

Planning for Non-Motorized Transportation in Garfield Township



Michigan State University Practicum Report

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Recognitions

Urban and Regional Planning requires coordination and cooperation between distinct groups and interests. The research and findings in this document could not have been completed without the assistance and dedication of the people and organizations listed below, to whom our group owe many thanks.

John Sych, AICP
Director of Planning, Charter Township of Garfield

Stephen Hannon, AICP
Deputy Director of Planning, Charter Township of Garfield

Additional Groups Include:

- Traverse Area Recreation and Transportation Trails, Inc. (TART)
- Michigan Department of Transportation (MDOT)
- Michigan State University Urban and Regional Planning Program
- The Residents of Garfield Township

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Executive Summary

Access to sidewalks and trails provides important mobility options that can improve overall health and quality of life. Michigan townships with up-to-date non-motorized transportation plans are eligible for funding allocated for walking and biking facilities. This Spring 2022, our Urban and Regional Planning Practicum group built a framework intended to help develop Garfield Township's non-motorized transportation plan. Our scope of work was to create an evidence-based replicable process for future planning. This was specific to Garfield Township areas that displayed the highest opportunity and need for built non-motorized infrastructure.

Our methods used case studies of five Michigan Townships like Garfield Township that have non-motorized transportation plans. This assured key factors were used to develop our method of prioritization. We analyzed Garfield Township's plans and survey data to measure interest for non-motorized infrastructure. The Township's demographics and socio-economic profile were examined. This data was used to create a method for prioritization using a two-phase process to identify key areas for final recommendations.

Phase 1 used data from the US Census and the Township's Geodatabase to determine areas of need based on existing infrastructure, high population, and residential density. Equity for special groups was prioritized and mapped along with other key demographic data found using geographic information systems (ArcGIS Pro and ESRI GIS (Geographic Information Systems)). This information created a series of maps showing demographics with a final map displaying the three areas of highest residential density with special groups included. The areas were close to essential destinations and existing infrastructure.

Phase 2 produced a final score for those three areas based on site evaluations and field observations. Our team measured the current level of connectivity, safety, and ease of implementation, which scored each of the three study areas.

Our findings suggested Garfield Township can improve non-motorized mobility by first building infrastructure and facilities along three highest priority areas. These areas showed the most need for built infrastructure due to their high residential density with special groups, their proximity to clustered destinations of interest and existing infrastructure. The priority areas are Lafranier Road, South Airport Road between US-31 and Miller Creek Nature Reserve and South Airport Road between Barlow Street and Park Drive. Our suggested improvements ranged from near-term and least expensive to long-term and most expensive.

Recommendations were based on potential improvements to connectivity, safety, and ease of implementation. Connectivity for all areas encouraged connected orphaned sidewalks and ADA compliant multi-use trails and improved bus stops. Safety recommendations included repainting crosswalks, adding lighting, signage, and traffic calming. Ease of implementation included the need to coordinate with Grand Traverse County Road Commission and other stakeholders to secure available funding. These recommendations were placed in a matrix that ranged from low-cost to high-cost and near-term to long-term projects (figure 1). Low-cost and near-term recommendations included signs, crosswalk painting, and applying for funding. Medium-cost and longer-term recommendations included installing benches, bike racks, lighting, and sidewalk gap infill. The highest-cost and long-term recommendations were the installation of multi-use trails and sidewalks along both sides of the roads. Protected bus stops with benches, lighting and covered bike racks were also a long-term and high-cost recommendation. Suggestions for funding strategies with other agencies were provided.

Lafranier Corridor		
	Low Cost	Medium Cost
Near Term	Install pedestrian crossing signage Repaint existing faded crosswalks	
Medium Term		Install traffic calming measures to increase pedestrian safety
Long Term		Install additional sidewalks to connect the north and south ends
		High Cost
South Airport Corridor		
	Low Cost	Medium Cost
Near Term	Repaint crosswalks Install signage	Install benches Install bike racks
Medium Term	Consider SRTS grants for funding Use community outreach programs	
Long Term		Install lighting Install covered Bus Stops Install multi-use trails or sidewalks
		High Cost
Mall Trail to Miller Creek Trail Corridor		
	Low Cost	Medium Cost
Near Term	Install signage along business entrances/exits Install painted crosswalks along business entrances/exits	
Medium Term		Install lighting Enhance physical Barriers
Long Term		Install non-motorized infrastructure
		High Cost

Figure 1: Recommendation Matrix

Introduction

Students in the Urban and Regional Planning Program within the School of Planning, Design and Construction at Michigan State University created this document as a practicum project in the program's capstone. With the collaboration between students, faculty, and Garfield Township staff, this document was created as an experiential learning opportunity, and a guide for Garfield Township to begin updating and expanding non-motorized infrastructure within the community. This document may serve as a basis for the Township planners and as a potential reference for future funding sources. This document will help the Township identify key areas that will benefit most from additional non-motorized infrastructure. The formula we developed can be replicated, meaning other cities and townships looking to update their non-motorized transportation infrastructure could use the formula we developed for Garfield Township.

What Is Non-Motorized Transportation

Non-motorized transportation, also known as active transportation or human-powered transportation, includes walking and bicycling, using small-wheeled transport like skateboards and wheelchairs. These are mobility choices that include access to public transportation. Research shows active transportation increases physical activity and reduces vehicle miles traveled, improving overall health and quality of life. Non-motorized transportation plans are an important part of a Township's master planning. They open sources of funding to create built environments that encourage walking and bicycling making active transportation more accessible and affordable. Rather than classifying drivers, bus riders, or cyclists as distinct groups, it is important to consider people's travel behavior along a continuum and the choices between those who drive everywhere to those who never drive.

Approximately one-third of Americans cannot drive, either because they are disabled, elderly, too young, or cannot afford to own a car (NHTS,12). Due to the lack of mobility options for marginalized populations, we need to accommodate their transportation needs by providing alternative modes of mobility. According to Active Transportation for America Report and The National Household Travel Survey (NHTS,3), twenty-five percent (25%) of all trips people take in the United States are within a mile, or about a twenty-minute walk, and fifty percent (50%) of all trips taken are within three miles, or a twenty-minute bike ride. Seventy-eight percent (78%) of these shortest trips are made by people using automobiles.

Reaching nearby destinations using non-motorized transportation should be safe and comfortable. Non-motorized transportation facilities are designed for pedestrians and cyclists. They include sidewalks, multi-use trails, paved shoulders, bike lanes, and shared lanes. See more information about non-motorized infrastructure and facilities in appendix. Image 1 shows well marked bike lanes. Image 2 shows ADA compliant intersection crosswalks including sidewalks, and image 3 shows a shared-use trail. These facilities improve mobility choices and improve the safety, convenience, and comfort of walking, bicycling, and wheeled mobility, leading to a healthier community.



Image 1: Examples of painted bike lanes



Image 2: Example of painted crosswalk and signage



Image 3: Example of shared-use trail

Garfield Township Non-Motorized Transportation Plan

In 2023, Garfield Township will adopt an updated master plan which will include a non-motorized transportation plan. Their Planning Department asked for a replicable framework to use as a guide for future non-motorized transportation opportunities. They have informed our Practicum group this will be a tool shared with developers to guarantee site plans include essential non-motorized elements like sidewalks, trails, and connectivity to nearby destinations. We worked with Garfield Township Planning staff and stakeholders to build a framework and method for their future non-motorized transportation plan.

We were asked to find opportunities to serve new areas by analyzing existing conditions and weighing out their pros and cons. This project is framed around a need for greater walkability. We have designed a way to guide project prioritization and identify areas that need connectivity.

Overview Of Garfield Township Planning Documents

The Charter Township of Garfield is one of the most rapidly growing townships in the region. They have made progress in planning and constructing non-motorized facilities as part of their stated goals in their Master Plan, Complete Streets Resolution, Master Plan Implementation Matrix, and section 5 of the Zoning Ordinance. Their 2021 Park Users Survey data indicates that

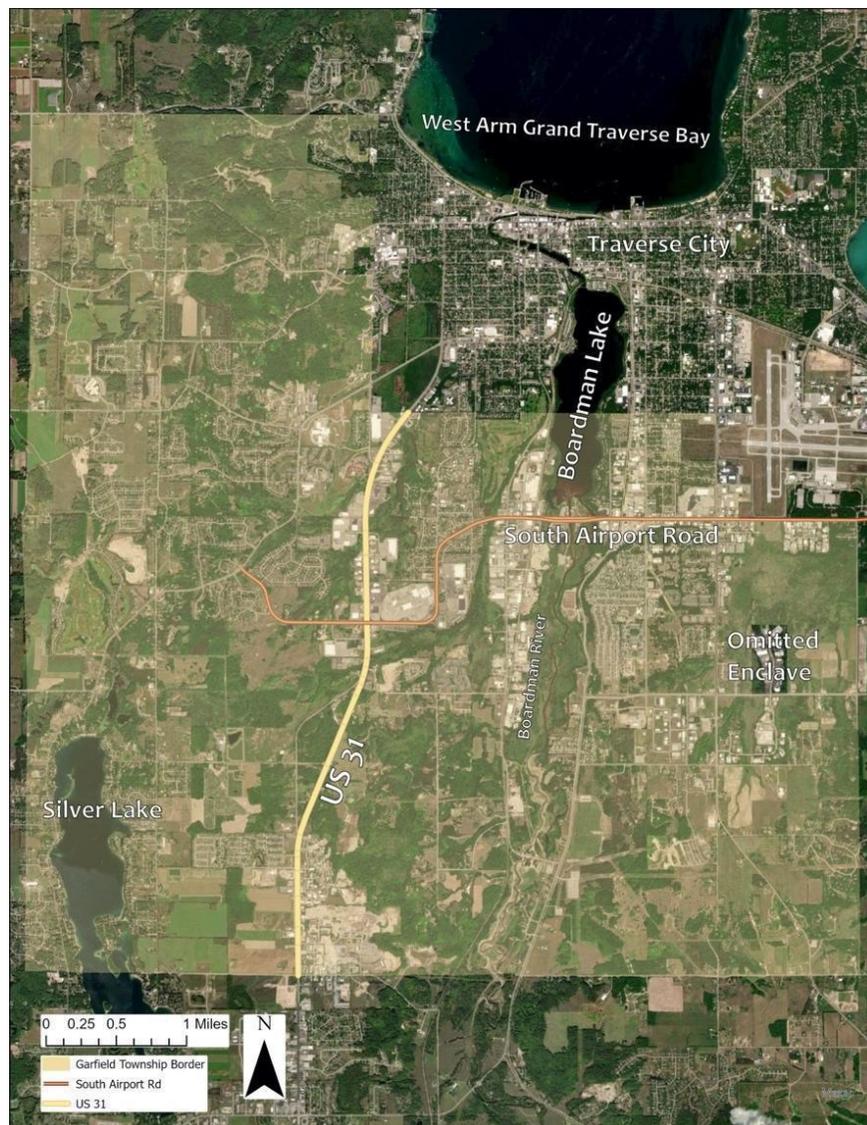
residents want increased walkability and greater access to trails. As evidenced from survey feedback, residents want to reduce their need to drive to nearby parks and recreation areas. Active transportation can also provide access to stores, work, and schools. Results from the 2021 Park User Survey are in Chapter 2 of this document.

Improving the quality of life for residents of Garfield Township involves reducing traffic congestion; increasing connectivity and the ability to reach nearby destinations without having to drive; connecting nodes like neighborhoods, schools, business centers, and recreation within the Township. These improvements can increase property values. Facilitating connections between travel modes like public transit and existing regional trail systems improves equity and safety. When considering improvements to a non-motorized network, it is important to keep safety and ease of implementation in mind by targeting areas with the least environmental challenges that have existing easements and rights of way.

When determining non-motorized transportation opportunities, we first reviewed the Township's current infrastructure inventory and state of planning efforts. Priorities were based on near-term opportunities by identifying potential connections that could positively impact most people. Garfield Township can use this method to create their non-motorized transportation plan. They can identify where to build non-motorized networks and seek project funding for those areas. Our project supports their plan for a built environment of transportation options. A multimodal transportation environment will result in a greater number of individuals choosing active transportation like walking, bicycling, and taking public transportation. This can increase overall quality of life and make neighborhoods and business districts more attractive.

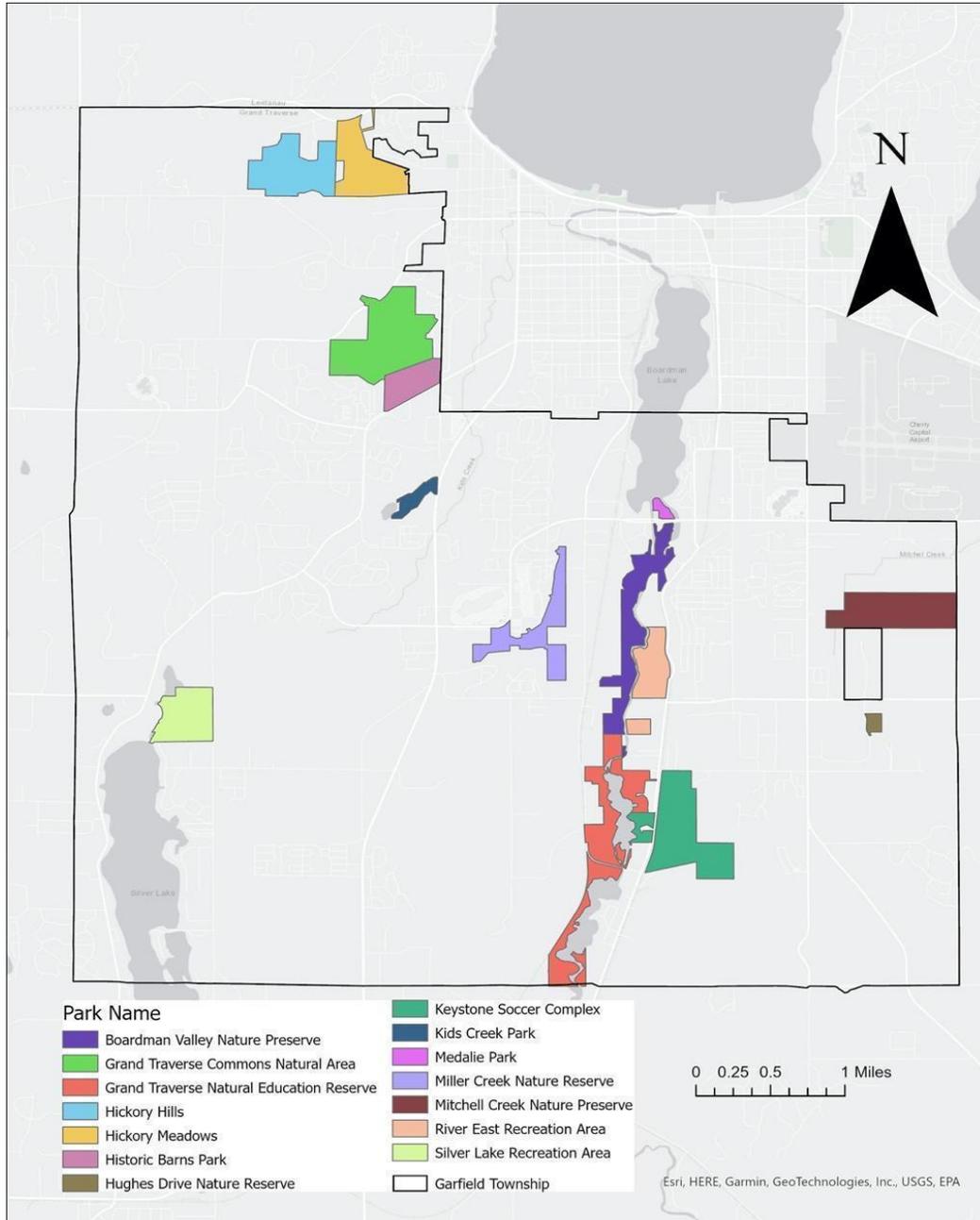
Chapter 1 – Introduction

Garfield Township is in Michigan’s Northwest Lower Peninsula. Its land size is 26.59 square miles, with 26 square miles being land, and the remainder water. The Township’s surrounding units of government are the City of Traverse City, Elmwood Township, Long Lake Township, Blair Township, and East Bay Charter Township. The Boardman River divides the western two-thirds of Garfield Township from the eastern third. The southern half of Boardman Lake is located within the boundaries of Garfield Township, which presents opportunities for public access.



Map 1: Garfield Township Overview

Map 1 is an overall map of Garfield Township and its relative location to Traverse City, Grand Traverse Bay, Boardman Lake, and Silver Lake. These are geographic landmarks that help orientate and define the area. The omitted enclave is an industrial zone belonging to Traverse City for tax purposes.



Map 2: Garfield Township Parks

Map 2 shows the Township parks that serve as points of interest or destinations, some offer routes for non-motorized transportation across Garfield Township, and many are situated

around the Boardman River. The two most popular Garfield Township parks based on the 2021 Park User Survey are Silver Lake Recreation Area and The Grand Traverse Commons Natural Area.

Public Land Ownership

There are 552 acres of public park land in Garfield Township. Each park has its own special amenities, whether that be for passive recreation, access to a children's play structure, dog parks or for playing organized sports. According to survey results from Garfield Township's 2021 Park User Survey, Township residents find it important to have access to these parks. Survey respondents also indicated they would like to walk and not drive to access their parks. For example, Miller Creek Nature Preserve, Kids Creek Park, and The Grand Traverse Commons Natural Area currently have trails connecting to important destinations like residential developments and business centers. They link to non-motorized facilities like multi-use trails, bikes, and shared lanes. The other Township parks have gaps between them and nearby non-motorized facilities. Infilling these gaps could improve non-motorized connectivity between the following park land areas.

- Silver Lake Recreation Area is an 85-acre multi-use park on the west side of the Township that includes a paved trail around much of the park.
- Kids Creek Park is a 21-acre park off US-31 at Marketplace Circle that connects to the Buffalo Ridge Trail. This connectivity offers non-motorized access from Kids Creek Park to the YMCA, West Middle School, businesses within Marketplace Circle and the Great Wolf Lodge.
- Grand Traverse Commons Natural Area is a 185-acre park that connects residential areas, schools, businesses, and a regional medical campus to Traverse City and the Township
- Hickory Meadows is a 116-acre park between The City of Traverse City and Garfield Township. It offers the potential to connect residents to work and school. It is primarily a recreational destination.
- Miller Creek Nature Preserve is a 94-acre park that connects high-density residential areas to important destinations and will be linked to Boardman Valley Nature Preserve.
- River East Recreation Area is a 62-acre park that links to the Boardman Valley Nature Preserve and can potentially link to residential areas along Lafranier Road.
- Boardman Valley Nature Preserve is a 125-acre park along both sides of the Boardman River. It provides access to water activities and the South YMCA.

Socio-Economic Profile

The following socio-economic profile describes and illustrates population trends between Garfield Township and Grand Traverse County. This presented data allows a better understanding of the various people who live in this region. Having a clear understanding of our socio-economic characteristics will help prepare the Township for future planning efforts and grant opportunities. The topics of interest that are discussed include trends in population, income, education, economics, and race.

Population

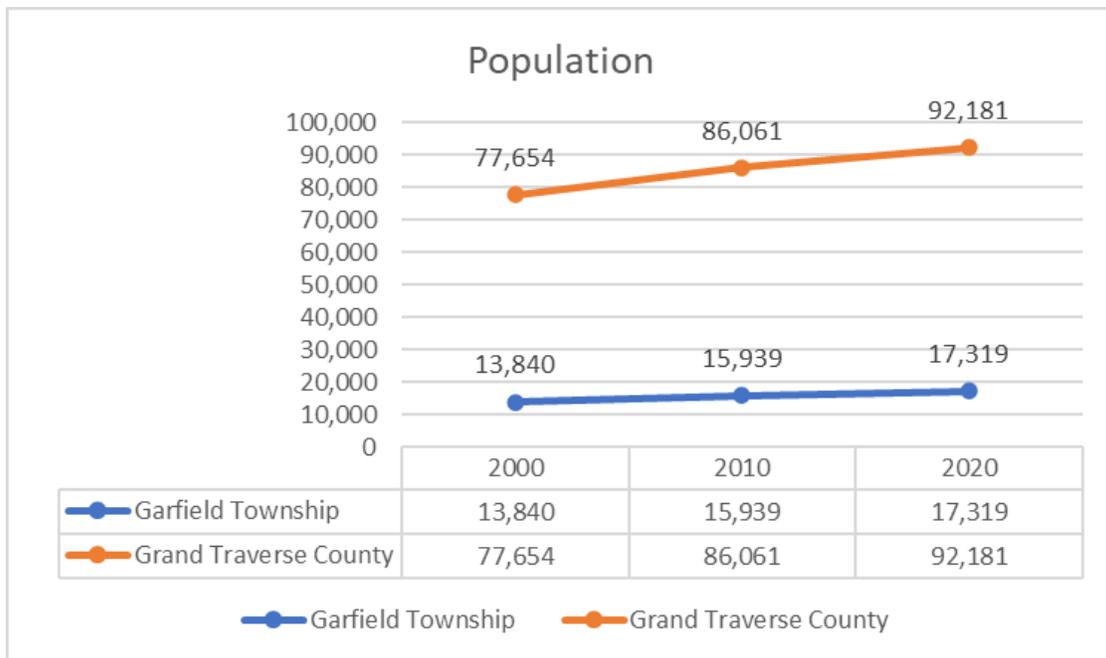


Figure 2: Population Trends

The population distribution of Garfield Township is primarily people 35 years and older, while the median age in the Township is 40 years old. Figure 2 shows the recent rise in population (American Community Survey 5-year Estimates, 2000-2019). This increase has been significant among younger people and new families, though the non-motorized transportation plan must accommodate all residents regardless of age, physical ability, income, or race while considering the underprivileged members of the community who would benefit from non-motorized investments.

Income

Garfield Township has seen positive economic growth since 2000 as shown in figure 3. The average household income has been steadily increasing. Following the great recession in 2008, many communities saw a decrease in average incomes of their citizens, yet Garfield Township and Grand Traverse County experienced their largest increase over that brief period (American Community Survey 5-year Estimates, 2000-2019).

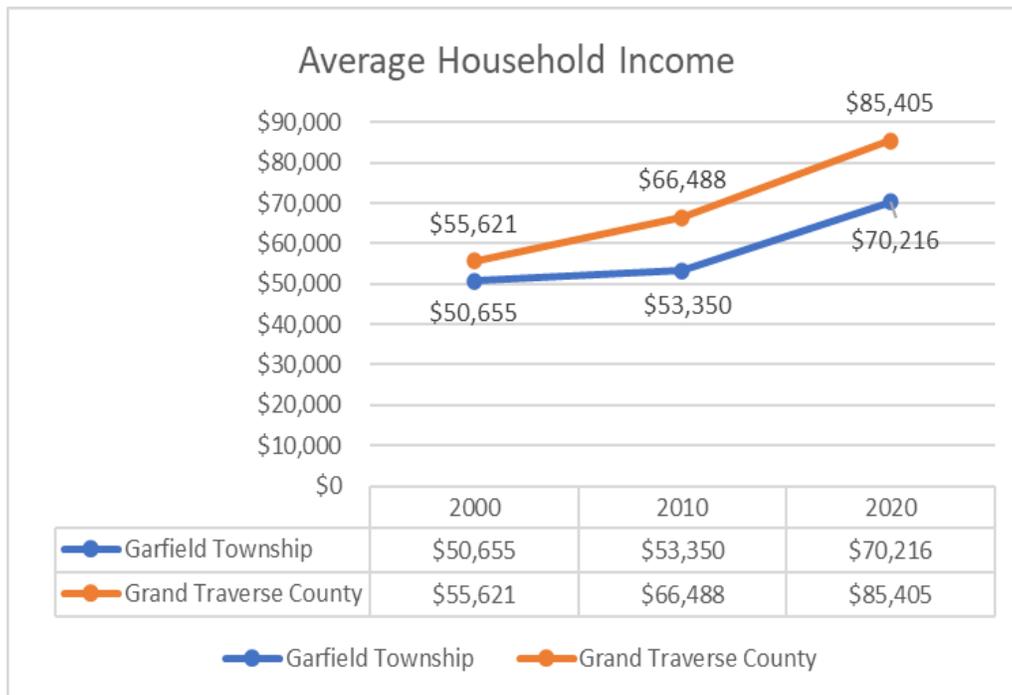


Figure 3: Household Income

Education

Figure 4 shows the regional educational attainment of Township residents compared to the County, ranging from less than a high school diploma to a doctorate degree. Census data shows that most people have a college degree. In both areas, more people have a college degree than a high school diploma. This is due to the increase in the population of young people moving to these areas after finishing college. In 2000, Garfield Township had a high school dropout rate of 11% higher than Grand Traverse County at 8%. This trend has continued into 2020, where currently Garfield Township has a dropout rate of 8%, and Grand Traverse County has declined to 3% (American Community Survey 5-year Estimates, 2000-2019).

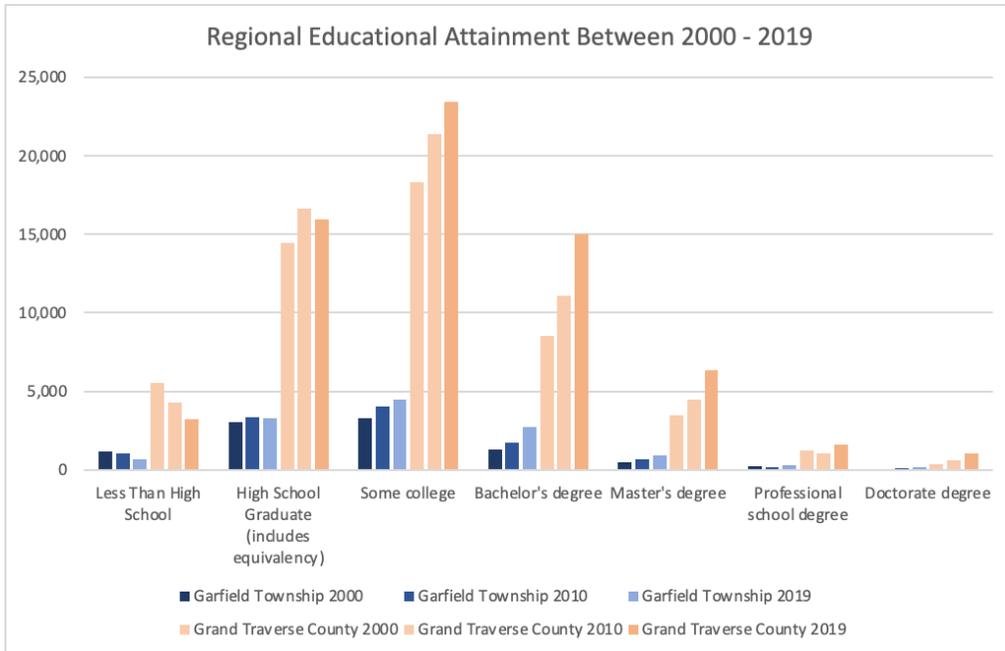


Figure 4: Educational Attainment

Economics

Figure 5 shows the number of people living below the poverty level in Garfield Township and Grand Traverse County since 2000. The number of residents living in poverty in Grand Traverse County has increased from 801 people in 2000 to 1,525 in 2020. In the case of Garfield Township, one can also see that the Township's poverty level has increased by 339 people in comparison to a total population increase of 3,479 since 2000 (American Community Survey 5-year Estimates, 2000-2019).

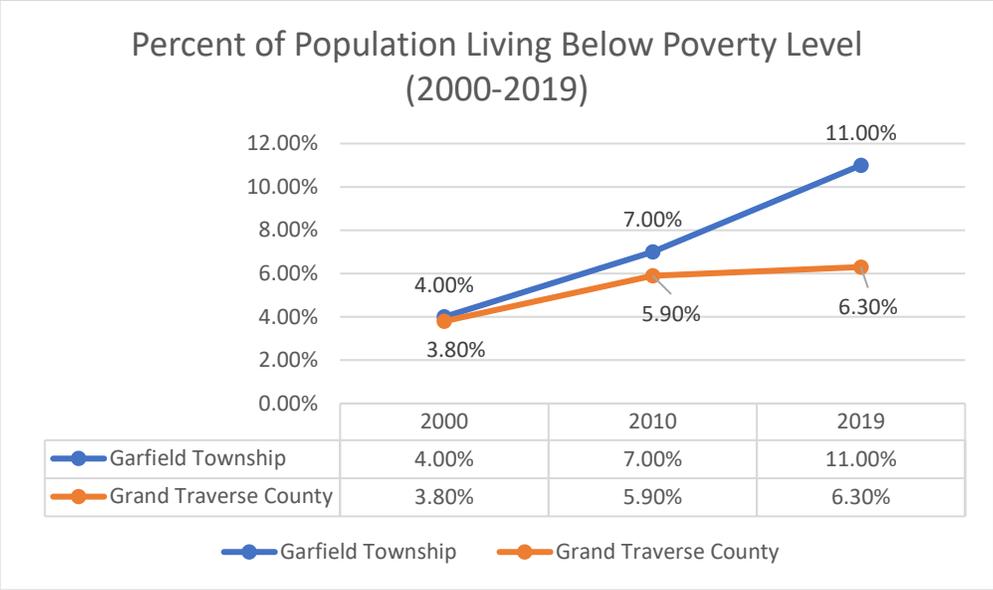


Figure 5: Poverty Levels

Race

Garfield Township and Grand Traverse County's racial makeup is shown in figure 6, where the population is the majority white. In 2000, Garfield Township had 53 African American residents, which grew to 88 in 2010. By 2020, the population of African American residents was 127. Grand Traverse County shows this same trend of a rise and fall in African American population. In Garfield Township and Grand Traverse County, the white population has shown consistent growth, while all other races tend to fluctuate. In Garfield Township, 13% of the white population is below the poverty line, while 45% of the African American population is below the poverty line. This is higher than the national average and a significant statistic in the Township (American Community Survey 5-year Estimates, 2000-2019).

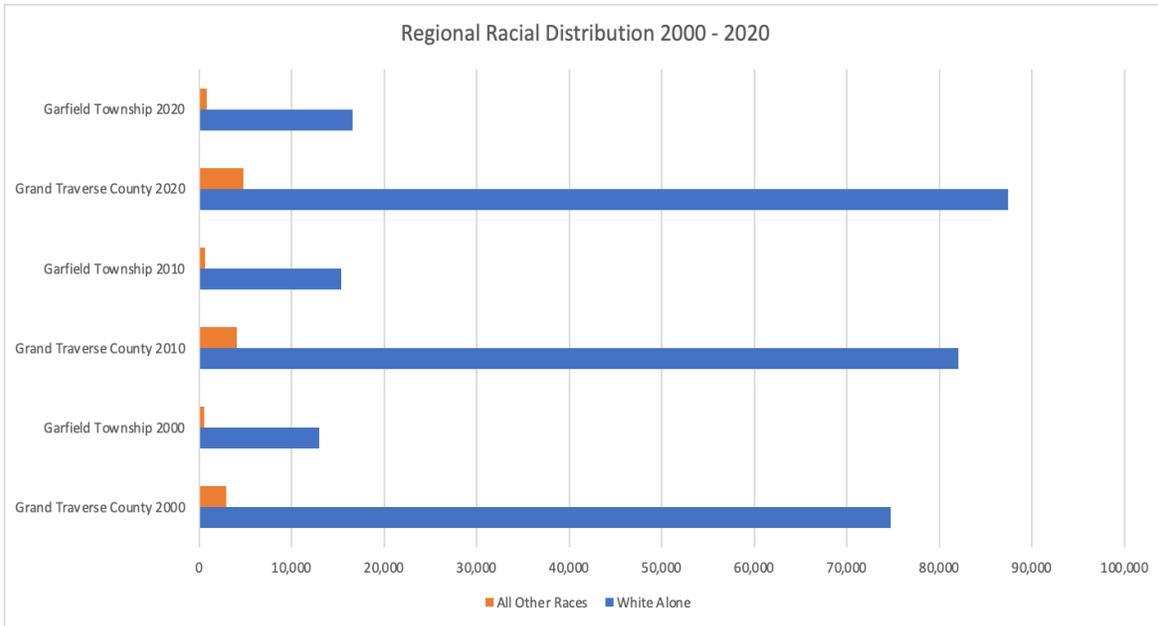
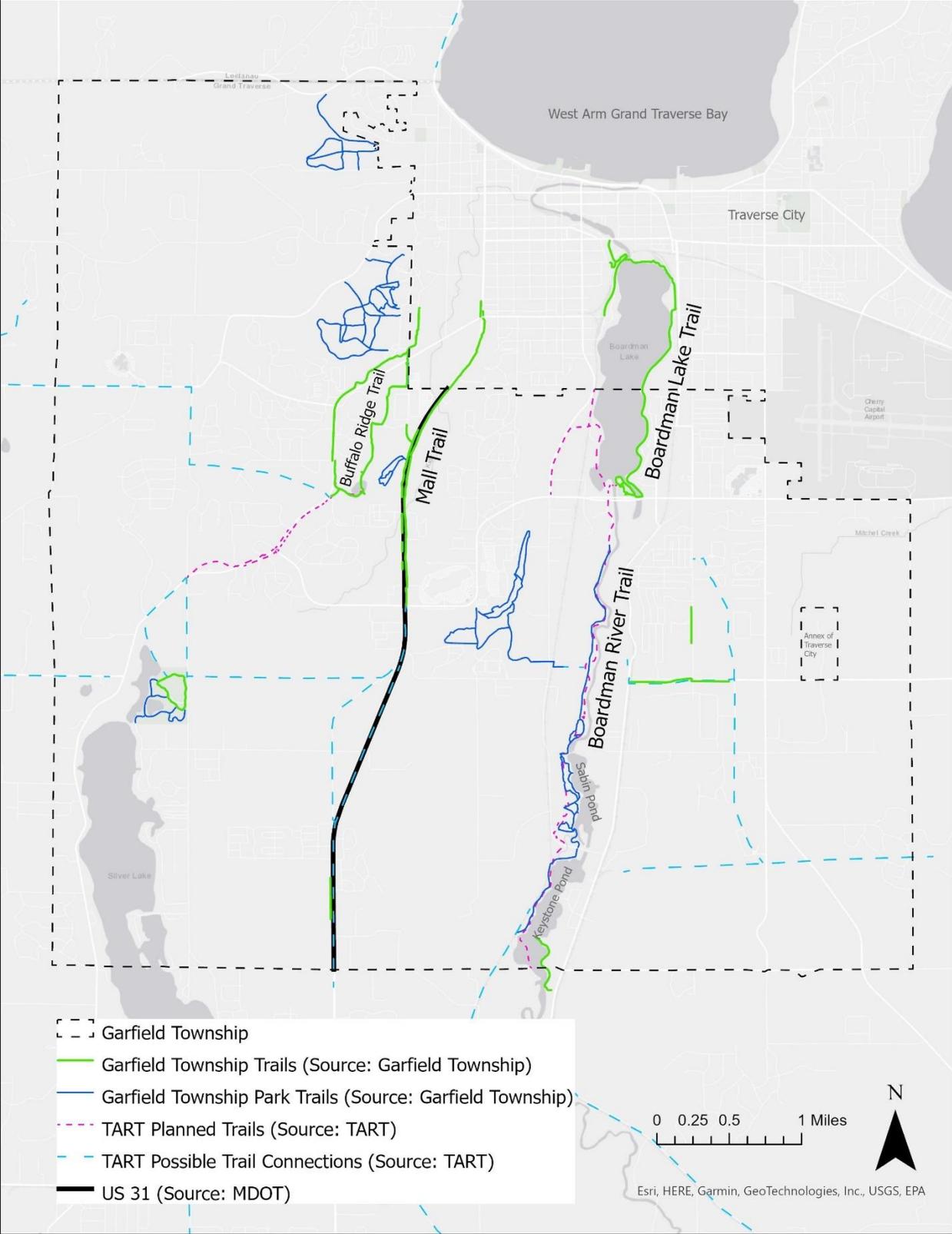


Figure 6: Racial Distribution

Existing Infrastructure

The purpose of Garfield Township’s non-motorized infrastructure is to provide a safe environment for walkers and cyclists whether they are using non-motorized facilities for recreation or commuting using active transportation. These facilities include sidewalks, multi-use trails, and trails composed of different surfaces for several types of use. However, all are similar in their ability to serve needs and wants for non-motorized transportation.

Parks like Miller Creek Nature Reserve, Grand Traverse Commons Natural Area, and Kids Creek Park are recreation areas owned by Garfield Township. Their trails are mostly unpaved, and they are close to TART trails (Traverse Area Recreational Trail). Silver Lake Recreation Area has a paved trail for recreation, and the Mall Trail is a paved multi-use trail that provides connectivity along US 31 and can accommodate walkers and cyclists in the same space.



Map 3: Existing Trails in Garfield Township

Existing Garfield Township Trails

Boardman Lake Trail

- The Boardman Lake Trail is a 4-mile loop trail that connects Garfield Township to the City of Traverse City. This trail has the potential to provide an east-west connection from the Barlow Street neighborhood to Cass Street.
- The trail is a combination of paved and unpaved surface and wooden boardwalks. Important destinations include Northwestern Michigan Community College's University Center, Traverse Area Public Library, food stores, dense residential areas, and businesses
- This trail is used for both commuting and recreational purposes. It is an economic driver attracting seasonal tourists.
- The southern portion of this trail exists within and is owned by Garfield Township. Trail advocacy and maintenance is provided by a community partnership with Traverse Area Recreation Trails (TART).

Mall Trail

- The Mall Trail is two miles in length and parallels US-31 from 14th Street to South Airport Road. It provides non-motorized transportation between The City of Traverse City to the Grand Traverse Mall and popular destinations like Chick-fil-A. This trail is owned by Garfield Township and Grand Traverse County and supported and maintained by Traverse Area Recreation Trails (TART).
- This trail is a paved, multi-use trail that directly connects to dense residential areas and is close to West Middle School and TCAPS Montessori School.
- This north-south trail is used for both recreation and active commuting.

Buffalo Ridge

- The 1.5 miles of paved trail connects to the trails at the Historic Barns Park across Silver Lake Road to Kids Creek Park, the YMCA, West Middle School, TCAPS Montessori, and Meijer. TART is a community partner that advocates for and maintains this trail.
- There are plans to extend the trail further South during the next Buffalo Ridge Trail expansion.

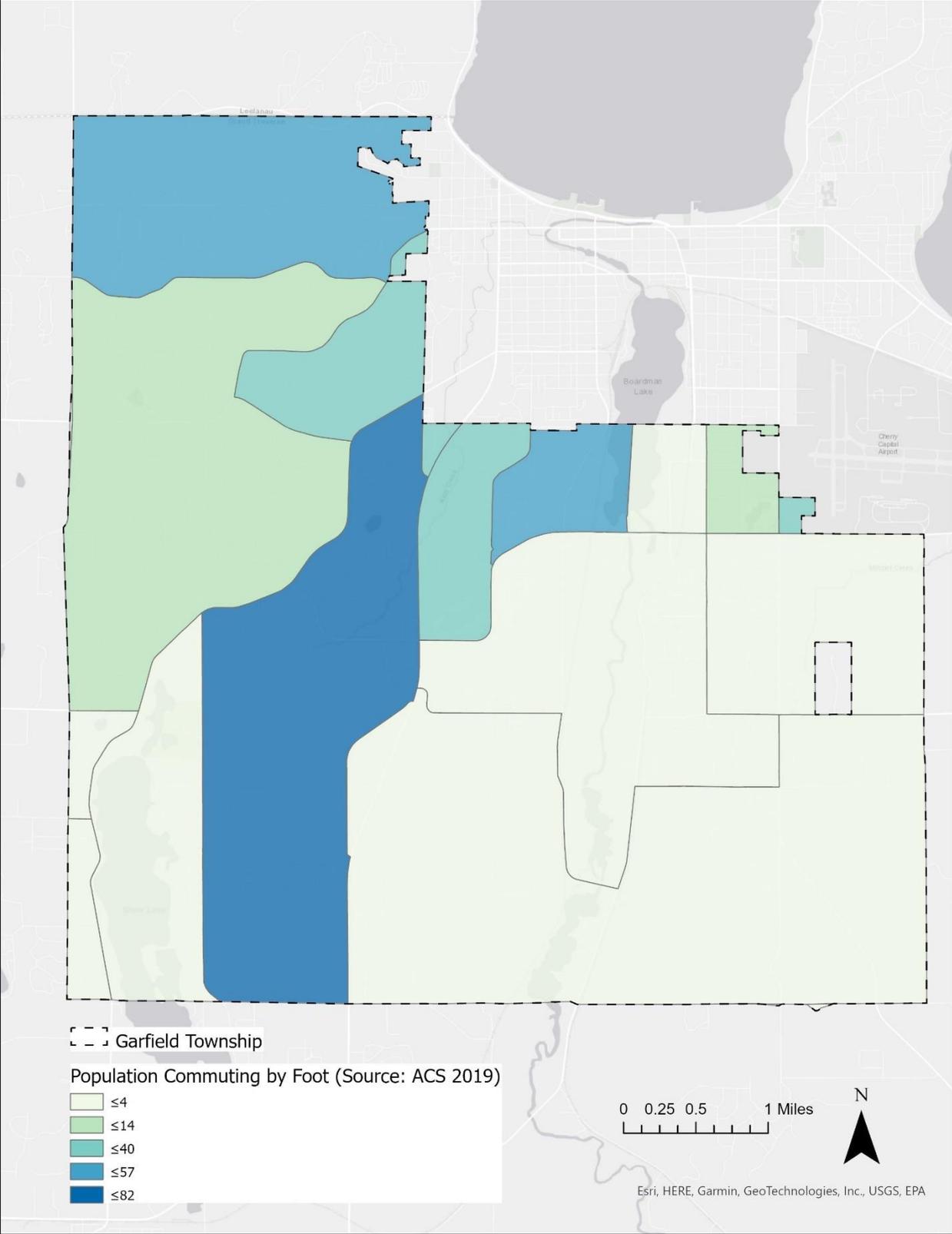
Boardman River Trail

- The Boardman River Trail is 24 miles in length
- Unpaved hiking trails along the Boardman River
- Mainly used for recreation
- Potential for direct connection to Boardman Lake Loop Trail through Boardman Valley Nature Preserve across South Airport Road

Commuting By Foot in Garfield Township

Our group used demographic and existing township trails data to better understand what parts of the Township would benefit most from non-motorized transportation infrastructure. We determined what parts of the township currently have residents who commute by biking or walking. In return, this census corresponds to where there is greater support for updating or adding trails and sidewalks. We compared that data with the existing transportation infrastructure and options to find gaps in Garfield Township's transportation system, as well as identify areas that may need special attention, such as businesses, schools, and apartment communities. This information was plugged into our method for prioritization to give recommendations on where non-motorized upgrades should be made, to help guide the township's future planning process.

Map 4 shows the number of residents who commute by foot on a daily average within each census block group. Statistics come from the 2019 American Community Survey (ACS). Most commuter activity is along the US 31 corridor and block groups surrounding the City of Traverse City. This data suggests individuals are more likely to commute on foot where jobs and residents are close together. The largest block group is adjacent to the Grand Traverse Mall and includes much of the commercial section of US 31.



Map 4: Population Commuting on Foot

Chapter 2 – Goals and Supporting Documentation

Goals and Non-Motorized Strategies

As shown in map 3, there are extensive gaps in Garfield Township’s non-motorized infrastructure. Prioritizing which of these gaps should be addressed is challenging. However, we devised a framework to score and plan future non-motorized projects within Garfield Township. This method is replicable and allows the Township to rank other projects in the future. In order to create this framework, our group identified the following goals, listed below:

1. Gather key data and identify areas of interest. The relevant information, data, and maps intend to add more walking and cycling infrastructure where population density is highest. Our project highlights areas of high residential and commercial density as well as areas of interest.
2. Develop a method of prioritization for Garfield Township to rank future non-motorized projects. The criterion in our framework considered goals from the Township’s 2022 Master Plan Implementation Matrix to remedy overburdened roadways and develop alternative transportation options to reduce demand on Township roads.
3. Our findings and recommendations to Garfield Township were based on our evaluation and analysis that identified which non-motorized projects and areas should be prioritized. These recommendations were based on census data, Geographic Information Systems (GIS), comparable Michigan Townships and existing Garfield Township plans.

Supporting Documentation

Garfield Township will include a non-motorized transportation plan in their updated Master Plan in 2023, which will allow the Township to qualify for available non-motorized infrastructure funding. One goal of their master plan update includes developing alternative transportation facilities to enable safe, convenient, and continuously connected non-vehicular access to nearby destinations. Examples of in-road and off-road non-motorized facilities can be found in the appendix. The following section will highlight Garfield Township’s plans that support non-motorized infrastructure. Recommendations from community partner Traverse

Area Recreational Trails (TART) for Garfield Township’s non-motorized network are also included. The plans and documents are listed below.

- 2021 Garfield Township Park User Survey
- Garfield Township Master Plan
- Garfield Township 2013 Complete Streets Resolution
- 2022 Master Plan Implementation Matrix
- Charter Township of Garfield Zoning Ordinance Section 5
- 2019 Traverse Area Recreational Trails (TART) Regional Trail Development Assessment for Grand Traverse and Leelanau County

2021 Park User Survey

According to Garfield Township’s 2021 Park User Survey, 74.29% of respondents indicated they use natural hiking trails and 57.71% use paved trails most out of all available amenities (figure 7). Survey responses were analyzed and coded for trails, and proximity to home. 42 out of 153 respondents indicated they like trails most about the park, while another 4 respondents liked that they could walk from their home to the park. When respondents were asked what one thing, they would like to see added to the township parks, 13 respondents asked for more hiking trails, including trails that connect to other Garfield Township Parks and the TART system. When asked what could be changed about the parks, comments included adding more trails with safe connections to other nearby parks without having to drive between them.

Garfield Township 2021 Parks User Survey

Q2 What amenities do you use most often when you visit one of the Township parks (check all that apply)?

Answered: 175 Skipped: 0

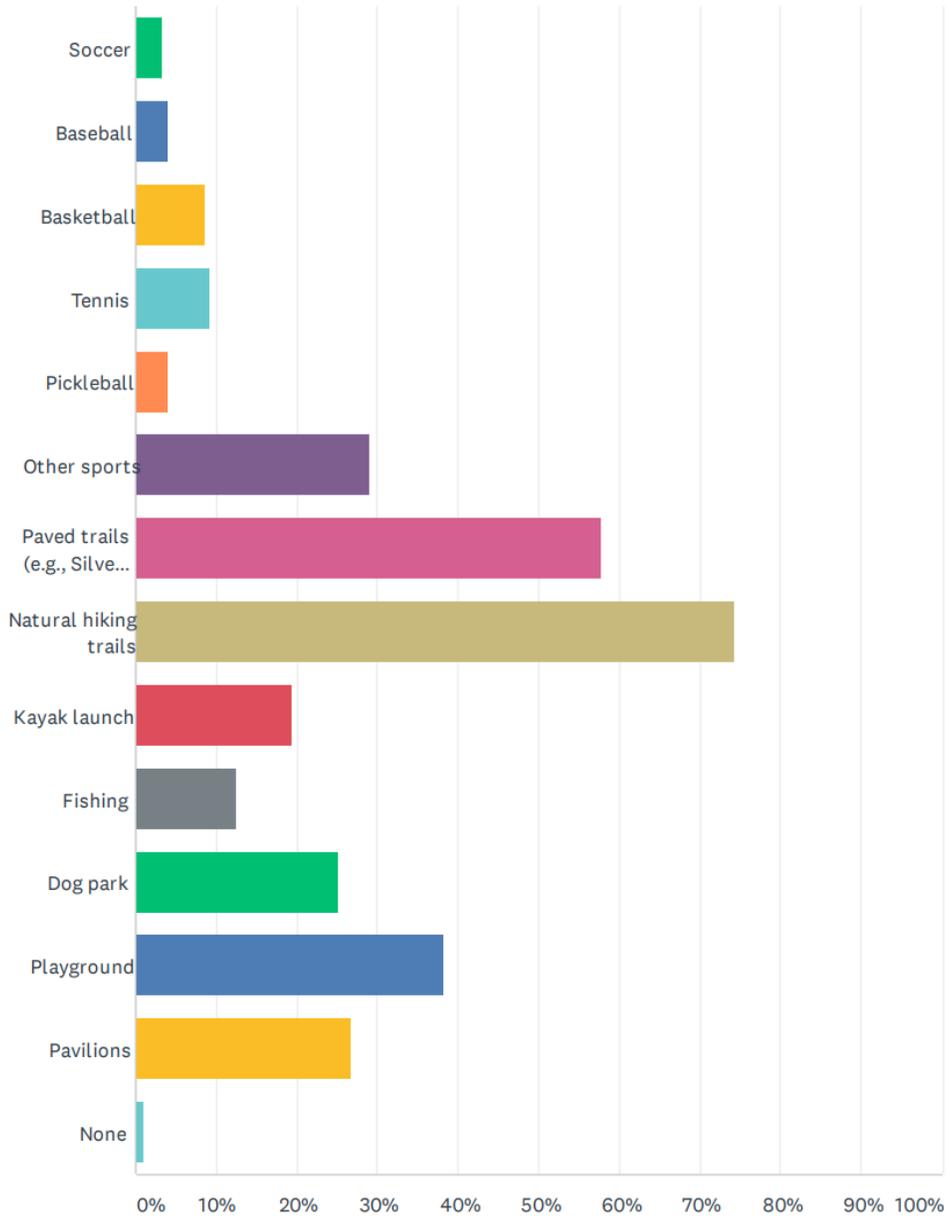


Figure 7: Park User Survey

Garfield Township Master Plan and Active Transportation

Garfield Township has identified within their Master Plan a goal to increase and improve their non-motorized infrastructure and infill connectivity gaps throughout the Township. Garfield Township's Master Plan currently has a one-page map (pg. 45) for their non-motorized transportation plan. The Master Plan supports alternative transportation to reduce demand on roadways (pg. 21). There are suggestions for non-motorized infrastructure in special use permits (SUP) and planned use development (PUD) reviews along with utilizing Safe Routes to School (SRTS) wherever possible (pg. 50).

Garfield Township 2013 Complete Streets Resolution

In 2013, the Township Board adopted a "Complete Streets" resolution to enable access for all users, pedestrians, bicyclists, transit riders, and drivers of all ages and abilities. "Complete Streets" means roadways are planned, designed, and constructed to provide appropriate access to all legal users in a manner that promotes safe and efficient, multimodal movement across the community. Complete streets allow people with disabilities, low-income residents, older adults, children, and other special groups who do not have access to vehicular transportation the ability to travel throughout the community. Streets that support multiple uses, including safe, active, and ample space for pedestrians, bicycles, and transit encourage more efficient movement of people than streets designed primarily for vehicular traffic.

2022 Master Plan Implementation Matrix

This matrix assists with implementing elements of the Township's master plan. Items are prioritized for the upcoming year with the objective of using a combination of public funds, grants, and a zoning ordinance requirement to implement their non-motorized plan. The Township has goals to build support for development of non-motorized and alternative transportation options to reduce the demand on area roadways, improve community connectivity and promote public health. Additional goals include improving public transportation opportunities within densely populated locations.

Garfield Township Zoning Ordinance Section 5.

Non-motorized facilities are mandated into Township land use and site planning. The Charter Township of Garfield Zoning Ordinance Article 5 Section 522 A refers to non-motorized

pathways and states, “Public pathways shall be constructed for all new development, re-developments, and amendments to previously approved site development plans, including additions or improvements to existing buildings with a construction cost of twenty thousand dollars (\$20,000.00) or more within a twelve-month period.” Sidewalks must be concrete and six feet wide on arterial roads and principal collector roads otherwise, they must be five feet wide (Zoning, 15). Within the Township there are several sidewalks that end abruptly. These gaps can be identified and connected to nearby sidewalks, linking residential areas to commerce, schools, parks, and neighborhoods. Research shows filling gaps between sidewalk segments increases walking and biking. Our Practicum group has been asked to identify high-priority lengths of gaps.

2019 Traverse Area Recreational Trails (TART) Regional Trail Development Assessment for Grand Traverse and Leelanau County

Findings from the 2019 Traverse Area Recreational Trails (TART) Regional Trail Development Assessment for Grand Traverse and Leelanau County, suggest Garfield Township has good planning efforts in place for non-motorized transportation priorities, and trails. TART recommends Garfield Township focus on schools, neighborhoods, areas of concentrated employment and link the Township’s parks. TART refers to Garfield Township’s 2018 Five-Year Master Plan about improved non-motorized travel within the Township and recommends six opportunities that include:

- Improved non-motorized transportation on North Long Lake Road to Traverse City West Senior High School (North Long Lake Road to Zimmerman Road to Barnes Road connecting to Buffalo Ridge Trail and Kids Creek Park.)
- Connect Buffalo Ridge Trail to Silver Lake Recreational Area, potential to connect via East Silver Lake Road.
- Improved sidewalk connectivity in Barlow-Garfield neighborhood for improved north to south non-motorized connections.
- Improve connections to River East Recreation Area. Route along Hammond Road linking to neighborhood East of Lafranier Road, south to Rusch Road and a utility easement. The utility easement could connect to East Bay Township.
- Consider the feasibility of a rail-to-trail project along the Cass Road rail line.
- Connect Miller Creek Nature Preserve to the Boardman River Trail.

Chapter 3 – Method for Prioritization

Introduction

Prioritizing areas for non-motorized transportation enhancements can be a challenge. Therefore, our group created a scoring system that will rank specific sites or corridors based on identified criteria. This will enable Garfield Township to identify and compare potential non-motorized transportation projects by using a method for prioritization. This framework was developed using case studies of several analogous townships' non-motorized transportation plans along with Garfield Township documents.

Developing our method for prioritization consisted of two phases. **Phase 1** measured three criteria within the Township: Density, Equity, and Current Infrastructure. These criteria were measured using data collected from the U.S. Census Bureau, Garfield Township, and TART. As we studied census block group data for the Township, we discovered smaller and more manageable sections of data were needed to better understand the Township's demographics. To compensate for the larger area of census block groups, we divided the Township into 42 one-mile square blocks. This also provided consistency when viewing data from various sources.

Phase 1 criteria (Density, Equity, and Current Infrastructure) were measured for Garfield Township, and a score was displayed for each one-square mile quadrant. We identified initial priority areas based on quadrants with the highest scores. Those priority areas were chosen for **phase 2** measurement, which consisted of Ease of Implementation, Connectivity, and Safety. A flow chart of the process is displayed in figure 8.

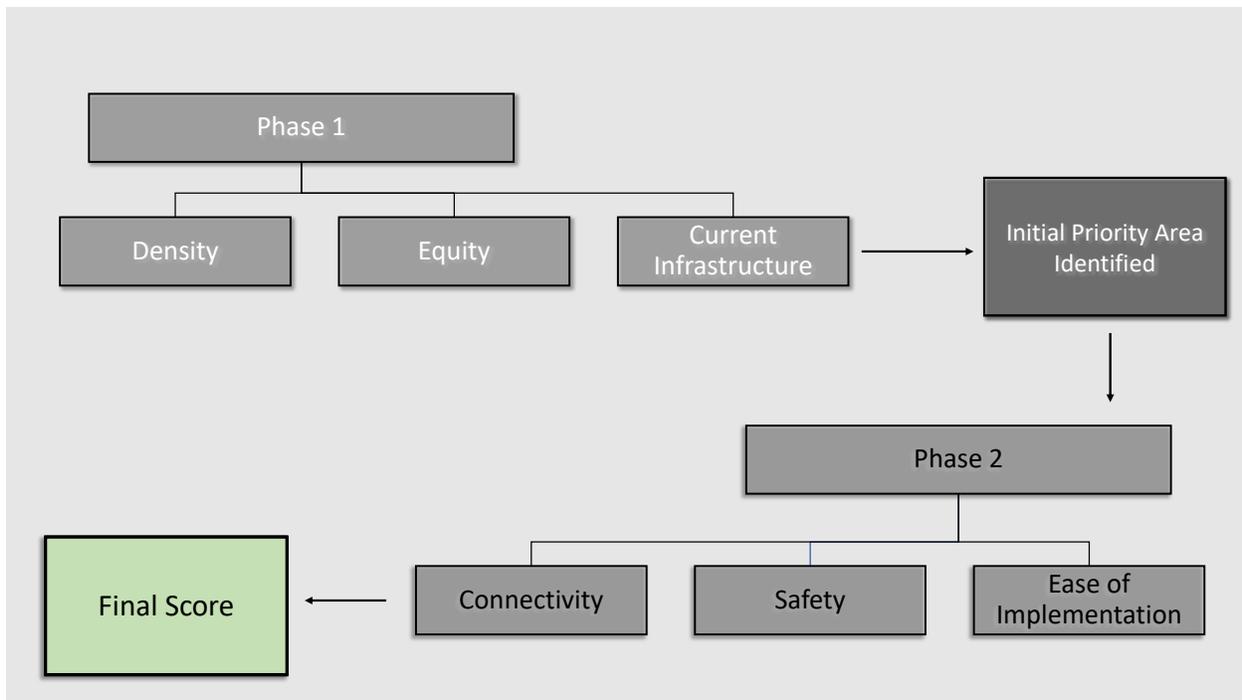
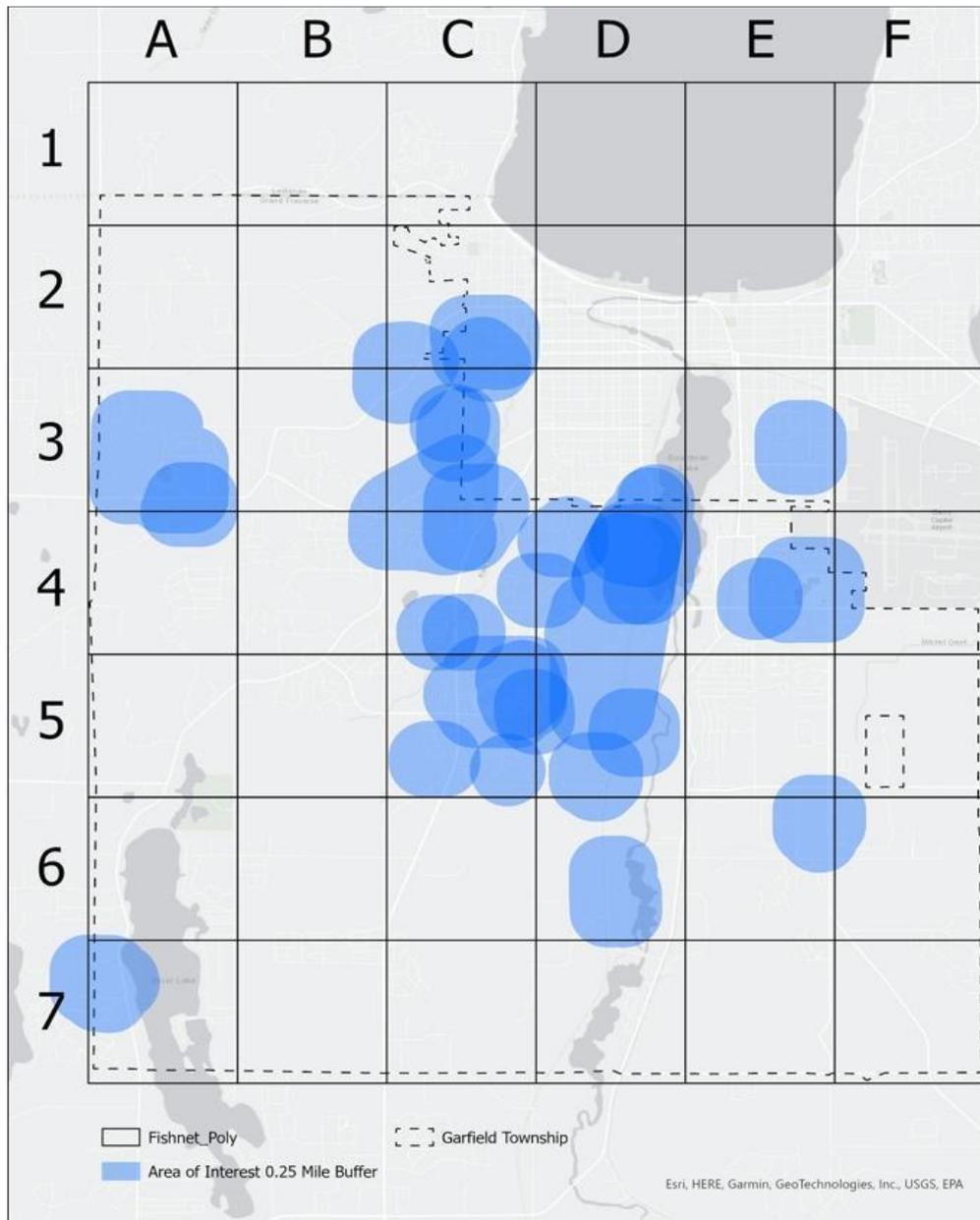


Figure 8: Method for Prioritization

Phase 1:

Density: According to Garfield Township’s 2018 Master Plan, serving areas of greater population, residential density, and highly frequented areas such as commercial centers, schools, and industry is a high priority. Therefore, we incorporated density as an essential criterion when measuring future non-motorized infrastructure as higher density areas serve more residents. We measured density by combining two components: Areas of Interest and Population Density.

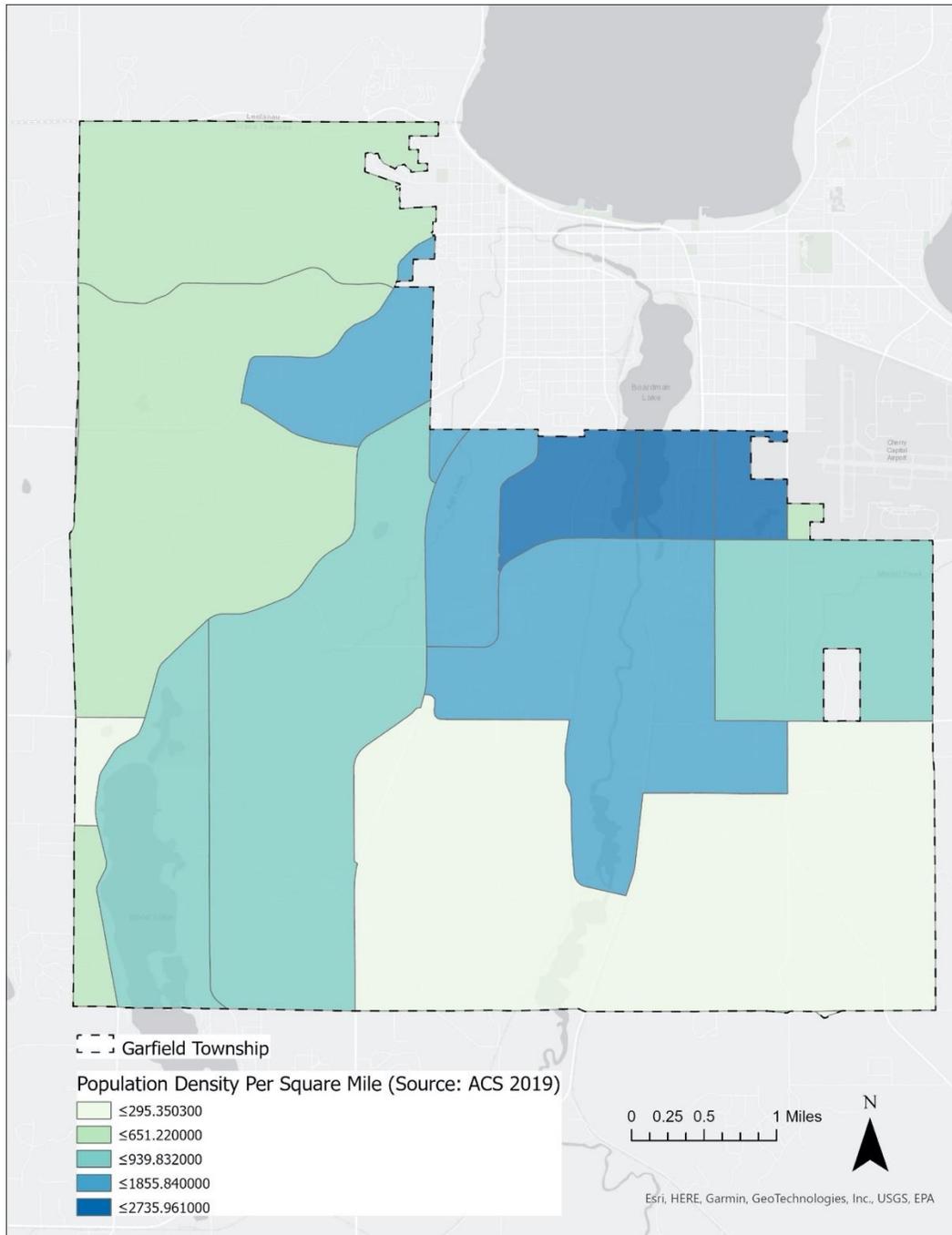
Areas of Interest: Areas of Interest were measured by mapping every public and private school in Garfield Township, high employment businesses (examples: Tyson, Grand Traverse Pavilions, Cherryland Center, Etc.), all public community centers, grocery stores, and public parks. We created a .25-mile buffer zone around each area of interest to display density clusters. As shown in map 5, areas of interest have large clusters in quadrants D4, D5, C5, and C3.



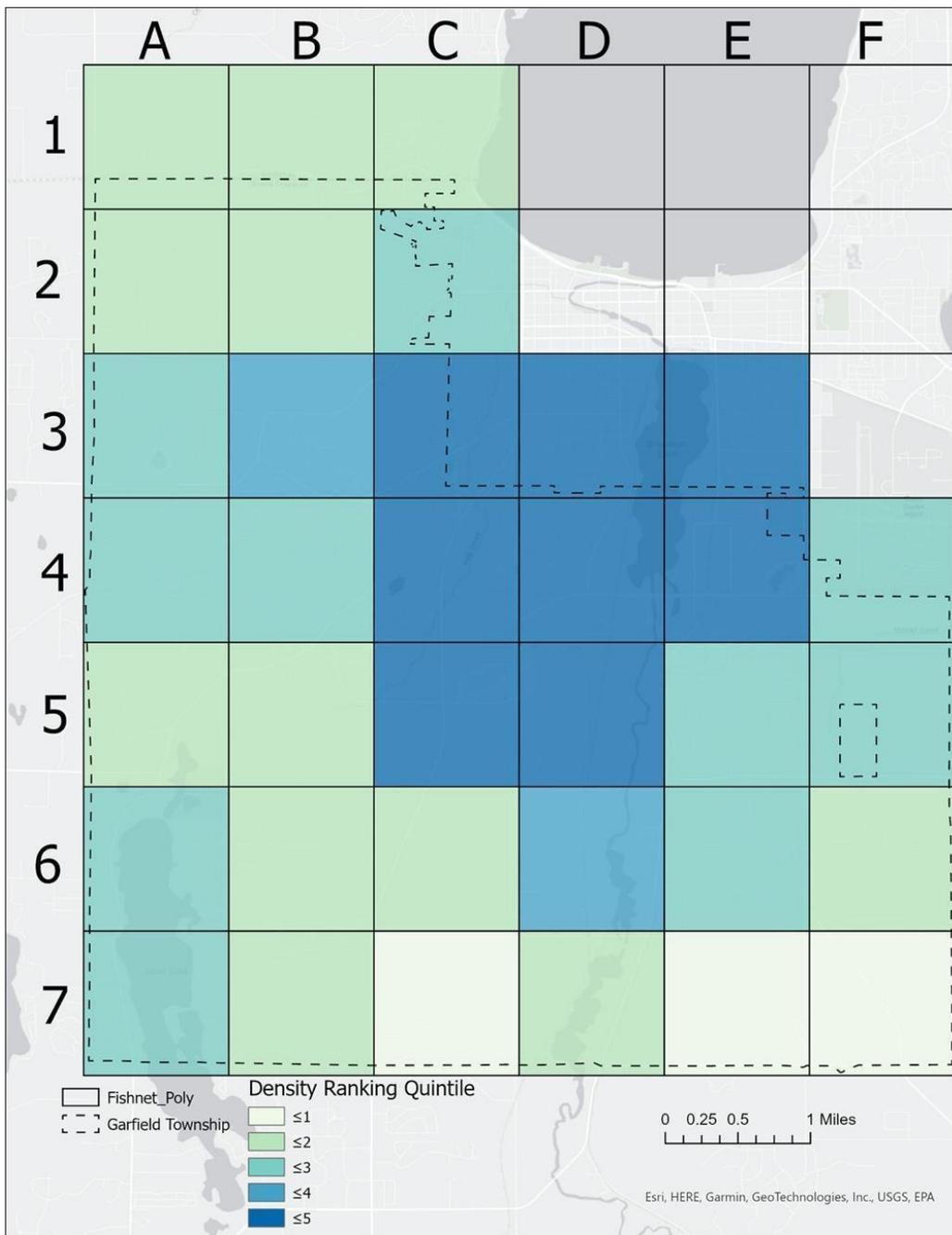
Map 5: Areas of Interest

Population Density: Population density was first measured by census block groups and is displayed in quintiles from lowest to highest population density in map 6. Though, as stated in the method for prioritization, we sectioned Garfield Township into 42 one-square mile blocks to compensate for the larger area of census block groups. Maps 6 and 7 show the darkest areas with the highest population density and lighter areas with the lowest population density, sorted by block group and 1 square-mile areas, respectively. The quadrants with the highest

population density are quadrants D4, E4, and D5. We combined data on both Population Density & Areas of Interest into a final density map. Map 7 shows a final density ranking on a scale from 1-5 (1 being the least dense and 5 being the highest density). As shown in map 7, the quadrants with the highest density ranking are quadrants C3, C4, C5, D3, D4, D5 E3, and E4.



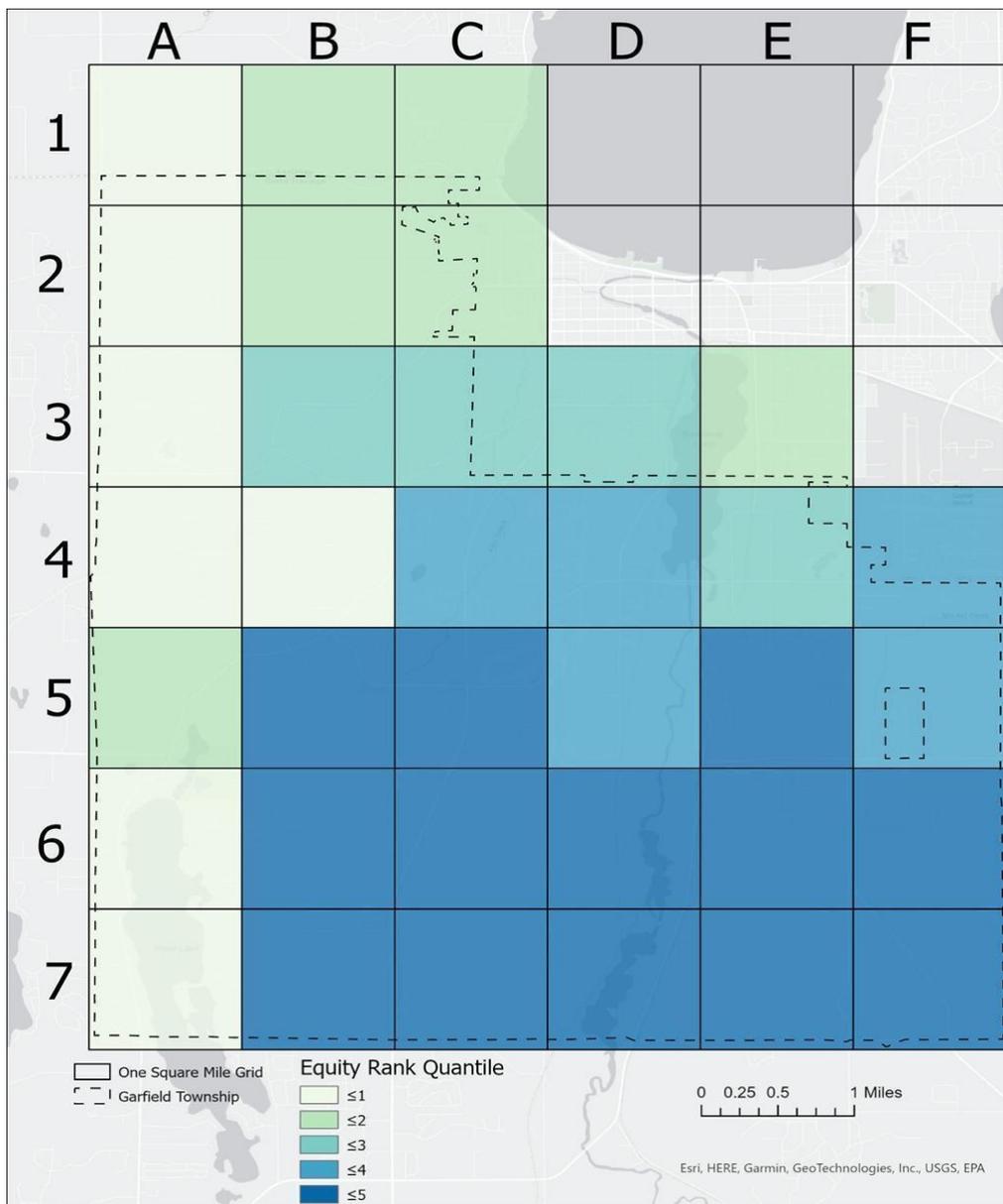
Map 6: Population Density by Block Group



Map 7: Density Ranking

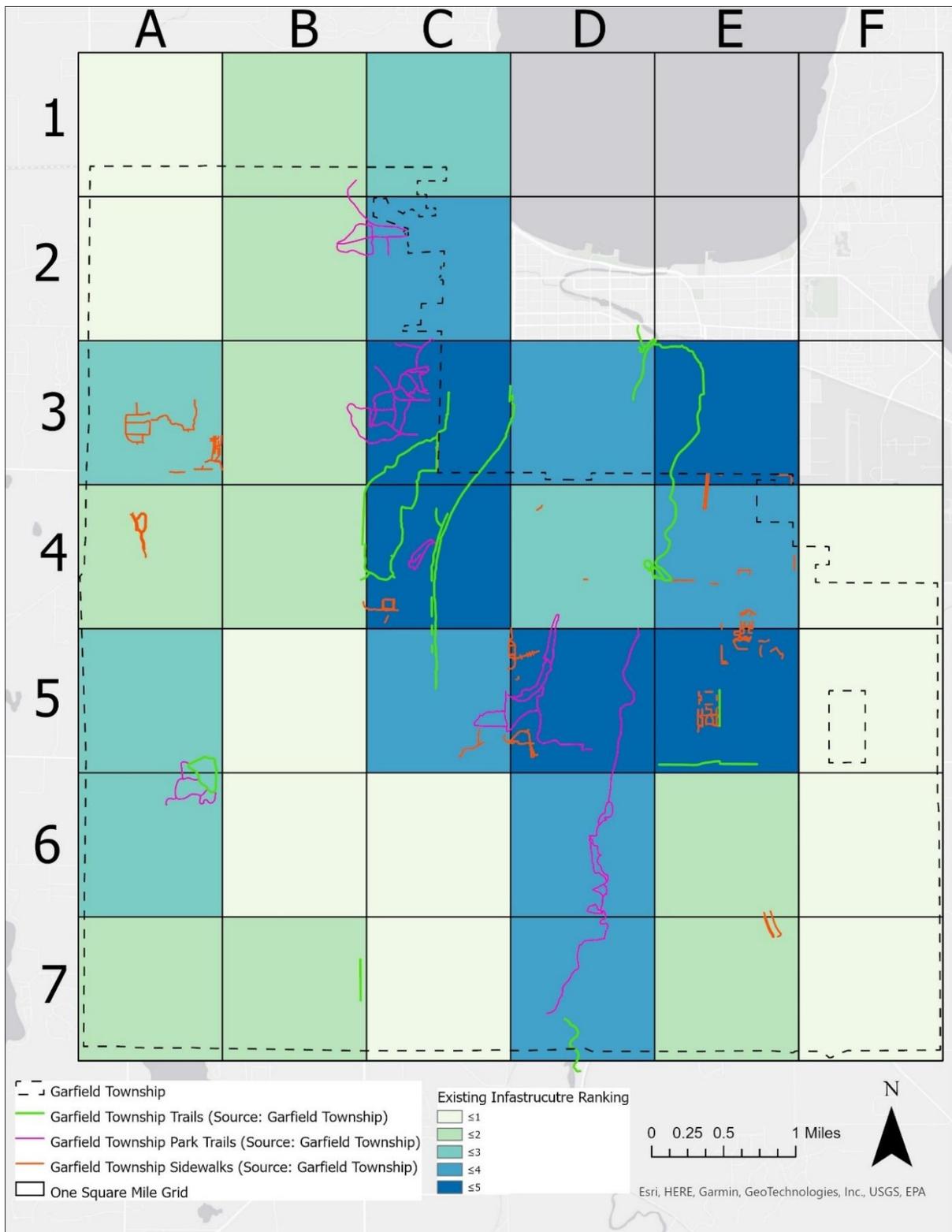
Equity: When considering future non-motorized infrastructure projects, it is important to incorporate equity, as it ensures that the most vulnerable members of the community are included, especially those who may not have access to a personal vehicle. We measured the

criteria of equity by combining and displaying data on the percentage of population under 18 years, percentage of population 65 years and older, percentage of families below poverty, and percentage of families below poverty with children. All four of these data points are individually displayed on maps located in the appendix. The final equity score combined all data and is displayed in map 8. Equity is ranked on a scale from 1-5 (1 being the population with the lowest need and 5 being the population with highest need). As shown in map 8, the quadrants with the highest equity ranking are in the southern part of the township: quadrant B5-7, C5-7, D6-7, E5-7, F6-7.



Map 8: Equity Ranking

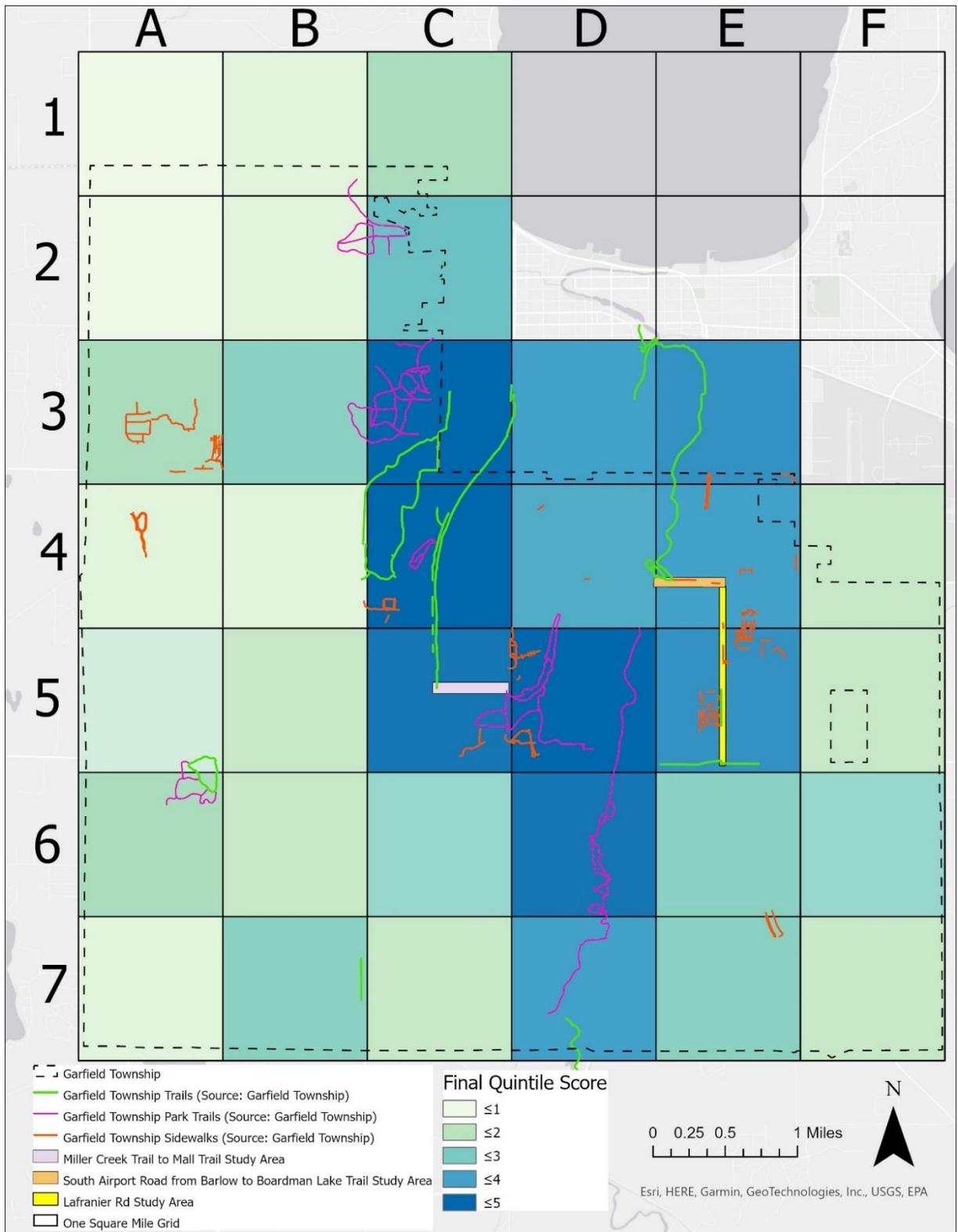
Current Infrastructure: To assess what areas in Garfield Township may need planned non-motorized infrastructure, we mapped all existing Garfield Township sidewalks and trails, TART existing trails, planned trails, and trail connections (map 9). This visual display of current infrastructure allowed us to identify areas of potential connection. We ranked this criterion based on the amount (in miles) of current infrastructure already in place. Each 1-square mile quadrant was calculated by the existing amount and planned sidewalks and trails. Areas with more non-motorized infrastructure were given a higher priority compared to areas with less non-motorized infrastructure. The reason for prioritizing areas with more existing infrastructure is for the potential to easily fill connectivity gaps. Current Infrastructure is ranked on a scale from 1-5 (1 being the least number of sidewalks and trails, and 5 being the most amount of sidewalk and trails). On map 9, the quadrants with the highest current infrastructure ranking are quadrants C3, C4, D5, E3, and E5.



Map 9: Existing Infrastructure Ranking

Phase 1 Findings & Conclusion: Initial Priority Areas Identified

Once we measured all criteria individually for phase 1, we combined the data into one map. The ranked scores for Density, Equity, and Current Infrastructure were combined to produce an overall score for phase 1. The scores were displayed by quadrant in map 10. The quadrants with the highest overall score for phase 1 are quadrants C3-5, D5, and D6. Once we produced the overall score for phase 1, we overlaid all current infrastructure on the final scoring map 10. This allowed us to see the current physical non-motorized infrastructure gaps in combination with areas of greatest need. From here, we chose three priority sites: Lafranier Road Corridor, Mall Trail to Miller Creek Corridor, and South Airport Road from Barlow Street to the Boardman Lake Loop. The areas were then scored in phase 2 of the method for prioritization, which we explain in the next section.



Map 10: Final Scores and Priority Areas Identified

Phase 2:

Phase 1 was driven by gathering quantitative data to prioritize three areas. In phase 2 we took a qualitative approach to gathering data by scoring current conditions. Once we identified the three priority areas from phase 1, we collected additional more detailed data by field observation. We visited each site, walked the corridor, took pictures, and took notes of the infrastructure that currently exists in the areas of interest identified in phase 1. We then scored each site using the evidence from our field study. The three selected sites are listed below and shown in map 11:

- Lafranier Road Corridor
- South Airport Road Corridor from Barlow Street to Boardman Lake Loop.
- Mall Trail to Miller Creek Corridor

We scored those areas based on their benchmark of: Connectivity, Safety, and Ease of Implementation. We saw connectivity and safety as essential elements to provide Garfield Township Residents, but also included ease of implementation to consider any logistical or practical challenges to implementing infrastructure on these sites.

For each criterion, we provided a set of questions that we used to score sites, based on their current condition. We scored each question on scale of 0 to 2. 0 meaning the site currently does not meet ideal standards, 1 meaning it meets ideal standards, and 2 meaning it completely meets ideal standards. There are 12 questions in total, meaning the highest possible score a site can receive is a 22 out of 22. In our scoring method, a high score indicates the site currently meets ideal standards for connectivity, safety, and ease of implementation. An area with a higher score would be a lower priority. Whereas a low score indicates the site is currently not meeting ideal standards for connectivity, safety, and ease of implantation, therefore it is a higher priority. We will further explain the scoring criteria of connectivity, safety, and ease of implementation.

Connectivity: Current infrastructure maps of Garfield Township show that there are physical gaps in connectivity between existing and planned sidewalks and trails. Connectivity is an important aspect when considering prioritization. The ability to connect gaps in infrastructure creates a cohesive non-motorized system. We scored the priority sites by weighing how they currently fulfill the connectivity needs of the community. We considered how sites currently connect to areas of interest and infrastructures such as: schools, parks, business centers,

residential neighborhoods, and existing trails and sidewalks. The following statements were addressed when measuring the connectivity score of a site:

- The site provides a continuous connection between existing non-motorized infrastructure
- The site provides a continuous connection to public transportation, or an existing trail network
- The site provides continuous and non-motorized infrastructure connecting to a high-density residential area, or high-density corridor.
- The site provides continuous non-motorized infrastructure that connects two areas of interest such as employment centers, schools, hospitals, or grocery stores.



Miller Creek Trail to Mill Trail Study Area



South Airport Road from Balfour to Boardman Lake Trail Study Area



Lafranier Rd Study Area

Map 11: Priority Areas

Safety: Increasing the safety of Garfield Township residents is an important criterion to consider when implementing non-motorized infrastructure projects. We scored priority sites by weighing how well they currently meet the safety needs of the community. If the site is currently meeting safety needs, it will have a higher score. Its higher score gives it a lower priority ranking. The following statements will be addressed when measuring the safety score of the site:

- The site provides safety for Garfield Township residents with attention to the following groups (elderly, children, low-income, disabled).
- The site contains non-motorized infrastructure located near a high-volume vehicular traffic area.
- The site contains safe barriers between pedestrians and motorized traffic.
- The site contains non-motorized infrastructure that incorporates such items (crosswalks, ADA crossings, pedestrian crossings, barriers).

Ease of Implementation: Ease of implementation considers property ownership and environmental factors. These considerations determine the ease with which a future project can be implemented on the site. We scored priority sites by measuring some challenges they would face for future construction. The following statements are addressed when measuring the ease of implementation score of the site:

- **Environmental Factors:**
 - There are environmental challenges related to topography and difficulty of construction.
 - There is environmental impact or sensitivity according to the Michigan Department of Environment, Great Lakes, and Energy (EGLE).
- **Property Ownership & Easements:**
 - The project poses challenges to property acquisition, ownership, and easements.

Phase 2: Scoring Priority Areas

Lafranier Road Corridor

Connectivity:

This study segment is shown on map 11. It was identified as a high priority site during phase 1 prioritization ranking due to its high residential density and population density. This corridor is 1.25 miles long, its northern boundary connects to South Airport Road, and its southern boundary connects to Hammond Road. Considering its degree of residential density (e.g., apartments, town homes, and multifamily structures), there appears to be little built non-motorized infrastructure along Lafranier Road to connect residents to nearby businesses and points of interest along South Airport Road. There are existing sidewalk segments that end abruptly, and therefore they do not close an existing gap or directly connect to residences. Based on our scoring method this study segment was given a 1 because it partially met our connectivity criteria in figure 9.

Safety:

Lafranier Road is classified as a minor arterial road according to the Grand Traverse County Road Commission with an annual average daily traffic count (AADT) of 16,144. This corridor has high speed uninterrupted traffic along the studied segment. There are several assisted living facilities along this road and fragmented sidewalks along a small percentage of the studied area therefore it is difficult and unsafe for elderly and disabled persons to walk along this road. Two out of the six bus stops have small, covered benches. Due to this area's population density, covered and protected bus shelters should be considered. Additionally, based on our observations, there was no connectivity from bus stops to the sidewalk.

Most existing sidewalks are in front of new structures like the Ridge 45 Apartments on the west side of the road. There are 20 curb cuts along the north side and four curb cuts along the south side of Lafranier Road which are important safety considerations when building non-motorized infrastructure. The area known as Lafranier Hill is a frequently used paved shoulder as evidenced by heavy foot traffic during our site visits. This steep hill does not have sidewalks or a shared-use trail to connect to businesses along South Airport Road. Based on our measured criteria, this section scored 0 for safety, because it did not meet the ideal standards of safety (as shown in figure 9).

Ease of Implementation:

Ease of implementation considers the difficulty of installing non-motorized infrastructure regarding property ownership and environmental factors. There are no immediate concerns that would have an impact on the environment along this site. For most of the study sites, there is little physical obstruction or environmental factors that would hinder improving and installing non-motorized infrastructure. However, a .25 mile stretch beginning at the South Airport Road intersection poses a considerable challenge. The topography of this section poses a challenge to constructing non-motorized infrastructure. Lafranier Road has a steep change in topography and installing non-motorized infrastructure would involve carving out the hill on both sides of the street. Therefore, we have measured the ease of implementation score on this site with an overall ranking of 3 out of 6, indicating that there may be some challenges to the ease of implementing non-motorized infrastructure.

As shown in figure 9, the overall score for phase 2, combining connectivity, safety and ease of implementation is a 4 out of 22.

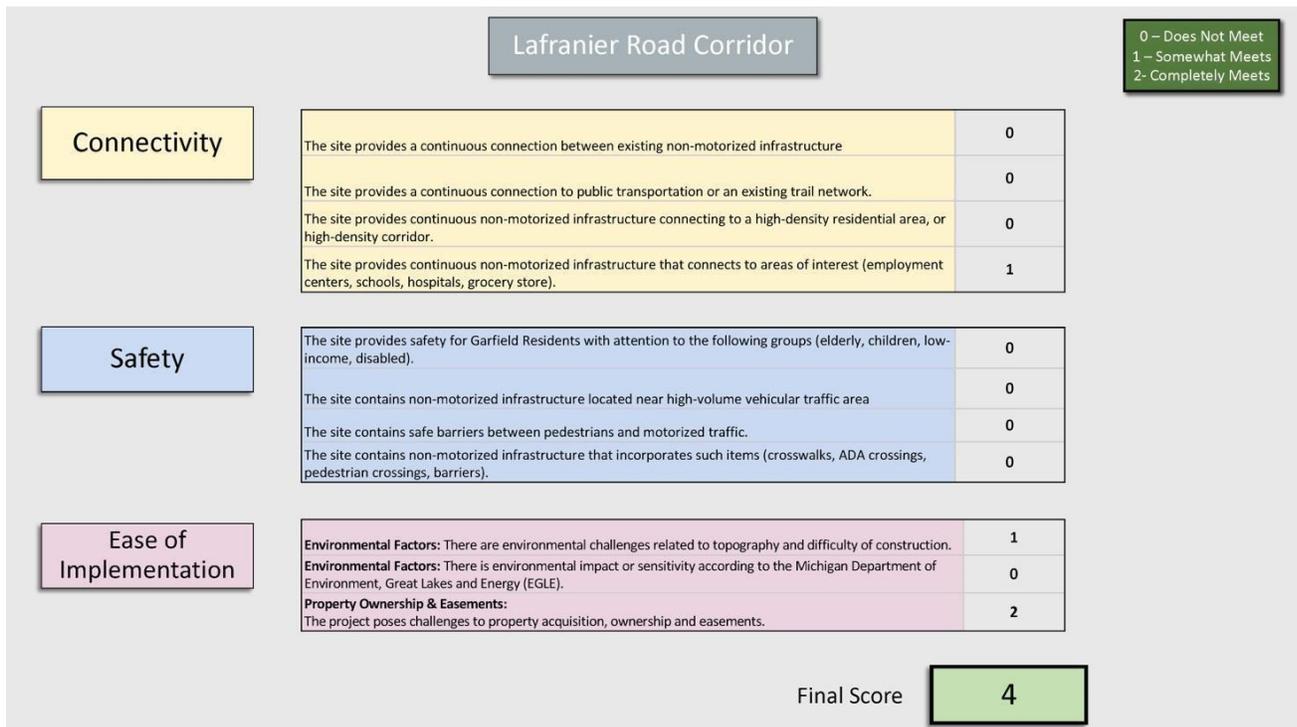


Figure 9: Lafranier Road Scoring

South Airport Road Corridor from Barlow to Boardman Lake Loop

Connectivity:

We measured connectivity east to west along South Airport Road between Barlow Street and Park Drive. This study segment is shown on map 11. It was identified as a high priority site during our phase 1 prioritization ranking due to its high population and residential density. This corridor exists within quadrant E4 (shown in map 10), which is a key linkage for the dense residential areas along Barlow Street and Lafranier Road and could connect both areas to public transportation links and the Boardman Lake Loop with non-motorized infrastructure. The Boardman Lake multi-use non-motorized loop is a point of interest and serves as a nexus connecting to many important destinations. This can be seen on map 5, where there are dense areas of interest shown in quadrant D4. The corridor has gaps in sidewalks and provides some connectivity to public transportation and existing trail networks but does not have a continuous connection of sidewalks or shared-use paths between residential areas, points of interest or public transportation. The connectivity score shown in figure 10 indicates the corridor is currently not meeting ideal standards of connectivity.

Safety:

The South Airport Road corridor is classified as a major arterial road with average annual daily traffic (AADT) of 38,428 according to 2021 MDOT (Michigan Department of Transportation) data. This is the busiest corridor in the township. The study segment partially met the criteria our team measured for safety. There are sidewalks along 50% of both the north and south side of the corridor. With this existing built infrastructure, it was determined the corridor met part of the safety standards we considered. There are sidewalk segments that end and need to be connected to be safe especially for elderly and disabled persons. There were crosswalks at every intersection but required repainting. Along the road we counted four curb cuts on the north side and six on the south side along with a railroad crossing on both sides of the road. These are safety areas that need to be considered when planning non-motorized infrastructure. The high volume of traffic along this road suggests a need for a protected off-road multi-use path at least six feet wide to be ADA compliant, preferably 10 feet wide to allow several types of users to either pass by or walk alongside.

Ease of Implementation:

This segment found within the E4 quadrant on map 10 shows a high amount of existing infrastructure that is fragmented and could be better connected. Based on our ease of implementation scoring method this area partially met criteria measured for environmental factors. There is a steep decline west of Park Drive that is also very narrow. This is an environmental challenge therefore we determined it partially met our standards. We determined there was no environmental sensitivity between Barlow Street and Park Drive, which explains its score in figure 10. Grand Traverse County Road Commission controls the right of way along South Airport Road. Therefore, we scored property ownership and easements at a 1 out of 2, indicating that there could be challenges in installing infrastructure.

Figure 10 shows the combined final score for this section of South Airport Road. The final score combining the scores of connectivity, safety, and ease of implementation was 7 out of 22.

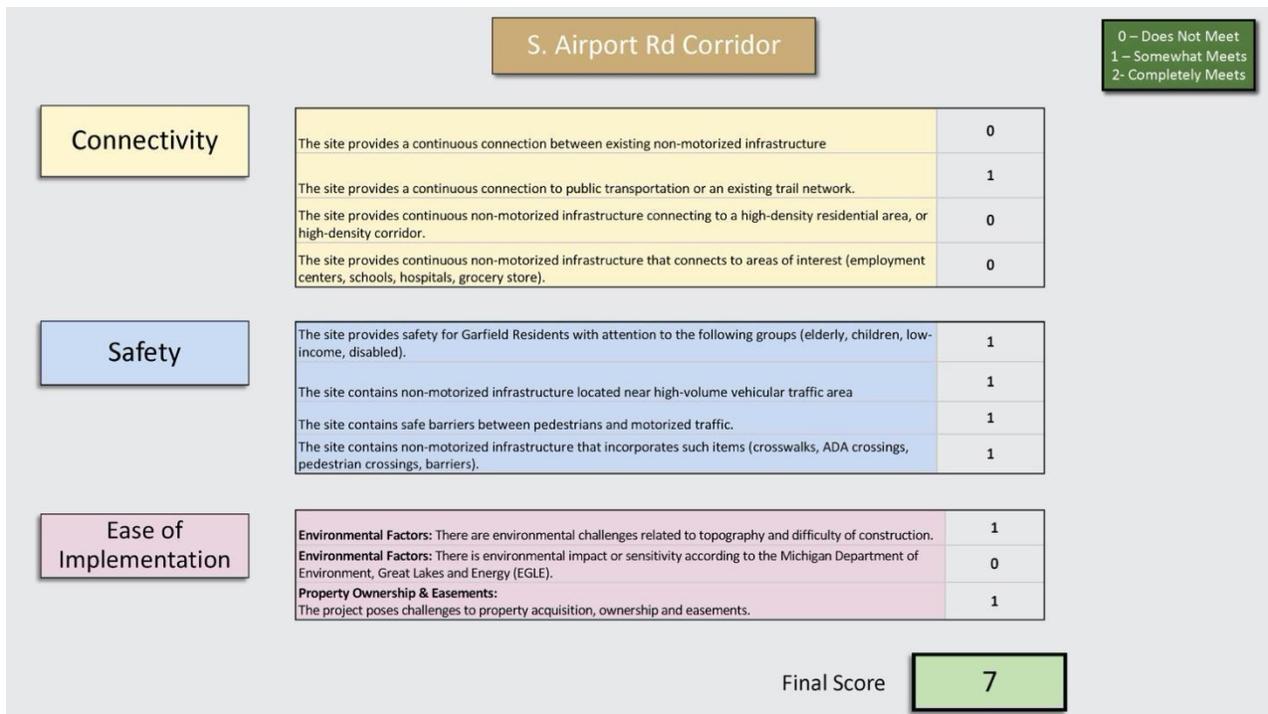


Figure 10: South Airport Road Scoring

Mall Trail to Miller Creek Corridor

Connectivity:

The Mall Trail to Miller Creek study area is a .5-mile stretch that runs east to west along South Airport Road (shown in map 11). The two important connection points are Miller Creek Trailhead behind the Aldi parking lot and the US 31 North and S. Airport Road intersection. The proposed area is in a gap between the Garfield Township Mall Trail and Garfield Township Mill Creek Trail. A cluster of areas of interest were represented in our density map in quadrant C5 (shown in map 5). This dense commercial corridor ranks in the highest overall density quintile and has several businesses, a grocery store, and multiple restaurants. The study area currently does not provide continuous access to the cluster of areas of Interest including the Emerald Creek apartments, the Chelsea Park Condominiums, and Liv Arbor Apartments behind the Aldi. Therefore, we measured the connectivity score on this site with an overall ranking of 0, indicating that it is currently not serving connectivity needs of the community.

Safety:

South Airport Road is a major arterial road. According to MDOT, its Annual Daily Traffic Count (AADT) was 23,829 in 2021 (MDOT 2022). This is one of the highest AADT counts in Garfield Township. The corridor is located along quadrant C5 & C6, which rank in the highest quintile for families living below poverty. Furthermore, quadrant C5 & C6 rank in the 4th quintile in the overall equity score. This study area currently has no pedestrian infrastructure or barriers between pedestrians and motorized traffic along South Airport Road. There are currently three business entrances/exits eastbound along South Airport Road with no crosswalks. Pedestrians are currently walking outside of the guardrail at South Airport Road. Furthermore, there is a steep drop off making the current social trail unsafe to use. Therefore, we have measured the safety score on this site with an overall ranking of 0, indicating that it is currently not serving the community's safety needs.

Ease of Implementation:

Ease of implementation considers the difficulty in property ownership and environmental factors that the site faces. There is minimal to no elevation change on the project site, and there is minimal to no environmental impact to installing pedestrian infrastructure along the

project site. Garfield Township owns a parcel of land along South Airport Road starting at the guardrail curve leading to the Aldi Parking lot and Miller Creek Nature Reserve’s trailhead. The Grand Traverse Commerce Center & the Garfield Township Condo Association own the parcel adjacent. Furthermore, two privately owned parcels are next to the US 31 intersection (Hoogland Keith Limited Partnership & True North Energy LLC). This poses some challenges to installing non-motorized infrastructure on the site as it would involve coordinating multiple stakeholders. Therefore, we have measured the ease of implementation score on this site with an overall ranking of 2, indicating that there may be some challenges to the ease of implementing non-motorized infrastructure.

In figure 11, the overall score for phase 2 is shown, combining connectivity, safety, and ease of implementation. The overall score is a 2 out of 22. This is the lowest score of all priority sites. Therefore, the Mall Trail to Miller Creek site has a high priority for future non-motorized infrastructure.

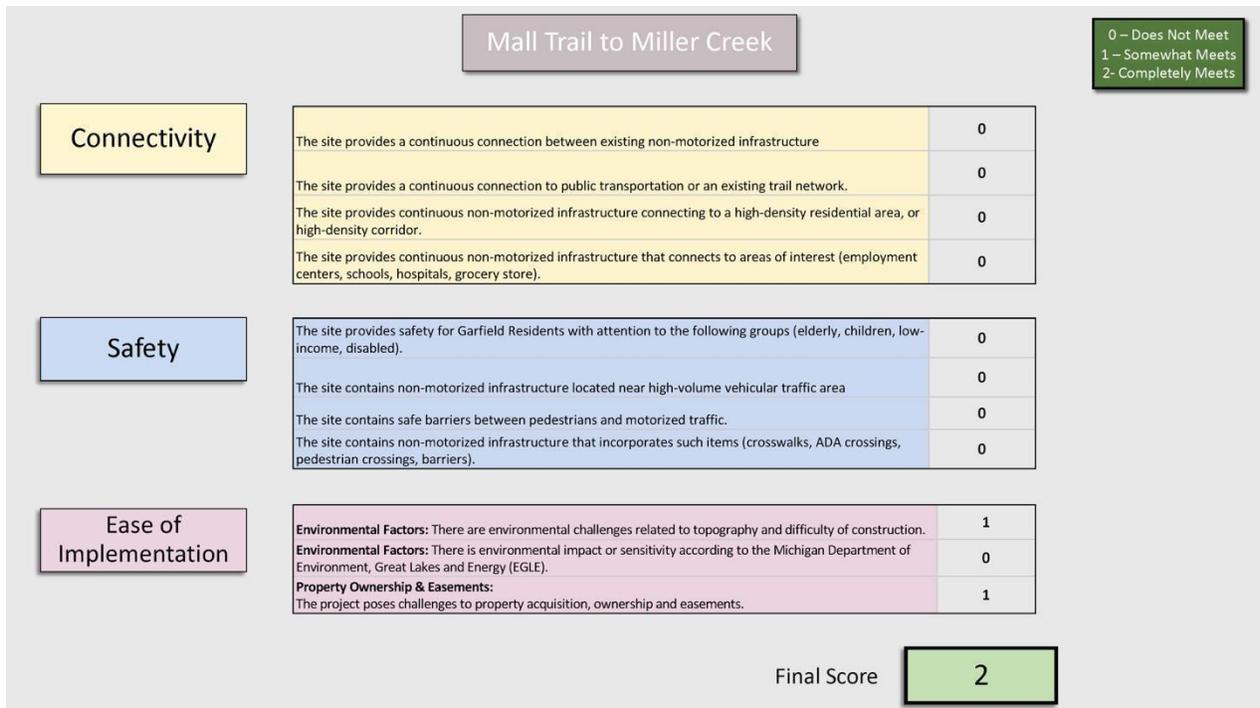


Figure 11: Mall Trail to Miller Creek Scoring

Chapter 4 – Comparable Communities

Purpose of Case Studies

Developing our method for prioritization involved analyzing other Michigan township's non-motorized transportation plans. We studied what factors they used to determine, prioritize, and implement projects following adoption of their non-motorized plans. We identified five townships whose non-motorized transportation plans include factors for prioritization. Our group used similar criteria to prioritize and map specific geographical areas of Garfield Township to consider when implementing future non-motorized infrastructure.

Comparable Communities

We selected Michigan townships that have demographics that are like Garfield Township's. The following statistics were based on 2020 and 2015-2019 US Census data. Delta and Ypsilanti Township's substantial differences in population were due to their proximity to major universities (figure 11).

	Dewitt Township	Delta Township	Kalamazoo Township	Oshtemo Township	Ypsilanti Township	Garfield Township
Population	15,073	33,119	22,777	23,747	55,670	19,499
Population >=65yo	18%	19%	13.6%	19.5%	10.9%	22.3%
Owner occupied housing	79.5%	62.7%	64.3%	52%	57.8%	59.6%
Median home value	176,600	173,500	107,800	212,100	155,600	190,300
Median gross rent	813	926	896	804	940	529
Education BA or higher	34.1%	40.6%	35%	47.3%	33.2%	32.8%
<65yo with disability	10.1%	11%	11.1%	8.8%	10.7%	9.8%
% Workers =>16yo in labor force	62.9%	65.4%	68.1%	63.5%	69.9%	61.4%
Mean travel time to work	21.9	18.8	20.4	19.7	25.7	15.7
Median household income	66,213	67,930	54,158	49,591	54,232	50,372
% Population in poverty	7.6%	8.2%	15.8%	13.5%	15.2%	14.5%

Figure 12: Case Study Comparisons

Using these townships as examples assured that our group considered key factors when creating the prioritization method. Our goal was to make a template to be used for creating sensitive mobility options that fit surroundings, are continuous, safe, and well used.

These townships' examples helped guide our project. They had current non-motorized transportation plans with their assets highlighted and clear prioritization methods that displayed their non-motorized implementation plan. Their prioritization matrix required an inventory of all existing infrastructure that included coordinating stakeholder input to strategize where to build their non-motorized networks.

- Based on other townships, what factors are important to represent on our maps created for Garfield Township?
- What geographical areas stand out once key factors were determined and mapped out?

Inventory of Existing Conditions

All five townships inventoried and quantified their existing sidewalks, shared use paths, bike lanes, wide shoulders, and gaps. Delta Township's non-motorized transportation plan listed future proposed infrastructure, followed by a summary of existing infrastructure. Delta, Ypsilanti, and Kalamazoo Townships divided their townships into sections and mapped all existing paths, scoring them based on a weighted system to identify projects that scored highest. In addition, the studied townships used a pros and cons analysis to identify the greatest opportunities for non-motorized improvements.

Figure 12 shows common factors of implementation which include connectivity, safety, ease of implementation, and cost. These factors were important in the development of the Townships' non-motorized transportation plans.

	Kalamazoo Township	Delta Township	Dewitt Township	Ypsilanti Township	Oshtemo Township
Connectivity					
Closes gaps in existing facilities improves continuity	Y	Y	Y	Y	Y
Connects to regional network, essential link	Y	Y	Y	Y	Y
Project creates connections between different modes (bus, rail, boat)	Y	Y	Y	Y	Y
Serves special groups e.g., elderly, youth, disabled, low-income	Y	Y	Y	Y	Y
Provides access to destination (shopping, employment, residential development, schools, recreation, connects adjacent neighborhood)	Y	Y	Y	Y	Y
Area considered < 1 mile from healthcare, bus stop, park, school, food store, Govt. service, popular destination	Y	Y	Y	-	-
Connects high household density areas to transit stops, stores, recreation areas, schools, transit stops	Y	Y	Y	Y	-
Safety					
Improves safety for special groups (elderly, youth, low-income, disabled)	Y	Y	Y	-	Y
Improves a known safety issue	Y	Y	Y	Y	Y
< 1 mile from schools	Y	Y	Y	Y	-
Improves routes that have high vehicle traffic AADT and provides alternative routes	Y	Y	Y	Y	-
Remedies traffic congestion and dangerous intersections	Y	Y	Y	Y	-
Easy to Implement					
zoning ordinance requires developer to include NMTP in site plan	-	Y	Y	-	Y
Quantifies number of completed projects since adoption of their NMTP	Y	Y	Y	-	-
Listed in master plan, rec plan, NMTP, complete streets ordinance	Y	Y	Y	Y	Y
Can be implemented without complex right of way acquisition, cost, intense design features, environmental permits	Y	Y	Y	Y	Y
Funding can be identified and/or acquired	Y	Y	Y	Y	Y
Minimal environmental challenges	Y	Y	Y	-	-
Strong local support (township residents)	Y	Y	Y	Y	Y
Costs					
Road corridors part of capital improvement program (CIP)	Y	Y	Y	-	Y
Opportunity to piggy-back off road commission projects and reduce cost	Y	Y	Y	-	Y
Easements	Y	Y	Y	-	Y
Donations of land	Y	Y	Y	-	-
Leases	Y	-	Y	-	-
Funds for acquisition	Y	Y	Y	-	-
NMTP allows for grant scoring potential (state and federal)	-	Y	Y	-	-
Grants or cost sharing	Y	Y	Y	Y	Y
Low annual maintenance	Y	Y	-	-	Y
Designate shared use paths as township properties, allow township management and access	-	Y	-	Y	Y

Figure 13: Comparable Communities Checklist

Feedback from the community and stakeholders was important in each of the five different plans reviewed. All townships had strong local support for non-motorized mobility shown by results of their community surveys and focus groups. Most of these townships branded themselves as active transportation-friendly townships and have restructured their zoning ordinances to require built environments for walking and biking. They also recommended townships review zoning ordinances to ensure pedestrian-friendly policies where developers were encouraged to implement non-motorized facilities as part of their larger developments (Kalamazoo, 18). Non-motorized facilities are amenities that increase home values, sell building sites based on walkability scores, improve future land use (Dewitt, 24), and reduce vehicle miles traveled.

Connectivity

Figure 12 shows that connectivity is an important determinant of building non-motorized infrastructure. Connectivity and continuity between non-motorized facilities increases the likelihood residents will choose to walk or bike. When gaps are closed between existing facilities and links to regional networks (Dewitt, 19) more people will choose active alternatives to driving. Creating connections to different transit modes like public transit is also an essential aspect of connectivity. Complete non-motorized built environments are continuous, safer, predictable, and link residential areas to important destinations like schools, work, and commerce centers. Orphaned significantly decrease willingness to choose biking and walking over driving (Dewitt, 45). Non-motorized Infrastructure can also impact vehicular traffic capacity by reducing traffic congestion.

Neighborhoods can be connected using available utility easements. During review of new residential and commercial developments, it is recommended sidewalk design includes connectivity between adjacent parks, schools, residential communities, and commercial centers to provide access to multiple destinations and points of interest. In our study of comparable townships, we found high density residential areas that serve special populations and are close to essential destinations like schools were given the highest priority for improving non-motorized Infrastructure. For example, Dewitt Township is prioritized by proximity based on either a 5-to-10-minute walk or bike to a destination.

Safety

The five comparable townships prioritization criteria emphasized the need to promote available non-motorized routes and educate the public about the benefits and importance of non-

motorized transportation. They included goals to construct sidewalks along their primary and other busy roads.

The townships suggest providing evidence and tools to address the need for non-motorized transportation planning to make streets more multi-modal, referred to as Complete Streets. People want to walk both within and safely outside of their residential development. Building non-motorized facilities improves unsafe areas and makes helps them accessible to people with disabilities, which would benefit the 9.8% of Garfield Township residents that are both disabled and 65 years old or younger.

Ease Of Implementation

Taking inventory of all existing infrastructure, public easements, and rights-of-way like railway corridors that are easy and inexpensive to acquire and utilize was the highest importance in Dewitt Township. Delta Township recommended acquiring more properties and utility easements, as a review of utility easements identified opportunities to use them for non-motorized transportation facilities.

Dewitt Township has implemented 17 out of 60 prioritized projects from their 2013 non-motorized transportation plan. In 2015, Kalamazoo Township implemented substantial infrastructure improvements: fixed orphaned sidewalks, increased bicycle routes, spot repaired sidewalks, and added three miles of new sidewalk along primary and roads with high Annual Average Daily Traffic (AADT).

Cost

A frequent element in the townships' prioritization matrix was future development of parcels and holding developers responsible for installing sidewalks and trails through new zoning ordinances. Townships suggested guiding developers to encourage mixed-use and compact development and regulating policies to implement sidewalks when development occurs (Dewitt, 25). These regulations also need to be enforced.

Pedestrian and bicycle accommodation should be identified early in the site planning process to coordinate existing transportation efforts with any proposed developments. Consideration of operation and maintenance costs are important when deciding where to create built environments for biking and walking. Capital Improvement Planning (CIP) helps with maintaining infrastructure, trails, and corridors. This is an opportunity to seek funds through

available grants. The Transportation Alternatives Program (TAP) is the largest Federal program for non-motorized infrastructure that includes Safe Routes to School (SRTS) and Transportation Enhancement (TE) which are applied for and distributed through MDOT. These programs also require collaboration with the county road commission. ACT-51 is an MDOT funding source that distributes revenue to the county road commission which can be used for non-motorized infrastructure. Figure 13 lists the most common funding the comparable townships used in their non-motorized transportation planning.

	<i>Kalamazoo Township</i>	<i>Delta Township</i>	<i>Dewitt Township</i>	<i>Ypsilanti Township</i>	<i>Oshtemo Township</i>
Largest Sources of Potential Funding					
Federal Programs					
Federal Grants	PG. 2&37	PG.32	PG.62		PG.5-11
Federal Highway Administration Programs(FHWA)			PG.62,64		KATS
Federal Transit Administration Programs(FTA)			PG.62,67		KATS
Congestion Mitigation/Air Quality (CMAQ)	PG.37	PG.34	PG.62	PG.79	KATS
Transportation Alternatives Program (TAP) Grants	PG. 3&36	PG.33	PG.62	PG.79	
Transportation Enhancement Activities (TEA)		PG.34	PG.62	PG.79	
Safe Routes To School (SRTS)	PG. 2&36	PG.34	PG.38	PG.79	PG.5-11
National Recreational Trails Fund			PG.63		
MAP-21	PG.3	PG.38	PG.62	PG.79	
Land and Water Conservation Fund(LWCF)	PG. 36	PG.32		PG.80	
National Scenic Byways Program			PG.63		
Small Urban Program					
Rural Task Force Program					
Bikes Belong Fund	PG. 37	PG.36	PG.70		
Energy Efficiency and Conservation Block Grant (EECBG)		PG.35			
Recreational Trails Program(FHWA)			PG.63	PG.79	
State Programs					
State Grants	PG. 2	PG.32	PG.62		PG.5-11
Michigan Department of Transportation(MDOT)	PG.6			PG.79	PG.5-11
State Infrastructure Bank (SIB)					
Michigan Natural Resources Trust Fund(MNRTF)	PG. 36	PG.32	PG.68	PG.80	
Recreation Passport Grant		PG.33	PG.69		
Section 10K of Public Act 51 1951	PG.11	PG.35	PG.67	PG.79	PG.5-11
Dalmac Fund	PG. 37	PG.36	PG.70		
Local Programs					
Local Utility Leases		PG.36	PG.69		
Local Foundation Grants	PG. 2	PG.34	PG.68		
General Fund	PG. 2&35				PG.5-11
Millage Bond Assessments	PG. 3&35	PG.36	PG.69		
DDA					PG.5-11
Partnered with City if shared borders	PG. 3	PG.38	PG.11		PG.5-11

Figure 14: Potential Funding Sources

When a township seeks easements for public use, such as utilities and maintenance, it is recommended that they attempt to include a provision in the easement agreement to allow for recreational use or future trail construction within that easement. Acquisition of all public

easements and rights of way like railway and utility corridors are an easy and inexpensive way to use land for non-motorized transportation upgrades (Kalamazoo, 18). In addition, utilizing township land and existing pathways can reduce costs.

Other townships mandate their road commission to create non-motorized facilities in future road reconstruction and improvement projects. If road construction occurs, installing sidewalks and bike infrastructure becomes much easier. Shared lanes, also known as ‘Sharrows’ reduce costs and enhance environments for active transportation. This can be accomplished if it coincides with road resurfacing projects where MDOT or the county road commission incorporate non-motorized facilities into upcoming road reconstruction and improvement projects (Kalamazoo, 18).

Examples of Road Commission and Township Planning Collaboration

The following examples are from Delta and Dewitt Townships’ non-motorized transportation network. Road commission engineers, township managers, and planners were asked how they secure funding for their non-motorized infrastructure projects. The goal was to understand how townships collaborate with road commissions for getting non-motorized facilities included in road improvements. Collaboration between townships, road commissions and their engineering departments are necessary to secure funding opportunities that combine road improvement projects with non-motorized infrastructure. The following examples show how two Michigan Townships collaborated with their county road commissions to secure available non-motorized transportation project funding.

Dewitt Township

The Clinton County Road Commission works closely with Dewitt Township to construct walking and biking paths throughout Dewitt Township along with all roadway projects, meaning two projects can be combined into one. Funding can be challenging for their road commission; therefore, townships bring money to the table from Transportation Alternatives Program (TAP) and Safe Routes to School (SRTS) funding along with township tax revenue and millage. One example is the Herbison Road corridor, where funding was provided by the Federal Highway Administration and Michigan Department of Transportation. By working closely with the Clinton County Road Commission, Michigan Department of Transportation, and the City of DeWitt, Dewitt Township identified funding opportunities to leverage limited Township resources. The Township received over \$2,319,282 million to help pave roads and to add sidewalks/pathways in multiple areas in their Township (Dewitt, 11).

Delta Township

The Eaton County Road Commission has consistent quarterly meetings with the Delta Township Planning Department. Their open dialogue allows for collaboration within upcoming projects. For example, any road new road projects get sidewalks and non-motorized infrastructure upgrades. According to their Assistant Road Engineer, a ten-year project was completed in under three years based on project alignment between the road commission and township.

Due to having a population of over 50,000, Delta Township is part of a Metropolitan Planning Organization (MPO), in its case, the Tri-county Regional Planning Commission. They are required to have a Transportation Improvement Program (TIP) every 4 years which lists short-range projects as part of their overall Long-Range Transportation Plan (LRTP). A TIP provides opportunities for federal and state funding of non-motorized facilities as part of road projects. TAP and the Congestion Mitigation and Air Quality (CMAQ) Program provide grants with matching funds from the township.

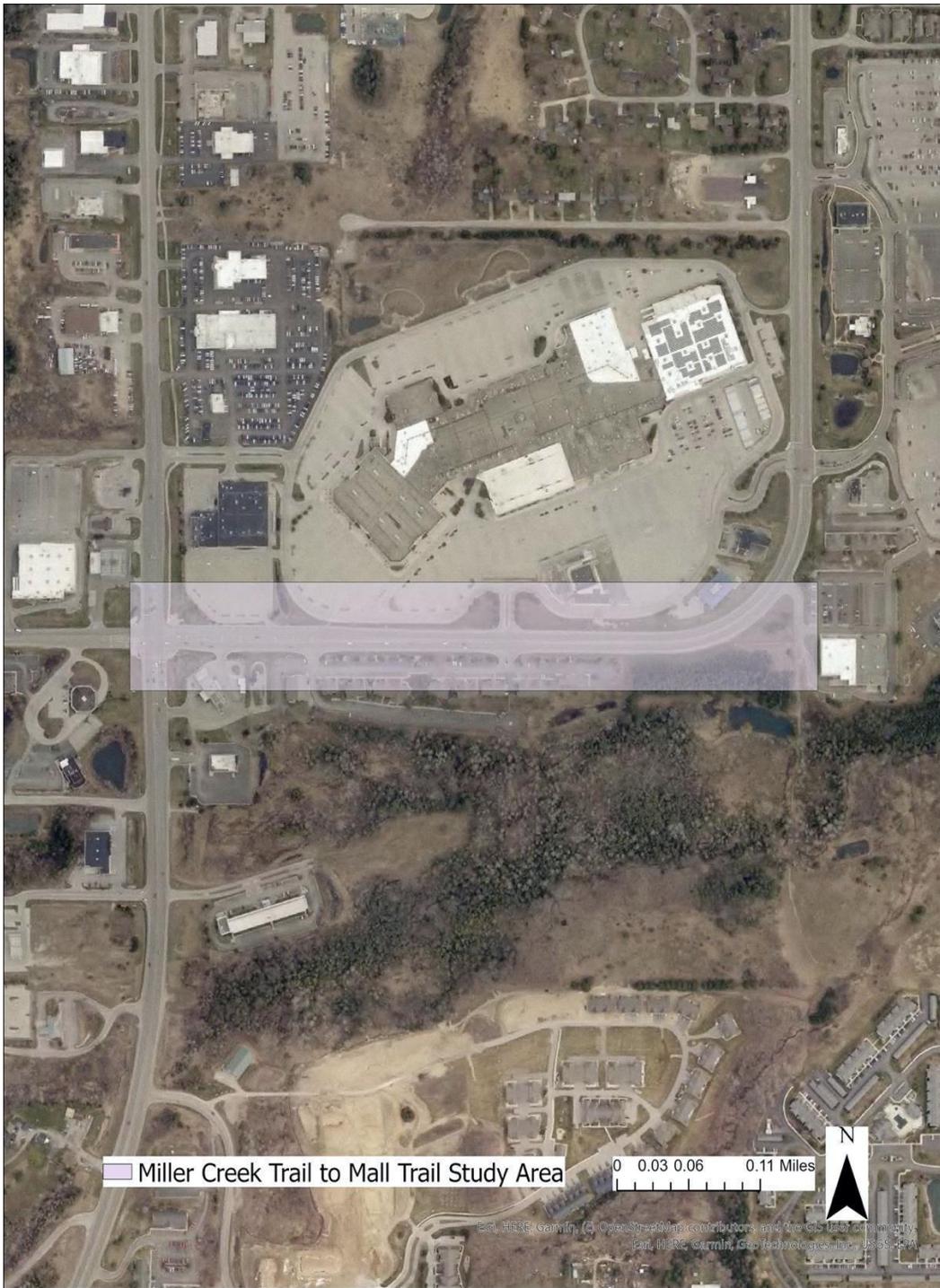
Chapter 5 – Recommendations

Introduction

The following chapter is broken into two separate sections, Near-Term Priorities and Other Areas for Consideration. The Near-Term Priorities section provides a set of planning recommendations for the three priority areas identified in Chapter 3 (Mall Trail to Miller Creek Trail Corridor, South Airport Road Corridor from Barlow Street to Boardman Lake Loop). We have provided recommendations and action steps to improve the connectivity, safety, and ease of implementation of the priority areas. The Other Areas for Consideration section includes additional areas in Garfield Township for future non-motorized infrastructure improvements. Due to the time constraints of this project, we did not score the other areas for consideration. However, we would encourage Garfield Township planners to consider these areas and score them using our method for prioritization.

Near-Term Priorities

Mall Trail to Miller Creek Trail



Map 12: Mall Trail to Miller Creek Study Area

Overview

Based on our phase 1 scoring of density, equity and current infrastructure, the Miller Creek to Mall Trail study area along South Airport Road was identified as an area of interest. Installing non-motorized infrastructure along the site would serve as an essential connection for Garfield Township residents. The Mall Trail runs 2.5 miles along US 31 from South Airport Road to 11th Street in Traverse City. However, no non-motorized infrastructure connects the Miller Creek Trailhead to the Mall Trail. Field observations and Strava data show social paths along the project site, indicating that people are currently using this corridor despite having no infrastructure.

The study site is along South Airport Road, a major arterial road with high AADT counts in 2021 and a speed limit of 45 mph. Currently, this study area has no infrastructure or barriers between pedestrian and motorized traffic along South Airport Road, and there are three business entrances/exits eastbound along South Airport Road with no crosswalks. Pedestrians are currently walking outside of the guardrail along South Airport Road, as shown in images 4 and 5, where there is a steep drop off. In addition to the speed and high traffic volume, this makes the current social trail unsafe for Garfield Township residents, particularly to children, elderly, and the disabled.



Image 4: Current Lacking Pedestrian Infrastructure



Image 5: Social Trail Between Miller Creek Park and South Airport Road

Suggested Improvements

Connectivity

- ***Consider installing non-motorized infrastructure along South Airport Road between Mall Trail and Miller Creek Trail to increase connectivity for Garfield Township residents.***

Installation of ADA compliant multi-use paths would be preferable on both sides of South Airport Road; however, the priority would be along the south side of the street as this would connect the Mall Trail to the Miller Creek Trailhead along with the apartment complexes, businesses, grocery store, and BATA bus station at GT crossing. The social path shown in image 5 indicates pedestrian use from South Airport Road to these areas. According to Garfield Township's interactive map, the section shown in image 5 is currently owned by the Township, which would involve no property acquisition.

Safety

- ***Improve and increase visibility of pedestrians' by installing signage, crosswalks, and lighting strategically along South Airport Road***
 - Consider installing painted crosswalks along business entrance/exits
 - Consider installing signage to indicated crossings along business entrance/exits
 - Consider installing an ADA compliant multi-use path along this corridor

Signage lets the community know that the Township and County value the safety of non-motorized transportation. As such, consider installing non-motorized signage along South Airport Road, including wayfinding signage that helps guide and connect pedestrians, rollers, and cyclists to cultural, natural, and retail sites. In addition to wayfinding signage, consider installing signage for indicated crossings along business ingress/egress.

There is currently street lighting along South Airport Road, but a future consideration would be the use of warm LED (Light Emitting Diode) lighting, which eliminates glare and light trespass and reduces illumination levels to save energy and money (Parks, 2014). A long-term goal for Garfield Township may be to adopt a community outdoor lighting standard using the IDA/IES Model Lighting Ordinance (MLO).

Enhancing physical barriers between non-motorized and motorized traffic also increases safety. We recommend installing an ADA compliant multi-use path along this corridor. This would increase safety, as the corridor is a major arterial road with high AADT counts and a speed limit of 45 mph. There are 3 business entrances/exits along the study site used by high speed and volume traffic off South Airport Road. In conjunction with crossing signage, painted crosswalks along the ingress/egress would enhance visibility of non-motorized traffic.

Ease of Implementation

- ***Apply for available funding by coordinating efforts with Grand Traverse County Road Commission and private property owners (See figure 13 for a list of federal, state, and local funding).***

Garfield Township owns approximately 1/5 of this .5-mile section. However, the rest of the section has private ownership. In addition, South Airport Road is controlled by the Grand Traverse County Road Commission. To receive Federal or State funding for non-motorized infrastructure along this section of South Airport Road, Garfield Township should work with the Grand Traverse County Road Commission to coordinate any upcoming road projects.

South Airport Road from Barlow Street to Boardman Lake Loop



Map 13: South Airport Road Study Area

Overview

The studied section along South Airport Road is an area of interest based on our demographic analysis. It is a high-density residential and low-income area with a high percentage of children under 18 years old. According to the Grand Traverse County Road Commission, this road segment is classified as a major arterial road. It has non-motorized infrastructure in the form of four-foot (4') concrete sidewalks along approximately 50% of the north side of the road section we studied. Our walk of the site revealed sidewalk segments that end without continuation (orphaned sidewalks.) The south side of our study area between Barlow Street and Park Drive appears to be a soil surface social path with regular foot and bike traffic evidence. Overall, there are sidewalks along 50% of the south side of the road. Based on current AADT and speed along this study section, protected and/or separated sidewalks are recommended for both sides of the road.

- There are four curb cuts or business barriers along the north side of our study area and six along the south side. There is one railroad crossing on each side of the road.
- Crosswalks are present at all studied intersections and include ADA texture pads. The crosswalks are difficult to see and need to be repainted to alert drivers to the crosswalk and calm traffic.
- BATA normally has two stops along this corridor. Service along this section of South Airport Road has been suspended at the time of this report.



Image 6: Social Path vs. Paved Sidewalk

Suggested Improvements

The most cost effective non-motorized transportation improvement to serve residents who walk and bike along this corridor includes paint and signs. These easy to implement improvements to existing built infrastructure that could encourage residents and others to recognize South Airport Road as a walk and bike-friendly corridor.

Connectivity

- ***Increase connectivity for Garfield Township residents by installing non-motorized infrastructure along South Airport Road to Boardman Lake Loop***
 - Consider installing an ADA compliant 6'-10' multi-use path along this corridor
 - Fill in the orphaned sidewalk in addition to the previously recommended signs, benches, bike racks, and transit stops.
 - Consider installing off-road protected walking and bike facilities e.g., separated sidewalks and shared use paths are recommended along this section.

Sidewalks and the connectivity they offer to the Boardman Lake Trail, access to nearby parks like Miller Creek Nature Preserve and the Boardman River Trail can increase quality of life for Garfield Township residents. Based on South Airport Road's AADT of 38,428 and a posted speed limit over 35mph. The outcomes of the project would fill physical gaps, improve connectivity, and create connections to public transportation that could potentially increase bus ridership and reduce traffic congestion. Completion of this project along South Airport Road would provide direct access to areas of interest around the Boardman Lake Trail like business centers, The University Center, and Traverse Area District Library. Connecting Barlow Street to Boardman Lake in ways that are ADA compliant with 6-foot side-paths and well-marked crosswalks will improve safety for special groups like elderly, disabled and children.

Safety

- ***Improve and increase visibility of pedestrians' by installing signage, repainting crosswalks, and adding strategic lighting***
 - Repainting all crosswalks at intersection
 - Include both traffic calming and wayfinding signs are the least expensive forms of non-motorized infrastructure improvements and follow National Association of City Transportation Officials (NACTO) guidelines.
 - Slightly more expensive options, but still reasonably easy improvements could include new benches and bike racks.



Image 7: Example of a Painted Crosswalk

Ease of Implementation

- ***Consider applying for Safe Routes to School (SRTS) grant funding***
 - Safe Routes to School (SRTS) a federal program managed by MDOT that can provide funding to communities that want to address safe and convenient routes for children to bicycle and walk to school.
- ***Use community engagement-measures to garner interest and sense of urgency from community***
 - Community engagement can be used as a necessary step to generate excitement for future projects as well as to understand the needs of the community. Consider support from neighborhood associations, non-profits, or local stakeholders to help initiate engagement.

Lafranier Road Corridor



Map 14: Lafranier Road Study Area

Overview

The studied section along Lafranier Road is a priority area for new infrastructure due to the high volume of residents and new housing developments. There is only one sidewalk that has been finished along the west side of the road, and the corridor needs additional connectivity. The intersection of Lafranier Road and South Airport Road at the north side of the study area also has poor overall connectivity, with a large hill just south of the intersection bearing no sidewalks on both the West and East side of the road, only paved shoulders. Image 9 shows a lone sidewalk. The crossing at the furthest north point of the corridor is at the intersection of South Airport Road and Lafranier Road and is fitted with updated pedestrian crossing buttons and ADA textured pads. However, this intersection has faded crossing paint, making crossing hazardous. The shoulder pictured in image 8 gives enough space for people to walk on the east side of the road. During the site visit, several pedestrians were observed using the lacking infrastructure.

- There are currently 20 curb cuts on the west side of Lafranier Road and six on the east side of the road.
- There are six bus stops in the area studied of this road. The bus stop on the east side does not align parallel to the rest of the sidewalk. The bus stop located on the west side of the road does not connect to a sidewalk, and experiences flooding, as shown in image 10.



Image 8: Paved Shoulder on Lafranier Road



Image 9: Sidewalk Along Lafranier Road

Suggested Improvements

Connectivity

- ***Improve connectivity by installing non-motorized infrastructure along Lafranier Road.***
 - Fill in empty sidewalk gaps by installing new infrastructure along Lafranier Road.
 - Coordinate with BATA to improve bus stop infrastructure to mitigate flooding
 - Installing sidewalks along the entirety of Lafranier could better the overall connectivity for residents.

Finishing the orphaned and unfinished sidewalks would be highly beneficial for township residents. Garfield Township code requires the construction of sidewalks in new development areas, which will aid in this process. Ideally, safe sidewalks leading to BATA transportation sites and protected bus stops would be the best fit for the corridor. Currently, one of the bus stops is prone to flooding, which inhibits access. Therefore, we recommend coordinating with BATA to protect infrastructure which would increase the likelihood of pedestrians and residents desire to use the non-motorized pathways and BATA transportation system.

Although the aim of this report is to inform on non-motorized infrastructure, to assist in the usage of said infrastructure, we suggest that the condition and usage of public transportation be improved to diversify means of transportation. This can be accomplished by improving the quality of the BATA (Bay Area Transportation Authority) stops along the route, with shelters and cut ins along the street, as suggested in images 11 and 12.

Safety

- ***Improve and increase visibility of pedestrians' by installing signage, repaint crosswalks, and add lighting along Lafranier Road.***
 - Repaint the crosswalk at Lafranier Road and Hammond Road intersection, as well as Lafranier and South Airport Road intersection.
 - Consider installing pedestrian crossing signage at the South Airport Road intersection.
 - Consider traffic calming measures such as trees, shrubs and greenery between sidewalks and roads, Barricades between drivers and pedestrians.

Adding signage would also benefit Lafranier Road since it is a high-volume, high-speed traffic area at 55 mph. In addition to adding signage, repainting the crosswalks would improve the

safety of pedestrians in a cost-effective way. With the increased number of residential zoning and development taking place along the site, encouraging improved pedestrian usage can alleviate potential future traffic problems that come from higher-density residential developments. This goal can be achieved through several means such as enhanced public transportation, non-motorized infrastructure, and traffic calming measures.

Traffic calming measures are suggested to solve high-speed limits through the corridor. Barricades between drivers and pedestrians and painted lines and/or street trees are recommended to assist in this goal. Implementing crosswalks and corresponding yield signs wherever necessary can ease crossings.

Ease of Implementation

- ***Coordinate with Grand Traverse County Road Commission and the Bay Area Transportation Authority (BATA) & Developers***
 - Coordinate plans with future developers along corridor to insure uniform sidewalks along Lafranier Road.
 - Coordinating with the Bay Area Transportation Authority (BATA) to promote safe bus stop infrastructure. Although BATA would decide on installation of bus stop infrastructure, we recommend lobbying, building partnerships as well as creating cost-sharing agreements.



Image 10: Flooded Bus Stop Along Lafranier Road



Image 11: Improved Infrastructure Idea for Lafranier Road



Figure 15: Improved Bus Infrastructure Idea for Lafranier Road

Other Areas for Consideration

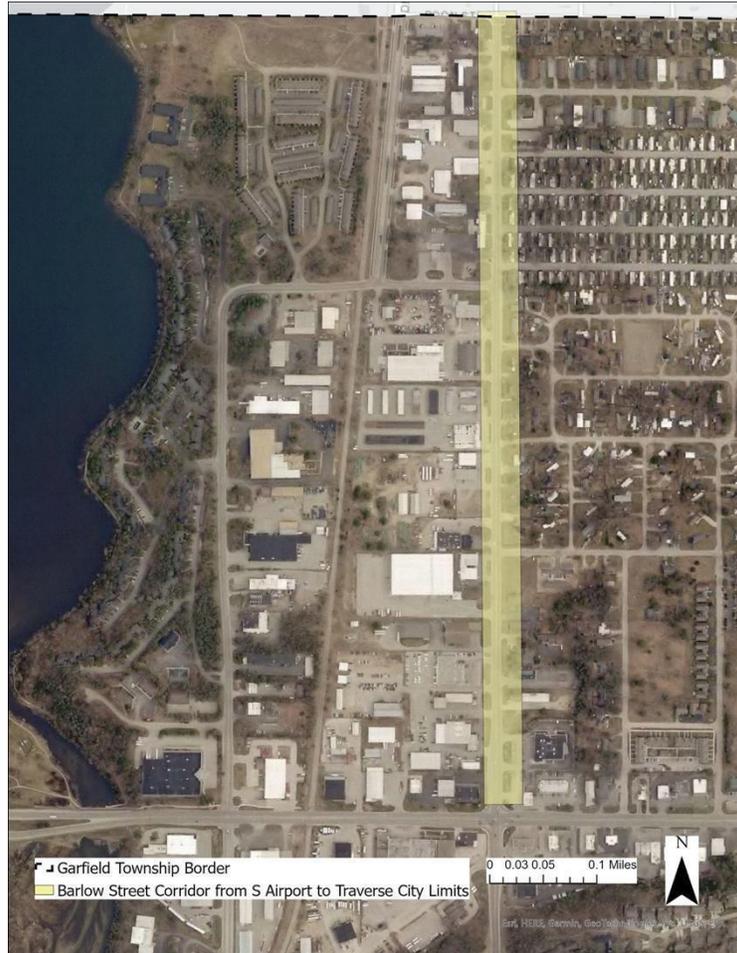
West Middle School to West Senior High School



Map 15: West Middle School to West High School Focus Area

Bringing connections between schools within the Traverse City Area Public School District up to a higher standard should be a future priority of Garfield Township. Due to a lack of existing non-motorized elements along public rights-of-way in the area between these two schools, greater investment, research, and funding are needed to fill this gap. Expanding connections between the schools may be considered a longer-term project.

Barlow Street from South Airport Road to Traverse City Limits



Map 16: Barlow Street Focus Area

Initially considered as a potential near-term priority, Barlow Street passes through a low-income area of Garfield Township. It connects South Airport Road north to the Traverse City Limits. This provides an opportunity for a future connection to move pedestrians and cyclists to and from the city, while acting as a connection to the South Airport Road corridor from the city. Barlow Street did not rank among the highest priority areas in the equity scoring section of our prioritization matrix. However, that does not mean the lower-income residents and school-aged children should be overlooked. The township should develop a non-motorized connection along this corridor. Furthermore, the Barlow Street corridor is eligible for Safe Routes to School because it is within a 2-mile radius of a public elementary school.

Boardman Lake Trail to Boardman Valley Trail via Tunnel



Map 17: Boardman River/ Boardman Lake Focus Area

This is an important connection between two popular trail systems. The challenge of crossing under or over South Airport Road limits the feasibility of this connection. In the past, TART has suggested constructing a tunnel under South Airport Road to connect the Boardman Valley Trail to the Boardman Lake Trail, however funding and Grand Traverse County Road Commission interest may also limit the priority of this project (see appendix).

Lafranier Corridor			
	Low Cost	Medium Cost	High Cost
Near Term	Install pedestrian crossing signage Repaint existing faded crosswalks		
Medium Term		Install traffic calming measures to increase pedestrian safety	Prevent flooding at bus stop Install additional bus stop infrastructure Fill gaps in the existing infrastructure
Long Term			Install additional sidewalks to connect the north and south ends
South Airport Corridor			
	Low Cost	Medium Cost	High Cost
Near Term	Repaint crosswalks Install signage	Install benches Install bike racks	
Medium Term	Consider SRTS grants for funding Use community outreach programs		Install lighting Install covered Bus Stops
Long Term			Install multi-use tails or sidewalks
Mall Trail to Miller Creek Trail Corridor			
	Low Cost	Medium Cost	High Cost
Near Term	Install signage along business entrances/exits Install painted crosswalks along business entrances/exits		
Medium Term		Install lighting Enhance physical Barriers	
Long Term			Install non-motorized infrastructure

Figure 16: Project Matrix

Conclusion

With the collaboration between students, faculty, and Garfield Township staff, this report was created as a learning opportunity, and a guide for future Garfield Township non-motorized transportation planning. The plan will help expand the Township's non-motorized infrastructure and qualify for available funding. It is important to note this document serves as a basis for the Township to identify and rank areas that will benefit most from non-motorized infrastructure by using a prioritization matrix that we developed. The formula we created can be replicated, which means other cities and townships looking to update their non-motorized transportation infrastructure could use the matrix we developed for Garfield Township.

The non-motorized transportation network in Garfield Township has the potential to be enhanced following our group's research, method for prioritization, findings, and recommendations. As a result, this will benefit the residents of the Township.

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Telephone interview with Josh DeBruyn, AICP, Bicycle and Pedestrian Coordinator Bureau of Transportation Planning, Michigan Department of Transportation

Glossary

Bypass Road- or highway that avoids or "bypasses" a built-up area, town, or village, to let traffic flow through without interference from local traffic, to reduce congestion in the built-up area, and to improve road safety.

Case Study- A process or record of research in which detailed consideration is given to the development of a particular person, group, or situation over a period.

Connectivity- The state or extent of being connected or interconnected within a certain field.

Crosswalks- A marked part of a road where pedestrians have the right of way to cross.

Easements- A nonpossessory right to use and/or enter onto the real property of another without possessing it.

Ease of Implementation- How easy or difficult a certain idea is to develop and put into place

Equity- Justice, impartiality, and fairness for all people, considering systematic inequalities faced by some.

Infrastructure- The basic physical and organizational structures and facilities (e.g., buildings, roads, power supplies) needed for the operation of a society or enterprise.

Master Plan- long term layout that provides a guide to future growth and development

Multimodal Transportation- Transport is the transportation of material performed by two or more modes of transportation.

Population Density- A measurement of population per unit area, or exceptionally unit volume; it is a quantity of type number density.

Socio-Economic Makeup- The social standing or class of an individual or group. It is often measured as a combination of education, income, and occupation.

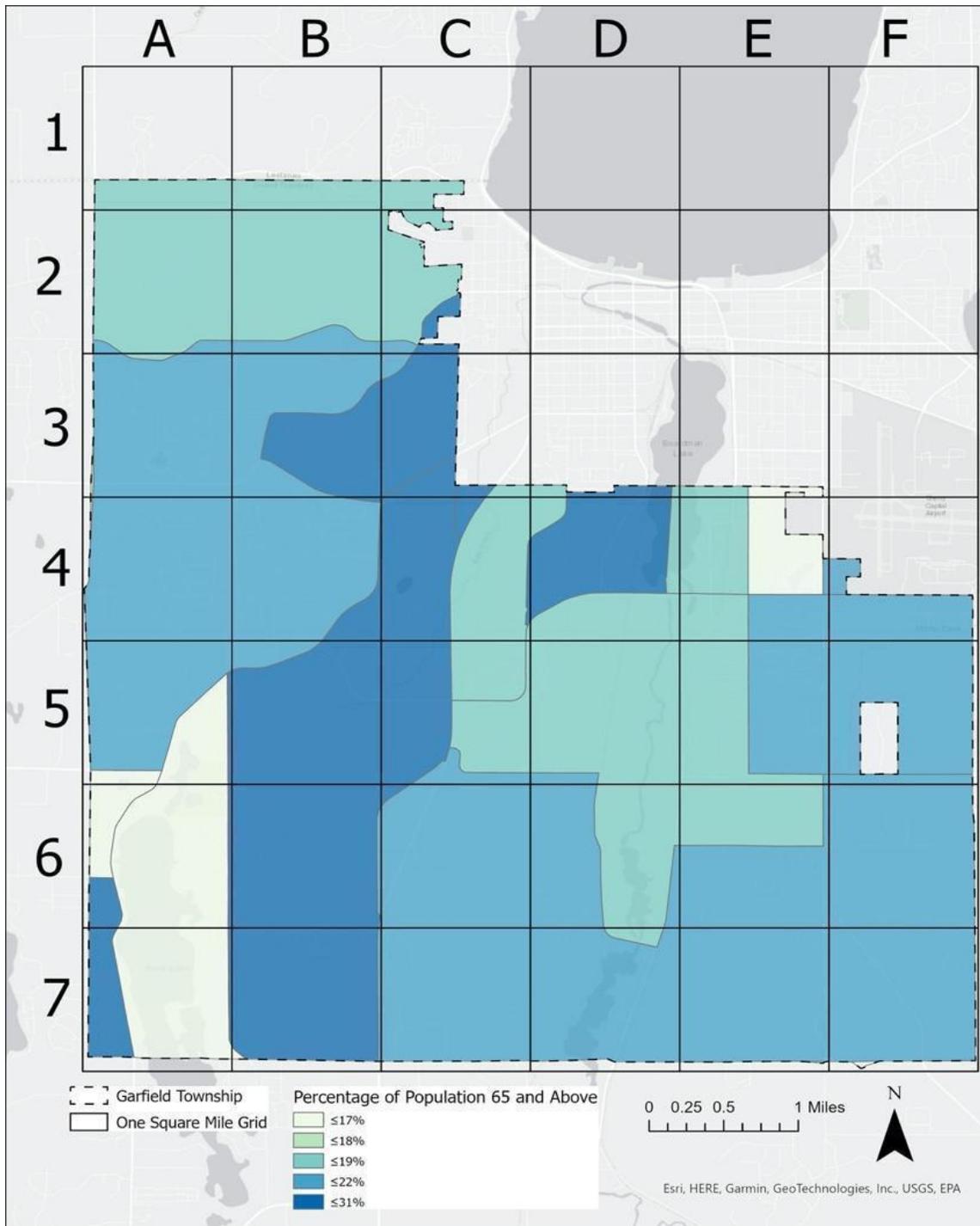
Stakeholders- A personal stake in a company can either affect or be affected by a business' operations and performance.

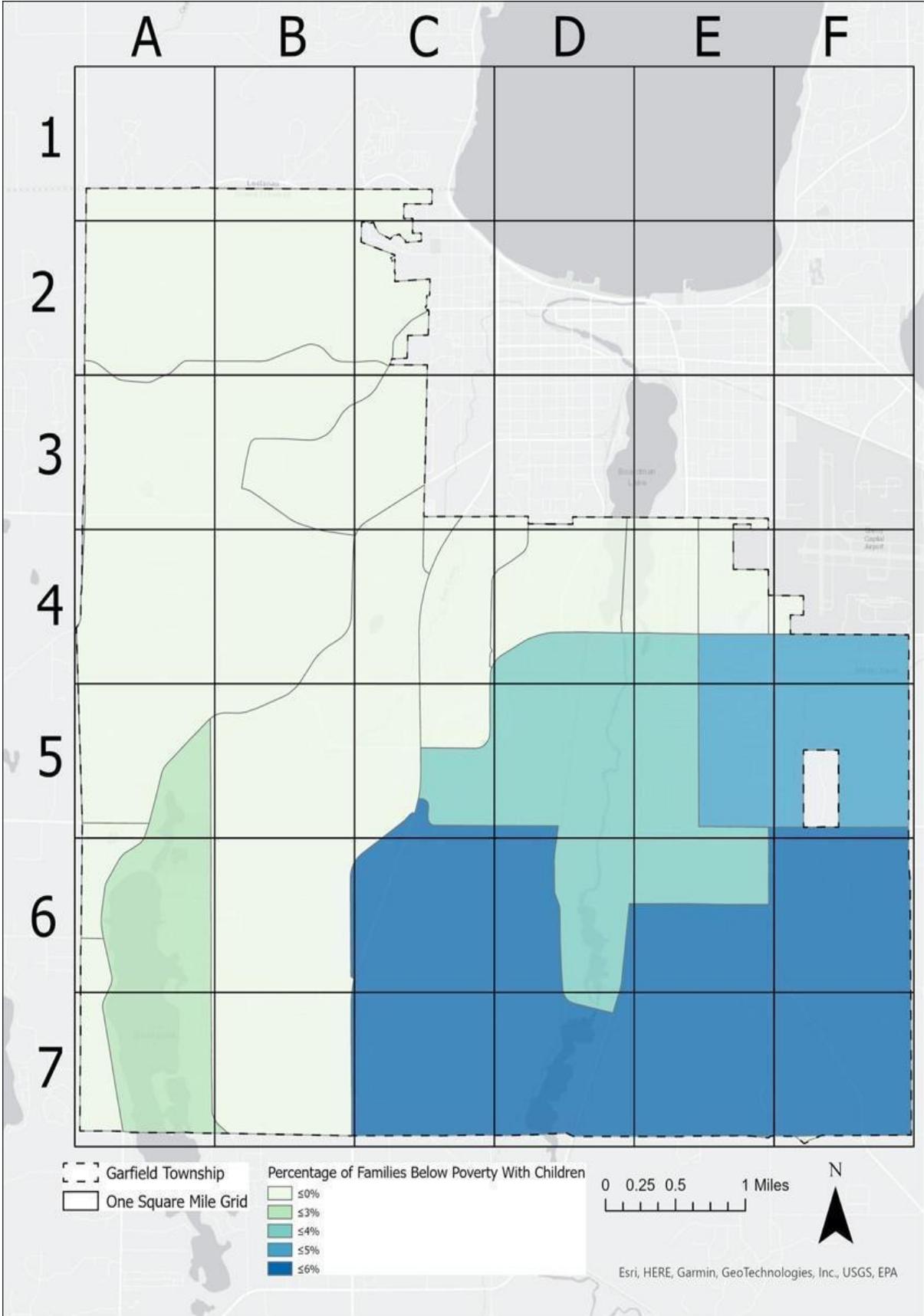
Zoning ordinance- The formal categorization of land-use policies applicable to land within a municipality.

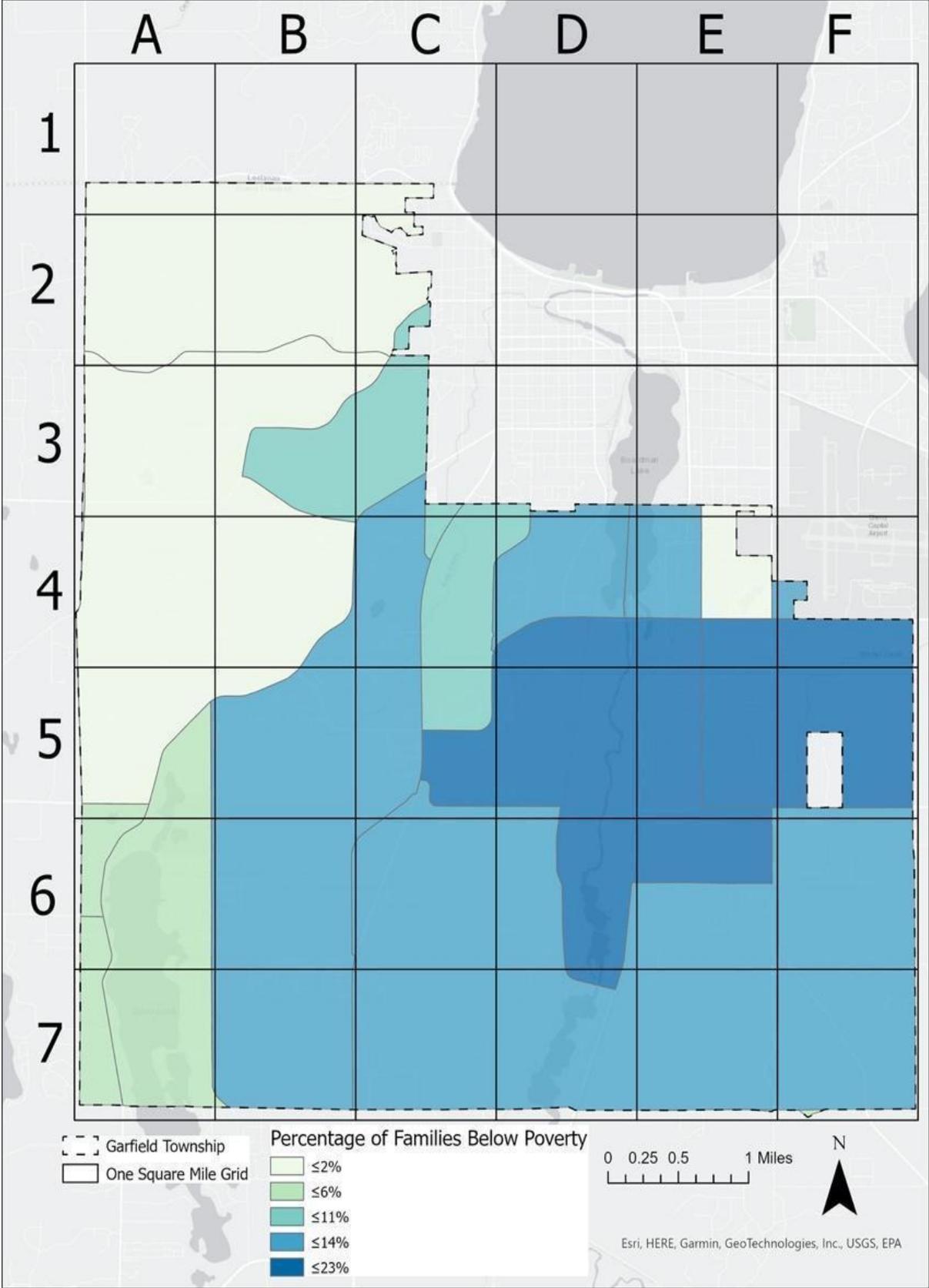
Social/Desire Paths- An unpaved path created because of human travel, typically the shortest route between two points.

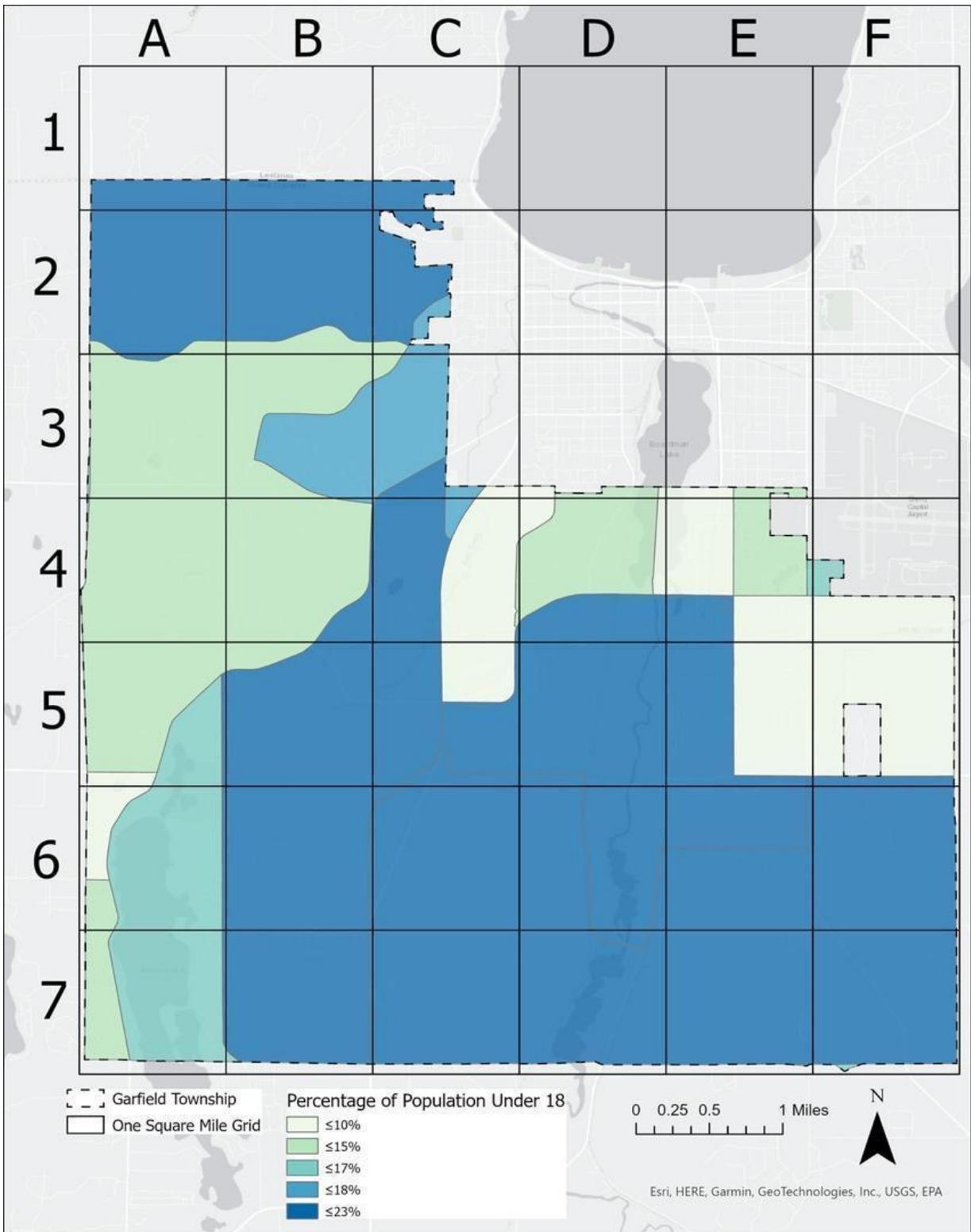
Appendix

Equity Maps

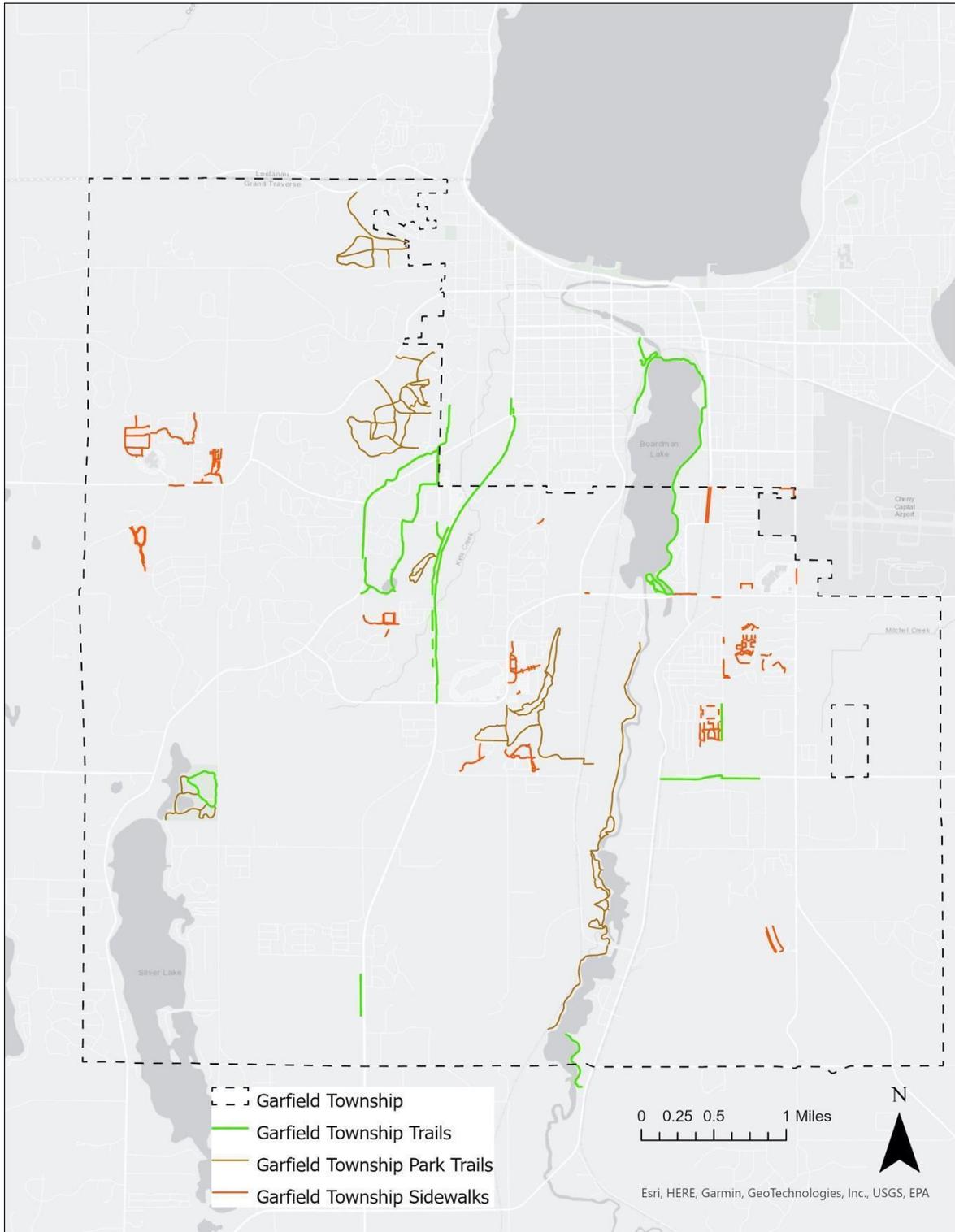


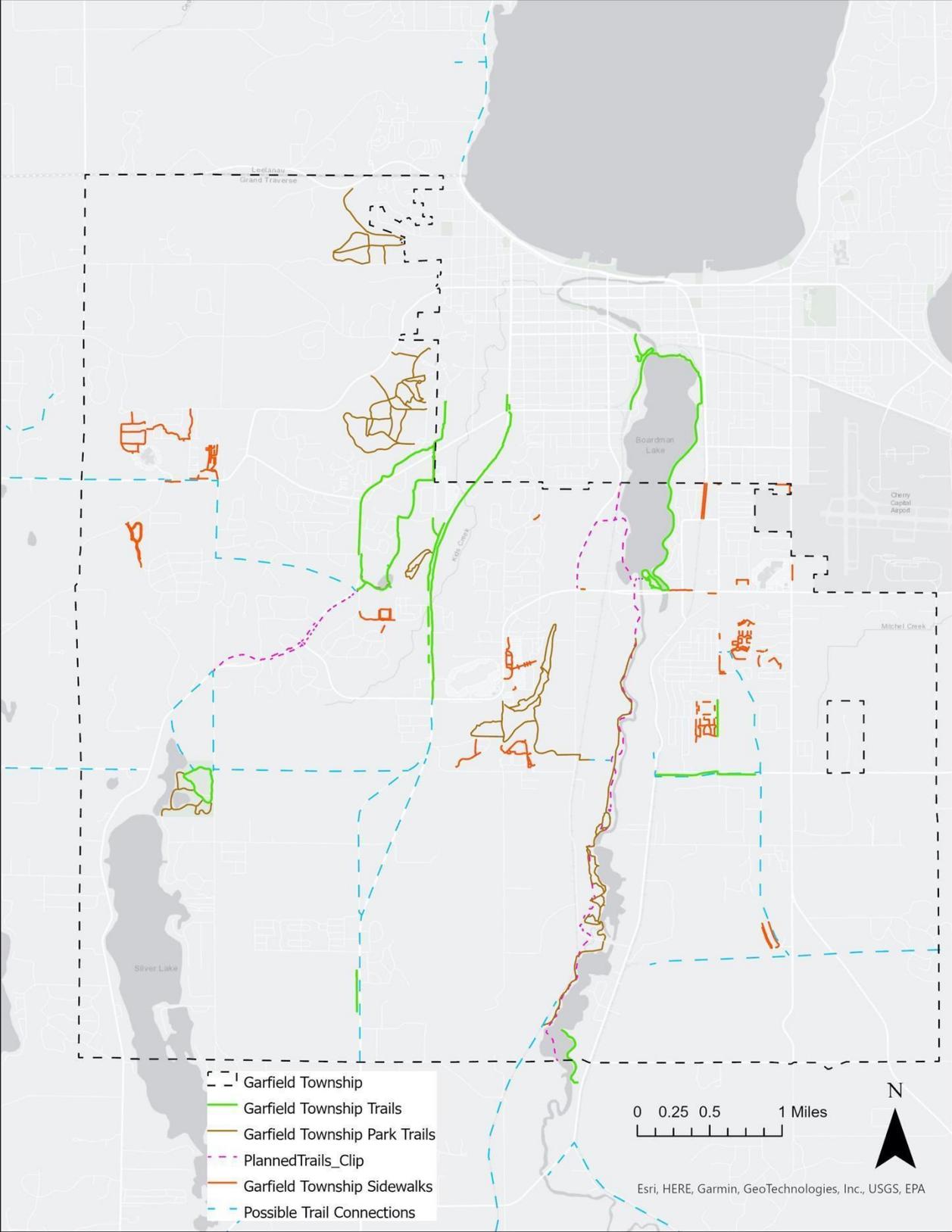




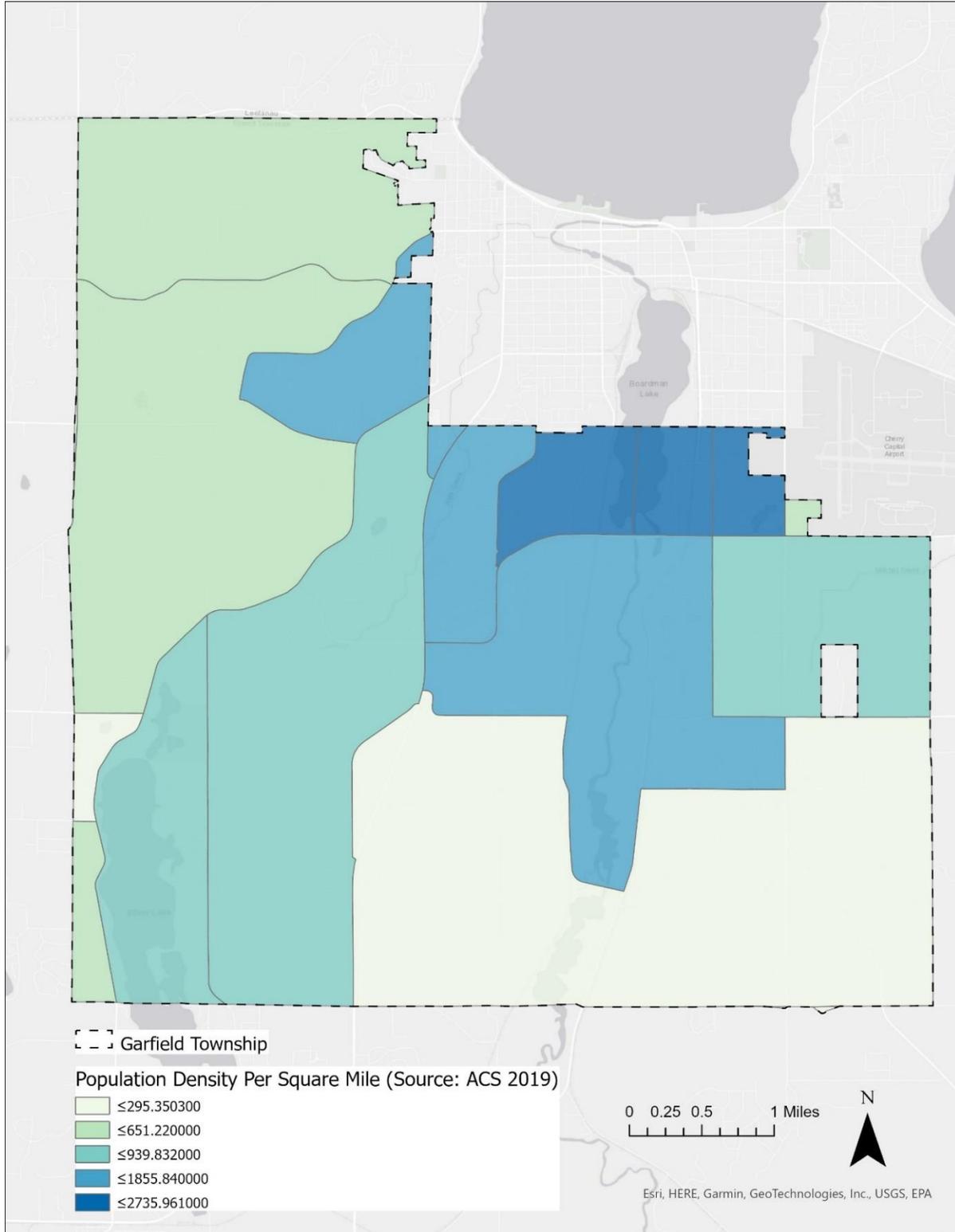


Current Infrastructure Maps





Density by Block Group



Types Of Non-Motorized Facilities

In-Road Facilities: Include non-motorized infrastructure within the roadway. This project includes bike lanes, shared-lanes, wide shoulders, and mid-block crossings.

Bike Lanes: A portion of a paved road (minimum 4' wide) designated by striping, signing and pavement marking for the exclusive use of bicyclists.



Shared-Lanes or “Sharrows”: Recommended for roads with speed limits of 10-25mph.



Wide Shoulders (Paved):



Mid-block Crossing: Crosswalks



Off-Road Facilities: Include non-motorized infrastructure separated from the road providing a protected barrier between vehicular traffic and pedestrians and cyclists. They include trails, sidewalks, and covered bike racks.

Trails: Includes shared-use paths and multi-use paths, a sometimes-paved path separated from a roadway and available for all types of non-motorized users (minimum 10' wide). Can utilize utility and railroad right of ways for these.



Sidewalks: A concrete path (minimum 4' width, 5' preferred, 6' ADA compliant)



Covered Bike Racks: Protects bikes from corrosion and resulting damage due to rain and snow exposure. Encourages active transportation.



Bikeway Guidance

Contextual Guidance for Selecting All Ages & Abilities Bikeways				
Roadway Context				All Ages & Abilities Bicycle Facility
Target Motor Vehicle Speed*	Target Max. Motor Vehicle Volume (ADT)	Motor Vehicle Lanes	Key Operational Considerations	
Any		Any	Any of the following: high curbside activity, frequent buses, motor vehicle congestion, or turning conflicts [‡]	Protected Bicycle Lane
< 10 mph	Less relevant	No centerline, or single lane one-way	Pedestrians share the roadway	Shared Street
≤ 20 mph	≤ 1,000 – 2,000		< 50 motor vehicles per hour in the peak direction at peak hour	Bicycle Boulevard
≤ 25 mph	≤ 500 – 1,500	Single lane each direction, or single lane one-way	Low curbside activity, or low congestion pressure	Conventional or Buffered Bicycle Lane, or Protected Bicycle Lane
	≤ 1,500 – 3,000			Buffered or Protected Bicycle Lane
	≤ 3,000 – 6,000			Protected Bicycle Lane
	Greater than 6,000	Multiple lanes per direction		Protected Bicycle Lane
Greater than 26 mph [†]	≤ 6,000	Single lane each direction	Low curbside activity, or low congestion pressure	Protected Bicycle Lane, or Reduce Speed
		Multiple lanes per direction		Protected Bicycle Lane, or Reduce to Single Lane & Reduce Speed
	Greater than 6,000	Any	Any	Protected Bicycle Lane, or Bicycle Path
High-speed limited access roadways, natural corridors, or geographic edge conditions with limited conflicts		Any	High pedestrian volume	Bike Path with Separate Walkway or Protected Bicycle Lane
			Low pedestrian volume	Shared-Use Path or Protected Bicycle Lane

* While posted or 85th percentile motor vehicle speed are commonly used design speed targets, 95th percentile speed captures high-end speeding, which causes greater stress to bicyclists and more frequent passing events. Setting target speed based on this threshold results in a higher level of bicycling comfort for the full range of riders.

[†] Setting 25 mph as a motor vehicle speed threshold for providing protected bikeways is consistent with many cities' traffic safety and Vision Zero policies. However, some cities use a 30 mph posted speed as a threshold for protected bikeways, consistent with providing Level of Traffic Stress level 2 (LTS 2) that can effectively reduce stress and accommodate more types of riders.¹⁸

[‡] Operational factors that lead to bikeway conflicts are reasons to provide protected bike lanes regardless of motor vehicle speed and volume.