



PLAN DEVELOPED FOR:



The Oklawaha Greenway

NORTHERN & SOUTHERN EXTENSION
OF THE OKLAWAHA GREENWAY

PLAN DEVELOPED BY:



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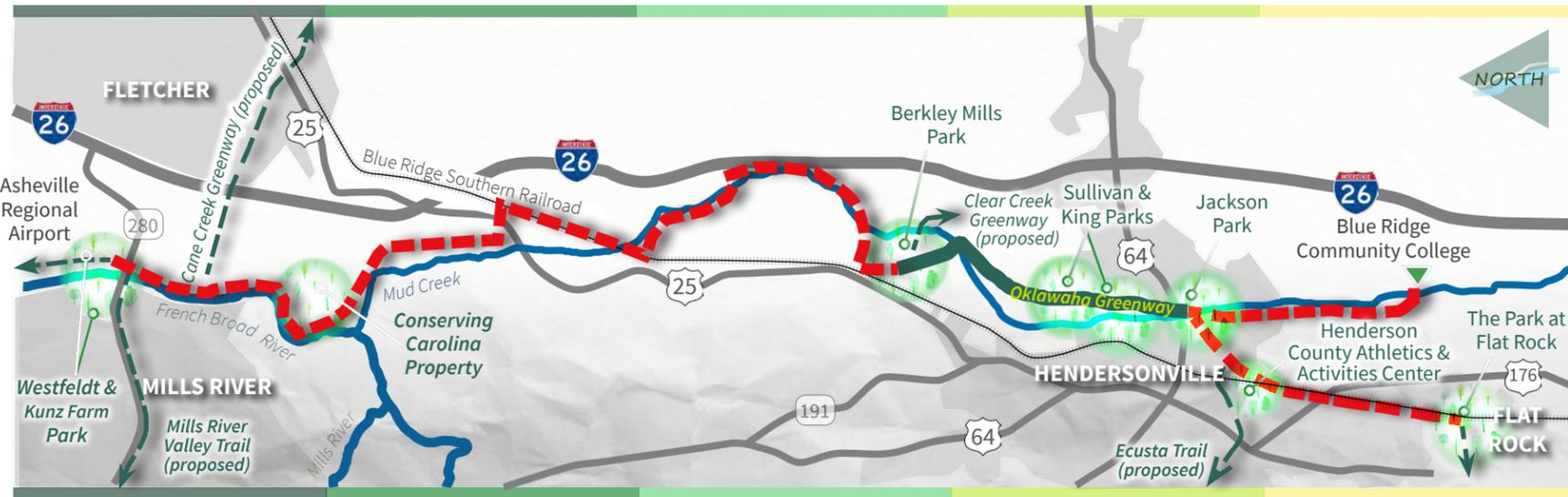
Thank You To Those That Provided Input on This Study:

- Henderson County Planning Department Staff, Recreation Department Staff, and Engineering Department Staff
- Henderson County Committees, including the Greenway Master Plan Committee, The Transportation Advisory Committee, and the Recreation Advisory Board
- Henderson County Cooperative Extension
- Henderson County Public Schools
- Conserving Carolina
- City of Hendersonville Staff
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- Friends of the Oklawaha Greenway
- Blue Ridge Community College
- Blue Ridge Bicycle Club
- Healthy People-Healthy Carolinas
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Thanks to the following organizations



INTRODUCTION



Overview

The Spine of the System. The proposed 14.65-miles of new greenway will travel both north and south of the existing Oklawaha Greenway, becoming the main spine for pedestrian and bicycle travel in Henderson County. Added to the existing Oklawaha Greenway mileage, the total greenway will make nearly an 18-mile corridor with other greenways connecting to and radiating out of it.

Major Destinations Connected. The greenway will connect rural and suburban parts of Henderson County, Fletcher, Mills River, Hendersonville, and Flat Rock together along a picturesque corridor that highlights the best of Henderson County. Traveling along the French Broad River, Mud Creek, and Bat Creek, through farm fields and orchards, and along natural areas, the greenway will connect neighborhoods and commercial areas by safe and inviting pedestrian and bicycle facilities. This greenway will also connect key destinations like downtown Hendersonville, major parks in the county, Blue Ridge Community College, and several planned greenways.

Key Opportunities. Opportunities to utilize existing utility and transportation corridors exist, such as utilizing sewer easements, Duke powerline easements, and the Blue Ridge Southern Railroad (BRSR) corridor. Duke Energy and BRSR have both expressed preliminary support for accommodating the greenway. While landowners will need to consent their use, these corridors are some of the most suitable locations for the greenway. Additionally, in some cases as seen elsewhere in the region, development has worked hand-in-hand to accommodate and embrace greenways as an amenity.

Benefits. Walk Bike NC describes the benefits of greenways in their 5-Pillar Campaign, demonstrating the potential the Oklawaha Greenway has and will have in the future. These benefits include:



Safety & Mobility. Pedestrians and bicyclists are hard pressed to find safe routes that broadly connect through the county. Several fatal pedestrian and bicycle crashes with vehicles are reported within the study area. The Oklawaha Greenway can vastly improve safety for those traveling outside of a vehicle



Health. The rate of obesity has doubled in the past 20 years, with nearly 2 in 10 people qualifying as obese in Henderson County as of 2015. Walking and bicycling are two of the top activities preferred by the public for fitness, and greenways are proven to attract those that would not otherwise want to walk or bike on roads



Economy. A recent study found that the Brevard Greenway had a nearly \$1.5 million impact on the local economy annually, with 21 jobs that directly support the trail. Businesses have been attracted to the region, in part because of greenways, including New Belgium Brewing which was part of a \$125 million investment to revitalize Asheville's waterfront.



Environment. The Oklawaha Greenway can work to preserve and make use of lands that are susceptible to flooding and unusable for development. The greenway will connect residents to their waterways in a way they are not currently connected.

Vision & Goals of the Greenway

The Vision

The Oklawaha Greenway extensions will create **connectivity** between parks, municipalities, and destinations through an accessible, continuous greenway that serves as a **walking and biking spine** for future greenway growth and connections within Henderson County. **The greenway will build community through shared recreation and ease of transportation.**

Goals of the Greenway

- Accessibility:** To provide access to local assets (both natural and cultural) by providing an opportunity for and promoting active transportation and recreation that is accessible to all abilities.
- Community engagement:** To build excitement and support for the greenway project through engagement and focus on community improvements, and respect for property owners.
- Constructibility:** To provide a cost-effective greenway by exploring alignment options, phasing, and funding sources.
- Stimulates Economic Development:** Greenways are proven to stimulate economic development and attract business, becoming an economic development strategy for the county.
- Adds to Henderson County's Sense of Place and Citizen's Quality of Life:** The greenway contributes to the larger sense of place and quality of life.



This image is of the Conserving Carolina conservation property which the proposed northern corridor is planned to travel through. This property is planned for a major environmental restoration effort. Plans for this property include accommodation of the greenway.

CHAPTER

1



Summary or Relevant Plans

Summary of Existing Plans

Introduction

Henderson County and Hendersonville have a variety of planning documents to guide decisions made in the Oklawaha Greenway Corridor. Above all, there is a desire from the Henderson County community to improve the quality of life through greater access to recreation, increased transportation options, and preserving the county's natural beauty. In addition, there is a strong desire to use improved transportation options to support economic growth.

Henderson County Greenway Master Plan | 2018

VISION

“Create a safe, accessible, comprehensive and connected system of constructed greenways and trails that enhances quality of life throughout Henderson county by providing opportunities for transportation, recreation, public health, economic development, and environmental stewardship.”

GOALS

- Improve access to recreation for health
- Increase county connectivity & transportation options
- Encourage economic support of local businesses
- Promote the natural beauty & environmental diversity in the county

The Henderson County Greenway Master Plan showcases a 30-year vision. The implementation of the desired greenway network, by design, is intended to be long term. Three types of greenways are identified: Priority, Destination, and Connection. The Oklawaha Greenway is identified in the plan as a priority greenway focusing on larger connections to other WNC residents and to join the proposed Hellbender Regional Trail network.

Policy recommendations identified in the plan include the desire to use existing and future utility easements for public use greenways and to connect greenways to existing transportation facilities. This goes in line with the vision to provide increased opportunities for transportation.

Other intentions identified as action steps include the desire to develop the greenways through voluntary negotiations or contributions and to encourage non-profits to work with local landowners to secure easements. Working with the community and non-profits was identified in several locations of the plan.



When considering the design of greenways, Henderson County expresses a wish to coordinate with local governments and non-profits for uniformity across the greenway network. Whenever possible, the designs should be able to be phased to allow for flexibility in starting construction when funding becomes available. To help meet the vision of the plan of connectivity, designers should work with NCDOT to have multi-use trails and sidewalks help create connections. In places where a greenway is in a floodplain, hydraulic modeling is requested to ensure environmental protections and greenway durability. Additional efforts should also be made to show no adverse environmental impacts will be made due to a particular design and construction. Lastly, the design may include amenities such as restrooms, lighting, and benches as well as a branding and way-finding program.

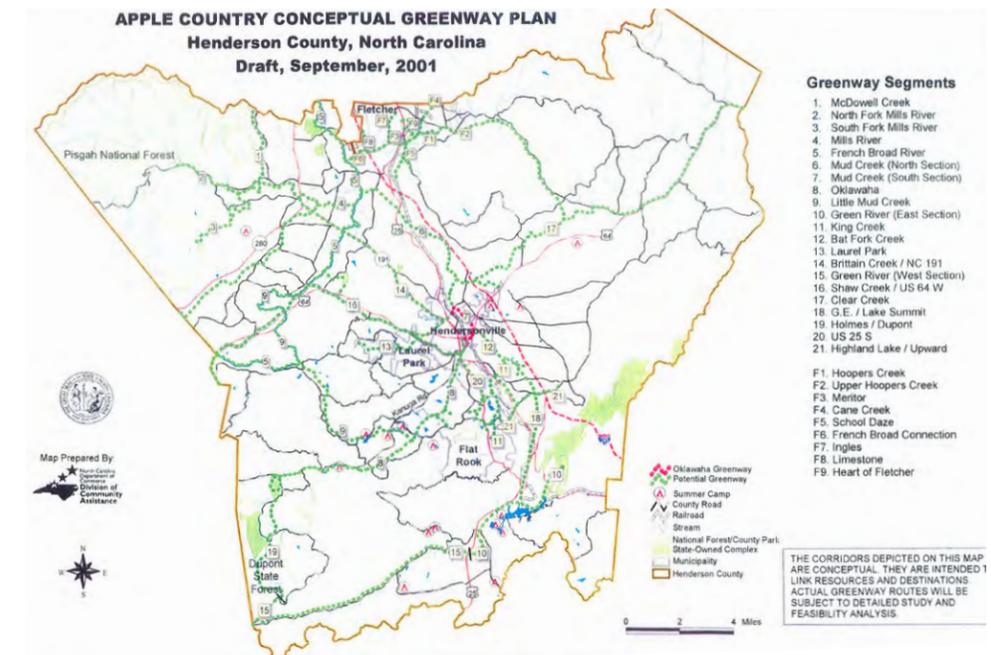
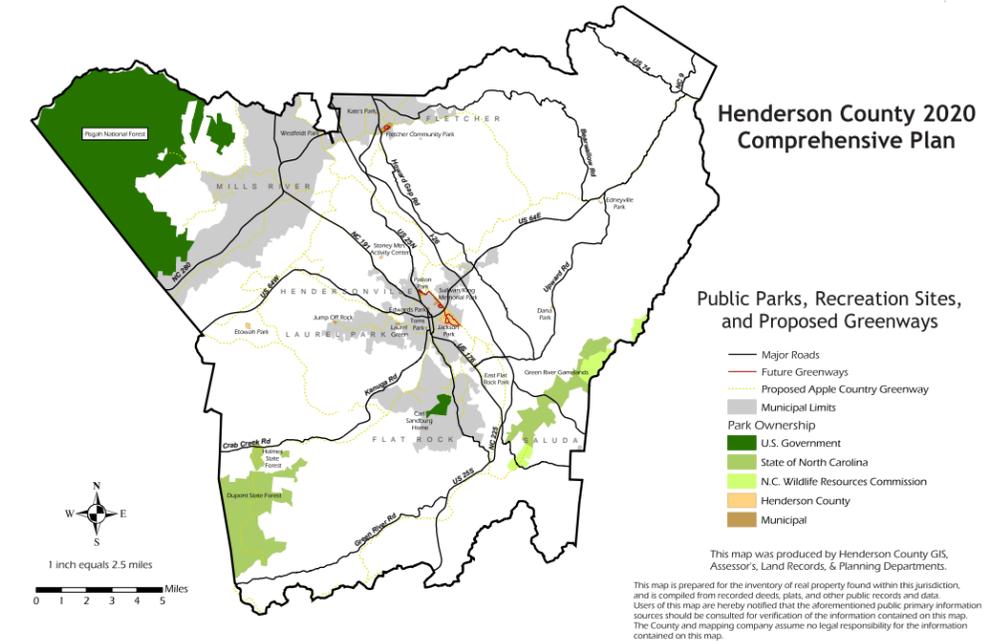
Henderson County 2020 Comprehensive Plan | 2004

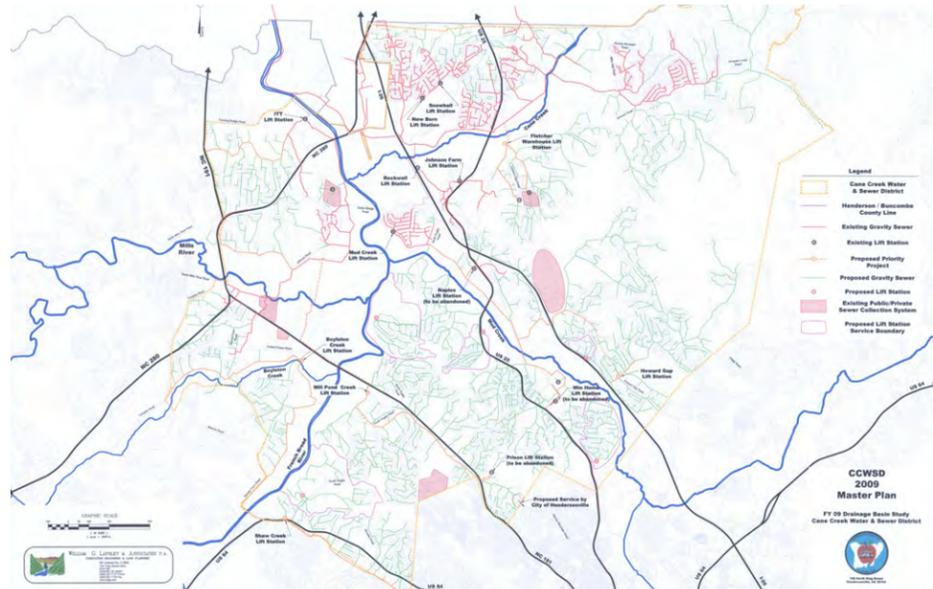
Public Parks, Recreation Sites, and Proposed Greenways

The Henderson County 2020 Comprehensive Plan identifies future greenways extending from Patton Park to Jackson Park and proposed greenways matching the county's Greenway Master Plan's vision of connecting residents of WNC and bringing them to recreation opportunities. In addition, the plan promotes the coordination between recreation planning and school planning, as schools provide great recreation opportunities. Further, the plan specifically addresses greenways. In regards to greenways, the plan identifies greenways as opportunities to enhance public health and the quality of life while promoting economic growth.

Recreation was the fourth primary category of comments received during public meetings. 2% of comments directly mentioned the need for greenways/multi-use trails.

The county's focus on greenways is evident in its formation of the Apple Country Greenway Commission. The goal is to form a network of greenways that would create linkages between population centers, schools, commercial centers, and recreation areas. The network would be designed to serve recreation needs, transportation needs, and open space protection. The network should accommodate walking, biking, and horseback riding. A recreation master Plan should include sewer (see plan next page) and water master plans with regard to using the right-of-ways as greenway paths.





Henderson County Sewer Master Plan

Apple Country Conceptual Greenway Plan | 2001

GOALS

- Transportation
- Safety
- Recreation/Fitness
- Education
- Economic development
- Protection of environmental assets

The Apple Country Conceptual Greenway Plan showcases an inventory of the county's greenways and identifies areas of need. In the planning and design section (7.1), the plan identifies steps that would lead to good planning, including a feasibility study, corridor planning, and construction documents. Within the corridor planning, the plan identifies old rail beds, utility easements, river corridors, road right-of-ways, and "paper" streets as ideal corridors for greenways.

When designing the greenway, designers should consider:

- Safety (designed to accommodate those who wish to travel safely)
- Site furnishings (lighting, rest, shelter, water, dog clean-up, way-finding, warning signs, trash)
- Trail type (locations range from urban to rural and the type of trail should match context)
- Bridges/Boardwalks
- Overlooks/Views
- Landscaping (keeping in mind line-of-sight)
- Buffer zones (ecosystem protection)
- Fencing (privacy, sound mitigation, controlled access, etc.)

Hendersonville Bicycle Plan | 2017

VISION

"The City of Hendersonville will have a bike-way system that is connected, safe, and comfortable for riders of all ages and abilities, supported by efforts that encourage and educate everyone who drives, bikes, and walks."

GOALS

- Enhance transportation mobility for everyone including children and elderly
- Normalize bicycling as a viable mode of transportation
- Strengthen connections between neighborhoods, schools, parks, and downtown
- Improve travel safety, personal health, and quality of life

SUMMARY

It is anticipated that continued growth will put stress on the current transportation system and Hendersonville would like to promote bicycling through the construction of bicycle facilities. Hendersonville has a main focus on promoting bicycle facilities to improve equity in transportation and bring people to where they need to go. Destinations include employment, schools, and recreation/greenways.

Public process was done to help identify the challenges, vision, and destinations

You can see in the recommended bicycle facility plan (Figure 5) the desire to have a network that runs along key streets and corridors as well as utilize a toolkit of bicycle facility options.

To help implement the plan, Hendersonville promotes partnership and working with surrounding communities. This idea of regional coordination and partnership is a common thread through many of the plans reviewed.

Oklawaha Greenway Extension Proposal | 2015

SUMMARY

This proposal focuses on the desire to have a diverse set of transportation options in the community, especially for students. Access to the Blue Ridge Community College and the High School were cited specifically. In addition, the proposal also points out the economic and health benefits of a greenway that links local assets, including parks and schools.

The proposal looks at a specific study area that extends the Oklawaha Greenway to the Blue Ridge Community College and to Flat Rock. Two ponds are identified as possible destinations with views that showcase the desire, as stated in previous plans, to highlight and protect natural resources as well as have amenities along the greenways.

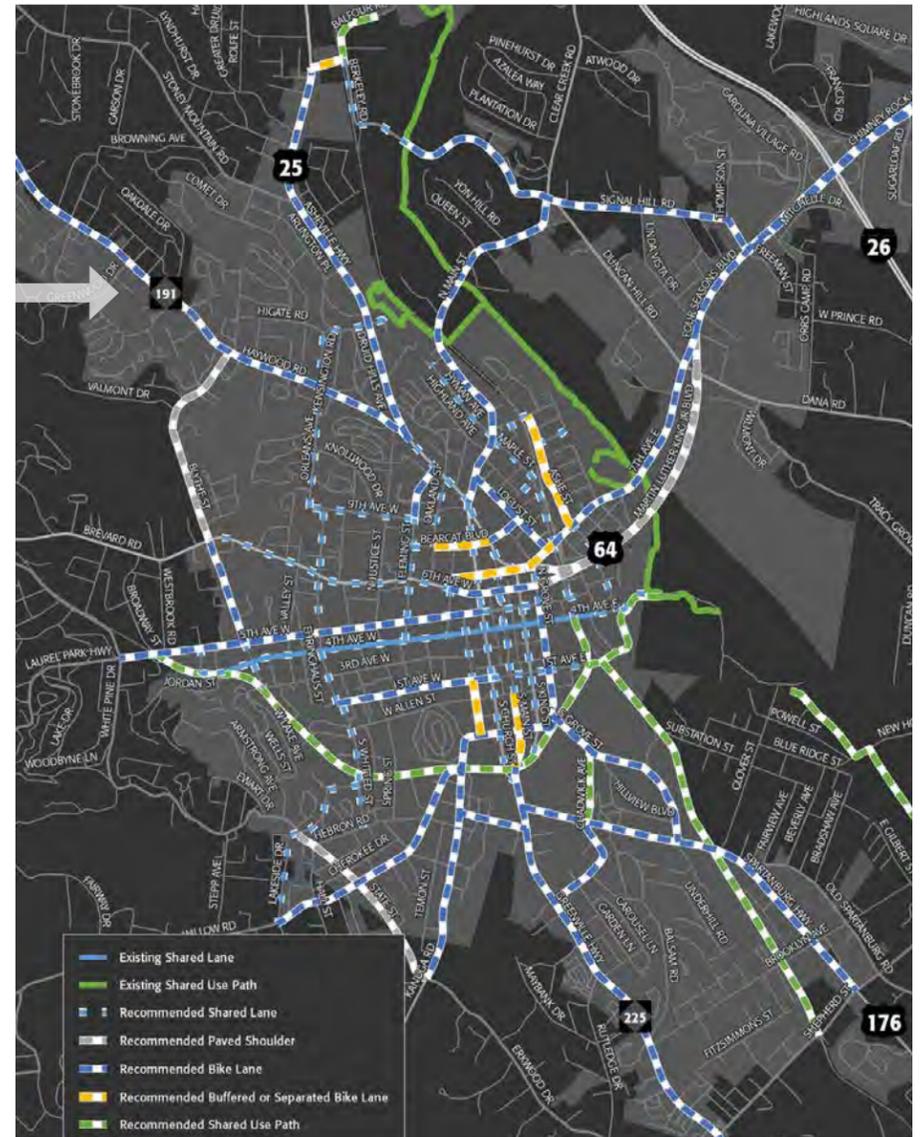


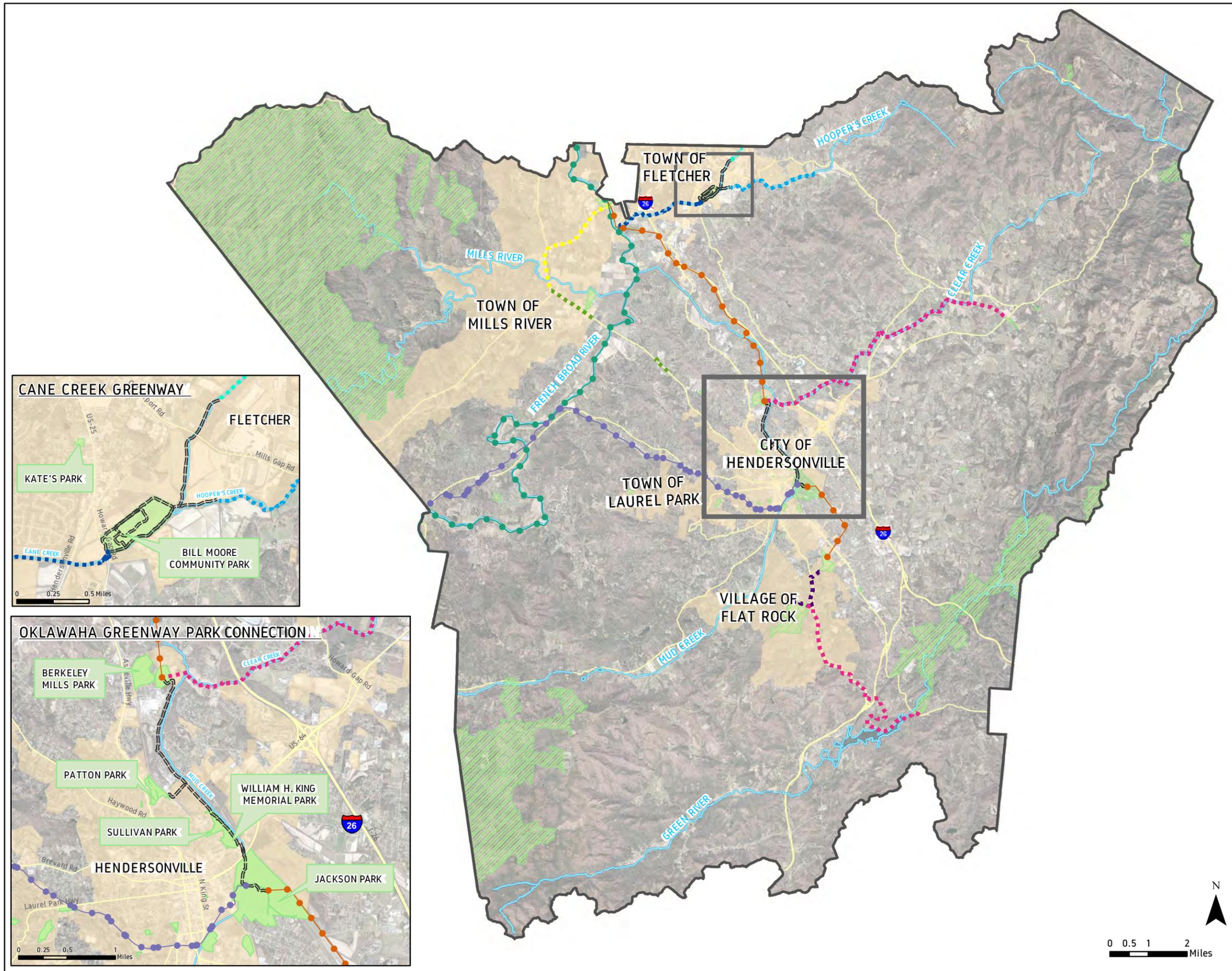
Figure 5. Recommended Bicycle Facility Plan

Conclusion

In review of the multitude of local and county-wide recreation and multi-modal plans, it is evident that the Henderson County region desires a greenway/multi-modal network that links residents to each other and resources within their communities. Such resources include, natural, educational, recreational, and economic. Such a network would be designed to link not only residents within the local communities, but would tie into larger networks and participate in regional coordination to connect residents in the larger WNC area.



PROPOSED GREENWAY NETWORK OVERVIEW



Priority Greenways:

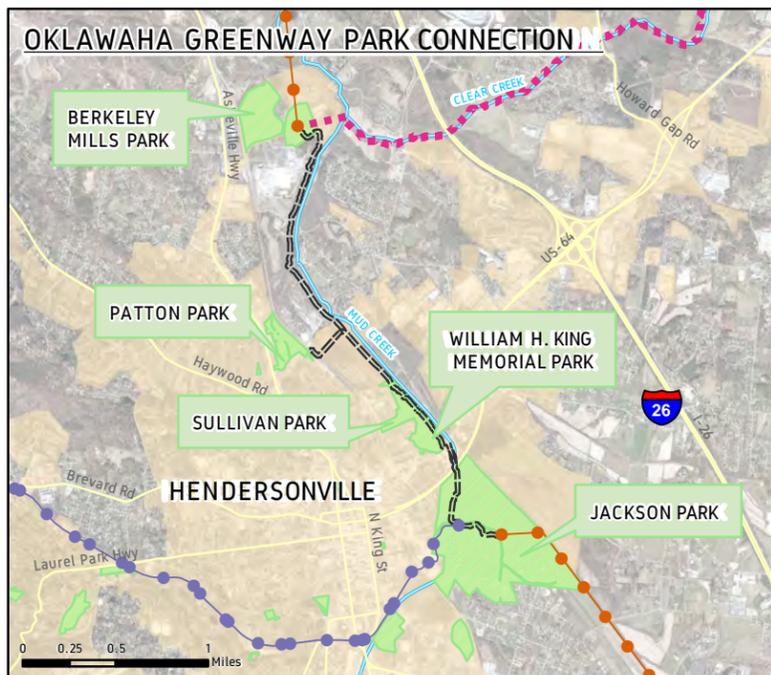
- Ecusta Trail
- French Broad Greenway
- Oklawaha Greenway

Greenways:

- Existing Greenways
- NCDOT Multi-Use Paths*
- Cane Creek Greenway
- Hooper's Creek Greenway
- Meritor Greenway
- Destination Greenways
- Mills River Valley Trail
- Flat Rock Greenway

Elements:

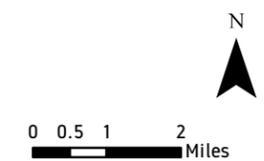
- Parks**
- Major Rivers/Streams
- Major Roads
- County Boundary



*Multi-Use Paths are to be constructed as part of the Hwy 191 widening project.
 **Parks include county parks, city parks, state parks/forests, and national parks/forests.

Please note that all greenways delineated in this map are representative of desirable locations to make greenway connections. The mapped lines of non-existing greenways are theoretical in nature.

This map was prepared from inventory of real property, recorded deeds, plats, and other public records and data. Users of this map are hereby notified that the public, primary information sources should be consulted for verification of the information contained on this map. The County and mapping company assume no legal responsibility for the information contained on this map.





This image shows the Super Sod property (majority of fields) and Conserving Carolina conservation property (bottom right corner). Much of the northern and southern study area parallels the French Broad River and Mud Creek, which both regularly flood. This plan addresses ways to mitigate flood issues related to the greenway.

CHAPTER

2



Existing Conditions

Existing Conditions of the Northern Corridor

Introduction

Site conditions of the corridor have an array of challenges and opportunities. These conditions were gathered through site investigation, stakeholder input, and Geographic Information System (GIS) analysis. This written description pairs with the *Opportunities, Constraints, and Potential Alignment Maps* which graphically displays what is discussed below.

The Importance of Knowing Existing Site Conditions

This written portion provides details of the site constraints with implications as they relate to permitting, design, and user experience. Early identification of natural and built environmental constraints can aid in understanding route feasibility, cost estimation, and the degree of required permitting that has both cost and time implications. The site conditions explanation also discusses opportunities on which the greenway could capitalize.

The Natural Environment Floodplains and Trail Systems

Floodplains provide advantages and disadvantages for trails. Development is regulated within the floodplain, allowing for continuous undisturbed natural areas that are great for greenways. However, because of reoccurring flooding, regulations of the floodplain, and alterations of natural hydrology, any future trail design should consider the following guidelines:

- **Much of the potential greenway alignments are in the floodway, so creating fill conditions within the floodway should still be avoided.** Avoid placement of structures or disturbance within the floodway. Floodways are regulated locally and by the Federal Emergency Management Agency (FEMA). Fill, structures (walls, kiosks, etc.), and impervious services are discouraged. Any structures located within the floodway require a no-impact/no-rise certification through FEMA. These

studies can vary on cost but can range from \$5,000-\$15,000 depending on complexity.

A no-rise study uses stream modeling to reflect changes in water levels during flood events due to construction in the floodplain. If there is no increase in the elevation of the 100-year flood event, a permit can be approved. If the disturbance causes a rise, then a FEMA CLOMR (Conditional Letter of Map Revision prior to construction) and LOMR (Letter of Map Revision done post construction) are required. Both of these steps significantly increase cost and add time to the project, and when possible, should include any proposed changes into one study, increasing the level of efficiency.

The majority of the greenway corridor is proposed to be within the 100-year floodplain. This corridor regularly floods and is likely to have an increase in flooding due to urbanization and a changing climate. Trails within the floodplain and in areas that flood frequently will require special design treatment. Designing for trails in flood-prone areas is addressed in more detail in Appendix D.

Wetlands

There are extensive wetlands within the study area as indicated in the maps. This data was collected through numerous means, including:

- **The National Wetlands Inventory (NWI):** NWI indicates that there is a strong possibility of wetlands but the data does not encompass areas that have been observed as wetlands around areas of the French Broad River, Mud Creek, and Bat Creek.
- **Aerial Digitization:** Equinox spent time observing what appears as wetlands and open water from recently taken high-resolution aerials.
- **Survey Data:** Equinox received surveyed wetland data related to sewer expansion in the North Rugby Road to Asheville Highway area. This data was only surveyed for a swath of land surrounding the sewer easement.

Delineate future wetlands as part of corridor design studies. The above methods do not accurately identify all wetlands, so in the future, a proper wetland delineation should occur prior to the engineering design phase.

Avoid impacts to wetlands. Wetlands are regulated by the U.S. Army Corp of Engineers (USACE) under the Clean Water Act. If wetland impacts occur, a Section 404 Permit through the USACE is required. The State is involved in Section 401

certification (see “Streams, Ponds, Lakes” below), in partner with USACE.

- **If wetlands are unavoidable, or if a different user experience is desired, utilize elevated boardwalk systems.** Much of the corridor travels through wetlands and use of some boardwalks might be inevitable. Boardwalks allow for travel over flat, poorly draining soils, standing water, and wetland features and have significantly less impact than other options. A section 404 (Clean Water Act) Permit may be required if the wetland is considered jurisdictional by the USACE. This means that the wetland is not isolated and is part of a broader lake or water system. A small boardwalk for a non-isolated wetland with limited fill or dredging may qualify for a programmatic Nationwide Permit. Nationwide Permits are designed to streamline the permitting process for actions with limited disturbances. In addition to permitting, disturbances exceeding a tenth (0.1) of an acre require mitigation which can increase project costs. Impacts under a tenth (0.1) of an acre do not trigger mitigation fees. Because dredge and fill are impacts, some proprietary boardwalk systems sit on the ground with a footer, reducing impact.

Opportunities provided by wetlands. Beyond the tremendous value of wildlife observation, wetlands can elevate funding opportunities that aid in acquiring and preserving the broader corridor around the greenway. This is discussed in more detailed in the Cost Estimate and funding chapter.

Streams, Ponds, Lakes

There are many water bodies within the study area that are regulated by the County, State, and Federal government. Some of the main considerations in future planning and design are:

Plan for NCDEQ: General Certifications. Federal 401 /404 Certifications will likely be required in cases where any stream or waterway alterations occur. These alterations would be most likely in conjunction with bridge improvements or addition of structures near waterways. Triggers for the permit include disturbance to the stream bed or banks, damming of the waterway, or placement of material within the waterway (i.e. culverts/pipes). If disturbance exceeds the threshold allowed by a Section 404 Nationwide Permit, described above in “Wetlands”, an Individual Permit may be required, as well as stream and wetland mitigation.



Conserving Carolina Property
West of Riverstone Development



Wetlands South of
North Rugby Road



Bridge Typical of the
Blue Ridge Southern Railroad Line

Rare Threatened and Endangered Species

Federally-Listed Species for the Project Area. Federal funding or federal permitting (which is likely for this project) will trigger the Endangered Species Act (Section 4(d), which will require review of listed Federal species. Initial review of Rare, Threatened & Endangered Species within the Project Area was conducted from the desktop using the USFWS iPAC Tool. The iPAC report generates an official species list, which indicates that there are nine (9) Federally-listed species that could potentially be affected by project activities. Those species are listed below.

Habit	Scientific Name	Common Name	Federal Status
Clam	<i>Alasmidonta raveneliana</i>	Appalachian Elktoe	Endangered
Flowering Plant	<i>Helonias bullata</i>	Swamp pink	Threatened
Flowering Plant	<i>Isotria medeoloides</i>	Small whorled pogonia	Threatened
Flowering Plant	<i>Sagittaria fasciculata</i>	Bunched Arrowhead	Endangered
Flowering Plant	<i>Sarracenia rubra</i> ssp. <i>jonesii</i>	Mountain Sweet Pitcher-plant	Endangered
Lichen	<i>Sisyrrinchium dichotomum</i>	White Irisette	Endangered
Mammal	<i>Glaucomys sabrinus coloratus</i>	Carolina Northern Flying Squirrel	Endangered
Mammal	<i>Myotis grisescens</i>	Gray Bat	Endangered
Mammal	<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	Threatened

Presence/Absence of Critical Habitat. The species, highlighted in blue, in the table to the left, has a defined Critical Habitat area that is mapped outside of the project, and therefore the potential of the project to negatively affect that species is essentially null; species not highlighted in blue do not yet have a Critical Habitat area as defined by the USFWS. The iPAC Report for the project area states that **there is no mapped critical habitat within the review area.**

Presence/Absence of Suitable Habitat. Despite the absence of defined Critical Habitat within the project area, there is existing suitable habitat close by for three of the above listed species, highlighted in red. Bunched arrowhead is known to occur in two locations that nearly adjoin a 500-foot buffer of the proposed alignment options. Active habitat management by multiple conservation organizations is occurring at one of these sites, whereas the other site is privately-owned and not under management..

Suitable summer roosting habitat for the Northern Long-Eared Bat and Gray bat exists in patches within and adjacent to the project area. They prefer to roost in crevices or behind the bark of mature, live trees or snags, both of which are present in small patches throughout the project area. Any clearing of suitable roost trees should occur in the off-season months and should follow guidance under the final 4(d) rulings for both species.

State-Listed Species for the Project Area. In addition to a desktop review of Federally-listed species within the project area, Equinox conducted an online review of the NC Natural Heritage Program (NCNHP) database that contains rare species and rare natural community information. Records occurring within or intersecting a 500-foot buffer of all possible greenway alignments were identified and analyzed, resulting in a list of twenty-six occurrences comprising a spread of 23 different species. Records were further analyzed by their Status ('Current' versus 'Historical') and Accuracy (scale of '1-Very High' to '5-Very Low') to determine their relevance in relation to the project area and proposed activities; historical records are not detailed in this report.

Current State Records

Taxonomic Group	Scientific Name	Common Name	Survey Date	Last Observed	Temporal Status	Record Accuracy	State Status	Federal Status	State Rank	Global Rank
Natural Community	<i>Montane Floodplain Slough Forest</i>	n/a	1992	2012	Current	2-High			S1	G1
Vascular Plant	<i>Senecio suaveolens</i>	Sweet Indian-plantain	2012-08-06	2012-08-06	Current	2-High	SC-H		S1	G4
Freshwater Bivalve	<i>Alasmidonta raveneliana</i>	Appalachian Elktoe	2014-10-22	2014-10-22	Current	3-Medium	E	E	S1	G1
Freshwater Bivalve	<i>Alasmidonta viridis</i>	Slippershell Mussel	2015-08-25	2015-08-25	Current	3-Medium	E	FSC	S1	G4
Crustacean	<i>Cambarus reburus</i>	French Broad River Crayfish	2010-10-12	2010-10-12	Current	3-Medium	SR	FSC	S2	G3
Vascular Plant	<i>Carex buxbaumii</i>	Brown Bog Sedge	1992-07	1993-Pre	Current	3-Medium	SC-V		S2	G5
Amphibian	<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	2016-09-23	2016-09-23	Current	3-Medium	SC	FSC	S3	T2
Freshwater Fish	<i>Erimystax insignis</i>	Blotched Chub	2014-04-10	2014-04-10	Current	3-Medium	SR		S2	G4
Mayfly	<i>Macdunnoa brunnea</i>	a mayfly	1992-07-08	1992-07-08	Current	3-Medium	SR		S2	G3
Natural Community	<i>Montane Floodplain Slough Forest</i>	n/a			Current	3-Medium			S1	G1
Natural Community	<i>Piedmont Swamp Forest</i>	n/a	1997-09	1997-09	Current	3-Medium			S2	G3
Freshwater Bivalve	<i>Strophitus undulatus</i>	Creepers	2010-08-25	2010-08-25	Current	3-Medium	T		S3	G5
Freshwater Bivalve	<i>Strophitus undulatus</i>	Creepers	2013-09-17	2013-09-17	Current	3-Medium	T		S3	G5
Vascular Plant	<i>Aconitum reclinatum</i>	Trailing Wolfsbane	1994-06-Pre	1994-06-Pre	Current	4-Low	SR-T		S3	G3
Bird	<i>Dolichonyx oryzivorus</i>	Bobolink	2009-06	2009-06	Current	4-Low	SR		S1B	G5
Vascular Plant	<i>Thermopsis mollis</i>	Appalachian Golden-banner	2000-Pre	2000-Pre	Current	4-Low	SC-V		S2	G3

In the *Current State Records* table, there is only one rare element, Sweet Indian-plantain, which is known to occur directly within the 500-foot buffer of the project area. It was observed as recently as 2012 during NHP surveys and its location is north-adjacent and within approximately 300 linear feet of a portion of the proposed greenway alignment. Project activities should consider the species and its habitat, and it is recommended that presence/absence floristic surveys be performed to confirm exact locations in relation to the project area.

The remaining species in the do not occur directly within the project area and have varying levels of Record Accuracy; therefore, they are of less direct concern than the Sweet Indian-plantain. However, many of the records are for aquatic species or ecosystems, and therefore project activities that may affect water quality should be carefully enacted in order to be protective of the waters flowing into area species habitats.

The Built/ Human Environment

Utilities

The study area has a combination of electric transmission and distribution lines, utility towers, water lines, and sewer infrastructure. Henderson County's sewer lines and future sewer line expansion are indicated on the maps. Duke Energy's electric transmission lines were digitized through aerials for the study. Water lines are not shown on the maps.

Greenways located along sewer. There are several locations where potential alignments parallel or intersect with sewer lines. Sewer lines are often compatible with trail alignments as easements have been acquired for the lines encumbering the land use. A landowner would still need to grant permission for the separate greenway easement. Pavement is allowed to overlap with the line, but structures should be offset from the line.

Transportation

Several aspects of the existing transportation network were analyzed in the study area including: DOT right-of-way planned improvements, transportation safety issues, existing and proposed bike and pedestrian infrastructure (crosswalks, bike lanes, etc.), railways, and existing and proposed greenways. Existing and proposed bike and pedestrian infrastructure as well as transportation safety issues can be found on pages 13 and 14. NCDOT Division 14 staff were met with to review and provide input on alignment options. A summary of that meeting is in Appendix B: Correspondence.

Following are some existing transportation conditions that will inform opportunities and challenges for development of a greenway.

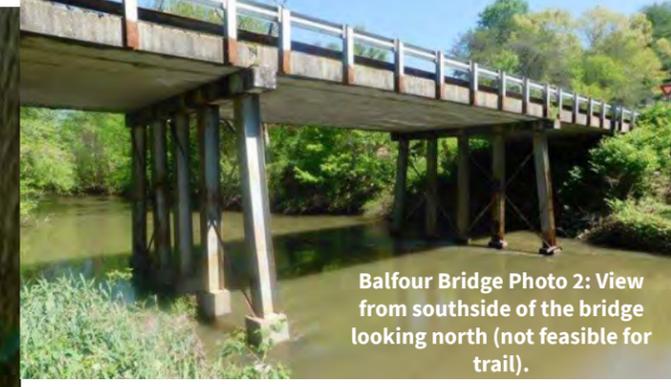
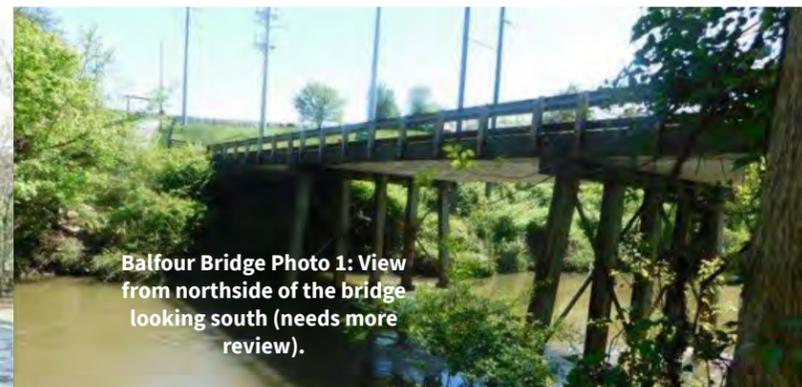
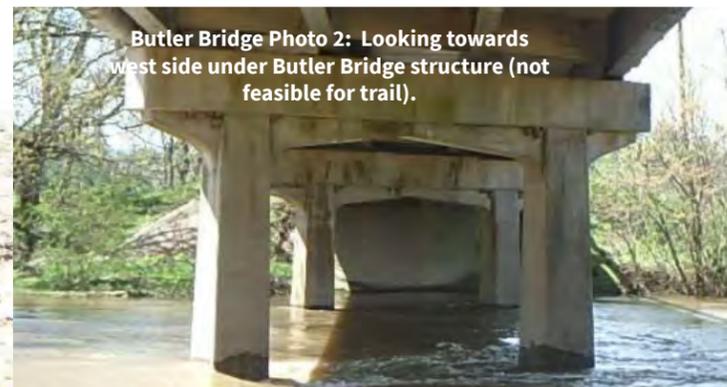
Road Right-of-Way. The North Carolina Department of Transportation (NCDOT) right-of-way (ROW) was analyzed for the ability to accommodate a trail alignment or accommodate a widened shoulder. Where these opportunities exist is indicated on the *Opportunities, Constraints, and Potential Alignment Maps*. Additionally, NCDOT Division 14 has provided general descriptions of the ROW widths of roads that involve any of the potential greenway alignments, which include:

Summary of NCDOT's ROW within the *Corridor*

NORTHERN CORRIDOR ROAD ROW	
Asheville Highway US-25 from Mud Creek to Old Park Road (SR-1370)	The ROW along this section of US 25 is 50 feet from center
SOUTHERN CORRIDOR ROAD ROW	
New Hope Road SR-1757 from Powell St (SR-1758) to S Allen Rd (SR-1756)	ROW is 50 feet on paved portion; maintenance limits on unpaved portions
Airport Road (SR-1779) from College Drive (SR 1920) south to just past the Bat Fork bridge	ROW is 60 feet
Airport Road (SR-1779) from the Bat Fork bridge to Gilbert Road (SR-1775)	ROW is the maintenance limits
Upwards Road (SR-1783) from Spartanburg Highway (US-176) to Old Spartanburg Rd (SR-1803)	Variable ROW ranging from 57.5 to 71.5 ft. from center.

Greenway Use of NCDOT Bridges. The majority of the corridor runs along waterways like the French Broad River, Mud Creek, and Bat Fork, and additionally along a rail line, resulting in interactions with numerous NCDOT-owned bridges. Different greenway alternatives may need to cross underneath or on top of a bridge. NCDOT has supplied bridge reports for this study, which are summarized in the adjacent table. The trail clearance column identifies whether or not it can accommodate a greenway underpass.

Bridge Replacements. Additional opportunity may occur where bridge replacements are planned to occur. While no bridges are proposed to be replaced on current NCDOT plans, Butler Bridge and the Balfour Road Bridge over Mud Creek are classified as functionally obsolete, meaning they are much more likely to be replaced. It is also of note that Butler Bridge, in the year of this study, flooded regularly, so any greenway underpass of this bridge would be inoperable during flooding.



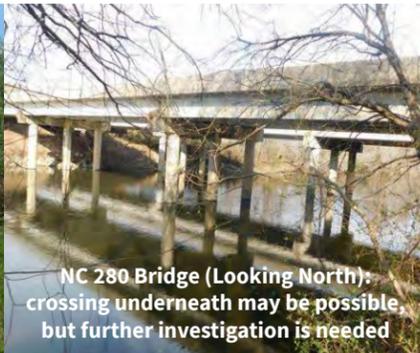
Summary of Bridges & How They Might Relate to the Oklawaha Greenway Extensions (Data Collected From NCDOT Bridge Report as of 2019)

Report Date (all 2017)	Bridge #	Road	SR	Year Built	Spanning	Length	Road Width	Side-walk	Type	Trail Clearance	Trail Clearance	Rating	Condition	Weight Restriction?
NORTHERN CORRIDOR ROAD ROW														
4/6	440003	Butler Bridge Road	1345	1960	French Broad River	250 feet	24 feet	No	Reinforced Concrete (RC) Floor on I-Beams	East: Maybe	West: No	60.37	FO	No
4/26	440019	Balfour Road	1508	1971	Mud Creek	121 feet	23 feet	No	Pre-stressed Concrete Cored Slab	North: No	South: Maybe	63.9	FO	No
4/17	440021	Brookside Camp Road	1528	2006	Mud Creek	220 feet	35 feet	No	RC Floor on Pre-stressed Concrete Box Beams	South: Maybe	North: Maybe	97.79	ND	No
SOUTHERN CORRIDOR ROAD ROW														
3/21	440362	Boylston Hwy WBL	NC280	1990	French Broad River	688 feet	34 feet	No	RC Floor & PPC Deck Panels on PPC Girders	East: Maybe	West: Maybe	96.24	ND	No
3/21	440361	Boylston Hwy EBL	NC280	1990	French Broad River	688 feet	34 feet	No	RC Floor & PPC Deck Panels on PPC Girders	East: Maybe	West: Maybe	98.24	ND	No
6/26	440153	US176/ Spartanburg Hwy	US176/ US 25B	1977	Blue Ridge Southern RR	201 feet	68 feet	Yes	RC Floor on I Beams	East: Maybe	West: Yes	77.94	ND	No
4/7	440169	US25	US25	2005	Mud Creek	375 feet	66 feet	Yes	RC Floor on Cont. Steel Plate Girders (SIP Metal Forms)	South: Maybe	North: Maybe	72.12	ND	No

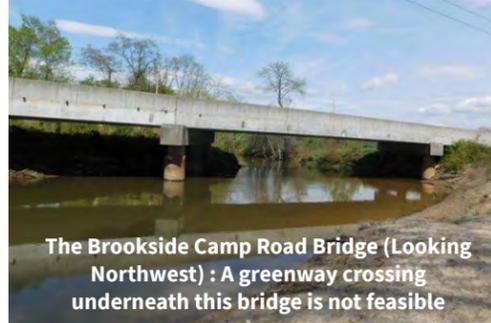
Key: FO = Functionally Obsolete ND = Not Deficient



The Brookside Camp Road Bridge (Looking Southeast) : A greenway crossing underneath this bridge is not feasible



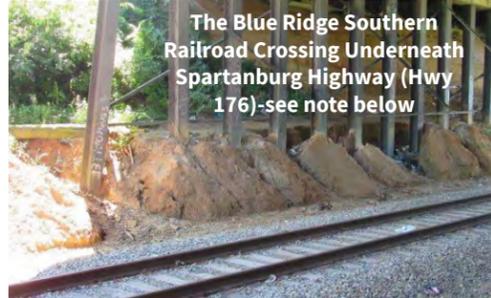
NC 280 Bridge (Looking North): crossing underneath may be possible, but further investigation is needed



The Brookside Camp Road Bridge (Looking Northwest) : A greenway crossing underneath this bridge is not feasible



NC 280 Bridge (Looking South): crossing underneath may be possible, but further investigation is needed



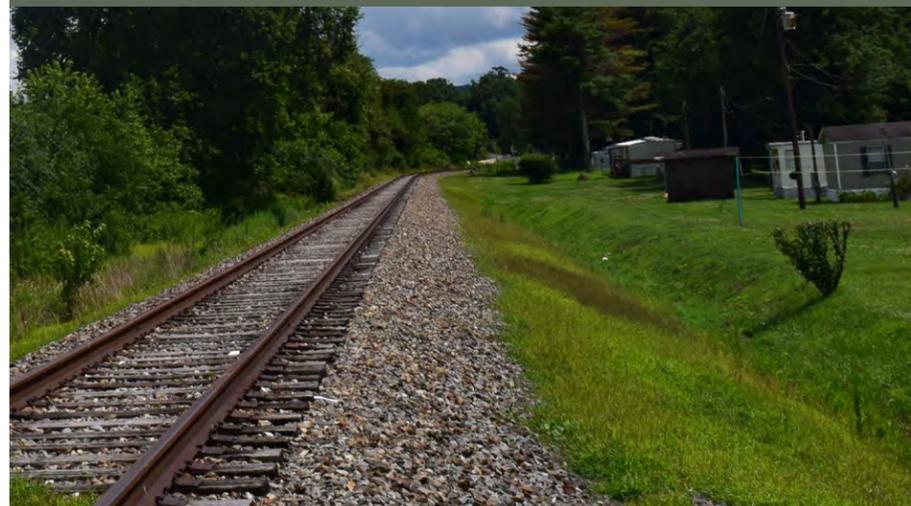
The Blue Ridge Southern Railroad Crossing Underneath Spartanburg Highway (Hwy 176)-see note below



The Blue Ridge Southern Railroad Crossing Underneath Spartanburg Highway (Hwy 176)-see note below

The greenway alignment 5-E in the southern corridor has a significant challenge of traveling under the Spartanburg Highway bridge. This bridge is NCDOT-owned. Designing a greenway underpass crossing to meet both NCDOT and railroad design requirements will be necessary and challenging.

The below images shows the railroad and potential greenway route traveling south towards The Park and Flat Rock. Designing around drainage swales and other features will elevate cost for the greenway.



Rail

Through the core of the study area runs the Blue Ridge Southern Railroad (BRSR) track, as seen on the *Opportunities, Constraints, and Potential Alignment Maps*. The rail line is owned fee simple by Blue Ridge Southern Railroad that is locally managed out of Sylva, NC, but is a subsidiary of a larger company, WATCO, which is based out of Kansas. From the beginning, this track was explored as being both a potential opportunity and major barrier. Through several correspondences, the below conclusions have been reached, which in summary show that the railroad can provide great opportunity for future development of the Oklawaha Greenway. More detailed explanation and correspondence with BRSR can be found in the *Appendix B: Correspondence*.

- **The Railroad and Greenways in the Northern Corridor.** The northern portion of the railroad from west of Interstate 26 to Berkeley Mills Park is actively used and there is an industrial area near Cloverdale Road that has industrial plants still serviced by the rail line. BRSR has asked that this study not look at a greenway alignment paralleling the east side of the tracks as that is where the majority of industrial sites are located. BRSR was still open to use of their ROW, since the majority of freight is run late at night. They would require lease and payment for whatever use is needed.
- **The Railroad and Greenways in the Southern Corridor.** The entire length of the rail line in this corridor is used only for rail car storage. BRSR's manager has communicated they may be agreeable to use of the railroad property by a greenway, which in the area averages around 100 feet. They would require payment and lease. A deed/lease research would need to be performed as part of the initial research and early design stage, as adjacent property owners have lease agreements which may be impacted by the greenway and would need to be negotiated with both the BRSR and the adjacent leasers. This approximately 1.5-mile corridor could fully connect a greenway from the Henderson County Athletics & Activities Center (AAC) and the Park at Flat Rock.

Existing and Proposed Greenways

Proposed Greenways. Connecting to the northern and southern Oklawaha corridor areas, several planned corridors were recently formalized in the *Henderson County Greenway Master Plan, 2018*, which has been summarized in the *Existing Plans* chapter. Further explanation of planned greenways can be found in that chapter on page 3.

Existing Greenways. The existing 3.5-mile Oklawaha Greenway connects four parks and terminates on the northern end at Berkley Mills Park and the southern end at Jackson Park. This study proposes to nearly triple the number of miles from its current length.

Historic Resources

Historic Sites

Archaeological/Sensitive Cultural Resource Areas

Construction funded or permitted by the federal government will trigger a project review by the State Historic Preservation Office (SHPO) for any resources covered under Section 106 (National Historic Preservation Act). These resources could include human remains, burial sites, archeology sites, and historic sites that are discussed below. If it is found that the action of trail construction could potentially adversely affect cultural resources, the SHPO will work with the related Federal Agency to eliminate or minimize the effect. Potential presence of these resources is typically flagged at the design and engineering phase when in consultation with the SHPO.

Historic Sites and Landscape

The SHPO oversees a large database of historic sites and resources. These resources include information from SHPO surveys as well as a large list of sites related to the National Register of Historic Places (which the National Park Service oversees but individual States manage). The most critical sites include those listed on the National Register (NR) or determined eligible (DOE) as they have further protection under Section 106. In general, a greenway would have no effect or have a complimentary relationship to preservation of these sites, but may require SHPO coordination in circumstances such as alterations to historic bridges or whole properties. If Federal funds or permitting is required, the SHPO will review this database and analyze the project for any adverse impacts.

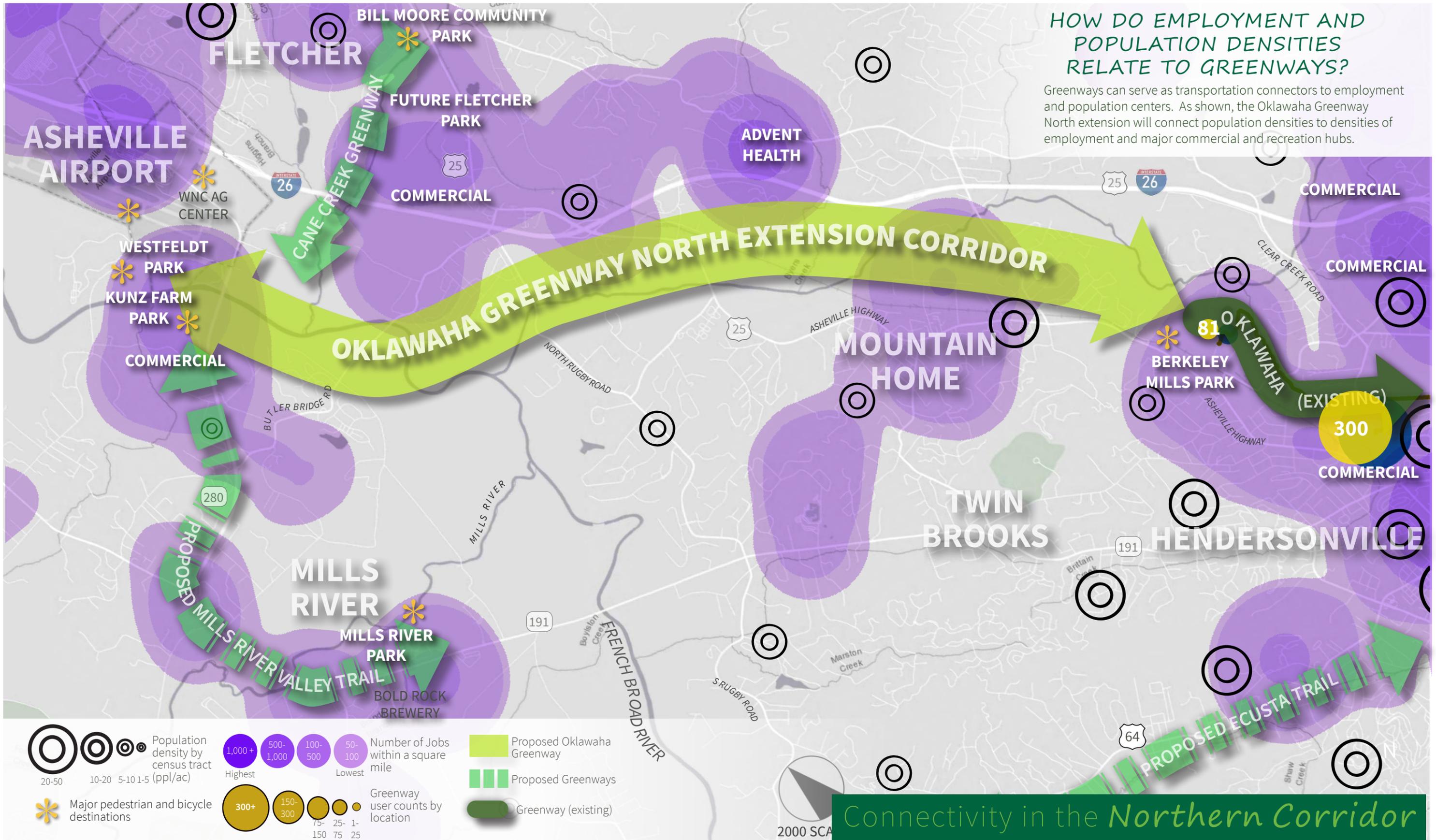
The only site listed on the SHPOs database that would intersect with any of the preferred alignments is the following:

Berkley Mills Park	Deemed Eligible of the National Historic Register	Built in 1949, this entire ballpark site is deemed historic. The ballpark was originally built by the adjacent textile mill and now serves as one of the City of Hendersonville's parks.
---------------------------	---	--



HOW DO EMPLOYMENT AND POPULATION DENSITIES RELATE TO GREENWAYS?

Greenways can serve as transportation connectors to employment and population centers. As shown, the Oklawaha Greenway North extension will connect population densities to densities of employment and major commercial and recreation hubs.

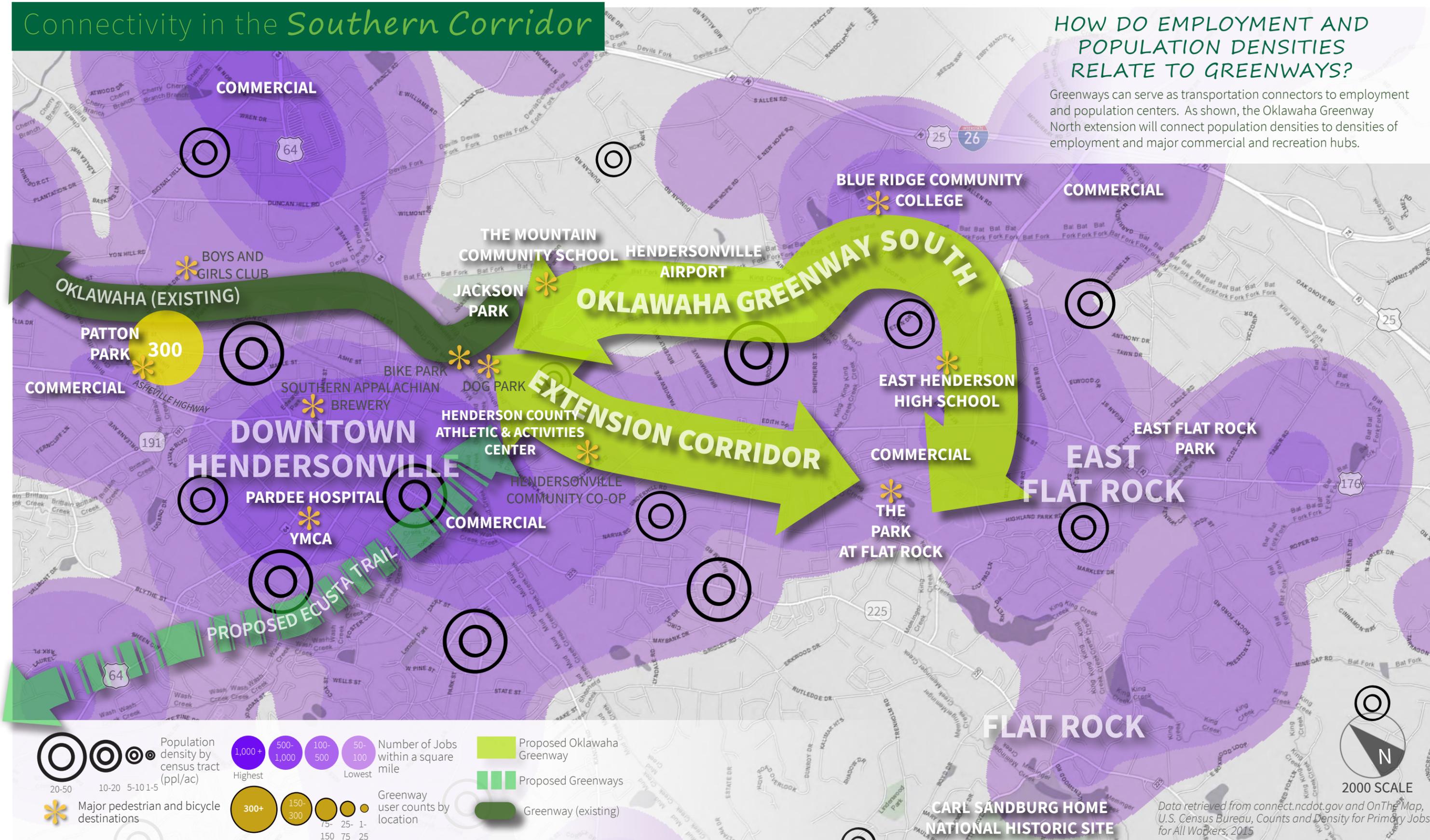


Connectivity in the Northern Corridor

Connectivity in the Southern Corridor

HOW DO EMPLOYMENT AND POPULATION DENSITIES RELATE TO GREENWAYS?

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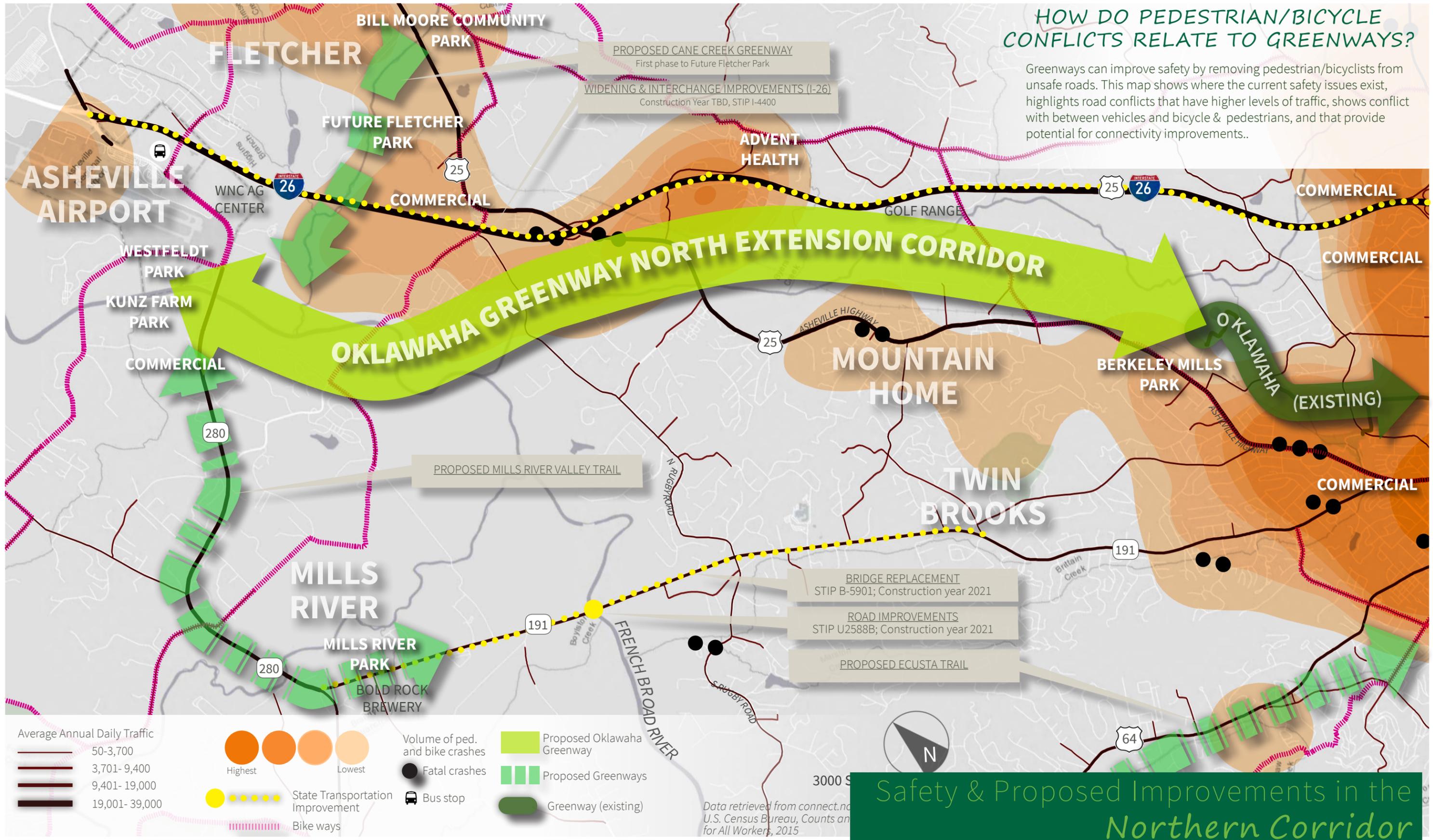
CARL SANDBURG HOME NATIONAL HISTORIC SITE

Data retrieved from connect.ncdot.gov and OnThe Map, U.S. Census Bureau, Counts and Density for Primary Jobs for All Workers, 2015



HOW DO PEDESTRIAN/BICYCLE CONFLICTS RELATE TO GREENWAYS?

Greenways can improve safety by removing pedestrian/bicyclists from unsafe roads. This map shows where the current safety issues exist, highlights road conflicts that have higher levels of traffic, shows conflict with between vehicles and bicycle & pedestrians, and that provide potential for connectivity improvements..



Safety & Proposed Improvements in the Northern Corridor

Safety & Proposed Improvements in the Southern Corridor

HOW DO PEDESTRIAN/BICYCLE CONFLICTS RELATE TO GREENWAYS?

Greenways can improve safety by removing pedestrian/bicyclists from unsafe roads. This map shows where the current safety issues exist, highlights road conflicts that have higher levels of traffic, shows conflict with between vehicles and bicycle & pedestrians, and that provide potential for connectivity improvements.

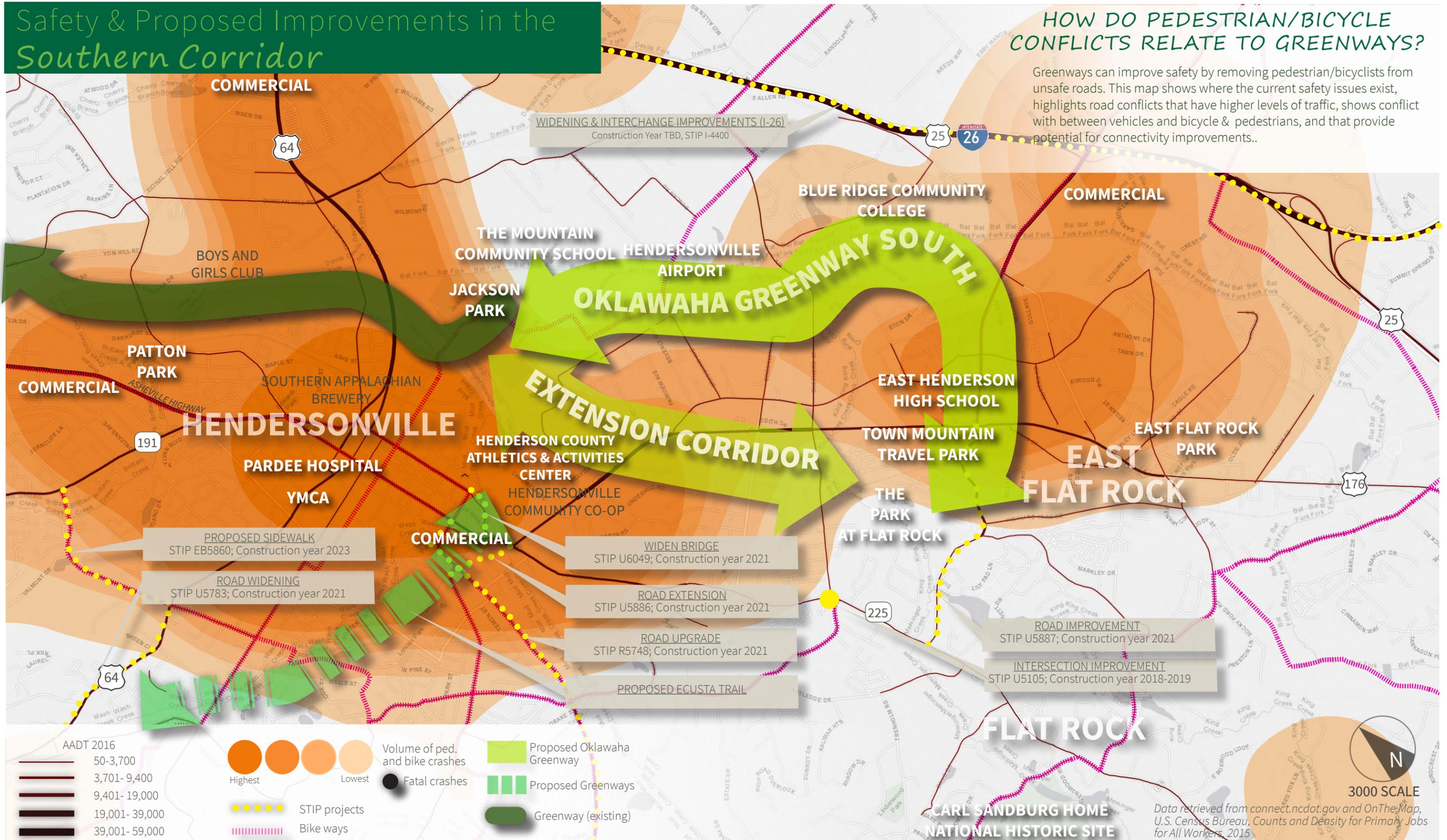




Image of the existing Oklawaha Greenway, courtesy of the Friends of the Oklawaha Greenway.

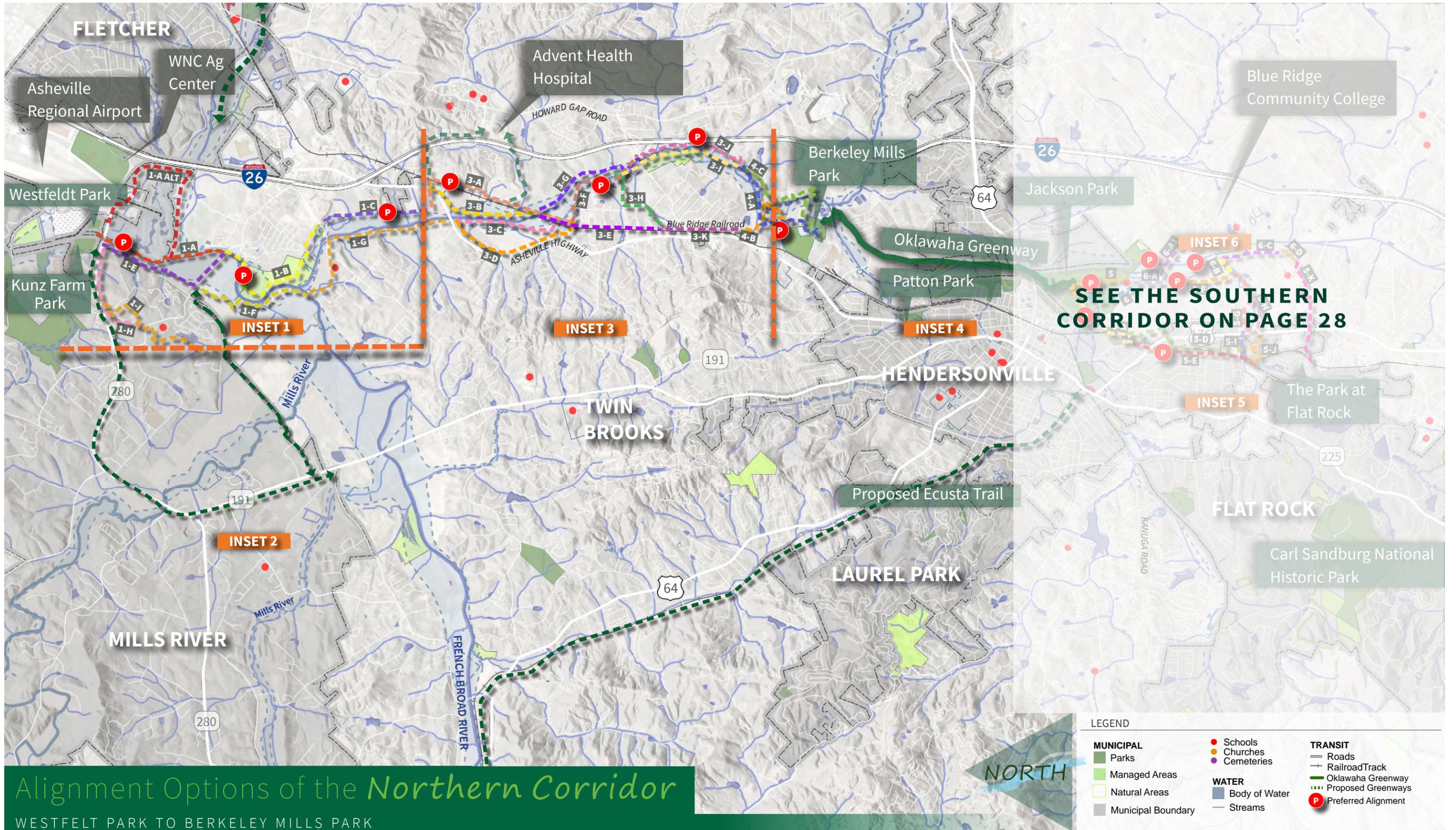
CHAPTER

3A



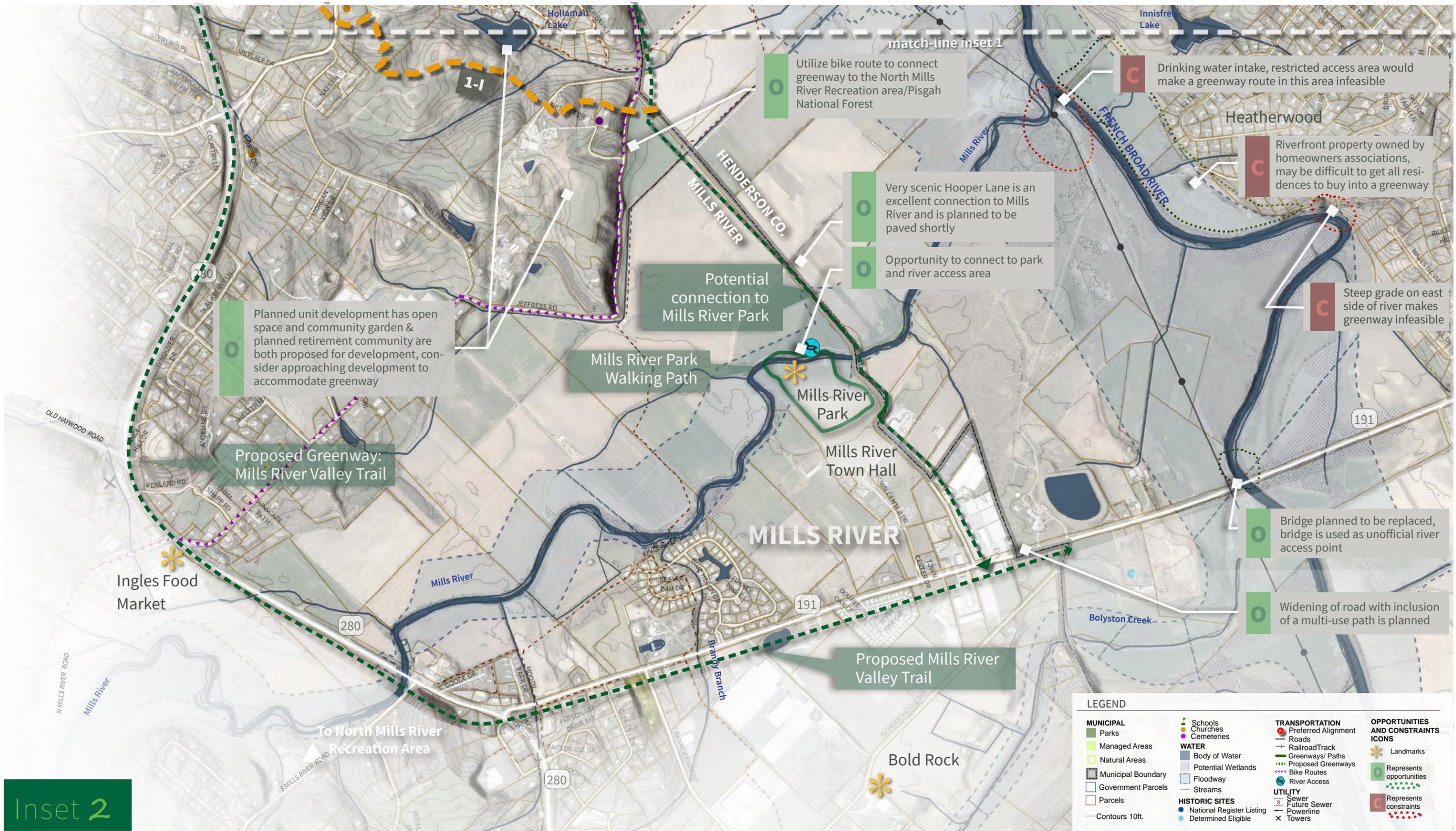
opportunities, Constraints, & Potential Routes

OF THE NORTHERN EXTENSION



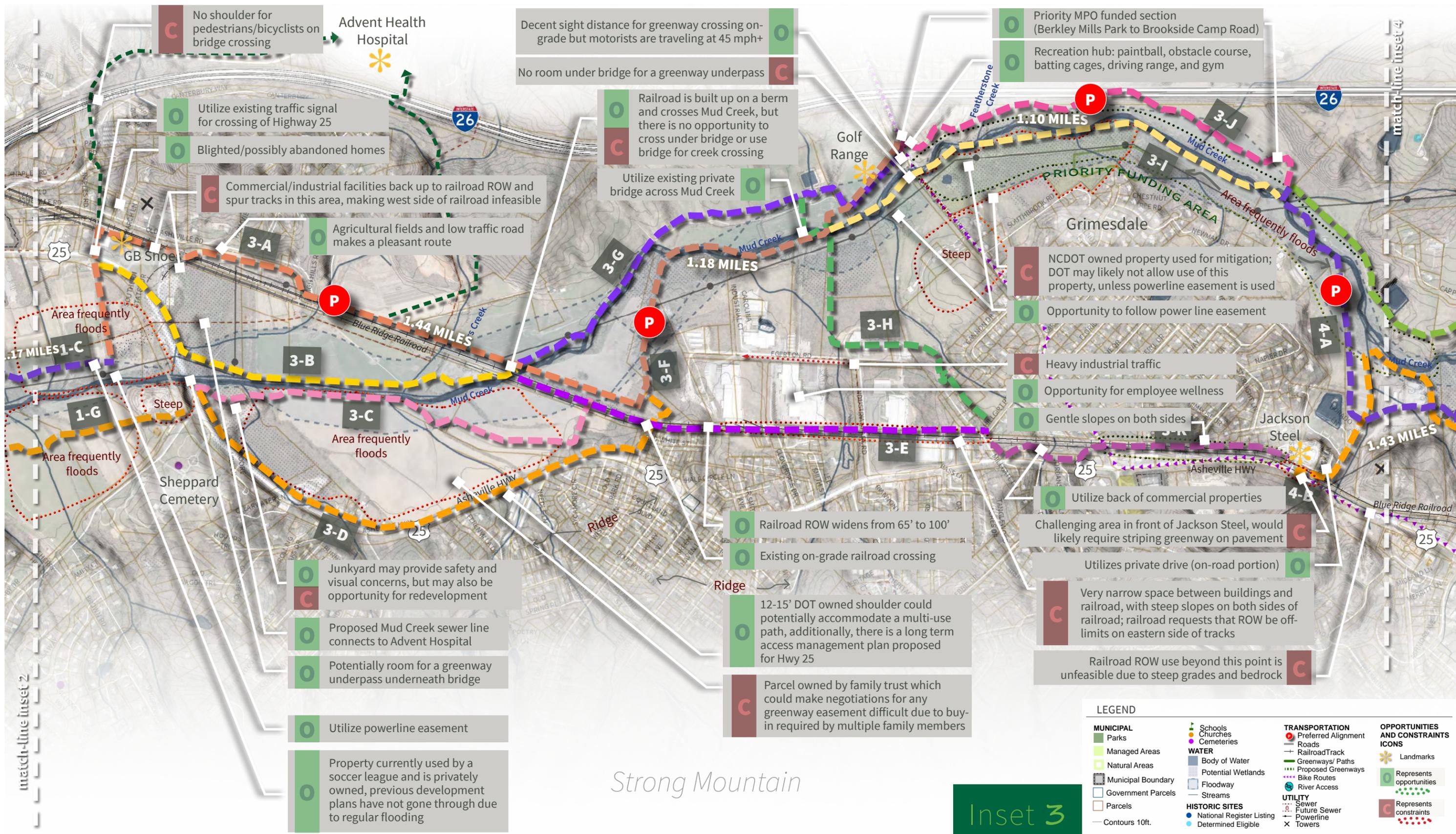
Alignment Options of the *Northern Corridor*
WESTFELT PARK TO BERKELEY MILLS PARK

SEE THE SOUTHERN CORRIDOR ON PAGE 28



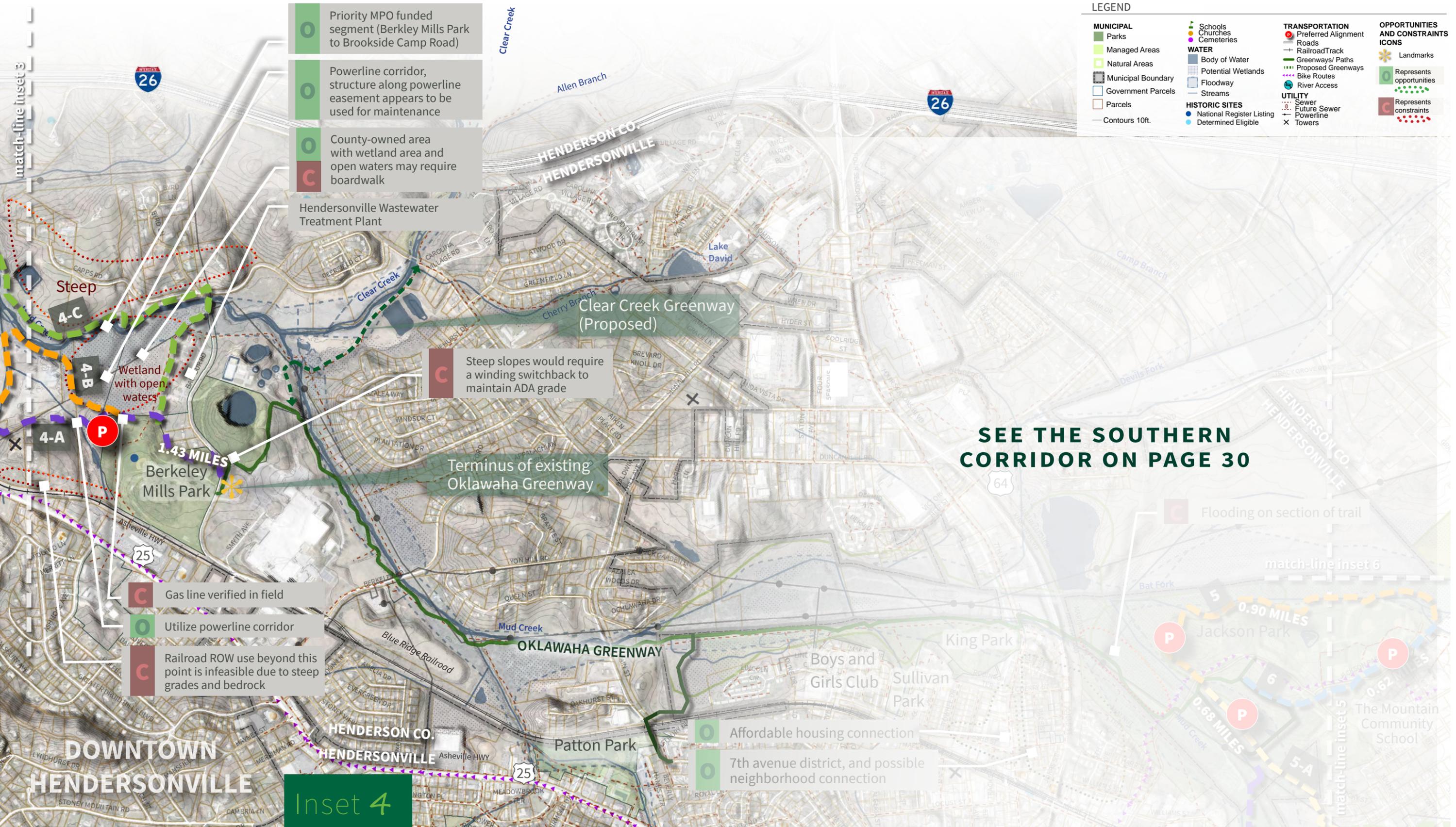
Inset 2
MILLS RIVER





0 0.25 0.75 miles **NORTH**

Inset 3
MUD CREEK TO ASHEVILLE HIGHWAY



- O** Priority MPO funded segment (Berkeley Mills Park to Brookside Camp Road)
- O** Powerline corridor, structure along powerline easement appears to be used for maintenance
- O** County-owned area with wetland area and open waters may require boardwalk
- C** Hendersonville Wastewater Treatment Plant

C Steep slopes would require a winding switchback to maintain ADA grade

- C** Gas line verified in field
- O** Utilize powerline corridor
- C** Railroad ROW use beyond this point is infeasible due to steep grades and bedrock

- O** Affordable housing connection
- O** 7th avenue district, and possible neighborhood connection

SEE THE SOUTHERN CORRIDOR ON PAGE 30

Inset 4

ASHEVILLE HIGHWAY TO BERKELEY MILLS PARK



NORTHERN

SECTION	INSET	Accessible for All to Use/ Ease of Use	Connects Ped/Bike Gaps & Improves Safety	Opportunity for Recreation & Social Interaction	Support			Constructability	Stimulates Economic Development	User experience	Avoidance of flood potential
		Stakeholder	Key Partners	Landowner							
		Provides the greatest level of use for all abilities. Connects to regional attractions, commercial, parks/natural areas, higher density housing, transit, etc.	Improves safety for bicyclists and pedestrians from roadways, congested areas, crossings, parking.	Provides opportunity, by connecting larger populations, for social interaction, neighborhood building, and recreational opportunity.	Stakeholder support for the alignment.	The North Carolina Department of Transportation and key stakeholders support the alignment.	Landowners have indicated they may be amendable, ROW exists, etc.	Including factors that drive costs, such as easements, ROW, relocations or design around utilities, crossing of waterways and roads, and design of terrain.	The greenway has the opportunity to stimulate economic development.	Route provides visual or other interest that adds to the overall experience.	Route takes advantage of being out of the floodway.

KUNZ PARK TO BUTLER BRIDGE ROAD *Section 1-A ALT not evaluated in this matrix

1-A	1					TBD	TBD				
		Utilizes forested buffer along river through golf course, which may have wetlands • Tap Root Dairy may be developed, with chance to integrate the greenway into the development									
1-E	1					TBD					
		Would require Butler Bridge crossing • Reduced commercial opportunity • Much of the route resides in the floodway									
1-H & 1-I	1					TBD	TBD				
		Existing proposal for Mills River greenway reduces gaps in pedestrian and bike facilities • Multiple road crossings and terrain make construction challenging • Reduced commercial opportunity									

BUTLER BRIDGE ROAD TO ASHEVILLE HIGHWAY

1-B & 1-C	2										
		Route does not pass through existing areas of pedestrian and bike safety concerns • Wetlands and flood potential may require boardwalk in places • Reduced commercial opportunity • Much of the route resides in the floodway									
1-F & 1-G	2					TBD					
		Less residential density reduces accessibility and concerns over safety • Minimal opportunities for recreation • Great flood potential may require boardwalk in places • Reduced commercial opportunity • Much of the route resides in the floodway									

ASHEVILLE HIGHWAY TO THE RAILROAD

3-A	3					TBD					
		Less residential density reduces accessibility and concerns over safety • Minimal opportunities for recreation • Road, railroad, and a creek crossing reduce constructability • Reduced commercial opportunity • Some of the route resides in the floodway									
3-B	3					TBD					
		Less residential density reduces accessibility and concerns over safety • Minimal opportunities for recreation • Road, wetland, and a creek crossing reduce constructability • Reduced commercial opportunity • Much of the route resides in the floodway									
3-C	3					TBD	TBD				
		Less residential density reduces accessibility and concerns over safety • Minimal opportunities for recreation • Reduced commercial opportunity • Much of the route resides in the floodway									
3-D	3					TBD	TBD				
		The route, primarily along the road has little opportunity for recreation and reduces the user experience • Uses ROW, reducing cost for acquisitions • Can be part of the future planned Hwy 25 Access project (long-term)									

THE RAILROAD TO BROOKSIDE CAMP ROAD

3-E	3					TBD					
		Minimal opportunities for recreation • Railroad right-of-way constraints make this route very difficult to construct • The route completely along the rail line reduces the user experience									
3-F	3					TBD					
		Travels through back-lot of industrial area • Potentially travels through wetlands and flood-prone areas • Utilizes existing private bridge that goes over Mud Creek near the golf range • Some andowners amenable									
3-G	3					TBD					
		Less residential density reduces accessibility • Minimal opportunities for recreation • Reduced commercial opportunity • Some of the route resides in the floodway									
3-H	3					TBD	TBD				
		Minimal opportunities for recreation • Reduced commercial opportunity • Route travels through areas of high industrial traffic • Some of the route resides in the floodway and potential wetlands									

BROOKSIDE CAMP ROAD TO NEAR BERKLEY MILLS PARK

3-I	3										
		Route goes through wetland mitigation property, which has an easement that may be to restrive for a greenway • Alignment would travel through wetland and oxbows of Mud Creek, making construction costly and challenging									
3-J	3					TBD	TBD				
		Much of the route resides in the floodway • Parcels largely undeveloped • Potential area to cross Mud Creek									
3-K	3					TBD					
		The area near Highway 25 will be challenging due to limited space between road and rail line • Travel along this route is on back side of commercial on Highway 25 • Would need to use both commercial and railroad ROW									

Highly Favorable
 Somewhat Favorable
 Highly Unfavorable
 Recommended Preferred Alignments



1.00

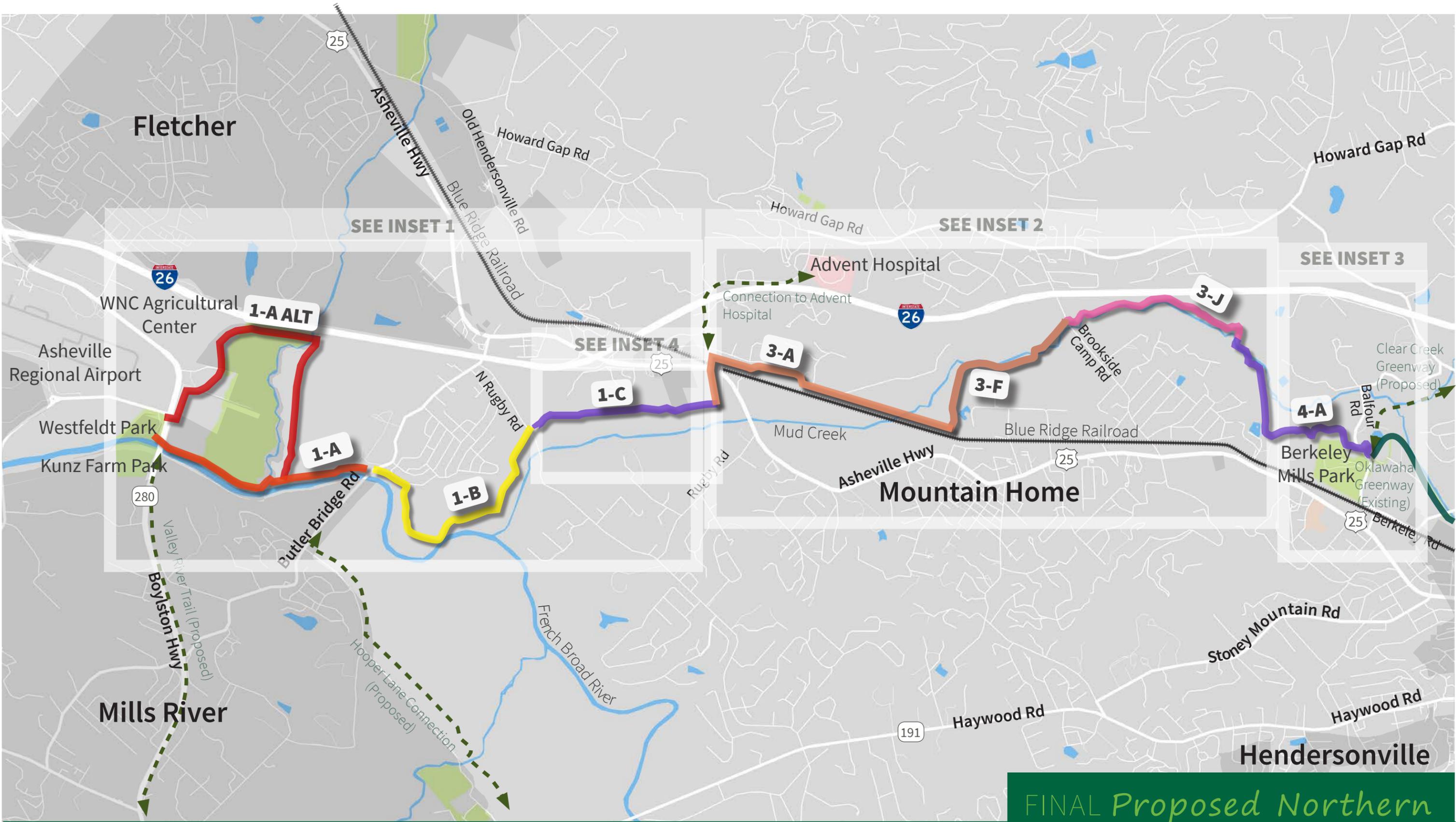
2.25

CHAPTER

3B

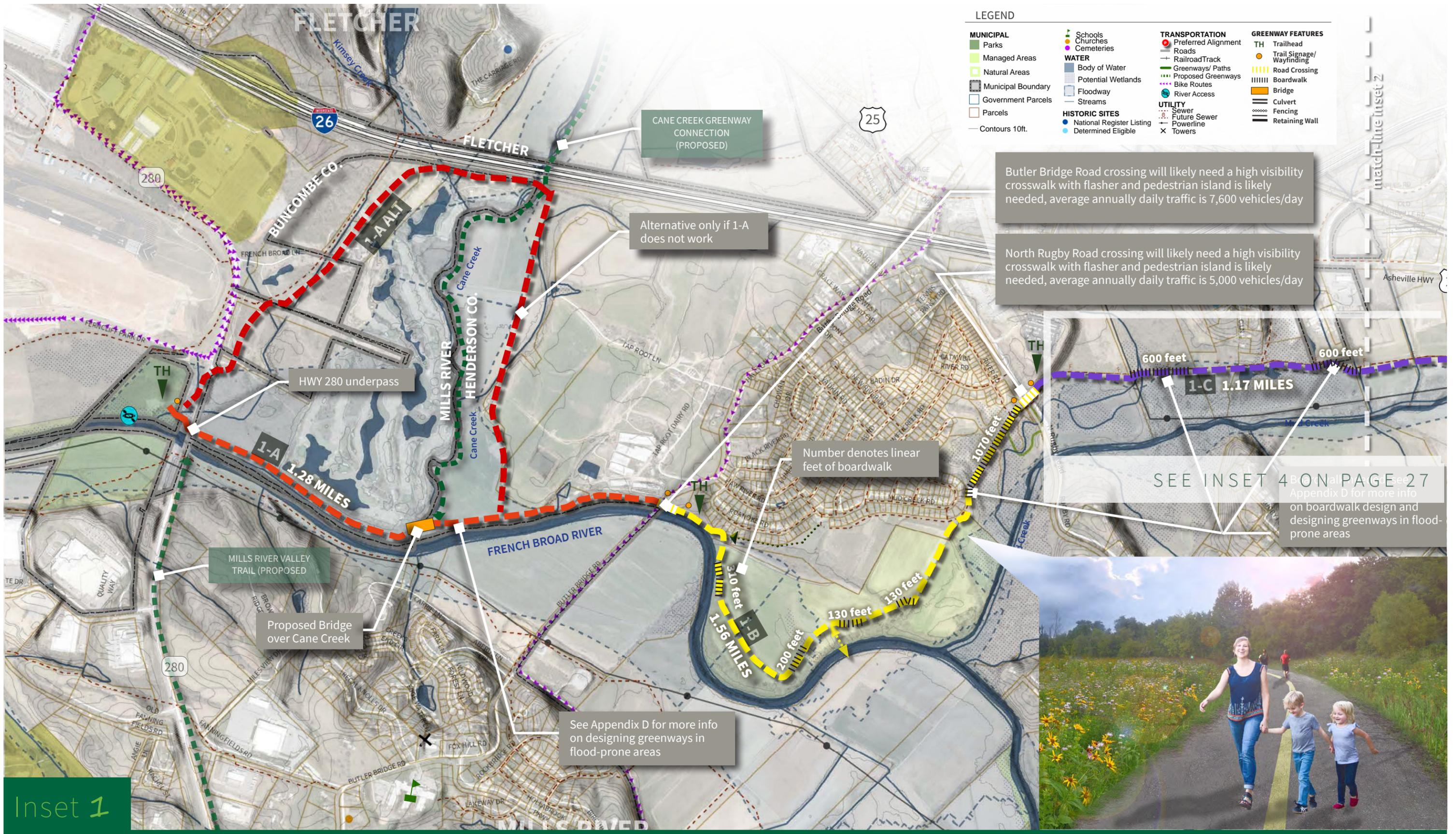
Corridor Design

OF THE NORTHERN EXTENSION



NOT TO SCALE NORTH

FINAL Proposed Northern Oklawaha Greenway



Inset 1

WESTFELDT PARK TO MUD CREEK

Butler Bridge Road crossing will likely need a high visibility crosswalk with flasher and pedestrian island is likely needed, average annually daily traffic is 7,600 vehicles/day

North Rugby Road crossing will likely need a high visibility crosswalk with flasher and pedestrian island is likely needed, average annually daily traffic is 5,000 vehicles/day

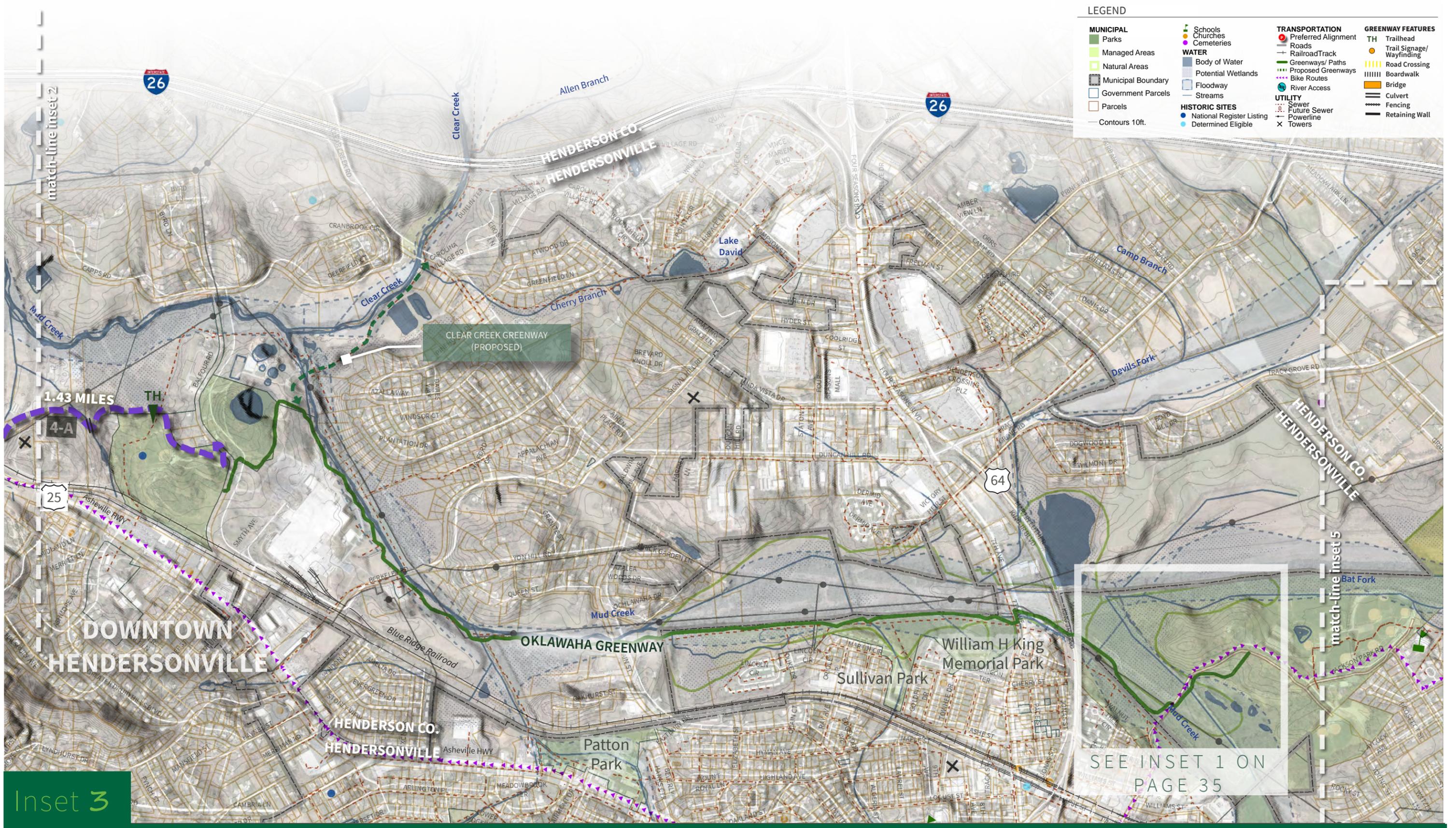
Alternative only if 1-A does not work

Number denotes linear feet of boardwalk



See Appendix D for more info on designing greenways in flood-prone areas





LEGEND		
MUNICIPAL	SCHOOLS	TRANSPORTATION
Parks	Churches	Preferred Alignment
Managed Areas	Cemeteries	Roads
Natural Areas	WATER	Railroad/Track
Municipal Boundary	Body of Water	Greenways/ Paths
Government Parcels	Potential Wetlands	Proposed Greenways
Parcels	Floodway	Bike Routes
Contours 10ft.	Streams	River Access
	HISTORIC SITES	UTILITY
	National Register Listing	Sewer
	Determined Eligible	Future Sewer
		Powerline
		Towers
		GREENWAY FEATURES
		TH Trailhead
		Trail Signage/Wayfinding
		Road Crossing
		Boardwalk
		Bridge
		Culvert
		Fencing
		Retaining Wall

Inset 3
WESTFELDT PARK TO MUD CREEK

SEE INSET 1 ON
PAGE 35





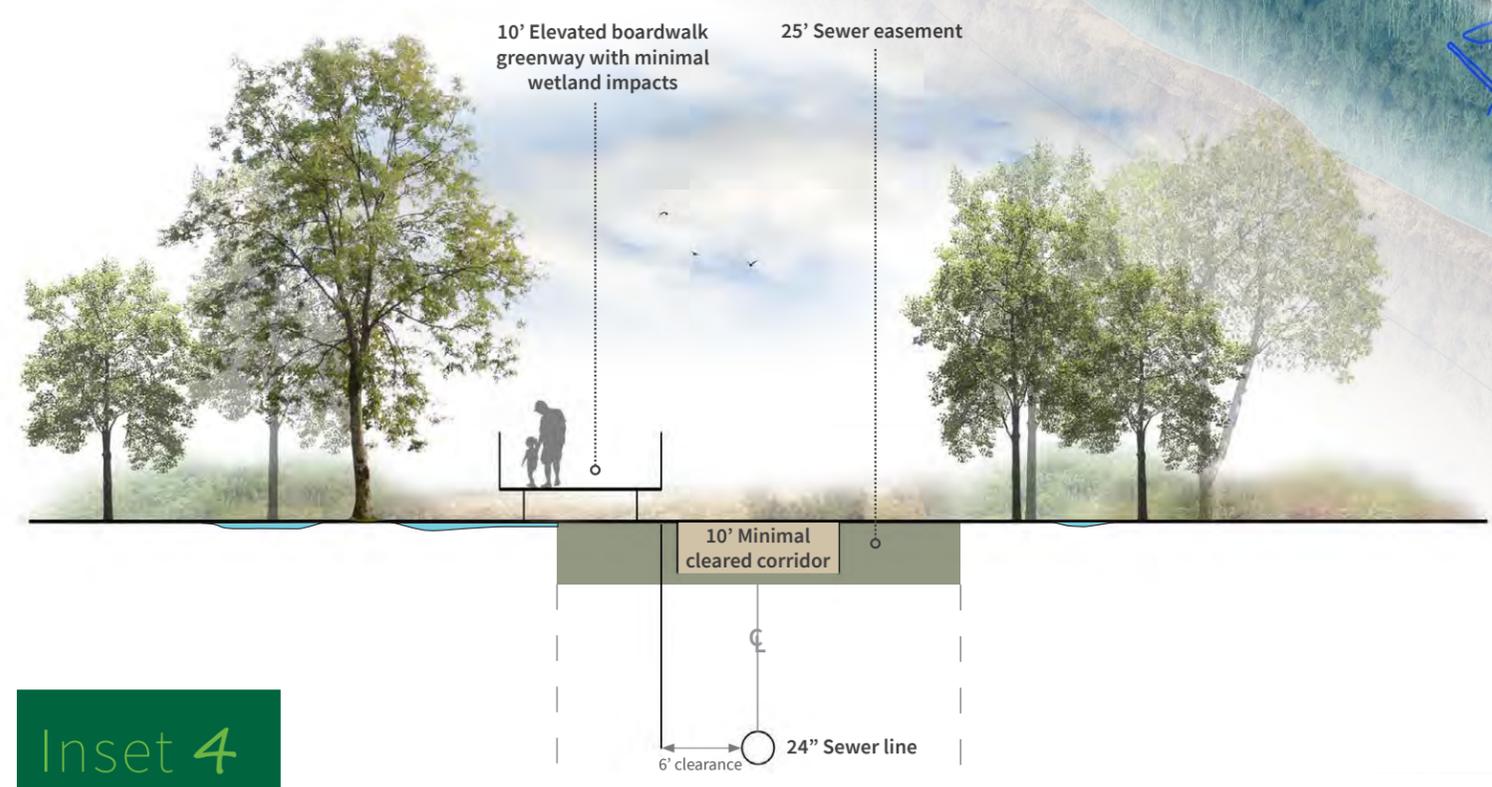
Boardwalk, see Appendix D for more info on boardwalk design and designing greenways in flood-prone areas

Boardwalk, see Appendix D for more info on boardwalk design and designing greenways in flood-prone areas

Boardwalk, see Appendix D for more info on boardwalk design and designing greenways in flood-prone areas

SEGMENT 1-C
NORTH RUGBY RD. TO ASHEVILLE HIGHWAY
If the greenway were to use/stay adjacent to the proposed sewer easement, it would potentially need 1,818 linear feet of boardwalk.

— Preferred greenway alignment
||||| Areas where a boardwalk is needed



Inset 4





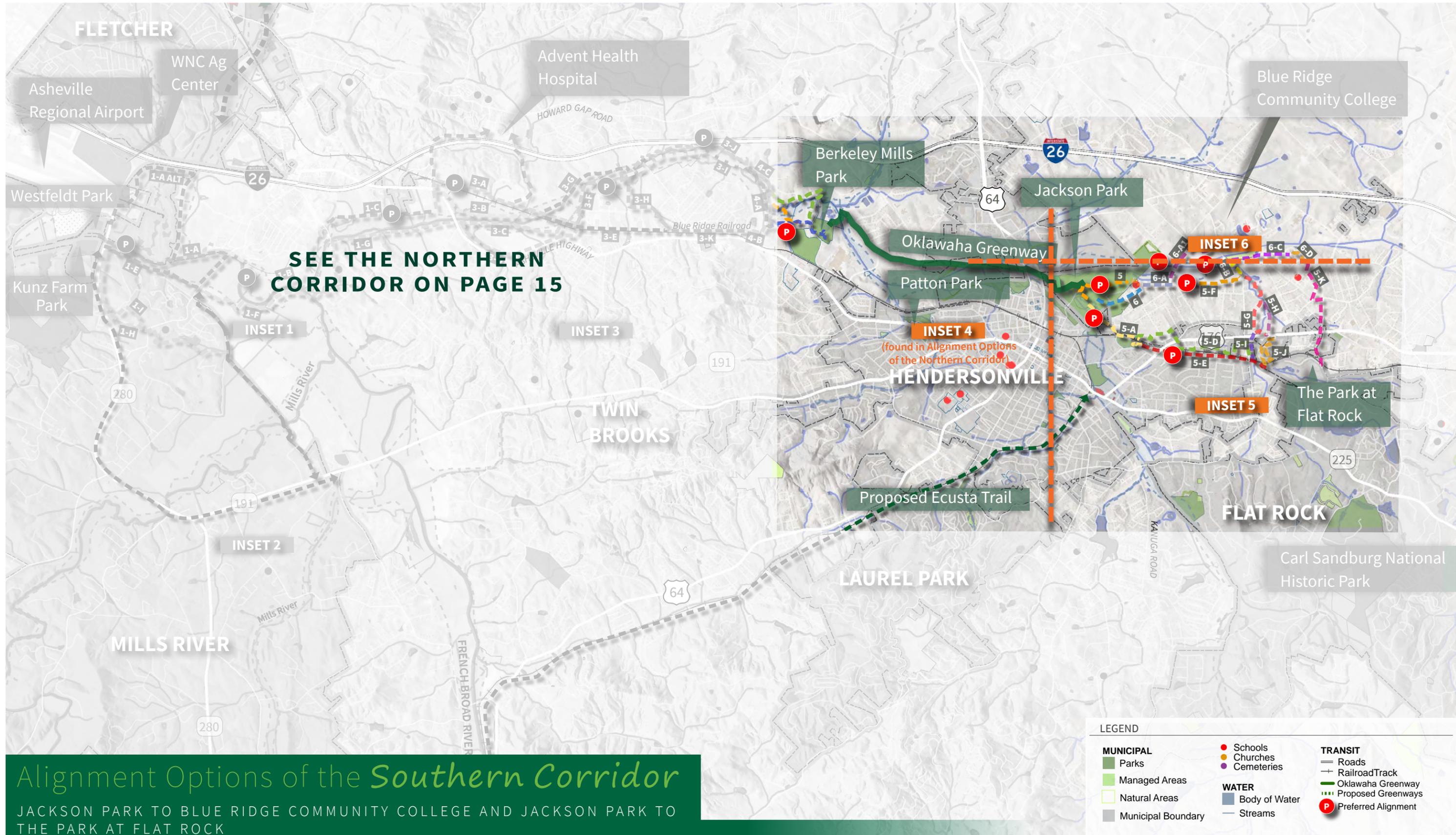
CHAPTER

4A



Opportunities, Constraints, & Potential Routes

OF THE SOUTHERN EXTENSION



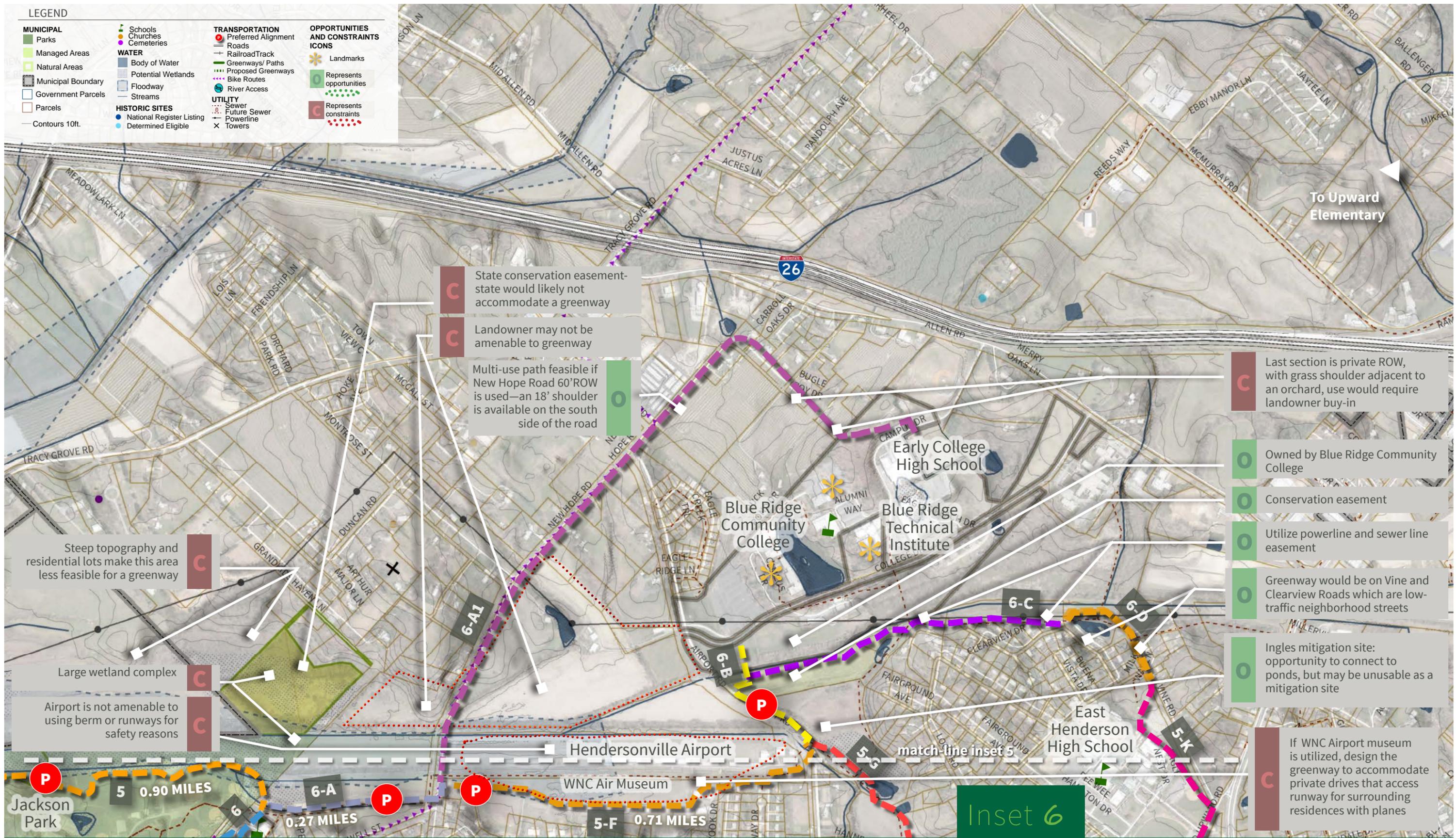
SEE THE NORTHERN CORRIDOR ON PAGE 15

Alignment Options of the *Southern Corridor*
 JACKSON PARK TO BLUE RIDGE COMMUNITY COLLEGE AND JACKSON PARK TO THE PARK AT FLAT ROCK



LEGEND

- | | | | |
|----------------------|--|-----------------------|--|
| MUNICIPAL | Schools
Churches
Cemeteries | TRANSPORTATION | OPPORTUNITIES AND CONSTRAINTS ICONS |
| ■ Parks | ■ Body of Water | ● Preferred Alignment | ★ Landmarks |
| ■ Managed Areas | ■ Potential Wetlands | — Roads | ○ Represents opportunities |
| ■ Natural Areas | ■ Floodway | — Railroad/Track | ■ Represents constraints |
| ■ Municipal Boundary | — Streams | — Greenways/ Paths | |
| ■ Government Parcels | | — Proposed Greenways | |
| ■ Parcels | | — Bike Routes | |
| — Contours 10ft. | | — River Access | |
| | HISTORIC SITES | — Sewer | |
| | ● National Register Listing | — Future Sewer | |
| | ● Determined Eligible | — Powerline | |
| | | — Towers | |



Steep topography and residential lots make this area less feasible for a greenway

Large wetland complex

Airport is not amenable to using berm or runways for safety reasons

State conservation easement-state would likely not accommodate a greenway

Landowner may not be amenable to greenway

Multi-use path feasible if New Hope Road 60' ROW is used—an 18' shoulder is available on the south side of the road

Last section is private ROW, with grass shoulder adjacent to an orchard, use would require landowner buy-in

Owned by Blue Ridge Community College

Conservation easement

Utilize powerline and sewer line easement

Greenway would be on Vine and Clearview Roads which are low-traffic neighborhood streets

Ingles mitigation site: opportunity to connect to ponds, but may be unusable as a mitigation site

If WNC Airport museum is utilized, design the greenway to accommodate private drives that access runway for surrounding residences with planes

0 0.25 0.50 miles



JACKSON PARK TO BLUE RIDGE COMMUNITY COLLEGE

SECTION	INSET	Accessible for All to Use/ Ease of Use	Connects Ped/Bike Gaps & Improves Safety	Opportunity for Recreation & Social Interaction	Support			Constructability	Stimulates Economic Development	User experience	Avoidance of flood potential
					Stakeholder	Key Partners	Landowner				
		Provides the greatest level of use for all abilities. Connects to regional attractions, commercial, parks/natural areas, higher density housing, transit. etc.	Improves safety for bicyclists and pedestrians from roadways, congested areas, crossings, parking.	Provides opportunity, by connecting larger populations, for social interaction, neighborhood building, and recreational opportunity.	Stakeholder support for the alignment.	The North Carolina Department of Transportation and key stakeholders support the alignment.	Landowners have indicated they may be amendable, ROW exists, etc.	Including factors that drive costs, such as easements, ROW, relocations or design around utilities, crossing of waterways and roads, and design of terrain.	The greenway has the opportunity to stimulate economic development.	Route provides visual or other interest that adds to the overall experience.	Route takes advantage of being out of the floodway.

JACKSON PARK TO HC ATHLETIC & ACTIVITIES CENTER

5-A	4 & 5					TBD					
-----	-------	--	--	--	--	-----	--	--	--	--	--

Reduced commercial opportunity • The majority of the route is along the powerline • Stream crossing • Some of the route resides in the floodway • Amenable landowner

HC ATHLETIC & ACTIVITIES CENTER TO THE PARK AT FLAT ROCK

5-D	5					TBD					
-----	---	--	--	--	--	-----	--	--	--	--	--

Utilities may need to be relocated • Would require an on-road portion

5-E	5										
-----	---	--	--	--	--	--	--	--	--	--	--

Alignment uses railroad ROW, with a new on-grade crossing proposed by Athletics and Activity Center • Railroad open to proposed design

JACKSON PARK TO NEW HOPE ROAD

5 & 6-A	5										
---------	---	--	--	--	--	--	--	--	--	--	--

Travels along old road beds on east side of ridge near wetlands and flood-prone areas • Nature experience, removed from park and traffic • Flood-prone along soccer fields • Would require redesign of parking lots near ballfields

6 & 6-A	5										
---------	---	--	--	--	--	--	--	--	--	--	--

Travels through park crossing roads several times • Uses some existing crossing but puts user at greater chance for vehicle conflict • Walls and fence relocation would elevate cost

NEW HOPE ROAD TO BLUE RIDGE COMMUNITY COLLEGE

6-A1	5 & 6					TBD					
------	-------	--	--	--	--	-----	--	--	--	--	--

Utilizes New Hope Road ROW, may need to secure additional easement along road frontage • Last segment near community college would require working with landowner to align greenway on their private road

5-F & 6-B	5					TBD					
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Potential wetlands through a small portion of alignment 6 • On-road crossing on Airport Road • Alignment 6-B passes through a mitigation site and conservation easement, landowner willingness unconfirmed

KING CREEK CONNECTION (BLUE RIDGE COMMUNITY COLLEGE TO THE PARK AT FLAT ROCK) THESE OPTIONS WERE DEEMED INFEASIBLE DUE TO CONSTRAINTS

	5 & 6										
--	-------	--	--	--	--	--	--	--	--	--	--

Utilities may need to be relocated • King Creek crossing • Reduced commercial opportunity • Some landowners opposed

5-J,5-H,4-C,6-B	5 & 6										
-----------------	-------	--	--	--	--	--	--	--	--	--	--

King Creek crossings • Reduced commercial opportunity • Some of the route resides in the floodway • Some landowners opposed

UPWARD ROAD CONNECTION (BLUE RIDGE COMMUNITY COLLEGE TO THE PARK AT FLAT ROCK) THIS IS A LONG-TERM OPTION BUT IS NOT DETAILED OUT IN CORRIDOR DESIGN

6-C, 6-D, & 5-K	5					TBD					
-----------------	---	--	--	--	--	-----	--	--	--	--	--

5-parallel Upward Road, decreasing user experience • Connects park, high school, and commercial • May be able to use Upward Road ROW

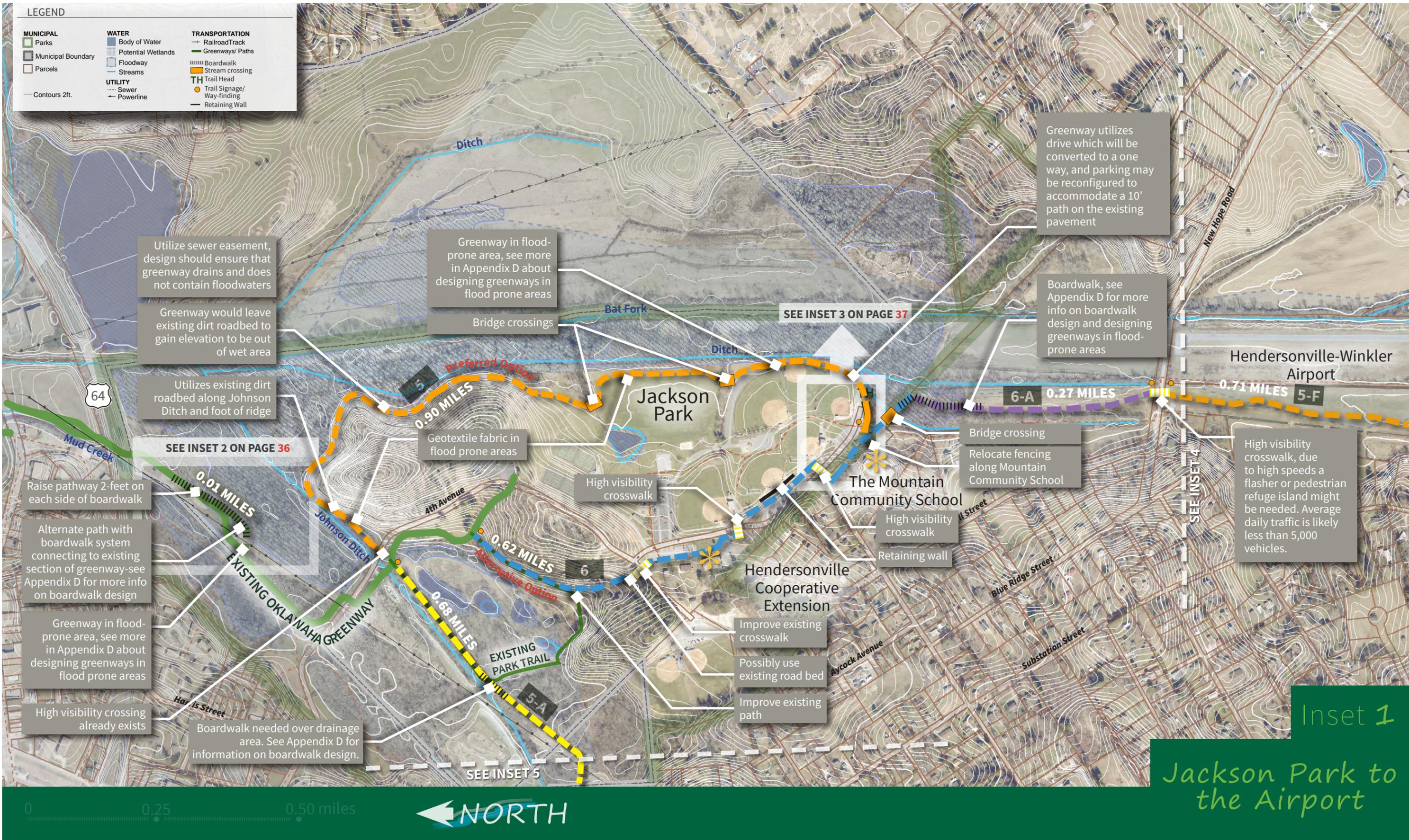
Highly Favorable
 Somewhat Favorable
 Highly Unfavorable
 Recommended Preferred Alignments



CHAPTER
4B Corridor Design
OF THE SOUTHERN EXTENSION



FINAL Proposed Southern Oklawaha Greenway



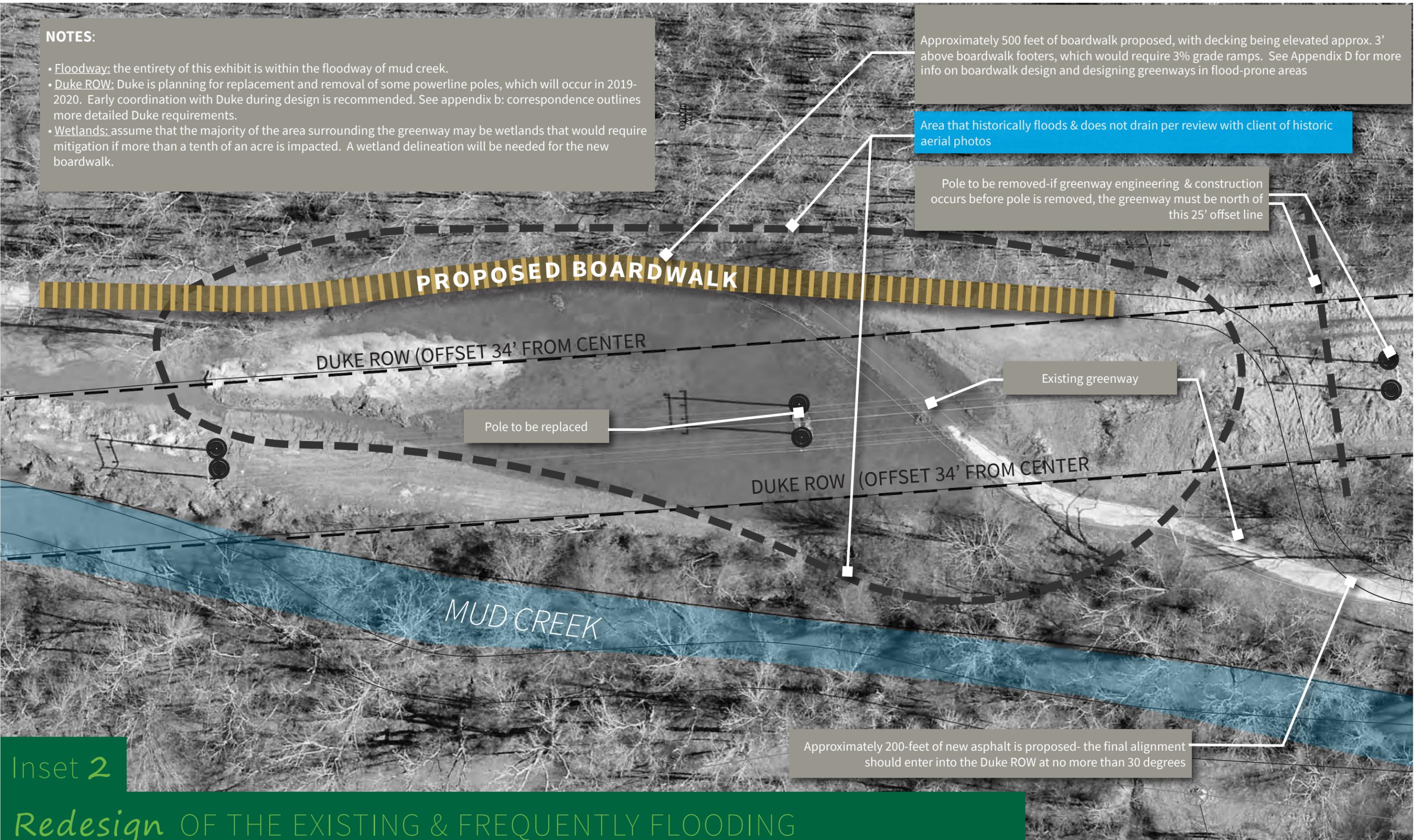
NOTES:

- **Floodway:** the entirety of this exhibit is within the floodway of mud creek.
- **Duke ROW:** Duke is planning for replacement and removal of some powerline poles, which will occur in 2019-2020. Early coordination with Duke during design is recommended. See appendix b: correspondence outlines more detailed Duke requirements.
- **Wetlands:** assume that the majority of the area surrounding the greenway may be wetlands that would require mitigation if more than a tenth of an acre is impacted. A wetland delineation will be needed for the new boardwalk.

Approximately 500 feet of boardwalk proposed, with decking being elevated approx. 3' above boardwalk footers, which would require 3% grade ramps. See Appendix D for more info on boardwalk design and designing greenways in flood-prone areas

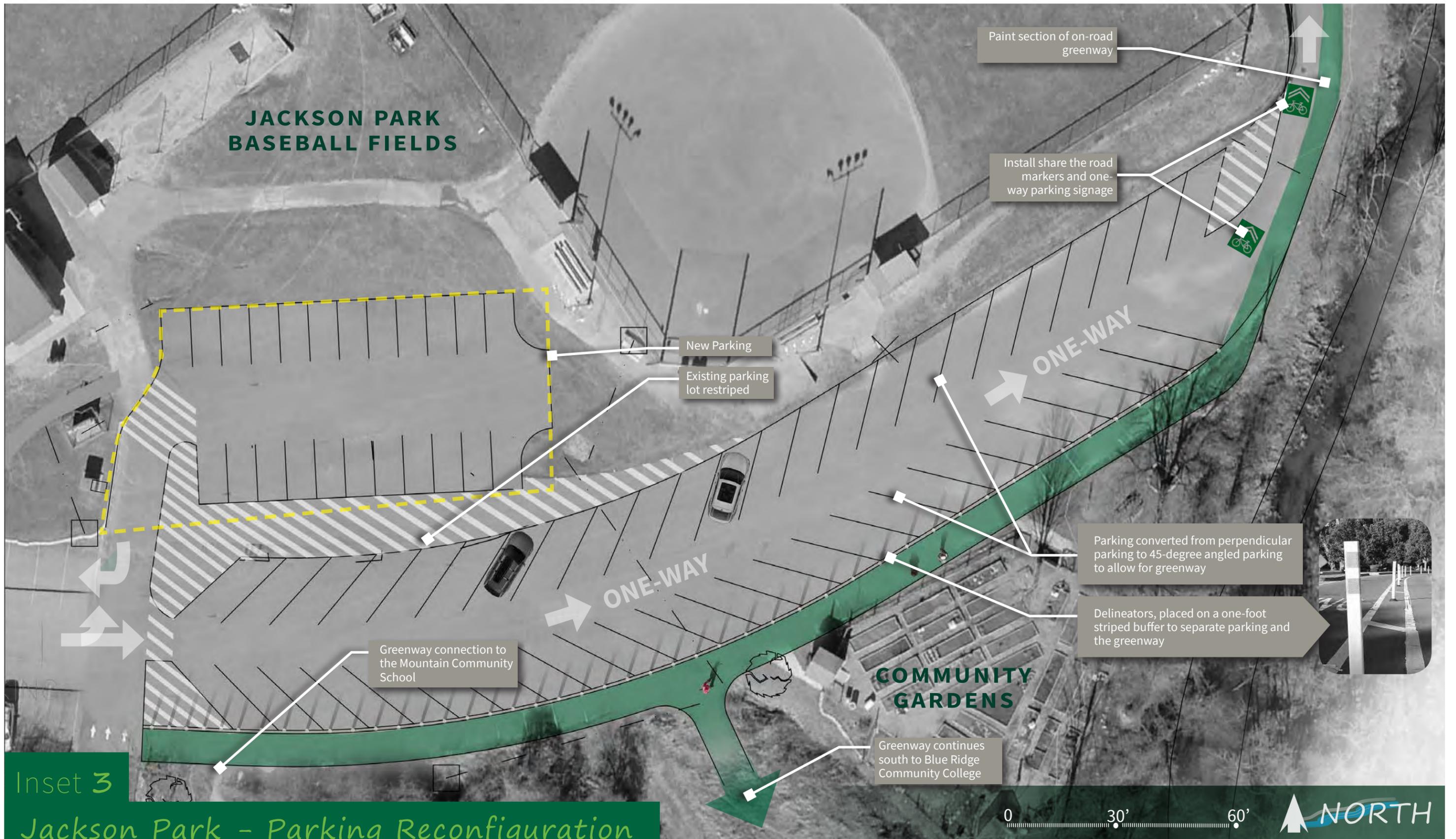
Area that historically floods & does not drain per review with client of historic aerial photos

Pole to be removed-if greenway engineering & construction occurs before pole is removed, the greenway must be north of this 25' offset line



Inset 2

Redesign OF THE EXISTING & FREQUENTLY FLOODING OKLAWAHA GREENWAY IN JACKSON PARK



Inset 3

Jackson Park - Parking Reconfiguration to Accommodate the Greenway

LEGEND		
MUNICIPAL	WATER	TRANSPORTATION
■ Parks	■ Body of Water	— Railroad/Track
■ Municipal Boundary	■ Potential Wetlands	— Greenways/ Paths
□ Parcels	■ Floodway	— Bike route
— Contours 2ft.	— Streams	— Stream crossing
	— Sewer	— Asphalt apron
	— Powerline	TH Trail Head
		● Trail Signage/ Way-finding



LEGEND		
MUNICIPAL	WATER	TRANSPORTATION
■ Parks	■ Body of Water	→ Railroad/Track
▬ Municipal Boundary	■ Potential Wetlands	→ Greenways/ Paths
□ Parcels	■ Floodway	■ Stream crossing
— Contours 2ft.	— Streams	▬ Boardwalk
	UTILITY	● TH Trail Head
	— Sewer	● Trail Signage/ Way-finding
	— Powerline	
	(Poles are shown in actual locations)	



Connect to existing path and widen existing path. Signage for way-finding may be helpful at path intersection

Potential boardwalk needed, see Appendix D for more info on boardwalk design and designing greenways in flood-prone areas

Alignment buffered from existing private structures through private property

High visibility crosswalk crossing beacon may be necessary due to location of crossing, average annual daily traffic around 1,100 vehicles a day

Recommended alignment accounts for all high transmission and utility poles

On-grade railroad crossing. See Appendix D for more information.

Greenway ramps up at 4.5% for ADA access. May require a small retaining wall on north side of building

Terminus of 5-A (Trailhead) connecting to sidewalk

Stream crossing needed

Stream and wet area

Greenway in Duke owned Property: Offset high transmission line 25' west on substation property

On grade crossing would require some grade work especially on field side to transverse dip in grade, see more in Appendix D for design details of this crossing

Inset 5
Jackson Park to Henderson Co. Athletics & Activity Center



LEGEND		
MUNICIPAL	WATER	TRANSPORTATION
■ Parks	■ Body of Water	→ Railroad Track
▭ Municipal Boundary	■ Potential Wetlands	→ Greenways/ Paths
▭ Parcels	■ Floodway	
— Contours 2ft.	■ Streams	
	UTILITY	
	--- Sewer	
	--- Powerline	



CONNECTION OF THE GREENWAY TO THE HENDERSONVILLE CO-OP

Inset 6
 Blue Ridge Southern
 Railroad North





Blue Ridge Southern Railroad (BRSR) did not provide exact guidelines for greenway development near rail. There are best practices and more stringent guidelines that are recommended by other rail lines (like Norfolk Southern). Some of the recommendations on this page are based on these. In general, recommendations include:

- The typical offset should be 25 feet from the rail, however, because this line serves as a storage line, BRSR may require less, with a recommended minimum offset of 15 feet with fencing
- BRSR suggests fencing where there is adjacent residential and requires fencing between track and trail



Guidelines for the Greenway When It Parallels Blue Ridge Southern Railroad

Image of the existing Oklawaha Greenway,
courtesy of the Friends of the Oklawaha
Greenway.



CHAPTER

5

Action & Maintenance Plan

	Action Team Members	YEAR 1-2	YEAR 3-5	YEAR 6-10
FURTHER DESIGN AND PLANNING	<p>Conserving Carolina</p> <p>Henderson County Public Schools</p> <p>Friends of the Oklawaha Greenway</p>	<ul style="list-style-type: none"> As easements are acquired, look for opportunities to construct small sections of the greenway with natural surface trails so they can be used early East Henderson High School connection to Blue Ridge Community College. Engage leadership to review draft options for campus proximity and access (HCPS to schedule and facilitate meeting). 		
LAND ACQUISITION/ LANDOWNER OUTREACH	<p>Volunteers</p> <p>Conserving Carolina</p>	<ul style="list-style-type: none"> Reach out to Realtor community. Conserving Carolina will reach out to landowners that are identified as priorities. Conserving Carolina will focus on a few identified priority segments. 		
PUBLIC & STAKEHOLDER ENGAGEMENT/ OUTREACH	<p>Blue Ridge Community College</p> <p>Friends of the Oklawaha Greenway</p> <p>Blue Ridge Bike Club, Pisgah Area SORBA, KIRBO Cycle Group, Friends of the Ecusta Trail</p> <p>Cooperative Extension Service</p>	<ul style="list-style-type: none"> Blue Ridge Community College Sustainability Committee to promote commuting along the greenway as route to the campus. Hand-out of benefits of greenway and “selling” points to pass out to public at events in advance of bond campaign. The Southern Off-Road Bicycle Association, The Blue Ridge Bike Club, and The KIRBO Cycle Group have 1,500-2,000 members in the community and can help engage their neighbors. Cooperative Extension Service to assist in education and engagement of stakeholders and potential users. 	<ul style="list-style-type: none"> The public can buy into the greenway by purchasing their own portion (one foot or even a mile). 	
FUNDING	<p>Village of Flat Rock</p> <p>Henderson County</p> <p>Conserving Carolina</p> <p>Blue Ridge Bike Club</p>	<ul style="list-style-type: none"> Considering hiring fundraising expert in partner with municipalities. Develop a partnership structure Address TDA at board meeting Blue Ridge Bike Club will help with match funds and promote among members. 	<ul style="list-style-type: none"> Consider long term funding opportunities like bonds or TDA funds. Easements can be held by Conserving Carolina until they are “funded” so that the easements are able to count as a match. They will be transferred to the county when funded. 	<ul style="list-style-type: none"> Inter-local agreement between municipalities and Henderson County Establish public-private partnership
MAINTENANCE AND MANAGEMENT	<p>Henderson County, Local Municipalities</p> <p>Friends of the Oklawaha Greenway</p>	<ul style="list-style-type: none"> Research low-maintenance options Record lessons learned from other greenways Determine how much is being spent now on greenway maintenance to ensure staff and budget for new sections. Gather volunteers from greenway friendly groups/organizations to help pick up trash. Neighborhoods can adopt sections of the greenway to maintain 	<ul style="list-style-type: none"> Establish local government maintenance coordination and meetings to collaborate and share information. Non-profit managing greenway maintenance with funding from local government and commercial donations. Equipment sharing policy can assist in lowering capital cost to maintenance. 	<ul style="list-style-type: none"> Consider increasing funds for continued maintenance and not just capital.

Who Helps? Partners & Potential Responsibilities in Maintenance Activities

	GOVERNMENT ENTITY OR CONTRACTORS	VOLUNTEERS AND/OR NON-PROFITS	GOVERNMENT ENTITY/ TRANSPORTATION DEPARTMENTS, OR CONTRACTORS
<p>SPOT / INCIDENT: Occurs as necessary or warranted.</p>	<ul style="list-style-type: none"> • Citizen Response • Low Water Crossing / Warning Signs • Major Debris Removal • Securing Temporary Signage • Identify Detours • Information Dissemination • Special Events Policies & Permitting • Lighting Replacement 	<ul style="list-style-type: none"> • Citizen Response • Spot Improvement & Incident Reporting • Water New Vegetation • Minor Debris Removal • Placing Temporary Signage • Information Dissemination • Special Event Monitoring / 	<ul style="list-style-type: none"> • Asphalt Spot Patches • Major Debris Removal • Graffiti Control • Parking Lot Repair • Major Debris Removal
<p>REGULAR: Programmed or continuous at logical intervals based on features and their needs.</p>	<ul style="list-style-type: none"> • Scheduling Major Maintenance Tasks • Trail Edge / Path Weed Treatment • Major Mowing & Trimming • Trash Disposal • Plant & Trim Trees • Stock, Clean Amenities • Rotary/Machine Sweeping • Bollards / Bollard Locks • Sign Replacement • Mapping • Volunteer Training • Accident & Incident Tracking • Pest Management 	<ul style="list-style-type: none"> • Trail Inspection & Condition Surveys • Scheduling Minor Maintenance Tasks • Minor Mowing & Trimming • Removing noxious weeds • Trail Shoulder / Borrow Ditch Clean- up • Trash Collection • Planting Shrubs, Grasses & Flowers; Mulch Planting Beds • Locking / Securing Trailheads & Access Points • Hand Tool Sweeping • Volunteer Training Support • Accident & Incident Monitoring 	<ul style="list-style-type: none"> • Asphalt Crack Sealing / Seal & Cover • Shoulder Protection & Maintenance • Large Scale Vegetation Removal • Dust Management • On-Street Sidewalk & Connecting Route Maintenance
<p>LONG-TERM: Requires major planning, budgeting and coordination for anticipated investments or major initiatives.</p>	<ul style="list-style-type: none"> • Fence & Structure Paint / Maintenance • Trail Location Signage / Wayfinding • Major Amenities Procurement & Replacement • Habitat / Environmental Maintenance & Control • Secure Funding 	<ul style="list-style-type: none"> • Benches & Table Paint / Maintenance • Support / Pursue Funding 	<ul style="list-style-type: none"> • Asphalt Seal & Cover / Overlay • Centerline Striping / Crosswalk Markings • Street Location Signage & Lighting • Bridge Inspections & Maintenance • Fencing & Railing • Drainage / Borrow Ditches, Culverts

How Often?
The following tasks are yearly needs for maintenance of a greenway

Tasks	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Basic Maintenance												
Inspection & conditions survey												
Graffiti removal	As needed throughout the year											
Hand tool sweeping												

Major mowing & trimming												
Machine Sweeping												
Planting shrubs, grasses & flowers												
Plant, trim trees												
Shoulder / borrow ditch clean-up	As needed or annually											
Trail edge, shoulder, gravel path weed control												
Trash collection & disposal												
Water new vegetation												
Weed control & pest management												
Substantial Maintenance												
Asphalt patching	As needed, fall and spring											
Asphalt crack sealing												
Painting	As needed year around; Every 10 years for major structures & amenities											
Overlay	Once every 20 years											
Shoulder / borrow ditch protection & maintenance												

How Much Does it Cost to Maintain a Greenway?

\$2K
per mile annually

It costs \$2,000 to maintain a mile of a greenway, on average, based on a recent study (*Maintenance Practices & Costs of Rail-Trails, 2015*)

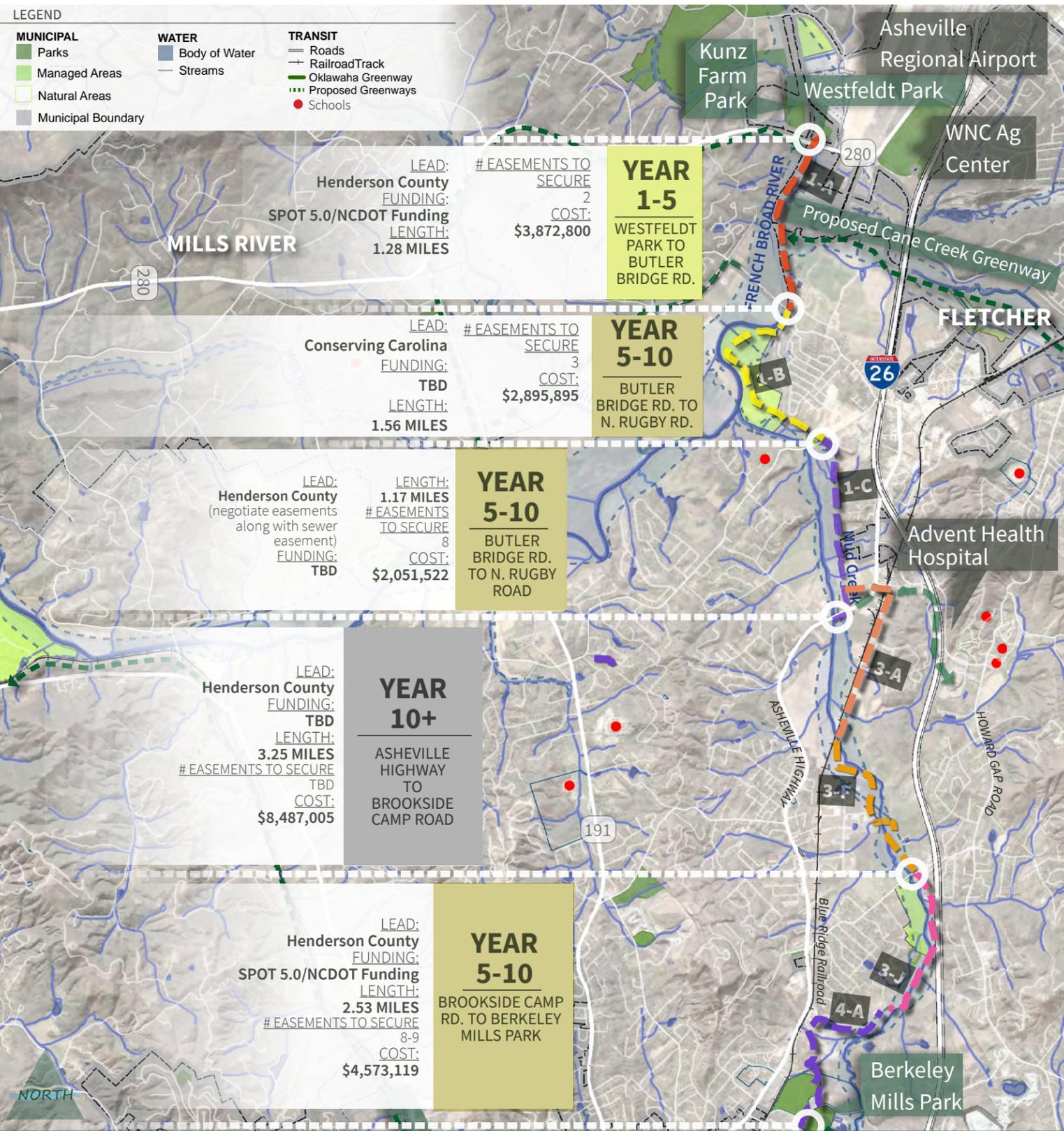


CHAPTER

6

P

hasing, Cost Summary, and Funding Sources



Phasing & Cost of the Northern Corridor

NOTE: Cost estimates are preliminary and subject to change. Inflation of 20-30% annual of cost should be considered when using for future planning and implementation.



Phasing & Cost of the Southern Corridor

Summary of Actions & Costs Per Phase

YEAR 1-5	Complete segments: Northern: 1-A, Southern: 5-A, 6-A & 6-B	4.09 Total Miles Completed	\$8,290,271 Approx. Total Cost to Complete	9 Approximate Easements to Secure
YEAR 5-10	Complete segments: Northern: 1-B, 1-C, 3-J, and 4-A Southern: 5-E	6.53 Total Miles Completed	\$11,599,224 Approx. Total Cost to Complete	20+ Approximate Easements to Secure
YEAR 10+ (Northern Only)	Complete segments: Northern: 3-A & 3-F	4.43 Total Miles Completed	\$8,487,005 Approx. Total Cost to Complete	Approximate Easements to Secure is to be Determined

15.05 Total New Miles Completed

OKLAWAHA GREENWAY EXTENSION - FUNDING OPPORTUNITIES MATRIX

Program	Purpose	Annual Funding	Min. Match Required	Public or Private Partnership Required	Application Deadline	Notes
STATE / FEDERAL						
STBG-DA and TAP-DA	Sidewalks, Multi-use paths, bikeways, etc.	Varies (typical is \$4.5 million /yr.)	20%	Local government	Annual (Applications due in January)	The Surface Transportation Block Grant Program comes from federal money that is distributed locally by the MPO. STBG-DA funds construction and TAP-DA funds both planning and construction.
NC Parks and Recreation Trust Fund (PARTF)	Recreation, greenways	Max \$500K per project	50%	Local government	Annual (Application due May 1st)	Competitive grant program; Funds can be used for site acquisition, renovation and construction.
EPA/US Forest Service Urban Waters Restoration	Urban waterway revitalization	Varies (\$1.7 million nationwide/yr.)		Yes	Annual (Applications due in January)	Program priorities include on-the-ground restoration of wetlands or riparian areas; environmental outreach, education and training, community partnerships; measurable results; and sustainability.
US FWS Urban Programs	Urban wildlife projects	\$180,000 nationwide/yr.			Annual (Applications due in January)	Urban Bird Treaty program to enhance urban bird habitat and improve habitat or access for outdoor recreational experiences.
NC Clean Water Management Trust Fund (CWMTF)	Land acquisition and easements, stormwater; projects that improve and protect water quality	Varies with average \$20,000-50,000 per project	None	No	Annual (Application due February 1st)	For site acquisition and restoration costs (not actual greenway construction); Formulaic and transparent scoring process favors innovative design and research opportunities with water quality; and an opportunity to team with Western Carolina Hydrologic Research Station (WCHRS) on innovative use/application.
State Transportation Improvement Program (NCDOT STIP)*	Transportation (Construction Funding)	Varies	20%	Local government (recommended)	Every 2 years; (submittal for fall 2019)	This is the State Transportation Improvement Program (STIP) and Prioritization Process (SPOT), updated every two years and amended as needed. Current STIP covers 2018-2017.
NCDOT Cost Share	Sidewalks, Multi-use paths within DOT ROWs and on DOT associated projects	Varies	~40% of Construction Materials	Local government	Any	Only applicable when a future greenway section overlaps with part of a roadway corridor that is funded for improvements in the TIP/STIP.
NC Recreational Trails Program	Building all types of greenways	\$1.49 million (for 2018)	25%	Local government and Non-profits	Annual (Pre-application May, final application in August)	The Recreational Trails Program has provided funding for construction of new trails, maintenance and repair of existing trails, land acquisition, purchase of trail tools and planning, legal, environmental and permitting costs. Minimum amount awarded is \$10,000 and maximum is \$100,000.
LOCAL GOVERNMENT						
Henderson County Tourism Development Authority (TDA)	Tourism promoting opportunities (special project funding)	TBD	Undetermined	Non-profits	Due April	Maximum of a \$5,000 request. For the purpose of promoting events, attractions and festivals that draw visitors from more than 40 miles outside Henderson County, which encourages overnight stays, thus stimulating spending and boosting the local economy.
Henderson County	Board of Commissioners	Discretionary	Varies	No	Varies	Budgeted each fiscal year; budget process typically starts in January; Important to express requests to elected officials early in the process.
PRIVATE / NON-PROFIT						
Duke Energy Foundation-Water Resource Fund	Stormwater; Riparian buffer improvements; environmental interpretation, easements, access to waterways	\$10 Million (Grants range from \$10,000-100,000)	No	Local government and Non-profits	Twice per year	Must demonstrate collaboration on environmental issues with state and local governments and stakeholders; Money must be used to benefit waterways downstream of Duke facilities as depicted on eligibility map. Priority projects should encourage education and awareness of water quality and conservation issues, water quality research opportunities, and/or promote public use of waterways. Apply via North Carolina Community Foundation website or https://www.duke-energy.com/community/duke-energy-foundation/water-resources-fund *Funding source may be ending, check with Duke contact.
Community Foundation of Western North Carolina	Varies	Varies	Varies	Varies	Varies	Good reference for a variety of grant opportunities.
Revitalization of Traditional Cherokee Artisan Resources (RTCAR) / Cherokee Preservation Foundation	Preserve, protect and teach the heritage of Cherokee traditional resources	\$500 - \$20,000+	Varies	Yes	Fall and Spring	Partner for establishing rivercane restoration areas, helping to supply vegetation material and direction as well as connecting artisans to raw material upon successful re-establishment http://www.rtcar.org and http://cherokeepreservation.org/grants/apply-for-new-grant/guidelines-policies-orientation/
Blue Cross Blue Shield of North Carolina Foundation / Dogwood Health Trust	Health	Varies	Varies	Local government or 501 c3	Varies	Priority given to partnerships that engage stakeholders from multiple sectors to seek policy, systems and environmental changes that improve health at a population level; Grant opportunities change per cycle but include "Healthy Living" funding applicable to greenways. http://www.bcbnccfoundation.org AND https://dogwoodhealthtrust.org/
(Other) Private Foundations	Often broader discretion than public funding	Varies	Varies	Varies	Varies	Visit North Carolina Network of Grantmakers website http://www.ncgrantmakers.org
(Other) Corporate Gifts and Sponsorships	Discretionary	Varies	Varies	Varies	Varies	Can be donated to a non-profit partner.
Family and/or Individual Gifts	Discretionary	Varies	Varies	Varies	Varies	Can be donated to a non-profit partner.

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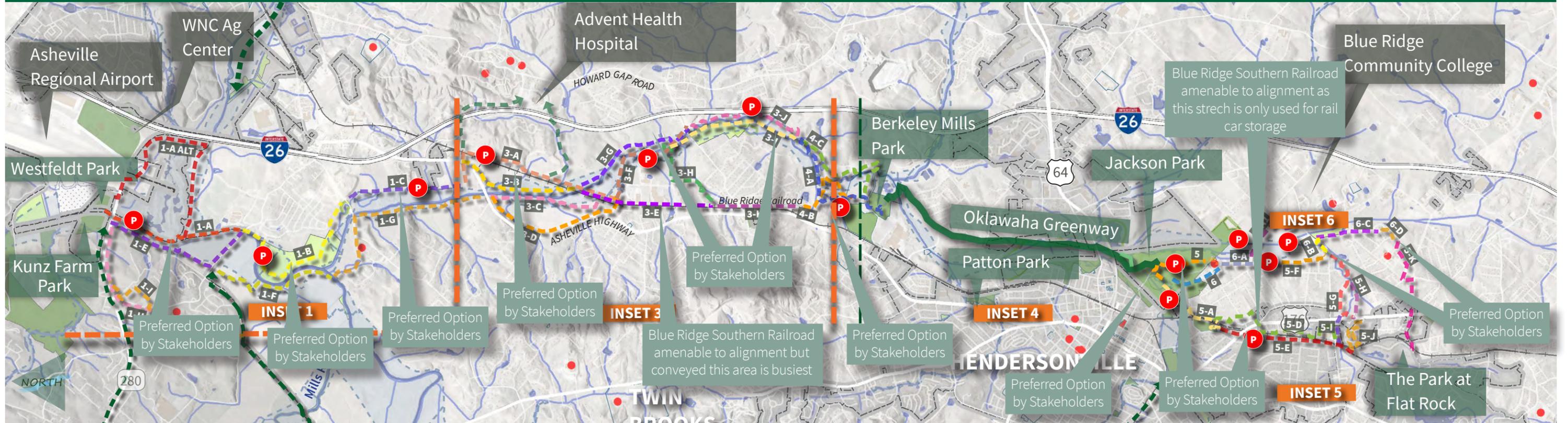


CHAPTER

7

Public & Stakeholder Engagement

Stakeholder & Major Landowner Input on the Alignments



How Input Was Gathered



EARLY & MID-PROCESS STAKEHOLDER ENGAGEMENT



PUBLIC INPUT IN CONJUNCTION WITH THE COUNTY MASTER PLAN



LANDOWNER INPUT VIA A WORKSHOP AND OTHER CORRESPONDENCE

Stakeholder Participants

Representatives of the following provided input:

- Henderson County Greenway Master Plan Advisory Committee, Recreation Advisory Board, and the Transportation Advisory Committee
- Blue Ridge Community College
- Friends of the Oklawaha Greenway
- Henderson County Planning, Engineering, and the Parks and Recreation Departments
- Healthy People-Healthy Carolinas
- City of Hendersonville
- Conserving Carolina
- Henderson County Cooperative Extension
- The Town of Mills River
- Blue Ridge Bicycle Club
- Henderson County Public Schools
- Village of Flat Rock
- Hendersonville Airport

Stakeholder Input

Key stakeholders were involved throughout the process to provide input through the exploratory phase and to provide input on alignments.

Early Stakeholder Engagement

The first meeting held for stakeholders was to gather input on the study area including input on opportunities, barriers, and destinations that the greenway should connect to. This input was incorporated into the Opportunities and Constraint Maps for the Northern and Southern Corridors. This input session also provided valuable input on landowner sentiment for greenways.

Stakeholder Input on the Greenway Alternatives

The second meeting was held after the landowner workshop when greenway alternative alignments had been developed. Stakeholders provided comments on the alignments and voted on their preferred alignment. Their preferences are shown in the map above.

Stakeholders were also asked to participate in an action planning session. Their input was incorporated into Chapter 5, The Action & Maintenance Plan.

Landowner Input

Landowner Workshop & Survey

Landowners were engaged first by a mailing that went out from Henderson County. These letters asked landowners to attend a workshop or provide comment and response via an online survey. Landowner response is summarized in maps and a table summary in Appendix A: Landowner Response.

The workshop gave an introduction to the project and Conserving Carolina presented about ways landowners could be engaged with the project through accommodating the greenway. Different easement options and other scenarios were presented. The consultant/client team then broke out into one-on-one conversations with those attending.

Landowners in both the workshop and survey asked if they were willing to consider accommodating a greenway and easement on their property. Through the survey they were given the choice to respond to the following:

- Willing to have the conversation.
- Uncertain but open to the idea and perhaps have a few concerns
- Not Willing at this time.

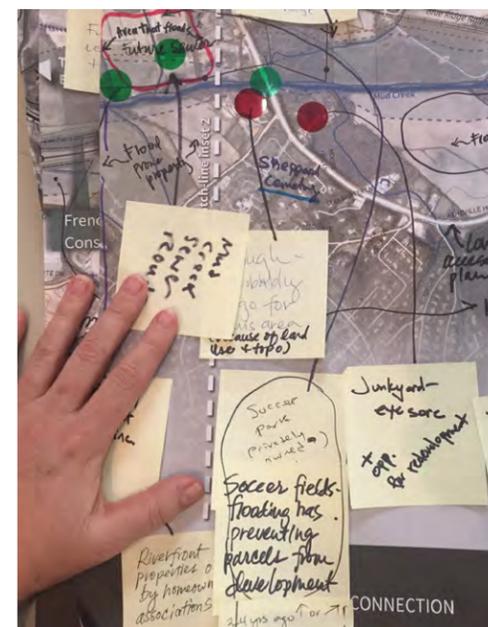
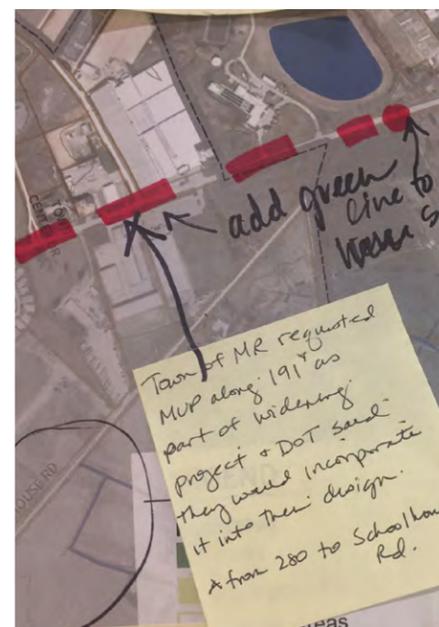
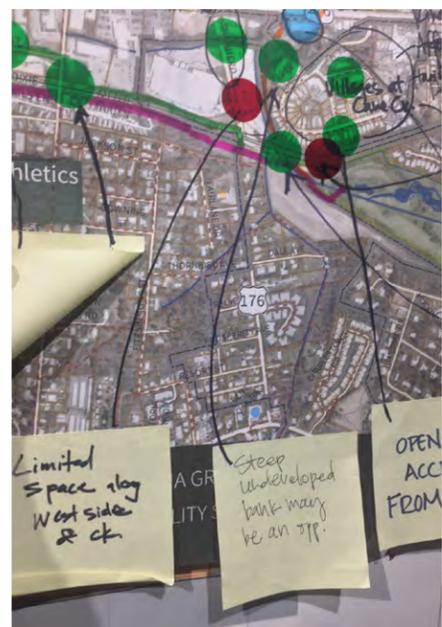
Major Landowner Correspondence

Two major landowners were engaged in meetings as part of this process. Duke Energy and Blue Ridge Southern Railroad were both engaged as they own major corridors that overlap, parallel, and intersect with the proposed greenway. Blue Ridge Southern Railroad met with the County and consultant team on two occasions. They shared they own their corridor fee-simple, meaning they own it out-right, but do have lease agreements with surrounding landowners to encroach their property. Both organizations expressed support for the plan and were interested in cooperating with the county where they can. Both organizations provided guidelines for greenway design and use. The full detail of correspondence can be found in Appendix B: Major Landowner Correspondence.

Public Input

The general public was engaged in a concurrent process of the County's Greenway Master Plan, which presented information about the Oklawaha Greenway extension and other greenways that would connect into the Oklawaha.

The public provided valuable feedback on how greenways and related amenities of the greenway should be prioritized. They also learned and provided input on the different corridor routes of the master plan. A summary of public input from the master planning process can be viewed to the right.



FEEDBACK FROM STAKEHOLDERS

EXPERIENCE IS IMPORTANT:

Locate the greenway along streams and creeks, even if the alignment could more easily be located along a road.

CONNECT DESTINATIONS: Connect schools, affordable housing, and commercial areas.

THIS CORRIDOR FLOODS: Much of the study area routinely floods, so design for the greenway should ensure it drains quickly and isn't an impediment to connectivity.

WE ARE READY TO HELP: Henderson County and the surrounding municipalities are blessed with many non-profits and

other organizations willing to help with reaching out to landowners, advocacy, helping to get funding, etc.

WE NEED TO CONSIDER, AS A COMMUNITY, THE LARGER DESTINATIONS WITH WHICH WE WANT TO CONNECT: for example, area hospitals and Buncombe County.

FEEDBACK FROM THE PUBLIC:

87%

of the public reported they have used a Henderson County Greenway



3

Top things that would make the public more likely to visit a greenway:

Greenways were closer to where they live/work

Greenways offered a more pleasant experience

Greenways offered more amenities: dog water fountains, lighting, etc.

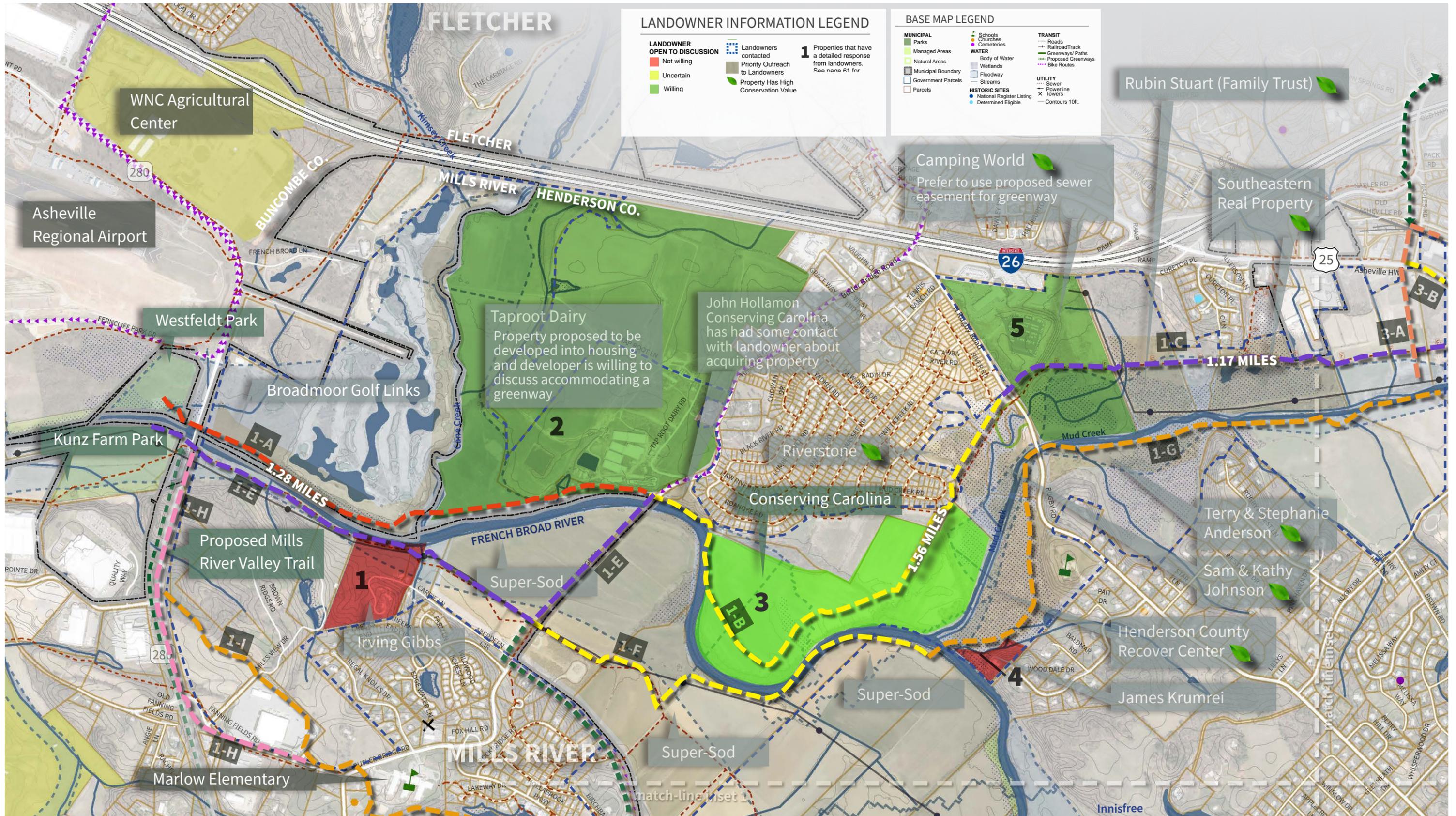
“I regularly use both greenways. I would use them more often if they did not flood and become covered with mud regularly.”

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**APPENDIX
A**

Landowner Response



MAP 1

NOT TO SCALE NORTH

LANDOWNER INFORMATION LEGEND

- | | | |
|-------------------------------------|--------------------------------------|--|
| LANDOWNER OPEN TO DISCUSSION | Landowners contacted | 1 Properties that have a detailed response from landowners. See page 61 for detailed responses. |
| Not willing | Priority Outreach to Landowners | |
| Uncertain | Property Has High Conservation Value | |
| Willing | | |

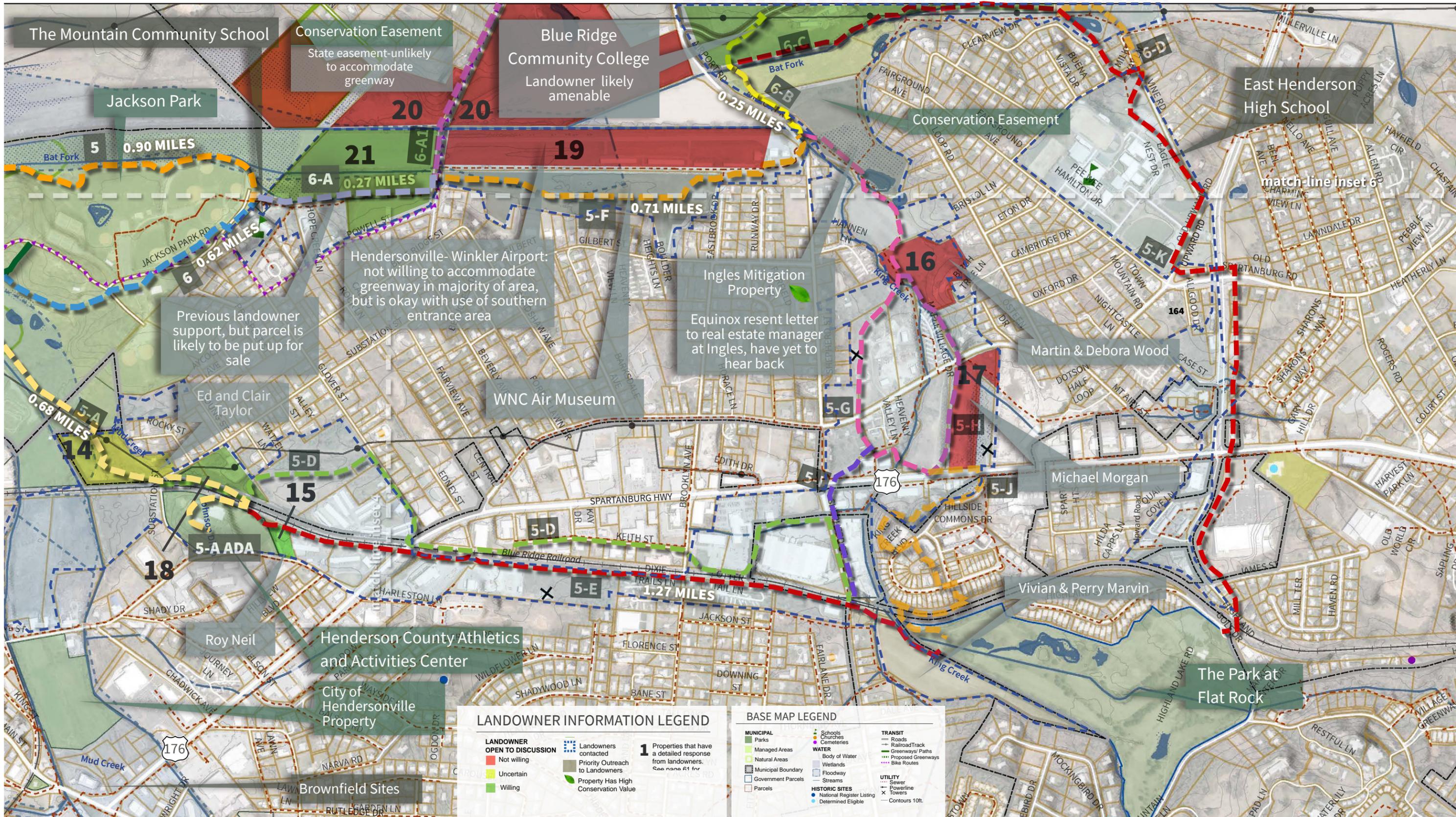
BASE MAP LEGEND

- | | | |
|--------------------|--------------------|---------------------------|
| MUNICIPAL | Parks | Schools |
| Managed Areas | Churches | Cemeteries |
| Natural Areas | Wetlands | Body of Water |
| Municipal Boundary | Floodway | Streams |
| Government Parcels | Parcels | Historic Sites |
| | | National Register Listing |
| | | Determined Eligible |
| TRANSIT | Roads | Railroads/Track |
| Greenways/Paths | Proposed Greenways | Bike Routes |
| UTILITY | Sewer | Powerline |
| Towers | Contours 10ft. | |



MAP 3

NOT TO SCALE NORTH



NOT TO SCALE NORTH

MAP 4

LANDOWNER RESPONSE

LANDOWNER INFORMATION LEGEND

- LANDOWNER OPEN TO DISCUSSION**
- Not willing
 - Uncertain
 - Willing
- Landowners contacted
- Priority Outreach to Landowners
 - Property Has High Conservation Value
- 1** Properties that have a detailed response from landowners. See page 61 for detailed responses.

BASE MAP LEGEND

- MUNICIPAL**
- Parks
 - Managed Areas
 - Natural Areas
 - Municipal Boundary
 - Government Parcels
 - Parcels
- SCHOOLS**
- Schools
 - Churches
 - Cemeteries
- WATER**
- Body of Water
 - Wetlands
 - Floodway
 - Streams
- HISTORIC SITES**
- National Register Listing
 - Determined Eligible
- TRANSIT**
- Roads
 - Railroad/Track
 - Greenways/ Paths
 - Proposed Greenways
 - Bike Routes
- UTILITY**
- Sewer
 - Powerline
 - Towers
 - Contours 10ft.



MAP 5

NOT TO SCALE NORTH

ABOUT THIS TABLE:

This table represents landowner's responses when contacted about their willingness to accommodate the greenway. The numbers in the far left column correlate with the numbers on the maps previous to this pages.

- Not willing at this time
- Willing to have the conversation
- Uncertain but open to the idea and perhaps have a few concerns

Landowner Map # (Correlates with number on the map)	Means of Contact	Name	Email	Address of property(ies) you own within Henderson County.	Phone number	Willingness Color Code (on Maps)	Would you be open to considering selling or donating an easement for a greenway on your property? Please note, this is all voluntary.	Comment	Do you have any concerns about accommodating a greenway through your property?
1	Workshop	Irving Gibbs	IrvingGibbs@qmail.com	546 Carrie Lane 28759	2827122089	●	Other (if other please provide your comment below)	I need to think this about this, but right now the answer is NO.	Very nervous that this plan and study will lead to eminent domain. This concern is why it's a "NO." Explore: Look at Hopper Ln from 191, cut through property below Holdman Lake or tie into Jeffress Rd.
2	Phone call	Tap Root Dairy		319 Tap root Dairy Rd 28732		●	Willing to have the conversation	Potential developer may purchase property and are willing to discuss accommodating a greenway	
3	Workshop	Conserving Carolina		SR 1352 on Butler Bridge Rd		●	Willing		
4	Online/Workshop	James Krumrei		335 Wood Dale Dr 28791		●	Not willing at this time		Liability issues
5	Phone Call	Camping World		2918 N Rugby Rd, Hendersonville, NC 28791		●	Willing	Prefer to use proposed sewer easement for greenway	
6	Phone call	Jane Coats Owen		5420 Asheville Highway		●	Willing to have the conversation	Willing to have the conversation, but would like to be compensated. Interested in selling entire property, it is currently for sale. She is currently fighting the proposed sewer line on her property.	
7	Online survey	Matthew McCraw	sm_rifleman@yahoo.com	947 S Old Asheville Rd	8286744220	●	Not willing at this time		
7	Correspondence with Conserving Carolina	Lassona Pappas Corporation	n/a	125 Industrial Park Rd, Hendersonville, NC 28792	n/a	●	Not willing at this time	Conserving Carolina corresponded with the landowner. Lassonde Pappas (a corporation and manufacturing facility) has a wastewater treatment facility on the Clement Pappas NC, LLC tract. Unfortunately, their permit for that facility prohibits public access on the property. Confirmed by NC Department of Environmental Management.	
8	Workshop	David Michael Sciupider (Champions Golf Driving Range)	wncjrgol@bellsouth.net	485 Brookside Camp Road	8286981234	●	Willing to have the conversation	We are a golf driving range, the proposed path could be in the landing zone of golf balls, however a small amount of netting could solve this issue	
9	Phone call	James Hauser/NCDOT	jhauser@ncdot.gov	Mud Creek Mitigation Site, 334 Brookside Camp Rd		●	Willing to have the conversation	This property is an NCDOT Mitigation site. They use this site as compensation for impacts to wetlands and because of that heavy restrictions have been placed on the site to restrict any further development. The following is correspondence with NCDOT: EMAIL TO EQUINOX 10/17/18 Based on my review to date, it appears that most of the mitigation credits on the site have been debited for various permits. Approximately 6.67 acres of wetland enhancement/preservation remains which could be debited for future permits. As a result, it is likely that any proposed greenway through the property would require compensation for the loss of potential mitigation credits. Also, the project would need to be approved by the Interagency Review Team (IRT), a group of regulatory agencies that oversees existing mitigation sites, including the U.S. Army Corps of Engineers, N.C. Division of Water Resources, and N.C. Division of Mitigation Services. They would need to see the project design, as well as a detailed explanation of avoidance and minimization efforts, and then authorize the proposed action. This may be a difficult task. Once mitigation sites have been debited for other permits, the IRT is very reluctant to allow encroachments into them. I apologize for the slow response, but I was attempting to pursue all available leads to see if your proposed greenway could be accommodated. At this time, it appears that acquiring the necessary regulatory approval could prove difficult. However, if you would like to continue, the next step would be to provide us a preliminary design of the greenway, along with an explanation of why alternative routes that avoid the mitigation site are not feasible. We could then review this information and provide it to the IRT when it is ready for their consideration. A presentation with questions and answers would eventually be required at one of the scheduled IRT meetings, the next one being December 11. As stated previously, the IRT is typically not receptive to such encroachments into sites which have been closed out and debited for permits. If you have any questions or need additional information, please let me know. EMAIL TO EQUINOX: 10/17/18 I doubt that the 6.67 acres of remaining credit on the site has been mapped to a particular location. In general, mitigation sites are allocated a total number of credits when they are approved, and these credits are debited until there are none remaining. However, the location of specific debits is not mapped, so the location of remaining credits cannot be determined. Sites are debited by quantity only. Assuming that portions of the powerline easement are jurisdictional wetlands (and I believe this is the case), they could be included in the remaining 6.67 acres of wetland mitigation credit. Regardless, because the remaining mitigation credits on the site have been transferred to the N.C. Division of Mitigation Services, NCDOT would not be able to affect them without approval from the Interagency Review Team. Based on my prior experiences, acquiring IRT approval remains the most daunting challenge.	
10	Workshop	Perry Sanderson	perrysanderson@bellsouth.net	209 Newman Drive	8286920808	●	Willing to have the conversation	Hickory Hill Stables is located adjacent to the Mud Creek. For us the liability on our side of the creek will not be acceptable. Would horse paths be allowed, could you integrate as part of the greenway? Floods a lot 12-foot deep, lots of sand loads onto the land. If greenway helps to clean the creek up, it would make us more likely to accommodate. Don't want users to hurt or interact with livestock.	
11	Workshop		greenmeadowfarm.mason@gmail.com	186 North Mason Way 28792	8286928423	●	Willing to have the conversation	Safety for Animals at Green Meadow Farm. How much property would be purchased? Could/ would you purchase all 18.5 acres of our property?	Safety for our cattle from people walking by or throwing things in field. We raised belted galloway cattle and they are beautiful to look at.
12	Workshop	James Klak	jamesklak@gmail.com	40 Dorado Ln	8284237854	●	Uncertain but open to the idea and perhaps have a few concerns		I would like to know more about how the greenway will be constructed and which properties will be used during construction to access the greenway
13	Workshop	Tracy & Augie Cavagnaro	tracycavagnaro@bellsouth.net	17,27,37,47 Frederick Ln	8285516994	●	Not willing at this time		
14	Online survey	Claire Taylor	landofdreamsnc@yahoo.com	136 Substation St.	8285959459	●	Other (if other please provide your comment below)	We have railroad tracks bordering our property and energy lines through it, both of which already bear easements to the railroad and Duke Energy. Our willingness would depend on where the greenway easements would be placed.	Not really- we already have foot traffic along the rail line; however, I can see it being a concern if vagrants use our property/barn to camp on/in.
15	Workshop	Roy Neill	royneill@morris66.net	800 South Grove	8286978510	●	Willing to have the conversation		I think it's a good idea generally, but in the area around my property it should be limited to the fenced area around the tracks. Blue Ridge Railroad owns easement through. They do not own the ROW fee simple.
16	Online survey	Debra Wood	dogwood129@hotmail.com	64 Birch Tree Lane		●	Not willing at this time	As much as I enjoy having a greenway in the area, it can bring some problems. My brother's property was repeatedly broken into because it bordered a greenway in the Winter Garden, FL. area.	I'm concerned about the decrease in security to my home by having the greenway beside it. How will the greenway be monitored to prevent crime?
17	Online Survey	Michael Morgan	mikeandvickymorgan@att.net	1101 Green River Rd		●	Not willing at this time	I am not interested in this project	Yes I do not want anything to do with this project I don't support this project
18	In-person Meeting	Craig Garrett-Duke Energy	CraigGarrett@duke-energy.com	200 Substation Road	8282585018	●	Willing	See full Duke meeting summary for more information on use of property. They may be open to using edge of property and staying away from the substation fenced area. They would not likely require fencing or anything for their property	Do not want people to get close to the substation but think that can be done through design of the greenway.
19	Workshop	Hendersonville Airport-Owner John Fadok	rv6John@aol.com	1232 Shepherd St	8286931897	●	Not willing at this time	Attended first stakeholder meeting. Expressed the airport did not feel comfortable with accommodating the greenway as there was no good location for it. HE did not feel the berm that had been identified as a potential space was adequate or safe for a greenway.	Concerns about safety of greenway users who will be directly adjacent to the flight path.
20	Correspondence	Kathleen and Robert Hodges Revocable Trust	n/a	501 New Hope Road	n/a	●	Not willing at this time	Correspondence with Conserving Carolina	Concerns about safety of greenway users who will be directly adjacent to the flight path.



**APPENDIX
B**

Correspondence

(Correspondence with Blue Ridge Southern Railroad, Duke Energy, and NCDOT- Division 14)

OKLAWAHA NORTH AND SOUTH GREENWAY EXTENSION PROJECT / DUKE ENERGY MEETING SUMMARY

Subject: Oklawaha Greenway North and South Extension Studies

Date: 10/22/2018

Attendees: Autumn Radcliff (Henderson County), Kim Williams and David Tuch (Equinox), and Craig Garrett (Transmission Asset Protection Specialist with Duke Energy)

[Meeting Summary](#)

GENERAL GUIDELINES:

Maintain 25 feet from all transmission pole structures. Can get close to distribution pole. If you knock out a transmission line it effects thousands of homes' power. The 25-foot buffer gives room for vehicles to maneuver around poles. Also protects structures.

Duke allows up to 12-feet of a greenway. A lot of service trucks, including cranes, bulldozers, etc. use the ROW, which will mean some of these will need to cross or use the greenway. In wetland areas they have temporary means to gain access, whether using wood pallets or temporary gravel.

68 feet is the typical easement through the majority of this corridor for transmission lines. A greenway agreement would be required from Duke. The Property owner has to agree to it.

Running a greenway through wetland areas in Duke easements will be very problematic as they don't allow any kind of above grade structure. This would include boardwalks, bridges, etc.

In the future, Duke can provide transmission/powerline GIS files, if a study area is defined. They cannot give broader areas for public display.

For a full list of greenway guidelines for working within Duke easement see the following pages.

COMMENTS ON SPECIFIC SEGMENTS WITHIN THE NORTHERN OKLAWAHA GREENWAY EXTENSION:

Segment 1-F: 68-foot right-of-way on 1-F.

Segment 1-C: Powerline on 1-C may be shifting. Line will shift closer to camping world. Ok to co-locate with 1-C, though there are a lot of wetlands. Designing in wetlands: Would not allow a boardwalk in ROW. Floods very bad through the area. ROW is 68'. It is a 44 KV line.

Segment 3-A: Lines along South Old Asheville Road are distribution. Setbacks are less and these distribution lines have a 35-foot ROW.

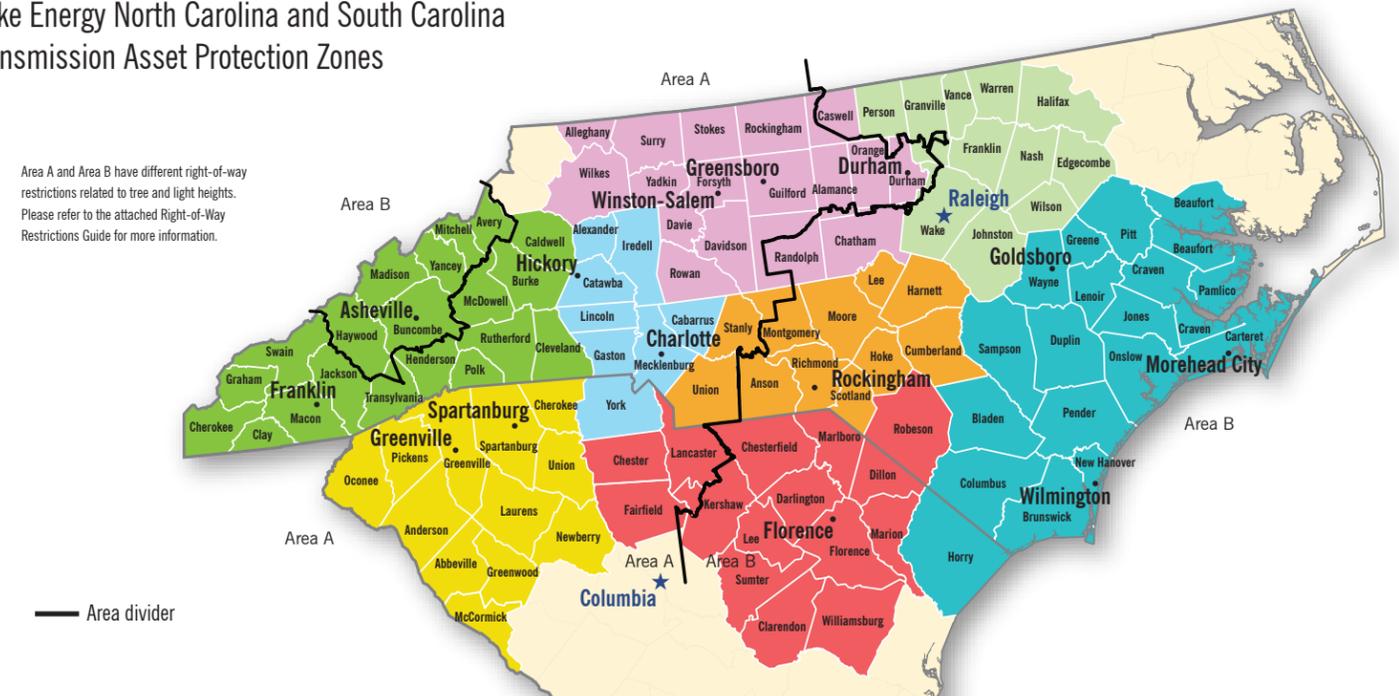
Segment 3-I: Equinox is not sure this is a feasible option, especially knowing we can't put boardwalks within Duke's ROW as some section of this might have to be boardwalk.

COMMENTS ON SPECIFIC SEGMENTS WITHIN THE SOUTHERN OKLAWAHA GREENWAY EXTENSION:

Segment 5-A: 130' easement through corridor in Jackson Park. Once over Substation Road, the greenway would be in Duke fee simple-owned property, which is the substation. The county would be required to obtain an easement with property owners in addition to an encroachment agreement along Duke owned property at the substation. Nothing can go within 10 feet of substation fence. There is a little more flexibility on this property and typical easement requirements may not apply. Equinox and the County asked if a fence would be needed so folks don't go near the fence. Craig (Duke) did not think so. There is no ROW in fee-simple owned properties.

Segment G-C: G-C still a typical 68' easement.

Duke Energy North Carolina and South Carolina Transmission Asset Protection Zones



Asset Protection Right-of-Way Specialist Zones

- Zone 1 – Craig Garrett 828.258.5018
- Zone 3 – Stephen Lord 704.812.2316
- Zone 6 – Robbie James 910.944.5363
- Zone 2 – Steven Pryor 864.948.5610
- Zone 4 – Ervin Summers 336.634.4633
- Zone 7 – Bruce Pait 919.329.5928
- Zone 5 – Robbie James 910.944.5363
- Zone 8 – Bill Wilder 910.772.4903

Legend – updated 5/13/16
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Electric Transmission Right of Way Requirements for Shared-Use Paths/Trails

This list of Duke Energy's transmission right of way requirements for the co-location of shared-use paths/trails has been developed as a guideline to answer the most frequently asked questions. This should not be considered a comprehensive list of all requirements or factors that may need to be addressed. You should contact the Asset Protection Right of Way Specialist if you have additional questions or concerns. This list of requirements and guidelines is subject to change at any time and without notice. Duke Energy reserves all rights conveyed to it by the right of way agreement applicable to the subject property. An engineering drawing, including topographic grade changes, location of Duke Energy structures and paths/trails must be approved by an Asset Protection Specialist.

Compliance with these Duke Energy Shared-Use Path/Trails requirements, or approval of any such plans by Duke Energy, does not guarantee that other applicable requirements imposed by any local, county, state, federal or other applicable regulatory agency have been satisfied.

Definition: For purposes of this document the term "trail(s)" shall be used to refer to Multi-Use Paths or Shared-Use Paths as defined by the American Association of State Highway and Transportation Officials (AASHTO).

1. The trails must not exceed a total of 12 feet in width, regardless of the surface construction material.
2. A minimum separation of 25 feet is required between the trail and its associated easement, to any Duke Energy electrical facility. This includes, but is not limited to, poles, towers, guy anchor(s), equipment, etc. If the owner of the trail is not the current owner of the fee simple title to the lands underlying Duke Energy's easement, the trail owner shall obtain a legally sufficient easement from the current fee simple title owner and produce said easement to Duke Energy prior to commencing activities within the Duke Energy easement. In the event a private easement is not required, no portion of the trail or shoulder, or associated grading, shall be located within 25 feet of any electrical facility.
3. The owner of the trail shall be responsible for safety and liability associated with its construction or use thereof.
4. Bollards shall be installed per Duke Energy specifications, with Duke Energy locks, where the trailheads connect with roads/streets as to prevent vehicular traffic. Duke Energy may require reinforcement of the trail at specified access points along the corridor for Duke Energy heavy equipment crossings. These trail reinforcement areas shall consist of a 20-foot-long, 10-foot-wide paved area capable of supporting 80,000 pounds with pavement markings indicating "heavy equipment crossing."
5. Culverts shall be installed where the trails cross creeks, ditches, etc. These culverts shall be capable of supporting 80,000 pounds, and shall be a minimum of 20 feet wide. Signage must indicate the maximum load of the crossing at culvert approach.
6. No structures including, but not limited to, lights, signs, benches, exercise equipment, and irrigation systems shall be located within the Duke Energy easement.
7. Planting of vegetation shall adhere to the Right of Way (RW) Restrictions Guidelines for the specific Duke Energy territory. A copy of the RW Restrictions/Guidelines can be obtained from your Asset Protection Specialist.
8. Duke Energy reserves the right to close, without notice, all or a portion of the trail located within the transmission line easement, for any length of time, for construction, maintenance or emergency line operations.
9. Duke Energy will not be held responsible for any damages to the trails due to its operations or any liability based on the use of the trail. Prior to the installation of a shared-use trail, a "Trail Encroachment Agreement", which includes "hold harmless" language, shall be executed with Duke Energy. In addition, deed information of all property owners that the trail affects must be supplied to Duke Energy. Proof that the property owners have signed an easement agreement with the owner of the trail will be required, as applicable.
10. All other Duke Energy electric transmission right of way restrictions/guidelines shall apply to the installation of trails.

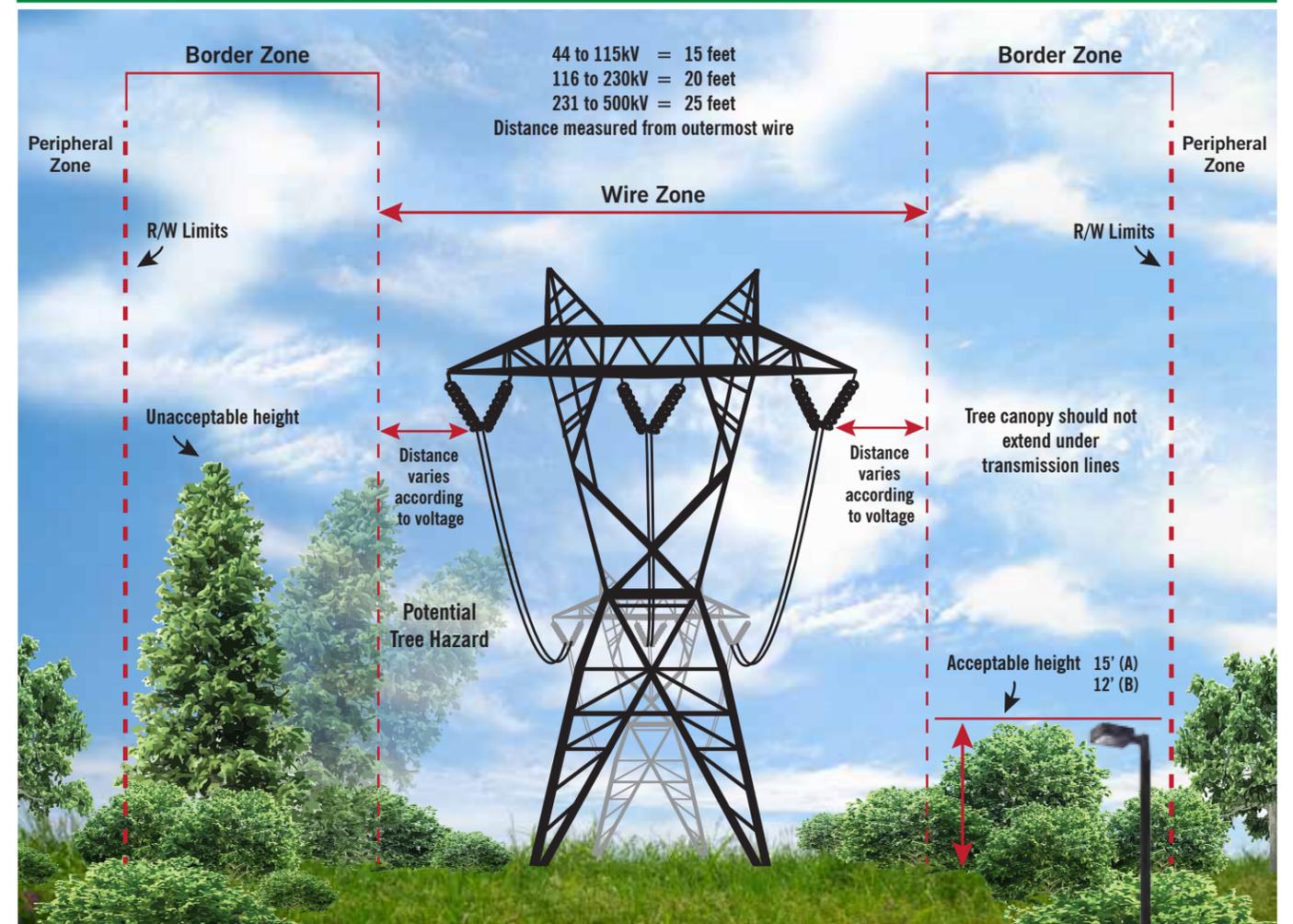
We hope this is useful information. If you have additional questions or plan any activity not mentioned above, please contact:

Duke Energy Representative

Phone Number

Form #XXXXXX (Rev. 04/16/2014)

Transmission Right-of-way Zones - Carolinas



Wire Zone: Extends beyond the outermost conductor on both sides. (See diagram above.)

Permitted within the Wire Zone: Low-growing plants, shrubs and grasses.

Not permitted within the Wire Zone: Tree species of any kind.

Border Zone: Extends from the edge of the Wire Zone to the outside edge of the Right of Way.

Permitted within the Border Zone: Lighting structures and plantings within the Right of Way that do not exceed a vertical height of 15 feet in Area A and 12 feet in Area B. (See Asset Protection Map for location of geographic areas) For compliant mature height species, refer to plants/ces.ncsu.edu/.

Not permitted within the Border Zone: Any object that exceeds vertical height restrictions. These restrictions are based on flat ground elevations. If the ground elevations differ, no object at any time may exceed the outermost conductor's ground elevation.

Peripheral Zone: Outside the Right of Way and adjacent to Border Zones.

Permitted within the Peripheral Zone: Trees may be planted in the Peripheral Zone. Duke Energy recommends customers exercise caution selecting and planning trees in this zone.

Not permitted in the Peripheral Zone: Trees with canopies are subject to routine trimming and possible removal.

In all zones:

When an outage risk is identified, Duke Energy will attempt to notify the affected customer. However, the company may need to take immediate action if trees cannot be pruned to appropriate levels. This may include trees and shrubs that are within 20 feet of the power line at the maximum peak load or during weather conditions that create line sag and sway.

Written approvals by Duke Energy are required for all plans.

We hope this is useful information. If you have additional questions on line voltages or plan any activity not mentioned above, please contact the Asset Protection Specialist for your area. (See Map)

*Right of Way is intended to reference the easement rights granted to Duke Energy. Actual zone size may vary based upon the particular Right of Way.

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OKLAWAHA NORTH AND SOUTH GREENWAY EXTENSION PROJECT / BLUE RIDGE SOUTHERN RAILROAD (BRSR) MEETING SUMMARY

Subject: Oklawaha Greenway North and South Extension Studies

Date: 10/19/2018

Attendees: Autumn Radcliff and John Mitchell (Henderson County), Kim Williams (Equinox), and Cain Greene (Manger at the Blue Ridge Southern Railroad)

Meeting Summary

Summary: BRSR is generally supportive of greenway use of their property, but their number one priority and concern is safety and efficiency. They have coordinated with Hendersonville on portions of the existing Oklawaha Greenway that crosses their property. They do have some legal concerns related to liability and would like to understand better how to ensure the county would assume liability for the greenway.

BRSR is a subsidiary of WATCO Companies, which is based out of Kansas. Generally, the manager of BRSR has a lot of discretion when it comes to local coordination, but any proposed encroachment would need to be reviewed by WATCO.

Information about the Corridor:

BRSR purchased the rail line from Norfolk Southern in 2014. They own the land outright and any encroachments by neighboring landowners are due to a lease agreement or are illegal. BRSR has a real estate company that annually assesses encroachments, so they generally do not have illegal encroachments.

Use/Lease of the Corridor: BRSR would require lease of the corridor for greenway for a monetary value that is based on a formula. Their real estate company Omega Real Estate would advise on lease price and would likely charge a fee (a \$1,500 application fee to start) to do a lease/deed research to determine which lessees would need to be coordinated with if a greenway were to be integrated into BRSR's property. While typically they only do short-term leases that are renewed regularly, BRSR understands a much longer lease agreement would be needed for the greenway and are willing to be flexible on the time length of lease.

The Northern Corridor. The northern greenway extension parallels or interacts with BRSR rail line from Asheville Highway (Hwy 25) all the way to Jackson Park. This rail line is actively used to service an industrial park in the area of Industrial Park/Cloverdale Road area. BRSR asks that the property east of the rail line of this area is not considered for greenway use since they have rail yards that service several manufacturing plants and they want to keep much of it open for future use. Past Berkley Mills Park,

trains mostly run at night and the line is only used for storage, so generally greenway users would not see trains running at all.

The Southern Corridor. From Berkley Mills Park area to the Park at Flat Rock, the rail line is used for storage and is not actively used at all during the day. The rail line south of the Park at Flat Rock is inactive at the moment. BRSR expressed this corridor is most conducive to greenway use because of its low activity. BRSR is open to adding new at-grade crossings on a case-by-case basis. They were the proposed new at-grade crossing by the Athletics and Activities Center (AAC).

Design Requirements for the Greenway in BRSR Property

While BRSR has no specific guidelines written up, conversation during this meeting conveyed certain design guidelines:

- Provide a 25-foot minimum offset of the greenway from the rail. Anywhere where the greenway runs closer would potentially need to accommodate much more safety measures like fencing, etc.
- Fencing where there is a lot of residential (i.e. greenway alignment 5-E) surrounding the rail would help BRSR be much more comfortable with greenway use.
- All design would be reviewed by WATCO. Early design review is important.

OKLAWAHA NORTH AND SOUTH GREENWAY EXTENSION PROJECT / NCDOT DIVISION 14 MEETING SUMMARY

To: NCDOT Division 14

From: Kimberly Williams, Equinox and Christy Staudt, Traffic Planning & Design

Subject: Oklawaha Greenway North and South Extension Studies.

Date: 10/22/2018

Attendees: Autumn Radcliff (Henderson County), Christy Staudt (Traffic Planning & Design (TPD)), Rachael Bronson (Traffic Planning & Design), Kim Williams (Equinox), Troy Wilson (NCDOT Division 14), Tristan Winkler (FBRMPO), Lonnie Watkins (NCDOT District Engineer Henderson, Polk & Transylvania County)

[Meeting Summary](#)

Meeting Purpose: Status/Overview of Oklawaha Greenway North and South Extension Projects Review and Feedback on Preliminary Alignments.

Project overview provided by Henderson County: The County hired the Equinox consulting team to narrow down routes for Oklawaha Greenway. Prior to hiring Equinox, the county had already held a number of stakeholder meetings including one regarding land along the Blue Ridge Southern Railroad. There have been a few landowners in support of this route and some who were not supportive.

Equinox shared some more detail about preliminary alignments. Extension 1 runs from Westfeldt Park and the county's property to the existing Oklawaha Greenway. The Southern extension runs from Jackson Park to Blue Ridge Community College and The Park at Flat Rock. Nearby proposed trails include the 280 Greenway, the Ecusta Trail, and the Flat Rock Greenway. The vision is to connect Hendersonville to Asheville and Fletcher (Cane Creek).

FBRMPO: There is a proposal for a feasibility study of an extension of the 280 Greenway to Brevard, which could coincide with an access management project. This greenway will be 5 lanes with a multi-use path on the eastern side.

Henderson County: Mills River communicated to staff that they are not in favor, at this time, of constructing some segments of the proposed 280 Greenway. This was not included in the County's recent Greenway Master Plan as a result, but the feasibility study was acknowledged.

QUESTIONS ABOUT THE NORTHERN CORRIDOR:

French Broad River bridge at 280. We could not determine the feasibility to cross under the 280 bridge as the access to it was difficult. Do you have any idea how feasible it is to cross on the other side under the bridge? Are there any issues or concerns you would have with a greenway crossing underneath this bridge?

- NCDOT: NCDOT Division 14 indicated that NCDOT could provide bridge inspection reports to provide this insight. NCDOT Division 14 will provide these if the team provides a list of requests.
- Henderson County: The County is in the process of writing up an agreement/easement for the trail to traverse Camping World property along the sewer easement.

Butler Bridge Road Area. Butler Bridge Road has a long-term proposed widening. Will the bridge be replaced and if so is it possible to accommodate a greenway so that a connection to Mills River can be made? The preferred alignment is proposed to go underneath, which based on field visit, we believe is possible. Any thoughts on any of this?

- NDOT: Believe the bridge is currently unposted.
- FBRMPO: Currently the MPO has a project to address Butler Bridge Road that would address the bridge. Doesn't believe it will be funded this round.
- NCDOT: Possible development at Tap Root Dairy, 800-1000 units. NCDOT currently in review.
- Henderson County: Proposed development potentially going in at Tap Root Dairy. The developer indicated, during preliminary scoping meetings, that they might be amenable to allowing the County to traverse the property. There also might be a signal or roundabout proposed at their entrance that will most likely line up with the access to Riverstone development. They have not submitted a development application as of the date of this meeting.
- Group discussion: The group discussed whether there is a way to show an optional version that connects into the development at the dairy and a potential cross around where a signal would go. Equinox will analyze if this is possible and may convey the cost difference. Ideally during the Oklawaha Greenway study, potential Butler Bridge Road access could be identified to see how it could impact the greenway.
- NCDOT: NCDOT's preference is for below-grade crossing, keep peds away from traffic.
- NCDOT: NCDOT Division 14 currently following NCDOT road crossing standards.

Rugby Road: the only option will likely be an at-grade crossing because the bridge is insufficient. Would that be appropriate?

- TP&D: The team will look at sight distances, follow NCDOT crossing guidelines. But team would like any early guidance on this.
- NCDOT: No immediate comment was made on this crossing, but no concerns were vocalized.

Discussion: Hooper Lane

- NCDOT: Repaving is imminent, work should begin soon.
- FBRMPO: Plan for 191: 5-lane from 280 to School House Road with multiuse path (10') on eastern side, then 4-lane divided (17' mountable median) from School House Road to Mountain Rd. Path ending at School House because that is the town boundary, town is paying match.

Mud Creek Bridge at Asheville Highway. Though not the preferred option, we did determine crossing underneath this bridge is potentially feasible. Also, can the turn lane be eliminated on the bridge if a greenway crossing on the bridge is needed to travel east-west?

- Equinox: The team did determine that it is feasible to cross underneath.
- NCDOT: No comments from NCDOT regarding this.
- TP&D: Asked if it is possible to use bridge deck and repurpose center turn lane for crossing/path. Need divided barrier. Team can provide examples of this if desired-this can be sent to NCDOT if a preferred alignment is chosen that would utilize this option.
- NCDOT: NCDOT staff were immediately unsure if reducing the turn lane would work for this bridge. Not favorable of this option. Don't want to preclude future development on either side of the bridge which would require a turn lane. Would have to replace railing if you put peds/bikes on it. Would need to check loading on bridge regarding weight of jersey barrier.
- TP&D: We will want to get the bridge inspection reports.
- FBRMPO: A few years ago, there was a discussion of 280 over Mills River to narrow down travel lanes, add Jersey barrier and widen shoulder for peds/bikes.

Does NCDOT require review of railroad crossings/funding for upgrades?

- NCDOT: NCDOT Division 14 responded affirmatively, they are funded as money comes available. There are guidelines for railroad crossings and the Rail Division can provide feedback on them.

NCDOT Park-and-ride. We identified a parcel as a NCDOT owned future park-and-ride property. This may serve as a good location for a trailhead and parking but would need sidewalk access to the greenway. Is there a plan and timeframe or concept for ultimately how this property will be used? Is there a possibility to locate a trailhead at this property?

- NCDOT: Troy and Lonnie are new to these positions, can find out more info about this property.
- FBRMPO: PnR was requested as a part of the I-26 expansion as a mitigation to the proposed interchange at US 25 (huge impacts anticipated).

Multi use path along Asheville Highway (alternative 3-D). While this option is not the preferred route, how does NCDOT view the multi-use path along Asheville Highway in this area?

- Equinox: This would be the option pursued if none of the land owners were amenable. It looks like there is an approx. 15' additional space in ROW on the east side.

- NCDOT: Unknown what the ROW is that is available, but NCDOT may be open to it. Encroachment would be required for widening. NCDOT can potentially provide ROW as-builts if needed or at least supply ROW widths.
- FBRMPO: Prefer this option as it would be better from a cost share perspective; better from a user perspective too (eyes on the street, lighting, access to commercial).

Brookside Camp Road crossing. Through field investigation we found an on-grade road crossing to be the only option. We have ideas on how to provide safe crossing, which we can discuss, but would like your thoughts.

- Equinox: Would be a similar on-grade road crossing condition to Rugby Rd. Golf Course is amendable to traversing their property.
- NCDOT: Bridge is in pretty good shape. Probably 30-year life span left.

NCDOT property along Mud Creek/mitigation area.

- Equinox: It is most likely that Henderson County would have to pay wetland mitigation credits to the State to use this alignment. This leaves 3-J as the preferred.
- NCDOT: It could be really costly to go through this property if they are charging for credits as NCDOT is currently looking at having to pay for \$80,000 an acre for wetland credits.

Discussion on a bridge crossing if greenway alignment 3-I cannot be utilized.

- Group Discussion: Equinox mentioned a separate pedestrian bridge crossing across Mud Creek might be needed if the NC Division of Mitigation Services land could not be used. The group looked at the Balfour Road bridge. The road to the bridge is posted at 35 mph, probably travels slower with curves. The group discussed how this bridge could be used as a greenway crossing, but it was generally determined it may not be a feasible option.

QUESTIONS ABOUT THE SOUTHERN CORRIDOR:

- Equinox: this section of railroad is only used for storage, the railroad is amenable to using their alignment all the way to The Park at Flat Rock. There would be some at-grade crossings, Equinox asked for feedback about concerns.
- NCDOT: no concerns other than to follow railroad crossing guidelines.

Multi-use path along Upwards Road. There appears to be enough room for a 10-foot sidewalk and an asphalt greenway. Are there any comments or concerns about use of right away for this alignment?

- Equinox: Fair amount of ROW available on Upward Road and grade is ok. No comments. 5-L would be in NCDOT ROW, 5-K depends on landowner support.
- TP&D: Upward Road really needs pedestrian amenities.
- FBRMPO: Highland Lake Road, current cross-section being recommended from 176 to RR (bike lanes + sidewalks). Don't want to confuse residents with another project.

- TP&D: Is there an opportunity to make Highland Lake Rd a multiuse path on one-side instead?
- FBRMPO: It would increase cost share but something to discuss with town.

What is the rule of thumb for right of way?

NCDOT: Rule of thumb for street widths are 50' on thru road, 40' on dead end.

Next steps:

- Equinox team to pull together a request for bridge reports from NCDOT, as well as a list of roads for NCDOT to provide ROW widths
- NCDOT (Lonnie) to find out about narrowing lanes on bridge and about the restrictions and requirements for alignment in ROW with NCDOT encroachments
- All to share any further thoughts following this conversation



APPENDIX
C

Cost Estimates (Detailed)

Oklawaha Northern Greenway - Section 1-A (1.28 miles)

Probable Cost Estimate
Cost estimates are preliminary and subject to change.

	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$63,330.71
			SUB-TOTAL	\$63,331
Trails (10' WIDE ASPHALT GREENWAY AT 6638 LF, 10' WIDE BRIDGE AT 120 LF)				
Aggregate Base Course (6" ABC Stone)	TN	2,820	\$30.00	\$84,600.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	7,330	\$11.50	\$84,295.00
Geogrid for Soil Stabilization	SY	5,870	\$5.30	\$31,111.00
Paint Pavement Marking Lines, 4"	LF	6,638	\$0.60	\$3,982.80
			SUB-TOTAL	\$203,989
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	4.57	\$6,000.00	\$27,420.00
Grading	LS	1	\$179,000.00	\$179,000.00
Clearing and Grubbing	AC	3.0	\$9,000.00	\$27,000.00
Undercut Excavation	CY	3,910	\$18.00	\$70,380.00
Temporary Silt Fence	LF	11,550	\$4.00	\$46,200.00
Seeding and Mulching	AC	2	\$5,000.00	\$10,000.00
Slope Matting	SY	670	\$4.50	\$3,015.00
6" Underdrain with Fabric & Stone	LF	100	\$15.00	\$1,500.00
48" R.C. Pipe Culverts, Class 4	LF	20	\$185.00	\$3,700.00
Rip Rap, Class B	TN	4	\$48.00	\$192.00
Import Suitable Material	CY	4,500	\$18.00	\$81,000.00
			SUB-TOTAL	\$362,015
Structures				
Prefabricated Pedestrian Bridge (Cane Creek)	LF	180	\$7,600.00	\$1,368,000.00
Abutments	EA	2	\$30,000.00	\$60,000.00
Prefabricated Pedestrian Bridge (tributary to French Broad)	LF	60	\$900.00	\$54,000.00
Bridge Installation	LF	60	\$217.00	\$13,020.00
			SUB-TOTAL	\$1,495,020
Amenities				
Signage	EA	2	\$400.00	\$800.00
Steel hinged bollard	EA	2	\$2,100.00	\$4,200.00
Trailhead (including parking area, kiosk)	EA	1	\$45,000.00	\$45,000.00
			SUB-TOTAL	\$50,000
Survey, Design & Permitting				
Design Construction Documents & Engineering (average 15%)		15%		\$326,153.18
Flood Modeling/No Rise (average cost)	LS	1	\$25,000.00	\$25,000.00
Wetland Delineation	AC	0.40	\$1,000.00	\$400.00
Construction Administration (Average 10%)				\$217,435.45
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width	AC	4.60	\$5,000.00	\$23,000.00
			SUB-TOTAL	\$591,989
			SUBTOTAL	\$2,766,343
			40% Contingency	\$1,106,537
			TOTAL	\$3,872,880

* earthwork estimated until a grading plan has been developed

Oklawaha Northern Greenway - Section 1-B (1.56 miles)

Probable Cost Estimate
Cost estimates are preliminary and subject to change.

	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$47,392.70
			SUB-TOTAL	\$47,393
Trails (10' WIDE ASPHALT GREENWAY AT 7640 LF, BOARDWALK AT 640 LF)				
Aggregate Base Course (6" ABC Stone)	TN	2,590	\$30.00	\$77,700.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	6,735	\$11.50	\$77,452.50
Geogrid for Soil Stabilization	SY	4,040	\$5.30	\$21,412.00
Paint Pavement Marking Lines, 4"	LF	7,640	\$0.60	\$4,584.00
			SUB-TOTAL	\$181,149
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	5.26	\$6,000.00	\$31,560.00
Grading	LS	1	\$215,000.00	\$215,000.00
Clearing and Grubbing	AC	3.7	\$9,000.00	\$33,300.00
Undercut Excavation	CY	2,695	\$18.00	\$48,510.00
Temporary Silt Fence	LF	13,825	\$4.00	\$55,300.00
Seeding and Mulching	AC	1.85	\$5,000.00	\$9,250.00
18" HDPE Pipe Culverts	LF	60	\$40.00	\$2,400.00
Chain Link Fence, 72" (Residential)	LF	1,680	\$25.00	\$42,000.00
Rip Rap, Class B	TN	6	\$48.00	\$288.00
Slope Matting	SY	580	\$4.50	\$2,610.00
Import Suitable Material	CY	3,100	\$18.00	\$55,800.00
6" Underdrain with Fabric & Stone	LF	100	\$15.00	\$1,500.00
			SUB-TOTAL	\$497,518
Structures				
Boardwalk	LF	1,840	\$217.00	\$399,280.00
Boardwalk Installation	LF	1,840	\$217.00	\$399,280.00
Flasher and high visibility at grade crossing - Butler Bridge Road	EA	1	\$51,700.00	\$51,700.00
			SUB-TOTAL	\$850,260
Amenities				
Bike Racks (powder coated) and Concrete Pad	EA	1	\$830.00	\$830.00
Trailhead (including parking area, wheel stops, kiosk)	EA	1	\$45,000.00	\$45,000.00
Signage	EA	2	\$400.00	\$800.00
Steel hinged bollard	EA	2	\$2,100.00	\$4,200.00
			SUB-TOTAL	\$50,830
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Wetland Delineation	AC	1.26	\$1,000.00	\$1,260.00
Design Construction Documents & Engineering (average 15%)		15%		\$244,072.38
Construction Administration (average 10%)				\$162,714.92
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	5.26	\$5,000.00	\$26,300.00
			SUB-TOTAL	\$441,347
			SUBTOTAL	\$2,068,496
			40% Contingency	\$827,399
			TOTAL	\$2,895,895

* earthwork estimated until a grading plan has been developed

NOTES: 1) Cost estimates are preliminary and subject to change. Inflation of 20-30% annual of cost should be considered when using for future planning and implementation. 2) Suitable material is a placeholder cost only. 3) Do not use cost estimates for grant application after September 2019, without v costs with a professional estimator. This excludes land acquisition costs and any cost required for wetland and stream mitigation.

Oklawaha Northern Greenway - Section 1-C (1.17 miles)

Probable Cost Estimate
Cost estimates are preliminary and subject to change.

	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$33,443.24
			SUB-TOTAL	\$33,443
Trails (10' WIDE ASPHALT GREENWAY AT 4978 LF, 10' WIDE BOARDWALK AT 1200 LF)				
Aggregate Base Course (6" ABC stone)	TN	1,880	\$30.00	\$56,400.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	4,890	\$11.50	\$56,235.00
Geogrid for Soil Stabilization	SY	3,910	\$5.30	\$20,723.00
Paint Pavement Marking Lines, 4"	LF	4,978	\$0.60	\$2,986.80
			SUB-TOTAL	\$136,345
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	4.62	\$6,000.00	\$27,720.00
Grading	LS	1	\$150,000.00	\$150,000.00
Clearing and Grubbing	AC	2.60	\$9,000.00	\$23,400.00
Undercut Excavation	CY	2,600	\$18.00	\$46,800.00
Temporary Silt Fence	LF	9,800	\$4.00	\$39,200.00
Seeding and Mulching	AC	1.30	\$5,000.00	\$6,500.00
6" Underdrain with Fabric & Stone	LF	100	\$15.00	\$1,500.00
48" R.C. Pipe Culverts, Class 4	LF	40	\$185.00	\$7,400.00
Rip Rap, Class B	TN	10	\$48.00	\$480.00
Import Suitable Material	CY	3,000	\$18.00	\$54,000.00
			SUB-TOTAL	\$357,000
Structures				
Boardwalk	LF	1,200	\$217.00	\$260,400.00
Boardwalk Installation	LF	1,200	\$217.00	\$260,400.00
18" HDPE Pipe Culverts	LF	15	\$40.00	\$600.00
Flasher and high visibility at grade crossing - North Rugby Road	LS	1	\$51,700.00	\$51,700.00
			SUB-TOTAL	\$573,100
Amenities				
Bike Racks (powder coated) and Concrete Pad	EA	1	\$830.00	\$830.00
Signage	EA	1	\$400.00	\$400.00
Steel hinged bollard	EA	1	\$2,100.00	\$2,100.00
Trailhead (including parking area, wheel stops, kiosk)	EA	1	\$45,000.00	\$45,000.00
			SUB-TOTAL	\$48,330
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Design Construction Documents & Engineering (average 15%)		15%		\$172,232.71
Construction Administration (Average 10%)				\$114,821.80
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	4.62	\$5,000.00	\$23,100.00
			SUB-TOTAL	\$317,155
			SUBTOTAL	\$1,465,373
			40% Contingency	\$586,149
			TOTAL	\$2,051,522

Cost assumes wetland delineation done with sewer placement
* earthwork estimated until a grading plan has been developed

Oklawaha Northern Greenway - Section 3-A (1.44 miles)

Probable Cost Estimate
Cost estimates are preliminary and subject to change.

	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$79,629.32
			SUB-TOTAL	\$79,629
Trails (10' WIDE ASPHALT GREENWAY AT 7308 LF, 10' WIDE BRIDGE AT 295 LF)				
Aggregate Base Course (6" ABC Stone)	TN	3,138.00	\$30.00	\$94,140.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	8,150.00	\$11.50	\$93,725.00
Geogrid for Soil Stabilization	SY	1,270.00	\$5.30	\$6,731.00
Paint Pavement Marking Lines, 4"	LF	7,308	\$0.60	\$4,384.80
			SUB-TOTAL	\$198,981
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	5.03	\$6,000.00	\$30,180.00
Grading	LS	1	\$200,000.00	\$200,000.00
Clearing and Grubbing	AC	3.3	\$9,000.00	\$29,700.00
Undercut Excavation	CY	850	\$18.00	\$15,300.00
Temporary Silt Fence	LF	12,800	\$4.00	\$51,200.00
Seeding and Mulching	AC	1.7	\$5,000.00	\$8,500.00
Import Suitable Material	CY	975	\$18.00	\$17,550.00
6" Underdrain with Fabric & Stone	LF	100	\$15.00	\$1,500.00
18" HDPE Pipe Culverts	LF	140	\$40.00	\$5,600.00
48" R.C. Pipe Culverts, Class 4	LF	80	\$185.00	\$14,800.00
Chain Link Fence, 72" (Railroad)	LF	3,575	\$25.00	\$89,375.00
Rip Rap, Class B	TN	40	\$48.00	\$1,920.00
Slope Matting	SY	2,600	\$4.50	\$11,700.00
			SUB-TOTAL	\$477,325
Structures				
Abutment	LS	2	\$30,000.00	\$60,000.00
Prefabricated Pedestrian Bridge (1@ 65')	LF	65	\$900.00	\$58,500.00
Bridge Installation	LF	65	\$217.00	\$14,105.00
48" R.C. Box Culverts, Class 4	LF	40	\$185.00	\$7,400.00
Bridge(1@230')	LF	230	\$7,600.00	\$1,748,000.00
Upgrade Signal for Crossing - Highway 25	LS	1	\$40,000.00	\$40,000.00
RR Crossing	LS	1	\$50,000.00	\$50,000.00
			SUB-TOTAL	\$1,978,005
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Flood Modeling/No Rise (average Cost)	LS	1	\$25,000.00	\$25,000.00
Wetland Delineation	AC	0.48	\$1,000.00	\$480.00
Design Construction Documents & Engineering (average 15%)		15%		\$410,091.02
Construction Administration (Average 10%)				\$273,394.01
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	5.03	\$5,000.00	\$25,150.00
			SUB-TOTAL	\$741,115.0
			SUBTOTAL	\$3,475,055
			40% Contingency	\$1,390,022
			TOTAL	\$4,865,077

* earthwork estimated until a grading plan has been developed

NOTES: 1) Cost estimates are preliminary and subject to change. Inflation of 20-30% annual of cost should be considered when using for future planning and implementation. 2) Suitable material is a placeholder cost only. 3) Do not use cost estimates for grant application after September 2019, without verifying costs with a professional estimator. This excludes land acquisition costs and any cost required for wetland and stream mitigation.

Oklawaha Northern Greenway - Section 3-F (1.18 miles)

Probable Cost Estimate
Cost estimates are preliminary and subject to change.

	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$59,032.35
			SUB-TOTAL	\$59,032
Trails (10' WIDE ASPHALT GREENWAY AT 6100 LF, 10' WIDE BRIDGE AT 130 LF)				
Aggregate Base Course (6" ABC stone)	TN	2,760	\$30.00	\$82,800.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	7,170	\$11.50	\$82,455.00
Geogrid for Soil Stabilization	SY	5,250	\$5.30	\$27,825.00
Paint Pavement Marking Lines, 4"	LF	6,100	\$0.60	\$3,660.00
			SUB-TOTAL	\$196,740
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	4.20	\$6,000.00	\$25,200.00
Grading	LS	1	\$175,000.00	\$175,000.00
Clearing and Grubbing	AC	3	\$9,000.00	\$27,000.00
Undercut Excavation	CY	3,500	\$18.00	\$63,000.00
Temporary Silt Fence	LF	11,200	\$4.00	\$44,800.00
Seeding and Mulching	AC	1.5	\$5,000.00	\$7,500.00
Slope Matting	SY	100	\$4.50	\$450.00
6" Underdrain with Fabric & Stone	LF	100	\$15.00	\$1,500.00
18" R.C. Pipe Culverts, Class 4	LF	60	\$60.00	\$3,600.00
48" R.C. Pipe Culverts, Class 4	LF	20	\$185.00	\$3,700.00
Chain Link Fence, 72" (Railroad)	LF	870	\$25.00	\$21,750.00
Rip Rap, Class B	TN	40	\$48.00	\$1,920.00
Import Suitable Material	CY	4,020	\$18.00	\$72,360.00
			SUB-TOTAL	\$447,780
Structures				
Prefabricated Pedestrian Bridge (1 @150')	LF	150	\$7,600.00	\$1,140,000.00
Boardwalk	LF	300	\$217.00	\$65,100.00
Boardwalk Installation	LF	300	\$217.00	\$65,100.00
Flasher and high visibility at grade crossing -Brookside Camp Road	LS	1	\$51,700.00	\$51,700.00
			SUB-TOTAL	\$1,321,900
Amenities				
Trash & Recycle Receptacles	EA	1	\$925.00	\$925.00
Signage	EA	1	\$400.00	\$400.00
			SUB-TOTAL	\$1,325
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Flood Modeling/No Rise (average cost)	LS	1	\$25,000.00	\$25,000.00
Wetland Delineation	AC	0.62	\$1,000.00	\$620.00
Design Construction Documents & Engineering (average 15%)		15%		\$304,016.60
Construction Administration (average 10%)				\$202,677.74
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	4.20	\$5,000.00	\$21,000.00
			SUB-TOTAL	\$560,314
			SUBTOTAL	\$2,587,092
			40% Contingency	\$1,034,837
			TOTAL	\$3,621,928

* earthwork estimated until a grading plan has been developed

Oklawaha Northern Greenway - Section 3-J (1.10 miles)

Probable Cost Estimate
Cost estimates are preliminary and subject to change.

	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$49,502.42
			SUB-TOTAL	\$49,502
Trails (10' WIDE ASPHALT GREENWAY AT 5508 LF, 10' WIDE BRIDGE AT 300 LF)				
Aggregate Base Course (6" ABC Stone)	TN	2,470	\$30.00	\$74,100.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	6,420	\$11.50	\$73,830.00
Geogrid for Soil Stabilization	SY	6,320	\$5.30	\$33,496.00
Paint Pavement Marking Lines, 4"	LF	5,508	\$0.60	\$3,304.80
			SUB-TOTAL	\$184,731
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	3.80	\$6,000.00	\$22,800.00
Grading	LS	1	\$155,000.00	\$155,000.00
Clearing and Grubbing	AC	2.60	\$9,000.00	\$23,400.00
Undercut Excavation	CY	4,200	\$18.00	\$75,600.00
Temporary Silt Fence	LF	10,100	\$4.00	\$40,400.00
Seeding and Mulching	AC	1.30	\$5,000.00	\$6,500.00
Import Suitable Material	CY	4,850	\$18.00	\$87,300.00
6" Underdrain with Fabric & Stone	LF	100	\$15.00	\$1,500.00
18" R.C. Pipe Culverts, Class 4	LF	20	\$60.00	\$1,200.00
48" R.C. Pipe Culverts, Class 4	LF	40	\$185.00	\$7,400.00
Rip Rap, Class B	TN	40	\$48.00	\$1,920.00
Slope Matting	SY	100	\$4.50	\$450.00
			SUB-TOTAL	\$423,470
Structures				
48" R.C. Box Culverts, Class 4	LF	20	\$185.00	\$3,700.00
Prefabricated Pedestrian Bridge (1 @130')	LF	130	\$7,600.00	\$988,000.00
			SUB-TOTAL	\$991,700
Amenities				
Trash & Recycle Receptacles	EA	2	\$925.00	\$1,850.00
Bike Racks (powder coated) and Concrete Pad	EA	1	\$830.00	\$830.00
Signage	EA	1	\$400.00	\$400.00
Steel hinged bollard	EA	1	\$2,100.00	\$2,100.00
Trailhead (including parking area, wheel stops, kiosk)	EA	1	\$45,000.00	\$45,000.00
			SUB-TOTAL	\$50,180
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Design Construction Documents & Engineering (average 15%)		15%		\$254,937.48
Wetland Delineation	AC	0.48	\$1,000.00	\$480.00
Flood Modeling/No Rise (average cost)	LS	1	\$25,000.00	\$25,000.00
Construction Administration (average 10%)				\$169,958.32
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	3.80	\$5,000.00	\$19,000.00
			SUB-TOTAL	\$476,376
			SUBTOTAL	\$2,175,959
			40% Contingency	\$870,384
			TOTAL	\$3,046,343

* earthwork estimated until a grading plan has been developed

NOTES: 1) Cost estimates are preliminary and subject to change. Inflation of 20-30% annual of cost should be considered when using for future planning and implementation. 2) Suitable material is a placeholder cost only. 3) Do not use cost estimates for grant application after September 2019, without verifying costs with a professional estimator. This excludes land acquisition costs and any cost required for wetland and stream mitigation.

Oklawaha Northern Greenway - Section 4-A (1.43 miles)

Probable Cost Estimate
 Cost estimates are preliminary and subject to change.

	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$24,059.52
			SUB-TOTAL	\$24,060
Trails (10' WIDE ASPHALT GREENWAY AT 7550.4 LF)				
Aggregate Base Course (6" ABC Stone)	TN	3,080.00	\$30.00	\$92,400.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	8,000.00	\$11.50	\$92,000.00
Geogrid for Soil Stabilization	SY	1,200.00	\$5.30	\$6,360.00
Paint Pavement Marking Lines, 4"	LF	7,550	\$0.60	\$4,530.00
			SUB-TOTAL	\$195,290
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	5.20	\$6,000.00	\$31,200.00
Grading	LS	1	\$195,000.00	\$195,000.00
Clearing and Grubbing	AC	3.30	\$9,000.00	\$29,700.00
Undercut Excavation	CY	800	\$18.00	\$14,400.00
Temporary Silt Fence	LF	12,600	\$4.00	\$50,400.00
Seeding and Mulching	AC	1.70	\$5,000.00	\$8,500.00
Import Suitable Material	CY	920	\$18.00	\$16,560.00
6" Underdrain with Fabric & Stone	LF	100	\$15.00	\$1,500.00
18" HDPE Pipe Culverts	LF	100	\$40.00	\$4,000.00
18" R.C. Pipe Culverts, Class 4	LF	40	\$60.00	\$2,400.00
48" R.C. Pipe Culverts, Class 4	LF	40	\$185.00	\$7,400.00
Rip Rap, Class B	TN	18	\$48.00	\$864.00
Slope Matting	SY	4,120	\$4.50	\$18,540.00
			SUB-TOTAL	\$380,464
Structures				
48" R.C. Box Culverts, Class 4	LF	40	\$185.00	\$7,400.00
Proposed Chain Link Fence, 72"	LF	350	\$25.00	\$8,750.00
Gravity Type Retaining Wall	SF	1,260	\$75.00	\$94,500.00
			SUB-TOTAL	\$110,650
Amenities				
Trash & Recycle Receptacles	EA	2	\$925.00	\$1,850.00
Safety Railings (galvanized steel)	LF	1,000	\$65.00	\$65,000.00
Bike Racks (powder coated) and Concrete Pad	EA	1	\$830.00	\$830.00
Signage	EA	2	\$400.00	\$800.00
Steel hinged bollard	EA	1	\$2,100.00	\$2,100.00
Trailhead (including parking area, wheel stops, kiosk)	EA	1	\$45,000.00	\$45,000.00
			SUB-TOTAL	\$115,580
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Flood Modeling/No Rise (average cost)	LS	1	\$25,000.00	\$25,000.00
Design Construction Documents & Engineering (average 15%)		15%		\$123,906.53
Construction Administration (average 10%)				\$82,604.35
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	5.20	\$5,000.00	\$26,000.00
			SUB-TOTAL	\$264,511
SUBTOTAL				\$1,090,554
40% Contingency				\$436,222
TOTAL				\$1,526,776

* earthwork estimated until a grading plan has been developed

END OF
 NORTHERN EXTENSION
 COST ESTIMATES

NOTES: 1) Cost estimates are preliminary and subject to change. Inflation of 20-30% annual of cost should be considered when using for future planning and implementation. 2) Suitable material is a placeholder cost only. 3) Do not use cost estimates for grant application after September 2019, without verifying costs with a professional estimator. This excludes land acquisition costs and any cost required for wetland and stream mitigation.

Oklawaha Greenway/ Section 5 (0.9 miles)				
Probable Cost Estimate				
Cost estimates are preliminary and subject to change.				
	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$14,028.75
			SUB-TOTAL	\$14,029
Trails (10' WIDE ASPHALT GREENWAY AT 3782 LF, 900 LF PAINTED ON-ROAD)				
Aggregate Base Course (6" ABC Stone)	TN	945	\$30.00	\$28,350.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	1,400	\$11.50	\$16,100.00
Geogrid for Soil Stabilization	SY	900	\$5.30	\$4,770.00
Paint Pavement Marking Lines (restriping and delineators)	LF	900	\$23.00	\$20,700.00
			SUB-TOTAL	\$69,920
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	3.20	\$6,000.00	\$19,200.00
Grading	LS	1	\$98,332.00	\$98,332.00
Clearing and Grubbing	AC	1.6	\$9,000.00	\$14,670.00
Temporary Silt Fence	LF	3,700	\$4.00	\$14,800.00
Seeding and Mulching	AC	1.60	\$5,000.00	\$8,000.00
6" Underdrain with Fabric & Stone	LF	160	\$34.00	\$5,440.00
Slope Matting	SY	2,900	\$4.50	\$13,050.00
			SUB-TOTAL	\$173,492
Structures				
Abutment	LS	1	\$60,000.00	\$60,000.00
Prefabricated Pedestrian Bridge	LF	40	\$900.00	\$36,000.00
Bridge Installation	LF	40	\$217.00	\$8,680.00
Abutment	LS	1	\$60,000.00	\$60,000.00
Prefabricated Pedestrian Bridge	LF	30	\$900.00	\$27,000.00
Bridge Installation	LF	30	\$217.00	\$6,510.00
			SUB-TOTAL	\$198,190
Amenities				
Trash & Recycle Receptacles	EA	1	\$925.00	\$925.00
Signage	EA	2	\$400.00	\$800.00
Steel hinged bollard	EA	2	\$2,100.00	\$4,200.00
Trailhead kiosk	EA	1	\$20,098.00	\$20,098.00
			SUB-TOTAL	\$26,023
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Design Construction Documents & Engineering (average 15%)		15%		\$72,248.06
Flood Modeling/No Rise (average cost)	LS	1	\$25,000.00	\$25,000.00
Construction Administration (average 10%)				\$48,165.38
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	3.20	\$5,000.00	\$16,000.00
			SUB-TOTAL	\$168,413
			SUBTOTAL	\$650,067
			40% Contingency	\$260,027
			TOTAL	\$910,094
* earthwork estimated until a grading plan has been developed				

Oklawaha Greenway / Section 6 (0.62 miles)				
Probable Cost Estimate				
Cost estimates are preliminary and subject to change.				
	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$8,584.75
			SUB-TOTAL	\$8,585
Trails (10' WIDE ASPHALT GREENWAY AT 4449 LF, 10' WIDE CONCRETE SIDEWALK AT 250 LF)				
Aggregate Base Course (6" ABC stone)	TN	868	\$30.00	\$26,040.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	2,366	\$11.50	\$27,209.00
1.5" Asphalt Overlay	SY	840	\$8.50	\$7,140.00
4" Concrete Sidewalk	SY	120	\$55.00	\$6,600.00
Paint Pavement Marking Lines, 4"	LF	3,248	\$0.60	\$1,948.80
			SUB-TOTAL	\$68,938
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	2.82	\$6,000.00	\$16,920.00
Grading	LS	1	\$85,113.60	\$85,113.60
Clearing and Grubbing	AC	0.1	\$9,000.00	\$900.00
Temporary Silt Fence	LF	3,273	\$4.00	\$13,092.00
Seeding and Mulching	AC	1.1	\$5,000.00	\$5,300.00
Slope Matting	SY	2,130	\$4.50	\$9,585.00
			SUB-TOTAL	\$130,911
Structures				
18" R.C. Pipe Culverts, Class 4	LF	25	\$60.00	\$1,500.00
Gravity Type Retaining Wall	LS	1	\$52,500.00	\$52,500.00
Fence relocation near Mountain School	LF	190	\$10.00	\$1,900.00
High visibility crosswalk - Glover Street	LS	1	\$4,500.00	\$4,500.00
High visibility crosswalk - Jackson Park Road	LS	1	\$4,500.00	\$4,500.00
High visibility crosswalk - Jackson Park Road	LS	1	\$4,500.00	\$4,500.00
			SUB-TOTAL	\$69,400
Amenities				
Trash & Recycle Receptacles	EA	2	\$925.00	\$1,850.00
Bike Racks (powder coated) and Concrete Pad	EA	2	\$830.00	\$1,660.00
Signage	EA	2	\$400.00	\$800.00
Steel hinged bollard	EA	6	\$2,100.00	\$12,600.00
			SUB-TOTAL	\$16,910
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Design Construction Documents & Engineering (average 15%)		15%		\$44,211.47
Construction Administration (Average 10%)				\$29,474.32
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	5.39	\$5,000.00	\$26,950.00
			SUB-TOTAL	\$107,636
			SUBTOTAL	\$402,379
			40% Contingency	\$160,952
			TOTAL	\$563,331
* earthwork estimated until a grading plan has been developed				

NOTES: 1) Cost estimates are preliminary and subject to change. Inflation of 20-30% annual of cost should be considered when using for future planning and implementation. 2) Suitable material is a placeholder cost only. 3) Do not use cost estimates for grant application after September 2019, without v costs with a professional estimator. This excludes land acquisition costs and any cost required for wetland and stream mitigation.

Oklawaha Greenway / Section 6-A (0.27 miles)

Probable Cost Estimate				
Cost estimates are preliminary and subject to change.				
	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$9,215.95
				SUB-TOTAL
				\$9,216
Trails (10' WIDE ASPHALT GREENWAY AT 1425 LF)				
Aggregate Base Course (6" ABC stone)	TN	372	\$30.00	\$11,160.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	1,014	\$11.50	\$11,661.00
4" Concrete Sidewalk	SY	120	\$55.00	\$6,600.00
Paint Pavement Marking Lines, 4"	LF	1,392	\$0.60	\$835.20
				SUB-TOTAL
				\$30,256
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	0.44	\$6,000.00	\$2,640.00
Grading	LS	1	\$37,000.00	\$37,000.00
Clearing and Grubbing	AC	0.3	\$9,000.00	\$2,880.00
Undercut Excavation	CY	62	\$18.00	\$1,116.00
Temporary Silt Fence	LF	1,665	\$4.00	\$6,660.00
Seeding and Mulching	AC	0.3	\$5,000.00	\$1,650.00
Import Suitable Material	CY	62	\$18.00	\$1,116.00
6" Underdrain with Fabric & Stone	LF	200	\$34.00	\$6,800.00
				SUB-TOTAL
				\$59,862
Structures				
Abutment	LS	1	\$60,000.00	\$60,000.00
Prefabricated Pedestrian Bridge	LF	40	\$900.00	\$36,000.00
Bridge Installation	LF	40	\$217.00	\$8,680.00
18" HDPE Pipe Culverts	LF	100	\$40.00	\$4,000.00
Gravity Type Retaining Wall	LS	1	\$52,500.00	\$52,500.00
High visibility crosswalk with flasher - New Hope Road	LS	1	\$51,700.00	\$51,700.00
				SUB-TOTAL
				\$212,880
Amenities				
Steel hinged bollard	EA	2	\$2,100.00	\$4,200.00
				SUB-TOTAL
				\$4,200
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Flood Modeling/No Rise (average Cost)	LS	1	\$25,000.00	\$25,000.00
Design Construction Documents & Engineering (average 15%)		15%		\$47,462.12
Construction Administration (Average 10%)				\$31,641.41
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	5.39	\$5,000.00	\$26,950.00
				SUB-TOTAL
				\$138,054
				SUBTOTAL
				\$454,468
				40% Contingency
				\$181,787
				TOTAL
				\$636,255

* earthwork estimated until a grading plan has been developed

Oklawaha Southern Greenway - Boardwalk Alternate (0.01 miles)

Probable Cost Estimate				
Cost estimates are preliminary and subject to change.				
	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$6,864.15
				SUB-TOTAL
				\$6,864
Trails (10' WIDE ASPHALT GREENWAY AT 201 LF)				
Aggregate Base Course (6" ABC Stone)	TN	50	\$30.00	\$1,500.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	223	\$11.50	\$2,564.50
Geogrid for Soil Stabilization	SY	223	\$5.30	\$1,181.90
Paint Pavement Marking Lines, 4"	LF	201	\$0.60	\$120.60
				SUB-TOTAL
				\$5,367
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	0.14	\$6,000.00	\$840.00
Grading	LS	1	\$5,226.00	\$5,226.00
Clearing and Grubbing	AC	0.1	\$9,000.00	\$1,260.00
Temporary Silt Fence	LF	200	\$4.00	\$800.00
Seeding and Mulching	AC	0.1	\$5,000.00	\$700.00
Import Suitable Material	CY	74	\$18.00	\$1,332.00
6" Underdrain with Fabric & Stone	LF	25	\$34.00	\$850.00
				SUB-TOTAL
				\$11,008
Structures				
Boardwalk	LF	485	\$221.00	\$107,185.00
Boardwalk Installation	LF	485	\$217.00	\$105,245.00
				SUB-TOTAL
				\$212,430
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Flood Modeling/No Rise (average Cost)	LS	1	\$25,000.00	\$25,000.00
Wetland Delineation	AC	0.5	\$1,000.00	\$500.00
Design Construction Documents & Engineering (average 15%)		15%		\$35,350.37
Construction Administration (Average 10%)				\$23,566.92
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	1.75	\$5,000.00	\$8,750.00
				SUB-TOTAL
				\$100,167
				SUBTOTAL
				\$335,836
				30% Contingency
				\$100,751
				TOTAL
				\$436,587

* earthwork estimated until a grading plan has been developed

NOTES: 1) Cost estimates are preliminary and subject to change. Inflation of 20-30% annual of cost should be considered when using for future planning and implementation. 2) Suitable material is a placeholder cost only. 3) Do not use cost estimates for grant application after September 2019, without verifying costs with a professional estimator. This excludes land acquisition costs and any cost required for wetland and stream mitigation.

Oklawaha Southern Greenway / Section 5-F (0.71 miles)

Probable Cost Estimate				
Cost estimates are preliminary and subject to change.				
	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$16,875.39
				SUB-TOTAL
				\$16,875
Trails (10' WIDE ASPHALT GREENWAY AT 3749 LF)				
Aggregate Base Course (6" ABC stone)	TN	1,350	\$30.00	\$40,500.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	3,875	\$11.50	\$44,562.50
1.5" Asphalt Overlay	SY	350	\$8.50	\$2,975.00
Geogrid for Soil Stabilization	SY	4,875	\$5.30	\$25,837.50
Paint Pavement Marking Lines, 4"	LF	3,520	\$0.60	\$2,112.00
				SUB-TOTAL
				\$115,987
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	2.58	\$6,000.00	\$15,480.00
Grading	LS	1	\$92,000.00	\$92,000.00
Clearing and Grubbing	AC	0.8	\$9,000.00	\$7,290.00
Undercut Excavation	CY	52	\$18.00	\$936.00
Temporary Silt Fence	LF	3,105	\$4.00	\$12,420.00
Seeding and Mulching	AC	0.8	\$5,000.00	\$4,050.00
Slope Matting	SY	360	\$4.50	\$1,620.00
Import Suitable Material	CY	170	\$18.00	\$3,060.00
6" Underdrain with Fabric & Stone	LF	100	\$34.00	\$3,400.00
				SUB-TOTAL
				\$140,256
Structures				
Asphalt Apron	EA	3	\$1,500.00	\$4,500.00
Small Bridge (less than 15')	EA	1	\$20,000.00	\$20,000.00
18" HDPE Pipe Culverts	LF	100	\$40.00	\$4,000.00
18" R.C. Pipe Culverts, Class 4	LF	25	\$60.00	\$1,500.00
High visibility crosswalk with flasher - Airport Road	LS	1	\$51,700.00	\$51,700.00
				SUB-TOTAL
				\$81,700
Amenities				
Trash & Recycle Receptacles	EA	2	\$925.00	\$1,850.00
Safety Railings (galvanized steel) -estimated at 30% of the greenway corridor	LF	1,520	\$146.00	\$221,920.00
Signage	EA	2	\$400.00	\$800.00
				SUB-TOTAL
				\$224,570
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Flood Modeling/No Rise (average cost)	LS	1	\$25,000.00	\$25,000.00
Design Construction Documents & Engineering (average 15%)		15%		\$86,908.26
Construction Administration (average 10%)				\$57,938.84
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	4.30	\$5,000.00	\$21,500.00
				SUB-TOTAL
				\$198,347
SUBTOTAL				\$777,735
40% Contingency				\$311,094
TOTAL				\$1,088,830

* earthwork estimated until a grading plan has been developed

Oklawaha Greenway/ Section 6-B (0.25 miles)

Probable Cost Estimate				
Cost estimates are preliminary and subject to change.				
	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$8,975.73
				SUB-TOTAL
				\$8,975
Trails (10' WIDE ASPHALT GREENWAY AT 3749 LF)				
Aggregate Base Course (6" ABC Stone)	TN	410	\$30.00	\$12,300.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	1,190	\$11.50	\$13,685.00
Geogrid for Soil Stabilization	SY	1,550	\$5.30	\$8,215.00
Paint Pavement Marking Lines, 4"	LF	1,120	\$0.60	\$672.00
				SUB-TOTAL
				\$34,872
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	0.93	\$6,000.00	\$5,580.00
Grading	LS	1	\$30,000.00	\$30,000.00
Clearing and Grubbing	AC	0.3	\$9,000.00	\$2,250.00
Undercut Excavation	CY	25	\$18.00	\$450.00
Temporary Silt Fence	LF	1,080	\$4.00	\$4,320.00
Seeding and Mulching	AC	0.25	\$5,000.00	\$1,250.00
Import Suitable Material	CY	25	\$18.00	\$450.00
6" Underdrain with Fabric & Stone	LF	100	\$34.00	\$3,400.00
				SUB-TOTAL
				\$47,700
Structures				
48" R.C. Box Culverts, Class 4	LF	40	\$185.00	\$7,400.00
Abutment (for bridge on Bat Fork)	LS	1	\$60,000.00	\$60,000.00
Prefabricated Pedestrian Bridge (for bridge on Bat Fork)	LF	50	\$900.00	\$45,000.00
Bridge Installation (for bridge on Bat Fork)	LF	50	\$217.00	\$10,850.00
High visibility crosswalk -College Drive	LS	1	\$4,500.00	\$4,500.00
				SUB-TOTAL
				\$127,750
Amenities				
Trash & Recycle Receptacles	EA	1	\$925.00	\$925.00
Safety Railings (galvanized steel) -estimated at 30% of the greenway corridor	LF	396	\$146.00	\$57,816.00
Bike Racks (powder coated) and Concrete Pad	EA	1	\$830.00	\$830.00
Signage	EA	2	\$400.00	\$800.00
Steel hinged bollard	EA	4	\$2,100.00	\$8,400.00
Trailhead kiosk	EA	1	\$20,098.00	\$20,098.00
				SUB-TOTAL
				\$88,869
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Wetland Delineation	AC	0.4	\$1,000.00	\$400.00
Design Construction Documents & Engineering (average 15%)		15%		\$46,225.01
Construction Administration (average 10%)				\$30,816.67
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	1.50	\$5,000.00	\$7,500.00
				SUB-TOTAL
				\$91,942
SUBTOTAL				\$400,108
40% Contingency				\$160,043
TOTAL				\$560,152

* earthwork estimated until a grading plan has been developed

NOTES: 1) Cost estimates are preliminary and subject to change. Inflation of 20-30% annual of cost should be considered when using for future planning and implementation. 2) Suitable material is a placeholder cost only. 3) Do not use cost estimates for grant application after September 2019, without verifying costs with a professional estimator. This excludes land acquisition costs and any cost required for wetland and stream mitigation.

Oklawaha Southern Greenway - Section 5-A (0.68 miles)

Probable Cost Estimate
Cost estimates are preliminary and subject to change.

	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$19,860.75
			SUB-TOTAL	\$19,861
Trails (10' WIDE ASPHALT GREENWAY AT 3590 LF)				
Aggregate Base Course (6" ABC Stone)	TN	1,835	\$30.00	\$55,050.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	5,250	\$11.50	\$60,375.00
Geogrid for Soil Stabilization	SY	4,460	\$5.30	\$23,638.00
5-A ADA - Accessible Pathway	LF	858	\$200.00	\$171,600.00
Paint Pavement Marking Lines, 4"	LF	4,720	\$0.60	\$2,832.00
			SUB-TOTAL	\$313,495
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	2.47	\$6,000.00	\$14,820.00
Grading	LS	1	\$123,000.00	\$123,000.00
Clearing and Grubbing	AC	1.1	\$9,000.00	\$9,900.00
Undercut Excavation	CY	110	\$18.00	\$1,980.00
Temporary Silt Fence	LF	7,680	\$4.00	\$30,720.00
Seeding and Mulching	AC	1.1	\$5,000.00	\$5,500.00
Slope Matting	SY	2,000	\$4.50	\$9,000.00
Import Suitable Material	CY	120	\$18.00	\$2,160.00
6" Underdrain with Fabric & Stone	LF	100	\$34.00	\$3,400.00
			SUB-TOTAL	\$200,480
Structures				
Abutment	LS	1	\$60,000.00	\$60,000.00
Prefabricated Pedestrian Bridge	LF	50	\$900.00	\$45,000.00
Bridge Installation	LF	50	\$217.00	\$10,850.00
Boardwalk	LF	50	\$221.00	\$11,050.00
Boardwalk Installation	LF	50	\$217.00	\$10,850.00
High visibility crosswalk -Substation Street	LS	1	\$4,500.00	\$4,500.00
			SUB-TOTAL	\$142,250
Amenities				
Signage	EA	4	\$400.00	\$1,600.00
Steel hinged bollard	EA	2	\$2,100.00	\$4,200.00
			SUB-TOTAL	\$5,800
Survey, Design & Permitting				
Design Construction Documents & Engineering (average 15%)		15%		\$102,282.86
Construction Administration (Average 10%)				\$68,188.58
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width	AC	4.12	\$5,000.00	\$20,600.00
			SUB-TOTAL	\$191,071
			SUBTOTAL	\$872,957
			40% Contingency	\$349,183
			TOTAL	\$1,222,140

* earthwork estimated until a grading plan has been developed

NOTES: 1) Cost estimates are preliminary and subject to change. Inflation of 20-30% annual of cost should be considered when using for future planning and implementation. 2) Suitable material is a placeholder cost only. 3) Do not use cost estimates for grant application after September 2019, without verifying costs with a professional estimator. This excludes land acquisition costs and any cost required for wetland and stream mitigation.

Southern Oklawaha Greenway Section 5-E (1.27 miles)

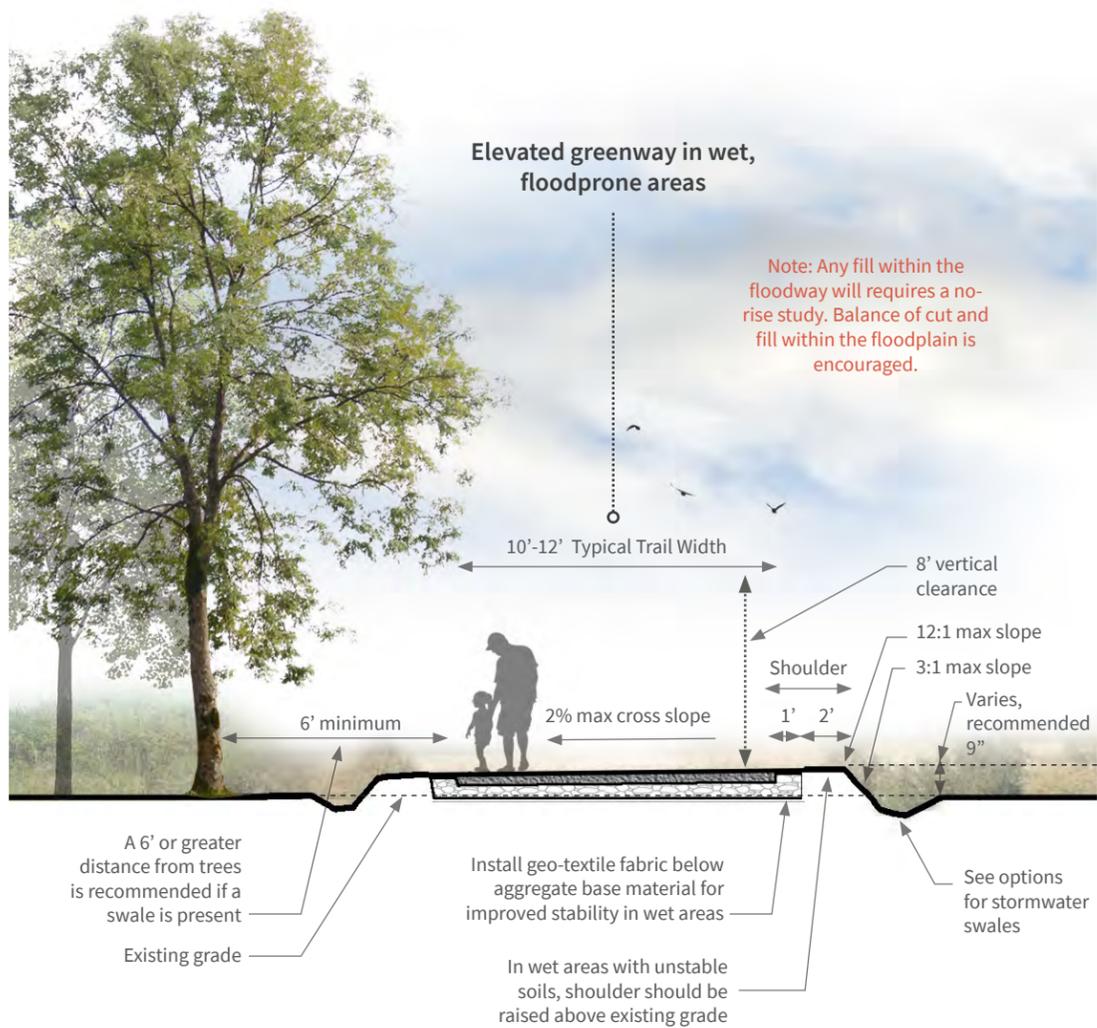
Probable Cost Estimate
Cost estimates are preliminary and subject to change.

	Units	Quantity	Cost Per Unit	Costs
*Mobilization				
Mobilization	LS	1	3% of construction Cost	\$32,955.20
			SUB-TOTAL	\$32,955
Trails (10' WIDE ASPHALT GREENWAY AT 6706 LF)				
Aggregate Base Course (6" ABC Stone)	TN	2,510	\$30.00	\$75,300.00
1.5" Asphalt Concrete Surface Course, Type S9.5C	SY	7,160	\$11.50	\$82,340.00
Geogrid for Soil Stabilization	SY	375	\$5.30	\$1,987.50
Paint Pavement Marking Lines, 4"	LF	6,665	\$0.60	\$3,999.00
			SUB-TOTAL	\$163,627
Site Work				
Erosion Control (cost range is 3,000-9,000/ac.)	AC	4.62	\$6,000.00	\$27,720.00
Grading	LS	1	\$170,000.00	\$170,000.00
Clearing and Grubbing	AC	1.5	\$9,000.00	\$13,500.00
Undercut Excavation	CY	150	\$18.00	\$2,700.00
Temporary Silt Fence	LF	5,400	\$4.00	\$21,600.00
Seeding and Mulching	AC	1.5	\$5,000.00	\$7,500.00
Slope Matting	SY	2,000	\$4.50	\$9,000.00
Import Suitable Material	CY	1,850	\$18.00	\$33,300.00
6" Underdrain with Fabric & Stone	LF	100	\$34.00	\$3,400.00
			SUB-TOTAL	\$288,720
Structures				
Railroad Crossings	EA	1	\$50,000.00	\$50,000.00
48" HDPE Pipe Culverts	LF	40	\$72.00	\$2,880.00
18" R.C. Pipe Culverts, Class 4	LF	100	\$60.00	\$6,000.00
Proposed Chain Link Fence, 72"	LF	1,500	\$25.00	\$37,500.00
Abutment (bridge at King Creek)	LS	1	\$60,000.00	\$60,000.00
Prefabricated Pedestrian Bridge (bridge at King Creek)	LF	50	\$900.00	\$45,000.00
Bridge Installation (bridge at King Creek)	LF	50	\$217.00	\$10,850.00
High visibility crosswalk -Edney Street	LS	1	\$4,500.00	\$4,500.00
High visibility crosswalk -Brooklyn Avenue	LS	1	\$4,500.00	\$4,500.00
High visibility crosswalk -Shepherd Street	LS	1	\$4,500.00	\$4,500.00
Crossing under HWY 176 Structure/ Fencing	LS	1	\$400,000.00	\$400,000.00
Chain link fence removal	LF	100	\$5.00	\$500.00
			SUB-TOTAL	\$626,230
Amenities				
Trash & Recycle Receptacles	EA	4	\$925.00	\$3,700.00
Bike Racks (powder coated) and Concrete Pad	EA	1	\$830.00	\$830.00
Signage	EA	7	\$400.00	\$2,800.00
Steel hinged bollard	EA	6	\$2,100.00	\$12,600.00
			SUB-TOTAL	\$19,930
Survey, Design & Permitting				
Environmental Permitting 401/404 (excludes brownfields)	LS	1	\$7,000.00	\$7,000.00
Flood Modeling/No Rise (average cost)	LS	1	\$25,000.00	\$25,000.00
Design Construction Documents & Engineering (average 15%)		15%		\$169,719.25
Construction Administration (average 10%)				\$113,146.17
Surveying (control, anthropogenic features, topography, substantial trees anticipated within primary use areas and contiguous trail/road areas) based on a 50' width.	AC	7.69	\$5,000.00	\$38,450.00
			SUB-TOTAL	\$353,315
			SUBTOTAL	\$1,484,777
			40% Contingency	\$593,911
			TOTAL	\$2,078,688



APPENDIX
D

Design Details



Greenways in *Flood-prone Areas*



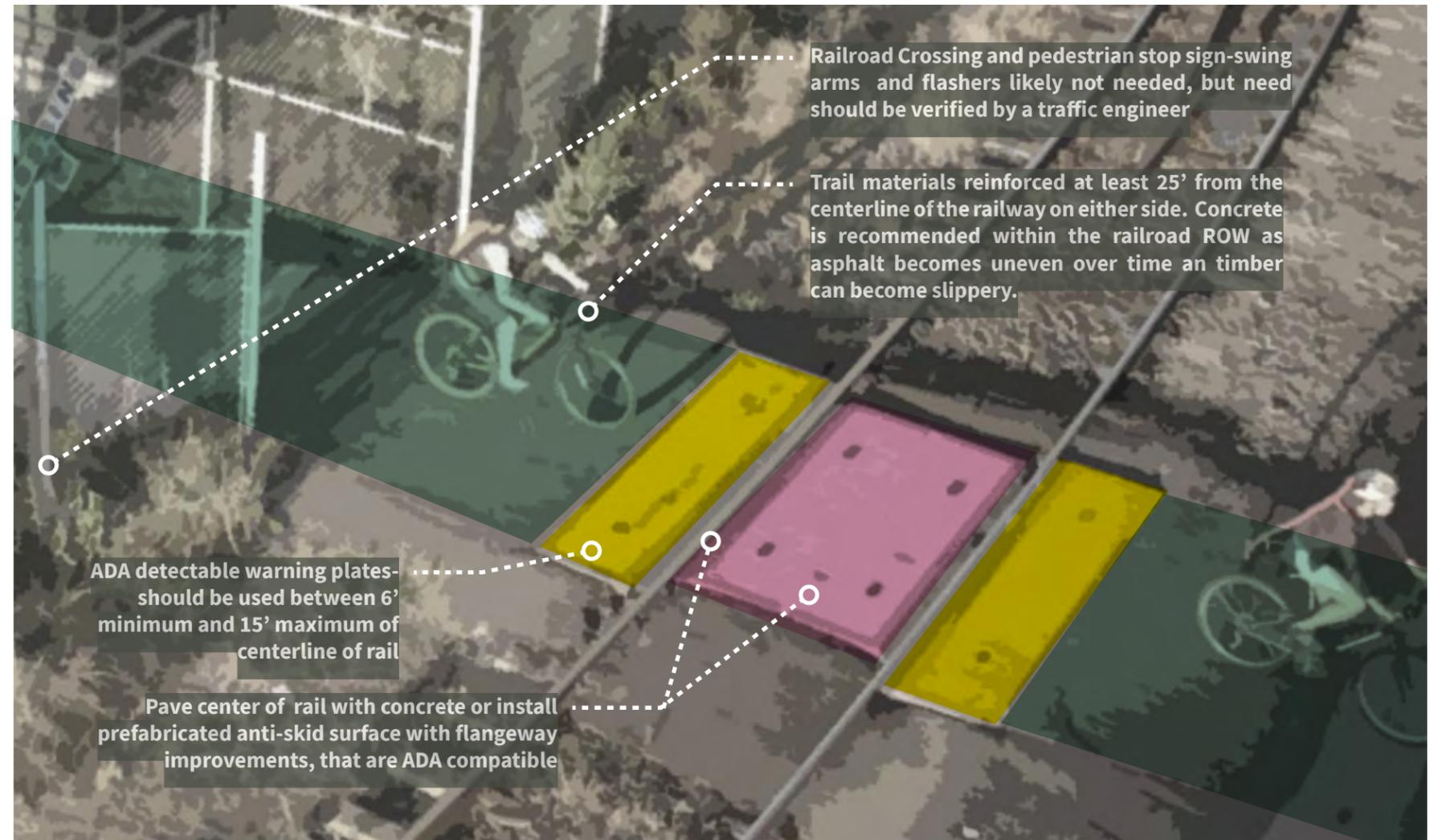
Greenways are commonly built in flood-prone areas and can be designed to regularly receive flooding but quickly drain away flood waters. While post-flooding maintenance may be required if sediment or debris is left, a well designed greenway will not be damaged by routine flooding.

The above cross section includes typical components which include an elevated greenway with swales, a wide shoulder of compacted gravel and earth to prevent erosion and sloughing of the asphalt.



Swales are crucial to greenways in flood-prone areas and can be either by a grass swale, or a wetland swale if water table levels are high. Dry swales are typically planted with grasses and should not be mowed to allow for maximum infiltration of water. The wetland swale is appropriate where the water table is high or stormwater collects for longer periods of time.

DESIGN DETAILS



Greenways that interface with *Railroad Crossings*

MAKING RAILROAD CROSSINGS SAFER. Retrofitting railroad crossings for greenway users is important for safety and for accessibility requirements. Typically many railroads will have stringent requirements for crossing and paralleling railroads. The Blue Ridge Southern Railroad's requirements, per conversation with their manager, have suggested their requirements are less stringent for crossings as they have not required flashers and gates for the existing Oklawaha where it crosses their rail line. The majority of the rail line where it interfaces with the greenway is used late at night, greatly reducing chances of conflict.

Other safety improvements that are highly recommended from a liability standpoint are the following:

- Crossing perpendicular to the track. Greenways should always cross perpendicular to the track.
- Improved crossing, including surface and gaps, through the use of flangeways and poured concrete. See more about this to the right.
- Use of variable MUTCD signs.

COMPONENTS OF A SAFE CROSSING.

Design for each crossing will vary but should contain some of the following features:

- **Flangeway improvements:** The flangeway is the filling between the rail and greenway surface. This can be particularly dangerous to bicyclists whose tires can be caught in the flangeway. Prefabricated fillers are recommended. These fillers should also address ADA issues, to allow for safe crossings for those of wheelchairs or with canes.

- **Signage Improvements:** Need for detectable flashers and gates should be determined at the next phase. A pedestrian stop sign and railroad crossing sign should be present at all crossings.





Wickcraft Douglas Center Project
Retrieved from wickcraft.com May 2019

Greenways that require Boardwalks

Most boardwalks are installed as proprietary and have many components where design, economic, and safety considerations can be made.



From left to right: Wickcraft-City Line Park, Wickcraft Biloxi Lighthouse, Permatrak footers, Wickcraft-Midland and Old Pond Park

Types of Boardwalks and their Components

THE BASE. Typical bases are steel frame or wood frame, however they can be concrete. Factors to consider when choosing a base material are weight, longevity, cost, impact, and flexibility of design.

The wood frame is the most typical boardwalk frame seen and may be the cheapest, however it has limitations. The durability of wood can not compete with steel or concrete. The construction of a wood frame allows it to be the most easily customized.

The steel frame can be designed to be modular, making installation easier while also having the capabilities of being adjustable, compensating for earth settling and unexpected water fluctuations. Steel frames are typically proprietary to brands such as Wickcraft.

The concrete frame is extremely durable and has a structural stability that can allow for great pressure applied to it. A concrete frame may be desirable when heavy vehicles may need to use the boardwalk. Cost may be prohibitive for this option.



WOOD



STEEL



CONCRETE

THE DECKING. Decking can be pre-purchased, custom made, and/or milled locally, providing several options for custom design, cost, and style.

Material Types:

↑ Longevity

↓ Longevity

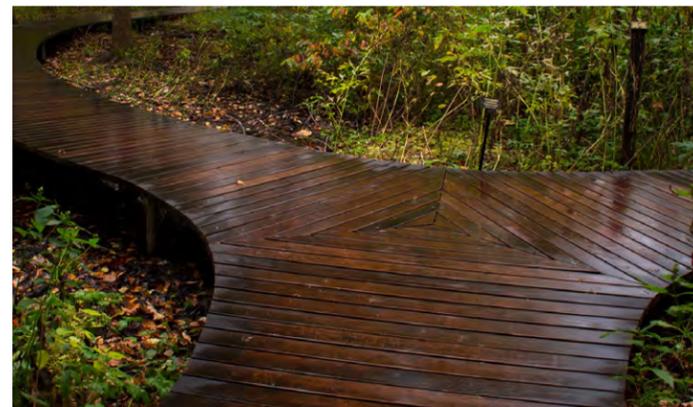
↑ Cost

↓ Cost

- Cyprus
- Oak
- Concrete
- Structural Composite

- Yellow pine
- Non-structural Composite

{Note: not all wood is appropriate for decking, consult a local timber supply specialist}



Wickcraft Eloise-Buttler Wildflower Garden. Courtesy of Wickcraft. The wood for the decking was milled locally with Ash trees removed from site. The custom design allowed for elegant curves and unique decking details.

THE FOOTERS. Footer considerations are made based on local site conditions. Sensitive areas may require a lighter touch for permitting reasons. The force/flow of water will also influence the necessary sturdiness of the footer.

The pan footer is proprietary to Wickcraft and typically sits on the ground, but can also be paired with earth anchors or concrete footers to increase its strength against lateral forces. Concrete footers can range in size and depth. Helical piers can be used in conditions where soils are challenging.



PAN FOOTER



CONCRETE FOOTER



HELICAL PIER

From left to right: Wickcraft (Proprietary design), Permatrak concrete pier, Moisture Lock- www.moisturelock.com.

THE RAILINGS and CURBS. Railings should be used in the following conditions....

- There will be heavy bicycle use
- If the boardwalk is 30" off of the ground or above water (check local building code)

Railings should....

- Be anywhere from 42" to 54" tall per local code
- Have no larger than 4" gaps between rails or pickets and no more than a 2" gap from the bottom

Railing material can be made of....

- Wood
- Galvanized steel
- Stainless steel
- Aluminum
- Cable wires
- Fiberglass

Railings can be decorative and are good opportunities to provide interpretive materials and placement of way-finding signage.

Curbs may be used where drops are less than 30". Curbs are good options for wheel stops in areas where ADA considerations are made.



From top to bottom: Wickcraft-MN Wildlife Valley Refuge, Wickcraft-City Line Park, Wickcraft-Eloise, Wickcraft-TX I-20 Preserve.