

SEWRPC Community Assistance Planning Report No. 345
MILWAUKEE COUNTY HAZARD MITIGATION PLAN UPDATE

Chapter 1

INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

In December 2021, the Southeastern Wisconsin Regional Planning Commission (SEWRPC), the City and the Milwaukee County Office of Emergency Management (OEM)¹ agreed to cooperatively prepare an update to the current (2017) Milwaukee County comprehensive hazard mitigation plan and incorporate the 2019 City of Milwaukee’s hazard mitigation plan² through the Hazard Mitigation Grant Program. The plan is designed to be consistent with the guidelines of the Wisconsin Department of Military Affairs, Division of Emergency Management (DMA, DEM), and the Federal Emergency Management Agency (FEMA).³ As such, the plan aligns with the requirements and procedures defined in the amended Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) of Title 44 Code of Federal Regulations (CFR) Section 201 “Mitigation Planning” and Section 201.6, “Local Mitigation Plans.”⁴ Additionally, the plan focuses on

¹ *Milwaukee County’s Office of Emergency Management is a public safety organization comprised of the Emergency Medical Services, 911 Communications, Radio Services, and Emergency Management divisions. OEM strives to create resilient communities through collaboration and increased access to public safety resources.*

² *SEWRPC Community Assistance Planning Report No. 282.*

³ *Federal Emergency Management Agency, State and Local Mitigation Planning How-to-Guide, “Understanding Your Risks: Identifying Hazards and Estimating Losses,” Publication No. FEMA 386-2, September 3, 2015; Federal Emergency Management Agency, Multi-jurisdictional Mitigation Planning, March 10, 2009; Federal Emergency Management Agency, Local Mitigation Planning Policy Guide, April 2022.*

⁴ *On April 19, 2022, FEMA updated the State and Local Mitigation Planning Policy Guides (policies). The policies are the official interpretation of the requirements in the Stafford Act, as amended, specifically Title 44 CFR Section 201.*

natural hazard mitigation which the Wisconsin Division of Emergency Management (WEM) and FEMA recommend as an option to single hazard mitigation planning. Natural hazard conditions, which include flooding, Lake Michigan coastal hazards, severe thunderstorms, windstorms, tornadoes, extreme heat or cold, drought, and winter storms were specifically considered for the preparation of this hazard mitigation plan update. While the plan considered all of the potential hazards, it must be recognized that only limited mitigation actions were feasible for some of these hazards, since they are not site-specific or repetitive in nature.

1.2 OVERVIEW OF STUDY AREA

Milwaukee County is located in southeastern Wisconsin, and is bordered on the north by Ozaukee County, on the south by Racine County, on the west by Waukesha County, and on the east by Lake Michigan.

Milwaukee County covers about 243 square miles, making it the third-smallest county in Wisconsin by land area. It is both the most populous and most densely populated county in Wisconsin with the most populous city in the state (City of Milwaukee). Uniquely among Wisconsin counties, Milwaukee County is completely incorporated (i.e., no part of the county has the Town form of local government). There are 19 municipalities with 10 cities and nine villages (see Map 1.1). According to the year 2020 U.S. Census, about 939,500 people live in Milwaukee County. While the County is highly urbanized, some land remains in agriculture, mostly in the Cities of Franklin and Oak Creek. There are seven natural watersheds located wholly or partially within the County. These include the entire Kinnickinnic River and Oak Creek watersheds; portions of the Fox River, Menomonee River, Milwaukee River, and Root River watersheds, and the areas draining directly to Lake Michigan. The County includes approximately 1,551 acres of inland surface waters.

1.3 RELATIONSHIP OF HAZARD MITIGATION PLANNING TO EMERGENCY OPERATIONS PLANNING

The focus of this planning effort is developing natural hazard mitigation measures. Such measures generally involve lasting, often permanent, efforts designed to reduce the exposure to, probability of, or potential loss from hazardous events. Such measures tend to focus on actions related to where and how to build structures, education to reduce losses or injury, establishing community resiliency, and continuing programs to improve the safety of identified hazard areas. A hazard mitigation plan outlines the strategy for mitigating the hazards potentially impacting a county or community, including those that are most vulnerable.

A mitigation plan should be distinguished from, but compatible with, an emergency response or operations plan. An emergency response plan is defined as a plan which describes how people and property will be protected in a disaster and disaster threat situations; details who is responsible for carrying out specific actions; identifies the personnel, equipment, facilities, supplies, and other resources available for use in the disaster; and outlines how all actions will be coordinated. Numerous such plans have been developed at the jurisdictional level, and often involve mutual assistance and cooperation agreements between local units of government in adjoining municipalities, both within and outside of Milwaukee County. Emergency response or operations is not directly considered in the planning program described herein. Plans for mitigating hazards are related to emergency operation activities involving short-term recovery decision-making, since such activities may highlight prospects for implementation of a mitigation strategy aimed at reducing long-term risk to human life and property.

With regard to the distinction between mitigation planning and emergency response or operations planning, the following definitions are noted for further clarification:

- **Emergency Response or Operations Services**—The actions of first responders, such as firefighters, police, and other emergency services personnel at the scene of a hazard event. The first responders take appropriate action to contain the hazard, protect property, conduct search and rescue operations, provide mass care, and ensure public safety. Emergency response or operations services are not the subject of the current planning program.
- **Hazard Mitigation**—Sustained actions or projects taken to reduce or eliminate long-term risk from hazards and their effects.
- **Mitigation Plan**—The document that identifies results from the systematic process of identifying hazards and evaluating vulnerability, identifying goals, objectives, and actions to reduce or eliminate the effects of identified hazards, and sets forth an implementation plan for carrying out the actions. The mitigation plan is the subject of the current planning program.

Emergency Operations Planning

Milwaukee County has developed a comprehensive emergency management plan (CEMP) that sets forth an all-hazards action plan. The CEMP provides the framework for the Milwaukee County government and partner entities to respond to public emergencies within the local jurisdiction and regionally. The CEMP establishes a unified command and control structure for emergency response operations to ensure a

coordinated and effective response. It also incorporates the concepts and processes of the National Incident Management System as the standard for emergency response operations. This plan is updated annually.

The CEMP includes procedures and protocols to respond to disasters or large-scale emergencies. The purpose and goal of the County emergency operations plan is to assist the government in protecting lives, property, and the environment from major emergencies by addressing the areas of mitigation, preparedness, response, and recovery. This CEMP is considered the core of the Milwaukee County emergency operations program. It provides policy for department and agency managers and emergency management professionals to use in planning and actual operations. In response to a disaster or large-scale emergency, all local government forces, including law enforcement, fire, medical, health, public works, and others, will be considered a part of the County's emergency management organization, and will be the first line responders to such an emergency. When the emergency or disaster exceeds the local governments and County's capability to respond, assistance will be requested from the State of Wisconsin. The Federal government will provide assistance to the State of Wisconsin when all local and State resources have been exhausted. The CEMP includes elements on direction and control, warning and communications, and management of resources during emergency situations.

Many of the local units of government in the County, including the City of Milwaukee, have developed emergency operations plans (EOP) and/or programs which complement the County plan, and which also set forth procedures and actions to deal with a range of situations and events. Milwaukee County's CEMP notes that the County is vulnerable to exposure to many hazards that have the potential for disrupting the community, causing damage, and creating casualties. In addition to flooding, the plan recognizes that the County is vulnerable to other natural hazards, including tornadoes and severe weather; technological hazards; accidents involving hazardous materials; terrorism and civil disorder; and utility hazards, such as power failure and water shortages or contamination.

In addition, the Milwaukee Metropolitan Sewerage District (MMSD) has prepared an emergency action plan for the Milwaukee County Grounds Floodwater Management Facility, which is located at the confluence of Underwood Creek and the Menomonee River. This plan describes notifications to be made and actions to be taken in the event an unexpected failure of the facility's embankment occurs during an extreme flooding event.

In addition to EOPs, each municipality in the County has completed a Memorandum of Agreement (MOA) to help coordinate emergency management services within the Milwaukee County area. Also, Milwaukee

County, along with Kenosha, Jefferson, Milwaukee, Ozaukee, Racine, Walworth, Washington, and the City of Milwaukee participate in the Southeast Wisconsin Mutual Aid Compact. This Compact allows the participating Counties to assist one another where an emergency involving a natural disaster or technological incident requires additional resource and knowledge beyond the effected County's control.

1.4 REVIEW OF RELATED EXISTING REGULATIONS AND PROGRAMS

The current ordinances and programs which are most directly related to hazard mitigation and plan implementation include general zoning, floodplain zoning, shoreland and shoreland-wetland zoning regulations, and stormwater management requirements. These ordinances and programs impact how and where development occurs in Milwaukee County and have a significant role in protecting and/or preventing development in potentially hazardous locations. Because Milwaukee County has no unincorporated areas, many of these regulations are promulgated and enforced by the cities and villages in the County. [Table 1.1](#) and the following presents a summary of regulations adopted by the County and local governments.

General Zoning

Zoning is a tool used to regulate the use of land in Milwaukee County in a manner that serves to promote the general welfare of its citizens, the quality of the environment, and conserve its resources. Zoning is also used to implement a comprehensive plan. Zoning involves delineating areas or zones into specific districts, which provides uniform regulations and requirements that govern the use, placement, spacing, and size of land and buildings. As the County has no unincorporated areas, and as each city and village in the County has adopted and enforces its own zoning ordinance, general zoning has not been adopted nor administered by Milwaukee County.

Floodplain Zoning Ordinance

Section 87.30 of the *Wisconsin Statutes* requires that cities and villages (and counties, with respect to their unincorporated areas), adopt floodland zoning to preserve the floodwater conveyance and storage capacity of the floodplain areas and to prevent the location of new flood damage-prone development in flood hazard areas. The minimum standards that such ordinances must meet are set forth in Chapter NR 116 of the Wisconsin Administrative Code. The required regulations govern filling and development within a regulatory floodplain, which is defined as the area subject to inundation by the 1-percent-annual-probability (100-year recurrence interval) flood event. Under Chapter NR 116, local floodland zoning regulations must prohibit nearly all forms of development within the floodway, which is that portion of the floodplain required to convey the 1-percent-annual-probability peak flood flow. Local regulations must also restrict

filling and development within the flood fringe, which is that portion of the floodplain located outside of the floodway that would be covered by floodwater during the 1-percent-annual-probability flood. Permitting the filling and development of the floodfringe area, however, reduces the floodwater storage capacity of the natural floodplain, and may thereby increase downstream flood flows and stages. As all cities and villages in the County have adopted floodland zoning ordinances (except for the Village of West Milwaukee, which has not officially identified flood hazard areas within its boundaries), Milwaukee County has not adopted, nor administers, its own floodland zoning ordinance. The existing floodplains in the County are illustrated on [Map 2.7](#) in Chapter 2 of this report.

Shoreland-Wetland Zoning Ordinance

Under Sections 62.231 and 61.351, respectively, of the *Wisconsin Statutes*, cities, and villages in Wisconsin are required to place wetlands five acres or larger and located in statutory shorelands into a shoreland-wetland conservancy zoning district to ensure their preservation. Minimum standards for city and village shoreland-wetland zoning ordinances are set forth in Chapter NR 117 of the *Wisconsin Administrative Code*. The Cities of Cudahy, Franklin, Glendale, Greenfield, Milwaukee, Oak Creek, South Milwaukee, Wauwatosa, and West Allis and the Villages of Greendale, Hales Corners, and River Hills have adopted their own shoreland-wetland zoning ordinances pursuant to Sections 62.231 and 61.351, respectively, of the *Wisconsin Statutes*. The City of St. Francis and the Villages of Bayside, Brown Deer, Fox Point, Shorewood, West Milwaukee, and Whitefish Bay do not have any shoreland wetlands and were thus not required to adopt such ordinances.

An important element of the Milwaukee County shoreland zoning ordinances relates to the regulation of land use activities and facilities along the Lake Michigan shoreline and bluffs. Municipalities within Milwaukee County that are situated along the Lake Michigan coastline generally utilize an assortment of coastline management strategies to protect existing property and proposed development from potential bluff instability and erosion/recession hazards. Such methods include establishing bluff setbacks, conducting site specific bluff stability studies, and constructing coastline protection structures. In Milwaukee County, multiple municipalities that border Lake Michigan regulate development and related activities to lake bluffs within their jurisdiction.⁵ Descriptions of existing coastline management strategies utilized by municipalities located along the County's Lake Michigan coast are in Chapter 5 of this Report.

⁵ Some municipalities' lake bluff regulations also relate to the bluffs of ravines that are tributary to Lake Michigan.

Stormwater Management Regulations

With increases in urbanization and alterations to the natural landscape, many of the natural functions of land surface are greatly reduced or even lost causing large amounts and high velocities of stormwater runoff. All communities in Milwaukee County have stormwater management plans and/or regulations (i.e., ordinances) designed to minimize the adverse impacts caused by urban development.

In addition, *Wisconsin Administrative Code* Chapter NR 216, requires certain industrial facilities, construction sites, and municipal separate storm sewer systems (MS4s)⁶ to obtain Wisconsin Pollutant Discharge Elimination System (WPDES) stormwater discharge permits to manage the quantity and quality of stormwater runoff before it enters streams and waterbodies.

In 2002, the WDNR issued Chapter NR 151 of the *Wisconsin Administrative Code*, outlining the performance standards governing stormwater runoff from both agricultural and nonagricultural lands. Those standards include controls for both the quantity and quality of runoff from newly developed and redeveloped lands. These rules are administered by the WDNR through the Chapter NR 216 stormwater discharge permit system, although local municipalities have the option of adopting their own ordinances consistent with the *Administrative Code*. Chapter NR 152 of the *Administrative Code* contains model ordinances covering both agricultural and nonagricultural operations. Those communities that are required to obtain a WPDES stormwater discharge permit are required to have a stormwater management program that most often results in adoption of a stormwater management ordinance. All of the communities in Milwaukee County, including Milwaukee County, have received a WPDES Stormwater Discharge Permit. Fifteen Milwaukee County communities and Milwaukee County are covered under a group permit (either the Menomonee River Watershed Based Municipal Stormwater Discharge Group, the North Shore Group, or the Root River Group) and four Milwaukee County communities are covered under individual permits.

Milwaukee Metropolitan Sewerage District (MMSD) Stormwater Drainage and Flood Control Plan

MMSD's responsibilities for stormwater management are carried out within explicit policy guidelines set forth by MMSD's Commission. A comprehensive stormwater drainage and flood control system plan

⁶ What classifies as a Municipal Separate Stormwater Sewer System (MS4) is defined under Wisconsin Administrative Code Chapter NR 216.02. Generally, a MS4 is a conveyance or system of conveyances, including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm sewers designed or used for collecting or conveying untreated stormwater, and is owned or operated by a state, city, town, county, district, association, or other public entity.

consistent with those policies was originally adopted in 1986. This plan consists of two parts: a policy plan and a stormwater drainage and flood control systems plan.⁷

The policy plan discusses the MMSD stormwater management and flood control responsibilities. Major elements include:

- Identification of streams and watercourses for which the MMSD should assume jurisdiction for the resolution of drainage and flood control
- Recommendations regarding the types of improvements for which the MMSD should assume responsibility
- Recommendations regarding how costs are to be shared

The 1990 stormwater drainage and flood control systems plan identified the types, general locations, and horizontal and vertical alignments of needed drainage and flood control facilities within MMSD's jurisdiction. Adopted in 2001 and last amended in 2023, MMSD Rules Chapter 13, *Surface Water and Stormwater*, define MMSD's flood management role and currently the District has jurisdiction for 42 streams that are wholly or partially within Milwaukee County.

1.5 SCOPE AND PURPOSE OF PLAN UPDATE

This plan updates the 2017 Milwaukee County comprehensive hazard mitigation plan.^{8,9} The scope of this plan is countywide, as such, the planning requirements identified in 44 C.F.R. of Section 201.6 "Local Mitigation Plans" requires all jurisdictions participating in a multi-jurisdictional hazard mitigation plan to participate in the planning process. Examples of participation include, but are not limited to, attending

⁷ SEWRPC Community Assistance Planning Report No. 130, *A Stormwater Drainage and Flood Control Policy Plan for the Milwaukee Metropolitan Sewerage District, March 1986*; SEWRPC Community Assistance Planning Report No. 152, *A Stormwater Drainage and Flood Control System Plan for the Milwaukee Metropolitan Sewerage District, December 1990*.

⁸ Milwaukee County Office of Emergency Management, Hazard Mitigation Plan: 2016-2017, January 2018.

⁹ The City of Milwaukee Hazard Mitigation Plan was developed during the period 2003 through 2005, updated in 2011, and updated again in 2018 through a collective effort under the guidance of the City of Milwaukee All Hazards Mitigation Plan Local Planning Team, which was created by the City specifically for plan development purposes.

planning meetings, contributing research, data, or other information, and commenting and reviewing drafts of the plan.

This plan update is intended to set forth the most appropriate, feasible, and effective hazard mitigation strategy for Milwaukee County and the local units of government within the County. The plan complements and refines the *State Hazard Mitigation Plan of Wisconsin*¹⁰ and focuses on local conditions and natural hazards likely to occur or be experienced within Milwaukee County and Southeastern Wisconsin. As such, the County and SEWRPC will evaluate, update, and revise existing mitigation strategies as well as develop new local mitigation strategies specific to a community's exposure and impacts from identified natural hazards.

Planning efforts will assess the status of implementation of recommended mitigation actions from previous editions of the County's hazard mitigation plan. Work will include reevaluation of the hazards identified to be addressed by the plan and include updating of the descriptions and prioritization of the natural hazards that have occurred within the County and reevaluation of the risk posed to each of the participating municipalities by these hazards. Planning efforts will also include updating existing or development of new base maps of areas affected by multiple natural hazards and the associated comprehensive inventories related to issues such as hazard occurrence, critical facilities, repetitive flood loss and substantial damage structures, land use, and population. In addition, Milwaukee County will evaluate, revise, and update the overview of its vulnerability and the vulnerability of the municipalities located within the County to specific hazards and evaluate, update, and revise existing mitigation strategies.

As the City of Milwaukee will be participating in the planning process, Milwaukee County will also integrate the analyses and recommendations in the City's recently updated hazard mitigation plan into this updated County plan. The municipalities that participated in the development of this Milwaukee County hazard mitigation plan update included:

¹⁰ *Wisconsin Emergency Management, State Hazard Mitigation Plan of Wisconsin, December 2021.*

Cities

Cudahy
Franklin
Glendale
Greenfield
Milwaukee
Oak Creek
South Milwaukee
St. Francis
Wauwatosa
West Allis

Villages

Bayside
Brown Deer
Fox Point
Greendale
Hales Corners
River Hills
Shorewood
West Milwaukee
Whitefish Bay

This plan update was developed under the guidance of the Milwaukee County Hazard Mitigation Plan Local Planning Team (LPT), which was created by the County specifically for plan update purposes. This team was comprised of elected and appointed officials, agency representatives, and citizens from throughout the County knowledgeable in hazard mitigation matters. [Table 1.2](#) summarizes municipal participation in the planning process. For more complete details on the level of participation of the LPT, local citizens and community groups in the public involvement process, and summary notes for each LPT meeting, see [Appendix A](#).

The plan development processes included the following steps:

- Collation and review of all pertinent reports relating to the hazard mitigation activities in Milwaukee County
- Inventory mapping and analysis of hazards pertinent to Milwaukee County
- Identification of the facilities and ongoing programs related to hazard mitigation
- Assessment of the vulnerability of County assets to each hazard
- Identification of and prioritization of needed facilities and programs

- Consideration of issues relating to neighboring municipalities and units of government likely to be affected or influenced by natural hazards within Milwaukee County
- Development and evaluation of alternatives to address the identified needs
- The development of plan recommendations and an implementation plan
- Development of a public informational and educational program and program of public consultation to guide the plan development and implementation program, including a prioritization of the recommended plan elements
- Adoption of a strategy for monitoring and refining the plan

Additional activities conducted as a part of the updating process for the plan update includes:

- Collation and review of all pertinent reports relating to the hazard mitigation activities in the City and County of Milwaukee since adoption of the initial plans
- Review of comprehensive planning material developed for each City and Village in Milwaukee County
- Review and updating of inventories developed from the previous planning efforts
- Review and updating of hazard and risk assessments
- Review of implementation activities
- Review and updating of plan recommendations and the initial implementation plans

1.6 PLAN MAINTENANCE AND IMPLEMENTATION ACTIVITIES

Outreach Activities (Ongoing)

Since the adoption of the initial hazard mitigation plan, local municipalities in Milwaukee County have conducted outreach activities to educate the public about emergency preparedness, including hazard mitigation. The most recent activities that can be associated with hazard mitigation are summarized in

Table 1.3. The most common methods used by the communities include making information available through posting on the municipality's website, including an electronic newsletter, and reaching out to the public through social media sites such as Facebook® and Twitter®. These are efficient methods to distribute information on hazard awareness and preparedness related to topics such as flooding, winter weather awareness, tornado awareness, hazardous materials awareness, heat awareness, and family preparedness.

The Milwaukee County OEM also participates in programs itself, including numerous training sessions associated with hazard mitigation, damage assessment, debris management, sheltering and functional needs, Incident Command System, National Incident Management System, and interoperable communications.

Implementation Activities (Ongoing)

Since the adoption of the most recent hazard mitigation plan (2017), Milwaukee County and the local municipalities have conducted a number of projects intended to implement recommendations of the plan directly or indirectly. Such projects or activities related to hazard mitigation that have been implemented throughout Milwaukee County since the previous plan are summarized in **Table 1.4**. It should be noted that MMSD plays a major role and often works with the County and City in reducing flood risks by actively implementing flood mitigation projects throughout the County as a part of their Watercourse System Management Plans. To date, the MMSD has spent approximately \$485.9 million (2023 dollars) since 1995 on removing structures from the floodplain and concrete on MMSD-owned concrete-lined channels.¹¹ The major flood control projects in the County completed by MMSD are summarized in **Table 1.5**.

1.7 REVIEW OF PLAN DEVELOPMENT EFFORTS, PROCESS AND ADOPTION

Review of the 2011 and 2017 Milwaukee County Hazard Mitigation Plans

Both the 2011 and 2017 Milwaukee County Pre-Disaster Hazard Mitigation Plans are the result of collaboration between the Milwaukee County Office of Emergency Management, appropriate county departments, and Milwaukee County municipalities. The City of Milwaukee was not included in these efforts as a separate hazard mitigation plan for the City was completed as described below. Each of the participating municipalities filled out hazard assessments of their own areas, which were used in addition to historical hazard data to calculate the county's risk for all hazards. This information was used by each

¹¹ *Milwaukee Metropolitan Sewerage District, 2023 Operation and Maintenance & Capital Budget Report, 2023*

municipality to focus on community projects that could help mitigate risks. The 2017 plan (County's current plan) gives a detailed community profile of Milwaukee County, including features and GIS maps of its land use, infrastructure, and population. The 2017 plan also includes separate sections for all hazards that could impact Milwaukee County, including descriptions of these hazards and historical records of when and where they occurred. That plan separates the 18 municipalities into separate sections, each containing specific hazard analyses, vulnerability information, and land use and floodplain maps pertaining to that jurisdiction. Most importantly, these sections contain lists of mitigation projects for each municipality, including what projects have been completed since the last plan and timelines for new projects. Lastly, the 2017 County plan used Integrated Solutions Consulting's Knowledge Management System to store both the 2011 and 2017 plan and administrative information for stakeholders to access.

Review of the City of Milwaukee Hazard Mitigation Plans

The initial City of Milwaukee all hazards mitigation plan (2005) was prepared under the guidance of a City advisory Steering Committee comprised of local official representatives, including police departments, fire departments, and MMSD. The Steering Committee met four times during the plan preparation period to provide input on the types of hazards to be considered, and the appropriate mitigation strategies, and to review the draft report chapters. The report chapters were then refined to reflect the comments and recommendations of the Steering Committee. Members of the Steering Committee included representatives from agencies that serve both the City and the County, including Milwaukee County Emergency Management staff and MMSD staff (a jurisdiction that extends beyond the County boundary). The City of Milwaukee Common Council formally adopted the plan on May 3, 2005. A first update of this plan followed a similar process and was completed in 2012.

The current City hazard mitigation plan update (2019) was prepared under the guidance of a Local Planning Team comprised of local official representatives, including representatives of City Departments, such as the police, fire, community development, and public works departments; County departments and agencies, including the County emergency management office and transit system; MMSD; interested nongovernmental organizations; and the health care community. The Local Planning Team met four times during the plan preparation period to provide input on the types of hazards to be considered, the appropriate mitigation strategies, and to review the draft report chapters. Those chapters were then refined to reflect the comments and recommendations of the LPT. The 2019 plan was provided to all neighboring communities in order to continue the coordination of hazard mitigation activities as provided by the use of the Milwaukee County plan as a framework for the City plan. The City of Milwaukee Common Council formally adopted the plan on November 5, 2019.

This Milwaukee County Mitigation Plan Update

As previously mentioned, this Milwaukee County hazard mitigation plan update was prepared under the guidance of a LPT (formally known as the Steering Committee) which comprised of representatives of the County and all of the communities within the County, as well as County agency representatives and local stakeholders. The LPT met three times during the plan preparation period to provide input on the types of hazards to be considered, the appropriate mitigation strategies, and to review the draft report chapters. The report chapters were then refined to reflect the comments and recommendations of the Team.

As draft chapters of the plan were completed, copies of the chapters were placed in downloadable form on the SEWRPC website. A hazard mitigation planning webpage was available on this website on which members of the public could ask questions and submit comments on the draft plan text. Following completion of the community profiles and the risk and vulnerability assessments sections of the plan and review by the LPT, a public informational meeting was held to review these sections of the plan with local officials, stakeholders, and citizens and to solicit their input.

After the plan was completed in draft form, an additional public informational meeting was held to review the entire draft plan with local officials, stakeholders, and citizens and solicit their input. In addition, copies of the draft plan were made available at the offices of the Milwaukee County Office of Emergency Management and on the SEWRPC website.

Once FEMA determined that the plan was approvable upon adoption, copies of the plan were sent to each of the local units of government requesting that they adopt the plan in order to retain future eligibility for mitigation funding. Funding to complete this plan was provided by the Hazard Mitigation Grant planning program administered by WEM. In addition, County and SEWRPC staffs were available to meet with communities on an individual basis to review the plan update and consider adoption and implementation steps. Copies of the adopted resolutions approving the plan by the local units of government are included in [Appendix B](#).

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Chapter 1

INTRODUCTION AND BACKGROUND

TABLES

**Table 1.1
 Regulations and Programs Within Milwaukee County Related to Hazard Mitigation: 2023**

Municipality	General Zoning	Floodplain Zoning	Stormwater Management Ordinance or Plan	Shoreland or Shoreland Wetland Zoning	Emergency Management Department, Ordinance, Program, or Plan
Cities					
Cudahy	Adopted	Adopted	Yes	Adopted	Yes
Franklin	Adopted	Adopted	Yes	Adopted	Yes
Glendale	Adopted	Adopted	Yes	Adopted	Yes
Greenfield	Adopted	Adopted	Yes	Adopted	Yes
Milwaukee	Adopted	Adopted	Yes	Adopted	Yes
Oak Creek	Adopted	Adopted	Yes	Adopted	Yes
South Milwaukee	Adopted	Adopted	Yes	Adopted	Yes
St. Francis	Adopted	Adopted	Yes	-- ^a	-- ^b
Wauwatosa	Adopted	Adopted	Yes	Adopted	Yes
West Allis	Adopted	Adopted	Yes	Adopted	Yes
Villages					
Bayside	Adopted	Adopted	Yes	-- ^a	Yes
Brown Deer	Adopted	Adopted	Yes	-- ^a	Yes
Fox Point	Adopted	Adopted	Yes	-- ^a	Yes
Greendale	Adopted	Adopted	Yes	Adopted	Yes
Hales Corners	Adopted	Adopted	Yes	Adopted	Yes
River Hills	Adopted	Adopted	Yes	Adopted	Yes
Shorewood	Adopted	Adopted	Yes	-- ^a	-- ^b
West Milwaukee	Adopted	Adopted	Yes	-- ^a	Yes
Whitefish Bay	Adopted	Adopted	Yes	-- ^a	Yes
County					
Milwaukee County	N/A	N/A	Yes	N/A	Yes

Note: N/A indicates "Not Applicable."

^a The City of St. Francis and the Villages of Bayside, Brown Deer, Fox Point, Shorewood, West Milwaukee, and Whitefish Bay do not have any shoreland wetlands and were thus not required to adopt such ordinances.

^b Municipalities that utilize Milwaukee County's Emergency Operations and Preparedness plans and procedures.

Source: Milwaukee County's Municipal Webpages and SEWRPC

Table 1.2
Participation in the Milwaukee County Hazard Mitigation Plan Update Planning Process

Civil Division	Attendance at Local Planning Team Meetings		Provision of Data ^a	Review of Report
	April 27, 2023	February 20, 2024		
Cities				
Cudahy	X			
Franklin	X			
Glendale	--			
Greenfield	--			
Milwaukee	X			
Oak Creek	X			
South Milwaukee	X			
St. Francis	--			
Wauwatosa	--			
West Allis	--			
Villages				
Bayside	X			
Brown Deer	--			
Fox Point	X			
Greendale	X			
Hales Corners	X			
River Hills	X			
Shorewood	--			
West Milwaukee	--			
Whitefish Bay	X			
County				
Milwaukee County	X			
Other				
MMSD	X			

Note: X indicates participation by at least one representative of the municipality or organization.

^a Provision of data includes providing information on hazards experienced, projects undertaken, and outreach efforts as well as sharing of relevant plans, reports, and concerns.

Source: SEWRPC

Table 1.3
Outreach Activities by Community in Milwaukee County Related or Beneficial to Hazard Mitigation

Community	Activity
Milwaukee County	County website Social Media coverage on natural weather hazards Office of Emergency Management webpage and social media sites Participation in NWS Integrated Warning Team (IWT) Participation in Wisconsin Heat Health Network Continued participation in the ReadyWisconsin campaigns Continued participation in the NWS SkyWarn Program Continued participation in FEMA’s Integrated Public Alert and Warning System (IPAWS) Continuing to encourage critical facilities to develop and maintain response and recovery plans Public informational and educational outreach projects, workshops, informational booths, and seminars on natural disaster preparedness Public awareness programs on winter, heat, tornado, hazardous materials, and family preparedness Continuation with the Milwaukee Extreme Weather Taskforce Providing in-depth hazard preparedness exercises and drills to County employees
City of Cudahy	City website City’s Social Media platforms containing natural weather hazard education City’s Social Media platforms used for natural weather hazards alerts and warnings City’s online newsletters
City of Franklin	City website City’s Social Media platforms containing natural weather hazard education City’s Social Media platforms for natural weather hazards alerts and warnings City’s online newsletters City’s Notification System
City of Glendale	City website City’s Notify Me Emergency Alert program City Newsletters
City of Greenfield	City website City’s Social Media platforms containing natural weather hazards education City’s Social Media platforms used for natural weather hazards alerts and warnings City Newsletter City’s Citizen Emergency Alert Program
City of Milwaukee	City’s Office of Emergency Management website, plans, and outreach and educational resources City website City’s Social Media platforms containing natural weather hazards education City’s Social Media platforms used for natural weather hazards alerts and warnings City’s E-Notify Text Alerts and Email Notification System
City of Oak Creek	City website City’s Social Media platforms containing natural weather hazards education City’s Social Media platforms used for natural weather hazards alerts and warnings City’s mobile alert system City’s eNotifications system City Newsletters and magazine
City of South Milwaukee	City website City’s Social Media platforms containing natural weather hazard education City’s Social Media platforms for natural weather hazards alerts and warnings City’s mobile emergency alert system City’s “Notify Me” alert system

Table continued on next page.

Table 1.3 (Continued)

Community	Activity
City of St. Francis	City website City newsletters City's Social Media platforms containing natural weather hazard education City's Social Media platforms for natural weather hazards alerts and warnings
City of Wauwatosa	City website City's Social Media platforms containing natural weather hazards education City's Social Media platforms used for natural weather hazards alerts and warnings Smart911 emergency alert system City's eNews City's Newsletter
City of West Allis	City's website City's Social Media platforms containing natural weather hazards education City's Social Media platforms used for natural weather hazards alerts and warnings City's monthly e-Newsletter CivicReady emergency notification platform
Village of Bayside	Village website Village Social Media platforms containing natural weather hazards education Village Social Media platforms for natural weather hazards alerts and warnings Village newsletter
Village of Brown Deer	Village website Village Social Media platforms containing natural weather hazards education Village Social Media platforms for natural weather hazards alerts and warnings Village "Notify Me" emergency alert system Village online community news link
Village of Fox Point	Village website North Shore Fire and Rescue Department website North Shore Health Department website Village "Notify Me" alert system
Village of Greendale	Village website Village Fire, Police, and Health Departments social media platforms Village's Code Red Emergency Alert program
Village of Hales Corners	Village website Village newsletter Village's Code Red alert system
Village of River Hills	Village website
Village of Shorewood	Village website Village Social Media platforms containing natural weather hazards education Village Social Media platforms for natural weather hazards alerts and warnings Village "Notify Me" alert system
Village of West Milwaukee	Village website Village newsletter Village Social Media platforms containing natural weather hazard education and outreach
Village of Whitefish Bay	Village website Village Social Media platforms containing natural weather hazards education Village Social Media platforms for natural weather hazards alerts and warnings Village "Notify Me" alert system
MMSD	Placed danger/warning signs along concrete channels to keep citizens out of the streams Sends out Water Drop Alerts to urge residents to limit water use during storm events Greenseams Program Educational outreach and implementation on Green Infrastructure projects

Source: Community Websites, Milwaukee County, and SEWRPC

Table 1.4 (Work in Progress)
Recent Hazard Mitigation Activities/Projects in Milwaukee County: 2018-2023

Community	Activity/Project
Milwaukee County	Designation of cooling and warming shelters Removal of concrete embankments in rivers Coastal erosion and bluff erosion prevention projects Removal/acquisition of structures in floodplain Warning system tests and upgrades Conducted an Emergency communications system tests Conducted an Emergency public information system tests Conducted an Emergency power tests Development and maintenance of plans and procedures Countywide tornado siren replacement project Dispatch training for 911 Communications Providing shelter for the homeless during an extreme cold weather event Technology updates to enhance the availability to serve socially vulnerable populations Development of a damage assessment dashboard Developed a stormwater training module for County Employees Text-to-911 services became available in 2022
City of Cudahy	Updates to tornado sirens Stormwater improvement projects to alleys and parking lots (2018) Kingman Avenue / 3800 Allerton-Van Norman Alley Reconstruction (GI project- 2019) Storm sewer improvements project (2021) with catch basins
City of Franklin	
City of Glendale	Completed a North Shore CEMP Participated in a Tabletop exercise Kletzsch Park tornado siren repair
City of Greenfield	
City of Milwaukee	Major street and bridge projects related to urban flood mitigation (i.e., Western Milwaukee Phase 2B earthen dam, floodwall, and storm sewer installations) Green Infrastructure projects
City of Oak Creek	North Bluff stabilization/revetment project Drexel Avenue pump station renovation Stormwater mitigation requirements on all new developments
City of South Milwaukee	In the process of writing and implementing a CEMP for Zone E Updating their Active Shooter Policy Hosted a 40-hour training for Arson Investigation Formulating a Zone E Fire Investigation team Requested more rescue rings in Grant Park from Milwaukee County Improving the City's Emergency Operations System (EOS) structure Training city employees in the Incident Command (IC) system
City of St. Francis	
City of Wauwatosa	Numerous EOC/Emergency Management tabletop exercises Implementation of Rave notification system Numerous green infrastructure projects to detain stormwater Numerous large sewer projects to reduce likelihood of flooding Replace radio tower link between City Hall and Police with buried fiber optic connection Coordinating with Milwaukee Metropolitan Sewerage District on designs to raise portions of the flood levy adjacent to Menomonee River in Hart Park Numerous EOC/Emergency Management tabletop exercises
City of West Allis	

Table continued on next page.

Table 1.4 (Continued)

Community	Activity/Project
Village of Bayside	621 Brown Deer Road Pond dredged New village hall stormwater relief pond East side sanitary relief system project Brown Deer Road sewer expansion with MMSD Tennyson Drive stormwater infrastructure relief project New I43 stormwater pond installed by WIDOT. New stormwater ponds at Bayside Middle School as part of new building project.
Village of Brown Deer	
Village of Fox Point	
Village of Greendale	Updates to Village's outdoor warning sirens Implemented reverse 911 (code RED) to alert community members Created contact lists with the Village's Health Department for secondary shelters Eastway storm sewer improvements
Village of Hales Corners	
Village of River Hills	
Village of Shorewood	Southeast Combined Sewer Improvement Project
Village of West Milwaukee	
Village of Whitefish Bay	
MMSD	Purchased several flooded structures Completed a number of stormwater and floodplain management projects Addressed coastal flooding issues at the Water Reclamation facilities and MMSD headquarters GreenSeams Program

Source: Milwaukee County, Local Planning Team, Municipal Websites, and SEWRPC

Table 1.5
Major Flood Mitigation Efforts by MMSD in Milwaukee County: 2023

Project	Project Description	Structures Removed from the Floodplain	Cost	Completion Date
Kinnickinnic Watershed				
Kinnickinnic (KK) River Watershed Flood Management Plan - Acquisitions	This is a multiphase project to improve the KK River and tributary streams by removing concrete lining, adding storage, modifying bridges, and naturalizing the channel. The primary objective for the work is to reduce the flood risk, reduce the risk of drowning, improve habitat, and improve community access to the naturalized river corridor. The projects recommended in the plan will reduce flood risk to over 700 structures in the 100-year floodplain, remove concrete from over seven miles of stream-lined in concrete or enclosed in culverts, and make significant investments in community spaces, including several Milwaukee County Parks. The scope of one of the ongoing projects located on the KK River between 6th and 16th Street includes the acquisition and removal of 83 residential structures within this project area. The properties are needed to widen the channel cross section from 60 ft. to 200 ft. Approximately 53 of these homes were in the updated 100-year floodplain. The wider channel will improve the passage of flood flows through this section and reduce the risk of flooding to about 300 homes and businesses within the adjacent neighborhood. The total structures removed include two at-risk structures in another part of the KK River watershed.	~55	\$402M (2024 dollars)	2024
Menomonee River Watershed				
All Watershed Projects Completed So Far	Many of the Menomonee River Watershed projects work in concert to mitigate flooding. For instance, the Milwaukee County Grounds Detention Basin project described below makes downstream concrete removal and levee/floodwall projects possible.	280		
Valley Park Levee and Floodwall	This project created a levee and floodwall to help protect about 130 homes along the Menomonee River. The project is part of a group of projects that work to reduce the risk of flooding on the Menomonee River, including: a seven-foot-high, 800-foot-long levee; five-foot-high, 750-foot-long floodwall; the acquisition of 18 homes for the construction of the levee and floodwall; an increase in Milwaukee County Parks land along the Menomonee River from 1.5 acres to 3 acres; and a new 15-foot-wide access road atop the levee for maintenance and security.		\$12M (2001 dollars)	2001
Hart Park	MMSD completed the Hart Park Project along the Menomonee River to reduce the flood risk in the Cities of Milwaukee and Wauwatosa. As part of this project, 80 formerly flood-prone residences and business in the area east of the Hart Park stadium were acquired and removed; the area of the park was expanded from 20 acres to 50 acres; a system of earthen levees, concrete floodwalls, and road grade raises was installed to contain the one-percent-annual-probability flood; the overbank north of the channel was excavated to provide floodwater storage and conveyance; and a gravity flow interior drainage system was constructed to convey stormwater from the “protected” side of the levee/floodwall system to the River.		\$48M (2007 dollars)	2007

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Table 1.5 (Continued)

Project	Project Description	Structures Removed from the Floodplain	Cost	Completion Date
Menomonee River Watershed (continued)				
Milwaukee County Grounds Detention Basin	The Milwaukee County Grounds detention basin is located in the City of Wauwatosa. This basin covers about 65 acres and has the potential to hold 315 million gallons of floodwaters from Underwood Creek and then slowly release the floodwaters to the Menomonee River. It provides flood relief benefits downstream in the Cities of Milwaukee and Wauwatosa.		\$93M (2011 dollars)	2011
Western Milwaukee Flood Management Projects	The fourth and final phase of these projects is currently being completed. The purpose of this project is to reduce the risk of overbank flooding in the vicinity of West State Street on the west side of Milwaukee and east side of Wauwatosa. The project scope is to design and construct a continuation of the floodplain levee and floodwall along West State Street, east from Hart Park project to at least the east side of the former Central Redi-Mix property (now owned by MMSD).		\$90M (2026 dollars)	2026
Milwaukee River Watershed				
Lincoln Creek Channel Restoration	This project included concrete channel lining removal, additional floodplain storage, and naturalizing the channel banks where possible within the public right-of-way corridor. Lincoln Creek is located in the City of Milwaukee.	~2,000	\$120M (2000 dollars)	2002
Estabrook Dam Removal	In 2016, MMSD approved plans to acquire land in Estabrook Park for the demolition and removal of the Estabrook dam. The purpose of this project was to provide the benefits of flood risk reduction for at least 50 structures located in the floodplain, and to improve water quality, habitat, fish passage, river aesthetics and reduce sediment accumulation.	~50	\$2.3M (2016 dollars)	2018
Structure Acquisitions	This is an ongoing effort to reduce the flood risk to structures in the Milwaukee River regulatory floodplain, focused on the City of Glendale, but MMSD is open to voluntary acquisition in other flood-prone areas in the Milwaukee River Watershed and recently acquired a clinic building in the Village of Brown Deer. Six structures were acquired for the Indian Creek project that was constructed in the early 2000s. The number of structures removed is the total as of 2023.	19	\$5.5M (2023 dollars)	Ongoing
Oak Creek Watershed				
Structure Acquisitions	MMSD has pursued voluntary acquisition and demolition for structures in the Oak Creek regulatory floodplain. As of 2023, three structures have been removed, with only five structures remaining in the floodplain. Two of these structures are on airport property and will be removed in future phases of airport redevelopment.	3	\$1.6M (2023 dollars)	Ongoing
Conservation and Green Infrastructure Projects				
Greenseams® Program	MMSD Greenseams program has acquired 5,290 acres as of 2023 within and upstream of Milwaukee County to help prevent future flooding and protect flood management infrastructure investments within Milwaukee County. The current total assessed value of the land acquired is \$29M.	--	\$23M (dollars)	Ongoing

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Table 1.5 (Continued)

Project	Project Description	Structures Removed from the Floodplain	Cost	Completion Date
Conservation and Green Infrastructure Projects (continued)				
Working Soils® Program	In collaborative cooperation with the Milwaukee River Watershed Conservation Partners (MRWCP), MMSD's Working Soils® Program will support the acquisition of approximately 15 agricultural easements across 1,500 acres by 2026. The District anticipates receiving \$2.4 million from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) as cost-share reimbursement after the District has paid for each easement. The MMSD Working Soils® Program staff work with agricultural landowners to place voluntary, permanent easements on undeveloped, private properties along streams, hydric soils, and wetlands. This flood management program helps to build and connect priority environmental corridors, in coordination with the District's Greenseams® program.	--	\$8.9M (2026 dollars)	2026
Reforestation and Wetland Restoration Program	The purpose of this project is to identify and implement large scale natural flood management strategies that work to mimic the natural hydrologic process. The scope of this project is to plant six million trees and restore or enhance 4,000 acres of wetlands in the Greater Milwaukee Watersheds (Milwaukee, Kinnickinnic, Menomonee, Oak Creek, Root River, and direct drainage to Lake Michigan). The work is supported by a 2022 Congressional Community Project Funding award of \$800,000.	--	\$11M	2032

Source: MMSD, Milwaukee County, Local Planning Team, and SEWRPC

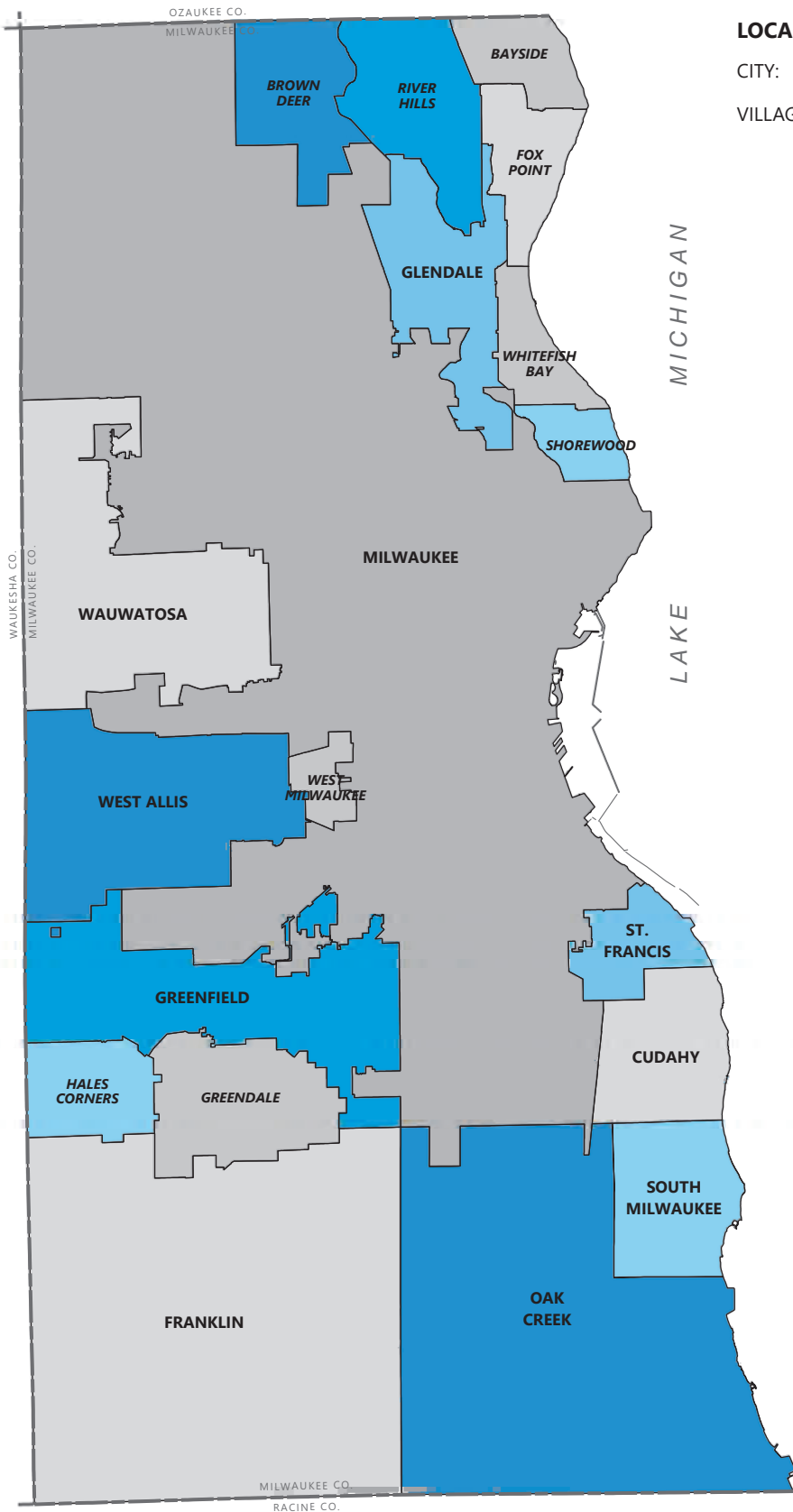
SEWRPC Community Assistance Planning Report No. 345
MILWAUKEE COUNTY HAZARD MITIGATION PLAN UPDATE

Chapter 1

INTRODUCTION AND BACKGROUND

MAPS

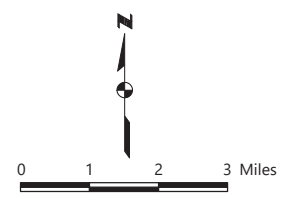
Map 1.1
Milwaukee County Municipalities: 2023



LOCAL GOVERNMENT TYPE

CITY: **MILWAUKEE**

VILLAGE: **HALES CORNERS**



Source: SEWRPC