



Trail Benefits

Evaluating the Economic, Physical Health, and Environmental Impacts of Completing Six Key Segments of the Carolina Thread Trail



DECEMBER 2022

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Executive Summary

The Carolina Thread Trail is a vital regional transportation, recreation, and conservation network with a system of connected greenways, trails and blueways. It weaves through much of the Carolinas' piedmont, reaching 15 counties, 2.9 million people, and currently offers 350 miles of trails and 170 miles of blueway open to the public. With plans to add an additional 1,280 miles, the Carolina Thread Trail continues to evolve as a landmark location for land conservation, physical activity, and economic impact.

Recently, six key links to the Carolina Thread Trail were completed, including the:

- Four Mile Creek Greenway (Matthews, NC)
- Piedmont Medical Center Trail (Rock Hill, SC)
- Hector H. Henry II Greenway (Concord, NC)
- South Fork Trail (McAdenville, NC)
- Mount Holly River Hawk Greenway (Mount Holly, NC)
- The Goat Island Park and River Link Greenway (Cramerton, NC)

Altogether, these six trails total approximately 13 linear miles, which is equivalent to 1 percent of the Carolina Thread Trail's planned network. Even as a small fraction of the total network, these corridors provide substantial economic, health, and environmental benefits. Findings from business surveys and interviews have shown that North and South Carolina business owners have purposefully located their facilities next to trails, have made targeted capital investment decisions based on a trail's existence, and have generated a substantial share of their revenue from patronage by trail users.

A Look Across Trails

Economic Impacts

- Each of the six study trails has been found to support upwards of \$3 million in annual business sales, with one the trails alone supporting nearly 60 employees in its local community.

Health Impacts

- The six study trails facilitate substantial physical health benefits through reduced healthcare costs and extended lifespan, providing a total estimated benefit of \$3.9 million, collectively.

Environmental Impacts

- Each trail eliminates or reduces the trip distance of tens of thousands of automobile trips each year. Altogether, the study trails eliminate 1.57 million vehicle miles traveled, which equates to a annual reduction of 634.6 metric tons of carbon dioxide from the atmosphere.
- Additionally, the ecosystems within the footprint of each trail actively sequester carbon from the atmosphere. Altogether, the six study trails sequester 559.5 metric tons of carbon annually.
- Altogether, the six study trails provide carbon emissions reductions equivalent to removing approximately 260 vehicles from the road annually.

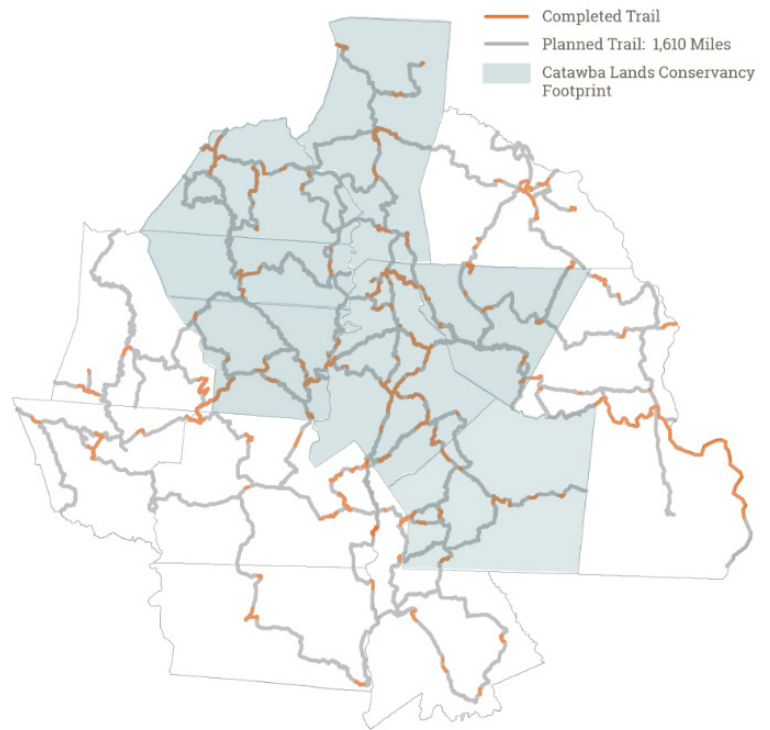


Introduction

Carolina Thread Trail Context

The Carolina Thread Trail was launched with a private capital campaign and continues to draw support from local, state and federal funds. After its inception in 2007, implementation grants have been awarded and momentum has been created in communities across the trail system's footprint. Currently, there are 88 communities with connected, adopted master plans averaging 100 miles per county.¹

The Carolina Thread Trail's greenways, blueways, and nature trails encourage families, friends, and communities to interact with each other and the great outdoors. They also provide an essential venue for physical activities such as walking, jogging, running, cycling, paddling, and in-line skating, among other activities. As the Carolina Thread Trail continues to expand, adding critical links to its multistate master plan, it becomes an increasingly valuable alternative to vehicle travel while enabling no- or low-emission transportation.



*Caption: Completed and planned trail segments.
Source: Carolina Thread Trail, 2022*

Study Purpose

Though many people are aware of the Carolina Thread Trail, the economic, health, and environmental impacts facilitated by the trail are often undervalued or misunderstood. To help quantify the value of the Carolina Thread Trail, the Catawba Lands Conservancy, Mecklenburg County, and the City of Mount Holly jointly sponsored a first-of-its-kind study evaluating six key links of the Carolina Thread Trail that were recently completed.

These links comprise a total of 13 miles and approximately 1 percent of the Carolina Thread Trail's planned network. Although just a fraction of the regional system, these trails demonstrated benefits to the communities they pass through and reflect the broader benefits facilitated by the Carolina Thread Trail network.

These benefits range from providing transportation for pedestrians, cyclists, and paddlers, recreational and physical opportunities, as well as providing ecological benefits and flood management.

To better communicate the importance of these segments and the Carolina Thread Trail, the economic, health, and environmental impacts of completing six segments of the Carolina Thread Trail were analyzed.

¹ Carolina Thread Trail. 2018. Fact Sheet. Online: <https://www.carolinathreadtrail.org/wp-content/uploads/2018/08/Carolina-Thread-Trail-Fact-Sheet-2018.pdf>



Methodology

Economic Impacts

The research team conducted an economic impact assessment for six key corridors of the Carolina Thread Trail. This involved applying intercept survey and manual count data for each of the study corridors to calculate the economic impact of completing each corridor. Trail intercept surveys (see “Appendix A”), supplemented by business data and surveys (see “Appendix B”), were used to understand trail user expenditure patterns (where people made purchases related to their trail use and how much was spent).

The research team used expenditure data as a direct input into an input-output model called IMPLAN® (IMpact Analysis for PLANing). Input/Output (I-O) models can be used to estimate multiplier effects (the economy-wide effects that an initial change in economic activity has on a regional economy). The initial change involves a change in final demand such as new consumption patterns that result from the existence of a trail. New spending behavior creates changes in economic activity, creating new business-to-business transactions (indirect effects) and new transactions from take-home earnings (induced effects). Due to the complexity and interconnectedness of economic activity (how expenditures give rise to a host of other economic activities), an I-O model is an appropriate tool to estimate how economic impacts circulate through the economy. As an important note, there are several economic terms discussed in this report, which are included in Table 1.

Table 1: Economic Analysis Terms and Definitions Used in the Report

| Term | Definition |
|--------------------------|--|
| Economic Activity | Dollars spent within region that are attributable to a given industry, event, or policy, such as the existence of a new trail segment. |
| Economic Impact | The net changes in new economic activity associated with an industry, event, or policy in an existing regional economy. Only refers to changes in new economic activity that can be assigned a market value (or monetary value). |
| Economic Benefit | A net increase in total social welfare. Economic benefits can be both market and nonmarket values, including physical health and environmental benefits. |
| Employment | Jobs supported by expenditures from trail users. |
| Labor Income | Total employment compensation, including wages and other benefits (e.g., healthcare insurance payments, retirement contributions, and others) that are supported by expenditures from trail users. (Similar terms: payroll, wages) |
| Economic Output | Value of expenditures made at businesses that are a direct result of the existence of a Carolina Thread Trail segment. For example, this could include expenditures made at grocery stores, restaurants, trail equipment rental and outfitters, and other establishments for planned activities on the trail, such as picnics, get-togethers, graduation ceremonies, concerts, wedding events and other trail activities or events. Or similarly, it could include expenditures at these types as well as other locations for activities planned after trail use. (Similar terms: business sales). |
| Direct Impacts | The first round of spending, or where the initial purchase occurs. If a trail user makes a purchase at a nearby restaurant, the total value of that purchase is the direct impact. |



| | |
|-------------------------|---|
| Indirect Impacts | Portions of direct revenues used to purchase goods and services from businesses within the region. For example, increased spending at a restaurant may result in that restaurant investing in a better reservation system to improve its overall efficiency. Indirect impacts result from business-to-business purchases. |
| Induced Impacts | Income earned by workers from direct and supplier sales transactions that is then spent within the region's economy. Induced impacts result from people spending their paycheck earnings in the local economy. |

Physical Activity

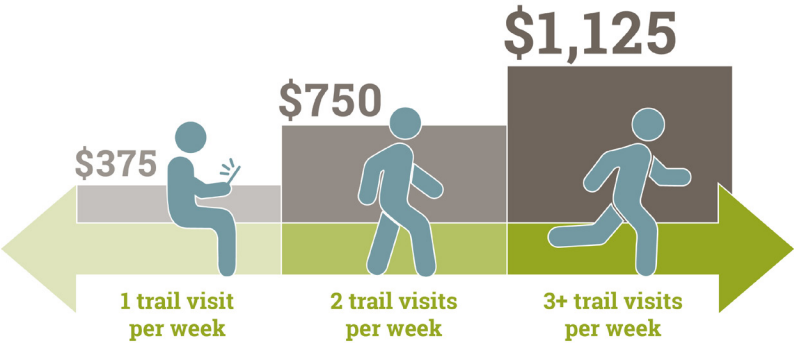
The Carolina Thread Trail provides an attractive, safe, and accessible place to walk, run, bicycle, skate, and engage in other physical activity. Additionally, many locations within the Carolina Thread Trail offer access to blueways, where people can kayak, canoe, or engage in other physically active water sports.

With its growing network of trails and blueways, the Carolina Thread Trail directly contributes to active lifestyles and reduces negative health impacts associated with physical inactivity, such as heart disease, diabetes, vascular disease, and some forms of cancer.

To quantify the health benefits that six key segments of the Carolina Thread provide, the U.S. Department of Transportation's (USDOT) benefit-cost analysis guidance was used. Appraisal values for physical activity benefits resulting from walking and cycling trips were used (see Table 2). USDOT BCA guidance develops physical activity risk reduction assumptions from the World Health Organization's Health Economic Assessment Tool (HEAT) for Walking and Cycling, the National Household Travel Survey, the Centers for Disease Control and Prevention's WONDER database, and the United States Census Bureau (USDOT, 2022).

Annual health benefits for each of the six trails were estimated using trail count forecasts developed for the year 2022 (see the "Unique Trail User Estimation Methodology" section). The product of unique trail visits by trail mode type was used to estimate annual health benefits.

Annual Healthcare Savings by Active Weekly Trail Visits



Health care savings resulting from trail visits. Source: ITRE. Adapted from Kittelson and Associates, 2021

Table 2: Physical Activity Benefits per Trip

| Mode | Recommended Value per Induced Trip |
|---|------------------------------------|
| Cycling ¹ | \$6.31 |
| Walking, Running (and other physical activities) ² | \$7.08 |

Source: USDOT BCA Guidance, 2022

¹Based on an assumed average walking speed of 3.2 miles per hour, an assumed average age of the relevant age range (20-74 years) of 45, a corresponding baseline mortality risk of 267.1 per 100,000, an annual risk reduction of 8.6 percent per daily mile walked, and an average walking trip distance of 0.86 miles.

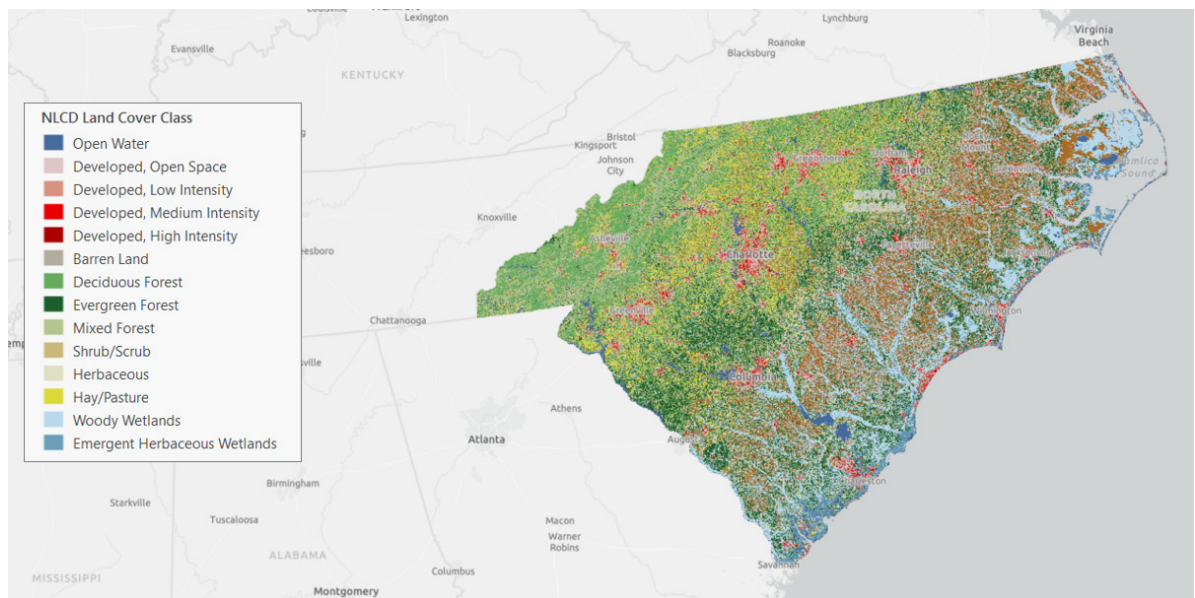
²Based on an assumed average cycling speed of 9.8 miles per hour, an assumed average age of the relevant age range (20-64 years) of 42, a corresponding baseline mortality risk of 217.9 per 100,000, an annual risk reduction of 4.3 percent per daily mile cycled, and an average cycling trip distance of 2.38 miles.



Environmental Benefits

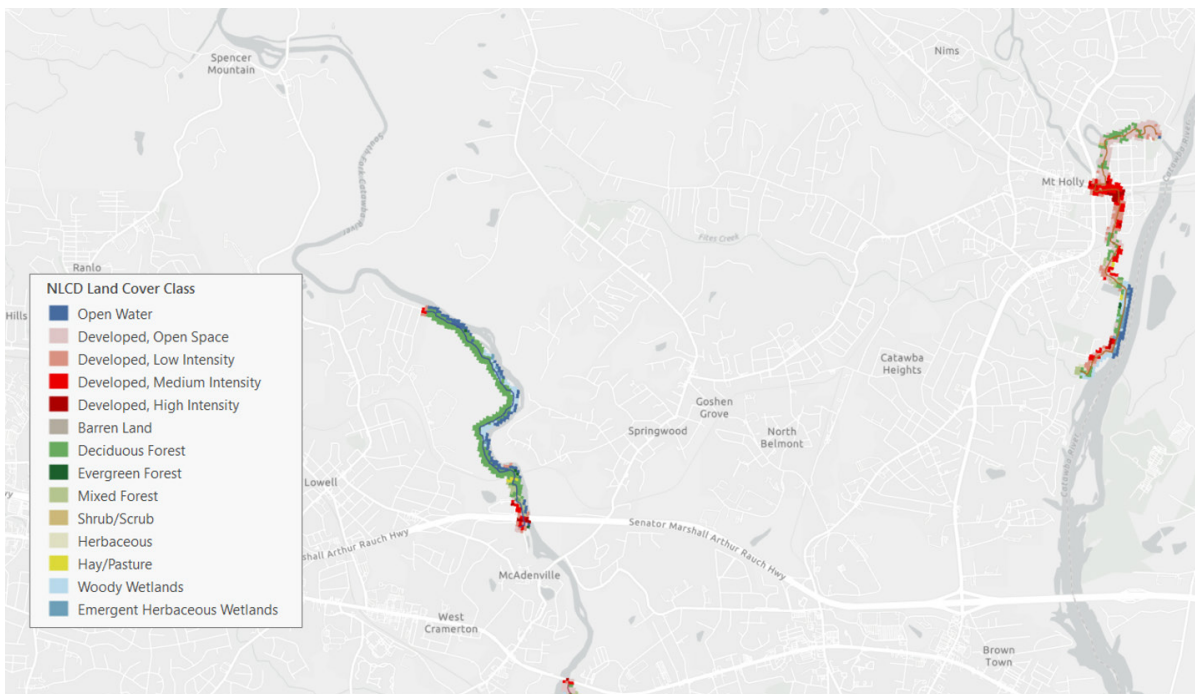
The Carolina Thread Trail preserves the natural environment in several ways. It serves as a transportation network for zero or low-carbon emission travel modes. Additionally, it offers land conservation benefits as the area within a trail’s footprint is less likely to be developed than land outside its footprint. For example, increased tree density and natural land cover found along the trail mitigates air pollution by filtering harmful emissions out of the air, thus decreasing the concentration of air pollutants that cause respiratory illnesses and climate change.

Figure 1: North Carolina and South Carolina Land Cover Classes



Data from the National Land Cover Database. Source: Multi-Resolution Land Characteristics Consortium, 2019

Figure 2: Sample Extraction of Land Cover Data for Carbon Analysis



GIS analysis of data from the National Land Cover Database. Source: Multi-Resolution Land Characteristics Consortium, 2019



Carbon Analysis

For this study, an analysis was conducted to evaluate the carbon stock and carbon sequestration capacities for each of the six study trails.² Carbon stock (also known as carbon storage) is the absolute quantity of carbon held in a habitat pool at any specified time. Carbon sequestration is the annual rate at which carbon is extracted from the air and stored within a habitat pool. In other words, a carbon stock is the quantity of carbon within a specified area, while carbon sequestration is that rate at which carbon is removed from the air and then stored within a specified area.

A geospatial analysis was conducted to assess the carbon stock and sequestration potential within a 200-foot buffer of each of the six study trails. The Multi-Resolution Land Characteristics Consortium's (MRLC) National Land Cover Database was used to determine the type of land cover, and the European Environmental Agency's (EEA) terrestrial and marine carbon stocks and sequestration rates data tables were then used to estimate carbon stocks and sequestration rates for the specified land cover types within a trail's footprint (MRLC, 2019; EEA, 2022). The land cover classifications, carbon stock, and carbon sequestration rates used in this analysis are found in Table 3. Annual carbon stock and sequestration quantities were multiplied by the social cost of carbon (from USDOT's BCA Guidance) to derive the land preservation benefits facilitated by the existence of the six study trails.

Table 3: Land Cover Classifications and Associated Carbon Stock Values and Annual Sequestration Rates

| Class\Value | Classification | Carbon Stock | Carbon Sequestration |
|-------------|------------------------------|------------------|----------------------|
| | | Mg C per Hectare | Mg C per Hectare |
| 11 | Open Water | 20.0 | 0.15 |
| 21 | Developed, Open Space | 10.0 | 0.01 |
| 22 | Developed, Low Intensity | 10.0 | -0.01 |
| 23 | Developed, Medium Intensity | 10.0 | -0.02 |
| 24 | Developed High Intensity | 10.0 | -0.02 |
| 31 | Barren Land (Rock/Sand/Clay) | 24.0 | 1.00 |
| 41 | Deciduous Forest | 138.5 | 3.60 |
| 42 | Evergreen Forest | 92.4 | 2.40 |
| 43 | Mixed Forest | 115.5 | 3.00 |
| 52 | Shrub/Scrub | 33.5 | 1.10 |
| 71 | Grassland/Herbaceous | 61.3 | 1.20 |
| 81 | Pasture/Hay | 80.1 | 1.40 |
| 82 | Cultivated Crops | 99.0 | 1.80 |
| 90 | Woody Wetlands | 154.5 | 1.60 |
| 95 | Emergent Herbaceous Wetlands | 115.9 | 1.20 |

Source: ITRE analysis of National Land Cover Database (2019) and the European Environmental Agency's carbon stocks and sequestration rates database (2022).

² Based on trail right-of-way considerations, a trail's footprint was assumed to be the land area within a 200-foot buffer of the trail.



Reduced Vehicular Travel Analysis

With safe and affordable trails for active commuting, the Carolina Thread Trail offers an alternative to vehicular travel and generates an emissions reduction benefit by enabling users to eliminate automobile trips or reduce the distances traveled for automobile trips.

For this study, an analysis was conducted to estimate the emissions benefits the Carolina Thread Trail facilitates through eliminated vehicle trips and vehicle trips made with reduced distances. Trail user survey response data were used to analyze trip behavior, trip lengths, and to determine the proportion of eliminated and reduced distance car trips. The proportions for these trip types were then multiplied by estimated annual unique trail user counts to derive annual eliminated car trips and annual reduced distance trips (see definitions below). Environmental Protection Agency (EPA) and Bureau of Transportation Statistics (BTS) estimates for tailpipe carbon dioxide (CO₂), nitrous oxide (NO_x), and particulate matter (PM_{2.5}) per vehicle mile and USDOT's BCA guidance appraisal values for emissions costs were used to estimate the environmental costs avoided from eliminated and reduced-distance car trips (EPA, 2018; BTS, 2021; USDOT, 2022).

- **Eliminated Car Trips.** Car trips were deemed to be eliminated if survey respondents who used active transportation to get to the trail said they would drive to their destination, or a similar destination, if the trail did not exist.
- **Reduced Distance Car Trips.** Car trips were deemed to be made at a reduced distance if survey respondents who used vehicular transportation to get to the trail said they would drive to a similar destination (often requiring a further distance of travel) if the trail did not exist. Based on survey response data it was estimated that vehicle trips to a similar destination would be approximately 20 percent farther.

Unique Trail User Estimation Methodology

During the month of May, 2022, the six study trails were visited by the research team. One purpose of these visits was to conduct a trail intercept survey to obtain expenditure, health, and trip behavior patterns of trail users. Another purpose was to obtain trail user count data for the extrapolation of unique trail user estimates over the course of a year.

Deriving Unique User Visits

For each of the six trails, the research team setup two count stations. Intercept surveys containing origin and destination information were evaluated in tandem with data obtained from the count stations to derive an estimate of unique trail users. Because trail users can be counted at both count stations, a simple summation of counts from each station would result in double- or multi-counting people who passed more than one station during their trip. When combining raw counts from each count station to develop a comprehensive estimate of trail usage, survey data were used to help define trip patterns (where respondents entered, exited, and/or turned around on the trail) to reduce the raw count at each station by people who would have been counted at another station.

The number of times a user is likely to be over counted increases as the number of survey- and -count stations increases. For example, during the data collection period, each trail had two count stations installed. This means that a single user could be counted up to four times for a roundtrip or two times for a one-way, through trip. The number of times a user is over counted is directly related to trip distance, which is tied to a user's travel mode, i.e., bicyclists tend to travel further distances than joggers/runners and walkers, and joggers/runners tend to travel further distances than walkers.

Deriving Annual Unique User Visits

Annual unique user visits were derived from the bottom up, estimating daily, weekly, monthly, then annual unique user visits. Daily estimates were derived from intercept survey data and video cameras mounted during the data collection period. These data were validated by using Google hourly trail usage data, a metanalysis of

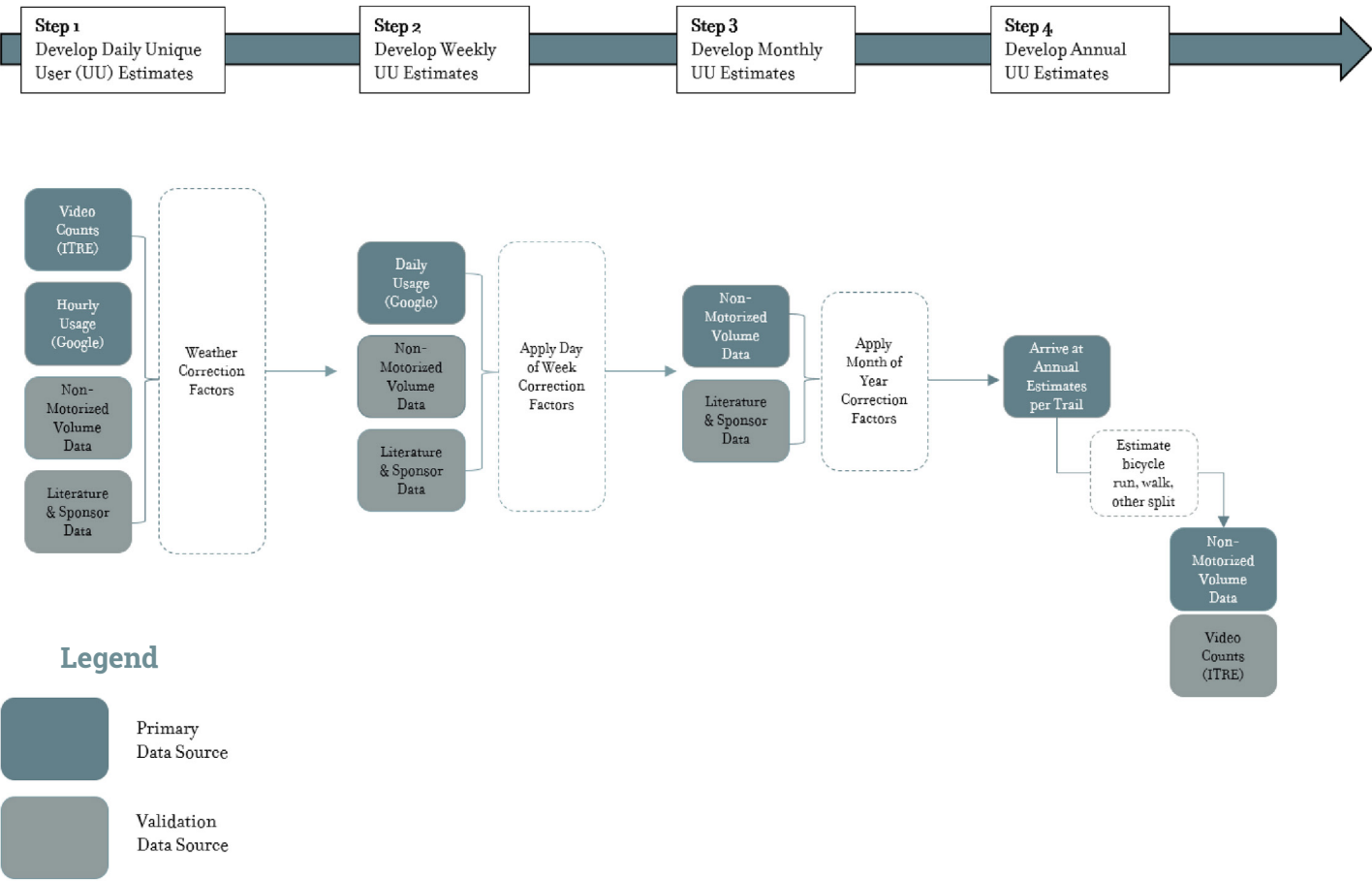


hourly trail usage found during a literature review, and proxy trail data found within the North Carolina Non-Motorized Volume Data Program (NC NMVDP) managed by the Institute for Transportation Research and Education (Google, 2022; Sandar et al., 2012; ITRE, 2022). Weather conditions experienced during the data collection period were recorded using local hourly weather forecasts, and correction factors were applied based on the statistical relationships between weather conditions and mean hourly trail user volumes (Sander et al., 2012) when deriving estimates for weekly, monthly, and annual user visits.

To estimate weekly unique user visits, Google hourly trail data were used. Hourly data were aggregated to derive daily trail usage for each day of the week. Then, each day was converted to a percentage of weekly trail use. Trail usage for each day of the week was then estimated by taking unique user count estimates from observed trail days (during the data collection period) and extrapolating unique user counts to unknown trail days by using their weekly usage percentages. These estimates were validated using counts collected on trails from the NC NMVDP, raw trail counts provided by the Carolina Thread Trail, and information obtained from a literature scan.

Monthly unique user visits were derived using NC NMVDP count data through an aggregation and apportionment process similar to the weekly user unique user visit estimation. First, weekly estimates for each of the six trails were aggregated for the month of May. Then an average of monthly use from six “proxy” trails within the NC NMVDP database were used to estimate a monthly share of trail usage for annual extrapolation. Finally, May’s monthly estimates were then used to extrapolate annual usage by adjusting May counts to the percentage of annual trail use estimated for each month. A visual depiction of the annual unique user count methodological process is shown in Figure 3.

Figure 3: Annual Unique User Visit Methodological Flow Chart



Source: ITRE, 2022



Findings by Trail

Four Mile Creek Greenway

Matthews, NC

Four Mile Creek Greenway is a joint project between the Town of Matthews and Mecklenburg County. It links downtown Matthews with Squirrel Lake Park and connects neighborhoods from E. John Street to S. Trade Street. The greenway is popular for area hikers, bikers, and animal lovers and is currently one of the most utilized trails within the region.

The greenway passes through a mixed Loblolly and Shortleaf Pine Forest. It is known for wildlife, such as the White-tailed deer, American Beaver or the many bird species that inhabit the area along the stream.

Trail Characteristics

- Trail length: 2.0 miles
- Surface type: asphalt trail with boardwalk
- Parking spaces: 25+
- Public restrooms: yes
- Trail uses: walking, hiking, running, biking

Access Points and Landmarks

- **Trailheads and Access Points: 11**
 - 1102 E John Street, Matthews, NC 28105
 - Squirrel Lake Park – 1631 Pleasant Plains Road, Matthews, NC 28105
 - Fountain Rock Park – 311 S Trade Street, Matthews, NC 28105
 - Rockwell View Road
 - Greylock Ridge Road
 - Privette Road
 - Woody Creek Road/Brenham Lane
 - Jeffers Drive
 - Country Pl Drive
 - Clearbrook Road
 - Eden Wood Court/Matthews Elementary School
- **Landmarks and Nearby Amenities:**
 - Downtown Matthews
 - Squirrel Lake Park
 - Arthur Goodman Memorial Park
 - Matthews Community Center
 - Stumptown Park
 - Matthews Elementary School
 - Matthews Playhouse
 - Baucom Park

Adjacent Context / Uses

- Residential, Park/Recreational



Boardwalk and trail entrance at East John Street.
Source: ITRE, 2022



Cyclists at the Trade Street entrance.
Source: ITRE, 2022



Economic Impact

The Four Mile Creek Greenway is located within a half mile of approximately 345 businesses (ESRI Business Analyst, 2020). Offering nearby access to 19 food, beverage, and dining locations, two grocery and convenience stores, 32 retail establishments, and 292 other businesses (see Table 4), the Four Mile Creek Greenway is a key facilitator of economic activity in Matthews, North Carolina. Based on user expenditure patterns, it is estimated that the Four Mile Creek Greenway facilitates approximately \$3.1 million in annual business sales by providing safe, affordable, and aesthetically valued transportation access to nearby storefronts.

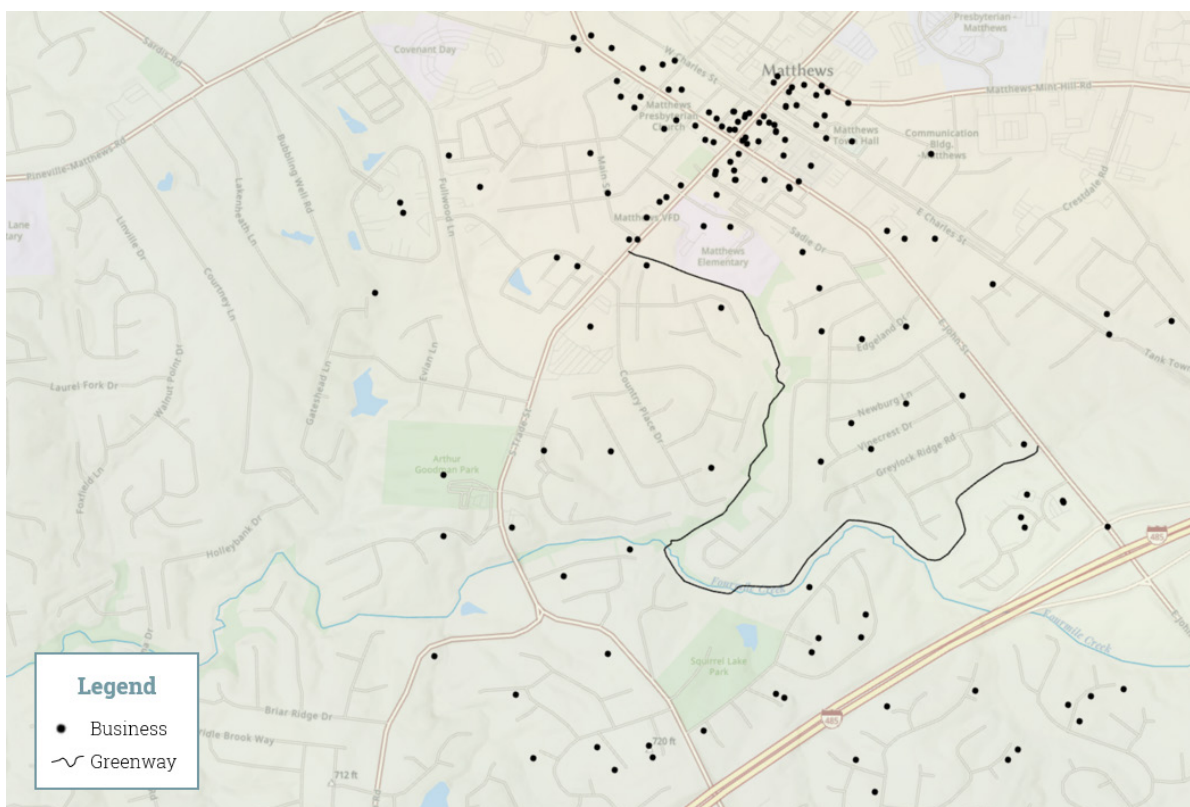
"People often pair walks and bike rides on the trail with visits to the farmers' market all year long."

- Community Farmers' Market Staff Member

Survey data from trail users and businesses sheds light on how the Four Mile Creek Greenway impacts the local economy in Matthews. According to a staff member from the Matthews Community Farmers' Market, trail visits and farmers' market visits often go hand-in-hand. "People often pair walks and bike rides on the trail with visits to the farmers' market all year long," said the staff member who completed a business survey. Additionally a business survey completed by a Brakeman's Coffee staff member stated that its patrons "...use and enjoy the [Four Mile Creek Greenway]..." and that "...the greenway enhances the City of Matthews."

The Four Mile Creek Greenway facilitates substantial economic impacts for its local community. On an annual basis, the trail supports approximately 26 local jobs, \$1.1 million in employee earnings, \$3.1 million in businesses sales and approximately \$400,000 in tax revenue (\$68,000 local, \$97,000 state, and \$234,000 federal). These employment impacts result from purchases that are made at nearby bars and restaurants, grocery and convenience stores, retail establishments, entertainment venues, other business establishments, and expenditures made to maintain the trail. For more information about how economic impacts were derived, see the “Methodology” section within this report.

Figure 4: Local Businesses Within 0.5 Miles of the Four Mile Creek Greenway



Source: ITRE analysis of ESRI Business Analyst Dataset



Table 4: Summary of Potential Business Interactions Facilitated by the Four Mile Creek Greenway

| Business Type | No. of Businesses within 0.5 miles ¹ | Purchase Probability per Trail Visit ² | Expenditure per Business Type ³ |
|------------------------------|---|---|--|
| Food, Beverage, Dining | 19 | 5.0% | \$38.70 |
| Grocery & Convenience Stores | 2 | 7.7% | \$69.10 |
| Other ⁴ | 292 | 0.5% | \$15.00 |
| Retail | 32 | 2.2% | \$48.90 |

¹ ITRE analysis of ESRI Business Analyst Dataset

^{2,3} ITRE analysis of Intercept Survey Responses

⁴ Research shows that trail users are most inclined to make purchases at food, beverage, dining; grocery and convenience stores; or retail locations associated with trail usage. Businesses that do not fit into these categories are defined as "other." Across the six study trails evaluated in this research, healthcare and spa facilities, recreation and fitness centers, art shops and studios, locksmiths, hotels, apartment complexes, and car dealerships were found to have economic activity facilitated by trail use and fall within the "other" designation.

Table 5: Local Jobs Facilitated by the Four Mile Creek Greenway

| Impact | Direct | Indirect | Induced | Total |
|------------|--------|----------|---------|-------|
| Employment | 17 | 5 | 4 | 26 |

Source: ITRE, IMPLAN Analysis

Table 6: Employee Earnings Facilitated by the Four Mile Creek Greenway

| Impact | Direct | Indirect | Induced | Total |
|--------------|-----------|-----------|-----------|-------------|
| Labor Income | \$630,000 | \$220,000 | \$210,000 | \$1,060,000 |

Source: ITRE, IMPLAN Analysis

Table 7: Local Business Sales Facilitated by the Four Mile Creek Greenway

| Impact | Direct | Indirect | Induced | Total |
|-----------------|-------------|-----------|-----------|-------------|
| Economic Output | \$1,670,000 | \$740,000 | \$690,000 | \$3,100,000 |

Source: ITRE, IMPLAN Analysis

Table 8: Tax Generation Facilitated by the Four Mile Creek Greenway

| Impact | Direct | Indirect | Induced | Total |
|----------------------|-----------|----------|----------|-----------|
| Local Taxes | \$43,000 | \$9,000 | \$15,000 | \$68,000 |
| State Taxes | \$60,000 | \$16,000 | \$21,000 | \$97,000 |
| Federal Taxes | \$140,000 | \$47,000 | \$47,000 | \$234,000 |
| Total Tax Generation | \$243,000 | \$72,000 | \$84,000 | \$399,000 |

Source: ITRE, IMPLAN Analysis

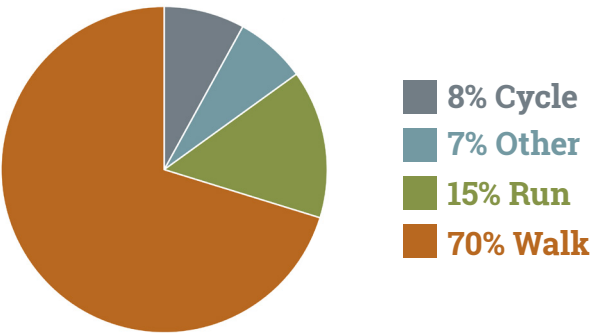


Physical Health Benefits

The Four Mile Creek Greenway serves as a convenient and accessible venue for recreational activities, such as walking, cycling, running, and other forms of exercise. In 2022, it is estimated that 165,540 unique trail visits will be made with approximately 70 percent walk trips, 15 percent run trips, 8 percent cycle trips, and 7 percent of trips made with some other active mode.

The Four Mile Creek Greenway substantially improves the health and the quality of life for its users by reducing ailments linked with physical inactivity such as heart disease, diabetes, vascular disease, and some forms of cancer. It is estimated that physical activity facilitated by trail use saves approximately \$1.2 million in healthcare costs for Four Mile Creek Greenway visitors. For more information about how physical health benefits were derived, see the “Methodology” section within this report.

Figure 5: Four Mile Creek Greenway Activity Split



Physical activity facilitated
by trail use saves...

\$1,163,000

...annually in healthcare cost

Annually, the trail supports **165,640** trail visits including...



116,335 walk visits.

On average, walkers achieve **228.4** minutes of exercise with **4** visits per week.



24,370 run visits.

On average, runners achieve **210.4** minutes of exercise with **4.3** visits per week.



13,260 bike visits.

On average, cyclists achieve **141.3** minutes of exercise with **3** visits per week.



11,675 other visits.

On average, other trail uses achieve **46.2** minutes of exercise with **1** visit per week.



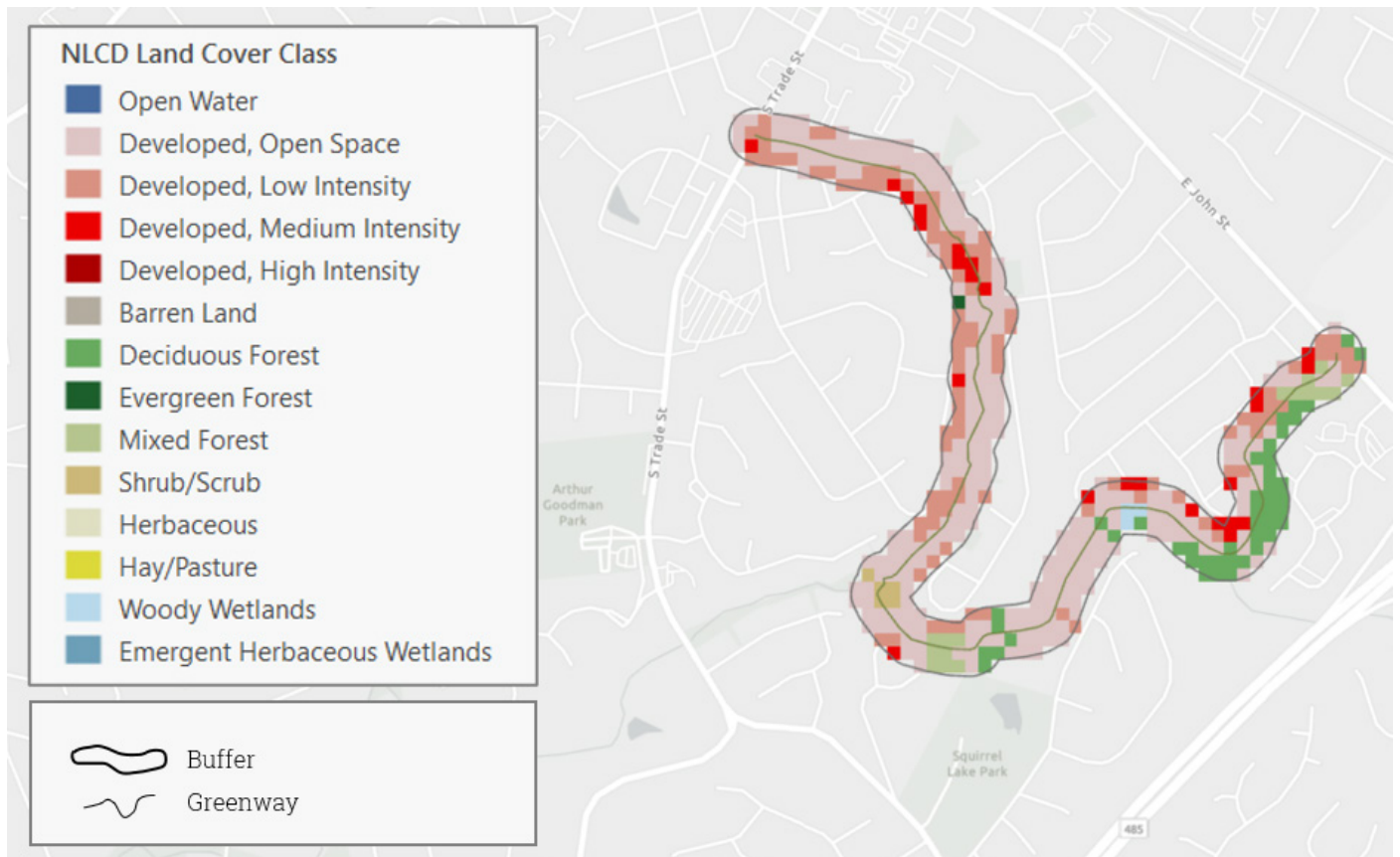
Environmental Benefits

The Four Mile Creek Greenway provides environmental benefits to the region through land preservation and vehicular trip reduction.

Land Preservation Benefits. The trail provides land preservation benefits enabling carbon sequestration and by protecting the carbon stock within and below the surface of ecosystem within the trail's footprint. The trail preserves an ecosystem with an estimated 1,700 metric tons of carbon stock and by preserving this ecosystem it enables an estimated 30.3 metric tons of carbon to be sequestered annually (see Table 9). The trail's footprint has a carbon stock and carbon sequestration capacity that is 1.1 times greater than that of the habitat pools found within the City of Charlotte on a per-unit basis (see Table 10). The Four Mile Creek Greenway generates an estimated \$91,700 in land preservation benefits annually.

Vehicular Trip Reduction Benefits. The trail mitigates greenhouse gas emissions by eliminating vehicle trips or reducing the distance traveled for vehicle trips. Car trips were classified as eliminated if survey respondents who used active transportation to get to the trail said they would drive to their destination, or a similar destination, if the trail did not exist. Car trips were classified as reduced-distance trips if survey respondents who used vehicular transportation to get to the trail said they would drive to a similar destination (often requiring a further distance of travel) if the trail did not exist. The Four Mile Creek Greenway eliminates an estimated 46,850 vehicular trips and reduces the trip distance of approximately 29,910 trips annually (see Table 11). **The Four Mile Creek Greenway generates an estimated \$32,200 in vehicle emissions reduction benefits annually.**

Figure 6: Land Cover Designations within the Footprint of the Four Mile Creek Greenway



Source: ITRE analysis of the National Land Cover Database (2019)

³ An average, per-unit land sample (also be known as a "statistically averaged land sample") was developed by aggregating 898,080 raster cells (30-meter by 30-meter land areas) within the City of Charlotte. Once aggregated, the percentage of each land cover type was calculated. This percentage breakdown was then applied to a raster cell area, the per-unit area, to create the statistically averaged land sample for the City of Charlotte.



Table 9: Carbon Stock and Sequestration Benefits Facilitated by the Four Mile Creek Greenway

| Trail Name | Trail Linear Miles | Trail Footprint in Acres ¹ | Carbon Stock (metric tons) ² | Annual Carbon Sequestered (metric tons) ³ | Carbon Stored or Sequestered (metric tons) | Annual Land Preservation Benefit of the Trail |
|--------------------------|--------------------|---------------------------------------|---|--|--|---|
| Four Mile Creek Greenway | 2.0 | 24.2 | 1,700.0 | 30.3 | 1,730.3 | \$91,700 |

¹ For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

² The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

³ The annual rate at which the carbon is stored is referred to as the carbon sequestration rate.

Source: ITRE analysis of National Land Cover Database (2019), the European Environmental Agency's terrestrial and marine carbon stocks and sequestration rates data tables (2022), and USDOT BCA guidance (2022) for the monetized value of carbon (\$53 per metric ton).

Table 10: Land Preservation Benefits per Acre Supported by the Four Mile Creek Greenway

| Land Area Evaluated | Raster Cells Evaluated | Land Preservation Benefit per Acre | Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater) |
|------------------------------------|------------------------|------------------------------------|---|
| Four Mile Creek Greenway Footprint | 441 | \$3,785 | 1.1 |
| City of Charlotte | 898,080 | \$3,530 | |

Source: ITRE analysis (same sources as previous table)

Table 11a: Vehicle Emissions Reduction Benefits Supported by the Four Mile Creek Greenway

| Trail Name | Unique Trail Visits | Reduced-Distance Car Trips | Car Trips Eliminated | Reduced Vehicle Miles Traveled |
|--------------------------|---------------------|----------------------------|----------------------|--------------------------------|
| Four Mile Creek Greenway | 165,640 | 29,910 | 46,850 | 561,110 |

Table 11b: Vehicle Emissions Reduction Benefits Supported by the Four Mile Creek Greenway

| Pollutant | Emissions (Grams per Mile) ^{1, 2} | Emissions Eliminated (metric tons) | Monetized Emissions Benefit | Total Emissions Benefit |
|--|--|------------------------------------|-----------------------------|-------------------------|
| Carbon Dioxide (CO ₂) | 404 | 226.69 | \$12,000 | \$32,200 |
| Nitrous Oxide (NOx) | 0.687 | 0.39 | \$6,100 | |
| Particulate Matter (PM _{2.5}) ³ | 0.033 | 0.02 | \$14,100 | |

¹ Environmental Protection Agency. 2018. Greenhouse Gas Emissions from a Typical Passenger Vehicle.

² Bureau of Transportation Statistics. 2021. Estimated U.S. Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel.

³ Includes exhaust, brakewear, and tirewear



Piedmont Medical Center Trail

Rock Hill, SC

The Piedmont Medical Center Trail is a paved, winding trail that runs alongside the Catawba River, and provides an enjoyable location for walking, running, and biking. It offers a shaded walk among the trees with numerous river views. The trail connects to River Park, which supports an assortment of connecting trails, greenways, and parks within the City of Rock Hill's Bicycle and Pedestrian Master Plan.

The Piedmont Medical Center Trail, contributed to the City of Rock Hill earning a bronze-level Bicycle Friendly Community designation in 2016 (City of Rockhill, 2022). The Riverwalk portion of the trail provides access to apartment communities, businesses, a canoe/kayak launch, and several miles of mountain bike trails with varying levels of difficulty.

Trail Characteristics

- Trail length: 2.5 miles
- Surface type: pavement
- Parking spaces: 80
- Public restrooms: yes
- Trail uses: walking, hiking, running, biking, paddling access
- ADA accessible

Access Points and Landmarks

- **Trailheads and Access Points: 3**
 - 100 Celriver Road, Rock Hill, SC 29730
 - 575 Herrons Ferry Road, Rock Hill, SC 29730
 - 1111 Brakefield Drive, Rock Hill, SC 29730
- **Landmarks and Nearby Amenities:**
 - Riverwalk railroad trestle
 - Rock Hill Criterium Course/BMX Supercross Track
 - Riverwalk Community residential areas
 - Riverwalk apartment community and businesses
 - Catawba River access

Adjacent Context / Uses

- Commercial, Residential, Industrial, Park/Recreational

Economic Impact

The Piedmont Medical Center Trail is located within a half mile of approximately 57 businesses (ESRI Business Analyst, 2020). With nearby access to five food, beverage, and dining locations, one grocery and convenience store, 10 retail establishments, and 41 other businesses, it is estimated that the Piedmont Medical Center Trail facilitates approximately \$7.9 million in annual business sales by providing safe, affordable, and aesthetically valued transportation access to nearby storefronts.

The Piedmont Medical Center Trail attracts residents and visitors to engage in recreational activities, and local businesses have taken note. The Charlotte Running Company, for example, opened its Riverwalk location due to its proximity to the trail. On the "Our Story" page of its company website, the Charlotte Running Company shares information about the storefront and the trail. "Nestled right on the banks of the Catawba River, the



Rollerbladers and woman walking on the trail.

Source: ITRE, 2022



Pedestrians on Piedmont Medical Center Trail.

Source: ITRE, 2022

"Nestled right on the banks of the Catawba River, the newest gem in the Charlotte Running Co. fleet sits right on the greenway, and has 5 plus miles of running trails right out the front door!"

– Featured in the "Our Story" web page of Charlotte Running Company

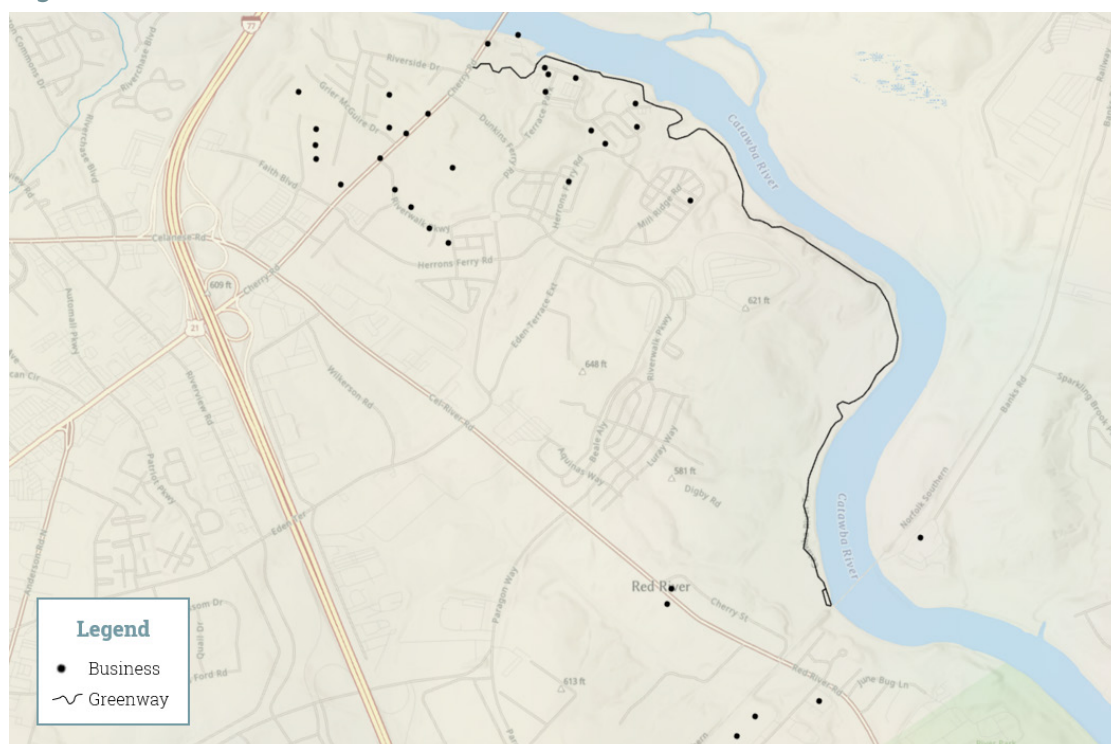


newest gem in the Charlotte Running Co. fleet sits right on the greenway, and has 5 plus miles of running trails right out the front door!” In addition to the Charlotte Running Company, trail users are drawn to other trail outfitters, such as Bike Town, nearby food and beverage establishments, such as the Brass Tap, Grapevine, the Pump House, and Sonny’s Barbecue, and grocery stores, such as Lidl, among other establishments in the area.

Beyond serving as a draw for local residents, the Piedmont Medical Center Trail also attracts visitors who contribute to Rock Hill’s economy. Findings from the intercept survey conducted on the trail showed that approximately 7.3 percent of the Piedmont Medical Center Trail’s users are visitors to the area. Though comprising only a fraction of overall trail use, visitors generate substantial economic impact in the region. According to intercept survey findings, the average visitor spends more than \$770 in the region over a period of 6.5 days. By comparison, locals who make a trail-related purchase, spend an average of \$40 per trail visit. It is important to note that not all visitors came to Rock Hill for the intended purpose of using the trail. Some visitors just happened to use the trail as an add on to their stay in the region. This distinction is important when estimating the economic impact of the Piedmont Medical Center Trail. Only expenditures made by visitors who stated that the trail was important in their decision were counted in the economic impact analysis.⁴

The Piedmont Medical Center Trail facilitates substantial economic impact for its local community. On an annual basis, the trail supports approximately 58 local jobs, \$2.8 million in employee earnings, \$7.9 million in businesses sales and approximately \$400,000 in tax revenue (\$68,000 local, \$97,000 state, and \$234,000 federal). These employment impacts result from purchases that are made at nearby bars and restaurants, grocery and convenience stores, retail establishments, entertainment venues, other business establishments, and expenditures made to maintain the trail. For more information about how economic impacts were derived, see the “Methodology” section within this report.

Figure 7: Local Businesses Within 0.5 Miles of the Piedmont Medical Center Trail



Source: ITRE analysis of ESRI Business Analyst Dataset

⁴ Trail users were surveyed during a May 2022 intercept survey. Visitors were asked, “how important was this trail in your decision to visit the area?” Survey responses at the Piedmont Medical Center Trail demonstrated that 27.3 percent of trail users responded that the trail was “very important,” 27.3 percent of trail users responded that the trail was “somewhat important,” and 45.4 percent of trail users responded that the trail was “not important” in their decision to visit the area. For the economic impact analysis, visitor expenditures not directly related to trail use (i.e. lodging and other purchases made not connected to use of the trail) were attributed in three ways. For visitors who answered “not important,” none of the expenditures, outside of those documented in the survey as related to trail use, were attributed to their purpose of visiting the trail. For those who answered “very important,” all of their visitor expenditures were attributed to the purpose of visiting the trail. For those who answered “somewhat important,” half of their visitor expenditures were attributed.



Table 12: Summary of Potential Business Interactions Facilitated by the Piedmont Medical Center Trail

| Business Type | No. of Businesses within 0.5 miles ¹ | Purchase Probability per Trail Visit ² | Expenditure per Business Type ³ |
|------------------------------|---|---|--|
| Food, Beverage, Dining | 5 | 17.6% | \$39.70 |
| Grocery & Convenience Stores | 1 | 1.6% | \$69.10 |
| Other ⁴ | 41 | 0.5% | \$15.00 |
| Retail | 10 | 1.2% | \$48.90 |

¹ ITRE analysis of ESRI Business Analyst Dataset

^{2,3} ITRE analysis of Intercept Survey Responses

⁴ Research shows that trail users are most inclined to make purchases at food, beverage, dining; grocery and convenience stores; or retail locations associated with trail usage. Businesses that do not fit into these categories are defined as "other." Across the six study trails evaluated in this research, healthcare and spa facilities, recreation and fitness centers, art shops and studios, locksmiths, hotels, apartment complexes, and car dealerships were found to have economic activity facilitated by trail use and fall within the "other" designation.

Table 13: Local Jobs Facilitated by the Piedmont Medical Center Trail

| Impact | Direct | Indirect | Induced | Total |
|------------|--------|----------|---------|-------|
| Employment | 34 | 12 | 12 | 57 |

Source: ITRE, IMPLAN Analysis

Table 14: Employee Earnings Facilitated by the Piedmont Medical Center Trail

| Impact | Direct | Indirect | Induced | Total |
|--------------|-------------|-----------|-----------|-------------|
| Labor Income | \$1,730,000 | \$550,000 | \$570,000 | \$2,850,000 |

Source: ITRE, IMPLAN Analysis

Table 15: Local Business Sales Facilitated by the Piedmont Medical Center Trail

| Impact | Direct | Indirect | Induced | Total |
|-----------------|-------------|-------------|-------------|-------------|
| Economic Output | \$4,250,000 | \$1,790,000 | \$1,840,000 | \$7,880,000 |

Source: ITRE, IMPLAN Analysis

Table 16: Tax Generation Facilitated by the Piedmont Medical Center Trail

| Impact | Direct | Indirect | Induced | Total |
|----------------------|-----------|-----------|-----------|-----------|
| Local Taxes | \$75,000 | \$22,000 | \$41,000 | \$137,000 |
| State Taxes | \$123,000 | \$37,000 | \$57,000 | \$217,000 |
| Federal Taxes | \$378,000 | \$114,000 | \$126,000 | \$618,000 |
| Total Tax Generation | \$575,000 | \$173,000 | \$224,000 | \$972,000 |

Source: ITRE, IMPLAN Analysis

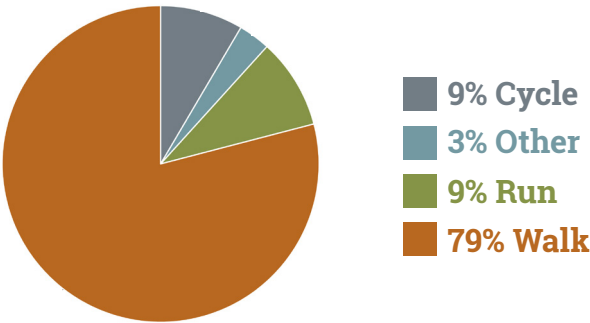


Physical Health Benefits

The Piedmont Medical Center Trail serves as a convenient and accessible venue for recreational activities, such as walking, cycling, running, and other forms of exercise. In 2022, it is estimated that 192,000 unique trail visits will be made with approximately 79 percent walk trips, 9 percent run trips, 9 percent cycle trips, and 3 percent of trips made with some other active mode.

The Piedmont Medical Center Trail substantially improves the health and the quality of life for its users by reducing ailments linked with physical inactivity such as heart disease, diabetes, vascular disease, and some forms of cancer. It is estimated that physical activity facilitated by trail use saves approximately \$1.3 million in healthcare costs for Piedmont Medical Center Trail visitors. For more information about how physical health benefits were derived, see the “Methodology” section within this report.

Figure 8: Peidmont Medical Center Trail Activity Split



Physical activity facilitated by trail use saves...

\$1,347,000

...annually in healthcare cost

Annually, the trail supports 192,020 trail visits including...



151,820 walk visits.

On average, walkers achieve 152.8 minutes of exercise with 2.4 visits per week.



17,710 run visits.

On average, runners achieve 116.1 minutes of exercise with 3 visits per week.



16,250 bike visits.

On average, cyclists achieve 149.8 minutes of exercise with 2.2 visits per week.



6,240 other visits.

On average, other trail uses achieve 70 minutes of exercise with 1 visit per week.



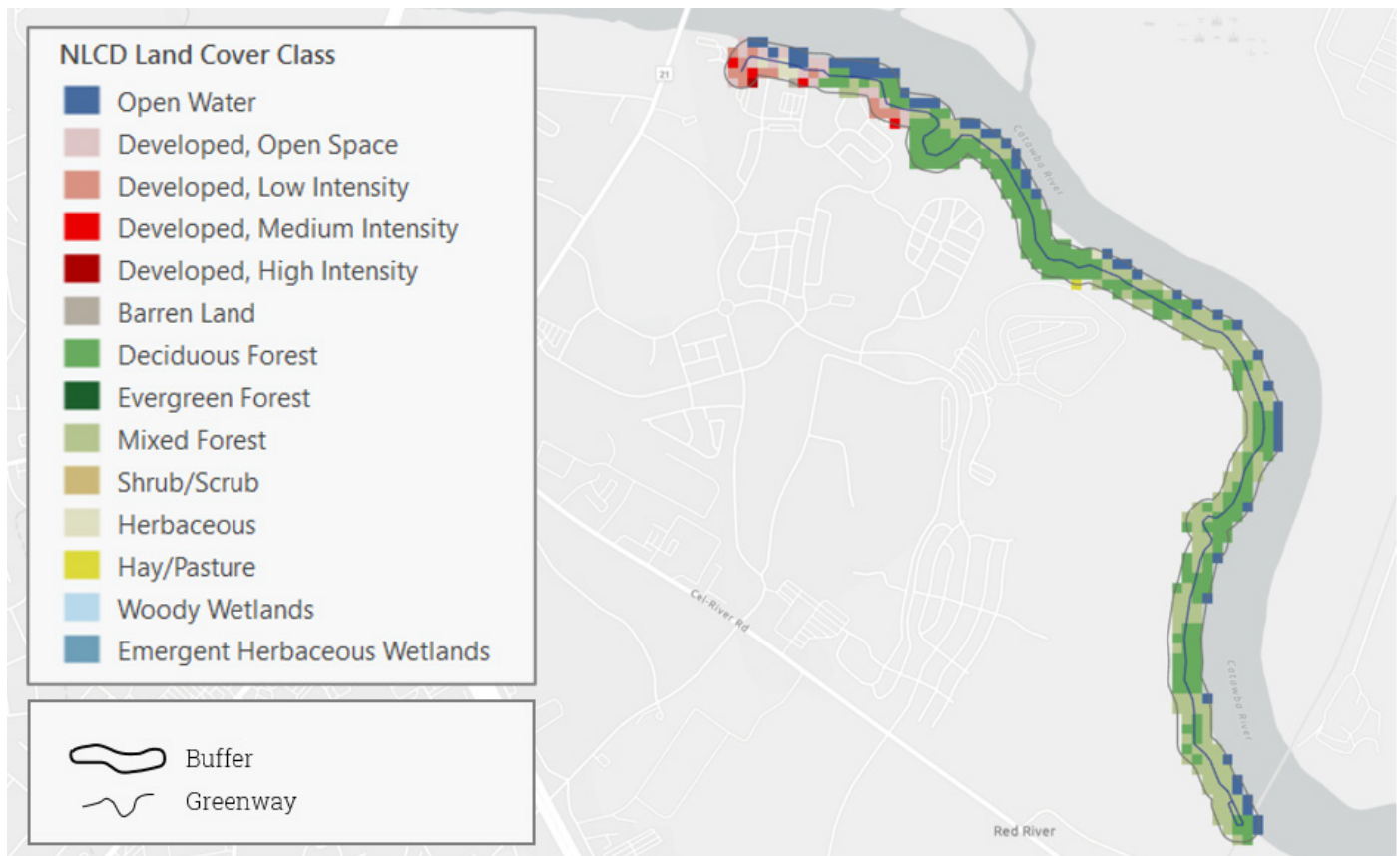
Environmental Benefits

The Piedmont Medical Center Trail provides environmental benefits to the region through land preservation and vehicular trip reduction.

Land Preservation Benefits. The trail provides land preservation benefits enabling carbon sequestration and by protecting the carbon stock within and below the surface of ecosystem within the trail's footprint. The trail preserves an ecosystem with an estimated 7,677.3 metric tons of carbon stock and by preserving this ecosystem it enables an estimated 193.6 metric tons of carbon to be sequestered annually (see Table 17). The trail's footprint has a carbon stock and carbon sequestration capacity that is 3.9 times greater than that of the habitat pools found within the City of Charlotte on a per-unit basis (see Table 18).⁵ **The Piedmont Medical Center Trail generates an estimated \$417,000 in land preservation benefits annually.**

Vehicular Trip Reduction Benefits. The trail mitigates greenhouse gas emissions by eliminating vehicle trips or reducing the distance traveled for vehicle trips. Car trips were classified to be eliminated if survey respondents who used active transportation to get to the trail said they would drive to their destination, or a similar destination, if the trail did not exist. Car trips were classified as reduced-distance trips if survey respondents who used vehicular transportation to get to the trail said they would drive to a similar destination (often requiring a further distance of travel) if the trail did not exist. The Piedmont Medical Center Trail eliminates an estimated 23,890 vehicular trips and reduces the trip distance of approximately 91,330 trips annually (see Table 19). **The Piedmont Medical Center Trail generates an estimated \$25,200 in vehicle emissions reduction benefits annually.**

Figure 9: Land Cover Designations within the Footprint of the Piedmont Medical Center Trail



Source: ITRE analysis of the National Land Cover Database (2019)

⁵ An average, per-unit land sample (also be known as a "statistically averaged land sample") was developed by aggregating 898,080 raster cells (30-meter by 30-meter land areas) within the City of Charlotte. Once aggregated, the percentage of each land cover type was calculated. This percentage breakdown was then applied to a raster cell area, the per-unit area, to create the statistically averaged land sample for the City of Charlotte.



Table 17: Carbon Stock and Sequestration Benefits Facilitated by the Piedmont Medical Center Trail

| Trail Name | Trail Linear Miles | Trail Footprint in Acres ¹ | Carbon Stock (metric tons) ² | Annual Carbon Sequestered (metric tons) ³ | Carbon Stored or Sequestered (metric tons) | Annual Land Preservation Benefit of the Trail |
|-------------------------------|--------------------|---------------------------------------|---|--|--|---|
| Piedmont Medical Center Trail | 2.5 | 30.3 | 7,677.3 | 193.6 | 7,871.0 | \$417,000 |

¹ For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

² The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

³ The annual rate at which the carbon is stored is referred to as the carbon sequestration rate.

Source: ITRE analysis of National Land Cover Database (2019), the European Environmental Agency's terrestrial and marine carbon stocks and sequestration rates data tables (2022), and USDOT BCA guidance (2022) for the monetized value of carbon (\$53 per metric ton).

Table 18: Land Preservation Benefits per Acre Supported by the Piedmont Medical Center Trail

| Land Area Evaluated | Raster Cells Evaluated | Land Preservation Benefit per Acre | Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater) |
|-------------------------------|------------------------|------------------------------------|---|
| Piedmont Medical Center Trail | 414 | \$13,770 | 3.9 |
| City of Charlotte | 898,080 | \$3,530 | |

Source: ITRE analysis (same sources as previous table)

Table 19a: Vehicle Emissions Reduction Benefits Supported by the Piedmont Medical Center Trail

| Trail Name | Unique Trail Visits | Reduced-Distance Car Trips | Car Trips Eliminated | Reduced Vehicle Miles Traveled |
|-------------------------------|---------------------|----------------------------|----------------------|--------------------------------|
| Piedmont Medical Center Trail | 192,020 | 91,330 | 23,890 | 438,230 |

Table 19b: Vehicle Emissions Reduction Benefits Supported by the Piedmont Medical Center Trail

| Pollutant | Emissions (Grams per Mile) ^{1, 2} | Emissions Eliminated (metric tons) | Monetized Emissions Benefit | Total Emissions Benefit |
|--|--|------------------------------------|-----------------------------|-------------------------|
| Carbon Dioxide (CO ₂) | 404 | 177.04 | \$9,400 | \$25,200 |
| Nitrous Oxide (NOx) | 0.687 | 0.30 | \$4,800 | |
| Particulate Matter (PM _{2.5}) ³ | 0.033 | 0.01 | \$11,000 | |

¹ Environmental Protection Agency. 2018. Greenhouse Gas Emissions from a Typical Passenger Vehicle.

² Bureau of Transportation Statistics. 2021. Estimated U.S. Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel.

³ Includes exhaust, brake wear, and tire wear



Hector H. Henry II Greenway

Concord, NC

The Hector H. Henry II Greenway Riverwalk segment is a 2.6-mile paved trail that follows the Rocky River and provides a safe walking and biking path along Weddington Road. It connects the Weddington Road Dog Park and Fire Station 11 with Embassy Suites and the Riverwalk neighborhood. From the dog park, it heads east along the Rocky River to Riverwalk subdivision. Additionally, you can head out to Weddington Road and take the greenway to shops and the Embassy Suites hotel. The greenway is marked by flags and painted stencils and provides access to shopping areas and restaurants.

This segment of greenway will be part of the City of Concord's longest greenway project and is named in honor of Council Member Hector H. Henry II. It is considered part of the "spine" of the footprint of the Carolina Thread Trail and will ultimately connect Iredell, Mecklenburg, Cabarrus, Stanly and Anson counties. The segment in Concord will pass a number of destination points, including local public schools, Concord-Padgett Regional Airport, Concord Mills, Concord Convention Center, Rocky River Golf Course, zMAX Dragway and Charlotte Motor Speedway.

Trail Characteristics

- Trail length: 2.6 miles
- Surface type: pavement, boardwalk
- Parking spaces: 15
- Public restrooms: yes
- Trail uses: walking, hiking, running, biking
- ADA accessible

Access Points and Landmarks

- **Trailheads and Access Points: 3**
 - 5400 John Q. Hammons Drive NW, Concord, NC, 28027
 - 8955 Weddington Road NW, Concord, NC 28027
 - Clover Road NW Access
- **Landmarks and Nearby Amenities:**
 - Embassy Suites – Charlotte/Concord
 - Multiple fast-food restaurants and hotels
 - Concord Bark Park
 - Waterlynn at Concord apartment community
 - Concord Fire Department – Station 11

Adjacent Context / Uses

- Commercial, Park/Recreational, Residential

Economic Impact

The Hector H. Henry II Greenway is located within a half mile of approximately 141 businesses (ESRI Business Analyst, 2020). With nearby access to 42 food, beverage, and dining locations, four grocery and convenience stores, 30 retail establishments, and 65 other businesses, it is estimated that the Hector H. Henry Greenway facilitates approximately \$2.2 million in annual business sales by providing safe, affordable, and aesthetically valued transportation access to nearby storefronts.



Pedestrians at Hector H Henry II Greenway.
Source: Planning Communities, 2022



Boardwalks near the opposing trailheads of the greenway.
Source: Planning Communities, 2022



Survey data from trail users and businesses sheds light on how the Hector H. Henry II Greenway impacts Concord's local economy. According to a survey respondent, access to the greenway is a key contributor to why they visit the Hendrick Honda automotive dealership in Concord. "Hendrick Honda opens their gate to the trail and we can walk on it while we wait. It's one of the reasons why I like to go there." The respondent mentioned that the greenway created a positive experience while having to wait for work to be finished on their car. The Hector H. Henry II Greenway also benefits employees in the area. Survey respondents who worked at Concord Mills Mall and other locations in the area stated that they liked to come to the trail during lunch or after work for exercise and to spend time outdoors.

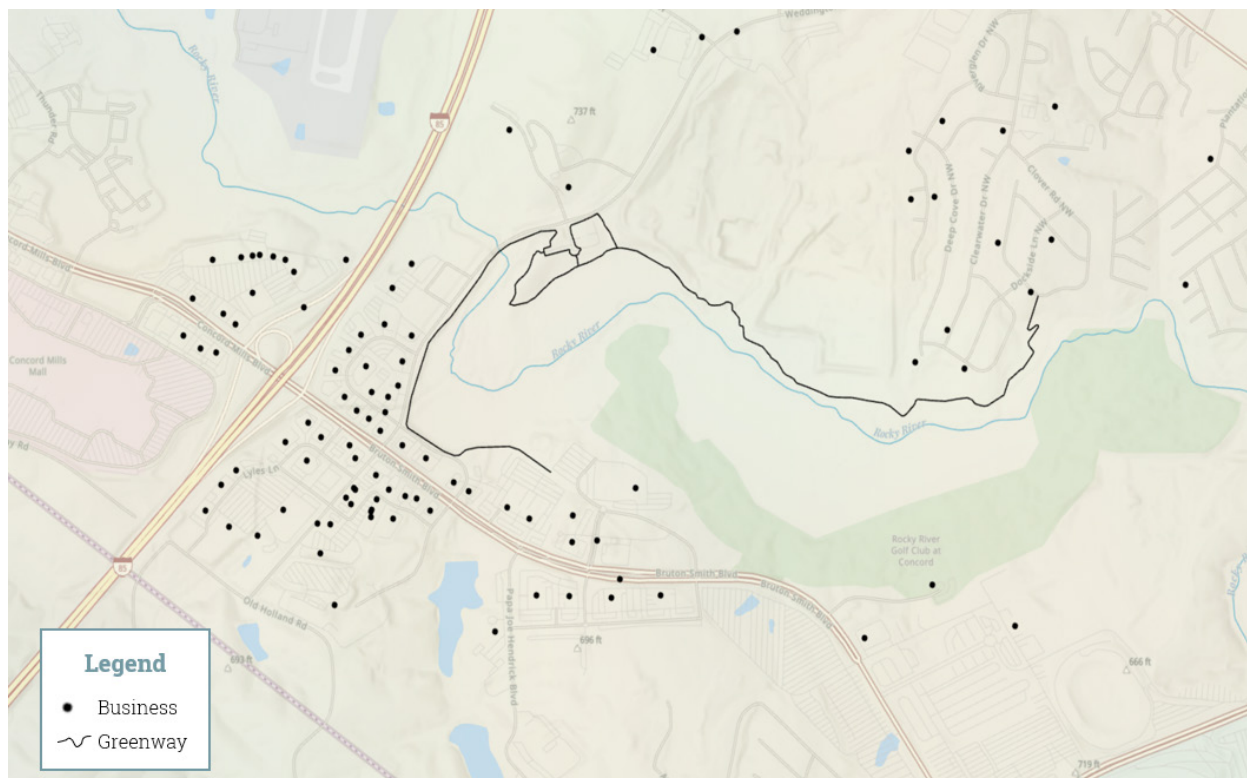
"Hendrick Honda opens their gate to the trail and we can walk on it while we wait. It's one of the reasons why I like to go there."

– Carolina Thread Trail Survey Respondent

The Hector H. Henry II Greenway facilitates substantial economic impact for its local community. On an annual basis, the trail supports approximately 16 local jobs, \$870,000 in employee earnings, \$2.2 million in businesses sales and approximately \$292,000 in tax revenue (\$42,000 local, \$65,000 state, and \$185,000 federal). These employment impacts result from purchases that are made at nearby bars and restaurants, groceries and convenience stores, retail establishments, entertainment venues, other business establishments, and expenditures made to maintain the trail.

According to a study conducted by Portland State University, restaurants, drinking establishments, convenience stores, and supermarkets in the Portland metropolitan area experienced monthly business sales that were comparable among pedestrians, cyclists, and vehicle owners, with cyclists outspending drivers in restaurants, drinking places, and convenience stores, and pedestrians outspending drivers in drinking places (Clifton et al., 2013). With the Hector H. Henry II Greenway located within a half mile of many of these types of businesses, the trail's economic impact will likely continue to increase as safe and walkable access points to nearby businesses establishments are developed. For more information about how economic impacts were derived, see the "Methodology" section within this report.

Figure 10: Local Businesses Within 0.5 Miles of the Hector H. Henry II Greenway



Source: ITRE analysis of ESRI Business Analyst Dataset



Table 20: Summary of Potential Business Interactions Facilitated by the Hector H. Henry II Greenway

| Business Type | No. of Businesses within 0.5 miles ¹ | Purchase Probability per Trail Visit ² | Expenditure per Business Type ³ |
|------------------------------|---|---|--|
| Food, Beverage, Dining | 42 | 1.6% | \$38.70 |
| Grocery & Convenience Stores | 4 | 0.8% | \$69.10 |
| Other | 65 | 1.6% | \$15.00 |
| Retail | 30 | 1.8% | \$48.90 |

¹ ITRE analysis of ESRI Business Analyst Dataset

^{2,3} ITRE analysis of Intercept Survey Responses

⁴ Research shows that trail users are most inclined to make purchases at food, beverage, dining; grocery and convenience stores; or retail locations associated with trail usage. Businesses that do not fit into these categories are defined as "other." Across the six study trails evaluated in this research, healthcare and spa facilities, recreation and fitness centers, art shops and studios, locksmiths, hotels, apartment complexes, and car dealerships were found to have economic activity facilitated by trail use and fall within the "other" designation.

Table 21: Local Jobs Facilitated by the Hector H. Henry II Greenway

| Impact | Direct | Indirect | Induced | Total |
|------------|--------|----------|---------|-------|
| Employment | 10 | 3 | 4 | 16 |

Source: ITRE, IMPLAN Analysis

Table 22: Employee Earnings Facilitated by the Hector H. Henry II Greenway

| Impact | Direct | Indirect | Induced | Total |
|--------------|-----------|-----------|-----------|-----------|
| Labor Income | \$550,000 | \$150,000 | \$170,000 | \$870,000 |

Source: ITRE, IMPLAN Analysis

Table 23: Local Business Sales Facilitated by the Hector H. Henry II Greenway

| Impact | Direct | Indirect | Induced | Total |
|-----------------|-------------|-----------|-----------|-------------|
| Economic Output | \$1,160,000 | \$510,000 | \$560,000 | \$2,230,000 |

Source: ITRE, IMPLAN Analysis

Table 24: Tax Generation Facilitated by the Hector H. Henry II Greenway

| Impact | Direct | Indirect | Induced | Total |
|----------------------|-----------|----------|----------|-----------|
| Local Taxes | \$23,000 | \$6,000 | \$12,000 | \$42,000 |
| State Taxes | \$37,000 | \$10,000 | \$17,000 | \$65,000 |
| Federal Taxes | \$116,000 | \$31,000 | \$38,000 | \$185,000 |
| Total Tax Generation | \$176,000 | \$48,000 | \$68,000 | \$292,000 |

Source: ITRE, IMPLAN Analysis

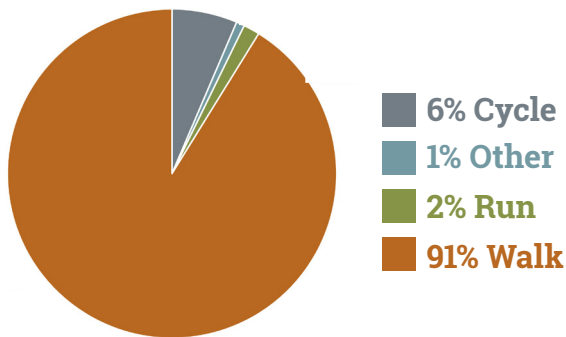


Physical Health Benefits

The Hector H. Henry II Greenway serves as a convenient and accessible venue for recreational activities, such as walking, cycling, running, and other forms of exercise. In 2022, it is estimated that 18,700 unique trail visits will be made with approximately 91 percent walk trips, 6 percent bike trips, 2 percent run trips, and 1 percent of trips made with some other active mode.

The Hector H. Henry II Greenway substantially improves the health and the quality of life for its users by reducing ailments linked with physical inactivity such as heart disease, diabetes, vascular disease, and some forms of cancer. It is estimated that physical activity facilitated by trail use saves approximately \$130,000 in healthcare costs for Hector H. Henry II Greenway visitors. For more information about how physical health benefits were derived, see the “Methodology” section within this report.

Figure 11: Hector H. Henry Greenway Activity Split



Physical activity facilitated
by trail use saves...

\$132,000

...annually in healthcare cost

Annually, the trail supports **18,700** trail visits including...



17,050 walk visits.

On average, walkers achieve **146.9** minutes of exercise with **2.6** visits per week.



300 run visits.

On average, runners achieve **105** minutes of exercise with **3** visits per week.



1,200 bike visits.

On average, cyclists achieve **62.7** minutes of exercise with **2.3** visits per week.



150 other visits.

On average, other trail uses achieve **90** minutes of exercise with **1** visit per week.



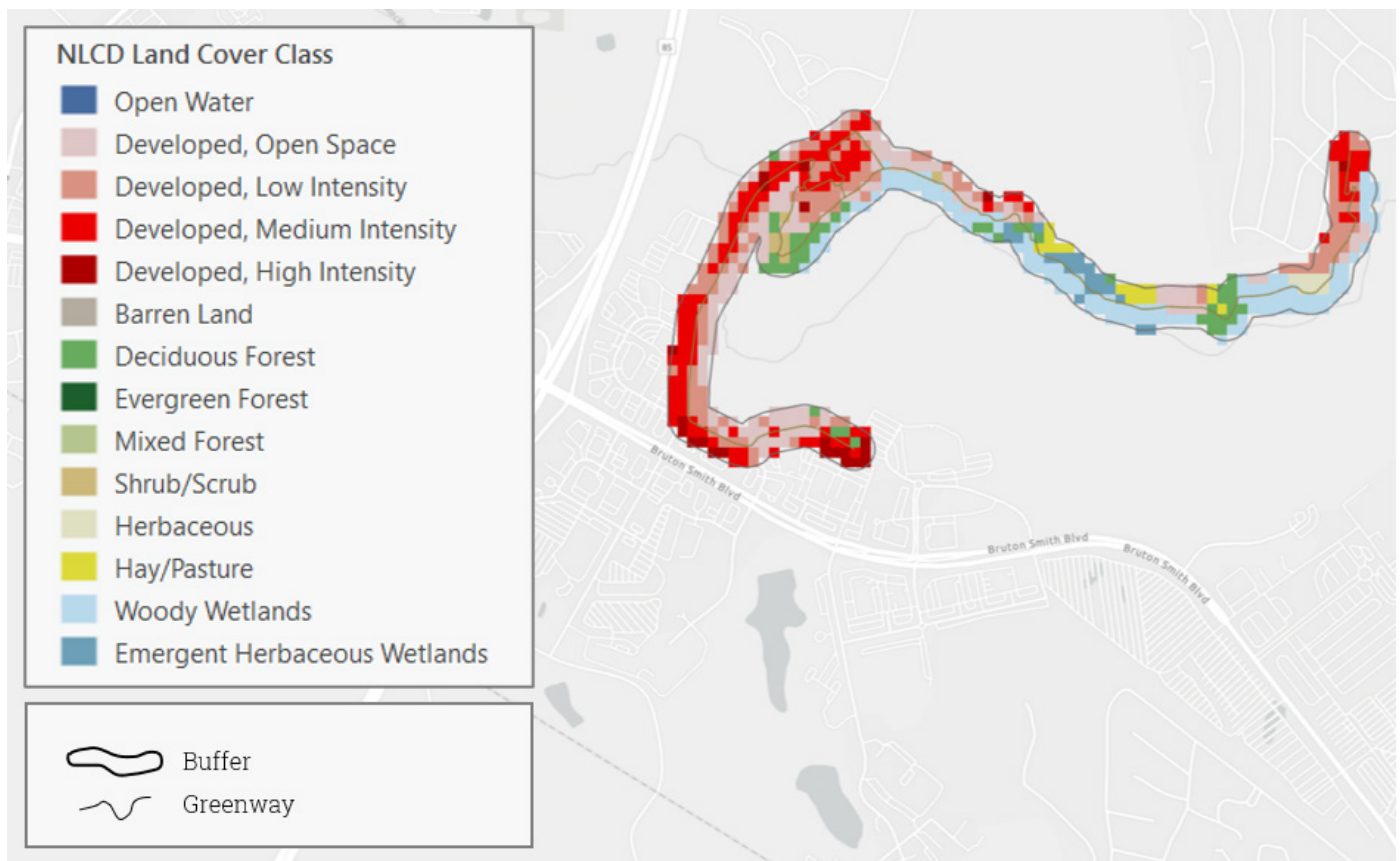
Environmental Benefits

The Hector H. Henry II Greenway provides environmental benefits to the region through land preservation and vehicular trip reduction.

Land Preservation Benefits. The trail provides land preservation benefits enabling carbon sequestration and by protecting the carbon stock within and below the surface of ecosystem within the trail's footprint. The trail preserves an ecosystem with an estimated 4,327.6 metric tons of carbon stock and by preserving this ecosystem it enables an estimated 54.5 metric tons of carbon to be sequestered annually (see Table 25). The trail's footprint has a carbon stock and carbon sequestration capacity that is 2.6 times greater than that of the habitat pools found within the City of Charlotte on a per-unit basis (see Table 26).⁶ The Hector H. Henry II Greenway generates an estimated \$417,000 in land preservation benefits annually.

Vehicular Trip Reduction Benefits. The trail mitigates greenhouse gas emissions by eliminating vehicle trips or reducing the distance traveled for vehicle trips. Car trips were classified to be eliminated if survey respondents who used active transportation to get to the trail said they would drive to their destination, or a similar destination, if the trail did not exist. Car trips were classified as reduced-distance trips if survey respondents who used vehicular transportation to get to the trail said they would drive to a similar destination (often requiring a further distance of travel) if the trail did not exist. The Hector H. Henry II Greenway eliminates an estimated 2,890 vehicular trips and reduces the trip distance of approximately 11,820 trips annually (see Table 27). **The Hector H. Henry II Greenway generates an estimated \$3,200 in vehicle emission reduction benefits annually.**

Figure 12: Land Cover Designations within the Footprint of the Hector H. Henry Greenway



Source: ITRE analysis of the National Land Cover Database (2019)

⁶ An average, per-unit land sample (also be known as a "statistically averaged land sample") was developed by aggregating 898,080 raster cells (30-meter by 30-meter land areas) within the City of Charlotte. Once aggregated, the percentage of each land cover type was calculated. This percentage breakdown was then applied to a raster cell area, the per-unit area, to create the statistically averaged land sample for the City of Charlotte.



Table 25: Carbon Stock and Sequestration Benefits Facilitated by the Hector H. Henry II Greenway

| Trail Name | Trail Linear Miles | Trail Footprint in Acres ¹ | Carbon Stock (metric tons) ² | Annual Carbon Sequestered (metric tons) ³ | Carbon Stored or Sequestered (metric tons) | Annual Land Preservation Benefit of the Trail |
|-----------------------------|--------------------|---------------------------------------|---|--|--|---|
| Hector H. Henry II Greenway | 2.6 | 31.5 | 4,327.6 | 54.5 | 4,382.1 | \$232,000 |

¹ For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

² The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

³ The annual rate at which the carbon is stored is referred to as the carbon sequestration rate.

Source: ITRE analysis of National Land Cover Database (2019), the European Environmental Agency's terrestrial and marine carbon stocks and sequestration rates data tables (2022), and USDOT BCA guidance (2022) for the monetized value of carbon (\$53 per metric ton).

Table 26: Land Preservation Benefits per Acre Supported by the Hector H. Henry II Greenway

| Land Area Evaluated | Raster Cells Evaluated | Land Preservation Benefit per Acre | Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater) |
|---------------------------------------|------------------------|------------------------------------|---|
| Hector H. Henry II Greenway Footprint | 584 | \$7,370 | 2.1 |
| City of Charlotte | 898,080 | \$3,530 | |

Source: ITRE analysis (same sources as previous table)

Table 27a: Vehicle Emissions Reduction Benefits Supported by the Hector H. Henry II Greenway

| Trail Name | Unique Trail Visits | Reduced-Distance Car Trips | Car Trips Eliminated | Reduced Vehicle Miles Traveled |
|-----------------------------|---------------------|----------------------------|----------------------|--------------------------------|
| Hector H. Henry II Greenway | 18,700 | 11,820 | 2,890 | 54,610 |

Table 27b: Vehicle Emissions Reduction Benefits Supported by the Hector H. Henry II Greenway

| Pollutant | Emissions (Grams per Mile) ^{1, 2} | Emissions Eliminated (metric tons) | Monetized Emissions Benefit | Total Emissions Benefit |
|---|--|------------------------------------|-----------------------------|-------------------------|
| Carbon Dioxide (CO ₂) | 404 | 22.06 | \$1,200 | \$3,200 |
| Nitrous Oxide (NOx) | 0.687 | 0.04 | \$600 | |
| Particulate Matter (PM2.5) ³ | 0.033 | 0.00 | \$1,400 | |

¹ Environmental Protection Agency. 2018. *Greenhouse Gas Emissions from a Typical Passenger Vehicle*.

² Bureau of Transportation Statistics. 2021. *Estimated U.S. Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel*.

³ Includes exhaust, brakewear, and tirewear



South Fork Trail

McAdenville, NC

The South Fork Trail is a 2-mile natural surface trail adjacent to the South Fork of the Catawba River. The trail offers both land and water recreation, which attracts hikers, runners, mountain bikers, paddlers, and anglers. The trail's southern access point is next to the Boathouse, which provides kayak, canoe, and stand-up-paddle board rentals. The Boathouse is the operational headquarters of the Catawba Riverkeeper's recreation arm, which serves to engage visitors and residents through guided paddle tours, environmental education, sustainable retail, and live music events. The trail's northern terminus can be accessed through the cul-de-sac of a residential neighborhood.

South Fork Trail is a part of the Butterfly Highway, which aims to restore native pollinator habitats. Additionally, the land surrounding the South Fork Trail is on the Pharr Yarns Preserve, a 94.8-acre preserve protected through the Catawba Lands Conservancy.

Trail Characteristics

- Trail length: 2 miles
- Surface type: natural surface
- Parking spaces: 18
- Public restrooms: no
- Trail uses: walking, hiking, running, mountain biking, paddling

Access Points and Landmarks

- **Trailheads and Access Points: 2**
 - 1101 Catawba Run Rd, Lowell, NC 28098
 - 115 Willow Dr, McAdenville, NC 28101
- **Landmarks and Nearby Amenities:**
 - South Fork Trail and Blueway access
 - I-85 overpass
 - Pharr factory equipment supplier
 - Wooden bridge
 - Railroad trestle
 - The Boathouse

Adjacent Context / Uses

- Residential, Park/Recreational

Economic Impact

The South Fork Trail is located within a half mile of approximately 35 businesses (ESRI Business Analyst, 2020). With nearby access to three food, beverage, and dining locations, two retail establishments, and 30 other businesses, it is estimated that the South Fork Trail facilitates approximately \$3.2 million in annual business sales by providing safe, affordable, and aesthetically valued transportation access to nearby storefronts.



Group of runners at South Fork Trail.
Source: Courtesy of Catawba Riverkeeper, 2022



Paddler at the Catawba River put-in at South Fork Trail.
Source: Courtesy of Catawba Riverkeeper, 2022

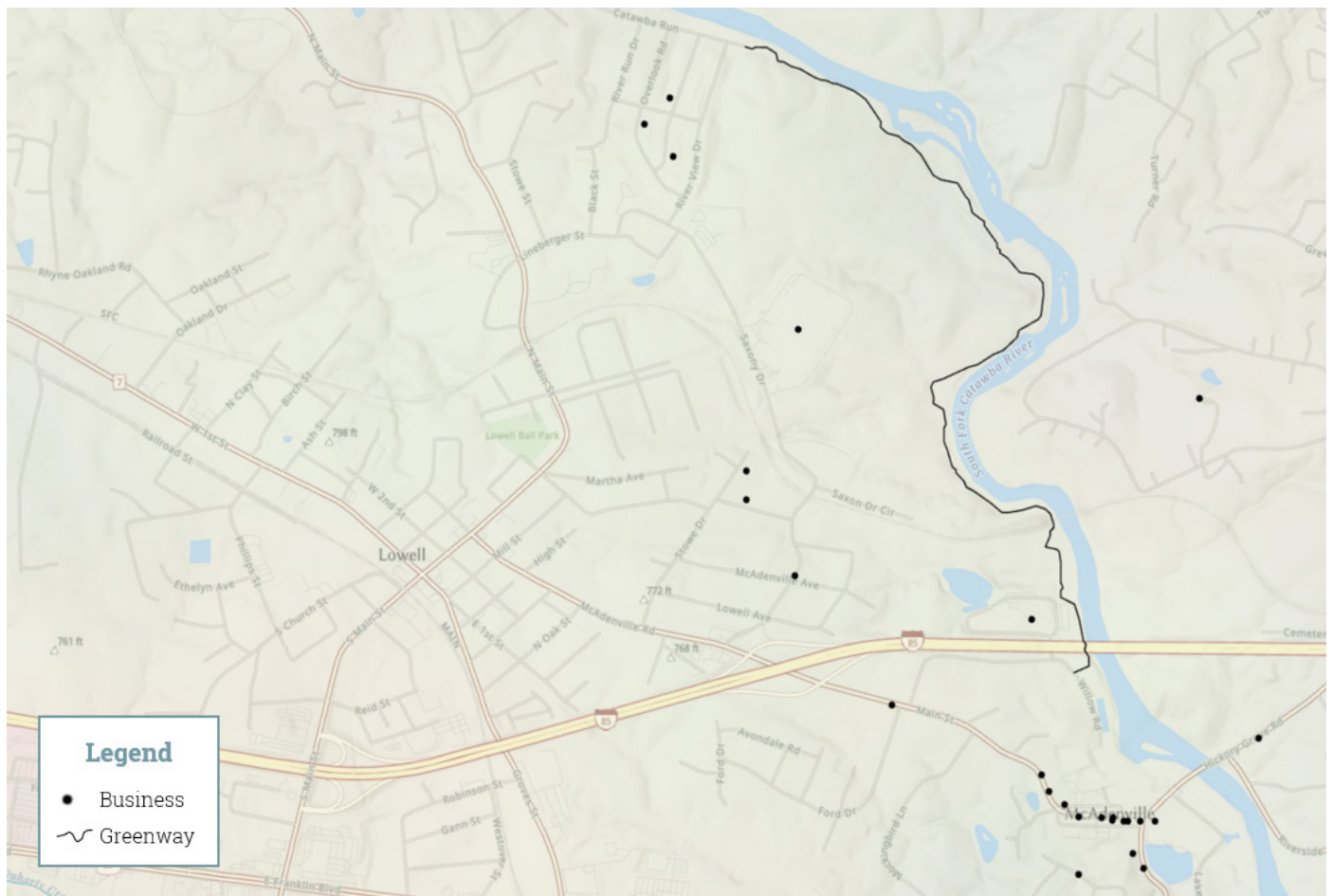


The South Fork Trail is an anchor for walking, running, cycling, cross-country training, and water recreation generating an estimated 20,000 trail users and 1,600 kayakers annually (ITRE, 2022; Catawba Riverkeeper, 2022). According to John Searby, Catawba Riverkeeper Executive Director, the South Fork Trail is essential for their organization and is the primary reason why their center of operations is located at the South Fork Trail head. “It’s pretty obvious that we wouldn’t even be here if the trail weren’t here. The only reason we have our business here is because of the trail.” Catawba Riverkeeper has 12- fulltime employees and supports 20-30 seasonal staff. For more information about how economic impacts were derived, see the “Methodology” section within this report.

“It’s pretty obvious that we wouldn’t even be here if the trail weren’t here. The only reason we have our business here is because of the trail.”

– Catawba Riverkeeper Executive Director, John Searby

Figure 13: Local Businesses Within 0.5 Miles of the South Fork Trail



Source: ITRE analysis of ESRI Business Analyst Dataset



Table 28: Summary of Potential Business Interactions Facilitated by the South Fork Trail

| Business Type | No. of Businesses within 0.5 miles ¹ | Purchase Probability per Trail Visit ² | Expenditure per Business Type ³ |
|------------------------|---|---|--|
| Food, Beverage, Dining | 3 | 10.5% | \$38.70 |
| Other ⁴ | 30 | 6.4% | \$15.00 |
| Retail | 2 | 10.5% | \$48.90 |

¹ ITRE analysis of ESRI Business Analyst Dataset

^{2,3} ITRE analysis of Intercept Survey Responses

⁴ Research shows that trail users are most inclined to make purchases at food, beverage, dining; grocery and convenience stores; or retail locations associated with trail usage. Businesses that do not fit into these categories are defined as "other." Across the six study trails evaluated in this research, healthcare and spa facilities, recreation and fitness centers, art shops and studios, locksmiths, hotels, apartment complexes, and car dealerships were found to have economic activity facilitated by trail use and fall within the "other" designation.

Table 29: Local Jobs Facilitated by the South Fork Trail

| Impact | Direct | Indirect | Induced | Total |
|------------|--------|----------|---------|-------|
| Employment | 12 | 4 | 5 | 22 |

Source: ITRE, IMPLAN Analysis

Table 30: Employee Earnings Facilitated by the South Fork Trail

| Impact | Direct | Indirect | Induced | Total |
|--------------|-----------|-----------|-----------|-------------|
| Labor Income | \$680,000 | \$280,000 | \$240,000 | \$1,200,000 |

Source: ITRE, IMPLAN Analysis

Table 31: Local Business Sales Facilitated by the South Fork Trail

| Impact | Direct | Indirect | Induced | Total |
|-----------------|-------------|-----------|-----------|-------------|
| Economic Output | \$1,620,000 | \$770,000 | \$780,000 | \$3,170,000 |

Source: ITRE, IMPLAN Analysis

Table 32: Tax Generation Facilitated by the South Fork Trail

| Impact | Direct | Indirect | Induced | Total |
|----------------------|-----------|----------|----------|-----------|
| Local Taxes | \$61,000 | \$10,000 | \$17,000 | \$88,000 |
| State Taxes | \$78,000 | \$18,000 | \$24,000 | \$120,000 |
| Federal Taxes | \$148,000 | \$58,000 | \$53,000 | \$259,000 |
| Total Tax Generation | \$287,000 | \$85,000 | \$95,000 | \$467,000 |

Source: ITRE, IMPLAN Analysis

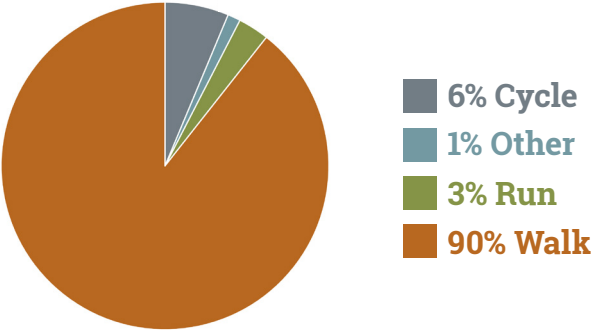


Physical Health Benefits

The South Fork Trail serves as a convenient and accessible venue for recreational activities, such as walking, cycling, running, paddling, and other forms of exercise. In 2022, it is estimated that 20,580 unique trail visits will be made with approximately 90 percent walk trips, 6 percent bike trips, 3 percent run trips, and 1 percent of trips made with some other active mode.

The South Fork Trail substantially improves the health and the quality of life for its users by reducing ailments linked with physical inactivity such as heart disease, diabetes, vascular disease, and some forms of cancer. It is estimated that physical activity facilitated by trail use saves approximately \$145,000 in healthcare costs for Four Mile Creek Greenway visitors. For more information about how economic impacts were derived, see the “Methodology” section within this report.

Figure 14: South Fork Activity Split



Physical activity facilitated by trail use saves...

\$145,000

...annually in healthcare cost

Annually, the trail supports 20,580 trail visits including...



18,395 walk visits.

On average, walkers achieve **135.2** minutes of exercise with **1.8** visits per week.



630 run visits.

On average, runners achieve **67** minutes of exercise with **67** visits per week.



1,295 bike visits.

On average, cyclists achieve **1,295** minutes of exercise with **1.8** visits per week.



260 other visits.

On average, other trail uses achieve **158.5** minutes of exercise with **2.6** visits per week.



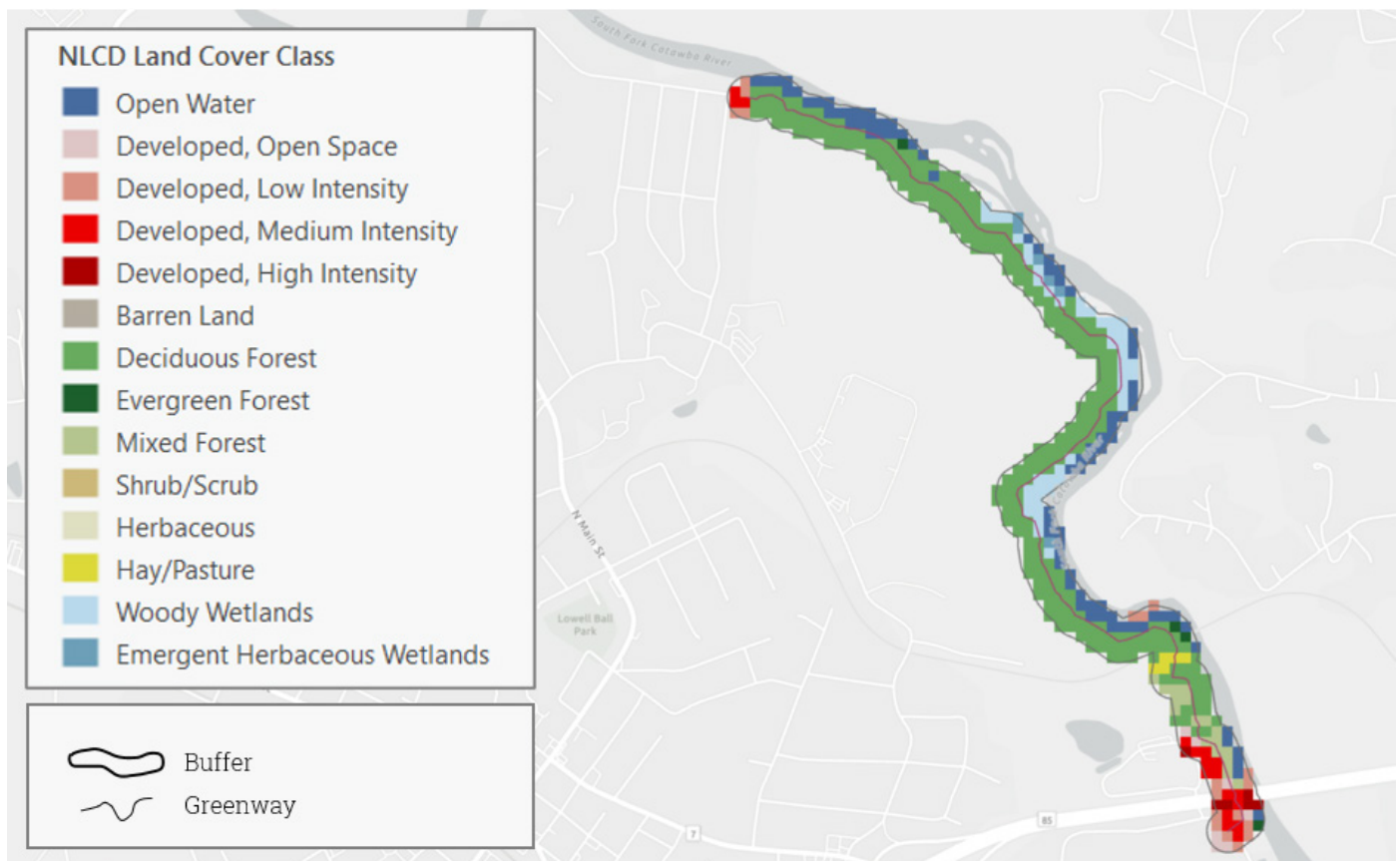
Environmental Benefits

The South Fork Trail provides environmental benefits to the region through land preservation and vehicular trip reduction.

Land Preservation Benefits. The trail provides land preservation benefits enabling carbon sequestration and by protecting the carbon stock within and below the surface of ecosystem within the trail's footprint. The trail preserves an ecosystem with an estimated 6,205.7 metric tons of carbon stock and by preserving this ecosystem it enables an estimated 140.0 metric tons of carbon to be sequestered annually (see Table 33). The trail's footprint has a carbon stock and carbon sequestration capacity that is 3.9 times greater than that of the habitat pools found within the City of Charlotte on a per-unit basis (see Table 34).⁷ **The South Fork Trail generates an estimated \$336,000 in land preservation benefits annually.**

Vehicular Trip Reduction Benefits. The trail mitigates greenhouse gas emissions by eliminating vehicle trips or reducing the distance traveled for vehicle trips. Car trips were classified to be eliminated if survey respondents who used active transportation to get to the trail said they would drive to their destination, or a similar destination, if the trail did not exist. Car trips were classified as reduced-distance trips if survey respondents who used vehicular transportation to get to the trail said they would drive to a similar destination (often requiring a further distance of travel) if the trail did not exist. The South Fork Trail eliminates an estimated 2,310 vehicular trips and reduces the trip distance of approximately 12,150 trips annually (see Table 35). **The South Fork Trail generates an estimated \$2,800 in vehicle emissions reduction benefits annually.**

Figure 15: Land Cover Designations within the Footprint of the South Fork River Trail



Source: ITRE analysis of the National Land Cover Database (2019)

⁷ An average, per-unit land sample (also be known as a "statistically averaged land sample") was developed by aggregating 898,080 raster cells (30-meter by 30-meter land areas) within the City of Charlotte. Once aggregated, the percentage of each land cover type was calculated. This percentage breakdown was then applied to a raster cell area, the per-unit area, to create the statistically averaged land sample for the City of Charlotte.



Table 33: Carbon Stock and Sequestration Benefits Facilitated by the South Fork Trail

| Trail Name | Trail Linear Miles | Trail Footprint in Acres ¹ | Carbon Stock (metric tons) ² | Annual Carbon Sequestered (metric tons) ³ | Carbon Stored or Sequestered (metric tons) | Annual Land Preservation Benefit of the Trail |
|------------------|--------------------|---------------------------------------|---|--|--|---|
| South Fork Trail | 2.0 | 24.2 | 6,205.7 | 140.0 | 6,345.7 | \$336,000 |

¹ For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

² The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

³ The annual rate at which the carbon is stored is referred to as the carbon sequestration rate.

Source: ITRE analysis of National Land Cover Database (2019), the European Environmental Agency's terrestrial and marine carbon stocks and sequestration rates data tables (2022), and USDOT BCA guidance (2022) for the monetized value of carbon (\$53 per metric ton).

Table 34: Land Preservation Benefits per Acre Supported by the South Fork Trail

| Land Area Evaluated | Raster Cells Evaluated | Land Preservation Benefit per Acre | Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater) |
|----------------------------|------------------------|------------------------------------|---|
| South Fork Trail Footprint | 460 | \$13,870 | 3.9 |
| City of Charlotte | 898,080 | \$3,530 | |

Source: ITRE analysis (same sources as previous table)

Table 35a: Vehicle Emissions Reduction Benefits Supported by the South Fork Trail

| Trail Name | Unique Trail Visits | Reduced-Distance Car Trips | Car Trips Eliminated | Reduced Vehicle Miles Traveled |
|------------------|---------------------|----------------------------|----------------------|--------------------------------|
| South Fork Trail | 20,580 | 12,150 | 2,310 | 49,050 |

Table 35b: Vehicle Emissions Reduction Benefits Supported by the South Fork Trail

| Pollutant | Emissions (Grams per Mile) ^{1, 2} | Emissions Eliminated (metric tons) | Monetized Emissions Benefit | Total Emissions Benefit |
|---|--|------------------------------------|-----------------------------|-------------------------|
| Carbon Dioxide (CO ₂) | 404 | 19.82 | \$1,100 | \$2,800 |
| Nitrous Oxide (NOx) | 0.687 | 0.03 | \$500 | |
| Particulate Matter (PM2.5) ³ | 0.033 | 0.00 | \$1,200 | |

¹ Environmental Protection Agency. 2018. Greenhouse Gas Emissions from a Typical Passenger Vehicle.

² Bureau of Transportation Statistics. 2021. Estimated U.S. Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel.

³ Includes exhaust, brakewear, and tirewear



Mount Holly River Hawk Greenway

Mount Holly, NC

The Mount Holly River Hawk Greenway follows the shores of the Catawba River connecting several trails within the City of Mount Holly. The greenway connects Tuckasee Park to River Street Park, by traversing the A&E Riverfront Trail segment and the recently opened Dutchman's Creek Trail segment. The Mount Holly River Hawk Greenway enables trail users to pass through downtown Mount Holly where dining and shopping options are available.

The greenway was first planned in 2003 by a committee of the Mount Holly Community Development Foundation, known as the Friends of the Greenway System (FROGS). Concepts from the FROGS can still be found today in the City of Mount Holly's comprehensive bicycle and pedestrian plans, which lay the groundwork for an additional seven miles of greenway to be added to the existing trail system.

Trail Characteristics

- Trail length: 2.1 miles
- Surface type: pavement
- Parking spaces: 100+
- Public restrooms: yes
- Trail uses: walking, hiking, running, mountain biking, paddling
- ADA accessible

Access Points and Landmarks

- **Trailheads and Access Points: 4**
 - 165 Broome St, Mt Holly, NC 28120
 - 231 Broome Street, Mt Holly, NC 28120
 - 400 E Central Ave, Mt Holly, NC 28120
 - 300 N River St, Mt Holly, NC 28120
- **Landmarks and Nearby Amenities:**
 - Tuckasee Park, including playground, soccer fields, baseball fields, parking, and restrooms
 - Tuckasee Community Center
 - Mount Holly City Recreation Center
 - American & Efirid textile production facility
 - City of Mount Holly Municipal Complex
 - River Street Park
 - Dutchman's Creek Kayak Landing & Fishing

Adjacent Context / Uses

- Residential, Commercial, Industrial, Park/Recreational, Institutional

Economic Impact

The Mount Holly River Hawk Greenway is located within a half mile of approximately 206 businesses (ESRI Business Analyst, 2020). With nearby access to 14 food, beverage, and dining locations, four grocery and convenience stores, 17 retail establishments, four and 171 other businesses, it is estimated that the Mount Holly River Hawk Greenway facilitates approximately \$5.4 million in annual business sales by providing safe, affordable, and aesthetically valued transportation access to nearby storefronts.

Survey data from trail users and businesses sheds light on how the Mount Holly River Hawk Greenway impacts Mount Holly's local economy. According to the owner of the up-and-coming Firehawk Brewpub, the brewpub's



Paddlers and boaters on the Catawba River near the Mount Holly River Hawk Greenway. Source: ITRE, 2022



Pedestrian walking at Mount Holly River Hawk Greenway. Source: ITRE, 2022



business plan is dependent on the Mount Holly River Hawk Greenway. “Our business model is built on the expectation that greenway and blueway activities will be accessible to our guests. We imagine a Mount Holly with families biking, friends paddling the creek and folks from all over the region enjoying our food and beverage while enjoying the city’s beautiful outdoor spaces.” Currently, \$1.5 million has been invested to build a 6,000 square-foot brewpub on Dutchman Creek, within close proximity to the Mount Holly River Hawk Greenway and blueway. It is anticipated that five fulltime employees and 10 parttime staff will be hired to handle operations.

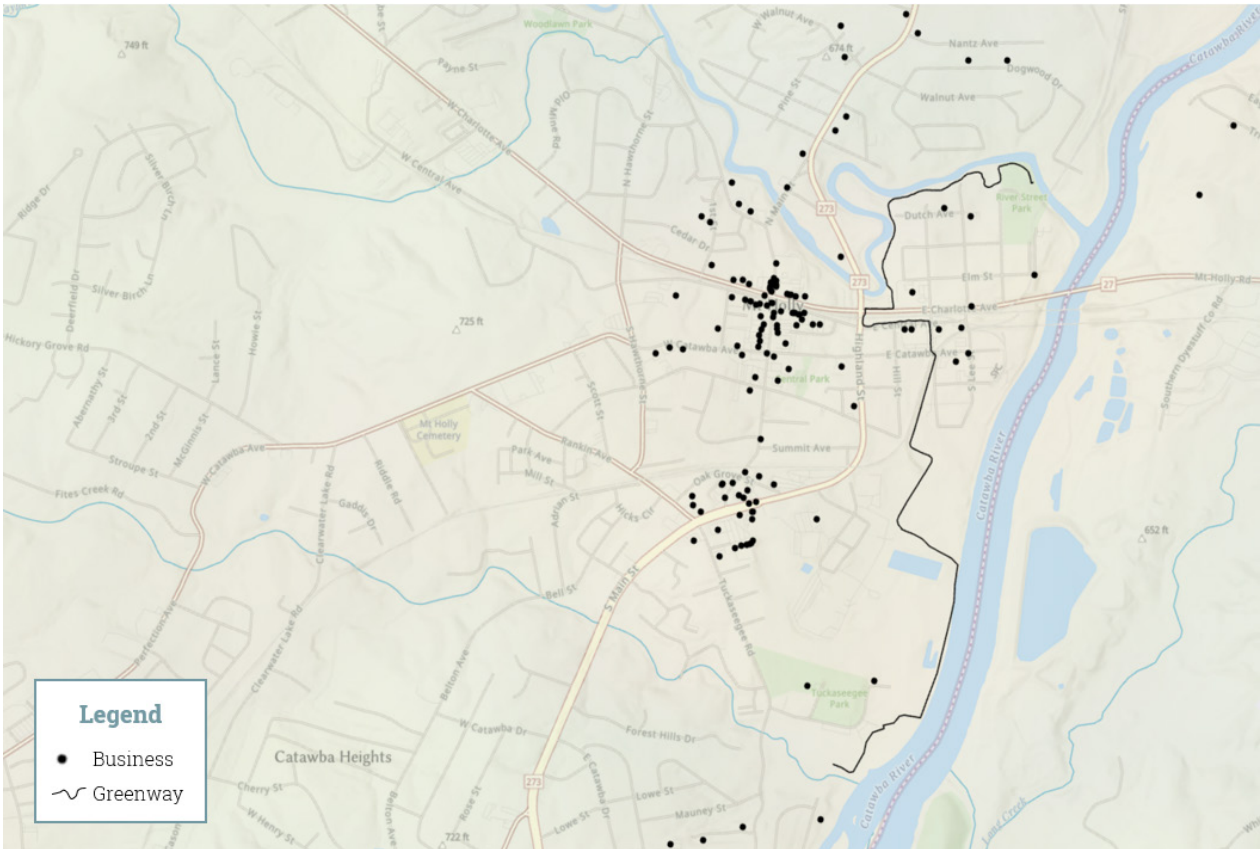
In addition to the plans being laid to take advantage of the trail in the future, many existing businesses are experiencing benefits today. According to survey respondent Kendle Starcher, the owner of Catalyst Mercantile, and survey respondent Vicki Whitmoyer, the owner of Create in Us Art Studio, the Mount Holly River Hawk Greenway helps generate additional foot traffic for their businesses. “Having a Carolina Thread Trail segment simply brings more people into our downtown area...this means more potential customers,” reported Starcher. Similarly, Whitmoyer shared, “People who visit the trail will also come to downtown to shop and eat due to close proximity to trail.”

“Our business model is built on the expectation that greenway and blueway activities will be accessible to our guests. We imagine a Mount Holly with families biking, friends paddling the creek and folks from all over the region enjoying our food and beverage while enjoying the city’s beautiful outdoor spaces.”

– Scott Blackwood, Owner, Firehawk Brewpub

The Mount Holly River Hawk Greenway facilitates substantial economic impact for its local community. On an annual basis, the trail supports approximately 39 local jobs, \$2.2 million in employee earnings, \$5.4 million in businesses sales and approximately \$670,000 in tax revenue (\$80,000 local, \$138,000 state, and \$452,000 federal). These employment impacts result from purchases that are made at nearby bars and restaurants, grocery and convenience stores, retail establishments, entertainment venues, other business establishments, and expenditures made to maintain the trail. For more information about how economic impacts were derived, see the “Methodology” section within this report.

Figure 16: Local Businesses Within 0.5 Miles of the Mount Holly River Hawk Greenway



Source: ITRE analysis of ESRI Business Analyst Dataset



Table 36: Summary of Potential Business Interactions Facilitated by the Mount Holly River Hawk Greenway

| Business Type | No. of Businesses within 0.5 miles ¹ | Purchase Probability per Trail Visit ² | Expenditure per Business Type ³ |
|------------------------------|---|---|--|
| Food, Beverage, Dining | 14 | 3.7% | \$39.70 |
| Grocery & Convenience Stores | 4 | 3.7% | \$69.10 |
| Other ⁴ | 171 | 1.2% | \$15.00 |
| Retail | 17 | 1.6% | \$48.90 |

¹ ITRE analysis of ESRI Business Analyst Dataset

^{2,3} ITRE analysis of Intercept Survey Responses

⁴ Research shows that trail users are most inclined to make purchases at food, beverage, dining; grocery and convenience stores; or retail locations associated with trail usage. Businesses that do not fit into these categories are defined as "other." Across the six study trails evaluated in this research, healthcare and spa facilities, recreation and fitness centers, art shops and studios, locksmiths, hotels, apartment complexes, and car dealerships were found to have economic activity facilitated by trail use and fall within the "other" designation.

Table 37: Local Jobs Facilitated by the Mount Holly River Hawk Greenway

| Impact | Direct | Indirect | Induced | Total |
|------------|--------|----------|---------|-------|
| Employment | 24 | 7 | 9 | 39 |

Source: ITRE, IMPLAN Analysis

Table 38: Employee Earnings Facilitated by the Mount Holly River Hawk Greenway

| Impact | Direct | Indirect | Induced | Total |
|--------------|-------------|-----------|-----------|-------------|
| Labor Income | \$1,400,000 | \$340,000 | \$430,000 | \$2,170,000 |

Source: ITRE, IMPLAN Analysis

Table 39: Local Business Sales Facilitated by the Mount Holly River Hawk Greenway

| Impact | Direct | Indirect | Induced | Total |
|-----------------|-------------|-------------|-------------|-------------|
| Economic Output | \$2,780,000 | \$1,180,000 | \$1,400,000 | \$5,360,000 |

Source: ITRE, IMPLAN Analysis

Table 40: Tax Generation Facilitated by the Mount Holly River Hawk Greenway

| Impact | Direct | Indirect | Induced | Total |
|----------------------|-----------|-----------|-----------|-----------|
| Local Taxes | \$33,000 | \$16,000 | \$31,000 | \$80,000 |
| State Taxes | \$69,000 | \$26,000 | \$43,000 | \$138,000 |
| Federal Taxes | \$284,000 | \$72,000 | \$96,000 | \$452,000 |
| Total Tax Generation | \$386,000 | \$114,000 | \$170,000 | \$670,000 |

Source: ITRE, IMPLAN Analysis

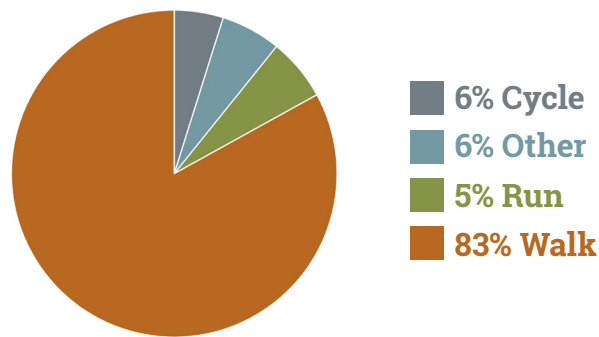


Physical Health Benefits

The Mount Holly River Hawk Greenway serves as a convenient and accessible venue for recreational activities, such as walking, cycling, running, paddling, and other forms of exercise. In 2022, it is estimated that 54,590 unique trail visits will be made with approximately 83 percent walk trips, 6 percent run trips, 5 percent bike trips, and 6 percent of trips made with some other active mode.

The Mount Holly River Hawk Greenway substantially improves the health and the quality of life for its users by reducing ailments linked with physical inactivity such as heart disease, diabetes, vascular disease, and some forms of cancer. It is estimated that physical activity facilitated by trail use saves approximately \$385,000 in healthcare costs for Mount Holly River Hawk Greenway visitors. For more information about how physical health benefits were derived, see the “Methodology” section within this report.

Figure 17: Mount Holly River Hawk Greenway Activity Split



Physical activity facilitated by trail use saves...

\$385,000

...annually in healthcare cost

Annually, the trail supports **54,590** trail visits including...



45,315 walk visits.

On average, walkers achieve **135.2** minutes of exercise with **2.4** visits per week.



3,370 run visits.

On average, runners achieve **134.9** minutes of exercise with **2.8** visits per week.



2,655 bike visits.

On average, cyclists achieve **37.6** minutes of exercise with **1.6** visits per week.



3,250 other visits.

On average, other trail uses achieve **80** minutes of exercise with **4** visits per week.



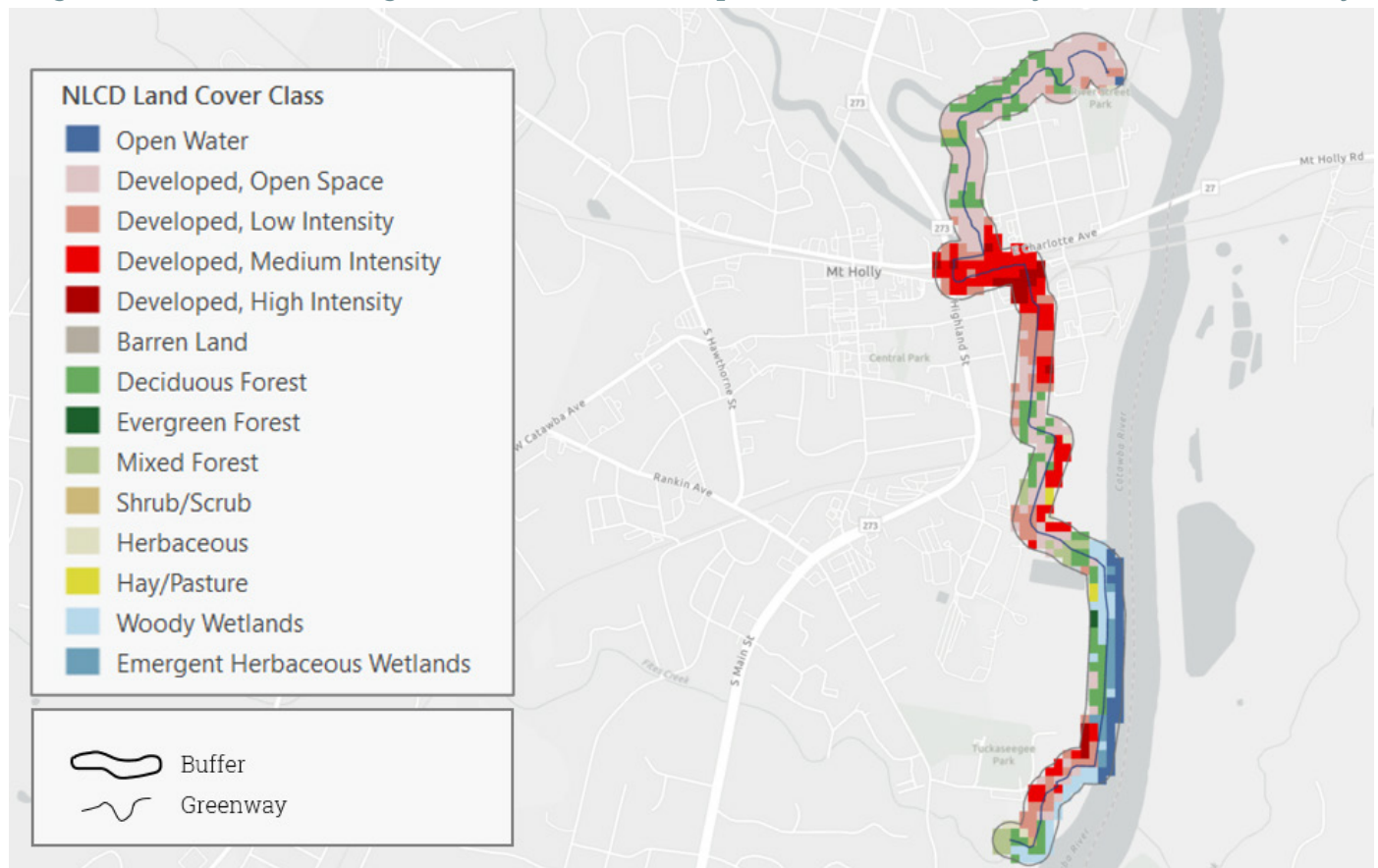
Environmental Benefits

The Mount Holly River Hawk Greenway provides environmental benefits to the region through land preservation and vehicular trip reduction.

Land Preservation Benefits. The trail provides land preservation benefits enabling carbon sequestration and by protecting the carbon stock within and below the surface of ecosystem within the trail's footprint. The trail preserves an ecosystem with an estimated 3,480.2 metric tons of carbon stock and by preserving this ecosystem it enables an estimated 60.8 metric tons of carbon to be sequestered annually (see Table 4.1). The trail's footprint has a carbon stock and carbon sequestration capacity that is 1.8 times greater than that of the habitat pools found within the City of Charlotte on a per-unit basis (see Table 4.2).⁸ **The Mount Holly River Hawk Greenway generates an estimated \$188,000 in land preservation benefits annually.**

Vehicular Trip Reduction Benefits. The trail mitigates greenhouse gas emissions by eliminating vehicle trips or reducing the distance traveled for vehicle trips. Car trips were classified to be eliminated if survey respondents who used active transportation to get to the trail said they would drive to their destination, or a similar destination, if the trail did not exist. Car trips were classified as reduced-distance trips if survey respondents who used vehicular transportation to get to the trail said they would drive to a similar destination (often requiring a further distance of travel) if the trail did not exist. The Mount Holly River Hawk Greenway eliminated an estimates 8,230 vehicular trips and reduces the trip distance of approximately 31,910 trips annually (see Table 4.3). **The Mount Holly River Hawk Greenway generates an estimated \$8,700 in vehicle emissions reduction benefits annually.**

Figure 18: Land Cover Designations within the Footprint of the Mount Holly River Hawk Greenway



Source: ITRE analysis of the National Land Cover Database (2019)

⁸ An average, per-unit land sample (also be known as a "statistically averaged land sample") was developed by aggregating 898,080 raster cells (30-meter by 30-meter land areas) within the City of Charlotte. Once aggregated, the percentage of each land cover type was calculated. This percentage breakdown was then applied to a raster cell area, the per-unit area, to create the statistically averaged land sample for the City of Charlotte.



Table 41: Carbon Stock and Sequestration Benefits Facilitated by the Mount Holly River Hawk Greenway

| Trail Name | Trail Linear Miles | Trail Footprint in Acres ¹ | Carbon Stock (metric tons) ² | Annual Carbon Sequestered (metric tons) ³ | Carbon Stored or Sequestered (metric tons) | Annual Land Preservation Benefit of the Trail |
|---------------------------------|--------------------|---------------------------------------|---|--|--|---|
| Mount Holly River Hawk Greenway | 2.4 | 29.1 | 3,480.2 | 60.8 | 3,541.0 | \$188,000 |

¹ For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

² The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

³ The annual rate at which the carbon is stored is referred to as the carbon sequestration rate.

Source: ITRE analysis of National Land Cover Database (2019), the European Environmental Agency's terrestrial and marine carbon stocks and sequestration rates data tables (2022), and USDOT BCA guidance (2022) for the monetized value of carbon (\$53 per metric ton).

Table 42: Land Preservation Benefits per Acre Supported by the Mount Holly River Hawk Greenway

| Land Area Evaluated | Raster Cells Evaluated | Land Preservation Benefit per Acre | Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater) |
|---|------------------------|------------------------------------|---|
| Mount Holly River Hawk Greenway Footprint | 636 | \$6,450 | 1.8 |
| City of Charlotte | 898,080 | \$3,530 | |

Source: ITRE analysis (same sources as previous table)

Table 43a: Vehicle Emissions Reduction Benefits Supported by the Mount Holly River Hawk

| Trail Name | Unique Trail Visits | Reduced-Distance Car Trips | Car Trips Eliminated | Reduced Vehicle Miles Traveled |
|---------------------------------|---------------------|----------------------------|----------------------|--------------------------------|
| Mount Holly River Hawk Greenway | 54,590 | 31,910 | 8,230 | 151,910 |

Table 43b: Vehicle Emissions Reduction Benefits Supported by the Mount Holly River Hawk

| Pollutant | Emissions (Grams per Mile) ^{1,2} | Emissions Eliminated (metric tons) | Monetized Emissions Benefit | Total Emissions Benefit |
|--|---|------------------------------------|-----------------------------|-------------------------|
| Carbon Dioxide (CO ₂) | 404 | 61.37 | \$3,300 | \$8,700 |
| Nitrous Oxide (NOx) | 0.687 | 0.10 | \$1,600 | |
| Particulate Matter (PM _{2.5}) ³ | 0.033 | 0.01 | \$3,800 | |

¹ Environmental Protection Agency. 2018. Greenhouse Gas Emissions from a Typical Passenger Vehicle.

² Bureau of Transportation Statistics. 2021. Estimated U.S. Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel.

³ Includes exhaust, brakewear, and tirewear



Goat Island Park and River Link Greenway

Cramerton, NC

The Goat Island Greenway is 0.7 miles of paved surface trail, including two pedestrian bridges that go over two sections of the South Fork Catawba River onto Goat Island Park. Goat Island Park features an observation pier, two canoe/kayak landings, two picnic shelters, a natural tree house style playground, 18-hole disc golf course, ADA accessible greenway, walking trails, fitness pavilion and an open air amphitheater located in the town center. One of the canoe/kayak launches is located behind the fire department and the second one is across the river on Goat Island. There is also a designated pedestrian lane on the roads leading from Lakewood Road to the parking lot at Greenwood Place.

The Town of Cramerton extended Goat Island Greenway. This extension is called the River Link Greenway. It adds 0.7 miles to the Carolina Thread Trail. The River Link Greenway winds along the banks of the South Fork River. At the end of the greenway is a boardwalk that leads to a viewing area overlooking the natural wetlands.

Trail Characteristics

- Trail length: 1.4 miles (Goat Island Greenway = 0.7 miles; River Link Greenway = 0.7 miles)
- Surface type: pavement
- Parking spaces: 50+
- Public restrooms: yes
- Trail uses: walking, hiking, running, biking, paddling
- ADA accessible

Access Points and Landmarks

- **Trailheads and Access Points: 2**
 - 142 8th Avenue, Cramerton, NC 28032
 - 305 Greenwood Place, Belmont, NC 28012
- **Landmarks and Nearby Amenities:**
 - Downtown Cramerton
 - Goat Island Park, including playground and picnic shelters
 - Bridges over South Fork Catawba River
 - Greenwood Place parking area
 - Goat Island disc golf course
 - Canoe / kayak launch

Adjacent Context / Uses

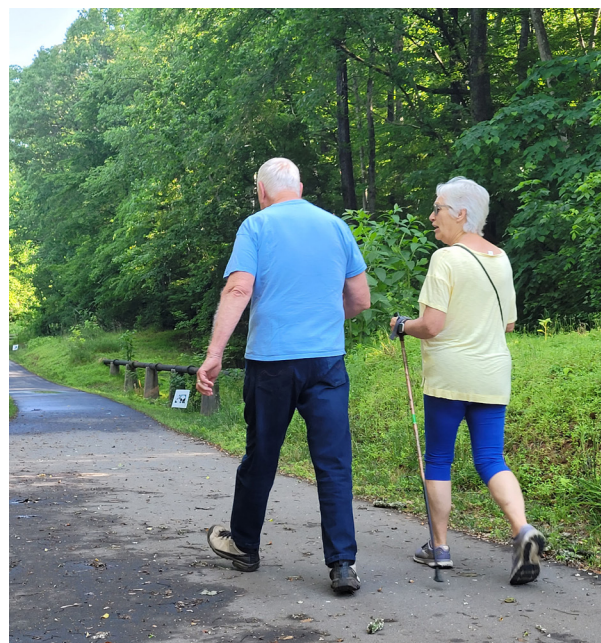
- Residential, Commercial, Park/Recreational

Economic Impact

The Goat Island Park and River Link Greenways are located within a half mile of approximately 81 businesses (ESRI Business Analyst, 2020). With nearby access to five food, beverage, and dining locations, five grocery and convenience stores, 18 retail establishments, and 53 other businesses, it is estimated that the Goat Island Park and River Link Greenways facilitate approximately \$4.1 million in annual business sales by providing safe,



People walking at pedestrian bridge entrance to Goat Island Park & Greenway. Source: ITRE, 2022



Couple walking at River Link Greenway. Source: ITRE, 2022



affordable, and aesthetically valued transportation access to nearby storefronts.

Survey data from trail users and businesses sheds light on how the Goat Island Park and River Link Greenways impact Cramerton's local economy. According to a staff member from Floyd and Blackies Bakery, Carolina Thread

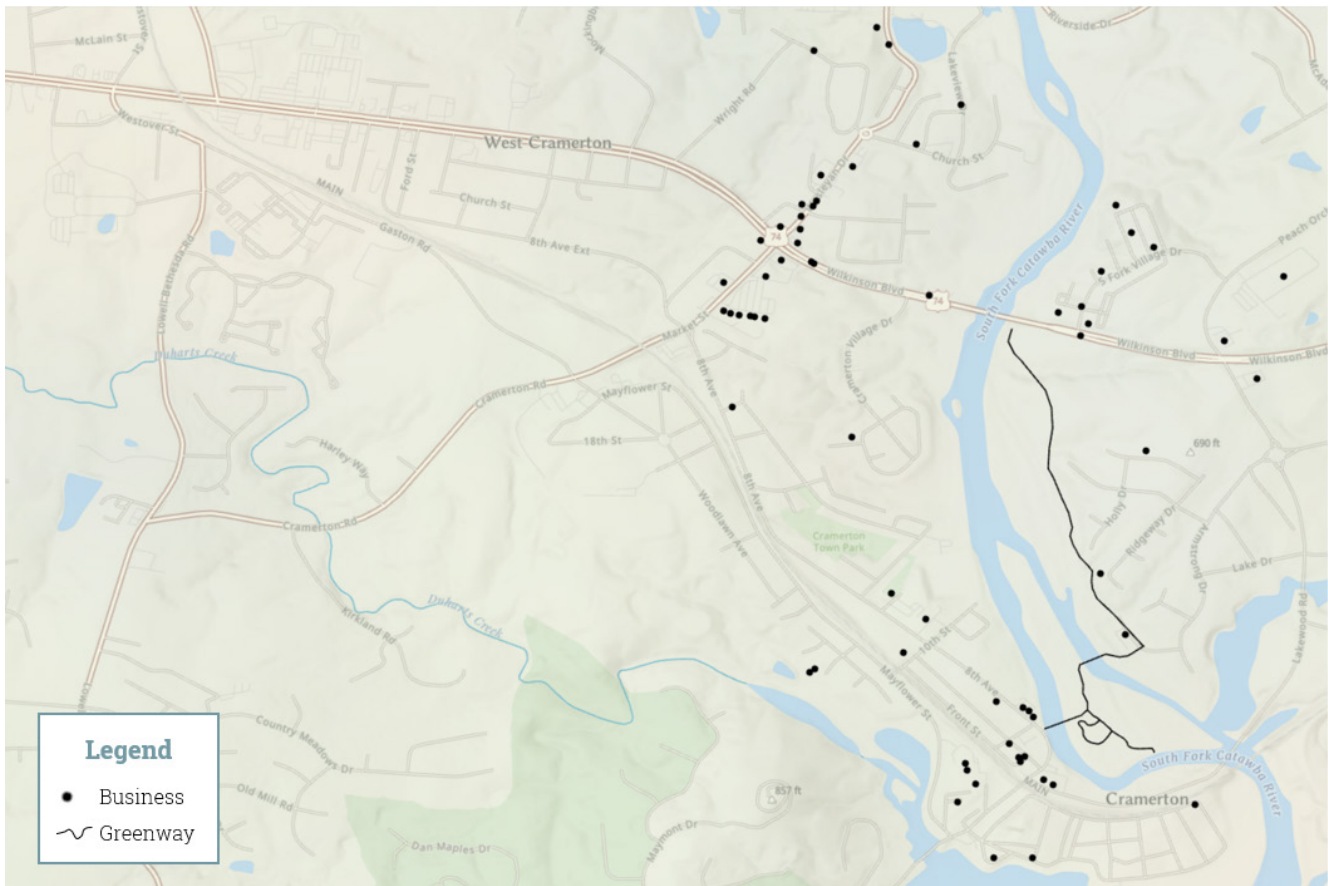
Trail users have a profound impact on the location's annual sales. "Depending on the time of year, up to half of our sales could come from people using the greenway." Trail users and business owners find the trail to be a valuable recreation point that precipitates business activity. One trail user explained, "we love the park. We come here after school and come here before going to get our groceries." Similarly, the owner of Rejuvenate Mind~Body~Soul explained, "Our employees and guests love to walk through the park after relaxing at our facility. Or they love coming in for a massage after a long bike ride." With one of the entrances to Goat Island Park Greenway connecting directly to 8th Avenue in Cramerton's central business district, the greenway generates significant foot traffic for local businesses.

The Goat Island Park and River Link Greenways facilitate substantial economic impact for the Town of Cramerton. On an annual basis, the trail supports approximately 29 local jobs, \$1.6 million in employee earnings, \$4.1 million in businesses sales and approximately \$511,000 in tax revenue (\$63,000 local, \$107,000 state, and \$341,000 federal). These employment impacts result from purchases that are made at nearby bars and restaurants, grocery and convenience stores, retail establishments, entertainment venues, other business establishments, and expenditures made to maintain the trail. For more information about how economic impacts were derived, see the "Methodology" section within this report.

"Depending on the time of year, up to half of our sales could come from people using the greenway."

– Floyd & Blackies Staff Member

Figure 19: Local Businesses Within 0.5 Miles of the Goat Island Park and River Link Greenways



Source: ITRE analysis of ESRI Business Analyst Dataset



Table 44: Summary of Potential Business Interactions Facilitated by the Goat Island Park and River Link Greenways

| Business Type | No. of Businesses within 0.5 miles ¹ | Purchase Probability per Trail Visit ² | Expenditure per Business Type ³ |
|------------------------------|---|---|--|
| Food, Beverage, Dining | 5 | 25.4% | \$39.70 |
| Grocery & Convenience Stores | 5 | 4.5% | \$69.10 |
| Other ⁴ | 53 | 0.9% | \$15.00 |
| Retail | 18 | 1.8% | \$48.90 |

¹ ITRE analysis of ESRI Business Analyst Dataset

^{2,3} ITRE analysis of Intercept Survey Responses

⁴ Research shows that trail users are most inclined to make purchases at food, beverage, dining; grocery and convenience stores; or retail locations associated with trail usage. Businesses that do not fit into these categories are defined as "other." Across the six study trails evaluated in this research, healthcare and spa facilities, recreation and fitness centers, art shops and studios, locksmiths, hotels, apartment complexes, and car dealerships were found to have economic activity facilitated by trail use and fall within the "other" designation.

Table 45: Local Jobs Facilitated by the Goat Island Park and River Link Greenways

| Impact | Direct | Indirect | Induced | Total |
|------------|--------|----------|---------|-------|
| Employment | 17 | 6 | 7 | 29 |

Source: ITRE, IMPLAN Analysis

Table 46: Employee Earnings Facilitated by the Goat Island Park and River Link Greenways

| Impact | Direct | Indirect | Induced | Total |
|--------------|-------------|-----------|-----------|-------------|
| Labor Income | \$1,030,000 | \$270,000 | \$320,000 | \$1,620,000 |

Source: ITRE, IMPLAN Analysis

Table 47: Local Business Sales Facilitated by the Goat Island Park and River Link Greenways

| Impact | Direct | Indirect | Induced | Total |
|-----------------|-------------|-----------|-------------|-------------|
| Economic Output | \$2,080,000 | \$940,000 | \$1,050,000 | \$4,070,000 |

Source: ITRE, IMPLAN Analysis

Table 48: Tax Generation Facilitated by the Goat Island Park and River Link Greenways

| Impact | Direct | Indirect | Induced | Total |
|----------------------|-----------|----------|-----------|-----------|
| Local Taxes | \$28,000 | \$11,000 | \$23,000 | \$63,000 |
| State Taxes | \$55,000 | \$19,000 | \$33,000 | \$107,000 |
| Federal Taxes | \$212,000 | \$58,000 | \$72,000 | \$341,000 |
| Total Tax Generation | \$295,000 | \$88,000 | \$128,000 | \$511,000 |

Source: ITRE, IMPLAN Analysis

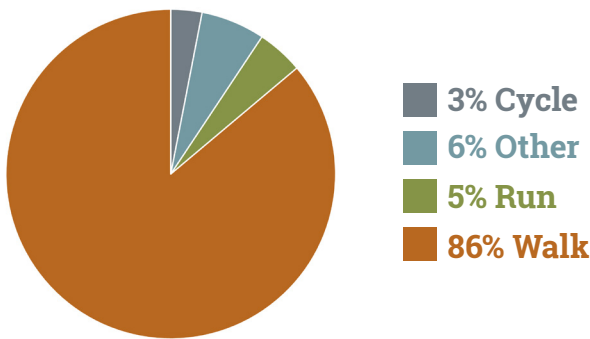


Physical Health Benefits

The Goat Island Park and River Link Greenways serve as a convenient and accessible venue for recreational activities, such as walking, cycling, running, paddling, and other forms of exercise. In 2022, it is estimated that 107,160 unique trail visits will be made with approximately 86 percent walk trips, 5 percent run trips, 3 percent bike trips, and 6 percent of trips made with some other active mode.

The Mount Holly River Hawk Greenway substantially improves the health and the quality of life for its users by reducing ailments linked with physical inactivity such as heart disease, diabetes, vascular disease, and some forms of cancer. It is estimated that physical activity facilitated by trail use saves approximately \$756,000 in healthcare costs for visitors to the Goat Island Park and River Link Greenways. For more information about how physical health benefits were derived, see the “Methodology” section within this report.

Figure 20: Goat Island Park and River Link Greenways Activity Split



Physical activity facilitated by trail use saves...

\$756,000

...annually in healthcare cost

Annually, the trail supports 107,160 trail visits including...



92,295 walk visits.

On average, walkers achieve **96.5** minutes of exercise with **2.4** visits per week.



4,860 run visits.

On average, runners achieve **68.9** minutes of exercise with **2.8** visits per week.



3,275 bike visits.

On average, cyclists achieve **45** minutes of exercise with **2.3** visits per week.



6,730 other visits.

On average, other trail uses achieve **46.2** minutes of exercise with **1** visit per week.



Environmental Benefits

The Goat Island Park and River Link Greenways provides environmental benefits to the region through land preservation and vehicular trip reduction.

Land Preservation Benefits. The trail provides land preservation benefits enabling carbon sequestration and by protecting the carbon stock within and below the surface of ecosystem within the trail's footprint. The trail preserves an ecosystem with an estimated 3,461.6 metric tons of carbon stock and by preserving this ecosystem it enables an estimated 80.3 metric tons of carbon to be sequestered annually (see Table 49). The trail's footprint has a carbon stock and carbon sequestration capacity that is 2.9 times greater than that of the habitat pools found within the City of Charlotte on a per-unit basis (see Table 50).⁹ **The Goat Island Park and River Link Greenways generate an estimated \$188,000 in land preservation benefits annually.**

Vehicular Trip Reduction Benefits. The trail mitigates greenhouse gas emissions by eliminating vehicle trips or reducing the distance traveled for vehicle trips. Car trips were classified to be eliminated if survey respondents who used active transportation to get to the trail said they would drive to their destination, or a similar destination, if the trail did not exist. Car trips were classified as reduced-distance trips if survey respondents who used vehicular transportation to get to the trail said they would drive to a similar destination (often requiring a further distance of travel) if the trail did not exist. The Goat Island Park and River Link Greenways eliminate an estimated 10,120 vehicular trips and reduce the trip distance of approximately 50,300 trips annually (see Table 51). **The Goat Island Park and River Link Greenways generate an estimated \$18,100 in vehicle emissions reduction benefits annually.**

Figure 21: Land Cover Designations within the Footprint of the Goat Island Park and River Link Greenways

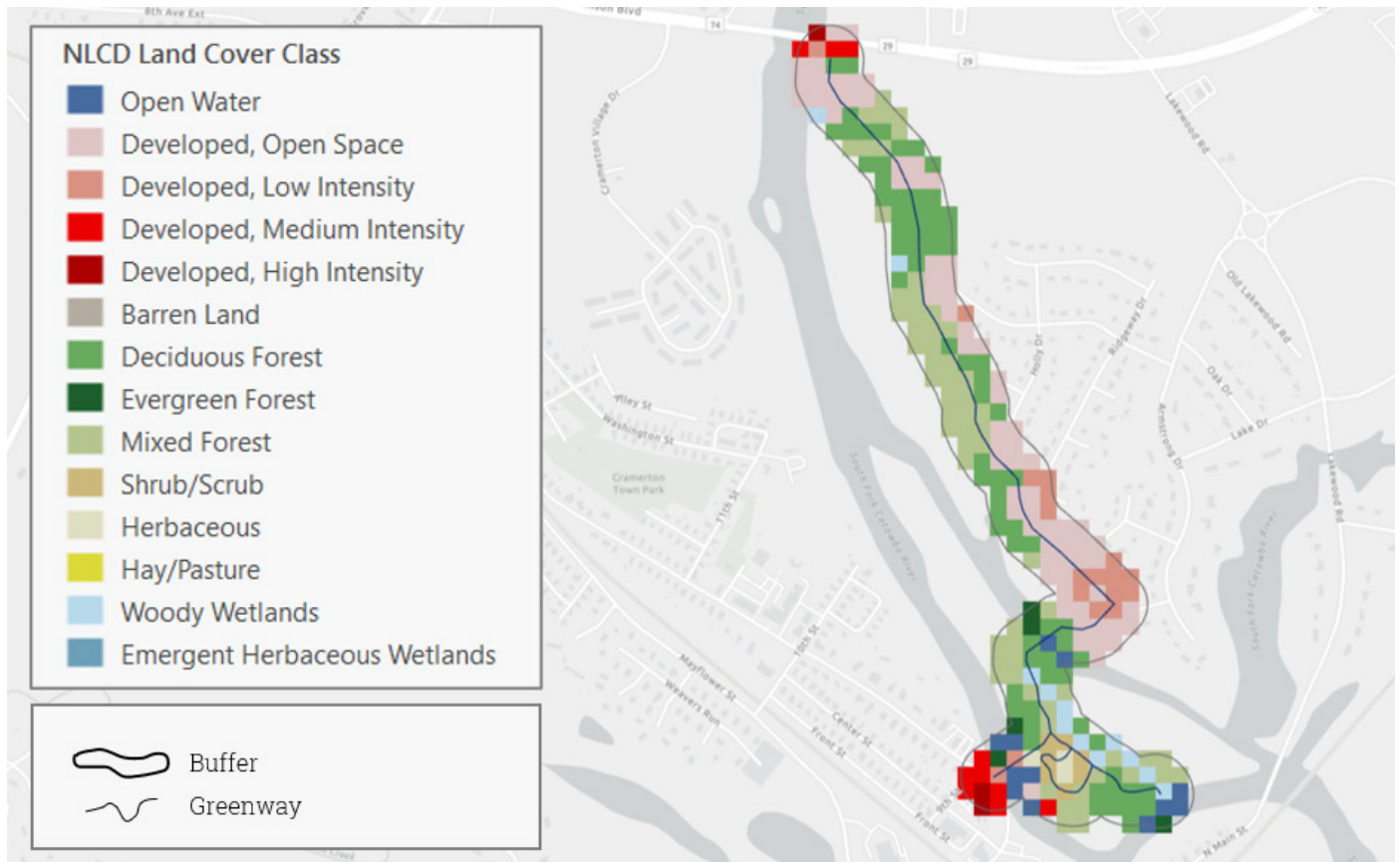


Table 49: Carbon Stock and Sequestration Benefits Facilitated by the Goat Island Park and River Link Greenways

| Trail Name | Trail Linear Miles | Trail Footprint in Acres ¹ | Carbon Stock (metric tons) ² | Annual Carbon Sequestered (metric tons) ³ | Carbon Stored or Sequestered (metric tons) | Annual Land Preservation Benefit of the Trail |
|--|--------------------|---------------------------------------|---|--|--|---|
| Goat Island Park & River Link Greenway | 1.5 | 18.2 | 3,461.6 | 80.3 | 3,541.9 | \$188,000 |

¹ For this analysis, the trail footprint is considered the land area within a 200-foot buffer of the trail.

² The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store.

³ The annual rate at which the carbon is stored is referred to as the carbon sequestration rate.

Source: ITRE analysis of National Land Cover Database (2019), the European Environmental Agency's terrestrial and marine carbon stocks and sequestration rates data tables (2022), and USDOT BCA guidance (2022) for the monetized value of carbon (\$53 per metric ton).

Table 50: Land Preservation Benefits per Acre Supported by the Goat Island Park and River Link Greenways

| Land Area Evaluated | Raster Cells Evaluated | Land Preservation Benefit per Acre | Carbon Sequestration & Storage Benefit Compared to Charlotte (No. of times greater) |
|--|------------------------|------------------------------------|---|
| Goat Island Park & River Link Greenway Footprint | 276 | \$10,320 | 2.9 |
| City of Charlotte | 898,080 | \$3,530 | |

Source: ITRE analysis (same sources as previous table)

Table 51a: Vehicle Emissions Reduction Benefits Supported by the Goat Island Park and River Link

| Trail Name | Unique Trail Visits | Reduced-Distance Car Trips | Car Trips Eliminated | Reduced Vehicle Miles Traveled |
|---|---------------------|----------------------------|----------------------|--------------------------------|
| Goat Island Park & River Link Greenways | 107,160 | 50,300 | 20,120 | 315,880 |

Table 51b: Vehicle Emissions Reduction Benefits Supported by the Goat Island Park and River Link

| Pollutant | Emissions (Grams per Mile) ^{1, 2} | Emissions Eliminated (metric tons) | Monetized Emissions Benefit | Total Emissions Benefit |
|--|--|------------------------------------|-----------------------------|-------------------------|
| Carbon Dioxide (CO ₂) | 404 | 127.62 | \$6,800 | \$18,100 |
| Nitrous Oxide (NOx) | 0.687 | 0.22 | \$3,400 | |
| Particulate Matter (PM _{2.5}) ³ | 0.033 | 0.01 | \$7,900 | |

¹ Environmental Protection Agency. 2018. Greenhouse Gas Emissions from a Typical Passenger Vehicle.

² Bureau of Transportation Statistics. 2021. Estimated U.S. Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel.

³ Includes exhaust, brakewear, and tirewear










Conclusions

During the pandemic, trail usage across the nation increased notably. As an indicator of this trend, bicycle sales increased from \$6 billion in the first quarter of 2019 to more than \$8.2 billion in the first quarter of 2021 (U.S. Bureau of Economic Analysis, 2022). Though this trend is expected to temper some, analysts predict that the demand for trail recreation and commuting will remain higher than pre-pandemic levels (Richter, 2022). As a vital regional transportation, recreation, and conservation network with a system of connected greenways, trails and blueways, the Carolina Thread Trail's existing and planned network can meet help meet the region's evolving demand for trail use.

The six trails evaluated in this study comprise only one percent of the Carolina Thread Trail's total planned network; however, they provide substantial economic, health, and environmental benefits to their local communities. These trail corridors facilitate millions of dollars in annual economic impact through increased foot traffic to storefronts and as attractors to tourism in the area. Each of the six trails support health benefits for their community residents through elongated lifespans and reduction in healthcare costs totaling in the hundreds of thousands of dollars annually. The Carolina Thread Trail's footprint also provides environmental preservation benefits: it preserves carbon stocks within the trail's habit pools; it stores carbon through sequestration rates that are substantially higher than developed lands; and it reduces harmful vehicular emissions by eliminating car trips or reducing trip distances. The impacts of the six study trail can be found in Table 52. As the trail network continues to expand, and safe access points to nearby businesses establishments are developed, the economic impact of the Carolina Thread Trail will become even more profound.

Table 52: Economic, Health, and Environmental Impacts Facilitated

| | | Total Impact of All Six Study Trails | Average Impact per Trail Mile | Impact Range Across All Six Study Trails |
|---|--|--------------------------------------|-------------------------------|--|
|  | EMPLOYMENT | 190 jobs | 15 jobs | 16-58 jobs |
|  | LABOR INCOME | \$9.7 million | \$770 thousand | \$0.9-\$2.9 million |
|  | ECONOMIC OUTPUT | \$25.8 million | \$2.1 million | \$2.2-\$7.9 million |
|  | TAX REVENUE | \$3.3 million | \$262 thousand | \$0.3-\$1.0 million |
|  | HEALTHCARE SAVINGS | \$3.9 million | \$310 thousand | \$0.1-\$1.4 million |
|  | VEHICLE EMISSIONS REDUCTION BENEFIT | \$90 thousand | \$7 thousand | \$2.8-\$32.2 thousand |
|  | CARBON STORAGE & SEQUESTRATION BENEFIT | \$1.45 million | \$115 thousand | \$92.7-\$417.2 thousand |



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Appendix A: Intercept Survey Instrument


Shared Use Path User Survey
 (to be completed by persons 18 or older – one per household)

Site No.
 Date

1. Trip Diagram

 ☐ [Auto] ☐ [Bike] ☐ [Foot] ☐ [Bus] ☐ [Other]

Start:
(street address, nearby intersection, name of place, business, or neighborhood name)

 ☐ [Auto] ☐ [Bike] ☐ [Foot] ☐ [Bus] ☐ [Other]

End:

Trail Access Point

Trail

Trail Access/ Turnaround Point

Destination:
(street address, nearby intersection, name of place, business, or neighborhood name)

2. How many minutes on this trip will you be walking/running/bicycling/etc?
 Minutes

| Trip Purpose | 3. What is the main purpose of <u>today's</u> trip? (check one) | 4. What is the secondary purpose of <u>today's</u> trip? (check all that apply) |
|---|--|--|
| Travel to/from work or school | <input type="checkbox"/> | <input type="checkbox"/> |
| Travel to/from dining/shopping/running errands | <input type="checkbox"/> | <input type="checkbox"/> |
| Travel to/from cultural attraction/entertainment/leisure activity | <input type="checkbox"/> | <input type="checkbox"/> |
| For exercise/recreation/sightseeing | <input type="checkbox"/> | <input type="checkbox"/> |

5. For these trip purposes: If this trail were not available, would you travel to your destination in an automobile?

☐ Yes ☐ No

☐ I would not make the trip

6. Related to today's trip on the trail, approximately how much did (will) you spend on the following goods or services? If traveling with members of your household, estimates should represent the total for your household.

| Expenditure Type | Amount | At what business did (will) you make these purchases? |
|---------------------------------------|-------------------------|---|
| Restaurant meals and drinks | \$ <input type="text"/> | <input type="text"/> |
| Groceries/convenience items | \$ <input type="text"/> | <input type="text"/> |
| Retail shopping | \$ <input type="text"/> | <input type="text"/> |
| Entertainment/admissions | \$ <input type="text"/> | <input type="text"/> |
| Bike rental | \$ <input type="text"/> | <input type="text"/> |
| Other (specify): <input type="text"/> | \$ <input type="text"/> | <input type="text"/> |

Survey Continues on Back



7. When was the first time you used this trail (month and year)?

☐ This is my first trip on the trail

8. How many trips have you made on this trail in the last 14 days, including today?

9. Allocate those total trips by the following primary purposes (total should sum to answer in #8):

| Primary Purpose | No. of Trips by Purpose |
|--|-------------------------|
| Travel to work or school | |
| Travel to dining/shopping/running errands | |
| For exercise/recreation/sightseeing | |
| Travel to cultural attraction/entertainment/leisure activity | |

10. Over the past 14 days, what percentage of your exercise was met by using this trail?

_____ %

14. Including yourself, how many people from your household are traveling with you today? _____

15. Tell us about who is on the trail with you today from your household or those in your responsible care:

| | You | Person 2 | Person 3 | Person 4 | Person 5 | Person 6 | Person 7 |
|-------------|--|--|--|--|--|--|--|
| Age | | | | | | | |
| Gender | | | | | | | |
| Travel Mode | <input type="checkbox"/> Walk <input type="checkbox"/> Run/Jog <input type="checkbox"/> Bicycle <input type="checkbox"/> Other: | <input type="checkbox"/> Walk <input type="checkbox"/> Run/Jog <input type="checkbox"/> Bicycle <input type="checkbox"/> Other: | <input type="checkbox"/> Walk <input type="checkbox"/> Run/Jog <input type="checkbox"/> Bicycle <input type="checkbox"/> Other: | <input type="checkbox"/> Walk <input type="checkbox"/> Run/Jog <input type="checkbox"/> Bicycle <input type="checkbox"/> Other: | <input type="checkbox"/> Walk <input type="checkbox"/> Run/Jog <input type="checkbox"/> Bicycle <input type="checkbox"/> Other: | <input type="checkbox"/> Walk <input type="checkbox"/> Run/Jog <input type="checkbox"/> Bicycle <input type="checkbox"/> Other: | <input type="checkbox"/> Walk <input type="checkbox"/> Run/Jog <input type="checkbox"/> Bicycle <input type="checkbox"/> Other: |

16. Household Income:

- ☐ less than \$25,000
- ☐ \$25,000-\$34,999
- ☐ \$35,000-\$49,999
- ☐ \$50,000-\$74,999
- ☐ \$75,000-\$99,999
- ☐ \$100,000-\$149,999
- ☐ \$150,000-\$199,999
- ☐ \$200,000 and more

17. Education Level:

- ☐ Some high school
- ☐ Completed high school
- ☐ Some college
- ☐ Completed college
- ☐ Completed business/technical school
- ☐ Advanced degree

18. Race:

- ☐ White
- ☐ Black or African-American
- ☐ American Indian or Alaskan Native
- ☐ Asian
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ _____

Conducted by:



On behalf of:



Thank you for taking the time to fill out this survey!

11. Where is your permanent residence (i.e., where is home)?

City/Town: _____

State/Province: _____ ZIP: _____

12. How do you define your living status in the area?

- ☐ Permanent Resident
- ☐ Seasonal Resident
- ☐ Visitor - If checked, my stay is _____ days

Visitors ONLY: How important was this trail in your decision to visit the area?

- ☐ Not important
- ☐ Somewhat important
- ☐ Very important

Visitors ONLY: How much will your household spend on your entire visit, excluding transportation to/from the area? (include all spending on lodging, food, retail items, entertainment, etc.)

\$ _____

13. How many people are traveling in your group today, including yourself?

_____ Check if with you on today's trip: ☐ Stroller ☐ Pet



Appendix B: Business Survey Instrument

Carolina Thread Trail - Business Survey

The Carolina Thread Trail in partnership with the City of Mount Holly and Mecklenburg County is conducting an analysis of the economic importance of six trails included in the Carolina Thread Trail system. We are asking each business serving, using, or being impacted by one of the trails in our study, to complete the following questionnaire.

Your participation in this survey is voluntary. You have the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. If you agree to participate, you will be asked to enter very basic information about your business location, employees, and any impact that the trail may have on your business. There are no anticipated risks for participating in this survey. You are not guaranteed any personal benefits from being in this study and you will not receive anything for participating. Data from this survey will be summarized so that the analysis and report will in no way disclose data on your specific company, unless your approval is explicitly provided.

Please help us by filling out this brief survey. Your answers should apply to your company as it exists. If you have any questions feel free to contact Jane Love with the Carolina Thread Trail at jane@carolinathreadtrail.org or 704-342-3330, Daniel Findley with NC State University at Daniel_Findley@ncsu.edu or 919-515-8564, or Steve Bert with Planning Communities at sbert@planningcommunities.com or 919-263-4062.

Name of Business*

Please provide the name of your business.

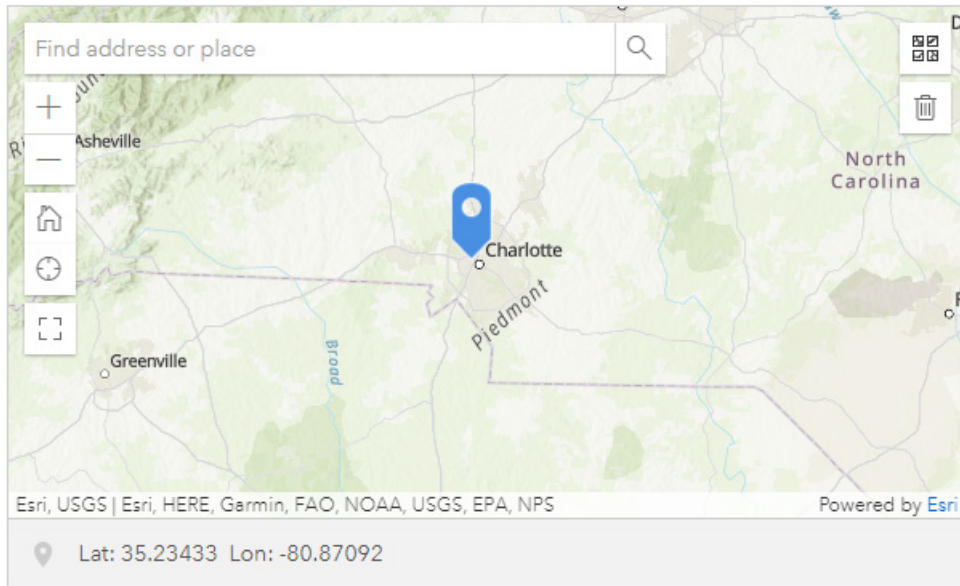
Business Address*

Please provide the address of your business.



Business Address

Please find the address of your business and place a pin on the map.



A map interface showing the Southeastern United States. A blue pin is placed in Charlotte, North Carolina. The map includes a search bar at the top left with the text "Find address or place" and a magnifying glass icon. On the left side, there are navigation controls: a plus/minus zoom slider, a home button, a clock icon, and a full-screen button. On the right side, there are icons for layers and a trash can. The map shows major cities like Asheville, Greenville, and Charlotte, and regions like the Piedmont. At the bottom, it says "Esri, USGS | Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS" and "Powered by Esri". Below the map, a location bar shows a pin icon and the coordinates "Lat: 35.23433 Lon: -80.87092".

Trail Importance for Business*

Please share brief examples or a quote which describes the importance of a nearby Carolina Thread Trail segment to your business.

1000

Business Sales Facilitated by the Trail

What percentage of your total revenues or sales would you attribute to the existence of the trail? (i.e., how much of your business is reliant on the trail)

Please provide your best estimate.

12³



Investment Facilitated by the Trail

Can you attribute any recent or planned expansions/investments in your business to the existence of the trail (or your original location choice)? If yes, please describe the type of expansion/investment in the text box.

☐

No

☐

Yes. (Please Explain)

Full-time Employees

For your business location served by the trail, on average, how many full-time employees were employed by your business during 2021?

12³

Part-Time Employees

For your business location served by the trail, on average, how many part-time employees were employed by your business during 2021?

12³

Part-Time Employees (Continued)

For your business location served by the trail, on average, what were the average hours per week for part-time employees?

12³



OPTIONAL: Contact Information

If you are willing to be contacted for more information regarding a study on the economic importance of the Carolina Thread Trail, please provide your contact information in the box below.

Please include the following:

- Name
- Position/Title
- Phone Number
- Email Address

1000

Submit

