

Envisioning a Statewide Connection

Mass Central Rail Trail Benefits Study



**This report was made possible by
the generous support of these
local visionary organizations.**



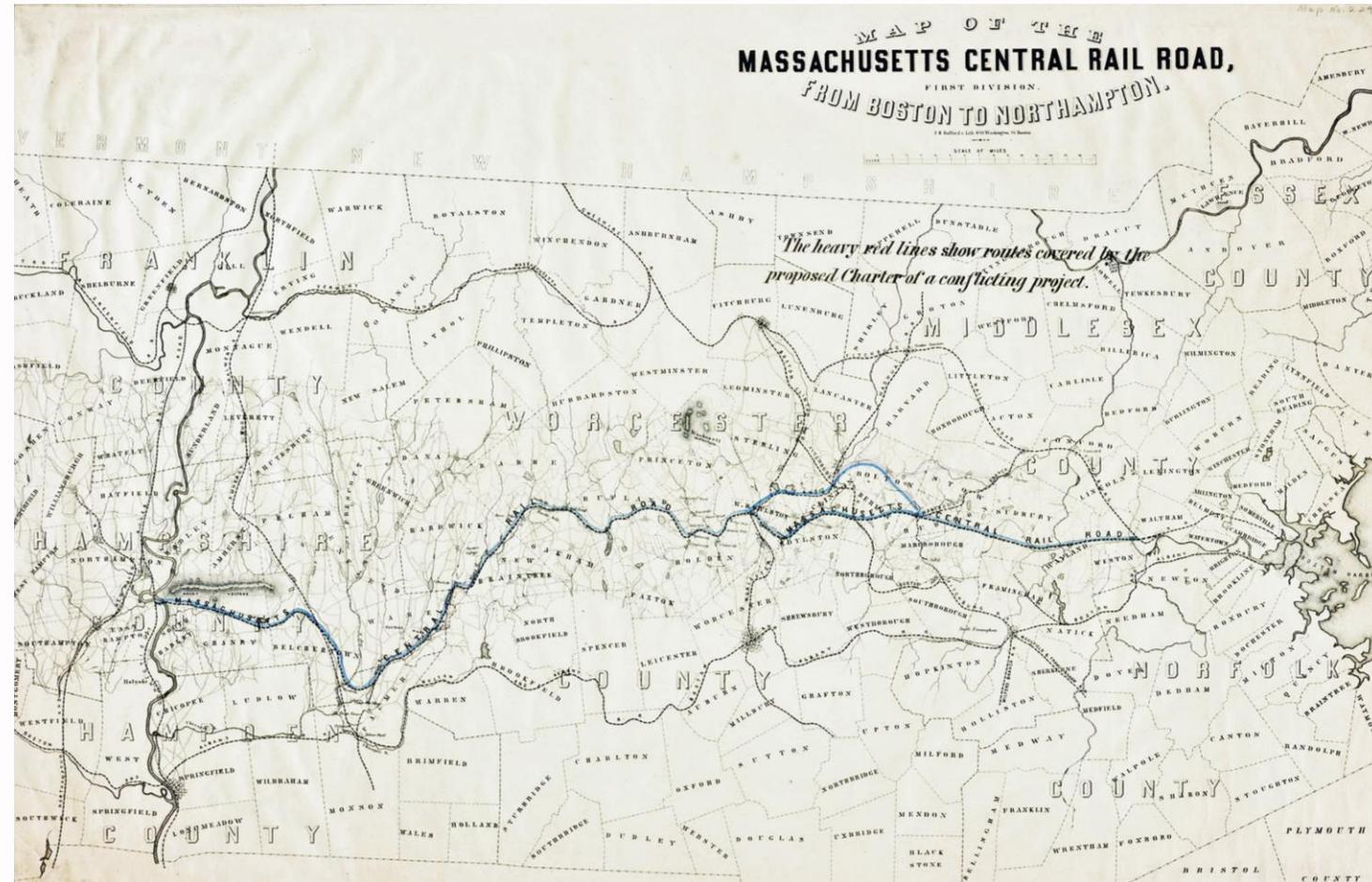
History

The Massachusetts Central Railroad traveled between Boston and Northampton serving residents and industry through the early 1900s. The original plan for the railroad is shown to the right. However, struggles with maintenance, negotiations over and transfer of ownership, and damage sustained during the Hurricane of 1938 all contributed to the decline of the railway corridor.

Today, the Mass Central Rail Trail represents a vision for what this historic rail corridor could become: a continuous shared-use path that connects communities across the Commonwealth, provides access to recreation and nature for Massachusetts residents and visitors, and creates new economic opportunities for communities along the corridor.

MCRT Trail Status

The envisioned Mass Central Rail Trail (shown on the next page) is a 100+ mile route between Boston and Northampton. About 70 miles are open to the public either as improved or unimproved trails, while 20 miles are in active planning or construction. As the trail begins to take shape, this report seeks to evaluate the potential benefits of a completed Mass Central Rail Trail.



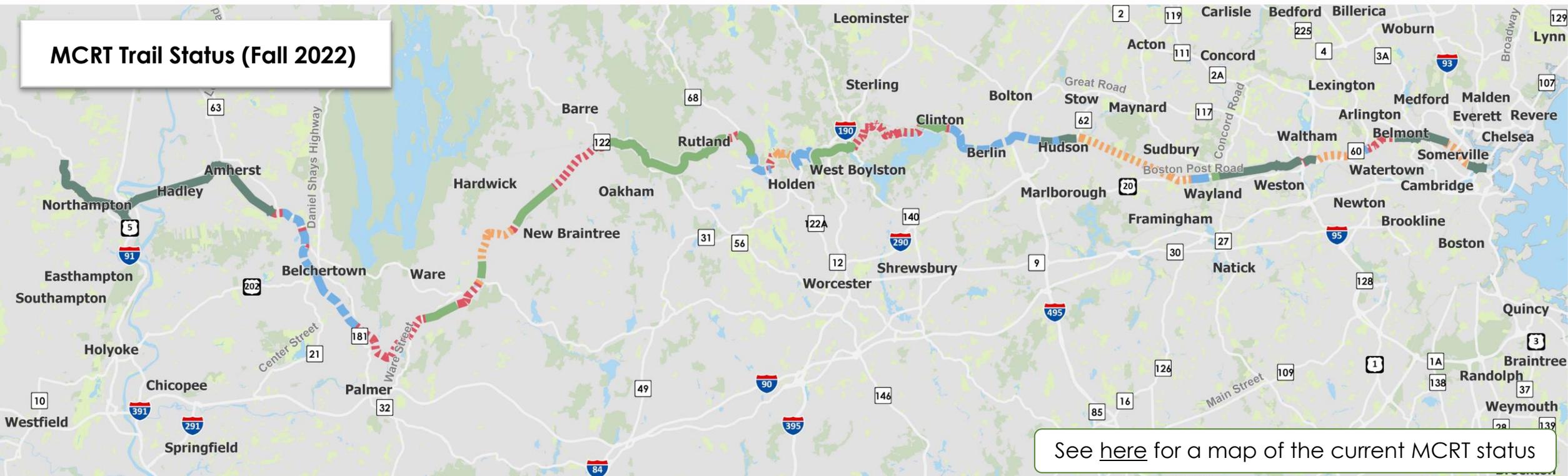
A Unique Resource Accessible to Many

Investments in trails throughout Massachusetts have been shown to provide meaningful economic and health benefits, and the MCRT is positioned to provide these, as well as additional, benefits:

- Long-distance continuous trails have greater potential to attract overnight visitors and increased spending on lodging and restaurants relative to shorter community trails. As a result, they can lead to significantly more economic benefits for local economies.
- The MCRT route would tie together 18 existing and proposed trails to create a connected 273-mile trail network that could increase the use of trails and greatly expand where users can travel.

The completed network would be within 10 miles of 64% of all Massachusetts residents and reach 10 Gateway Cities and 19 smaller cities and towns with lower-than-state-average income and education levels.

MCRT Trail Status (Fall 2022)



See [here](#) for a map of the current MCRT status

Estimated Use

Completing the MCRT would result in many new users, including overnight visitors, who would be experiencing the trail over multiple days with stays in communities along the trail.

- Annual visits on the MCRT would increase from around 1.3 million visits to between 4.1 and 5.5 million visits.
- New visits would include 105,000 to 375,000 overnight visits.

Estimates are comparable to the observed use along the Erie Canalway Trail in New York and the Great Allegheny Passage in Maryland and Pennsylvania.

Economic Impacts

Completing the MCRT could result in:

- \$87 to \$182 million per year in new economic activity, including \$55 to \$114 million in new spending by trail users.
- New small business opportunities and 620 to 1,250 new jobs.

Health Benefits

The completed MCRT would provide more residents with a comfortable place for recreation and exercise, including in communities where such resources are hard to find.

Expanding trail access with a completed MCRT is expected to:

- Result in 3,850 and 5,450 more people who are considered "active" according to the CDC's guidelines for activity.
- Reduce health costs by \$4.1 to \$5.8 million per year.

User Excitement

Current MCRT users were nearly unanimous in voicing their excitement about a completed MCRT.

- 93% of respondents anticipate that they would use the MCRT more frequently and/or travel on the trail for longer distances.
- Almost 50% of respondents stated that they would "definitely" use the MCRT as part of a multi-day trip.

"Having the trail broken up makes my use limited to short trips, primarily walking. If the trail was contiguous then I would use it more often, particularly for biking."

"The trail near my house is very short and awaiting a piece to connect it up to more. Otherwise, I would be using the path a LOT more. I would walk and bike almost everywhere I need to go instead of having to drive. I think that's very important, and more fun."

"We have visited the Erie Canalway Rail Trail for overnight trips. Would love to be able to do overnight trips closer to home!!!"

Report

Kittelson & Associates, Inc. and Cambridge Econometrics prepared this report in 2023 to evaluate the potential use and economic impacts from completing a continuous Mass Central Rail Trail (MCRT), a shared use path built along the historic Massachusetts Central Rail corridor between Boston and Northampton, Massachusetts.

The study was supported and funded by the Norwottuck Network, a 501(c)(3) non-profit corporation that supports the completion and management of the MCRT.

The final report consists of an executive summary, the body of the report with information from user surveys, expected use, estimated economic and health benefits, and an appendix with more details on analytical methods.

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Organization

This report is organized around a set of analyses.

- **Part 1: Access to the Trail** – Describes the potential for the trail to connect residents and communities and create a larger trail network.
- **Part 2: Survey of Current Users** – Reports survey results from current trail users about how they use the existing trail sections and how completing the trail would change their use.
- **Part 3: Trail Use Estimates** – Provides estimates of potential trail use with the completion of the MCRT, including potential for overnight visitors.
- **Part 4: Economic Impacts** – Describes the estimated economic impacts from completing the MCRT due to spending by new users.
- **Part 5: Health Benefits** – Provides estimates for increases in physical activity and related health cost savings from completing the MCRT.

The report focuses on benefits from increasing trail access and attracting more users, and spending along the trail. As a result, the report does not capture all potential benefits from completing the MCRT, such as reduced driving, increased enjoyment of nature, and increased property values. For a summary of additional trail benefits, see the primer prepared as part of the 2019 [Shared Use Path Benefits Study](#) by MassTrails.

History of the Railroad

The Massachusetts Central Railroad was chartered by the Massachusetts Legislature on May 10, 1869, the same day the first transcontinental railroad was completed at Promontory Point, Utah with the driving of the Golden Spike. The Massachusetts Central Railroad opened for business on October 1, 1881, after twelve years of construction. It provided regular service from Boston to Hudson. Within a year, the line extended to Jefferson, a village of Holden. By mid-1883, however, a major financier went bankrupt, halting the developing railroad briefly.

The company was reorganized as Central Massachusetts Railroad and three years later, construction westward resumed. In December 1887, the spectacular seven-span iron truss bridge over the Connecticut River opened, and the inaugural passenger train arrived in Northampton amid great fanfare. The line is best remembered for its most famous daily commuter, Governor Calvin Coolidge, who rode from Northampton to Boston until he became Vice President of the United States in 1920.

In 1938, continuous service between Northampton and Boston came to an end after several of the bridges along the railroad were destroyed by [The Great New England Hurricane of 1938](#). The railroad was split into western and eastern branches, from Northampton to Hardwick, and from Boston 35 miles west to Clinton. Use of the railroad declined, and sections began to close. By the 1970s, the section from Hudson to Clinton was shut down; in 1980, the Northampton to Hardwick segment closed. Soon after, the line from Boston was terminated at Waltham.



Historic Boston & Maine RR Passenger Station
MCRT Wayside Section (Weston, MA)
Listed on [2022 Most Endangered Historic Resources](#)

Massachusetts Central Rail Trail

The origin of the MCRT can be traced to around 1980 when the Massachusetts Bay Transportation Authority and the Massachusetts Department of Environmental Management each purchased unused sections of the Massachusetts Central Railroad corridor from the Boston & Maine Railroad. The purchases reserved large sections of the corridor within the public sphere, including the western-most section and multiple sections east of I-495. Shortly thereafter, the state began to plan the first major shared-use path along the western-most section of the corridor. The project was completed in 1993 as the Norwottuck Rail Trail and was instantly popular.

In 1995, community leaders and volunteers formed the Wachusett Greenways, a 501(c)(3) nonprofit with a goal of connecting the Wachusett community with trails and greenways. They began to build a stone-dust trail on corridor, naming it the Massachusetts Central Rail Trail. Almost 30 years in, they have completed 20 of the 30 miles in their service area with more currently under-construction. Their work inspired other communities and land trusts to begin to build out their own sections of the MCRT.

Vision for a Completed Trail

The envisioned MCRT is a 100+ mile route between Boston and Northampton. Today, almost 70 miles are open to the public as improved or unimproved trails, while 20 miles are in active planning or construction. By 2025, it is expected that 75% of the trail will be open with a paved or stone-dust surface. As the final trail comes into focus, this report evaluates the benefits of completing MCRT.

The report complements the 2021 [feasibility study](#) completed by the Massachusetts Department of Transportation, which verified the current use and ownership of the original rail right-of-way, assessed the existing conditions of the corridor, and identify potential alternate routes around constrained sections.



Charnock Cut
MCRT Wachusett Greenway Section (Rutland, MA)

Peer Trails

To understand the benefits associated with long distance trails, this report looks to two similar trails in the northeast where economic analyses were recently completed:

- Erie Canalway Trail, New York
- Great Allegheny Passage, Maryland & Pennsylvania

In addition to these two peer trails, other examples of benefits trails can have on their communities are found across the country.

Unique Benefits

The Erie Canalway and Great Allegheny Passage each attract over 1 million visitor annually, generating millions of dollars in economic impacts each year. The studies of each trail also found that compared to shorter shared use paths, the longer trails attract many more users who are not local and travel from far away. These visitors often stay overnight along the trail and spend substantially more than other users on lodging, food, and equipment rentals.

PEER TRAIL ECONOMIC IMPACTS

Trail	Appx. Length	Annual Economic Impact
Erie Canalway Trail	300 mi	\$253 Million
Great Allegheny Passage	150 mi	\$121 Million
<i>Mass Central Rail Trail</i>	<i>~100 mi</i>	<i>\$117 - \$212 Million</i>



Erie Canalway Trail
(Lockport, NY)

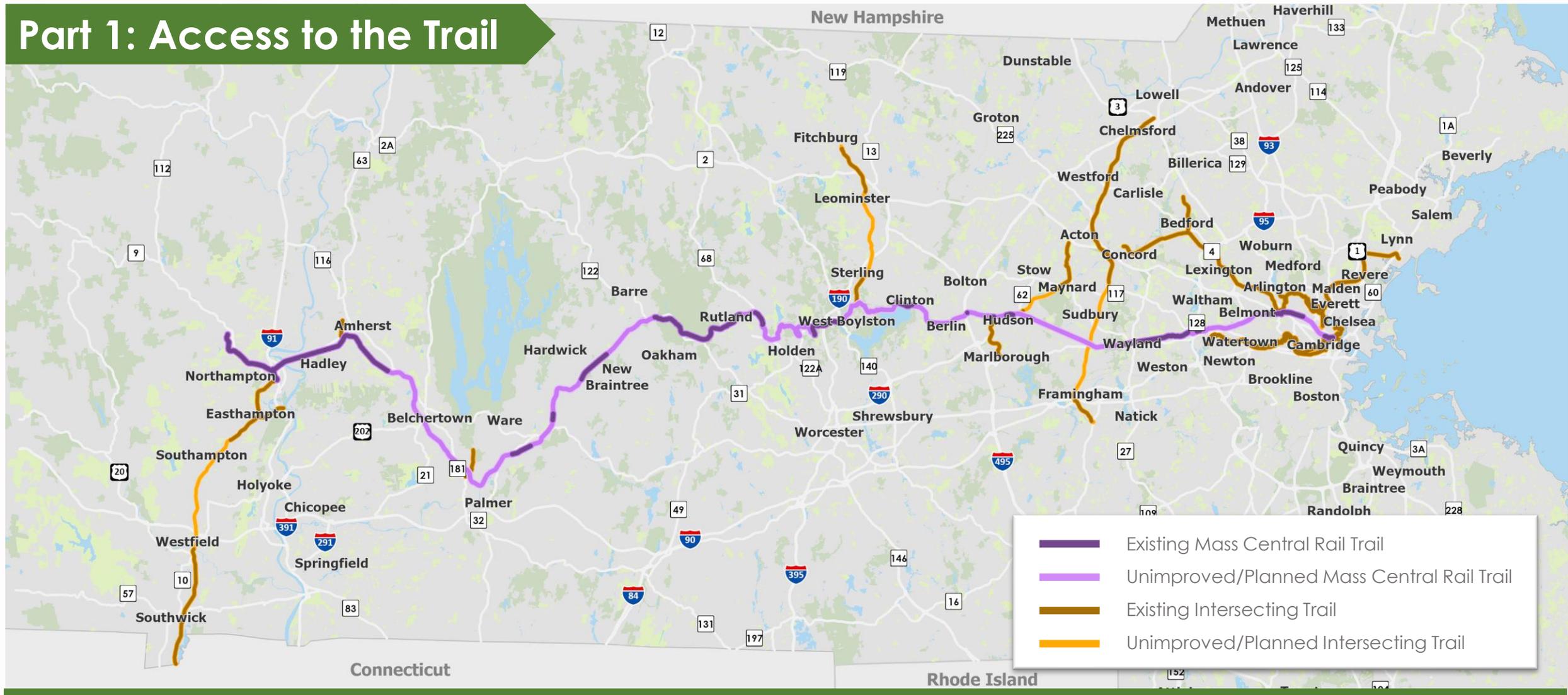
Comparing the MCRT

The MCRT shares many characteristics with these two trails, including similar tourism opportunities. It would connect historic towns and improve access to outdoors destinations, such as rural areas outside of the Quabbin Reservoir area and in the Connecticut River Valley.

One difference from these peer trails is that the MCRT directly connects to a much larger and denser population center: the Boston metropolitan area. Furthermore, the Northampton and Amherst area provides a second population anchor which could help encourage travel along the full extent of the complete route.

This difference increases the trail's potential to serve both long-distance bike touring and daily transportation trips – both walking and biking – that could replace driving trips.

Part 1: Access to the Trail

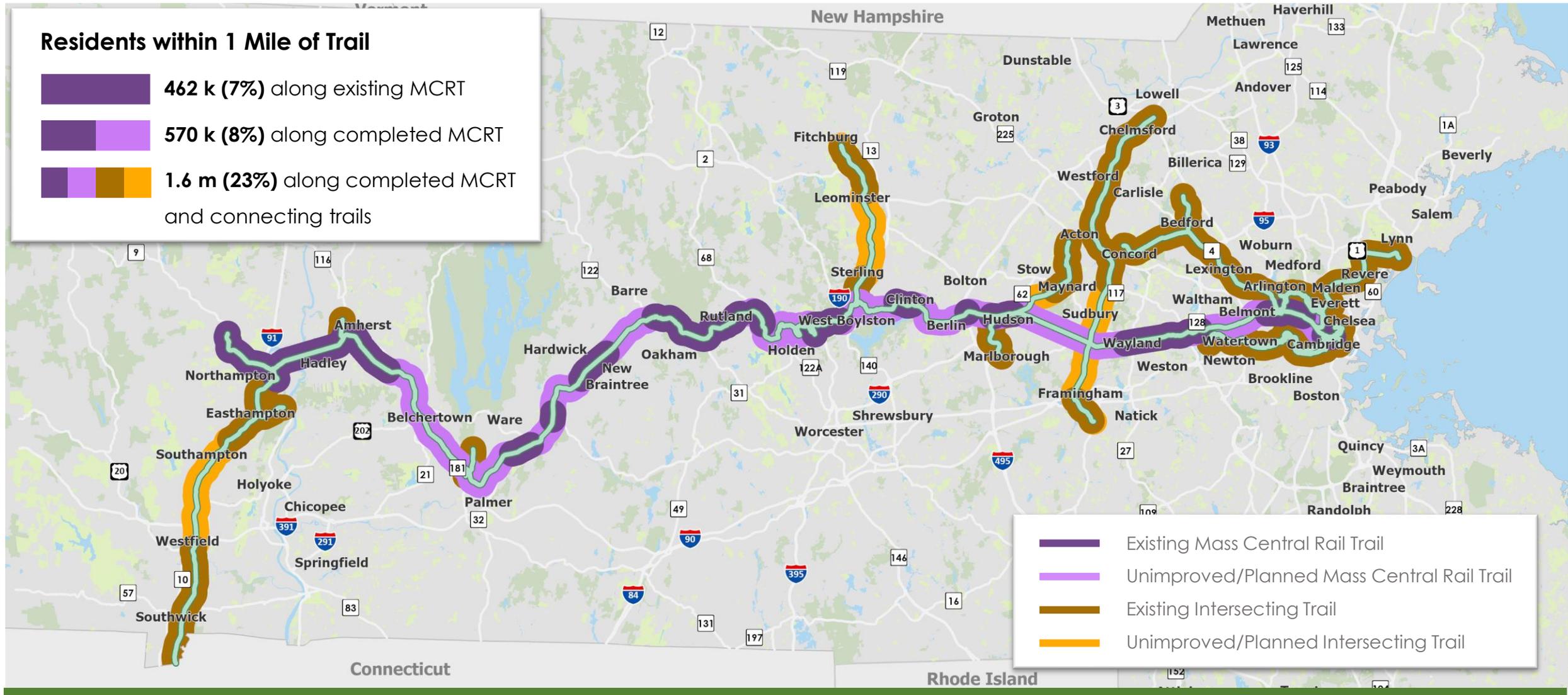


Connecting cities and towns throughout Massachusetts

The planned route would intersect with 20 existing and proposed trails, creating a “backbone” trail network less than ten miles from 64% of Massachusetts residents. The completed trail would allow residents to easily access much of the state on safe, comfortable, and accessible paths. The network would connect towns and cities across the state, including regional centers, such as Northampton, Framingham, Fitchburg, and Lowell. It would also connect to the nearly completed New Haven and Northampton Canal Greenway to create an almost 200-mile route from Boston to New Haven.

Residents within 1 Mile of Trail

-  **462 k (7%)** along existing MCRT
-  **570 k (8%)** along completed MCRT
-  **1.6 m (23%)** along completed MCRT and connecting trails



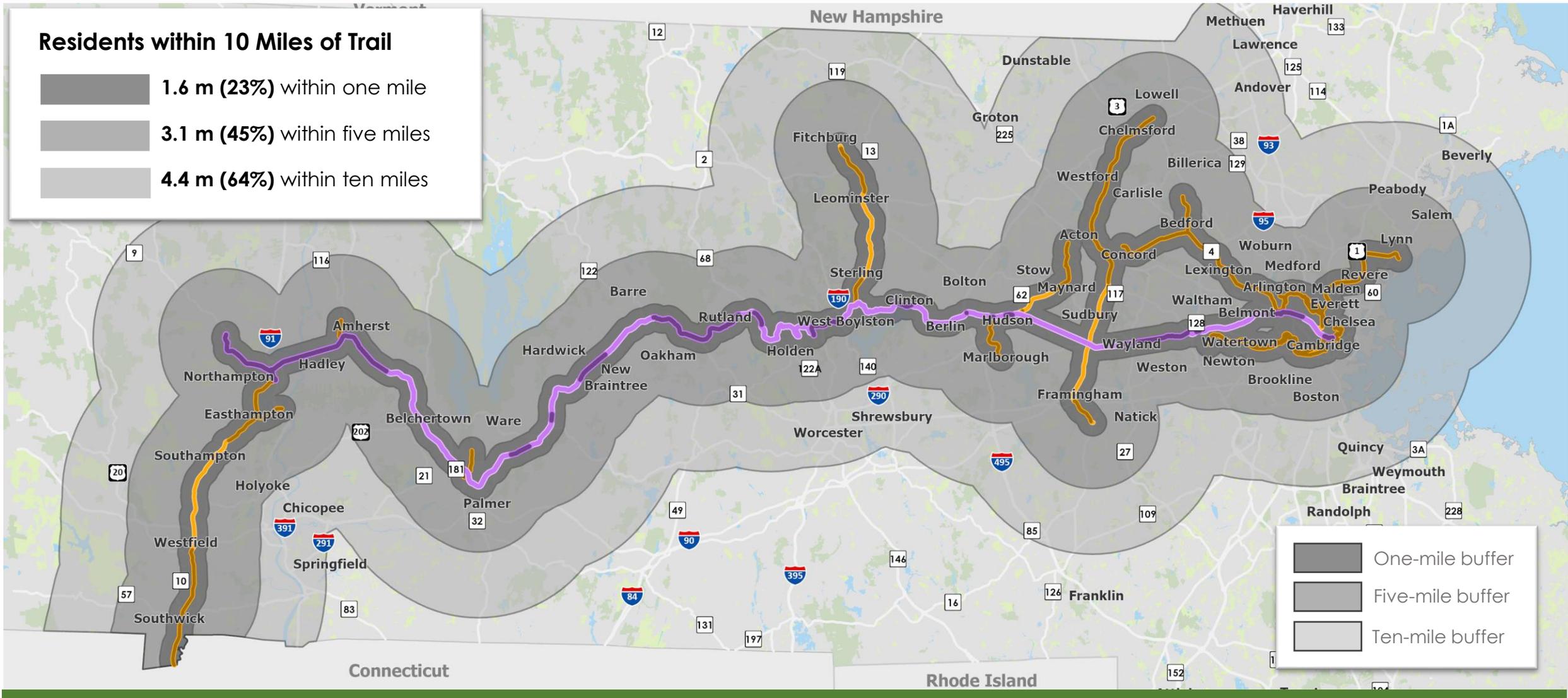
-  Existing Mass Central Rail Trail
-  Unimproved/Planned Mass Central Rail Trail
-  Existing Intersecting Trail
-  Unimproved/Planned Intersecting Trail

Providing expanded access

Currently, 7% of Massachusetts residents live within one mile of an existing section of the MCRT. If completed, the full MCRT and connecting trail network, would be within one mile of nearly a quarter of Massachusetts residents.

Residents within 10 Miles of Trail

- 1.6 m (23%) within one mile
- 3.1 m (45%) within five miles
- 4.4 m (64%) within ten miles



Serving residents across the Commonwealth

The completion of the MCRT and connecting trails would result in the majority of Massachusetts residents living less than ten miles from the 273-mile network of trails.

Who Benefits from Trails?

Lack of funding, right-of-way access, and other constraints often result in the unequal distribution of recreational resources, such as trails, across the Commonwealth.

Furthermore, those who could benefit most from access to green space, alternative modes of transportation, and the health and economic boosts associated with walking and biking, too often lack access to these resources.

The report uses three metrics to measure the potential for the MCRT to improve equitable access to trails:

- The Massachusetts Environmental Justice (EJ) screening uses US Census demographic information to inform planning decisions to reduce inequities and enable all residents to enjoy a clean and healthful environment (Mass.gov)
- Gateway Cities are those cities identified by Massachusetts state law that face social and economic challenges but retain assets, such as infrastructure or major institutions, with unrealized potential ([Mass Legislature](#) and [MassINC](#))
- “Gateway Towns” are smaller, often overlooked communities similar to Gateway Cities in income and educational attainment.

The next section describes how the MCRT and connecting network could impact EJ communities, connect Gateway Cities, and revitalize “Gateway Towns.”

Assessing Equitable Access to Trails

Environmental Justice Populations:

(must meet one or more)

- Annual median household income is <65% of statewide median
- Minorities comprise $\geq 40\%$ of population
- $\geq 25\%$ households lack English proficiency
- Minorities comprise $\geq 25\%$ of population AND annual median household income of municipality $\leq 150\%$ of statewide median

As defined by the Massachusetts Executive Office of Energy and Environmental Affairs

Gateway City:

(must meet all three)

- Population greater than 35,000 and less than 250,000
- Median household income below the state average
- Rate of educational attainment of a bachelor’s degree or above that is below the state average

As defined by Chapter 23A, Section 3A of the Massachusetts Legislature

“Gateway Town”:

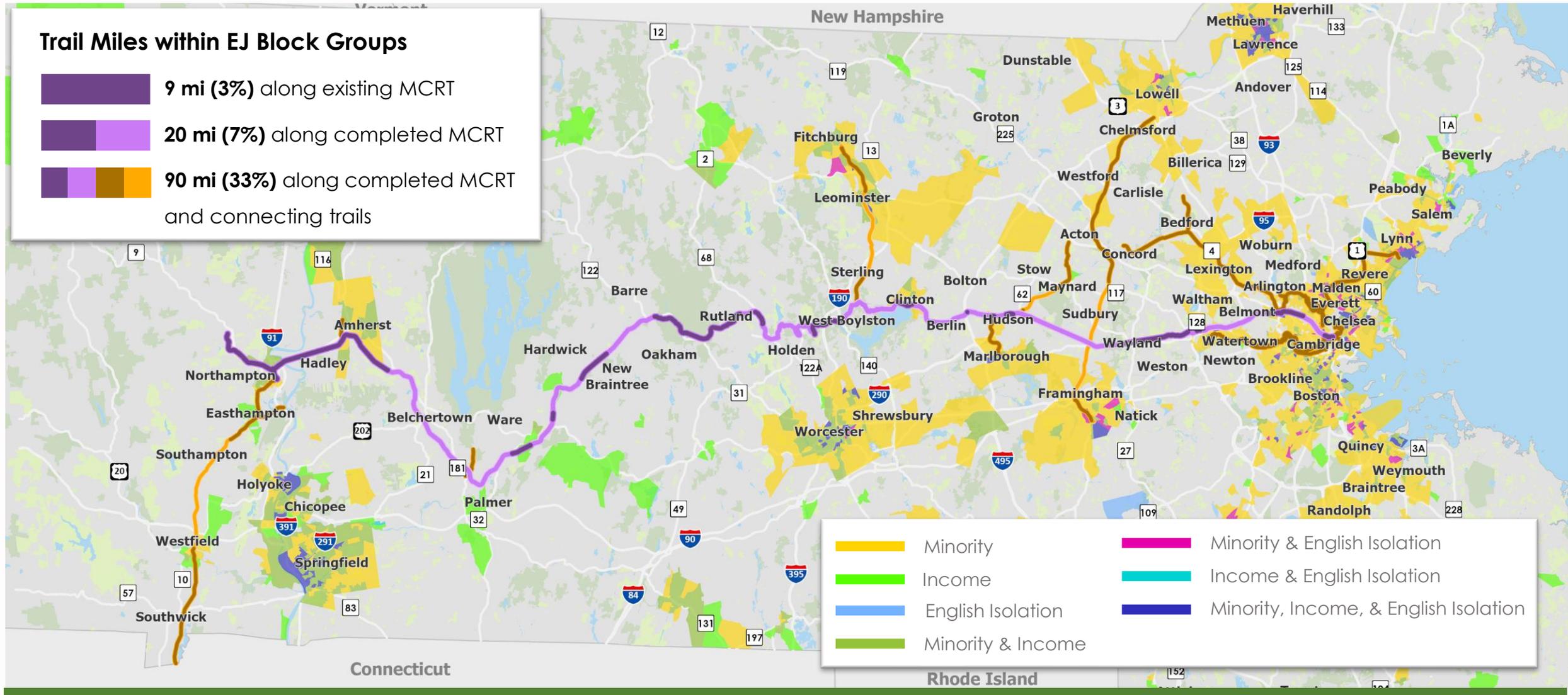
(must meet both)

- Median household income below the state average
- Rate of educational attainment of a bachelor’s degree or above that is below the state average

As defined by this analysis

Trail Miles within EJ Block Groups

-  9 mi (3%) along existing MCRT
-  20 mi (7%) along completed MCRT
-  90 mi (33%) along completed MCRT and connecting trails



A resource for EJ Communities

The map above identifies where the MCRT and connecting trails travel through Environmental Justice communities. While the MCRT itself does not travel significantly through EJ communities, the full “backbone” network features **90 trail miles** through EJ communities.

Part 2: Survey of Current Users

As noted in the previous section, completing the MCRT would expand access to the trail for a large proportion of Massachusetts residents. To measure the potential impact of completing the trail, the project team conducted a survey of existing trail users to understand how people use existing sections of the trail.

The survey collected information on how people:

- Use existing sections of the trail
- Spend money when using the trail, and
- Would use the completed MCRT.

The project team, the Norwottuck Network, and students of Worcester Polytechnic Institute distributed the survey in person and online using flyers, handouts, posters, newsletters, and social media posts. The survey was conducted between September 20th and November 14th, 2022, and received over 2,000 responses, including users from all sections of the trail.



MASS CENTRAL RAIL TRAIL USER SURVEY

The Mass Central Rail Trail (MCRT) is a proposed east-west trail that will provide a direct connection from Boston to Northampton. Today, 53 miles of the 104-mile route are currently open.

Your feedback is essential for understanding what a completed MCRT would mean to Massachusetts!

Get Involved!

1

Take our survey and let us know about your experience using the Mass Central Rail Trail. Visit the website or scan the QR code to get started:

<https://www.surveymonkey.com/r/MCRTSurvey>



2

Learn more about the Mass Central Rail Trail here:

<https://www.masscentralrailtrail.org/>

Moving and Exercising on the Trail

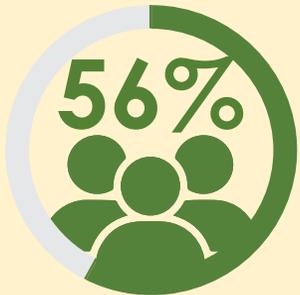
The existing MCRT is a critical resource as a safe and comfortable place to be active. Respondents reported spending an average of **65 minutes on the trail per visit** and **30% get half their weekly exercise** on the trail.

See the *Health Benefits* section of the report for information about the benefits of completing the MCRT.



80%

of respondents' primary reason for visiting the MCRT was for health and exercise, touring, or recreation.



56%

of respondents reported that they **would not participate** in their primary activity on the trail (biking, walking, etc.) as frequently if the trail did not exist.



MCRT Wayside Section (Weston, MA)

Access and Use of the Trail

Completing the MCRT will bring the trail closer to more residents, resulting in more frequent visits.

- Respondents who live within one mile of an existing section of the MCRT are twice as likely to visit the trail at least once a week, compared to other respondents.

Completing the MCRT will further increase the attractiveness of the trail as a regional destination.

- One-third of respondents travel greater than five miles to access the existing MCRT.

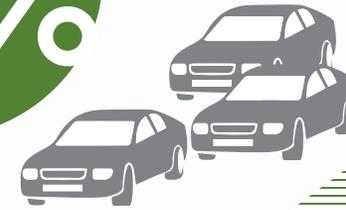


2x

More likely to visit at least once a week if trail is within one mile



Travel 5+ miles to visit



Completed Trail



Multimodal Connections

Completing the MCRT would create new connections to common destinations and bring more residents closer to the trail, enabling more people to use the trail as part of walking and biking trips.

Three-quarters of respondents living within five miles of an existing trail section primarily access the trail by walking or biking. In contrast, 50% of respondents who live more than five miles from an existing section travel by personal vehicle to access the trail.

Respondents would be more likely to use the trail to:



Long-distance and Overnight Trips

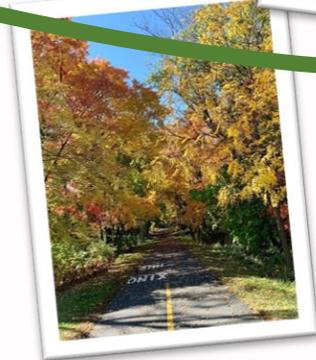
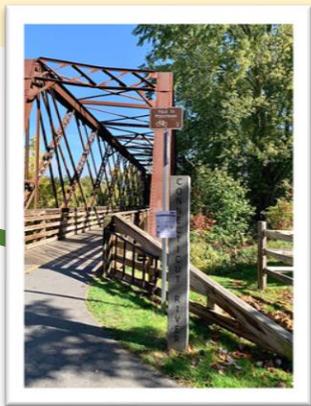
The MCRT currently exists in multiple sections, some of which are known by other names. As a result, survey respondents included a mix of people who did and did not know about the potential for completing a 100+ mile trail. However, both groups indicated almost universal interest in traveling farther on the trail if completed.



of respondents would likely or definitely use the trail more frequently or travel longer distances if the trail was completed.



Almost half of respondents would definitely consider using the MCRT as a part of a multi-day trip, and **another 30%** would likely consider an overnight trip on the trail.



Part 3: Trail Use Estimates

Trail use estimates were calculated using a methodology that estimates visits to trails based on the relative number of people and buildings along a corridor and the quality of the trail. The methodology was developed using data from existing trails in Massachusetts. *The report appendix provides additional information.*

Definitions

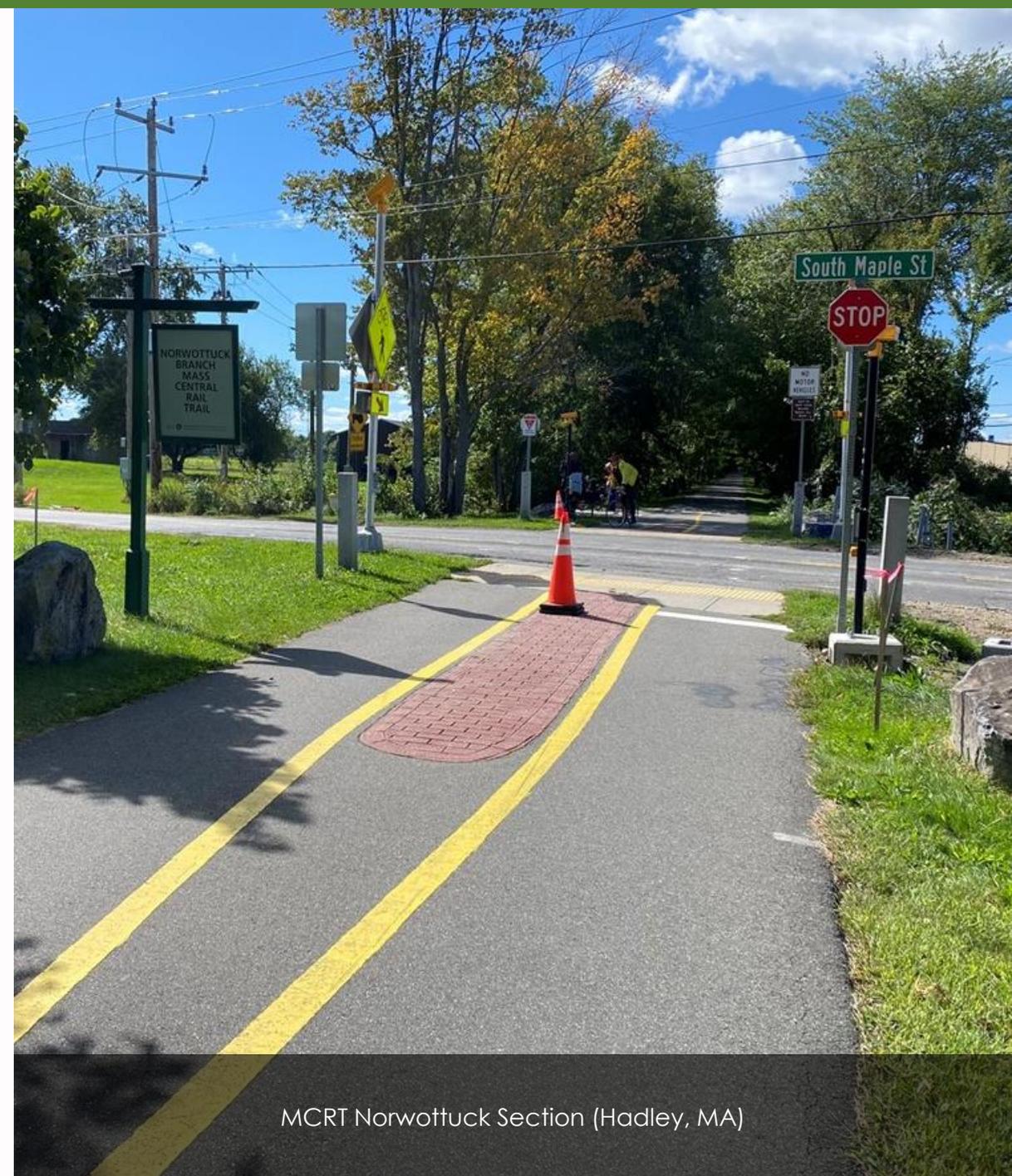
Visits are individual trips to the trail. A person who travels to the trail each day for their daily walk would be recorded as 365 annual visits.

Visits are categorized as daily visits or overnight visits.

- **Daily Visits** are trips completed as part regular day-to-day activities and do not involve overnight travel.
- **Overnight Visits** are trips completed as part of a trip where a person is staying away from their home. This includes through-trips traveling along the trail as well as trips where a person stays in one location and uses the trail during their stay.

Visits were estimated for two scenarios:

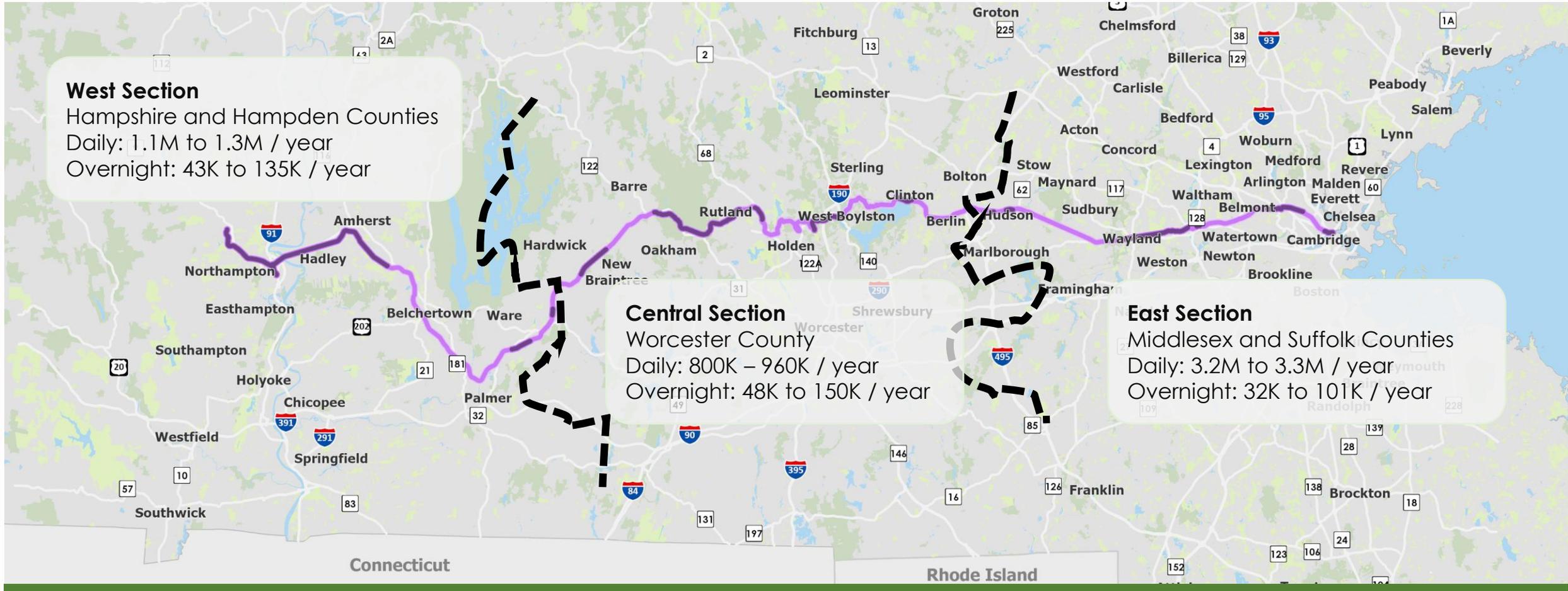
- **Existing Trail** – estimated annual visits to existing sections with paved or stone dust surface as of Fall 2022.
- **Completed Trail** – estimated annual visits once the MCRT is completed from Boston to Northampton.



MCRT Norwottuck Section (Hadley, MA)

Existing Trail: 1.3 million annual visits, with 15k overnight trips.

Completed Trail: Between 4.1 million and 5.5 million annual visits, including 120k to 390k overnight visits.



Estimated Annual Visits to the Mass Central Rail Trail

Daily visits are expected to be highest along the more densely populated sections of the trail, whereas overnight visits are expected to be spread more evenly across the trail. Note that gaps in the MCRT would reduce expected trips, particularly overnight trips along the trail. Estimates do not include any potential increase in use along connecting trails.

Part 4: Economic Impacts

Economic impacts for the existing and proposed section of the MCRT were calculated based on estimated trail use and spending patterns of trail users.

- Estimates for day and overnight trail visits were developed as part of this report and are discussed in the prior section.
- Spending patterns were developed based on user surveys collected for this report and comparisons to studies conducted on peer trails.

Spending Patterns

Spending patterns were derived primarily from the MCRT survey responses. Respondents were asked how much they spent per visit for several categories, including lodging. If respondents reported lodging costs, their answers were used to estimate spending patterns for overnight visits.

Survey responses for overnight visitors were also compared to user spending data collected on Erie Canalway Trail and Great Allegheny Passage. Spending patterns were similar for the different categories except for restaurant spending. As a result, restaurant spending was modified based on [Bureau of Labor Statistics traveler expenditure profiles from 2019](#) which found restaurant spending is typically about 80 percent as large as spending on lodging.

Range of Estimates

For the completed MCRT, economic impacts are presented as a *projected low estimate* and a *projected high estimate*.

- **Projected Low** estimate is based on the lower range of the estimated daily and overnight annual visits to the MCRT – 4.1 million total visits, including 120,000 overnight visits.
- **Projected High** estimate is based on the upper range of the estimated daily and overnight annual visits to the MCRT – 5.5 million total visits, including 390,000 overnight visits.

Other Considerations

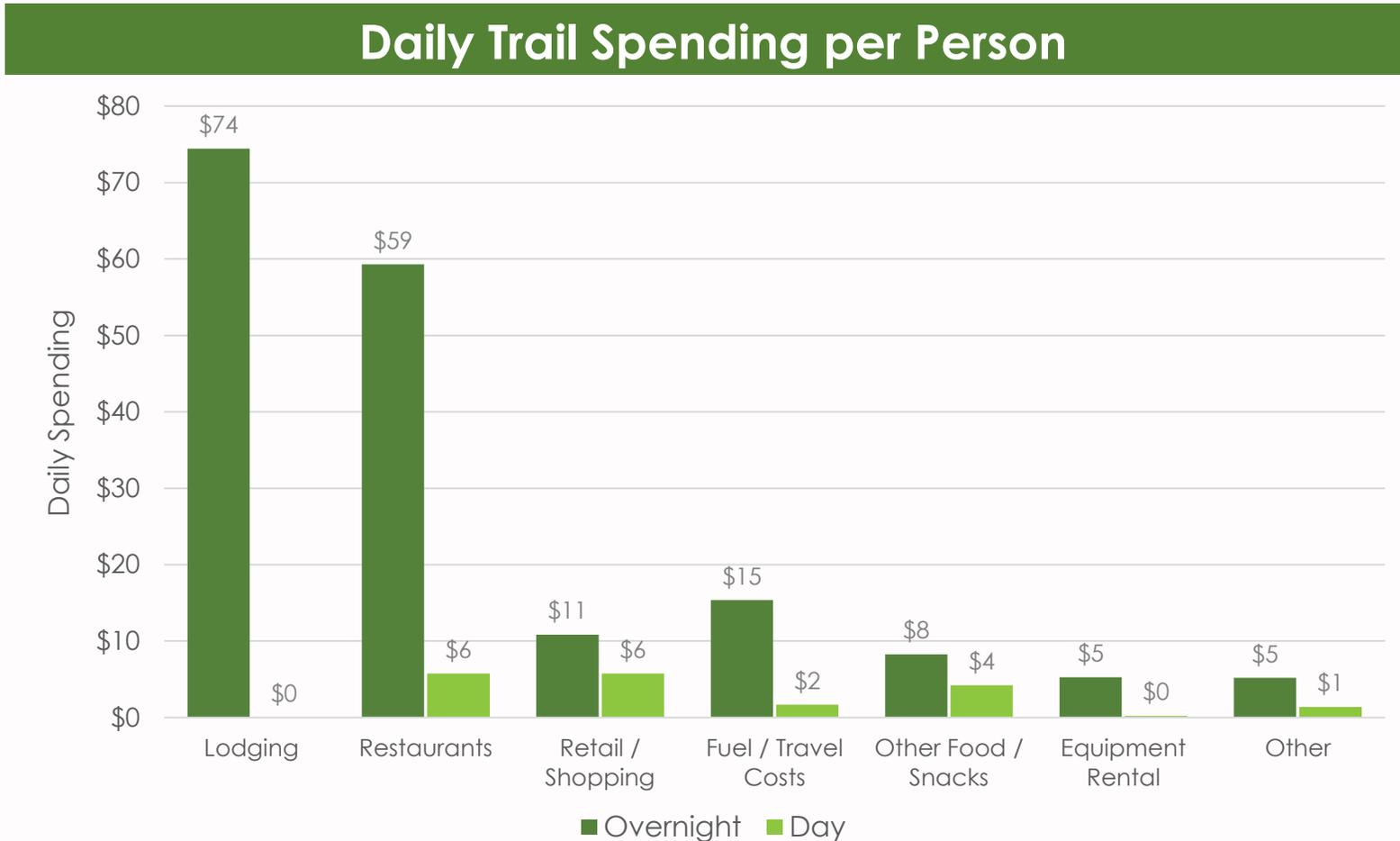
The economic analysis conducted for this report focuses on benefits generated by spending by trail users. It does not quantify additional potential benefits, such as increased property values along the trail or personal savings for individuals who are able to reduce their driving.

See the 2019 [Shared Use Path Benefits Study](#) by MassTrails, for additional information on the economic impact of trails. The report includes analysis of the Norwottuck Rail Trail section of the MCRT and two trails that connect to the MCRT.

The report appendix provides additional information on the methods used for the economic analysis and detailed tables summarizing benefits.

Spending Patterns for Overnight and Day Users

The figure below shows expected visitor spending per person based on the survey data collected. It shows that overnight visitors spend almost **10x** more per day as day visitors (\$179 versus \$19 per day). As a result, despite representing a smaller share of expected visitors, they have an outsized economic impact.



Largest spending categories for overnight users are:



LODGING

\$74 per person / day

Equivalent to \$296 for family of four



RESTAURANTS

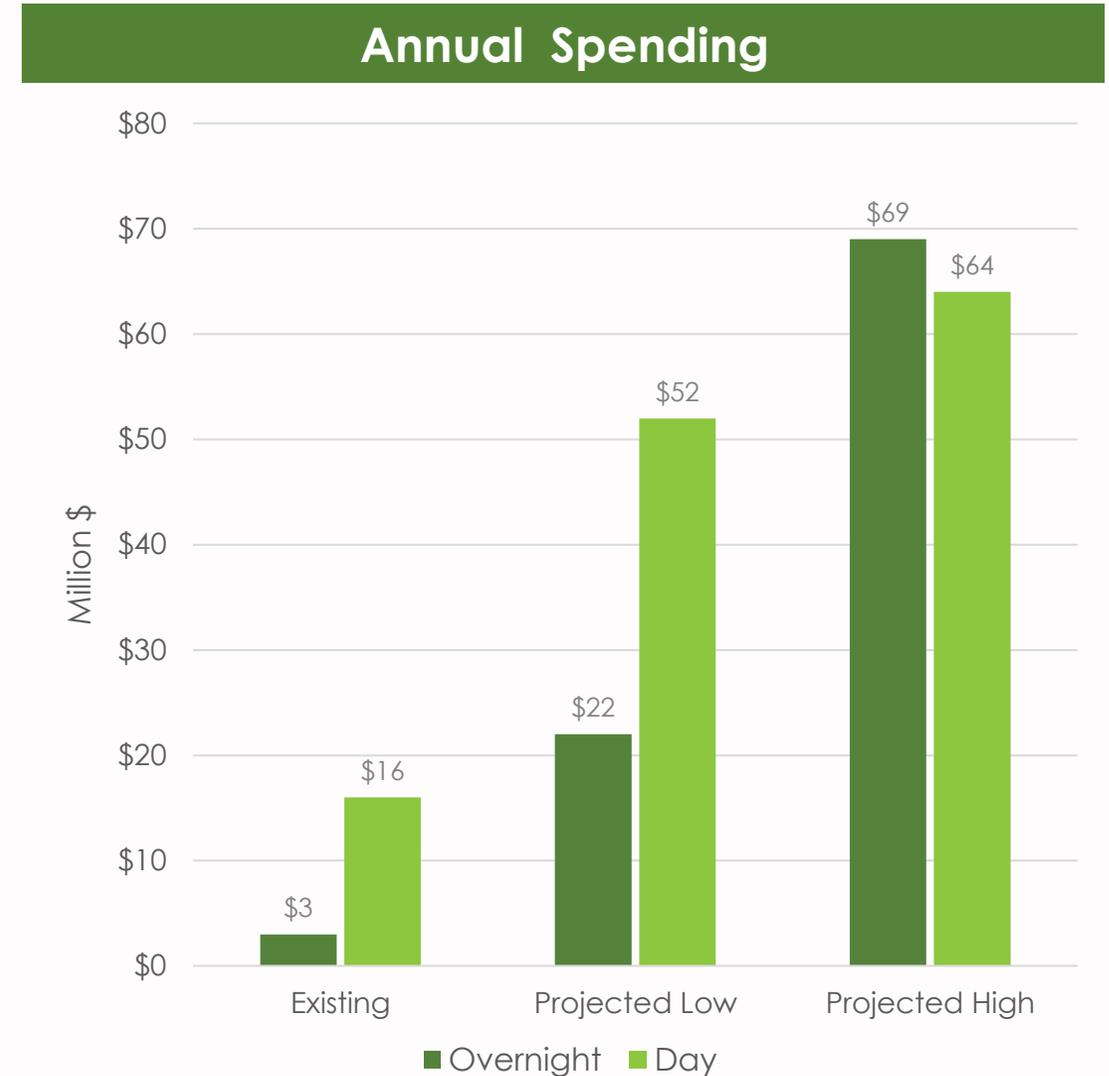
\$59 per person / day

Equivalent to \$236 for family of four

Estimated Annual Spending

Total estimated spending was calculated by multiplying estimated daily and overnight visits by estimated daily spending for day and overnight visitors. Estimates are calculated for current visits and for the range of estimated visits for a completed MCRT.

- Visitors to the existing MCRT spend about **\$19 million annually**
- Visitors spending is expected to increase to **between \$74 and \$133 million annually** for the completed MCRT



Economic Impact

User spending provides both a direct economic benefit and additional benefits as businesses use revenue to expand or hire more employees, who in turn spend the additional income in their community.

The completed MCRT is estimated to result in **\$117 to \$212 million** in total economic activity. This is an increase in **\$87 to \$182 million** from the economic activity associated with the existing sections of the MCRT.

In addition, this study generated estimates for the MCRT's impact on:

- **Jobs** – Employees supported by the MCRT
- **Earning** - Earning for those employees
- **Value Added** – Net benefit associated with new economic activity.

\$117 – \$212 million
in total economic output

\$71 – \$127 million in
value added

Support **850 – 1,490 Jobs**
\$30 – \$55 million in added earnings



Regional Impacts

The economic analysis also measures the distribution of benefits across the MCRT. The analysis identifies three regions, representing the west, central, and east sections of the trail (as shown on Slide 22). The west region includes Hampshire and Hampden Counties. The central includes Worcester County, and east includes Middlesex and Suffolk Counties.

Jobs and Earning

The completed MCRT is expected to support a similar number of jobs and total earnings for each of the three regions. Jobs are primarily supported by spending on restaurants and lodging by overnight users and overnight users are estimated to be similar in each region.

Earning and Economic Activity

The east region will experience slightly greater economic impacts due to the substantially larger number of day users along the eastern section of the trail.

Distribution of Benefits

While total benefits are similar across the three regions, benefits per resident are estimated to be greater in the west and central regions because they are less densely populated than the east region.

Tables with additional details are included in the appendix.

Total Economic Activity



Economic Activity per Resident

\$ / Residents within 1 mile of Completed MCRT

West
\$400 - \$600



Central
\$500 - \$1,000



East
\$100 - \$200



Part 5: Health Benefits

Increased physical activity leads to better physical and mental health outcomes, including reduced risk for premature death, various diseases and cancers, and depression. In addition, increased physical activity contributes to reduced personal and societal spending on health-related costs.

This section reports the estimated benefits from increased activity tied to the MCRT based on national guidance¹, survey responses, and estimated trail use for the existing and completed MCRT.

Specifically, the section reports on:

- The number of people considered “active” as defined by the CDC. This is at least 150 minutes/week or more of moderate-intensity aerobic activity, at least 75 minutes of vigorous-intensity aerobic activity, or an equivalent combination.
- Changes in health expenditures as a result of greater levels of activity by people using the MCRT.



¹ Physical Activity Guidelines Advisory Committee. 2018 Physical Activity Guidelines Advisory Committee Scientific Report, 2018. https://health.gov/sites/default/files/2019-09/PAG_Advisory_Committee_Report.pdf.



Northampton's Union Station
MCRT Norwottuck Section (Northampton, MA)

Increased Activity

The MCRT already serves as a valued resource for residents, which increases their ability and interest in physical activity.



Of MCRT users are "active" according to the CDC's definition

Critically, many users depend on the MCRT as a safe and comfortable venue for exercise. 22% of users would not be considered "active" without access to the MCRT.

56%



of survey respondents reported that they would not participate in their primary trail activity (walking, jogging/running, biking) as frequently if the trail did not exist.



MCRT Cambridge Crossing Section (Cambridge, MA)

Health Benefits

While some users reported being able to exercise elsewhere if the MCRT was not available, many others reported that they would not get the same exercise if they did not have access to the trail. Based on their responses, it is estimated that:

- 1,750 people are considered “active” because they can exercise on an existing section of the MCRT.
- Completing the MCRT would result in 5,600 to 7,200 people being “active” because of exercise on the MCRT.

Financial Benefits

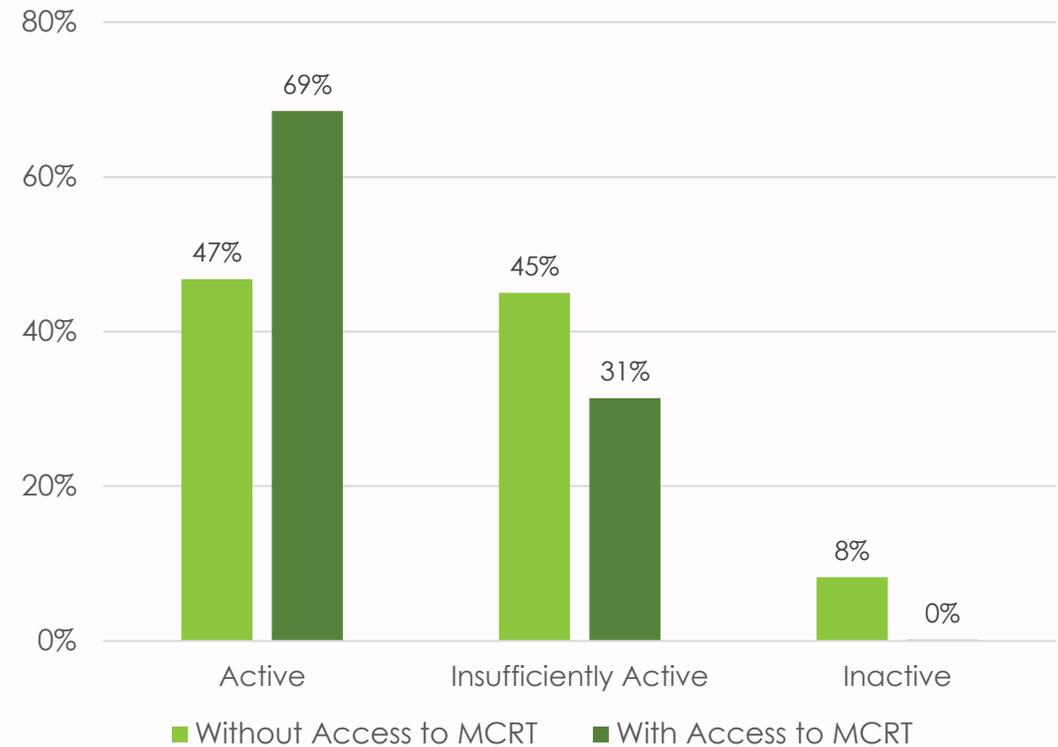
Increased physical activity contributes to reduced personal and societal spending on health care expenditures.²

The completed MCRT is estimated to reduce annual health care expenditures by

\$6 to \$7.7 million

²Carlson, S. A., Fulton, J. E., Pratt, M., Yang, Z., & Adams, E. K. (2015). Inadequate physical activity and health care expenditures in the United States. *Progress in Cardiovascular Diseases*, 57(4), 315–323. <https://doi.org/10.1016/j.pcad.2014.08.002>

MCRT Impact on Activity Levels



Active: Reporting at least 150 minutes/week of moderate-intensity aerobic activity, at least 75 minutes of vigorous-intensity aerobic activity, or an equivalent combination

Insufficiently Active: Reporting some physical activity but not enough to meet active definition

Inactive: Reporting no physical activity that lasted at least ten minutes

Now is a great time to plan, design, and build trails!

Legacy programs, such as the federal Congestion Mitigation and Air Quality Program (CMAQ), continue to fund shared-use path projects that strengthen the environment and local communities. For example, CMAQ funds were used to build the Bruce Freeman Rail Trail which will connect from Lowell to Framingham and intersects with the MCRT.

In addition, recent national legislation includes funding sources for build-out of trails. These include the Infrastructure Investment & Jobs Act of 2021, Inflation Reduction Act of 2022, and the Consolidated Appropriations Act, Fiscal Year 2023, which creates and funds the Active Transportation Infrastructure Investment Program with \$45 million.

Since 2019, the state of Massachusetts has supplemented the funding it receives from the federal Recreational Trail Program (RTP) with additional state revenues to fund MassTrails Grants. These state grants support recreational trail and shared use path projects across the Commonwealth. In 2022, the MCRT Clinton – Tunnel and Trail Design was awarded just under \$400k to design and construct the Clinton Tunnel and Trail Connection. Furthermore, local jurisdictions continue to make use of Massachusetts' Community Preservation Act to preserve open space and create recreational facilities.

For More Information

Visit <https://www.masscentralrailtrail.org/> to read more about the MCRT and sign-up for the free monthly newsletter with updates on the trail's progress.



Bruce Freeman Rail Trail intersection with MCRT (Sudbury, MA)

Access to the Trail

Residents with Access

Access to the Mass Central Rail Trail (MCRT) was calculated using population data from the 2020 American Community Survey (5-year estimates) and trail data from the Massachusetts Department of Transportation (MassDOT). First, the project team constructed a network of existing and proposed trail segments based on conditions in October 2022. This network included the full extent of the MCRT as well as connecting trails. Connecting trails were defined as trails that are within 1/10th of a mile of an existing or future MCRT segment and are or will be appropriate for walking and biking by most users (e.g., hiking trails were excluded). The resulting network is shown on page 10 of the report.

Then, the project team created a series of buffers around the trail network representing 1-, 5-, and 10-mile distances from the existing MCRT, the complete MCRT, and the full existing and proposed network. The 1-mile buffer areas are shown on page 11 in the report. Page 12 shows each of the buffer areas. The project team then identified census block groups located fully or partially within each buffer and calculated the total population of those intersecting block groups for each buffer. To measure the percent of residents with access, the access estimates were each divided by the total 2020 population estimate for the State of Massachusetts. The access areas do include residents of Connecticut or New Hampshire along connecting trails, such as the New Haven and Northampton Canal Greenway.

¹ <https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations>

Equity and Access

Access within environmental justice areas was calculated using 2020 environmental justice population data from MassGIS and trail data from MassDOT.¹ First, the project team used GIS tool to identify where the trail network overlaps with an environmental justice block group. Then, the project team calculated the total length of these trail segments and summarized the length based on the status of the section (existing MCRT, complete MCRT, and full existing and proposed network). The environmental justice block groups are shown on page 14 in the report.

Access to Gateway Cities was assessed by selecting the Gateway Cities that intersect or are within a mile of the MCRT and connecting trail network. In total, ten of the 26 Massachusetts Gateway Cities are within a mile of the trail network.

Access to "Gateway Towns" was assessed by identifying the "Gateway Towns" that intersect or are within a mile of the MCRT or the connecting trail network. "Gateway Towns" were defined as towns that meet the income and educational attainment definitions of Gateway City but do not meet the population size requirement. To determine which towns met this definition, median household income and educational attainment data from the 2020 American Community Survey (5-year estimates) was downloaded for each county subdivision. Then, the county subdivision data was compared to the statewide data. In total, 19 "Gateway Towns" are within a mile of the trail network. Gateway Cities and "Gateway Towns" are shown on page 15.

Survey of Current Users

Survey Implementation

The survey was available for respondents from September 20th to November 14th, 2022. The project team partnered with the Norwottuck Network to distribute the survey in person and online using flyers, post cards, newsletters, and social media posts. In total, 2,215 responses were received, including partial responses. The project team reviewed and cleaned the data to filter out empty or incomplete responses. Where possible, partial responses were retained and used to analyze specific metrics. This resulted in some calculations, such as spending estimates, using fewer responses than others. Over 130 responses were received from each section of the trail with the two highest sections being Section 1 (Northampton / Hadley / Amherst / Belchertown) and Section 3 (Oakham / Rutland / Holden / West Boylston).

Health Benefits

Based on 1,908 responses, the project team calculated that respondents report spending an average of 65 minutes on the trail per visit.

Based on 1,811 responses, the project team calculated that 30% of respondents get at least half of their weekly exercise on the trail.

Based on 1,903 responses, the project team calculated that over 80% of respondents' primary reason for visiting the MCRT was for health and exercise, touring, or recreation.

Based on 1,904 responses, the project team calculated that 56% of respondents would not participate in their primary activity on the trail as frequently if the trail did not exist.

Access to the Trail and Use

Based on 1,843 responses, the project team calculated that respondents who live within one mile of an existing section of the MCRT are twice as likely to visit the trail at least once a week, compared to other respondents.

Based on 1,904 responses, the project team calculated that one-third of respondents travel greater than five miles to access the existing MCRT.

Completing the MCRT

Based on 1,900 responses, the project team calculated that three-quarters of respondents living within 5 miles of an existing trail section primarily access the trail by walking or biking.

Based on 1,900 responses, the project team calculated that 50% of respondents who live more than five miles away travel by personal vehicle to access the trail.

Based on 1,750 responses, the project team calculated whether respondents would be more likely to use the trail to travel to access certain destinations if it was completed.

Based on 1,753 responses, the project team calculated that over 90% of respondents would likely or definitely use the trail more frequently or travel longer distances if the trail was completed.

Based on 1,751 responses, the project team calculated that almost half of respondents would definitely consider using the MCRT as part of a multi-day trip, and another 30% would likely consider an overnight trip on the trail.

Trail Use Estimates

Methodology Overview

The project team estimated annual visits to the MCRT using a methodology developed by the project team for Massachusetts trails. The methodology estimates expected trail counts (e.g., users passing at a location) based on the number of buildings within one mile of trails and the quality of the trail. Number of buildings operates as a proxy for population with relatively easy access to the trail. In developing the methodology, the project team found that using buildings, rather than Census population, had the benefit of capturing the impact of non-residential and vacation/seasonal housing along a trail. In rural areas, buildings also provide a reasonable approximation of where activity is concentrated.

Under the methodology, a prospective trail is categorized as either a lower, average, or higher quality trail, with higher quality trails expected to generate more use for a given number of buildings along the trail. For each categorization, an equation is used to relate building density near trails to potential demand. The equations were developed using data from existing trails across Massachusetts.

The estimation process is conducted in four steps:

- Identify buildings within one mile of trail using the Open Street Map building layer and calculate the number of buildings within a defined access area at quarter miles intervals along the trail.
- Identify trail quality to determine appropriate estimation equation.
- Calculate estimated counts for each quarter mile interval and multiply the average by trail length to calculate total walking and biking miles.
- Divide total miles of travel by people walking and biking by average length of walking and biking trips to estimate visits to the trail.

Scenario Estimates

The project team estimated three scenarios:

Existing Trail – Calculated for existing trail. For the existing trail, the estimation process is based on the equation for a lower quality trail. While some sections are established and popular, such as the Norwottuck Trail section of the MCRT, multiple sections are more difficult to access or relatively short in length making them less appealing to certain trip types (e.g., exercise bike rides). Estimated visits are based on an average trip length of 1.7 miles for people walking or running and 7.3 miles for people biking.

Completed Trail (Low) – Calculated for full length of the proposed trail. For this estimate, the equation for average quality trail was used. This scenario represents a full construction of the entire MCRT where there remain sections of the that are more difficult for some users. Reasons could include difficult road crossings, non-intuitive routings away from the historical right-of-way, relatively narrow sections that create potential for conflict, or unpaved sections that are more difficult for some users to travel. Estimated visits are based on an average trip length of 1.7 miles for people walking or running and 12.7 miles for people biking. Biking trips are longer based on an expectation for a greater share of longer-distance trips, including overnight visits.

Completed Trail (High) – Calculated for full length of the proposed trail. This scenario represents a full construction of the entire MCRT where the trail is built to provide a consistent and comfortable experience for all users. Few of the situations noted for the Completed Trail (Low) are present along the trail. Estimated visits are based on an average trip length of 1.7 miles for people walking or running and 17.1 miles for people biking. Biking trips are longest under this scenario to reflect that the higher quality trail will attract the most long-distance users.

In the report, the Completed Trail (low) and Completed Trail (high) are used to provide an estimated range of demand, where the low end of the range is the Completed Trail (low), and the high end of the range is the Completed Trail (high) (page 22).

Economic Impacts

Economic impacts for the existing and proposed section of the MCRT were calculated based on estimated trail use and spending habits of trail users. Economic impacts were calculated using traditional estimation methods and models. As noted in the report, economic impacts capture benefits generated by user spending along the trail. The impacts do not capture other potential sources of economic benefit, including increased property values along the trail, personal savings from reduced driving, or reduced emissions due to transportation mode shift.

Spending Patterns for Overnight and Day Users

User spending estimates come from the survey results in response to the question: "On days you use the trail, how much money do you typically spend in the following categories as part of your visit, such as buying food to have on a bike ride?" The categories included:

- \$ per day on Restaurants
- \$ per day on Other Food / Snacks
- \$ per day on Retail / Shopping
- \$ per day on Equipment Rental
- \$ per day on Lodging
- \$ per day on Fuel / Travel Costs
- \$ per day on Other

Respondents were separated into overnight and day users based on whether they reported spending on lodging. The project team then calculated average spending for overnight and days user for each spending category.

Overnight Spending Adjustment

Because the MCRT is not completed, and relatively few users reported spending on lodging (less than 40 respondents), the project team compared reported overnight spending against data collected along the Erie Canalway Trail and Great Allegany Passage to understand if responses were comparable to spending observed on two completed long-distance trails. The project team found that survey responses from the MCRT were generally in-line with users on other trails and national tourism spending profiles.

The one exception was spending on restaurants. For restaurants, the MCRT responses were substantially lower than spending reported on other trails. As a result, the project team used Bureau of Labor Statistics (BLS) expenditure profiles from 2019 to update restaurant spending. [BLS traveler expenditure profiles from 2019](#) show that restaurant spending is typically about 80% as large as spending on lodging. In the data derived from the survey, spending on restaurants was only 26% of lodging spending. Given this inconsistency, the project team adjusted restaurant spending to be 80% of reported lodging spending. Lodging spending totaled \$74 per person per day, which resulted in an estimated spending of \$59 per person per day at restaurants.

Estimated Annual Spending

The project team estimated annual spending by multiplying estimated non-commute day and overnight visits calculated for the trail use estimates by the spending profiles generated from the survey data. The calculation was applied separately for the three

sections of the trail to capture the different number of visits and differences in the share of visits completed by overnight versus day users along each section.

The process excluded commute trips so that the estimated impacts more accurately capture “new” spending associated with completing the MCRT. The MCRT could change where commuters spend money; however, there is a high likelihood that commuter spending could be considered “displaced” spending. This is spending that would have occurred in the absence of the trail (e.g., a person who buys coffee on their way to work, is likely to buy the coffee whether they bike or travel by another mode).

The percent of day visits which are commute versus non-commuter trips was estimated using survey data collected from existing trails in Massachusetts. For the western section of the trail, the team used the non-commuter shares from the Norwottuck Trail (76% non-commuters). For the eastern region, non-commute share of users was based on the Minuteman and Northern Strand trails (54 percent non-commuters). For the central region, the team used the non-commuter share estimates from the Cape Cod Rail Trail (94% non-commuters) as no data was available for a local comparison trail. Note that this adjustment has no effect on overnight spending.

Economic Impact

The project team estimated direct impacts as well as indirect and induced impacts from user spending. The impacts were estimated for both the existing MCRT and the completed MCRT. Direct impacts reflect the increase in jobs and associated business activity as a direct result of rail trail user spending. Indirect impacts stem from the increased demand for supply chain components and inputs. Induced impacts arise as workers spend their additional earnings on goods and services in the economy. The total economic impact (also known as the multiplier effect) of the existing and completed MCRT reflects the sum of all three categories.

The project team used the RIMS II input-output model from the US Bureau of Economic Analysis for the five counties that have sections of the existing or proposed MCRT running through them. They include Hampden County, Hampshire County, Worcester County, Middlesex County, and Suffolk County. Results are summarized for three sections of the MCRT representing the western (Hampden and Hampshire Counties), central (Worcester County), and eastern sections (Middlesex and Suffolk Counties).

The model generates four outputs which are reported in the report:

- Jobs – Employees supported by the MCRT
- Earning - Earning for those employees
- Value Added – Net impacts associated with new economic activity
- Total Economic Activity – Effectively the GDP associated with the trail. Economic models tend to describe this as economic output

Table 1 provides a summary of economic impacts for the full MCRT in Massachusetts. Table 2, Table 3, and Table 4 provide economic impacts for the west, central, and eastern sections of the trail.

Economic impact per resident is calculated by dividing the total economic impact for each section by the number of people identified in the access analysis as living within 1-mile of the completed MCRT. Low and high ranges are rounded to the nearest hundred.

- West Section - \$37.0M – \$63.9M by 99,000 residents within 1 mile of MCRT
- Central Section - \$36.6M – \$67.9M by 68,000 residents within 1 mile of MCRT
- East Section - \$43.6M – \$80.2M by 399,000 residents within 1 mile of MCRT

Table 1: Total MCRT Economic Impacts

Impact Type	Existing	Projected Scenario Low	Projected Scenario High	Difference from Existing (Low Scenario)	Difference from Existing (High Scenario)
Jobs					
Direct	185	668	1,156	483	971
Indirect	21	82	152	62	131
Induced	28	100	179	72	151
Total	234	850	1,487	616	1,253
Earnings (millions)					
Direct	\$5.5	\$20.1	\$35.9	\$14.7	\$30.5
Indirect	\$1.3	\$5.4	\$9.9	\$4.0	\$8.6
Induced	\$1.4	\$4.9	\$8.7	\$3.5	\$7.3
Total	\$8.1	\$30.3	\$54.5	\$22.2	\$46.4
Value added (millions)					
Direct	\$11.6	\$44.6	\$80.2	\$33.0	\$68.6
Indirect	\$3.4	\$14.0	\$25.5	\$10.6	\$22.2
Induced	\$3.2	\$12.1	\$21.7	\$8.9	\$18.5
Total	\$18.1	\$70.7	\$127.4	\$52.5	\$109.2
Output (millions)					
Direct	\$19.1	\$73.7	\$133.2	\$54.6	\$114.1
Indirect	\$5.7	\$23.6	\$43.1	\$17.9	\$37.4
Induced	\$5.3	\$19.9	\$35.7	\$14.6	\$30.5
Total	\$30.1	\$117.1	\$212.0	\$87.1	\$181.9

Table 2: MCRT Economic Impacts, Western Section

Impact Type	Existing	Projected Scenario Low	Projected Scenario High	Difference from Existing (Low Scenario)	Difference from Existing (High Scenario)
Jobs					
Direct	112	242	395	129	283
Indirect	12	27	47	15	35
Induced	19	41	71	22	52
Total	143	310	513	166	370
Earnings (millions)					
Direct	\$3.3	\$7.3	\$12.4	\$4.0	\$9.0
Indirect	\$0.7	\$1.6	\$2.9	\$0.9	\$2.2
Induced	\$0.9	\$2.0	\$3.4	\$1.1	\$2.5
Total	\$5.0	\$10.9	\$18.7	\$5.9	\$13.7
Value added (millions)					
Direct	\$6.5	\$14.3	\$24.5	\$7.8	\$18.0
Indirect	\$1.7	\$3.7	\$6.4	\$2.0	\$4.7
Induced	\$1.9	\$4.2	\$7.1	\$2.3	\$5.2
Total	\$10.1	\$22.1	\$38.0	\$12.1	\$27.9
Output (millions)					
Direct	\$10.7	\$23.6	\$40.8	\$12.9	\$30.1
Indirect	\$2.9	\$6.4	\$11.3	\$3.5	\$8.3
Induced	\$3.2	\$7.0	\$11.9	\$3.8	\$8.7
Total	\$16.8	\$37.0	\$63.9	\$20.2	\$47.1

Table 3: MCRT Economic Impacts, Central Section

Impact Type	Existing	Projected Scenario Low	Projected Scenario High	Difference from Existing (Low Scenario)	Difference from Existing (High Scenario)
Jobs					
Direct	28	205	364	92	251
Indirect	4	28	54	17	42
Induced	4	34	63	15	44
Total	36	267	480	124	337
Earnings (millions)					
Direct	\$0.8	\$6.2	\$11.5	\$2.9	\$8.2
Indirect	\$0.2	\$1.9	\$3.6	\$1.2	\$2.9
Induced	\$0.2	\$1.6	\$3.0	\$0.7	\$2.1
Total	\$1.3	\$9.8	\$18.1	\$4.8	\$13.2
Value added (millions)					
Direct	\$1.8	\$13.5	\$24.9	\$7.0	\$18.4
Indirect	\$0.6	\$4.5	\$8.3	\$2.8	\$6.7
Induced	\$0.5	\$4.0	\$7.3	\$2.1	\$5.4
Total	\$2.9	\$21.9	\$40.5	\$11.8	\$30.4
Output (millions)					
Direct	\$2.9	\$22.3	\$41.4	\$11.6	\$30.7
Indirect	\$1.0	\$7.7	\$14.3	\$4.8	\$11.4
Induced	\$0.9	\$6.6	\$12.2	\$3.4	\$9.0
Total	\$4.8	\$36.6	\$67.9	\$19.8	\$51.1

Table 4: MCRT Economic Impacts, Eastern Section

Impact Type	Existing	Projected Scenario Low	Projected Scenario High	Difference from Existing (Low Scenario)	Difference from Existing (High Scenario)
Jobs					
Direct	45	221	397	176	352
Indirect	5	27	51	22	46
Induced	5	25	46	20	41
Total	55	273	494	219	439
Earnings (millions)					
Direct	\$1.3	\$6.6	\$12.0	\$5.3	\$10.7
Indirect	\$0.3	\$1.8	\$3.4	\$1.5	\$3.0
Induced	\$0.2	\$1.2	\$2.3	\$1.0	\$2.0
Total	\$1.9	\$9.6	\$17.7	\$7.8	\$15.8
Value added (millions)					
Direct	\$3.3	\$16.9	\$30.8	\$13.6	\$27.5
Indirect	\$1.1	\$5.8	\$10.8	\$4.7	\$9.7
Induced	\$0.8	\$3.9	\$7.2	\$3.2	\$6.5
Total	\$5.2	\$26.7	\$48.9	\$21.4	\$43.7
Output (millions)					
Direct	\$5.5	\$27.8	\$51.0	\$22.3	\$45.5
Indirect	\$1.8	\$9.5	\$17.5	\$7.6	\$15.7
Induced	\$1.2	\$6.3	\$11.7	\$5.1	\$10.4
Total	\$8.5	\$43.6	\$80.2	\$35.1	\$71.7

Health Benefits

The project team estimated the economic benefit from the trail based on increased exercise using data from the respondent survey. The estimate was created by identifying users who reported that they would exercise less if they did not have access to the MCRT and identifying if they would still be considered active if time spent on the MCRT was excluded.

Survey Data

Respondents reported how often they visited the trail from a series of options. The following assumptions were made to develop an estimate of visits per week for each user:

- Daily = 7 visits per week
- 4-6 times/week = 5 visits per week
- 1-3 times/week = 2 visits per week
- Several times/month = 0.75 visits per week
- Monthly = 0.24 visits per week
- Several times per year = 0.08 visits per week

Then, the project team calculated an estimate of weekly time spent on the trail using respondents' estimates of how long they typically use the trail on each visit. This time was then compared to respondents reported weekly time exercising to understand what percent of activity was completed on the MCRT.

² Physical Activity Guidelines Advisory Committee. 2018 Physical Activity Guidelines Advisory Committee Scientific Report, 2018. https://health.gov/sites/default/files/2019-09/PAG_Advisory_Committee_Report.pdf.

The team then isolated the respondents who would not participate in their primary activity as frequently if the trail did not exist. This identifies individuals whose access to the trail increased their weekly activity. Individuals who reported that they would otherwise get exercise at a different location are not identified as receiving additional health benefits from access to the trail.

Measuring Impact

The Centers for Disease Control and Prevention (CDC) define people as "active" if they report at least 150 minutes per week of moderate-intensity aerobic activity, at least 75 minutes of vigorous-intensity aerobic activity, or an equivalent combination.² Respondents' on- and off-trail exercise was categorized into three activity levels:

- Inactive: ≤ 10 minutes of exercise
- Insufficiently active: Between 10-150 minutes of exercise
- Active: ≥ 150 minutes of exercise

To simulate the distinction between moderate- and vigorous-intensity aerobic activity, the project team assumed that respondents who reported most frequently running or jogging on the trail participated in vigorous-intensity activity, and therefore, their reported time was doubled. Other activities were assumed to be moderate-intensity aerobic activity.

Based on 851 responses the project team calculated that 69% of current MCRT users reported activity levels that would qualify as active.

Based on 1,904 responses, the project team calculated that 56% of respondents would not participate in their primary activity on the trail as frequently if the trail did not exist.

Based on 851 responses the project team calculated that 22% of current MCRT users would not meet the standard for being active if they did not have access to the MCRT.

The project team then applied these observed shifts in activity levels to the trail use estimates. Based on the weekly estimates above, the project team calculated estimated visits per year per person for the existing and proposed scenarios. Given that 56% of survey respondents would not participate in their primary activity on the trail as frequently if the trail did not exist, only 56% of these visits were considered for this analysis. To this 56%, the project team applied the same distribution of observed activity level shifts as seen in the survey responses. This resulted in the estimates that 1,750 more people are active as a result of the existing MCRT, and 5,600 to 7,200 more people would be active as a result of a completed MCRT.

Using research on the health care expenditures associated with inadequate physical activity, the project team then calculated the expected financial benefits of access to the MCRT.³ Given that this research was conducted in 2015, the project team used the Consumer Price Index Inflation Calculator to scale these estimates to 2022 values.

³ Carlson, S. A., Fulton, J. E., Pratt, M., Yang, Z., & Adams, E. K. (2015). Inadequate physical activity and health care expenditures in the United States. *Progress in Cardiovascular Diseases*, 57(4), 315–323. <https://doi.org/10.1016/j.pcad.2014.08.002>

Table 5: Reductions in Health Care Expenditures from Increased Activity

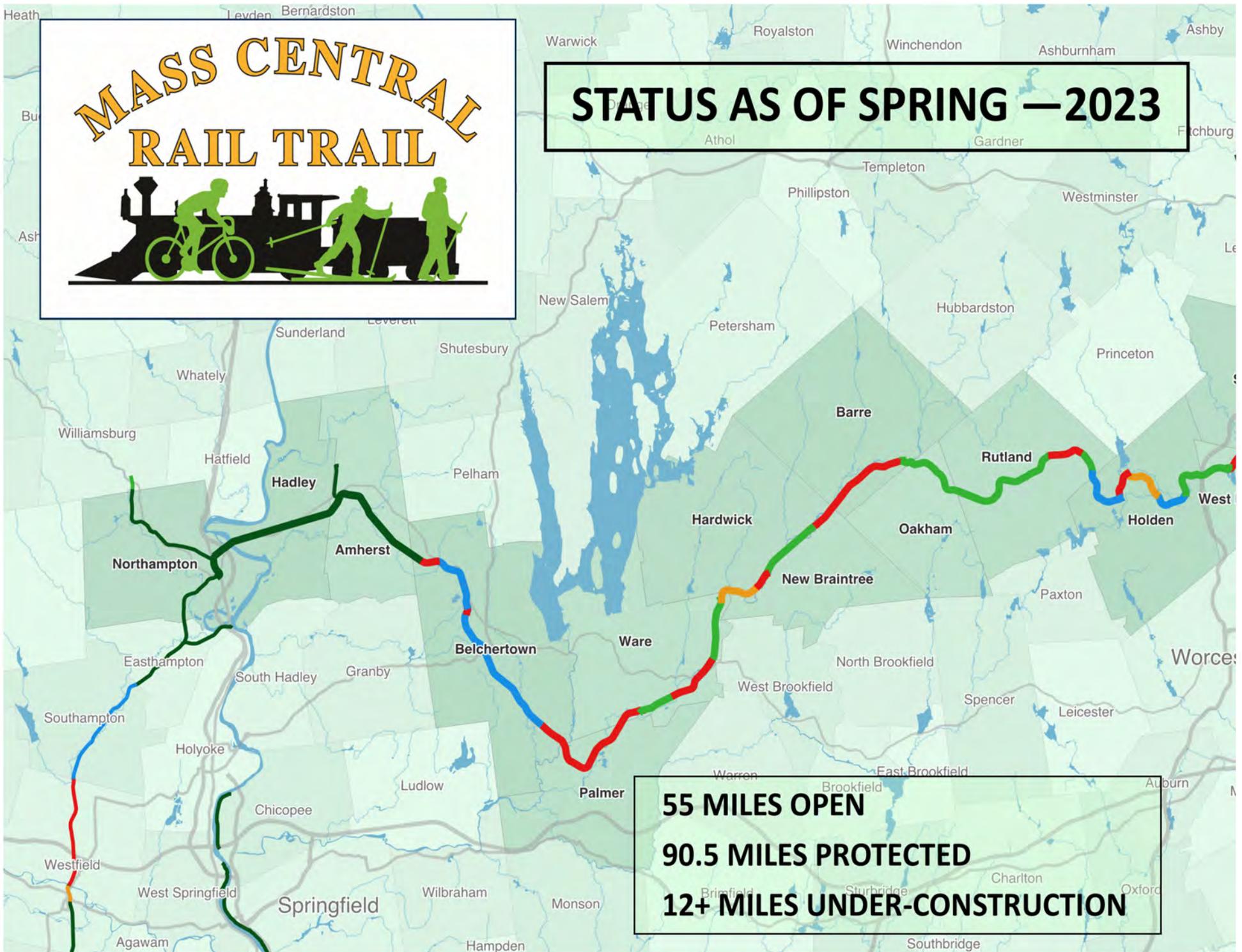
Shift in Activity Level	Annual Health Care Expenditures (2022)
Inactive to Active	\$1,667 per person
Inactive to Insufficiently Active	\$936 per person
Insufficiently Active to Active	\$731 per person

Based on the expected shifts in activity level for the existing and proposed scenarios, the project team estimated that the existing MCRT generates for \$1.9 million in annual reduced health care expenditures and that the completed MCRT would generate \$6.0 to \$7.7 million in annual reduced health expenditures.

MASS CENTRAL RAIL TRAIL



STATUS AS OF SPRING — 2023



55 MILES OPEN
90.5 MILES PROTECTED
12+ MILES UNDER-CONSTRUCTION

