Safe Connections Improvement Recommendations

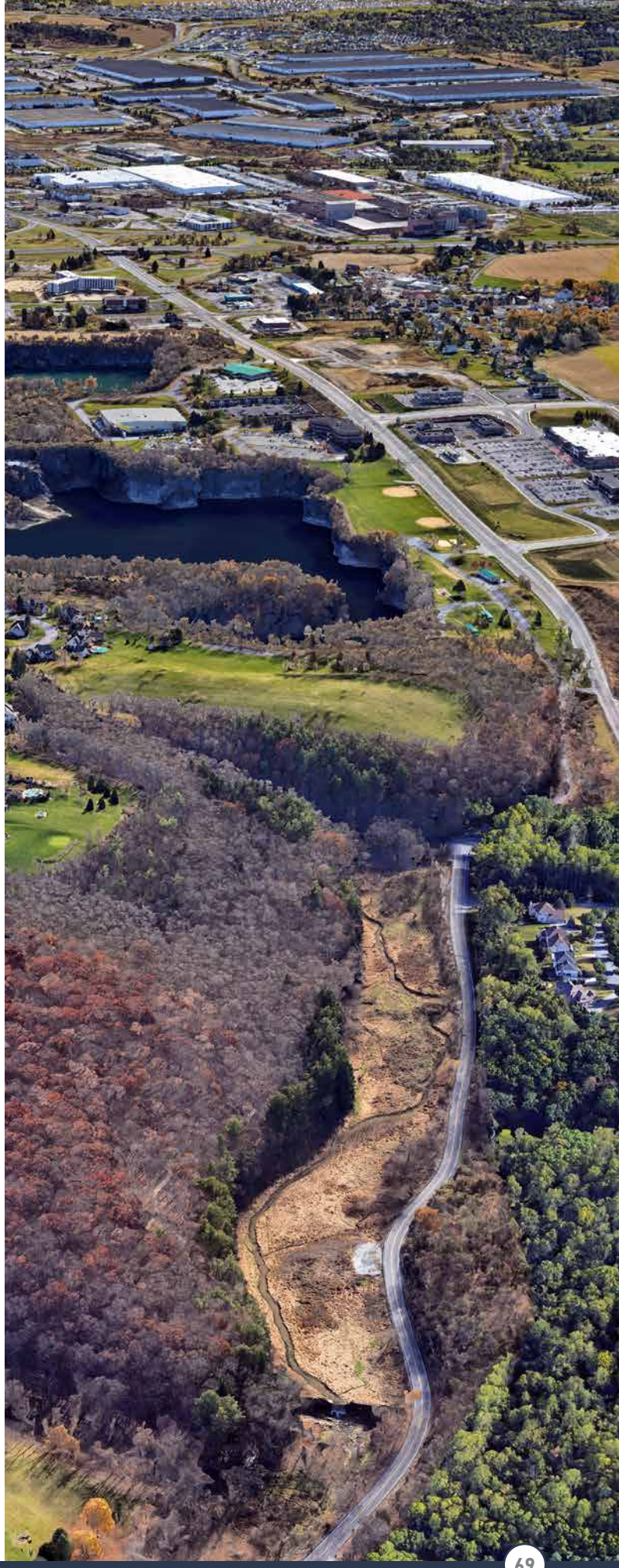
7

A. Safe Connections Improvements Plan

1. Safety & Connectivity 'Toolbox'

After several on-site drive-throughs, walk-throughs, and community bike rides, the following tools are recommended for implementation in the Upper Macungie Multimodal Safety Improvements Plan:

- Speed Table
- Speed Cushion
- Speed Limit Reduction
- Curb Extension
- Special Crossings
- School Walking Route
- Bike Box
- Pedestrian Refuge Island
- Rapid Flashing Beacon
- Handman
- Crosswalk
- Bike Lane
- Bike Boulevard
- Sharrow
- Sidepath
- Hiking Trail
- Sidewalk (Connection/ New)
- Multiuse Path
- Bike Share
- Decorative Crosswalk
- Bike Parking
- Small Bridge
- Large Bridge



2. Design and Acquisition Recommendations

Inclusion of Multimodal Safety Improvements Plan into Township Official Map

Upper Macungie Township has undertaken the study and preparation of an Official Map. The Pennsylvania Municipal Code allows for municipalities to use an Official Map as a method of planning for future trails, parks, networks of open space, road improvements, or other public uses. By identifying the lands, the municipality effectively expresses its priorities and intention to acquire the land in the future for public improvements. Chapter 8 of this VZAP recommends the inclusion of the VZAP Multimodal Safety Improvements plan that follows into the Official Map.

Township Roads and State Routes: Traffic Calming

While beyond the scope of this study, it is recommended that the Township pursue detailed study of traffic calming options in the high crash areas of the Township.

The technical design standards for traffic calming safety improvements will conform to PennDOT's Pennsylvania's Traffic Calming Handbook (2012 and updated). This guidance document explores the very real issues inherent in retro-fitting existing streets with safety improvements encouraging speed reductions, emergency service vehicle movement, streetscape improvements, snow removal, drainage, and ADA requirements. Traffic circles, roundabouts, speed cushions, diverters, raised medians, and raised intersections are all additional 'tools' (some are described above in 1. Safety & Connectivity 'Toolbox') available to municipalities.

Sidepath (Shared Use) Network: Trail Guidelines

The large amount of green landscaped rights-of-way bordering the vehicular cartway in the central industrial/ warehouse corridor of Upper Macungie offer opportunities for the development of sidepath improvements. Side paths are another name for 'shared use' pathways. Shared use paths are pathways that are physically separated from the vehicular cartway by a physical barrier or open space. The 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 some 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

The development of the sidepath system in Upper Macungie offers the potential for connection into residential areas thereby extending the connectivity of pedestrians and cyclists across the Township.

Trail design standards have been developed by 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).

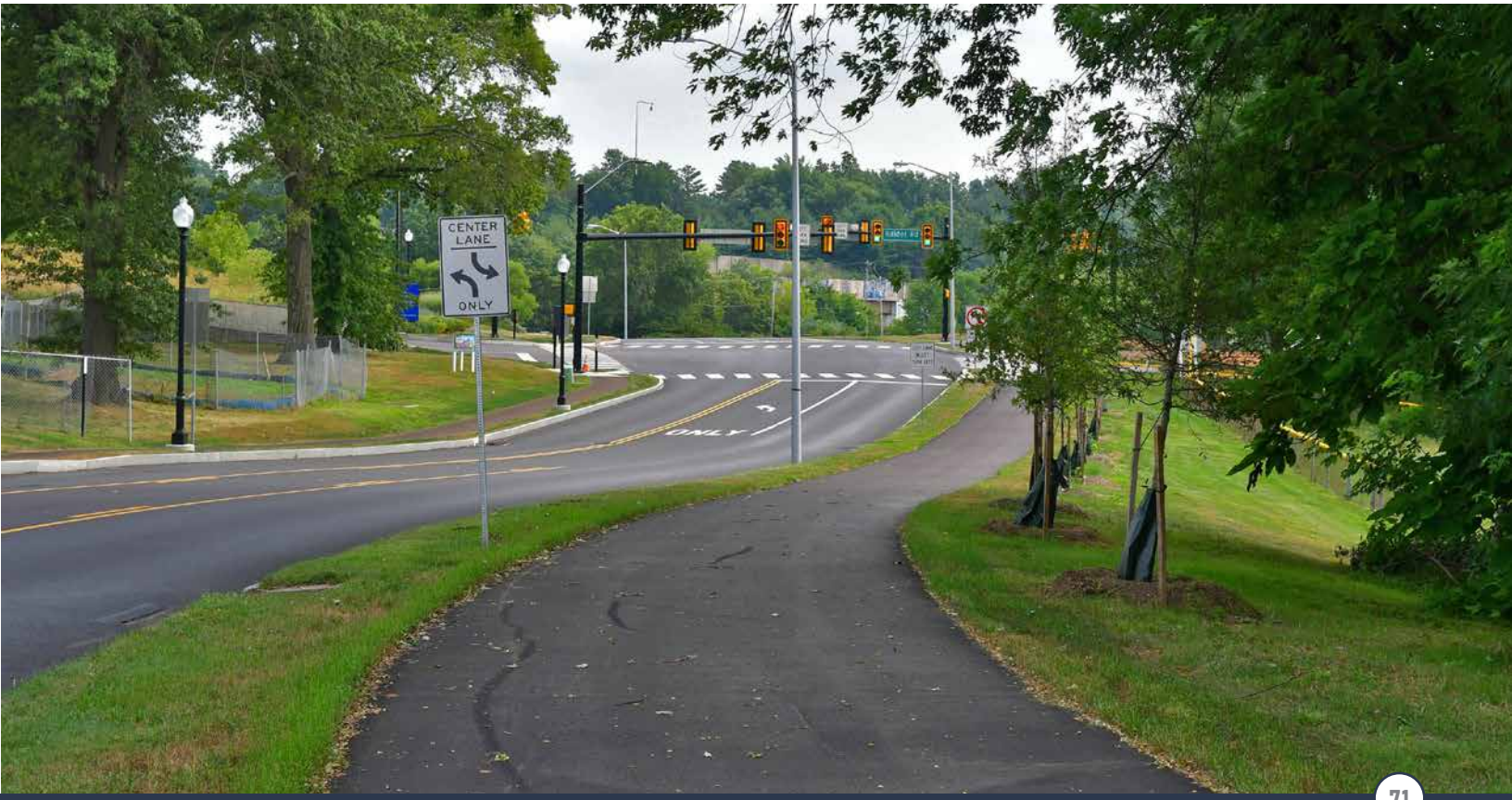
AASHTO standards are federally recognized while NACTO standards explore innovative solutions to urban bikeway design. All on-road and multi-purpose trail improvements should adhere to AASHTO and MUTCD standards.

There are also various design standards for the development of 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.

On-Road Facilities: Guidelines

On-Road Bicycle facilities in the Multimodal Improvements Plan are broken down into four 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

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

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 signs have been replaced by 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:

- 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

Paved Shoulders - Bicyclists operate on the shoulders of roadways, typically on rural roadways:

- Paved Shoulders should be placed on both sides of the road
- Shoulder width with no vertical obstruction: 4' shoulder width minimum
- Shoulder width with vertical obstruction (curb, guiderail, etc.): 5' shoulder width minimum

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

Complete Streets' Design Standards Inclusion in Township SALDO

National Association of Community Transportation Officials (NACTO) - Urban Bikeway Design Guide

The principals of Complete Streets are contained in the NACTO Urban Bikeway Design Guide provides state-of-the-practice solutions to create Complete Streets that are enjoyable for motorists, bicyclists, pedestrians, wheelchair users, and transit users. The guidebook is divided into six primary design categories:

- Streets
- Street Design Elements
- Interim Design Strategies
- Intersections
- Intersection Design Elements
- Design Controls

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 to 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

Recommended Trail Surface Types

Asphalt Surfaces

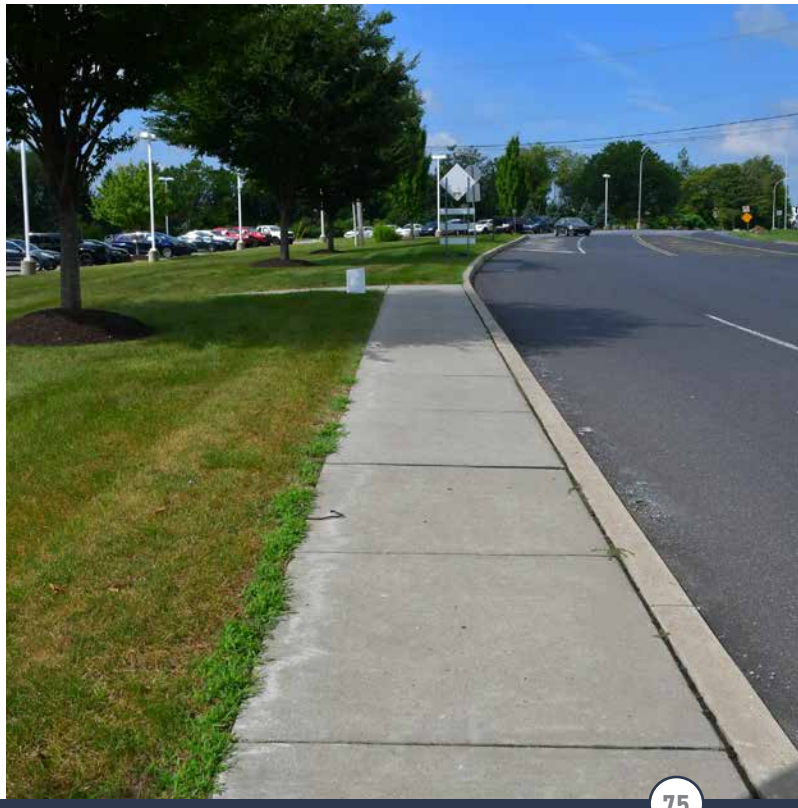
Asphalt surfaces provide for the widest variety of trail users including bicyclist, walkers, joggers, wheelchair users, and in-line skaters. Initial installation costs are high (lower than Portland cement concrete however) compared to other trail surface types. However, long term maintenance costs will 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 costliest. 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. Concrete is recommended for sidewalks that are recommended along some segments of proposed trails.

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 low, however long-term maintenance costs increase due to 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 on slopes over 3%.

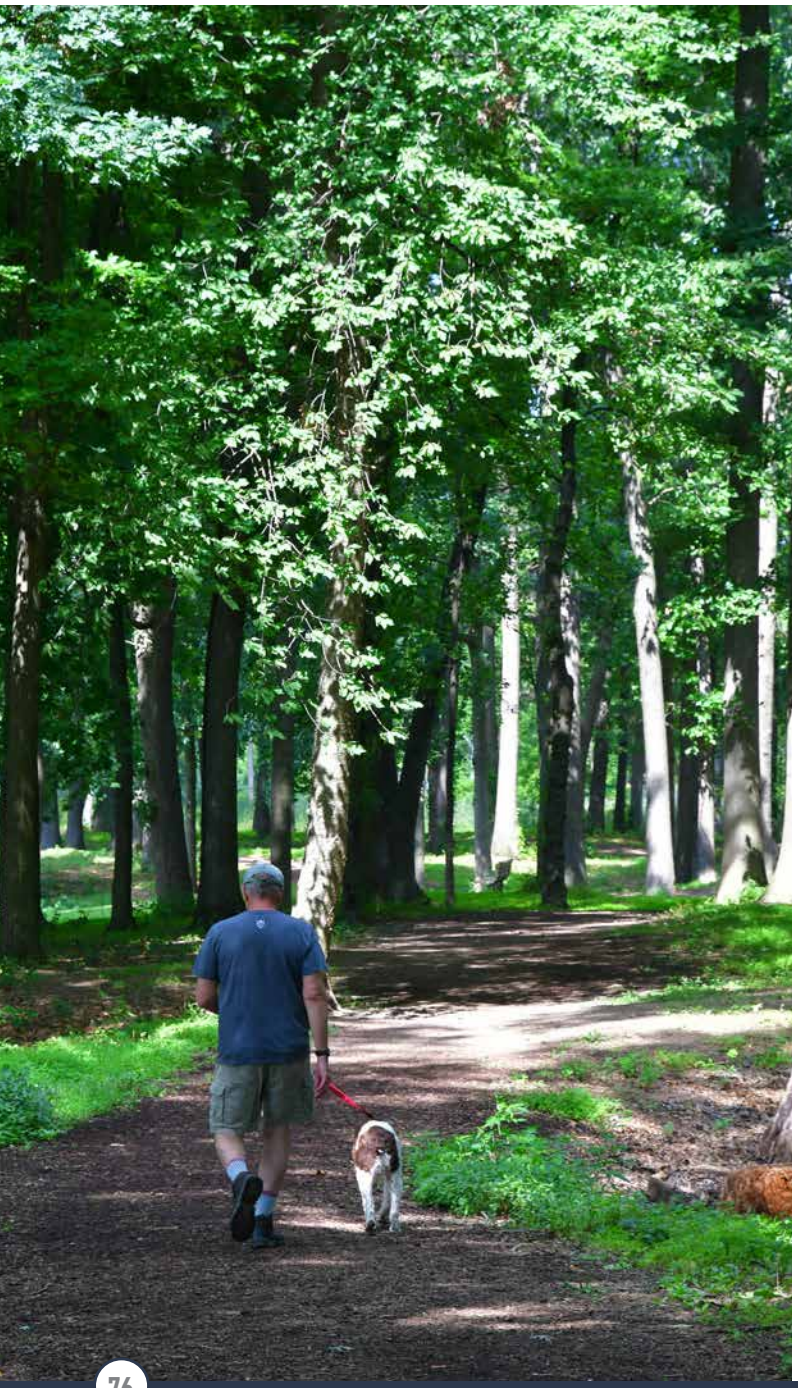


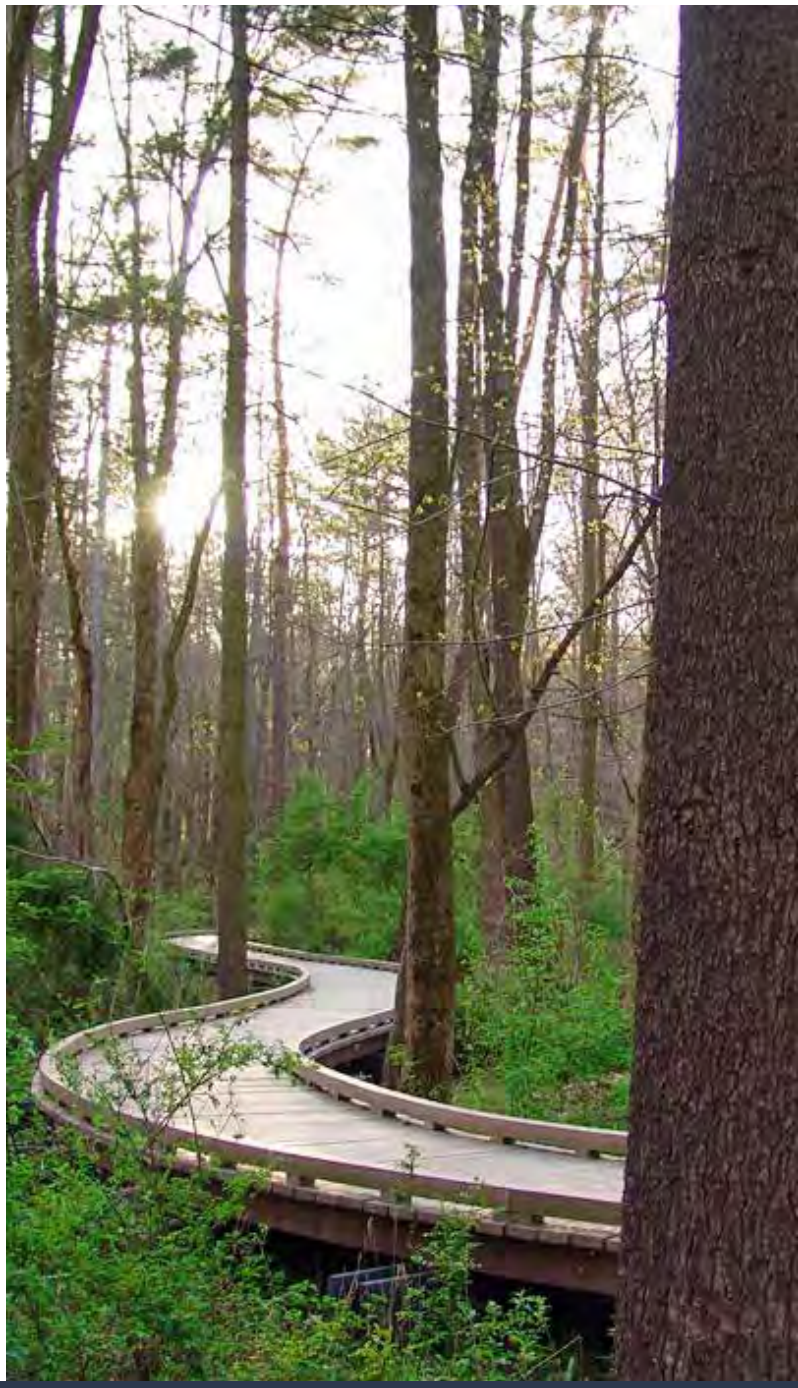
Compact Earth Surfaces

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 have 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.





Recommended Safety Improvement Implementation Strategies

The following are strategies for how to implement trails shown on private lands. Eminent domain is not a recommendation of this study. If property owners are not willing to work with the Township, the Township should consider alternative routes with public lands or willing property owners:

Trail Agreements

Agreements can be negotiated between private landowners and the Township to establish an understanding of public use for trails on a property. These agreements are not always official and may impact the permanent use of a trail.

Public Access Easements

Public access easements are the most typical trail implementation strategies. These involve the purchasing of easements on private lands for use by the greater public. The Township should work with willing property owners on purchasing access easements.

Acquisition

Acquisition is the purchasing or inheriting of land by the Township. This should not be done through eminent domain as noted previously. The Town should only consider acquisition with willing property owners. Properties considered for acquisition should have recreational and/or ecological significance. The Town will also need to have the maintenance and financial capacity to acquire and maintain acquired lands.

Annual Update of All Components of the UMT Vision Zero Action Plan:

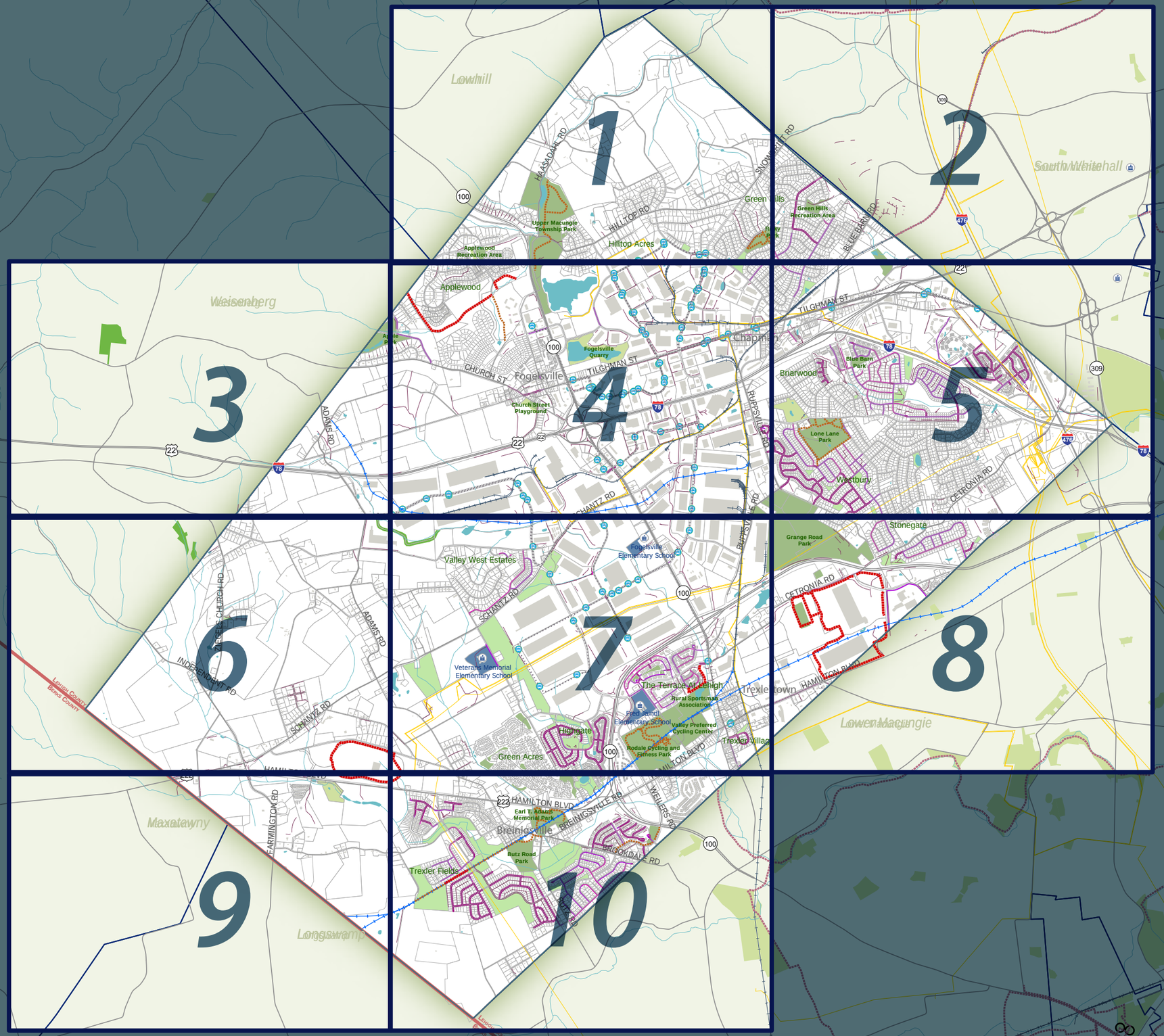
It is recommended that the Township annually update the data and elements contained in the VZAP:

- Township Development Plan
- Upper Macungie Crash Data Plan
- Multimodal Safety Improvements Plan
- Priority Improvements Plan
- VZAP: Matrix*

*See Chapter 8-Plan of Action & Implementation

3. Multimodal Safety Improvements Plans

- The Upper Macungie Township Multimodal Safety Improvements Plan follows:



UPPER MACUNGIE TOWNSHIP

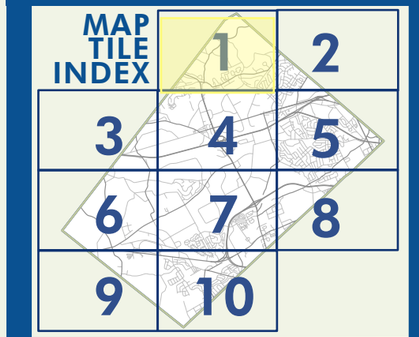
VISION ZERO | ACTION PLAN

Legend

- Local Road
- State Road
- Railroad - Active
- Railroad - Historic Alignment
- Parcel Boundary
- Municipal Boundary
- Sidewalk (Both Sides)
- Sidewalk (One Side)
- Existing Trail - Private
- Existing Hiking Trail - Public
- BikePA - Route L
- Bus Route / Stop
- Park and Rec
- Open Space
- Institutional
- Water/Stream

UPPER MACUNGIE TOWNSHIP

VISION ZERO | ACTION PLAN



Map 1 of 10

Existing Conditions

- Local Road
- State Road
- Railroad - Active
- Railroad - Historic Alignment
- Parcel Boundary
- Municipal Boundary
- Sidewalk (Both Sides)
- Sidewalk (One Side)
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- Bus Route / Stop
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- Open Space
- Institutional
- Water/Stream

Proposed Improvements Plan

Legend

- Bike Parking
- Decorative Crosswalk
- Crosswalk
- Handman
- Rapid Flashing Beacon
- Ped refuge Island
- Bike Share
- Bike Box
- Multiuse Path
- School Walking Route
- Sidewalk
- Hiking Trail
- Special Crossing
- Sidepath
- Sharrow
- Bike Boulevard
- Bike Lane
- Speed Limit Reduction
- Adjacent Connections
- Speed Cushion
- Speed Table
- Small Bridge
- Large Bridge

0 200' 600' 1000' 2000' N

HICKORY
POST
TOWNSHIP LINE
NORTH
HAASADAHL RD
BECKER
HICKORY
KAY
EDGEWOOD
RIDGE
SUNRISE
RIDGE
WOODLEDGE
CENTRAL
PARK
SNOWDRIFT
EAST
PARK
OVERLOOK
HEIDELBERG
HILLTOP RD
LEHIGH
PORTLAND
FIELDSTONE
LOCHHAVEN
MOHR
LONGWOOD
BEECHWOOD
MULBERRY
VERTMAN
BLOSSOM
HEIGHTS
ORCHARD
VIEW
MOHR
DOUG HANDLE
Upper Macungie Township Park
Applewood Recreation Area
Hilltop Acres
Green H
HIGHLAND
PROSPECT
DEER
GROVE
VISTA
KINGSIDE
RICKY RIDGE
100
80

UPPER MACUNGIE TOWNSHIP

VISION ZERO | ACTION PLAN

Existing Conditions

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- Park and Rec
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- Institutional
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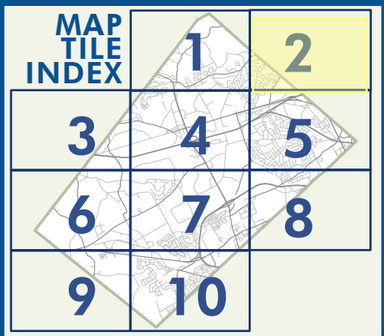
MAP TILE INDEX



Map 2 of 10

Proposed Improvements Plan

Legend

- Bike Parking
- Decorative Crosswalk
- Crosswalk
- Handman
- Rapid Flashing Beacon
- Ped refuge Island
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- Multiuse Path
- School Walking Route
- Sidewalk
- Hiking Trail
- Special Crossing
- Sidepath
- Sharrow
- Bike Boulevard
- Bike Lane
- Speed Limit Reduction
- Adjacent Connections
- Speed Cushion
- Speed Table
- Small Bridge
- Large Bridge

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309

476

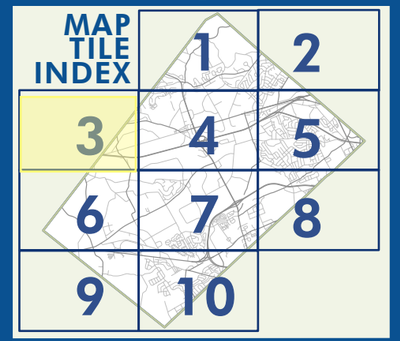
South Whitehall

SNOWDRIFT RD

BLUE BARN RD

Green Hills Recreation Area

Ricky Park



Map 3 of 10

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Proposed Improvements Plan

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- Speed Cushion
- Speed Table
- Small Bridge
- Large Bridge

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UPPER MACUNGIE TOWNSHIP

VISION ZERO | ACTION PLAN

MAP TILE INDEX		
1	2	
3	4	5
6	7	8
9	10	

Map 4 of 10

Proposed Improvements Plan

Legend

- Bike Parking
- Decorative Crosswalk
- Crosswalk
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- Speed Limit Reduction
- Adjacent Connections
- Speed Cushion
- Speed Table
- Small Bridge
- Large Bridge

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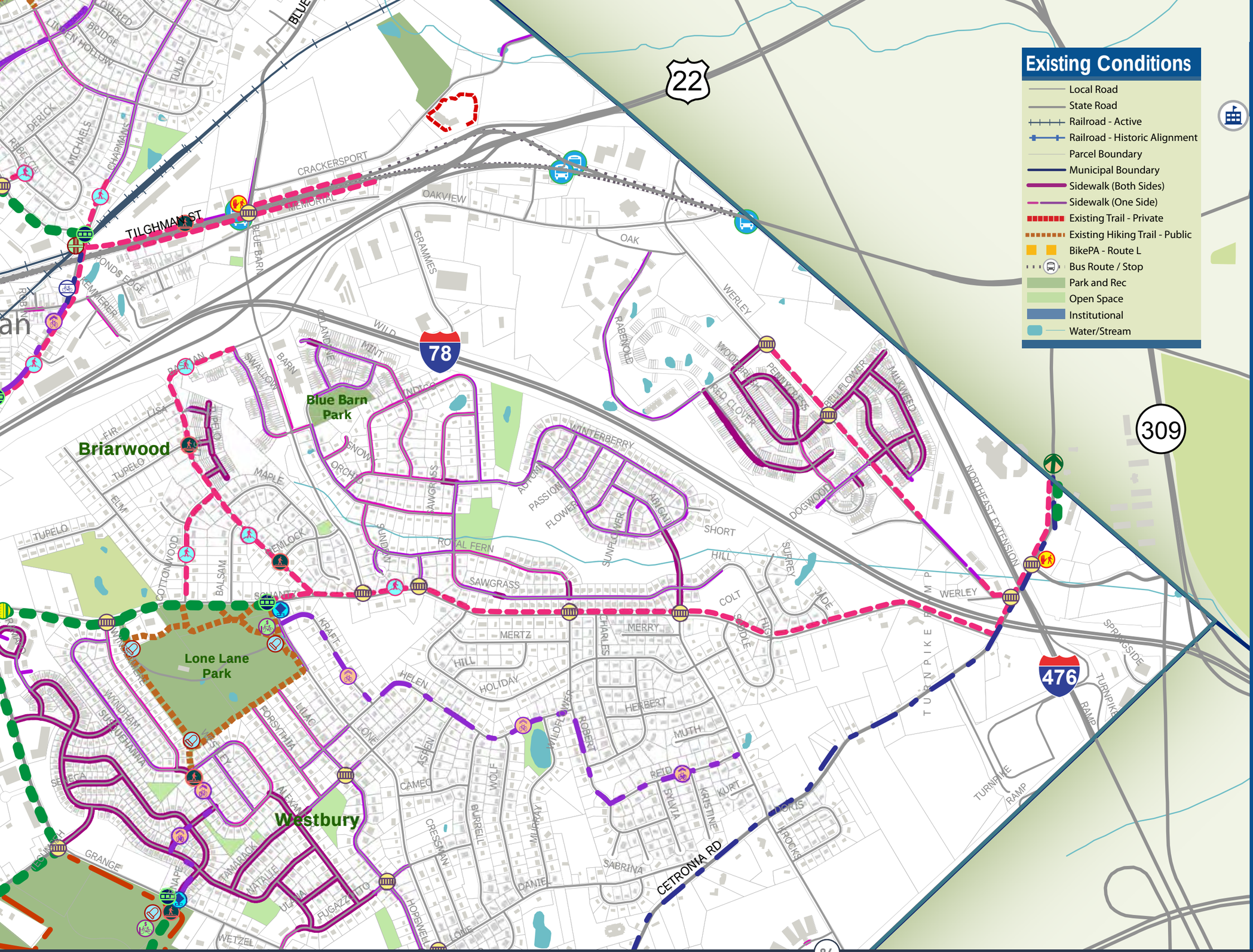
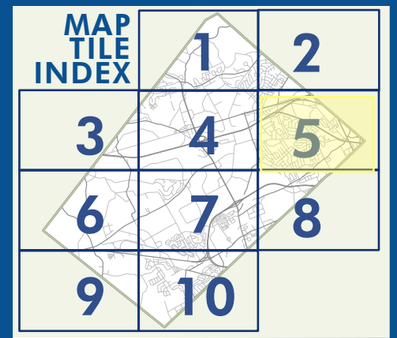


UPPER MACUNGIE TOWNSHIP

VISION ZERO | ACTION PLAN



Map 5 of 10

Proposed Improvements Plan

Legend

- Bike Parking
- Decorative Crosswalk
- Crosswalk
- Handman
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- Speed Table
- Small Bridge
- Large Bridge

0 200' 600' 1000' 2000' N

UPPER MACUNGIE TOWNSHIP

VISION ZERO | ACTION PLAN

MAP TILE INDEX

1	2	
3	4	5
6	7	8
9	10	

Map 6 of 10

Existing Conditions

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- State Road
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- Sidewalk (One Side)
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- Open Space
- Institutional
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- Speed Table
- Small Bridge
- Large Bridge

0 200' 600' 1000' 2000' N

WINDSWEPT
WEISS
WOOD
ARROWHEAD
CORMORANT
ZIEGELS CHURCH RD
ADAMS RD
INDEPENDENT RD
DIETRICH
ALLISON
TORL
SARA
SCHANTZ RD
HAAS HILL
FOLK
HAMILTON BLVD
222
LEHIGH COUNTY
ERKS COUNTY

Valley West Estates
Fogelsville Elementary School
Veterans Memorial Elementary School
The Terrace At Lehigh
Rural Sportsman Association
Fred Jaindl Elementary School
Valley Preferred Cycling Center
Rodale Cycling and Fitness Park
Highgate
Green Acres
Trexler Village
Trexlertown
SCHANTZ RD
BOULDER
MORRIS
RUPPSVILLE RD
TIMBER
CROSS
CREEK
KEBLER
ACORN
CETRONIA
RAILROAD
KUHNS
LINCOLN
MOSSER
YORKSHIRE
HIGHGATE
KING
WEILER
WILLOW
HAMILTON BLVD
TWIN PONDS
TILLAGE
BAYBERRY
MERLOT
EVERGREEN
CYPRESS
WESTMINSTER
KINGSTON
SUTTON
GRACE
VALLEY WEST
GRADY
FRANCIS
SCENIC VIEW
MCBRIDE
100

UPPER MACUNGIE TOWNSHIP

VISION ZERØ ACTION PLAN

MAP TILE INDEX

1	2
3	4	5
6	7	8
9	10	

Map 7 of 10

Proposed Improvements Plan

Legend

- Bike Parking
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- Crosswalk
- Handman
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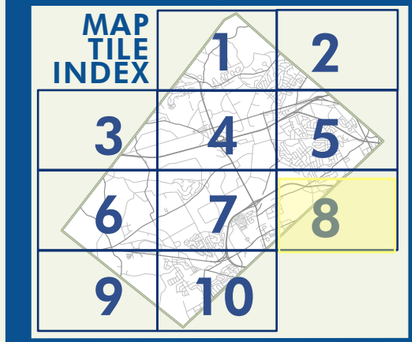

Map 8 of 10

Proposed Improvements Plan

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- Crosswalk
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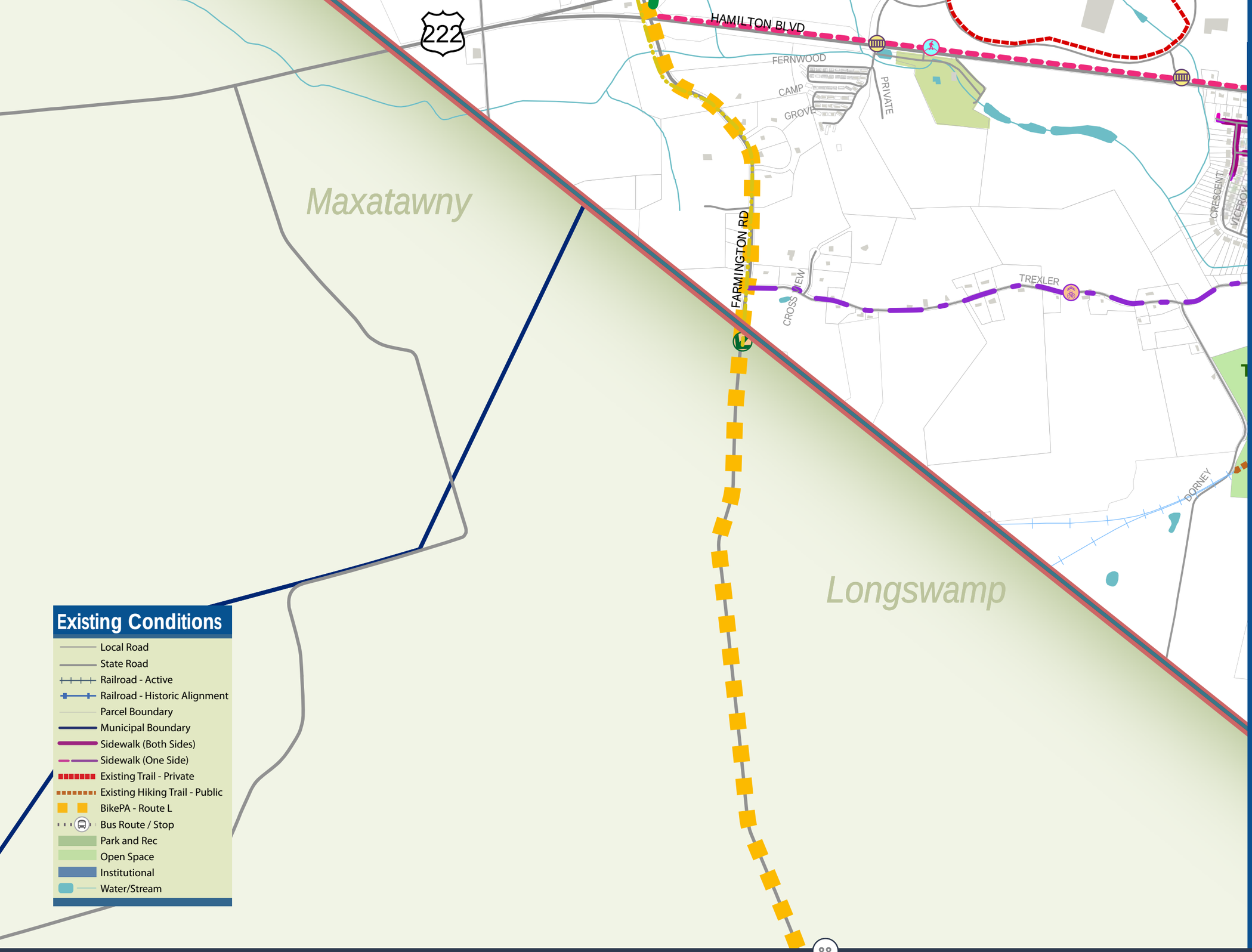
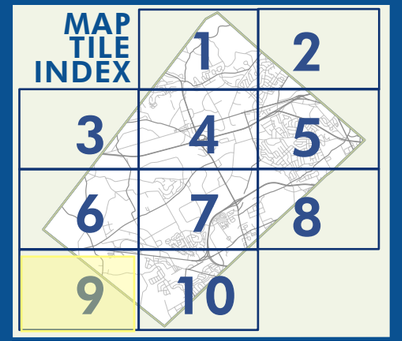


UPPER MACUNGIE TOWNSHIP

VISION ZERO | ACTION PLAN



Map 9 of 10

Proposed Improvements Plan

Legend

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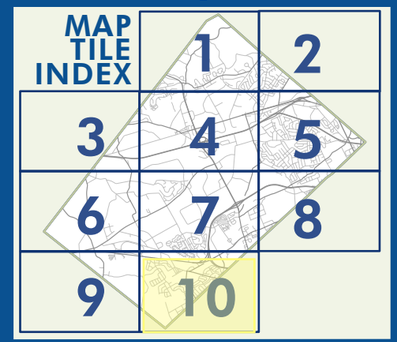
- Small Bridge
- Large Bridge

0 200' 600' 1000' 2000'

N

Existing Conditions

- Local Road
- State Road
- Railroad - Active
- Railroad - Historic Alignment
- Parcel Boundary
- Municipal Boundary
- Sidewalk (Both Sides)
- Sidewalk (One Side)
- Existing Trail - Private
- Existing Hiking Trail - Public
- BikePA - Route L
- Bus Route / Stop
- Park and Rec
- Open Space
- Institutional
- Water/Stream



Map 10 of 10

Proposed Improvements Plan

Legend

- Bike Parking
- Decorative Crosswalk
- Crosswalk
- Handman
- Rapid Flashing Beacon
- Ped refuge Island
- Bike Share
- Bike Box
- Multiuse Path
- School Walking Route
- Sidewalk
- Hiking Trail
- Special Crossing
- Sidepath
- Sharrow
- Bike Boulevard
- Bike Lane
- Speed Limit Reduction
- Adjacent Connections
- Speed Cushion
- Speed Table
- Small Bridge
- Large Bridge

Existing Conditions

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0 200' 600' 1000' 2000' N