically along trail segments that are farther from access points and parking.
- Additional access to the trail network through formal access points and neighborhood connections can provide more of the City's population and visitors convenient access to the system without the use of a vehicle.
- Existing policies and standards for street design and access will offer the most benefit to trails developed in the future or trails adjacent to new development; however, they lack direction on increasing connectivity for trails that are adjacent to property with little potential for new development.
- A variety of trail amenities are included in the Design Guide without clear policy on implementation—specifically amenities such as lighting and hours of operation and striping trails to separate users that could impact user comfort and non-recreational greenway trail trips.

Findings by Existing Trail Classification

Cross City Greenway Trails

This classification makes up most of the trail network (52%); however, many access points on these greenway trails are not connected to sidewalk. In addition, most of the at-grade street crossings of these trails have low comfort scores. Lastly, the majority of bicycle- and pedestrian-related crashes near access points occur along these trails, specifically the Rocky Branch and Walnut Creek trails.

Greenway Collector Trails & Loop Trails

Greenway Collector trails and Loop trails comprise roughly 27% of the existing trail network, and large stretches of these trails are not along existing greenway trail access points. However, both the Little Rock Creek Trail and East Fork Mine Creek Trail have multiple access points that offer connectivity to surrounding destinations through a robust sidewalk network. Overall, trails within this classification have many at-grade street crossings with medium to high crossing comfort scores; however, Greenway Collector trails in more urban environments, such as Little Rock Creek Trail connecting downtown Raleigh with Walnut Creek Trail, had lower crossing comfort scores and higher densities of pedestrian- and bicycle-related crashes.

Neighborhood Greenway Trails

This classification is comprised of smaller trail segments that either connect two larger segments or serve as a connection between a greenway trail access point or a Collector or Cross City Trail. Portions of Beaver Dam, Durant Segment, Gardner Street, Loblolly Segment, and Wakefield Trail are exceptions to this, as these trails either run along streets or connect with parks. Neighborhood Greenway Trails generally cross low-speed, low-volume streets in primarily residential areas and, as a result, have higher crossing comfort scores.

Greenway Connectors



This classification is the smallest in terms of mileage, constituting only 5% of greenway trails; however, it consists of several key existing and planned trail sections, including the Martin Street Connector, the Falls River Connector, and the Centennial Bikeway Connector. As there are so

few of these greenway trails, it is difficult to draw classification-wide assumptions regarding their overall safety and accessibility. That being said, the few Greenway Connectors that do exist are better connected to the sidewalk and bicycle network and face fewer barriers to greenway trail access when compared to other trail classification types. This may be because the purpose of this trail classification category is to increase connectivity of the trail network from key community resources. Of note, areas where Greenway Connectors cross heavily trafficked roads, such as Abbotts Creek Trail along Durant Road, had lower crossing comfort scores and higher amounts of pedestrian- and bicycle-related crashes.

Next Steps

The Existing Conditions Analysis for the Greenway Master Plan Update will be used in conjunction with public input when developing recommendations. Although the findings from this assessment describe several factors along the system, there are many others that could be considered. Several key considerations have been developed based upon the findings of the analyses performed:

- Quality of infrastructure will always need to be addressed and will require a funding structure that is updated.
- Trail classifications are relatively new and existing trails and amenities along trails do not align with current purpose or desired elements.
- New trails with strategic greenway trail access point locations can provide additional users,

specifically those in vulnerable communities, convenient access to the system.

- Where appropriate, trail-oriented development (particularly around transit stations) can further integrate the trail network with surrounding development and transit.
- Existing and planned trails have limited connections to destinations due to primary alignments along stream corridors.

It is important to recognize that users experience the trail network on an individual basis. Also, the design of the trail network, the amenities that it possesses, and even the destinations that can be accessed are all perceived differently by its users. As the Greenway Master Plan Update develops recommendations, the findings of this document will be balanced with the feedback, desires, and needs of the public. Recommendations will seek to address the quantitative elements that have been noted but will also focus on qualitative factors that can enhance a user's experience. In addition, recommendations will align with concurrent planning efforts, such as the development of the BRT Street Plan Street Types.



APPENDIX C

Public Outreach Summaries



Appendix Summary

Engaging the community—hearing their voices, needs, and desires for the CAG System—is crucial to ensuring that the CAG Plan’s recommendations reflect the community’s vision for greenway trails and open space corridors throughout the City of Raleigh and the region. The planning process involved three phases of outreach: Listen, Check-In, and Reveal + Refine. This document, the Public Outreach Summary appendix, details all engagement activities conducted during each phase of outreach. It contains the following sections:

- Overview
- Steering Committee Meetings
- Phase 1 Outreach
- Phase 1 Survey Results
- Focus Groups
- Community-based Outreach
- Phase 2 Outreach
- Phase 2 Survey Results
- Phase 3 Outreach and Survey Results

Overview

A primary focus of the Capital Area Greenway Master Plan Update (CAG Plan) is to engage with various community stakeholders to better understand greenway use, needs, and desires. While people who live, work, and play in Raleigh were engaged throughout the development of the CAG Plan, there were three primary public outreach phases: Listen, Check-In, and Reveal + Refine. The following sections will present an overview of all engagement activities conducted in each outreach phase. Some engagement, such as steering committee meetings and community-based outreach, spanned all three phases.

Throughout the planning process, the project team aimed to engage City of Raleigh residents and greenway users through meaningful and creative public outreach. The project team includes staff from the City's Parks, Recreation and Cultural Resources Department, along with a consulting team led by Toole Design and supported by McAdams and PEQ. The process included planning more traditional methods (e.g., steering committee, open house meetings), as well as a variety of creative, in-person engagement methods (e.g., intercept surveys, pop-up events) to reach various communities in Raleigh, particularly those who are less likely to attend public meetings. However, during the development of the CAG Plan, the COVID-19 pandemic spread rapidly throughout the United States and across the world, necessitating an immediate halt to public gatherings. This drastic change to daily life transformed the

approach to public outreach and the process of developing the CAG Plan.

Beginning in March 2020, all public engagement activities were held virtually. The planned community-based components of the CAG Plan's outreach process were changed to adjust to a new, socially distanced format. This document describes each public engagement activity that was held as a part of the initial outreach period, how it was impacted by COVID-19, and a summary of feedback received. It is organized by public engagement method: steering committee meetings, online survey, focus groups, and community-based outreach.

Steering Committee Meetings

A steering committee was formed to provide oversight, guide the CAG Plan process, and champion its ultimate success. The steering committee was composed of representatives with diverse backgrounds and interests (e.g., biking advocacy, economic development, social equity) and was supplemented by a design review team of staff from various City departments. The steering committee and design review team were involved consistently throughout the entire process, meeting with the project team at key intervals during the planning process.

Table 25: Steering Committee Members

NAME	REPRESENTING	INTEREST AREA
Alex Brissette	Oaks & Spokes	Bicycle Advocacy
Alice Johnson	Black Girls Run	Social Equity
Anya Gordon	Environmental Advisory Board	Environmental
Beverly Clark	Parks, Recreation, & Greenways Advisory Board	Recreation & Programming
Brad Johnson	Parks, Recreation, & Greenways Advisory Board	Recreation & Programming
Chris Moutos	Raleigh Downtowner Magazine	Economic Development
Christina Jones	Citizens Advisory Council	Social Equity
Crystal Melvin	National Pan-Hellenic Council Greater Raleigh Area	Social Equity
Dan Gottlieb	North Carolina Museum of Art	Art & Design/Culture
Dr. Ricky Scott	Mayor's Committee for Persons with Disabilities	Social Equity
Dwight Otwell	Bicycle and Pedestrian Advisory Commission	Bicycle Advocacy
Elanor Sykes	Black Girls Run	Social Equity
Heather Monackey	WakeMed	Health/Fitness
Jason Knight	Black Men Run	Social Equity
Jennifer Wagner	Parks, Recreation, & Greenways Advisory Board	Recreation & Programming
John A. Vine-Hodge	NCDOT	Transportation/Regional Planning
Lydia Cleveland	NCDR	Public/Private Partnerships
Molly Stuart	Urban Land Institute	Economic Development, Public/Private Partnerships
Nick Neptune	Bicycle and Pedestrian Advisory Commission	Bicycle Advocacy
Natalie Ridout	Raleigh Chamber of Commerce	Regional Planning
Stephen Sposato	Wake County Public School System	Bicycle Advocacy
Susan Hatchell	Bicycle and Pedestrian Advisory Commission	Bicycle Advocacy

Table 26: Design Review Team Members

NAME	CITY DEPARTMENT	SERVICE UNIT
Ainsley Worrell	Parks, Recreation and Cultural Resources	Park Programs
Anthony McLamb	Parks, Recreation and Cultural Resources	Natural Resources/Urban Forestry
Ben Brown	Engineering Services	Stormwater
Brian Smith	Parks, Recreation and Cultural Resources	Natural Resources
Cara McLeod	Parks, Recreation and Cultural Resources	Park Development and Communications
Lorraine Eubanks	Development Services	Business Support
David Bender	Parks, Recreation and Cultural Resources	Greenway Planning
David Hamilton	Parks, Recreation and Cultural Resources	Greenway Maintenance
Donald Belk	Planning and Development	Comprehensive Planning
John Sorrell	Development Services	Public Utilities
Karli Stephenson	Planning and Development	Urban Design Center
Kris Nikfar	Parks, Recreation and Cultural Resources	Greenway Planning
Lisa Schiffbauer	Parks, Recreation and Cultural Resources	Greenway Planning
Michael Gutekunst	Parks, Recreation and Cultural Resources	Park Development and Communications/ Technology
Nikki Speer	Parks, Recreation and Cultural Resources	Park Programs
Paul Black	Transportation	Transportation Planning/BikeRaleigh
Jeffrey Burgess	Raleigh Police Department	N/A
Greg Kingsbury	Raleigh Police Department	N/A
Shawne Anderson	Raleigh Police Department	N/A
TJ McCourt	Parks, Recreation and Cultural Resources	Park Development and Communications/ Comprehensive Planning
Sara Powers	Parks, Recreation and Cultural Resources	Raleigh Arts
Shawsheen Baker	Parks, Recreation and Cultural Resources	Park Development and Communications/ Park Planning
Stephen Bentley	Parks, Recreation and Cultural Resources	Park Development and Communications
Susan Mullins	Planning and Development	Real Estate

Meeting Dates and Brief Summary

The steering committee and design review team met together six times over the course of the project. Each meeting included a presentation that updated members on the key milestones and upcoming events, along with interactive opportunities for attendees to provide feedback. The December social event and January kickoff meeting were in-person, while meetings held after March 2020 occurred virtually via Zoom.

- Pre-Project Social Event (In-Person) – December 9th, 2019: Got to know one another, reviewed greenway history, and voted on CAG Plan goals
- Meeting 1 (In-Person) – January 15th, 2020: Reviewed project scope and timeline, discussed public outreach techniques and events, and developed project goals and objectives
- Meeting 2 (Virtual) – March 25th, 2020: Reviewed existing system review, discussed preliminary public outreach results and COVID-19 outreach Update, and discussed trail classifications
- Meeting 3 (Virtual) – September 30th, 2020: Review public outreach results, provide feedback on proposed trail classifications and draft trail project recommendations
- Meeting 4 (Virtual) – January 27th, 2021: Review work completed to date, kick-off Phase 2/Check-In outreach period
- Meeting 5 (Virtual) – April 15th, 2021: Review public outreach results, provide feedback

on proposed trail classifications and project, program, and policy recommendations

- Meeting 6 (Virtual) – August 11, 2021: Review draft Greenway Master Plan Update, interactive polling and discussion of upcoming in-person tabling events
- Meeting 7 (Virtual) - January 5, 2022: Review of minor edits to final Greenway Master Plan; Steering Committee voted to endorse the Plan to Raleigh City Council

Phase 1 Outreach Summary: Listening

The first phase of outreach focused on gaining a more comprehensive understanding of community members' experience with the CAG System to inform recommendations. Phase 1 lasted from February to August 2020 and included the following:

- Online survey
- Tabling at Raleigh Half Marathon
- Focus groups
- Community-based organization outreach
- Steering committee meetings

Phase 1 Online Survey

An online survey was developed using PublicInput.com, the City's chosen community engagement software. The survey was active between February 19th and July 31st, 2020. The email survey was heavily promoted via social media, email blasts from partner organizations, and signage along the greenway trails and on GoRaleigh buses, to ensure it was accessible to individuals across all demographics. More than 4,000 people participated in the survey, resulting in nearly 3,000 comments and opinions regarding the future of the CAG System. Questions are listed below:

In general, how often do you use the Raleigh greenway trail network? Select One

- Daily
- A few times a week
- A few times a month
- A few times a year
- Never

How do you most often access greenway trails? Select one.

- Drive
- Bike
- Walk/Wheel
- Other

The City's current definition of greenway trails requires that they only be constructed in environmentally sensitive greenway/stream corridors. Where these corridors do not exist, greenway trails cannot be built. Do you believe the City should change the definition of greenway trails

to allow their construction outside of greenway/stream corridors?

- Yes
- No

What do you believe are the top two benefits of a greenway system? Select only two.

- Transportation/connectivity to destinations
- Recreation/fitness
- Access to nature
- Habitat and environmental protection
- Economic development
- Quality of life
- Other

What are the top five factors that you believe encourage general greenway trail use? Select your top five factors and rank them in order of importance.

- More information about existing greenways
- Safe street crossings
- Proper placement of location/wayfinding signage
- Safe connections to nearby businesses and schools
- Proper placement of rest areas (e.g., picnic areas and benches)
- Safety while on the greenway trail system
- Additional amenities (e.g., restrooms, water fountains, bike repair stations)

- Physical conditions of greenway trails
- ADA accessibility
- Notification of greenway closures
- Adequate lighting
- Connections to activity centers
- Other

What are the top five factors that you believe encourage active transportation greenway trail use? Select your top five factors and rank them in order of importance.

- More information about existing greenways
- Safe street crossings
- Proper placement of location/wayfinding signage
- Safe connections to nearby businesses and schools
- Proper placement of rest areas (e.g., picnic areas and benches)
- Safety while on the greenway trail system
- Additional amenities (e.g., restrooms, water fountains, bike repair stations)
- Physical conditions of greenway trails
- ADA accessibility
- Notification of greenway closures
- Adequate lighting
- Connections to activity centers
- Other

Map-based Question - On the map provided, please use the "draw line" feature to draw any new greenway trails that you would like to see in the future (draw lines that connect existing or planned trails to destinations that are important to you).

Map-based Question - On the map provided, please use the "add point" feature to identify areas where

you believe new or additional amenities would be useful on the greenway trail system. Also, please specify which type of amenity you would like in the comment box that appears when you add a point.

Greenway Trails may be used for active transportation such as commuting to work or other non-recreational trips. What do you believe are the most important trails that should be prioritized for active transportation? Please select your top trail on the map below.

- Abbotts
- Baileywick
- Beaver Dam
- Birch Ridge Connector
- Centennial Bikeway
- Crabtree Creek Trail
- East Fork Mine Creek Trail
- Edwards Mill Connector
- Gardner Street Trail
- Hare Snipe Creek Trail
- Honeycutt Creek Trail
- House Creek Trail
- Little Rock Trail
- Marsh Creek Trail
- Martin Street Connector
- Mine Creek Trail
- Reedy Creek Trail
- Richland Creek Trail
- Rocky Branch Trail Extension
- Rocky Branch Trail

- Simms Branch Trail
- Snelling Branch Trail
- Spring Forest Trail
- Wakefield Trail
- Walnut Creek Trail
- Neuse River Trail

Please select your age group

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- Over 75
- Prefer not to say

How do you describe your race/ethnicity? Select all that apply

- Asian
- Black or African American
- Latino/a or Hispanic
- Native American Indian or Alaskan Native
- Native Hawaiian or other Pacific Islander
- White
- Prefer not to say
- Other

What gender do you identify as?

- Female
- Male
- Non-binary/third gender
- Prefer not to say
- Prefer to self-describe

What is the highest level of education you have completed?

- Some high school
- High school
- Vocational training
- Bachelor's degree
- Graduate degree
- Prefer not to say
- Other

What is your annual household income?

- Less than \$25,000
- \$25,001-\$50,000
- \$50,001-\$100,00
- \$100,001-\$200,000
- Over \$200,000
- Prefer not to say

Demographics

The following figures provide demographic information of survey participants. About 20% of respondents declined to answer the survey's demographic questions.

Figure 35: Age of Survey Respondents

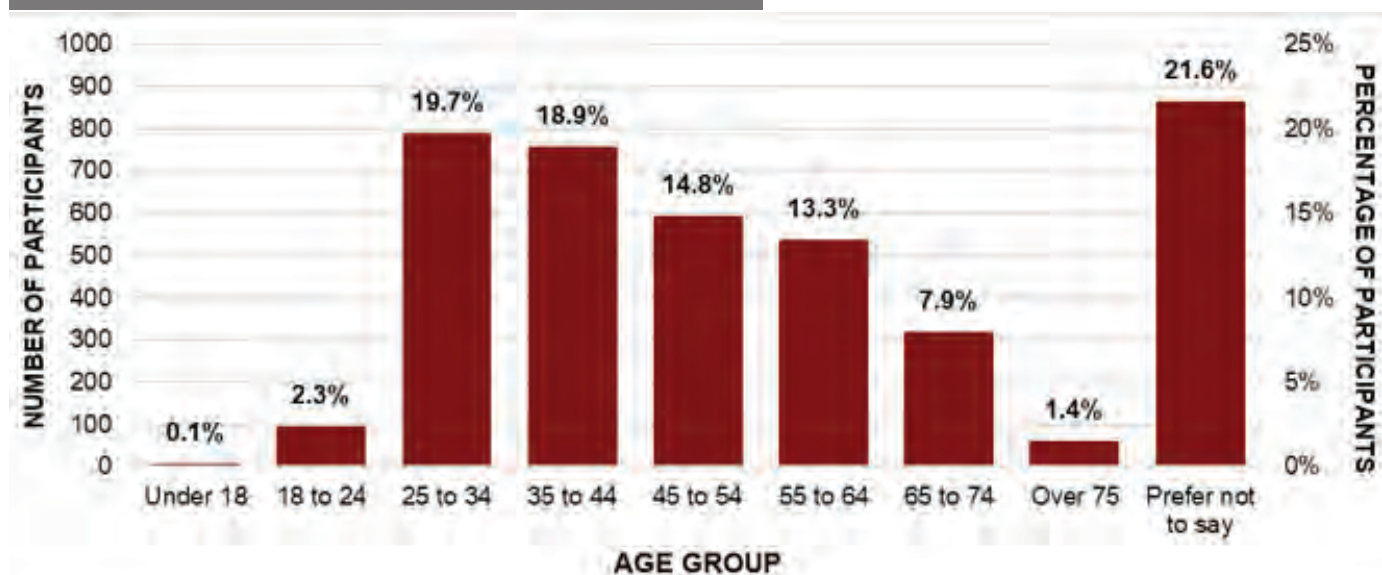


Figure 36: Gender of Survey Respondents

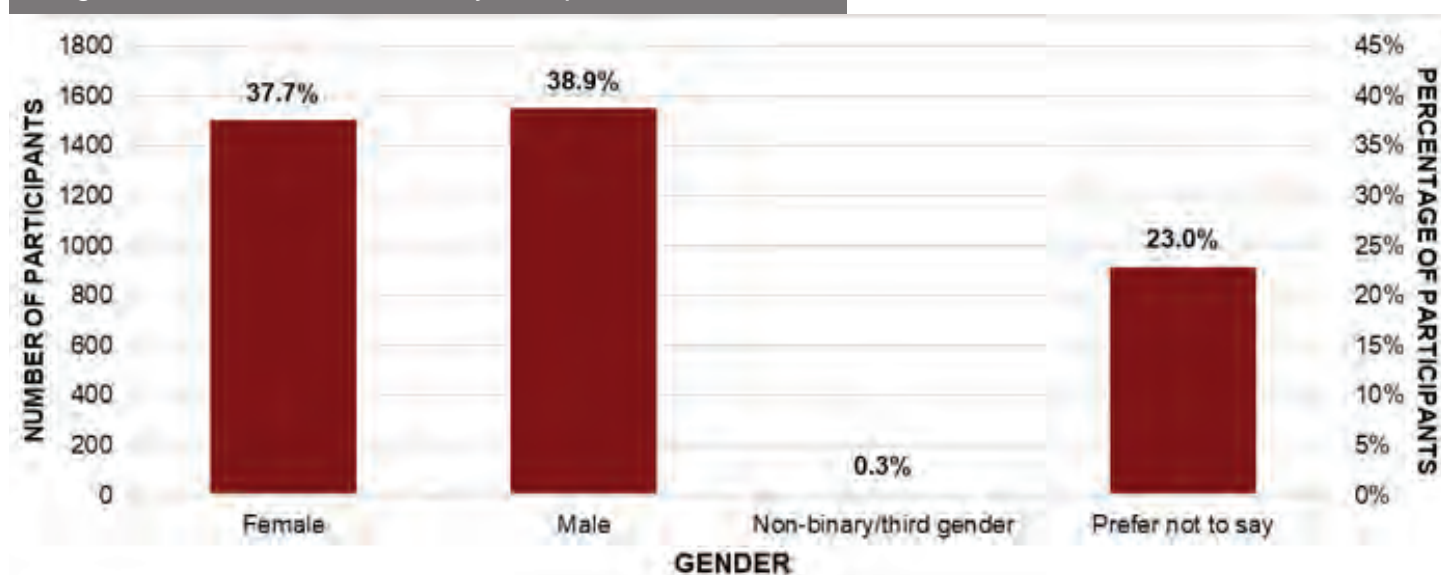


Figure 37: Race and Ethnicity of Survey Respondents

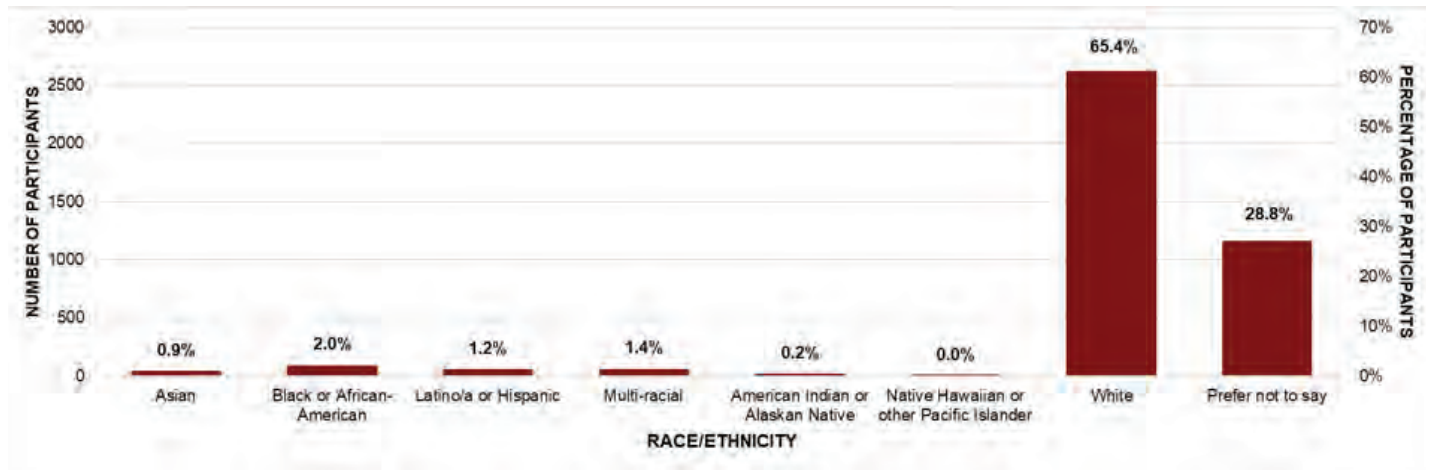


Figure 38: Education of Survey Respondents

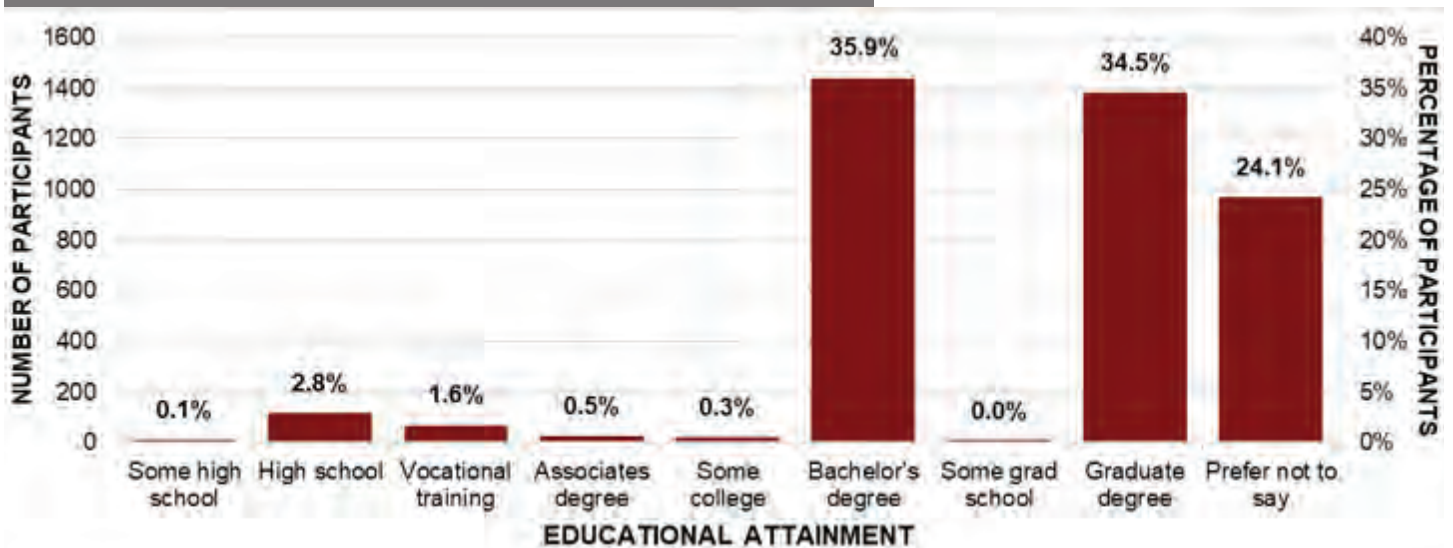
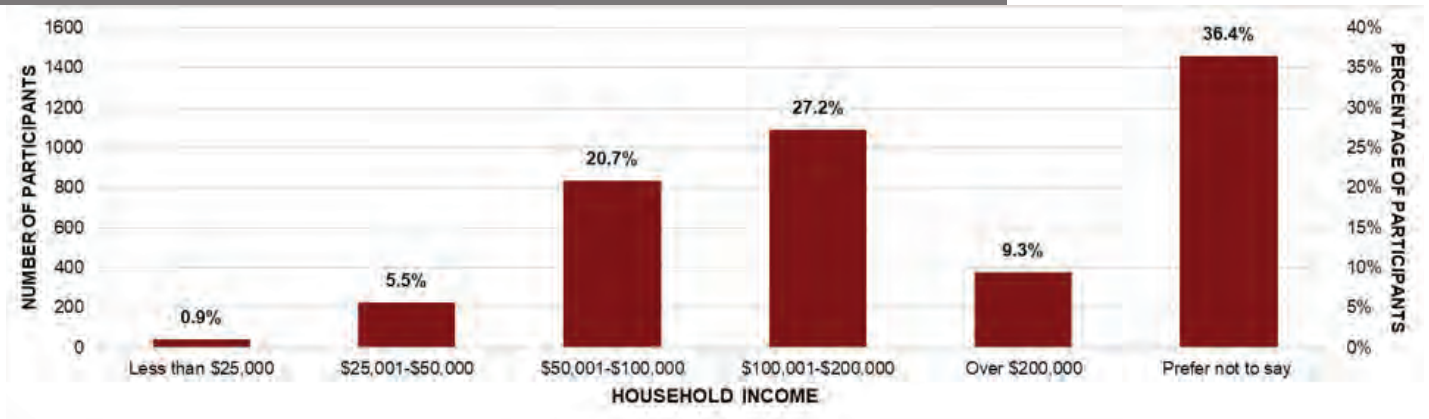


Figure 39: Household Income of Survey Respondents



Overall Themes & Findings

Survey respondents were asked several multiple choice and mapping questions with the option of leaving additional comments. The survey included interactive mapping components to allow users to identify desired greenway trail connections and amenities. An analysis of comments provided across all questions, in conjunction with locations designated through the map-based questions, revealed a variety of themes. The findings below summarize the responses to specific questions, as well as the themes extracted from survey comments.

Figure 40: How Frequently Survey Respondents Use the Greenway System

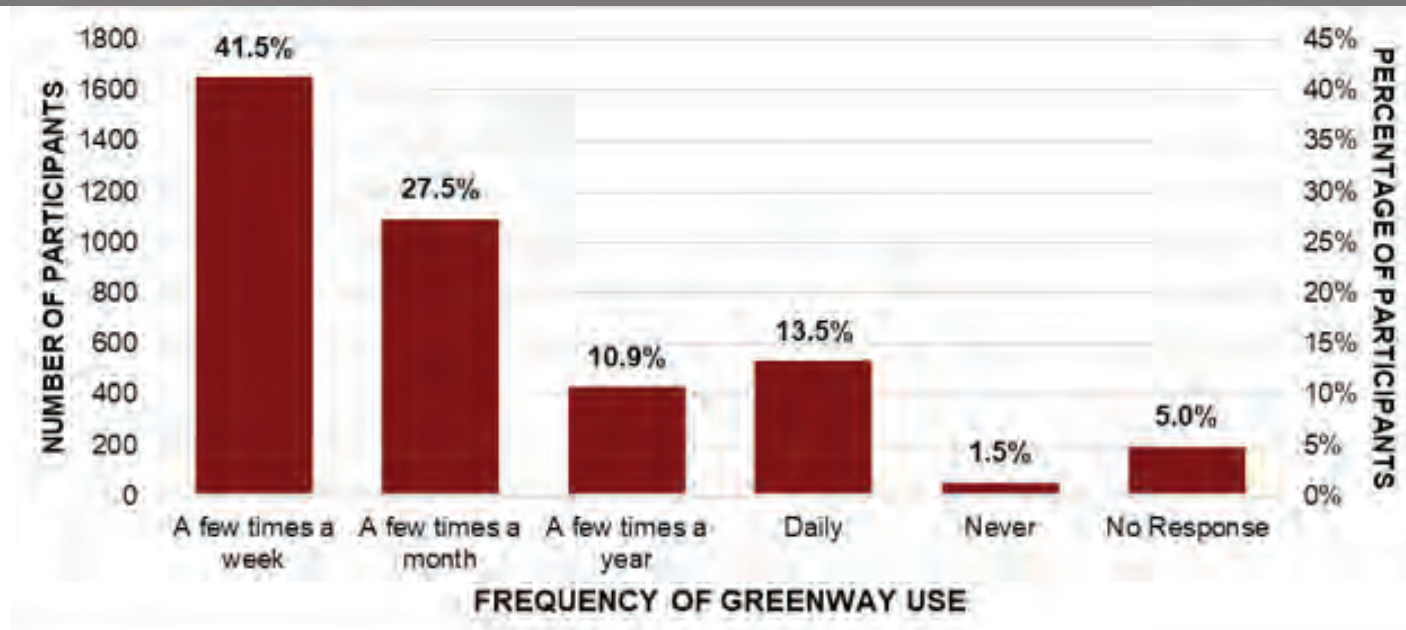


Figure 41: How Survey Respondents Travel to the CAG System

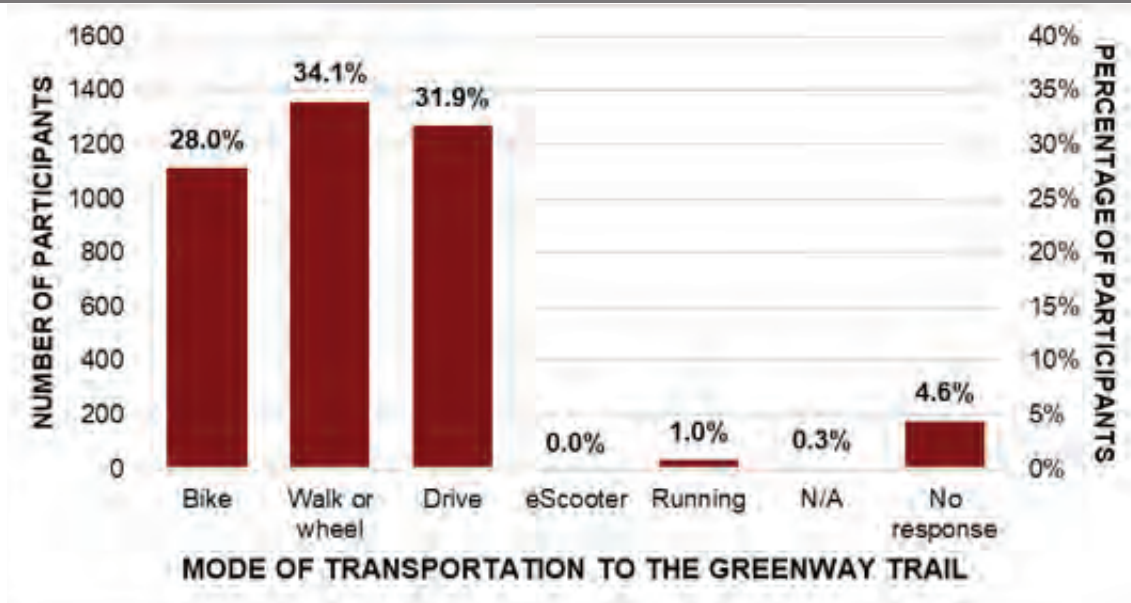


Figure 42: Support for Urban Trails

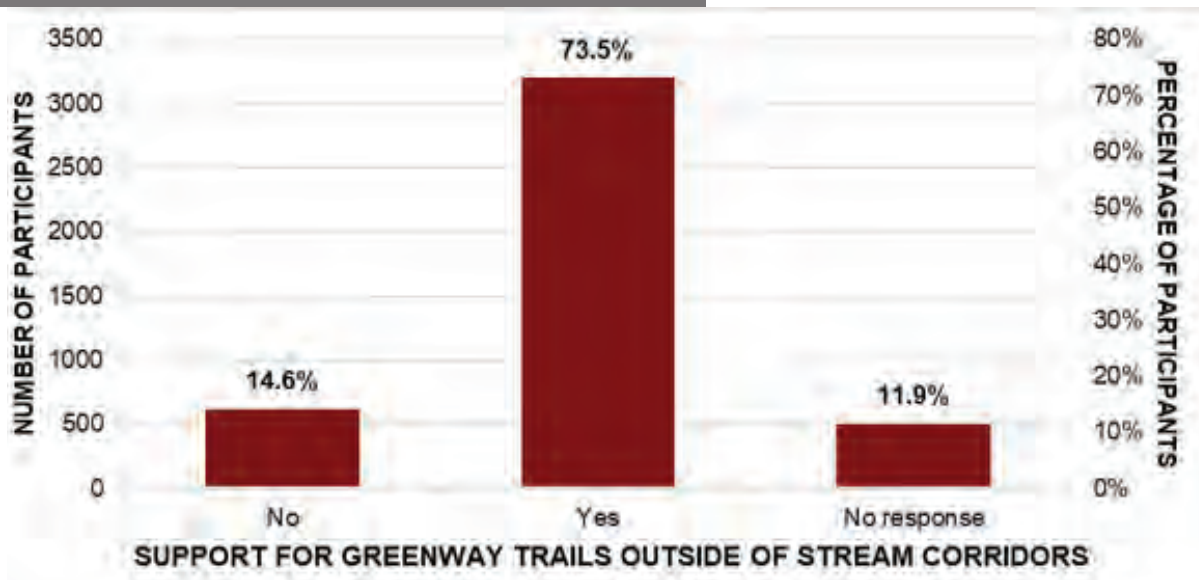


Figure 43: Respondent's Top Greenway Benefits

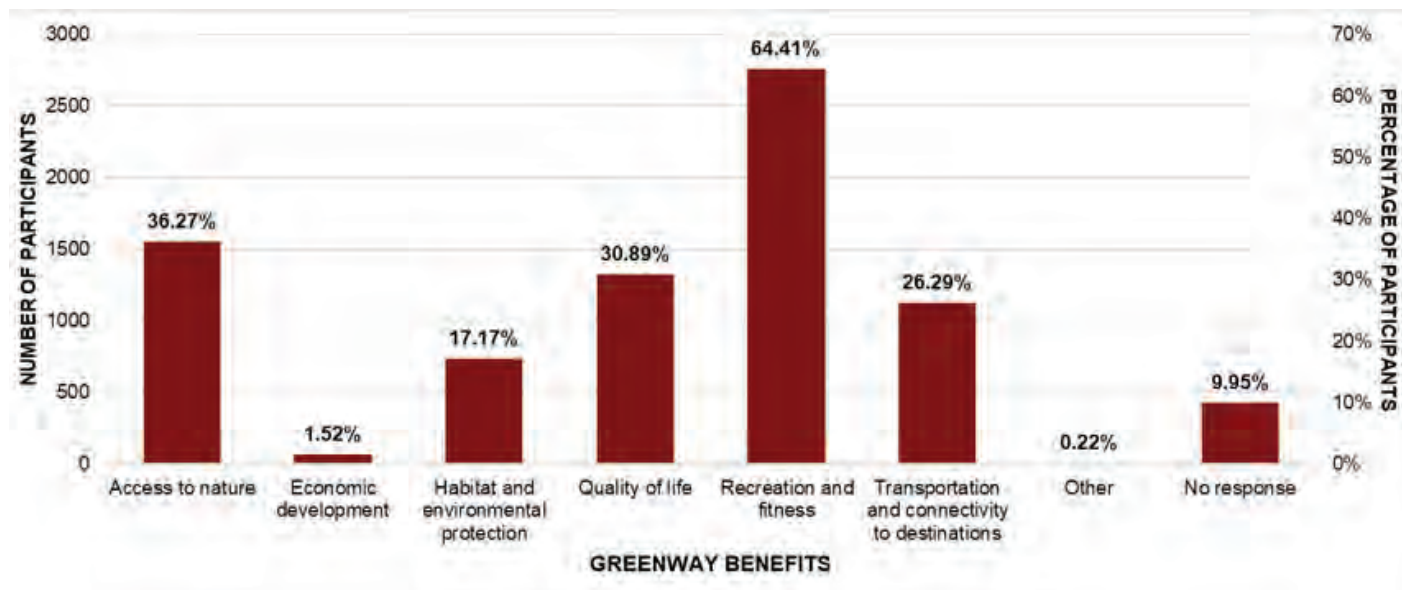


Figure 44 compares participants' responses to questions asking them to compare the top factors that encourage general greenway use with active transportation use. The top three factors participants thought encouraged general greenway use were:

- The physical condition of greenway trails
- Safety while on the trail network
- Proper placement of location/wayfinding signage

The top three factors participants thought encouraged active transportation on the trail network were:

- Physical condition of greenway trails
- Safe street crossings
- Safety while on the trail network

Participants were also asked to identify which existing greenway trails they believed should be prioritized for active transportation improvements. Just over 30% of participants selected Crabtree Creek Trail. Walnut

Creek Trail (14%), Rocky Branch Trail (13%), and Neuse River Trail (10%) were also identified by at least 10% of respondents as potential active transportation corridors. It is important to note that participants were not able to select proposed or non-existent greenway trails. Survey results and input provide insights on how planned connections into downtown and areas of the City that are currently experiencing less greenway access may also benefit from targeted active transportation investments, particularly if they are along major street corridors.

Figure 44: Factors that Encourage Greenway Use

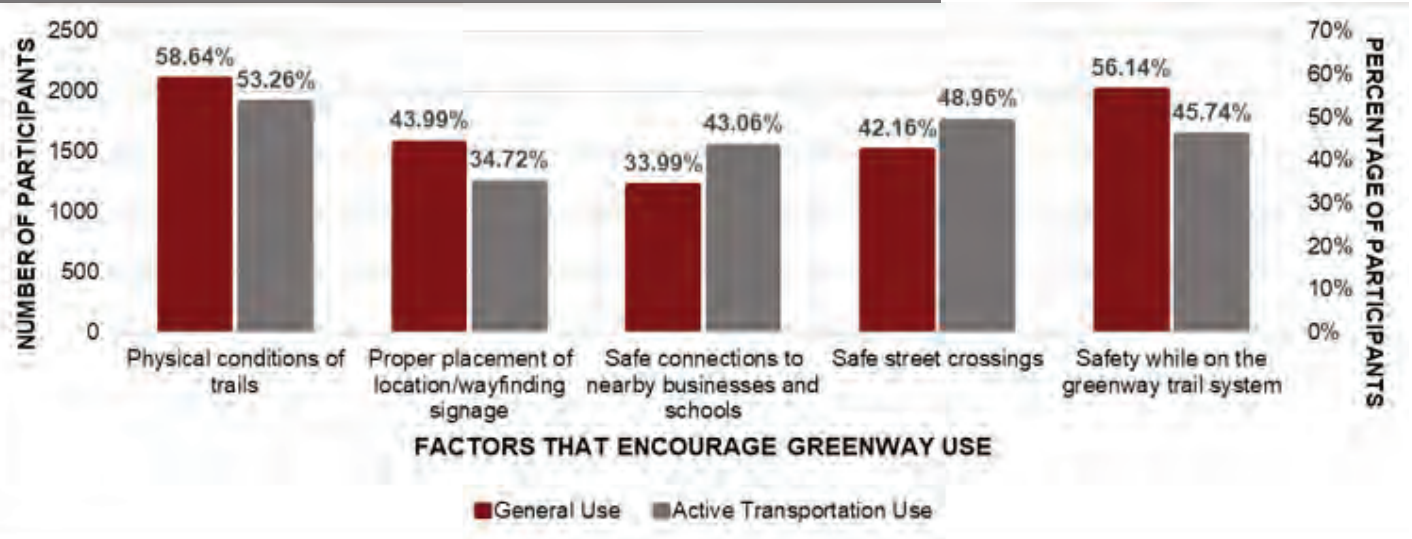


Image 66: Crabtree Creek Trail



Image 67: Rocky Branch Trail

New Connections

Using a map-based tool, participants identified areas where they would like new greenway connections.

They were also able to provide written comments to supplement the lines they drew on the map. The following themes emerged from the lines drawn and comments provided for this survey question:

STREET CROSSINGS

Respondents expressed the desire for safer ways to cross high-volume and high-speed streets. Some of these streets, such as Western Boulevard, already have greenway trails on them; many, however, do not. Multiple participants mentioned the following streets:

- Capital Boulevard (28 participants)
- Atlantic Avenue (9 participants)
- Western Boulevard (9 participants)
- I-440 (10 participants)
- Avent Ferry Road (11 participants)

In addition, multiple participants emphasized that they would like to see traffic calming measures at difficult street crossings and any at-grade street crossings of the trail network. Some proposed adding pedestrian lights, flashing lights, and greenway warning signage, as well as lowering speed limits around any proposed or existing at-grade street crossings.

CONNECTIONS TO SIDEWALKS AND BICYCLE FACILITIES

Many respondents commented that they would like to see more sidewalks and bicycle facilities that connect to existing greenways. Others also pointed

out that there should be better integration between the trail network and the on-street bicycle and sidewalk network.

CONNECTIONS TO AREAS WITHIN RALEIGH

Multiple survey participants expressed the desire for general greenway connections throughout Raleigh:

- North-South connection (18 participants)
- East-West connection (12 participants)
- South Raleigh (particularly outside of I-40) (9 participants)
- North Raleigh (particularly outside of I-440) (9 participants)
- Downtown Raleigh (30 participants)

Multiple participants stated a desired greenway connection to the following neighborhoods:

- Brier Creek (18 participants)
- Five Points (14 participants)
- Mordecai (12 participants)
- Lassiter Mill Road (15 participants)
- Brentwood (10 participants)

Multiple participants requested a greenway connection (or more greenway connections) to the following destinations:

- Umstead State Park (27 participants)
- Lake Lynn (11 participants)
- Lake Johnson (11 participants)
- Lake Wheeler (16 participants)
- Schools (25 participants)
- North Carolina State University (particularly from SW Raleigh) (18 participants)
- Dix Park (14 participants)

REGIONAL CONNECTIONS

The following regional municipalities and destinations were recommended for future greenway connections by multiple participants:

- Cary (19 participants)
- Wake Forest (8 participants)
- Garner (11 participants)

CONNECTING GAPS IN THE EXISTING TRAIL SYSTEM

Some participants also highlighted existing trails that they would like to see connected. The most popular ones were:

- Crabtree Creek to Hare Snipe Trail (6 participants)
- Crabtree Creek to Lake Lynn (3 participants)
- Crabtree Creek to Pigeon House Trail (3 participants)

- Neuse River Trail to Honeycutt Trail (3 participants)

Key Amenities

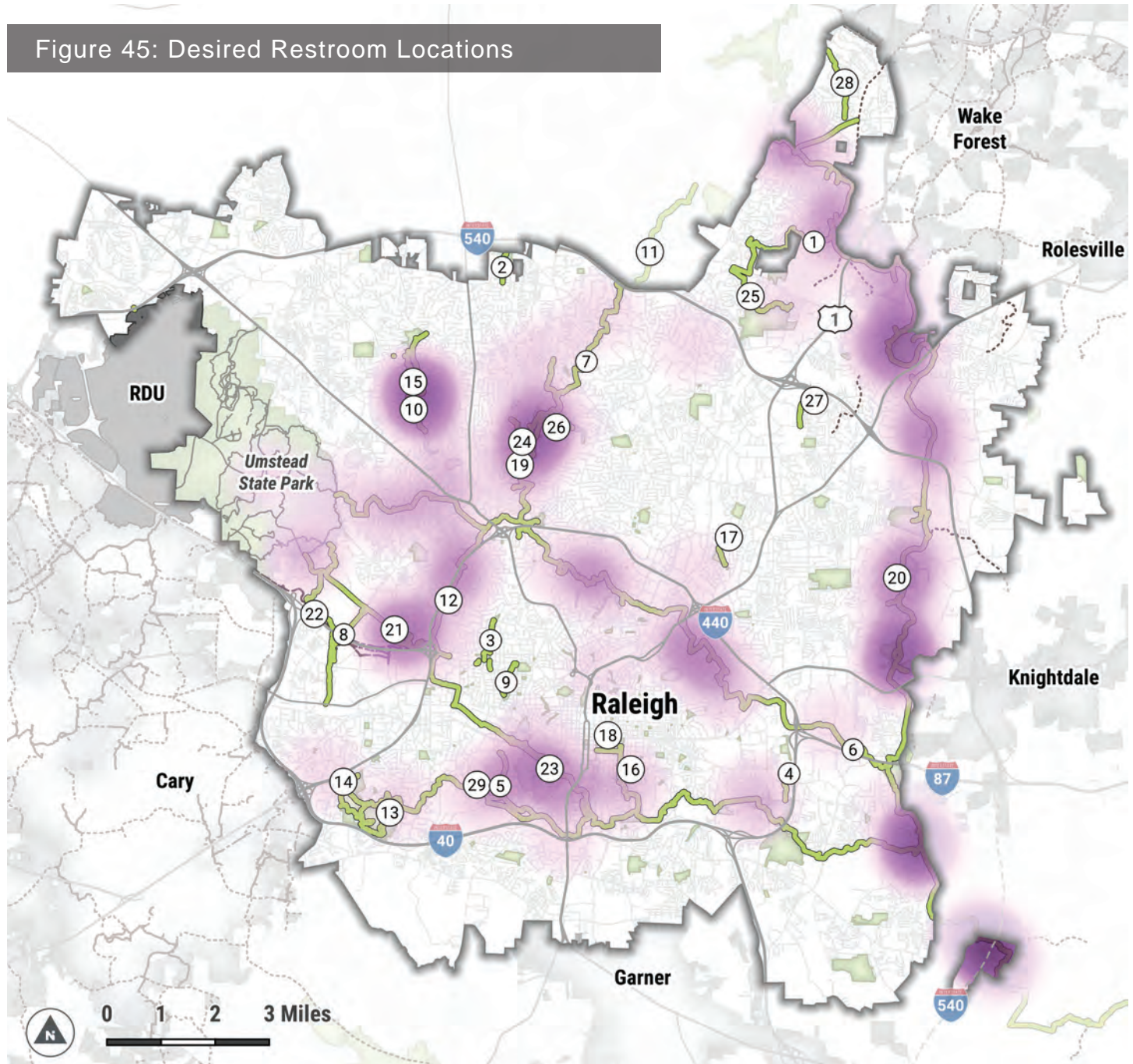
Using a map-based tool, participants identified areas where they would like more amenities along greenway trails, as well as the type of amenity they would prefer. Table 27 summarizes public feedback by type of amenity, number of comments, and any specific location identified as a “hot spot”. Heat maps (Figure 45- Figure 52) were developed for amenities that received more than 20 comments, excluding for crossing upgrades.

Table 27: Desired Amenity Type, Location, and Demand

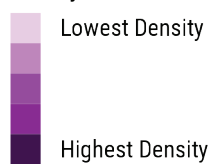
AMENITY	#	COMMENTS	AREAS OF HIGH DEMAND
Restrooms	118		<ul style="list-style-type: none"> • Neuse River Trail at Auburn Knightdale Road • Walnut Creek Trail and Neuse River Trail intersection • Neuse River Trail at Milburnie Park • Neuse River Trail at Alvis Farm • Neuse River Trail just north of I-540 crossing • Neuse River Trail at Horseshoe Farm • Shelley Lake • Lake Lynn • Reedy Creek Trail near Blue Ridge Road
Wayfinding and signage	91		<ul style="list-style-type: none"> • Little Rock Trail (entirety) • Walnut Creek Trail at Eliza Pool Park • Walnut Creek Trail from Rose Lane to Sunnybrook Drive • Crabtree Creek Trail from Raleigh Boulevard to Lockwood Park • Crabtree Creek Trail along Northampton Street • Rocky Branch Trail (entirety) • Neuse River Trail at Falls of Neuse Road
Crossing upgrades	68		<ul style="list-style-type: none"> • Rocky Branch Trail crossing S Saunders Street • Rocky Branch Trail crossing Pullen Road • Rocky Branch Trail crossing Ashe Avenue • Rocky Branch Trail crossing from north to south side of Western Boulevard • Walnut Creek Trail crossing Garner Road • Walnut Creek Trail crossing Gorman Street • Walnut Creek Trail crossing Trailwood Drive
Water fountains	45		<ul style="list-style-type: none"> • Crabtree Creek Trail near Anderson Point • Crabtree Creek Trail between Atlantic Avenue and New Bern Avenue • Crabtree Creek Trail and Mine Creek Trail intersection • House Creek Trail and Reedy Creek Trail intersection • Walnut Creek Trail near Main Campus Drive • Walnut Creek Trail near Worthdale Park • East Fork Mine Trail (entirety) • Neuse River Trail near Horseshoe Farm • Neuse River Trail near Thornton Road • Neuse River Trail near Buffaloe Road Athletic Park
Parking	31		<ul style="list-style-type: none"> • Neuse River Trail at Horseshoe Farm • Crabtree Creek Trail (proposed) at Ebenezer Church Road • Centennial Bikeway Connector at Farmers Market Drive • Walnut Creek Trail at Rose Lane • Neuse River Trail at Buffaloe Road

AMENITY	#	COMMENTS	AREAS OF HIGH DEMAND
Benches and seating	25		<ul style="list-style-type: none"> • Neuse River Trail near Louisburg Road • Crabtree Creek Trail near Lockwood Park • Intersection of House Creek Trail and Crabtree Creek Trail
Bike repair station	23		<ul style="list-style-type: none"> • Lake Johnson • Crabtree Creek Trail east of Lockwood Park • Crabtree Creek Trail west of House Creek Trail intersection
Lighting	21		<ul style="list-style-type: none"> • Crabtree Creek Trail at Creedmor Road • Walnut Creek Trail at S Saunders Street • Lake Johnson East Loop
Trash cans	20		<ul style="list-style-type: none"> • Little Rock Trail near Chavis Park • Simms Branch Trail near Hiking Trail
Vendors	18		<ul style="list-style-type: none"> • Reedy Creek Trail at Blue Ridge Road • Rocky Branch Trail at Dix Park • Neuse River Trail at Anderson Point • Neuse River Trail at the Falls Lake Canoe Launch • Neuse River Trail at Horseshoe Farm
Boat or canoe access	11		<ul style="list-style-type: none"> • Lake Lynn • Shelley Lake • Neuse River Trail near Thornton Road
Bikeshare stations	8		<ul style="list-style-type: none"> • Walnut Creek Trail between Apollo Heights and the Athletic Complex
Access point	6		<ul style="list-style-type: none"> • Tryon Road near railroad
ADA ramp	5		<ul style="list-style-type: none"> • Walnut Creek Trail and S State Street • Crabtree Creek Trail and Atlantic Avenue
Bike racks	4		N/A
Fitness park	4		<ul style="list-style-type: none"> • Crabtree Creek near Kiwanis Neighborhood Center
Mirrors	3		N/A
Playgrounds	3		N/A
Art	2		N/A
Emergency blue light system	2		N/A

Figure 45: Desired Restroom Locations

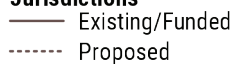


Density of Public Comments



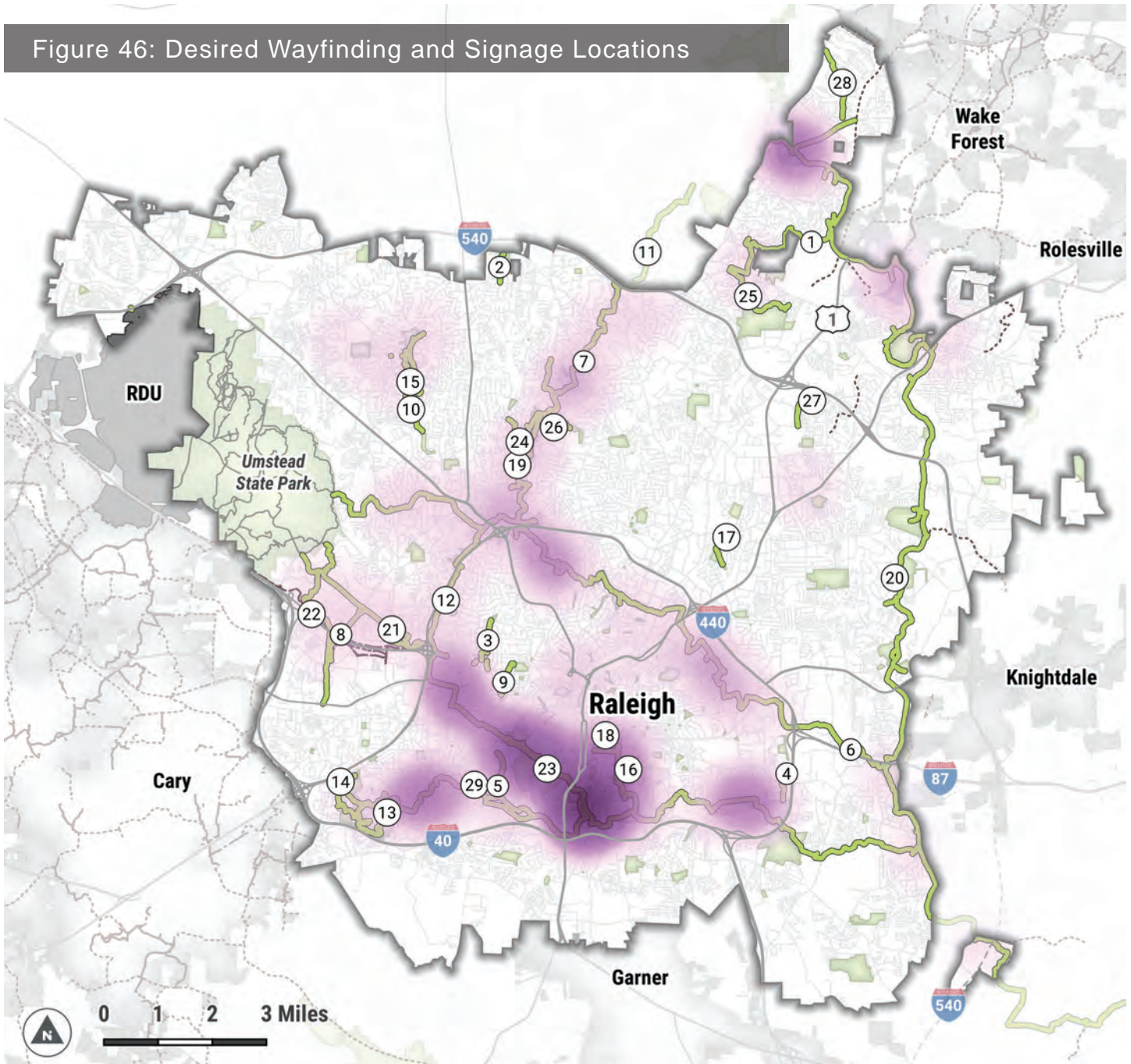
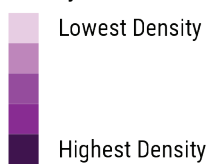
Parks

Trails in Adjacent Jurisdictions

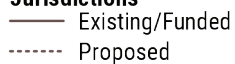


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| 8 Edwards Mill Connector | 17 Marsh Creek | 27 Spring Forest |
| 9 Gardner Street | 18 Martin Street Connector | 28 Wakefield |
| | 19 Mine Creek | 29 Walnut Creek |

Figure 46: Desired Wayfinding and Signage Locations

**Density of Public Comments**

Parks

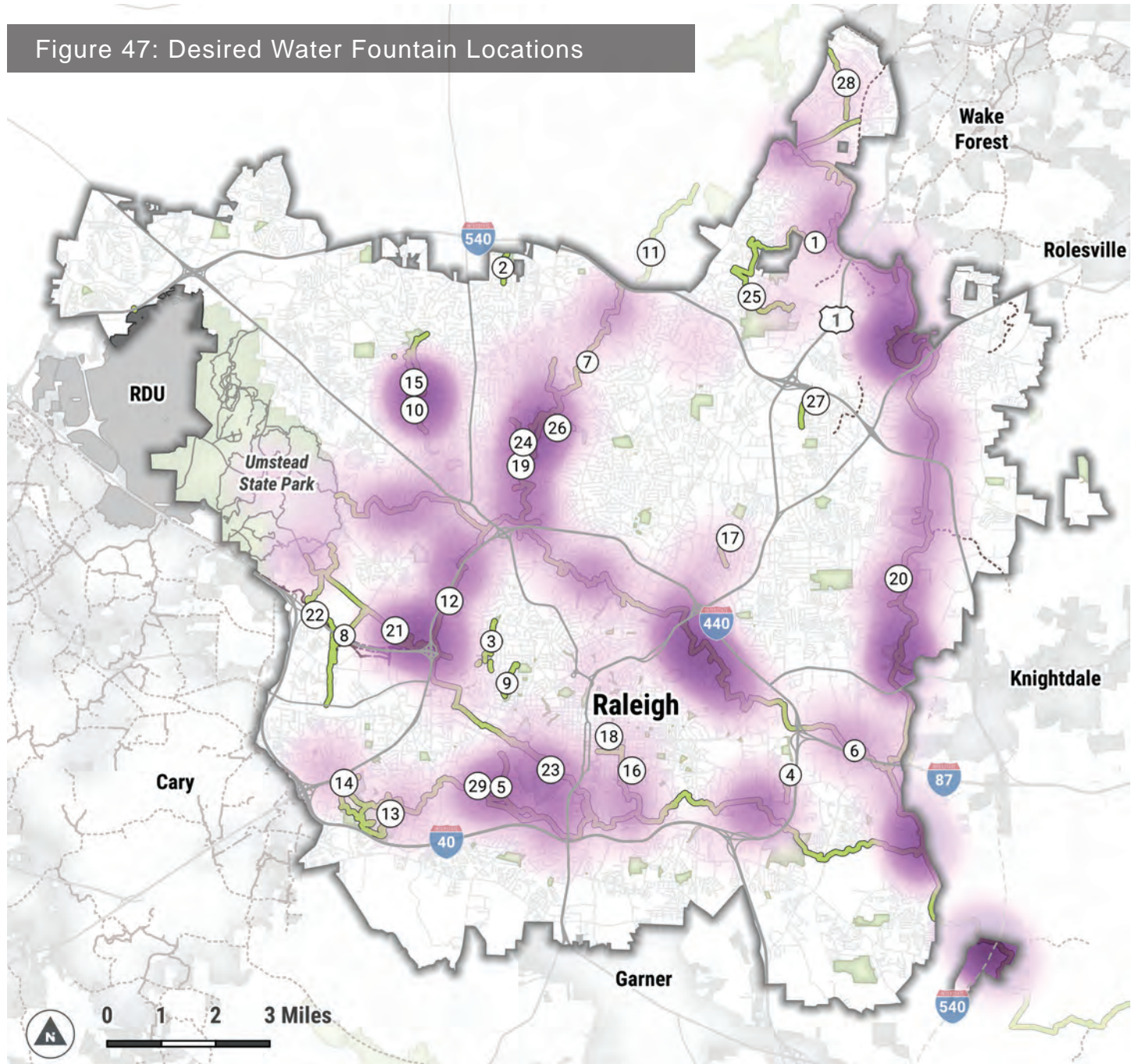
Trails in Adjacent Jurisdictions

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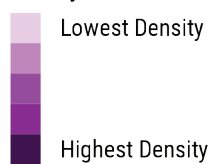
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- 24 Shelley Lake Loop
- 25 Simms Branch
- 26 Snelling Branch
- 27 Spring Forest
- 28 Wakefield
- 29 Walnut Creek

Figure 47: Desired Water Fountain Locations

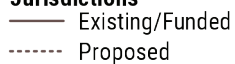


Density of Public Comments



Parks

Trails in Adjacent Jurisdictions

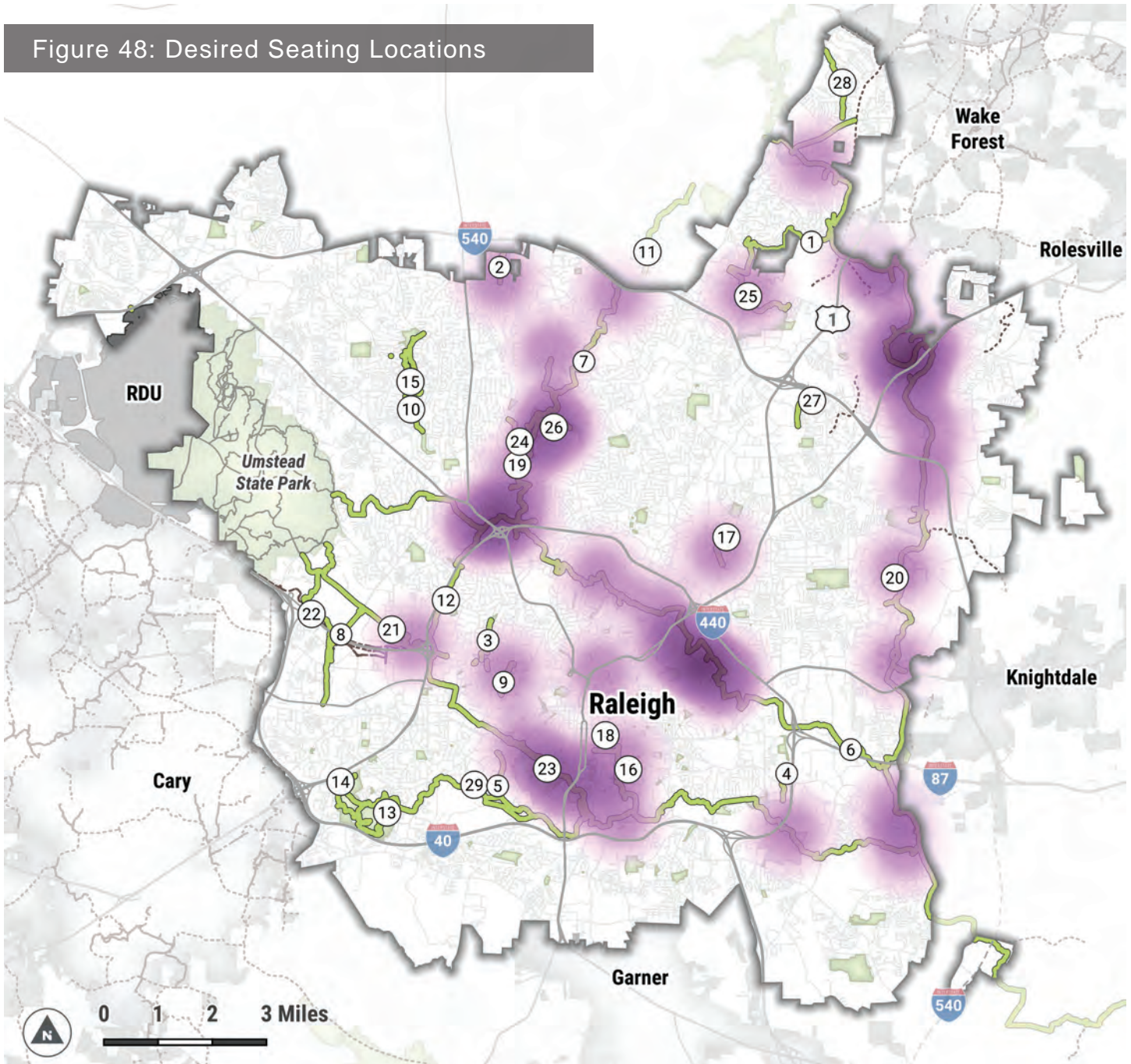


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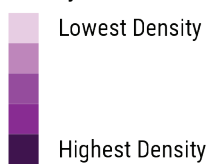
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- 24 Shelley Lake Loop
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- 26 Snelling Branch
- 27 Spring Forest
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Figure 48: Desired Seating Locations

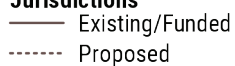


Density of Public Comments



Parks

Trails in Adjacent Jurisdictions

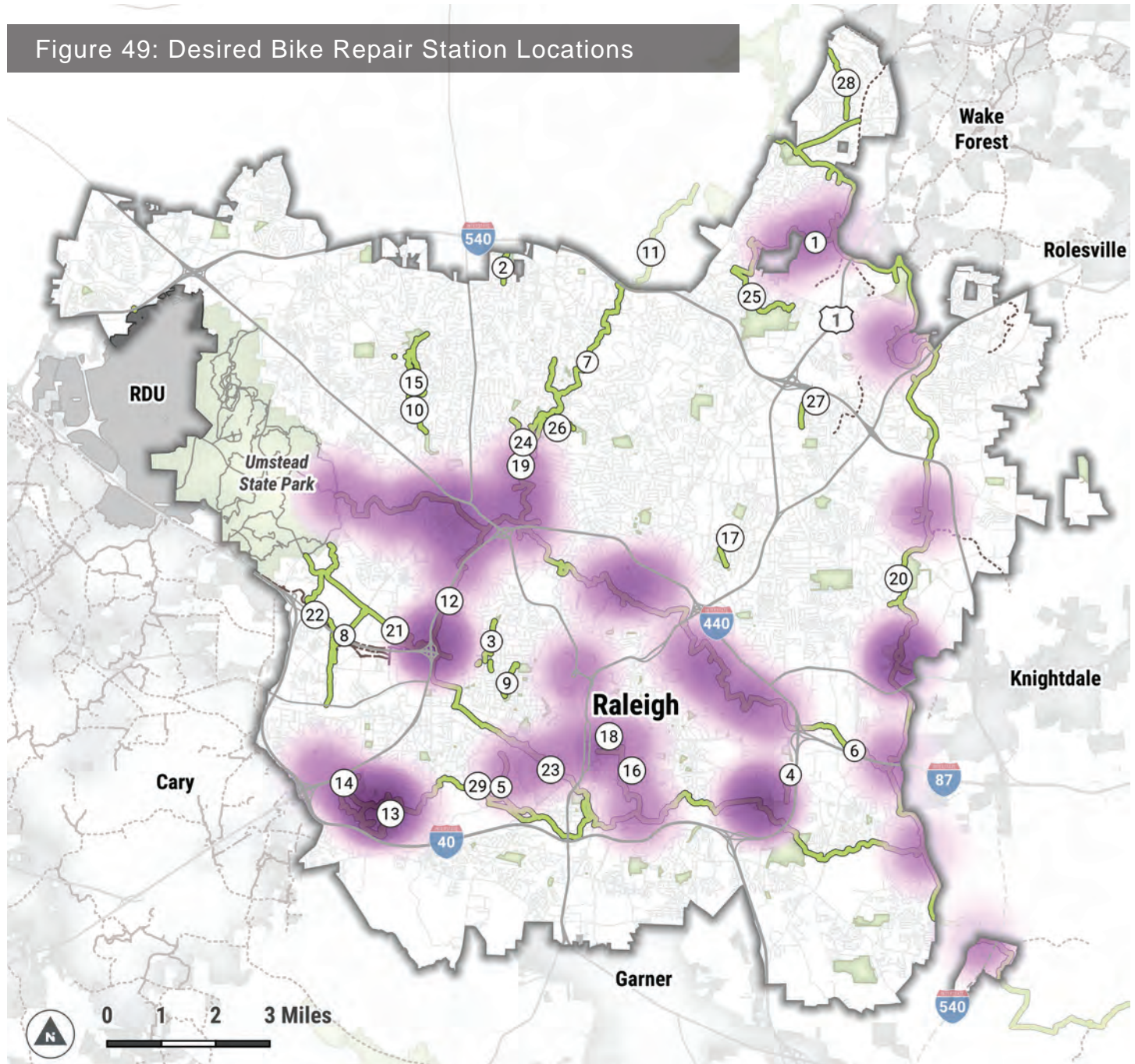


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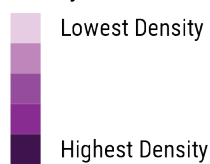
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- 29 Walnut Creek

Figure 49: Desired Bike Repair Station Locations

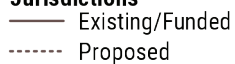


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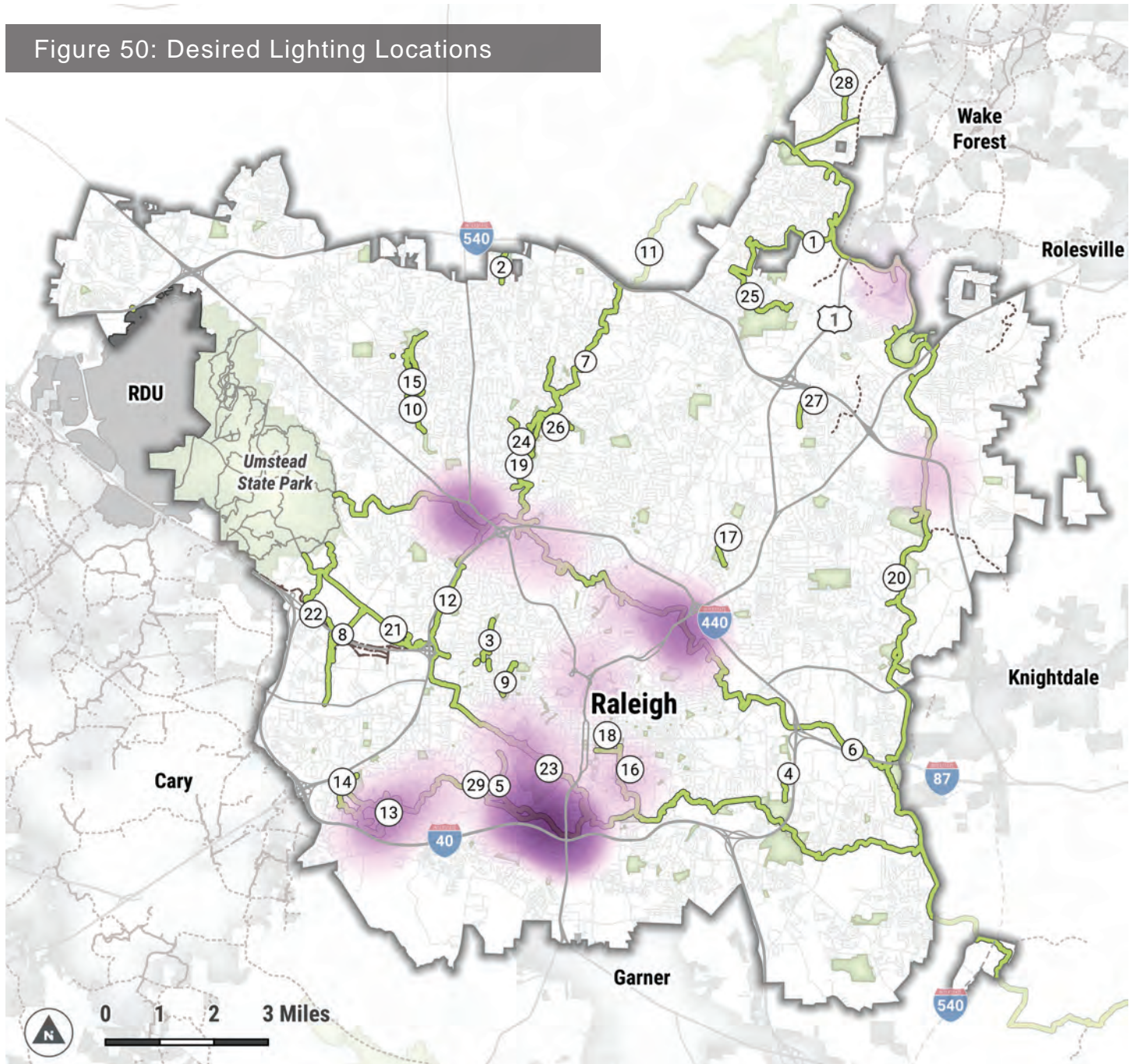
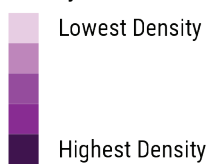
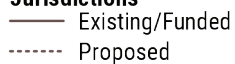
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Figure 50: Desired Lighting Locations

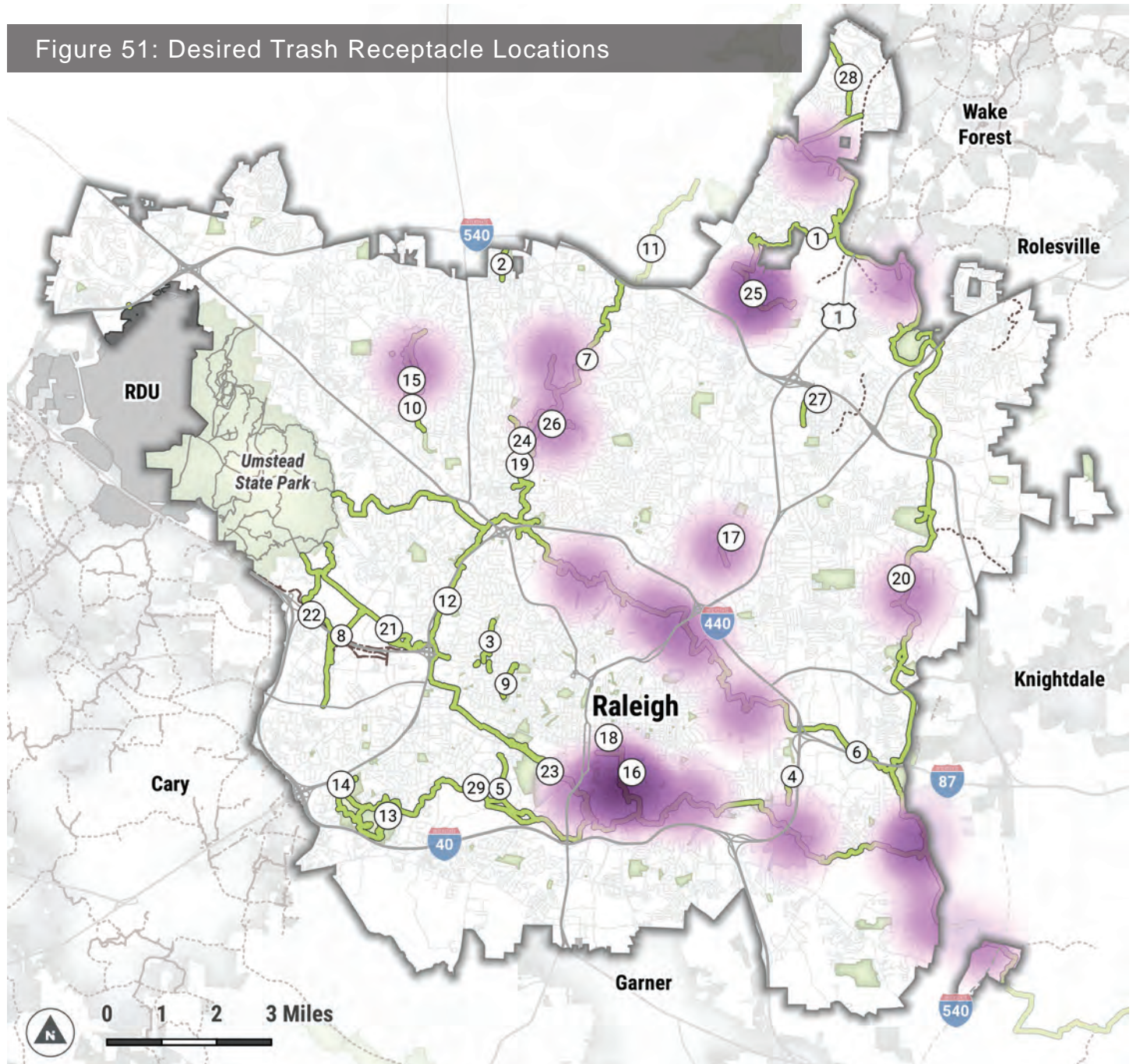
**Density of Public Comments****Parks****Trails in Adjacent Jurisdictions**

- 1 Abbotts Creek
- 2 Baileywick
- 3 Beaver Dam
- 4 Birch Ridge Connector
- 5 Centennial Bikeway Connector
- 6 Crabtree Creek
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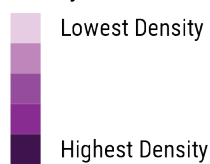
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- 29 Walnut Creek

Figure 51: Desired Trash Receptacle Locations

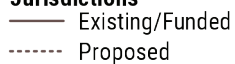


Density of Public Comments



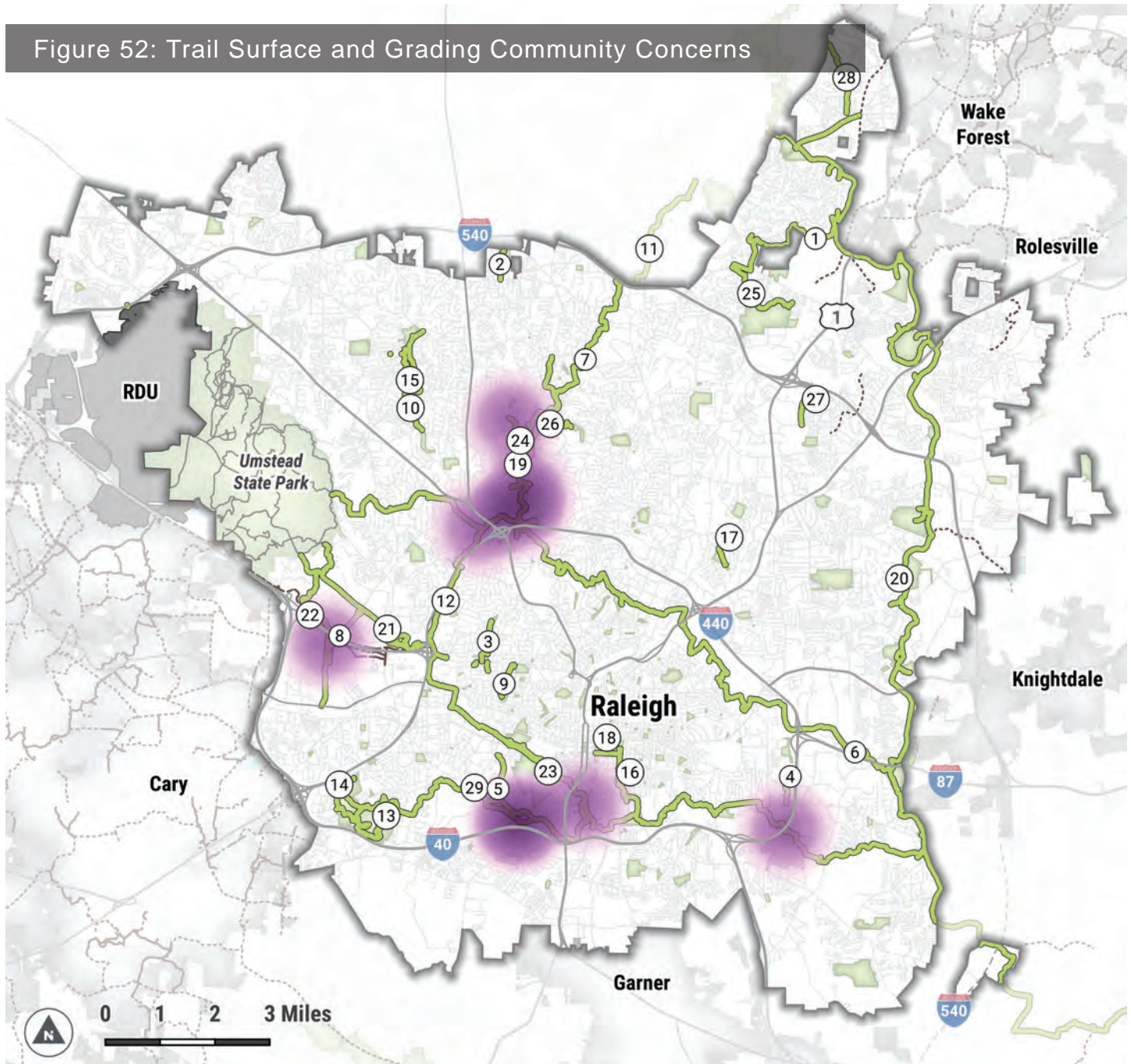
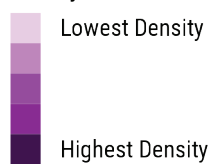
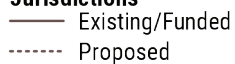
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Figure 52: Trail Surface and Grading Community Concerns

**Density of Public Comments****Parks****Trails in Adjacent Jurisdictions**

- 1 Abbotts Creek
- 2 Baileywick
- 3 Beaver Dam
- 4 Birch Ridge Connector
- 5 Centennial Bikeway Connector
- 6 Crabtree Creek
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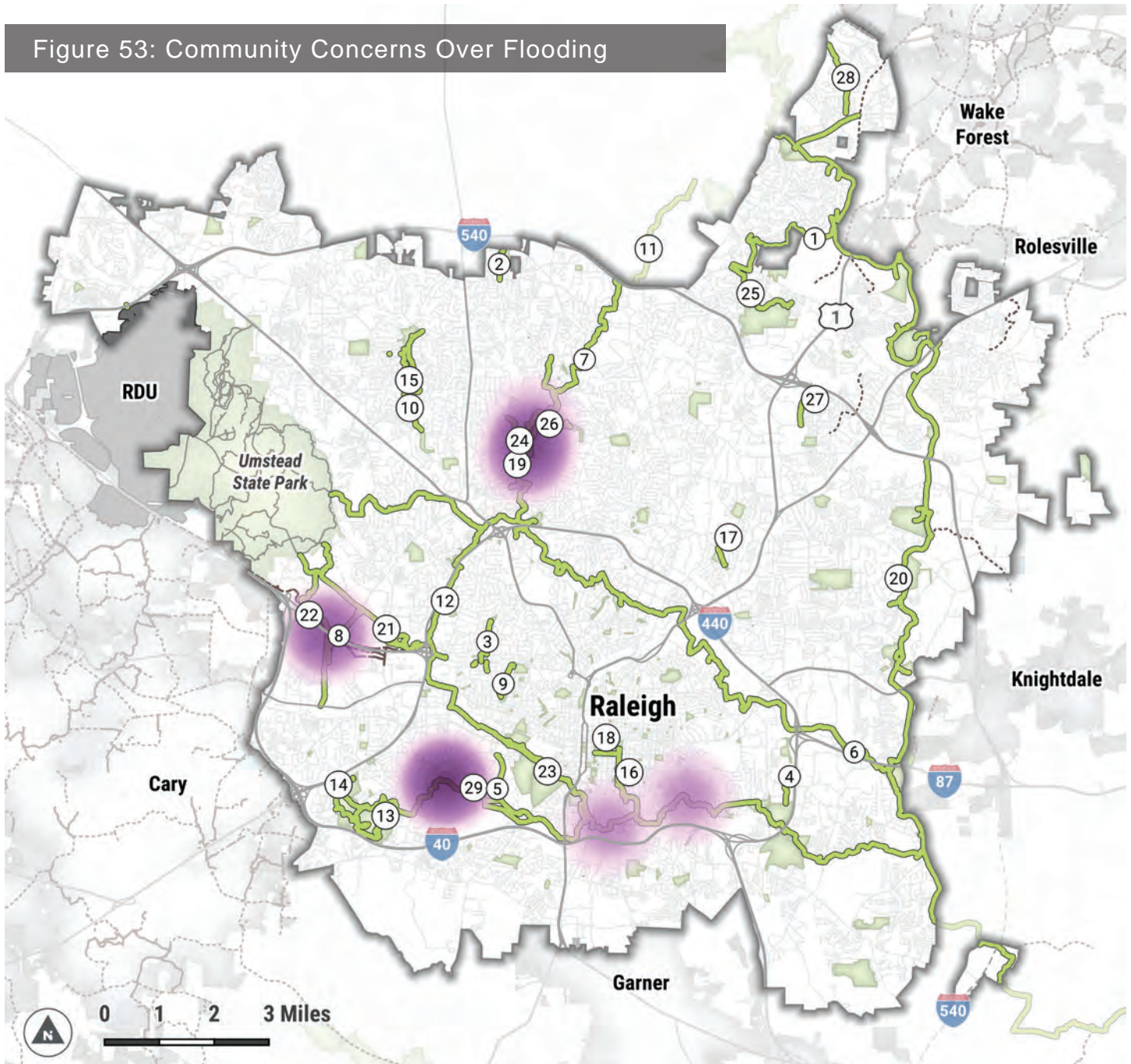
Maintenance Concerns

Throughout the survey, participants expressed a desire for better maintenance of greenway trails and improved communication about maintenance. Many requested more clean-up efforts and maintenance of existing bridge structures, as well as better trail surface quality and drainage on trails and tunnels. Multiple survey participants also suggested upgrading older trails to more current design standards, with specifics including updates to pavement surface type, width, slope, and/or drainage mechanisms of trail design. Some participants used the map-based questions to specify greenway trail areas where they would like more maintenance efforts. Figure 53 shows locations of public comments focused on flooding, and Figure 54 highlights all other maintenance-related comments received. Table 28 summarizes the type and number of maintenance comments received, as well as any areas of high demand.

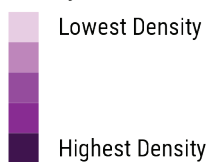
Table 28: Maintenance Concerns, Demand, and Locations

MAINTENANCE CONCERN	# COMMENTS	AREAS OF HIGH DEMAND
Bridge repair/ replacement	28	<ul style="list-style-type: none"> Near Crabtree Creek Trail and Mine Creek Trail intersection Sharp turn on Crabtree Creek Trail just north of Capital Boulevard underpass
Flooding	12	<ul style="list-style-type: none"> Walnut Creek Trail near Avent Ferry Road Mine Creek Trail around Shelley Lake Walnut Creek Trail at Apollo Heights Walnut Creek Trail at Hammond Road Richland Creek Trail at Wade Avenue
Faster maintenance	9	<ul style="list-style-type: none"> Crabtree Creek Trail near Mine Creek Trail intersection
Trail surface and grading	9	<ul style="list-style-type: none"> Richland Creek Trail near Edwards Mill Road Mine Creek Trail west of Rushingbrook Drive Crabtree Creek Trail just south of I-440 Mine Creek Trail near Generation Drive Mine Creek Trail near Ludwell Branch Court Crabtree Creek Trail at Hertford Street Walnut Creek Trail and Rocky Branch Trail intersection
Cleanliness	3	<ul style="list-style-type: none"> Crabtree Creek Trail near Milburnie Road
Tunnel lighting	3	<ul style="list-style-type: none"> Rocky Branch Trail at S Dawson Street Walnut Creek Trail at S Saunders Street Walnut Creek Trail at Lake Wheeler Road

Figure 53: Community Concerns Over Flooding





Density of Public Comments



 Parks

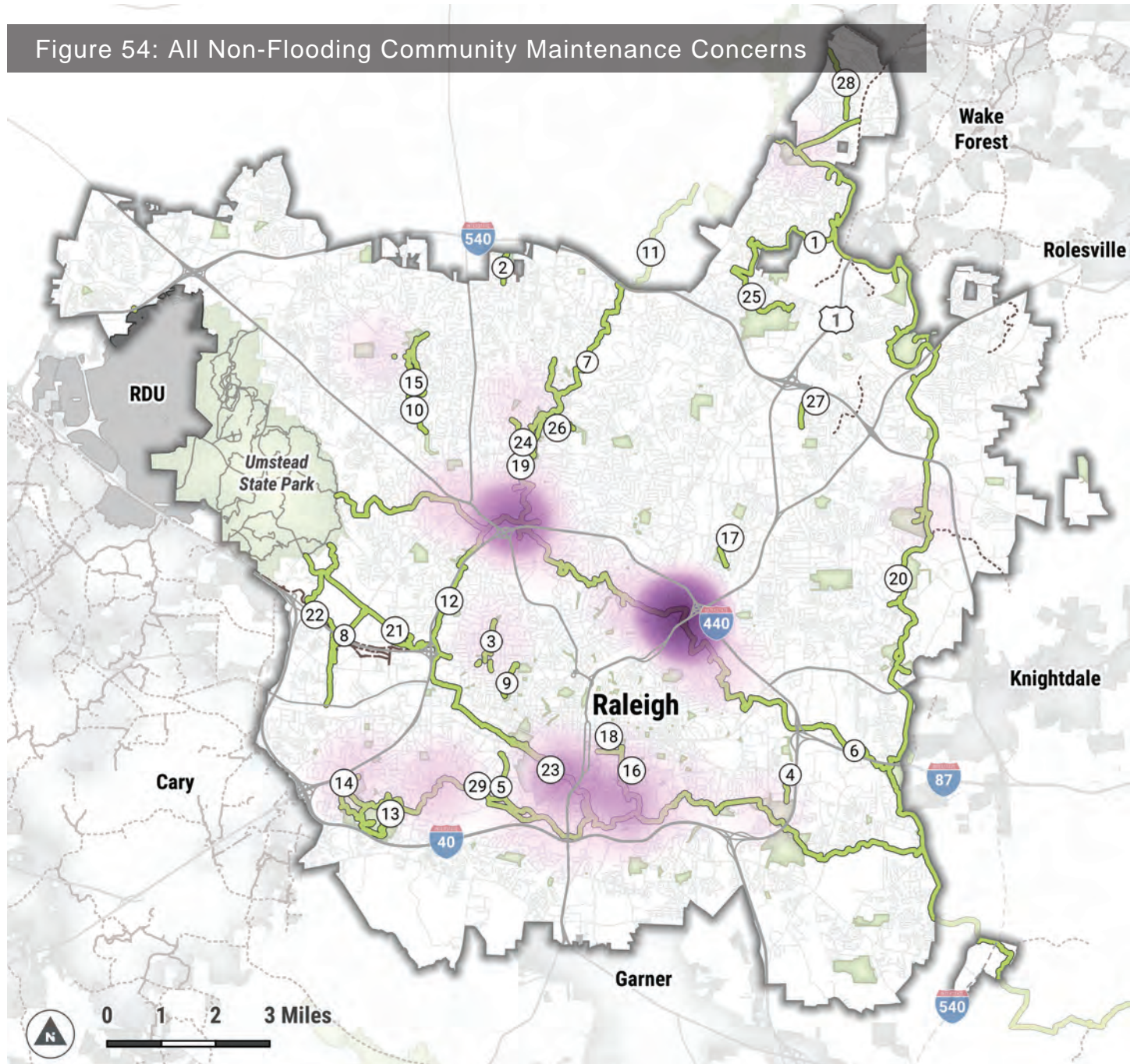
Trails in Adjacent Jurisdictions

 Existing/Funded

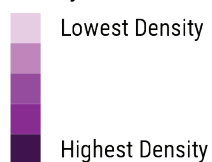
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| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
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Figure 54: All Non-Flooding Community Maintenance Concerns



Density of Public Comments



Parks

Trails in Adjacent Jurisdictions

— Existing/Funded
 - - - - - Proposed

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| 1 Abbotts Creek | 10 Hare Snipe Creek | 20 Neuse River |
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| | 19 Mine Creek | 29 Walnut Creek |

Focus Groups

Between March and August 2020, 14 targeted focus groups were held with the following key groups of greenway stakeholders:

- City of Raleigh Staff (three focus groups), in which the following service units were represented
 - Parks, Recreation and Cultural Resources
 - Greenway Planning
 - Natural Resources
 - Park Programs
 - Park Development and Communications/ Comprehensive Planning
 - Park Development and Communications/Technology
 - Raleigh Arts
 - Engineering Services Department
 - Stormwater Unit
 - Public Utilities
 - Transportation
 - Planning and Development
 - Comprehensive Planning Service Unit
 - Real Estate Service Unit
 - Urban Design Center Service Unit
- Neighboring Community Partners (two focus groups), in which the following partners were represented:
 - Triangle J Council of Governments
 - Research Triangle Park
 - Town of Knightdale
 - Wake County
 - Town of Rolesville
 - Town of Wake Forest
 - Town of Clayton
 - Capital Area Metropolitan Planning Organization
 - Raleigh-Durham Airport Authority
 - Town of Cary
 - Town of Fuquay-Varina
 - Town of Apex
 - Bicycle and Pedestrian Advisory Commission (BPAC) (two focus groups)
 - Bicycle and Run Groups (one focus group), in which the following organizations were represented
 - Oaks and Spokes
 - Raleigh GallowayNC State Parks Staff (one focus group)
 - Development Community (two focus groups)
 - Parks, Recreation and Greenway Advisory Board (PRGAB) (three focus groups)

The City of Raleigh provided contact information for participants identified to be invited to take part in the following focus groups: City of Raleigh Staff, Neighboring Community Partners, Bicycle and Pedestrian Advisory Commission, NC State Parks Staff, Parks, Recreation and Greenway Advisory Board, and Developers. Potential participants for bicycle and run clubs were identified through a search of bicycle/run advocacy groups, Meetup groups, and clubs. This list was provided to the Bicycle and Pedestrian Advisory Commission for their review. While more than 30 organizations were invited to participate in bicycle/run club focus groups, only two organizations participated. A few potential reasons for this low participation rate may include:

- Messages to Meetup groups may have been flagged as spam
- Some organizations only had a generic 'info@' email address that may have not reached the appropriate organization contact.
- For many, it was difficult to balance advocacy and extracurricular efforts with family and work responsibilities during the COVID-19 pandemic.

Invitees were sent a Doodle poll with a variety of date and time options, including business and evening hours. Multiple focus groups were organized to provide invitees with options for participation. Focus groups were held virtually over the Zoom meeting platform. Questions asked during the focus groups were tailored to the stakeholders present and their relationship to the CAG System and are listed below.

Questions for all focus groups:

- What is great vs. not great about the greenway system?
- What are the biggest opportunities for the greenway system in the future?
- What can be done to enhance the user experience on the greenway system?
- What special issues should we be aware of as we complete the Greenway Master Plan Update?
- From your perspective, what should be the City's top priorities for providing and managing the greenway trail system?
- Which planned greenway trail facilities should the City focus on designing and constructing over the next 5 to 10 years, 10 to 20 years and beyond?
- Is there anything else you would like to share that hasn't been covered already?
- What do you see as the biggest obstacles and constraints currently facing the greenway system that should be addressed?

Questions specifically for developers:

- What specific obstacles are preventing the Capital Area Greenway system from achieving its full [tourism/ economic development] potential?
- Whether the UDO requires the dedication of greenway or not, what would incentivize you to include greenway dedication and/

or construction in your projects?

- What market influences should we be aware of that could influence greenway development in the future?

Questions specifically for mobility advocates and run/bike clubs:

- How can safety be increased on your way to greenway trails?
- How can safety be increased while you are on greenway trails?
- What makes a greenway trail feel more accessible to you?

While each stakeholder group maintains a unique perspective on the CAG System, many common themes emerged across the focus groups.

Community Asset

“The Capital Area Greenway System is the City’s largest park.”

In general, participants felt that Raleigh’s residents and visitors enjoy the CAG System. They pointed to the miles of trails and ability to connect with the environment and escape vehicular traffic as things that are well-regarded about the system. Others identified the following as reasons people enjoyed the trail network:

- It is close and convenient to some neighborhoods in the city.
- The trails provide an opportunity for social interaction.

- One can partake in many different types of activities along the greenway.
- The trails are beautiful.
- Raleigh’s legacy as a leader in greenway trail development makes residents proud.

Some felt that more aggressive marketing efforts should be employed to attract more tourism opportunities and leverage the trail network as a selling point for future residents. Others wanted to use the trail network’s status as a community asset to help developers realize their value and inspire a desire to contribute to the system’s expansion by building more trails.

Connectivity

“Gaps, temporary or permanent, have a dramatic impact on usability.”

The trail network’s connectivity—or which parts of the city and region it touches—was a common theme across focus groups. Many stakeholders discussed areas they felt were not reached by the trail network or where there were significant gaps in connectivity. Within the City of Raleigh, many pointed to downtown, lower-income neighborhoods, communities of color, and Southeast Raleigh as areas with perceived gaps in the trail network. Brier Creek was also mentioned as an area of the city that needed more access to the trail network. Outside of the city, stakeholders emphasized the importance of regional connections and partnerships, particularly to/with Wake Forest and Cary.

Expansion into these areas was highlighted as a key opportunity for the future of the trail network. In prioritizing planned greenway facilities, the following specific greenway trail projects were mentioned by at least two focus group participants:

- Hare Snipe Creek Trail to Crabtree Creek Trail
- Pigeon House Branch connecting into downtown
- Linking Neuse River Trail to Mine Creek Trail
- Multiple connections to Walnut Creek Trail (including Barwell Road, Buck Jones Road, downtown Cary, downtown Raleigh)

In addition, a few participants pointed to the lack of connections with commercial, retail, and entertainment destinations as a drawback of the trail network. Connecting the trail network into downtown Raleigh was mentioned in every focus group. Some participants proposed trail-oriented development, temporary vendors (e.g., food trucks), or programming (e.g., rock climbing walls) along trails as a way to supplement connections to commercial areas, incentivize more users, enhance the user experience, and better connect greenway users to a variety of experiences. Another participant suggested creating “miniature destinations” at targeted greenway access points rather than along the trails, as to provide these amenities while maintaining the integrity and natural environment of the greenway trails.

Envisioning the greenway as a channel for transportation, in addition to recreation and environmental stewardship, was another key

component of the conversation around connectivity. Ensuring that greenway trails can serve as transportation corridors that connect people to where they live, work, and play was emphasized. Some participants advocated for a new “urban trail” designation for trails in a more urban context. Participants expressed that while greenway trails should certainly strive to connect these places, it is also important for the trail network to be integrated with sidewalk and on-street bicycle facilities. This is covered in more detail under the “Accessibility” Section.

Funding

“We need to elevate the status of greenways.”

Stakeholders across focus groups expressed concerns over limited funding for the CAG System. Many felt that the City should allocate more funding specifically to the CAG System and advocated for greenway construction and maintenance to be recurring line items in the City budget. They expressed a desire for more consistent dedicated funding streams for ongoing greenway maintenance. In addition, some mentioned a need for funding to upgrade existing facilities to present-day design standards. Others felt that a wider variety of funding mechanisms should be explored, particularly opportunities through third parties. The following opportunities were suggested by stakeholders:

- Adopt-A-Trail program that goes beyond litter removal and requires funding elements of trail or amenity construction and/or maintenance

- Developer incentives for developer-built greenway trails
- Bicycle purchase tax
- 1-3 cent tax increase
- Non-profit organization or conservancy for the purpose of fundraising for the CAG System

All stakeholders recognized the constraints that limited funding placed on the CAG System. Many expressed that they wanted the City to prioritize projects that are efficient given limited resources that offer “the best bang for their buck.”

Accessibility

“Getting to them can be a challenge. When you’re with your kids, you think twice about crossing busy and dangerous roads.”

The ability for people—particularly those walking, wheeling, or bicycling—to reach the trail network, as well as the accessibility of the trail network for people with disabilities, was important to stakeholders. Many focus group participants emphasized the need to drive to greenway access points due to non-existent, incomplete, uncomfortable, or unsafe infrastructure for people walking, bicycling, and taking transit. The lack of a robust sidewalk and bikeway network around greenway access points was identified as a key barrier for people walking and bicycling to the trail network. Many participants proposed future bikeway connections to the trail network that emphasize safety and user comfort by separating bicyclists

from roadway users (e.g., separated bicycle lanes, sidepaths). Others suggested making more neighborhood bikeways through residential, lower-trafficked streets to connect to greenway access points. More dedicated space and designing facilities for all ages and abilities was a clear priority in increasing bicyclist access to the trail network. Even still, the importance of integrating the trail network with the existing bicycle, pedestrian, and transit network was underscored by many stakeholders.

Focus group participants also pointed out that many residential and commercial areas may have a greenway trail adjacent to their property but do not enjoy access to the system through a nearby access point. The opportunity to add additional access points, particularly in residential areas, was promoted as a way to increase the number and variety of greenway users.

Dangerous road crossings were another key accessibility issue raised. One participant stated they “think twice” about crossing busy and dangerous roads when they are with their kids, impacting their decision whether to walk or drive to the trail network. Another participant recommended that every at-grade street crossing should have Hi-Visibility markings, Leading Pedestrian Interval (LPI) signals, and restricted turning movements. In addition, some participants pointed out that crossing designs are not always designed for multiple modes. The location where Walnut Creek Trail crosses Garner Road was offered as an example. The crossing there, which uses a design that is common throughout the City of Raleigh, includes a pedestrian

refuge island with curbs that prevents bicyclists from moving straight through, pushing bicyclists outside of the painted crosswalk.

Future grade-separated trail crossings of high-speed and high-volume roadways, including I-440, were mentioned as high priority for many participants.

Designing greenway trails to be accessible for people using wheelchairs or other mobility devices was also mentioned by several stakeholders. Steep inclines along trails and jarring transitions between trails and greenway structures were highlighted as barriers to people who wheel along the trail network. Participants also emphasized ensuring that crossing areas include curb-cuts.

User Conflict

“The [trail network] is a victim of its own success. Everybody loves the greenway. This causes it to become over-populated and increases user conflicts due to the width.”

Conflicts between greenway users on different modes, especially between bicyclists and pedestrians, were a common discussion item during the focus groups. Many pointed out that this is an issue that stems from a positive problem: the popularity of the trail network. Some pedestrians felt that people on bicycles don't heed the 10 miles per hour speed limit on the trail network, while bicyclists expressed concerns that pedestrians wearing earbuds may not be able to hear them calling to pass. Participants overwhelmingly felt

that the greenways were too narrow and proposed wider trails to make different greenway user types more comfortable. Some also expressed a desire for center-line markings on the trails to help separate pedestrians and bicyclists, particularly in more heavily trafficked greenway trail sections. Some participants also expressed that they felt not all greenway users are aware of the existing greenway code of conduct and recommended more educational efforts. A few stakeholders suggested investing in signage and marketing that builds culture and community around dignified behavior from greenway users.

Signage, Wayfinding, and Awareness

“You have to discover them. It takes a while to find them, and you have to seek them out.”

Focus group participants identified signage, wayfinding, traffic calming, and other visual cues as opportunities to enhance the safety and user experience on greenway trails. When discussing ways in which the trail network could be better, many mentioned that greenway signage can be improperly sized, or placed causing users to get lost, broken, and limited throughout the system. One stakeholder expressed that having large print signs that were more at eye-level would help users better navigate the trail network. Many stakeholders felt that signs should contain more contextual information that orients users to how far they are from community destinations, nearby parks, neighborhoods, and

amenities. Stakeholders overwhelmingly felt that it could be easy to get lost on the trail network, particularly for people who are newer to the trails. In addition to general greenway signage, stakeholders voiced that there is limited signage, information online, or communication informing users of repairs and maintenance. One participant suggested using signage to add to the experience of being on the greenway, to tell the story of Raleigh, and honor the culture and history of the area surrounding the greenway trail. Trail segments in Southeast Raleigh and near historically Black institutions were mentioned as an example of areas that could benefit from this experiential signage.

Stakeholders also communicated a desire for wayfinding to help people, regardless of mode, to reach the trail network. Some wanted to use cues to slow vehicles and warn drivers that a greenway trail access point or crossing is coming up. They recommended implementing more traffic calming measures on streets with greenway access points or at-grade crossings. Others suggested using branding on streets with greenway access to showcase the presence of the greenway or enhance placemaking at entrances to the trail network. One participant recommended that bikeway facilities that lead to greenway access points have different markings or painted symbols on them to show people that this route will take them to a greenway trail. Electronic wayfinding methods were also recommended, including an application for the entire region that showcases trails, amenities, and other community destinations. Some mentioned the City of Raleigh's

Greenspace app (previously RGreenways), stating that the City should advertise it more.

Amenities

“The greenway is scary to ride at night—it’s dark and unsafe. Lighting along the trails would support commuters.”

Focus group participants felt that the system needed more comfort stations, water fountains, and bicycle repair facilities. Bicyclists felt there should be a focus on adding shelters to the repair stations to extend their longevity and keep them functional. People overwhelmingly wanted more art and placemaking along the trail network. A representative from Raleigh Arts mentioned that the organization is beginning the Public Art Plan and there will likely be some overlap with the CAG Plan in the vision for art along the trail network. Lighting was also an issue of concern, particularly for bicyclists who use the trail network to commute. Participants recommended focusing lighting amenities along greenway trails identified as active transportation corridors by adopted City plans. Another recommendation was made to install LED lights and strips on both sides of tunnels.

Municipal Processes and Procedures

“Every project that is built without us changing our current policies is a lost opportunity.”

While this theme was not heard in all focus groups, it was echoed across focus groups that involved staff from the City of Raleigh or neighboring community partners. Overall, City staff felt there was an opportunity to streamline City processes and have better communication across departments related to greenways. Parks, Recreation and Cultural Resources and Transportation Department staff stressed their commitment to collaborating on greenway trails and acknowledged that the public doesn't differentiate City projects by their responsible department. Participants identified a variety of barriers to greenway development, such as jurisdictional boundaries, limiting Unified Development Ordinance language, and the amount of time it takes to go through the regulatory process. Several recommendations came out of the City of Raleigh Staff and Neighboring Community Partner focus groups, including:

- Update language and terminology around greenways
- Include greenway trails in the Traffic Impact Assessment (TIA)
- Classify the City's trail network as a state-wide or regional-level facility to further leverage CAMPO dollars

- Focus on engaging the most vulnerable members of the community during public outreach
- Ensure that the public understands flooding issues
- Mitigate inconsistencies in curb-cut requirements for crossings
- Collaborate with neighboring partners to ensure consistency in policies and design standards
- Create an avenue to discuss the use of electric bikes on greenway trails with neighboring partners
- Re-evaluate and update the Unified Development Ordinance to focus more on greenways as transportation, rather than simply recreation

Working with Developers

“More developers will be engaged, consider it, and find ways to do it if they feel like they are a partner in it, not just the sole carrier of the costs.”

The Developer focus group presented a unique opportunity to hear directly from the development community and develop an understanding of their barriers to allocating land for or building greenway trails. The following section summarizes what was heard in the City of Raleigh Staff, Developer, and Neighboring Community Partner focus groups.

City of Raleigh staff, as well as their fellow neighboring community partner staff, expressed that they need more assistance from the private development community in building greenway trails.

They feel that there is a race to build greenways with or before development occurs and would like to collaborate more with the development community. Municipal staff recommended updating criteria in the City's Unified Development Ordinance (UDO) for greenway easement dedication, property acquisition, and greenway construction. In addition, municipal staff stated they would like to see more greenway trails built through development, and the UDO should include specific standards for developer-built greenway trails.

Developers said that greenway costs are too high and indicated that they would like financial assistance from the City for building greenway trails, structures, and amenities. Cost-sharing and an established pot of funds to assist developers were recommended. They also suggested using the UDO to enable trail-oriented development. Many also recommended a variety of incentives for developers who dedicate land for greenways or build trails or amenities, such as density bonuses and coordination with key property owners involved in the development (e.g., railroads).

Maintenance of Greenway Trails and Structures

“We have a great network. You can go from Anderson Point to Clayton and anywhere in between. We have to work on the resiliency of it.”

All focus groups discussed maintenance as a key focus area for the CAG System moving forward.

Maintenance was identified by most participants as their top priority for the CAG System. While most wanted to balance growing the system and maintaining it, some stakeholders did feel that maintaining existing trails should be a priority over building new trails. Some felt that more greenway trails needed to be paved, particularly for bicyclists. In addition, many felt that existing trail segments that were not built in accordance with today's standards need to be updated.

Many participants felt trails are closed too often, for too long, and that the fixes are only temporary. Those who use the trail network as a form of transportation expressed that the consistent closures make it unreliable and difficult to use. Many expressed that they would like the City to ensure proper detours for people walking or bicycling when their usual greenway route is under construction. Others wanted to see the maintenance process take less time. City staff acknowledged the challenge in finding opportunities to create detour routes. For greenway trails within utility easements, City staff underlined the necessity of coordination to ensure that any utility maintenance along the trail network happens quickly and efficiently. Staff indicated that this generally isn't a problem unless there is a greenway structure on a utility easement.

Frequent greenway users discussed greenway structures as a safety concern and recommended upgrades to many of these facilities. Most find the bridges, tunnels, and underpasses to be too slippery and a fall hazard for both people walking and bicycling. Some stated that the underpasses

often flood and become muddy, which is also a safety hazard for many greenway users. Bicyclists expressed that navigating the bridges, some of which involve sharp angles to turn onto them, is very difficult and creates conflicts between bicyclists and pedestrians. They recommended that bridges be designed and constructed to support multiple user types. One participant did mention that a boardwalk that had been recently widened had enhanced their experience on the trail network.

Community-based Outreach

Originally, the CAG Plan process was to include multiple “pop-up” events, informal forms of public engagement that capitalize on places or events where people already gather, to broaden engagement methods and reach people who may not typically attend public meetings or receive information about online surveys. This often means project team staff attending already planned community meetings and events and engaging neighborhood and organizational leaders. The project team had planned to attend five pop-up events over the course of the project, and they were able to attend one in January 2020; however, many subsequent in-person and community-based events were canceled or moved online as a result of COVID-19. Alternative, socially distanced community-based outreach methods were used for the remainder of the CAG Plan process in an attempt to maintain equitable engagement.

Pop-up Events

Project team members attended the Raleigh Half Marathon on February 22nd, 2020. A map of greenway trails, business cards with a QR code to access the online survey, and iPads, which attendees could use to complete the online survey, were made available for the event.

Outreach to Community Organizations

Due to the COVID-19 pandemic, many planned pop-up events were canceled. To ensure outreach was still reaching a wide variety of community members, a list of community-based organizations was compiled for City of Raleigh staff to review. Each organization on the list was contacted via email and/or phone and asked the following questions to gain more understanding about engagement methods and potential collaboration opportunities:

- How are you currently communicating with members/constituents/people you serve? Is this through email, calling, paper mailings, social media, etc.?
- How are you hearing back from these same groups?
- Are there any specific groups that you are serving that you are having difficulty contacting or hearing back from right now, due to COVID-19?
- What is their reach? (i.e., number of people/members, area of the city, or population served)

- If a collaboration is possible, in what format should we provide information (i.e., survey website link, QR code for survey on a 11x17 poster, business cards with website link, text for informational materials, paper surveys)?
- How can we collect feedback if it is not through the online survey?

Organizations were called and/or emailed three times before efforts to reach them were paused. The following table summarizes each organization contacted, whether they were able to be reached, and whether they agreed to distribute materials. Some organizations did not have a specific contact to send materials to and discuss the Greenway project. When possible, the project team connected with individuals within community

organizations and provided materials for online and in-person distribution. Although many of the following organizations were reached, verifying the distribution of materials was difficult, even with follow-up emails and calls. There are a multitude of reasons why organizations may not have followed-up or distributed materials during this unprecedented time.

While Table 29 presents the results of the initial round of outreach to community-based organizations during Phase 1, these organizations were also contacted and engaged during Phases 2 and 3.

Table 29: Phase 1 - Community Organization Outreach Summary

ORGANIZATION	REACHED?	DISTRIBUTED MATERIALS?	SUMMARY OF DISTRIBUTION
My Brother's Keeper (Wake County)	Yes	Not Verified	Provided materials for social media, email, and physical handouts
Southeast Raleigh Promise	Yes	Yes	Social media post; Email blast to community partners with survey link
Habitat for Humanity (Wake County)	Yes	Yes	Email blast to new homeowners in development near proposed greenway trail
Wake Up Wake County	Yes	Yes	Email blast to Capital Area Friends of Transit (CAFT) group with survey link; Attended June CAFT meeting
Crosby-Garfield Community Advocacy Group	No	-	-
Diamante	No	-	-
El Pueblo	No	-	-
National Black MBA Association	No	-	-
Wake County Voter Education Commission	Yes	No	-
A Place at the Table	Yes	Yes	Social media post; Email blast to volunteer list with survey link
Urban Ministries of Wake County	No	-	-
Comite Popular Somos Raleigh	No	-	-
Big Brothers/Big Sisters	No	-	-
Inter-Faith Food Shuttle	Yes	No	-
Shaw University	No	-	-
St. Augustine's University	Yes	Not Verified	Provided materials for email and physical handouts
Ministerios Palabra Fiel NC	No	-	-
100 Black Men of Raleigh	No	-	-
Carolina Elite Track and Field Organization	No	-	-
Delta Sigma Theta Sorority - Raleigh Chapter	Yes	Not Verified	Provided materials for email and physical handouts
Sigma Gamma Rho Sorority - Raleigh, NC	Yes	Not Verified	Provided materials for email and physical handouts

ORGANIZATION	REACHED?	DISTRIBUTED MATERIALS?	SUMMARY OF DISTRIBUTION
Omega Psi Phi Fraternity	Yes	Not Verified	Provided materials for email and physical handouts
Kappa Alpha Psi Fraternity	Yes	Not Verified	Provided materials for email and physical handouts
St. James AME Church	Yes	Not Verified	Provided materials for email and digital or paper bulletins
St. Matthew AME Church	Yes	Not Verified	Provided materials for email and digital or paper bulletins
St. Paul African American Episcopal Church	Yes	Not Verified	Provided materials for email and digital or paper bulletins
Victory Church	Yes	Yes	Email blast to constituents
Martin Street Baptist Church	Yes	Not Verified	Provided materials for email and digital or paper bulletins
Abundant Life Christian Center	Yes	Not Verified	Provided materials for email and digital or paper bulletins
Mount Peace Baptist Church	Yes	Not Verified	Provided materials for email and digital or paper bulletins
Watts Chapel Baptist Church	Yes	Not Verified	Provided materials for email and digital or paper bulletins
First Baptist Church Raleigh	Yes	Not Verified	Provided materials for email and digital or paper bulletins
Tupper Memorial Baptist Church	Yes	Not Verified	Provided materials for email and digital or paper bulletins
New Hope Baptist Church	Yes	Not Verified	Provided materials for email and digital or paper bulletins
Baptist Grove Church	Yes	Not Verified	Provided materials for email and digital or paper bulletins
Lincolnvillle AME Church	Yes	Yes	Email blast to constituents
Wilson Temple United Methodist Church	Yes	Yes	Social media post
Brooks Avenue Church of Christ	Yes	Not Verified	Provided materials for email and digital or paper bulletins

Phase 2 Outreach Summary: Check-In

After gathering information from community members and analyzing existing conditions of the CAG System, findings were shared with the public to ensure their voices were heard accurately before recommendations were developed. This phase of outreach was held from January to March 2021 and included:

- Online survey
- Community-based organization outreach
- Steering committee meetings

Phase 2 Check-In Survey

The Check-In Survey presented documents summarizing the work completed before recommendations development, including:

- Formative Plans Review (Appendix A)
- Existing Conditions Analysis and Policy Evaluation (Appendix B)
- Public Outreach Summary for Phase 1 (Phase 1 components of this appendix)
- Draft Prioritization Criteria (Appendix D)

The survey was open from January 27th to March 3rd, 2021 and had 232 participants. Questions are listed below:

Previous Plans Review

The Previous Plans Review summarizes planning documents that are relevant to the Greenway Master Plan. These documents provide historical context, influence greenway development decisions, and showcase the impact of greenway development to specific areas of Raleigh. This document organizes these previous plans into three overarching sections: 1) How did we get here?, 2) How do we make decisions?, and 3) Where is the impact of those decisions?

Please share any comments/feedback about the Previous Plans Review.

Existing Conditions Analysis

The *Existing Conditions Analysis* reports on the current state of the greenway system. This document provides an overview of existing trails, trail volumes, and maintenance needs, describes the existing trail classification system, assesses barriers to greenway trail access, inventories existing greenway trail amenities, and summarizes existing policies.

Do you think the Existing Conditions Analysis captures the state of the greenway system today?

- Yes
- No
- If you selected no, why?

Please share any additional comments/feedback about the Existing Conditions Analysis.

Phase 1 Public Outreach Summary

The Public Outreach Summary describes community engagement efforts conducted in 2020 for the Greenway Master Plan Update. This document is organized by engagement method: steering committee meetings, online survey, focus groups, in-person events, and community-based outreach.

In your opinion, have the public engagement methods used to this point adequately engaged the residents of Raleigh?

- Yes
- No

If you selected no, what can be done differently in the coming months to better engage community members?

Please share any additional comments/feedback about the Public Outreach Summary.

Draft Prioritization Criteria

The Draft Prioritization Criteria provides of an overview of the draft factors to prioritize or rank future greenway projects (new greenway development) in the Greenway Master Plan Update. Each criterion includes a description and the possible scoring methodology.

In your opinion, do the draft prioritization criteria include factors that should be considered when prioritizing/ranking future greenway projects?

- Yes
- No

If you selected no, what do you think is missing from the prioritization criteria?

Please share any additional comments/feedback about the Draft Prioritization Criteria.

Survey Results

Previous Plans Review

Few comments were received regarding the Formative Plans Review. Participants expressed support for the relevant planning documents detailed in the review.

Existing Conditions Analysis

- 86% feel the Existing Conditions Analysis and Policy Evaluation captures the state of the system.
- Of the 14% who did not think the document adequately captured the state of the system, most felt that a more robust section on maintenance needed to be included.

Phase 1 Public Outreach Summary

- 74% believe public engagement methods adequately engaged Raleigh residents.
- Of the 26% that did not think the methods adequately engaged Raleigh residents, most expressed concerns about equity in reaching lower-income residents and people of color.

- Ideas for future engagement include more emphasis on media (social, print, TV, and radio), more signs on greenway trails, and more neighborhood-specific engagement around future greenway trail sites.

Draft Prioritization Criteria

- 88% support the prioritization criteria.
- Those that do not support the criteria desire more emphasis on communication with property owners who may be impacted by future trail construction.

Phase 3 Outreach Summary: Reveal + Refine

During this phase, the draft Plan, including recommendations, was shared with the public. Their feedback was used to refine the contents of the CAG Plan and ensure that it reflects community values and desires. This phase of outreach included:

- Online survey
- Community-based organization outreach
- Steering committee meetings
- Open houses
- On-demand virtual content

Phase 3 Reveal + Refine Survey

The Reveal + Refine Survey presented a complete draft version of the CAG Plan for the public to review, as well as Appendices A-G.

The survey was open from August 27th to September 27th, 2021 and had 1,250 participants. Questions are listed below:

What benefits of the Capital Area Greenway System do you value most?

- Protecting natural areas
- Physical health
- Recreation
- Walking or biking to employment or other destinations
- *Which trail amenities are most important to you? (pick two)*
 - Signage and wayfinding
 - Restrooms
 - Seating
 - Trash receptacles
 - Public art
 - Drinking fountains

- Appropriate lighting
- Educational signage
- Wildflower and pollinator plantings

What expanded maintenance priority do you see as MOST important?

- Repairing trail surface issues
- Removing overgrown vegetation and invasive plant species
- Other

Have you already been involved in shaping the Capital Area Greenway System Master Plan? If so, in what way?

- Taking a previous online survey
- Talking with staff at a table at an event
- Learning about the greenways from a community-based organization
- This is my first time providing feedback

Do you feel the Plan adequately builds on and incorporates community input?

- Yes
- No
- Unsure

Recommended trail projects were prioritized using the following criteria:

- Population Density (census blocks with

high total population per square mile)

- Future Density (access to growth areas identified in the City's Comprehensive Plan)
- Greenway Access (distance to nearest existing greenway trail)
- Transit (proximity to high frequency public transit)
- Social Equity (age, income, level of education, employment status, etc.)
- Racial Equity (neighborhoods with the highest percentages of residents that identify as black, Indigenous and people of color)
- Overall Park Level of Service (distance to, and variety of, nearest parks and recreational opportunities)
- Active Transportation (direct connections to existing and proposed bicycle infrastructure)
- Adopted Plans (aligning with adopted City planning documents e.g., BikeRaleigh, small area plans, Design Guide etc.)

Do you feel the above project prioritization criteria ensures a fair and balanced approach to project implementation? If not, what is missing? (add criteria)

- Yes
- No
- Unsure

Do you feel the recommendations address the needs of communities that are underserved?

- Yes
- No
- Unsure

Which categories do you believe are MOST important for the future success of the CAG System? (select 2)

- Trail Classifications
- New Trails
- Open Space Corridors
- Funding
- Planning & Development
- Collaboration & Partnerships
- Trail Security
- Maintenance & Operations
- Environmental Stewardship
- Trail Reinvestment
- Other

To maintain momentum, the City of Raleigh is committing to a 100-Day Action Plan upon adoption of the Plan. What aspect of the 100-Day Action Plan is most important to you?

- Establish an interdepartmental working group to discuss topics related specifically

to trails and open space corridors

- Strengthen requirements for developers to contribute to trail construction
- Expanding partnerships with non-profits and private agencies
- Support greenway construction and easement dedication outside of a floodplain, or flood hazard area
- Securing funding

How do you find information about the Capital Area Greenway System including system maps, closure/detour information, events, project updates and more?

- Website
- Social Media
- E-mail News Flash
- Greenway Newsletter
- Yard signs
- Press releases
- All of the above
- Other

Building new trails costs money. Which of the following do you see as MOST important as the City builds on existing funding mechanisms to construct new trails and reinvest in existing trails?

- Leveraging grant opportunities and donations

- Exploring the use of impact fees on stormwater or development
- Bond referendums
- Incentivizing private developers to build trails
- Other

Please select your age group.

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- Over 75
- Prefer not to say

How do you describe your race/ethnicity? Select all that apply.

- White
- Black or African American
- Latino/a or Hispanic
- Native American Indian or Alaskan Native
- Native Hawaiian or Pacific Islander
- Asian
- Other

- Prefer not to say

What gender do you identify as?

- Male
- Female
- Prefer not to say
- Non-binary/third gender
- Prefer to self-describe

Do you feel uncomfortable answering demographic questions like age, race and gender?

- Yes
- No

Survey Results

- Outreach and advertisements for the survey in Phase 3 reached many people who had not yet participated in the CAG Master Plan process. 68% of respondents said this was their first time giving feedback.
- 73% said they felt the prioritization criteria ensured a fair and balanced approach to project implementation.
- Respondents reemphasized the importance of balancing constructing new trails with reinvesting and maintaining the existing system. When asked what was MOST important to the future success of the CAG System, there was a near even split between building new trails (42%) and maintenance and operations (39%).

The survey also provided space for general comments. Key themes from these comments included:

- Improved signage and wayfinding, especially at on-street connections
- Invasive species removal
- Requirements for developers to construct new trails and leave a buffer along existing trails
- Maintenance needs, including removal of trash, undergrowth, and downed trees

Virtual Open Houses

During Phase 3, the project team hosted three virtual open houses. At each open house, the project team presented an overview of the draft plan and

highlighted key recommendations and action items. At the conclusion of the presentation, members of the public offered comments and asked questions which were answered live during the meeting. All three open houses had identical content but were held on different days and times to accommodate as many schedules as possible.

- Virtual Open House 1:
Tuesday September 14, 2021 at 10:00 am
(30 participants from the public)
- Virtual Open House 2:
Tuesday September 23, 2021 at 6:30 pm
(23 participants from the public)
- Virtual Open House 3:
Saturday September 25, 2021 at 11:00am
(10 participants from the public)

Parks, Recreation, and Greenway Advisory Board Meeting

This meeting provided the Parks, Recreation, and Greenway Advisory Board with a comprehensive overview of the draft plan. The chapter-by-chapter overview highlighted key themes from the existing conditions analysis and the first two phases of engagement. A majority of the meeting was dedicated to discussing the recommendation categories and the phased approach for ongoing, immediate, and short-term action items.

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APPENDIX D

Prioritization Criteria Methodology & Results



Appendix Summary

Prioritization is critical to identify a phased approach to implementing new trails and reinvesting in existing trails that add value to the system and provide the greatest benefits to residents and visitors. This appendix:

- summarizes the importance of developing a trail network,
- details the prioritization methodology and process,
- reviews the prioritization criteria,
- provides a complete list of prioritized proposed trail projects, and
- provides a list of site-specific projects along existing trail segments for consideration during future reinvestment decisions.

Why a Network?

For many people who live, work, and play in Raleigh, the CAG System is an important recreational resource, providing opportunities to enjoy time outdoors. For others, the CAG System is or has the potential to be a vital piece of their commute to work, trip to the grocery store, or excursion to see friends. The CAG Plan supports greenway trail networks that prioritize mobility and encourages bicycling, walking, and wheeling as modes of choice within Raleigh and throughout the region by proposing a trail network that connects residents and visitors with the places they need and want to go in a safe and convenient way. A network of seamlessly connected and continuous greenway trails—integrated with the City’s bikeways, sidewalks, and transit services—is more powerful for increasing mobility and accessibility than isolated projects that do not link into a larger system. A network or system approach to trail infrastructure—rather than a piecemeal approach—better supports the use of greenway trails for active transportation and is a more strategic investment for the City of Raleigh. Ultimately, an implemented network of trails serving the entire community will enhance mobility more than a single trail alone.

Network Development

The network of new trails recommended as part of the CAG Plan was developed by conducting a thorough review of the trails previously proposed during other planning efforts. Trails that did not connect to the overall system or were deemed infeasible by PRCR staff were removed from recommendation. Additional trails were added to fill gaps in the network, particularly in areas without planned trails where the public desired them. The final network contains 280 miles of proposed trails.

In addition, open space corridors also present an opportunity to expand the CAG System. They preserve natural areas throughout the City, providing valuable vegetative buffers and wildlife corridors. Greenway trails may be constructed within open space corridors depending on future growth, connectivity needs, development, and environmental factors. Therefore, future trail construction may include projects not yet identified in proposed trail network. Open Space corridors contribute an additional 80 miles of natural lands to be used for environmental preservation or trail construction.

Prioritization Methodology

While the proposed trail network is the framework for greenway connections throughout the City, implementation begins with the realization of individual projects. To begin moving from vision to reality, the CAG Plan prioritizes individual projects within the proposed network and recommends strategies for selecting and building trails, creating a clear path toward implementation.

Developing a prioritized project list used a quantitative approach that incorporated a variety of factors. Individual projects were identified within the network of varying lengths based upon characteristics noted during network development. Projects are comprised of multiple segments that are portions of the network between existing roadway intersections, parks, or stream branches. These segments received weighted scores based on the prioritization criteria outlined later in this document. During the prioritization process, each segment was scored independently then averaged with all other segments within the respective project. Calculating the prioritization score in this way ensured that each factor was captured at a detailed level for scoring of the overall projects.

Prioritization Criteria

Criteria used to prioritize projects for the City's Parks Bond referendum have been modified based upon national best practices and public input that is specific to greenway trail development. The following criterion and scoring weights were used to prioritize new trail projects and locations for reinvestment on existing trails.

- Population Density
- Greenway Access
- Social Equity
- Racial Equity
- Adopted Plans
- Future Density
- Transit
- Overall Park Level of Service
- Active Transportation

A detailed overview of each criteria, as well as their scoring categories, is provided in Table 30 and over the following pages.

Prioritization Shift

This set of prioritization criteria and its associated values present a shift from a solely recreational emphasis to a more integrated approach to greenway development as both a recreational asset and a fundamental piece of the larger transportation system.

Table 30: Prioritization Criteria

PRIORITIZATION CRITERION	DESCRIPTION	SCORING
Population Density	Based upon the total population for all census blocks divided by the block area.	High – 10 points Medium-high – 8 points Medium – 6 points Medium-low – 4 points Low – 2 points
Greenway Access Priority	Based upon Nearest Greenway Score by Census Block from the PRCR Level of Service (LOS) Model. A higher value in the Nearest Greenway Score reflects a shorter distance to the nearest greenway access point.	Nearest Greenway Score of 1 – 20 points Nearest Greenway Score of 2 – 15 points Nearest Greenway Score of 3 – 10 points Nearest Greenway Score of 4 – 5 points Nearest Greenway Score of 5 – 1 point
Social Equity	Based upon Social Equity by Census Block from the PRCR Level of Service (LOS) Model. A higher value in the Social Equity Score reflects higher concentrations of people who are unemployed, have low educational attainment, are under 18 or over 65, and living below the poverty threshold.	Social Equity Score of 91 or above – 20 points Social Equity Score between 76 to 90 – 17 points Social Equity Score between 61 to 75 – 15 points Social Equity Score between 46 to 60 – 12 points Social Equity Score of 31 to 45 – 8 points Social Equity Score of 16 to 30 – 4 points Social Equity Score below 15 – 1 point
Racial Equity	Based upon projects which provide access to Neighborhoods with highest percentage of residents that identify as black, Indigenous and people of color (“BIPOC” Neighborhoods)	Intersects with a BIPOC Neighborhood – 5 points
Adopted Plans	Based upon adopted City planning documents (e.g., BikeRaleigh, small area plans, Design Guide).	Proposed or supported in City-adopted planning document - 5 points
Future Density	Based upon the Growth Framework Map in the City’s Comprehensive Plan.	Located within Downtown Regional Center – 10 points Located within Growth Centers – 7 points Located within Mixed-Use Centers – 5 points

PRIORITIZATION CRITERION	DESCRIPTION	SCORING
Transit	Based upon proximity to existing high-frequency bus routes (15 minutes or less during peak hours) or proposed Bus Rapid Transit (BRT) alignments.	<p>Within 1/4 mile of current and/or proposed Bus Rapid Transit and/or high-frequency bus route – 10 points</p> <p>Within 1/2 mile of current and/or proposed Bus Rapid Transit and/or high-frequency bus route – 5 points</p>
Overall Park Level of Service	Based upon Level of Service Grade from the PRCR Level of Service (LOS) Model. The Level of Service Grade is based on the total level of service for the current park system. A higher value reflects a higher level of service.	<p>LOS Grade F – 10 points</p> <p>LOS Grade D – 7 points</p> <p>LOS Grade C – 5 points</p> <p>LOS Grade B – 3 points</p> <p>LOS Grade A – 1 point</p>
Active Transportation	Based upon direct connection to existing bikeways and proposed infrastructure defined by the BikeRaleigh priority network.	<p>Direct connection to existing separated bikeway facilities (i.e., protected bike lanes, sidepaths/multiuse trails) – 10 points</p> <p>Direct connection to existing delineated bikeways (i.e., bike lanes or buffered bike lanes) or proposed separated bikeways – 7 points</p> <p>Direct connection to existing shared facilities (i.e., sharrows) or proposed delineated bikeways – 5 points</p> <p>Direct connection to proposed shared facilities – 3 points</p>



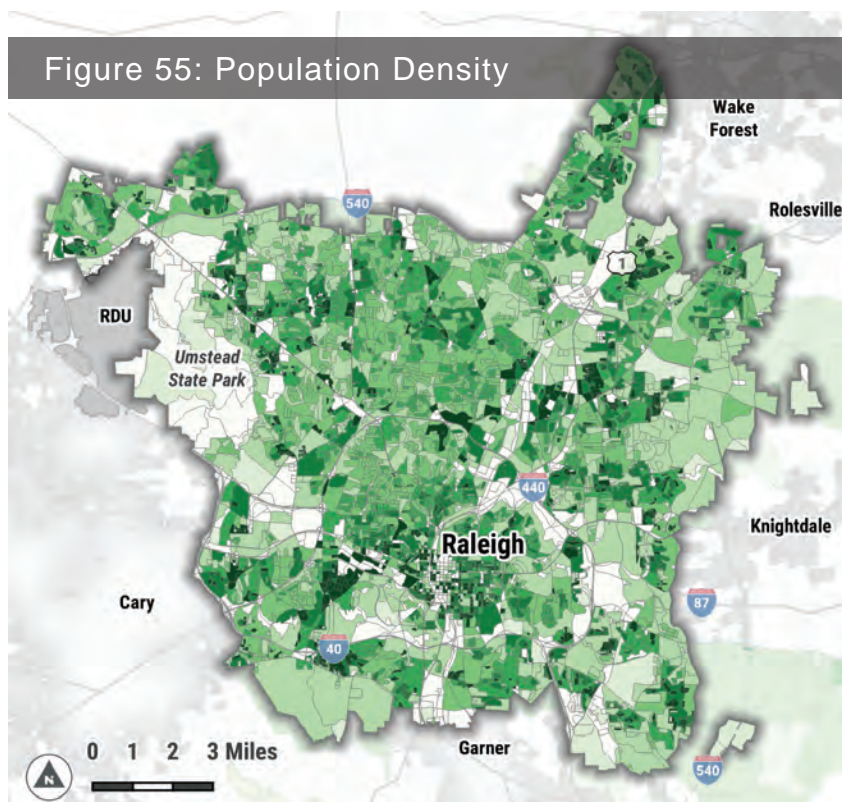
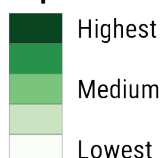
Population Density

Trail segments in areas of higher population density will be able to connect more people to the overall CAG System.

Scoring

- Up to 10 points
- Higher scores awarded to trail segments with a higher population density.

Population Density



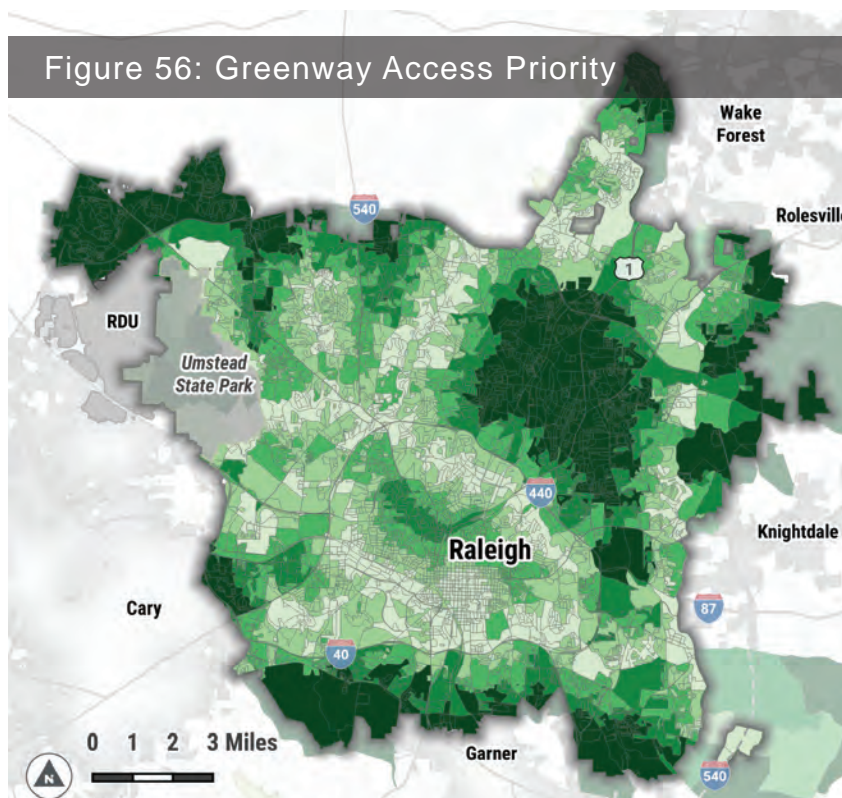
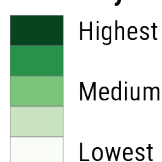
Greenway Access Priority

Part of promoting equity throughout the CAG System is increasing trail construction in areas that do not currently have access to trails.

Scoring

- Up to 20 points
- Higher scores awarded to areas with lower Greenway Access scores

Greenway Access Priority





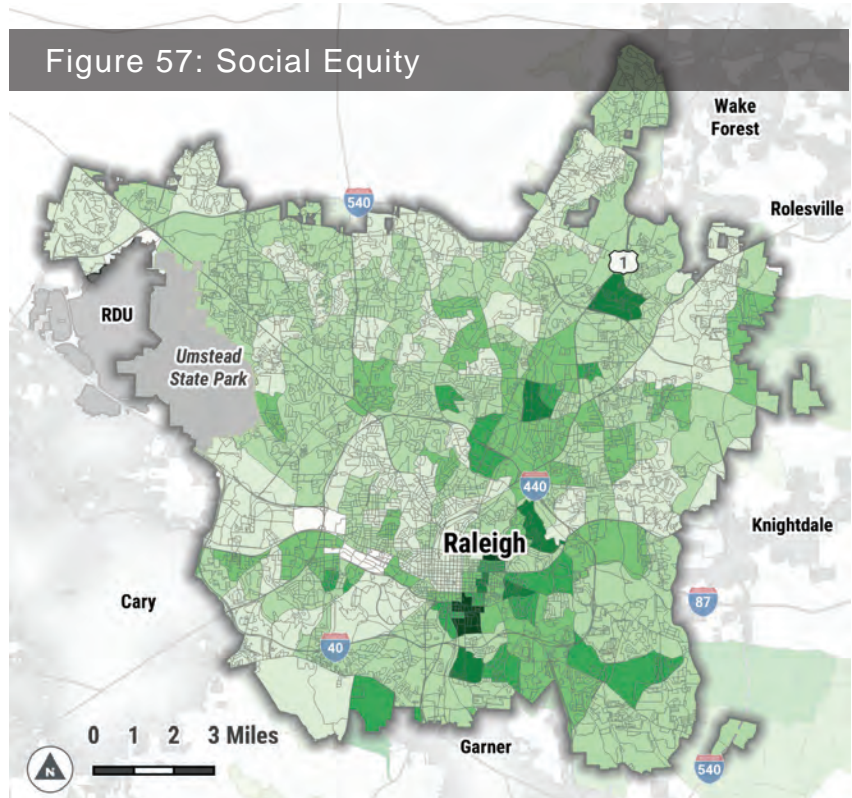
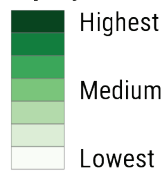
Social Equity

Incorporating demographics into the prioritization process is key to ensuring an equitable distribution CAG System investments.

Scoring

- Up to 20 points
- Higher scores awarded to areas with higher Social Equity scores

Equity Priority



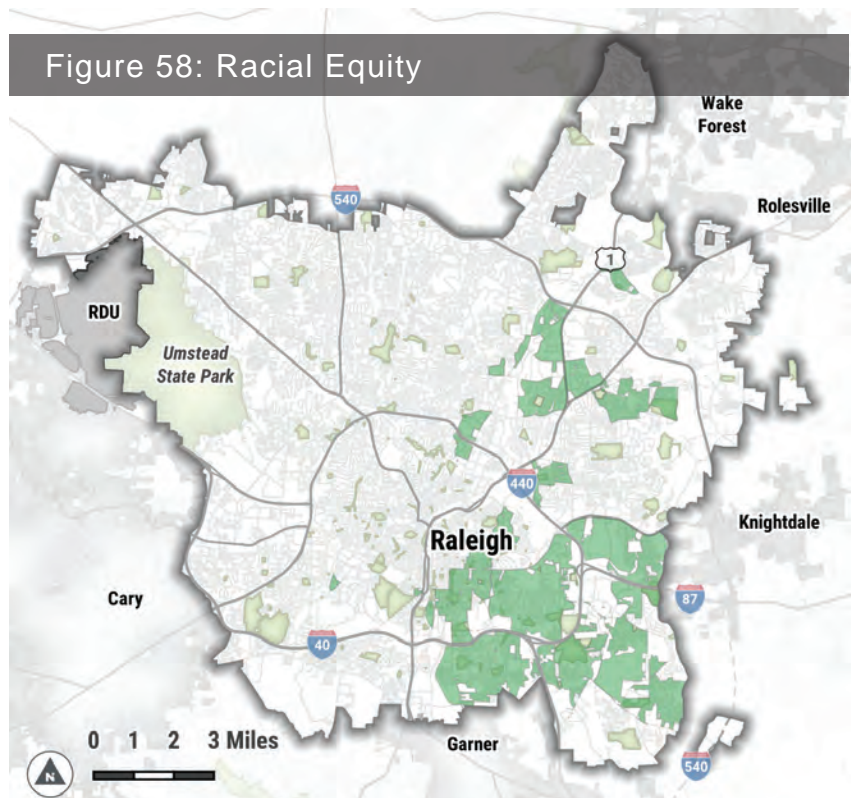
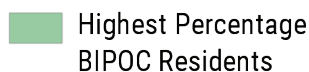
Racial Equity

BIPOC Neighborhoods have historically been intentionally disconnected from each other and the City. Prioritizing connections to and through these neighborhoods makes the CAG System more equitable.

Scoring

- Up to 5 points
- Trail segments were given an additional 5 points if they provided access to a BIPOC Neighborhood.

High Priority





Adopted Plans

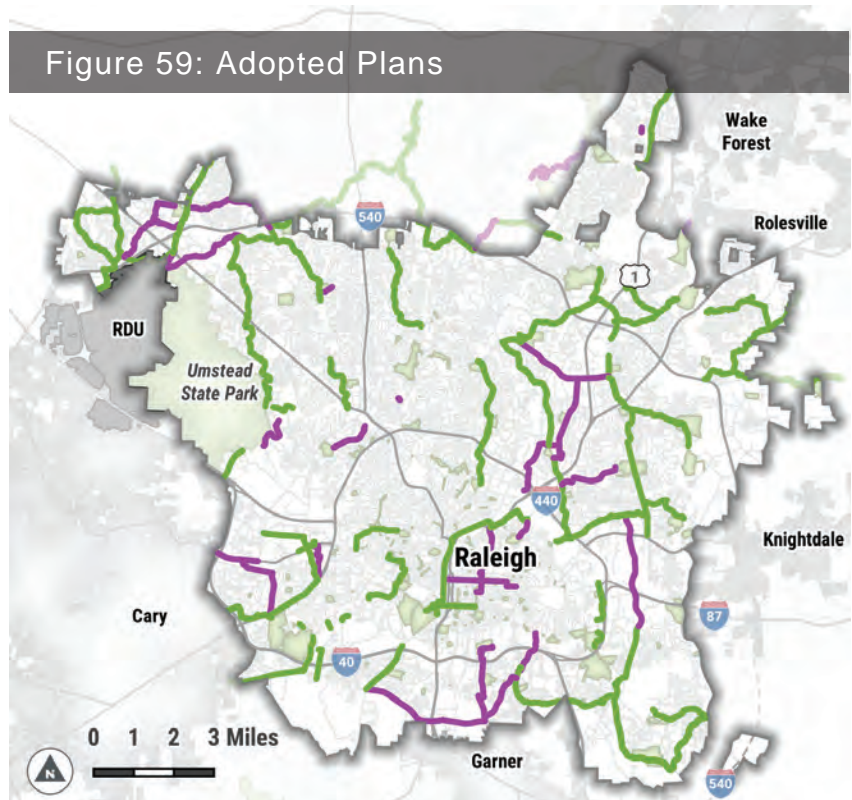
Trails that already have documented community support should be uplifted through the CAG Plan.

Scoring

- Up to 5 points
- Trail segments proposed or supported in City-adopted plans received points

Trails Identified in Previously Adopted Plans

- Adopted Previous Plan (Higher Priority)
- Not Adopted in Previous Plan (Lower Priority)



Future Density

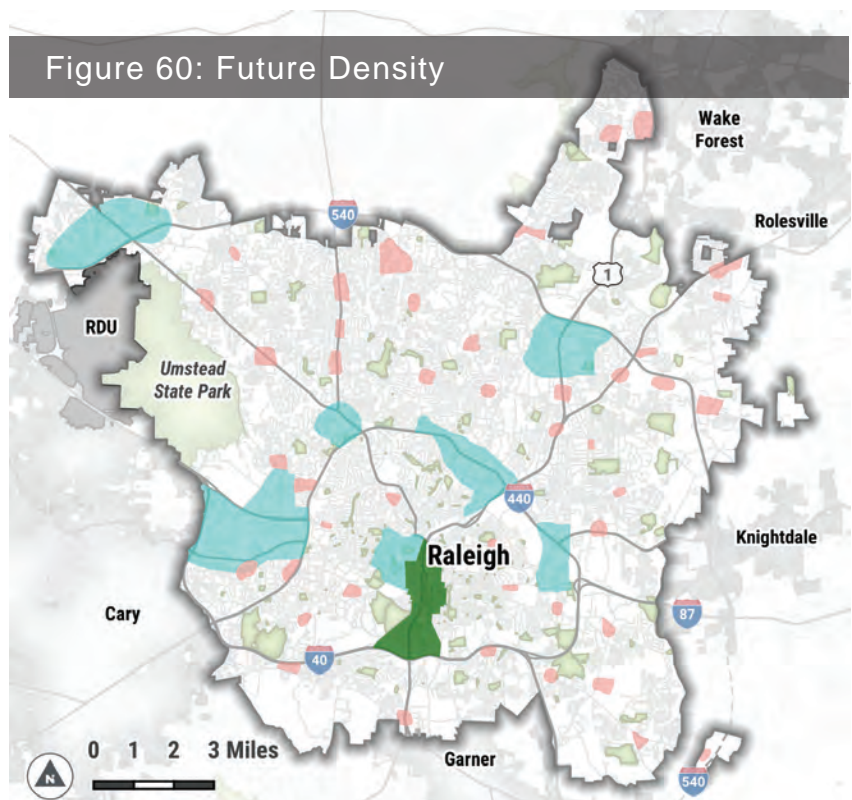
The Comprehensive Plan's Growth Framework presents a vision to accommodate future growth. Trail investment should align with this vision.

Scoring

- Up to 10 points
- Trail segments received points if they were located in Downtown, Growth Center, or Mixed-Use Center areas on the Growth Framework Map

High Priority

- Downtown Regional Center
- City Growth Center
- Mixed Use Center



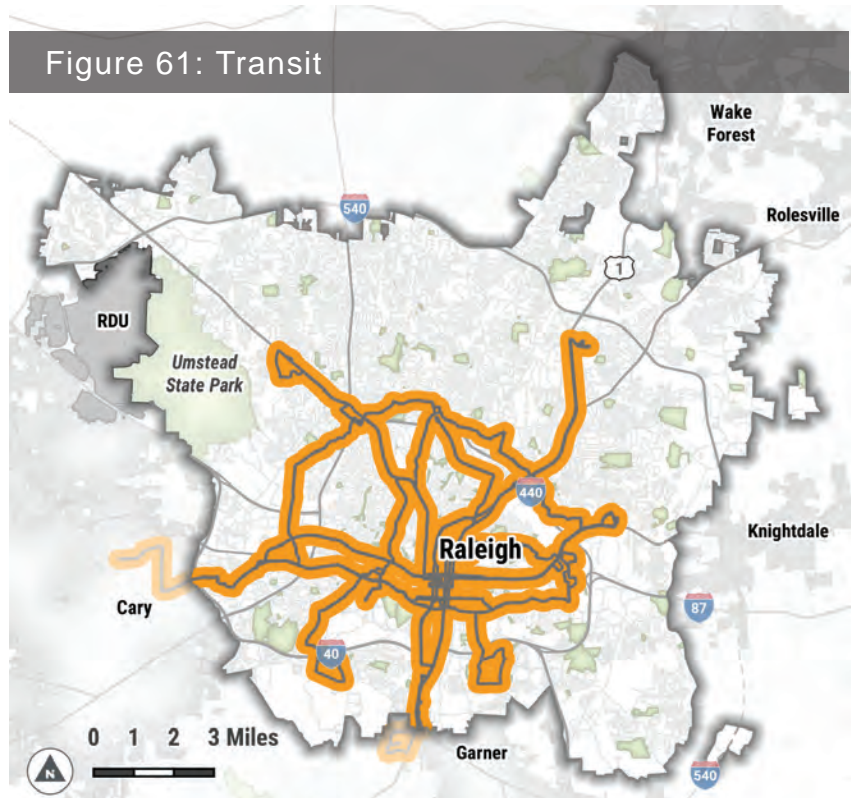
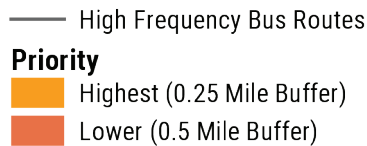


Transit

The CAG System must provide access to transit if it is to be a successful component of the City's overall transportation system.

Scoring

- Up to 10 points
- Higher scores awarded to trail segments closer to transit routes

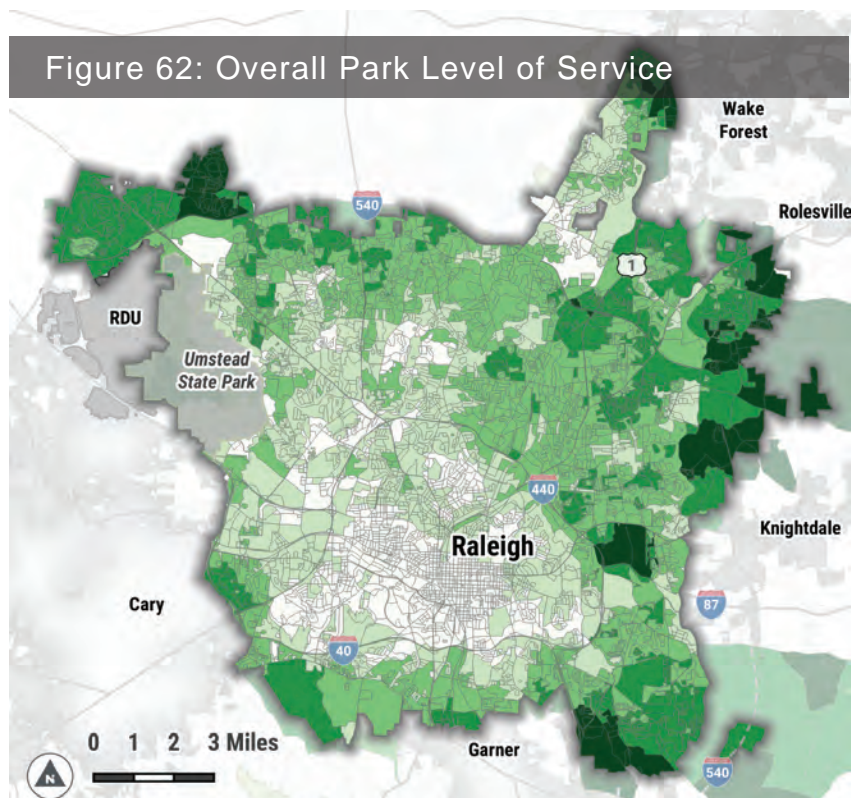
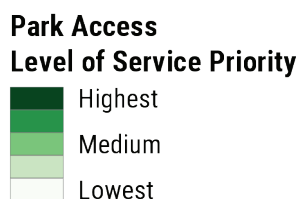


Park Access Level of Service (LOS)

Trails are an important element of the City's overall park system. This criterion aims to direct trail investments in areas that are less well-served by the City's park system.

Scoring

- Up to 10 points
- Higher scores awarded to trail segments with a lower LOS Grade





Active Transportation

Direct connections to the City's bikeway network allow trails to be used by bicyclists for transportation, in addition to recreation.

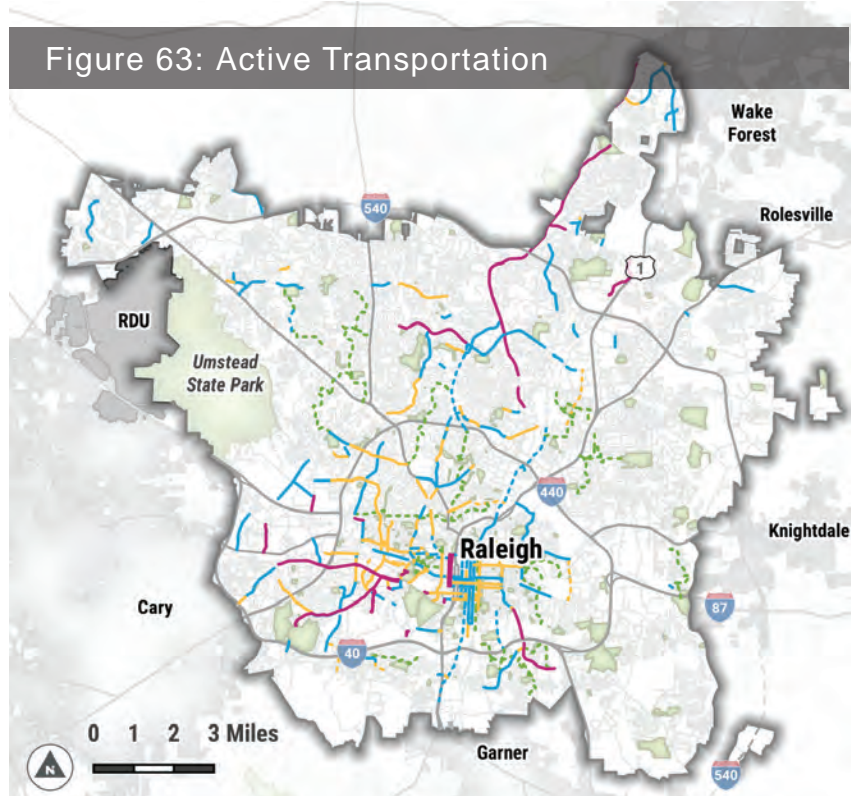
Scoring

- Up to 10 points
- Scores vary based on whether bikeways are existing or proposed and the level of separation

Priority

- Separated Bikeways (highest)
- Bicycle Lanes (medium-high)
- Shared Lanes (medium-low)
- Proposed Protected Bikeways (medium-high)
- Proposed Bicycle Lanes (medium-low)
- Proposed Neighborhood Bikeways (low)

Figure 63: Active Transportation



Scoring Results

While not every project can be in the highest level, each project on the proposed network is a critical piece of increasing connectivity and safety for greenway trail users in Raleigh. Projects that rank lower but fill essential gaps in the network may be considered for implementation sooner or in conjunction with adjacent projects. Additionally, while levels have been established, these designations are for planning purposes only and it is understood that there will be “projects of opportunity”; therefore, projects should be implemented when opportunities arise or funding is available. The prioritization criteria and scoring noted previously in this chapter were used to identify which new trails should be considered the highest priorities. During both processes, trails were grouped into five prioritization levels:

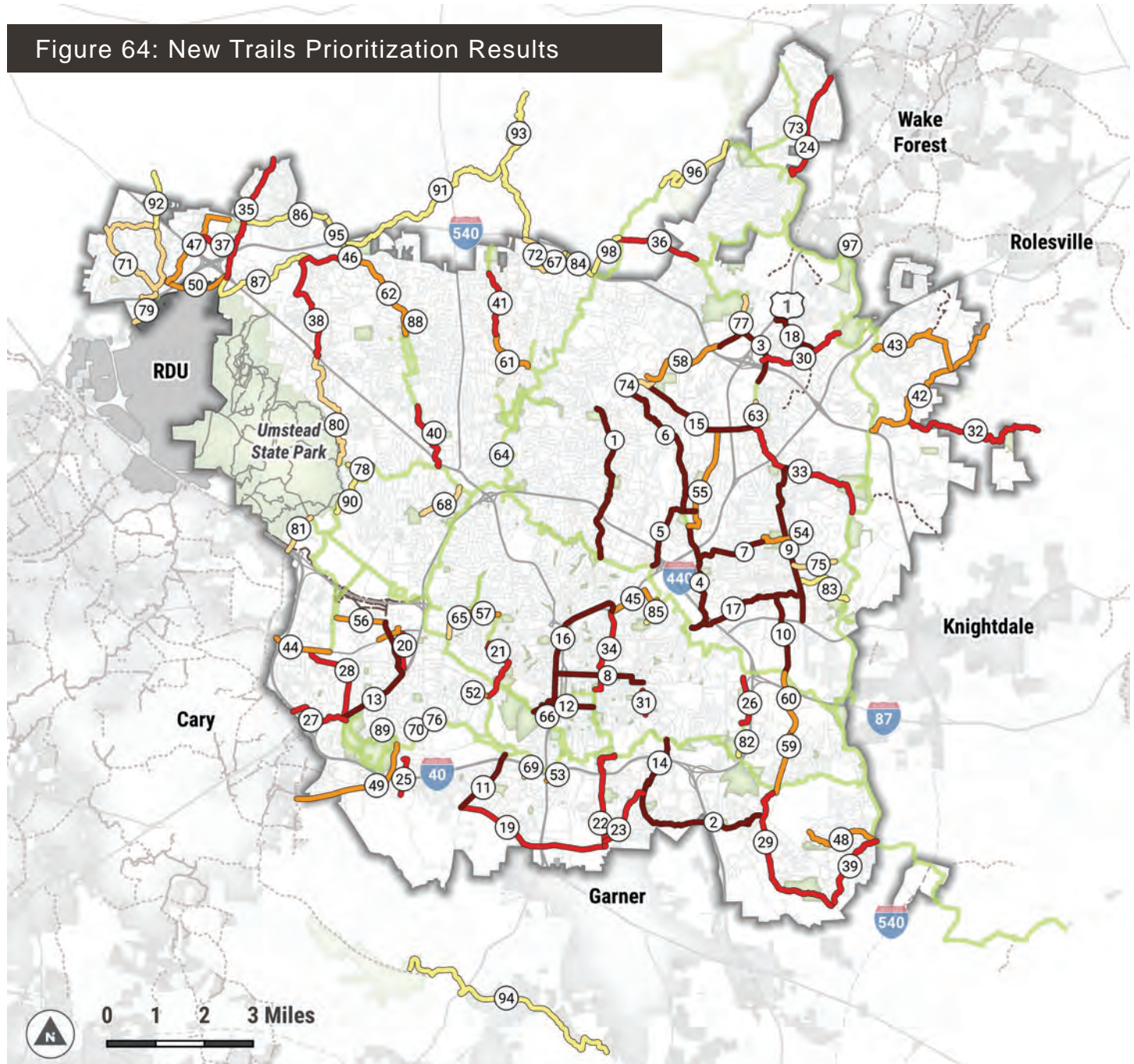
- High Priority
- Medium-High Priority
- Medium Priority
- Medium-Low Priority
- Low Priority

New Trails

Expanding the existing 117-mile CAG System through the construction of new trails will provide additional access to residents and visitors while also increasing connectivity to existing destinations and the larger transportation network. New trail

construction should be strategic, focusing on equitable distribution, linking to high-frequency transit, and providing comfortable connections to and from parks, activity centers, and other destinations. Recommended new trails include previously planned trails, as well as additional trails added due to public input and specific corridors that align with priority criteria. Figure 64 and Table 31 illustrate the prioritization results for all recommended new trails.

Figure 64: New Trails Prioritization Results



New Trail Priority

- High (Tier 1)
- Medium-High (Tier 2)
- Medium (Tier 3)
- Medium-Low (Tier 4)
- Low (Tier 5)

Parks

Existing Trails

Trails in Adjacent Jurisdictions

- Existing/Funded
- Proposed

Table 31: Prioritized New Trails

ID	POP.	ACCESS	SOCIAL EQUITY	RACIAL EQUITY	ADOPTED PLANS	FUTURE DENSITY	TRANSIT	PARK LOS	ACTIVE TRANS.	TOTAL	TIER
1	4	15	8	5	5	7	10	5	7	66	1
2	4	15	12	5	5	0	10	5	10	66	1
3	2	20	12	0	5	7	0	7	10	63	1
4	2	15	12	5	5	7	10	5	0	61	1
5	4	15	12	0	0	7	10	5	7	60	1
6	4	20	12	5	5	5	0	5	3	59	1
7	2	20	12	5	0	0	10	5	3	57	1
8	4	5	12	5	0	10	10	1	10	57	1
9	4	20	8	5	5	5	5	5	0	57	1
10	2	20	8	5	0	5	10	7	0	57	1
11	2	15	8	0	5	10	10	3	3	56	1
12	4	5	8	5	5	10	10	1	7	55	1
13	2	10	8	0	5	7	10	3	10	55	1
14	4	10	12	5	0	0	10	3	10	54	1
15	2	20	8	5	0	7	0	5	7	54	1
16	4	10	4	0	5	10	10	3	7	53	1
17	2	15	8	0	5	7	10	5	0	52	1
18	4	15	15	5	5	0	0	7	0	51	1
19	2	20	8	0	0	5	10	5	0	50	2
20	2	10	8	0	0	7	10	3	10	50	2
21	4	5	8	0	5	7	10	1	10	50	2
22	2	10	12	5	0	0	10	3	7	49	2
23	2	15	12	5	0	0	10	5	0	49	2
24	2	20	8	0	5	0	0	7	7	49	2
25	2	10	8	0	5	5	10	1	7	48	2
26	2	15	8	5	5	0	10	3	0	48	2
27	2	20	4	0	5	0	5	7	5	48	2
28	4	15	8	0	0	7	10	3	0	47	2
29	2	20	8	5	5	0	0	7	0	47	2

Capital Area Greenway Master Plan

Update | 2021

ID	POP.	ACCESS	SOCIAL EQUITY	RACIAL EQUITY	ADOPTED PLANS	FUTURE DENSITY	TRANSIT	PARK LOS	ACTIVE TRANS.	TOTAL	TIER
30	2	15	15	5	5	0	0	5	0	47	2
31	2	10	17	5	0	0	10	3	0	47	2
32	2	20	8	0	5	0	0	10	0	45	2
33	2	20	8	5	5	0	0	5	0	45	2
34	2	10	8	5	0	0	10	3	7	45	2
35	2	20	4	0	5	7	0	7	0	45	2
36	2	20	1	0	5	5	0	1	10	44	2
37	2	20	8	0	0	7	0	7	0	44	2
38	4	15	8	0	5	0	0	5	7	44	2
39	4	15	8	5	5	0	0	7	0	44	2
40	4	10	8	0	5	0	10	3	3	43	3
41	4	20	4	0	5	0	0	5	5	43	3
42	2	20	8	0	5	0	0	7	0	42	3
43	2	15	8	0	5	5	0	7	0	42	3
44	2	15	4	0	5	7	5	3	0	41	3
45	2	5	8	0	5	0	10	3	7	40	3
46	2	20	8	0	5	0	0	5	0	40	3
47	2	20	4	0	0	7	0	7	0	40	3
48	4	10	8	5	5	0	0	7	0	39	3
49	2	15	4	0	5	5	5	3	0	39	3
50	2	20	1	0	5	7	0	3	0	38	3
51	2	10	1	0	5	7	10	3	0	38	3
52	2	1	4	0	5	5	10	1	10	38	3
53	2	5	8	0	0	10	10	3	0	38	3
54	2	20	12	0	0	0	0	3	0	37	3
55	4	0	12	5	0	7	0	5	3	36	3
56	2	5	4	0	5	7	10	3	0	36	3
57	4	10	4	0	5	0	5	1	7	36	3
58	2	20	4	0	5	0	0	5	0	36	3
59	2	5	8	5	5	5	0	5	0	35	4
60	2	15	8	5	0	0	0	5	0	35	4

Appendix D | Prioritization Criteria Methodology & Results

ID	POP.	ACCESS	SOCIAL EQUITY	RACIAL EQUITY	ADOPTED PLANS	FUTURE DENSITY	TRANSIT	PARK LOS	ACTIVE TRANS.	TOTAL	TIER
61	2	15	8	0	5	0	0	5	0	35	4
62	2	15	8	0	5	0	0	5	0	35	4
63	4	0	8	5	5	7	0	5	0	34	4
64	2	10	12	0	0	0	5	5	0	34	4
65	2	5	4	0	5	0	10	1	7	34	4
66	4	5	8	0	5	0	10	1	0	33	4
67	2	15	4	0	5	0	0	7	0	33	4
68	2	5	8	0	0	7	10	1	0	33	4
69	2	10	8	0	0	10	0	3	0	33	4
70	6	1	4	0	5	5	10	1	0	32	4
71	2		4	0	5	7	0	7	7	32	4
72	2	15	4	0	5	0	0	5	0	31	4
73	2	10	8	0	0	5	0	5	0	30	4
74	4	0	4	0	5	5	0	3	7	28	4
75	2	10	4	0	0	5	0	7	0	28	4
76	2	5	4	0	5	0	10	1	0	27	4
77	2	10	8	0	5	0	0	1	0	26	4
78	2	5	8	0	5	0	0	5	0	25	4
79	2	0	4	0	5	7	0	7	0	25	4
80	2	10	4	0	5	0	0	3	0	24	5
81	2	10	4	0	5	0	0	3	0	24	5
82	2	5	8	0	5	0	0	3	0	23	5
83	4	5	4	0	5	0	0	5	0	23	5
84	2	5	4	0	5	0	0	5	0	21	5
85	2	5	8	0	0	0	5	1	0	21	5
86	2	0	4	0	0	0	0	7	7	20	5
87	2	10	4	0	0	0	0	3	0	19	5
88	6	5	4	0	0	0	0	3	0	18	5
89	4	1	4	0	5	0	0	1	0	15	5
90	2	5	4	0	0	0	0	3	0	14	5
91	2	0	1	0	5	0	0	1	0	9	5

Capital Area Greenway Master Plan

Update | 2021

ID	POP.	ACCESS	SOCIAL EQUITY	RACIAL EQUITY	ADOPTED PLANS	FUTURE DENSITY	TRANSIT	PARK LOS	ACTIVE TRANS.	TOTAL	TIER
92	2	0	1	0	5	0	0	1	0	9	5
93	2	0	1	0	5	0	0	0	0	8	5
94	0	0	0	0	5	0	0	0	0	5	5
95	2	0	1	0	0	0	0	1	0	4	5
96	2	0	1	0	0	0	0		0	3	5
97	0	0	0	0	0	0	0	0	0	0	5
98	0	0	0	0	0	0	0	0	0	0	5

Future Reinvestments of Existing Trails

Balancing new construction with existing trail reinvestment is critical to the sustainability of the CAG System. Existing trail segments in need of reinvestment were determined based on public input, existing conditions analysis, and site observation. Trail design best practice also informed the following list reinvestment projects.

Chapter 5 provides a sample of reinvestment projects. The following pages include a comprehensive list of existing trail segments with identified reinvestment needs. There may be trail segments that are not identified as being in need of reinvestment now, however, they may require reinvestment in the future. Regular inspection of trails is recommended and is conducted routinely by PRCR maintenance staff.

Additionally, prioritization criteria described previously in this Appendix can help determine which existing trails are most important to continuously invest in.

Reinvestment Projects

As noted above, not all existing trails need redesign or upgrades now; however, there are existing trail segments that are in need of reinvestment. The following trail projects were identified as having reinvestment needs:

CENTENNIAL BIKEWAY CONNECTOR

Section: Achievement Drive east to trail end

- Enhance wayfinding and provide map-based signage to nearby trails from NCSU Centennial Campus

CRABTREE CREEK TRAIL

Section: Galax Drive to bridge #45

- Enhance wayfinding and signage at Galax Drive access point and bridge #44

Section: North Hills Drive connection to North Hills Park spur

- Enhance wayfinding and signage at intersection of Crabtree Creek Trail and Mine Creek Trail

Section: Anderson Drive crossing

- Enhance safety of at-grade trail crossing

Section: Atlantic Avenue access points

- Add curb ramps to trail entrances

Section: Bridge #104 to Lockwood Park

- Enhance safety of at-grade trail crossing of Raleigh Boulevard
- Enhance wayfinding and signage along trail section. Opportunity for educational signage

Section: Crabtree Boulevard/Somerset Road connection to Crabtree Boulevard/Culpepper Lane connection

- Enhance wayfinding and signage

Section: Culpepper Lane to South New Hope Road

- Enhance wayfinding and signage along trail section

EAST FORK MINE CREEK TRAIL

Section: Longstreet Drive to Newton Road

- Enhance wayfinding and signage through on-street neighborhood greenway connection

Section: Six Forks Road to Old Deer Trail

- Increase comfort of street adjacent trail segment along Six Forks Road. Consider widening or providing more separation from vehicles

GARDNER STREET TRAIL

Section: entirety

- Consider paving trail or upgrading trail surface material to increase accessibility

LAKE JOHNSON EAST LOOP

Section: intersection with Lake Johnson West Loop to bridge #74

- Upgrade trail to current design standards

Section: Avent Ferry Road connection

- Upgrade trail to current design standards

LITTLE ROCK TRAIL

Section: Martin Street to Davie Street

- Enhance safety of at-grade trail crossings of Martin Street and Davie Street
- Upgrade curb ramps at Martin Street trail entrance
- Provide better wayfinding at Martin Street entrance

Section: Davie Street to Cabarrus Street

- Enhance safety of at-grade trail crossing of Cabarrus Street

Section: Lenoir Street to Martin Luther King Junior Boulevard

- Enhance wayfinding and signage to navigate trail users through Chavis Park

Section: Bragg Street to Walnut Creek Trail intersection

- Fix broken signage along this section
- Provide more wayfinding and signage at trail intersections

MARTIN STREET CONNECTOR

Section: entirety

- Enhance wayfinding and signage along the entirety of trail
- Ensure trail has the design and feel of a greenway trail, rather than a sidewalk

MINE CREEK TRAIL

Section: West Milbrook Road to bridge #18

- Enhance safety of West Milbrook Road underpass
- Resurface trail segments with surface quality in poor condition

Section: Shelley Lake Loop to North Hills Drive

- Consider re-grading trail segment to be more accessible
- Resurface trail segments with surface quality in poor condition

Section: East Fork Mine Trail intersection to Sawmill Road

- Improve accessibility of trail section

NEUSE RIVER TRAIL

Section: Covered walk #209 to Neuse River Bridge

- Bolster wayfinding along trail section

Section: boardwalk #239 to boardwalk #240

- Add dashed pavement markings on trail to separate directions of travel
- Address sharp right-angle turn at boardwalk #240

Section: Anderson Point Park to Crabtree Creek Trail intersection

- Increase signage and awareness of existing water fountains at Anderson Point Park
- Enhance wayfinding and signage to navigate trail users through Anderson Point Park

REEDY CREEK TRAIL

Section: Blue Ridge Road to Edwards Mill Road

- Provide map-based signage at intersections of Reedy Creek Trail and Edwards Mill Connector

RICHLAND CREEK TRAIL

Section: Wade Avenue tunnel

- Increase accessibility of trail at tunnel approaches
- Enhance wayfinding and signage near approaches to tunnel

ROCKY BRANCH TRAIL

Section: Walnut Creek Trail intersection to Hunt Drive

- Enhance safety of at-grade trail crossing at Jamaica Drive
- Add lighting to tunnel under McDowell Street
- Pave trail segment east of Fayetteville Street
- Widen trail
- Resurface trail segments with surface quality in poor condition
- Increase comfort of street-adjacent trail section along South Saunders Street (consider widening and/or providing more separation from vehicles) Provide more wayfinding for trail users
- Enhance wayfinding and signage along entirety of trail and at intersection with Walnut Creek Trail

Section: Hunt Drive to Ashe Avenue

- Widen trail.
- Resurface trail segments with surface quality in poor condition
- Enhance wayfinding and signage along entirety of trail. Signage should alert users of the need to cross Western Boulevard

Section: Bilyeu Street to Gorman Street

- Widen trail
- Resurface trail segments with surface quality in poor condition
- Add curb cuts to trail entrances around Pullen Park
- Enhance wayfinding and signage along entirety of trail. Signage should alert users of the need to cross Western Boulevard
- Resurface trail segments with surface quality in poor condition

Section: Gorman Street to Reedy Creek Trail

- Widen trail section along Gorman Street or provide a dedicated separated on-street bikeway to complement to narrow trail segment along Gorman Street
- Enhance wayfinding and signage along entirety of trail, particularly for street-adjacent trail section along Gorman Street
- Resurface trail segments with surface quality in poor condition

Section: Sunnybrook Road crossing

- Enhance safety of at-grade trail crossing

Section: Little John Road crossing

- Enhance wayfinding and signage of at-grade trail crossing

Section: Belmont Drive to Lunar Drive

- Upgrade trail to current design standards

Section: South State Street to Summit Avenue

- Replace stairs with ramp on west side of South State Street
- Increase signage to downtown from Walnut Creek Wetland Center
- Enhance safety of at-grade trail crossing of Garner Road
- Add lighting to tunnel at Hammond Road

Section: Centennial Bikeway Connector intersection to bridge #2047

- Add lighting to tunnel under Lake Wheeler Road

Section: boardwalk #369 to Lake Johnson East Loop

- Add curb cuts to Walnut Creek Trail along Avent Ferry Road
- Enhance safety of at-grade trail crossing of Gorman Street

WALNUT CREEK TRAIL

Amenity Gaps

The following amenity recommendations reflect public comment and existing amenity inventory along existing trail segments that scored as high or medium-high during the prioritization process. Note that not all trails had segments that scored as high or medium-high. Similarly, not all segments that scored as high or medium-high have amenity gap recommendations.

BAILEYWICK TRAIL

Section: entirety

- Provide additional seating along trail

CRABTREE CREEK TRAIL

Section: Industrial Drive to Atlantic Avenue

- Provide additional seating along trail

Section: bridge #107 to Lockwood Park

- Increase awareness of existing parking lot #67
- Increase signage and awareness of existing water fountain at Lockwood Park
- Add bikeshare station near Raleigh Boulevard access point
- Invest in public art
- Add lighting to Capital Boulevard underpass
- Add lighting at Raleigh Boulevard access point

Section: Culpepper Lane to South New Hope Road

- Provide lighting at New Bern Avenue underpass

- Provide trash receptacle near New Bern Avenue underpass
- Provide a bicycle repair station near New Bern Avenue underpass
- Invest in public art

LITTLE ROCK TRAIL

Section: Hargett Street to Martin Street

- Provide additional seating at this location or in adjacent trail segments

Section: Martin Street to Davie Street

- Provide additional seating at this location or in adjacent trail segments
- Add water fountain at Martin Street entrance.
- Provide a bicycle repair station at Martin Street entrance

Section: Davie Street to Cabarrus Street

- Provide additional seating at this location or in adjacent trail segments

Section: Martin Luther King Junior Boulevard to Bragg Street

- Invest in public art at trail entrances near MLK Jr. Blvd
- Provide a trash receptacle and recycling

MARSH CREEK TRAIL

Section: entirety

- Provide water fountain at Brentwood Park
- Provide additional seating along trail

MINE CREEK TRAIL

Section: bridge #3 to Sawmill Road

- Provide additional seating at this location or in adjacent trail segments

NEUSE RIVER TRAIL

Section: Thornton Road parking area (lot #95)

- Add sign along Neuse River alerting canoers, kayakers, and tubers of the location of the Thornton Road parking area
- Provide lighting at Thornton Road parking area
- Provide water fountain and comfort station at Thornton Road parking area on southern section of lot outside of floodway

REEDY CREEK TRAIL

Section: NCMA Blue Loop to Blue Ridge Road

- Collaborate with North Carolina Museum of Art (NCMA) to provide public restrooms for trail users
- Provide additional seating
- Invest in public art and explore possibilities to partner with NCMA

ROCKY BRANCH TRAIL

Section: Walnut Creek Trail intersection to Hunt Drive

- Provide a water fountain, comfort station, and seating adjacent to trail at Dorothea Dix Park

Section: Bilyeu Street to Gorman Street

- Increase signage and awareness of existing comfort station at Pullen Park

WAKEFIELD TRAIL

Section: Old Falls of Neuse Road to Dunard Street

- Evaluate the need to increase parking capacity for vehicles at lots #72 and #79

WALNUT CREEK TRAIL

Section: Rose Lane to Belmont Drive

- Evaluate the need to increase parking capacity for vehicles at Dacian Road Park (lot #38)
- Increase signage and awareness of existing comfort station at Dacian Road Park
- Provide a map at Dacian Road Park with information on distance to Worthdale Park and other nearby destinations
- Invest in public art

Section: Belmont Drive to Lunar Drive

- Increase signage and awareness of existing water fountains at Apollo Heights Park
- Invest in public art

Section: Little Rock Trail intersection to Summit Avenue

- Evaluate the need to increase parking capacity for vehicles at Eliza Pool Park (lot #76)
- Add comfort station at Eliza Pool Park
- Add mirrors to South State Street
- Invest in public art

Section: Main Campus Drive to boardwalk #369

- Collaborate with North Carolina State University (NCSU) to explore providing a water fountain along trail segment



APPENDIX E

Recommendations



Appendix Summary

This appendix includes a complete list of all recommendations and associated action items and supporting parties listed in Chapters 4 and 5. The tables within this appendix are organized in a phased approach and can be used as an Action Plan by City staff. The phased approach includes ongoing, immediate-term (0 to 2 years), and short-term (3 to 5 years) action items.

In addition, the appendix includes sample code language which is provided as a reference for recommended updates to the City's Unified Development Ordinance. Code language included in this appendix was pulled from peer communities during the Unified Development Ordinance Analysis and Peer Review ([Appendix B](#)).

Full List of Recommendations

This Plan's recommendations are intended to be a resource for the City for both capital projects and future policy and program decisions. To elevate the status of the CAG System, creating a network of greenway trails that supports all users from the recreational birdwatcher to the avid bicyclist commuter, the City of Raleigh will need to implement changes to infrastructure and policies, while leveraging and building upon existing programming.

This section provides the full list of recommended actions to guide Raleigh in making decisions that promote and provide safe, accessible space for residents and visitors to use greenway trails for leisurely walks with friends and family, to commute to school or work, or to pick up groceries. The following tables include all recommendations and action items presented in Chapters 4 and 5. Action items are organized in a phased approach, with tables dedicated to ongoing, immediate-term (0 to 2 years), and short-term (3 to 5 years) implementation. The tables also provide key supporting partners the Parks, Recreation and Cultural Resources Department can collaborate with for each action item.

See [Appendix D](#) for the full list of recommended and prioritized new trails, and specific high-priority reinvestment projects and amenity gaps.

Table 32: Ongoing Recommendations and Action Items

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Update CAG Plan every five years.	Track recommendations that should be updated based on changing City goals or innovative best practices. As trails are upgraded and new trails are developed, review prioritization to guide future investment.	General	N/A
Update CAG Design Guide and Operations Manual.	At each five-year update of the CAG Plan, update the CAG Design Guide and Operations Manual concurrently.	General	N/A
Prioritize reinvestment for existing trails while strategically building new trails.	Continue to identify high-priority trails for new construction.	Development; General; Funding	N/A
	Continue to identify high-priority existing trails for reinvestment and/or redesign.	Development; General; Funding	N/A
Support ongoing trail and stream corridor clean-up efforts.	Continue to evaluate trail and stream corridor clean-up needs.	Environmental	N/A
Annually update the greenway trail and open space corridor maps.	Develop a task force or interdepartmental work group to formalize a process for mapping updates.	Development	Planning and Development Department; Communications Department
Establish a more resilient trail network that supports recreation and transportation uses even during flooding events.	Invest in other recommendations within the CAG Plan to build trails outside of the city's floodplains.	Development; Maintenance and Operations	Planning and Development Department
	Support the Raleigh Transportation Department in the development of separated on-street bikeways that connect to the CAG System and that can be used for effective detours during flood events.	Development	Transportation Department
Continuously evaluate trail needs for active transportation, recreation, and open space preservation.	Regularly evaluate community needs for recreational and active transportation trails.	General	N/A
	Regularly assess the equitable distribution of trails.	General	N/A
	Determine resource needs and feasibility of completing an active management plan for forests and wetlands and inventory the quality of protected ecosystems.	General	N/A

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RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Continue to protect sensitive ecological areas.	Prevent trail construction from impacting wetlands, lakes, rivers, streams, habitats of rare and endangered species, public water supplies, sensitive forest areas, steep slopes, soils identified as restricted for trail and road development, and unique or important geologic features or formations.	Environmental	N/A
	Use low-impact design and construction methods.	Environmental	N/A
Encourage opportunities for public art along the CAG System.	Continue maintenance of vegetation and other amenities that may impede clear sight lines along the trail system (see Maintenance Recommendations).	Security; Maintenance and Operations	N/A
Continue to promote Trail Safety Education, Awareness and Outreach.	Continue to promote and bring awareness of the importance of physical safety when using trails.	General; Development; Security	Communications Department; Trail Users
	Continue to communicate and bring awareness of greenway alerts, closures, and project status.	General; Development; Security	Communications Department; Trail Users
Encourage opportunities for public art along the CAG System.	Consider temporary and permanent art installations as opportunities for education and community storytelling.	General	Planning and Development Department; Raleigh Arts
Continue to promote Trail Safety Education, Awareness and Outreach.	Continue to promote and bring awareness of the importance of physical safety when using trails.	General; Development; Security	Communications Department; Trail Users
	Continue to communicate and bring awareness of greenway alerts, closures, and project status.	General; Development; Security	Communications Department; Trail Users
Continue to prioritize trail user security in routine trail maintenance.	Continue maintenance of vegetation and other amenities that may impede clear sight lines along the trail system (see Maintenance Recommendations).	Security; Maintenance and Operations	N/A

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Prioritize safety of trail users and evaluate trail planning and design elements that enhance safety.	Collaborate with other city departments, government agencies, businesses, nonprofit groups, and volunteers.	Collaboration; Security	Transportation Department; Engineering Services Department; Raleigh Water; Raleigh Police Department; Volunteer Groups
	Support planning, design, and improvement projects that increase greenway user safety.	Collaboration; Maintenance and Operations; Security	Transportation Department; Engineering Services Department; Raleigh Water
	Continue to utilize best practices for safety.	Development; Maintenance and Operations; Security	Transportation Department; Engineering Services Department; Raleigh Water
	Continue to engage with programs that promote public art, programs, and events.	Development; Maintenance and Operations; Security	Raleigh Arts, PRCR Recreation Division, City Manager's Office (Office of Emergency Management and Special
	Review ongoing trail safety practices annually.	Development; Maintenance and Operations; Security	Raleigh Police Department; Raleigh Water

Table 33: Immediate Term (0-2 years) Recommendations and Action Items

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Prioritize reinvestment for existing trails while strategically building new trails.	Identify three high-priority new trails for construction and conduct 30% feasibility studies for more accurate cost estimates	General; Development	N/A
	Identify five high-priority trail reinvestments and assess necessary resources.	General; Development	N/A
	Complete at least one new trail construction project.	General; Development	N/A
Continue to promote Trail Safety Education, Awareness and Outreach.	Increase communication efforts –on social media, webpages, text alerts, closures/detours.	General; Security	Communications Department; Technology and Information Department
	Continue to implement the Safety and Etiquette Campaign on an annual basis at a minimum.	General; Security	Communications Department; Raleigh Police Department
	Collaborate with Stormwater on Flood Monitoring Program to provide surveillance that can help monitor need for communications of trail closures and maintenance.	General; Collaboration; Maintenance and Operations; Security	Engineering Services Department (Stormwater Division)
Explore the development of a neighborhood trail request program.	Identify all neighborhoods that fall within program eligibility criteria.	Development	N/A
	Identify eligibility criteria for neighborhoods (e.g., near utility corridor or existing easement).	Development	N/A
	Create a process for requests; the process should consider social equity, trail length, feasibility, and neighborhood support.	Development	Planning and Development Department
	Create a menu of amenities that could potentially be included in trail projects.	Development	N/A
Continue to protect sensitive ecological areas.	Create a plan for open space corridors, outlining which will likely involve trail construction and which will serve as permanent open space corridors. Routinely review and update this plan based upon growth patterns and anticipated City needs.	Environmental	N/A

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Provide forward-thinking, ecologically just, and sustainable trails and amenities using industry best-practices.	Adopt sustainable design principles for urban trails.	Environmental	N/A
Prioritize safety of trail users and evaluate trail planning and design elements that enhance safety.	Increase signage and wayfinding along the CAG System that improves user safety based on standards in the 2021 Greenway Safety Report.	Collaboration; Security	Transportation Department; Raleigh Water; Raleigh Police Department; Volunteer Groups
	Evaluate areas that would benefit from pavement markings such as centerline striping, outer edge pavement markings, trail object markings and implement improvements.	Development; Security	N/A
	Evaluate strategic locations for trail lighting to improve visibility. Increase overall trail access and convenience that also provides users a sense of security.	Development; Maintenance and Operations; Security	Engineering Services Department; Transportation Department
	Identify lighting options/recommendations that will have the least negative impact to the surrounding natural environment.	Development; Maintenance and Operations; Security	Engineering Services Department (IFS Division)
	Identify hazardous wooden structures where a retrofit to cast in place concrete would reduce slip accidents.	Maintenance and Operations; Security	N/A
	Complete trail underpass (Tunnel) lighting.	Development; Security	Engineering Services Department (IFS Division)
Explore partnership opportunities with nonprofit and private organizations.	Expand the Adopt-A-Trail Program to allow for monetary sponsorship from individuals, businesses, and groups.	Development; Funding	Department of Human Relations (Equity and Inclusion Division)
	Support a Friends of the Trails group.	Development; Funding	Department of Human Relations (Equity and Inclusion Division)
	Bolster relationships with nonprofit and private organizations, such as Oaks and Spokes, Wake County Habitat for Humanity, Triangle Land Conservancy, Trail Rails to Trails Conservancy, Triangle Greenways Council, Downtown Raleigh Alliance, BikeWalk NC, and local HOAs and neighborhood groups.	Development; Funding	Department of Human Relations (Equity and Inclusion Division)

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RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Consider ways trail design and amenities can increase real and perceived trail safety.	Update the Master Sign Program to incorporate Help Locator codes to all non-mile marker signage.	Security	N/A
Continue to develop and expand trail counting program.	Continue to evaluate and update equipment management and maintenance protocols; develop data management protocols; archive and publish data annually.	General	Transportation Department, North Carolina Department of Transportation (NCDOT); North Carolina Capital Area Metropolitan Planning Organization (NC CAMPO); Institute for Transportation and Research (ITRE)
Establish an interdepartmental working group to discuss topics related specifically to trails and corridors.	Solicit participation from each City department and convene regular meetings.	Collaboration	Transportation Department, Engineering Services Department, Planning and Development Department, City Attorney's Office
	Continue to convene an inter-department working group with the Parks, Recreation and Greenway Advisory Board's Greenways Committee at least two times a year.	Collaboration	Greenway Committee, PRGAB, BPAC
	Develop an annual work plan to organize working group efforts.	Collaboration	Transportation Department; Raleigh Water
Increase accessibility of CAG System.	Develop policy that address Other Power-Driven Mobility Devices (OPDMD) to accommodate individuals with mobility disabilities..	General	N/A
Continue to improve trail connectivity to jurisdictions surrounding the City of Raleigh.	Continue to participate in and lead regional planning initiatives with groups and organizations whose goals are to promote linkages needed to enhance regional trail connectivity.	General	Triangle J Council of Governments; Triangle Trails Initiative, Wake County
Integrate new trail development as part of private development.	Research standards and design guidelines to encourage trail-oriented development and address gaps in regulation for trail-oriented design.	General	Planning and Development Department

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Establish and grow industry, economic development, and tourism partners.	Partner with the Chamber of Commerce, the City's Economic Development and Innovation Department, Downtown Raleigh Alliance, and others to develop support for CAG Plan implementation. Reach out to City, County, and State tourism agencies to ensure that trails are promoted as a top attraction in Raleigh.	General	Chamber of Commerce; Economic Development and Innovation Department; Downtown Raleigh Alliance; others
	Evaluate the need and resource needs of extended hours of operation within the CAG System, particularly those classified as Oak City Trails.	General	Emergency Communications Department; City Attorney's Office; Emergency Management and Special Events Department; Raleigh Police Department
Evaluate extending hours of operation to support active uses of the trail network.	Evaluate the need for updating signage to inform the public of any changes to hours of operations.	General	N/A
	Evaluate the need for additional staff resources to respond to trail emergencies after dark and to track and maintain lighting outages.	General	N/A
	Evaluate design features that could make trails safer after dusk, such as reflective pavement markings.	General	N/A
	Evaluate how to address after dark policies, bike light initiatives, police monitoring, and night-time use etiquette.	General	N/A
	Evaluate lighting impacts on the environment and design options that could mitigate adverse environmental impacts.	General	N/A
Explore a range of operating and capital funding sources to support the growing needs and public expectations of the CAG.	Provide funding and other staff resources for additional planning staff that can carry out the recommendations and action items set forth in this plan.	General; Funding	N/A
Integrate maintenance needs with volunteer programming efforts.	Coordinate with local volunteer groups to assist with maintenance tasks as appropriate.	Maintenance and Operations	Housing and Neighborhoods Department

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RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Increase funding for trail maintenance.	Assess funding approved each year in the general fund and determine the gap in reaching maintenance needs, particularly as additional trail construction is pursued.	Development; Maintenance and Operations; Funding	Budget and Management Services Department
Enhance communication efforts about trail closures and maintenance projects.	Make every effort to provide a safe, convenient walking and bicycling detour for every maintenance closure that will last longer than 24 hours. Detours may require on-street routing and should prioritize designated and separated bikeways for detour routes.	Development; Maintenance and Operations	Transportation Department; Raleigh Water
	Advertise on the greenway alerts webpage. Consider a banner on other greenway webpages users can click that navigates them to the alerts and closures webpage.	Development; Maintenance and Operations	Communications Department
Educate trail users about the value of the City's stream corridors and floodplains.	Create educational materials about the City's waterways and the environmental benefits of floodplains. Note how trails may be impacted during flooding events.	Maintenance and Operations	Engineering Services Department (Stormwater Division); Sustainability Department; Communications Department; Raleigh Arts
	Promote CAG beautification and encourage users to get involved in keeping waterways and floodplains clean and free of debris.	Maintenance and Operations	Engineering Services Department (Stormwater Division); Sustainability Department; Communications Departments
Strengthen the rapid response maintenance plan that guides the clearance of debris and detour provision.	Communicate identified priority trail segments and maintenance expectations to the public for existing and newly constructed trails that connect people to transit, employment centers, and have a higher number of active transportation trips.	Maintenance and Operations	N/A
	Establish protocols for debris removal and providing detours after storm events for priority trail segments.	Maintenance and Operations	Transportation Department
	Coordinate with the city's Flood Early Warning Pilot Program.	Maintenance and Operations	Emergency Communications Department

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Establish more consistent City funding for CAG System development.	Develop a toolkit of funding options for greenway construction.	Funding	Budget and Management Services Department
Be mindful of existing resources and collaborate with other City departments to solve maintenance needs.	Coordinate maintenance, and associated funding for maintenance, with other City departments.	Funding; Maintenance and Operations	Transportation Department; Engineering Services Department; Raleigh Water
Clarify CAG System definitions and processes within the UDO.	Include definitions of open space corridors, greenway trails, and reservation in the UDO.	Development	Planning and Development Department
	Replace all instances of "greenway corridor" with "open space corridor" in the UDO and other relevant City-wide documents.	Development	N/A
	Clarify the appropriate method for adding or revising corridors, trails, and easement widths.	Development	Planning and Development Department
	Clarify the use of facility fee credits.	Development	Planning and Development Department
	Explore the use of facility fee funds to reimburse private developers for constructing greenway connections.	Development	Planning and Development Department
	Research what structures would need to be established to use facility fee funds to reimburse developers for constructing public trail connections during construction of private development projects.	Development	Planning and Development Department
	Clarify reimbursement procedures when land is dedicated.	Development	Planning and Development Department
Require development to provide a fee-in-lieu program that directly contributes to CAG System funding.	Consider updating the UDO to provide developers an alternative option to required trail construction, such as a fee-in-lieu.	Development	City Attorney's Office; Planning and Development Department
	Consider eliminating the 10% open amenity area requirement for development along trails in favor of a fee-in-lieu program to pay for greenway maintenance and reconstruction.	Development	City Attorney's Office; Planning and Development Department

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RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Establish mechanisms to ensure quality of developer-built trails and amenities.	In the UDO, add reference to the Council-adopted Capital Area Greenway Master Plan and any future updates for standards and requirements associated with land dedication and easement widths.	Development	
	Develop standards for trail design and development.	Development	
Support greenway construction and easement dedication outside of a floodplain or flood hazard area.	Evaluate removing language from the UDO that limits requirements for greenway dedication only to floodplain, flood-prone, and flood hazard areas.	Development	City Attorney's Office; Planning and Development Department
	Update the UDO by making the "land for parks" and "trails and open space" primary open space categories, rather than tertiary.	Development	City Attorney's Office; Planning and Development Department
	Update the UDO to allow for the provision of publicly accessible open space to meet the outdoor amenity area requirements.	Development	City Attorney's Office; Planning and Development Department
	Evaluate updating the UDO to require greenway easement dedication for land uses beyond residential.	Development	City Attorney's Office; Planning and Development Department
	In the UDO, consider establishing different standards for trail width dependent whether the trail is built within or outside of a stream corridor.	Development	Planning and Development Department
	Clarify the definition and interpretation of "reservation" within the UDO. (Sec. 8.1.6)	Development	Planning and Development Department
Explore opportunities to expand environmental conservation efforts (i.e., habitat mapping bioblitzes, citizen science opportunities, periodic monitoring of habitat and species) by leveraging partnerships and trained volunteers.	Evaluate requiring developers to dedicate the full floodplain for trails and/or open-space corridors along streams.	Environmental; Development	City Attorney's Office; Planning and Development Department
	Review the impacts of lighting to the natural environment, particularly for trails along stream corridors that are classified as Oak City Trails and that are designated to support active transportation.	Environmental	Engineering Services Department (Integrated Facility Services Division); Sustainability Department

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Strengthen requirements for developers to contribute to trail construction.	Update the UDO to require developers to build trails within their property (along stream corridors or on-street connectors) identified by the Greenway Master Plan. Consider providing an alternative for developers to pay a fee-in-lieu instead of constructing the trail.	Development	Planning and Development Department
	Consider updating the UDO to provide staff with the authority to consider alternative locations or dimensions of required greenway easement dedications in order to maximize public benefit and improve flexibility in the development process.	Development	Planning and Development Department
	Update the UDO to provide incentives for developer-built greenway trails through reduced greenway trail easement width requirements (or other design standards), required open space credits, or density bonus.	Development	Planning and Development Department
	Offer a graduated density bonus for developers that exceed the greenway dedication requirement or construct a greenway trail that is wider and/or offers additional amenities for users.	Development	Planning and Development Department
	In the UDO, establish redevelopment criteria for land containing existing or planned greenway trails.	Development	Planning and Development Department
	Update the UDO to modify section 8.3.2 (Blocks) to permit an extension of the otherwise applicable "Dead-End Street (max)" where said dead-end street terminates with a greenway connection to a developer constructed greenway identified on the City's adopted plan.	Development	Planning and Development Department
	Update the UDO to require developers building within in specific overlay zoning districts to provide trail amenities (such as benches, water fountains, comfort stations) on-site or within the overlay district.	Development	Planning and Development Department
	Offer an express development review cycle for development applications that propose to construct priority greenway trails of a set length.	Development	Planning and Development Department
	In the UDO, add the ability for administrative modifications to street cross-sections to permit sidewalk on one side rather than both sides, where parallel/within a set distance of a developer constructed greenway.	Development	Planning and Development Department

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RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Require development to provide connections to existing and proposed trails.	Update the UDO to require private development to build connections, provide easements, and/or pay a fee-in-lieu to connect to existing and proposed trail corridors and street-side/urban trails.	Development	City Attorney's Office; Planning and Development Department
Expand the trail user data collection program.	Supplement data counters with in-person, mailed, and online surveys.	General	Communications Department
Bolster requirements for easement dedication to better prepare the City for trail design and construction.	Evaluate updating the UDO to require developers to produce stormwater calculations for impervious surface and nutrient load when greenway easements are dedicated, anticipating a future 10-12' minimum trail width.	Development	City Attorney's Office; Planning and Development Department
	Update the UDO to require a minimum easement dedication width of 75', instead of 50'. All corridors currently assigned a 50' required dedication width should be updated to 75'.	Development	City Attorney's Office; Planning and Development Department
	In cases where a trail connection is not being made by required development ordinance, update the UDO to require developers to demonstrate that a trail could be constructed by the City within the dedicated easement area by showing the necessary grading, engineering, and other documentation required by the PRCR Department.	Development	Planning and Development Department
Identify and designate protected natural areas (using existing PRCR definition) to proactively support eventual trail routing and permitting.	Utilize existing data/institutional knowledge, habitat mapping, and continued field monitoring and observation to identify ecologically unique or sensitive areas in support of future trail routing and permitting processes.	Environmental	Engineering Services Department (Stormwater Division) Wake Nature Preserve Partnership
Incorporate place making and activity hubs (trail-side hubs) along the existing and future network for both public and private development.	Identify locations along the existing system for potential trailside hubs.	Development	
	Explore public private partnerships.	Development	

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Continue to work across departments to further the success of the CAG System.	Collaborate with Transportation and Engineering Services Departments on the prioritization of at-grade trail street crossing and street resurfacing improvements.	Collaboration	Transportation Department; Engineering Services Department
	Coordinate with Engineering Services Department to complete trail and stream restoration projects in tandem.	Collaboration; Environmental	Engineering Services Department (Stormwater Division)
	Coordinate with Raleigh Water Department to plan and design water, sewer, and trail projects in tandem.	Collaboration	Raleigh Water Department
	Follow-up with the Transportation Department to define roles and responsibilities for planning and maintenance of greenway connectors (both current and new).	Collaboration	Transportation Department
	Coordinate with the City's Strategic Plan initiatives focused on enhancing greenways. (GNR 2.1, 2.2, 2.3)	Collaboration	N/A
Take a more active role in community conversations about people experiencing homelessness.	Commit to taking part in conversations already happening around homelessness.	Collaboration	Housing and Neighborhoods Department; Raleigh Police Department; Wake County Health and Human Services; Raleigh/Wake Partnership to End Homelessness; North Carolina Coalition to End Homelessness
	Re-evaluate current practices related to people experiencing homelessness who take shelter on the trail network. Involve community partners in this reevaluation effort if possible.	Collaboration	Housing and Neighborhoods Department; Raleigh Police Department; Wake County Health and Human Services; Raleigh/Wake Partnership to End Homelessness; North Carolina Coalition to End Homelessness

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RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Update CAG Design Guide.	Update CAG Design Guide for new and renovated trails to provide increased safety, comfort, convenience, maintenance, and amenities for users, and a consistent identity across the entire system.	General	N/A
Promote a culture of shared stewardship where the PRCR Department, trail users, volunteers, agency partners, and other stakeholders form a collective community of stewards who provide support to and receive shared benefits from trails and open space corridors.	Bolster carry in/carry out campaigns to reduce trash along trails and reduce burden on maintenance staff.	Maintenance and Operations; Environmental	Engineering Services Department (Stormwater Division); Sustainability Department
	Continue to involve volunteers in stream clean-up efforts.	Maintenance and Operations; Environmental	N/A
	Provide additional opportunities for volunteers to assist with trail repairs and maintenance, as appropriate.	Maintenance and Operations; Environmental	N/A
	Evaluate the training provided to volunteers and stewards for trail maintenance volunteering. Update as needed.	Maintenance and Operations; Environmental	N/A
	Collaborate with stewards to explore grant opportunities or potential for financial donations	Maintenance and Operations; Environmental	N/A
	Partner with neighborhoods, HOAs, and community groups to communicate the availability and benefits of adopt-a-park and trail programs on their adjacent trails and open space.	Environmental; Collaboration	N/A
	Work with adjacent landowners when combating non-native plant invasions.	Environmental; Collaboration	N/A
	Form a working group of stakeholders (e.g., DOT, utilities, private landowners, HOAs) to communicate and collaborate on active management and protection of natural resources.	Environmental; Collaboration	N/A
	Improve working relations with other City departments on shared easements by coordinating maintenance and construction projects.	Environmental; Collaboration	N/A

Table 34: Short Term (3-5 years) Recommendations and Action Items

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Prioritize reinvestment for existing trails while strategically building new trails.	Complete four trail reinvestment projects.	General; Development	N/A
	Identify three additional high-priority new trails for construction and conduct 30% feasibility studies for more accurate cost estimates.	General; Development	N/A
	Identify five additional high-priority trail reinvestments and assess necessary resources.	General; Development	N/A
Prioritize safety of trail users and evaluate trail planning and design elements that enhance safety.	Implement trail lighting projects that improve visibility, increase overall trail access and convenience, and provide users a sense of security.	Development; Maintenance and Operations; Security	Engineering Services Department; Transportation Department
Continue to protect sensitive ecological areas.	Develop a program to increase awareness of, contain, and possibly eradicate invasive plants and insects.	Environmental	N/A
	Develop an invasive plant management program to protect the forests, wetlands and meadows on the greenway and the environmental benefits these areas provide to citizens.	Environmental	N/A
	Establish a tree buffer zone for new trails and preserve the tree buffer on existing trails to enhance the natural experience, increase shade, and provide natural screening from adjacent land uses.	Environmental	N/A
Provide forward-thinking, ecologically just, and sustainable trails and amenities using industry best-practices.	Review and update trail design standards for inclusion of additional sustainability measures in the design of trails, selection of amenities, and maintenance of the CAG System.	Environmental; Maintenance and Operations	N/A
Communicate how greenway users can report maintenance issues.	Make information for users reporting maintenance issues more prominent on City websites.	Maintenance and Operations	Communications Department
	Advertise and spread the word about how users can report maintenance issues that include trails, litter/ debris, and stream blockages/flooding through the City's marketing departments and social media channels.	Maintenance and Operations	Communications Department
	Place signage along trails and at access points informing users how they can report maintenance issues. Signage may include websites and/or QR codes.	Maintenance and Operations	Communications Department

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RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Integrate maintenance needs with volunteer programming efforts.	Establish a trail stewardship/ ambassador program or Friends of the Trails group.	Maintenance and Operations; Environmental	N/A
Establish more consistent City funding for CAG System development.	Increase annual funding from general fund that corresponds to a per capita investment, proposed greenway miles, active transportation mode split, or some other quantifiable measure.	Funding	Budget and Management Services Department
	Include a dedicated allocation for greenway construction in future bond packages.	Funding	N/A
	Establish a dedicated funding source for greenway construction.	Funding	Budget and Management Services Department
Establish mechanisms to ensure quality of developer-built trails and amenities.	Update UDO language to provide consistent design requirements between the Greenway Master Plan and on-street trail cross sections within the Street Design Manual.	Development	Planning and Development Department
Consider ways trail design and amenities can increase real and perceived trail safety.	Evaluate the appropriateness of CEPTD throughout the CAG System.	Security	N/A
Add bike share stations at key trail access points and trailheads.	Work with Citrix Cycles and bike share planners to identify appropriate station locations. Monitor trail usage to note any correlation between increased trail users and bike share users.	General	Transportation Department; Citrix Cycles
Develop comprehensive invasive plant management plan to protect existing natural resources and forests in greenway parcels and easements.	Expand invasive vegetation inventories and monitoring to include all greenway parcels and easements and develop an integrated management plan to control invasive plants for the conservation of natural resources.	Environmental	N/A
Incentivize trail-oriented development where appropriate given land use context.	Provide density bonuses for trail-oriented development.	Development	Planning and Development Department

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Increase awareness of the environmental benefits and history of the CAG System by increasing interpretive signage and/or programming opportunities.	Celebrate the cultural heritage and environmental benefits of areas surrounding trails through signage, public art, and programming.	Environmental	Raleigh Arts; Engineering Services Department (Stormwater Division); Wake Audubon Society; Conservation Trust for North Carolina; Historic Resources
Explore opportunities to expand environmental conservation efforts (i.e., habitat mapping bioblitzes, citizen science opportunities, periodic monitoring of habitat and species) by leveraging partnerships and trained volunteers.	Conduct a detailed environmental analysis of the greenway system, including vegetation and wildlife characteristics, stream water quality, and tree canopy cover.	Environmental	North Carolina Department of Environmental Quality; Universities; Wake Nature Preserves Partnership
	Consider developing a partnership with local universities and/or the North Carolina Department of Environment Quality to monitor health and vibrancy of plants and animals along the trails and corridors.	Environmental	Local Universities; North Carolina Department of Environmental Quality
	Prioritize areas for habitat restoration and conservation activities within open space corridors and collaborate with conservation partners on funding, grant opportunities, staffing, acquisition, and project management.	Environmental	Land and Water Conservation Fund; City of Oaks Foundation
	Prioritize areas for stream enhancements and restoration.	Environmental	Engineering Services Department (Stormwater Division); Wake Nature Preserve Partnership
Incorporate place making and activity hubs (trail-side hubs) along the existing and future network for both public and private development	Develop guidance and standards for trailside hubs along existing and future trails.	Development	Planning and Development Department

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RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Engage the community about trail security to inform departmental policies and trail operations, design, and programming.	Host routine community conversations to hear about security concerns and communicate actions taken by the City.	Security	Community Partners
	Develop and distribute an annual survey for Raleigh residents to collect feedback on trail and park safety and security.	Security	N/A
Continue to work across departments to further the success of the CAG System.	Continue to coordinate with Urban Forestry on the removal of tree hazards on developed greenway corridors when trees are determined to be diseased or otherwise a safety hazard.	Maintenance and Operations; Environmental; Collaboration	N/A
	Collaborate with relevant City departments to discuss trail-oriented development opportunities.	Collaboration; Development	Transportation Department; Planning and Development Department
	Coordinate with relevant City departments to improve requirements for trail detours as part of public and private development projects.	Collaboration; Development	Transportation Department; Planning and Development Department
	Ensure integration of trail planning and design efforts with the Bike Raleigh Plan.	Collaboration	Transportation Department
	Collaborate with relevant City departments to limit on-street parking near at-grade trail street crossings to support sight lines for trail users and drivers.	Collaboration	Transportation Department; Planning and Development Department
	Collaborate with relevant City departments to determine the best way to address safety issues for trail users.	Collaboration; Security	City Manager's Office (Office of Emergency Management and Special Events); Raleigh Police Department; Emergency Operations Center (EOC); Transportation Department

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Increase funding for trail maintenance.	Establish an annual dedicated budget for trail reconstruction and maintenance.	Funding	Budget and Management Services Department
Continue to leverage grant opportunities, particularly ones that support multi-modal facilities such as trails, street side paths, trail connections.	Pursue federal grants, such as RAISE, Transportation Alternatives Program (TAP), Recreational Trails Program (RTP), Locally Administered Projects Program (LAPP), Congestion Management and Air Quality (CMAQ) Improvement Program, Land and Water Conservation Fund (LWCF).	Funding	Budget and Management Services Department; Transportation Department
	Pursue state grants, such as Parks and Recreation. Trust Fund (PARTF), NC Land and Water Fund (NCLWF), Water Resources Development Grant Program, State Street-Aid (Powell Bill) Program, and Governor's Highway Safety Program.	Funding	Budget and Management Services Department; Transportation Department
	Pursue private grants, such as AARP Livable Community Initiatives Grant and the variety of grant programs through the Rails-to-Trails Conservancy.	Funding	Budget and Management Services Department
Leverage residential development to enhance sidewalk connectivity.	Assess a fee for development in residential neighborhoods to be used for sidewalk development on residential streets that connect to greenway trails.	Development	Planning and Development Department
Compile crime, emergency response, and other incident data including location-specific information for routine reporting and identification of opportunities to improve trail safety, security, and overall management.	Coordinate with applicable departments, agencies, and local jurisdictions to develop reporting forms that include specific location and incident details. Link forms to searchable database.	General; Security	Raleigh Police Department; Local Jurisdictions

RECOMMENDATION	ACTION ITEMS	CATEGORY	SUPPORTING PARTIES
Enhance stream clean-up efforts at specific trail locations.	Prioritize clean-ups in the following areas: Crabtree Creek Trail between Wake Forest Road and Atlantic Avenue, Crabtree Creek Trail between Capital Boulevard to Raleigh Boulevard, Crabtree Creek Trail near New Bern Avenue, and Little Rock Trail between Bragg Street and Walnut Creek Wetland Center.	Environmental; Maintenance and Operations	Volunteer Groups
	Conduct a system-wide inventory and score with equity metrics to determine additional stream and trail clean-up locations and goals.	Environmental; Maintenance and Operations	Volunteer Groups

Sample Code Language

The following sample code language was pulled from peer communities as part of Unified Development Ordinance Analysis and Peer Review conducted and described in Appendix B. This language can be used as a resource for City of Raleigh staff in determining the most appropriate language and development policy decisions for Raleigh's unique context, land use and growth patterns, transportation network, and vision for the CAG System. Sample code language is grouped into seven categories:

- Land Dedication Requirements
- Easement Width Requirements
- Dedication Alternatives
- Developer-built Trails
- Trail Management and Maintenance
- Connecting to Trails
- Developer Incentives

Land Dedication Requirements

Cary, NC

DEDICATION IS REQUIRED FOR SUBDIVISIONS

The subdivider of land for residential or non-residential purposes shall be required to dedicate land or make a payment in lieu thereof, for public

park and/or greenway development, to serve the recreational needs of the residents of the subdivision or development and/or provide connectivity...Lands granted for public greenway development will be required for both residential and non-residential development for those locations recommended in the most recently approved Town of Cary's Parks, Recreation and Cultural Resources Facilities Master Plan for park and greenway development (or any proceeding plan addendums). (Sec. 8.2.3.A)

If the Town of Cary's Parks, Recreation and Cultural Resources Facilities Master Plan indicates a future greenway through a proposed development, whether residential or non-residential, a strip of greenway land through this area shall be dedicated to the Town, at a minimum of thirty (30) feet, but not to exceed fifty (50) feet in width; widths of easements may be reduced to twenty (20) feet in those cases where the developer is constructing the greenway trail. Widths of greenway easements for street-side trails [see Section 7.10.4 (C)] shall be determined by the Parks, Recreation and Cultural Resources Director. (Sec. 8.2.3.D)

DEDICATION IS NOT REQUIRED FOR SITE PLANS

To the maximum extent feasible, where significant natural and scenic resource assets exist on a property, the developer shall give priority to their preservation through public park or greenway dedication or as private open space. (Sec. 8.3.2.1)

Morrisville, NC

OPEN SPACE REQUIREMENTS

(SEE TABLE 5 IN UDO)

All new development except individual lot development of a single-family detached, duplex, or manufactured home dwelling on an existing lot (i.e., including subdivisions for such dwellings) shall incorporate into its required open space any greenway path or multi-use path called for across the development site by the Comprehensive Plan. Such incorporation shall include installation of the path and recording of an associated pedestrian access easement, if applicable. (Sec. 5.8.8.B)

PUBLIC RECREATION AREAS REQUIREMENTS

Any subdivisions proposing to create lots designed and intended to serve as building sites for bungalow court, pocket neighborhood, single-family detached, duplex, manufactured home, single-family attached, multifamily, live/work, congregate living facility, and continuing care retirement facility shall dedicate a portion of the subdivision site as public recreation area. The amount of land required to be dedicated shall equal 1/35 of an acre multiplied by the number of dwelling units proposed to be accommodated by subdivision lots (for subdivisions creating lots for bungalow court, pocket neighborhood, single-family detached, manufactured home, or single-family attached dwellings, this will equal the number of such lots; for subdivisions creating lots for duplex dwellings, this will equal twice the number of lots; for

subdivisions creating lots for multifamily dwellings, live/work, congregate living, and continuing care retirement facilities this will equal the number of dwelling units)....

*In instances where the Town Council authorizes partial payment of in lieu funds and partial dedication of public recreation area for any multifamily dwelling development or mixed-use not subject to subdivision regulations (see Sec. 5.5.2.B), the amount of land required to be dedicated shall equal 1/35 acre multiplied by the number of multifamily dwelling units proposed for land dedication multiplied by the current multifamily factor (e.g. $1/35 * \text{the number of dwelling units} * .80$). A flat fee per unit shall be paid for any dwelling unit not proposed for land dedication. (Sec. 5.5.2.C)*

No more than 25 percent of land dedicated as active public recreation area shall be located within a Floodplain Overlay District...

If the development site is adjacent to existing or planned parks, greenways, or other public open space, required public recreation area shall, to the maximum extent practicable, be located to adjoin, extend, and enlarge the park, greenway, or other public open space. (Sec. 5.5.2.D)

Asheville, NC

OPEN SPACE REQUIREMENTS

(SEE TABLE 6 IN UDO)

Open space shall be provided in accordance with the above table [see Table 6] for: initial residential development containing eight or more units or

redevelopment or additional development that adds eight or more units; for initial nonresidential or mixed use development of lots containing one acre or more in area; or for redevelopment or additional development that adds 25 percent more nonresidential or mixed use floor area on lots containing one acre or more in area. The CBD district and single-family residential subdivisions with a minimum lot size of one acre or more are exempt from the requirements of this section...

Regardless of the requirements and exemptions of this subsection, any portion of the site of the proposed development that is designated as future open space or greenway in the Greenway Master Plan of the City of Asheville shall be reserved for open space. This area may be counted toward the total amount of open space required for the development...

If the total amount of land required to comply with the greenway master plan is less than the total amount required for the development by the above table, then the developer shall provide additional open space to meet the requirement of the above table. If the total amount of land required to be reserved to comply with the greenway master plan exceeds the total amount required by the above table, then the developer must still provide the open space required by the greenway master plan. (Sec.7-11-4-C)

Minneapolis, MN

Any developer of land within the city that will result in a net increase in the number of development

employees and/or a net increase in the number of residential dwelling units shall convey or dedicate to the public a reasonable portion of the land for public use for parks, playgrounds, recreational facilities, wetlands, trails, or open space. This requirement shall apply to platting of land, re-platting of land, registered land survey, or development that will require a building permit, but shall not apply to tax parcel combinations or splits, minor subdivisions, lot line adjustments, conversions of apartments to condominiums, or internal leasehold improvements that do not result in a net increase in the number of residential dwelling units or development employees.

City staff, in consultation with the park board superintendent or their designee and the developer, shall determine the location and configuration of any land dedicated, taking into consideration the suitability and adaptability of the land for its intended purpose, future needs of the proposed development, and the criteria below. The park board may decline any such proposed dedication by responding in writing within ten (10) business days to a communication from the city to the park board describing the proposed land dedication. In such case, the developer will be required to make a payment-in-lieu of dedication in accordance with subdivision (c) below.

Criteria to be considered:

- (1) The land to be dedicated must be in conformance with the comprehensive plan and applicable adopted small area plans and in an area that is identified for park or conservation purposes in an adopted city or park board plan.

(2) The land to be dedicated should serve an appropriate public purpose, which might include one (1) or more of the following:

- a. Connecting existing components of the parks and open space network (including creation of a trail connection).*
- b. Expanding an existing public park, trail, or open space by the addition of adjacent land.*
- c. Preserving significant landforms, native plant communities, sensitive habitat, and/or cultural resources.*
- d. Preserving areas containing vegetation identified as endangered or threatened or that provide habitat for animals identified as endangered, threatened, or of special concern under 15 United States Code Section 1531 et seq. or Minnesota Statutes Section 84.0895, and rules adopted under these respective laws.*
- e. Providing space for recreational and leisure uses appropriate to meet the needs of the new residents and/or employees.*

(3) There must be sufficient resources, public and/or private, available and committed to develop, operate, and maintain the new park land.

(4) The land to be dedicated should help serve an area that is under-served by parks due to distance to existing parks, population density, inadequate facilities, or inadequate size of existing nearby parks.

(5) The land to be dedicated shall be adequate for its intended purpose.

(6) Land dedicated solely for roadway, stormwater retention, or utility purposes, or otherwise unsuitable for the purposes listed above, shall not be accepted as satisfying the land dedication requirements of this article.

(7) Dedicated land shall be accessible to the public served unless the city and park board determine that the dedicated land is an environmentally or ecologically sensitive area for which public access would be detrimental.

At any time that net new residential dwelling units and/or net new or increased development employees will result from development, the developer shall dedicate:

(1) .0066 acres of land for every newly created residential dwelling unit within the downtown area or .01 acres of land for every newly created residential dwelling unit outside of the downtown area, up to a maximum of ten (10) percent of the area being platted or developed, plus

(2) One hundred (100) square feet of land for each development employee, up to a maximum of ten (10) percent of the area being platted or developed.

Land so dedicated shall be within the plat, registered land survey, or development site and/or, subject to approval by the city after consultation with park board staff and the developer, in close proximity to the plat, registered land survey, or development

site. The city may require the land dedication option under this subdivision (b) as a condition of plat, registered land survey or building permit approval, and in so doing may require that the land be dedicated prior to or at the same time as recording the final plat or registered land survey. (Sec. PB15-4)

Austin, TX

DEFICIENT PARK AREA MAP

Except as provided in Subsection (C), PDOP-Exhibit A is the Deficient Park Area Map required under the Parkland Dedication Ordinance and depicts areas in which land dedication may be required rather than payment of a fee in-lieu of dedication.

The deficient areas depicted on the map meet at least one of the following locational criteria:

- (1) Areas that have no parkland within:
 - (a) ¼-mile, for areas within the Parkland Dedication Urban Core established by City Code § 25-1-601(8); and
 - (b) ½-mile, for areas outside of the Parkland Dedication Urban Core; or
 - (c) areas within ¼-mile or half-mile of a park that do not have adequate crossings over a major roadway, a railroad track, or a water body.
- (2) Potential greenways; and
- (3) Corridors that would provide increased connectivity with existing or planned parks

or recreational amenities and proposed trails designated by the City's Urban Trails Master Plan.

Updates to the Deficient Park Area Map may be made administratively, without amending PDOP-Exhibit A, if necessary to reflect changes in deficient area boundaries under Subsection (B) and expansions of the city limits or extraterritorial jurisdiction due to annexation. However, the PARD director shall formally amend PDOP-Exhibit A on a regular basis to reflect administrative updates to the Deficient Area Map, and shall make a current copy of the updated map available on the department's website. (Sec. 14.3.3.A-C)

LAND DEDICATION REQUIREMENTS

PARD shall review applications for preliminary plans, final plats, site plans, and building permits, as required, in order to:

- (1) determine whether to allow or require payment of a fee in-lieu of parkland dedication under the Parkland Dedication Ordinance, City Code § 25-1-605 (Fee In-Lieu of Parkland Dedication); and
- (2) evaluate land for dedication to meet the standards for dedication under Parkland Dedication Ordinance, City Code § 25-1-603 (Standards for Dedicated Parkland) and PDOP § 14.3.6 and § 14.3.7.

As part of its review, PARD may meet with applicants before or after a development application is filed and may request a site visit to evaluate the suitability of land for dedication.

As part of the application process, PARD may require information, including spatial data, that it deems necessary to determine the amount of land available for dedication that meets the standards referenced in Subsection (A)(2). These items may include the following:

- (1) the total number of residential units proposed as part of the preliminary plan, final plat, or site plan application;*
- (2) lot dimensions or metes and bounds acreage of parkland to be dedicated;*
- (3) site acreage amounts for land within the 25- and 100-year floodplain, as well as land located outside the floodplain;*
- (4) the location, size, and general description of any Critical Environmental Features (CEFs) and CEF setbacks existing on the site;*
- (5) a tree survey if applicable to site proposed trails and other amenities; utility easements that run through the park, and/or to better understand the inventory of proposed public trees;*
- (6) a slope analysis, to aid in determining the percentage of dedicated land that may be developed with park amenities including the indication of any erosion hazard areas;*
- (7) an erosion hazard zone analysis if requested for areas where dedicated parkland includes a creek or lake;*

- (8) the location of all existing and proposed: (a) structures; (b) above and in-ground utilities; and (c) public and private easements.*

An application filed in connection with a Municipal Utility District (MUD), development Public Improvement Districts (PID), Municipal Management District (MMD), or a Planned Unit Developments (PUDs) must include the following additional elements if a park superiority determination is being evaluated or if a park plan is being approved to meet all of the parkland dedication requirements for the PUD.

- (1) A Land Use Plan that shows the location and acreage amounts of proposed public parkland, private parkland and greenways in different colors. Additionally:*

- (a) for a MUD or a PID, the acreage amounts shown on the plan should match any acreage amounts delineated in an agreement for creation of the MUD or PID; and*
- (b) for a PUD, the acreage amounts shown on the plan should indicate amount of parkland required to meet the "superior development" standard.*

- (2) A Park Plan, with a map and corresponding tables that delineate how credited acreage for parks was determined and how it will be distributed within the development. This may include an exhibit that shows buffers around proposed parkland by ¼-mile in the Parkland Dedication Urban Core and ½-mile outside that urban core, to ensure that all residents are located near a park.*

(3) For a PUD, provisions in the PUD ordinance that establish timing requirements for the dedication of parkland. (Sec. 14.3.4)

Nashville, TN

GREENWAY OVERLAY DISTRICT

The greenway overlay district is established for the purpose of identifying on the official zoning map those properties which an adopted greenway master plan has determined appropriate for inclusion in a communitywide greenway system. The provisions of the greenway overlay district are intended to facilitate the implementation and ongoing utilization of a countywide greenway system through appropriate design and development of properties within the district, and to encourage active participation in the implementation of an adopted greenway plan through the use of development incentives. (Sec. 17.36.160)

In accordance with Chapter 17.40, Article III, the greenway overlay district may be applied to any property included within a greenway master plan adopted by the metropolitan greenways commission. The provisions of this article shall apply to those portions of a property lying within a greenway overlay district. (Sec. 17.36.140)

Portland, OR

All applicants for a land use review or for building permits on lands designated with a recreation trail symbol on the zoning map are required to grant an easement for the recreation trail. The easement must be done as part of recording a land use review

and finalized prior to obtaining a final certificate of occupancy. The land may be donated to the City instead of granting an easement when the standards of Section 33.272.080 are met. Trails shown adjacent to public rights-of-way may be constructed in the public right-of-way, subject to approval from the Portland Bureau of Transportation. (Sec. 33.272.020)

Easement Width Requirements

Cary, NC

If the Town of Cary's Parks, Recreation and Cultural Resources Facilities Master Plan indicates a future greenway through a proposed development, whether residential or non-residential, a strip of greenway land through this area shall be dedicated to the Town, at a minimum of thirty (30) feet, but not to exceed fifty (50) feet in width; widths of easements may be reduced to twenty (20) feet in those cases where the developer is constructing the greenway trail. Widths of greenway easements for street-side trails [see Section 7.10.4 (C)] shall be determined by the Parks, Recreation and Cultural Resources Director. (Sec. 8.2.3.D)

San Jose, CA

Real property dedicated by the applicant to city for a trail will be eligible for credit equal to the square footage of land to be dedicated if the following requirements are met:

1. The real property to be dedicated meets the city's trail requirements; and

2. The applicant dedicates the real property to city in accordance with the procedures specified in Section 14.25.330; and
3. The real property to be dedicated shall be used for a trail that is identified in the city's general plan or in the city's master plan for parks and recreational facilities; and
4. The real property to be dedicated is not less than twenty-four (24) feet wide; and
5. The real property to be dedicated is not already dedicated for public park or recreational purposes. (Sec. 14.25.440)

Colorado Springs, CO

Bicycle Paths Located Adjacent To Arterial Streets: Where an off-street bicycle path is to be located adjacent to a major street, as shown by the bicycle plan, the subdivider shall be required to dedicate an amount of right of way sufficient to accommodate the bicycle path as indicated in the traffic engineering policy and design standards.

Bicycle Paths Not Located Adjacent To Arterial Streets: Where an off-street bicycle path is to be located not adjacent to a major street, as shown by the bicycle plan, the subdivider shall be required to dedicate an amount of right of way and/or provide a public access easement such that a fourteen foot (14') wide strip of land is available for the placement of a bicycle path. The fourteen foot (14') wide strip of land may be comprised of a combination of available utility or drainage right of

way or easement, additional dedicated right of way, and public access easement. The Executive Director and City Engineer shall determine the amount of utility or drainage right of way or easement available for this purpose. In no instance shall bicycle path improvements conflict with utility or drainage facilities. (Ord. 96-44; Ord. 98-185; Ord. 01-42) (Sec. 7.7.1602)

Dedication Alternatives

Cary, NC

If land to be dedicated does not meet the requirements of Section 8.2.3 of this Ordinance, or is not suitable for public recreation purposes, or if the recreational needs of the proposed development can be met by other park, greenway, or recreational facilities planned or constructed by the Town within reasonable proximity to the development, or if existing park land is adequate to serve the development, a payment or partial payment of funds ("subdivision recreation fund payment") in lieu of a land dedication shall be made. Recommendations regarding payment of funds in lieu of a dedication of land will be made by the Town at the time of subdivision plan approval, or master land use plan approval in the case of a Planned Development, or as part of the preliminary development plan for a Mixed Use District. (Sec. 8.2.4.A)

Pursuant to N.C. Session Law 2007-321, developers of multi-family dwelling units not requiring subdivision plan approval shall provide funds ("multi-family recreation fund payment") whereby the town may acquire recreational land or areas to serve

the development of more than one (1) multifamily development or residential subdivision, except where dedication of land is approved pursuant to this Section 8.2.4(B). Such funds may be combined with funds received from residential subdivisions pursuant to Section 8.2.4(A) of this Ordinance and used for the acquisition or development of recreation, park or open space sites. (Sec. 8.2.4.B)

San Jose, CA

The planned development zoning or development permit for the residential project subject to this chapter, whichever occurs first, shall set forth whether the city will accept land dedication or require payment of a fee in lieu thereof, or a combination of both. The determination shall be based upon, but not limited to, consideration of the following:

- 1. The General Plan of the City of San José;*
- 2. The city's policies for the development or renovation of park facilities and recreational facilities;*
- 3. The topography, geology, access, and location of land in the residential project that is suitable for the development or renovation of park facilities or recreational facilities;*
- 4. The size and shape of the residential project and land available for dedication;*
- 5. The location of existing or proposed park sites and trails. (Sec. 14.25.320)*

Minneapolis, MN

If a plat or registered land survey is not required under section 598.40, if the dedication of land is not practical, or if city staff, after consultation with park board superintendent or their designee, determines that the land to be dedicated does not meet the requirements of subdivision (a), then a developer of property subject to subdivision (b) of this section shall contribute a cash payment in lieu of all or a portion of the land otherwise required under subdivision (b) of this section. The fee for mixed-use developments that include both residential and non-residential development shall be the sum of the fees for the residential and non-residential development components. The amount of cash payment for residential development shall be one thousand five hundred dollars (\$1,500.00) per non-exempt unit, with said amount to be adjusted annually as described below. The amount of the cash payment for non-residential development shall be based upon the city assessor's most recent certified land estimated market value per square foot of the total acreage of the plat or development site at the time of city approval, multiplied by the number of square feet that would have been dedicated under subdivision (b). The amount of cash payment in lieu of dedication for non-residential development shall not exceed two hundred dollars (\$200.00) per development employee, with said maximum to be adjusted annually as described below. Both the per unit and per development employee limits above shall be adjusted each April 1 by the change in the Consumer Price Index for all Urban Consumers (CPI-U, all Items) for the Minneapolis-St. Paul area

issued by the Bureau of Labor Statistics for the preceding twelve (12) months ending December 31 of the previous year, but shall not be reduced. In determining whether land dedication or cash in lieu thereof will be required, city staff, in consultation with park board staff, may consider without limitation the suitability and adaptability of land within the site for the purposes listed in subdivision (a) of this section and criteria for land dedication in subdivision (a) of this section. The cash payment in lieu shall be contributed prior to obtaining the city clerk's signature on the final plat or at the time of payment of the fees for the building permit that authorizes the construction of the main structure of the project.

In the event there is a significant change in the size and/or type of a development project that is subject to this parkland dedication ordinance, there may be a commensurate increase in the parkland dedication fee or a refund of the previously paid fee. Said increased fee will be payable at the time the building permit review fee for the revised project is collected. Any refunds will be paid from the parkland dedication special fund by the park board.

Exemptions. The following are exempt from the parkland dedication requirements:

- (1) All affordable housing units as defined in section 598.360. (2009-Or-030, § 1, 4-10-09; 2010-Or-081, § 4, 9-24-10; Pk. Bd. Ord. No. 2013-103, § 1, 12-18-13) (Sec. PB15-4)*

Asheville, NC

For open space requirements of 10,000 or less square feet in area and not involving property affected by the Greenway Master Plan, a property owner may elect to pay a fee-in-lieu of open space instead of providing the open space. For other required open space areas, a property owner may pay a fee-in-lieu of open space designation for all or a portion of the open space requirement if such fee-in-lieu is acceptable to both the parks and recreation director and planning director...

This fee shall be calculated by using the pro rata value of the designated property relative to the value of the entire site to be developed using tax appraisal data; for properties covered by agricultural or other exemptions, the city may utilize a separate appraisal method in its sole discretion. Funds collected in this manner shall be maintained in a separate account and shall be used to purchase or to enhance recreational use of property necessary to implement features of the greenway master plan or the Parks and Recreation Master Plan of the City of Asheville provided such features are reasonably proximate to the site(s) from which the funds are collected. Where practical, the collected fees for each project shall be designated for specific parks and recreation acquisitions and/or enhancements by the parks and recreation director...

For developments and subdivisions containing more than 50 residential units, the fee-in-lieu option may only be used for up to 50 percent of the open space requirements in order to ensure that these larger projects provide on-site open space for their

residents; developments in urban-scale mixed use districts (NCD, UV, URD, UPD) are exempt from this requirement and up to 100 percent of the open space requirements may be accommodated through fee-in-lieu payments regardless of development size. (Sec. 7-11-4-G)

Morrisville, NC

FEE-IN-LIEU

In lieu of providing all or a portion of the required public recreation area on a development site in accordance with Section 5.5.2, the developer may, with Town approval, make a payment to the Town. (Sec. 5.5.3.C)

Type 1 and Type 2 Subdivisions: The amount of the in-lieu payment shall be the product of the number of acres of required public recreation area that is proposed and approved for the in-lieu payment option multiplied by the pre-development fair market value per acre of land making up the development site. The development application shall include an appraisal or other documentation acceptable to the Town showing the development site's predevelopment fair market value...

If the Town disagrees with the pre-development fair market value submitted by the applicant, such value shall be determined by a professional appraiser appointed by the Town Manager. The cost of the appraisal shall be borne by the applicant.

Major and Minor Site Plan Approval for Multifamily Dwellings: The amount of the payment for any multifamily dwelling development or mixed-use

development that includes multifamily dwelling units that is not subject to Section 5.5.2.B.1, Type 1 and Type 2 Subdivisions, shall be a flat fee per unit as established in the current Town of Morrisville Planning Department Fee Schedule.

OFF-SITE DEVELOPMENT

In lieu of providing required common open space area or public recreation area on a development site in accordance with Section 5.5.1 or Section 5.5.2, the developer may, with the approval of the Town provide all or some of required common open space or public recreation area on land outside the development site...

Any approved off-site common open space or public recreation area shall be identified on a plat. The plat shall be recorded with the Register of Deeds for the county in which the dedicated land is located. Ownership, management, and maintenance of common open space shall be in accordance with Section 5.5.1.F, and the conveyance of dedicated recreation area shall be in accordance with Section 5.5.2.F. (Sec. 5.5.3.B)

Austin, TX

PARD shall evaluate requests to pay a fee in-lieu of dedication under the criteria specified under City Code § 25-1-605 (Fee In-Lieu of Parkland Dedication). If land available for dedication generally meets those criteria, and satisfies the standards for dedication under PDOP § 14.3.7, PARD shall consider the overall value of the land to the City's park system based on whether:

(1) the site provides a connection to existing or future parkland;

(2) the land available for dedication provides an opportunity to expand an existing park; and

(3) onsite parkland would further goals of the Imagine Austin Comprehensive Plan by providing:

(a) gathering areas and outdoor play in corridors and centers;

(b) opportunities for health-enhancing activities for residents;

(c) green infrastructure with recreation amenities; or

(d) increased connectivity for pedestrian and bicycle traffic.

PARD may, as authorized by City Code § 25-1-605(E) (Fee In-Lieu of Parkland Dedication), accept a reduced land dedication in combination with payment of a fee in-lieu of land and/or amenities of equal value where doing so best furthers the goal of maintaining a viable City park system. PARD will calculate a combination of land, amenities and/or fees with the following methodology:

(1) Determine the percentage of credited acres being dedicated from the total amount of acres owed according to City Code § 25-1-602.

(For example, 30% of the land owed is being dedicated.)

(2) Calculate the fee in-lieu of land owed as if no land were being dedicated. (For example,

\$100,000 in fees is owed per the number of residential units or hotel/motel rooms.)

(3) Multiply (1) by (2) above to determine the amount to be subtracted from the fee owed. (For example, $.30 \times \$100,000 = \$30,000$.)

(4) Subtract (3) from (2) to determine the remaining fee in-lieu owed. (For example, $\$100,000 - \$30,000 = \$70,000$.)

(5) The remainder (For example, \$70,000) shall be paid by:

a. the construction of amenities of a value equal to or more than the remainder;

b. a fee in-lieu of parkland; or

c. a combination of a. and b. (Sec. 14.3.6)

Except as provided in Subsection (C), PDOP-Exhibit A is the Deficient Park Area Map required under the Parkland Dedication Ordinance and depicts areas in which land dedication may be required rather than payment of a fee in-lieu of dedication.

The deficient areas depicted on the map meet at least one of the following locational criteria:...

Potential greenway corridors... (Sec. 14.3.3)

Colorado Springs, CO

For purposes of park land dedication requirements or fees to be paid in lieu thereof under this part in those land developments where proposed trails are located, land for trails may be substituted in lieu of land for parks in whole or in part. No fees in lieu of trail land dedication will be accepted unless there is

an acceptable alternate route shown on the multiuse trail master plan. (Sec. 7.7.1207.A.3)

Prince George's County, MD

The Planning Board may require the payment of a fee in lieu of dedication equal to five percent (5%) of the total new market value of the land as stated on the final assessment notice issued by the State Department of Assessments and Taxation when it finds that dedication of parkland is unsuitable or impractical due to size, topography, drainage, physical characteristics, or similar reasons, or if adequate open space has been acquired and is available to serve the subdivision. The fee shall be paid prior to recording the subdivision and shall be used by the Commission to purchase or improve parkland for the benefit of the future residents. Preliminary plans approved prior to the effective date of this legislation shall not be subject to this change. (Sec. 24-135)

*NOTE: Interviews with the Maryland-National Capital Park and Planning Commission staff indicated that this option is not pursued for greenway trails.

Developer-Built Trails

Morrisville, NC

All new development except individual lot development of a single-family detached, duplex, or manufactured home dwelling on an existing lot (i.e., including subdivisions for such dwellings) shall incorporate into its required open space any greenway or sidepath called for across the

development site by the Comprehensive Plan. Such incorporation shall include installation of the path and recording of an associated pedestrian access easement, if applicable. (Sec. 5.8.8.B)

Prince George's County, MD

SUBDIVISION REQUIREMENTS

Land for bike trails and pedestrian circulation systems shall be shown on the preliminary plan and, where dedicated or reserved, shown on the final plat when the trails are indicated on a master plan, the County Trails Plan, or where the property abuts an existing or dedicated trail, unless the Board finds that previously proposed trails are no longer warranted. (Sec. 24-123-A-6)

The preliminary plan and final plat shall conform to the area master plan, including maps and text, unless the Planning Board finds that events have occurred to render the relevant recommendations within the comprehensive plan no longer appropriate, is no longer applicable, or the District Council has not imposed the recommended zoning. Notwithstanding any other requirement of this Section, a proposed preliminary plan or final plat of subdivision may be designed to conform with the land use policy recommendations for centers, as approved within current County general plan. In such cases, the Planning Board may approve a preliminary plan application as may be designed to conform with the land use policy recommendations for centers, as duly approved within the current General Plan. (Sec. 24-121-A-5)

*NOTE: Interviews with the Maryland-National Capital Park and Planning Commission staff indicated that staff will use these authorities to condition the approval of the subdivision only if the developer builds the greenway trail.

BICYCLE AND PEDESTRIAN ADEQUACY REQUIREMENTS

This Section establishes general criteria by which to ensure the adequacy of public pedestrian and bikeway facilities in County Centers and Corridors as designated by the General Plan (or as designated, defined, or amended by a subsequent master plan or sector plan). It also sets forth the requirements for those who establish subdivisions within Centers and Corridors to construct on-site and off-site pedestrian and bikeway facilities and other public streetscape improvements as part of any development project...

Except for applications for development projects proposing five (5) or fewer units or otherwise proposing development of 5,000 or fewer square feet of gross floor area, before any preliminary plan may be approved for land lying, in whole or part, within County Centers and Corridors, the Planning Board shall find that there will be adequate public pedestrian and bikeway facilities to serve the proposed subdivision and the surrounding area.

The finding of adequate public pedestrian facilities shall, at a minimum, include the following criteria:

(A) The degree to which the sidewalks, streetlights, street trees, street furniture, and other streetscape features recommended in the Countywide Master Plan of Transportation and

applicable area master plans or sector plans have been constructed or implemented in the area.

(B) The presence of elements that make it safer, easier, and more inviting for pedestrians to traverse the area (e.g., adequate street lighting, sufficiently wide sidewalks on both sides of the street buffered by planting strips, marked crosswalks, advance stop lines and yield markings, "bulb-out" curb extensions, crossing signals, pedestrian refuge medians, street trees, benches, sheltered commuter bus stops, trash receptacles, and signage).

The finding of adequate public bikeway facilities shall, at a minimum, include the following criteria:

(A) the degree to which the bike lanes, bikeways, and trails recommended in the Countywide Master Plan of Transportation and applicable area master plans or sector plans have been constructed or implemented in the area;

(B) the presence of specially marked and striped bike lanes or paved shoulders in which bikers can safely travel without unnecessarily conflicting with pedestrians or motorized vehicles;

(C) the degree to which protected bicycle lanes, on-street vehicle parking, medians, or other physical buffers exist to make it safer or more inviting for bicyclists to traverse the area; and

(D) the availability of safe, accessible, and adequate bicycle parking at transit stops, commercial areas, employment centers, and other

places where vehicle parking, visitors, and/or patrons are normally anticipated.

As part of any development project requiring the subdivision or re-subdivision of land within Centers and Corridors, the Planning Board shall require the developer/property owner to construct adequate pedestrian and bikeway facilities (to the extent such facilities do not already exist) throughout the subdivision and within one-half mile walking or biking distance of the subdivision if the Board finds that there is a demonstrated nexus to require the applicant to connect a pedestrian or bikeway facility to a nearby destination, including a public school, park, shopping center, or line of transit within available public rights of way. The cost of the additional off-site pedestrian or bikeway facilities shall not exceed thirty-five cents (\$0.35) per gross square foot of proposed retail or commercial development proposed in the application and Three Hundred Dollars (\$300.00) per unit of residential development proposed in the application, indexed for inflation.

Examples of adequate pedestrian and bikeway facilities that a developer/property owner may be required to construct shall include, but not be limited to (in descending order of preference):

- (1) Installing or improving sidewalks, including curbs and gutters, and increasing safe pedestrian crossing opportunities at all intersections;*
- (2) Installing or improving streetlights;*
- (3) Building multi-use trails, bike paths, and/or pedestrian pathways and crossings;*

(4) Providing sidewalks or designated walkways through large expanses of surface parking;

(5) Installing street furniture (benches, trash receptacles, bicycle racks, bus shelters, etc.); and

(6) Installing street trees...

No developer/property owner shall be required to acquire additional land not already owned by that developer/property owner in order to construct adequate pedestrian and bikeway facilities. All adequate pedestrian and bikeway facilities required under this Section shall be constructed within existing public easements and rights-of-way, or within land dedicated (or to be dedicated) by the applicant to public use.

If a conceptual or detailed site plan approval is required for any development within the subdivision, the developer/property owner shall include, in addition to all other required information in the site plan, a pedestrian and bikeway facilities plan showing the exact location, size, dimensions, type, and description of all existing and proposed easements and rights-of-way and the appurtenant existing and proposed pedestrian and bikeway facilities throughout the subdivision and within the designated walking or biking distance of the subdivision specified in Subsection (c) of this Section, along with the location, types, and description of major improvements, property/lot lines, and owners that are within fifty (50) feet of the subject easements and rights-of-way.

Prior to the issuance of any building permit for development within the subdivision, the developer/

property owner shall show that all required adequate pedestrian and bikeway facilities have full financial assurances, have been permitted for construction through the applicable operating agency's access permit process, and have an agreed-upon timetable for construction and completion with the appropriate operating agency. (Sec. 24-124.01)

Portland, OR

Single-dwelling zones. The construction of the recreational trail in single-dwelling residential zones is only required for subdivisions and PUDs that involve the creation of a street. Existing single-dwelling lots are not required to construct the trail.

Columbia South Shore Plan District. Sites in the Columbia South Shore Slough Trail area and Cross-Levee Trail area must also comply with the regulations of Section 33.515.260. These areas are shown on Map 515-4. Other trails in the Columbia South Shore Plan District must comply only with the regulations of this chapter.

South Waterfront subdistrict of the Central City plan district. Sites in the South Waterfront subdistrict must comply with the regulations of Section 33.510.253. The regulations of that section specify when recreational trails must be constructed within the South Waterfront subdistrict.

All other zones. Construction of the recreational trail is required on lands designated with a recreational trail symbol on the zoning maps in any of the following situations:

- 1. When there is new development;*

- 2. When exterior alterations to existing development are 35 percent or greater of the assessed improvement value of the total improvements on the site; or*

- 3. When streets are constructed in a subdivision, industrial park, or PUD.*

Prior to certificate of occupancy. The trail must be constructed prior to the issuance of a certificate of occupancy, unless the site is eligible for the trust fund provisions of 33.515.260.B, or the special timing provisions of Paragraph 33.510.253.D.4.

Trail standards. A recreational trail must comply with the standards of Portland Parks and Recreation for recreational trails or, where the trail is located in a public right-of-way, it must comply with the standards of the Portland Bureau of Transportation.

Environmental review. If the trail is located within the Environmental zones, the trail must comply with the requirements of Chapter 33.430. (Sec. 33.272.030)

Cary, NC

If the Town of Cary's Parks, Recreation and Cultural Resources Facilities Master Plan indicates a future greenway through a proposed development, whether residential or non-residential, a strip of greenway land through this area shall be dedicated to the Town, at a minimum of thirty (30) feet, but not to exceed fifty (50) feet in width; widths of easements may be reduced to twenty (20) feet in those cases where the developer is constructing the greenway trail. Widths of greenway easements for street-side trails [see Section 7.10.4 (C)] shall be determined

by the Parks, Recreation and Cultural Resources Director. (Sec. 8.2.3.D)

San Jose, CA

The applicant may enter into a parkland agreement, prior to issuance of the applicant's building permit(s), which obligates the applicant to make public park and recreation improvements to property dedicated by the applicant to the city or to either existing park facilities or recreational facilities in exchange for credit towards the applicant's obligations under this chapter. Credit may be granted up to the actual cost of the improvements in accordance with this section.

In order for park facilities improvements and recreational facilities improvements to be eligible for credit, the director must find that the improvements are consistent with the city's construction standards, policies and practices and that it is in the best interest of the city to accept the improvements. (Sec. 14.25.410)

Trail Management and Maintenance

Asheville, NC

The owner or lessee of the property designated as the open space shall be responsible for the maintenance of the open space area. Landscaped areas shall be maintained in good condition and the entire area shall be kept clear of debris. Failure to maintain the area shall constitute a violation of this chapter and subject the violator to the penalty

provisions of section 7-18-2 if not corrected within 30 days of notification. Alternatively, if acceptable to the parks and recreation director and/or public works director, as applicable, the land may be dedicated to the city for public use and thereafter maintained by the city. (Sec. 7-11-4-F)

Morrisville, NC

Open space may be held in common ownership by the owner(s) of the development, who will be responsible for managing and maintaining the land for its intended open space purposes.

Open space areas may be conveyed to a property owners' or homeowners' association that holds the land in common ownership and will be responsible for managing and maintaining the land for its intended open space purposes.

Open space areas may be conveyed to a third-party beneficiary such as an environmental or civic organization that is organized for, capable of, and willing to accept responsibility for managing and maintaining the land for its intended open space purposes.

Open space areas may be dedicated to the public and conveyed to the Town or other public agency that is organized for, capable of, and willing to accept responsibility for managing and maintaining the land for its intended open space purposes. (Sec. 5.5.1.F)

Cary, NC

The Town shall maintain all public greenway trails. (Sec. 4.4.3.H)

In those cases where the Comprehensive Plan requires the use of greenways instead of sidewalks, the greenways shall be constructed in accordance with Town of Cary standards and specifications as provided by the Parks, Recreation and Cultural Resources Department, and shall meet the following criteria:...

(b) these trails shall be privately maintained by the Homeowners' Association (HOA) and shall be open to the public, and this must be noted on the approved site and subdivision plans, as well as recorded plats... (Sec. 7.10.4.B)

Portland, OR

The City will accept maintenance and liability, similar to its responsibilities for City-owned park property, for a recreational trail segment if the City Engineer or the Director of Portland Parks and Recreation finds all of the following:

- 1. The applicant requests that the City assume the responsibilities;*
- 2. The trail lies within an easement or right-of-way granted to the City for trail purposes;*
- 3. The trail has been constructed to City standards;*
- 4. The trail is physically continuous for at least 1/4-mile along the designated route. This*

requirement will be waived if the trail has not been made part of a physically continuous segment of at least 1/4-mile within 2 years after completion of the segment under consideration; and

- 5. If the applicant desires to use a private security force to patrol the trail area, the owner has signed an agreement holding the City harmless from all claims, suits, or actions of any nature, caused or arising out of the actions of the private security force, its subcontractors, agents, or employees.*

The applicant retains maintenance and liability responsibilities unless these responsibilities are accepted by the City. Where the applicant retains maintenance and liability responsibilities, the trail segment must be maintained at a level at least equal to those segments maintained by the City. (Sec. 33.272.070)

Connecting to Trails

Cary, NC

Within a development, sidewalks and/or greenways shall form an on-site circulation system that provides pedestrian access to all public building entrances, on-site amenities, and adjacent parks and greenways, minimizing conflict between pedestrians and vehicular traffic. Where building frontages exceed six hundred (600) feet in length, a building break or pedestrian pass-thru shall be provided to facilitate pedestrian circulation between areas in front of and behind the building mass. Such a break shall not be required if there is no current, proposed, or future development, pedestrian destination, or

point of interest (e.g., a parking lot, greenway, plaza, etc.) located to the rear of the building. Sidewalks and/or greenways shall connect building entrances to one another and from building entrances to public sidewalk connections and existing or planned transit stops, street-side trails and/or greenways. Non-residential buildings located more than one hundred (100) feet from the public right-of-way shall provide for direct pedestrian access to buildings located on adjacent lots. Cul-de-sacs and dead-end streets shall be connected to the closest local or collector street and/or to cul-de-sacs in adjoining residential subdivisions, commercial development, or similar compatible land uses including schools, parks, recreation facilities, libraries, and greenways, via a sidewalk or street-side trail. (Sec 7.10.4.A)

Development plans shall provide private, paved trail connections to existing and planned public greenways located within or adjacent to the development. Such private trail connections shall be constructed at least every nine hundred (900) feet along the adjacent greenway corridor with the details being determined by Town staff during the development plan review process. These connections shall meet the Town of Cary standards and specification as provided by the Parks, Recreation and Cultural Resources Department. (Sec. 7.10.4.B)

Colorado Springs, CO

These standards are intended to ensure a safe and convenient system of well connected pedestrianways and bikeways. These facilities shall be designed to link MU developments with adjacent uses, including

residential areas, shopping, employment centers, recreational facilities, open space, parks, transit stops, and schools. Within individual developments, safe and convenient pedestrian and bikeway systems shall be provided that directly connect buildings, parking areas, open space, transit stops, services, on site amenities, and other areas of interest.

This section is applicable to all development in MU zone districts.

All new development shall provide and contribute to an on site system of pedestrian walkways, sidewalks, and bikeways that provide continuous access to all land uses within a development site and to land uses on adjacent properties, according to the following standards. For additional design detail, the City's subdivision policy and public works design manual shall be consulted.

All new development shall provide pedestrian and bicycle systems that provide continuous connections with off site destinations according to the following standards:

a. Safe and convenient bicycle and pedestrian access from the development site shall be provided to existing and designated public bike paths or greenways located on or adjacent to the development site.

b. Connections shall be made to provide direct pedestrian and bicycle travel from within the development to adjacent uses, transit stops, perimeter sidewalks, and to major pedestrian destinations located within an adjacent

neighborhood. Pedestrian access shall be provided by connection to any sidewalks or walkways on adjacent properties that extend to the boundaries shared with the development site. In order to provide efficient pedestrian connections to adjacent destinations, the City may require additional sidewalks, walkways, or bike paths not associated with a street, or the extension of a sidewalk from the end of a cul-de-sac to another street or walkway....(Sec. 7.5.717.B)

Minneapolis MN

The land to be dedicated should serve an appropriate public purpose, which might include one (1) or more of the following:

a. Connecting existing components of the parks and open space network (including creation of a trail connection)...(Sec. PB15-4)

Austin, TX

All sites or developments subject to this section [site development and planning] shall select and comply with at least two of the options in [Table 35]. However, if a site or development provides surface parking that amounts to more than 125 percent of the parking required in Appendix A (Tables of Off-Street Parking and Loading Requirements), the site or development must select and comply with at least three of the options in [Table 35]. (Subchapter E.2.3.1.B)

All development subject to this section [site development and planning] shall devote a minimum of five percent of the gross site area to one or more

of the following types of private common open space or pedestrian amenities:...

8. A multi-use trail connecting to or proposed in the City of Austin Trails Master Plan, Austin Parks and Recreation Long-Range Plan, Sidewalk Master Plan, or Bicycle Plan, or other trail connections as approved by the Director....(Subchapter E.2.7.3.B)

Table 35: City of Austin Additional Measures to Improve Connectivity (Table 11 in UDO)

OPTION	COMMENTS
Provide additional pedestrian connections from on-site buildings to adjacent streets.	Pedestrian connections must be edged by curb, except where connections cross drive aisles, and should be evenly spaced. One point per pedestrian connection.
Provide pedestrian and bicycle connections from adjacent parkland.	Where public parkland is adjacent to the property line, provide pedestrian and bicycle access from the trail or walkway system on that parkland to the building entrance. The pedestrian and bicycle access points must be fully accessible during operating hours and shall meet city standards for pedestrian and bike ways.
Provide solar power shading devices in parking lots.	Devices shall comply with requirements of administrative rules on this subject.
Provide pedestrian and bicycle connection to adjacent residential development.	If there is a residential development adjacent to the site, provide a pedestrian and bicycle connection to the property line, and to an existing pathway if one is present on the adjacent site. Compliance with this option also may include providing a sidewalk that connects the project site to an adjacent residential development and that runs along a public roadway where no sidewalk currently exists or where the existing sidewalk does not meet the width standards in this Subchapter.
Exceed applicable sidewalk standards by constructing a sidewalk along a public street frontage to Core Transit Corridor standards.	Sidewalks along an ICR may not be used to satisfy this standard.
Provide a public access easement for the construction of a multi-use trail connecting to or proposed in the City of Austin Trails Master Plan, Austin Parks and Recreation Lone-Range Plan, Sidewalk Master Plan or Bicycle Path.	Requires approval of the Director of Public Works.
Incorporate a transit stop into the project.	Review and approval of Capital Metro, or transit provider required.
Internal utility lines should be located in drive aisles or Internal Circulation Routes, rather than under parking areas.	Do not locate utility lines beneath surface parking areas.
Limit curb cuts.	Connections between site and adjacent arterials and highways occur no more frequently than every 330 feet.
At least 10% of the provided parking is underground or within a parking structure.	N/A

Capital Area Greenway Master Plan

Update | 2021

OPTION	COMMENTS
Enhance physical fitness opportunities and multi-modal connectivity by providing shower and locker facilities for employees and increase required bicycle parking by 10%.	To comply with this option, the site must meet the shower requirements of LDC Section 25-6-478.
Provide secure indoor bicycle storage in building or parking structure.	N/A
For sites with a single building, provide shaded sidewalks along 100% of building facing the principal street.	N/A
Provide shaded sidewalks along 100% of all publicly visible building facades.	N/A
Other options as approved by the Director.	N/A

Developer Incentives

Asheville, NC

As compensation for any open space dedication associated with implementing the greenway master plan above that requirement listed in the above table, the developer is eligible for a density bonus of one dwelling unit per each 1,000 square feet of land area in excess of that required in the above table or 500 square feet of nonresidential gross floor area per each 1,000 square feet of land area in excess of that required in the above table, up to a maximum of a 25 percent increase above the maximum density or intensity allowed in the applicable zoning district, provided hillside, river resource yard, flood protection, and other environmental preservation regulations are complied with. Alternatively, upon approval by the parks and recreation director, open space fee-in-lieu funds may be used to purchase the additional requirement, or the additional requirement may be reduced by the parks and recreation director. (Sec. 7-11-4-C)

Cary, NC

Public greenways and dedication of easements shall be credited towards park land dedication and payment-in-lieu requirements in accordance with LDO Section 8.2.3. (Sec. 7.10.4.B)

San Jose, CA

Real property dedicated by the applicant to city for a trail will be eligible for credit equal to the square

footage of land to be dedicated if the following requirements are met:

- 1. The real property to be dedicated meets the city's trail requirements; and*
- 2. The applicant dedicates the real property to city in accordance with the procedures specified in Section 14.25.330; and*
- 3. The real property to be dedicated shall be used for a trail that is identified in the city's general plan or in the city's master plan for parks and recreational facilities; and*
- 4. The real property to be dedicated is not less than twenty-four (24) feet wide; and*
- 5. The real property to be dedicated is not already dedicated for public park or recreational purposes. (Sec. 14.25.440)*

Nashville, TN

Development incentives are established by this section to encourage participation in the implementation of a comprehensive greenway network. In return for a development bonus, the landowner shall locate all development outside the overlay district, design and orient all development in a manner which protects the functional and operational integrity of the greenway network, and dedicate all areas within the overlay district for public use by conveyance of easements, property title or equivalent means. The following incentives may be applied to properties lying within a mapped greenway overlay district, and are to be considered bonuses granted above

and beyond all other cluster incentives established elsewhere in this title.

A. Residential development in the R/R-A and RS/RS-A districts utilizing the cluster lot option provisions of Section 17.12.080 or the PUD cluster provisions of Article II of this chapter may utilize the development bonus provisions of Section 17.36.090 for a corresponding amount of land area dedicated for public greenway use. Minimum lot sizes in a cluster lot option development may be reduced the equivalent of two base zone districts. Area dedicated for public greenway use in a PUD or cluster lot option form of development may count one and one-half times towards satisfying minimum common open space requirements of Section 17.36.070B.

B. Multifamily development in the RM and mixed-use districts may achieve a twenty-five percent bonus in achievable density derived from that amount of land area dedicated for public greenway use. Area dedicated for public greenway use in a PUD development may count one and one-half times towards satisfying the minimum common open space requirement of Section 17.36.070B; all protected trees within the area of dedication may count one and one-half times in satisfying the tree density requirements of Section 17.24.100.

C. Nonresidential development may be granted a floor area ratio (FAR) bonus of twenty-five percent for that amount of land area dedicated for public greenway use. All protected trees within the area of greenway dedication may count one

and one-half times in satisfying the tree density requirements of Section 17.24.100. (Ord. BL2015-1153 § 16, 2015; Ord. 96-555 § 9.4(D), 1997) (Sec. 17.36.160)

Portland, OR

Bonus floor area options. Additional development potential in the form of floor area is earned for a project when the project includes any of the specified features listed below. The bonus floor area amounts are additions to the maximum floor area ratios shown on Map 510-2.

South Waterfront Willamette River Greenway bonus option. To complement and enhance the existing public corridor, projects along the Willamette River Greenway in the South Waterfront Subdistrict that provide open space for public activity will receive bonus floor area. For each square foot of open space dedicated, a bonus of three square feet of additional floor area is earned. Open space that will earn bonus floor area under 33.510.210.C.17, Open Space bonus option, may not be used to earn additional floor area under this bonus. To qualify for this bonus, the following requirements must be met:

a. Location. The open space must abut the South Waterfront Greenway Area, as shown on Figure 510-2;

b. Size and dimensions. The open space must include at least 2,500 square feet of contiguous area; the north-south dimension of the area must be at least twice as long as the east-west dimension of the area;

c. *Connection to the recreational trail.* A direct pedestrian connection must be provided between the open space and any required recreational trail or recreational trail easement on the site; d. *Ownership and use.* One of the following must be met:

(1) *The open space and pedestrian connection must be dedicated to the City; or*

(2) *A public access easement must be provided that allows for public access to and use of all the open space and the pedestrian connection.*

e. *Maintenance.* The property owner must execute a covenant with the City that ensures the installation, preservation, maintenance, and replacement, if necessary, of the open space features, and that meets the requirements of 33.700.060, *Covenants with the City*;

f. *Landscaping.* The open space must be landscaped to meet the requirements of Paragraphs 33.510.253.E.2. and E.7. that apply to South Waterfront Greenway subarea 3;

g. *Open space features.* Public seating such as benches must be provided at a ratio of at least 5 seats per 1,000 square feet of open space; and

h. *Timing.* The requirements of this paragraph must be met before an occupancy permit for any building using the bonus floor area is issued... (Sec. 33.510.210.C)

Requirements for open space areas eligible for the height transfer.

a. *The proposed open space area must be in the Central City plan district outside of the South Waterfront Subdistrict. If the open space is at a Proposed Open Space location, as shown on the Central City plan map, the site is eligible by right. If the site is not a Proposed Open Space location, the site is subject to the review requirements stated in Paragraph 4, below. Open space sites resulting from the North Pearl Subarea open area requirement are not eligible for the height transfer.*

b. *The area designated for the open space must be dedicated to the City as a public park. The minimum size of the open space must be a full block at least 35,000 square feet in size. However, the open space may be 20,000 square feet in size if located along the alignment of the North Park Blocks.*

c. *All park improvements must be made by the applicant prior to dedication to the City. The improvements to the park are subject to a major design review using the specific area's design guidelines. The Parks Bureau will provide advice to the Design Commission.*

Amount of height potential that can be transferred. The allowed height at the proposed open space site shown on Map 510-3 may be transferred within the Central City plan district consistent with the limits stated below.

a. *The maximum amount of height that may be transferred is 100 feet. The transfer may only be to a site eligible for a height bonus as shown on Map 510-3. Increases in height that result in buildings*

greater than 460 feet or which are higher than an established view corridor are prohibited. The transferred height may not be used in addition to any allowed bonus heights of 33.510.210

b. The open space improvements must be approved and the site dedicated to the City before the issuance of building permits for the building receiving the increased height.

Reviews for sites not designated Proposed Open Space on the Central City plan map.

a. Procedure. The review is processed with a Type III procedure.

b. Approval criteria. The proposed open space site will be approved for the height transfer if the review body finds that the applicant has shown that all of the following approval criteria are met:

(1) The proposed site will help to alleviate an area's identified projected future open space deficiency. This determination is based on such things as proximity to parks, proximity to people living or working in the Central City plan district, and how the site relates to the Central City Plan's park and open space system (covered in Policy 8 of the plan);

(2) The proposed improvements on the open space site are consistent with the design guidelines for the area; and

(3) The Parks Bureau approves of the site. (Sec. 33.510.205.E)

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APPENDIX F

Feasibility & Cost Estimates



Appendix Summary

A clear understanding of trail feasibility is a critical step to constructing new trails or reinvesting in existing trails. Feasibility studies were completed for several planned trails as part of the CAG Plan. This Appendix highlights the feasibility process that was conducted and provides an overview of the methodology that can be used for future feasibility studies. Project cut sheets have been provided for feasibility studies that includes:

- Existing conditions,
- Key considerations,
- Alternative alignments (if applicable),
- Proposed alignment maps, and
- Opinion of probable cost.

Methodology

Trail Segments for Feasibility Study and Cost Estimates

Trail segments identified in this appendix were selected based on previous priority routes, and PRCR staff recommendations. Preferred segments received detailed investigation and are presented as project cut sheets to facilitate future implementation. The following information provides an overview of the methodology used to study trail segment feasibility and calculate the cost of trail construction. Future trails identified for construction should consider this methodology to refine alignment, develop alternatives, summarize information for project cut sheets, and calculate current and future cost.

Refining the Proposed Alignment

After selecting trail segments, the first step is to refine the proposed alignment and analyze elements that may require additional levels of design or additional negotiation to finalize. Such elements may include greenway and construction easements, structural challenges like tunnels and bridges, and establishing funding for construction.

Refining the proposed alignment requires modeling the trail and looking for opportunities and constraints. For high-level feasibility studies and cost estimates, modeling based on the spatial accuracy afforded by Geographic Information System (GIS) applications is acceptable. GIS data

provides a basis for analyzing most, if not all, of the aspects that pertain to a greenway's location and the major challenges associated with the proposed alignment.

GIS data layers and other key considerations that are valuable when creating a model of existing conditions for each trail segment include:

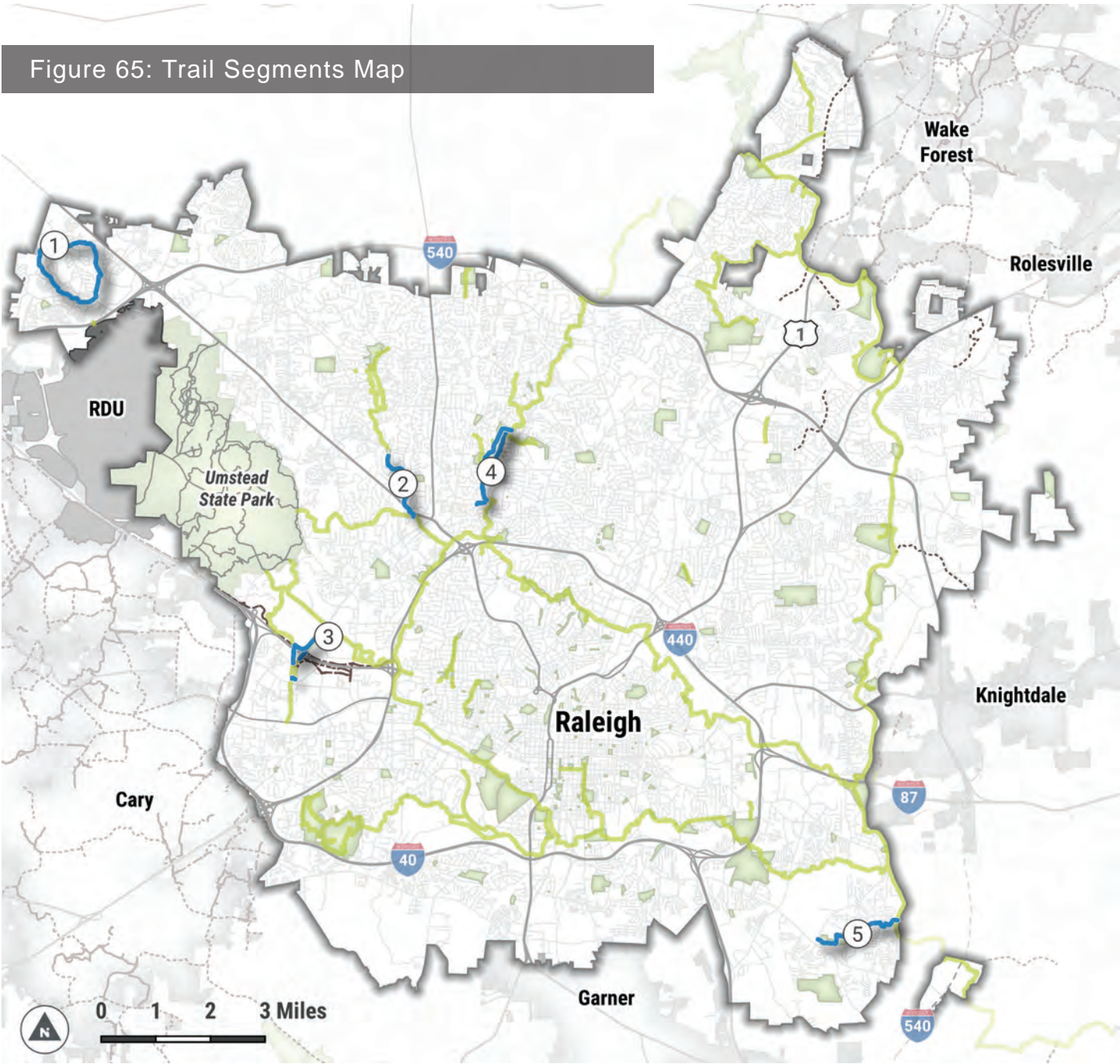
Natural environment considerations for each study area:

- Threatened and endangered species
- Jurisdictional wetlands, rivers/streams/creeks, and other surface waters; including applicable local, state, and federal buffer ordinances/regulatory requirements
- Hydrology and hydraulics (floodplains, etc.)
- Managed natural areas (tree canopy/conservation areas, nature preserves, waterfowl impoundments, etc.)
- Topography/terrain

Human environment considerations for each study area include:

- Transportation context/existing and planned infrastructure inventory, which may include:
 - Roadways (typical geometry, traffic volumes, speed limits, signalized and unsignalized intersections, driveways, crash data, etc.)
 - Bridges (vehicular and pedestrian)

Figure 65: Trail Segments Map



- Bicycling facilities and pedestrian networks (bicycle lanes, sidewalks, greenways trails, crosswalks, crash data, etc.)
- Transit (routes and stops) and rail (freight and commuter)
- Utilities (publicly and privately-owned), which may require site visits for field observations
- Adjoining/surrounding area projects such as:
 - Relevant programmed and/or funded State Transportation Improvement Program (STIP), Highway Maintenance Improvement Program (HMIP), and Capital Improvement Program (CIP) projects and
 - Projects in design or under construction that may influence the study).
- Real estate and/or land acquisition, which may include:
 - Existing ROW (roadway, rail, etc.)
 - Utility easements (private or public)
 - Government-owned property, public lands, and conservancy-owned lands
 - Land use/rezoning petitions
- Operational impact to adjacent businesses and landowners
- Items of cultural or historical significance
- Brownfields and known contamination sites

Other Key Considerations

- Identify pertinent permitting agencies and other entities for coordination; summarize anticipated permitting and coordination requirements for the project.
- Conduct field observations to inventory conditions as a basis for planning. Field observations include a site review of the transportation context, utilities, topography/terrain, surrounding land use, wetlands, rivers/streams/creeks and other surface waters, etc.

Alternative Development

Once a baseline existing conditions model is built, the proposed alignment should be compared to alternative alignments to evaluate opportunities where changes to the proposed alignment may minimize impacts. During development of alternative alignments for the identified trail segments, the City and the design team followed the steps below for each of the trail projects under consideration:

- Established design criteria and identified desired typical section information to use when developing alternatives
- Evaluated each project for division into segments or key areas as necessary
- Analyzed opportunities and constraints with each segment/area (including photos and maps) and developed alignment alternatives within each segment/area
- Created an overall map showing the alignment alternatives

- Produced a summary table of segment alignment alternatives with segment ID/name, short description, length, cost considerations, and overview of challenges and opportunities associated with each segment. Additional considerations for future feasibility studies include but are not limited to restrooms, drinking fountains, and lighting.
- Identified and discussed connections and access areas (such as trailheads, etc.)
 - Created an overall map showing connections and access areas.
 - Produced a summary table of connections and access areas including ID/name, short description, length/size, cost considerations, and overview of challenges and opportunities associated with each segment
- Summarized results of preliminary modeling that may have been performed, which may have included:
 - Hydraulic and/or flood modeling to determine impacts to the floodplain, approximate bridge spans, and understand permitting implications (no-rise vs. Conditional Letter of Map Revision (CLOMR) or Letter of Map Revision (LOMR)
 - Grading and/or corridor modeling to verify longitudinal grades meet accessibility requirements and to determine preliminary earthwork (cut/fill) for cost estimating purposes
 - Traffic modeling to determine impacts to vehicular traffic (level of service, delay, etc.) for road diet alternatives

Project Cut Sheets

A project cut sheet was created for each trail segment selected for feasibility study and cost estimating to summarize project details and present findings. Cut sheets present pertinent information for moving the project forward including:

- Detailed segment map that identifies streams and wetlands, roads, neighborhoods, schools, parks, and existing pedestrian and bicycle facilities as well as adjacent greenway projects.
- Recommendations
 - The proposed alignment (note: where streams, creeks, or wetlands were inaccessible, assumptions were made to reach an alignment solution)
 - Trail bridges and boardwalks (non-vehicular)
 - Pedestrian crosswalk locations
- Project Snapshot including
 - Project location
 - Project type
 - Length of project
 - Estimated construction year
- Previous Planning Efforts
- Potential Right-of-Way (ROW) Needs
 - Total estimated area to acquire

- Number of impacted parcels that are privately owned (not State, County, or City)
- Number of impacted property owners
- Potential Permitting Needs
 - 401/404, flood plain modifications, etc.
- Estimated Project Cost (see the section below on How to Use Estimated Costs)
 - 2021 estimated construction costs
 - Escalated construction costs (adjusted to reflect the project's estimated construction year)
 - 25% contingency
 - Estimated ROW costs
 - Estimated design services
 - Estimated construction engineering and inspection (CEI) services
- Potential funding sources

Estimated Costs

Disclaimers and Assumptions

When reviewing the estimated project costs contained in the subsequent cut sheets, please consider the following:

- These are only estimates; all values are rounded up to the nearest one thousand dollars.
- The estimated costs are indicative of a planning-level of analysis. No survey, subsurface

investigation, or precise measurements were taken to produce base maps or models.

- Elements of the project are priced by using a linear foot (LF) or mile (MI) unit cost from the US dollar value in 2021. Each item is inclusive of all costs associated with its construction. However, these costs should not be taken as a final estimate and should only be used for planning purposes.
- Detailed construction cost estimates should be completed during the design phase of each project.
- The estimated subtotal of construction costs is escalated to the fiscal year for which each segment is expected to be constructed (see below for how this was calculated by the design team).

Typical elements for each estimate include, but are not limited to:

- Cost per linear foot (LF) of 10-foot asphalt trail: \$185/LF. This price includes grading, base materials, basic drainage, and asphalt.
- Cost per linear foot (LF) of boardwalk: \$1,200/LF. This price includes piles for foundation, boardwalk substructure, decking, and handrails.
- Cost per linear foot (LF) of bridge: \$3,500/LF. This price includes bridge foundations, end bents and caps, prefabricated bridge, and bridge erection.

- Cost per linear foot (LF) of erosion control: \$24/LF. This price includes silt fence and outlets, temporary crossings, construction entrances, etc.
- Cost per mile (MI) of temporary traffic control for construction: \$10,000/MI. This price includes signs, traffic cones/barrels, temporary concrete barriers, flagmen, etc.

Each estimate includes a 25% contingency line for unforeseen or unknown costs that may arise during design and construction. Unforeseen or unknown costs may include any flood study permit fees, such as CLOMR/LOMR, any additional construction material costs that may vary over time such as steel, utility relocation, etc.

Cost estimates for land acquisition and ROW needs are based on Wake County's assessed property values and are an approximation. The method for calculating costs is based on the current tax value of each property (per square foot) and multiplied by the estimated easement needed for greenway and construction of the trail. The estimated easement needed is based on the proposed alignments.

Engineering and planning services (design costs) can range between 8-14% of construction costs. The cost of design included in these cost estimates is not escalated with the assumption that design may occur several years before construction nor with the assumption that design fees are somewhat more stable than construction costs. Survey and wetland delineation are included in the design costs as well as whether a Federal Emergency Management Agency (FEMA) and/or National Environmental

Policy Act (NEPA) study is needed. Please note that the estimated design costs will be higher for projects that involve:

- Structures such as bridges and boardwalks
- Impacts to FEMA regulated floodways, which will require detailed flood modeling and permitting
- Federal funding, which will require a high-level of regulatory compliance
- Smaller project scope/size

CEI services account for a third party CEI firm to provide the City documentation of the construction, review submittals, approval of pay applications, and coordination with NCDOT on federally and state funded projects. Fees for CEI services range between 8% and 12% of the construction costs. Since the CEI occurs at the same time as the construction, the estimate is based on the escalated construction costs to the calculation of the CEI fee. The City may also provide CEI services in-house for non-state or non-federal funded projects as a cost savings option.

Cost Escalation

Each estimate was projected to the fiscal year (FY) 2025 as the hypothetical beginning of construction. Additionally, costs for the following two years were also calculated for flexibility in planning and ease of budgeting costs for projects. For example, the fiscal year 2025 is identified as “FY2025”. As more detailed information becomes available during the design process, costs will evolve. Costs are listed in the base year of 2021 and should be escalated at a rate of 5% (the current industry standard) each year thereafter.

The formula used is a linear compound interest formula,

$$A = P \cdot (1 + r)^t$$

- where P is the original cost in 2021 dollars,
- r is the rate of 5% escalation, and
- t is difference in years from 2021 to construction year (i.e., the t value for a project constructed in 2025 would be: $t = (2025 - 2021) = 4$).

Table 36: Example Cost Estimate Summary Table

2021 CONSTRUCTION ESTIMATE (BASIS FOR CALCULATIONS)	(BASIC ELEMENTS OF THE PROJECT) X (LINEAR FEET X UNIT COST)
Escalated Construction Cost Estimate (Design Year):	Basis compounded at 5% annually to the Design Year
25% Contingency:	25% of escalated construction estimate
Estimated ROW Costs:	(Estimated easement area) x (current tax value)
Estimated Engineering and Planning Services ±3%	11% of 2021 Basis cost +/-3% adjusted per project
Estimated CEI Services ±2%	10% of escalated cost +/-2% adjusted per project
Total Estimated Cost:	Total

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Barwell Road

- This trail will provide a connection from the sidewalk on Barwell to the Neuse River Trail in southeast Raleigh.

Project Snapshot

- Project Location: Between Barwell Road at Barwell Community Center and the Neuse River Trail South of Poole Road.
- Project Type: Greenway
- Length of Project: 1.86 Miles
- Estimated Construction Year: 2025, 2026, 2027 (hypothetical)

Trail Trip Generators

- Neuse River Trail
- Barwell Road Elementary School
- Barwell Road Community Center
- Battleridge North Neighborhood
- Chastain Neighborhood
- Barrinton Village Neighborhood

Previous Planning Efforts

- Capital Area Greenway Planning & Design Guide (2014)

Potential Right-of-Way Needs

- Total estimated area needed: 0.56 AC
- Number of impacted parcels (not City or County owned): 1
- Number of impacted property owners: 1

Potential Permitting Needs

- Erosion Control
- 401/404 permitting
- CLOMR/LOMR flood modeling permit

Potential Funding Sources

- CAMPO/LAPP funding
- City of Raleigh CIP funding
- CMAQ Funds
- Part F grant
- Municipal Bonds



Preliminary Cost Estimates

Notes

- Linear foot of asphalt trail includes: grading, basic drainage, clearing and grubbing, aggregate base course (ABC), asphalt paving, fencing, curb ramps, and basic pavement marking.
- Linear foot of boardwalk includes: timber pile foundations, sub structure, decking, and handrails.
- Linear foot of bridge includes: prefabricated bridge delivered, foundations, bent construction, and erection of bridge. Assuming 60-ft to 110-ft spans between bents.
- Linear foot of erosion control includes: silt fence, tree protection fence, silt fence outlets, inlet protection, construction accesses, and special silt basins.
- No utility relocations are part of this estimate.
- ROW costs are for legal services to create an easement on HOA property with a current land value of \$0.
- Unit costs are a composite of multiple greenway projects from across the area that have been bid in the last 4 years.
- Pavement markings are assumed to be thermoplastic.
- There are no signal modifications unless otherwise stated as part of the estimate.
- Trail lighting is not assumed to be included in the project and the estimate.
- Proposed trail signage and wayfinding are included within the contingency of the estimate.
- Counters do not include cabinets, power supplies, or any ongoing data collection.
- Pedestrian ramps are included within the linear foot cost of asphalt/concrete trail. Crosswalks and pedestrian refuges are not and are a separate item within this estimate.
- Pedestrian refuges include monolithic concrete in the center of the road with detectable warning domes.

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Table 37: Barwell Road Preliminary Cost Estimates

ITEM #	DESCRIPTION	QUANTITY	UNITS	CURRENT UNIT COST	ITEM AMOUNT CURRENT	ESCALATED UNIT COST (FY2025)
0000000800-N	Mobilization 5% of total cost	1	LS	\$ 202,232.52	\$ 202,232.52	\$ 245,814.90
0000000450-N	Cost per LF of Trail Asphalt	7637	LF	\$ 210.00	\$ 1,603,770.00	\$ 255.26
0000000200-N	Cost per LF of Boardwalk	1436	LF	\$ 1,200.00	\$ 1,723,200.00	\$ 1,458.61
0000000300-N	Cost per LF of Bridge	106	LF	\$ 3,500.00	\$ 371,000.00	\$ 4,254.27
0000000500-N	Traffic Control Cost per mile	1.738447	MI	\$ 10,000.00	\$ 17,384.47	\$ 12,155.06
0000000610-N	Erosion Control Cost per LF	9179	LF	\$ 24.00	\$ 220,296.00	\$ 29.17
-	Mid-Block Crossing with Pedestrian refuge	2	EA	\$ 40,000.00	\$ 80,000.00	\$ 48,620.25
-	Crosswalk and Ped Ramps	2	EA	\$ 7,500.00	\$ 15,000.00	\$ 9,116.30
-	Ped and Bike Counter	2	EA	\$ 7,000.00	\$ 14,000.00	\$ 8,508.54
				Subtotal:	\$ 4,246,882.99	Subtotal:
SUB TOTAL CONSTRUCTION COSTS:						
25% CONTINGENCY:						
RIGHT OF WAY COSTS:						
ENGINEERING AND PLANNING SERVICES (11% OF 2021 CONSTRUCTION COST ±3%):						
CEI SERVICES (10% OF ESCALATED COST ±2%):						
TOTAL BUDGET RECOMMENDATION:						

ITEM AMOUNT (FY2025)	ESCALATED UNIT COST (FY2026)	ITEM AMOUNT (FY2026)	ESCALATED UNIT COST (FY2027)	ESCALATED UNIT COST (FY2027)
\$ 245,814.90	\$ 258,105.64	\$ 258,105.64	\$ 271,010.92	\$ 271,010.92
\$ 1,949,392.46	\$ 268.02	\$ 2,046,862.08	\$ 281.42	\$ 2,149,205.19
\$ 2,094,560.37	\$ 1,531.54	\$ 2,199,288.39	\$ 1,608.11	\$ 2,309,252.81
\$ 450,952.82	\$ 4,466.99	\$ 473,500.46	\$ 4,690.33	\$ 497,175.48
\$ 21,130.93	\$ 12,762.82	\$ 22,187.48	\$ 13,400.96	\$ 23,296.85
\$ 267,771.16	\$ 30.63	\$ 281,159.72	\$ 32.16	\$ 295,217.71
\$ 97,240.50	\$ 51,051.26	\$ 102,102.53	\$ 53,603.83	\$ 107,207.65
\$ 18,232.59	\$ 9,572.11	\$ 19,144.22	\$ 10,050.72	\$ 20,101.43
\$ 17,017.09	\$ 8,933.97	\$ 17,867.94	\$ 9,380.67	\$ 18,761.34
\$ 5,162,112.81	Subtotal:	\$ 5,420,218.46	Subtotal:	\$ 5,691,229.38
(FY2025)		(FY2026)		(FY2027)
\$ 5,162,112.81		\$ 5,420,218.46		\$ 5,691,229.38
\$ 1,290,528.20		\$ 1,355,054.62		\$ 1,422,807.34
\$ 10,000.00		\$ 10,000.00		\$ 10,000.00
\$ 465,000.00		\$ 465,000.00		\$ 465,000.00
\$ 517,000.00		\$ 543,000.00		\$ 570,000.00
\$ 7,444,641.02		\$ 7,793,273.08		\$ 8,159,036.72

Brier Creek Loop

This trail will provide a loop trail around Brier Creek Country Club. The trail begins and ends at Lumley Road and Brier Creek Parkway.

Project Snapshot

- Project Location: Around Brier Creek Country Club. Near Brier Creek Parkway and paralleling TW Alexander.
- Project Type: Greenway and Sidepath
- Length of Project: 3.57 Miles
- Estimated Construction Year: 2025, 2026, 2027 (hypothetical)

Trail Trip Generators

- Brier Creek Country Club and residence
- Brier Creek Commons Shopping Center
- Frankie's Fun Park
- Avera Place Condominiums
- Brier Creek Park

Previous Planning Efforts

- Capital Area Greenway Planning & Design Guide (2014)

Potential Right-of-Way Needs

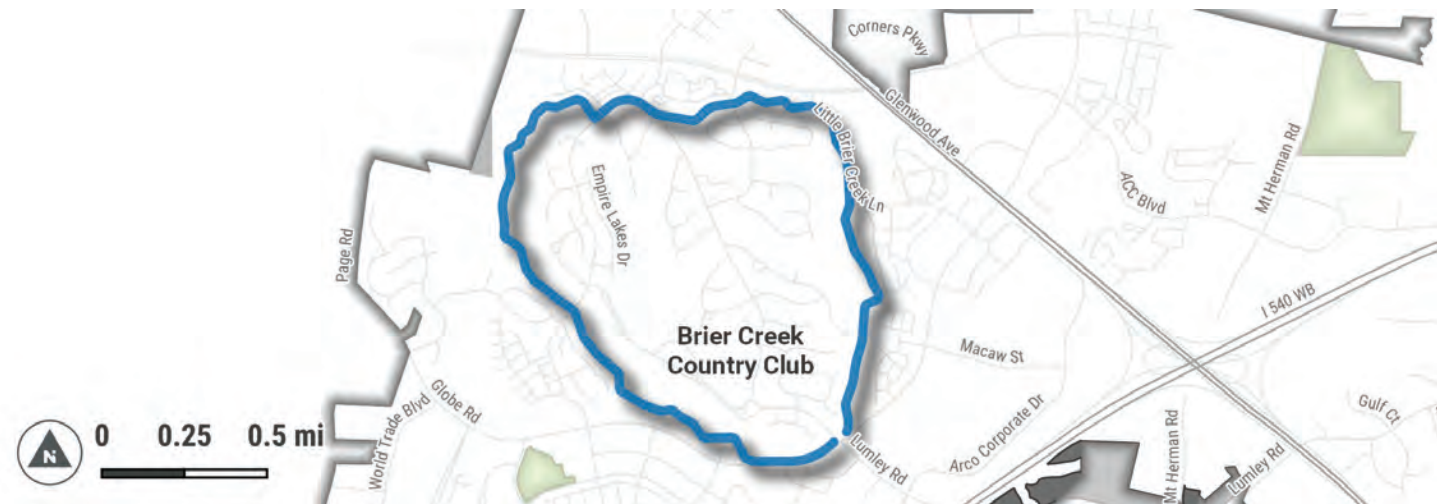
- ROW analysis was not performed for this segment. There are existing greenway easements, but this project will require substantial easement acquisition before construction.

Potential Permitting Needs

- Erosion Control
- 401/404 permitting
- CLOMR/LOMR flood modeling permits

Potential Funding Sources

- CAMPO/LAPP funding
- City of Raleigh CIP funding
- CMAQ Funds
- Municipal Bonds
- Partnership with Brier Creek Country Club



Preliminary Cost Estimates

Notes

- Assuming 12-ft wide trail with 10-ft clear width for boardwalk and bridges.
- Linear foot of asphalt trail includes: grading, basic drainage, clearing and grubbing, aggregate base course (ABC), asphalt paving, fencing, curb ramps, and basic pavement marking.
- Linear foot of boardwalk includes: timber pile foundations, sub structure, decking, and handrails.
- Linear foot of bridge includes: prefabricated bridge delivered, foundations, bent construction, and erection of bridge. Assuming 95-ft spans between bents.
- Linear foot of erosion control includes: silt fence, tree protection fence, silt fence outlets, inlet protection, construction accesses, and special silt basins.
- No utility relocations are part of this estimate.
- No parcel analysis has been completed for ROW. There are several existing greenway easements but additional easements will be required.
- Crosswalk and ped ramps include two ped ramps each with high visibility thermo plastic pavement markings.
- Unit costs are a composite of multiple greenway projects from across the area that have been bid in the last 4 years.
- Pavement markings are assumed to be thermoplastic.
- There are no signal modifications unless otherwise stated as part of the estimate.
- Trail lighting is not assumed to be included in the project and the estimate.
- Proposed trail signage and wayfinding are included within the contingency of the estimate.
- Counters do not include cabinets, power supplies, or any ongoing data collection.
- *Ped ramps are included within the linear foot cost of asphalt/concrete trail. Crosswalks and pedestrian refuges are not and are a separate item within this estimate.
- Pedestrian refuges include monolithic concrete in the center of the road with detectable warning domes.

Table 38: Brier Creek Preliminary Cost Estimates

ITEM #	DESCRIPTION	QUANTITY	UNITS	CURRENT UNIT COST	ITEM AMOUNT CURRENT	ESCALATED UNIT COST (FY2025)
0000000800-N	Mobilization 5% of total cost	1	LS	\$ 332,977.32	\$ 332,977.32	\$ 404,736.01
0000000450-N	Cost per LF of Trail Asphalt	16975	LF	\$ 210.00	\$ 3,564,750.00	\$ 255.26
0000000200-N	Cost per LF of Boardwalk	1803	LF	\$ 1,200.00	\$ 2,163,600.00	\$ 1,458.61
0000000300-N	Cost per LF of Bridge	95	LF	\$ 3,500.00	\$ 332,500.00	\$ 4,254.27
0000000500-N	Traffic Control Cost per mile	3.574432	MI	\$ 10,000.00	\$ 35,744.32	\$ 12,155.06
0000000610-N	Erosion Control Cost per LF	18873	LF	\$ 24.00	\$ 452,952.00	\$ 29.17
-	Mid-Block Crossing with Pedestrian refuge	2	EA	\$ 40,000.00	\$ 80,000.00	\$ 48,620.25
-	Crosswalk and Ped Ramps	2	EA	\$ 7,500.00	\$ 15,000.00	\$ 9,116.30
-	Ped and Bike Counter	2	EA	\$ 7,500.00	\$ 15,000.00	\$ 9,116.30
				Subtotal:	\$ 6,992,523.64	Subtotal:
SUB TOTAL CONSTRUCTION COSTS:						
25% CONTINGENCY:						
RIGHT OF WAY COSTS:						
ENGINEERING AND PLANNING SERVICES (11% OF 2021 CONSTRUCTION COST ±3%):						
CEI SERVICES (10% OF ESCALATED COST ±2%):						
TOTAL BUDGET RECOMMENDATION:						

ITEM AMOUNT (FY2025)	ESCALATED UNIT COST (FY2026)	ITEM AMOUNT (FY2026)	ESCALATED UNIT COST (FY2027)	ESCALATED UNIT COST (FY2027)
\$ 404,736.01	\$ 424,972.81	\$ 424,972.81	\$ 446,221.45	\$ 446,221.45
\$ 4,332,975.90	\$ 268.02	\$ 4,549,624.70	\$ 281.42	\$ 4,777,105.93
\$ 2,629,869.32	\$ 1,531.54	\$ 2,761,362.79	\$ 1,608.11	\$ 2,899,430.93
\$ 404,155.83	\$ 4,466.99	\$ 424,363.62	\$ 4,690.33	\$ 445,581.80
\$ 43,447.44	\$ 12,762.82	\$ 45,619.81	\$ 13,400.96	\$ 47,900.80
\$ 550,565.99	\$ 30.63	\$ 578,094.29	\$ 32.16	\$ 606,999.00
\$ 97,240.50	\$ 51,051.26	\$ 102,102.53	\$ 53,603.83	\$ 107,207.65
\$ 18,232.59	\$ 9,572.11	\$ 19,144.22	\$ 10,050.72	\$ 20,101.43
\$ 18,232.59	\$ 9,572.11	\$ 19,144.22	\$ 10,050.72	\$ 20,101.43
\$ 8,499,456.17	Subtotal:	\$ 8,924,428.99	Subtotal:	\$ 9,370,650.42
(FY2025)		(FY2026)		(FY2027)
\$ 8,499,456.17		\$ 8,924,428.99		\$ 9,370,650.42
\$ 2,124,864.04		\$ 2,231,107.25		\$ 2,342,662.61
\$ -		\$ -		\$ -
\$ 765,000.00		\$ 765,000.00		\$ 765,000.00
\$ 850,000.00		\$ 893,000.00		\$ 938,000.00
\$ 12,239,320.22		\$ 12,813,536.24		\$ 13,416,313.03

Hare Snipe

This trail will provide a connection from Crabtree Creek Greenway just north of Crabtree Valley Mall, across US-70 and up to Wooten Meadow Park off of West Millbrook Road. The corridor follows the creek corridor and the sewer line the majority of the way.

Project Snapshot

- Project Location: east of Crabtree creek between US-70 and W Millbrook. North of Crabtree Valley Mall.
- Project Type: Greenway
- Length of Project: 1.48 Miles
- Estimated Construction Year: 2025, 2026, 2027 (hypothetical)

Trail Trip Generators

- Crabtree Creek Greenway Trail
- Crabtree Valley Mall
- Wooten Meadow Park
- York Elementary School
- Brookhaven Neighborhood
- Womble Neighborhood

- Brook Forest Neighborhood
- Sir Walter Hills Neighborhood

Previous Planning Efforts

- Capital Area Greenway Planning & Design Guide (2014)

Potential Right-of-Way Needs

- Total estimated area needed: 3.29 AC
- Number of impacted parcels (not City or County owned): 13
- Number of impacted property owners: 12

Potential Permitting Needs

- Erosion Control
- 401/404 permitting
- CLOMR/LOMR flood modeling permits

Potential Funding Sources

- CAMPO/LAPP funding
- City of Raleigh CIP funding
- CMAQ Funds
- Part F grant
- Municipal Bonds



Preliminary Cost Estimates

Notes

- Unit costs are a composite of multiple greenway projects from across the area that have been bid in the last 4 years.
- Assuming 12-ft wide trail with 10-ft clear width for boardwalk and bridges.
- Linear foot of asphalt trail includes: grading, basic drainage, clearing and grubbing, aggregate base course (ABC), asphalt paving, fencing, curb ramps, and basic pavement marking.
- Linear foot of boardwalk includes: timber pile foundations, sub structure, decking, and handrails.
- Linear foot of bridge includes: prefabricated bridge delivered, foundations, bent construction, and erection of bridge. Assuming 60-ft to 110-ft spans between bents.
- Linear foot of erosion control includes: silt fence, tree protection fence, silt fence outlets, inlet protection, construction accesses, and special silt basins.
- All pavement markings are assumed to be thermoplastic.
- Pedestrian culvert assumes a cut and cover method of construction
- Ped ramps are included within the linear foot cost of asphalt/concrete trail. Crosswalks and pedestrian refuges are not and are a separate item within this estimate.
- Proposed trail signage and wayfinding are included within the contingency of the estimate.
- Counters do not include cabinets, power supplies, or any ongoing data collection.
- Trail lighting is not assumed to be included in the project and the estimate.
- There are no signal modifications unless otherwise stated as part of the estimate.
- No utility relocations are part of this estimate.

Capital Area Greenway Master Plan

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Table 39: Hare Snipe Preliminary Cost Estimates

ITEM #	DESCRIPTION	QUANTITY	UNITS	CURRENT UNIT COST	ITEM AMOUNT CURRENT	ESCALATED UNIT COST (FY2025)
0000000800-N	Mobilization 5% of total cost	1	LS	\$ 264,299.02	\$ 264,299.02	\$ 333,473.25
0000000450-N	Cost per LF of Trail Asphalt	6028	LF	\$ 210.00	\$ 1,265,880.00	\$ 255.26
0000000200-N	Cost per LF of Boardwalk	1271	LF	\$ 1,200.00	\$ 1,525,200.00	\$ 1,531.54
0000000300-N	Cost per LF of Bridge	526	LF	\$ 3,500.00	\$ 1,841,000.00	\$ 4,466.99
0000000500-N	Traffic Control Cost per mile	1.48	MI	\$ 50,000.00	\$ 74,100.38	\$ 63,814.08
0000000610-N	Erosion Control Cost per LF	7825	LF	\$ 24.00	\$ 187,800.00	\$ 30.63
0000000300-N	Pedestrian Culvert	108	LF	\$ 3,500.00	\$ 378,000.00	\$ 4,466.99
-	Ped and Bike Counter	2	EA	\$ 7,000.00	\$ 14,000.00	\$ 8,933.97
				Subtotal:	\$ 5,550,279.40	Subtotal:
SUB TOTAL CONSTRUCTION COSTS:						
25% CONTINGENCY:						
RIGHT OF WAY COSTS:						
ENGINEERING AND PLANNING SERVICES (11% OF 2021 CONSTRUCTION COST ±3%):						
CEI SERVICES (10% OF ESCALATED COST ±2%):						
TOTAL BUDGET RECOMMENDATION:						

ITEM AMOUNT (FY2025)	ESCALATED UNIT COST (FY2026)	ITEM AMOUNT (FY2026)	ESCALATED UNIT COST (FY2027)	ESCALATED UNIT COST (FY2027)
\$ 333,473.25	\$ 350,146.91	\$ 350,146.91	\$ 367,654.26	\$ 367,654.26
\$ 1,538,685.05	\$ 268.02	\$ 1,615,619.30	\$ 281.42	\$ 1,696,400.27
\$ 1,946,584.64	\$ 1,608.11	\$ 2,043,913.87	\$ 1,688.52	\$ 2,146,109.56
\$ 2,349,634.36	\$ 4,690.33	\$ 2,467,116.07	\$ 4,924.85	\$ 2,590,471.88
\$ 94,572.95	\$ 67,004.78	\$ 99,301.59	\$ 70,355.02	\$ 104,266.67
\$ 239,685.68	\$ 32.16	\$ 251,669.96	\$ 33.77	\$ 264,253.46
\$ 482,434.43	\$ 4,690.33	\$ 506,556.15	\$ 4,924.85	\$ 531,883.96
\$ 17,867.94	\$ 9,380.67	\$ 18,761.34	\$ 9,849.70	\$ 19,699.41
\$ 7,002,938.30	Subtotal:	\$ 7,353,085.20	Subtotal:	\$ 7,720,739.47
(FY2025)		(FY2026)		(FY2027)
\$ 7,002,938.30		\$ 7,353,085.20		\$ 7,720,739.47
\$ 1,750,734.58		\$ 1,838,271.30		\$ 1,930,184.87
\$ 223,000.00		\$ 223,000.00		\$ 223,000.00
\$ 610,000.00		\$ 610,000.00		\$ 610,000.00
\$ 701,000.00		\$ 736,000.00		\$ 773,000.00
\$ 10,287,672.88		\$ 10,760,356.50		\$ 11,256,924.34

Edwards Mill Connector

This segment will provide connection between several existing trail as well as destinations. It will connect to the Reedy Creek trail to north and the new Bandwidth campus and PNC Arena and existing parking to the south. There are options to use the existing pedestrian tunnel underneath Wade Avenue and Schenck Forest and modifying the Wade Avenue/Edwards Mill Road interchange with a signalized option.

Project Snapshot

- Project Location: West of PNC along Edwards Mill Road between the existing parking lot on PNC Center Road and the pedestrian tunnel under Edwards Mill Road just south of Reedy Creek road.
- Project Type: Greenway and MUP
- Length of Project: 1.93 Miles
- Estimated Construction Year: 2025, 2026, 2027 (hypothetical)

Trail Trip Generators

- Bandwidth
- PNC Arena
- NCMA
- REX Hospital
- Carter Finley Stadium
- NC Fair Grounds
- Cardinal Gibbons High School

Previous Planning Efforts

- Capital Area Greenway Planning & Design Guide (2014)

Potential Right-of-Way Needs

- Total estimated area needed: 0.34 AC
- Number of impacted parcels (not City or County owned): 1
- Number of impacted property owners: 1
- NOTE: State of North Carolina Own the parcels affected for ROW

Potential Permitting Needs

- Erosion Control
- 401/404 permitting
- CLOMR/LOMR flood modeling permits
- NCDOT Encroachments

Potential Funding Sources

- CAMPO/LAPP funding
- City of Raleigh CIP funding
- CMAQ Funds
- Part F grant
- Municipal Bonds
- Partnerships with PNC Arena and Bandwidth



Preliminary Cost Estimates

Notes (Signalized Option)

- Unit costs are a composite of multiple greenway projects from across the area that have been bid in the last 4 years.
- Assuming 12-ft wide trail with 10-ft clear width for boardwalk and bridges.
- Linear foot of asphalt trail includes: grading, basic drainage, clearing and grubbing, aggregate base course (ABC), asphalt paving, fencing, curb ramps, and basic pavement marking.
- Linear foot of boardwalk includes: timber pile foundations, sub structure, decking, and handrails.
- Linear foot of bridge includes: prefabricated bridge delivered, foundations, bent construction, and erection of bridge. Assuming 60-ft to 110-ft spans between bents.
- Linear foot of erosion control includes: silt fence, tree protection fence, silt fence outlets, inlet protection, construction accesses, and special silt basins
- All pavement markings are assumed to be thermoplastic.
- ROW is based on tax valuation data available from Wake County. The one property needed is owned by the State of North Carolina and a non-monetary deal may be available.
- Pedestrian refuges include monolithic concrete in the center of the road with detectable warning domes.
- Pedestrian ramps are included within the linear foot cost of asphalt/concrete trail. Crosswalks and pedestrian refuges are not and are a separate item within this estimate.
- Proposed trail signage and wayfinding are included within the contingency of the estimate.
- Counters do not include cabinets, power supplies, or any ongoing data collection.
- Trail lighting is not assumed to be included in the project and the estimate.
- There are no signal modifications unless otherwise stated as part of the estimate.
- No utility relocations are part of this estimate.

Notes (Tunnel Option)

- Unit costs are a composite of multiple greenway projects from across the area that have been bid in the last 4 years.
- Assuming 12-ft wide trail with 10-ft clear width for boardwalk and bridges.
- Linear foot of asphalt trail includes: grading, basic drainage, clearing and grubbing, aggregate base course (ABC), asphalt paving, fencing, curb ramps, and basic pavement marking.
- Linear foot of boardwalk includes: timber pile foundations, sub structure, decking, and handrails.
- Linear foot of bridge includes: prefabricated bridge delivered, foundations, bent construction, and erection of bridge. Assuming 60-ft to 110-ft spans between bents.

- Linear foot of erosion control includes: silt fence, tree protection fence, silt fence outlets, inlet protection, construction accesses, and special silt basins.
- All pavement markings are assumed to be thermoplastic.
- ROW is based on tax valuation data available from Wake County. The one property needed is owned by the State of North Carolina and a non-monetary deal may be available.
- Pedestrian refuges include monolithic concrete in the center of the road with detectable warning domes.
- Pedestrian ramps are included within the linear foot cost of asphalt/concrete trail. Crosswalks and pedestrian refuges are not and are a separate item within this estimate.
- Proposed trail signage and wayfinding are included within the contingency of the estimate.
- Counters do not include cabinets, power supplies, or any ongoing data collection.
- Trail lighting is not assumed to be included in the project and the estimate.
- There are no signal modifications unless otherwise stated as part of the estimate.
- No utility relocations are part of this estimate.

Table 40: Edwards Mill Connector Preliminary Cost Estimates (Signalized Option)

ITEM #	DESCRIPTION	QUANTITY	UNITS	CURRENT UNIT COST	ITEM AMOUNT CURRENT	ESCALATED UNIT COST (FY2025)
0000000800-N	Mobilization	1	LS	\$ 50,000.00	\$ 50,000.00	\$ 63,814.08
0000000450-N	Cost per LF of Trail Asphalt	353	LF	\$ 210.00	\$ 74,130.00	\$ 255.26
0000000200-N	Cost per LF of Boardwalk		LF	\$ 1,200.00	\$ -	\$ 1,531.54
0000000300-N	Cost per LF of Bridge		LF	\$ 3,500.00	\$ -	\$ 4,466.99
0000000500-N	Traffic Control Cost per mile	0.066856	MI	\$ 10,000.00	\$ 668.56	\$ 12,762.82
0000000610-N	Erosion Control Cost per LF	353	LF	\$ 24.00	\$ 8,472.00	\$ 30.63
0000000400-N	Cost per LF of Trail Concrete		LF	\$ 285.00	\$ -	\$ 363.74
	Signalized Crossings at Wade Ave	1	LS	\$ 141,000.00	\$ 141,000.00	\$ 179,955.70
	Ped and Bike Counter	2	EA	\$ 7,000.00	\$ 14,000.00	\$ 8,933.97
Subtotal:					\$ 288,270.56	Subtotal:
SUB TOTAL CONSTRUCTION COSTS:						
25% CONTINGENCY:						
RIGHT OF WAY COSTS:						
ENGINEERING AND PLANNING SERVICES (11% OF 2021 CONSTRUCTION COST ±3%):						
CEI SERVICES (10% OF ESCALATED COST ±2%):						
TOTAL BUDGET RECOMMENDATION:						

ITEM AMOUNT (FY2025)	ESCALATED UNIT COST (FY2026)	ITEM AMOUNT (FY2026)	ESCALATED UNIT COST (FY2027)	ESCALATED UNIT COST (FY2027)
\$ 63,814.08	\$ 67,004.78	\$ 67,004.78	\$ 70,355.02	\$ 70,355.02
\$ 90,105.48	\$ 268.02	\$ 94,610.75	\$ 281.42	\$ 99,341.29
-	\$ 1,608.11	-	\$ 1,688.52	-
-	\$ 4,690.33	-	\$ 4,924.85	-
\$ 853.27	\$ 13,400.96	\$ 895.94	\$ 14,071.00	\$ 940.73
\$ 10,812.66	\$ 32.16	\$ 11,353.29	\$ 33.77	\$ 11,920.95
-	\$ 381.93	-	\$ 401.02	-
\$ 179,955.70	\$ 188,953.49	\$ 188,953.49	\$ 198,401.16	\$ 198,401.16
\$ 17,867.94	\$ 9,380.67	\$ 18,761.34	\$ 9,849.70	\$ 19,699.41
\$ 363,409.13	Subtotal:	\$ 381,579.59	Subtotal:	\$ 400,658.56
(FY2025)	(FY2026)		(FY2027)	
\$ 363,409.13		\$ 381,579.59		\$ 400,658.56
\$ 90,852.28		\$ 95,394.90		\$ 100,164.64
\$ 225,000.00		\$ 225,000.00		\$ 225,000.00
\$ 32,000.00		\$ 32,000.00		\$ 32,000.00
\$ 37,000.00		\$ 39,000.00		\$ 41,000.00
\$ 748,261.41		\$ 772,974.49		\$ 798,823.20

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Table 41: Edwards Mill Connector Preliminary Cost Estimates (Tunnel Option)

ITEM #	DESCRIPTION	QUANTITY	UNITS	CURRENT UNIT COST	ITEM AMOUNT CURRENT	ESCALATED UNIT COST (FY2025)
0000000800-N	Mobilization 5% of total cost	1	LS	\$ 136,130.08	\$ 136,130.08	\$ 167,377.41
0000000450-N	Cost per LF of Trail Asphalt	9971	LF	\$ 210.00	\$ 2,093,910.00	\$ 255.26
0000000200-N	Cost per LF of Boardwalk		LF	\$ 1,200.00	-	\$ 1,531.54
0000000300-N	Cost per LF of Bridge	90	LF	\$ 3,500.00	\$ 315,000.00	\$ 4,466.99
0000000500-N	Traffic Control Cost per mile	1.929356	MI	\$ 10,000.00	\$ 19,293.56	\$ 12,762.82
0000000610-N	Erosion Control Cost per LF	10187	LF	\$ 24.00	\$ 244,488.00	\$ 30.63
0000000400-N	Cost per LF of Trail Concrete	126	LF	\$ 285.00	\$ 35,910.00	\$ 363.74
	Ped and Bike Counter	2	EA	\$ 7,000.00	\$ 14,000.00	\$ 8,933.97
				Subtotal:	\$ 2,858,731.64	Subtotal:
SUB TOTAL CONSTRUCTION COSTS:						
25% CONTINGENCY:						
RIGHT OF WAY COSTS:						
ENGINEERING AND PLANNING SERVICES (11% OF 2021 CONSTRUCTION COST ±3%):						
CEI SERVICES (10% OF ESCALATED COST ±2%):						
TOTAL BUDGET RECOMMENDATION:						

ITEM AMOUNT (FY2025)	ESCALATED UNIT COST (FY2026)	ITEM AMOUNT (FY2026)	ESCALATED UNIT COST (FY2027)	ESCALATED UNIT COST (FY2027)
\$ 167,377.41	\$ 175,746.28	\$ 175,746.28	\$ 184,533.59	\$ 184,533.59
\$ 2,545,160.69	\$ 268.02	\$ 2,672,418.73	\$ 281.42	\$ 2,806,039.66
-	\$ 1,608.11	-	\$ 1,688.52	-
\$ 402,028.69	\$ 4,690.33	\$ 422,130.13	\$ 4,924.85	\$ 443,236.63
\$ 24,624.02	\$ 13,400.96	\$ 25,855.22	\$ 14,071.00	\$ 27,147.98
\$ 312,035.53	\$ 32.16	\$ 327,637.30	\$ 33.77	\$ 344,019.17
\$ 45,831.27	\$ 381.93	\$ 48,122.83	\$ 401.02	\$ 50,528.98
\$ 17,867.94	\$ 9,380.67	\$ 18,761.34	\$ 9,849.70	\$ 19,699.41
\$ 3,514,925.55	Subtotal:	\$ 3,690,671.82	Subtotal:	\$ 3,875,205.42
(FY2025)		(FY2026)		(FY2027)
\$ 3,514,925.55		\$ 3,690,671.82		\$ 3,875,205.42
\$ 878,731.39		\$ 922,667.96		\$ 968,801.36
\$ 225,000.00		\$ 225,000.00		\$ 225,000.00
\$ 315,000.00		\$ 315,000.00		\$ 315,000.00
\$ 352,000.00		\$ 370,000.00		\$ 388,000.00
\$ 5,285,656.94		\$ 5,523,339.78		\$ 5,772,006.78

Shelley Lake Trail Restoration

This project includes the restoration of the Shelley Lake Trail Loop and associated structures that includes a portion of the Mine Creek Trail. The trail provides a recreational loop in Shelley Lake Park.

Project Snapshot

- Project Location: Within Shelley Lake Park and adjacent to Mine Creek
- Project Type: Greenway, Sidepath, including boardwalk and bridge locations
- Length of Project: 2.33 Miles
- Estimated Construction Year: 2025, 2026, 2027 (hypothetical)

Trail Trip Generators

- Shelley Lake Park
- Sanderson High School
- Sertoma Arts Center
- Lynnwood Park Apartment Homes
- Millbrook Apartment Homes
- North Hills Club

Previous Planning Efforts

- Capital Area Greenway Planning & Design Guide (2014)
- Ongoing maintenance inventory

Potential Right-of-Way Needs

ROW analysis was not performed for this segment. This project is a restoration of an existing trail loop and no acquisition is anticipated for this project.

Potential Permitting Needs

- Erosion Control
- 401/404 permitting
- NCDOT Encroachments

Potential Funding Sources

- CAMPO/LAPP funding
- City of Raleigh CIP funding
- Municipal Bonds



Preliminary Cost Estimates

Notes

- Unit costs are a composite of multiple greenway projects from across the area that have been bid in the last 4 years.
- Assuming 12-ft wide trail with 10-ft clear width for boardwalk and bridges.
- Linear foot of asphalt trail includes: grading, basic drainage, clearing and grubbing, aggregate base course (ABC), asphalt paving, fencing, curb ramps, and basic pavement marking.
- Linear foot of boardwalk includes: timber pile foundations, sub structure, decking, and handrails.
- Linear foot of bridge includes: prefabricated bridge delivered, foundations, bent construction, and erection of bridge. Assuming 60-ft to 110-ft spans between bents.
- Linear foot of erosion control includes: silt fence, tree protection fence, silt fence outlets, inlet protection, construction accesses, and special silt basins.
- All pavement markings are assumed to be thermoplastic.
- Proposed trail signage and wayfinding are included within the contingency of the estimate.
- Counters do not include cabinets, power supplies, or any ongoing data collection.
- Trail lighting is not assumed to be included in the project and the estimate.
- There are no signal modifications unless otherwise stated as part of the estimate.
- No utility relocations are part of this estimate.

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Table 42: Shelly Lake Preliminary Cost Estimates

ITEM #	DESCRIPTION	QUANTITY	UNITS	CURRENT UNIT COST	ITEM AMOUNT CURRENT	ESCALATED UNIT COST (FY2025)
0000000800-N	Mobilization 5% of total cost	1	LS	\$ 248,789.78	\$ 248,789.78	\$ 302,405.53
0000000450-N	Cost per LF of Trail Asphalt	10629	LF	\$ 210.00	\$ 2,232,090.00	\$ 255.26
0000000200-N	Cost per LF of Boardwalk	1050	LF	\$ 1,200.00	\$ 1,260,000.00	\$ 1,458.61
0000000300-N	Cost per LF of Bridge	111	LF	\$ 3,500.00	\$ 388,500.00	\$ 4,254.27
0000000500-N	Traffic Control Cost per mile	2.33	MI	\$ 10,000.00	\$ 23,276.52	\$ 12,155.06
0000000610-N	Erosion Control Cost per LF	12290	LF	\$ 24.00	\$ 294,960.00	\$ 29.17
0000000400-N	Cost per LF of Trail Concrete	500	LF	\$ 285.00	\$ 142,500.00	\$ 346.42
	Structure 17 Repair	1	LS	\$ 136,351.00	\$ 136,351.00	\$ 165,735.49
	Structure 19 Replacement	1	LS	\$ 204,860.00	\$ 204,860.00	\$ 249,008.61
	Structure 32 Replacement	1	LS	\$ 100,000.00	\$ 100,000.00	\$ 121,550.63
	Structure 33 Replacement	1	LS	\$ 150,000.00	\$ 150,000.00	\$ 182,325.94
	Demolition of Existing Asphalt	11129	LF	\$ 2.00	\$ 22,258.00	\$ 2.43
	Bike and Ped Counters	3	EA	\$ 7,000.00	\$ 21,000.00	\$ 8,508.54
				Subtotal:	\$ 5,224,585.30	Subtotal:
SUB TOTAL CONSTRUCTION COSTS:						
25% CONTINGENCY:						
RIGHT OF WAY COSTS:						
ENGINEERING AND PLANNING SERVICES (11% OF 2021 CONSTRUCTION COST ±3%):						
CEI SERVICES (10% OF ESCALATED COST ±2%):						
TOTAL BUDGET RECOMMENDATION:						

	ITEM AMOUNT (FY2025)	ESCALATED UNIT COST (FY2026)	ITEM AMOUNT (FY2026)	ESCALATED UNIT COST (FY2027)	ESCALATED UNIT COST (FY2027)
	\$ 302,405.53	\$ 317,525.80	\$ 317,525.80	\$ 333,402.09	\$ 333,402.09
	\$ 2,713,119.35	\$ 268.02	\$ 2,848,775.31	\$ 281.42	\$ 2,991,214.08
	\$ 1,531,537.88	\$ 1,531.54	\$ 1,608,114.77	\$ 1,608.11	\$ 1,688,520.51
	\$ 472,224.18	\$ 4,466.99	\$ 495,835.39	\$ 4,690.33	\$ 520,627.16
	\$ 28,292.75	\$ 12,762.82	\$ 29,707.39	\$ 13,400.96	\$ 31,192.76
	\$ 358,525.72	\$ 30.63	\$ 376,452.01	\$ 32.16	\$ 395,274.61
	\$ 173,209.64	\$ 363.74	\$ 181,870.12	\$ 381.93	\$ 190,963.63
	\$ 165,735.49	\$ 174,022.27	\$ 174,022.27	\$ 182,723.38	\$ 182,723.38
	\$ 249,008.61	\$ 261,459.04	\$ 261,459.04	\$ 274,531.99	\$ 274,531.99
	\$ 121,550.63	\$ 127,628.16	\$ 127,628.16	\$ 134,009.56	\$ 134,009.56
	\$ 182,325.94	\$ 191,442.23	\$ 191,442.23	\$ 201,014.35	\$ 201,014.35
	\$ 27,054.74	\$ 2.55	\$ 28,407.48	\$ 2.68	\$ 29,827.85
	\$ 25,525.63	\$ 8,933.97	\$ 26,801.91	\$ 9,380.67	\$ 28,142.01
	\$ 6,350,516.08	Subtotal:	\$ 6,668,041.89	Subtotal:	\$ 7,001,443.98
	(FY2025)		(FY2026)		(FY2027)
	\$ 6,351,000.00		\$ 6,669,000.00		\$ 7,002,000.00
	\$ 1,587,750.00		\$ 1,667,250.00		\$ 1,750,500.00
	-		-		-
	\$ 575,000.00		\$ 575,000.00		\$ 575,000.00
	\$ 636,000.00		\$ 667,000.00		\$ 701,000.00
	\$ 9,149,750.00		\$ 9,578,250.00		\$ 10,028,500.00



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