

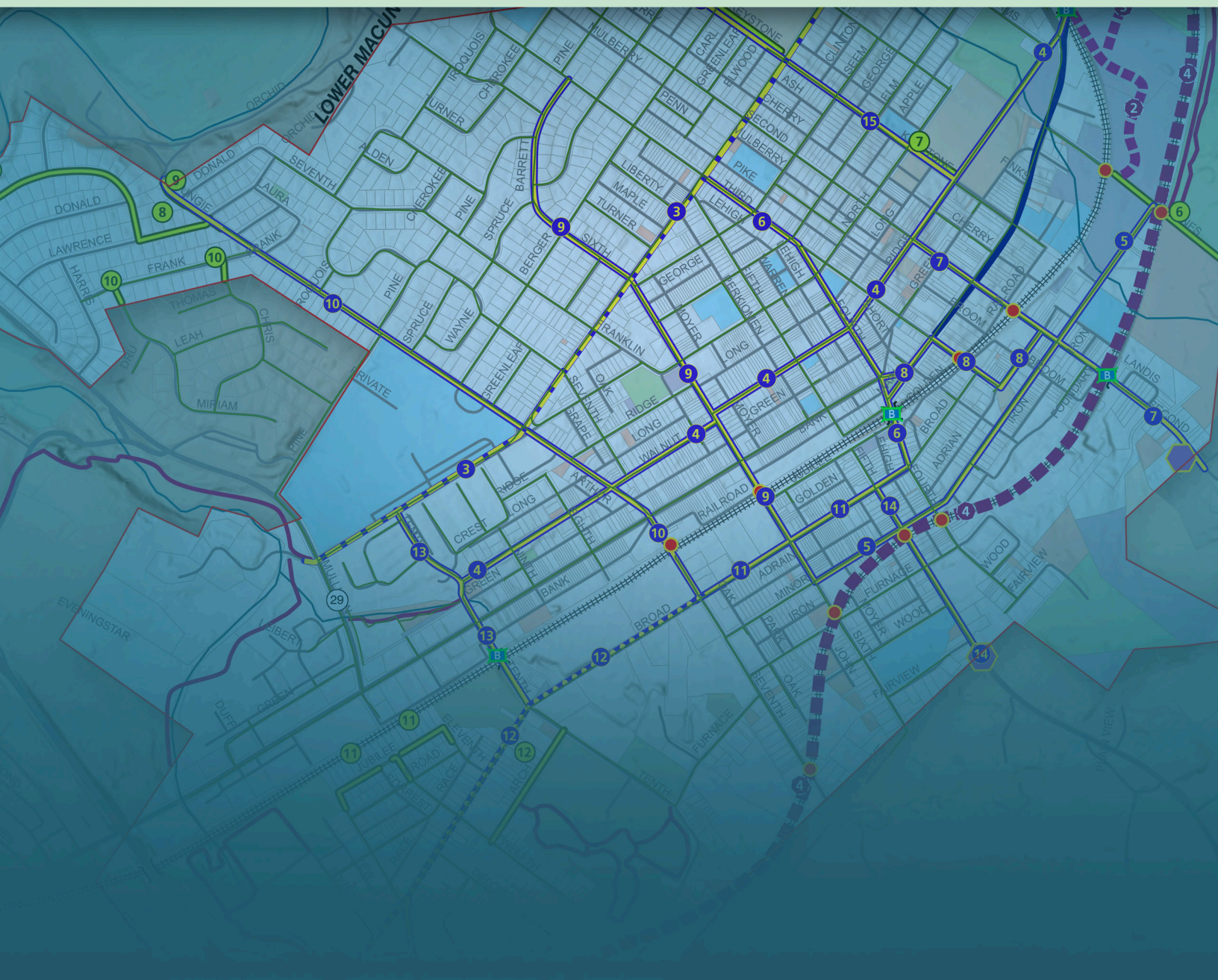
Proposed On Road - Bike Lane
Walk Roll LV - On Road Bike
Bridge
Grade RR Crossing
Municipal Connector



Comprehensive Parks, Recreation, Open Space, Greenways & Trails Study

Report 2 of 4

BOROUGH OF EMMAUS Greenways & Trails Plan





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This project was financed in part by grants from the Department of Conservation & Natural Resources (DCNR) Keystone Recreation, Park & Conservation Fund; and the Department of Community & Economic Development (DCED) Greenways, Trails & Recreation Program through the Commonwealth Financing Authority.



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Please refer to the Borough of Emmaus Comprehensive Parks & Recreation Plan for the appendix.

1 Introduction





Study Purpose

The Borough of Emmaus commissioned this Greenways and Trails Plan to plan for the phased development of a comprehensive network of trails and greenways within the Borough. This plan develops a comprehensive, borough-wide network of bicycle routes and trails that link individual neighborhoods and various destinations in and around the Borough. This study also identifies existing greenways and addresses how to enhance and protect them. This document is one of four reports included in the Borough of Emmaus Comprehensive Parks, Recreation, Open Space, Greenways and Trails Study, September 2021.

An inventory and analysis of existing connectivity infrastructure establishes the framework for this plan by assessing site conditions, technical data, and public input. The design guidelines provide standards for proper design of both trails and greenways. The proposed network of trails and greenways should follow standard, nationally accepted guidelines for safety and accessibility. Chapters 3 and 4 of this report provide recommendations and an implementation schedule along with general cost estimates and potential funding sources.

Study Goals and Objectives:

- Develop a Borough-wide trails and greenways network;
- Gather public input to inform the plan;
- Link cultural, environmental, recreational, and historical destinations within the Borough and region;
- Encourage conservation of environmentally sensitive areas;
- Design for all trail users;
- Provide trails and trail routes that facilitate transportation and recreation;
- Provide for quality of life amenities that retain and attract residents;
- Identify funding opportunities;

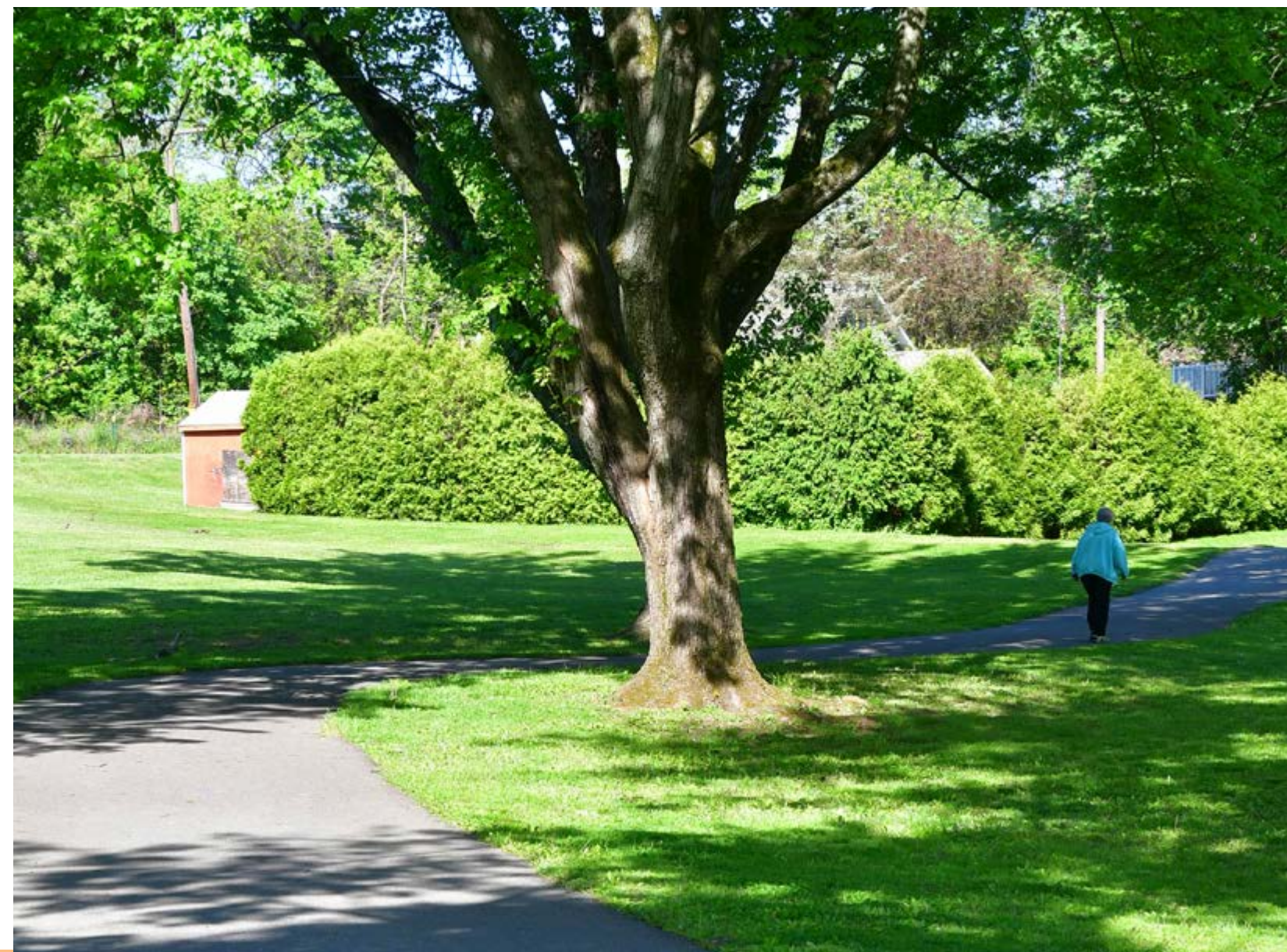
- Identify stakeholders;
- Protect & respect private property rights; and,
- Develop cost estimates and priorities for seeking grants and implementing trails.

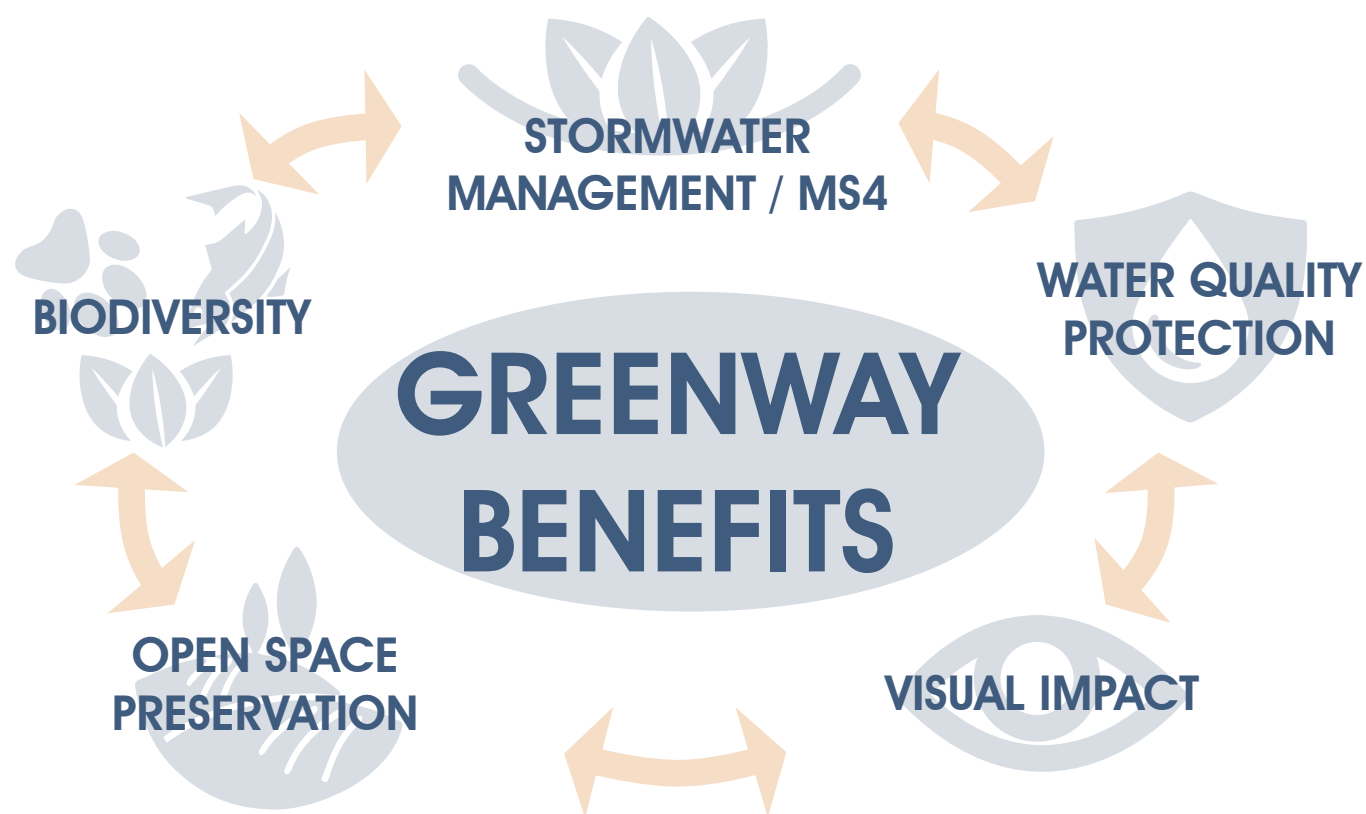
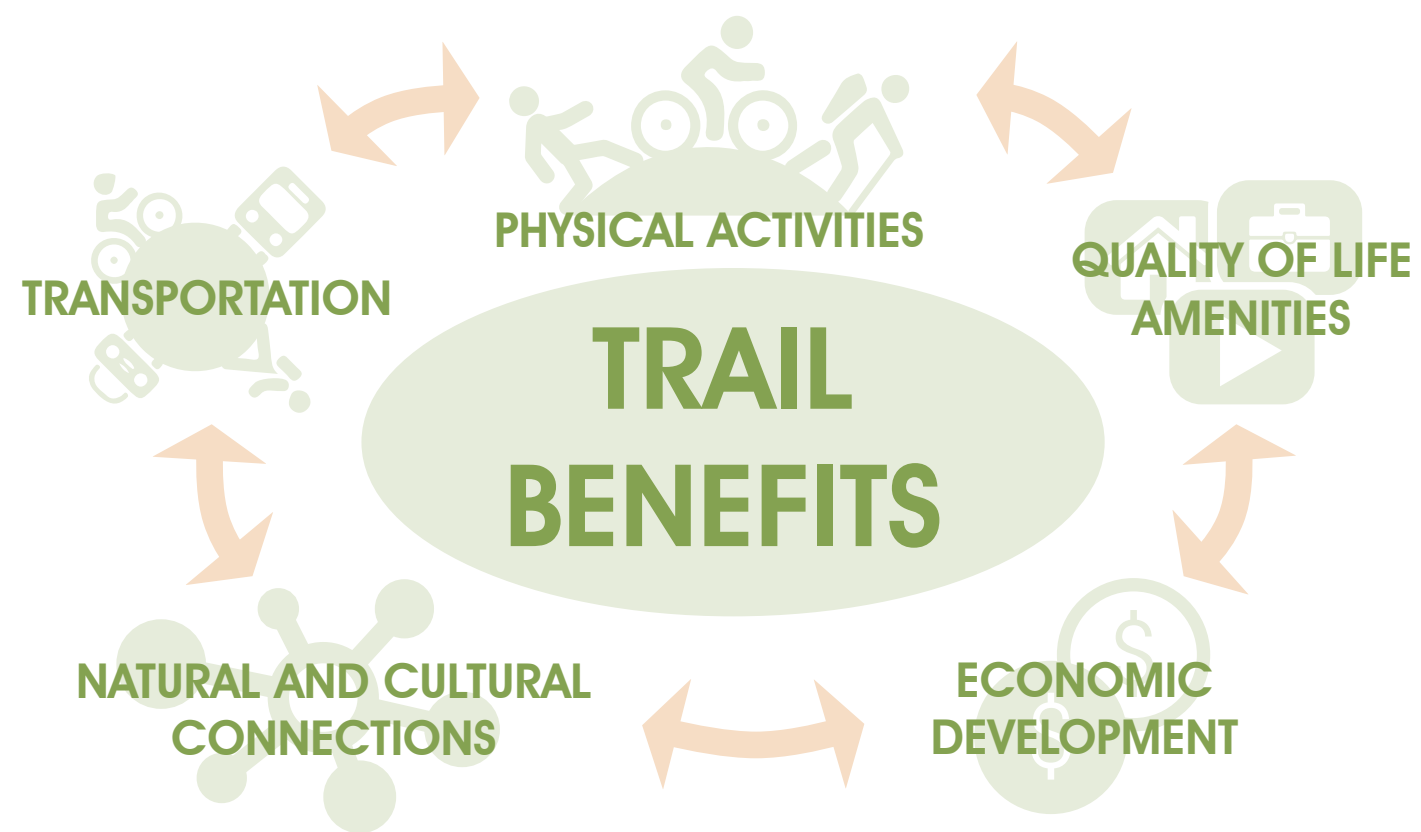
Municipal Background, Regional Context, and Demographics

The Borough of Emmaus is in southern Lehigh County, within the southeastern part of Pennsylvania. Emmaus is a sophisticated municipality that includes a park

system, municipal services, and a public library. The Borough covers 2.9 sq. miles and in 2019 had an estimated population of 11,533 according to the U.S. Census Bureau. The Borough has a population density of 3,928 people per square mile (2019) and is the sixth most densely populated municipality in Lehigh County.

For more information about the Borough's regional context, background, and demographics, please refer to the *Parks, Recreation, and Open Space Plan*, September 2021.





Benefits of Trails and Greenways

The importance of trails became very apparent during the Covid-19 pandemic. Across the country, trail user data showed nearly a 200% increase in use over the same time in the previous year, according to the 2020 Rails-to-Trails survey. This was also shown in the 121% increase of bicycle sales nationwide. Some visited parks and trails because of closed gyms and other closed recreational facilities. Others may have sought mental health and spiritual benefits of being outdoors. Others may have needed a less expensive alternative for transportation during the economic downturn. Whatever the reason for the use of trails, the trends have not disappeared since stay at home orders have been lifted. It is expected that most people will continue to take advantage of these important green infrastructure, recreation, and transportation facilities.

Trails and bicycle routes can provide multiple economic, social, and other health benefits to a community. According to a study by The Rails to Trails Conservancy titled *Economic Benefits of Trails and Greenways*, the economic benefits of trails can include increased property values for nearby properties. One of the social benefits is that they provide additional opportunities for community interaction and can contribute to an improved quality of life.

Trail facilities can improve the community's general health and well-being through additional opportunities for regular physical activity. Depression, obesity and diabetes are chronic diseases directly related to the physical inactivity and unhealthy eating habits associated with sedentary lifestyles. The CDC Guide for Strategies to Increase Physical Activity in the Community indicates that "improved pedestrian infrastructure may promote physical activity by making walking and cycling more appealing, easier, and safer." The opportunity for physical activity that trails can provide not only fights obesity and related diseases but has also been shown to result in reduced health care costs, increased work productivity, and increased life expectancy.

Using bicycling as a means for commuting can have added benefits such as traffic reduction and environmental benefits such as the reduction of hazardous wastes, transportation emissions and the need for fossil fuels.

Greenways are corridors of open space, that may vary in scale from narrow strips of green that run through developed areas to wider corridors that may incorporate natural, cultural, and/or scenic features. Greenways are an important component of the landscape because the connectivity of open space creates additional value when compared to isolated paths and small pockets of open space. Any preserved open space or waterway is a valuable resource in its own right; but when they are linked together, their beneficial impacts increase by biodiversity, water quality protection, and stormwater management mitigation.

2 Inventory & Analysis





Data Collection, Methodology, and Public Participation

Data collection for this plan was done in conjunction with data collection for the *Parks, Recreation, and Open Space Plan*, September 2021. Site reconnaissance was completed at the beginning of the process with additional visits during the planning process, with one visit done via bicycle to attain a first-hand experience of the existing conditions of the current trail and roadway systems within the Borough.

All public participation for this plan was done in conjunction with public participation for the *Parks, Recreation, and Open Space Plan*, September 2021. During the public participation process, the consultants received community input as it pertained to the Trails and Greenways Plan. In the public survey, a series of questions were asked in regards to trail and bicycle use in the Borough.

In the survey, 91% of the respondents answered that they walk, run, or bike on area trails and/or roadways. When asked how often they would either bike or walk to work, school, and/or to run errands, nearly 97% answered that they never biked, but almost 92% answered that they would walk on a daily basis. These numbers were nearly identical when asked about walking or biking for recreational purposes with 93% answered that they never bike and 96% answered that they walked daily.

When asked about comfort levels from a traffic perspective, most respondents felt very comfortable walking but 88% answered that they felt very uncomfortable bicycling. Almost 58% of respondents noted that they would possibly bicycle more if there were bicycle lanes, followed by 47% who noted a desire for additional off-road trails. According to survey data, residents currently either walk or drive to area parks. All questions from the survey can be reviewed as part of the appendix in the *Parks, Recreation, and Open Space Plan*, September 2021.



Existing Planning Documents and Borough Ordinances

There are various planning documents that the consultants reviewed to assist in guiding this study. They were:

- Southwest Lehigh Comprehensive Plan, Lehigh Valley Planning Commission (LVPC) 2017
- Livable Landscapes – A Park, Recreation, Open Space, Agriculture and Historic Lands Plan for Lehigh County, LVPC, 2018
- One Lehigh Valley, Lehigh Valley Planning Commission (LVPC), 2014
- Future LV: Regional Comprehensive Plan, Lehigh Valley Transportation Study (LVTS) and Lehigh Valley Planning Commission (LVPC), 2019
- Walk/Roll LV – Active Transportation Plan, Lehigh Valley Planning Commission (LVPC), 2020
- Lehigh Valley Return on Environment, Lehigh Valley Planning Commission, 2014
- Lehigh Valley Greenways Plan – A Regional Greenways Plan for Lehigh and Northampton

Counties, Lehigh Valley Planning Commission, 2007

- Sidewalk Conditions and Handicap Accessibility, Borough of Emmaus, 2014
- And other surrounding Municipal Plans.

The consultants reviewed the Borough's Zoning and SALDO ordinances as they related to this study.

To read more about the planning documents and ordinances that were used for this study, please refer to the *Parks, Recreation and Open Space Plan*, September 2021, Chapter 2.

Opportunities and Constraints

Development of the Trails and Greenways Plan presents both opportunities and constraints:

Opportunities

- Extensive road network that provides adequate vehicular connectivity. These roadways may provide opportunities for on-road cycling routes;



- Popular regional trails exist within the Borough that provide existing quality of life amenities and can be marketed as such;
- New residential and commercial developments in the Borough have proposed trails and paths that can potentially connect to existing paths and sidewalks;
- Designation of unnamed tributaries on greenways can help enhance riparian ecosystems for flood mitigation.

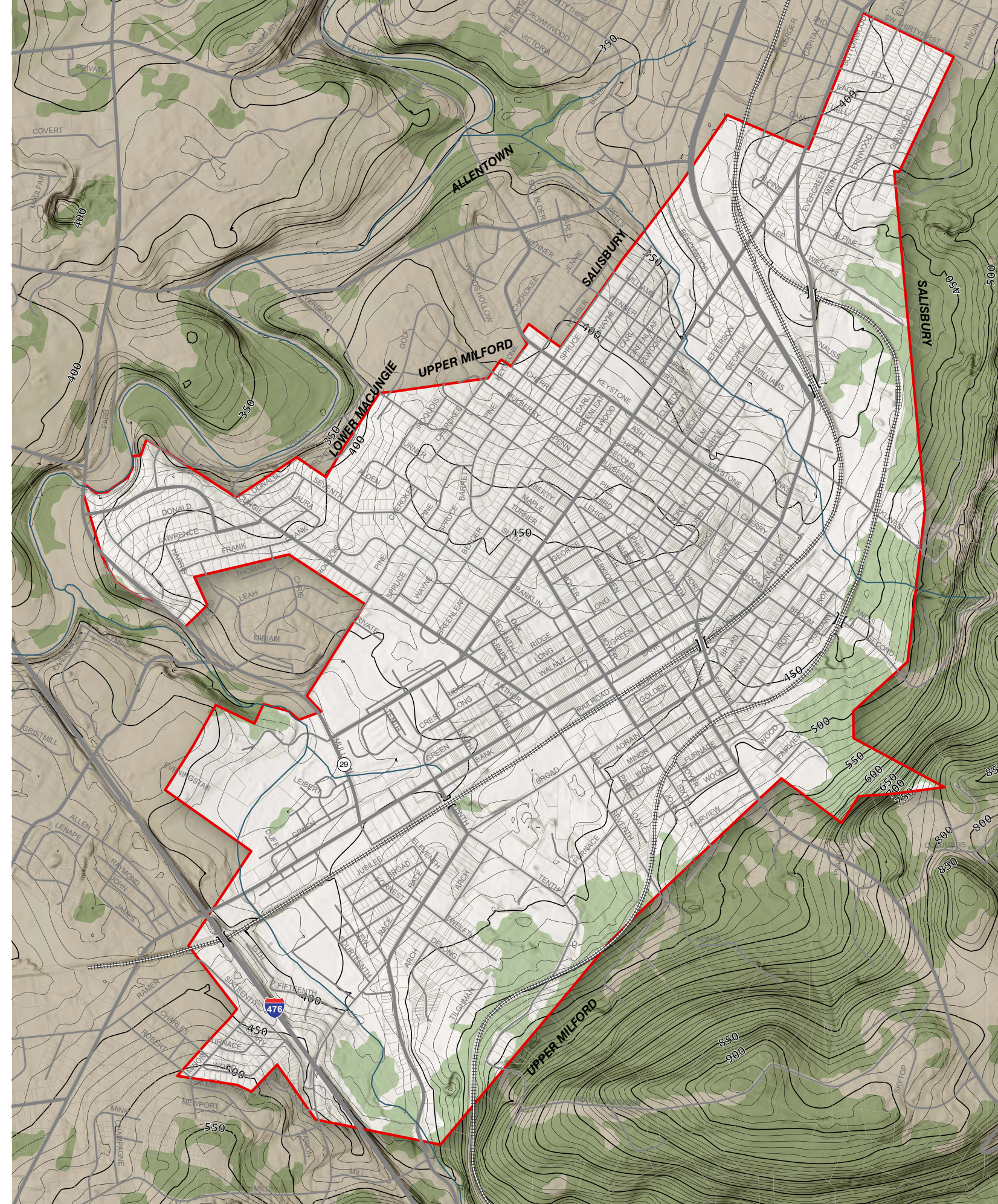
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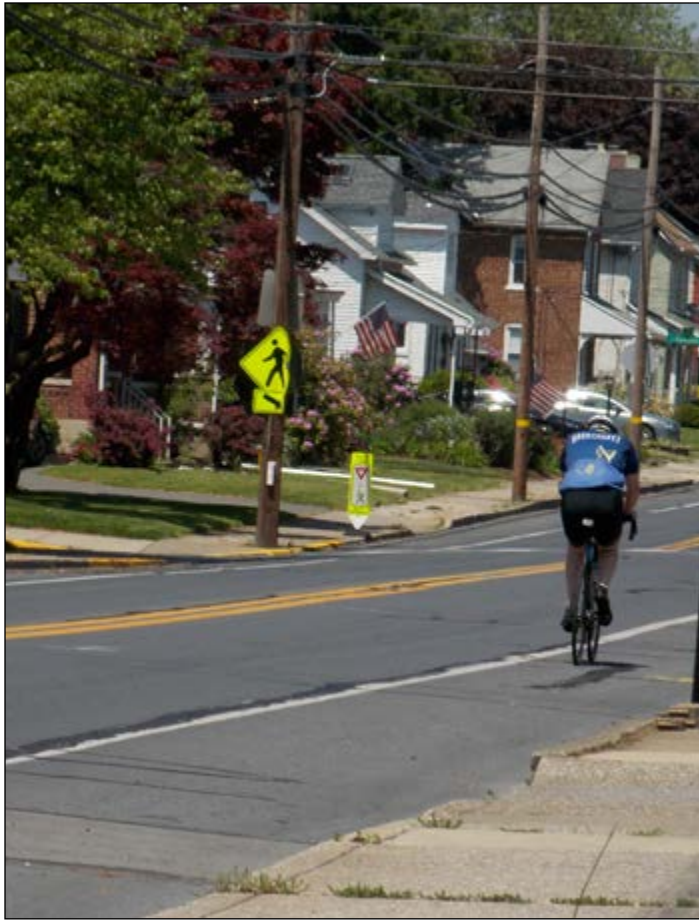
- Lack of signage and crosswalks make some busy intersections dangerous to pedestrians;
- Sidewalk gaps on Macungie Avenue restrict pedestrian access to local destinations like the Wildlands Conservancy Pool Sanctuary;
- Chestnut Street has limited shoulder and Right-of-Way widths;
- Much of the unnamed tributary that flows through Williams Street Recreation Area traverses private property within the Borough.

Existing Conditions: Trails

Topography – The Borough of Emmaus has some significant areas of sloping topography which can present challenges for the average bicyclists. The areas of highest elevation change lie along South Mountain, but other hilly areas can be found moving away from the two main creeks that run through the Borough. There is approximately 120 feet of elevation change as you move from the area between 6th and Liberty Street and Pine and Ridge Streets. Topographic changes were considered in the analysis of development of proposed bicycle routes.

Land Use – Most land use in the Borough is single family detached residential housing. State Road, Main Street, and Chestnut serves as the commercial corridor that runs through the center of the Borough. Other land uses such as institutional (ie. Schools, religious, government), parks, and some industrial areas are scattered throughout the Borough.





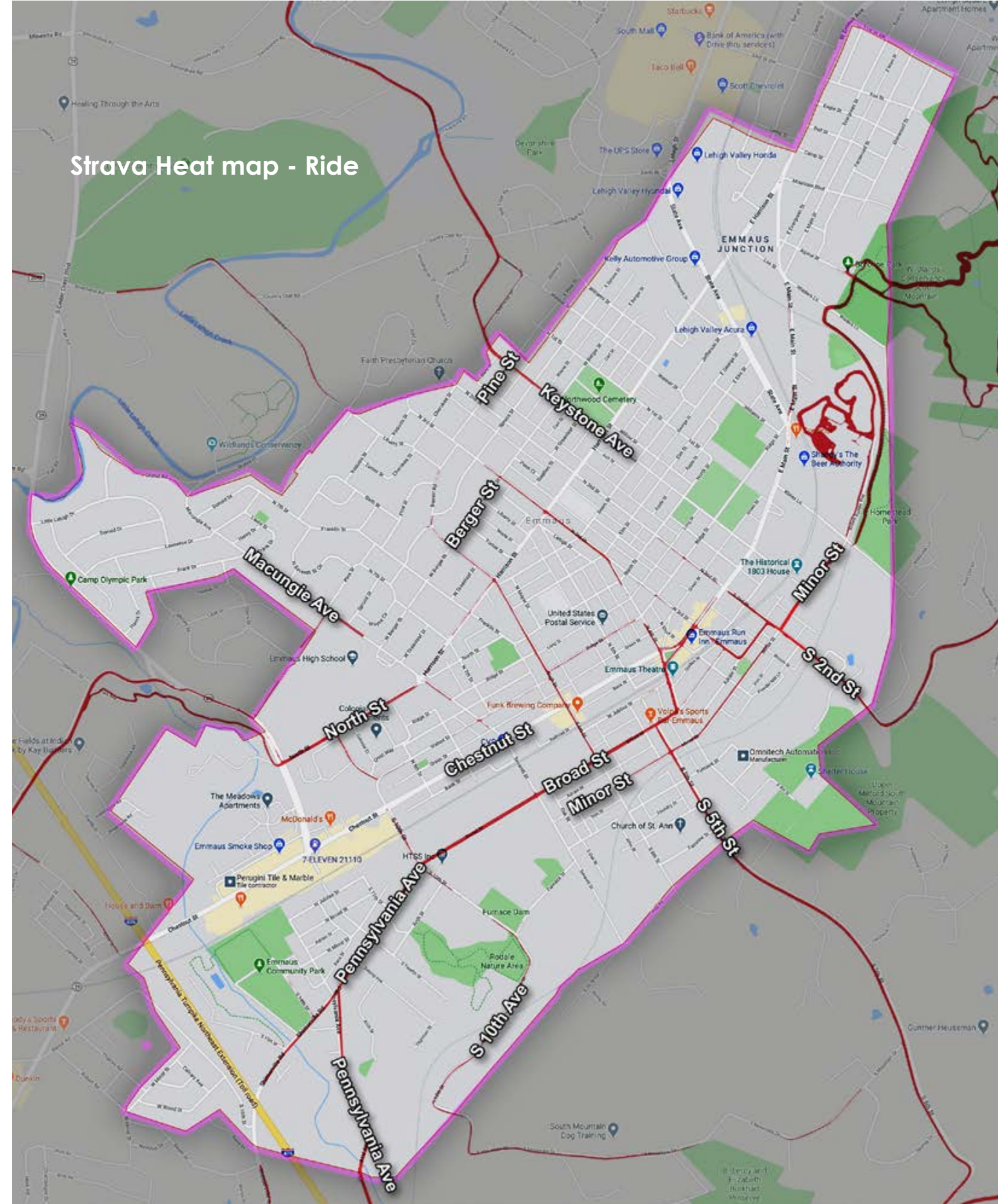
Transportation

Strava - Strava is a popular app that uses GPS to record workout routes by cyclists and runners. Strava heatmapping was used to determine popular running and biking routes within the Borough. This information shows intensity of usage along recorded routes. A review of this information reveals that Harrison Street and Keystone Ave, among others, are heavily used bike routes today.

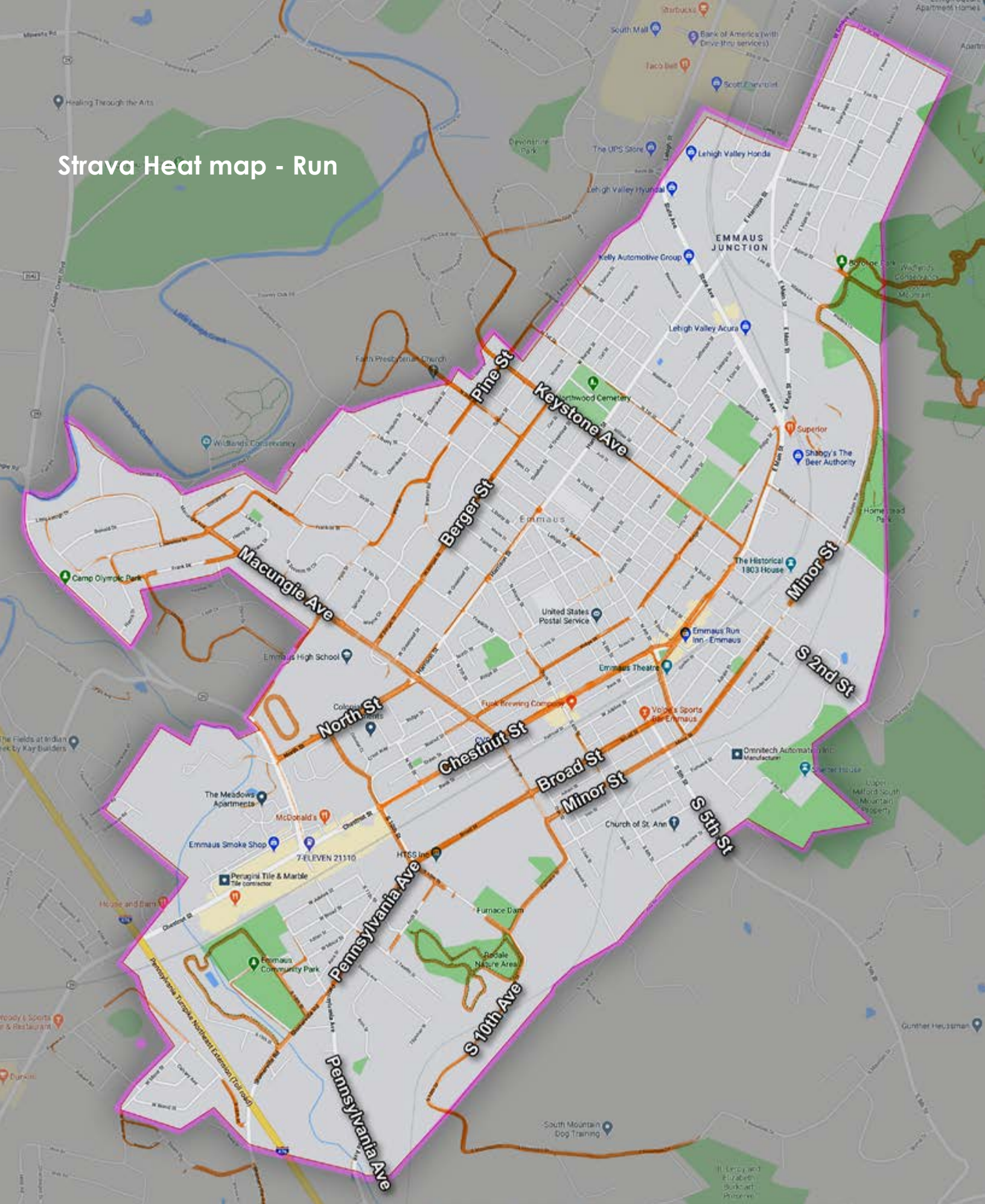
Roadways - State Street, East Main Street/Dalton Street, Main Street, Chestnut Street, and S. Cedar Blvd/Rt 29 serves as the main arterial streets for the Borough. This is also where the most traffic volume exists. The major collector streets are Harrison Street, Ridge Street, Keystone Avenue, N. 3rd Street, N. 6th Street, Macungie Avenue, Broad Street, S. 5th Street, Pennsylvania Avenue, and Shimmerville Road. Speed limits in the Borough range between 25 and 35 MPH with State Road and S. Cedar Blvd/Rt 29 being the exceptions with a speed limit of 40 MPH.

Public Transportation - LANTA Bus Route 104 enters the Borough from South Mall along State Avenue and runs along Harrison to N. 3rd, Main Street and Chestnut Street before stopping at the Weis Market. It then turns around and follows the same route out of the Borough. The LANTA buses have a bicycle rack that can accommodate two bicycles. It runs nearly every half hour during busy hours during the week and about every hour any other time including weekends.

Utility Corridors - There are two train lines that run through the Borough. The main line runs constantly with trains running nearly every hour during daylight hours and runs practically parallel to the business corridor through the town. The secondary track runs along the base of South Mountain. This line is not very busy and may have trains running on the tracks about 2-3 times a week.



Strava Heat map - Run



Trails – Existing trails are mostly local trails with connections between some of the parks within the Borough. The Robert Rodale South Mountain Gateway Trail connects Homestead Park to Boroline Park and The Wildlands Conservancy South Mountain Preserve. The Rodale Trails are popular trails that run through the former Rodale Property. There is a small trail that follows Leibert Creek through the Community Park. There is another trail that starts from N. 10th Street that runs along an unnamed tributary below Colonial Crest Apartments. The future plan is to connect this trail to the trail that runs on the east side of S. Cedar Blvd/29 and provide an off-road connection to Camp Olympic Park which is located in Lower Macungie Township.

Borough Destinations

Regional trails – The closest major regional trail is the Little Lehigh Parkway Path that is about 1.5 miles north of the Borough. Bicyclists and runners will access the path by way of Keystone Road that connects to Keystone Avenue.

Parks and Open Space – The Borough of Emmaus has an extensive park system and open spaces that provides many public facilities throughout the Borough. A complete list of the parks and open spaces can be found in the *Parks, Recreation and Open Space Plan*, September 2021. Some of the major parks that would be considered as destination points for the residents are:

- Emmaus Community Park
- Williams Street Recreational Area
- Boroline Park
- Furnace Dam Park
- Cintas Fields/Community Gardens
- Klines Lane Multipurpose Field
- Wildlands Conservancy South Mountain Preserve
- Outside of the Borough



Gateway Trail



Active adult cyclist riding along 4th Street to the center of the of the Borough

The historic Knauss House



- Camp Olympic Park
- Dorothy Rider Pool Wildlife Sanctuary
- Devonshire Park
- Percy Ruhe Park
- Little Lehigh Parkway

Schools - Safe connections to Borough schools and institutions are an important part of the Master Bicycle Plan. The Borough has several schools and institutions within its borders. The East Penn School District property includes Emmaus High School and Jefferson and Lincoln Elementary Schools. The School District also maintains ownership of a property adjacent to the Shelter House.

The Borough is also home to other schools that are not part of the East Penn School District. These schools are the Seventh Generation Charter School and St. Ann School.

Commercial, Retail, and Employment Centers – Major commercial, retail, and employment areas are primarily located along the major arterial roadways. Notable destinations include the South Mall just outside of the Borough, the shops around Triangle Park, the Emmaus Theatre, and the shops at the east end of the Borough on Chestnut Street.

Cemeteries - The Borough has two large cemeteries within its boundaries: Northwood Cemetery along Harrison Street and Center Cemetery along Ridge Street. In total, these properties make up approximately 21 acres of land accessible to the public. Cemeteries can provide opportunities for pedestrian and bicycle connections as they often contain paved pathways through their property.

Historical Properties – The Borough owns three National Register of Historic Places sites. Both the Shelter House and the Knauss Homestead are located within parkland. Other historic places are located within Emmaus and are described in more detail in the *Parks, Recreation, and Open Space Plan*, September 2021. These locations can also be desired destinations within the Borough.

Existing Conditions: Greenways

Lehigh Valley Planning Commission (LVPC) prepared a report in 2007 to define and identify greenways within Lehigh and Northampton Counties. This report identified three greenways that are part of the Borough's identity: Leibert Creek, Little Lehigh Creek, and the Pennsylvania Highlands. Each greenway serves different functions and is described in further detail below.

Leibert Creek Greenway – This greenway is identified by LVPC as a conservation greenway, meaning that this greenway's main purpose is to protect the natural resources and habitats that are contained within it. The greenway is approximately 4 miles long, beginning at the headwaters located just east of Shimmerville and ending at its confluence with the Little Lehigh Creek. This greenway makes an important connection between the Little Lehigh and Pennsylvania Highlands greenways. Currently, there are some trails along the waterway, but they are fragmented. A trail exists in Emmaus Community Park, and another trail runs along the creek north of the Meadows Apartments; this trail follows Leibert Creek to Indian Creek Road. Future plans will connect the trail to Camp Olympic Park, making this an important greenway for the residents of Emmaus.

Little Lehigh Creek Greenway – This greenway is considered a conservation/multi-use greenway. There are many low impact recreational opportunities along this creek, as well as areas of historical significance. This greenway lies just north of Emmaus and provides close-to-home recreational opportunities at the Dorothy Rider Pool Wildlife Sanctuary and the Little Lehigh Parkway. At approximately 20 miles long, this greenway is an important water source for the City of Allentown and is also considered a scenic waterway within the region.

Pennsylvania Highlands Greenway – This greenway is considered to be nationally significant greenway that was identified in the Highlands Conservation



Unnamed Tributary to Little Lehigh Creek



The riparian buffer has been improved with recent tree plantings along the Unnamed Tributary to Little Lehigh Creek.

Act of 2004. DCNR identifies this greenway as one of Pennsylvania's major greenway corridors. The Highlands passes through four states: Pennsylvania, New Jersey, New York, and Connecticut. The Pennsylvania Highlands Greenway runs along South Mountain at the southern border of the Borough. This portion of the greenway is considered a scenic greenway, meaning that it can enhance quality of life benefits by providing a natural and beautiful landscape for residents and visitors.

Natural Resources – One of the most important functions of greenways is the protection of natural resources. These resources include hydrology, topography, hydrological soils, wetlands, and floodplains. These resources are listed and described in more detail in the *Parks, Recreation and Open Space Plan*, September 2021..

Greenway Additions

The LVPC Greenways Plan identified the major regional greenways. This study identified two other smaller greenways that are just as important to the residents of Emmaus and can assist in increasing the water quality of other streams, provide habitat, and perform stormwater management services.

One greenway is the unnamed tributary that begins in South Mountain and flows through Furnace Dam Park before it enters Leibert Creek. The other greenway is the unnamed tributary that begins in South Mountain and passes alongside the 1803 House, running through Williams Street Recreational Area and the Borough-owned property behind the Beechwood Street homes before it continues out of the Borough and enters the Little Lehigh Creek.

Environmental Assessment

As part of this report, the consultants reviewed the ecological health of the Leibert Creek and the two unnamed tributary greenways. All three of these greenways are centered along streams, which increases their importance due to concerns for water quality and riparian buffers. The Borough is continuing to do work to improve both of these aspects as part of their MS4 requirements.

Each of these waterways has been assessed by the Pennsylvania Department of Environmental Protection (PADEP) for stream health and has been given a classification. Pennsylvania Chapter 93 defines stream classifications to set water quality standards for surface water uses. All three streams are classified as High Quality / Cold Water Fish streams, which means that these streams provide habitats that are able to support and naturally breed cold water fishes. Additionally, these streams have been assessed for stream health every two years as part of the Federal Clean Water Act. Currently, all three streams are listed as Category 5 impaired streams. This means that the streams currently require a Total Maximum Daily Load (TMDL) plan to identify the maximum amount of pollutants that water can receive and still meet water quality standards. When the streams have a TMDL plan, they will be moved to Category 4a, which indicates waters that are impaired for one or more uses and will be removed from this category once water quality standards are met.

Leibert Creek – The creek was noted by PADEP as impaired for both recreational uses and supporting aquatic life due to pathogens and sediment from urban stormwater runoff. This creek has recently had work done along parts of the waterway to armor the streambank and replant the riparian buffer as it runs through the southern part of the Emmaus Community Park. This was done because of the damages that occurred during a major flooding event in April 2020.

As the creek enters the Borough, it meanders through several private properties before it enters Emmaus Community Park. These properties have significant



Leibert Creek



Unnamed Tributary to Little Lehigh Creek

tree canopy coverage and some wetlands that were identified by the National Wetland Inventory. The health of the riparian buffer and stream was not assessed by the consultants through this area. When the stream enters the Community park, there are areas noted where stormwater can enter directly into the creek without any benefit of BMPs. The portion of the riparian buffer that survived the flood damage showed to be full of invasive plants and not very conducive to providing a healthy riparian ecosystem. This lack of a strong riparian buffer continues as the stream crosses under Chestnut Street and through private property until it meets and flows alongside S. Cedar Crest Blvd. to exit the Borough.

Unnamed Tributary to Leibert Creek – PADEP assessed this stream as impaired for recreational use and aquatic life due to pathogens, sedimentation, and urban stormwater runoff. There are vast differences in the quality of this stream between the point where it comes into the Borough and where it connects to Leibert Creek. It enters the Borough as a beautiful, natural waterway from South Mountain, north of S. 7th Street Ext. The stream passes under S. 7th Street Ext. and then through areas of woodland canopy before eventually flowing into the Furnace Dam pond. At a point just south of the pond, stormwater runoff flows directly into the stream. From there, the stream is piped underground before daylighting again north of Broad Street. The riparian buffer is minimal and not healthy as it passes under the train tracks and makes its way to Leibert Creek. There are areas where the stream is channelized through a concrete passageway and there are some areas of noticeable streambank erosion.

Unnamed Tributary to Little Lehigh Creek – This creek is considered impaired for recreational use and aquatic life by the PADEP due to pathogens, the source of which is unknown. This creek starts in South Mountain and flows through the Unami Fish & Game Association, and is provided woodland cover until it crosses Minor Street. Here, the riparian buffer is either non-existent or is unhealthy due to the abundance of

invasive plants, which continues as it passes through Williams Street Recreational Area and out of the Borough before making its way to Little Lehigh Creek. There are areas where the stream is channelized or forced into pipes, and noticeable streambank erosion and sediment build up can be observed. This stream is also fed by waters that come from the South Mountain Preserve area, travel through the retention pond by the Community Garden, and then cross E. Main Street and State Avenue before being forced into a pipe under one of the ballfields in the Williams Street Recreation Area.





3 Recommendations

Proposed trail connection to East Main Street.



The Rodale Nature Area trails attracts all types of users.

Trails

Trail Users

Proposed trails should account for all trail user types. Accessibility requirements are legislated by the Americans with Disabilities Act (ADA). Where feasible, proposed trails should be in compliance with current ADA standards.

Bicyclists - Includes riders of varying experience levels. These include:

- Adult (experienced) - Comfortable riding in any environment, including on-road and off-road trails;
- Adult (novice) - A less confident or casual rider. Will use on-road facilities that have high levels of comfort (low stress) – typically low traffic and low motor vehicle speeds;

- Child/ Beginner - Riders that are typically limited to off-road facilities and very high level of comfort roads. These roads are generally found in residential subdivisions.

Pedestrians - Includes walkers and runners of all ages. This is typically the largest user group.

Safety and Privacy

Trail safety is the top priority of this plan. The adherence to aforementioned safety and design standards are key to ensuring that a trail is constructed to create optimum trail user safety.

An additional priority is the protection of private property rights for properties adjacent to or near a trail. Where needed, visual screening should be used

along the trails to prevent access and/or views into private property. Screening options include physical barriers such as fencing, as well as vegetative barriers. The Borough should work with property owners adjacent to trails to determine the best means of providing privacy.

As the trail system is developed, police patrols of the trails can increase the sense of safety and security. However, the best safety measure is good use of the trail, since more use of the trail and “eyes on the trail” will discourage unwanted activity.

Trail Guidelines

Trail Design Standards

Trail design standards have been developed by a number of nationally and locally recognized organizations. These include: the American Association of State Highway Transportation Officials (AASHTO), the National Association of City Transportation Officials (NACTO), the Pennsylvania Trail Design and Development Principles by DCNR, and the Manual on Uniform Traffic Control Devices (MUTCD).

AASHTO standards are federally recognized while NACTO standards explore innovative solutions to urban bikeway design. All on-road and multi-purpose trail improvements should adhere to AASHTO and MUTCD standards.

There are also various design standards for the development of equestrian trails and hiking trails.

The design guideline resources are described herein:

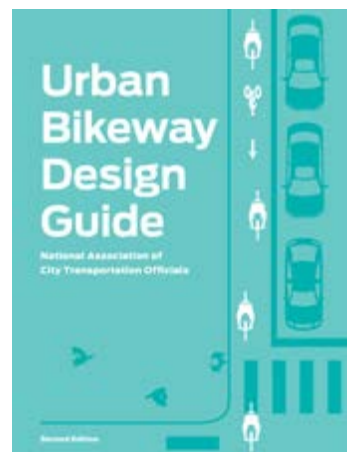
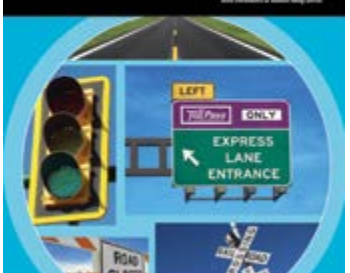
AASHTO - Guide for the Development of Bicycle Facilities

AASHTO provides federally accepted standards for the development of bicycle facilities including information on: Bicycle Planning, Bicycle Operation and Safety, Design of On-Road Facilities, Design of Shared Use Paths, Bicycle Parking Facilities, and Maintenance and Operations. All improvements should adhere to these standards.

Pennsylvania Trail Design & Development Principles
Guidelines for Sustainable, Multi-Purpose Trails



Manual on Uniform Traffic Control Devices
For Streets and Highways
2009 Edition



On-Road Facilities

On-Road Bicycle Facilities are broken down into 4 primary facility types, each with their own design guidelines and regulations: signage only, marked shared lanes (sharrows), shoulder improvements, and bicycle lanes.

The general guidelines for shared lanes include:

- Roadways carry low to very low volumes of traffic.
- Low vehicular operating speeds (Lane Widths: 14' or wider allow motorists to pass without encroaching on the next lane).

Requirements for each on-road facility type are provided below:



Image from: Reconnect Rochester

Bicycle Boulevard

Boulevards are designated and designed to give bicycle travel priority. Bicycle boulevards use pavement markings, speed tables, and speed cushions to create a safe, convenient bicycle route. The removal of stop signs along the boulevard prevents lost bicycle momentum at each intersection.



Image from: Mobilizing the Region

Sharrow

Sharrows are pavement markings designed to alert motorists to the likely presence of cyclists in the roadway. A sharrow is a graphic that is a combination of an arrow and a cyclist and also includes the concept of "share the road", thus the "sharrow".

Sharrows are typically appropriate for roadways with posted speeds no higher than 25 MPH. Many of Camp Hill's roadways fall into this category.

Through conversations at public meetings and site visits, the consultant team determined which roadways would best serve as sharrow routes. Selected routes serve as direct routes to destinations and were selected to be appropriately distributed throughout the project area. Bike routes with sharrows may have accompanying signage; however they are not required to include signage.



Bicycle Lane

Bicycle lanes are designed to create corridors of increased safety, separated from motorists through the use of pavement markings, striping, and signage. Bike lanes enable cyclists to ride at a comfortable speed 'without interference from prevailing traffic conditions and facilitate predictable behavior and movements between bicyclists and motorists.' - NACTO. Bike lanes should be implemented along Pennsylvania Avenue and Shimerville Road. Because



Image from: NACTO

of the importance of on street parking, there was not enough street width to incorporate more bike line in the Borough.

Speed Cushions

Speed cushions and speed tables are effective traffic calming measures that should be used in the bike boulevard along Harrison Street.

Speed cushions are mounted on the road and slow the movement of vehicular traffic while allowing bicycles and first responders to travel unimpeded. Speed tables are traffic control devices that can have specific design speeds and may be combined with crosswalks for greater pedestrian visibility.

Emergency services should act in coordination with transportation departments, recognizing that reducing speeds and volumes on local roadways benefits overall safety goals by reducing crash frequency and severity.

Speed cushions allow cyclists to ride through or around them unimpeded (above) while slowing motor vehicle traffic.



Speed cushions can be built into the roadway, or purchased and installed with the option of removing them during snow events.



Example of "MAY USE FULL LANE" signage found in Pottstown, PA.

Signage - Signage is provided along the road with no cartway (pavement) improvements:

- Signage informs motorists to watch out for bicyclists on the roadway;
- MUTCD standards: Share the Road (W11- and W16-1P) signs and Bicyclist May Use Full Lane (R4-11) signs;
- Place signs at the beginning of the bike route, roadway intersections, and throughout the segment where deemed required.

Marked Shared Lanes - Bicyclists operate on the roadways with motor vehicles:

- Should be used on roads with posted speed limits in excess of 25 mph;

- Shared-Lane Striping: (MUTCD 9C - 9) placed at intersections and at intervals not greater than 250';
- Striping position on cartway with Parallel Parking: 11' from face of curb or edge of travel way;
- Striping position on cartway with no Parking: 4' from face of curb or edge of travel way;
- Signage (noted above) is still required.

Bicycle Lanes - Bicyclists operate within a designated portion of the roadway that is separate from motor vehicle traffic:

- Bike lanes should be provided on both sides of two-way streets;
- Bike Lane Widths without Parking: 4' minimum (not adjacent to curb) and 5' minimum (adjacent to curb or other obstacles);
- Bike Lane Widths with Parallel Parking: 5' minimum to 7' (wider bike lanes are recommended adjacent to parking areas to reduce conflict with opening vehicle doors);
- Bike lanes should be placed between the parking lane and travel lane (this applies to diagonal and parallel parking);
- Storm Drains and Utility Covers: Bike lanes should be wide enough to accommodate bicyclists swerving to avoid obstructions;
- Bike Lane Striping: 4" to 6" solid white line (dotted lines are optional at major driveways and intersections, solid lines should be continued at all minor driveways);
- Pavement Marking: Bike Lane Symbols (MUTCD 9C - 3);
- Bike Lane Signage: Bike Lane (R3-17) placed at periodic intervals with either Ahead (R3-17aP) or Ends (R3-17bP) where appropriate.

Shared Use Paths

Shared use paths are bikeways that are physically separated from the vehicular cartway by a physical barrier or open space. Design of these facilities should comply with current ADA requirements. Path users include, but are not limited to:

- Bicyclists of all types;
- Inline & roller skaters, and skateboarders;
- Kick scooter users;
- Pedestrians.

Design Requirements:

- Trail width: 10' minimum to 14' (8' is permitted under rare circumstances) Trail Shoulder width: 2' minimum shoulder free of vertical obstructions (fence, sign, wall, etc.), 3' to 5' is preferred;
- Trail Shoulder slope: 1 vertical to 6 horizontal (1:6) maximum;
- Adjacent to a body of water or slope 1 vertical to 3 horizontal (1:3) or greater: vertical distance between the trail and nuisance should be minimum 5' (physical barrier or rail is recommended and may be placed at a minimum 1' from the edge of trail);
- Vertical Clearance: 8' minimum, 10' preferred;
- Separation between Trail and roadway: 5' minimum from edge of pavement (if less than 5' a physical barrier is needed);
- Trail cross slope: Not to exceed 2%, 1% is recommended (or as per ADA requirements);
- Trail grade slope: Maximum grade should be 5% or match that of the adjacent roadway.

NACTO - Urban Bikeway Design Guide

The NACTO Urban Bikeway Design Guide provides state-of-the-practices solutions to create "complete streets" that are enjoyable for motorists and bicyclists. The guidebook is divided into six primary design categories:

- Bike lanes;
- Cycle tracks;
- Intersection treatments;
- Bicycle signals;
- Bikeway signing and marking;
- Bicycle boulevards.

MUTCD - Manual on Uniform Traffic Control Devices

The Manual on Uniform Traffic Control Devices provides standards for the design and implementation of traffic control devices that provide for safe and efficient transportation. Part 9 of the manual includes traffic control for bicycle facilities. The section includes signs, pavement markings and highway traffic signals for both on-road and off-road trail facilities. All guidance in this document should be adhered too when implementing the alignment alternatives.

Sources:

Guide for Development of Bicycle Facilities, American Association of State Highway and Transportation Officials (AASHTO), 2012;

Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways, U.S. Department of Transportation Federal Highway Administration, 2009;

Pennsylvania Trail Design & Development Principles: Guidelines for Sustainable, Non-motorized Trails, Pennsylvania Department of Conservation and natural Resources;

Urban Bikeway design Guide, Second Edition, National Association of City Transportation Officials (NACTO), 2014.

Trail Surface Types

Asphalt Surfaces

Asphalt surfaces provide for the widest variety of trail users including bicyclist, walkers, joggers, wheelchair users, and in-line skaters. Initial installation costs are relatively high (lower than Portland cement concrete however) compared to other trail surface types. However, long term maintenance costs will remain lower than others if properly installed and maintained. Asphalt trails are preferred in flood prone areas. Porous asphalt can also be used in situations where stormwater infiltration or a pervious surface is required. Porous asphalt should not be used in flood prone areas where silt will clog the voids in the pavement.

Concrete Surfaces

Portland cement concrete pavement is the most durable material for trail surfaces but is the most costly. Concrete trails are commonly used in urban environments. Advantages of concrete include longer service life, reduced susceptibility to cracking and deformation from roots and weeds, and a more consistent riding surface after years of use and exposure to the elements. The joints in concrete trail treads can degrade the experience of using the path for some wheeled users. In addition, users can see pavement markings more easily on asphalt than on concrete, particularly at night. Concrete’s light color on a trail reflects the sunlight.

Compacted Aggregate Surfaces

Compacted aggregate surfaces, or stone dust trails, can accommodate all trail user types with the exception of in-line skaters. Initial installation costs for this trail surface are relatively low, however long-term maintenance costs increase due this surface’s higher susceptibility to erosion, especially if not properly installed with swales and cross drains. Crushed limestone or sandstone or “Trail Surface Aggregate (TSA) Mix” are typical aggregates used in this situation. A compacted aggregate surface can also serve as base material for an asphalt surface if trail use increases or funds become available for a surfacing upgrade. Compacted aggregate surfaces should be avoided in flood prone areas or slopes over 3%.

Compact Earth Surfaces

Compact earth surfaces are the least expensive to install, however they limit the types and number of trail users. Compact earthen surfaces are primarily used for hiking only or biking trails and generally has significantly less trail user volume. Typically, these trails do not meet trail standards or ADA compliance. Hiking trails may be considered as an alternate means to reach more environmentally sensitive areas while providing for environmental education, bird watching, boating and / or fishing opportunities.

Boardwalk Surfaces

Boardwalk surfaces are often used in floodplains and wetland areas where wet and inundated ground surface is common. Boardwalks can provide an elevated, accessible surface for trail users. Surface types include: wood, plastic wood, and precast concrete plank. Structural components can be any of these materials as well as steel. Prices vary widely depending on the materials that are utilized.

Trail Access

Access to trails is recommended at trailheads and at locations with direct access to public streets and right-of-ways. Access should be restricted where trails abut residential and private properties. Amenities such as bicycle racks, bicycle repair stations, benches, and trash/recycling receptacles should be considered at desired trailhead locations. Signage should also be installed to identify these areas as official trailheads.

Proposed Trail Routes

This plan establishes Emmaus Borough’s municipal-wide trail network and seeks to connect residents to local and regional destinations. Proposed trails include on and off-road trail types (as described in the preceding section). Descriptions of the proposed trail routes are provided below. Additional information and costs to develop the connections are noted in the Cost Estimates in Chapter 4. Trail routes are identified by number on the Trails Plan (p. 35).

Proposed On Road Routes

- 1. **31st St. SW:** This sharrowed route at the northern border of the Borough with Allentown runs from Emmaus Avenue to Huron Street. It connects with On-Road Route 2 and a proposed Walk Roll LV trail that runs from Allentown through the Borough, down Emmaus Avenue/Dalton Street and Main Street toward 3rd Street.
- 2. **Glenwood St./Mountain Blvd./Main St./Alpine St.:** This sharrowed route along the northeastern edge of the Borough runs along Glenwood Street, turns





east on Mountain Blvd. and goes south along Main St. before merging into On-Road Route 4. A spur also runs along Alpine St., which connects to Boroline Park and the Alpine Street Trail.

3. Harrison Ave.: This route along Harrison Avenue from Dalton Street to South Cedar Crest Boulevard is proposed as a bike boulevard. NACTO defines bike boulevards as streets with low existing speeds (25mph on Harrison) and volumes that offer the basic components of a safe bicycling environment. Design treatments can be added to the existing infrastructure to enhance the safety and rideability of the boulevard. These include markings, like sharrows; share the road signs; and speed tables, which are midblock traffic calming installations that raise the entire car off the lane to reduce speeds. Harrison Ave. also has 4-way stop signs at some intersections which help to calm speeds. A bike boulevard along Harrison Ave. acts as a spine through the Borough that directly connects to residential neighborhoods in the center of town and destinations like the Northwood Cemetery, Lincoln Elementary School, and Emmaus High School and its facilities. It also connects to many proposed routes such as On-Road Routes 6, 9, 10, 13, and 15, and Off-Road Route 4.

4. Ridge St./Walnut St.: This sharrowed route acts as a companion spine to the Harrison Avenue bike

boulevard and runs along Ridge Street from the intersection at State Avenue and Main Street to Sixth Street, turning on Walnut Street south to 10th Street. This route also traverses the proposed Walk Roll LV route through the Borough. Major destinations along the route include Williams Street Recreation Area, Emmaus Public Library, and the post office. This route also connects to On-Road Routes 2, 6, 7, 9, 10, 13 and 15 and Off-Road Route 4.

5. Minor St.: This sharrowed route is near the eastern border of the Borough and runs along Minor Street from Klines Lane south to Sixth Street. Destinations along the route include the Klines Soccer Field, Homestead Park and the Rodale South Mountain Gateway Trail, the 1803 House, Seven Generations Charter School, and God's Acre. This route also connects with On-Road Routes 7, 9 and 14 and Off-Road Route 4.

6. 3rd St./4th St.: This sharrowed east-west route runs through the middle of the Borough along 3rd St. from Harrison Ave., turning east onto 4th St. to Broad St. Destinations along this route include Triangle Park and the businesses near this public space and the Borough administrative building. This route also connects to On-Road Routes 3, 4, 8 and 11.

7. 2nd St.: This sharrowed east-west route runs along 2nd Street from Ridge Street east to the Borough border and Chestnut Hill Road. This route provides

access to the Upper Milford South Mountain Property and connects to On-Road Routes 4, 5 and 8; Off-Road Route 4; and the proposed Walk Roll LV route through the Borough.

8. Adrian St./3rd St.: This short sharrowed route runs along Adrian St. from 2nd St., turns west on 3rd St. then turns south on Main St. to Triangle Park. Major destinations along this route include God's Acre, Triangle Park and nearby businesses. This route connects with On-Road Routes 6 and 7, and the proposed Walk Roll LV route through the Borough.

9. 6th St.: This sharrowed route through the center of the Borough runs along Barrett Rd./6th St. from 3rd St. south to Minor St. Destinations along the route include the Emmaus Fire Department and Lions Field, businesses along Chestnut Street, and Emmaus Fire Company #1. This route connects to On-Road Routes 3, 4, 5 and 11.

10. Macungie Ave./7th St.: This sharrowed east-west route runs along Macungie Avenue/7th Avenue from the Borough border in the west to Broad Street. This route provides bicycle access to the Wildlands Conservancy's Pool Sanctuary outside the Borough in Lower Macungie as well as to Emmaus High School within the Borough. This route also connects to On-Road Routes 3, 4, 11, and 12.

11. Broad St. North of 7th St.: This sharrowed route runs along Broad Street from 7th Street north to 4th Street and provides access to businesses along Broad Street and Emmaus Fire Company #1. It connects to On-Road Routes 6, 9, 10, 12 and 14.

12. Broad St./Pennsylvania Ave. South of 7th St.: This route is a proposed bike lane along Broad Street/Pennsylvania Avenue from 7th Street south to 15th Street and Shimerville Road, before changing over to a sharrowed lane south to the Borough border. The presence of a dedicated bike lane will help to calm traffic on the road and make sidewalks safer for pedestrians. This route provides access to businesses along Broad Street and to Community Park. It is also in close proximity to the Rodale Nature Area. This route connects to On-Road Routes 10, 11, 13, and 15.

13. 10th St.: This sharrowed route acts as a connector between the Harrison Street bike boulevard and the Broad Street/Pennsylvania Avenue bike lane, running along 10th Street. It provides access to businesses along Chestnut Street and connects to On-Road Routes 3, 4, and 12.

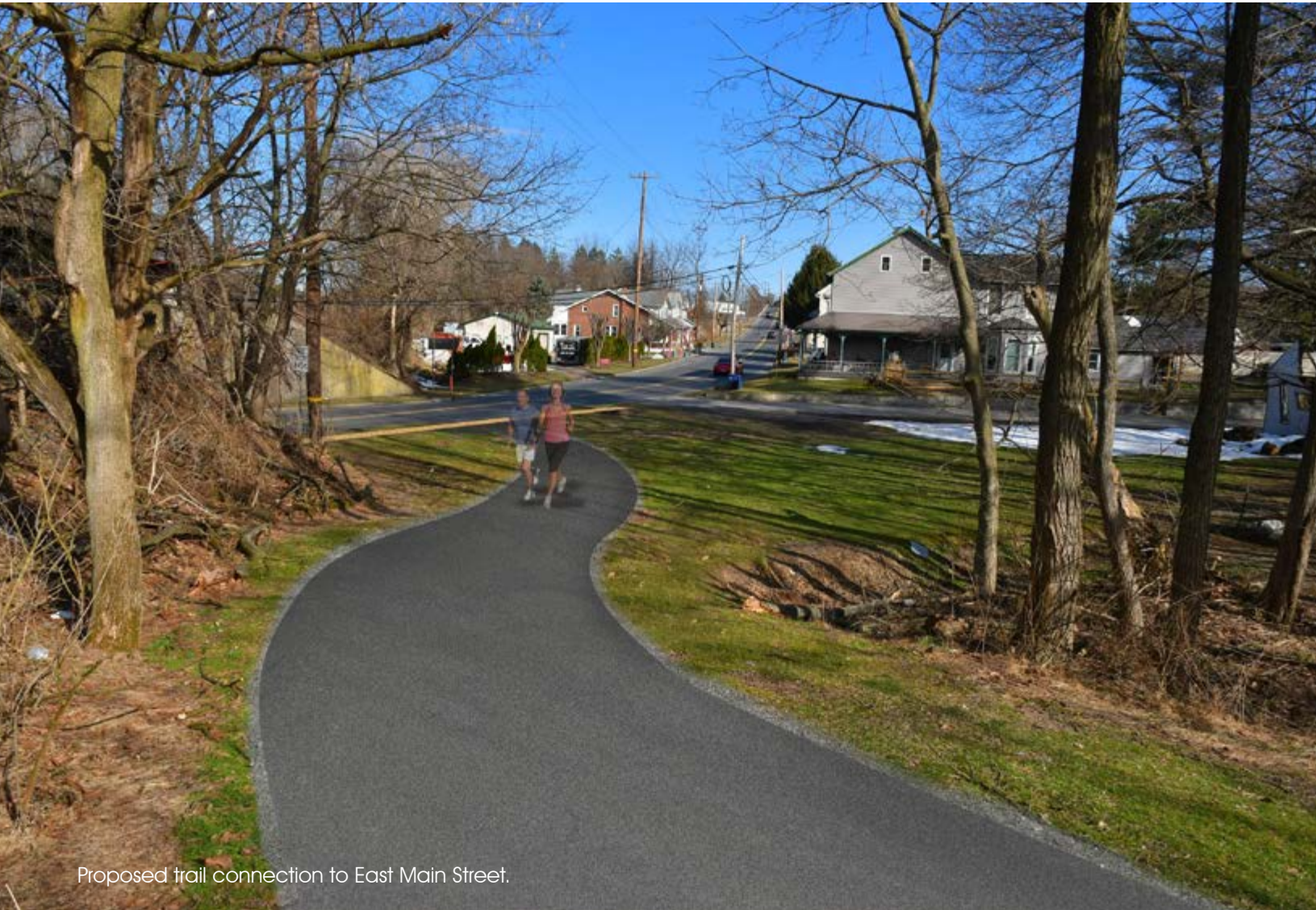
14. 5th St.: This sharrowed spur trail runs along 5th Street from Minor Street east to the Borough border and provides indirect access to the South 4th Street Recreation Area. It connects with On-Road Routes 5 and 11 and Off-Road Route 4.

15. Keystone Ave./Iriquois Ave./Keystone St.: This sharrowed route runs along Keystone Ave, which changes to Iriquois Ave at the Borough boundary, and then turns left onto Keystone Rd. This is a popular running and bicycle route, as shown on Strava Maps, and is an established connection from the Borough to the Little Lehigh Creek Greenway, which connects to Allentown. This route also connects to On-Road Routes 3 and 4.

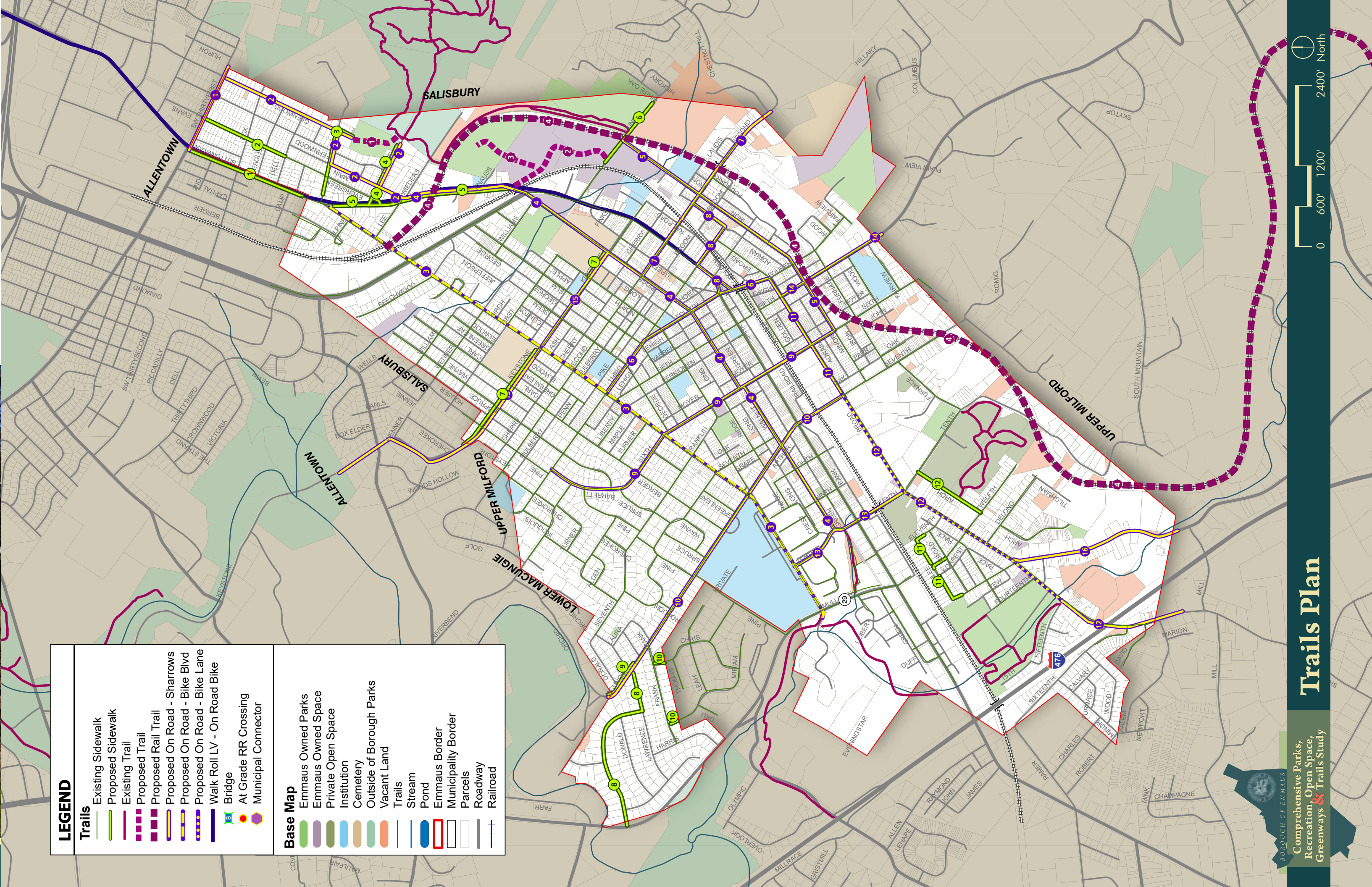
16. Pennsylvania Ave.: This sharrowed route runs from Shimerville Road south to the Borough border. It provides access to the residential neighborhoods in this section of town and connects to Route 12.

Proposed Off-Road Trails

- 1. Borolline Park Trail:** This is a proposed redesigned trail for Borolline Park that connects On-Road Route 2 on Glenwood Street to the Alpine Street Trail and Wilderness Trail in the South Mountain Preserve.
- 2. Klines Ln./Main St. Trail:** This proposed trail runs through the Emmaus Fire Training Grounds from Klines Lane up to Main Street (to On-Road Route 4) along the pond behind the Community Garden.
- 3. Community Garden/Knauss House Trail:** This trail runs north from the Klines Lane/Main Street Trail and provides access to the Community Garden, Knauss House, Remembrance Garden, and Cintas Park.



Proposed trail connection to East Main Street.





Repairs may be needed for older sidewalks.



ADA curb ramps make for easy transtions for all users.



Even with Sidewalks present, some users might prefer the roads.

A proposed recreational complex for this area is described in the *Parks, Recreation and Open Space Plan*, September 2021.

4. Proposed Rail Trail: This trail is a proposed rail trail that utilizes the Norfolk-Southern line near the eastern border of the Borough. As this line is currently used for storage by the rail line, with cars running a few times a week, discussions will need to occur with Norfolk-Southern on the future of the line and the possible conversion to a rail trail. Although this would be a long-term project and would not likely commence for several years, the potential for a rail trail on this line would further close the gap for an off-road trail between Allentown and Philadelphia.

Sidewalks

Sidewalks are something that many residents and their children use nearly every day to provide easy access to homes, places of work, shops, parks, schools, transit stops, and other desired destinations. Because they are practically everywhere within the Borough, it is easy to take for granted their importance and the safety and value that they provide. Sidewalks are considered the front steps of an urban community and serve as a conduit for social and economic interaction. They enhance connectivity, promote walking, and reduce the chance of pedestrian-involved incidents by creating a safe place for pedestrians to walk without being too close to vehicular traffic. Additionally, walkable neighborhoods are desired by many new potential homeowners.

Emmaus has a good sidewalk system with approximately 292,965 linear feet, or 55.5 miles, in place. In 2014, the Borough performed an assessment of the sidewalk conditions, handicap accessibility, and areas where no sidewalks exist. During this assessment, it was noted that most of the sidewalks were in good condition, but it also noted where sidewalks were in poor condition. The Borough should build upon this work to reassess the existing sidewalk system and identify where there is still need for handicap accessibility or sidewalk improvements.



Sidewalks cost vary on the size of the project. Items such as width, length, even what contractor is completing the work may factor into the estimate. The diagram above displays what a new sidewalk could cost.

There are also noticeable sidewalk gaps in the Borough. These sidewalk gaps were identified with the help of public input and noted desired destinations. The gaps presented in this report are listed below and in order of priority for being added to the existing sidewalk system. Please refer to the Trails Plan (p. 35).

1, 2, and 5. East Main Street/Dalton Street/W. Emaus Avenue: This area has been identified by residents as a desired connection that currently lacks sidewalks and places pedestrians dangerously close to vehicular traffic. As an alternative, sidewalks should be placed along Evergreen Street north of Dell Street to complete a sidewalk connection to East Main Street on a low stress roadway.

3 and 4. Alpine Street and Mountain Boulevard: Both Alpine Street and Mountain Blvd should have sidewalks to Boroline Park. This would also provide a sidewalk connection to the South Mountain Preserve and to Robert Rodale S. Mountain Gateway Trail.

6. Kline Lane: The sidewalk along Kline Lane ends just beyond the railroad tracks. This sidewalk should be put in place so that pedestrians have safe access to Homestead Park and the Kline Lane Multipurpose Field.

7. Keystone Avenue north of Harrison Street: Many residents noted that this area is popular with pedestrians. There are trails through the cemetery,

but this may not always be an option when there are services.

8. Little Lehigh Drive: Little Lehigh Drive is a neighborhood connection for a development without sidewalks. This one sidewalk would help many residents reach Macungie Avenue.

9. Macungie Avenue: The sidewalks on Macungie Ace. stop just before Lawrence Dr. It was noted that schools use this road to walk to the Dorothy Rider Pool Wildlife Sanctuary. There currently is not a safe or ADA compliant way to walk to this popular destination that lies just outside of the Borough.

10. Mariam Drive and Chris Drive to Frank Drive: Small gaps lie on Mariam Drive and Chris Drive between Frank Drive and the Emmaus/Lower Macungie Municipal Lines. These gaps should be filled in to provide safe passage to Emmaus High School through the neighborhood.

11. W. Jubilee Street and S. 12th Street to W. Jubilee Street: These streets are connections to the Emmaus Community Park.

12. Arch Street: Sidewalks along Arch St. street can provide safe access to the Rodale Trails and Furnace Dam.

Within the past few years, a proposed ordinance was discussed that would have the Borough provide a Compliance Certificate that, prior to a sale/transfer of a property, would require the property owner to have all sidewalks, curbing, and/or crossovers conforming to the regulations set forth in the ordinance. This also included installation of new sidewalks if the adjacent property has an existing sidewalk and/or if the property is adjacent to an intersection and the intersection is less than 15 ft wide and/or the property on the opposite side of the intersection contains sidewalks. The Borough should reconsider adding this ordinance and add to the new sidewalk requirements any sidewalk connection that is recommended in this plan.

Greenways

Proposed Greenways

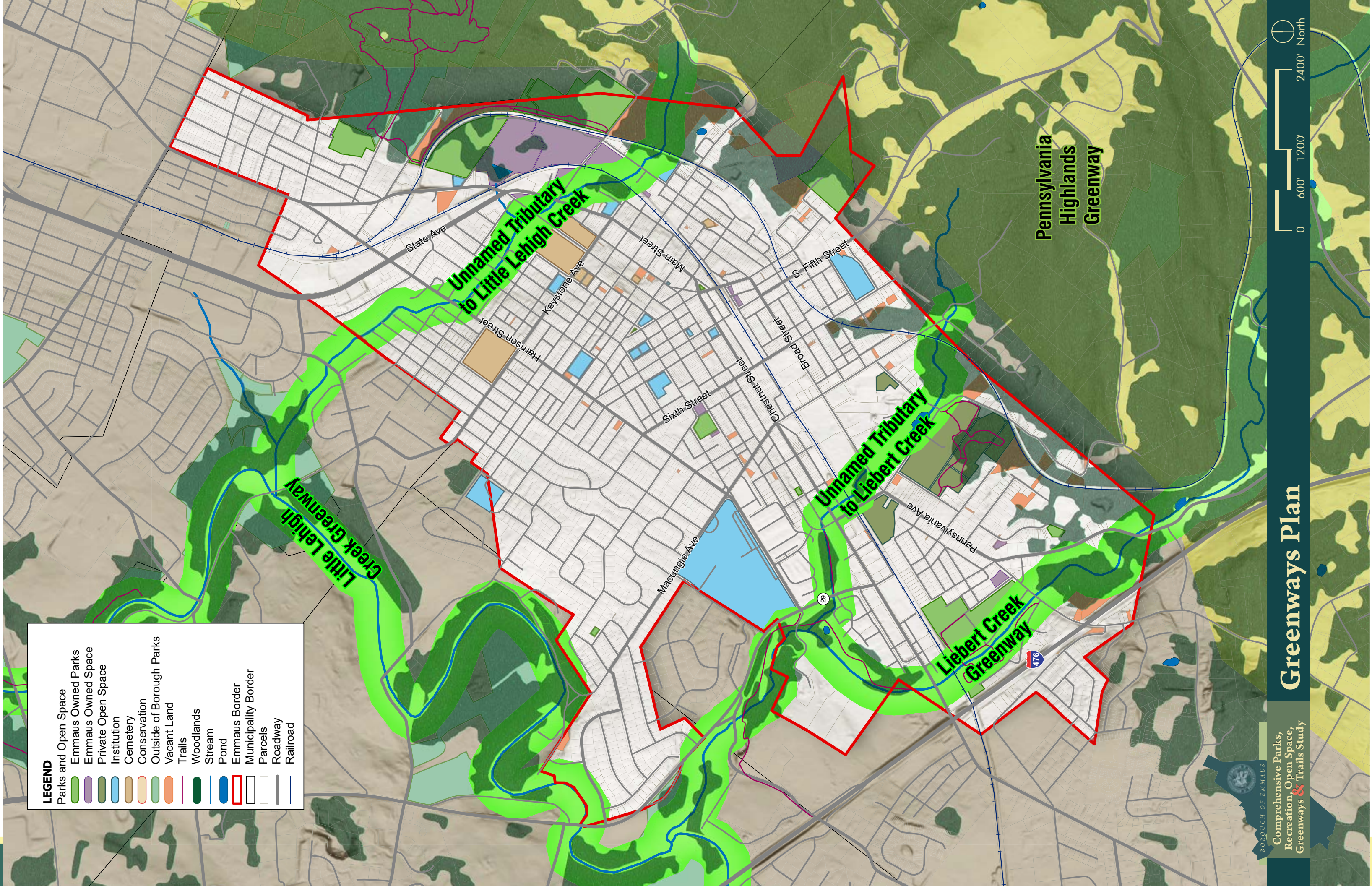
The proposed greenway plan expands upon Lehigh Valley Greenways Plan completed by LVPC in 2007. Beyond the Leibert Creek Greenway identified in the LVPC plan, this plan adds the unnamed tributary to Leibert Creek and the unnamed tributary to the Little Lehigh Creek. Both of these greenways will foster the conservation and protection of critical habitats and water quality as a primary goal. Educational and interpretive signage should be added once these greenways are established.

Unnamed Tributary to Leibert Creek – This tributary starts in South Mountain and flows through Furnace Dam Park, under Chestnut St. just east of S. 10th Street, under S. 10th Street, between Colonial Crest Apartments, under S. Cedar Crest Blvd. and then joining Leibert Creek just north of The Meadows Apartments.

The area of this greenway that lies between S. 10th Street and S. Cedar Crest Blvd has an existing trail that runs along the creek. A new pedestrian bridge crosses the creek just before S. Cedar Crest Blvd. The property that contains the Greenway is noted in the *Parks, Recreation and Open Space Plan*, September 2021 as a parcel that should be acquired by the Borough for conservation purposes.

There are few opportunities to create trails along this greenway except where they are noted as part of park improvements at Furnace Dam.

Unnamed Tributary to Little Lehigh Creek – This tributary starts in South Mountain and flows next to the 1803 House, behind the Public Library, through Williams Street Recreational Area and the Borough owned property behind the Beechwood Street homes before it continues out of the Borough and enters into the Little Lehigh Creek by Keystone Road. There is another stream that feeds this waterway by way of the retention pond located by the Emmaus Community Gardens.





Streambank erosion along the unnamed tributary of Leibert Creek, entering Furnace Dam pond.



Streambank tree plantings along the unnamed tributary of Little Lehigh Creek at the Borough-owned property behind the homes on Beechwood Street.

There currently are no trails along this greenway but an opportunity to enhance this greenway. A small meadow trail exists in the Borough owned property behind the homes on Beechwood Street. Access to this parcel can be made at the end of E. Berger Street.

Keeping Greenways Green

The following recommendations, ideas, and strategies will promote the protection and enhancement of the Borough's greenways. Emmaus may wish to implement some or all of these strategies to encourage the protection and establishment of greenways:

Add Riparian Buffer Overlay Zone to Emmaus Zoning and Zoning Map - The Borough currently has waterway setback ordinances which establish riparian zones along waterways and wetlands. However this designation is not shown on the Zoning Map and could be shown and legislated as an overlay. The Borough should consider adding this designation to the Borough Zoning Map in order to protect these resources. The Borough should also consider widening the setbacks along main drainage channels from 10 feet from centerline of the creek to 25 feet from centerline of the creek to provide better protection of the waterways and to foster the establishment of greenways.

Educational Outreach – The Borough should continue its partnership with Wildlands Conservancy and partner with Seven Generation Charter School and East Penn School District to develop recreational programming that promotes the importance of protecting waterways. In this report and in the *Parks, Recreation and Open Space Plan*, September 2021, the importance of protecting natural resources is stressed. Improvements recommended in these plans can be used as educational opportunities. Educational improvements range from making a raingarden to the importance of trees for a healthy environment.

Greenway Volunteer Network - The Borough should create a volunteer network for the establishment and maintenance of greenways. Volunteer tasks could be programmed and facilitated by the Borough several days throughout the year, such as on Earth Day.

Local organizations, such as Scouts and Wildlands Conservancy, are logical partners. Pennsylvania also has a “Keep Pennsylvania Beautiful” Program that is similar to PennDOT's adopt-a-highway program. Additional information can be found at: <http://www.keeppabeautiful.org/>

Promote Greenway Networks - Many residents, community organizations, and businesses are attracted to greenways for the many environmental and aesthetic benefits that they offer. The Borough should promote these sustainable greenways as a staple of Emmaus' values and cultural landscape.

Collaborate with Regional Greenway Plan - LVPC and Lehigh County already have Greenway Plans and on-going conservation and enhancement efforts. The Borough should coordinate its efforts with the LVPC. This agency may also be a funding source for greenway enhancement and preservation efforts.



Streambank erosion along the unnamed tributary of Little Lehigh Creek on the north side of E. Harrison Street.

4

Implementation



Project Partners

Various partnerships will need to be fostered to assist in the promotion, funding, and/or implementation of the Borough of Emmaus Trails and Greenways Plan. Partners can help to advocate the completion of projects recommended by the plan and also assist in securing funding through grants and other means.

Local partners may include:

- Local businesses: running, bicycling, etc.;
- Local landowners;
- Real estate developers;
- Schools and institutions.

County / Regional partners include:

- Adjacent municipalities;
- Lehigh Valley Planning Commission;
- Wildlands Conservancy.

State partners include:

- PennDOT
- Department of Community and Economic Development (DCED)
- Department of Conservation and Natural Resources (DCNR)
- Pennsylvania Infrastructure Reinvestment Authority (PennVEST)

State agencies such as DCNR (PA Department of Conservation and Natural Resources) and DCED (PA Department of Community and Economic Development) will be important sources for design/ engineering and construction funding. PennDOT will need to be involved with the proposed routes on state roadways. Inter-county efforts should continue with this plan through the Lehigh Valley Planning Commission while inter-municipality opportunities can be pursue with neighboring communities. Funding applications for connectivity improvements are generally more successful when they involve multiple local governments.

Additionally, private developers will be an important part of the implementation process where alignments proposed in this plan are to be located within or adjacent to tracts under future or current land development review. The Borough should make every effort to have these improvements included in the land development application and constructed as part of the proposed developments. This can be done efficiently if the Borough adopts an Official Map and includes proposed trails on the Official Map.

Implementation of Priority Routes

Development Priorities

The proposed routes in the Trail and Greenway Plan were broken down into short, medium, and long-term priorities. These priorities were based on public input, safety, connectivity, funding, and property ownership. The Borough should continue to assess and adjust these priorities as conditions change in the future. The implementation of these various route sections should also be opportunistic. This means that if a specific property owner is interested in advancing the construction of a route segment, or if a funding program emphasis has high applicability for a route segment in a particular year, the priorities for implementation can and should change. On-road routes should be implemented as operational repaving occurs on Borough roads. On-road routes along state roads will need to be discussed further with PennDOT. An implementation priorities map is found at the end of this chapter. A description of the priorities is provided below:

Short-Term Priorities

- Glenwood St, from 31st St to Boroline Park
- Harrison St, Dalton St to Macungie Ave
- North St, Macungie Ave to Cedar Crest Blvd
- Minor St, Klines Ln to Sixth St
- 6th St, Harrison St to Minor St

- Broad St, 7th St to 10th St
- Pennsylvania Ave, 10th St to 13th St
- Shimerville Rd, Pennsylvania Ave to 15th St
- Pennsylvania Ave, 15th St to Borough line
- Keystone, Borough line to Ridge

Mid-Term Priorities

- 31st St, from Emaus Ave to Ithica Street
- Mountain Blvd, Glenwood St to E Main St
- E Main St, Mountain Blvd to Wieders Ln
- Main St, Wieders Ln to Williams St
- Main St, Williams St to State St
- Ridge St, State St to 6th St
- Walnut St, 6th St to 10th
- Macungie Ave, Borough line to Chestnut St
- 7th St, Chestnut St to Broad St
- Knauss Connector Trail, Off Road

Long Term Priorities

- 3rd St, Harrison St to 4th St
- 4th St, 3rd to Broad St
- 2nd St, Ridge St to the Borough Line
- Adrain St, 2nd to 3rd St
- 3rd St, Adrain St to Main St
- Main St, 3rd St to 4th St
- Chestnut St, Main St to Fourth St
- Broad St, 4th St to 7th St
- 10th St, North St to Broad
- 5th St, Broad St to Borough line
- Pennsylvania Ave, 17th St to Borough line
- Keystone, Borough line to Ridge



Estimate of Probable Development Cost

Probable costs of development were created from GIS mapping / measurements and unit costs from current material and labor costs for public projects. A summary of costs is provided below:

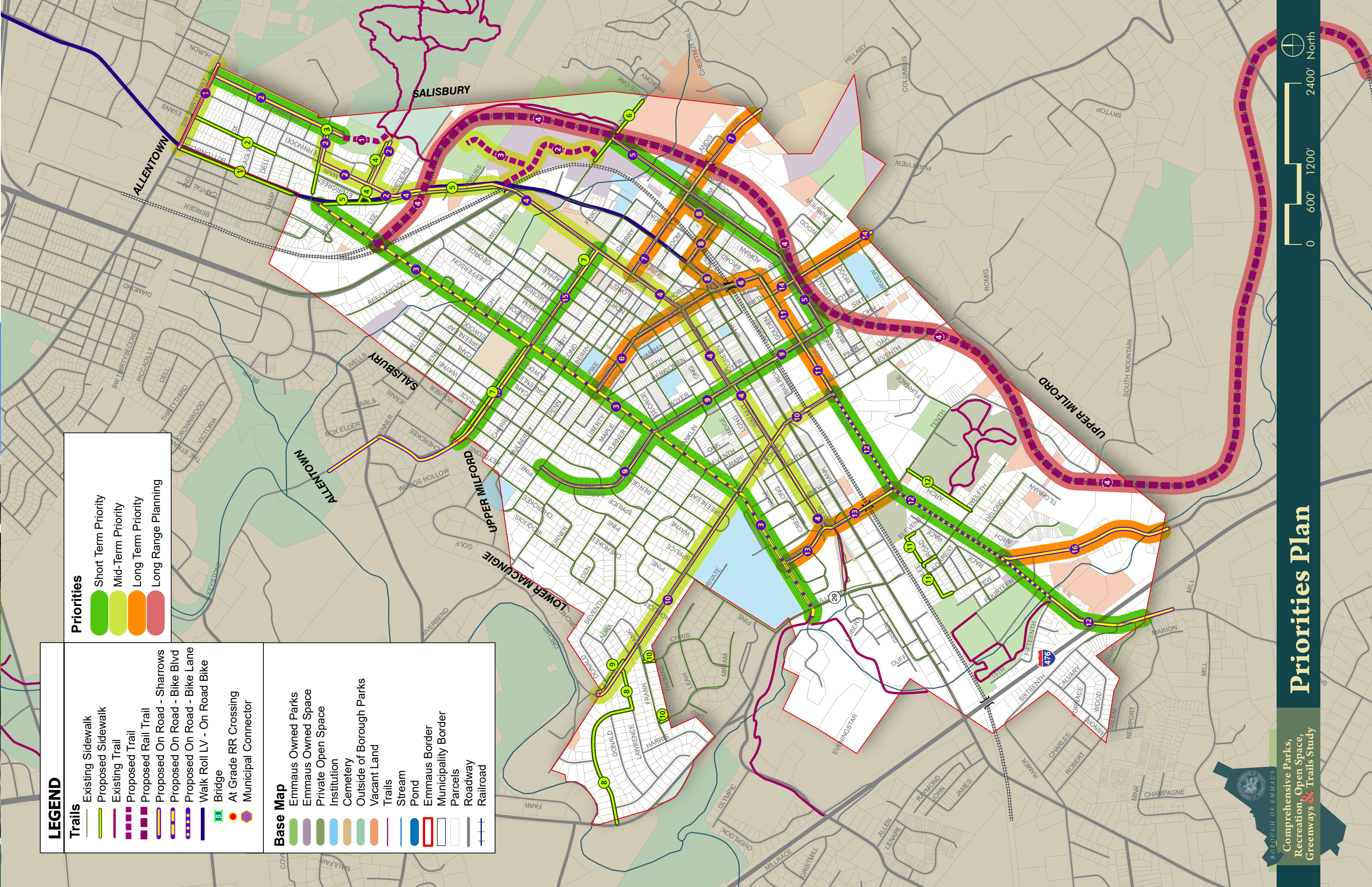
- On-road Routes: \$209,630.00
- Off-road Routes: \$286,950.00
- TOTAL: \$496,580

Potential Funding Sources

Pennsylvania Department of Conservation and Natural Resources (PA DCNR)

Community Conservation Partnership Program (C2P2)

The Community Recreation and Conservation Program through the PA DCNR Community Conservation Partnership Program (C2P2) provides funding to municipalities and authorized nonprofit organizations for recreation, park, trail and conservation projects. These include planning for feasibility studies, trail studies, conservation plans, master site development



Priorities Plan

Comprehensive Parks, Recreation, Open Space, Greenways & Trails Study

ON ROAD ROUTES

Number	Type	Name	Description	Recommendation	Priority	Quantity		Unit Cost	Total Item Costs	Total Costs
1	On Road - Sharrow	31st St	from Emaus Ave to Ithica Street	Sharrow Emblem	Mid-Term	1775	LF	\$2.00	\$3,550.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$4,050.00
2	On Road - Sharrow	Glenwood Rd	from 31 st to Boroline Park	Sharrow Emblem	Short-Term	2150	LF	\$2.00	\$4,300.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$4,800.00
		Mountain Blvd	Glenwood to E Main St	Sharrow Emblem	Mid-Term	50	LF	\$2.00	\$100.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	
		E Main St	Mountain Blvd toWieders Ln	Sharrow Emblem	Mid-Term	1170	LF	\$2.00	\$2,340.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$8,240.00
3	On Road - Bike Blvd	Harrison St	Dalton St to Macungie Ave	Sharrow Emblem	Short-Term	7550	LF	\$2.00	\$15,100.00	
				Bikes may use full Lane Sign		8	EA	\$250.00	\$2,000.00	
				Speed Cushions		1	EA	\$12,000	\$12,000.00	
		North St	Macungie Ave to Cedar Crest Blvd	Sharrow Emblem	Short-Term	1970	LF	\$2.00	\$3,940.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	
				Speed Cushions		1	EA	\$12,000	\$12,000.00	\$45,540.00
4	On Road - Sharrow	Main St	Wieders Ln to Williams St	Sharrow Emblem	Mid-Term	1850	LF	\$2.00	\$3,700.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	
		Main St	Williams St to State St	Sharrow Emblem	Mid-Term	1780	LF	\$2.00	\$3,560.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	
				Widening Road		TBD			TBD	
		Ridge St	State St to 6th St	Sharrow Emblem	Mid-Term	4355	LF	\$2.00	\$8,710.00	
				Bikes may use full Lane Sign		4	EA	\$250.00	\$1,000.00	
		Walnut St	6th St to 10th	Sharrow Emblem	Mid-Term	2495	LF	\$2.00	\$4,990.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$23,460.00
5	On Road - Sharrow	Minor St	Klines Ln to Sixth St	Sharrow Emblem	Short-Term	4290	LF	\$2.00	\$8,580.00	
				Bikes may use full Lane Sign		4	EA	\$250.00	\$1,000.00	\$9,580.00
6	On Road - Sharrow	3rd St	Harrison St to 4th St	Sharrow Emblem	Long Term	940	LF	\$2.00	\$1,880.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	
		4th St	3rd to Broad St	Sharrow Emblem	Long Term	2120	LF	\$2.00	\$4,240.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$7,120.00
7	On Road - Sharrow	2nd St	Ridge St to the Borough Line	Sharrow Emblem	Long Term	2935	LF	\$2.00	\$5,870.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$6,370.00
8	On Road - Sharrow	Adrain St	2nd to 3rd St	Sharrow Emblem	Long Term	575	LF	\$2.00	\$1,150.00	

				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	
		3rd St	Adrain St to Main St	Sharrow Emblem	Long Term	675	LF	\$2.00	\$1,350.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	
		Main St	3rd St to 4th St	Sharrow Emblem	Long Term	340	LF	\$2.00	\$680.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	
		Chestnut St	Main St to Fourth St	Sharrow Emblem	Long Term	220	LF	\$2.00	\$440.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$5,620.00
9	On Road - Sharrow	6th St	Harrison St to Minor St	Sharrow Emblem	Short-Term	2945	LF	\$2.00	\$5,890.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$6,390.00
10	On Road - Sharrow	Macungie Ave	Borough line to Chestnut St	Sharrow Emblem	Mid-Term	4920	LF	\$2.00	\$9,840.00	
				Bikes may use full Lane Sign		6	EA	\$250.00	\$1,500.00	
		7th St	Chestnut St to Broad St	Sharrow Emblem	Mid-Term	805	LF	\$2.00	\$1,610.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$13,450.00
11	On Road - Sharrow	Broad St	4th St to 7th St	Sharrow Emblem	Long Term	2050	LF	\$2.00	\$4,100.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$4,600.00
12	On Road - Bike Lane	Broad St	7th St to 10th St	Bike Lane Emblem and lines	Short-Term	1695	LF	\$10.00	\$16,950.00	
				Bike Lane Sign		2	EA	\$250.00	\$500.00	
		Pennsylvania Ave	10th St to 13th St	Bike Lane Emblem and lines	Short-Term	1995	LF	\$10.00	\$19,950.00	
				Bike Lane Sign		2	EA	\$250.00	\$500.00	
		Shimerville Rd	Pennsylvania Ave to 15th St	Bike Lane Emblem and lines	Short-Term	860	LF	\$10.00	\$8,600.00	
				Bike Lane Sign		2	EA	\$250.00	\$500.00	
	On Road - Sharrow	Pennsylvania Ave	15th St to Borough line	Sharrow Emblem	Short-Term	1310	LF	\$2.00	\$2,620.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$50,120.00
13	On Road - Sharrow	10th St	North St to Broad	Sharrow Emblem	Long Term	1215	LF	\$2.00	\$2,430.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$2,930.00
14	On Road - Sharrow	5th St	Broad St to Borough line	Sharrow Emblem	Long Term	1890	LF	\$2.00	\$3,780.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$4,280.00
15	On Road - Sharrow	Pennsylvania Ave	17th St to Borough line	Sharrow Emblem	Long Term	2260	LF	\$2.00	\$4,520.00	
				Bikes may use full Lane Sign		2	EA	\$250.00	\$500.00	\$5,020.00
16	On Road - Sharrow	Keystone	Borough line to Ridge	Sharrow Emblem	Short	3530	LF	\$2.00	\$7,060.00	
				Bikes may use full Lane Sign		4	EA	\$250.00	\$1,000.00	\$8,060.00
On Road Routes total:										\$209,630.00

OFF ROAD ROUTES

Number	Type	Name	Description	Recommendation	Priority	Quantity		Unit Cost	Total Item Costs	Total Costs
1	Multi-use Trail	Boroline Park	Alpine St to Mountain Blvd	Refer to Boroline Park Master Plan					\$66,957	
2	Multi-use Trail	Borough Complex	Klines Ln to Main St	10' Wide Asphalt trail	Mid-Term	1680	LF	\$150.00	\$252,000.00	
				Bollards		4	EA	\$500	\$2,000.00	
				Culvert Crossing		1	EA	\$2,500	\$2,500.00	\$256,500.00
3	Multi-use Trail	Borough Complex		8' Crushed Stone Path	Mid-Term	1015	LF	\$30	\$30,450.00	\$30,450.00
4	Rail Trail	RR ROW	Main St to Borough line		Long Range	14626	LF	\$1mil per mile		
Off Road Routes total:										\$286,950.00

	On Road	Off Road	
Short-Term Priority			\$124,490.00
Mid-Term Priority	\$49,200.00	\$286,950.00	\$336,150.00
Long Term Priority			\$35,940.00
TOTAL:			\$496,580.00

plans, and comprehensive recreation park and open space and greenway plans. In addition to planning efforts, the program provides funding for land acquisition for active or passive parks, trails and conservation purposes, and construction and rehabilitation of parks, trails, and recreation facilities. Most of these projects require a 50% match, which can include a combination of cash and/or non-cash values.

Grant applications for the C2P2 program are accepted annually—usually in April. More information on this program can be found at the DCNR website: <http://www.dcnr.state.pa.us/brc/grants/indexgrantsinstruct.aspx>

Transportation Alternatives Program (TAP)

The Transportation Alternatives Program (TAP) was started in 2012 by Congress as part of the Moving Ahead for Progress in the 21st Century Act (MAP-21). The program funds a range of alternative transportation projects that include: pedestrian and bicycle facilities, public transportation, safe routes to school, historic transportation structures, environmental mitigation, and trail projects. All funding money is administered by PennDOT and strictly used for the construction of projects, but not the planning or design.

Recently Transportation Enhancements (TE), Safe Routes to School (SRTS), Scenic Byways (Byways), and the Recreational Trails Program (RTP) have all been consolidated into the Transportation Alternatives Program (TAP). Projects must have a construction cost of at least \$50,000, but no more than \$1,000,000.

Additional information is available online at: <http://www.penndot.gov/ProjectAndPrograms/Planning/Pages/default.aspx>

Commonwealth Financing Agency (CFA)

Greenways, Trails and Recreation Program (GTRP)

The Greenways, Trails, and Recreation Program (GTRP) provides funding for: public park and recreation area projects, greenway and trail projects, and river conservation projects. The program requires a 15%

local cash match of the total project cost and projects must not exceed \$250,000.

More information can be found at: <http://www.dced.pa.gov/programs/greenways-trails-and-recreation-program-gtrp/>

Multimodal Transportation Fund (MTF)

The Multimodal Transportation Fund provides grants to encourage economic development and ensure that a safe and reliable system of transportation is available to the residents of the Commonwealth. Funds may be used for the development, rehabilitation and enhancement of transportation assets to existing communities, streetscape, lighting, sidewalk enhancement, pedestrian safety, connectivity of transportation assets and transit-oriented development. Grants are available for projects with a total cost of \$100,000 or more and grants shall not exceed \$3,000,000 for any project. For more information please visit <http://dced.pa.gov/programs/multimodal-transportation-fund>

PennDOT Multimodal Fund

PennDOT's multimodal program seeks to improve freight and passenger mobility options, maximize benefits of capital investment in all modes of transportation, promote safety on all modes of transportation, use transportation improvements to spur economic development, and improve the effectiveness and efficiency of the transportation network. Projects eligible for funding include:

- projects related to streetscape, sidewalk enhancement, pedestrian safety;
- transit oriented development projects;
- projects related to connectivity improvements;
- projects that coordinate local land use with transportation assets to enhance existing communities.

The PennDOT Multimodal fund is separate from the Multimodal Transportation Fund administered by the Pennsylvania DCED. A local match of at least



30% of the non-federal project costs is required. More information on the program can be found at: <http://www.penndot.gov/ProjectAndPrograms/MultimodalProgram/Pages/default.aspx>

PennVEST (Pennsylvania Infrastructure Investment Authority)

PennVEST offers both grants and low interest loans for projects that help to manage stormwater and improve water quality. Several of the proposed recommendations for the greeways will be of interest to PennVEST since they include stormwater BMPs.

More information on the grants and loans available through PennVEST can be found at: <http://www.pennvest.pa.gov/Information/Funding-Programs/Pages/default.aspx>

Maintenance

All proposed capital improvements should not be implemented until a maintenance strategy is created. For on-road trails, the Borough will have to maintain signage and striping. For off-road trails, the Borough will have to maintain trail surface conditions and cleanliness. Maintenance for greenways will require horticulture knowledge and a management plan to protect and enhance the health of the riparian ecosystem along the creeks.

Trail and Greenway Maintenance Operations Include:

- Frequency of maintenance;
- Trail and greenway assessment and inspection;
- hazard (trees, invasives, fence damage, etc.) identification and corrective action;
- Revegetation;
- Restoration;
- Staff Training.

Typical Trail and Greenway Maintenance Tasks Include:

- Sweeping;
- Surface repairs and pavement overlays (chip sealing not recommended);
- Management, removal, and addition of native vegetation (can be done with volunteer assistance);
- Traffic control devices and signal replacement;
- Sign and pavement marking replacement;
- Drainage improvements;
- BMP Clean-outs;
- Snow clearance (optional).

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Appendix

The appendix for this report can be found in the Comprehensive Parks, Recreation, and Open Space Plan.

- Public Open Space
- Emmaus Owned Parks
- Emmaus Owned Space
- Private Open Space
- Institution
- Cemetery
- Conservation
- Outside of Borough Parks



Pennsylvania
Department of
Transportation