



Barry County Trails Master Plan

Completed in partnership with



BLUE ZONES®

**ACTIVATE
BARRY COUNTY**



TABLE OF CONTENTS



INTRODUCTION	4
INTRODUCTION PURPOSE	
BACKGROUND + NEED	10
RECREATION & LEISURE HEALTH & WELLBEING TRANSPORTATION EFFICIENCY & EQUITY ECONOMIC DEVELOPMENT & VIBRANCY ENVIRONMENTAL RESILIENCE & SUSTAINABILITY	
PLANNING PROCESS	18
THE PLANNING STUDY PROJECT APPROACH STAKEHOLDERS TAKEAWAYS & THEMES	
TRAIL TYPES + AMENITIES	26
TRAIL CONSTRUCTION & MAINTENANCE EXISTING CONDITIONS TRAIL TYPES AMENITIES	
RECOMMENDATIONS + IMPLEMENTATION	56
GOALS AND OBJECTIVES TRAIL SEGMENTS IMPLEMENTATION STRATEGIES FUNDING & GRANT OPPORTUNITIES	

INTRODUCTION

INTRODUCTION

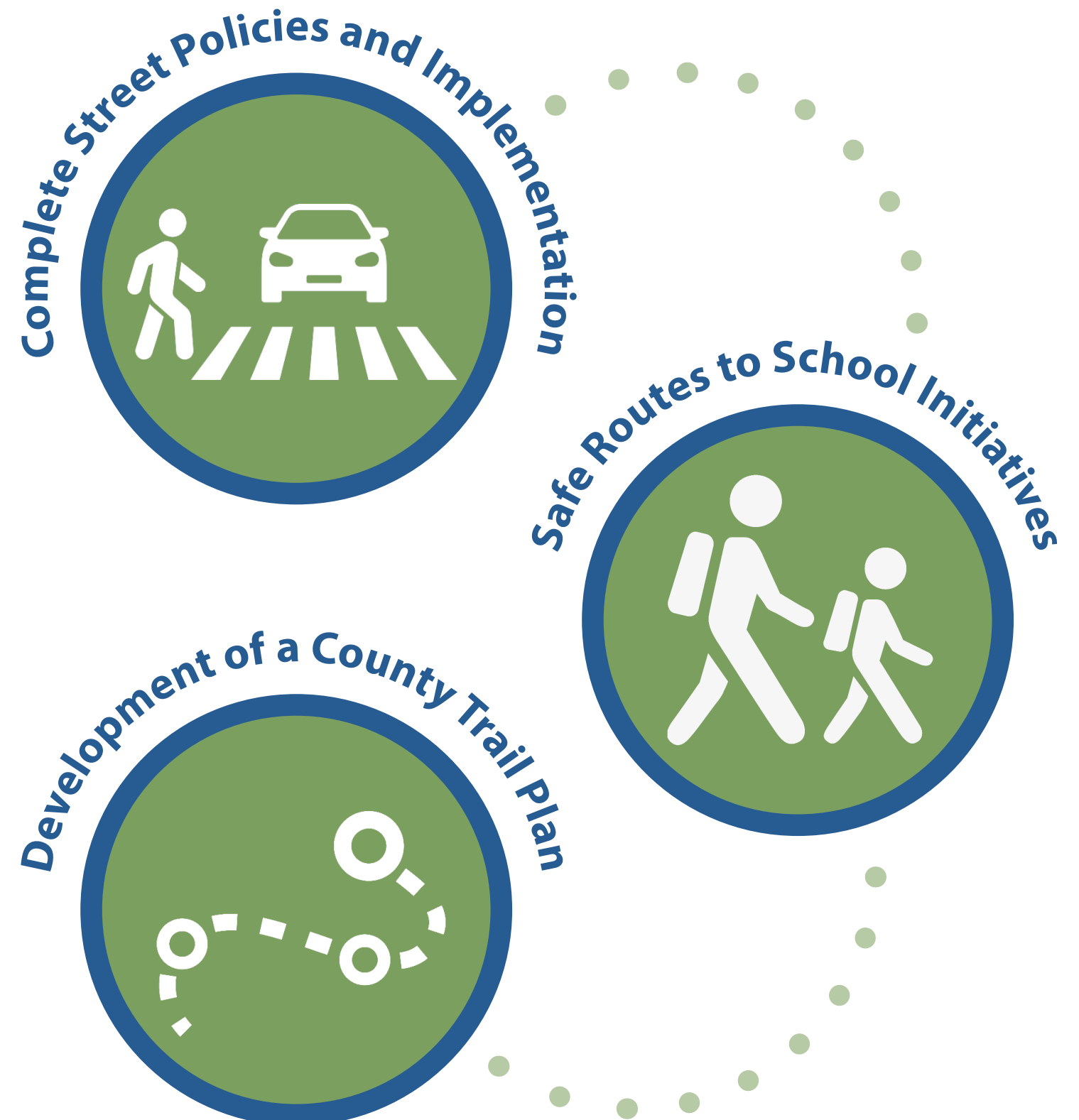
In September of 2019, Barry County launched the initiative Activate Barry County along with Blue Zones to create a healthier environment so that all residents of Barry County experience greater well-being, and live healthier, better, longer lives. A central tenet of that work is to create settings where people are likely to get physical activity as a part of their daily lives.

One of the simplest ways to do that is through walking or biking - collectively termed "active transportation" - for routine tasks and travel, as well as recreation and leisure.

The development of the Barry County Trail Plan is the result of the substantial community and expert engagement, which stemmed from the Activate Barry County Blue Zones initiative. Representatives of the Blue Zones National Built Environment team visited Barry County in the fall of 2019, touring key sites throughout the county and engaging a wide range of stakeholders for insights on what would help increase routine physical activity and active transportation for county residents. As part of this work, a virtual planning summit was convened in summer of 2020 in which community partners explored approaches to advance health through the built environment.



Three priorities identified through this summit process were:



PURPOSE

HOW TO USE THIS PLAN

A master plan is a long-term, dynamic planning document that takes existing data & conditions as well as community input to support decision making for future development. It gives communities a reference point when making decisions on their built-environment. This county-wide non-motorized trail plan will complement

municipal trail planning throughout the County, including the Barry County Parks and Recreation Plan and Barry County Master Plan. The Barry County Trail Plan will effectively serve as a foundation for a collective vision, future investments, and funding opportunities for a county-wide and regional non-motorized trail system.



Barry County has the good fortune to have preserved its historic rural and agricultural character. The County's vision of vibrant city, town, and village centers surrounded by protected open space, forests, wetlands, and working farmlands was often described by participants throughout this planning process. A robust, diverse, and connected network of trails has been consistently identified as a critical element in allowing residents to enjoy the many benefits of these settings while helping to preserve the county's character and protect even the most sensitive environments.

This plan identifies a series of specific recommendations for action that will continue to advance this vision. The County Trail Plan will be incorporated into Barry County's comprehensive master planning process that is scheduled for completion in late 2022.



From the onset of the Activate Barry County initiative, residents made clear that a diverse network of trails throughout the county is critical to maintaining the desired character of the county and quality of life for residents. This is true for both urban and developed areas as well as open space and natural areas. A theme throughout this planning process was that the very best trail system is comprised of a range of trail types spread throughout the county to accommodate users from across the broad spectrum of age, income, interests, and abilities.

An ideal system would accommodate everyone from serious cyclists to mountain bikers to long-distance hikers. There would also be areas for cross country skiers to birders to fishermen to fitness walkers as well as recreating families and active commuters. Ideally there will be a network of trails allowing residents to bike to work, walk to school, or to shop. Several broad benefits of a diverse and connected network of trails were identified during the planning process.

BACKGROUND + NEED

RECREATION & LEISURE

Many residents indicated they feel one of the very best ways to enjoy the beauty of Barry County is along its trails. Trails allow residents to amble along remote sections of the Thornapple River, hike to improbable glacial erratics on the North Country Trail, or bike to a favorite fishing spot, whether out in the country or near the downtowns of Middleville, Hastings, or Nashville.



These findings are consistent with research from the National Recreation and Parks Association and the Rails-to-Trails Conservancyⁱⁱ which identify trails as a highly valued asset by residents in, and visitors to, trail communities. It is important to recognize that the more diverse a trail network, the greater the variety of residents who can enjoy utilizing the trails.

The variety of trails identified and recommended for further development in this plan is important to assure that residents of all ages, abilities, and incomes can enjoy the recreational and health benefits of the trails. Paved sections of trail near population centers (and that meet the Americans with Disabilities Act (ADA) design standards) are particularly important to assure that older adults and those with mobility limitations can explore the trails. For example, sections of the Thornapple Trail linking Middleville, Hastings, Nashville, and Delton are particularly important in providing this access.

HEALTH & WELL-BEING

The US National Physical Activity Guidelines recommend that all American Adults participate in a minimum of 150 minutes/week of moderate physical activity for health benefits.ⁱⁱⁱ Averaging just 30-minutes of walking five days a week will not only reduce risk for a host of chronic diseases, such as cardiovascular disease, Type II diabetes, hypertension, osteoporosis, and a growing list of cancers, but it will also reduce stress, improve mental health, and reduce risk for dementia in old age. Although far too few Americans meet those guidelines (certainly less than half, and perhaps as few as 20% of adults)^{iv}, walking is one of Americans' favorite ways of getting physical activity. This aligns with findings of the Activate Barry County Blue Zones initiative, through which many

stakeholders indicate an interest in walking for health on trails in the county. Therefore, walking on trails presents an exceptionally appealing opportunity for increasing population physical activity and public health.^v It requires no formal training or participation structure, little if any specialized equipment, no cost to the individual if trails are public assets, and a varied experience that allows people to calibrate their effort to their own fitness level and desires; one can saunter for 30-minutes on an in-town section of paved trail, or hike all day along a footpath of the North Country Trail. This is borne out by numerous studies indicating that the presence of trails is well correlated with increased physical activity among park visitors.^{vi, viii}



Trails can provide an essential and uniquely equitable component of Barry County’s active transportation system. The Rails-to-Trails conservancy, in a report that makes the case for increased public investment in walking and bicycling connectivity, states the following:

“Active transportation networks provide more people—such as children, seniors, those with disabilities and those without economic means—with inclusivity and connection to not only destinations and opportunities, but their communities and society at large.”^{viii}


For example, if significant numbers of students walked and biked on an improved connection from the Thornapple Trail to Fuller Elementary school in Nashville, it could help alleviate traffic congestion that, at school dismissal, will often back traffic out to Casgrove Road and M-66. Similarly, employers such as Bradford White (located along the trail) might encourage employees to consider active commuting, providing improved employee health, reduced demand for on-site employee parking, and less traffic congestion at shift changes. Improved trail access can also ease parking demand in community centers; for example, if more people walk and bike to events in Tyden Park or Thornapple Plaza in Hastings there is less competition for area parking.

The Paul Henry - Thornapple Trail spine route through the county, as well as connecting spurs and links recommended in this plan, will provide significant opportunities for pedestrian and bicycle access to community centers, major employers, schools, and parks.

BENEFITS OF TRAILS


ECONOMY

Outdoor recreation now outpaces the oil and gas industry in economic impact. The outdoor recreation industry is built on trails, making trails an important economic driver.




EMPLOYMENT

Trails create jobs. Pedestrian and bicycle infrastructure projects create 8–12 jobs per \$1 million of spending. Road infrastructure projects create 7 jobs per \$1 million of expenditures.




HEALTH

Trails boost physical activity, creating measurable and substantial savings in healthcare costs.



RESIDENTIAL

Trails both drive tourism, and make communities a more desirable place to live, which in turn increases nearby property values.



<https://www.americantrails.org/economic-benefits>

A growing body of research has identified trails as beneficial to local and regional economies.^{ix} Many assume that this benefit is restricted to the commercial activity that accompanies travel and tourism associated with visitors who come to Barry County to walk, ride, or otherwise enjoy the trails. And this benefit will be increasingly realized as networks are completed, connected, and marked and identified for users.

Many additional economic benefits will be associated with a comprehensive trail system in the county. Home values tend to be higher proximate to trails, and homes near trails tend to sell more quickly. This price premium yields higher property tax revenues for communities with trails.



The public health benefits of a more physically active population, as well as environmental health benefits of cleaner air and water can, over time, help reduce collective health care costs in the region.



Trails can also benefit local businesses by facilitating greater access for a wider array of patrons and employees, who are able to walk and bike to their destinations. An example would be the increased access provided by the trail to Middleville’s downtown district, farmers market, and other activities at the pavilion. This impact can be even greater if there are on-street pedestrian and bicycle facilities connecting to trails, by providing an even more comprehensive active transportation network. Studies have shown increases in retail activity and employment on more Complete Streets that accommodate all travel modes.

A growing body of evidence suggests that the quality-of-life benefits of trails create communities with better employee recruitment and retention, which therefore creates greater desirability for businesses hoping to hire and retain those employees.^{xi}

ENVIRONMENTAL RESILIENCE & SUSTAINABILITY

A robust network of trail corridors provides an array of benefits for Barry County's environmental health. Trails can provide crucial green/wildlife corridors with many benefits to their surrounding areas. This is particularly important as communities work to improve their resilience to climate change. Obvious benefits include the reduction in harmful emissions through the expansion of non-motorized transportation alternatives as well as the carbon capture and cooling benefits associated with greater foliage and tree canopy. Well planned trail networks will promote the use of non-polluting transportation options such as bicycles, scooters, and walking.



Environmental Benefits of Trails

Expanding non-polluting transportation options

Providing wildlife habitat corridors for natural wildlife movement

Natural & cultural history preservation & interpretation opportunities, which can help with community education around critical environmental issues

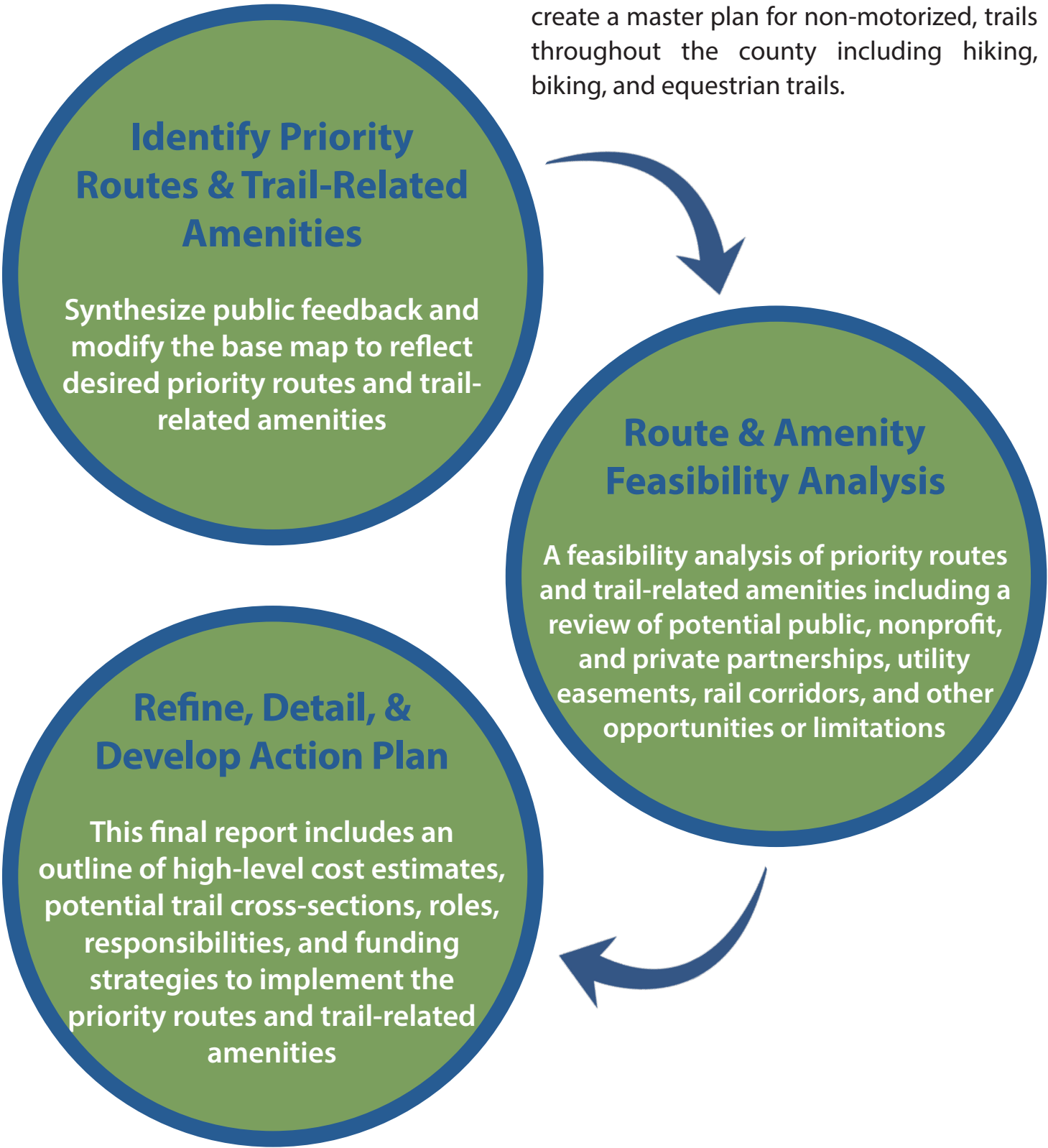
Air quality and heat reduction benefits of enhanced green corridors

Often provides a natural buffer to development or watercourses.



PLANNING PROCESS

Goals of the Planning Study:



After reviewing the initial feedback regarding the importance of trails to the health and vitality of Barry County, the Built Environment Committee prioritized developing a comprehensive, county-wide trail plan. In 2021, the Committee hired a consultant to create a master plan for non-motorized, trails throughout the county including hiking, biking, and equestrian trails.

Barry County, with the assistance of Blue Zones Activate, West Michigan Trails, The Paul Henry - Thornapple Trail Association, and Wightman & Associates, conducted focused public outreach to engage Barry County residents on their opinions and ideas regarding the trail systems.

A stakeholder advisory group was formed to help guide this process. The committee also sought input through an interactive website.

The online feedback resources included a public survey comprised of selection, rating, and short answer questions; a trail point map to help indicate specific areas of opportunity or concern; and a proposed trail map that allowed respondents to draw a trail segment or link they would like to see implemented. These online tools were available from November 3rd through the end of 2021 and were utilized by nearly 260 respondents.

Input was also collected at a booth at the County Fair where information was gathered from residents on current trail uses, needs, and desired connections. This in-person outreach was conducted at a pop-up booth at the County Fair from July 19 through July 24, 2021 by the Blue Zones, Barry County Parks Board, and Wightman teams. The booth provided educational materials regarding Activate Barry County Blue Zones and the trail master plan. A mapping activity was provided that encouraged residents to place pushpins along areas of the trail they use and write sticky notes for further feedback and ideas.

The community feedback provided insight as to how people use the trail system, where they are using it most often, and the areas in which they would like to see further development.



Participants in the June 2021 Blue Zones “marquee” summit

STAKEHOLDERS

The project team consisting of representatives from Barry County, West Michigan Trails, Wightman, and Activate Barry County met monthly throughout the planning process. Throughout these activities stakeholder advisory meetings were held to present new information, assess feedback that was being collected, and to plan next steps. Stakeholders range from residents and trail enthusiasts to Michigan Department of Transportation and National Parks Service officials. The multi-disciplinary nature of the stakeholder group allowed for understanding and context, innovative ideas, and critical conversations that helped continuously move the trails plan forward.

Meeting	Location	Date
1	Marquee Meeting	June 2020
2	Stakeholder Meeting	July 14, 2021
3	Barry County Fair	July 19 - 24, 2021
4	Stakeholder Meeting	January 26, 2022



January 26, 2022 Stakeholder Meeting

Stakeholder	Affiliation/Organization
Catherine Getty	Trail Plan Co-Champion, Barry County Commissioner, County Parks and Recreation, Thornapple Area Parks & Recreation Commission
Jennifer Antel	Trail Plan Co-Champion, West Michigan Trails
Mark Fenton	Blue Zones Built Environment Expert
Dan Patton	Barry County Parks and Recreation
Patrick Lydon	National Park Service: Rivers, Trails, and Conservation Assistance (RTCA) program
Jon Sporer	Barry County YMCA
Dan King	City of Hastings
Rick Moore	Barry County Parks and Recreation Board, PHTT association
Chelsey Foster	Trail enthusiast
Jane Norton	North Country Trail, Chief Noonday Chapter
Joseph Jandernoa	Michigan DNR, Yankee Springs Recreation Area
Lucas Galiviz	Michigan DNR, Yankee Springs Recreation Area
Ron Welton	Staff, Barry County Parks & Recreation
Brian Green	Nashville area resident
Tom Devries	Village of Middleville
Jennifer Heinzman	Barry County Chamber and Economic Development Alliance
Frank Fiala	Barry County Road Commissioner / Barry County Parks and Recreation Commission
Bobbie Taffee	Trail enthusiast
Staff	City of Hastings Department of Public Works
Tyler Kent	MDOT, Transportation Planner
Cynthia Krupp	MDOT, Transportation Planner
Josh DeBruyn	MDOT, Pedestrian and Bicycle Coordinator/Specialist
Dave Bee	West Michigan Regional Planning Commission
Jill Sell	Michigan DNR, Southwest Michigan Trail Specialist
Debbie Jensen	Barry County Parks and Recreation Commission, Trails Committee
Chuck and Mary Schira	Yankee Springs residents - M179 trail planning
Mickey Bittner	Wightman Consultant - County Wide Trail Plan
Ben Baker	Wightman Consultant - County Wide Trail Plan
Sarah Nelson	Barry Conservation District, Barry County Parks & Recreation
Allison Troyer Wiswell	Activate Barry County Blue Zones, Director

TAKEAWAYS AND THEMES

Some of the repeated ideas and needs that were understood from the public and stakeholder feedback included completing The Paul Henry - Thornapple Trail spine across the county, increasing trail connections to community destinations (schools, parks, business districts, neighborhoods, etc.), furthering development of a bicycle pedestrian trail along M-179 in Yankee Springs, and increasing safety measures and infrastructure for pedestrian and bicyclist routes and connections on or near roads.

Increased trail connections and access to services such as restrooms and drinking water were the most requested specific improvements for trails. Updated connections and maintenance, particularly at The Paul Henry - Thornapple Trail (Middleville and Hastings) and Yankee Springs, were noted as the most needed trail improvements from the public input. Connectivity, wayfinding, and trail safety were consistently addressed as needs and opportunities throughout the public and stakeholder engagement process.

CONNECTIVITY



SAFETY



WAYFINDING



Walkability Audit led by Blue Zones Expert, Mark Fenton.

TRAIL TYPES + AMENITIES

TRAIL CONSTRUCTION & MAINTENANCE

Trails are constructed in a variety of ways, whether these are typical sidewalks or larger regional trails. The most cost-effective way to add a non-motorized facility within a road right-of-way is in conjunction with the adjacent roadway being constructed or maintained. If a roadway is being reconstructed, it's much more efficient to widen the shoulders, add bike lanes, or side paths to add additional non-motorized facilities than it is to construct those features as a separate project.

Many communities require new developments or businesses to include sidewalks as they are built and trails can also be a part of the construction requirements, depending on the situation.



Trails outside of road rights-of-way can be constructed in various ways, but typically aren't part of a road project. These projects take years of planning and often use existing corridors such as utility corridors, abandoned rail corridors or other rights-of-way. These are often spearheaded by municipalities, park departments, and trail organizations.

Like all infrastructure, trails have a lifespan and need to be maintained. This can vary from adding additional aggregate and regrading unpaved trails, sealing, or repaving asphalt trails, or replacing concrete. It is important to understand the maintenance requirements for trails and have maintenance and repair as part of the budget by the trail's owner.



Consideration for ongoing maintenance and operations cost will be taken into account for trails support and funding. See the following table for estimates on maintenance requirements and frequencies.

Maintenance Task	Frequency
Trash Collection	Weekly
Pruning	1 time / year
Crack Sealing	1 time / year
Tree Root Cutting	As Needed
Aggregate Grading	1 time / year
Mowing	3-4 times / year
HMA Seal Coat	1 time / 3-5 years
HMA Mill & Resurface	1 time/ 30 years

EXISTING CONDITIONS

The main trails through the county are The Paul Henry - Thornapple Trail, which runs from the northwest to the east through the northern half of the county, and the North Country hiking trail, which runs north and south through the western third of the county. In addition to these longer trail corridors, there are self-contained trails at Yankee Springs Recreation Area, Pierce Cedar Creek Institute, and City of Hasting Hammond Hill Park. There is also a small spur of the Jordan Lake Trail in the Northeast portion of the county. See the existing trail map on page 32/33 to provide context.

The Paul Henry - Thornapple Trail is approximately 50% complete through the County, with the largest gaps immediately east and west of Hastings and another gap north of Middleville. The survey and feedback listed completing this trail through the county as the highest priority. In addition, spurs connecting the main trail to parks and facilities along the trail, such as Historic Charlton Park and Hammond Hill were highly desired.

Connecting Yankee Springs to Gun Lake and communities to the west, as well as The Paul Henry - Thornapple Trail, were also highly requested. In addition, a trail from Hastings running southwest



TRAIL TYPES

There are a variety of different trails types to choose from when planning trails. The selection of which trail type to use is critical to the operation of the trail, as well as the roadway that it might be along.

Two critical ideas to keep in mind when planning a trail for bicyclists, according to the American Association of State Highway

and Transportation Officials (AASHTO), is continuity and consistency for all users. It is important that the proposed trail will not encourage or require bicyclists or motorists to operate in a manner that is inconsistent with the rules of the road. Considering the needs of both the motorists and the bicyclists are equally as important and should be carefully evaluated.



Shared Use Path/Trails

Separated Trail, with Dirt/Gravel Shoulders

A separated trail, also known as a shared use path/trail, allows users to be physically separated from motorized vehicular traffic by an open space (dirt or gravel shoulders) or barrier, either within the road right-of-way or within an independent trail right-of-way.

Separated shared use paths/trails may be used by bikers, pedestrians, skaters, wheelchair users, runners, and other non-motorized users depending on the surface type. In some cases, this trail type couple be separate and at a slightly different elevation than the roadway, providing a sufficient space between the road travel way and the trail travel way.

According to American Association of State Highway and Transportation Officials (AASHTO), shared use paths can provide a recreational opportunity or, in some instances, can serve as direct commute routes if flow between motor vehicles and pedestrians is minimized.

Shared use paths and trails can be paved (asphalt/cement) or unpaved (crushed limestone/aggregate/asphalt, etc.). Trail surfacing decisions should be well researched to consider the likely users of the trail, construction costs, long term maintenance plans, grading needs, etc. ADA compliance will also be important when considering surface material. Unpaved shared use paths/trails can be a lower cost, natural alternative to paved trails especially for long sections outside village or city limits.



TRAIL TYPES

Roadside Trail, Shoulder, or Sidepaths

The Michigan Department of Transportation (MDOT) Grand Region Non-motorized Trail Plan describes sidepaths as a specific type of shared use path that runs adjacent to a roadway. They are setback from the edge of roadway or have a physical barrier between the path and roadway. MDOT cautions that sidepaths may not be safe for bikers depending on the frequency of curb cuts due to intersection conflicts.



On-Road Links

On-road links are typically used in urban areas where there are higher levels of bicycle traffic. There are a variety of different types of on-road links related to bicycle lanes. In general, a bicycle lane is a marked space along a length of roadway designated for use for bicyclists.

According to AASHTO, bike lanes are intended to delineate the right of way assigned to bicyclists and motorists, and to provide for more predictable movements by each.

A buffered bicycle lane is a bike lane with additional buffer space between the bike lane and the auto lane or parked cars used on high-volume or high-speed roads or roadways with high parking turnover. A contra flow bicycle lane is a bicycle lane separated by a yellow centerline marking on a street with one-way motor vehicle traffic, to allow contra-flow bicycle traffic. Utilizing bike lanes on a roadway creates a safe and comfortable area within the road right-of-way for bicyclists to exist and travel within. Another aspect of on-road links are bike boulevards.



A bike boulevard incorporates several design elements to accommodate bicyclists. These may include, but are not limited to: stop signs on side streets to allow free flow of bicyclists, traffic circles to slow motor vehicles, wayfinding signs for bicyclists, shared lane markings where appropriate, crossing improvements at major streets, and traffic diverts for motor vehicles. Every street is different, so the type of on-road link needs to be evaluated to best fit each scenario.

Specialty Trails (Horse, Mountain Bike, Foot Paths, etc.)

There are a variety of specialty trails, which include but aren't limited to equestrian trails, mountain biking trails, and foot paths. It is typical that specialty trails are unpaved and separate from roadways. Specialty trails should be carefully designed and maintained to plan for surface drainage and minimize erosion.



Image Source: www.secondwavemedia.com/concentrate/features/mountainbiking05262021.aspx



Image Source: www.fs.usda.gov/activity/dbnf/recreation/horseriding-camping

TRAIL TYPES

PAVED COUNTY ROAD SHOULDER ACCESS TO TRAILS

A repeated theme throughout the community feedback process for this plan was the need to provide safe access to trails, particularly for those who cannot or choose not to drive, but who would like to walk or bicycle to a nearby shared use path/trail. In more developed areas, infrastructure such as sidewalks and on-street bicycle lanes may provide safe trail connections for many possible users. But in more rural areas, the roads are the only available routes to a shared use path/trail.

There are numerous locations where county roads could provide access to trails for nearby residents, but only if users feel comfortable enough walking or biking along those roadways. One approach is to provide a paved and marked 4- to 5-foot wide shoulder along county roads in areas that provide access points to trails.

- The initial recommended goal is to target roads within one mile of shared use path/trail crossings. This is roughly a 15- to 20-minute walk, or 5- to 10-minute bike ride
- Eventually the goal is to expand to areas within three miles of shared use path/trail crossings (a 12- to 20-minute bike ride)

Although there is a cost to include additional finished surface on county roadways, there are numerous safety, performance, and maintenance benefits recognized by roadway management agencies across the country which is creating a movement toward more routinely paving shoulders even in rural areas.

The Small Town and Rural Multimodal Networks guide of the Federal Highway Administration (FHWA-HEP-17-024, 2016; www.ruraldesignguide.com) identifies the following specific benefits associated with paved shoulders for bicycle and pedestrian use:

- Improves bicyclist experiences on roadways with higher speeds or traffic volumes
- Provides a stable surface off the roadway for pedestrians and bicyclists to use when sidewalks are not provided
- Reduces pedestrian “walking along roadway” crashes
- Can reduce “bicyclist struck from behind” crashes, which represent a significant portion of rural road crashes
- Provides advantages for all roadway users, by providing space for bicyclists, pedestrians, and motor vehicles



Benefits to Adding Shoulders to County Roads

Based on guidance from the American Association of State Highway & Transportation Officials (AASHTO), standard width paved shoulders provide benefits in three important areas: safety, capacity, and maintenance. Priority should be given to seek and allocate funding to make Barry County’s roads safer, more efficient, and less costly to maintain by routinely paving more shoulders.

1. Safety

Highways with paved shoulders have reduced accident rates, as paved shoulders:

- Provide space to make evasive maneuvers;
- Accommodate driver error;
- Add a recovery area to regain control of a vehicle;
- Provide space for disabled vehicles;
- Provide increased sight distance for through vehicles and for vehicles entering the roadway (such as in cut sections or brushy areas in rural areas);
- Provide lateral clearance to roadside objects such as guardrail, signs, and poles;
- Contribute to driving ease and reduced driver strain;
- Reduce passing conflicts between motor vehicles and bicyclists and pedestrians;
- Make the crossing pedestrian more visible to motorists;
- Provide for storm water discharge farther from the travel lanes, reducing hydroplaning. This also reduces splash and spray to following vehicles and nearby pedestrians and bicyclists

2. Capacity

Roadways with paved shoulders can carry more mixed or multiple use traffic, as paved shoulders:

- Provide more intersection and safe stopping sight distance;
- Allow for easier exiting from travel lanes to side streets and roads (also a safety benefit);
- Provide greater effective turning radius for trucks;
- Provide space for off-tracking of truck’s rear wheels in curved sections;
- Provide space for disabled vehicles, mail delivery, and bus stops;
- Provide space for bicyclists to ride at their own pace and not delay vehicles;
- Provide space between motor vehicles and pedestrians, increasing drivers’ and pedestrians’ level of comfort

3. Maintenance

Highways with paved shoulders are easier to maintain, as paved shoulders:

- Provide structural support to the pavement;
- Discharge water further from the travel lanes, reducing the undermining of the base and subgrade;
- Provide space for maintenance operations and snow storage;
- Help to direct run-off away from streams/rivers, and towards storm drains
- Provide space for portable maintenance signs;
- Facilitate painting of fog lines

AMENITIES

(Trailheads, restrooms, drinking water, signage, etc.)

Highly visible and friendly trailheads and trail access points are necessary to ensure trails are inviting and accessible to residents and visitors alike. Trailheads help orient users to the local area and can be designed to fit with the natural and cultural surroundings. There are many opportunities for safe, clear trail access points along Barry County Trails that will help connect residents and visitors alike to the trail.

The following are recommendations to consider as trail project move into the design phase. The opportunities listed are recommendations and not be misconstrued as final decisions. Each of the following categories will need further consideration during the design and engineering phases. Communities should consider the feasibility of the potential trailhead facilities and trailhead locations as well signage design, location, and quantity when considering trail improvements.

Trail support facilities include trailheads, directional, regulatory and interpretive signage, and other trail amenities (e.g. site furnishings, trash cans, lighting). Trail support facilities should allow for safe, easy access to the trails while also helping to connect trail users to other attractions in the area.



Trailheads

Trailheads should be provided at locations that give the greatest range of users access to the trail network. Particularly important locations are in or near population centers (cities, towns, and villages), and at or near major roadway crossings. It may be better for trailhead facilities, such as a parking area and information kiosks, to be located on a secondary road near to a major crossing rather than on a high traffic roadway, simply for ease and safety of access.

Specific candidate locations for trailheads along the Paul Henry - Thornapple Trail within Barry County include a location in the northwest end of Hastings (Rutland Township property, Walmart, Aldi's Grocery), and within the Village of Nashville.

Wayfinding Signage

Community wayfinding guide signs are part of a coordinated and continuous system of signs that direct tourists and other road users to key civic, cultural, visitor, and recreational attractions

and other destinations within a city or a local urbanized or downtown area. In 2022 & 2023 West Michigan Trails is developing a unified signage system guide for all West Michigan non-motorized, multi-use trails. Although this guide will be for the entire West Michigan region, each community will have an opportunity to brand their signs to fit their community. This guide will be incorporated into the Barry County Trail Plan when completed.

Volunteer Efforts

Friends & other Grassroot groups play a key role in trail support. A "Friends of" group is a group of people who have an interest in trails in Barry County and volunteer their time, services, and support to enhance the trail corridor. These groups often attend to low-skill maintenance tasks, community outreach and coordination of volunteer efforts. Current Groups include The Thornapple Trail Association, Friends of the Barry County Parks and Trails, and the Chief Noonday Chapter of the North Country Trail Association.

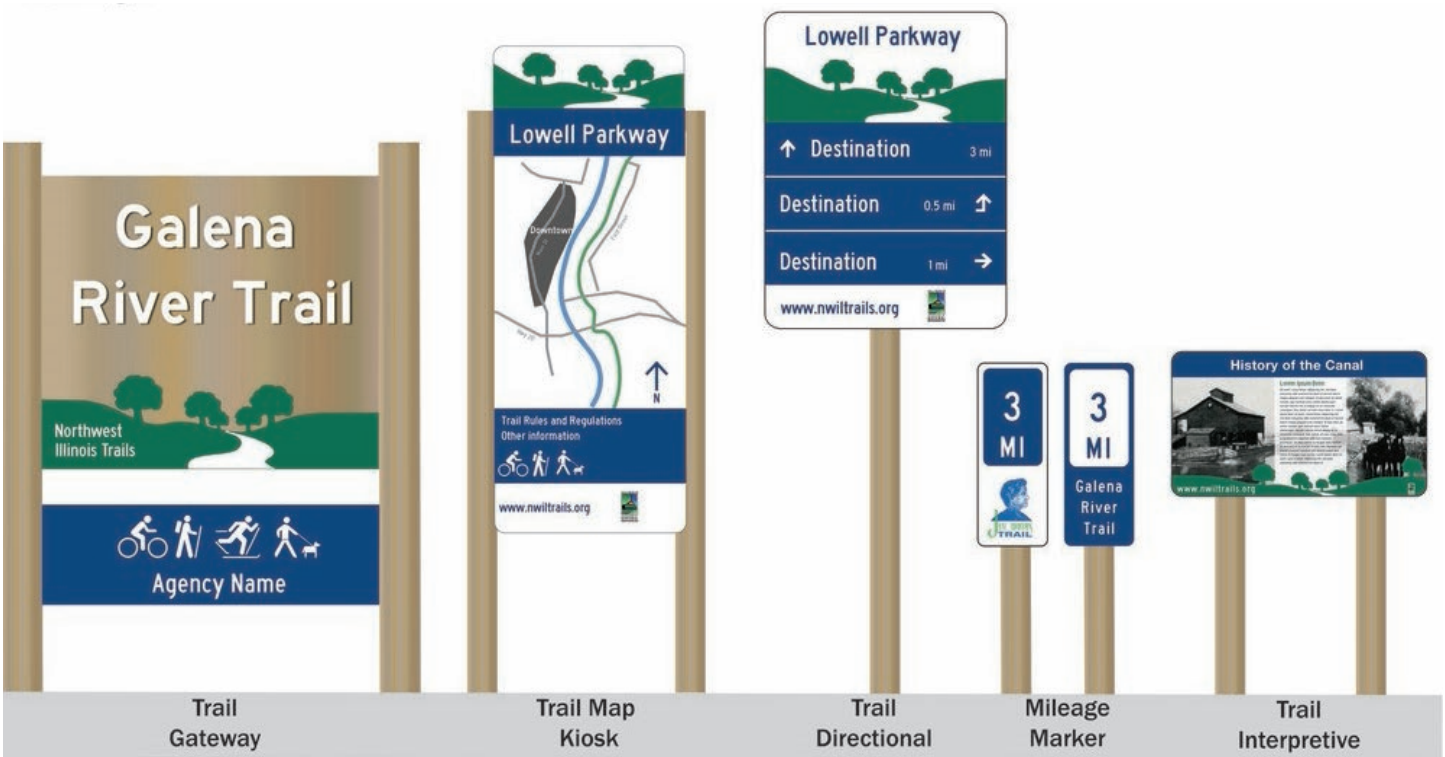


Image Source: wmtrails.org

RECOMMENDATIONS + IMPLEMENTATION

GOALS & OBJECTIVES

The following goals and objectives were identified through community and stakeholder input.

1

Complete the Paul Henry - Thornapple Trail main spine across the County. Priority segments of this corridor include the following:

- 1.1 A connection from the paved section of the trail extending southeast from Caledonia to the trail in Middleville
- 1.2 The incomplete sections of trail from Middleville to Hastings
- 1.3 The incomplete sections of the trail from Hastings to Nashville
- 1.4 A portion of trail from Nashville toward the Maple Valley Schools complex

2

Make more trail connections to local destinations. There are numerous opportunities for short links to connect the Paul Henry-Thornapple trail spine to community destinations such as schools, parks and green spaces, retail and business districts, and residential areas. Examples of these links include:

- 2.1 Links and wayfinding from the Hastings Riverwalk to the Hammond Hill open space and trail system
- 2.2 A connection to the Fuller Elementary School in Nashville, including an improved high visibility crossing of Fuller Road (M-66)
- 2.3 Links to trailheads for the North Country Trail

3

Develop and implement standard wayfinding and signage to guide residents and visitors safely and efficiently to and from trails county-wide. Trail utilization throughout the county will improve with better promotion and clearer direction to access points.

- 3.1 Collaborate with West Michigan Trails and other regional trail organizations on consistent signage throughout Barry County
- 3.2 Develop local wayfinding signage to promote local amenities near trail routes (restaurants, ice cream, public restrooms, drinking water, etc.)
- 3.3 Develop standardized trail map displays along the Paul-Henry Thornapple Trail spinal route ("you are here")

4

Create safer on-road and near-road facilities to get people to and from the trails, especially for cyclists. (See FHWA Small Town Rural Design Guide for shoulder recommendations). Improvements to on-road alternatives are needed where off-road sections of trail are planned but not yet complete. Examples include:

- 4.1 A high-quality on-road route from Middleville to the Caledonia section of trail, likely utilizing Crane Road, M-37, Garbow Road, and Stimpson Road
- 4.2 A trail parallel to M-179 in Yankee Springs, for pedestrian and bicycle access to local businesses, Yankee Springs State Park, Yankee Springs Township Park, and potentially as part of a trail loop around Gun Lake
- 4.3 A safe crossing for the Hastings Riverwalk (Thornapple corridor) across Broadway Ave. (M-43) at Tyden Park in Hastings

5

Advance the trail system as a destination and economic asset by developing regional connections. Specific long-term connection opportunities include:

- 5.1 Linking south to Kalamazoo
- 5.2 Linking north from the Nashville area to Odessa and the Jordan Lake Trails
- 5.3 Linking west from Yankee Springs to Allegan County Trails

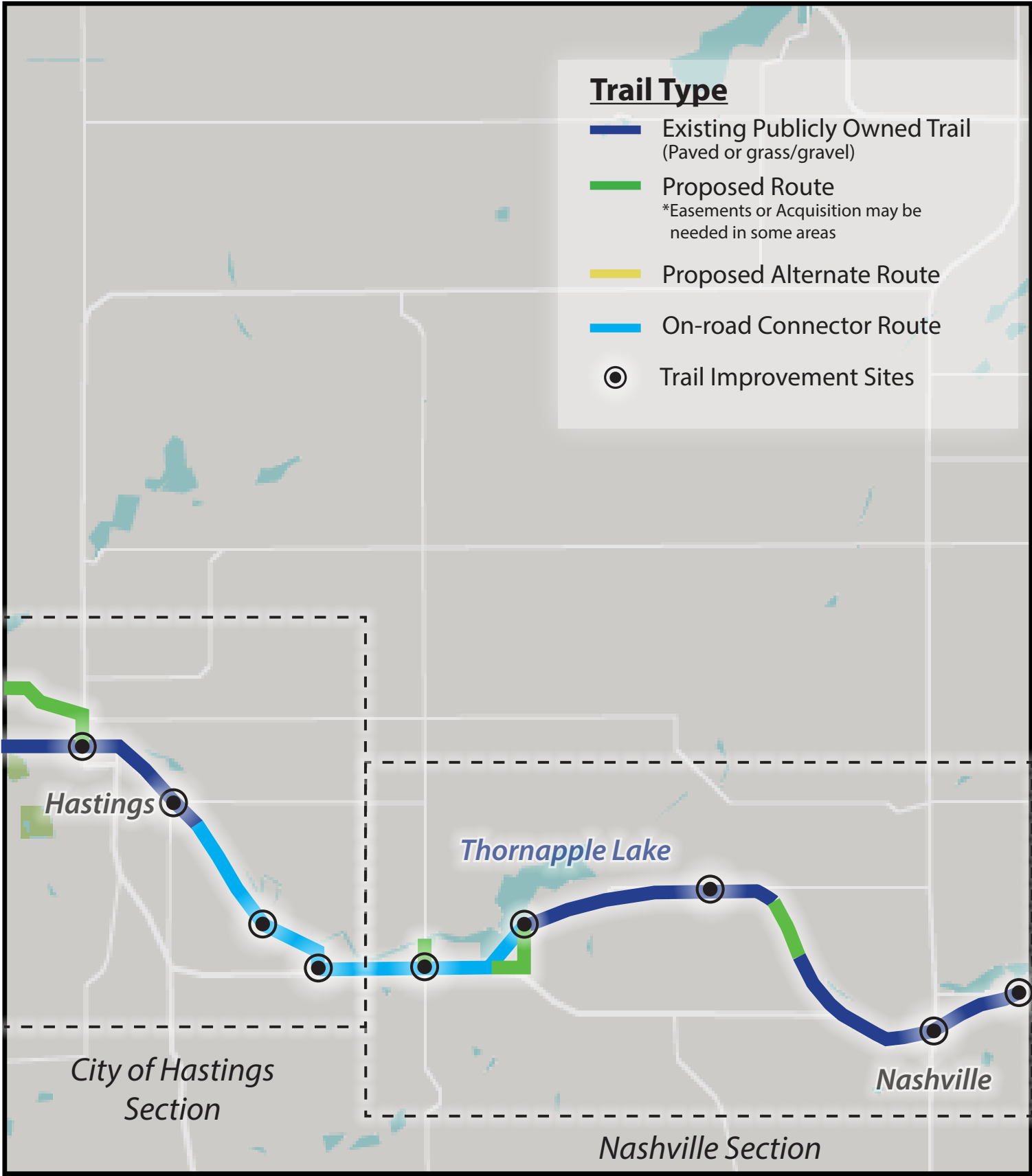
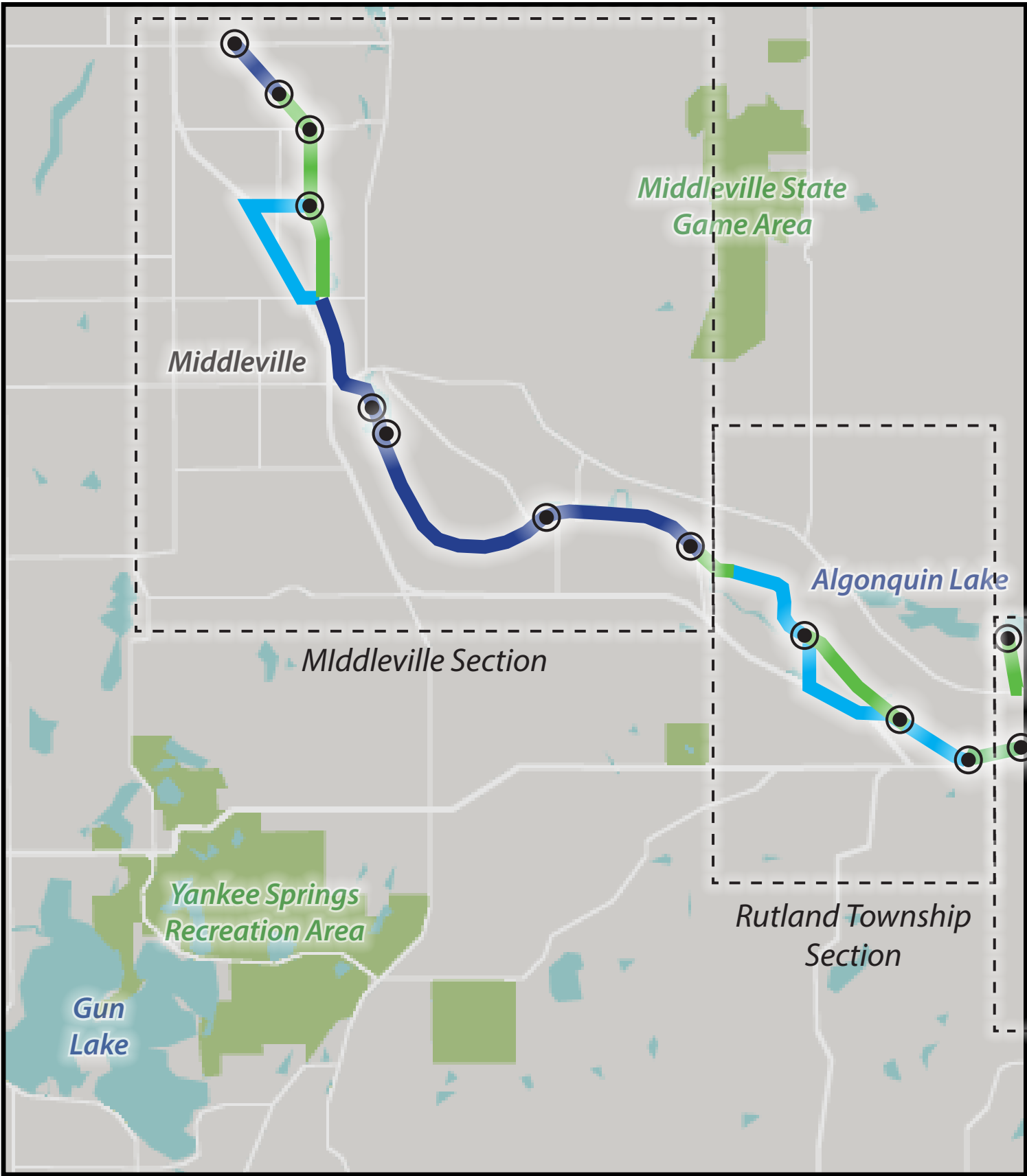
6

Provide enhanced trail amenities:

- 6.1 Identify key locations on the spine of the Paul Henry - Thornapple Trail for additional restrooms, drinking water, and parking areas.
- 6.2 Identify high profile trailhead locations for more developed user amenities (pavilions etc.)

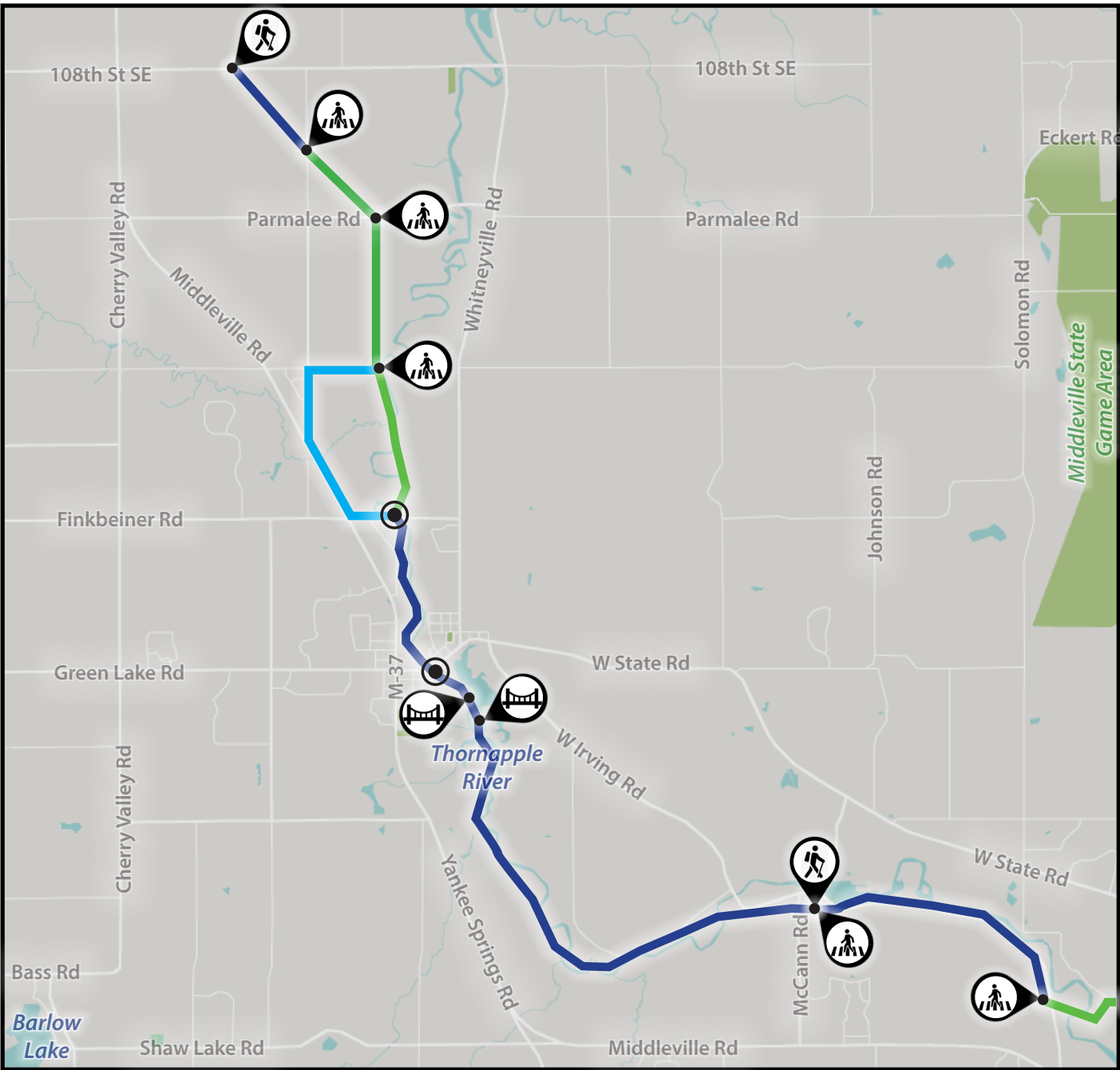
TRAIL SEGMENTS

PAUL HENRY-THORNAPPLE TRAIL From Kent County To Eaton County



TRAIL SEGMENTS

MIDDLEVILLE SECTION 108th Street to Irving Road



Trail Type

- Existing Publicly Owned Trail (Paved or grass/gravel)
- Proposed Route
*Easements or Acquisition may be needed in some areas
- Proposed Alternate Route
- On-road Connector Route

Trail Improvement Sites

- Existing Major Trail Point
- Trail Improvement Opportunity
- Trail Crossing
- Bridge Evaluation/Improvement

DESCRIPTION:

This section of trail runs from the Kent/Barry County Line south through the paved trail section in Middleville to Irving Road. There is an existing paved trail heading north from 108th Street that will eventually connect this section of the trail north into Caledonia Township and regional trail networks. Barry County owns approximately 4,000 feet from 108th Street to Stimson Road that was recently graded and is well traveled.

The trail section from West Crane Road to Irving Road is approximately 4.5 miles and is owned by the Village of Middleville. This section is almost entirely located on the old RR ROW. The Village of Middleville has developed trailhead parking, restrooms, potable water, and bike repair stations at Crane Road and Main Street crossings. There is a picnic pavilion, amphitheater, several restaurants, and shopping available in the area. The publicly owned and developed trail in this section is a 10' asphalt paved path from Crane Road to McCann Road and grass and gravel from McCann Road to Irving Road.

STATUS:

Thornapple Township was awarded a MIDNR Land Acquisition grant to acquire the RR ROW from Stimson Road to Crane Road. At the time this report was published (December 2022), of the 3 miles needed to complete the trail from 108th Street to Irving Road, property owners have agreed to sell or give trail easements to approximately two miles.

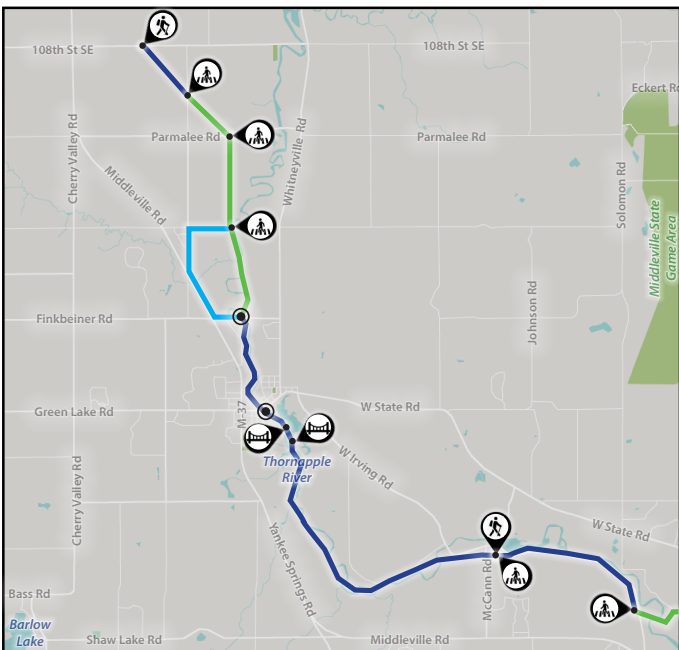
The paved section from Main Street to McCann Road was first installed in the 1990's and will need maintenance or repaving in the near future. The short railroad bridges closest to the Village have been identified as needing to be repaired or replaced. The Village of Middleville considers the repair or replacement of the bridges to be a critical need.



TRAIL SEGMENTS

MIDDLEVILLE SECTION (Continued)

108th Street to Irving Road



PREFERRED ROUTE:

- Along the existing RR ROW from Stimson Road to Crane Road
- Utilize existing cement tunnel under Crane Road designed to serve the trail when the bridge was constructed

ALTERNATIVE ROUTE(S):

- A connector route along Garbow Road east to M37, south to Crane Road and east to Village trailhead on Crane Road
- Acquisition of private property adjacent to RR ROW or public roads to establish off road trail route

PREFERRED TRAIL TYPE/SURFACES:

- 10-foot-wide unpaved (crushed limestone/aggregate) surface with shoulders outside of Village limits
- 10-foot-wide paved surface with shoulders within the Village limits
- Consider converting paved sections outside Village limits to a 10-foot-wide unpaved trail (limestone/aggregate) surface with shoulders when trail reconstruction is needed
- Alternate surface - 10-foot-wide asphalt surface for entire section

CHALLENGES:

- Connector routes on Garbow, M37, and Crane have safety concerns due to heavy traffic and narrow shoulders
- Acquisition of adjacent private property not within RR ROW would involve river crossings of the Thornapple River and potentially the construction of boardwalk through wetlands to connect with existing sections of trail
- Two bridges need to be repaired or replaced
- Repaving older paved sections south of Main Street
- The trail section from McCann to Irving is not developed. The Village of Middleville owns this 1.5+ mile section but has not allocated resources to make improvements. It is several miles outside its municipal boundaries and improvements are not likely going to be funded solely by the Village of Middleville

OPPORTUNITIES:

- The entrance to the trail off 108th Street is an opportunity for a “Welcome to Barry County Paul Henry - Thornapple Trail” arch to match Eaton County line entrance
- Trailhead parking at 108th Street
- Consider transfer of the McCann to Irving Road section to Barry County or Irving Township to promote the development and maintenance of this section of the PHTT



KEY DESTINATIONS FROM THIS SEGMENT:

- Connects the Village of Middleville to the Village of Caledonia and to the broader west Michigan trail network

- Connects Barry County to Kent County
- Village of Middleville downtown district (restaurants, farmer’s market, live music)
- Barry County Expo and Fairgrounds
- Whispering Waters Campground
- Thornapple River boating access sites (Village of Middleville, DNR boat launch at Irving Road, and Whispering Waters Campground)

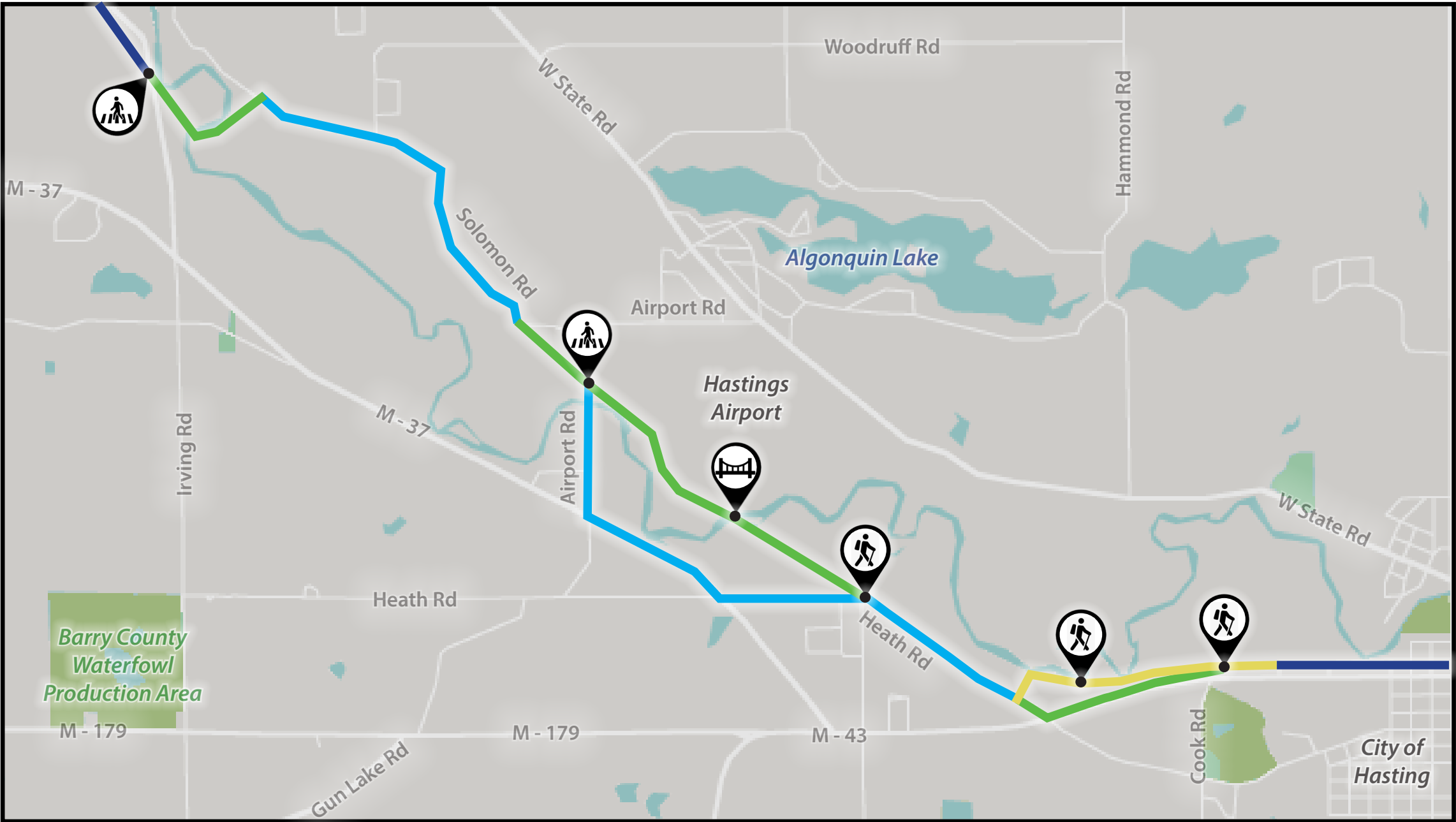
AMENITIES NEEDED: (road crossing, enhanced crosswalks, water, bathrooms, trailhead parking, bike rack, benches, bridge work, signage, etc.):

- Trailhead with “Welcome Arch” at 108th
- Benches/Picnic area at 108th
- Benches at Thornapple River overlook at ½ mile north of Crane Road
- Trail crossing signage/stripping at Stimson Road, and Parmalee Road
- Wayfinding signage of connector route along Garbow Road, M37, and Crane
- Enhanced wayfinding signage within the Village
- Enhanced connections from the PHTT to neighborhoods, schools, and shopping districts
- McCann Road Trailhead improvements (parking, cross walk, drinking water, bathrooms)
- Irving Road Trailhead parking area and safe road crossing

TRAIL SEGMENTS

RUTLAND TOWNSHIP SECTION

Irving Road to City of Hastings

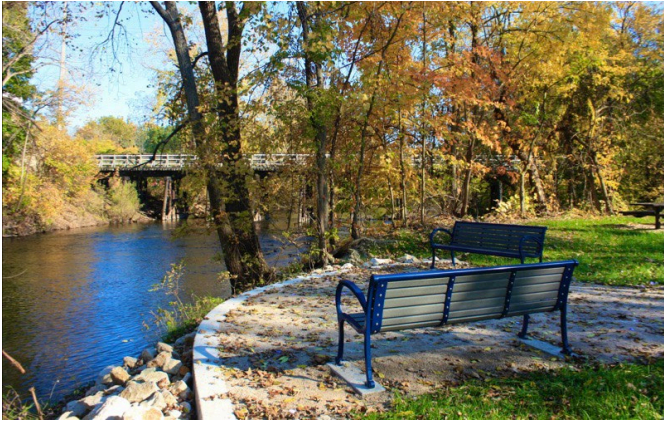


Trail Type

- Existing Publicly Owned Trail (Paved or grass/gravel)
- Proposed Route
*Easements or Acquisition may be needed in some areas
- Proposed Alternate Route
- On-road Connector Route

Trail Improvement Sites

- Existing Major Trail Point
- Trail Improvement Opportunity
- Trail Crossing
- Bridge Evaluation/Improvement



DESCRIPTION:

Irving Road to Airport Road

This section of the trail will require easements and/or purchases to construct a 10' wide trail along the old RR ROW through private property to allow access over the existing trestle bridge and north to Solomon Road. An on-road trail connector route is anticipated along Solomon Road adjacent to an active agricultural/ dairy farm operation to connect trail users to the county-owned property on the corner of Solomon and Airport Roads.

Airport Road to Walmart

This sub-segment includes sections of the old RR ROW held in both public and private ownership. Title research and surveys are needed to determine locations of public and privately owned sections of the old RR ROW. Some residential structures have been constructed within or close to the old RR ROW. Careful determination on the best routes to establish a 10' wide trail is needed in this section.

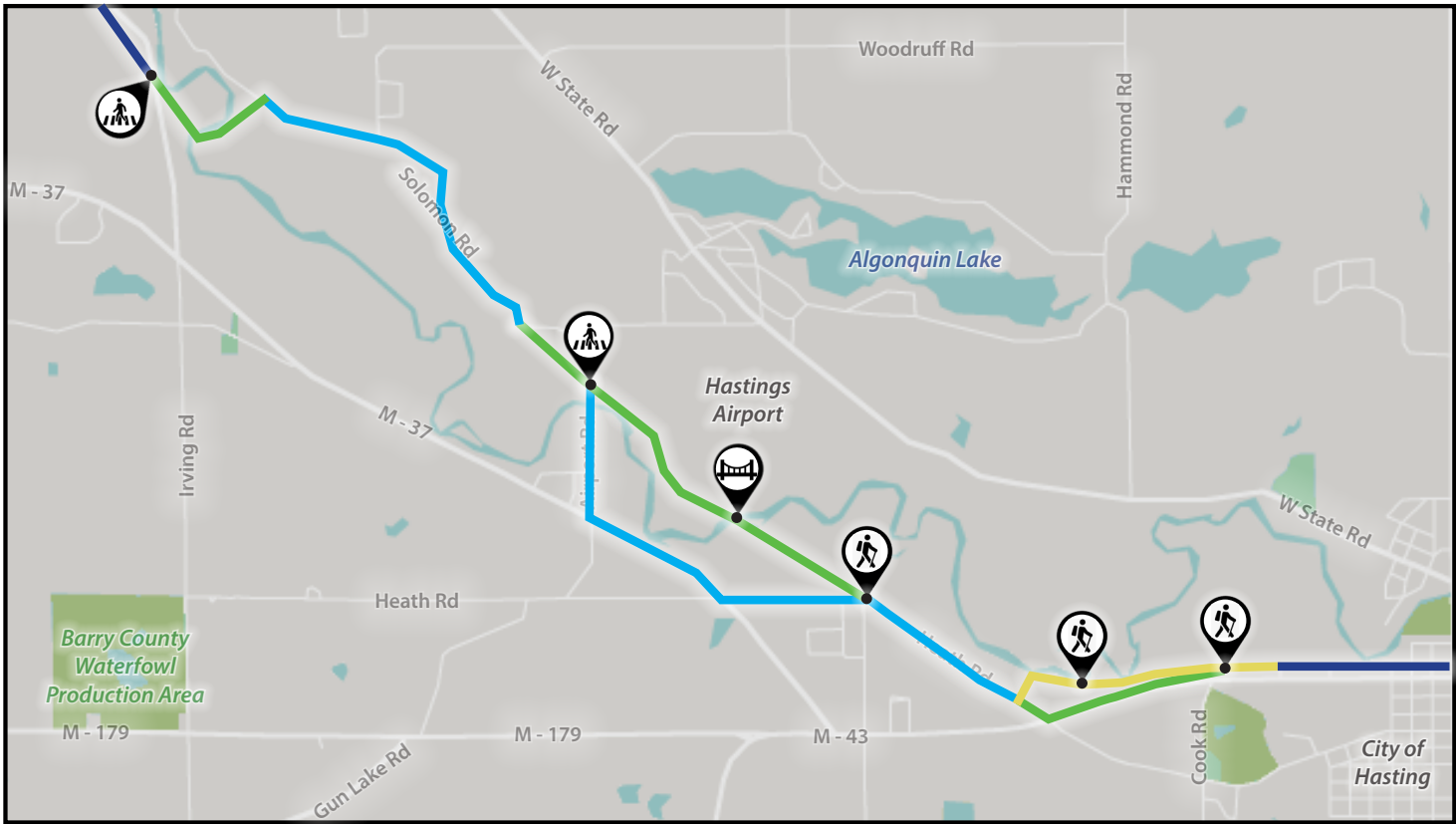
Walmart - Hastings Riverwalk/Industrial Drive

This missing one-mile trail connection could connect Walmart to the paved Hastings Riverwalk at Industrial Drive and through the City of Hastings to Bliss Park. Portions of the old RR ROW are still intact and in good condition in this subsection. However, several other short sections have been developed into commercial and office buildings. Property acquisitions and easements will be necessary to establish an off-road, separated trail in this subsection. The City of Hastings owns close to 20 acres behind Aldi's Market that could serve as a park destination along the trail and trailhead.

TRAIL SEGMENTS

RUTLAND TOWNSHIP SECTION

Irving Road to City of Hastings



PREFERRED ROUTE:

- Along or as close as possible to the existing RR ROW

ALTERNATIVE ROUTE(S):

- Land acquisitions or easements of property within or close to RR ROW property
- Property acquisition or easements along M43 for a separated 10-foot-wide trail with shoulders
- Connector route along Airport Road to M37 to Heath Road to Walmart

PREFERRED TRAIL TYPE/SURFACES:

- 10-foot-wide unpaved trail surface with shoulders outside of City limits
- Alternate surface: 10-foot-wide asphalt surface



CHALLENGES:

- Determine the best route from Irving Road to Solomon Road.
- Property acquisition and/or easements are necessary to connect this section.
- Establish safe connector route along Solomon Road to Barry County owned Airport Road property.
- Establish an approved trail route through Barry County Airport property.
- Determine RR ROW property ownership throughout this segment
- Trestle bridge structural evaluation is needed
- Establish safe connector route along Heath Road to Walmart.
- Several different property owners within this subsection would need to agree to sell or give easements for this section to be an off-road/separated trail.
- Acquisition of private property near the RR ROW contains wetlands and would likely involve the construction of boardwalk to connect to Industrial Drive.

OPPORTUNITIES:

- Establish connector route to DNR Boat Launch site (River Trail connection)
- Rutland Township owns a parcel off Heath Road connecting to the old RR ROW. This could be an ideal trailhead park with parking, bathrooms, drinking water, etc.
- This is a key connection to the City of Hastings and shopping destinations
- This route has the potential to become a non-motorized commuting route

between residential areas and employment centers in the City of Hastings and Rutland Township

- Significant economic impact of connecting non-motorized users with commercial districts along M43

KEY DESTINATIONS FROM THIS SEGMENT:

- Barry County Expo and Fairgrounds
- Whispering Waters Campground
- DNR Boat Launch at Airport Road (800 feet south of trail crossing on Airport Road)
- Village of Middleville
- Walmart/Business District
- DNR Boat Launch at Airport Road
- Connection to the City of Hastings (retail, grocery stores, restaurants, coffee houses, hotel, and employment centers)
- Scenic Thornapple River overlook sites

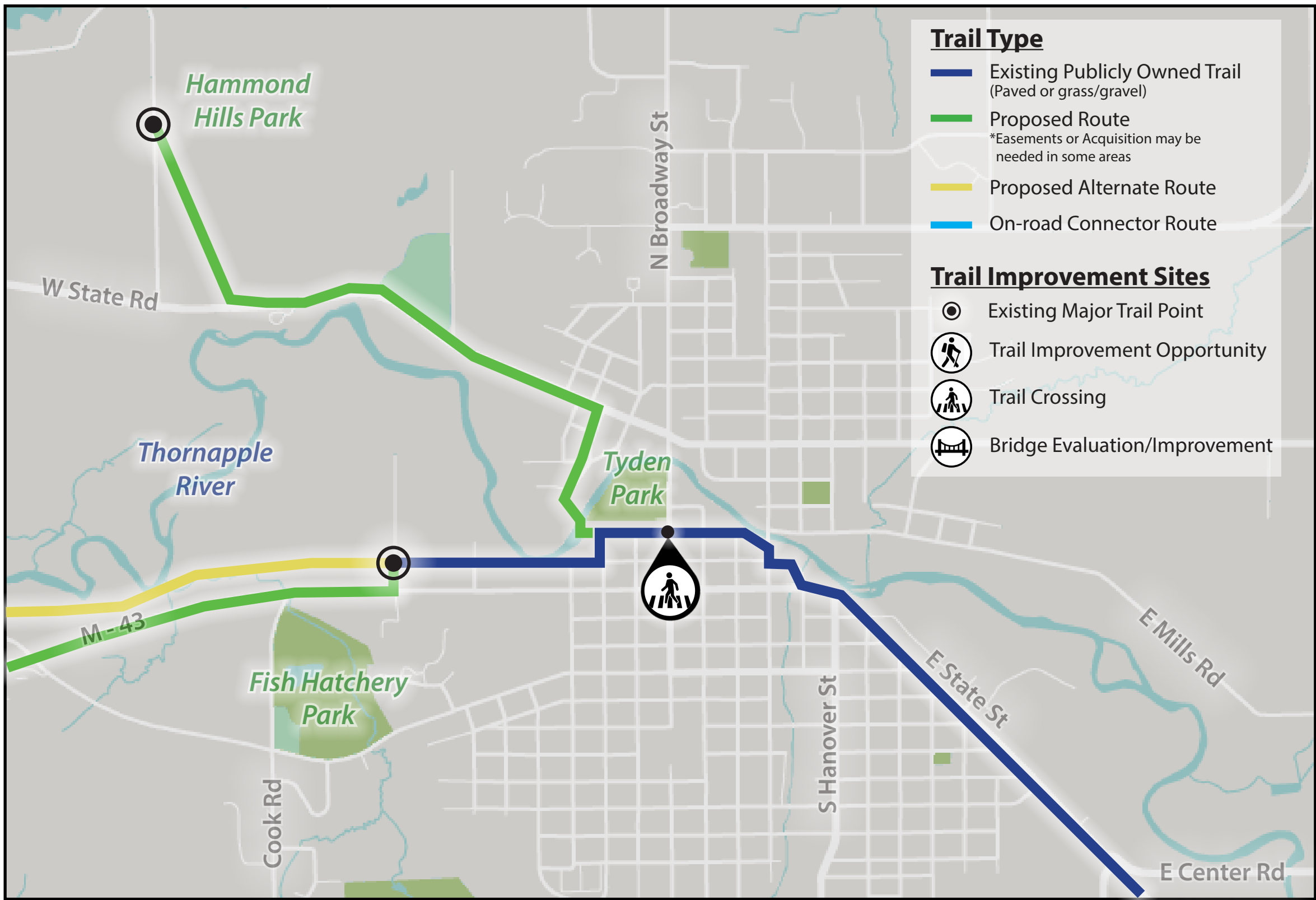
AMENITIES NEEDED:

- Improved parking at Airport Road trail access site
- Wayfinding signage (miles to Middleville, miles to Hastings, river access)
- Benches/Picnic area
- Trail crossing signage/stripping at all road crossings
- Connector route signage on Solomon
- Restrooms
- Drinking Water
- Bike Racks
- Possible development of City of Hastings parcel as trailhead and park area

TRAIL SEGMENTS

CITY OF HASTING SECTION

Industrial Drive to Bliss Riverfront Park



DESCRIPTION:

The City of Hastings trail section is a fully constructed 10-foot-wide paved shared use path traveling along Apple Street through Tyden Park and along the Thornapple River east to Bliss Riverfront Park. This section includes several amenities including trail maps, benches, scenic overlooks, and trail parking.

PREFERRED ROUTE:

- No change in this route is anticipated

PREFERRED TRAIL TYPE

SURFACES:

- 10-foot-wide asphalt surface

CHALLENGES:

- Crossing at M43/Tyden Park

OPPORTUNITIES:

- Develop a safe, non-motorized trail route connecting the City's Hammond Hill Disc Golf and Mountain Bike Park

KEY DESTINATIONS FROM THIS SEGMENT:

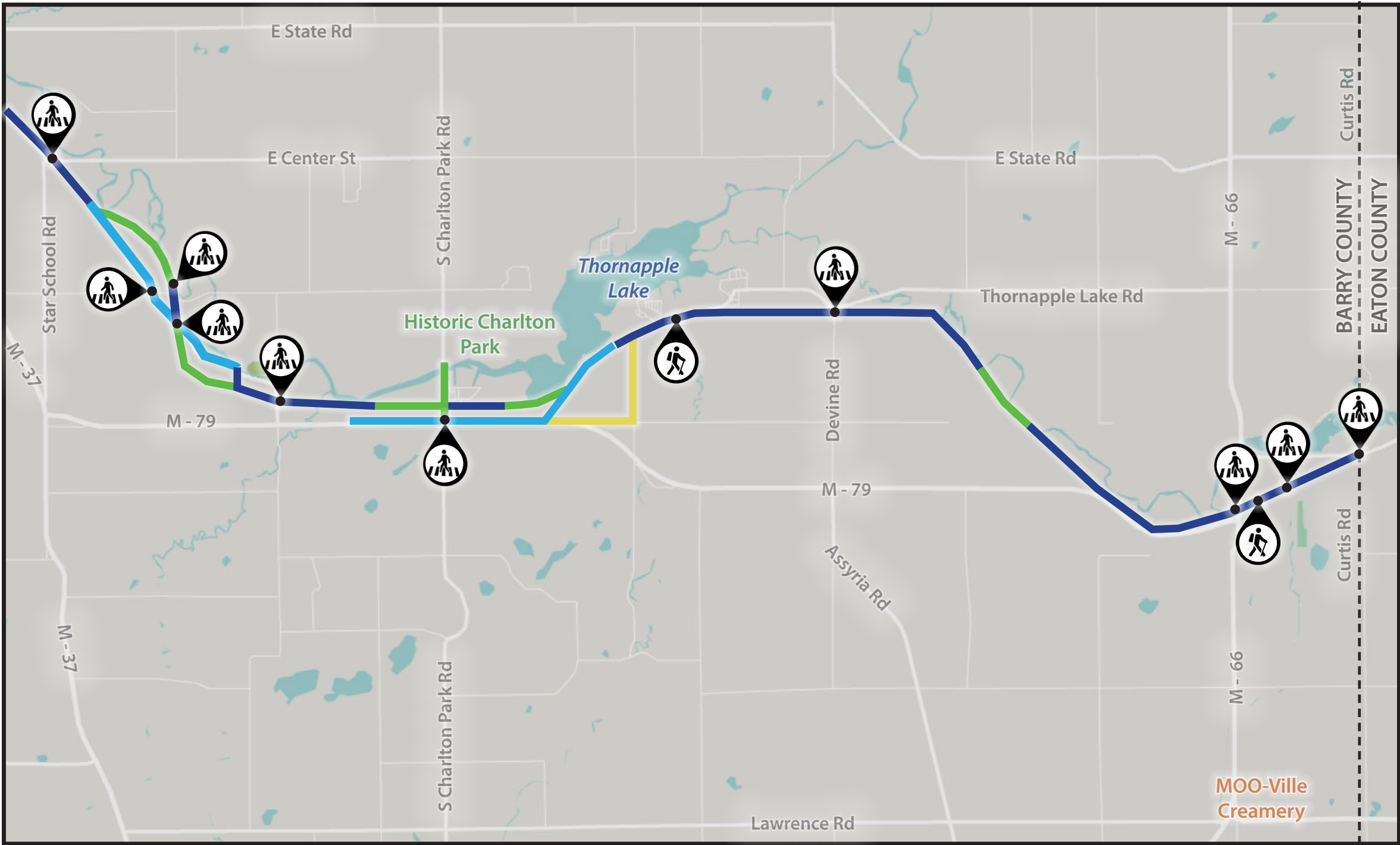
- City of Hastings commercial district
- Tyden Park
- Thornapple River
- Bliss Riverfront Park
- Kayak and tubing livery along Apple Street

AMENITIES NEEDED:

- Consistent wayfinding signage

TRAIL SEGMENTS

NASHVILLE SECTION City of Hastings to Nashville



DESCRIPTION:

This section of trail is the gateway from Eaton County into Barry County and has the potential to connect Nashville with Vermontville and the Eaton County trail system. The old RR ROW is publicly owned between Eaton County line and the Nashville Village limits to the west. Improvements to the trail surface as well as enhanced trail amenities (safe road crossings, lighting, trailhead parking, and restrooms) throughout the Nashville section will expand this section of the trail to be used as a non-motorized transportation route. Priority should be given to working cooperatively with Eaton County to coordinate trail construction to provide improved connections between Fuller Street Elementary and Maple Valley Jr./Sr. High Schools. Extending the Nashville trail section west approximately 12 miles to the City of Hastings will connect residents and visitors to Thornapple Lake, Charlton Park, McKeown Bridge Park, Barry County Christian School and Thornapple Manor.

STATUS:

As of 2022, Barry County is developing the publicly owned sections of the trail between Nashville and Hastings as part of funds allocated to the County from the American Rescue Plan Act (ARPA). The route from Nashville to Hastings will likely require the use of many trail types including shared use paths (paved and unpaved), roadside trails, and on-road links. Trail easements and purchases should be a priority to gain access to a separated shared use pathway in this corridor when available.

Trail Type

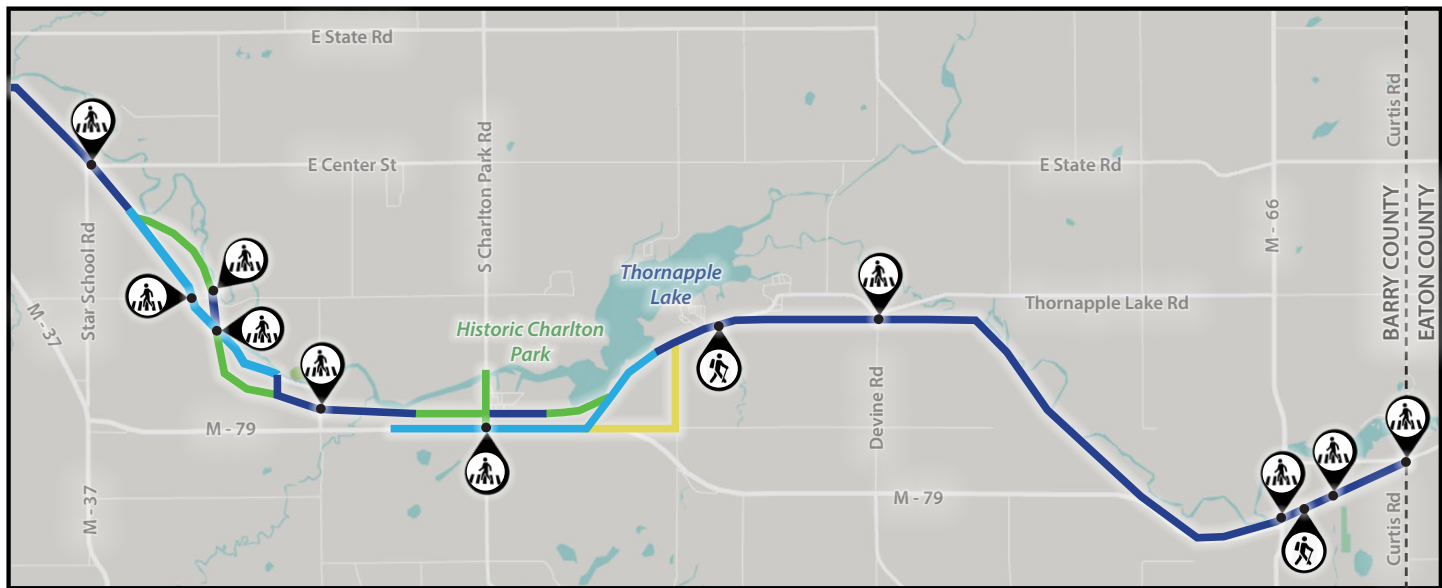
- Existing Publicly Owned Trail (Paved or grass/gravel)
- Proposed Route
*Easements or Acquisition may be needed in some areas
- Proposed Alternate Route
- On-road Connector Route

Trail Improvement Sites

- Trail Improvement Opportunity
- Trail Crossing
- Bridge Evaluation/Improvement

TRAIL SEGMENTS

NASHVILLE SECTION City of Hastings to Nashville



PREFERRED ROUTE:

- Along or as close as possible to the old RR ROW

ALTERNATIVE ROUTE(S):

- Property acquisition or easements along public roads for a separated 10-foot-wide trail with shoulders
- On-road connections with widened shoulders

PREFERRED TRAIL TYPE/ SURFACES:

- 10-foot-wide shared use path
- Paved surface trail within City and Village limits
- Unpaved surface trail outside of City and Village limits
- Consideration should be given to asphalt surfaces within the Thornapple Manor/Harvest Point senior living campus



CHALLENGES:

- Old RR ROW along Nashville Road south of Hastings Riverfront Park is in private ownership
- Several different property owners within this subsection would need to agree to sell or give easements for this section to be an off-road/separated trail
- Acquisition of private property near the RR ROW may contain regulated wetlands and would likely involve the construction of boardwalk

OPPORTUNITIES:

- Establishment of a safe on or near road connection from Riverfront Park to the County owned Thornapple Manor/911 Dispatch campus
- Establish a connector route to Charlton Park Historic Village and Recreation Area
- Connect City of Hastings with Thornapple Manor/Harvest Point Senior Living Campus
- Connect City of Hastings with Charlton Park Historic Village and Recreation Area
- Establish commuting route from City of Hastings to Thornapple Manor/Harvest Point Senior Living Campus, and Barry County Christian School
- This is a key connection between The Village of Nashville, Barry County parks, and the City of Hastings
- Significant economic impact of connecting non-motorized trail between the Village Nashville and the City of Hastings
- Establish a Connector Route from Nashville to MooVille Ice Cream

KEY DESTINATIONS FROM THIS SEGMENT:

- McKeown Bridge Park (picnic area, fishing, kayak launch, bathroom, walking trails)
- Charlton Park (Historic Village, lake access, hiking trails, picnicking, special events)
- Thornapple Lake
- Thornapple Manor/Harvest Point Senior Living Campus
- Barry County Christian School
- Village of Nashville
- Maple Valley Schools

AMENITIES NEEDED:

- Road crossings
- Benches/river overlooks
- Wayfinding signage/maps/distance indicators



IMPLEMENTATION STRATEGIES

IMPLEMENTATION

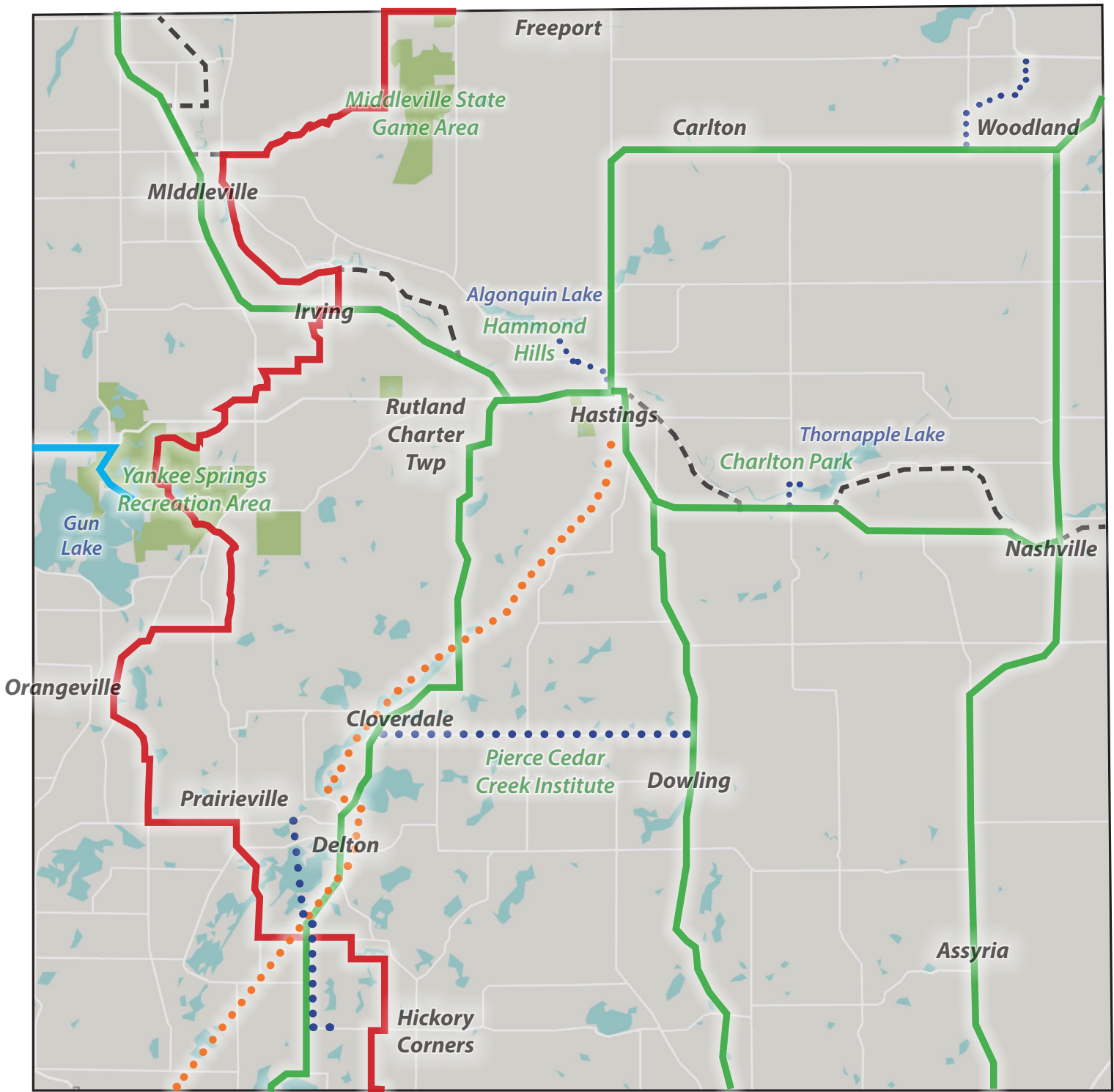
- 1 Municipalities within Barry County are encouraged to include this Countywide Trails Plan in their community master plan and parks and recreation plan. This will support communities when applying for grants to complete projects within their jurisdictional boundaries.
 - 2 Municipalities can use this plan to identify and pursue trail property acquisition/easements.
 - 3 Municipalities should develop detailed engineered designs, working towards 75% engineered designs for publicly owned segments. This phase should also identify the lead agency for trail implementation. Often these plans are required by funders before applications for grants can be submitted.
- There are several areas that will require further research during the trail design phase: Designs and specifications for trail amenities (e.g., benches, picnic areas, signage for Hwy 131, signage for trailheads and signage for overlooks)
 - Designs and layout of trailheads and of rest areas / overlooks
 - Locations and design needs for fill, design over wet areas, and installation of railings at higher trail elevations
 - SHPO (State Historic Preservation Office) investigation as part of grant funding

OTHER RESOURCES (TRAIL PLANNING TOOL KIT)

- 1 Small Town and Rural Multi-Modal Networks, published by the Federal Highway Administration
https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/
- 2 American Trails Resource Library
<https://www.americantrails.org/resources/trail-planning-hub>
- 3 Rails to Trails Conservancy Resource Library
<https://www.railstotrails.org/resource-library/>
- 4 Trail Planning Workshop Toolkit by the National Parks Service
<https://www.nps.gov/orgs/rtca/upload/Trail-Planning-Workshop-Toolkit.pdf>

OTHER TRAIL SEGMENT FOCUS AREAS FOR FUTURE CONSIDERATION:

- "M" Roads – Routine improvements to "M" Roads should include 7-foot shoulders
- Prioritizes local area trail connections including Yankee Springs Recreation Area, the North Country Trail, and other nearby trail opportunities



Trail Map Key

- "M" Roads
- North Country Trail
- Yankee Springs - M179/State Park
- - - Paul Henry - Thornapple Trail
- ... Possible Future Utility Corridor
- ... Key Destination Connections Needed

FUNDING & GRANT OPPORTUNITIES

There are numerous funding sources that can be utilized for trail or pathway projects. One of the most comprehensive places to locate information on funding is the Michigan Trail and Greenways Alliance website www.michignatrails.org. Of the numerous funding sources available the most likely sources of funding for the identified projects are federal and state grant opportunities, trail sponsors and donations, foundations, and county/municipal funds.

Funding Sources

Federal & State Grants

Trail Sponsors & Donations

Foundations

County/Municipal Funds



FEDERAL GRANTS

There are several federal transportation funding sources that are dispersed by the Michigan Department of Transportation (MDOT). These sources would need to be allocated through either MDOT or the Barry County Road Commission (BRC). The sources most likely to be used for non-motorized facilities include:

TRANSPORTATION ALTERNATIVES PROGRAM (TAP):

The Transportation Alternatives Program (TAP) is a competitive grant program that uses federal transportation funds designated by Congress for specific activities that enhance the intermodal transportation system and provide safe alternative transportation options. Facilities for pedestrians and bicyclists are eligible, including traffic calming and other safety improvements.; TAP funding requires matching funds of at least 20% of the eligible project cost.



SAFE ROUTES TO SCHOOL (SR2S):

Safe Routes to School is an international movement—and now a federal program—to make it safe, convenient, and fun for children, including those with disabilities, to bicycle and walk to school. When routes are safe, walking or biking to and from school is an easy way to get the regular physical activity children need for good health. Safe Routes to School initiatives also help ease traffic jams



Safe Routes to School



FUNDING & GRANT OPPORTUNITIES

STATE GRANTS

DNR NATURAL RESOURCES TRUST FUND:

Can be used for land acquisition or project development. Minimum match requirement of 25%. No minimum or maximum grant request for Acquisition projects. \$15,000 minimum grant and \$300,000 maximum grant request for development projects.

DNR LAND AND WATER CONSERVATION FUND:

This grant may be used for development projects only. Match requirement is 50%. \$30,000 minimum and \$500,000 maximum grant request.



DNR RECREATION PASSPORT:

This grant may be used for development projects only. Match requirement is 25% minimum. \$7,5000 minimum and \$150,000 maximum grant request.

CONGESTION MITIGATION AND AIR QUALITY (CMAQ):

The CMAQ program funds transportation projects or programs that will contribute to the attainment or maintenance of National Ambient Air Quality Standards. In the past, CMAQ funds have been used for trail and pathway programs that will reduce the number of trips by automobiles.



EXTERNAL RESOURCES

Bicycle Specific Infrastructure Information

Economic Benefits of Bicycling

<https://www.michigan.gov/mdot/travel/safety/road-users/bicycling/economic-benefits-of-bicycling>

Bicycle Lending Libraries

<https://nextcity.org/urbanist-news/bike-libraries-are-increasing-access-to-bikes-across-america>

Michigan Bike Wave Lending Library

<https://lmb.org/initiatives/bike-wave/>

AASHTO Guide for the Development of Bicycle Facilities

<https://store.transportation.org/>

MDOT Bicycling

<https://www.michigan.gov/mdot/Travel/safety/Road-Users/Bicycling>

FHWA Bikeway Selection Guide

https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf

FHWA Incorporating On-Road Bicycle Networks into Resurfacing Projects

https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/resurfacing/

Traffic Control and Road Design Information

Criteria for Level of Traffic Stress (LTS):

<https://peterfurth.sites.northeastern.edu/2014/05/21/criteria-for-level-of-traffic-stress/>

Michigan Manual on Uniform Traffic Control Devices

<https://mdotjboss.state.mi.us/TSSD>

NCHRP Guide for Pedestrian and Bicyclist Safety at Alternative and Other Intersections and Interchanges

<https://nap.nationalacademies.org/catalog/26072/guide-for-pedestrian-and-bicyclist-safety-at-alternative-and-other-intersections-and-interchanges>

FHWA Traffic Calming

<https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer>

FHWA Small Town and Rural Design Guide

https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/

FHWA Office of Safety – Proven Safety Countermeasures

<https://highways.dot.gov/safety/proven-safety-countermeasures>

FHWA Road Diet Informational Guide

https://safety.fhwa.dot.gov/road_diets/guidance/info_guide/

FHWA Guide for Improving Pedestrian Safety at Uncontrolled Locations

https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-07/STEP_Guide_for_Improving_Ped_Safety_at_Unsig_Loc_3-2018_07_17-508compliant.pdf

FHWA Interim Approvals

https://mutcd.fhwa.dot.gov/res-interim_approvals.htm

Other State Level Plans and Guides

Michigan Mobility 2045: State Long-Range Transportation Plan and AT Plan

<http://www.michiganmobility.org/>

Regional Nonmotorized Investment Plans

<https://www.michigan.gov/mdot/travel/safety/road-users/bicycling>

MDOT Sidepath Intersection & Crossing Treatment Guide

<https://www.michigan.gov/-/media/Project/Websites/MDOT/Travel/Safety/Road-User/Bicycling/Research/Sidepath-Intersection-Crossing-Treatment-Guide.pdf?rev=48b64203714a49efb24e512792e737ae>

Trail Towns Designation Program

<https://www.michigan.gov/-/media/Project/Websites/dnr/Documents/PRD/Misc/PureMichiganTrailsHandbook20-21.pdf?rev=05491584bbb64ba2b77e8294bd14cd93>

Gateway Treatment

https://www.planningmi.org/assets/docs/gateway_treatment_research_presentation_2018_transportation_bonanza2.pdf

Winter Maintenance

<https://tooledesign.com/wp-content/uploads/2019/12/Winter-Maintenance-Resource-Guide.pdf>

Online Tools for Municipalities

Street Mix: an online tool that allows you to edit street elements given a specific right-of-way width quickly. It is free and can be exported for use in reports and presentations

<https://streetmix.net>

My Maps: A Google application and tool that allows you to develop a network map and document issues and opportunities within your community

<https://mymaps.google.com>

Michigan Fitness Foundation Promoting Active Communities

<https://activecommunitytool.org/about.aspx>

NACTO Don't Give up at the Intersection

<https://nacto.org/publication/dont-give-up-at-the-intersection/>

REFERENCES

- ⁱ National Recreation and Parks Association, Safe Routes to Parks: Improving Access to Parks through Walkability; NRPA, Ashburn VA, 2015.
- ⁱⁱ Torsha Bhattacharya, Ph.D.; Kevin Mills, J.D.; and Tiffany Mulally, Ph.D., Active Transportation Transforms America: The Case for Increased Public Investment in Walking and Biking Connectivity; Washington, D.C.: Rails-to-Trails Conservancy, 2019.
- ⁱⁱⁱ U.S. Department of Health and Human Services. Physical Activity Guidelines for Americans, 2nd edition. Washington, DC: U.S. Department of Health and Human Services; 2018.
- ^{iv} Zenko Z., Willis E.A., and White D.A., (2019). Proportion of Adults Meeting the 2018 Physical Activity Guidelines for Americans According to Accelerometers. *Frontiers in Public Health*, 7:135.
- ^v Andrew T. Kaczynski, PhD, Luke R. Potwarka, MA, and Brian E. Saelens, PhD. Association of Park Size, Distance, and Features With Physical Activity in Neighborhood Parks; *American Journal of Public Health*; August 2008, Vol 98, No. 8
- ^{vi} Andrew T. Kaczynski and Karla A. Henderson, Parks and Recreation Settings and Active Living: A Review of Associations With Physical Activity Function and Intensity; *Journal of Physical Activity and Health*, 2008, 5, 619-632.
- ^{vii} Merriam, D.; Balilty, A.; Stein, J.; Boehmer, T. 2017. Improving Public Health through Public Parks and Trails: Eight Common Measures. Summary report. US Department of Health and Human Services, Centers for Disease Control and Prevention and US Department of the Interior, National Park Service.
- ^{viii} Torsha Bhattacharya et. al., ... 2019.
- ^{ix} Measuring Trails Benefits Series: Overall Benefits; <http://headwaterseconomics.org>; Spring 2016
- ^x Liu, Jenny H. and Shi, Wei. Understanding Economic and Business Impacts of Street Improvements for Bicycle and Pedestrian Mobility – A Multicity Multiapproach Exploration. NITC-RR-1031/1161. Portland, OR: Transportation Research and Education Center (TREC), 2020.
- ^{xi} Andersen M. and Hall ML. Protected Bike Lanes Mean Business: How 21st Century Transportation Network Help Urban Economies Boom; The Green Lane Project, 2015.