

TOWN OF NAVASSA

COMPREHENSIVE BICYCLE AND

PEDESTRIAN PLAN

July 2022



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ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

In collaboration with NCDOT Integrated Mobility Division, the Town of Navassa, and the Wilmington Urban Area Metropolitan Planning Organization, Kittelson & Associates, Inc. prepared the Navassa Comprehensive Bicycle and Pedestrian Plan to develop a recommended bicycle and pedestrian network for the Town. The project study area includes all of the Town of Navassa limits, and the final bicycle and pedestrian network including the project recommendations is displayed on the following page.

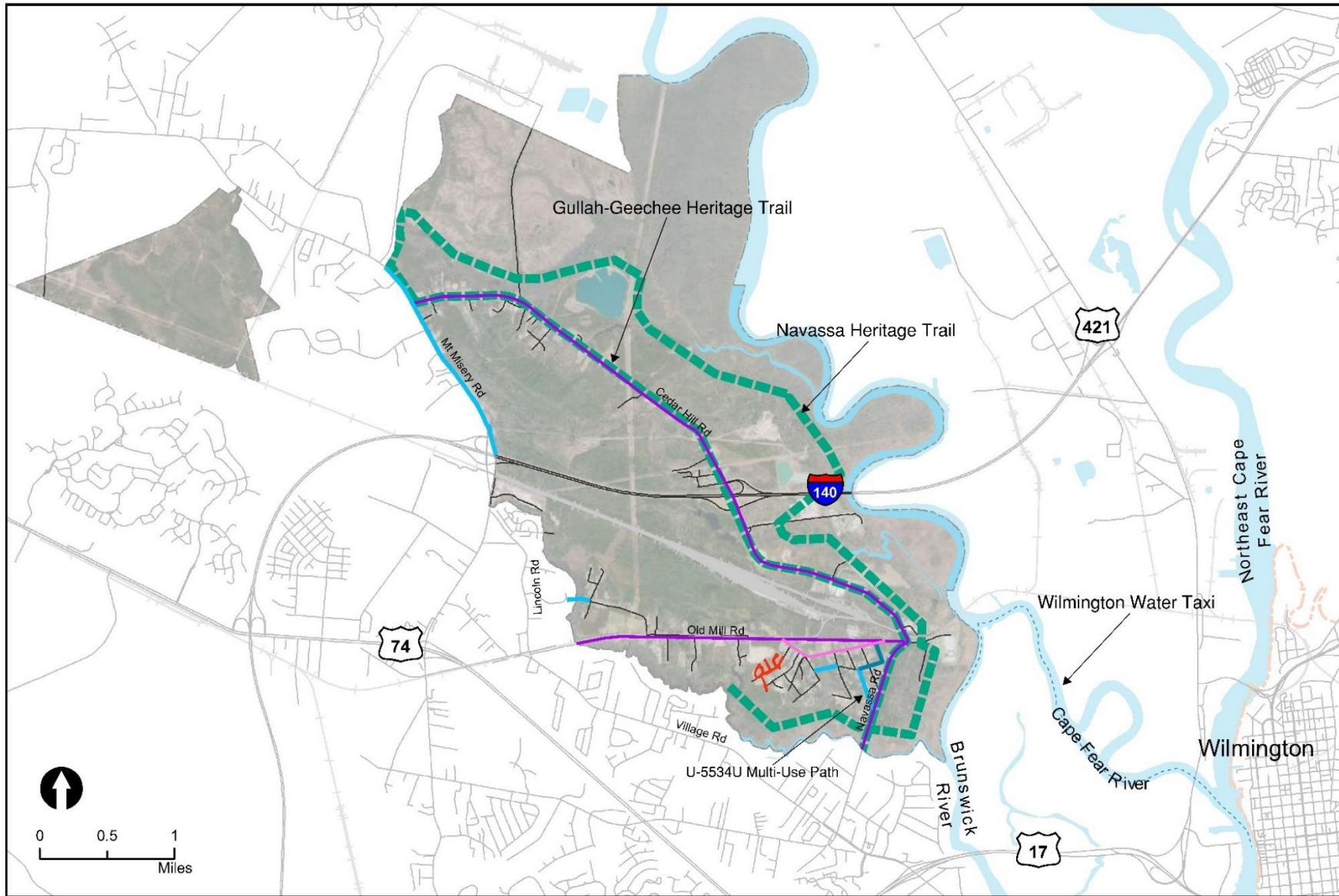
While the population of Navassa was recorded at 1,367 during the 2020 U.S. Census, some 6,000 new residential units are planned and under agency review within the Town's limits, with Town staff and elected officials expecting a dramatic increase in demand for multimodal transportation. The purpose of the Comprehensive Bicycle and Pedestrian plan is to identify recommended bicycle and pedestrian projects within the Town, considering existing and planned development, and unify the planning and design efforts for these facilities.

The vast majority of the Town of Navassa currently lacks bicycle or pedestrian infrastructure and has not previously developed a comprehensive bicycle and pedestrian plan. Using an NCDOT 2020 Planning Grant Initiative, the Town has developed this comprehensive bicycle and pedestrian plan to build on recommendations from previous planning efforts and align with future redevelopment areas. The Town of Navassa Comprehensive Bicycle and Pedestrian Plan presented here identifies and prioritizes projects, policies, and programs that improve the Town's multimodal infrastructure.

The following five goals were identified by the project steering committee during the early stages of plan development and provide a framework for developing recommendations for the plan. Project alternatives and recommended projects were identified based on an evaluation of how those projects achieve each of these goals.

- **ESTABLISH** a master plan for bicycle and pedestrian improvements.
- Provide **GUIDANCE** and requirements for multimodal transportation within new development.
- **CONNECT** new bicycle and pedestrian facilities with planned parks and trails.
- Increase **ECONOMIC** benefits from bicycle and pedestrian infrastructure.
- Support public **HEALTH** and **SAFETY** by encouraging active transportation.

The project team incorporated a broad approach to public outreach, including an in-person public workshop held in July 2021, a project website and online comment map, and frequent collaboration with the project steering committee and stakeholders throughout the project.



Legend

Town Boundary	River	Existing Sidewalk	Recommended Multi-use Path	Recommended Sidewalk and On-Street Bicycle Lanes
Road	Railroad	Existing Multi-use Path	Recommended Sidewalk and Multi-use Path	

Recommended Bicycle and Pedestrian Network

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Using a series of multimodal performance measures and public and stakeholder input, the project team identified 10 locations for bicycle and pedestrian improvements within the Town limits. At least two alternatives were developed for most of these locations and then vetted with the project steering committee before a preferred alternative was identified. The project cut sheets provided at the end of this report document the conceptual design of each of the following project recommendations, as well as a high-level cost estimate:

1. **Cedar Hill Road** from Old Mill Road to Mount Misery Road: add a 5-foot sidewalk along the south/west side of the road and a 12-foot multi-use path along the north/east side of the road.
2. **Navassa Road** from Old Mill Road to the Town's southern limit at Sturgeon Creek: add a 5-foot sidewalk along the west side of the road and a 12-foot multi-use path along the east side of the road.
3. **Old Mill Road** from Navassa Road/Cedar Hill Road to the west Town limit at Mill Creek: add a 5-foot sidewalk along the south side of the road and a 12-foot multi-use path along the north side of the road (within the utility/rail easement).
4. **Main Street** (entire length): add 5-foot sidewalks and 5-foot on-street bicycle lanes in both directions.
5. **Mount Misery Road** within the Town of Navassa limits (approximately I-140 to Daniels Road): add a 12-foot multi-use path on the east side of the road.
6. **Cedar Hill Road/Navassa Road/Old Mill Road Intersection:** add a single-lane roundabout with sidewalk and/or multi-use path facilities.
7. **Broadway Street Trail Crossing:** add beacons or supplemental crosswalk treatments.
8. **Navassa Road at Sturgeon Creek Bridge:** add a multi-use path (bridge) parallel to the east of the existing bridge.
9. **Magnolia Drive Extension:** add a new alignment/boardwalk to extend to Playground Way.
10. **Water Street to Pine Valley Drive:** add a multi-use path on new alignment west of Park Avenue.

The following sections of this report describe the project scope, assumptions, methodology, public engagement, alternatives development, and recommendations. The report concludes with a project prioritization and implementation plan that identifies near- to long-term strategies for maximizing the probability of programming each project, as well as various applicable funding sources. The table below provides a simplified reference for each key section of the report.

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INTRODUCTION

Project Purpose

Multi-modal transportation is a foundation of robust city planning, sustainable development, and quality of life. The vast majority of the Town of Navassa currently lacks bicycle or pedestrian infrastructure and has not previously developed a comprehensive bicycle and pedestrian plan. Using an NCDOT 2020 Planning Grant Initiative, the Town has developed this comprehensive bicycle and pedestrian plan to build on recommendations from previous planning efforts and align with future redevelopment areas. The Town of Navassa Comprehensive Bicycle and Pedestrian Plan presented here identifies and prioritizes projects, policies, and programs that improve the Town's multimodal infrastructure.

With substantial portions of undeveloped land and street frontage, the Town of Navassa has the opportunity to reserve land for dedicated multimodal infrastructure, as well as to work with the private sector to build pedestrian and bicycle facilities as land is developed. The following are unique aspects of the Town's history and location that support an increase in multimodal transportation:

- Two regional trails, the Gullah-Geechee Corridor and the Navassa Heritage Trail, are being developed through the community. The Navassa Heritage Trail will consist of 10 miles of natural trails, raised boardwalks, and bridges, connected by parks and natural lands adjacent to estuarial wetlands and biodiverse areas. Likewise, the Gullah-Geechee Corridor will connect Jacksonville, North Carolina with Jacksonville, Florida and include many sites of historic and cultural significance to the Gullah-Geechee people (Figure 1).

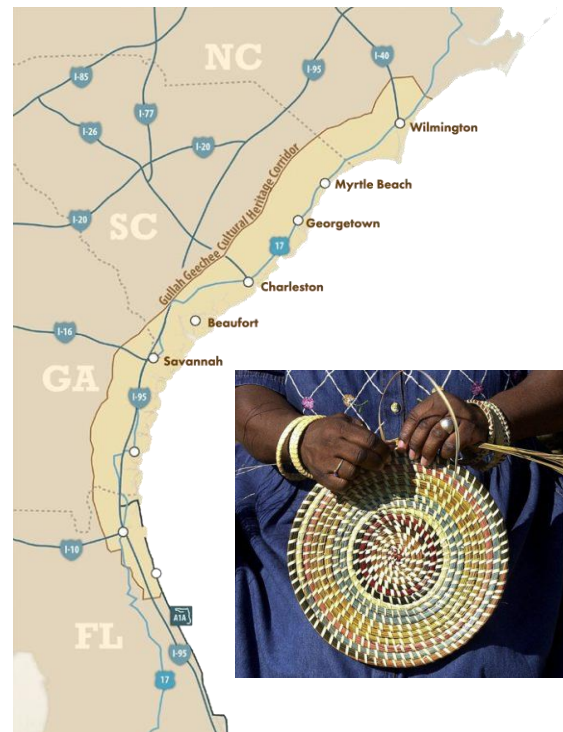
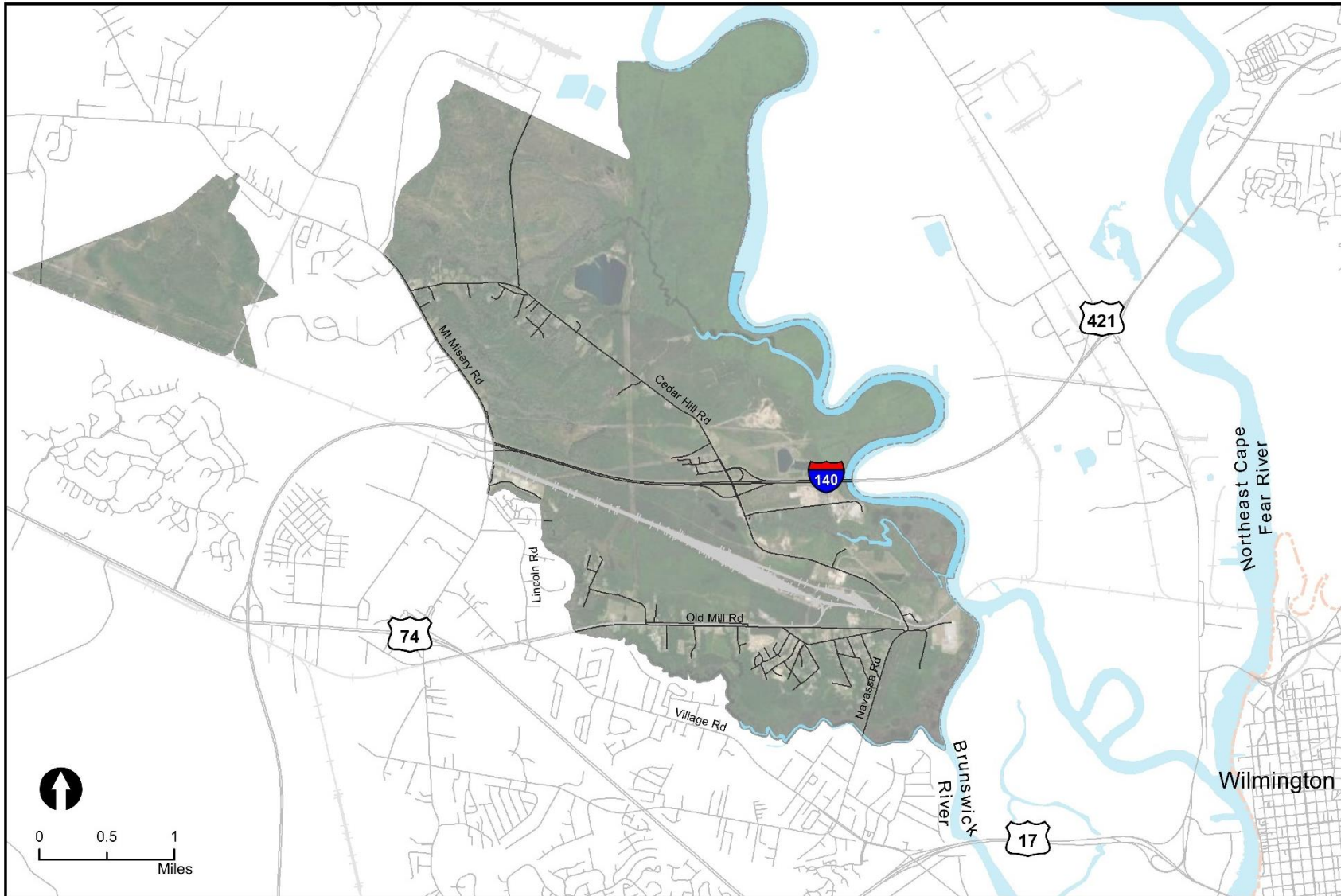


Figure 1. Gullah-Geechee Corridor Map

Figure 2 displays the project study area, which includes all of the Town of Navassa. While the population of Navassa was recorded at 1,367 during the 2020 U.S. Census, some 6,000 new residential units are planned and under agency review within the Town's limits, with Town staff and elected officials expecting a dramatic increase in demand for multimodal transportation. The purpose of the Comprehensive Bicycle and Pedestrian plan is to identify recommended bicycle and pedestrian projects within the Town, considering existing and planned development, and unify the planning and design efforts for these facilities.



Legend

-  Road
-  Railroad
-  River
-  Town Boundary

Project Study Area



Figure 2. Project Study Area

- The Town includes large areas of conserved open space due to environmental provisions, supporting additional eco-tourism and activity.
- The position of the Town near the Brunswick River and Sturgeon Creek provide an opportunity to connect to adjacent communities via water transportation.

These elements provide a strong foundation for future multimodal transportation demand and associated development through heritage tourism, eco-tourism, and recreation.

Planning Process

The Town of Navassa Comprehensive Bicycle and Pedestrian Plan was developed in a series of five tasks, led by the project team, NCDOT Integrated Mobility Division, the Town of Navassa, and the Wilmington Urban Area Metropolitan Planning Organization:

1. Project Kickoff and Administration
2. Existing Conditions Assessment
3. Public and Stakeholder Engagement
4. Project Recommendations
5. Project Prioritization and Implementation

Figure 3 displays the project timeline. The first task of the project consisted of the project kickoff meeting, review of the project background materials, including the 2020 Planning Grant Initiative, and coordination with Town staff.

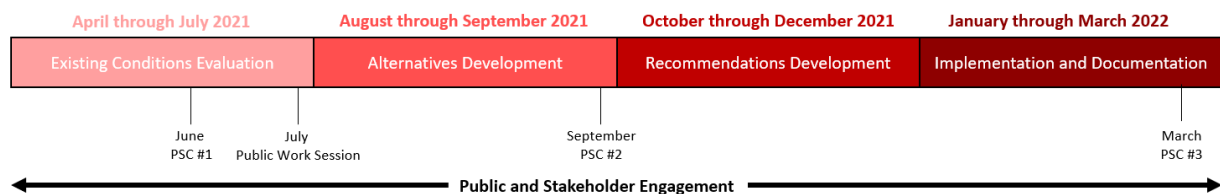


Figure 3. Project Timeline

In Task 2, the project team evaluated existing transportation, land use, and demographic data within the Town limits. Mapping annual average daily traffic, posted speed limits, functional classification, multimodal crash history, and existing parks and trails enabled the team to gain a better understanding of the Town's unique contexts and any impediments toward walking and bicycling. The project team also performed a field inventory of all major streets within the Town to assess street widths, pavement conditions, existing signing and markings, and general levels of traffic. The team also reviewed relevant plans and projects to both identify where further support could improve the Town's multimodal network.

Task 3 consisted of all public and stakeholder engagement, including public workshops and steering committee meetings. The project team met with the steering committee during the early, middle, and late portions of plan development to review progress and solicit feedback from the project stakeholders. The team also held a public engagement workshop at the Navassa Community Center in July 2021 to provide an overview of the plan, confirm/refine project goals and objectives, and review existing conditions and deficiencies.

In Task 4, the project team identified the major areas of focus within the Town and developed a series of bicycle and pedestrian facility alternatives for ten project locations. These alternatives were screened by the project steering committee and ultimately refined by the project team to develop visualizations, cost estimates, and cut sheets. This enabled the team to develop the recommended comprehensive bicycle and pedestrian plan for the Town.

The final task consisted of the project prioritization and implementation plan, in which major funding sources and policies were identified to advance each recommended project. This task culminated with a draft of the comprehensive bicycle and pedestrian plan and all subsequent review. Pending NCDOT approval, the plan will be submitted to the Town of Navassa for adoption in April 2022.

Vision & Goals

At the outset, the project team collaborated with the community and stakeholders to develop a vision and set of goals for the plan that are aligned with the Navassa community's needs.

VISION

As stated in the 2020 Planning Grant Initiative application, the Town of Navassa envisions a community that encourages development that supports walking and bicycling while reducing the need for automobile dependency. Project identification, development policy review and revisions, and community surveys and workshops are all elements of the plan that support this vision.

GOALS

The following five goals were identified by the project steering committee during the early stages of plan development and provide a framework for developing recommendations for the plan. Project alternatives and recommended projects were identified based on an evaluation of how those projects achieve each of these goals.

- **ESTABLISH** a master plan for bicycle and pedestrian improvements.
- Provide **GUIDANCE** and requirements for multimodal transportation within new development.
- **CONNECT** new bicycle and pedestrian facilities with planned parks and trails.
- Increase **ECONOMIC** benefits from bicycle and pedestrian infrastructure.
- Support public **HEALTH** and **SAFETY** by encouraging active transportation.



Figure 4. Town Gateway Near Navassa Road and Broadway Street

PUBLIC ENGAGEMENT

Broad public outreach is critical to maximizing the public support, effectiveness, and equity of the plan recommendations. While the size of the project study area and Town population were quite manageable, it was important to provide continued public outreach over multiple platforms throughout the project to reach all affected communities and interested parties. The following public engagement strategies were utilized: project steering committee meetings, an in-person public workshop, project website, online comment map, online survey, printed outreach materials, and the Town's automated call service.

After the project kickoff but before any public or steering committee engagement, the project team developed a Public Engagement Plan to identify strategies for soliciting public input, reaching interested community members safely (given the COVID-19 pandemic) and equitably, and encouraging the project development process to begin at the grass-roots level. The Public Engagement Plan was submitted on May 6, 2021.

Project Steering Committee

The project steering committee guided the overall direction of the plan by providing feedback at key points during its development. Representatives from NCDOT Integrated Mobility Division, NCDOT Division 3, Town of Navassa, and the Wilmington Urban Area Metropolitan Planning Organization served on the project steering committee. The PSC met a total of three times during the plan's development, with the following content discussed:

Meeting #1: June 2021

- Plan development overview
- Vision and goals
- Existing conditions
- Public engagement plan

Meeting #2: September 2021

- Project alternatives and concepts
- Performance measures
- Preferred treatments

Meeting #3: March 2022

- Project prioritization and implementation
- Draft plan

The project steering committee provided valuable feedback in the following areas:

- Identified gaps in the existing conditions assessment and highlighted areas of the analysis for potential refinement.
- Screened project goals, objectives, findings, and recommendations before interacting with the public in workshops/online media.
- Provided feedback on project alternatives, recommendation, and prioritization.

Project Website

The project team created a simple project website (Figure 5) for disseminating information about the project purpose and need, upcoming meetings, the online comment map, and project recommendations.

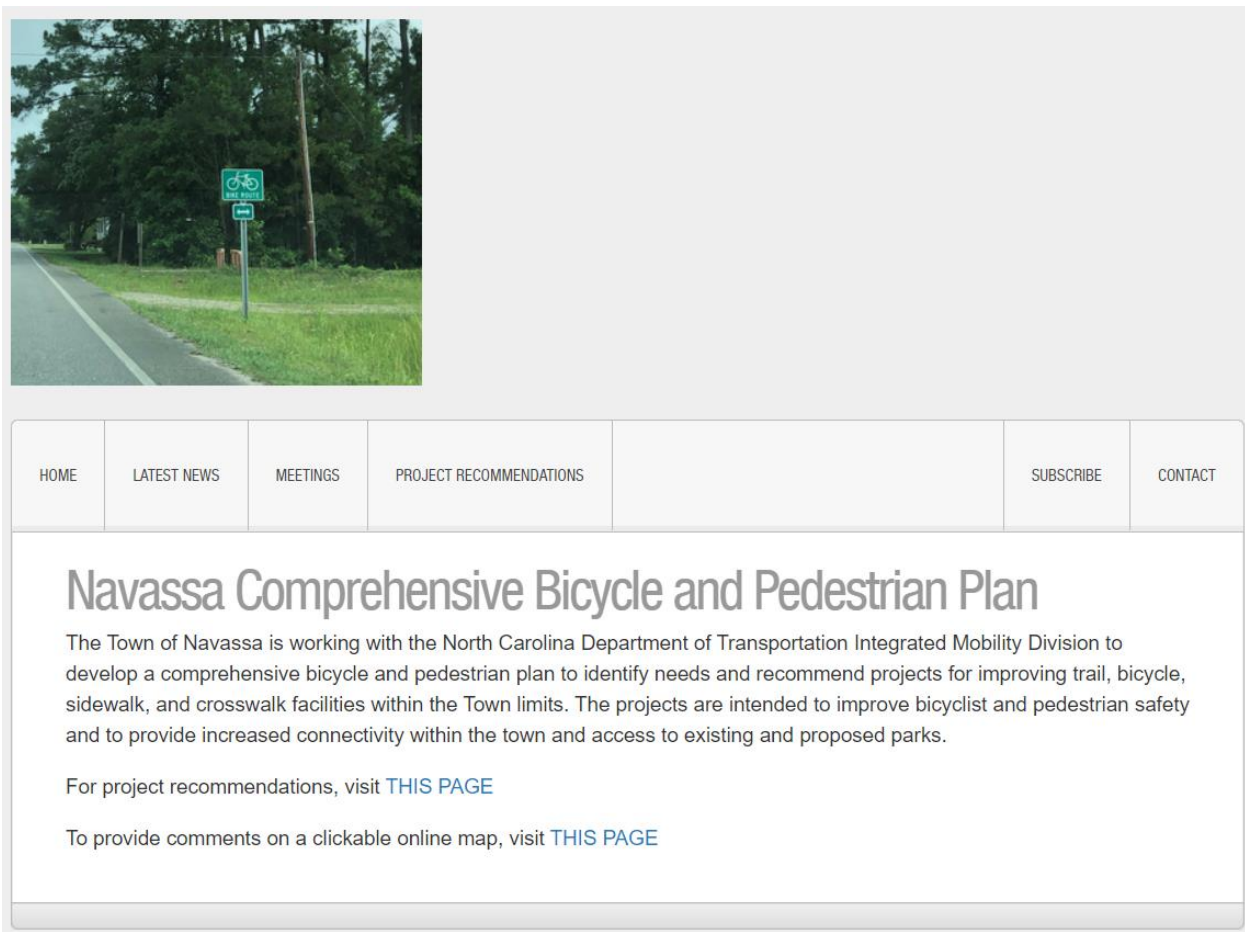


Figure 5. Project Website

Online Interactive Mapping

Community members identified existing gaps in the walking and bicycling network, as well as locations of concern and desired improvements using an online mapping tool. The map was open for public comment beginning on June 24, 2021 and received 28 comments. Figure 6 below displays the format of the comment map at two points within the project: before and shortly after the public meeting, the Town limits were displayed on the map to help identify the project study area and encourage open-ended comments on deficient walking and bicycling conditions and potential project ideas. After the project recommendations were developed in October 2021, the map was updated to display the recommended project locations in order to encourage more specific comments on the projects.

ONLINE MAP COMMENTS

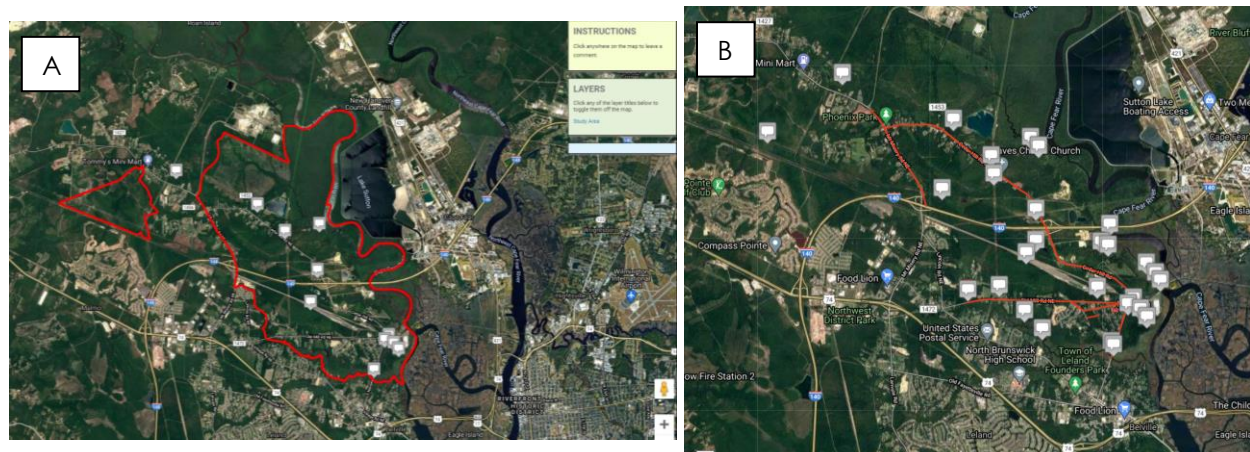


Figure 6. Online Comment Map

A. Through September 2021

B. October 2021 and After

The following themes emerged from the public comments:

- There is a desire to convert abandoned rail lines and utility easements into trails.
- Historical markers are desired to help support eco- and heritage tourism.
- Future land uses should be coordinated with trail themes.
- Planned trails should be supplemented with blueway / water taxi connections.

Public Workshop

A community meeting was held on July 29, 2021 to present the project purpose and need, review findings from the existing conditions assessment, and identify additional multimodal deficiencies, needs, and gaps in the transportation network. The meeting was held at the Navassa Community Center at 338 Main Street and was advertised via the Town's Automated Phone System, Website Updates, and printed flyers (Figure 7), which were circulated to community meeting areas. The meeting was held in an open-house format, with four boards

provided to show existing walking and bicycling conditions and facilitate discussions with the project team.

Due to the ongoing COVID-19 pandemic, attendees were socially distanced and asked to wear masks unless speaking at the podium (Figure 7). The four boards were duplicated on two sides of the meeting room to help space attendees. Meeting attendees were encouraged to provide written comments on post-it notes on each board or to verbally give comments to the project team, which logged all comments after the meeting. A brief presentation covering the project background, purpose and need, and existing conditions findings was given by the project team and Town of Navassa at 4:30pm and repeated at 6:30pm. Approximately 15 community members attended the workshop, and all actively participated and provided comments.

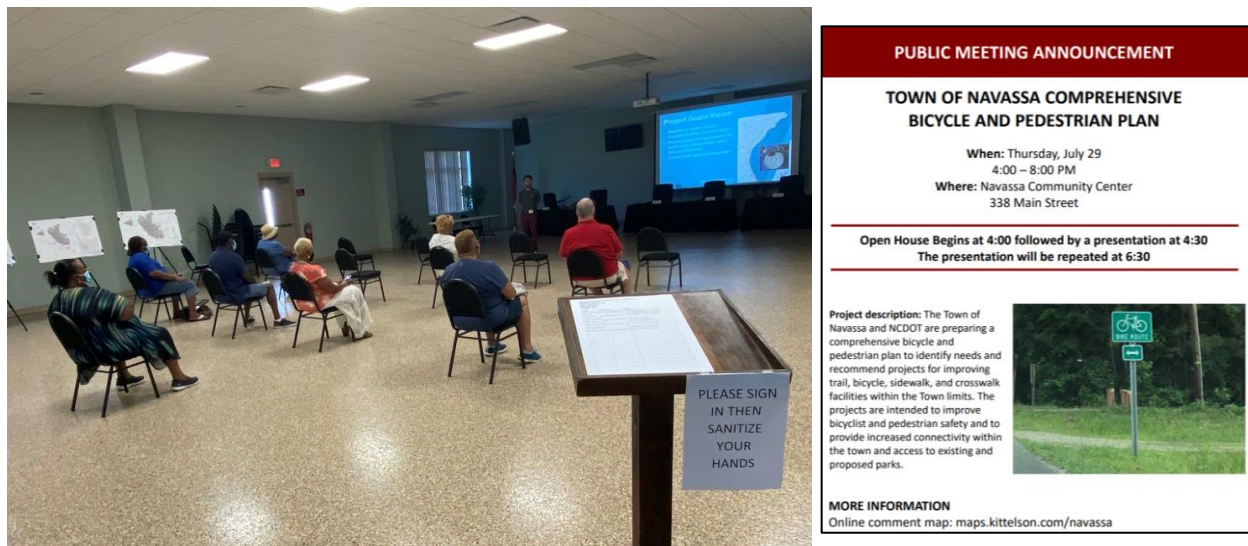


Figure 7. Public Workshop on July 29, 2021 and Printed Announcement Material

KEY TAKEAWAYS

The following general comments emerged from the public workshop:

- Safety is a priority for the Town. Safety should be included in the project goals and objectives. In addition to prioritizing projects that improve pedestrian and bicyclist safety and comfort, trails should be designed to support safety. For example, fencing may be needed along trails to keep out dogs or wildlife.
- The Broadway Street trail crossing is a major priority for the Town. A signalized crosswalk and speed bumps along Broadway are recommended to enhance pedestrian safety/comfort, especially since trail users are children.
- A connection between Magnolia Drive and Playground Way is desired to provide access to Lincoln Elementary School and neighboring planned trails in Leland.

- The trail network should connect to additional facilities in Leland, including the Leland Town Hall Multi-Use Path and Brunswick High School.
- Bicycling facilities are desired on Cedar Hill Road.
- Trails should connect to both sides of I-140 so that the urban and rural portions of the Town are equally prioritized.
- More marked crosswalks are desired.
- Trail maintenance is as equally important as trail connections—the existing multi-use trail is not very well maintained.

Bicyclists and pedestrians in Navassa generally fall into one or more types of users:

1. Local residents making recreational trips, possibly with children
2. Local residents commuting to work or accessing retail/service land uses
3. Extended area residents passing through Navassa, possibly for recreation
4. Tourists with a destination in Navassa

EXISTING CONDITIONS

Community Demographics

POPULATION & DENSITY

Navassa is home to 1,367 people, most of whom live in the urban area of the Town south of the CSX Railroad. This represents a population increase of 285% since 2000.

EMPLOYMENT & INCOME

Most (56.2%) of Navassa's working population is employed outside Brunswick County. The top employers within the Town are Town government, Bolivia Lumber Company, Pacon Manufacturing, and American Distillation.

The median household income in Navassa is \$33,571, significantly less than the statewide median household income of \$57,341.¹ Median household income has decreased approximately 5.2% since 2010.

RACE & ETHNICITY

Navassa is a majority-minority community, with most residents identifying as Black or African American. The percentage of Town residents who identify as white, not Hispanic or Latino (28.1%) is much lower than Brunswick County (81.0%), New Hanover County (74.1%), and North Carolina (60.5%).

Black or African American alone: 58.2%
White alone, not Hispanic or Latino: 28.1%
Hispanic or Latino of any race: 10.3%
Two or More Races 3.0%
Asian alone 0.3%
American Indian and Alaska Native: 0.1%

AGE

Navassa's population is generally split across age groups, with a skew toward an older population than North Carolina as a whole. The median age here is 46, which is older than the statewide median age of 39.1.

Under 20 years: 19.4%
20 to 34 years: 23.7%
35 to 54 years: 25.5%
55 years and older: 31.4%

¹ 2019 American Community Survey

COMMUTING

According to the American Community Survey, 2019 Estimates, approximately 82.4% of Navassa's working population commutes to work via car alone, while 14% carpool. 0.6% of residents identified walking as their primary means of transportation to work, while no residents indicated they bicycle to work. Approximately 2.0% of residents indicated they take public transportation, taxi, or rideshare to work. Only 43.8% of residents indicated they work in Brunswick County.

SCHOOLS

There are currently no public K-12 schools within the Town of Navassa limits. Nearby public schools which serve residents include Lincoln Elementary School, Belville Elementary School, Leland Middle School, and North Brunswick High School. Leland Christian Academy is also located just outside the Town limits.

Transportation Network Overview

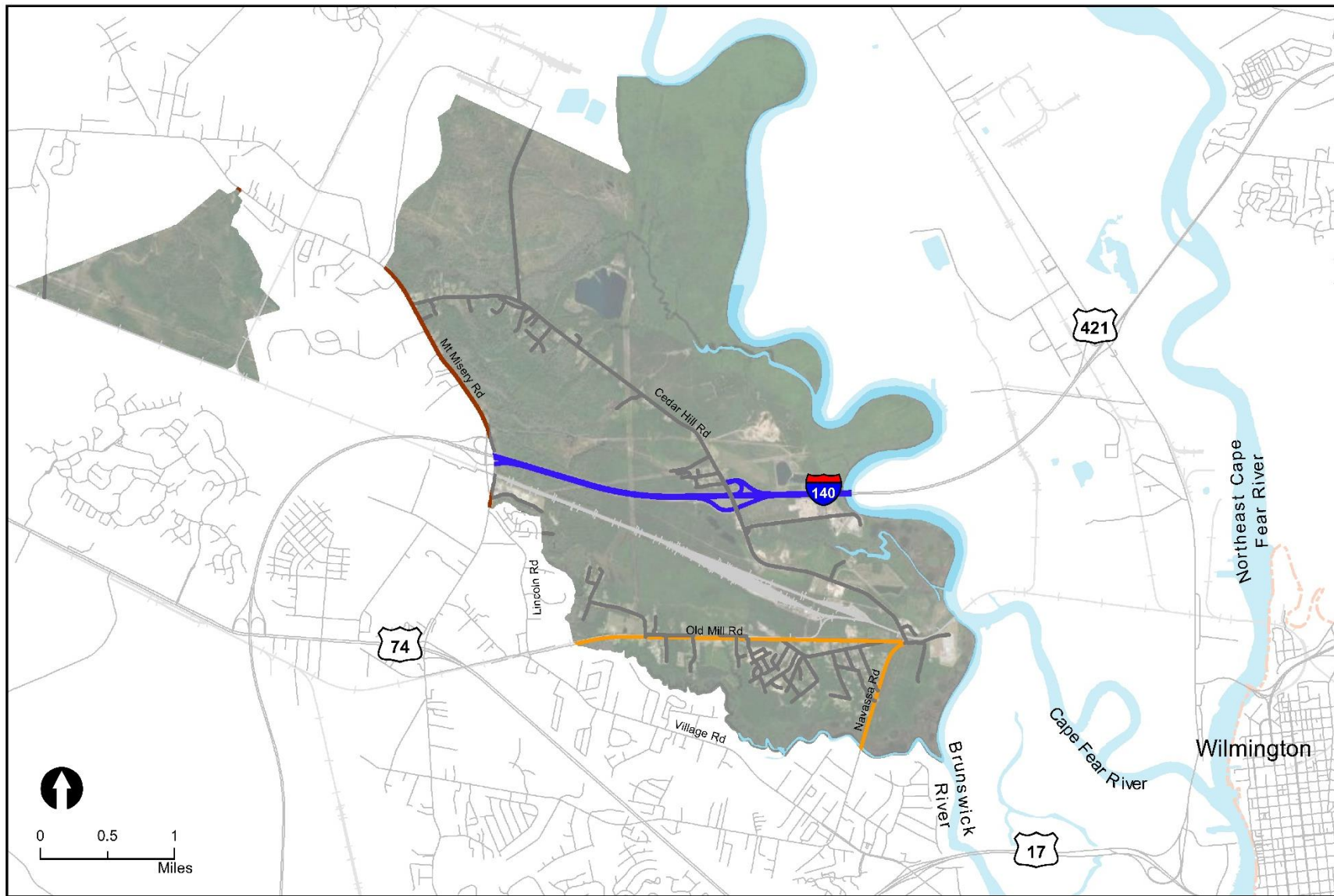
EXISTING STREETS

Table 1 displays the major transportation facilities within the Town limits, and Figure 8 displays the functional classification of all Town roadways. The primary roadway connections to and within the Town of Navassa include Navassa Road, which connects to Leland to the south via the Sturgeon Creek Bridge, Cedar Hill Road, which connects to rural parts of Brunswick County to the north and interchanges with I-140 west of the Cape Fear River, and Old Mill Road, which connects to Leland to the west. Mount Misery Road traverses a portion of the Town limits at and just north of its interchange with I-140. Other important connections within the Town include Main Street, which spurs from Old Mill Road into the central business district, Broadway Street, which connects Old Mill Road and Navassa Road, and Water Street, which parallels Main Street to the south.

Table 1. Existing Transportation Facilities

Major Roadway	Posted speed limit (mph)	Functional Classification	Lane widths (ft)	Ped/bike facilities
Mt Misery Rd	55	Minor arterial	12	Paved shoulder
Navassa Rd	45	Major collector	10	None
Old Mill Rd	45	Major collector	10.5	None
Cedar Hill Rd	45	Local	11	Paved shoulder
Main St	35	Local	11	None
Brooklyn St	25	Local	10	None
Broadway St	35	Local	12	None
Interstate 140	70	Interstate	12	None

All streets within Navassa are 2-lane roads, with the exception of I-140 and the portions of Cedar Hill Road and Mount Misery Road near the I-140 interchanges. None of the streets listed in Table 1 have curb and gutter, and most have an unpaved gravel or unimproved shoulder. Only recently-constructed streets in new subdivisions within the town have curb and gutter. NCDOT owns and maintains all streets listed in Table 1, with the exception of Brooklyn Street, which is maintained by the Town of Navassa. All other local streets within the Town limits are owned and maintained by the Town of Navassa. Figure 9 displays the Annual Average Daily Traffic (AADT) for the major roadways within the study area.



Legend

Town Boundary
Road

River
Railroad

Functional Class

Interstate

Other Freeway

Other Principal Arterial

Minor Arterial

Major Collector

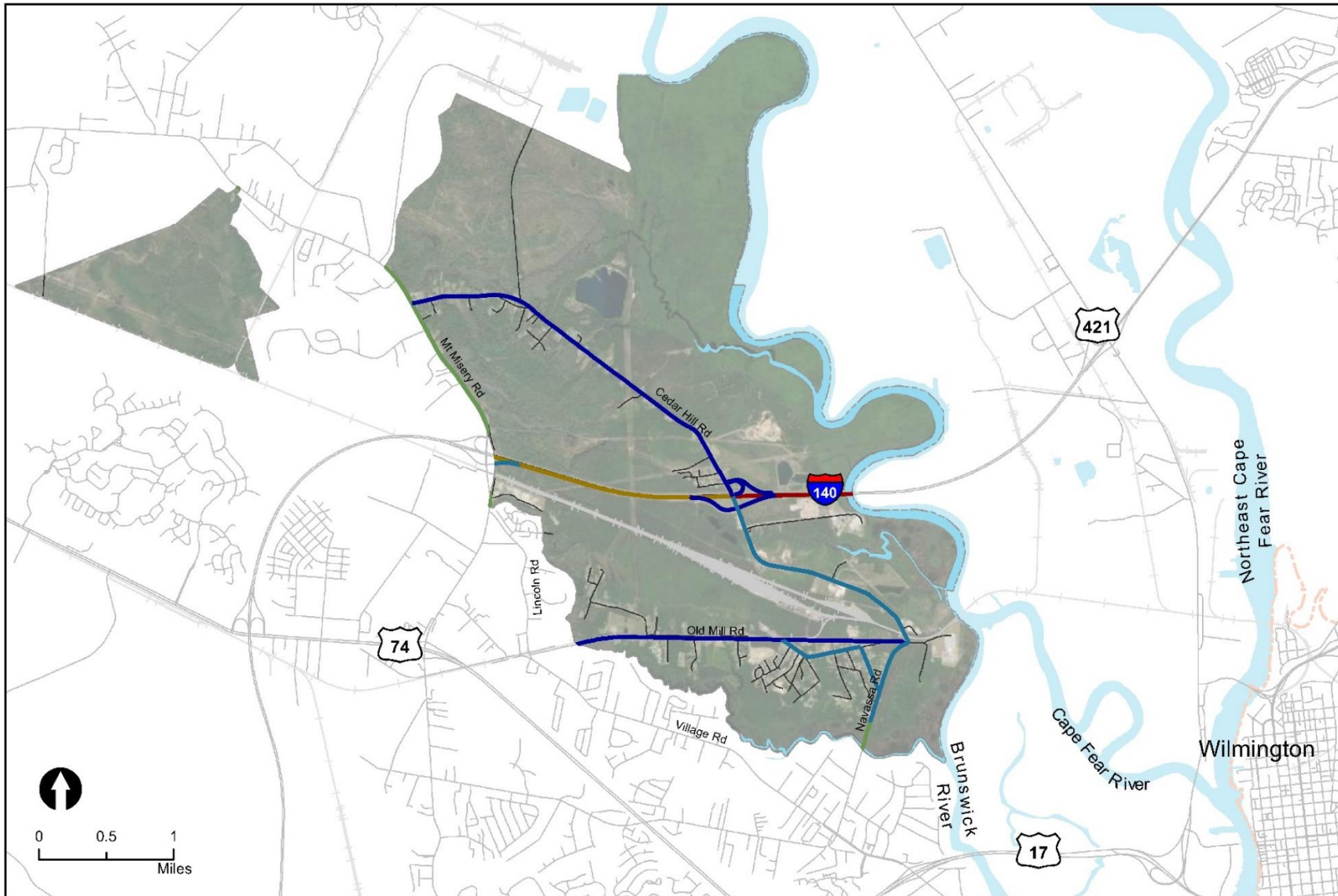
Minor Collector

Local

Roadway Functional Classification

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Figure 8. Roadway Functional Classification



Legend

- Town Boundary
- River
- Road
- Railroad

Annual Average Daily Traffic

- <1,500
- 5,001 - 10,000
- 10,001 - 15,000
- 1,501 - 5,000
- >15,000
- No Data

Annual Average Daily Traffic (AADT) 2019

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Figure 9. Annual Average Daily Traffic

EXISTING PEDESTRIAN AND BICYCLE FACILITIES

While no recent bicycle or pedestrian count data were available at the time this report was prepared, the project steering committee indicated that while there is high demand for walking and bicycling within Navassa, there are few safe facilities for active transportation. Field observations and steering committee comments have indicated that bicycling and walking activity is generally very low due to the limited number of dedicated facilities. There is currently only one off-street bicycle facility in Navassa: the 0.3-mile Water Street multi-use trail, which loops from Water Street/Brooklyn Street across Broadway Street to Main Street within the central business district. The Brooklyn Street multi-use path project (U-5534U) is currently under design and will extend the trail approximately ¼ mile south to Navassa Road. Other dedicated bicycle facilities include paved shoulders/on-street bicycle lanes on Cedar Hill Road and Mount Misery Road within the vicinity of the I-140 interchanges (Figure 10).

There are currently no sidewalks provided on any major roadways within Navassa, although the Lena Springs community and several other planned or under-construction subdivisions feature sidewalks on local streets (Figure 11). There is one signed midblock crosswalk on Broadway Street at the Water Street multiuse path crossing and one marked crosswalk on Westfield Drive south of Old Mill Road.



Figure 10. Paved Shoulders on Mount Misery Road and Cedar Hill Road Provide the only On-Street Bicycle Facilities in Navassa



Figure 11. Sidewalk Coverage is Limited to New Neighborhoods and Developments

Figure 12 displays the existing pedestrian and bicycle facilities in the Town of Navassa.

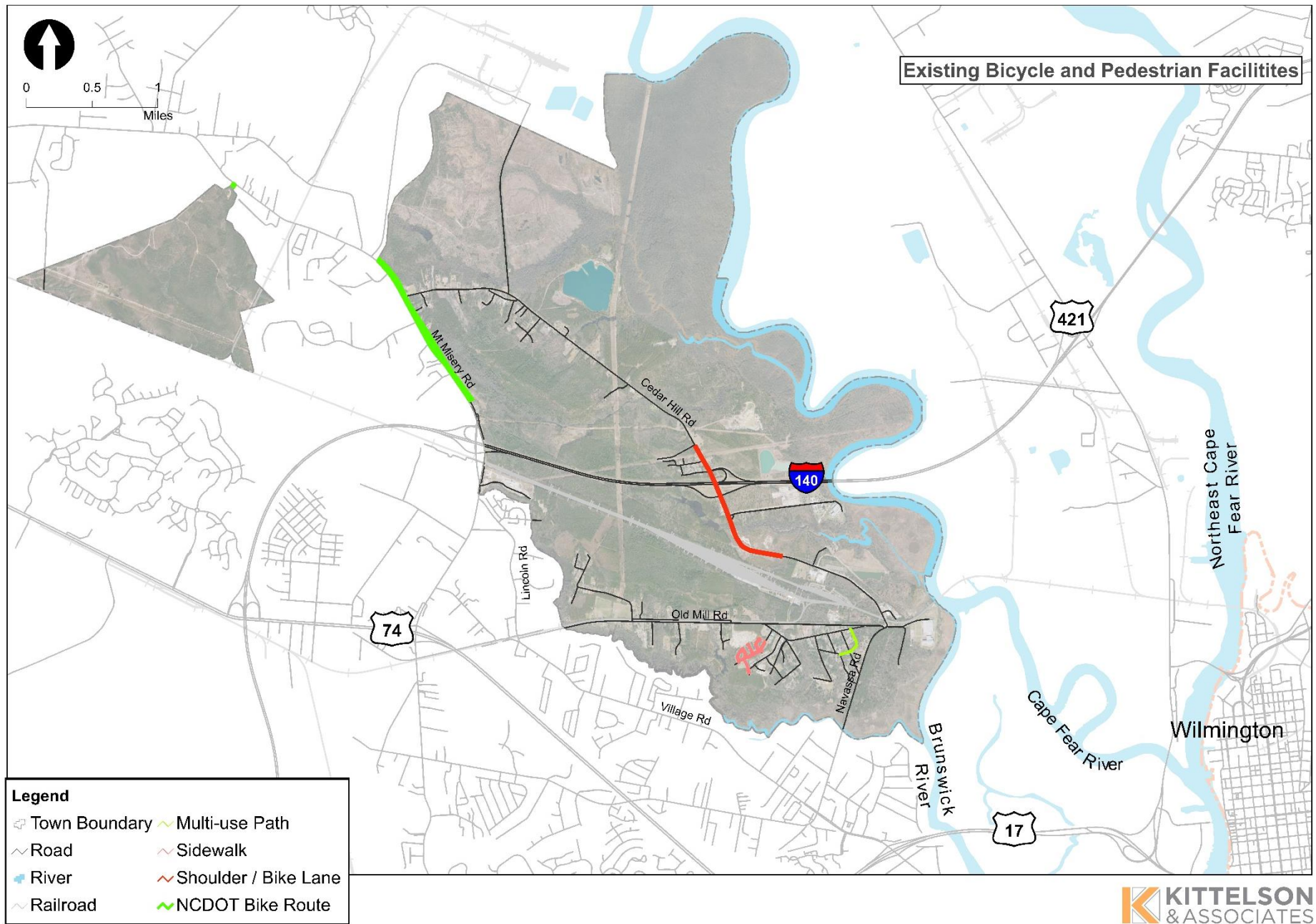


Figure 12. Existing Bicycle and Pedestrian Facilities

EXISTING TRANSIT SERVICE

Both Brunswick Transit System (BTS) and Wave Transit provide public transportation services to the Town of Navassa. There has been no fixed route transit service to Navassa since Route 204: Brunswick Connector was discontinued in September 2020. On-demand service is provided by Brunswick Transit System Dial-a-Ride and RideMICRO, the Wilmington area's Regional Microtransit system, which launched in October 2021:

- BTS Dial-a-Ride operates within Brunswick County only on weekdays from 8:00 AM to 5:00 PM and requires a reservation at least two hours in advance. Service is provided to New Hanover County on Tuesdays and Thursdays from 9:30 AM to 12:30 PM.
- The RideMICRO pilot program allows passengers to book an on-demand ride from a virtual stop within a series of zones to connect to Wave Transit's fixed route service, allowing spontaneous trips not available with traditional fixed route service. Service is provided on weekdays from 7:00 to 10:00 AM and 12:00 to 7:30 PM.

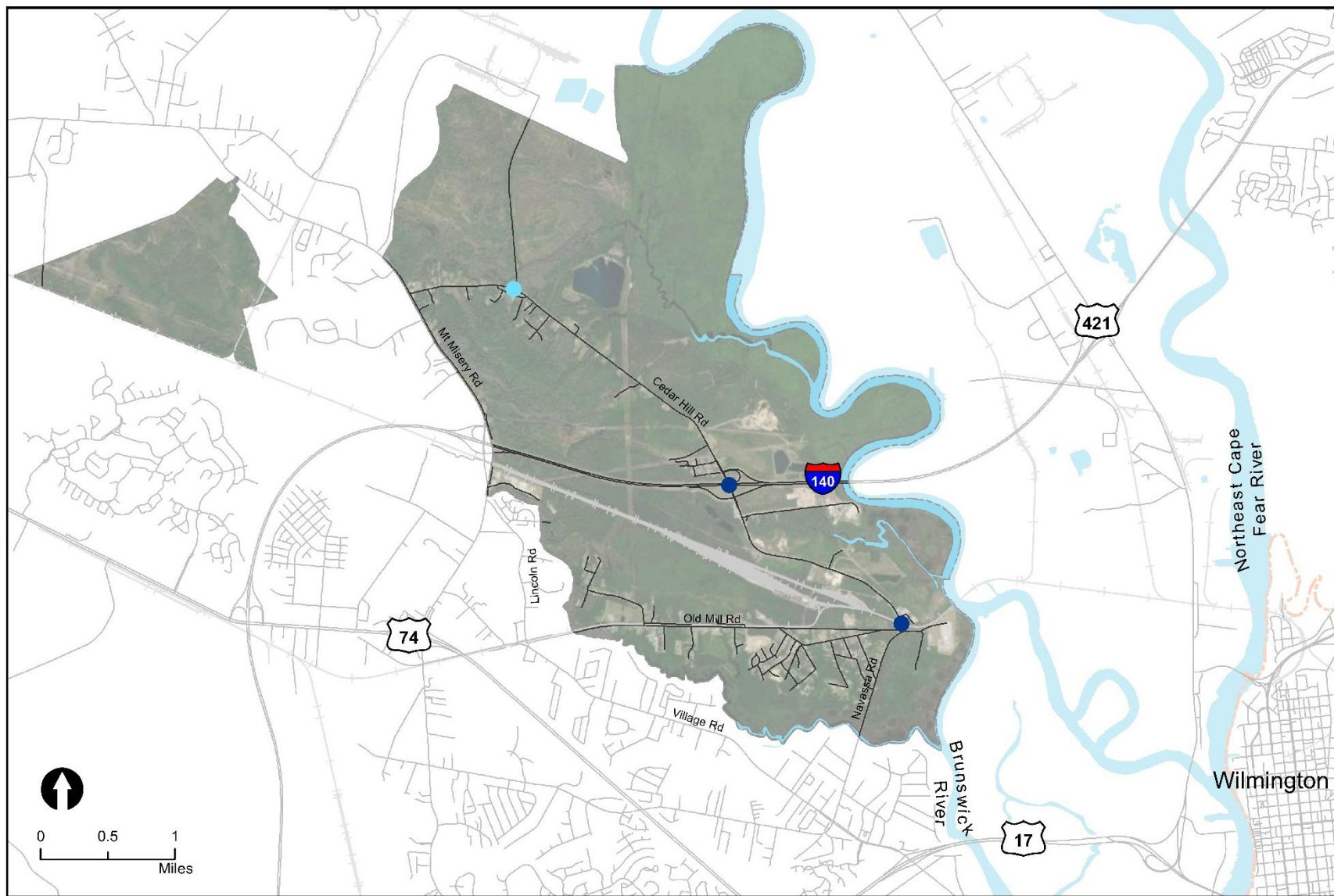
SAFETY AND COMFORT

Assessing the safety of pedestrian and bicycle users on streets without dedicated facilities is challenging and must be examined using multiple performance metrics. Crash data, while a direct measure of safety performance, is ultimately tied to exposure and is understandably limited in areas with low pedestrian or bicycle volume. Figure 13 displays the most recent 10 years of reported bicycle and pedestrian crash data within Navassa from NCDOT.

A total of three such crashes were identified:

- A bicycle crash at Cedar Hill Road/Daniels Road,
- A crash involving a pedestrian at Cedar Hill Road near I-140, and
- A crash involving a pedestrian at Cedar Hill Road just north of Quality Drive.

Note there are no sidewalks or marked crosswalks along any portion of Cedar Hill Road, and the posted speed limit is 45 mph.



Legend

- Road
- Railroad
- River
- Town Boundary
- Bicycle Crash
- Pedestrian Crash

Bicycle and Pedestrian Crashes 2010 - 2019

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Figure 13. Bicycle and Pedestrian Crashes, 2010-2019

Given the low existing bicycling volumes in Navassa, another useful evaluation criterion is level of traffic stress (LTS). LTS is a methodology developed by the Mineta Transportation Institute to evaluate bicyclists' perceived safety and comfort on roadway segments, intersection approaches, and unsignalized crossings, with the goal of classifying the street network into four levels of stress:

- LTS 1: low stress, suitable for children
- LTS 2: moderately low stress, suitable for interested but concerned cyclists
- LTS 3: moderately high stress that limits the cycling population
- LTS 4: high stress facilities that few cyclists will ride

Each successive stress level is associated with a decreasing proportion of the population that would be comfortable using the facility. As shown in Figure 14, 60-70 percent of the population, including children, are willing to use an LTS 1 facility, but less than 5 percent will use an LTS 4 facility.

Figure 15 displays the existing bicycle level of traffic stress on the Town's roadways. While most streets within the Town limits are low-stress facilities (LTS 1 or 2), the major collectors and arterials, including Cedar Hill Road, Mount Misery Road, Navassa Road, Old Mill Road, and Main Street, generally lack dedicated bicycle facilities and have either high traffic speed or volume.

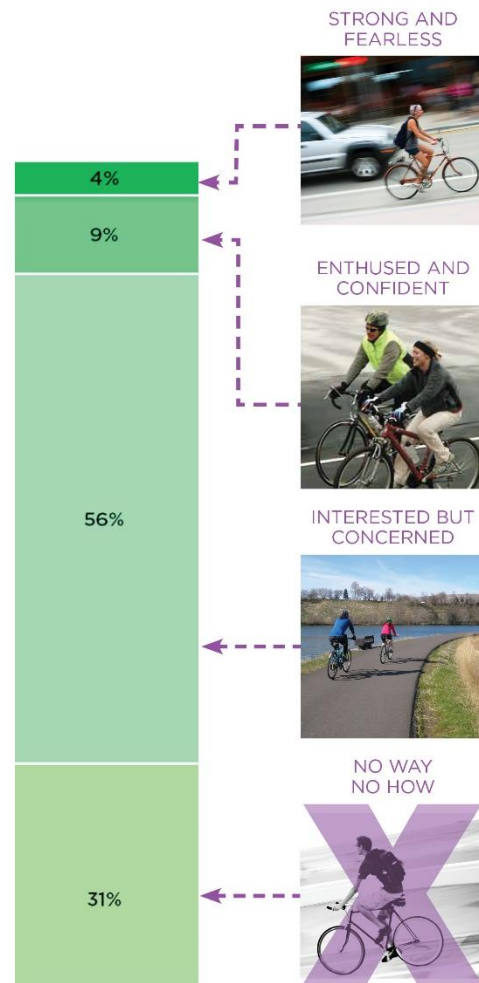


Figure 14. Four Types of Cyclists

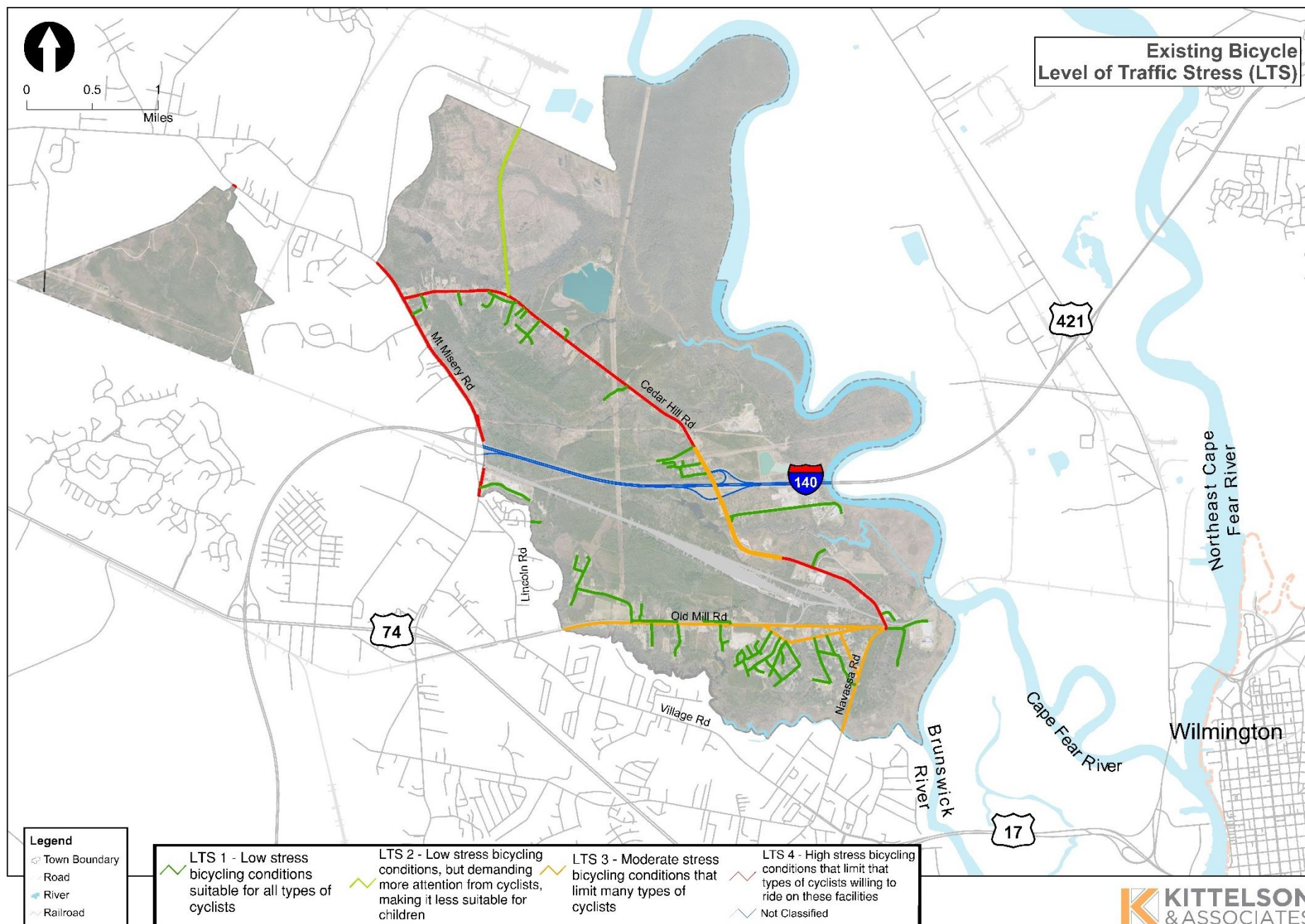


Figure 15. Existing Bicycle Level of Traffic Stress

Parks and Recreation

EXISTING PARKS AND TRAILS

Recreation is a major part of the Town of Navassa's vision for its walking and bicycling network, with the goal of connecting most existing and planned parks with multiuse trails. Figure 16 displays a map of the Town's existing and proposed parks and trails. In addition to the Water Street multi-use trail, existing parks include the following:

- Phoenix Park
- Davis Creek Park and Boat Launch
- Cartwheel Branch Park
- Navassa Township District Park
- Reaves Chapel Historic Site

PROPOSED PARKS AND TRAILS

As noted in the Town's Parks and Recreation Master Plan, several additional parks are planned as part of new developments, including the following:

- Indian Creek Park
- Navassa Waterfront Park
- Moze Heritage Center and Nature Park

The following new multiuse trails are planned to connect these parks:

- U-5534U Multiuse Path (in design)
- Gullah-Geechee Heritage Trail
- Navassa Heritage Trail

Finally, the Town envisions future ferry service to the Brunswick River waterfront via the Wilmington Water Taxi.

REGIONAL DESTINATIONS

A key part of planning the Town's future pedestrian and bicycle network is identifying major trip generators and destinations within and just outside the Town limits. Figure 17 displays a map of area schools, places of worship, parks, stores, and restaurants within approximately two miles of the Town limits, including areas in Leland, Belville, and rural Brunswick County. The prevalence of major traffic generators in these areas indicates a latent demand for bicycling and walking, pending future network connections. Farther beyond the Town limits, multimodal demand to and from Downtown Wilmington will increase as more tourism- and commuter-oriented development occurs within Navassa—these longer-distance trips may be facilitated via water taxi or future trails if these connections are eventually provided.

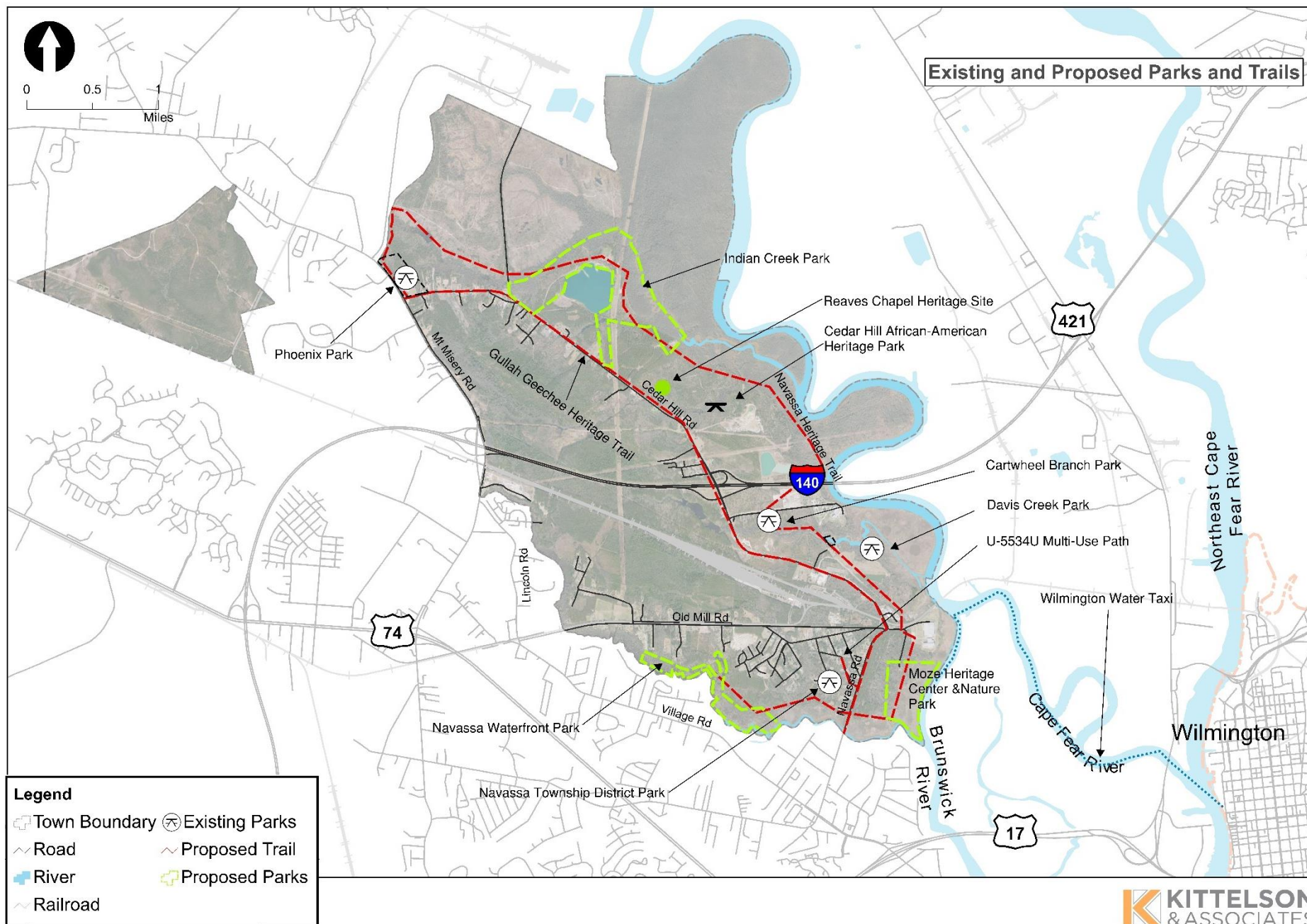


Figure 16. Existing and Proposed Parks and Trails

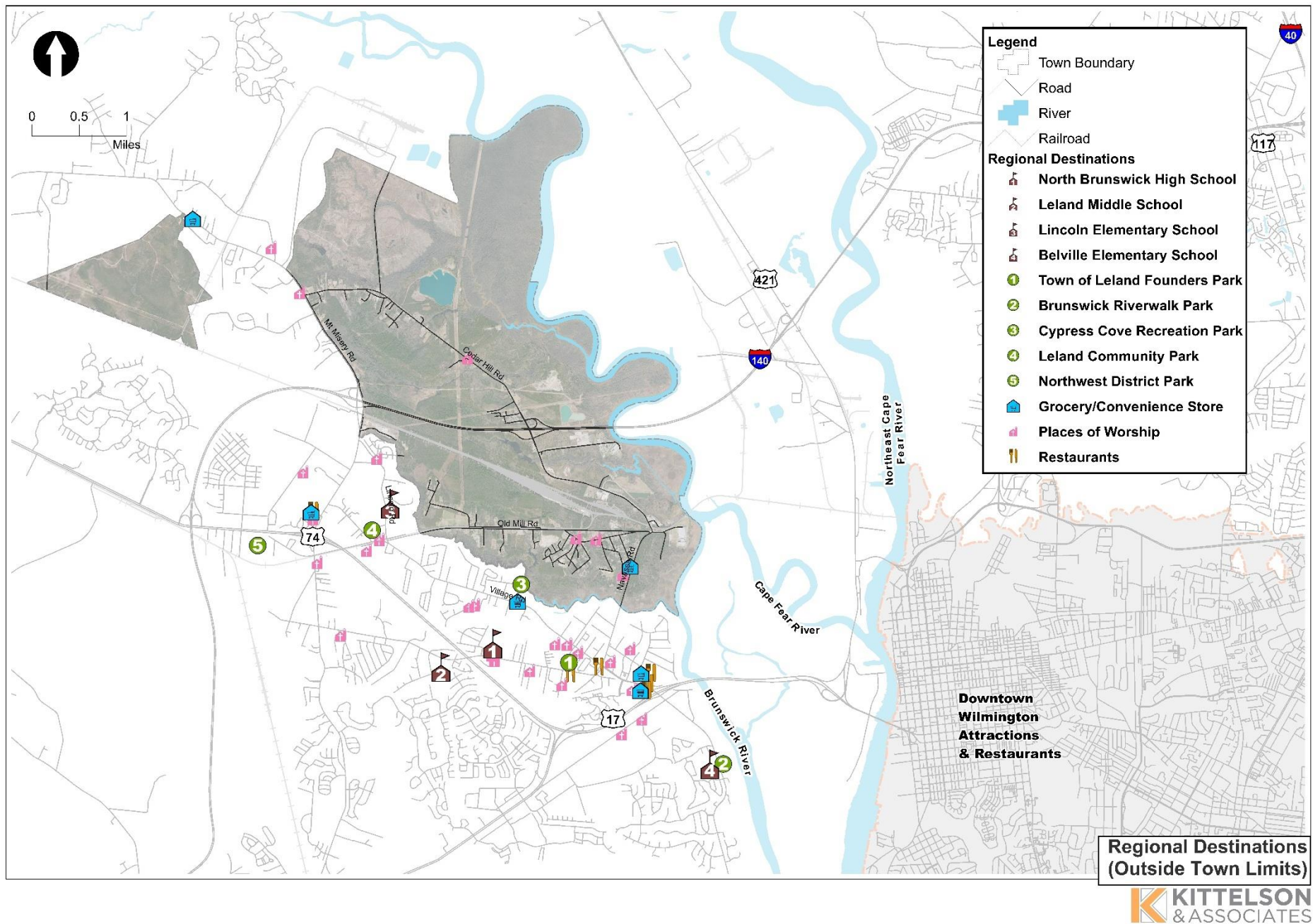


Figure 17. Regional Destinations (Outside Town Limits)

It is important to note that Navassa is already a key part of several long-distance bicycle rides through the region. Figure 18 displays two routes (50-kilometer and 100-kilometer) taken by the Cape Fear Cyclists through Navassa and Brunswick County. While these types of trips may be infrequent, the vision of the Plan intends to support these users through planning additional on- and off-street bicycling facilities.

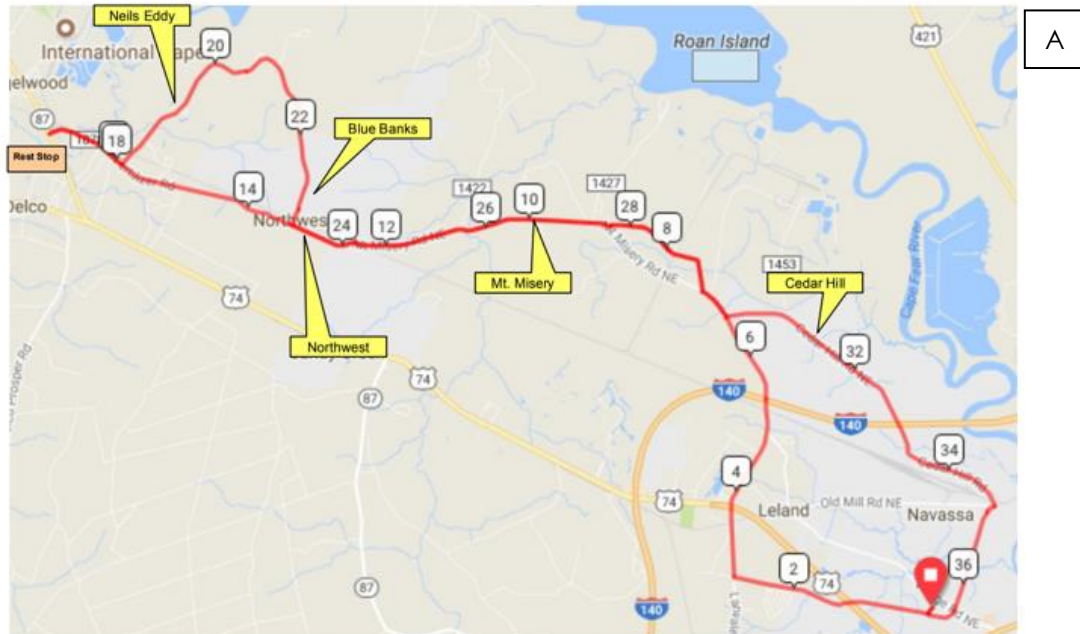


Figure 18. Regional Bicycle Rides in Navassa (Source: Cape Fear Cyclists)

A. Brunswick Metric 50

B. Brunswick Metric 100

PREVIOUS PLAN & POLICY REVIEW

Previous Plans

The project team reviewed existing plans to identify useful recommendations and potential locations for bicycle improvements.

Cape Fear Moving Forward 2045: WMPO Metropolitan Transportation Plan (2020)

The WMPO's Metropolitan Transportation Plan (MTP) is a programmed list of fiscally-constrained regional projects. While the MPO's boundary includes all of the Town of Navassa, no bicycle or pedestrian projects were identified within the Town limits. The MTP did include the following projects for other modes:

- **TD-5291:** Route 204 Amenity Upgrades (*Brunswick Connector*)
This project would add additional amenities to stops along Route 204. Note that Route 204 was discontinued in September 2020.
- **PT-156:** Route 204 Extended Service to 9pm and Weekends
This project would extend service to Route 204 through 9pm and weekends. Note that Route 204 was discontinued in September 2020.
- **FR-22:** Davis Yard At-Grade Crossing (*Cedar Hill Road Safety Improvement*)
This freight project would improve the at-grade crossing of the CSX rail road at Cedar Hill Road.

More Than A Trail: Brunswick County Trail Plan (2017)

The Brunswick County Trail Plan identified existing park lands, preserves, paddle boat launches, and on-road bicycling trails throughout the County. While the exact layout and design of future trails were not yet identified, Cedar Hill Road, Mount Misery Road, Old Mill Road, and Navassa Road, and the existing Water Street Multiuse Path were all identified as on-road bicycling trails of significance within Navassa, as shown in Figure 19. The Town voted in support of the trail plan after adoption in 2017.

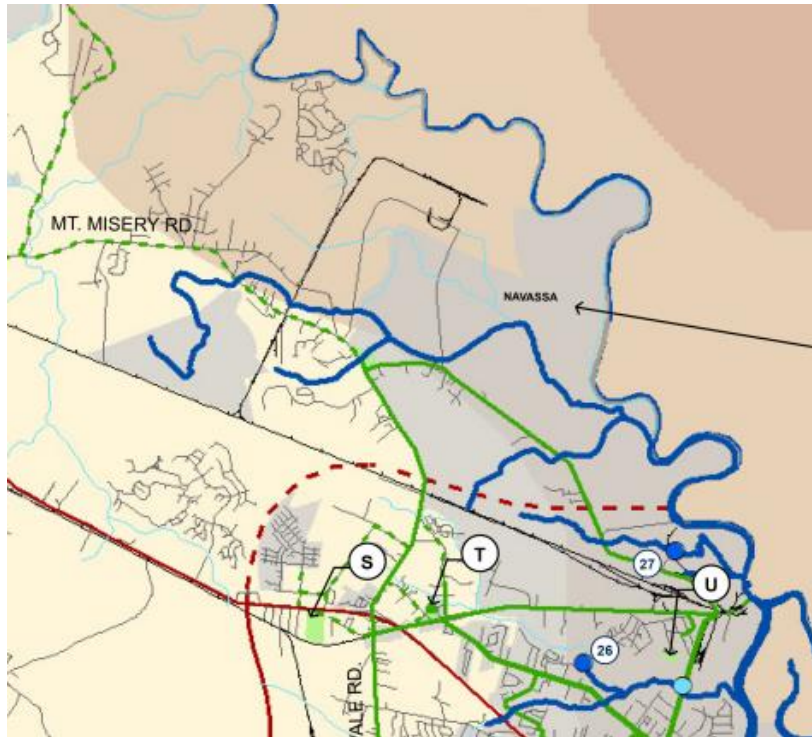


Figure 19. More Than A Trail Map

Town of Navassa Collector Street Plan (2004)

The Town uses the collector street plan as a guiding document to relieve traffic congestion and provide emergency and evacuation routes. Several new collector streets are proposed to provide additional connectivity, especially within the more rural portions of the town north of I-140. Figure 20 displays a map of the collector street plan recommendations. This plan is currently being updated and is expected to be adopted in June 2022.

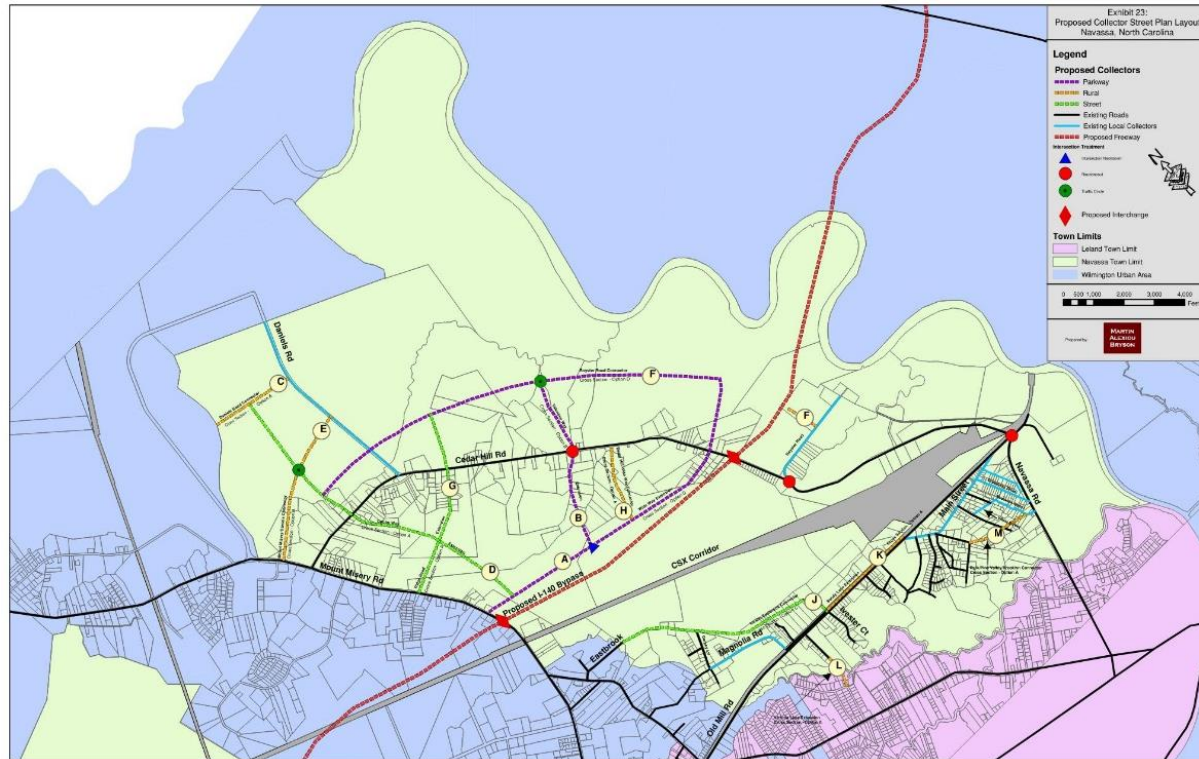


Figure 20. 2004 Navassa Collector Street Plan

Town of Leland Bicycle Plan (2008)

While this Bicycle Plan was focused on prioritizing improvements within the Town of Leland, the plan aimed to propose new bicycling routes and connections to adjacent Towns, including Navassa. The plan identified the Navassa Road/Village Road/Old Mill Road loop as a near-term priority for improvement, including crossings over Sturgeon Creek into Navassa.

Navassa Comprehensive Parks & Recreation Master Plan (2011)

The Town's Master Plan included an inventory of existing facilities, public engagement through a survey and community meetings, and a recreational needs assessment to address planned population growth. The project resulted in an implementation plan to outline the concept design, projected cost, and year of opening for several planned parks, including the following:

- Phoenix Park, a 4.65-acre community park at the northeast quadrant of Mount Misery Road and Cedar Hill Road, which will include a softball field, basketball court, playgrounds, sheltered picnic area, nature trail, and two pedestrian bridges over wetlands.
- Indian Creek, consisting of eight parks totaling 39.43 acres, will be located within the Indian Creek Planned Unit Development north of Cedar Hill Road extending west and east of Daniels Road. These parks will include an elevated walkway, a multiuse trail connection to

Phoenix Park, and a multiuse trail running through the entire development with access from public parking areas.

- River Bend, consisting of 16 parks totaling 52.22 acres, will be located within the River Bend Planned Unit Development northeast of Cedar Hill Road and northwest of I-140. The parks and open space will include sidewalks and a greenway extending through the development and connecting with the Historic Cedar Hill Cemetery.
- Cedar Hill Road / Mount Misery Road / Navassa Road Loop was identified as a short-term improvement to add walking and bicycling facilities to these roadways as they are improved by NCDOT. The plan recommended that any future TIP projects along these roadways adhere to NCDOT Complete Streets Guidelines.
- A proposed Rail Trail (repurposing old rail easements) feasibility study from Davis Creek to the southern edge of River Bend was identified as a short-term need.

Town of Navassa Future Land Use Plan (2012)

The Town's future land use plan includes an evaluation of land use growth and development trends and identified issues and impacts concerning the natural environment, community resources, and transportation. The plan concluded that the vast majority of near term development within the Town would continue to be residential, with most new residential growth limited to the areas near Cedar Hill Road in the north and west parts of the Town, as shown in Figure 21.

The following are additional multimodal facilities identified within the plan as part of future needs:

- The plan identified additional public water accesses planned as part of the Indian Creek and River Bend Planned Unit Developments, as well as a future access to Mill Creek/Sturgeon Creek as part of the Lena Springs Development, Phase 2.
- Additional bus service to the Town was identified as a needed improvement.
- The plan recommended incorporating additional bicycle and pedestrian facilities within the Indian Creek and River Bend Planned Unit Developments as part of the required public space dedication.

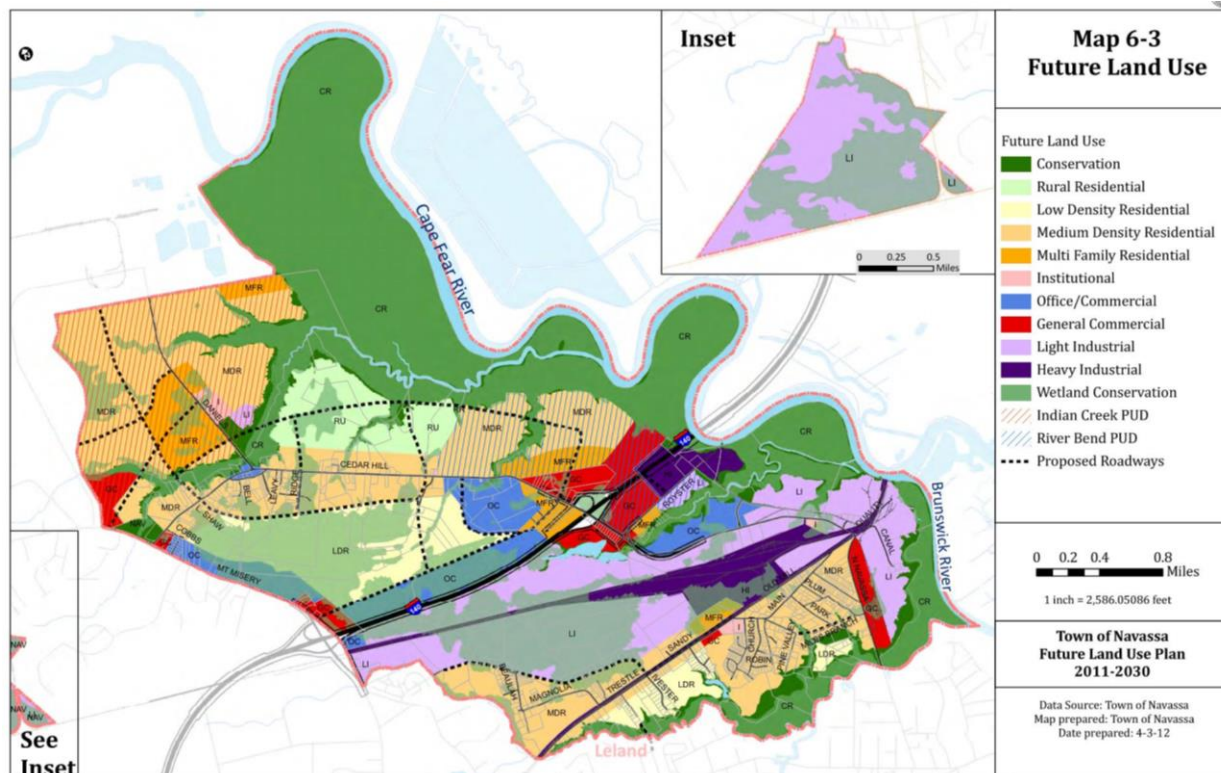


Figure 21. Town of Navassa Future Land Use

North Brunswick Collector Street Plan (2013)

Connecting Northern Brunswick County is a collector street plan for the Town of Leland, the Town of Navassa, and adjacent areas led by the Wilmington MPO. Building upon the 2004 Town of Navassa Collector Street plan, the Plan identified the following improvements to expand the system of collector streets within the Town of Navassa:

- Wide Way Extension to the west to connect to Mount Misery Road.
- Magnolia Drive Extension to the west to connect to Mount Misery Road via Playground Way.
- Valentine Way Extension to the south to connect to the proposed Wide Way Extension southwest of Cedar Hill Road.
- Cedar Hill/Wide Way Extension Connector from Cedar Hill Road south to the Wide Way Extension.
- Ivester/Eastbrook Connector from the Old Mill Road/Ivester Court intersection to Eastbrook Street.
- Victoria Lane Extension to the south into Leland.

These improvements are intended to provide additional connectivity within the Town and to guide future development. Figure 22 displays a map of the recommended collector street additions and extensions.

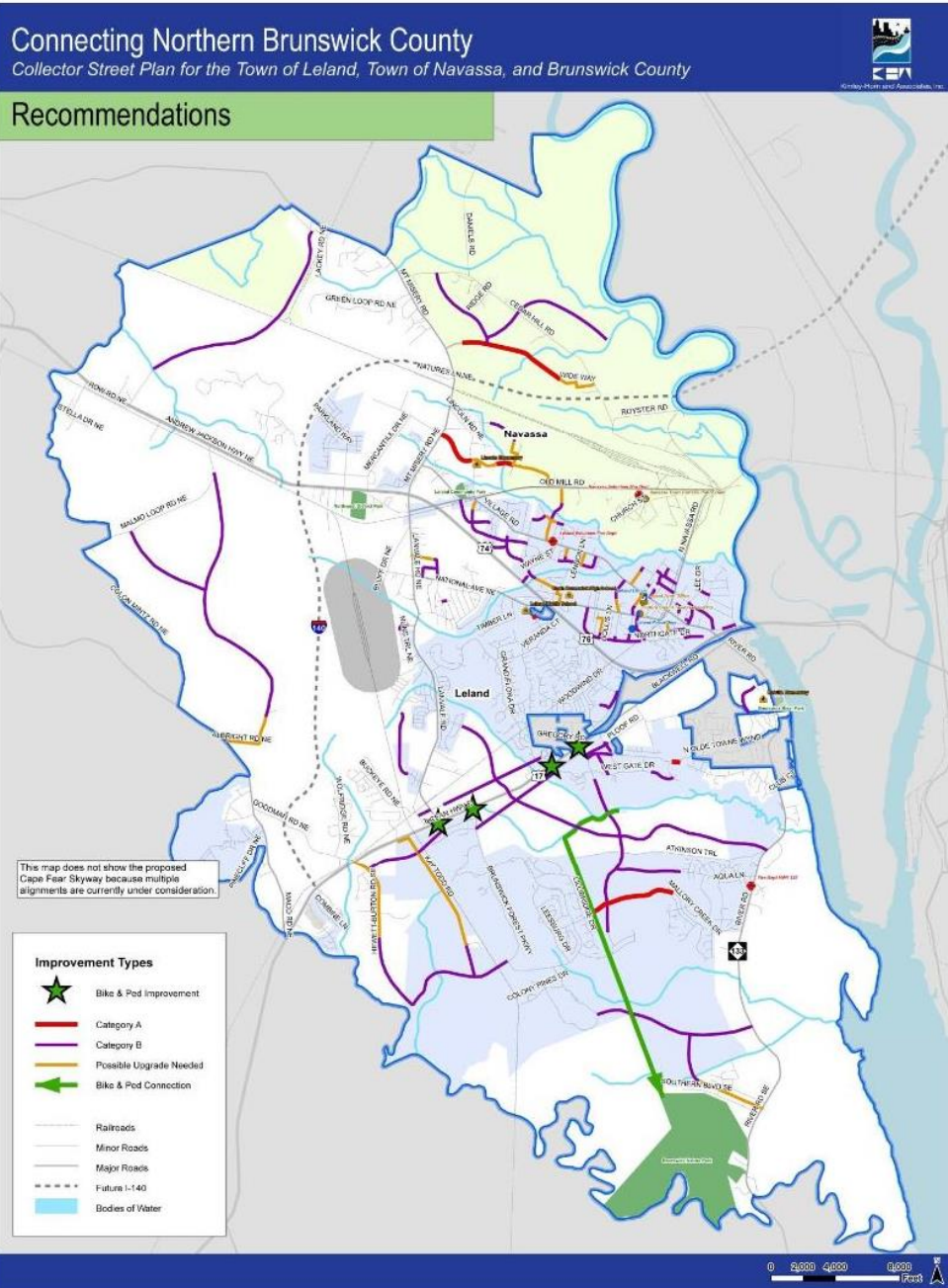


Figure 22. Navassa Collector Street Recommendations

Wilmington MPO Comprehensive Transportation Plan (2015)

The WMPO Comprehensive Transportation Plan identified several corridors for pedestrian and bicycle improvements within the Town of Navassa, including Cedar Hill Road, Navassa Road, Old Mill Road, Mount Misery Road, and the Navassa Heritage Trail. Additionally, the power and gas line easement bisecting the Town of Navassa from south to north was identified as a potential corridor for additional pedestrian and bicycle facilities.

Town of Leland Pedestrian Plan (2016)

The recommended pedestrian network for the Town of Leland includes dozens of new sidewalk and multiuse trail projects throughout the Town limits. While no new pedestrian connections into the Town of Navassa were ranked within the highest-priority projects, several improvements were proposed just outside the border with Navassa, including a new multiuse path on Navassa Road south of Sturgeon Creek, a new Multiuse Path on Old Mill Road and Village Road east and west of Leland Community Park, and a new sidewalk from Cypress Cove Park to Village Road.

Town of Navassa Gateway Plan (2017)

Commissioned by the North Carolina Department of Commerce, this economic plan provides a guide for recommended land use and transportation improvements near the Mount Misery Road and Cedar Hill Road interchanges with I-140, with the goal of improving quality of life as a result of future development at these locations. Building on the Navassa Future Land Use Plan, the study identified the following strategies for new development at these two interchange locations:

- Discourage commercial strip development and encourage development within nodal areas.
- Relate buildings to the street to encourage pedestrian circulation.
- Line streets with sidewalks to build safe, comfortable connections between buildings, the street, and parking.
- Limit the number, size, and height of free standing signs to reduce sign clutter.
- Provide site landscaping and retain as many existing site trees as possible to create a sustainable environment.
- Prohibit cul-de-sacs so that connectivity and site access is preserved for all users, while mitigating traffic congestion.
- Manage driveway access to limit conflicts and promote orderly land use patterns.

In support of and in addition to these strategies, the plan identified several elements of the zoning and subdivision ordinances to review and amend, including requiring sidewalks for all new residential and commercial land uses. The plan also recommended the Town cross-check development codes from peer cities and towns within North Carolina that have achieved a high quality level of development.

Current Programs and Policies

The project team reviewed current programs and policies to assess how existing efforts support pedestrian and bicycle infrastructure and users in Navassa. The team reviewed land use and development regulations in the Town's Code of Ordinances, notes from Town and WMPO staff, as well as community needs and concerns gathered during the public workshop and steering committee meetings to synthesize the following list.

Town of Navassa Zoning Ordinance (Amended 2010)

The Town Zoning Ordinance was prepared in 2009 and amended in 2010. The ordinance includes several provisions for requiring new multifamily developments to preserve open space and construct pedestrian and bicycle facilities. The ordinance requires that 0.03 acre of open space per unit (or lot) be provided within multifamily developments. At least 25 percent of open space reserved for this purpose must be usable for active recreation. The ordinance also requires that multiple parcels of open space be connected by a multi-use path within a dedicated corridor of 15 feet minimum width.

Town of Navassa Subdivision Ordinance (Amended 2015)

The Town's Subdivision Ordinance regulates single- and multi-family residential developments by requiring an organized street layout, division of land, and provision of open space and parks (or comparable fee in lieu). The ordinance requires that 0.04 acre of open space per unit (or lot) be provided within major subdivisions. At least 12.5 percent of open space reserved for this purpose must be usable for active recreation. The ordinance also requires that multiple parcels of open space be connected by a multi-use path within a dedicated corridor of up to 30 feet in width. Sidewalks are required on both sides of streets within all major subdivisions.

GoCoast

The GoCoast Committee is a group comprised of local agencies, businesses, and stakeholders that strives to encourage active transportation and Transportation Demand Management. The Committee has led the "Be a Looker" educational campaign to encourage individuals to pledge to educate themselves about bicycle and pedestrian safety and the rules of the road. In tandem with the WMPO, the GoCoast Committee has identified bicycle and pedestrian infrastructure implementation as a high-priority strategy for Transportation Demand Management. A bicycle sharing program has been identified as a medium-priority strategy.

Navassa Community Economic and Environmental Resource Commission

The NCEERC is a non-profit corporation founded in 2015 to address brownfield remediation within the Town of Navassa and adjacent areas. The commission has consistently encouraged

the redevelopment of brownfield areas into open space to allow public access to natural and historic resources.

Health Advisory Committee

The Town of Navassa currently benefits from a three-year UNCW Community Engagement grant to support the exploration of family medical history and genealogy. The initiative will facilitate a program to help residents better understand their health and identify resources for maintaining and improving health, ultimately establishing a Health Advisory Committee made up of the program's participants. It is through this Health Advisory Committee where additional recreational projects could be led and supported, including new community gardens, parks, and trails.

Program and Policy Recommendations

Generally, the community lacks policies and programs related to pedestrian and bicycle infrastructure. While this plan's recommended bicycle and pedestrian network provides the foundation for increasing pedestrian and bicycle use and creating safer streets, further policy and program actions are needed to make the best use of that infrastructure. Walking and bicycle-related programs help educate people about navigating their community outside of vehicles and encourage them to do so. It is also important to implement supportive policies that welcome walking and bicycling and are consistently enforced as well as to conduct ongoing evaluations of current infrastructure's effectiveness and the need for new or updated projects. Policies and programs can complement engineering improvements such as bike lanes, routes, and greenways by giving Navassa residents the tools they need to ride their bicycles safely and confidently.

Program and policy recommendations in this plan are based on conversations with Town staff, thorough review of existing relevant planning documents, the vision and goals of this plan, as well as the public engagement process.

Key recommendations include the following:

- Adopt the Bicycle and Pedestrian Infrastructure Model Ordinance being developed by WMPO to establish facility needs and enhance development requirements.
- Adopt a Town Complete Streets Policy to guide street design whenever new roadways are created or existing streets are reconstructed or upgraded, making the best use of Town and NCDOT rights of way.
- Develop and adopt a Town Traffic Calming Policy.
- Continue to partner with WMPO and NCDOT on safety and education programs such as "Watch for Me NC", "Let's Go NC", and the WMPO's "Be a Looker" focused on developing children's safety skills.

- Continue participation on the WMPO Bicycle and Pedestrian Advisory Committee (BPAC) to coordinate and advocate for local and regional walking and bicycling projects and programs.
- Partner with the WMPO (which regularly conducts multimodal counts), NCDOT, and Institute for Transportation Research and Education (ITRE) to conduct pedestrian and bicycle counts, particularly to conduct before/after project evaluations.

Successful implementation of recommended policies and programs will require interdepartmental, interagency, and stakeholder coordination. Working together with Brunswick County, NCDOT, WMPO, and other community partners is an effective way to leverage adequate funding and support for program efforts.

RECOMMENDED BICYCLE AND PEDESTRIAN NETWORK

Potential Project Locations

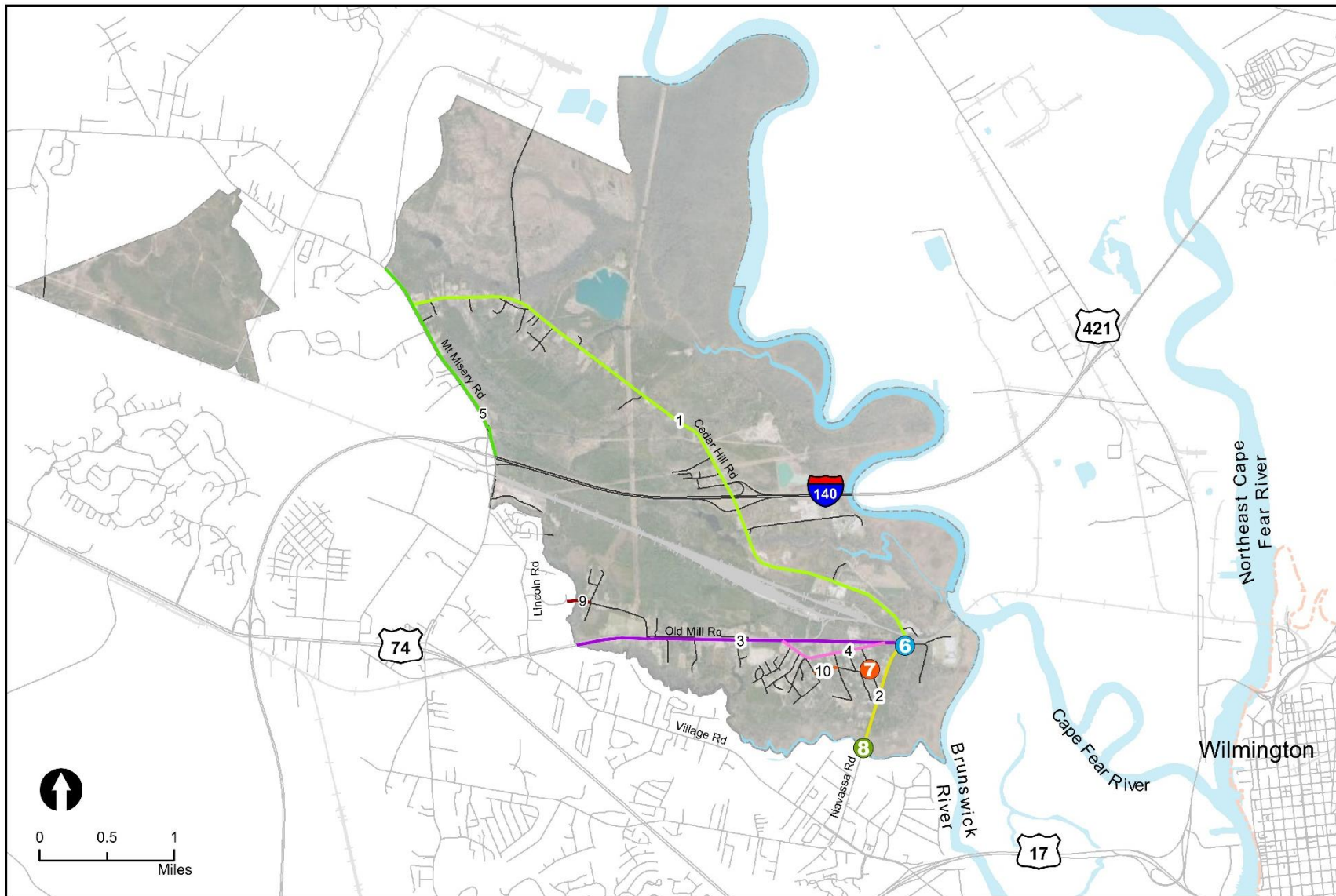
Project locations are defined as both spot locations such as crosswalk or intersection improvements, as well as corridor locations, including existing and planned connections. To identify potential project locations for the Town's bicycle and pedestrian network, the project team considered the following data:

- Reported crash data involving a pedestrian or bicyclist,
- High-stress streets based on existing bicycle level of traffic stress (high stress defined as an LTS of 3 or 4),
- Deficient locations or desired improvements identified during public and steering committee involvement, and
- The location of existing and planned parks and trails, including those in adjacent areas such as Leland.

A total of 10 such locations were identified across the Town limits, ranging from rural to urban areas of the Town. Figure 23 summarizes the potential project locations identified through this process, including the following:

1. **Cedar Hill Road.** The length of Cedar Hill Road from Old Mill Road to Mount Misery Road (also the Town Limit) was identified as a location for improvement due to crash history (3 reported crashes involving a bicyclist or pedestrian within the past 10 years), high level of traffic stress (LTS 3-4), public and stakeholder comments, and the Gullah-Geechee Trail route. Additional planned development along Cedar Hill Road, including Indian Creek and River Bend, create an opportunity for funding and/or right-of-way dedication for sidewalk or trail improvements by private developers.
2. **Navassa Road.** The length of Navassa Road from Old Mill Road to the Town's southern limit at Sturgeon Creek was identified as a location for improvement due to high level of traffic stress (LTS 3), public and stakeholder comments, and the Gullah-Geechee Trail route. Additional planned development along the east side of Navassa Road within the Kerr-McGee Superfund Site could create an opportunity for funding and/or right-of-way dedication for sidewalk or trail improvements by private developers.
3. **Old Mill Road.** The Old Mill Road corridor from Navassa Road/Cedar Hill Road to the west Town limit at Mill Creek was identified as a location for improvement due to high level of traffic stress (LTS 3) and public and stakeholder comments. Rail right-of-way and parallel low-stress facilities (Trestle Way and Sandy Lane) could create an opportunity to save right-of-way or construction costs for sidewalk or trail improvements along this corridor.

4. **Main Street.** The entire length of Main Street was identified as a location for improvement due to high level of traffic stress (LTS 3) and public and stakeholder comments. Additionally, Main Street services the Navassa central business district and has potential for high pedestrian and bicycle demand.
5. **Mount Misery Road.** The length of Mount Misery Road within the Town of Navassa limits (approximately I-140 to Daniels Road) was identified as a location for improvement due to high level of traffic stress (LTS 4), the presence of an NCDOT bicycle route, and public and stakeholder comments. Provision of additional bicycling and walking facilities along Mount Misery Road is key to serving more of the Town of Navassa's rural population to the north and west.
6. **Cedar Hill Road/Navassa Road/Old Mill Road Intersection.** The intersection of Cedar Hill Road, Navassa Road, and Old Mill Road currently exhibits several challenges toward biking and walking, including a lack of marked crosswalks, skewed approach geometry, poor lines of visibility, and high vehicle speeds. The close spacing between this intersection and the Cedar Hill Road / Quality Drive intersection and the CSX rail crossing to the north create additional challenges for both active transportation and automobile users. The intersection forms a barrier toward walking or bicycling from any direction, which may be exacerbated by future development to the south and east.
7. **Broadway Street Trail Crossing.** The Water Street multiuse trail mid-block crossing of Broadway Street is currently signed but not marked. This was a location identified for improvement due to public and stakeholder concerns about pedestrian safety crossing at this location, particularly for children.
8. **Navassa Road at Sturgeon Creek Bridge.** The Navassa Road bridge between Leland and Navassa is 750 feet long and rises predominantly over Sturgeon Creek. While the bridge was replaced in 2004, it is still only 28 feet wide and does not contain any sidewalk or dedicated bicycle facilities, creating a high-stress (LTS 3) barrier between Leland and Navassa.
9. **Magnolia Drive Extension.** The project steering committee and the public identified the need for an additional sidewalk or multiuse trail connection between Magnolia Drive and Playground Way to connect Navassa to Lincoln Elementary, enabling children to walk to school and also for bicyclists and pedestrians to access planned parks and trails within Leland. The connection would include an elevated crossing of Rowel Branch.
10. **Water Street to Pine Valley Drive.** The connection from the Water Street/Park Avenue intersection to Pine Valley Drive was identified as a project location for increasing street connectivity and multimodal access within the Navassa central business district, including providing a low-stress bicycling route to high-stress facilities on Main Street and Old Mill Road.



Legend

- Town Boundary
- River
- Road
- Railroad

- 1 - Cedar Hill Rd (Old Mill Rd to North Town Limit)
- 2 - Navassa Rd (Old Mill Rd to Sturgeon Creek)
- 3 - Old Mill Rd (Cedar Hill Rd to West Town Limit)
- 4 - Main St (Entire Length)
- 5 - Mt Misery Rd (I-140 to North Town Limit)
- 6 - Cedar Hill Rd/Navassa Rd/Old Mill Rd Intersection
- 7 - Broadway St at Trail Crossing
- 8 - Navassa Rd at Sturgeon Creek
- 9 - Magnolia Drive Extension
- 10 - Water St to Pine Valley Dr

Locations for Improvement



Figure 23. Locations for Improvement

PROJECT ALTERNATIVES

Alternative treatments for the 10 locations identified for improvement in the previous section were developed to solicit feedback from the project steering committee and via public engagement, with the goal of developing cost estimates and cut sheets for the 10 locations.

To develop these alternatives, the project team considered a range of bicycle and pedestrian treatments intended to improve safety, comfort, and accessibility, while considering the local context and constraints. Visualizations were developed to help illustrate each alternative for the purposes of public and stakeholder engagement. Table 2 provides a brief description of these alternatives. Two alternative cross sections were developed for each of the five corridors (locations 1-5), as follows:

- Cross Section 1: 5' Sidewalk, 6' Landscape Buffer, and 5' On-Street Bicycle Lanes in both directions
- Cross Section 2: 12' Multi-use path on one side of the roadway with 6' Landscape Buffer

These two cross sections were identified to cater to a range of bicyclist and pedestrian comfort levels, acknowledging that some bicyclists prefer to ride on the street, while others prefer off-street facilities. Similarly, some pedestrians prefer sidewalk to a wider multi-use path, albeit shared with bicyclists. The two alternatives were also intended to explore a range of potential costs, with Cross Section 2 providing a generally narrower footprint and more flexibility with parcel impacts, leading to lower cost.

At three of the point locations (locations 6-8), two unique alternatives were developed to address the deficiencies identified for each location, with the goal of providing both low- and high-cost alternatives. At the remaining two locations (locations 9-10), the preferred alternative was already identified through public and stakeholder engagement, and no changes were expected beyond minor refinements.

Table 2. Locations for Improvement and Project Alternatives

Location		Segment or Point	Deficiency	Recommendation	Alternative 1	Alternative 2	Preferred Alternative
1	Cedar Hill Rd (Old Mill Rd to North Town Limit)	Segment	No Sidewalk / Bicycle LTS 3-4*	Add bicycle/pedestrian facilities	Sidewalk and on-street bicycle lanes**	Sidewalk and multi-use path	Sidewalk and multi-use path
2	Navassa Rd (Old Mill Rd to Sturgeon Creek)	Segment	No Sidewalk / Bicycle LTS 3	Add bicycle/pedestrian facilities	Sidewalk and on-street bicycle lanes	Sidewalk and multi-use path	Sidewalk and multi-use path
3	Old Mill Rd (Cedar Hill Rd to West Town Limit)	Segment	No Sidewalk / Bicycle LTS 3	Add bicycle/pedestrian facilities	Sidewalk and on-street bicycle lanes	Sidewalk and multi-use path (utility/rail easement)	Sidewalk and multi-use path (utility/rail easement)
4	Main St (Entire Length)	Segment	No Sidewalk / Bicycle LTS 3	Add bicycle/pedestrian facilities	Sidewalk and on-street bicycle lanes	Sidewalk and multi-use path	Sidewalk and on-street bicycle lanes
5	Mt Misery Rd (I-140 to North Town Limit)	Segment	No Sidewalk / Bicycle LTS 4	Add bicycle/pedestrian facilities	Sidewalk and on-street bicycle lanes	Sidewalk and multi-use path	Multi-use path
6	Cedar Hill Rd/Navassa Rd/ Old Mill Rd Intersection	Point	No Crosswalk / High Speeds	Add crosswalk/improve intersection	Add crosswalk with supplemental treatments*	Add roundabout	Add roundabout
7	Broadway St at Trail Crossing	Point	No Crosswalk / High Speeds	Add crosswalk/traffic calming	Add signage and pavement markings to crosswalk	Add supplemental crosswalk treatments***	Add beacons or supplemental crosswalk treatments
8	Navassa Rd at Sturgeon Creek	Point	No Sidewalk / Bicycle LTS 3	Add bicycle/pedestrian facilities	Replace bridge and add ped/bike facilities	Add multi-use path (bridge)	Add multi-use path (bridge)
9	Magnolia Drive Extension	Segment	Limited Street Connectivity	Extend to Playground Way	New alignment / boardwalk	Not applicable	New alignment / boardwalk
10	Water St to Pine Valley Dr	Segment	Limited Street Connectivity	Provide multi-use path	Add multi-use path / new alignment	Not applicable	Add multi-use path / new alignment

*LTS = bicycle level of traffic stress (1=suitable for children, 2=suitable for most riders, 3=moderate stress, 4=high stress)

**Details regarding sidewalk/path dimensions and placement (side of road) will be refined as concepts are developed

***Supplemental crosswalk treatments could mean median refuge, raised crosswalk, and/or signalization (RRFB, PHB, or full signal) pending more detailed assessment

PUBLIC AND STAKEHOLDER FEEDBACK

The project team shared the list of 10 locations for improvement and the project alternatives during Steering Committee Meeting #2, held on September 24, 2021, answered questions about the specific alternatives, and gathered valuable feedback on the proposed bicycle and pedestrian treatments. The following is a summary of the feedback received:

1. Cedar Hill Road:

- A multiuse path is already planned on the east/north side of the road to coincide with future developments.
- Approximately 65' of right-of-way is available along the length of the corridor.
- There was consensus that a multiuse path was more appropriate given the higher vehicle speeds and rural context along most of the corridor.
- The steering committee requested a hybrid option be developed that preserves Cross Section 2 but incorporates a sidewalk on the west/south side of the roadway to serve local land uses opposite from the multiuse path.

2. Navassa Road:

- A multiuse path is preferred due to high speeds along the corridor. If the path were located on the east side of the road, it could be incorporated with future development at the Kerr-McGee Superfund Site.
- The steering committee requested a hybrid option be developed that preserves Cross Section 2 but incorporates a sidewalk on the west/south side of the roadway to serve local land uses opposite from the multiuse path.

3. Old Mill Road:

- Detailed impacts concerning the use of the utility easement along the north side of the road would need to be addressed if the project moves forward.
- The project team explained that in some areas, existing low-volume, low speed streets (Sandy Lane and Trestle Way) would be incorporated within the multiuse path along the north side of the road. Design details regarding interaction between trail users and automobiles on these streets would need to be explored as the project moves forward.
- The steering committee requested a hybrid option be developed that preserves Cross Section 2 but incorporates a sidewalk on the west/south side of the roadway to serve local land uses opposite from the multiuse path.

4. Main Street:

- Cross Section 1 was identified as the consensus preferred option due to lower speeds and more activity along the corridor.

5. Mount Misery Road.

- Cross Section 2 was identified as the consensus preferred option due to high speeds and rural context along most of the corridor.
- The project team explained that a grade separation (bridge or underpass) may be the most appropriate treatment at I-140 to make use of existing street/right-of-way along the former alignment of Old Mount Misery Road.

6. Cedar Hill Road/Navassa Road/Old Mill Road Intersection:

- The steering committee expressed support for Option 2 (roundabout) but raised concerns about truck access to Quality Lane and the other approaches.
- It was noted that enhanced crosswalks or other treatments in Option 1 may not provide a real benefit if vehicle speeds are not controlled and the existing skewed geometry remains.
- If Option 1 were to be advanced, the type of treatment selected would need to be identified using NCDOT's pedestrian treatment workflow.

7. Broadway Street Trail Crossing:

- Option 2 (enhanced crosswalk with rectangular rapid flashing beacon, pedestrian hybrid beacon, or an equivalent treatment) was identified as the consensus preferred option due to the level of improvement toward crosswalk safety and accessibility.
- The Town of Navassa noted that planned gardens and playgrounds in the vicinity of the trail crossing, as well as the trail extension project, will only bring additional activity to the crosswalk.

8. Navassa Road at Sturgeon Creek Bridge:

- Option 2 (parallel raised path) was identified as the consensus preferred option due to high speeds on the existing bridge and the design to align with future multiuse trail projects north and south of the bridge.

9. Magnolia Drive Extension:

- The steering committee expressed support for the preferred option and had no additional comments.

10. Water Street to Pine Valley Drive:

- The steering committee expressed support for the preferred option and had no additional comments.

PROJECT CUT SHEETS

The following pages display the cut sheets for the 10 project locations, including a description of the preferred option, visualization, and high-level cost estimate. Appendix A provides the detailed cost estimates prepared for each project. Cost estimates were prepared internally by Kittelson & Associates, Inc. using design expert opinion and with the following assumptions:

- Year 2021 construction quantities costs were incorporated with minimal consideration for inflation.
- Assumed right of way costs ranged from \$20 to \$30/square foot.
- No total takes or major structural impacts were assumed.
- Allowances (as a percentage of the overall project cost estimate) rather than detailed quantities were estimated for some items such as mobilization, traffic control, earthworks, landscaping, and signage.
- Costs were prepared independently of any other planned or programmed improvements such as roadway resurfacing or maintenance.

Project #1: Cedar Hill Rd (Old Mill Rd to Mount Misery Rd)

Description:

- The project would add a 12-foot multi-use path along Cedar Hill Road, which would also serve as the Gullah-Geechee Heritage Trail. The path would be placed along the north/east side of Cedar Hill Road.
- A five-foot sidewalk would also be built along the roadway on the opposite site from the multi-use path.
- The project length is approximately 4.8 miles.

Estimated Cost:

- Section 1A – Old Mill Road to Wide Way: \$9 Million
- Section 1B – Wide Way to Mount Misery Road: \$13 Million

Potential Barriers/Constraints:

- Extensive length of construction (4.8 miles) and materials cost.
- Wetlands impacts, particularly near Cartwheel Branch and the I-140 interchange.
- Impacts to historical and culturally significant areas, including Reaves Chapel Church.
- Need to coordinate feasibility of trail construction pending planned and future developments adjacent to Cedar Hill Road, particularly along the north/east side.

Conceptual Rendering:

Looking North

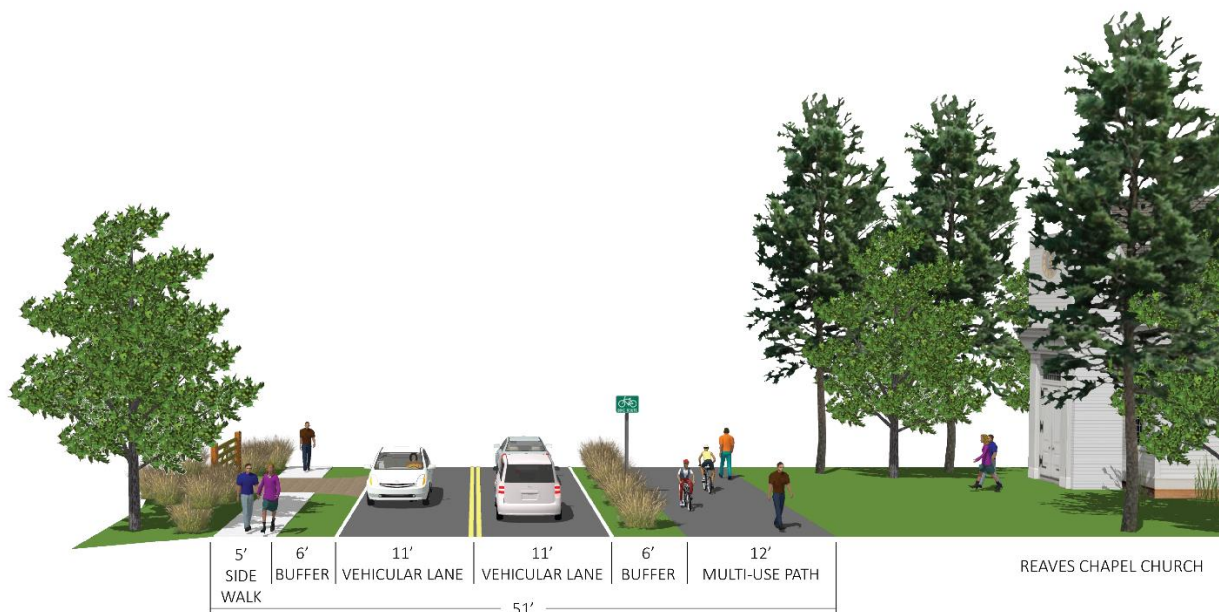


Figure 24. Cedar Hill Road Preferred Alternative

Project #2: Navassa Rd (Old Mill Rd to Sturgeon Creek)

Description:

- The project would add a 12-foot multi-use path along Navassa Road, which would also serve as the Gullah-Geechee Heritage Trail. The path would be placed along the east side of Navassa Road between the proposed Sturgeon Creek bridge and Old Mill Road.
- A five-foot sidewalk would also be built along the west side of Navassa Road.
- The project length is approximately 0.7 mile.

Estimated Cost: \$4 Million

Potential Barriers/Constraints:

- Extensive length of construction (4.8 miles) and materials cost.
- Environmentally sensitive areas near the Brunswick River and Sturgeon Creek.
- Utility impacts along the east side of Navassa Road.
- Need to coordinate feasibility of trail construction pending planned and future developments along the east side of Navassa Road.

Conceptual Rendering:

Looking North



Figure 25. Navassa Road Preferred Alternative

Project #3: Old Mill Road (Cedar Hill Road to West Town Limit)

Description:

- The project would add a 12-foot multi-use path along the north side of Old Mill Road. The path would be placed within existing rail or utility easements to minimize cost and could also make use of existing pavement along Sandy Lane and Trestle Way.
- A five-foot sidewalk would also be built along the south side of the roadway.
- The project length is approximately 2.4 miles.

Estimated Cost: \$9 Million

Potential Barriers/Constraints:

- Environmentally sensitive areas near Mill Creek.
- Stormwater/drainage impacts along the south side of Old Mill Road, including potential runoff impacts to adjacent properties.
- Need to coordinate feasibility of trail construction with nearby railroad.

Conceptual Rendering:

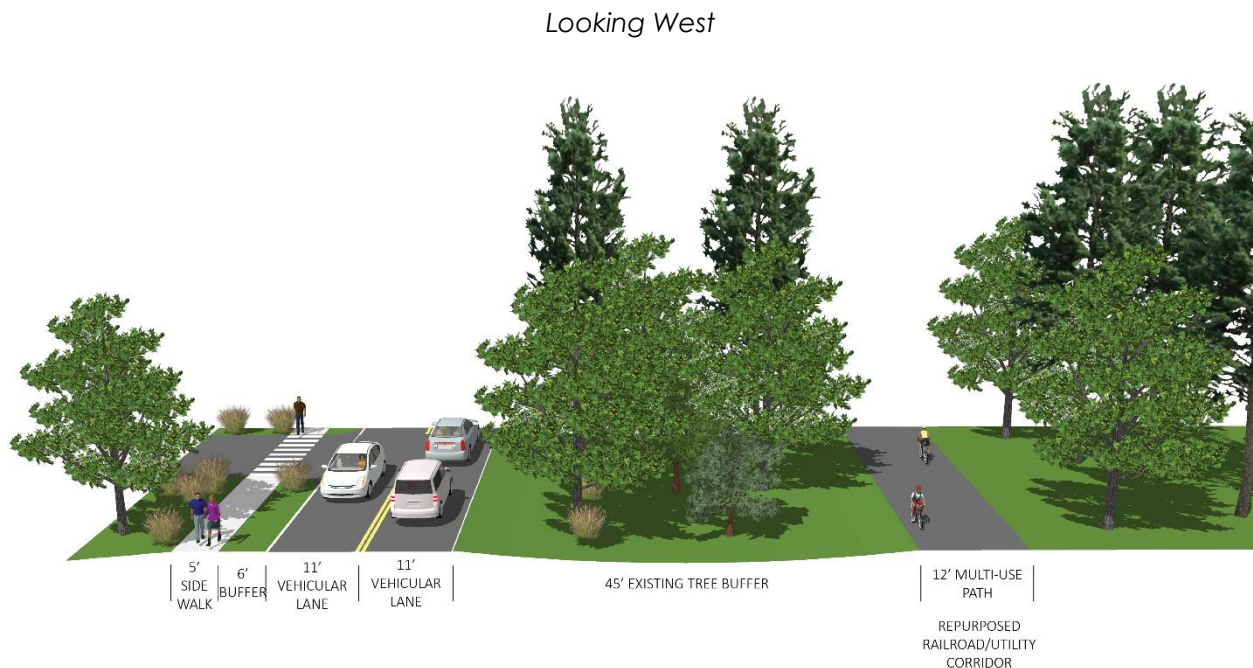


Figure 26. Old Mill Road Preferred Alternative

Project #4: Main Street (Entire Length)

Description:

- The project would add five-foot on-street bike lanes in both directions of Main Street.
- Five-foot sidewalks would also be built along both sides of the roadway.
- The project length is approximately 0.8 mile.

Estimated Cost: \$5 Million

Potential Barriers/Constraints:

- Stormwater/drainage impacts along both sides of Main Street, including potential runoff impacts to adjacent properties.
- Potential utility impacts on the east side of the corridor.

Conceptual Rendering:

Looking West

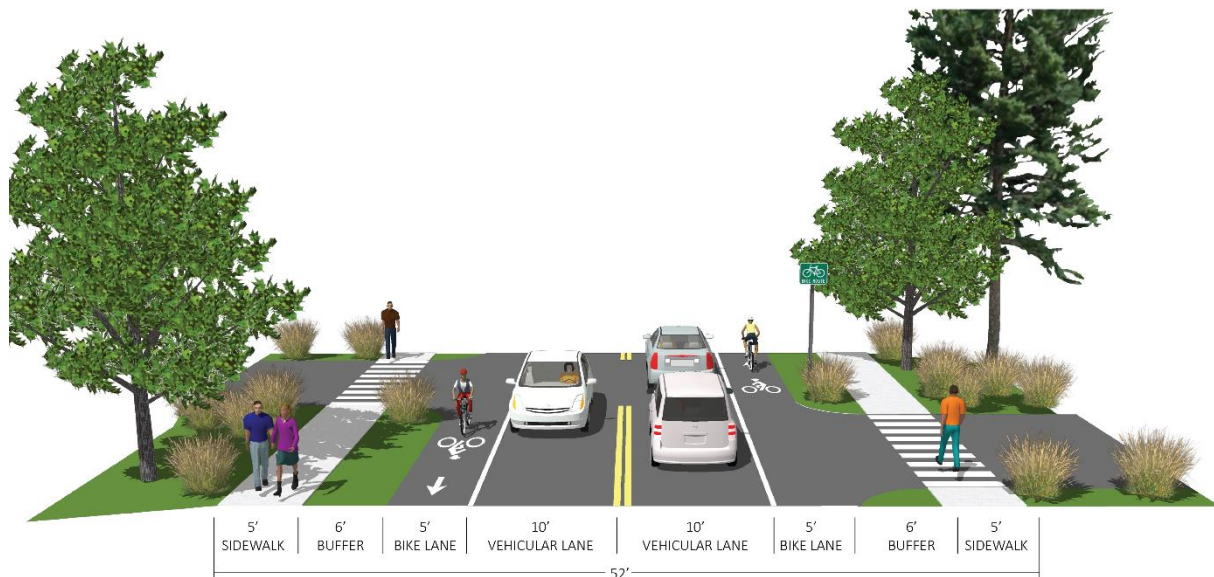


Figure 27. Main Street Preferred Alternative

Project #5: Mount Misery Road (I-140 to North Town Limit)

Description:

- The project would add a 12-foot multi-use path along the east side of Mt Misery Road from Lincoln Road to Daniels Road, which would also serve as the Gullah-Geechee Heritage Trail north of Navassa Road.
- The project could include a grade-separated crossing (bridge or underpass) of I-140.
- The project length is approximately 2.0 miles.

Estimated Cost: \$5 Million

Potential Barriers/Constraints:

- Extensive length of construction (2.0 miles) and materials cost.
- Utility impacts along the east side of Mount Misery Road.
- Potential grade separation over I-140 mainline/interchange ramps and/or railroad could increase cost and require further stakeholder coordination.

Conceptual Rendering:

Looking North



Figure 28. Mount Misery Road Preferred Alternative

Project #6: Cedar Hill Road/Navassa Road/Old Mill Road Intersection

Description:

- The project would replace the two existing two-way stop-controlled intersections at Cedar Hill Road/Quality Drive and Navassa Road/Old Mill Road with a single-lane roundabout.
- The project would include a 12-foot multi-use path along the south/east sides of the intersection and a five-foot sidewalk along the north/west sides of the intersection.
- The project would avoid the utility easement in the northwest quadrant and connect to planned sidewalks and multi-use path north, south, and west of the intersection.

Estimated Cost: \$7 Million

Potential Barriers/Constraints:

- Considerable right-of-way needs.
- Utility impacts in the northwest quadrant of the intersection.
- Construction staging and maintenance of traffic/access to adjacent properties.

Conceptual Rendering:



Figure 29. Cedar Hill Road/Navassa Road/Old Mill Road Preferred Alternative

Note that the visualization displayed in Figure 29 is a conceptual rendering of one potential roundabout design that minimizes property and utility impacts, achieves speed control (limiting vehicle speeds to 25 mph or less), and accommodates large trucks to/from the approaches on Cedar Hill Road, Quality Drive, and Navassa Road. The design may ultimately be refined pending changes in project assumptions or identifying further environmental or property constraints.

Project #7: Broadway Street at Trail Crossing

Description:

- The project would add a supplemental signalized treatment (either rectangular rapid flashing beacon, pedestrian hybrid beacon, or full signal, pending further assessment) at the existing multi-use path crossing of Broadway Street.
- The project would also include additional warning signage and enhanced pavement markings.

Estimated Cost: \$200,000

Potential Barriers/Constraints:

- Power supply/utility impacts.
- Coordination with future roadway resurfacing.

Conceptual Rendering:

Looking North

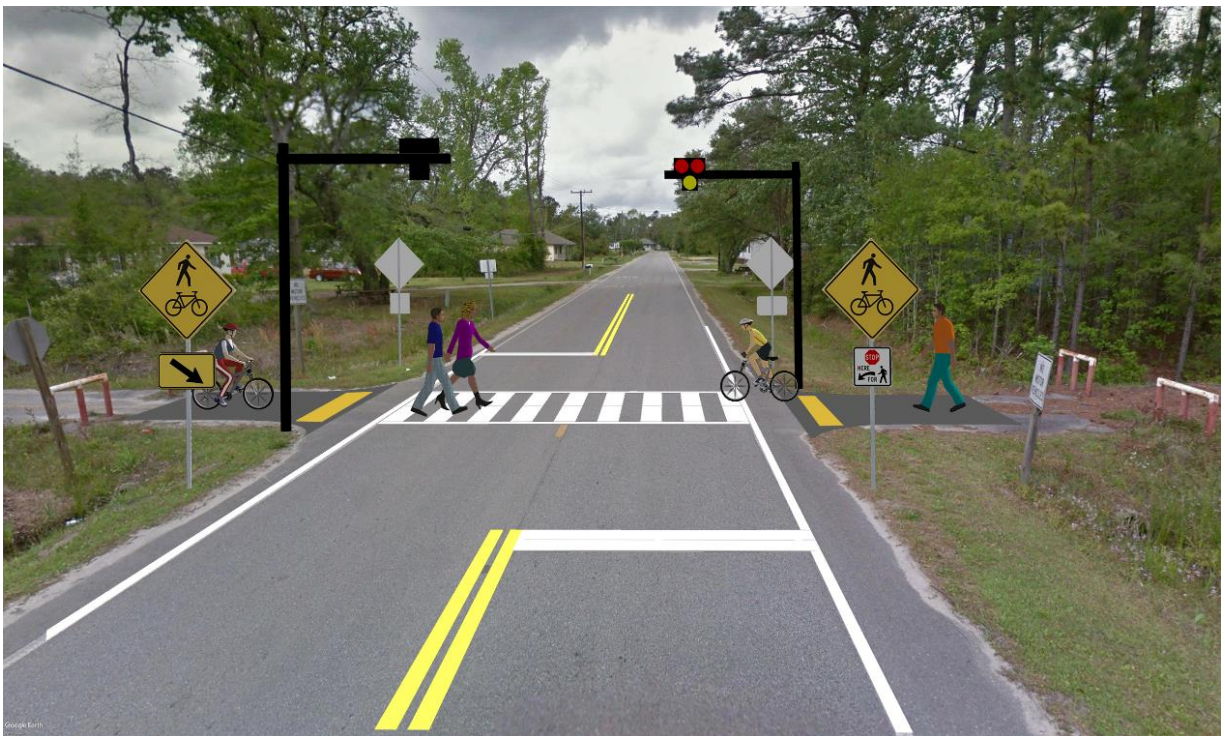


Figure 30. Broadway Street Trail Crossing Preferred Alternative

Note that while the visualization in Figure 30 displays a Pedestrian Hybrid Beacon (PHB), the type of signalized treatment would ultimately be determined in a more detailed phase of project development and design.

Project #8: Navassa Road at Sturgeon Creek Bridge

Description:

- The project would add a multi-use path on a parallel structure on the east side of Navassa Road over Sturgeon Creek.
- The project would connect to planned multi-use paths north and south (in Leland) of Sturgeon Creek.

Estimated Cost: \$6 Million

Potential Barriers/Constraints:

- Complex structural and architectural design needs.
- Environmentally sensitive areas near the Brunswick River and Sturgeon Creek.
- Utility impacts along the east side of Navassa Road.
- Need to coordinate feasibility of trail construction pending future trail development by Town of Leland south of the bridge.

Conceptual Rendering:

Looking North



Figure 31. Sturgeon Creek Bridge Preferred Alternative

Project #9: Magnolia Dr Multi-Use Path Extension

Description:

- The project would add a 12-foot multi-use path/boardwalk from Magnolia Drive west to Playground Way / Lincoln Elementary School.
- The project would include a bridge over Rowell Branch.
- The project length is approximately 1,000 feet.

Estimated Cost: \$4 Million

Potential Barriers/Constraints:

- Considerable right-of-way needs.
- Environmentally sensitive areas near Rowell Branch.
- Stormwater/drainage impacts, including potential runoff impacts to adjacent properties.

Conceptual Rendering:

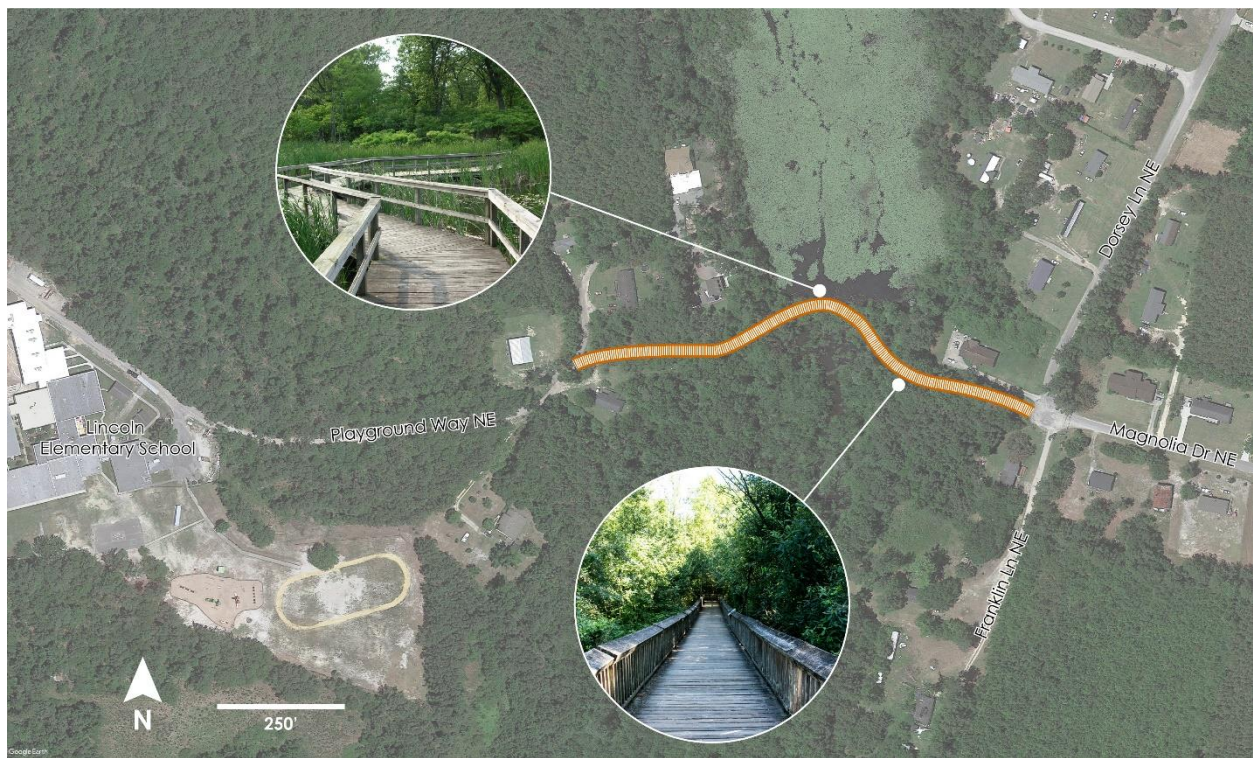


Figure 32. Magnolia Drive Extension Preferred Alternative

Project #10: Water Street to Pine Valley Drive Multi-Use Path

Description:

- The project would add a 12-foot multi-use path on a new alignment from Water Street/Park Avenue to Pine Valley Drive
- The project would provide a connection to existing and planned multi-use paths to the east.
- The project length is approximately 1,900 feet.

Estimated Cost: \$2 Million

Potential Barriers/Constraints:

- Considerable right-of-way needs.
- Environmentally sensitive and low-lying areas through the length of construction.
- Stormwater/drainage impacts, including potential runoff impacts to adjacent properties.

Conceptual Rendering:



Figure 33. Water Street to Pine Valley Drive Preferred Alternative

BICYCLE AND PEDESTRIAN NETWORK

Figure 34 displays a map of the recommended bicycle and pedestrian network, incorporating the preferred alternative for each of the 10 projects.

Project Prioritization

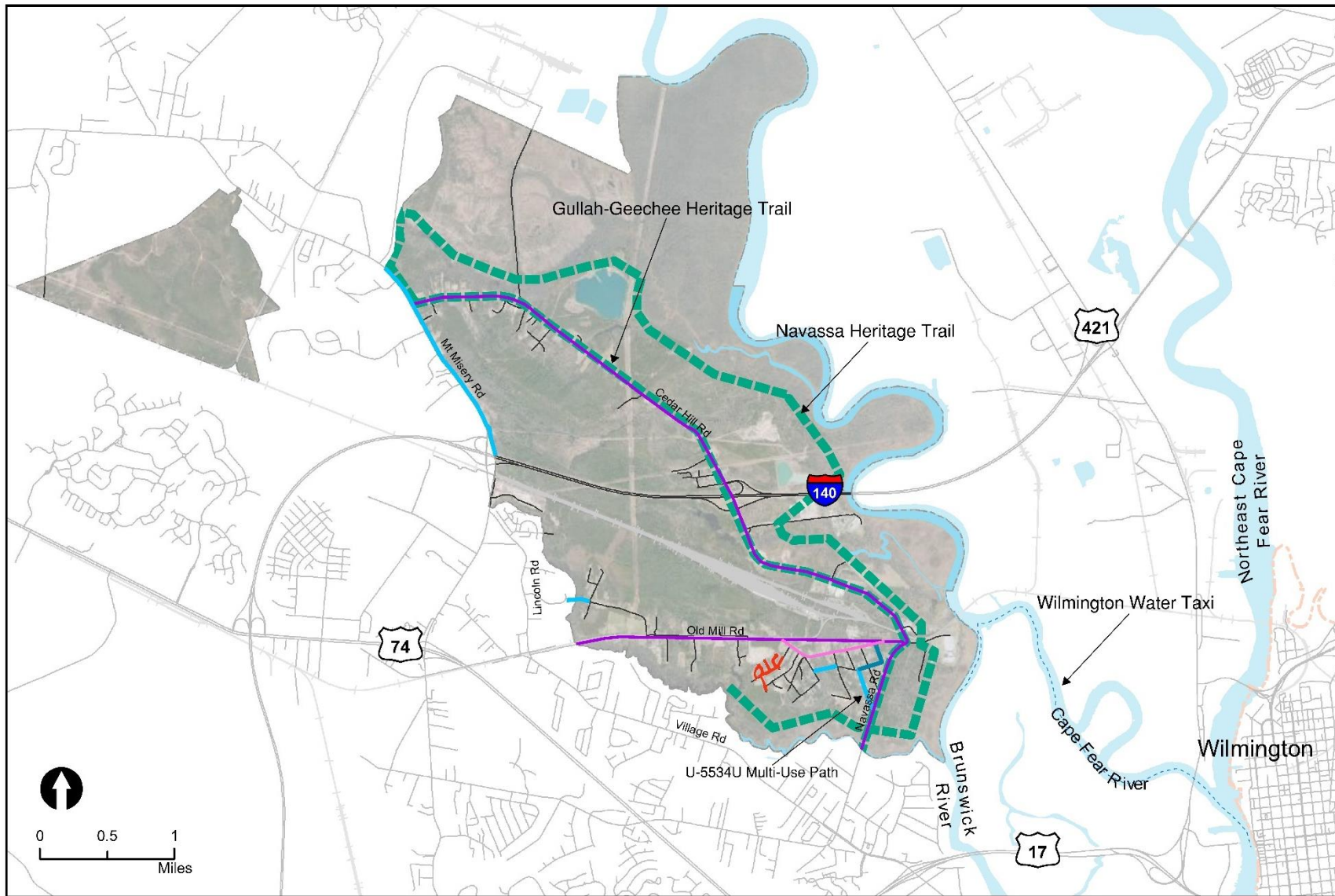
Project prioritization helps to identify which projects best advance the vision and goals of the plan and enables the Town of Navassa and NCDOT to allocate resources needed for project implementation.

METHODOLOGY

Proposed projects were evaluated and scored based on the following performance measures:

- **Safety.** All projects were considered at least a moderate benefit to safety because they add bicycling or walking facilities where there currently are none. Projects located on a roadway with a reported bicycle or pedestrian crash in the past 10 years were considered a high benefit to safety.
- **Comfort.** A project was considered a moderate benefit to comfort if located on a roadway with bicycle level of traffic stress 3, and it was considered a high benefit to comfort if located on a roadway with bicycle level of traffic stress 4.
- **Connectivity.** The project was considered a moderate benefit to connectivity if it provides a connection near at least one existing sidewalk, multi-use path, or park, and it was considered a high benefit to connectivity if it provides more than one such connection.
- **Equity.** A project's benefit to equity was identified by the number of user groups served². Projects serving two or more user groups were considered moderate equity, and projects serving three or more user groups were considered high equity.
- **Public Feedback.** A project scored moderate if at least one public comment was received either online or in person at the public engagement workshop, while a project scored high if comments were received both online and in person.
- **Feasibility.** A project ranked high in feasibility if the public cost of the project (regardless of public funding source) was estimated at less than \$3 Million, and moderate in feasibility if the public cost was estimated between \$3 and \$5.5 Million. The estimated cost considered the potential to offset funding to private developers.

² User groups included: 1) Residents with a recreational trip purpose, 2) Residents commuting or attending schools, places of workshop, or shopping, 3) Long-distance users passing through Navassa, and 4) Tourists from outside Navassa.



Legend

Town Boundary	River	Existing Sidewalk	Recommended Multi-use Path	Recommended Sidewalk and On-Street Bicycle Lanes
Road	Railroad	Existing Multi-use Path	Recommended Sidewalk and Multi-use Path	

Recommended Bicycle and Pedestrian Network

KITTELSON & ASSOCIATES

Figure 34. Recommended Bicycle and Pedestrian Network

PRIORITIZATION TABLE

Table 3 **Error! Reference source not found.** summarizes how each proposed project aligns with the plan goals and the overall priority. The resulting ranking identified the following projects as **high priority**:

- Location #1: Cedar Hill Road from Old Mill Road to North Town Limits – add sidewalk and multi-use path
- Location #2: Navassa Road from Old Mill Road to Sturgeon Creek – add sidewalk and multi-use path
- Location #7: Broadway Street at Trail Crossing – add beacons or supplemental crosswalk treatments

The following projects were identified as **moderate priority**:

- Location #3: Old Mill Road from Cedar Hill Road to West Town Limit: add sidewalk and multi-use path
- Location #4: Main Street: add sidewalks and on-street bicycle lanes
- Location #6: Cedar Hill Road / Navassa Road / Old Mill Road intersection: add roundabout
- Location #9: Extend Magnolia Drive to Playground Way

While the three remaining projects were not classified as either high or moderate priority, it should be noted that these are still critical needs identified for improving bicycling and walking within the Town. These projects may simply be prioritized as medium-to-long range improvements after the other projects are moved forward.

Table 3. Project Prioritization Table

Location		Preferred Alternative	Safety	Comfort	Connectivity	Equity	Public Feedback	Feasibility	Overall Priority
1	Cedar Hill Rd (Old Mill Rd to North Town Limit)	Sidewalk and multi-use path	●	●	●	●	●	○	●
2	Navassa Rd (Old Mill Rd to Sturgeon Creek)	Sidewalk and multi-use path	◐	◐	●	●	●	●	●
3	Old Mill Rd (Cedar Hill Rd to West Town Limit)	Sidewalk and multi-use path (utility/rail easement)	◐	◐	◐	◐	●	○	◐
4	Main St (Entire Length)	Sidewalk and on-street bicycle lanes	◐	◐	◐	◐	○	◐	◐
5	Mt Misery Rd (I-140 to North Town Limit)	Multi-use path	◐	●	◐	○	◐	○	○
6	Cedar Hill Rd/Navassa Rd/ Old Mill Rd Intersection	Add roundabout	●	●	◐	●	◐	◐	◐
7	Broadway St at Trail Crossing	Add beacons or supplemental crosswalk treatments	◐	◐	●	○	◐	●	●
8	Navassa Rd at Sturgeon Creek	Add multi-use path (bridge)	◐	◐	◐	●	●	○	○
9	Magnolia Drive Extension	New alignment / boardwalk	◐	○	◐	◐	◐	◐	◐
10	Water St to Pine Valley Dr	Add multi-use path / new alignment	◐	○	◐	○	○	●	○

Legend: ○ - Low ◐ - Moderate ● - High

IMPLEMENTATION

This section provides information on how the plan can be implemented over time, including measuring success with performance measures, project phasing, potential partners and funding sources, and design guidelines and resources that can be used to design projects.

Project Phasing

Implementation of the plan is projected to vary depending on the availability of funding and the various funding sources applicable to each project. While the projects listed as “high priority” in the previous section are clearly the most beneficial toward meeting the community’s goals, lower priority projects may still be advanced sooner due to lower construction costs and impacts. The following is a high-level phasing approach for the 10 projects considering these funding and feasibility elements at the time of this plan:

- **Short Term** (0–5 years): Improvements that have minimal cost and property impacts and/or may be constructed by private developers or in conjunction with other City, WMPO, or NCDOT projects:
 - U-5534U Multi-Use Path
 - Location #7: Broadway Street at Trail Crossing
- **Medium Term** (6–14 years): Improvements with moderate to high cost but low property impacts and/or may be partially constructed by private developers:
 - Location #1: Cedar Hill Road from Old Mill Road to North Town Limit
 - Location #2: Navassa Road from Old Mill Road to Sturgeon Creek
 - Location #4: Main Street
 - Location #6: Cedar Hill Road / Navassa Road / Old Mill Road Intersection
- **Long Term** (15+ years): Improvements with moderate to high cost and substantial property impacts, with low likelihood of construction or contribution by private developers:
 - Location #3: Old Mill Road from Cedar Hill Road to West Town Limit
 - Location #5: Mount Misery Road from I-140 to North Town Limit
 - Location #8: Navassa Road at Sturgeon Creek Bridge
 - Location #9: Extend Magnolia Drive to Playground Way
 - Location #10: Add Multi-use Path from Water Street to Pine Valley Drive

Key Partners and Potential Funding Sources

Leveraging projects, support, and funding sources from key partners will be critical to successfully implement the Navassa Comprehensive Bicycle and Pedestrian Plan. These implementation actions could include the following:

- Reviewing planned/funded projects on the STIP and MTP to identify where other agencies will be making improvements.
- Coordinating with local stakeholders such as NCDOT, Brunswick County, and WMPO on bicycle initiatives.
- Facilitating conversations with developers to include pedestrian and bicycle connections in their developments.
- Working with stakeholders to build local support for a project.

Implementation Partners

NCDOT and WMPO are key partners who are planning and funding projects in Navassa. Proposed projects will be considered for incorporation into the WMPO Metropolitan Transportation Plan (MTP) and for implementation through the WMPO Transportation Improvement Program (TIP) and NCDOT State Transportation Improvement Program (STIP).

On-going coordination with the development of the proposed parks shown in Figure 16 are essential to connect recreational paths and trails to local and regional nonmotorized transportation facilities. These connections allow for trails to be used to utilitarian purposes and facilitate recreation without requiring a car to access the park.

Partnerships with local developers will also be critical. Planned development projects in the Town will provide opportunities to include sidewalks and connections in development and subdivision plans.

Implementing the plan will also require a variety of funding sources, including federal, state, local, and non-profit/private funds. The tables below summarize source types available for bicycle improvements.

Potential Funding Sources for Pedestrian and Bicycle Improvements

Implementing the plan will also require a variety of funding sources, including federal, state, local, and non-profit/private funds. Table 4 below summarizes source types available for pedestrian and bicycle improvements.

Table 4. Potential Funding Sources

FEDERAL FUNDING

Source	Eligibility/Requirements/Purpose
Transportation Alternatives (TA)	Funding source under the FAST Act. WMPO is a direct recipient of these funds and has a process for awarding funding. These funds are also awarded by NCDOT through the State Transportation Improvement Program (STIP).
	Funds may be used for a variety of pedestrian, bicycle, and streetscape projects including sidewalks, bikeways, side paths, and rail-trails.
	TA funds may also be used for selected education and encouragement programming such as Safe Routes to School.
Surface Transportation Program (STP)	Provides states with flexible funds which may be used for a variety of highway, road, bridge, and transit projects. WMPO is a direct recipient of these funds and has a process for awarding funding. These funds are also awarded by NCDOT through the STIP.
	Eligible projects include trails, sidewalks, crosswalks, pedestrian signals, and ADA upgrades to sidewalks.
	Unlike most highway projects, STP-funded pedestrian facilities may be located on local and collector roads which are not part of the Federal-aid Highway System.
Safe Routes to School (SRTS) Program	Eligible SRTS projects include sidewalks, intersection improvements (signalization, marking/upgrading crosswalks, etc.), on-street bicycle facilities (bike lanes, wide paved shoulders, etc.) or off-street shared-use paths.
RAISE Discretionary Grant Program	Previously known as BUILD and TIGER grants. Project sponsors at state and local levels can obtain funding for multi-modal projects that are more difficult to support through traditional DOT programs. Funding can be awarded to projects that connect communities and people to jobs, services, and education as well as to projects that anchor economic revitalization and job growth in communities.
National Park Service (NPS)	The U.S. National Park Service is funded by Congress and private donations and provides grants toward landscape and wildlife conservation efforts. The proposed Navassa Heritage Trail will preserve a large area of natural lands through sensitive areas of the Town and Brunswick County, and the Gullah-Geechee Trail has national and cultural significance that is not just confined to one town or state. Other parks or planned protected areas within the Town's Parks and Recreation Master Plan may be eligible for NPS funding.

STATE FUNDING

Source	Eligibility/Requirements/Purpose
NCDOT Strategic Transportation Investments (STI)	<p>20% of total project cost is currently required as non-federal match by local governments. State law prohibits state match for bicycle and pedestrian projects, except for Powell Bill.</p> <p>Includes adopted bicycle plans, greenway plans, pedestrian plans, Safe Routes to School action plans, comprehensive transportation plans (CTPs), and long-range transportation plans</p>
NCDOT High Impact/Low Cost Funds	<p>Low-cost projects with high impacts to the transportation system including intersection improvement projects, minor widening projects, and operational improvement projects.</p> <p>\$1.5M max per project unless otherwise approved by the Secretary of Transportation.</p>
Powell Bill Funds	Can be used for planning, construction, and bikeway or sidewalk maintenance.
Eat Smart, Move More North Carolina Community Grants	Provides funding to local communities to support efforts to develop community-based interventions that encourage, promote, and facilitate physical activity.
Adopt-A-Trail Grants	Awards \$108,000 annually to government agencies, nonprofit organizations, and private trail groups for trail projects.
Community Development Block Grant Funds	For projects that enhance the viability of communities by providing housing and suitable living environments and by expanding economic opportunities, principally for people with low and moderate incomes.
NCDOT's Complete Streets Policy	Policy requires incorporating multimodal facilities in NCDOT roadway projects.

LOCAL FUNDING

Source	Eligibility/Requirements/Purpose
Tax Incremental Financing (TIF)	<p>Leverages future tax gains to finance current improvements that will create those gains.</p> <p>Dedicates increased tax revenues to finance the debt created by the project.</p>
Partnerships	<p>Local communities in the region may be able to partner with the private sector to fund or sponsor some aspects of a project.</p> <p>Examples</p> <ul style="list-style-type: none"> - Wilmington/New Hanover County & Blue Cross Blue Shield (Gary Shell CrossCity Trail) - Swamp Rabbit Trail & Greenville Health System
Developer Contributions	Negotiate bicycle and pedestrian facility construction in conjunction with an adjacent development project
Municipal Service District (MSD)	<p>Designates a district with a property tax in addition to the town-wide property tax.</p> <p>Within the MSD, revitalization projects are one of the eligible uses and can include street, sidewalk, or bikeway improvements within the downtown taxing district.</p>

PRIVATE/NON-PROFIT FUNDING

Source	Eligibility/Requirements/Purpose
The Robert Wood Johnson Foundation	<p>Largest U.S. foundation devoted to improving the health and healthcare of all Americans.</p> <p>Grant making is concentrated in four areas: (1) To ensure that all Americans have access to basic health care at a reasonable cost, (2) To improve care and support for people with chronic health conditions, (3) To promote healthy communities and lifestyles, and (4) To reduce the personal, social, and economic harm caused by abuse of tobacco, alcohol, and illicit drugs.</p>
Rite Aid Foundation Grants	<p>Supports projects that promote health and wellness in the communities Rite Aid serves.</p>
Carolina Thread Trail	<p>The Thread Trail grants funds to communities for planning, design, land acquisition, and construction of trail segments.</p>
National Trails Fund	<p>Eligible projects include: (1) Securing trail lands, including acquisition of trails and trail corridors, and the costs associated with acquiring conservation easements; (2) Building and maintaining trails which will result in visible and substantial ease of access, improved hiker safety, and/or avoidance of environmental damage; and (3) Constituency building surrounding specific trail projects, including volunteer recruitment and support.</p>
Blue Cross Blue Shield Of North Carolina Foundation (BCBS)—Healthy Place Grant	<p>Program focuses on outcome approach to improve the health and well-being of residents.</p> <p>Eligible projects for grants concentrate on increased physical activity and active play through support of built environment improvements like sidewalks and safe places to bike.</p>

Design Guidelines and Resources

Creating a physical network of safe and comfortable facilities for people walking and biking is a critical step towards improving and encouraging use of these modes. The following sections provide best practices for walking and biking facility design.

Best Practices in Walking and Biking Facility Design

For walking and bicycling to be key forms of transportation, facilities must be comfortable, safe, convenient, and designed to be attractive to a wide range of potential users. To plan for walking and bicycling facilities that will be attractive to a wide range of potential users, the Town of Navassa and its partner agencies should consider the following best practices for walking and biking facility design for the regional network:

1. Travelers must feel comfortable and safe while walking and bicycling on the system
 - Facilities must be sufficiently separated from motor vehicle traffic
 - Facilities must feel secure for travel at all times of the day
 - Facilities should create a network that connects seamlessly between jurisdictions
 - Projects must be prioritized to address barriers, fill existing gaps, and create a continuous and comfortable experience for all users independent of skill level or ages
2. Walking and bicycling must be convenient ways to travel
 - Provide wayfinding signage, particularly for neighborhood routes and key connections that are not on the arterial roadway system
 - Design direct routes between origins and destinations where possible
 - Minimize delay for walkers and bikers at intersections and road crossings
3. Create facilities to serve a wide range of users
 - Within one mile of schools, facilities should be designed to serve school-aged children walking and bicycling to school and should be consistent with safe routes to school action plans
 - Sidewalks and crossings throughout the Town must be designed to serve persons with disabilities in accordance with the Americans with Disabilities Act (ADA)
 - In locations adjacent to senior centers or other similar facilities, design for slower walking speeds
 - Other parts of regional bicycling and walking network should be designed to serve the general population. In many cases, this will result in higher levels of separation from motor vehicles for bicyclists

Bicyclists are generally more comfortable with more separation from vehicular traffic, particularly as vehicle traffic increases in speed and volume. Figure 35 shows a range of bicycle facility types on a spectrum from least separation to most separation from vehicular traffic.



Figure 35. Common Bicycle Facility Types

Walking and Biking Facility Design Guidance

Key sources for detailed design guidance for bicycle and pedestrian facility selection and design include the following:

- NCDOT Complete Street Guidelines
- Federal Highway Administration (FHWA) Small Town and Rural (STAR) Multimodal Networks Guide
- FHWA Bikeway Selection Guide
- American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities
- National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide

Table 5 shows a full list of planning and design resources for a number of topics.

Table 5. Pedestrian and Bicycle Facility Planning and Design Guidance

Report Title	Type of Guidance Provided
NCHRP Report 562: Improving Pedestrian Safety at Unsignalized Crossings	Crossing Selection
FHWA Guide to Improving Pedestrian Safety of Uncontrolled Crossing Locations	Crossing Design
NCHRP Report 834: Crossings Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians With Vision Disabilities: A Guidebook	Crossing Design at Roundabouts and Channelized Turn Lanes
Americans with Disabilities Act Accessibility Guidelines (ADAAG)	ADA Design Requirements
Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG)	ADA Design Guidelines
AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities	Pedestrian Planning and Design
USDOT and FHWA Small Town and Rural Multimodal Design Guide	Pedestrian and Bikeway Design
FHWA Bikeway Selection Guide	Bikeway Planning
FHWA Incorporating On-Road Bicycle Networks Into Resurfacing Projects Guide	Bikeway Design and Implementation
FHWA Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts	Bikeway Design
FHWA Separated Bike Lane Planning and Design Guide	Bikeway Planning and Design
AASHTO Guide for Achieving Flexibility in Highway Design	Multimodal Roadway Design
AASHTO A Policy on Geometric Design of Highways and Streets (Green Book)	Multimodal Roadway Design
AASHTO Guidelines for Geometric Design of Low-Volume Roadways	Multimodal Roadway Design for Low Traffic Roadways
AASHTO Guide for the Development of Bicycle Facilities	Bikeway Planning and Design
NACTO Urban Bikeway Design Guide, Urban Street Design Guide, Global Street Design Guide, and Bike Share Station Siting Guide	Multimodal Design
ITE Designing Walkable Urban Thoroughfares: A Context Sensitive Approach	Pedestrian Design
FAST Planning Complete Streets Policy	Planning and Design Policy
Highway Capacity Manual	Multimodal Level of Service and Crossing Delay Guidance
NCHRP Report 926: Guidance to Improve Pedestrian and Bicyclist Safety at Intersections	Intersection Design and Crash Mitigation