

CHAPTER 2: EXISTING CONDITIONS

2.1. Regional and Local Plans

2.1.1. WJCTC Long Range Transportation Plan

After its designation as an MPO following the 2010 Census, the Watertown Jefferson County Transportation Council published a Long Range Transportation Plan. The plan, finished in 2017, identified how federal, state, and local funds would be allocated to transportation projects throughout the region to achieve goals that focused on maintenance, safety, efficiency, accessibility, economic viability, and environmental quality. Some of the broader goals that provide guidance related to pedestrian and bicycle infrastructure improvements include:

- » Maintaining safe and accessible sidewalks and trails.
- » Using and improving trail systems to support travel and tourism.
- » Integrating multi-modal, Complete Streets.
- » Enhancing pedestrian and bicycle networks to promote healthier lifestyles and low-carbon commuting options.
- » Providing additional public access to waterfront areas while preserving scenic and historic qualities.
- » Reducing the percentage of trips taken by single occupancy vehicles.

The City of Watertown has two miles of existing (though disconnected) bike lanes and is well suited for additional trails due to slower and lighter traffic and its radial street pattern. Watertown also has 19 miles of off-street bicycle and hiking trails and 12 miles of proposed pedestrian trails which aims to connect important nodes in the city such as Thompson Park. The following opportunities support an overarching goal to create a widespread multi-use trail network throughout the region that improves mobility, accessibility, and recreation.

- » Connecting existing Watertown bike/hike network to the Fort Drum Military Base.
- » Creating a bicycle trail that runs adjacent to the Black River and link communities as well as serve as a destination trail.
- » Leveraging rural roads with low AADT's as rural bicycle routes that allow tourists to traverse the greater region and potentially access the Thousand Island and Lake Ontario areas.
- » Enhancing the walkability of Public Square to be include more pedestrian and open spaces.

2.1.2. City of Watertown Complete Streets Policy

The City of Watertown adopted a Complete Streets Policy in early 2017, with the intent of developing a “safe, accessible, and well-connected multi-modal surface transportation network that meets the

needs of all users, regardless of age or ability level.” There are five main goals that the City is seeking to achieve with this Policy, including:

- » Ensuring safe travel for all transportation user groups.
- » Increasing economic activity by creating walkable commercial areas.
- » Providing safe routes to schools for children.
- » Improving residents’ health by providing active transportation opportunities.
- » Incorporating bicyclist and pedestrian accommodations at the beginning of scheduled roadway improvement projects.

This Policy applies to all public and private projects that effect the right-of-way (ROW) in the City. The City has taken steps to ensure that this Policy is embedded within the existing day-to-day operations of the City, including requiring a review of site plan, subdivision, special use permit, or zone change applications for consistency with this Policy. Additionally, complete streets elements will be incorporated into existing manuals, checklists, decision-trees, and regulations. The City has also established a Complete Streets Committee, made up of representatives from five departments, that evaluates upcoming surface transportation projects ahead of the design phase. The adoption of the Complete Streets Policy signifies the City of Watertown’s commitment to fostering a built environment that is accessible for transportation users of all types.

2.1.3. City of Watertown Comprehensive Plan

The City’s first ever Comprehensive Plan was adopted in 2019, and is intended to act as a blueprint to guide decision-making in the City for the next decade. The Plan contains a vision statement for the City’s future and a set of goals that work towards achieving that vision, including attracting new residents, revitalizing neighborhoods, and fostering economic development. The Plan then outlines several recommendations organized by topic area. Several of these recommendations pertain directly to this Study, including the following:

- » Increasing and improving connections and public access to the Black River.
- » Creating a more walkable downtown.
- » Completing sections of trails as identified in the GIS system, identify potential new connections and create a plan to make those connections.
- » Building from the Complete Streets Policy to create opportunities for convenient and safe circulation for all modes of transportation to allow for equity, safety, and enhanced public health.
- » Ensuring safe access to the City’s schools that is consistent with “Safe Routes to Schools” principles.
- » Continuing to coordinate with Jefferson County and Watertown/Jefferson County Area Transportation Council to implement the 2016 Mobility Plan
- » Improving traffic circulation and pedestrian safety downtown

In addition, the Plan also contains a future land use strategy, as well as a detailed implementation matrix for each of the recommendations. This recommendations contained within this Study will be aligned with the relevant recommendations from the Comprehensive Plan summarized above, and will help to further bolster the support for achieving the overall vision for the City of Watertown.

2.1.4. Sewall’s Island + Factory Square Redevelopment Plan

The City of Watertown prepared a revitalization and redevelopment design plan for Sewall’s Island and Factory Square, with the aim of creating a vision to “capitalize on community assets and recreation opportunities, guide redevelopment and help attract new investments, businesses, and identify transformational projects in this area of downtown Watertown.” The Plan envisions Factory Square and Fairbanks Streets to be redesigned to allow for shared use by vehicles, pedestrians, and bicyclists alike. The development of the rail bridges on both the east and west side of Sewall’s Island is also illustrated; depicting the potential alignment of the Black River Trail through this area of the City. Overall, the Plan envisions this area of downtown Watertown as a vibrant area that attracts visitors with well-considered public spaces and new investment. This Study will give special consideration to this area to ensure that any recommendations pertaining to this area will help to enhance the walkable sense of place that is desired for Sewall’s Island and Factory Square.

2.1.5. Downtown-Riverfront Parks Connection Feasibility Study

In 2019 the City of Watertown completed a connection feasibility study for downtown riverfront parks. This report builds off of a priority stated in a previously published Local Waterfront Revitalization Program. The overarching goals of the study were to create strong, physical and visual connections for bicyclists and pedestrians between Public Square in Downtown Watertown and the Black River riverfront. The report involves a detailed inventory and analysis which reviews historically, culturally, and environmentally sensitive areas; land ownership; flood and erosion hazards and more. It also reviews preliminary schematic designs for six sub-areas within the study boundaries and associated cost estimates.

The study proposes to enhance and create bicycle and pedestrian connections between downtown Watertown and the riverfront that are inviting to citizens and tourists and that use a common design language through building materials and creative wayfinding and signage. The riverfront itself houses many opportunities for improvements with the aim of a welcoming corridor and accompanying parks that are designed with the flexibility for a wide range of programming including recreation, education, and entertainment.

Some challenges foreseen in achieving these goals include subsurface structures and hazardous materials from a former industrial site (Now the Empsall Plaza and JB Wise lots), flooding and erosion in select areas of riverfront within the study area, providing ADA accessible amenities across steep areas and significant elevation change, private ownership of riverfront parcels, and narrow ROW in certain locations.

2.1.6. Downtown Revitalization Strategic Investment Plan

As the Downtown Revitalization Initiative (DRI) winner in the North Country in 2018, the Watertown local planning committee compiled a strategic investment plan that outlines an extensive assessment and inventory of Downtown Watertown, goals for end products and accomplishments obtained using awarded funds, an implementation strategy, a record of public involvement, and a detailed profiles of projects prioritized for funding. The plan identifies the DRI area spanning outward from Public Square, and catalogues historic, natural, commercial, and cultural assets in the area. Using this information, records of past improvement efforts, and local capacity assessment, opportunities for investment were identified. The goals of the DRI are to create a dynamic downtown environment in which a diverse population can work, live, and play as well as function as a desirable destination for recreation and tourism. In total, 21 projects are recommended for joint funding from local leverage and DRI funding. These projects are split into three categories: New Development and Rehabilitation of Existing Structures, Public Improvement, and Revolving Loan and Grant Fund/ Branding and Marketing. The assessment of the DRI area as well as the prioritization of these 21 projects was accomplished with extensive public input and participation to ensure that funding allocation represents the interests of the local population.

2.1.7. Local Waterfront Revitalization Program

The Black River is an integral part of the Watertown landscape and its riverfront is the interface between a defining natural resource and its community. Through much of its history, the riverfront has facilitated industrial activities. However, after a period of marked disinvestment, the Local Waterfront Revitalization Plan, drafted in 2010, offers an extensive inventory and analysis of existing conditions and policies, and identifies strategies to transition the Watertown waterfront away from traditional industries and towards commercial, residential and recreational purposes while also maintaining a high level of care and protection to the environmental quality of the water and its surrounding land. Projects prioritized by the plan include:

- » Developing the physical connection between Downtown and the Waterfront
- » Sewall's Island and Factory Square Redevelopment
- » Whitewater Park Shoreline Improvements
- » Route 3 Wave Access Improvements

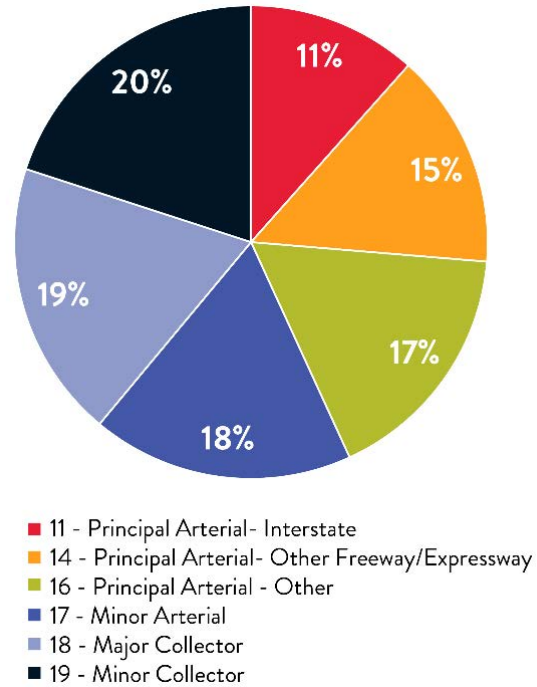
2.1.8. Brownville Bridge Alternatives Relocation Study

In 2019, a planning study was developed for the replacement of the Brownville Bridge. The existing bridge was nearing the end of its useful life; and safety, traffic, operational, and geometric issues necessitated relocation of this highway crossing of the Black River. The preferred alignment was determined to be approximately 0.5 mile to the west of the existing bridge, and will accommodate pedestrians through sidewalk connections across the Black River from Routes 12E to Route 12F.

2.2. Transportation Characteristics

2.2.1. Functional Classification

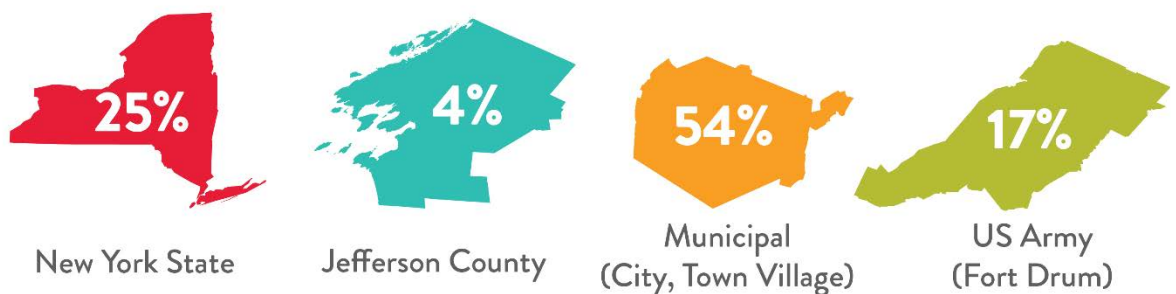
Within the WJCTC MPO boundary, roadways are classified using New York State urban functional classification codes, as shown in Map 2.1. Of the existing roadways, 43% are classified as Principal Arterial roads. Within Principal Arterial roads, interstate highways account for 11%, Expressways or Other Freeways account for 15%, and Other Arterials account for the remaining 17%. The remaining roads within the MPO boundary are classified as Minor Arterials (18%), Major Collectors (19%), and Minor Collectors (20%).



2.2.2. Roadway Jurisdiction

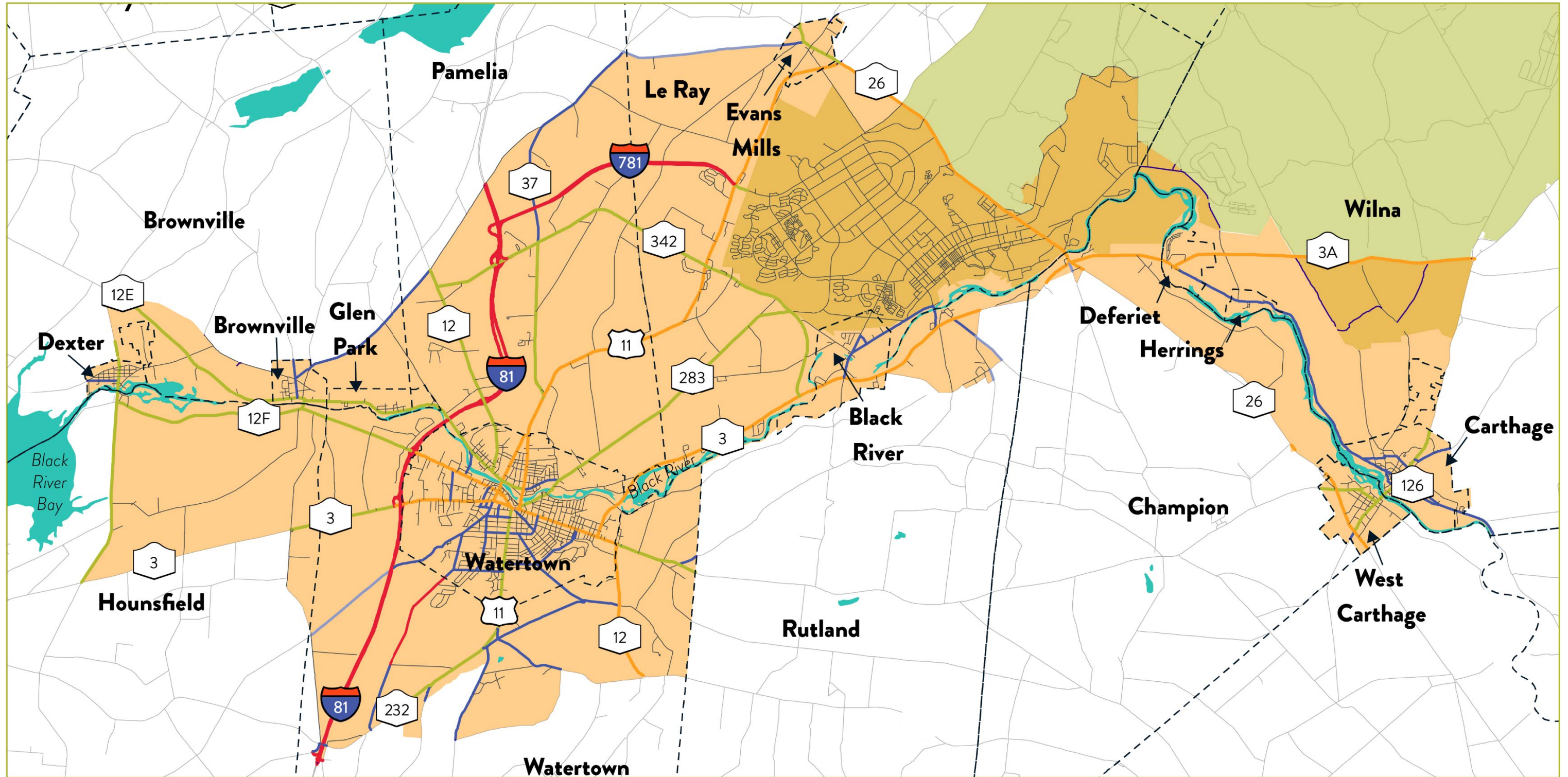
Roadway Jurisdiction within the WJCTC MPO boundary is shared between Jefferson County, New York State DOT, municipalities, and the US Army (Fort Drum). Roads owned by municipalities make up the largest proportion of the roads within the MPO boundaries at 54%. NYSDOT accounts for 25%, the US Army accounts for 17%, and Jefferson County Accounts for 4%. Less than 1% of roads are attributed to private ownership with restricted access and other state agencies.

Road Ownership by Centerline Miles



2.2.3. Roadway Lanes

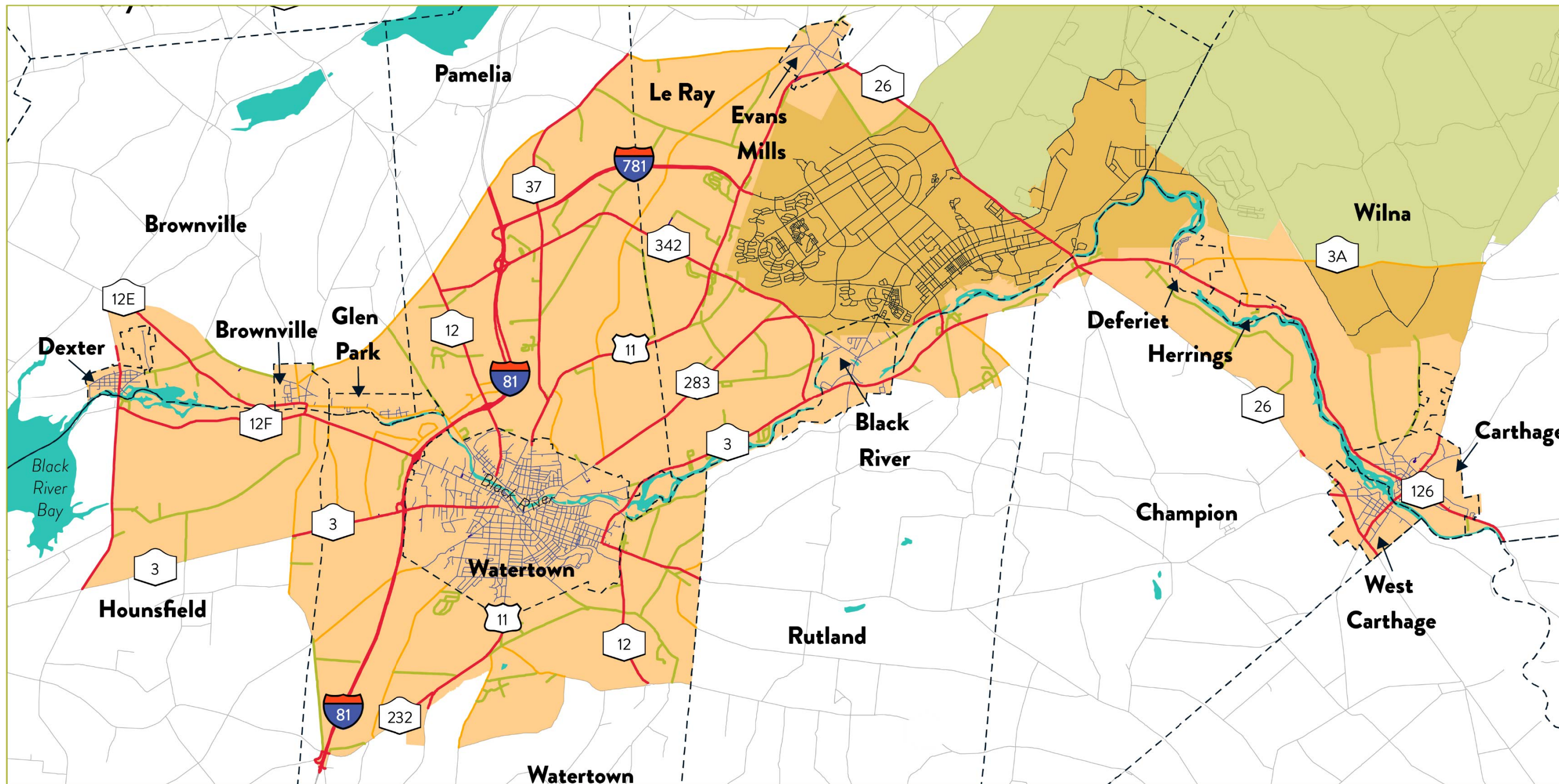
Approximately 90% of roadways within the WJCTC have 2-lanes and approximately 5% are 1 lane. The remaining 5% of roads are primarily 4 lane principal arterial roads. The high proportion of 2 or fewer lane roads is a positive indicator of safe implementation of bicycle and pedestrian trails and walkability improvements.



<ul style="list-style-type: none"> Municipal Boundaries WJCTC MPO Boundary Water Bodies Fort Drum Installation Area 	<p>Functional Class - NYS Urban Codes</p> <ul style="list-style-type: none"> 11 - Principal Arterial - Interstate 14 - Principal Arterial - Other Freeway/Expressway 16 - Principle Arterial - Other 17 - Minor Arterial 18 - Major Collector 19 - Minor Collector
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Map 2.1: Functional Classification



	Municipal Boundaries	Jurisdiction
	WJCTC MPO Boundary	 NYSDOT
	Water Bodies	 County
	Fort Drum Installation Area	 Town
		 City or village
		 Army



Map 2.2: Jurisdiction

2.2.4. Traffic Volumes

Unsurprisingly, and shown in Map 2.3, the roadways with the highest annual average daily traffic (AADT) are the segments of I-81 between Route 342 and Route 3, and Arsenal Street between I-81

AADT	Miles	% of MPO Mileage
Not Collected	366.4	61%
< 5,000	144.4	24%
5,000 - 10,000	57.7	10%
10,000 - 20,000	24.0	4%
20,000 +	12.7	2%
Total	605.2	100%

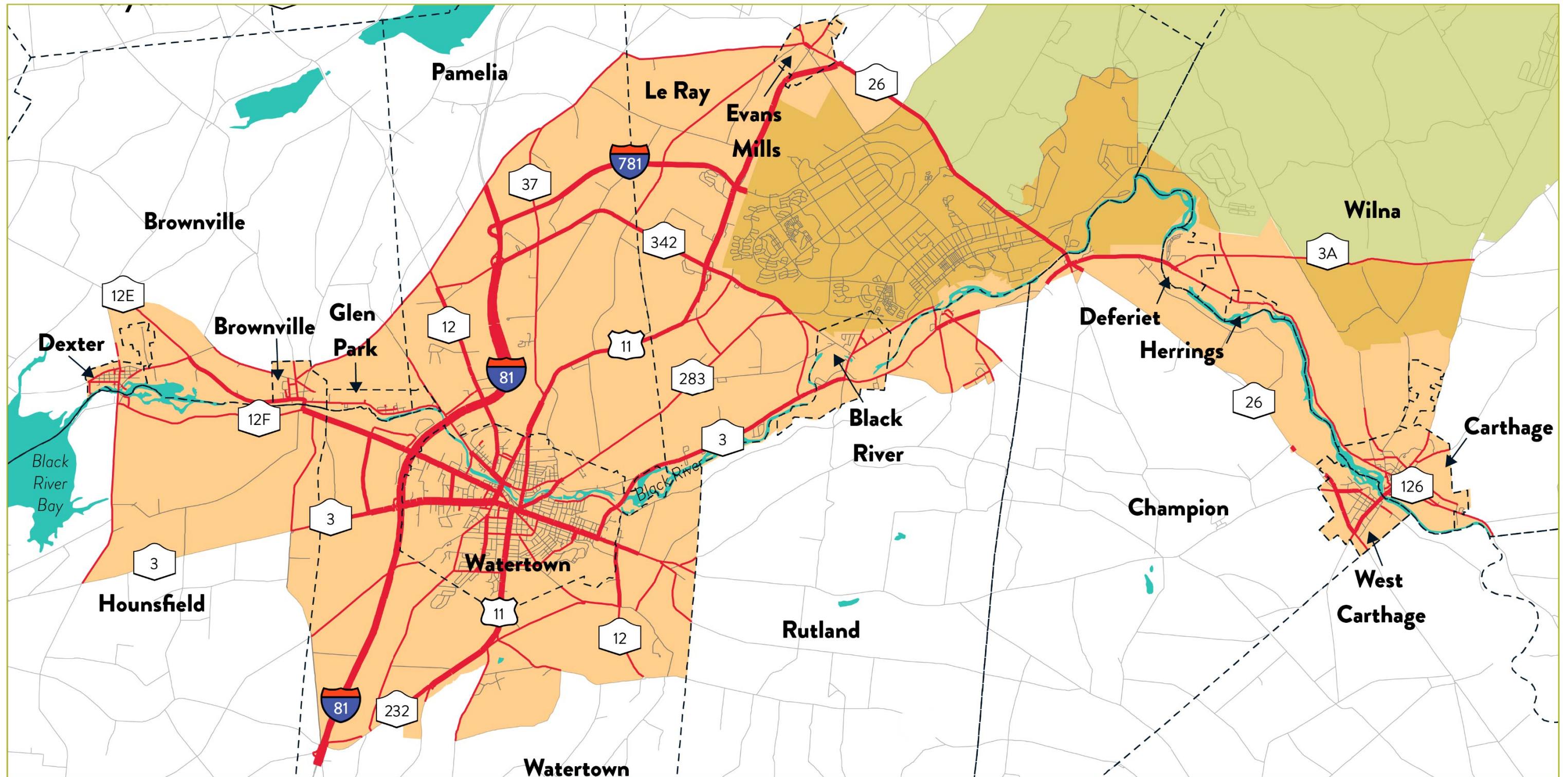
and North Massey Street. These segments see over 20,000 vehicles per day on average, but make up approximately 2% of the total MPO mileage. The majority (61%) of roadways in the MPO did not have AADT data available. For those roadways for which AADT was estimated, over half of the segments see less than 5,000 vehicles per day. Other heavily trafficked corridors include Route 11 between Route 342 and Route 26, Coffeen Street, and Route 12 with the City limits. Although these roadway segments with relative high traffic volumes pose challenges in terms of safely accommodating non-motorists, they also present opportunities for creating dedicated pedestrian and bicyclist spaces, as they typically provide the most efficient access to local goods and services.










2.2.5. Speed Limits

Analysis of posted speed limits within the WJCTC MPO boundary indicate that approximately 75% of roads have a speed limit of 30 miles per hour (mph) or lower. Many of these roads fall within the City of Watertown's boundaries where the official speed limit is 30 mph. It should be noted that New York State law does not allow a City to post a speed limit below 30 mph unless it is in a school zone. Data for roads within Fort Drum is not readily available. The high quantity of roads with low posted speed limits is a positive indicator for the safe implementation of bicycle and pedestrian trails and walkability improvements.

2.2.6. Transit

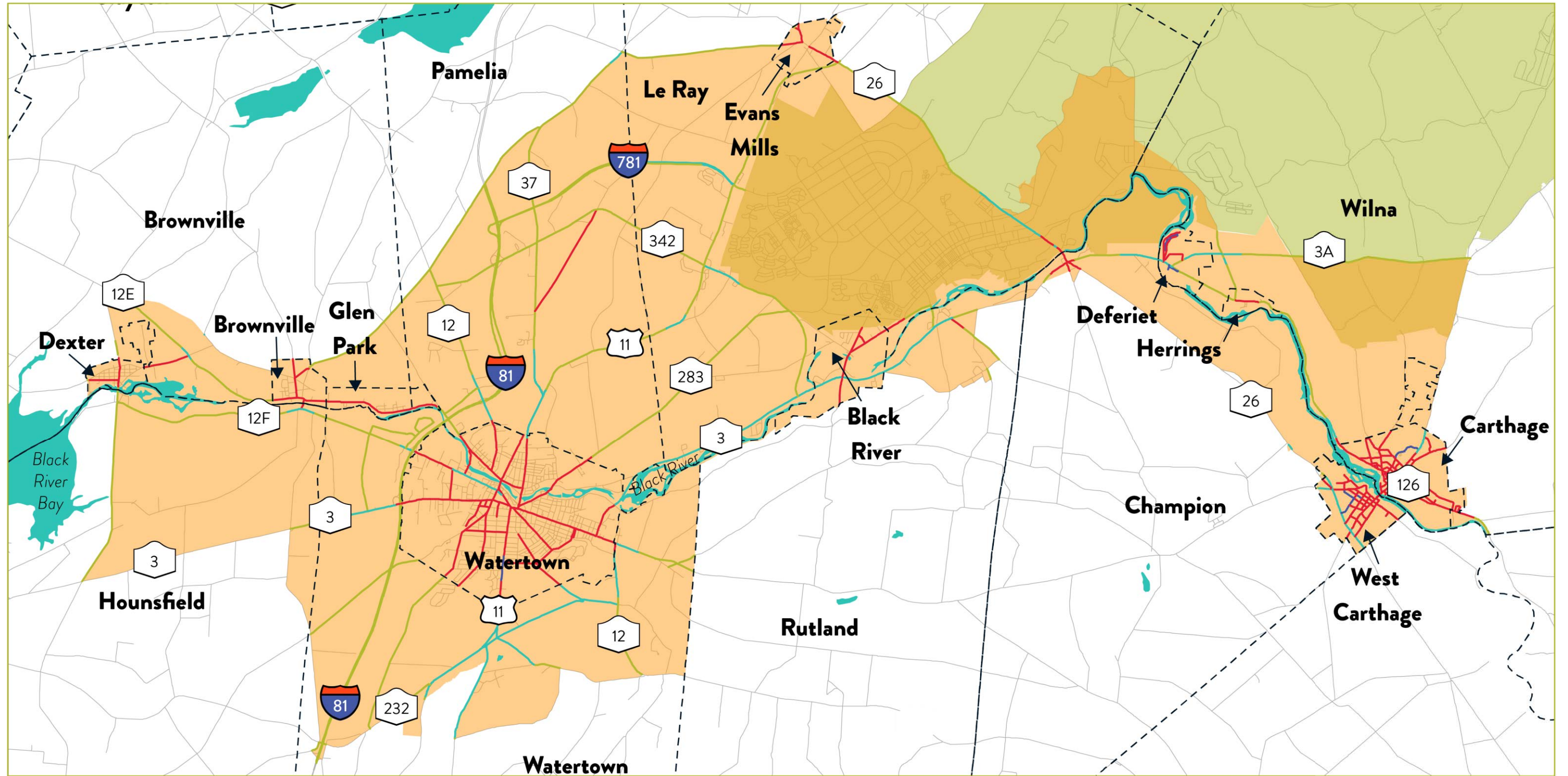
Watertown offers five bus routes within city limits. Ridership data from the year 2017 shows that many of the routes are regularly used within the city center with the most heavily used routes and pick up locations falling along Arsenal Street and Main Street West particularly the intersection between Main and Mill Street and Main and Grove Street. Detailed ridership data is unavailable for areas outside of the Watertown City Center.






 Municipal Boundaries	AADT
 WJCTC MPO Boundary	 Not Collected
 Water Bodies	 < 5,000
 Fort Drum Installation Area	 5,001 - 10,000
	 10,001 - 20,000
	 20,001 +



Map 2.3: Annual Average Daily Traffic (AADT)



 Municipal Boundaries	Speed Limit
 WJCTC MPO Boundary	 0 - 20 MPH
 Water Bodies	 25 - 35 MPH
 Fort Drum Installation Area	 40 - 45 MPH
	 55 - 65 MPH



Map 2.4: Speed Limits

2.2.7. Commute Patterns

Based on 2019 American Community Survey Five-Year data, a majority of workers over the age of 16 in Jefferson County commuted to their place of work via single occupant vehicle. Approximately 78% drove to work by themselves while 8% carpoled. Of the remaining 14%, 5% worked from home, 2% took alternative forms of transportation such as taxi or motorcycle, and less than 1% biked to work. Average commuter time in Jefferson County and Watertown are favorable when compared to the state average. Commutes in the City of Watertown take 15 minutes on average and 18 minutes on average in Jefferson County. These are nearly half the time of the average New York State commute time of 34 minutes. The short average commute time in the City suggests that many residents could be able to walk or bike to work within a reasonable timeframe as compared to other New York State residents.

Out of 100 Commuters in Jefferson County*...

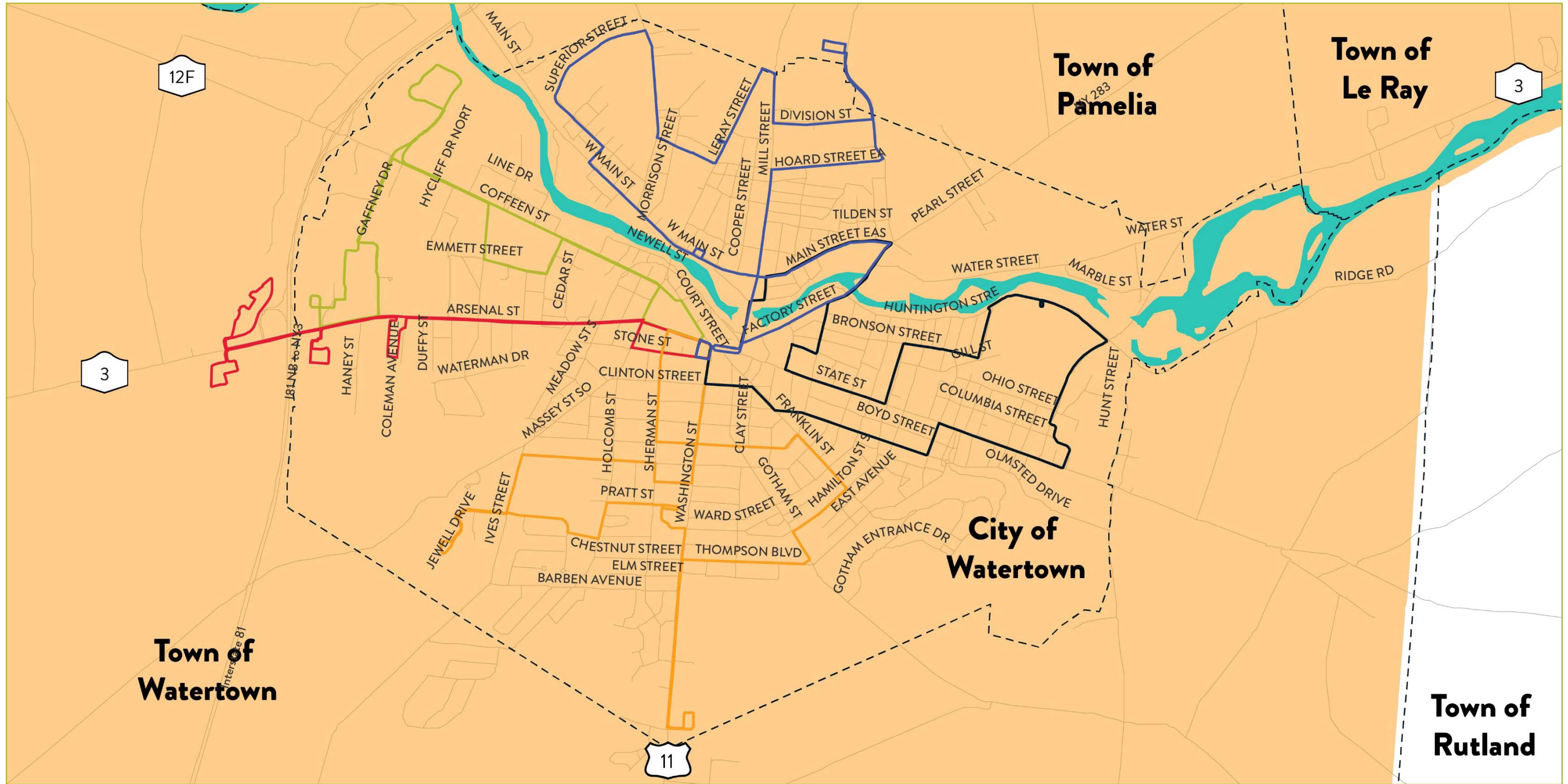





*2 workers took an alternative form of transportation such as a taxi or motorcycle.

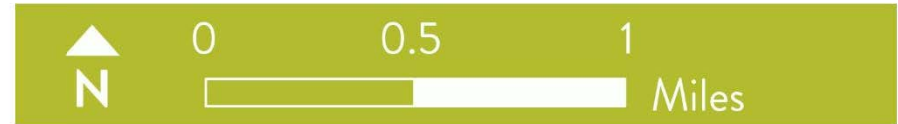
2.3. Civic, Education, Recreational Amenities and Bicycle/Pedestrian Destination Areas

2.3.1. Schools

There are eighteen public K-12 schools within or directly adjacent to the MPO area, as well as several private schools. The public schools include 13 elementary schools, two junior/middle schools, one combination junior/senior high school, and two senior high schools. Eight of these schools are located within the City of Watertown's limits; which are tied into the existing pedestrian network within the City limits. In addition, several of the schools are located within Village settings, and have an existing pedestrian connection to the nearby downtown areas. This promotes the ability of school-aged children to walk to school, rather than relying on bussing or being dropped off by a parent or guardian. However, several of the schools in the rural outlying areas of the MPO lack pedestrian facilities to enable non-motorist travel to and from the school, such as the West Carthage Elementary Schools, Carthage Middle School, General Brown Junior-Senior High School, and the Calcium Primary School. This report will identify these gaps, and develop strategies to promote the ability of children to safely access their school buildings on foot or bike.



 Municipal Boundaries	Route
 WJCTC MPO Boundary	 A-1
 Water Bodies	 A-2
 Fort Drum Installation Area	 B
	 C-1
	 C-2



Map 2.5: City of Watertown Bus Routes

2.3.2. Parks, Recreational Areas, and Trails

2.3.2.1. Local Parks

Parks are natural destinations for bicyclists and pedestrians, and therefore are inventoried and analyzed as a part of this study. There are several local and county parks that exist within the WJCTC planning area, which area summarized by community below, and shown on Map 2.6:

BLACK RIVER:

- » Maple Street Park

CARTHAGE:

- » Carthage Recreation Park
- » Long Falls Park/Guyot's Island
- » Monument Park
- » Riders Edge Skateboarders Park
- » Turning Point Park



Turning Point Park (Source: Black River Blueway)

DEFERIET:

- » Local Park / Playground

DEXTER:

- » Dexter Bandstand / Memorial Bell
- » Dexter Memorial Field
- » Fish Island Park



Dexter Memorial Field (Source: Black River Blueway)

EVANS MILLS:

- » Jack Williams Community Park

HERRINGS:

- » Village of Herrings Playground

RUTLAND:

- » Jefferson County Forest



Remington Park (Source: US Army MWR)

WEST CARTHAGE:

- » Donald J. Getman Memorial Park

WATERTOWN:

There are over 550 acres of land within the city dedicated to parks and recreational facilities. This includes fifteen parks, listed below:

- » Adams Recreation Park
- » Alex Duffy Fairgrounds
- » Bicentennial Park
- » Factory Square River Park
- » Gair Park
- » Kostyk Field
- » Lansingdorf Park
- » Lauchner Memorial Park
- » Marble Street Park
- » Peanut Park
- » SPCA Dog Park
- » Thompson Park
- » Veteran's Memorial Riverwalk Park
- » Waterworks Park
- » Whitewater Park



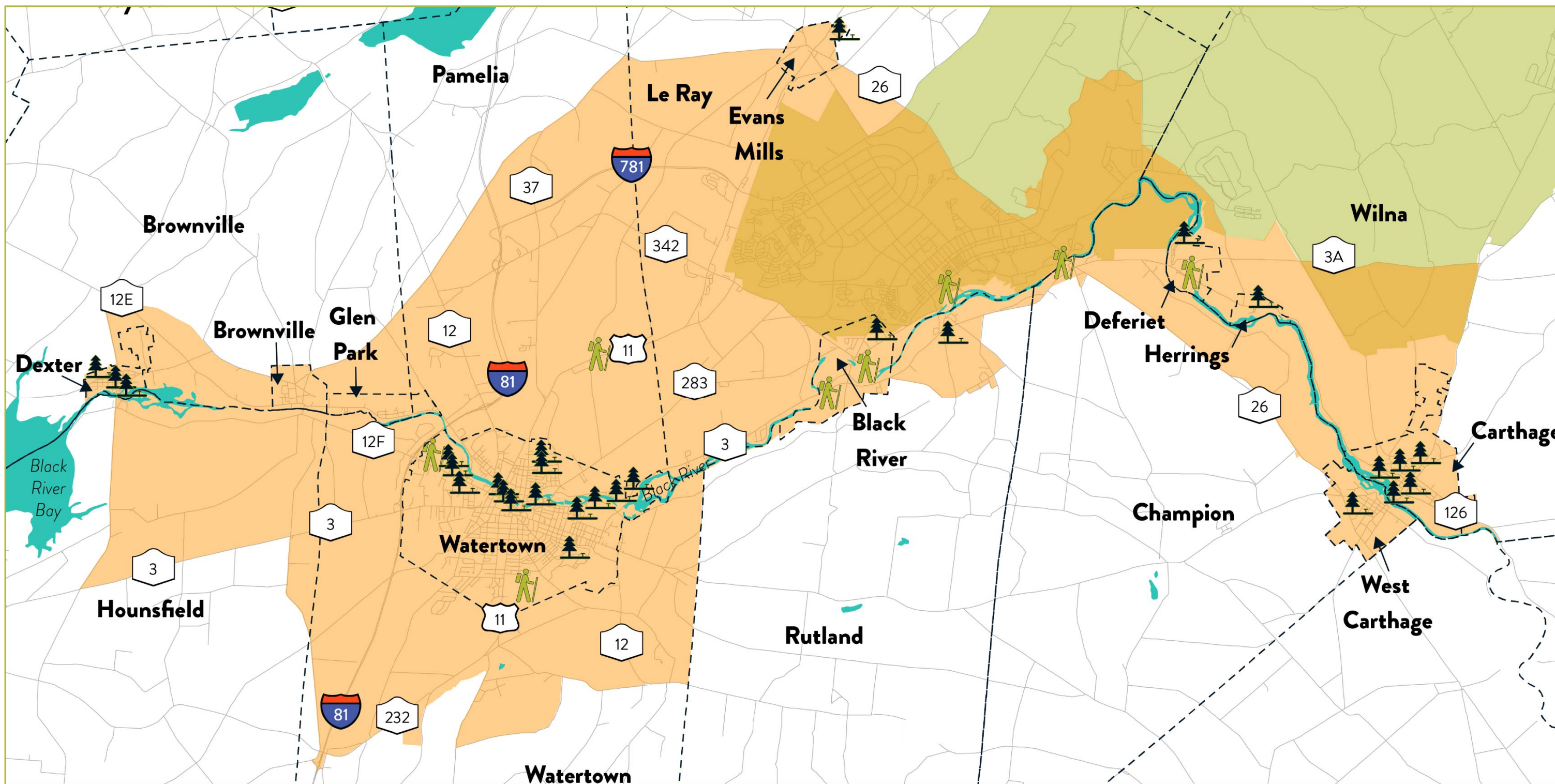
*Historic Photo of Thompson Park
(Source: City of Watertown)*

Of the parks listed, Thompson Park is one of the most significant in the MPO area in terms of size and programming. The park was donated by John C. Thompson in 1899, and designed by the sons of Frederick Law Olmsted. The park hosts many amenities, including a zoo, a playground, pavilions, and many walking and biking pathways.

Another very active park space in the City is the Alex Duffy Fairgrounds, which is 67 acres of sports fields, horse rings, a picnic area, a swimming pool, a skatepark, and many other amenities. In addition, several of the parks in the City provide public access to the Black River, including Bicentennial Park, Veteran's Memorial Riverwalk Park, Waterworks Park, Marble Street Park, and Whitewater Park.

2.3.2.2. Local Trails

Many of the parks listed above contain trail systems within them, such as Thompson Park in the City of Watertown and Jefferson County Forest. However, there are also several stand-alone trail systems in the MPO area that should be considered when developing connectivity between existing pedestrian bicyclist facilities.



	Municipal Boundaries		Park
	WJCTC MPO Boundary		Trail
	Water Bodies		
	Fort Drum Installation Area		

Scale bar showing 0, 2.5, and 5 Miles. Includes a north arrow.

Map 2.6: Parks and Trails

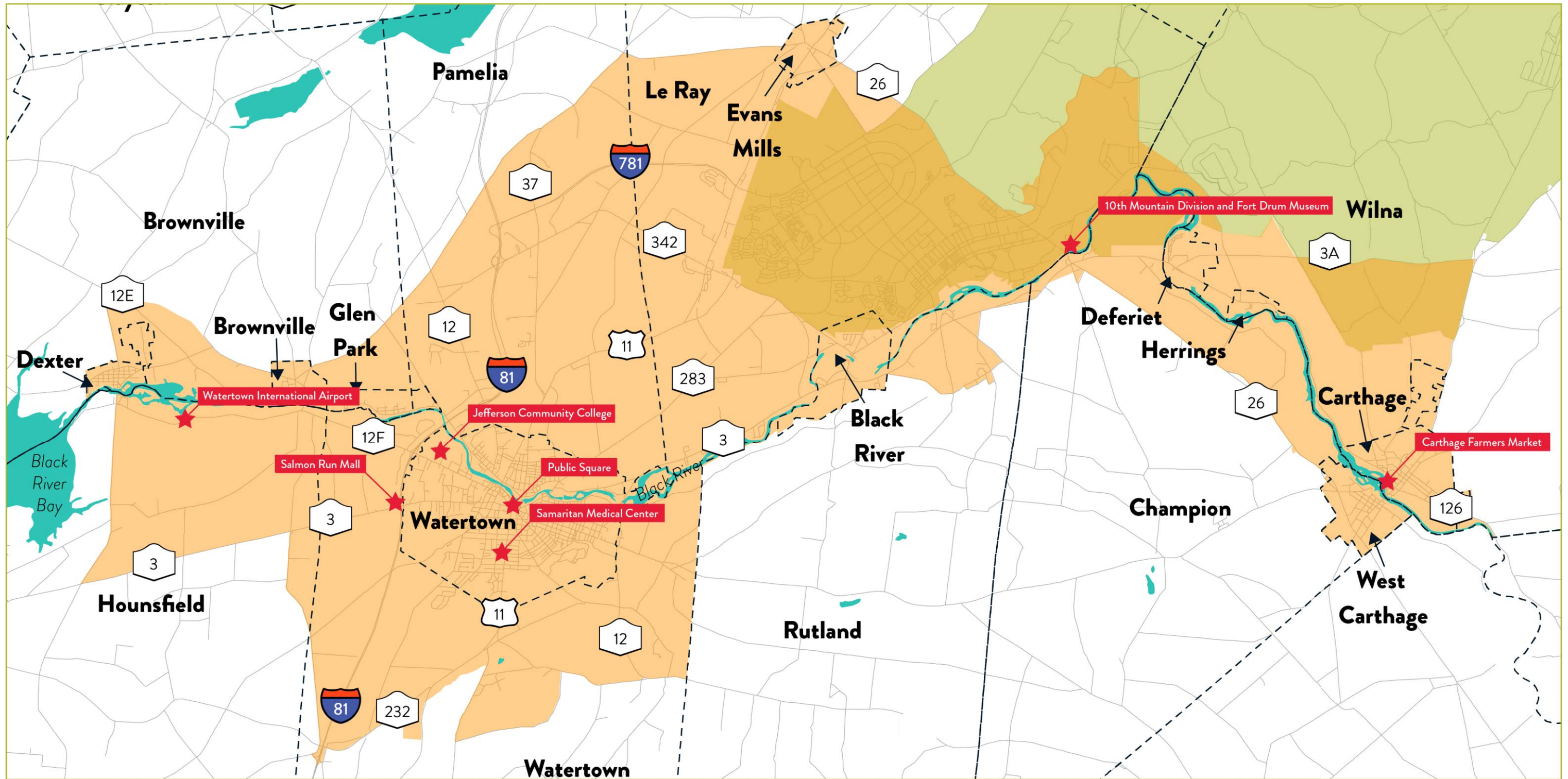
- » **JCC Trails:** One mile loop trail behind Jefferson Community College.
- » **Kanik Trail:** Four mile out-and-back gravel trail extending west from Calcium.
- » **Wiley Trails:** Three miles of trails behind H.T. Wiley Middle School
- » **Deferiet Riverfront Trail:** 1.2 mile out-and-back trail along the Black River
- » **Kamargo Trail:** About 1.6 miles of trails on Poors Island in the Village of Black River
- » **Great Bend to Felts Mills Rail-Trail:** Three miles along former rail line along the south side of the Black River
- » **Great Bend to Felts Mills Trail:** About three miles of trail parallel to the rail trail mentioned above, but on the north side of the Black River.
- » **Black River Trail:** 9 mile trail owned by NYS Office of Parks, Recreation and Historic Preservation (OPRHP) along the Black River between the Village of Black River and the City of Watertown.




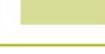
The Black River Trail is of particular importance for this study; as an extension of this Trail from the Village of Black River to Fort Drum will be analyzed, and alternatives will be developed for the alignment of this extension.

2.3.3. Other Regional Points of Interest

This study will also take into consideration the location of other key points of interest or destinations within the MPO when recommending pedestrian and bicyclist improvements. Some of these points of interest are found on Map 2.7 and include:

- » Jefferson Community College
- » Samaritan Medical Center
- » Public Square
- » Carthage Farmers Market
- » Salmon Run Mall
- » Watertown International Airport
- » The 10th Mountain Division and Fort Drum Museum (anticipated opening 8/2021)



-  Municipal Boundaries
-  WJCTC MPO Boundary
-  Water Bodies
-  Fort Drum Installation Area

-  Park
-  Trail



Map 2.7: Regional Points of Interest

2.4. Existing Bicycle and Pedestrian Characteristics

2.4.1. City of Watertown Pedestrian & Bicyclist Facilities

Given the significance of the City of Watertown in the WJCTC region, as well as the availability of robust pedestrian and bicyclist network data, this section focuses on the City of Watertown's amenities to understand the full inventory of existing facilities, as well as begin to identify gaps and potential extensions outside of the City to connect to the other nodes of development in the MPO area.

The City of Watertown has a multitude of different types of bicyclist and pedestrian facilities that currently exist, including shared roadways, on-road bike lanes, pedestrian trails, and shared use trails. The City also has ambitious plans for extending these facilities, and fostering increased connectivity between the existing multi-modal systems. Each type of multi-modal facility is discussed further below.

2.4.1.1. Bike Lanes

There are three roadway segments that possess on-road separated bike lanes:

- » Main Street West from the railroad overpass to Bradley Street;
- » Coffeen Street from Gaffney Drive to Black River Parkway; and
- » Washington Street from the Watertown City School District to Chestnut Street.

These three bike lanes provide dedicated space for bicyclists and motorists to travel alongside each other simultaneously. Additional bike lanes are planned on Mill Street from Public Square to Main Avenue, as well. This study may identify potential future locations for bike lanes both within the City and elsewhere throughout the MPO.

2.4.1.2. Shared Use Roadways

There are two existing roadways with shared lane markings (commonly referred to as "sharrows") in the City; indicating that the roadway is to be shared by bicyclists and motorists. This type of facility is generally appropriate for roadways that are too narrow to accommodate bicyclists and motorists side-by-side, and have posted speed limits of 35 MPH or lower. The two existing shared use roadways are Factory Street and Gaffney Drive. As shown on Map 2.8, there are several roadways that are proposed to have shared lane markings installed, generally to act as key linkages between existing and/or proposed off-road trails. Some of these proposed shared use roadways include the following:

- » Pearl Street and Starbuck Ave, connecting Sewall's Island to the Starwood Apartment and Starbuck Elementary School;
- » William T Field Drive, connecting Bicentennial Park with existing bike lanes along Coffeen Street; and
- » Newell Street, connecting Whitewater Park and Veterans Memorial Park.

2.4.1.3. Shared Use Trails

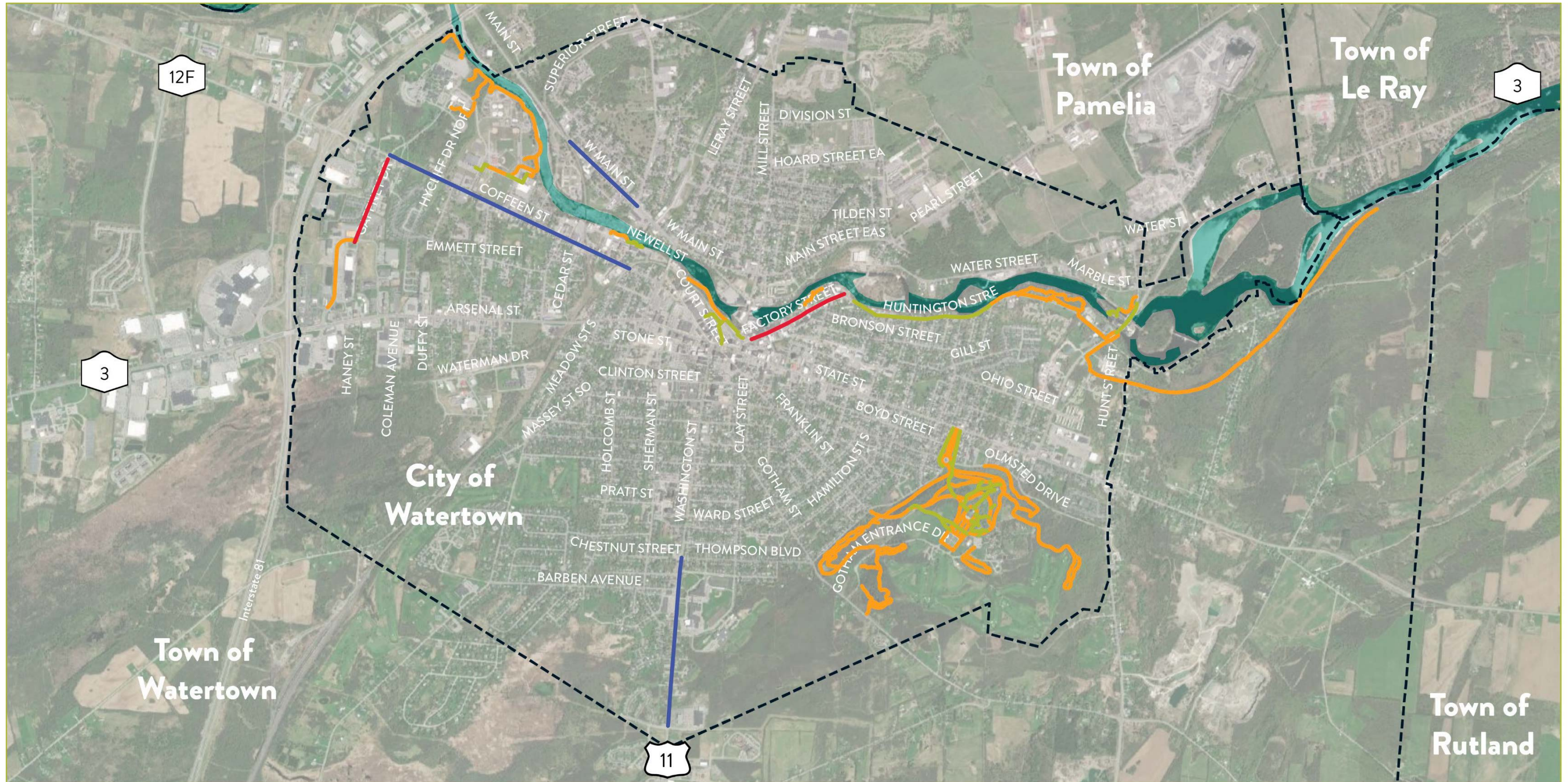
There are many paths and trails within the City that are accessible to both bicyclists and pedestrians, as well as other types of non-motorists. The majority of these shared use trails are within Thompson Park, discussed in the previous section. However, as shown in Map 2.8, there are also several other within the City; particularly along the Waterfront. These include trails within the following areas:






- » Waterworks Park
- » Veterans Memorial Riverwalk Park
- » Whitewater Park
- » Bicentennial Park

The Black River Trail was recently extended from its western terminus to Waterworks Park. Recent planning efforts have envisioned the trail extending further west into the heart of Downtown Watertown. Other proposed shared use trails to be considered in the future include:

- » A trail along Fairgrounds Park;
- » Landfill Loop;
- » Huntington Island Loop;
- » A shared use trail connecting Watertown Junior and Senior High Schools and Thompson Park; and
- » Several smaller trails connecting the existing trails along the Black River mentioned previously.

The intent of these trails are to provide key connections between all of the City's trails and pathways, while providing access to one of the City's most prized assets: the Black River.



 Existing Bike Lanes	 Existing Pedestrian Trail
 Existing Shared Use Roadway	 Municipal Boundaries
 Existing Shared Use Trails	









Map 2.8: Watertown Existing Bike & Ped Facilities

2.4.1.4. Pedestrian Trails

Some of the trails within the City are only accessible to pedestrians, due various reasons such as the presence of stairs, or where the pathway follows the sidewalk network. Given the City's objective of promoting accessibility for all transportation users, there are not as many pedestrian-only trail proposed for the future. However, there are some small pedestrian trail segments proposed, as shown on Map 2.8.

2.4.2. Existing Sidewalk Coverage

City of Watertown has extensive sidewalk coverage. Virtually all of the roadways within the City limits have sidewalks on both sides of the street. In the more rural and suburban towns of the MPO planning area, sidewalk coverage is less extensive. Given the low-density nature of these areas, comprehensive sidewalk coverage is not expected, and is most likely not appropriate. However, the key corridors that support regional connections to local businesses, such as segments of Routes 11, 12, 342, and 26, are lacking pedestrian or bicyclist facilities. This detracts from resident's ability to safely access goods and services in the area without access to a vehicle.

Within the nine Villages within the MPO boundary, there is a more traditional development pattern where streets are gridded and sidewalks are prevalent. These Villages as well as the City of Watertown act as activity nodes within the WJCTC area, and should generally be the focus of pedestrian and bicyclist facility improvements, given their inherently walkable nature. In addition, longer regional connections between these nodes will be explored. Using this approach, it can be assured that multi-modal improvements are being strategically implemented to support practical and feasible non-motorist travel patterns