SEWRPC Community Assistance Planning Report No. 312 (2nd Edition)

A LAND AND WATER RESOURCE MANAGEMENT PLAN FOR MILWAUKEE COUNTY: 2021-2030

Chapter 3

RELATED PLANS, REGULATIONS, AND PROGRAMS

3.1 INTRODUCTION

The updated Milwaukee County land and water resource management plan is built upon the initial plan and its previous updates and complements other planning and resource management efforts and programs linking local level planning with regional and watershed level plans. The plan, therefore, provides an integrated framework within which Milwaukee County will conduct activities to protect and rehabilitate the land and water resource base of the County and contribute to the environmentally sound management of these valuable resources in a coordinated manner that is compatible with watershed-wide needs and resource management programs. One of the first steps to be undertaken in the land and water resource management planning program is the inventory, collation, and review of the recommendations of relevant previously prepared reports and plans.

There are a number of plans that focus on the natural resources of Milwaukee County. These plans include programs that address the interconnection of the natural resources of Milwaukee County with those of the related watersheds and the Southeastern Wisconsin Region, as well as the importance of natural resources at the County and community level. The plans collated and reviewed for input into this current planning program were generally most relevant to actions undertaken by the County or potentially to be undertaken by the County. In addition, selected plans prepared at the local level, including local land use plans, park and open space plans, lake and water quality management plans, and sewer service area plans prepared for individual communities or for special-purpose units of government were considered. All of these documents provide the basis for developing an integrated scheme for the sustainable management of the natural resources of Milwaukee County through the coordinated efforts of Federal, State, County, and local

governments, special-purpose units of government, and community groups. The land and water resource management plan provides an opportunity to promote detailed action at the local level while achieving strategic objectives within the boundaries of Milwaukee County, its watersheds, and the Southeastern Wisconsin Region. This plan takes into account planning objectives identified by local officials and also those reflected in locally adopted land use plans and ordinances. Accordingly, an important step in the planning process was a review of the existing framework of areawide and local plans and related land use regulations. This chapter presents a summary of that review.

3.2 REGIONAL PLANS

Regional Land Use and Transportation Plan (VISION 2050)

The regional land use and transportation plan, referred to as VISION 2050, recommends a long-range vision for land use and transportation in the seven-county Region. It makes recommendations to local and State government to shape and guide land use development and transportation improvement, including public transit, bicycle and pedestrian facilities, arterial streets and highways, and freight transportation to the year 2050. Map 3.1 shows the recommended regional land use development pattern as it relates[1] to Milwaukee County. The key recommendations of the plan as they pertain to land and water resource management include:

Environmental Corridors

VISION 2050 recommends limiting any new urban development within primary environmental corridors to essential transportation and utility facilities and/or compatible outdoor recreation facilities. To the extent possible, new urban development should also avoid secondary environmental corridors and isolated natural resource areas. Development considered compatible with environmental corridors is set forth in Table 3.1. VISION 2050 recommends preserving the remaining primary environmental corridors in essentially natural and open land uses. The plan further recommends that local governments consider preserving secondary environmental corridors and isolated natural resource areas in natural open space uses or for stormwater management and recreational purposes. For the most part, primary environmental corridors within Milwaukee County are protected through either public park and open space ownership by the State, County, local governments, or other public entities or through compatible zoning by local governments. Map 2.22 in Chapter 2 of this report shows the primary environmental corridors within Milwaukee County.

[1]*Documented in SEWRPC Planning Report No. 55,* VISION 2050: A Regional Land Use and Transportation Plan*, July 2017.*

Urban Development

VISION 2050 recommends focusing urban development within urban service areas that typically include public sanitary sewer and water supply, parks, schools, and shopping areas. Since the majority of Milwaukee County is highly urbanized, it is recommended that any new residential development would primarily occur as infill and redevelopment under the Small Lot Traditional Neighborhood, Mixed-Use Traditional Neighborhood, and Mixed-Use City Center land use categories. These residential developments encourage a compact development pattern that also support Transit-Oriented Development (TOD). These developments allow single-family homes on smaller lots (one-quarter acre or less) and multifamily housing, which tends to be more affordable to a wider range of households. In addition, these developments would encourage walkable neighborhoods with housing in proximity to a mix of uses, such as parks, schools, and businesses. Descriptions of the types of residential developments recommended to be developed in Milwaukee County include:

Mixed-Use City Center

A Mixed-Use City Center includes offices, stores, services, apartments, condominiums, and homes with small yards. Many of the offices, apartments, and condominiums may be in mid-rise buildings and high-rise towers (particularly in and around downtown Milwaukee). There may also be stores and services located on the ground floors of these buildings. The demand for common open space, such as a public park, is high due to many of the housing developments lacking private yards. Mixed-use developments typically include dwellings above the ground floor of commercial uses and residential structures intermixed with, or located adjacent to, compatible commercial, institutional, or other civic uses.

Mixed-Use Traditional Neighborhood Development

A Mixed-Use Traditional Neighborhood includes stores, services, offices, apartments, condominiums, and major employment centers. This development may also include homes with small yards. The offices, apartments, and condominiums may be in midrise and low-rise buildings with stores and services on the ground floor. People are also able to walk to many everyday destinations from their homes. Although there may be homes with yards, there is still a high demand for public open space. This development, including the layout of streets and sidewalks, encourages walking and bicycling as alternatives to automobile transportation within the neighborhood.

Small Lot Traditional Neighborhood

A Small Lot Traditional Neighborhood includes a mix of housing types such as homes with small lots (less than a quarter-acre in size) and apartments and condominiums. Small Lot Traditional Neighborhood also

includes a mix of stores, services, and offices; can also be served efficiently by public transit; and may contain major employment centers located adjacent to highways. People are also able to walk to many destinations from their homes.

Transit-Oriented Development (TOD)

A TOD is a compact, mixed-use development whose internal design is intended to maximize access to a transit stop located within or adjacent to the development. Within the development, commercial uses and higher-density residential uses are located near the transit stop. Residential development should occur in multifamily buildings or buildings with a mix of uses such as commercial-retail space on the ground floor and dwellings on upper floors. Some buildings may have a mix of commercial-retail space on the ground floor with office space on upper floors. Public plazas, parks, and other governmental and institutional uses may also be included. The layout of streets and sidewalks should provide convenient and safe walking and bicycling access to the transit stop. A TOD also supports healthy communities, mobility, and revitalization in highly urbanized areas.

In addition, detailed neighborhood plans should be prepared for mature neighborhoods or special-purpose districts showing signs of land use instability or deterioration. Such plans should identify areas recommended for redevelopment to a different use, areas recommended for rehabilitation, any local street re-alignments or improvements, and other public utility and facility improvements. Redevelopment plans should seek to preserve historic, cultural, and natural features and features of the urban landscape that provide for neighborhood identity within the larger urban complex. Major industrial centers and other economic activity centers in older urban areas should be maintained and redeveloped to moderate the historical loss in employment at these centers. Aging industrial centers should undertake strategic and physical planning efforts for each center.

Productive Agricultural Land

The compact development pattern recommended under VISION 2050 would minimize the impacts of new development on productive agricultural land, including highly productive Class I and II soils (prime agricultural land), as classified by the U.S. Natural Resources Conservation Service. Some Class I and II farmland located in the vicinity of existing urban service areas may be converted to urban use as a result of planned expansion of those urban service areas to accommodate efficient regional growth. VISION 2050 defers to county plans to identify productive agricultural land. VISION 2050 also recommends developing a regional food system that connects food producers, distributors, and consumers to ensure access to

healthy foods throughout the entire Region. In addition, local governments should implement land use policies that would allow urban agriculture, such as vertical farming and community gardens on vacant lots.

Regional Transportation Component

The regional transportation component of VISION 2050 is intended to provide a vision for, and guide to, transportation system development in the Region. The transportation component of VISION 2050 includes the following six elements: public transit; bicycle and pedestrian; transportation systems management; travel demand management; arterial streets and highways; and freight transportation. VISION 2050 recommends developing a rapid transit network consisting of eight rapid transit corridors (either bus rapid transit or light rail) with dedicated transit lanes and transit signal priority or preemption and is intended to provide travel times comparable to an automobile. VISION 2050 further recommends improving or expanding the express bus service, local public transit, intercity transit, and the off-street bicycle network which will increase access to activity centers, employment centers, neighborhoods, and other destinations in the Region. The eight recommended bus rapid transit or light rail corridors to affect Milwaukee County include:

- From downtown Waukesha to downtown Milwaukee via the Milwaukee Regional Medical Center, predominately on E. Main Street, W. Blue Mound Road, and Wisconsin Avenue

- From Bayshore Town Center in Glendale to downtown Milwaukee via the University of Wisconsin-Milwaukee, predominately on N. Oakland Avenue, N. Prospect Avenue, and N. Farwell Avenue

- From the Park Place complex on the northwest edge of Milwaukee to downtown Milwaukee, predominately on W. Fond du Lac Avenue

- From the retail centers located around the intersection of S. 108th Street and W. Cleveland Avenue in West Allis to downtown Milwaukee, predominately on W. National Avenue

- From Northwestern Mutual's Franklin Campus on S. 27th Street to downtown Milwaukee via Milwaukee Mitchell International Airport, predominately along S. Howell Avenue and S. 1st Street

- From Bayshore Town Center in Glendale to W. Drexel Avenue, predominately on 27th Street

- From the Park Place Complex on the northwest edge of Milwaukee to the retail centers located around the intersection of S. 108th Street and Cleveland Avenue in West Allis via Mayfair Mall, predominately on N. Mayfair Road and S. 108th Street (STH 100)

- From Shoppers World of Brookfield at N. 124th Street and W. Capitol Drive to the University of Wisconsin-Milwaukee, predominately on Capitol Drive

VISION 2050 recommends additional express bus services within Milwaukee County, and improvements to the existing express bus services that would not be replaced by rapid transit lines. The express route serving 27th Street would be extended north to Brown Deer Road and south to Southridge Mall in Greendale along W. Forest Home Avenue. Additional express routes would be added on 76th Street and Oklahoma Avenue. Stops would be spaced at least one-half mile apart, and therefore, the services would provide better travel times than local bus routes. Express services in Milwaukee County would come at least every 15 minutes nearly the entire day.

Intercity rail and bus services will provide transit connections between Milwaukee County, the Region, and destinations outside Southeastern Wisconsin. VISION 2050 recommends developing two new intercity rail lines, one connecting Chicago to Minneapolis and St. Paul via Milwaukee and Madison, and another connecting Chicago to Green Bay via Milwaukee and the Fox Valley. Both services would be operated as extensions of the existing Amtrak Hiawatha service from Chicago, and all three lines would operate at speeds up to 110 miles per hour.

Future needs for transportation improvements are derived from the future growth proposed in VISION 2050.

2020 Review and Update

Every four years, the Regional Planning Commission conducts an interim review and update of the regional land use and transportation plan, in part to address Federal requirements. The 2020 Review and Update assessed implementation to date of VISION 2050, reviewed the year 2050 forecasts underlying the plan, and monitored current transportation system performance. The 2020 Review and Update examined whether it remains reasonable for the recommendations in VISION 2050 to be accomplished over the next 30 years, given the implementation of the plan to date and available and anticipated funding for the transportation component. Based on the implementation evaluation and public input, no changes were made to the land use component of the plan. VISION 2050 will continue to recommend: focusing new urban development in

urban centers; a compact development pattern with a mix of housing types and uses; and preserving primary environmental corridors and agricultural land.

Regional Natural Areas Plan

Map 2.21 in Chapter 2 of this report presents the regional natural areas plan as it pertains to Milwaukee County. The natural areas plan[2] identifies the most significant remaining natural areas, critical species habitats, geological sites, and archaeological sites in the Region, and recommends means for their protection and management. Natural areas are tracts of land or water that contain plant and animal communities believed to be representative of the pre-European settlement landscape and critical species habitat sites are other areas that support endangered, threatened, or rare plant or animal species. The plan identifies potential sites for public or private protective ownership, and protection of other sites, insofar as it is possible, through zoning or other regulatory means without protective ownership. It also recommends preparing and implementing a detailed management plan for each site placed under protective ownership. The vast majority of natural areas and critical species habitat sites are located within environmental corridors and isolated natural resource areas. Tables 2.22 and 2.23 in Chapter 2 includes an inventory of natural areas and critical species habitat sites in the County. An update to the inventory of these areas and sites in Milwaukee County was underway as of the preparation of this plan update, and is expected to be completed in 2021.

Regional Park and Open Space Plan

The regional park and open space plan consists of two basic elements: an open space preservation element and an outdoor recreation element.[3] The open space preservation element consists of recommendations for preserving primary environmental corridors within the Region. The outdoor recreation element consists of a resource-oriented outdoor recreation element that provides recommendations for the number and location of large parks, recreation corridors, and water-access facilities, and an urban outdoor recreation element that provides recommendations for the number and distribution of local parks and outdoor

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[2]*SEWRPC Planning Report No. 42,* A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin*, September 1997, documents the 1994 inventory. SEWRPC Amendment to Planning Report No. 42,* Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin*, December 2010 documents the plan update.*

[3]*SEWRPC Planning Report No. 27,* A Regional Park and Open Space Plan for Southeastern Wisconsin: 2000*, November 1977.*

recreational facilities required in urban areas of the Region. The Milwaukee County park and open space plan[4] refines, details, and extends this regional plan. With the assistance of the Commission, Milwaukee County initiated work on an update to its park and open space plan in 2015, with the goal of extending the planning horizon to the year 2050. In Milwaukee County, the park and open space plan update recommends developing 14 undeveloped County-owned sites at five regional parks, two community parks, and seven neighborhood parks. The plan also recommends that the County develop additional trails within the Lake Michigan Corridor, the Little Menomonee River Corridor, the Menomonee River Corridor, and the Root River Corridor.

Regional Water Quality Management Plan

In 1979, SEWRPC completed and adopted a regionwide water quality management plan for Southeastern Wisconsin as a guide to achieving clean and healthy surface waters within the seven-county Region. The design of the plan is, in part, to meet the Congressional mandate that the waters of the United States be "fishable and swimmable" to the extent practical. It is set forth in SEWRPC Planning Report No. 30, *A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000*, Volume One, *Inventory Findings*, September 1978; Volume Two, *Alternative Plans*, February 1979; and Volume Three, *Recommended Plan*, June 1979. Subsequently, SEWRPC completed a report documenting the updated content and implementation status of the regional water quality management plan: SEWRPC Memorandum Report No. 93, *A Regional Water Quality Management Plan for Southeastern Wisconsin: An Update and Status Report*, March 1995. This status report also documents the extent of progress made toward meeting the water use objectives and supporting water quality standards set forth in the regional plan.

The 2007 regional water quality management plan update for the greater Milwaukee watersheds[5,6] addressed three major elements of the original regional water quality management plan: the land use element; the point source pollution abatement element; and the nonpoint source pollution abatement element, and it also included instream and riparian habitat considerations. Conduct of the regional water

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[4]*SEWRPC Community Assistance Planning Report No. 132,* A Park and Open Space Plan for Milwaukee County*, November 1991.*

[5]*SEWRPC Planning Report No. 50,* A Regional Water Quality Management Plan Update for the Greater Milwaukee Watersheds*, December 2007, amended May 2013.*

[6]*The greater Milwaukee watersheds are the Kinnickinnic, Menomonee, Milwaukee, and Root River watersheds, the Oak Creek watershed, and the Lake Michigan direct drainage area, of which portions of the Menomonee and Milwaukee River watersheds, and the Lake Michigan direct drainage area, are located in Ozaukee County.*

quality management plan update planning effort was in conjunction with development of the MMSD 2020 facilities plan. The 2013 amendment revisions were based on changes to the watershed water quality models necessitated by findings during additional modeling efforts conducted after the plan report was issued. Conduct of those modeling efforts was under a separate study directed toward evaluating the possible effects of climate change on water quality in the streams in the study area.

The original regional water quality management plan and its subsequent updates and status reports include specific recommendations for reducing nonpoint source pollutant levels. Evaluation of the degree to which the adopted water use objectives for rivers and streams could meet recommended plan conditions within the greater Milwaukee watersheds was based on detailed water quality modeling.

Regional Water Supply Plan

The Commission has conducted a regional water supply study and planning program for Southeastern Wisconsin.[7] The regional water supply plan together with past SEWRPC groundwater inventories and development of a ground water simulation model[8,9] form the basis of the SEWRPC regional water supply management program. These three elements were prepared in collaboration with the U.S. Geological Survey (USGS), the Wisconsin Geological and Natural History Survey, the University of Wisconsin-Milwaukee, the Wisconsin Department of Natural Resources (WDNR), and many of the area's water supply utilities.

The regional water supply plan includes the following major components:

- Identification of public utility water supply service areas
- Recommendations for source of water supply for identified service areas
- A recommendation for implementing comprehensive water conservation programs, including both supply side efficiency measures and demand side conservation measures with the scope and content of these programs to be determined on a utility-specific basis reflecting the type and sustainability of the source of supply and probable future water supply infrastructure requirements

[7]*SEWRPC Planning Report No. 52,* A Regional Water Supply Plan for Southeastern Wisconsin*, December 2010.*

[8]*SEWRPC Technical Report No. 37,* Groundwater Resources of Southeastern Wisconsin*, June 2002.*

[9]*SEWRPC Technical Report No. 41,* A Regional Aquifer Simulation Model for Southeastern Wisconsin*, June 2005.*

- Identification of important groundwater recharge areas and recommendations for protecting and preserving recharge areas that have a high or very high recharge potential

- Recommendations for implementing state-of-the-art stormwater management practices which, to the extent practicable, will maintain the natural recharge of areas committed to urban land use development

- Recommendations related to siting new high-capacity wells

- Recommendations for installing enhanced rainfall infiltration systems in areas where evaluations conducted in conjunction with the siting of high-capacity wells in the shallow aquifer indicate probable reductions in baseflow on nearby streams or water levels in nearby lakes and wetlands due to the installation and operation of these wells

The recommendations and guidance given in the plan should be considered by municipalities in Milwaukee County when evaluating the sustainability of proposed developments and in conducting local land use planning.

Regional Chloride Impact Study

In March 2016, SEWRPC completed a prospectus[10] for a comprehensive study of the environmental impacts of the use of chloride on the surface water and groundwater resources in the Region. SEWRPC is currently preparing the comprehensive study. The study will provide an inventory of the historical and present sources of chloride loads to surface and groundwater resources; assess the impacts of the loads on the environment; utilize a state-of-the-art component addressing current research and emerging technologies and policies related to mitigating the environmental effects of chloride from multiple sources; identify alternate means of achieving desired levels of managing sources of chloride; and provide general recommendations for reducing the undesirable environmental impacts of the use of chloride. The primary purpose of the study is to identify the relationship between significant sources of chloride to the environment and the chloride content of surface and groundwater within the Region.

Study work began in summer 2017 and included the installation of 37 conductance monitoring stream locations throughout the Region, which was completed in fall 2018. The intent is to monitor the streams for

[10]*Documented in a SEWRPC report titled,* Prospectus for Chloride Impact Study for the Southeastern Wisconsin Region*, March 2016.*

two winters from 2018 to 2020. Chloride loads entering surface and groundwater resources can potentially come from several significant sources, including road salt applied for anti-icing and deicing roads, sidewalks and parking lots; water softening systems and other systems that discharge to sanitary sewers or private onsite wastewater treatment systems; salt storage areas; large agricultural feed lots; fertilizers; landfills; chemical manufacturing; and food processing. However, salt applied to roads, parking lots, and public walkways are the most visible of the potential chloride sources, and thus, receives the most attention.

The negative environmental impacts regarding the use of chloride are significant because chloride introduced to surface water and groundwater resources is not treatable by the best management practices applicable to other forms of water pollution. There are no natural processes by which sodium and chloride concentrations contained in contaminated runoff or other discharges are broken down, metabolized, safely absorbed, or otherwise removed from the environment. Ultimately, chloride will accumulate over time in surface lakes and reservoirs and in groundwater, thereby constituting a significant threat to the future quality of life within the Region.

3.3 COUNTY AND MULTI-JURISDICTIONAL PLANS

Milwaukee County Park and Open Space Plan

The Milwaukee County park and open space plan was adopted in 1991 and is currently being updated.[11] The plan consists of both an open space preservation element and an outdoor recreation element, intended to, respectively, protect areas containing important natural resources and to provide major parks, areawide trails, and resource-oriented recreational facilities. Major or regional parks are defined as publicly owned parks at least 100 acres in size providing opportunities for such resource-oriented activities as camping, golfing, picnicking, and swimming. Map 2.23 in Chapter 2 of this report shows County- and State-owned park and open space sites in Milwaukee County as of 2020.

The regional park and open space plan, as amended by the park and open space plan for Milwaukee County, contains recommendations which, if implemented, would provide residents of Milwaukee County with opportunities to participate in a wide range of resource-oriented outdoor recreation activities. Those recommendations are concerned with providing major or regional parks, which provide opportunities for intensive resource-oriented outdoor recreation activities, and recreation corridors, which provide opportunities for various trail-oriented activities. In addition, the plan contains recommendations for

[11] *SEWRPC Community Assistance Planning Report No. 132,* op. cit.

protecting and preserving open space lands, including natural resource features such as woodlands, wetlands, and floodplains, located within environmental corridors and isolated natural resource areas.

Milwaukee County Land and Water Resources Management Plan

The land and water resources management plan (LWRMP) was originally adopted by the County Board in 2001. A revised and updated version of the plan was approved in 2006. The second edition of the Milwaukee County LWRMP was adopted in 2011. The County submitted an interim plan to the Department of Agriculture, Trade and Consumer Protection (DATCP) in 2016 and DATCP extended approval through 2021. The 2011 plan identifies a set of five major goals related to County land and water resources. These goals include improving water quality by reducing sediment and nutrient delivery to surface waters in Milwaukee County; protecting, maintaining, and restoring land and water resources in Milwaukee County; enhancing Lake Michigan bluff protection initiatives; maintaining the existing information network and land information web portal; and limiting the introduction and reducing the spread of invasive species in Milwaukee County. The plan identifies the natural resources and the current condition of those resources, the limitations of those resources, and sets forth a strategy that addresses the natural resource issues and problems. This plan also provides a means to educate the public about these issues and problems and include the public in the steps necessary to protect the natural resource base. The plan further defines a work plan, which sets forth the objectives and actions to be implemented in order to achieve the goals associated with each issue and identifies the agency or organization responsible for carrying out the listed actions.

Milwaukee County Pond and Lagoon Management Plan

Milwaukee County parklands include 68 lakes, ponds, and lagoons comprising over 120 acres of surface water. These waterbodies enhance park aesthetics while providing a variety of recreational opportunities, including fishing, boating, and ice skating. In addition, some of these lakes, ponds, and lagoons provide stormwater detention, which serves to improve water quality in receiving waters. Concerns about water quality and aesthetics have arisen as degraded conditions along some lagoon shorelines have become more apparent. Residents have also expressed concern over the impacts of poor water quality on fishing and on the health implications to humans of exposure to the water in the ponds. In response to these concerns, Milwaukee County developed a park pond and lagoon management plan.[12] The objectives of this plan were to:

[12] *Milwaukee County Environmental Services,* Milwaukee County Pond & Lagoon Management Plan, *June 2005.*

- Evaluate water quality conditions in representative lagoons
- Identify and prioritize lagoon needs and set long-term goals
- Identify water quality management objectives
- Compare observed conditions to water quality objectives
- Recommend long-term and short-term actions

The study identified several problem issues related to the lakes, ponds, and lagoons, including shoreline erosion; the presence of nuisance algae and aquatic plants, related to high nutrient loadings; elevated concentrations of fecal indicator bacteria, such as *E. coli*; litter; the presence of rough fish; and siltation. The plan made three general recommendations for all park lakes, ponds, and lagoons:

- Identify and deploy alternative management strategies to mowing grass to short lengths directly adjacent to these waterbodies
- Pursue grant funding for shoreline stabilization projects
- Continue water quality monitoring of these waterbodies in order to document conditions both before and after restoration projects

The plan also made specific project recommendations for ponds at Dineen, Humboldt, and Jacobus Parks. These recommendations were mostly concerned with shoreline stabilization and aquatic macrophyte management projects. In 2017, the County resampled various lakes, ponds, and lagoons to continue to evaluate the water quality issues at the sites, and updated and inventoried the data associated with those sites.

Milwaukee County Parks Ecological Restoration and Management Plans

The Milwaukee County Department of Parks Natural Areas Program is an inspiring use of partnerships to restore the ecology for the purposes of both science and beauty in Wisconsin's largest urbanized area. The program has developed over 75 community partnerships and a large volunteer corps to assist with managing the County Park's 10,000 acres of natural areas and agricultural lands. The Natural Areas Program also prepares Ecological Restoration and Management Plans for some of the County's natural areas. The primary goal of these plans is to restore and manage the natural resources within County parks, however, another goal of equal importance is connecting the citizens of the County to the publicly owned natural

areas. The Ecological Restoration and Management Plans assist in prioritizing sites and management activities within natural areas and each plan serves as a comprehensive guide to manage the natural areas at each site in order to maintain a high level of ecological and aesthetic value.

These plans are not all-inclusive and may not provide every recommendation that could enhance the natural area or corridor ecologically, but these plans detail a number of progressive projects that will help stabilize the ecology of the natural areas. In most cases, the natural and biological diversity has persisted in these natural areas as evidenced by the various types of flora and fauna observed by the County Parks Department and SEWRPC. Some of the natural areas identified in these County plans may also be part of SEWRPC's regional natural areas inventory and these lands are recommended to be protected or preserved by any means necessary.

Ecological restoration and management plans prepared by the County Parks Department since 2010 include: the Grobschmidt Park Plan, the Franklin Savana Plan, two Oak Creek Parkway Plans, the Falk Park Plan, the Rawson Woods Plan, the Barloga Woods Plan, and the Cudahy Nature Preserve Plan. The primary goals identified in these plans include: protecting existing high quality natural areas; maintaining and increasing native plant and wildlife diversity; reducing the negative impact of invasive species; providing passive recreational opportunities for the public; engaging the public as part of the restoration management process; and enhancing and maintaining the environmental corridor.

In addition, in 2015, the City of Milwaukee consulted with TERRA Engineering to develop the Copernicus Park Master Plan for the County-owned park. The area surrounding the park has a history of surface flooding primarily due to a system of aging and undersized infrastructure that has been unable to keep up with the growth and development in the area over the years. Upgrading sewer infrastructure and developing a stormwater mitigation facility were solutions recommended during local meetings. Copernicus Park was identified as a potential location for a stormwater mitigation facility during the meetings. The City of Milwaukee determined that it would need to partner with the County Parks Department in order to implement strategies for stormwater mitigation at Copernicus Park.

Thus, the purpose of the Copernicus Park Master Plan was to develop a comprehensive concept for the park land in context with its location, natural resources, and community vision. The primary goal of the plan was to mitigate localized flooding in the neighborhood while improving park facilities and programming opportunities.

Milwaukee County Coastal Resources Inventory

In 2019, Milwaukee County received a grant from the Wisconsin Coastal Management Program's (WCMP) Coastal Resilience Grant Program to undertake a comprehensive study to identify and address the vulnerability of its coastal resources, facilities, assets, and infrastructure to extreme weather. The report,[13] which was prepared by the Milwaukee County Environmental Services Unit in partnership with WCMP and GZA Environmental, Inc., inventories Milwaukee County's coastal resources and summarizes their current value, condition, and vulnerability. Milwaukee County has extensive property holdings along the Lake Michigan shoreline, primarily as part of the Milwaukee County Park System, and maintains a variety of recreational assets and facilities in its shoreline parks. Extreme weather has damaged Milwaukee County's coastal natural resources and associated recreational facilities and it is anticipated that damaging events will continue to occur in the future.

The report summarizes Milwaukee County's coastal resources and their vulnerability to weather driven damage and evaluates the resources from a resiliency perspective. Documenting the County's coastal resources vulnerability to extreme weather will also help in the pursuit of construction grants and potentially help stimulate greater investments in funding coastal protections by the State and Federal governments. In 2018, a Coastal Resilience Grant Self-Assessment was conducted and included ratings on coastal hazard issues such as shoreline recession and bluff failure; coastal flooding; shore protection damage; beach loss; beach impairment; and port, harbor, and marina damage and navigation impairment.

Coastal assets inventoried in the report were provided condition, vulnerability, and valuation assessments, and those asset features included: athletic courts and fields, aquatic features, beaches, bluffs, bridges, buildings, golf courses, marina components, non-paved trails, open vegetated areas, paved areas, playgrounds, shore protection devices, storage tanks, and stormwater management features. A resiliency rating was also provided for each asset, and those assets were then grouped into three levels of total resiliency priority categories. An asset with a "high priority" designation signified a severe or permanent risk of damage. The report documents the 40 highest priority rated assets in Milwaukee County that have the most potential risk.

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[13] *Milwaukee County,* Milwaukee County Coastal Resources Inventory, *County Environmental Services Unit, October 7, 2020.*

In addition, about 13 percent of the assets inventoried were categorized to be in poor condition and about 22 percent of the assets inventoried were considered highly vulnerable. Assets with the highest risks were beaches, groins (a shoreline protection device), and parking lots.

Milwaukee County Coastline Management Guidelines

In 2019, Milwaukee County requested that SEWRPC prepare a set of coastline management guidelines[14] to be used by County staff to evaluate projects affecting County-owned assets with respect to coastline area impacts. To develop the guidelines, an inventory of existing conditions was conducted, including natural resources and urban development along the Milwaukee County Lake Michigan coastline; a review of existing municipal, State, and Federal coastline management guidelines/policies and best management practices; and an examination of trends in the stability of the Lake Michigan bluffs within the County. Milwaukee County has always had a substantial interest in protecting County-owned assets along Lake Michigan. As Lake Michigan water levels approached the lake's highest measured level, sections of bluffs along Milwaukee County's coastline collapsed, and these properties and others along Milwaukee County's lakefront are becoming increasingly vulnerable to coastline impacts. Lakefront property may be best protected from future coastline impacts through the implementation of coastline management guidelines based upon best practices.

The guidelines offer a framework for promoting bluff slope stability within County-owned lands along the Lake Michigan coastline, and the County will seek to attain the following long-term management guidelines of the Lake Michigan Coastline Management Zone:

- Ensure appropriate public access to and recreational opportunities within the Lake Michigan Coastline Management Zone without compromising the stability of the Lake Michigan bluff slope or the integrity of the Lake Michigan shoreline

- Ensure access for the maintenance of stormwater facilities within the Lake Michigan Coastline Management Zone

- Limit land-disturbing activities within the Lake Michigan Coastline Management Zone that adversely impact natural functions of the land

[14] *SEWRPC Memorandum Report No. 248,* Milwaukee County Coastline Management Guidelines*, report completed in February 2021 (awaiting publication).*

- Prevent erosion and sedimentation that would alter the natural drainage system. In areas where erosion and sediment control practices may not be effective, activities that increase erosion should be severely limited

- Assess bluff conditions around existing facilities and infrastructure within the Lake Michigan Coastline Management Zone in order to identify both short- and long-term detrimental impacts

- Severely limit actions that may detrimentally alter natural and ecologically stable conditions characteristic of the Lake Michigan coastline

- Preserve or enhance the natural character and aesthetic values of the Lake Michigan viewshed in a sustainable way

- Preserve undeveloped areas within the Lake Michigan Coastline Management Zone that contain a unique or sensitive resource

Comprehensive Watershed and Basin Plans

SEWRPC has developed comprehensive plans for the Kinnickinnic River watershed,[15] the Menomonee River watershed,[16] the Milwaukee River watershed,[17] the Oak Creek watershed,[18] and the Root River watershed.[19] The Kinnickinnic River watershed encompasses 24.5 square miles, or about 10 percent of the total land area of Milwaukee County. Within the County, the Menomonee River watershed encompasses 55.3 square miles, or about 23 percent of the total land area of the County; the Milwaukee River watershed encompasses 57.7 square miles, or about 24 percent of the total land area of the County; the Oak Creek watershed encompasses 27.4 square miles, or about 11 percent of the total land area of the County; and the Root River

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[15] *SEWRPC Planning Report No. 32,* A Comprehensive Plan for the Kinnickinnic River Watershed, *December 1978*.

[16] *SEWRPC Planning Report No. 26,* A Comprehensive Plan for the Menomonee River Watershed*, Volume One,* Inventory Findings and Forecasts, *October 1976; Volume Two,* Alternative Plans and Recommended Plan, *October 1976*.

[17] *SEWRPC Planning Report No. 13,* A Comprehensive Plan for the Milwaukee River Watershed*, Volume One,* Inventory Findings and Forecasts, *December 1970; Volume Two,* Alternative Plans and Recommended Plan, *October 1970*.

[18] *SEWRPC Planning Report No. 36,* A Comprehensive Plan for the Oak Creek Watershed, *August 1986*.

[19] *SEWRPC Planning Report No. 9,* A Comprehensive Plan for the Root River Watershed, *July 1966*.

watershed encompasses 57.7 square miles, or about 24 percent of the total land area of the County. Together these comprehensive watershed plans cover approximately 92 percent of the County's land area. These plans include delineations of floodplain boundaries along many streams in each watershed. Plan recommendations were developed for land use, park and open space needs, stormwater and floodland management, water quality management, and fisheries management. These watershed plans also recommend maintaining and preserving primary and secondary environmental corridors and isolated natural resource areas in open uses.

As part of its planning activities related to watershed management, the WDNR has prepared State of the Basin Reports for each basin within the County to provide an overview of land and water resource quality, identify challenges facing these resources, and outline future actions. The State of the Basin reports for Milwaukee County include the Milwaukee Basin, which encompasses the Kinnickinnic River, Menomonee River, and Milwaukee River watersheds and adjacent portions of the Lake Michigan direct drainage area,[20] and the Root-Pike basin, which in Milwaukee County encompasses the Root River and Oak Creek watersheds and adjacent portions of the Lake Michigan direct drainage area.[21] The WDNR recently updated its water quality plan for the Oak Creek watershed.[22] The WDNR Basin reports identify the need to monitor and manage high priority issues and actions to restore and protect each basin's resources.

Nine-Key Element Watershed Plans

In 1987, Congress enacted Section 319 of the Clean Water Act (CWA), which established a national program to control nonpoint sources of water pollution. Section 319 grant funding is available to states, tribes, and territories for the restoration of impaired waters and to protect unimpaired and high-quality waters. Watershed plans funded by CWA Section 319 funds must address nine key elements that the USEPA has identified as critical for achieving improvements in water quality.[23] In addition, projects implemented using Federal funds provided under Section 319 must directly implement a watershed-based plan that USEPA has determined to be consistent with the nine elements. Thus, a finding of consistency with the nine elements is a significant benefit to implementing the plan because it makes projects recommended under the plan

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[20] *Wisconsin Department of Natural Resources,* The State of the Milwaukee River Basin, *PUBL WT-704-2001, August 2001.*

[21] *Wisconsin Department of Natural Resources,* The State of the Root-Pike River Basin, *PUBL WT-700-2002, May 2002.*

[22] *Wisconsin Department of Natural Resources,* Oak Creek Frontal Lake Michigan TWA WQM 2017, *September 2017.*

[23] *U.S. Environmental Protection Agency,* Handbook for Developing Watershed Plans to Restore and Protect Our Waters*, EPA 841-B-08-002, March 2008.*

eligible for Federal funding. The nine elements from the USEPA Nonpoint Source Program and Grants Guidelines for States and Territories are as follows:

1. Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed.

2. Estimates of the load reductions expected from management measures.

3. Descriptions of the nonpoint source management measures that will need to be implemented to achieve load reductions in element 2, and a description of the critical areas in which those measures will be needed to implement this plan.

4. Estimates of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.

5. An information and education component used to enhance public understanding of the plan and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.

6. A reasonably expeditious schedule for implementing the nonpoint source management measures identified in this plan.

7. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.

8. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.

9. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under element eight.

Three nine-key element plans have been developed that encompass portions of Milwaukee County: the Kinnickinnic and Root River watershed restoration plans and the Wind Point watershed-based plan. These plans were reviewed by the WDNR and USEPA and found to be consistent with the nine key elements. As of October 2020, the Menomonee River and the Oak Creek watershed restoration plans were being developed by Southeastern Wisconsin Watersheds Trust, Inc (Sweet Water) and SEWRPC, respectively, and both plans are being developed to comply with the USEPA's nine minimum elements of a watershed plan. A finding that the plan is consistent with the nine key elements provides eligibility for nonpoint source pollution funding through Section 319 of the Federal Clean Water Act for implementing projects in the plan's study area for a period of ten years.

The proceeding section identifies the watershed restoration plans that have been prepared or are being prepared within Milwaukee County, including those plans that are in compliance with or are being prepared to be in compliance with the USEPA's nine minimum elements of a watershed plan.

Watershed Restoration Plans

Kinnickinnic and Menomonee River Watershed Restoration Plans

The Milwaukee Metropolitan Sewerage District, in collaboration with Sweet Water), has developed watershed restoration plans for the Kinnickinnic and Menomonee River watersheds.[24] These plans were developed within the overall framework provided by the SEWRPC regional water quality management plan update for the greater Milwaukee watersheds, and their primary purpose is to identify specific short-term and long-term actions to improve water quality. The recommended actions were identified based upon consideration of many factors, including overall effectiveness, scientific underpinning, regulatory considerations, and stakeholder goals.

Through the stakeholder input of Sweet Water, three major focus areas emerged for these watershed restoration plans: bacteria/public health, habitat, and nutrients/phosphorous. These focus areas reflect the linkage between water quality parameters and water use in the Kinnickinnic and Menomonee River watersheds. Relative to these focus areas, the plans identify a set of targets to be achieved over the plan period.

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[24]*Milwaukee Metropolitan Sewerage District,* Kinnickinnic River Watershed Restoration Plan, *April 2010; Milwaukee Metropolitan Sewerage District,* Menomonee River Watershed Restoration Plan, *April 2010.*

These plans sought to identify management strategies that could be developed to meet the targets in a cost-effective manner. The approach used is predicated on the assumption that the existing regulations for point and nonpoint sources of pollution will be implemented. The analysis used in developing the plans assumes the management strategies recommended to meet these regulations, as identified in the regional water quality management plan update, are in place and would serve as the foundation upon which new management strategies are added to achieve the desired goals. The watershed restoration plans categorize these management strategies, comprised of facilities, policies, operational improvements, and programs into three categories: existing regulatory management strategies, other management strategies in various stages of implementation, and management strategies recommended for implementation under the regional water quality management plan update for the greater Milwaukee watersheds, but which have not yet been implemented.

The plans also prioritize the identified management strategies. As part of this prioritization, they identify as foundational actions those management strategies whose implementation is necessary for the full benefit of other strategies to be achieved.

In 2018, the Kinnickinnic River Watershed Restoration Plan was updated[25] by Sweet Water and was developed to comply with the USEPA's nine minimum elements of a watershed plan. The plan update was prepared to make watershed improvements through a comprehensive and collaborative implementation of priority projects and practices in four main categories: water quality, flood management and water quantity, habitat, and recreational use. The plan recognized that of the 25 stream miles in the Kinnickinnic River watershed, only five miles were meeting their designated uses, and the remaining segments were listed as impaired, and those impairments included: recreational use restrictions, habitat degradation, low dissolved oxygen, and chronic aquatic toxicity.

There have been improvements made at the municipal and regional level that have reduced combined sewer system overflows and other causes of poor water quality, but stressors continue to degrade water quality in the watershed. Urban and stormwater runoff were identified as the leading cause of TP, TSS, and FC pollutants. In addition, several related indicators of poor water quality in the Kinnickinnic River included a lack of riparian habitat, increasing frequency of flood events, a lack of widespread policy supporting water quality improvement efforts, and a growing disconnect between community members and their water

[25] *Southeastern Wisconsin Watersheds Trust, Inc.,* The Kinnickinnic River Watershed Updated Implementation Plan, A Comprehensive Watershed Restoration Plan, *November 2018*.

resources. Impervious pavement in the Kinnickinnic River Watershed is also a large contributor to runoff and resulting pollutant loading of TSS and TP. In the hopes of reducing high volumes of untreated and pollutant heavy stormwater to runoff into waterways, the plan identified critical priority "hot spots" on impervious and commercial lots to target for green infrastructure implementation. These priority hotspots were determined by identifying areas with high densities of impervious pavement and the commercial lots within those areas with the goal of targeting clusters instead of individual sources.

The plan prioritizes projects that address numerous deficiencies in order to most concisely address the issues in the watershed. By identifying and evaluating past barriers to successful implementation of the multitude of prior plans in the area, the plan continued to use the adaptive process of "Plan, Do, Check, Act" presented in the 2010 Kinnickinnic River Watershed Restoration Plan.

An update to the Menomonee River Watershed Restoration Plan is currently being prepared by Sweet Water. The plan will update the plan approved in 2010 by the WDNR and USEPA and is being developed to comply with the USEPA's nine minimum elements of a watershed plan.

Root River Watershed Restoration Plan

SEWRPC, in collaboration with Root-Pike Watershed Initiative Network (Root-Pike WIN) and Sweet Water, developed a watershed restoration plan for the Root River watershed.[26] The Root River watershed restoration plan is a second-level plan for managing and restoring water resources in the Root River watershed. It was prepared in the context of the regional water quality management plan update for the greater Milwaukee watersheds, and the plan recommendations were for focused implementation from 2014 to 2019, but the plan is comprehensive in scope and implementation will continue well beyond 2019. The plan seeks to develop specific, targeted recommendations to preserve, restore, and improve the natural environment by focusing on four areas: water quality, recreational access and use, habitat conditions, and flooding. The water quality recommendations include measures to reduce the levels of phosphorus, bacteria, and pollutants.

The Root River watershed contains a mixture of urban and rural land uses, with urban development concentrated in Milwaukee and Waukesha Counties, the City of Racine, and the southeastern portion of the watershed. The remainder of the watershed, about 66 percent, is primarily influenced by rural land uses. Nonpoint source pollution contributed by urban and rural stormwater runoff is a major source of pollution

[26]*Documented in SEWRPC Community Assistance Planning Report No. 316,* A Restoration Plan for the Root River Watershed*, July 2014*.

in the Root River watershed. The plan provides numerous strategies to reduce pollution from both urban and rural runoff, and also recommends implementing strategies from MMSD's green infrastructure plan. The most important component to the existing and future economic, social, and recreational well-being of the Root River watershed is to preserve and develop riparian buffers, which are natural or relatively undisturbed lands located adjacent to waterbodies and to corridor lands in need of protection. Riparian buffers protect surface- and ground-water quality and recharge, help protect wildlife, allow native species to flourish while discouraging unwanted species, and provide natural areas for rivers. In addition to riparian buffers, the plan also recommends preserving an expanding open spaces through native landscaping and small wetlands, woodlands, and prairies.

The Root River Watershed Restoration Plan was developed to meet the requirements of the USEPA's nine elements for a Watershed Plan. However, when the plan was submitted to the WDNR and USEPA for their review, which assures plan consistency with the nine minimum elements of a watershed-based plan that USEPA considers critical for achieving improvements in water quality, both organizations requested several clarifications regarding the plan. A memorandum report[27] was subsequently prepared by SEWRPC that presented the Root River Watershed Restoration Plan supplemental information that the WDNR and USEPA specifically requested, and in addition, the plan provided additional quantification relative to implementing several specific recommendations. In 2015, the WDNR and USEPA determined that the Root River Watershed Restoration Plan, as supplemented by the Memorandum Report, is consistent with the USEPA nine minimum elements of a watershed-based plan, thus allowing projects recommended under the plan eligible for Federal and State funding.

Wind Point Watershed-Based Plan

Root-Pike Watershed Initiative Network (Root-Pike WIN) hired Applied Ecological Services, Inc. (AES) to conduct a watershed planning effort and produce a comprehensive watershed-based plan for the Wind Point watershed.[28] This plan meets the requirements of the USEPA to develop and implement a watershed-based plan designed to enable waterbodies within the watershed to achieve water quality standards/criteria (i.e. nine key element watershed plan).

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[27]*SEWRPC Memorandum Report No. 220,* Supplemental Information Developed for the Root River Watershed Restoration Plan, *April 2015.*

[28]*Documented in Root-Pike Watershed Initiative Network,* Wind Point Watershed-Based Plan, A Guide to Protecting and Restoring Watershed Health, Final Report*, May 2015, prepared by Applied Ecological Services, Inc.*

Within Milwaukee County, the watershed is located along Lake Michigan in the Cities of Oak Creek and South Milwaukee and is a direct drainage to Lake Michigan. The watershed planning process is a collaborative effort involving voluntary stakeholders whose primary intent is to provide a healthy watershed and lakefront by protecting, restoring, and managing the cultural and ecological aspects of green infrastructure through watershed plan implementation, education, and stewardship.

This plan defines green infrastructure as a network of connected systems that include natural areas (stream corridors, wetlands, floodplain, woodlands, and grasslands) and other open spaces or working lands (farms, parks/ball fields, golf courses, school grounds, detention basins, and large residential parcels). Protecting, restoring, and managing these areas within the watershed will help conserve natural ecosystem values and functions, sustain clean air and water, and provide a wide array of benefits to wildlife and people. Primary and secondary environmental corridors identified by SEWRPC will serve as the foundation of the green infrastructure network within the watershed.

The Wind Point watershed-based plan focuses on programmatic and site-specific recommendations. Programmatic recommendations are general watershed-wide remedial, preventative, and regulatory actions and site-specific recommendations involve specific locations where projects can be implemented to improve surface and groundwater quality, green infrastructure, and aquatic and terrestrial habitats. Site-specific high priority critical area recommendations within the watershed include: detention basin retrofits, wetland restoration, stream and ravine stabilization, riparian area restoration, green infrastructure protection areas, agricultural management practices, and bluff stabilization.

Having a watershed-based plan will allow Wind Point watershed stakeholders to access Federal and State grant funding and other funding for watershed improvement projects recommended in the plan.

Oak Creek Watershed Restoration Plan

The Commission, in collaboration with Milwaukee County, MMSD, and the City of South Milwaukee, is in the process of developing a watershed restoration plan for the Oak Creek watershed.[29] The Oak Creek watershed restoration plan will be a second-level plan for managing and restoring water resources in the Oak Creek watershed. It is being prepared in the context of the regional water quality management plan update for the greater Milwaukee watersheds, and will provide a guide for addressing the water quality

[29]*Documented in SEWRPC Community Assistance Planning Report No. 330,* A Restoration Plan for the Oak Creek Watershed*. The plan is currently being prepared and is planned to be completed in 2021.*

impairments that have been identified in the watershed, and it will also include specific, targeted restoration and improvement recommendations to address four focus issues: water quality, recreational access and use, habitat conditions, and targeted stormwater drainage and flooding issues. The four focus issues were derived from the findings of the regional water quality management plan for the greater Milwaukee watersheds and from themes that emerged from a series of discussions by elected officials, State and local government staff, nongovernmental organizations, landowners, and residents. In addition, the plan will address the status of the Oak Creek Mill Pond and the associated dam, considering their relationship to multiple focus issues.

The plan is being prepared to meet the USEPA's nine minimum elements for a watershed-based plan, thus allowing projects recommended under the plan eligible for Federal and State funding.

Remedial Action Plan for the Milwaukee Estuary Area of Concern (AOC)

The Great Lakes and the rivers that feed them have been historically important centers of trade and industry in Wisconsin. As cities grew around the economic hubs, river and harbor sediments were polluted by chemicals, which contributed to the loss of important fish and wildlife habitat. The Great Lakes rivers and harbors that have been most severely affected by pollution and habitat loss are known as "Areas of Concern," or AOCs. In 1987, as part of an international agreement (the Great Lakes Water Quality Agreement) between the United States and Canada, there were 31 U.S.-based AOCs identified across the Great Lakes, including five AOCs in the State of Wisconsin. The Milwaukee Estuary was designated an Area of Concern because of historical modifications and pollutant loads that contributed toxic contaminants to the AOC and Lake Michigan. Sediments contaminated with PCBs (polychlorinated biphenyls), PAHs (polycyclic aromatic hydrocarbons) and heavy metals contribute to the beneficial use impairments within the boundaries of the AOC. Eleven of the possible 14 beneficial uses identified by the International Joint Commission are impaired or suspected to be impaired for the Milwaukee Estuary AOC.

The original boundaries of the Milwaukee Estuary AOC included the Milwaukee River downstream from the former North Avenue Dam; the Menomonee River downstream from 35th Street; the Kinnickinnic River downstream from Chase Avenue; the inner and outer harbors; and the nearshore waters of Lake Michigan, bounded by a line extending north from Sheridan Park to the City of Milwaukee's Linnwood water intake. In July 2008, the EPA approved expanding the geographic boundaries for the Milwaukee Estuary Area of Concern due to evidence showing contributions of toxic substances from upstream sources that have accumulated since the boundaries were originally delineated in 1980. The expanded boundaries includes the Milwaukee River downstream from the confluence with Cedar Creek to the former North Avenue Dam,

which also includes the entire length of Lincoln Creek and Cedar Creek from Bridge Road to the confluence with the Milwaukee River, and the Menomonee River downstream from the confluence with the Little Menomonee River to 35th Street, which includes the Little Menomonee River downstream from Brown Deer Road to the confluence with the Menomonee River.

The WDNR has worked with community stakeholders to develop a Remedial Action Plan[30] since 1991. The Remedial Action Plan is updated regularly to summarize progress made in the AOC and share the progress with various partners and stakeholders. The plan includes a summary of the progress towards removing beneficial use impairments and tracks the progress of projects in the AOC which may delist or remove the Area of Concern designation. The plan updates continue to identify goals and actions necessary to address legacy contamination in the AOC. The main priorities for the Milwaukee Estuary AOC include:

- Remediating contaminated sediments in tributaries and nearshore waters of Lake Michigan
- Controlling nonpoint source pollution
- Improving water quality for recreation
- Enhancing fish and wildlife habitat and populations

The WDNR and various partners are working to clean up sediments, prevent excessive algal growth, control storm water pollution, improve beach water quality, enhance fish and wildlife populations, and restore habitat. Since 1991, approximately 300,000 cubic yards of sediment have been removed; the North Avenue, Falk, and Lime Kiln Dams have been removed; the Mequon-Thiensville fishway passage has been completed; concrete-lined river channels have been restored in portions of the Kinnickinnic River, Menomonee River, and Underwood Creek; and citizen monitoring of fish impediments in AOC tributaries are continually being conducted. The WDNR also continues to perform surface water and sediment sampling to determine if PFAS (per- and poly-fluoralkyl substances) are present in areas that are targeted for potential remedial dredging in the Milwaukee Estuary Area of Concern.

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[30] *The most recent updated WDNR plan is entitled,* Remedial Action Plan Update for the Milwaukee Estuary Area of Concern*, August 2020. A complete list of remedial action plans prepared since 1991 can be located at https://dnr.wisconsin.gov/topic/GreatLakes/Milwaukee.html.*

MMSD 2050 Facilities Plan

The Milwaukee Metropolitan Sewerage District (MMSD) is currently developing a 2050 Facilities Plan,[31] which will identify the projects and other actions required to meet regulatory and permit requirements through the 2020 to 2040 regulatory planning period and to address MMSD's 2050 Foundational Goals through 2050. The plan addresses long range planning through the year 2050 from an asset management perspective. Major asset areas addressed in the plan include the conveyance and storage system (the MMSD conveyance and deep tunnel system); the water reclamation facilities and biosolids system (the two MMSD water reclamation (wastewater treatment) facilities); the watercourse and flood management system (watercourses under MMSD jurisdiction); the Green infrastructure system; and the District's administrative facilities. The plan also outlines social, economic, and environmental aspects that will influence future facilities development and provides a plan to protect the quality of the Region's water resources as well as to reliably and sustainably meet the needs of growth and redevelopment in a cost-effective manner.

The plan uses elements of an asset management approach to direct the efficient management of MMSD's infrastructure, because the approach was used in the previous facilities report (2007), and that approach has helped improve the quality of area waterways and Lake Michigan. During the planning process, MMSD assessed the condition of its systems and associated risks, established needs for improvement, evaluated options to address the system needs, and recommended the projects and other actions needed to continue to meet existing and anticipated permit requirements and projected future conditions.

The plan also included an integrated approach to watershed management that involves interjurisdictional opportunities and limitations related to wastewater conveyance and treatment, stormwater management, flood risk reduction, and regional water supply strategies. This approach will focus on the infrastructure of the watersheds, seeking a healthy balance between grey and green infrastructure.

Foundational goals identified in the 2050 plan include:

- Changing MMSD from an organization that impacts the environment to an organization that benefits the environment

- Incorporating new technologies and operational improvements to minimize MMSD's financial burden on ratepayers

[31] *Milwaukee Metropolitan Sewerage District,* 2050 Facilities Plan, *Draft Report, July 2020.*

- Integrating Green Infrastructure into all aspects of development and redevelopment

- Supporting urban biodiversity activities within the Region

- Providing adaptive leadership to climate change and the other goals listed above

Milwaukee Metropolitan Sewerage District Stormwater Drainage and Flood Control Plan

The Milwaukee Metropolitan Sewerage District's responsibilities for stormwater management are carried out within explicit policy guidelines set forth by the governing body of the District, as well as within the context of a comprehensive stormwater drainage and flood control system plan consistent with those policies. This plan consists of two parts: a policy plan and a stormwater drainage and flood control systems plan.[32]

The policy plan discusses the District's 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 the District's jurisdiction. The District's jurisdiction includes 28 streams that are wholly or partially within Milwaukee County. These streams include:

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[32]*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.*

- The mainstem of the Edgerton Ditch, Wilson Park Creek, Villa Mann Creek, an unnamed tributary to Villa Mann Creek, Lyons Creek, the South 43rd Street Ditch, and the mainstem of the Kinnickinnic River in the Kinnickinnic River watershed

- The Little Menomonee River, Underwood Creek, the South Branch of Underwood Creek, Honey Creek, Woods Creek, and the mainstem of the Menomonee River in the Menomonee River watershed

- Beaver Creek, Southbranch Creek, Brown Deer Park Creek, Indian Creek, and Lincoln Creek in the Milwaukee River watershed

- The North Branch of Oak Creek, the Mitchell Field Drainage Ditch, and the mainstem of Oak Creek in the Oak Creek watershed

- An unnamed tributary to the Root River identified as the 104th Street Branch, Whitnall Park Creek, including the North and Northwest Branches of Whitnall Park Creek, Tess Corners Creek, East Branch Root River, Crayfish Creek, including the Caledonia Branch of Crayfish Creek, and the mainstem of the Root River in the Root River watershed

- Fish Creek in the Lake Michigan direct drainage area

Milwaukee Metropolitan Sewerage District Watercourse System Planning Program

Identifying, analyzing, and recommending possible methods of mitigating flooding problems in Milwaukee County have been the subject of various planning efforts. The most recent effort is currently being carried out by the MMSD under its watercourse system management planning program. This planning effort is intended to update and refine the 1990 MMSD watercourse system plan, which was built upon the findings of the comprehensive watershed system plans prepared by SEWRPC for the five major watersheds that are located within the County. Like the earlier planning efforts, the current planning program uses the watershed as the basic geographic unit for planning. Thus, the floodplain management elements set forth below are also presented by watershed in summary form. Additional plan details for each watershed are available in the referenced advanced planning reports prepared by various consultants for the MMSD.

Floodplain Management Plan for the Kinnickinnic River Watershed

The MMSD recently completed an advanced planning effort of its watercourse system plan for the Kinnickinnic River watershed. The planning effort is documented in the Kinnickinnic River Watershed Flood

Management Plan.[33] This plan includes recommendations for flood mitigation for the mainstem of the Kinnickinnic River, Wilson Park Creek, Lyons Park Creek, Villa Mann Creek, an unnamed tributary to Villa Mann Creek, and the S. 43rd Street Ditch. The improvements along the mainstem of the Kinnickinnic River extend continuously for about 4.5 miles from S. 6th Street to S. 43rd Street.

- Recommended improvements for the section of the mainstem of the Kinnickinnic River between S. 6th Street and S. 27th Street consist of replacing the concrete channel lining with a more naturalized stream design, widening the stream corridor, acquiring and demolishing 83 structures between S. 6th Street and S. 16th Street to allow for the wider stream and replacing five vehicular and four pedestrian bridges. The plan also recommends acquiring and removing or floodproofing seven flood-prone residential structures that are expected to remain in the floodplain after the recommended improvements are implemented.

- Recommended improvements for the mainstem between S. 27th Street and the West Kinnickinnic River Parkway in Jackson Park consist of replacing the concrete channel lining and improvements to the West Kinnickinnic Parkway bridge that is located near S. 29th Street. In addition, the plan recommends acquiring and removing or floodproofing three flood-prone residential structures that are expected to remain in the floodplain following implementation of the recommended improvements.

- Recommended improvements for the mainstem in Jackson Park consist of lowering a portion of the park to provide flood storage to reduce flood risk to structures located on the Kinnickinnic River mainstem, removing 700 feet of concrete lined channel, removing 700 feet of corrugated metal pipe culvert, and increasing the flow capacity under the S. 43rd Street Bridge.

Detailed recommended developments or improvements for Lyons Park Creek, Villa Mann Creek, a Villa Mann Creek tributary, Wilson Park Creek, and the 43rd Street Ditch are identified in the Kinnickinnic River floodplain management plan.

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[33] *Milwaukee Metropolitan Sewerage District,* Kinnickinnic River Watershed Flood Management Plan: Final Report, *May 4, 2017.*

Floodplain Management Plan for the Menomonee River Watershed

The flood control plan for the Menomonee River watershed was developed through several planning efforts, which included a stormwater drainage and flood control system plan for the streams for which the MMSD has jurisdiction, a stormwater drainage and flood control system plan for Grantosa Creek[34] and Phase 1 and 2 watercourse management plans for the Menomonee River. Although some of the plan elements are located outside of Milwaukee County, they are integral to the design and function of those elements that are located in the County. Specifically, lowering the floodplain along Hart Park and the Milwaukee County Grounds detention basin serve to reduce downstream flood discharges, thus, reducing the size of the required plan elements in that area.

The stormwater drainage and flood control system plan for Grantosa Creek recommended developing flood storage to eliminate overland flooding to buildings immediately south of W. Hampton Avenue and to reduce surcharging in the Grantosa Creek enclosure along N. 100th Street and W. Grantosa Avenue. Several of the projects recommended in the Grantosa Creek flood control plan have been completed, including MMSD constructing a dry detention basin for Grantosa Creek at Timmerman Airport.

MMSD's Menomonee River Phase 1 Watercourse Management Plan called for a series of flood mitigation projects to be implemented along an 8.5-mile reach of the Menomonee River between the mouth of the river and W. North Avenue.[35] Additional Menomonee River projects were recommended in a second phase of planning by MMSD.[36] The projects recommended in these plans were designed to function as integrated, interdependent components of an overall system, with the design of some projects incorporating the flood reduction benefit of the upstream Milwaukee County Grounds flood management basin. Several of the elements recommended in the Menomonee River Phase 1 and Phase 2 watercourse management plans have been completed, including two phases of the Western Milwaukee Flood Management Project.

Two elements recommended in the Menomonee River Phase 1 and 2 watercourse management plans have yet to be implemented. These plans recommend floodproofing two municipal structures in Hart Park and one in Jacobus Park in the City of Wauwatosa. In addition, Phase 2B of the Western Milwaukee Flood

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[34]*SEWRPC Memorandum Report No. 53,* A Stormwater Drainage and Flood Control System Plan for Grantosa Creek, *February 1992*.

[35]*Milwaukee Metropolitan Sewerage District,* Menomonee River Phase 1 Watercourse Management Plan*, August 2000*.

[36]*Milwaukee Metropolitan Sewerage District,* Menomonee River Phase 2 Watercourse Management Plan*, July 2002*.

Management Project has been designed and will include removing a structure, lowering a floodplain, and constructing an approximately 2,600-foot series of earthen levees and reinforced concrete floodwalls in the northern overbank located along a stretch of the Menomonee River in the City of Milwaukee.

Preventing flooding problems has been the major focus of stormwater and floodland management efforts in urban areas. This has led to channelization (both ditching and straightening), and placement of concrete (to promote conveyance of flood flows and to control flows as in the case of dams, drop structures, and enclosed channels) in portions of the Menomonee River watershed. Concrete-lined stream segments are particularly damaging, due to the creation of conditions that 1) fragment and limit linear and lateral connectivity with the stream and their corridor habitat and ecosystem; 2) limit or prevent fish and wildlife movement; 3) increase water temperature; 4) destroy fish, aquatic life and wildlife habitat; 5) limit recreational uses, including those attendant to navigation, fishing, and aesthetics; and 6) may actually increase flooding and decrease public safety if not designed as part of an overall system plan. Recognizing the value of lotic water resources and their multi-faceted contributions to the quality of life has led to programs to restore and recreate naturalized river systems that not only meet flood mitigation requirements, but also incorporate features related to habitat and maintenance of aquatic life.

MMSD also completed a number of concrete and drop structure removal projects throughout the greater Milwaukee watersheds since 2010. The Underwood Creek project involved removing both concrete lining and drop structures. Stream stabilization and flooding are important issues that must be addressed when removing concrete lining. Increased stream velocities within a concrete lined section can impact downstream "natural" channels and cause excessive streambed and streambank erosion, which is why streambed and streambanks must be protected after concrete lining is removed. To mitigate or offset the potential for increased flood risk, concrete removal needs to be associated with mitigative measures such as expanding the floodplain to the lands adjacent to the channel and lowering the ground elevation in the overbanks outside the low- and moderate-flow channel to allow more room for attenuation and/or conveyance of flood flows. Such measures have the added benefit of decreasing instream velocities for multiple flood stages and reducing streambed and streambank erosion. Expanding the floodplain also allows for the opportunity to restore connectivity with the stream channel, restore native riparian vegetation, and allow space for a more naturally functioning stream channel, as well as providing stable instream habitat.

Full implementation of the floodplain management actions recommended for the subwatershed areas would eliminate structure flood damages in areas of the County due to direct overland flooding along the

Menomonee River, Grantosa Creek, and the Little Menomonee River for floods up to, and including, the one-percent-annual-probability flood event under planned land use and channel conditions.

Floodplain Management Plan for the Milwaukee River Watershed

In October of 2006, the MMSD assumed jurisdiction for the reach of the Milwaukee River mainstem in Milwaukee County from the upstream end of the Milwaukee Harbor Estuary to the Milwaukee-Ozaukee County line. A watercourse system plan[37] for the Milwaukee River was subsequently prepared by SEWRPC in 2010. The goal of the plan is to mitigate structural flood damages to 393 inhabited residential, commercial, or recreational structures resulting from overflow of the Milwaukee River within the one-percent-annual-probability floodplain shown on the Milwaukee County effective Digital Flood Insurance Rate Maps. Three alternative plans were evaluated on the basis of cost, implementability, effectiveness of protection, special considerations related to levee systems, and local preferences as stated by the City of Glendale. Based off those factors, the floodproofing, elevation, or acquisition and demolition of buildings in the one-percent-annual-probability floodplain was selected as the recommended plan.

Under the recommended plan, 138 buildings would be floodproofed, 176 buildings would be elevated, and 70 buildings would be purchased and demolished and removed from the floodplain in the City of Glendale. Three buildings in the City of Milwaukee and three buildings in the Village of Brown Deer would be floodproofed. In the Village of River Hills, one building would be floodproofed, one would be elevated, and one would be acquired and demolished. The open space that would be created in areas where buildings would be removed would remain in public ownership and would be prohibited from future development with inhabited structures. It is also assumed that structures designated to be elevated would be raised two feet above the one-percent-probability flood stage, and that the maximum structure elevation height would be four feet above grade. If a structure would have to be elevated more than four feet to achieve the desired two feet of freeboard above the design flood stage, it was assumed that the structure would be purchased and demolished. However, the building elevation criterion could be revised on a case-by-case basis to allow buildings to be elevated more than a total of four feet, potentially reducing the number of buildings to be acquired and demolished.

MMSD also removed the Estabrook Dam from the Milwaukee River during the spring of 2018. As part of this project, the streambank immediately adjacent to the dam was restored. The dam removal resulted in a

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[37]*SEWRPC Memorandum Report No. 172*, A Watercourse System Plan for the Milwaukee River in Milwaukee County Upstream of the Milwaukee Harbor Estuary*, December 2010.*

lowering of water levels upstream of the dam, thus 50 structures were no longer included in the floodplain. It is anticipated that the floodplain delineation of the areas at and upstream of the former dam will need to be revised.

Flood mitigation projects have also been implemented by MMSD for Lincoln Creek and Southbranch Creek. The plans for both streams have been fully implemented, which should eliminate structure flood damages due to direct overland flooding along Lincoln Creek and Southbranch Creek for floods up to, and including, the one-percent-annual-probability flood event under planned land use and existing channel conditions. Roadway flooding during such a flood event should also be eliminated. The MMSD Lincoln Creek flood mitigation and stream rehabilitation project resulted in many repetitive loss structures being removed from the one-percent-probability floodplain.

Floodplain Management Plan for the Oak Creek Watershed

In 2010, SEWRPC was authorized by MMSD to update the 2000 Phase 1 Oak Creek watercourse management plan.[38] The purpose of the study is to identify and categorize flooded structures located within the floodplain resulting from the one-percent-annual-probability (100-year recurrence interval) storm event, update structural damage estimates, and develop costs related to structure floodproofing or acquisition based on floodplain mapping developed by SEWRPC. The study draft report was completed in 2011, and then put on hold pending MMSD contact with identified floodplain property owners as well as a District policy revision regarding floodproofing. The report initially documented 23 structures in the Oak Creek regulatory floodplain. In 2018, Short Elliot Hendrickson, Inc. (SEH) prepared a technical memorandum at the request of MMSD to address conceptual floodproofing designs for structures within the Oak Creek Watershed.[39] Preliminary recommendations for Oak Creek and North Branch of Oak Creek consists of floodproofing nonresidential buildings or demolishing nonresidential buildings located within the one-percent-annual probability floodplain. Final recommendations for flood mitigation are being formulated for streams for which structural flood damages have been identified in the watershed.

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[38]*SEWRPC Memorandum Report No. 198,* Oak Creek Updated Phase 1 Watercourse Management Plan*, December 2011, Revised May 2019 (draft).*

[39]*Short Elliot Hendrickson Inc.,* Oak Creek Watershed Conceptual Floodproofing Designs*, Technical Memorandum to MMSD, June 22, 2018.*

Stream flooding impacts to insurable structures were scattered throughout the Oak Creek watershed, thus large flood mitigation projects were not warranted. Nevertheless, stream flooding does impact roadways, properties, and infrastructure in the watershed. FEMA flood profiles identify roadways that are flood-prone along Oak Creek, the North Branch of Oak Creek, and the Mitchell Field Drainage Ditch. Flood overtopping of roads is a concern for structure and roadway maintenance, safety, and emergency access.

In addition, the preliminary floodplain management recommendation for the Mitchell Field Drainage Ditch located within the Oak Creek watershed consists of constructing a floodwall and interior drainage facilities to protect structures located at Milwaukee Mitchell International Airport. The affected area is planned by Milwaukee County for redevelopment and structures in the floodplain will be addressed as part of the redevelopment plans. Determination of a final plan will be based upon coordination with all parties involved, including the MMSD, Milwaukee County, and local municipalities. Full implementation of the preliminary floodplain management actions recommended for the subwatershed areas involved would eliminate structure flood damages due to direct overland flooding along the North Branch of Oak Creek and the Mitchell Field Drainage Ditch for floods up to, and including, the one-percent-annual-probability flood event under planned land use and channel conditions.

Floodplain Management Plan for the Root River Watershed

The MMSD has jurisdiction for developing and implementing flood mitigation activities in the Milwaukee County portion of the Root River watershed. Flooding problems in that portion of the watershed are being addressed through the MMSD watercourse planning program and the ongoing floodplain mapping that SEWRPC is conducting for the Milwaukee County Automated Mapping and Land Information System Steering Committee and MMSD.

The MMSD's responsibilities for floodplain management planning are executed within explicit policy guidelines set forth by the governing body of the District, as well as within the context of a watercourse management plan consistent with those policies. The MMSD program consists of two parts, a policy plan and watercourse management plans for the watersheds that include streams for which the District has jurisdiction. The policy plan identifies the streams and watercourses for which the MMSD has assumed jurisdiction for resolving drainage and flood control problems, makes recommendations regarding the types of improvements for which the MMSD should assume responsibility, and makes recommendations regarding how costs are to be shared. The watercourse system plan identifies the types, general locations, and horizontal and vertical configurations of needed flood mitigation and stream rehabilitation facilities

within the District's jurisdiction. The following streams and rivers in the Root River watershed[40] within Milwaukee County were studied under the MMSD watercourse planning program, and flood mitigation measures were identified for all but Tess Corners Creek and 104th Street Branch, neither of which has identified hazards to structures during floods with annual probabilities of occurrence of 1 percent or more:

- Upper North Branch of the Root River and Hale Creek
- Lower North Branch of the Root River
- East Branch of the Root River
- Whitnall Park Creek, including the North and Northwest Branches of Whitnall Park Creek
- Crayfish Creek, including the Caledonia Branch of Crayfish Creek
- Tess Corners Creek
- An unnamed tributary to the Root River identified as the 104th Street Branch

In addition, several local stormwater management plans cover portions of the Root River watershed. These plans contain specific recommendations regarding nonpoint source water pollution control and the collection, conveyance, and storage of stormwater. Furthermore, all four counties in the Root River watershed have developed multi-jurisdictional hazard mitigation plans. These plans include recommendations for mitigating the impacts of flooding.

Great Lakes Coastal Flood Study: Milwaukee County

The Great Lakes Coastal Flood Study (GLCFS) is an ongoing collaboration of FEMA, the U.S. Army Corps of Engineers Engineering Research and Data Center (USACE-ERDC), State partners, the Association of State Floodplain Managers (ASFPM), and FEMA contractors. The GLCFS is FEMA's comprehensive storm and wind study of the Great Lakes basin for updating coastal flood hazard information and Digital Flood Insurance Rate Maps (DFIRMs) for Great Lakes coastal communities, including Milwaukee County. The purpose of the

[40] *Documented in SEWRPC Community Assistance Planning Report No. 316,* A Restoration Plan for the Root River Watershed*, July 2014.*

DFIRMs is to identify the areas in a community that are subject to flooding. One such area is the Special Flood Hazard Area (SFHA), or the 1-percent-annual floodplain.

Included in the GLCFS was 50 years of historical wave and wind data, storm surge modelling, statistical wave and water level analyses, and response-based modelling to determine the coastal SFHA. The coastal SFHA was determined from water level and wave combinations that could potentially impact the coastline, including wave run-up.[41] As a part of the GLCFS coastal hazard analysis and mapping, FEMA used cross-sectional transects to determine near shore flood hazards. Transects represented coastal reaches with similar physical characteristics and are set perpendicular to the average shoreline. In addition to the coastal flooding concerns along the Milwaukee County shoreline, since there also numerous proportions of bluffs in Milwaukee County, the impact of wave run-up on the stability of the bluffs is also a major concern.

Milwaukee Metropolitan Sewerage District Conservation Plan

The Milwaukee Metropolitan Sewerage District (MMSD), with the assistance of The Conservation Fund staff, completed and adopted a conservation plan that identifies land parcels that are recommended to be protected for multiple purposes, including flood reduction potential and stormwater management benefits, as well as wildlife habitat, water quality, and recreational benefits.[42] This plan identified 165 sites, including 42 high-priority sites, for protection through public acquisition or conservation easements, throughout the Menomonee River, Root River, and Oak Creek watersheds within the District. Many of these sites are located within Milwaukee County.

Many of the sites identified in the conservation plan consisted of isolated parcels. In order to provide greenway corridors connecting these parcels, the MMSD and SEWRPC staffs developed a greenway connection plan for the District.[43] The District later adopted a greenway connection plan that identified potential greenway corridors connecting, and typically downstream of, the isolated parcels identified in the

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[41]*Wave Run-up is the uprush of water from wave action on a beach, steep bluff, or coastal structure, typically caused by* a storm surge.

[42]*The Conservation Fund; Applied Ecological Services, Inc.; Heart Lake Conservation Associates; Velasco and Associates; and K. Singh and Associates,* Conservation Plan, Technical Report Submitted to the Milwaukee Metropolitan Sewerage District, *October 31, 2001.*

[43]*SEWRPC Memorandum Report No. 152,* A Greenway Connection Plan for the Milwaukee Metropolitan Sewerage District, *December 2002.*

MMSD Conservation Plan. It also synthesized the results of other related open space planning efforts undertaken in the MMSD area to date, resulting in a comprehensive Districtwide greenway connection plan having flood mitigation benefits as well as a wide range of other environmental benefits.

MMSD Green Infrastructure Plan

The MMSD has developed a green infrastructure plan[44] for the planning area. In developing the plan, the District undertook a detailed data analysis of the opportunities and constraints for implementing green infrastructure strategies. Extensive data collection and mapping were conducted as part of the planning effort. The analyses included quantifying the numbers of roads, buildings, and parking lots in the planning area that can be treated with green infrastructure. The objectives of the MMSD green infrastructure plan include:

1. Capturing the first 0.5 inch of rainfall from impervious surfaces with green infrastructure

2. Striving toward a rainwater harvest goal of capturing the first 0.25 gallon per square foot of area over the watershed for reuse

3. Complementing MMSD's Private Property Infiltration and Inflow Program and Integrated Regional Stormwater Management Program

4. Helping municipalities and other entities prioritize green infrastructure actions

5. Helping to meet receiving water quality standards by acknowledging watershed restoration plan recommendations

6. Meeting MMSD's Wisconsin Pollutant Discharge Elimination System (WPDES) discharge permit requirements for green infrastructure volume capture

As part of the approach to meeting these objectives, the plan developed watershed-specific recommendations for installing green infrastructure over the plan implementation period of 2014 through 2035. The recommendations were based on individual characteristics of each watershed.

[44] *Milwaukee Metropolitan Sewerage District,* Regional Green Infrastructure Plan*, June 2013*.

Other MMSD Green Infrastructure Plans[45]

The regional MMSD Green infrastructure Plan was developed in 2013. From 2011 to 2020, numerous other green infrastructure plans were either prepared for or by MMSD. These plans provide supplemental information to the regional green infrastructure plan or provide green infrastructure strategies to specific areas. Plans were developed to help with water reclamation, flood management, and sewer overflows. MMSD has proposed to eliminate all sewer overflows by 2035. Green infrastructure will be a critical component in eliminating overflows by integrating a variety of practices to detain, evapotranspire, and infiltrate stormwater within the MMSD sewer service area. A study was conducted in three sewersheds to assess the abilities of the various green infrastructure practices. Potential benefits of green infrastructure were measured based on environmental outcomes such as overflow, peak stream flow, and pollutant loading reductions, and the analysis concluded that the potential of green infrastructure is an important component of improving environmental, economic, and social conditions within the three study areas.

Green infrastructure plans were also prepared for areas within the Kinnickinnic and Menomonee River watersheds. The Menomonee River plan focuses on raising green infrastructure planning and opportunities for street and parking lot projects within the MMSD service area. The plan identified the top two green infrastructure opportunities within 11 selected municipalities that were planned for a road or parking lot reconstruction. Each project within those 11 municipalities was provided information with developing the most impactful green infrastructure technique. The analysis for each project will enable the municipalities to plan for implementing green infrastructure and have the project information needed for funding opportunities. The Kinnickinnic River green infrastructure plan would work in conjunction with the Kinnickinnic River Flood Management Plan to reduce flooding risks and manage stormwater within the watershed, which is the most urbanized watershed in the MMSD planning area. Implementing green infrastructure would provide environmental benefits as such elements would act as resilient sponges that would absorb the shock from storms and smaller-scale flood events by slowing and filtering stormwater. Green infrastructure would also enhance natural aesthetics, improve water quality, and positively impact community health. Infiltration-based green infrastructure strategies are recommended with the focus on infiltrating more water upstream or away from impacted structures and improving the overall water quality by managing pollution, phosphorous, and runoff and identifying the locations of the highest levels of nonpoint source pollution.

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[45]*All MMSD green infrastructure plans and documents are located on MMSD's Fresh Coast Guardians website at: https://www.freshcoastguardians.com/resources/our-plans.*

The District's Green Infrastructure Standards Specifications and Plan Templates Report prepared in October 2016 by MMSD, provides simplified planning and design tools to promote more widespread implementation of green infrastructure strategies throughout the District's service area. The intent is for the tools to be used initially by local municipalities served by the District to assist with capturing and reducing the quantity of stormwater runoff, while also improving municipal stormwater management and water quality consistent with Total Maximum Daily Load (TMDL) objectives. Such strategies include bioretention/bioswales, rain gardens, porous pavement, stormwater trees, native landscaping, and soil amendments. Because of the District's goal of widespread implementation of sustainable stormwater management throughout its service area, the report provides a brief description, site suitability considerations, design considerations, costs, plan templates/typical details, specifications, and inspection and maintenance of the strategies listed above. These tools can also be used to assist in meeting the District's vision for zero basement backups, zero overflows, reduced water quantity, and improved water quality. The report also includes tools and materials to provide information and guidance on planning, design, and construction/post-construction. The report should be utilized as a streamlined and user-friendly document with specifications and plan templates that can be adjusted to accommodate site-specific conditions and used as a reference document to supplement the green infrastructure sizing tool, typical details, and technical specifications.

MMSD, with the support of local stakeholders, also prepared a plan to help protect and restore native biodiversity within MMSD's planning area through applying green infrastructure. The plan defines green infrastructure as localized management approaches and technologies that infiltrate, evapotranspire, capture, and reuse stormwater to maintain or restore natural hydrology. While green infrastructure often refers to landscape scale components such as forests, floodplains, and wetlands, that help maintain the natural water cycle, the focus of the report is on the potential biodiversity contributions of parcel- and street-level stormwater interventions. Promoting urban biodiversity is linked to MMSD's core mission to cost-effectively protect the region's water resources and is also consistent with MMSD's goal of using effective planning to allow the planning area and broader region to thrive economically and environmentally. MMSD recognizes that its activities to provide water reclamation and flood management services directly impact urban biodiversity.

Green infrastructure strategies promoted by MMSD and the benefits of urban agriculture were evaluated for their ability to enhance biodiversity. Direct benefits include the addition of new habitat (putting a green roof on an existing building), improvements to habitat quality (planting native species, removing concrete stream channels and dams), and pollination enhancement (planting wildflowers that are preferred by bees).

Indirect benefits include improving aquatic biodiversity by returning instream flows to more natural conditions. More importantly, monitoring and evaluating the effectiveness of any urban biodiversity program will be necessary to make sure the activities are reducing the stressors they are designed to reduce. This includes evaluating the design, installation, and maintenance, as well as monitoring the performance of the practices in reducing runoff and pollutants. The plan further identifies goals and strategies for enhancing urban biodiversity in the MMSD planning area, identifies high priority conservation and rehabilitation areas, and provides suggestions for research, monitoring, and education/outreach in future areas.

A plan was also prepared for MMSD that provides information about lessons learned (successes and failures) of green infrastructure. The goal of the plan was to use experiences and realities to guide the practices of green infrastructure strategies, installations, and maintenance. Municipalities and other governmental agencies have encountered various barriers and successes regarding green infrastructure maintenance through project phases including planning, budgeting, design, construction, and post-construction. The plan focuses on these barriers and successes, summarizes the lessons learned, and prescribes recommendations about maintenance needs to both municipalities and MMSD.

In order to formulate the basis of the plan (lessons learned of green infrastructure), a survey was sent to 24 governmental units including 20 municipalities that received green infrastructure funding, three Milwaukee County agencies, and the University of Wisconsin-Milwaukee. The survey questions were relative to green infrastructure maintenance and mostly focused on the types of infrastructure that are most frequently installed, the level they are being maintained, and whether agencies have the correct equipment, personnel, and/or training to maintain these features. Face-to-face interviews were then scheduled after an agency responded to the survey and most interviews were scheduled in groups of two to three with the intent of generating conversations and sharing experiences. Feedback from the survey and interviews mostly determined that communities do not have the time, expertise, or funding to maintain green infrastructure. About one-half of the respondents would be interested in a full-time commitment maintenance partnership with a neighboring community. Because of the demanding maintenance (time and resources) and rising costs of green infrastructure systems, some communities are not applying for or accepting potential funding and grants to install more infrastructure. Green infrastructure is an asset to assist with stormwater quality and control, meeting regulation requirements, and overall stormwater education. As more strategies are installed and require maintenance, more creative funding mechanisms for maintenance will need to be explored as well as increased training and education to all project phases because of concerns regarding future maintenance.

MMSD Urban Biodiversity Plan

The MMSD has developed an urban biodiversity plan[46] for its planning area. This plan is intended to help preserve and restore biodiversity in the MMSD planning area through the application of green infrastructure. The plan evaluates green infrastructure practices for their ability to enhance biodiversity. In addition, it identifies goals and strategies for enhancing urban biodiversity by making recommendations for incorporating biodiversity into green infrastructure and other projects; identifying high priority conservation and rehabilitation areas; and suggesting future areas for research, monitoring, education, and outreach.

TMDL Study for the Milwaukee River Basin

Under the Clean Water Act, states are required to develop Total Maximum Daily Loads (TMDLs) to address impaired waterbodies that are not meeting water quality standards and not achieving their designated uses. A TMDL includes both a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards and an allocation of that load among the various sources of that pollutant. The TMDL must also account for seasonal variations in water quality and include a margin of safety to account for uncertainty in predicting how well pollutant reductions will result in meeting water quality standards.

A TMDL allocates the allowable load between a wasteload allocation for point sources such as municipal wastewater treatment plants, industrial dischargers, concentrated animal feeding operations, and municipal separate storm sewer systems (MS4s); a load allocation for nonpoint sources such as agricultural sources, urban sources not covered under a discharge permit, and natural background loads; and a margin of safety. Wasteload allocations are implemented through limits established in discharge permits under the Wisconsin Pollutant Discharge Elimination System (WPDES). Load allocations are implemented through a wide variety of Federal, State, and local programs as well as voluntary action by citizens. These programs may include regulatory, non-regulatory, or incentive-based elements, depending on the program. Implementing load allocations is typically an adaptive process, requiring collaboration between diverse stakeholders and prioritizing and targeting available programmatic, regulatory, financial, and technical resources.

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[46] *Milwaukee Metropolitan Sewerage District,* MMSD Planning Area Urban Biodiversity Plan: Draft for Ad Hoc Committee Review, *July 14, 2017.*

In 2018, CDM Smith, on behalf of the MMSD and the WDNR, completed a TMDL study[47], for the U.S. Environmental Protection Agency, Region 5, which included the Kinnickinnic River watershed and the Milwaukee Harbor Estuary within Milwaukee County and the entirety of the Menomonee River and Milwaukee River watersheds, including those portions of each watershed located outside of Milwaukee County. Elevated phosphorus, sediment, and bacteria levels in the Milwaukee River Basin have led to low dissolved oxygen concentrations, degraded habitat, excessive algal growth, turbidity, and recreational impairments. As a result, impairments to beneficial uses within the Basin, such as preserving and enhancing fish and other aquatic life and recreational use, have occurred. The purpose of this study is to describe the overall TMDL development process, the water quality impairments within the Basin, the technical approach and assumptions used to develop TMDLs for each impaired waterbody, the load and wasteload allocations by source that must be met to achieve water quality standards and targets, and the management practices that can be considered for TMDL implementation. This study also developed an implementation plan for the TMDLs, consisting of those programs and management measures needed to provide reasonable assurance toward achieving the load allocations developed for this TMDL study. The actual allowable load of pollutants for each TMDL reach is set forth in Appendix A of the study.

The Milwaukee River TMDL addresses impairments such as recreation restrictions, oxygen depletion, degraded biological communities, elevated water temperatures, high phosphorus, and degraded habitat resulting from high concentrations of fecal coliform bacteria, total phosphorus, and total suspended solids. It establishes wasteload allocations and load allocations for fecal coliform bacteria, total phosphorus, and total suspended solids in 55 TMDL basins of the Kinnickinnic River, Menomonee River, and Milwaukee River watersheds, including all seven basins in the Kinnickinnic River watershed, eight TMDL basins of the Menomonee River watershed and six TMDL basins of the Milwaukee River watershed that are wholly or partially located within Milwaukee County.

The developers of the Milwaukee River Basin TMDL used two models to simulate flow and calculate loads of fecal coliform bacteria, total phosphorus, and total suspended solids and predict associated water quality conditions under existing and anticipated future conditions for all the TMDL basins in the Milwaukee River Basin. The Hydrological Simulation Program-Fortran (HSPF) was used to model the TMDL basins within the Kinnickinnic and Menomonee River watersheds. The Loading Simulation Program in C++ (LSPC) was used

[47]*Milwaukee Metropolitan Sewerage District,* Total Maximum Daily Loads for Total Phosphorus, Total Suspended Solids, and Fecal Coliform, Milwaukee River Basin, Wisconsin*,* Final Report, *March 19, 2018, prepared by CDM Smith*.

to model the TMDL basins in the Milwaukee River watershed. LSPC includes HSPF algorithms but uses a different database structure.

For total phosphorus and total suspended solids, the Milwaukee River Basin TMDL expresses the load allocations for agricultural and non-permitted urban areas and the wasteload allocations for municipal separate storm sewer systems (MS4) as an average monthly percent reduction from the TMDL baseline loads. Within Milwaukee County, the Milwaukee River Basin TMDL does not contain any urban areas that are not required to be covered under a WPDES permit for the discharge of stormwater, thus no data was collected. In addition, since land uses in the Kinnickinnic River basins are highly urbanized, no agricultural load allocations were collected. Agricultural load allocations for the Milwaukee River Basin TMDL located wholly or partially within Milwaukee County were collected in four Milwaukee River basins and in five Menomonee River basins.

The reductions of total phosphorus loads for MS4 systems range between 38 percent and 88 percent in Kinnickinnic River basins, between 23 percent and 73 percent in Menomonee River basins, and between 14 percent and 87 percent in Milwaukee River basins. The reductions of total phosphorus loads for agricultural areas in the four Milwaukee River basins range between 12 percent and 70 percent and in the five Menomonee River basins range between 38 percent and 53 percent.

The reductions of total suspended solid loads for MS4 systems range between 69 percent and 80 percent in Kinnickinnic River basins, between 56 percent and 75 percent in Menomonee River basins, and between 48 percent and 66 percent in Milwaukee River basins. The reductions of total suspended solid loads for agricultural areas in the four Milwaukee River basins range between 26 percent and 45 percent and in the five Menomonee River basins range between 42 percent and 61 percent.

The Milwaukee River Basin TMDL also gives daily loading capacities and allocations that vary by month of the year. This reflects the fact that average total phosphorus and total suspended solids loading varies substantially by month. This variation is primarily driven by seasonal patterns in precipitation and vegetative cover that influence runoff and erosion rates. These same seasonal patterns also affect stream flow, which is the basis for pollutant assimilative capacity.

The Milwaukee River Basin TMDL used a load duration curve approach to develop allowable bacteria loads for each TMDL basin. This methodology considers how streamflow conditions relate to pollutant sources and makes rough determinations of what flow conditions result in exceedances of water quality standards.

The TMDL is presented as a set of fecal coliform bacteria load duration curves that are given in Appendix D of the Milwaukee River Basin TMDL. Depending on the TMDL basin, the TMDL calls for reducing loads of fecal coliform bacteria by approximately one to three orders of magnitude under low flow and dry conditions, one to two orders of magnitude under mid-range flow and moist conditions, and one order of magnitude under high flow conditions.

Meeting the water quality targets set in the Milwaukee River TMDL will require substantial reductions in nonpoint source loading. The percent reductions goals from the TMDL should be used to help prioritize work in the Milwaukee River basins located in Milwaukee County.

3.4 CITY AND VILLAGE PLANS

Local Comprehensive Plans

Section 62.23 of the *Wisconsin Statutes* grants cities and villages the authority to prepare and adopt local master plans or plan elements, such as a community land use plan. In 1999, the Wisconsin Legislature enacted legislation that greatly expanded the scope and significance of comprehensive plans within the State. The legislation, often referred to as the State's "Smart Growth" law, provides a new framework for developing, adopting, and implementing comprehensive plans by regional planning commissions and by county, city, village, and town units of government. The law is set forth in Section 66.1001 of the *Wisconsin Statutes*. This section of the *Statutes* also defines elements that a comprehensive plan must contain. The law has been amended periodically, most recently in June 2010 through enactment of 2009 Wisconsin Act 372.

The law does not require the adoption of county and local comprehensive plans; however, Section 66.1001(3) of the *Statutes* requires that county and local general zoning ordinances; county, city, and village shoreland and floodplain zoning ordinances; county and local subdivision ordinances; and local official mapping ordinances enacted or amended on or after January 1, 2010, be consistent with the comprehensive plan adopted by the unit of government enacting or amending an ordinance.

All of the municipalities in Milwaukee County are incorporated as cities or villages. Because of this, the County has not prepared or adopted a comprehensive plan. All municipalities in Milwaukee County had prepared and adopted their own comprehensive plans. As of September 1, 2020, the Cities of South Milwaukee and St. Francis and Villages of Greendale, River Hills, West Milwaukee, and Whitefish Bay had adopted an update to their comprehensive plans and the Cities of Cudahy, Greenfield, and Oak Creek and the Villages of Fox Point and Shorewood are currently preparing updates to their plans.

City of Milwaukee Sustainability Plan

In 2013, the City of Milwaukee Office of Environmental Collaboration developed a sustainability plan titled ReFresh Milwaukee.[48] One goal set forth in this plan is reducing the amount of stormwater runoff and clearwater entering the sewer system. The plan established several targets related to this goal, including establishing a baseline measure through assessing existing amounts of impervious surface and green infrastructure within the City, developing a green infrastructure policy plan for the City, and increasing the volume of stormwater runoff captured by green infrastructure by 10 percent annually. The plan also outlined elements that should be included in the recommended green infrastructure policy plan. Other recommendations of the sustainability plan that relate to stormwater management include recommendations that the City collaborate with Milwaukee County Parks and local land trusts to maximize the use of green space for stormwater management, replace and maintain City sewers, and work with private property owners to maintain private laterals. The City's HOME GR/OWN program, a program that repurposes foreclosed properties and vacant lots in order to increase the availability of healthy foods, implements the City's sustainability plan. The plan also provides opportunities for stormwater management through installing green infrastructure and other stormwater best management practices. Since the development of the HOME GR/OWN program, several projects in the City have included stormwater management features such as porous pavement, cisterns, rain gardens, and bioswales.

City of Milwaukee Baseline Green Infrastructure Inventory

In 2015, the City of Milwaukee conducted a baseline inventory[49] of green infrastructure within the City. The objectives of this inventory included:

- Determining the total amount of impervious area within the City
- Establishing the length of shoreline along rivers, streams, and Lake Michigan within the City
- Assessing the amount of shoreline within the City possessing properly maintained vegetative buffers
- Identifying, cataloging, and quantifying existing green infrastructure sites in the City and estimating the volume of water captured by these sites

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[48] *City of Milwaukee,* ReFresh Milwaukee: City of Milwaukee Sustainability Plan: 2013-2023, *July 2013*.

[49] *City of Milwaukee,* Green Infrastructure Baseline Inventory, *April 2015*.

- Identifying areas within the City that are prone to surface flooding, basement water infiltration, and/or basement backups due to topography

- Calculating the City's annual targets for stormwater runoff reductions through the implementation of green infrastructure practices

The findings of the inventory were used to determine the highest priority locations in the City to implement green infrastructure practices and to support development of a City green infrastructure plan.

City of Milwaukee Green Infrastructure Plan

In October 2017, the Milwaukee Common Council directed the City's Environmental Collaboration Office (ECO) to develop a comprehensive green infrastructure plan for Milwaukee's combined sewer area. After consulting with the MMSD, the City of Milwaukee Departments of Public Works and City Development, and community stakeholders, ECO proposed a green infrastructure plan framework.[50] This framework serves to guide development of the City's green infrastructure plan and was approved by the Common Council in September 2018. The City's green infrastructure plan[51] was subsequently adopted in June 2019.

The plan envisions that the City of Milwaukee will add approximately 36 million gallons of stormwater storage through green infrastructure implementation by 2030, and based on data analysis, is the equivalent of adding 143 acres of green space throughout the City. The plan will provide strategic and comprehensive strategies for implementing green infrastructure and prioritizing projects and should also help the City adapt to climate change. The plan further identifies various green infrastructure practices and potential financing mechanisms, prioritizes sub-basins and locations, formalizes policy changes within the City, and recognizes stakeholders within City, County, private, and nonprofit organizations that may offer a partnership to accomplish these goals. In addition, the Green Infrastructure Plan supplements the targets outlined in the City's Sustainability Plan.

In October 2018, a companion Common Council resolution was approved that will revise City ordinances to require green infrastructure on all large developments and redevelopments and explicitly outlines green infrastructure as a climate adaptation strategy in Chapter 120 of the City of Milwaukee Code of Ordinances.

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[50] *City of Milwaukee,* Framework for Green Infrastructure Plan*, September 2018*.

[51] *City of Milwaukee,* Green Infrastructure Plan*, June 2019*.

City of Milwaukee Green Streets Stormwater Management Plan

The City of Milwaukee developed a green streets plan[52] to reduce stormwater quantity and improve stormwater quality through implementing green street stormwater strategies in conjunction with street and alley repaving or reconstruction projects. The plan provides and evaluates a menu of strategies to manage stormwater runoff in street rights-of-way without sacrificing roadway function. This menu includes practices that can be installed in vegetated areas such as medians, street terraces, and adjacent open spaces and paved areas such as streets, alleys, and parking lanes. The strategies also include the use of trees as drainage components. Implementing these strategies can be integrated into the design of street or alley repaving or reconstruction projects. The plan provides a mechanism for incorporating the installation of green street features into the City's standard process for planning and designing street and alley repaving and reconstruction projects. The City estimates that implementing such strategies during repaving and reconstruction projects can provide a cost savings of 20 to 40 percent over the cost of green street installation as a retrofit.

3.5 COUNTY AND LOCAL ORDINANCES

Good community development depends not only on quality planning at all levels of government, but on practical implementation measures as well. Land use and development regulations affect the type of uses allowed, as well as the detailed design and site layout of proposed developments. Because Milwaukee County has no unincorporated areas, many of these regulations are promulgated and enforced by the cities and villages in the County. 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 conserving its resources. Zoning also is 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.

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[52] *City of Milwaukee,* Green Streets Stormwater Management Plan*, March 2013, prepared by CH2MHill*.

Floodland 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 one-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 one-percent-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 one-percent-probability flood. Permitting the filling and development of the flood fringe 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 no 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 2.13 in Chapter 2 of this report.

Shoreland-Wetland Zoning

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*.

It should be noted that the basis for identifying wetlands to be protected under Chapter NR 117 of the *Wisconsin Administrative Code* is the Wisconsin Wetlands Inventory. Mandated by the State Legislature in 1978, the Wisconsin Wetlands Inventory resulted in preparing wetland maps covering each U.S. Public Land Survey Township in the State. The inventory was completed for counties in Southeastern Wisconsin in 1982, the wetlands being delineated by SEWRPC in 1980, on one-inch equals 2,000 feet scale, aerial photographs. The Wisconsin Wetlands Inventory was last updated by SEWRPC in 2015.

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 did not have any shoreland wetlands and were thus not required to adopt such ordinances.

Subdivision Regulations

Chapter 236 of the *Wisconsin Statutes* requires preparing a subdivision plat whenever five or more lots of 1.5 acres or less in area are created either at one time or by successive divisions within a period of five years. The *Statutes* set forth requirements for surveying lots and streets, for plat review and approval by State and local agencies, and for recording approved plats. Section 236.45 of the *Statutes* allows any city, village, town, or county that has established a planning agency to adopt a land division ordinance, provided the local ordinance is at least as restrictive as the State platting requirements. Local land division ordinances may include the review of other land divisions not defined as "subdivisions" under Chapter 236, such as when fewer than five lots are created or when lots larger than 1.5 acres are created.

With the exception of the Village of Whitefish Bay, each of the municipalities in Milwaukee County has adopted its own subdivision control ordinance.

Official Mapping Ordinance

Section 62.23(6) of the *Wisconsin Statutes* allows the Common Council of any City to establish an official map for precisely identifying right-of-way lines and boundaries of streets, highways, waterways,[53] and parkways and the location and extent of railroad rights-of-way, public transit facilities, parks, and playgrounds. An official map is intended to be used as a precise planning tool for implementing master and comprehensive plans and for insuring the availability of land for the above features. Section 61.35 of the *Statutes* applies the authority provided cities under Section 62.23 to develop an official map to villages.

One of the basic purposes of the official map is to discourage constructing structures and their associated improvements on land that has been designated for future public use. Local government subdivision ordinances can also require land shown on the official map to be dedicated for street, park, or other public use at the time land is subdivided. The official map is a plan implementation device that operates on a communitywide basis in advance of land development and can thereby effectively assure the integrated development of the street and highway system. Unlike subdivision control, which operates on a plat-by-

[53] *Waterways may be placed on the map only if included within a comprehensive surface water drainage plan.*

plat basis, the official map can operate over the entire community in advance of development proposals. All of the communities in Milwaukee County have an adopted official map, except the Villages of Fox Point and Whitefish Bay.

3.6 STATE NONPOINT SOURCE POLLUTION CONTROL STANDARDS AND PROHIBITIONS

Construction Site Erosion Control and Stormwater Management

Stormwater management and construction site erosion control ordinances act to protect water quality and protect and promote health, safety, and general welfare by minimizing the amount of sediment and other pollutants carried to lakes, streams, and wetlands by stormwater and runoff discharged from construction sites or land disturbing activities. Sections 62.234 and 61.354 of the *Statutes* grant authority to cities and villages, respectively, to adopt ordinances for preventing erosion from construction sites and the management of stormwater runoff from lands within their jurisdiction. While Milwaukee County does not have a construction site erosion control and stormwater management ordinance, all of the municipalities within the County have adopted such ordinances.

Chapter NR 216 of the *Wisconsin Administrative Code*, which intends to reduce the discharge of pollutants carried by stormwater, requires county and local governments in urbanized areas, which are based on population and density, to obtain a Wisconsin Pollutant Discharge Elimination System (WPDES) Stormwater Discharge Permit. The code requires that the designated county or local government meet State standards to control pollution that enters a municipal storm sewer system and develop a storm sewer system map, a public information and education program, a stormwater and erosion control ordinance, an illicit discharge detection program, and a plan to reduce suspended solids. The designated county or local government must then submit an annual report on progress in meeting the requirements to the WDNR.

Chapter NR 151 of the *Wisconsin Administrative Code* required that municipalities with a WPDES permit reduce the amount of total suspended solids in stormwater runoff by 20 percent by 2008 and by 40 percent by 2013, with respect to stormwater runoff from areas of existing development with no controls as of October 2004. 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.

In addition, regardless of whether a municipality is required to have a stormwater discharge permit under Chapter NR 216, Chapter NR 151 requires that all construction sites that have one acre or more of land disturbance must achieve an 80 percent reduction in the amount of sediment that runs off the site. With certain limited exceptions, those sites required to have construction erosion control permits must also have post-development stormwater management practices to reduce the total suspended solids (sediment) that would otherwise run off the site by 80 percent for new development, 40 percent for redevelopment, and 80 percent for infill development. If it can be demonstrated that the solids reduction standard cannot be met for a specific site, total suspended solids must be controlled to the maximum extent practicable.

Under the requirements of Chapter NR 151, beginning March 10, 2008, incorporated municipalities with average population densities of 1,000 people or more per square mile that are not required to obtain municipal stormwater discharge permits must implement public information and education programs relative to specific aspects of nonpoint source pollution control; municipal programs for management of leaf and grass clippings; and site specific programs for application of lawn and garden fertilizers on municipally-owned properties with over five acres of pervious surface. This requirement applies to virtually all cities and villages.

The MMSD also promulgates stormwater management regulations as set forth in MMSD Rules Chapter 13, Surface Water and Stormwater. The purpose of Chapter 13, which applies to all users of the sewerage system and all governmental units in the sewer service area, is to:

- Reduce the unsafe conditions, property damage, economic losses, and adverse health effects caused by flooding

- Maximize the effectiveness of flood abatement facilities and watercourse improvements

- Reduce the number and magnitude of releases of sewage to the environment from sanitary and combined sewers and to protect sewage collection and treatment facilities from high flows

- Promote comprehensive watershed planning and intergovernmental cooperation

- Restore and enhance opportunities to use and enjoy watercourses

Runoff management is required for any development or redevelopment that meets all of the criteria set forth in Subchapter III – Stormwater Runoff Management Requirements, and applies to all cities, villages, and other governmental units (including counties, special districts, and state agencies if the other governmental unit asserts exemption from local land development requirements and receives sewer service from the District).

State Standards and Regulations for Control of Nonpoint Source Pollution

Through 1997 Wisconsin Act 27, the State Legislature required the WDNR and DATCP to develop performance standards for controlling nonpoint source pollution from agricultural and nonagricultural land and from transportation facilities.[54] The performance standards are set forth in Chapter NR 151, "Runoff Management," of the *Wisconsin Administrative Code*, which became effective on October 1, 2002, and was revised in 2004, 2010, and 2018. Below is a summary of the standards and prohibitions that apply to the Milwaukee County Land and Water Resource Management plan:

Agricultural Regulations, Performance Standards, and Prohibitions

Performance standards relate to four areas of agriculture: cropland soil erosion control, soil loss from riparian lands, manure management, and nutrient management.

The agricultural performance standards are:

- Sheet, rill and wind erosion: Maintain soil erosion rates on all cropland at or below "T" (Tolerable Soil Loss)

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[54]The State performance standards are set forth in the Chapter NR 151, "Runoff Management," of the Wisconsin Administrative Code. Additional code chapters that are related to the State nonpoint source pollution control program include: Chapter NR 152, "Model Ordinances for Construction Site Erosion Control and Storm Water Management;" Chapter NR 153, "Targeted Runoff Management and Notice of Discharge Grant Programs;" Chapter NR 154, "Best Management Practices, Technical Standards and Cost-Share Conditions;" Chapter NR 155, "Urban Nonpoint Source Water Pollution Abatement and Storm Water Management Grant Program;" and Chapter ATCP 50, "Soil and Water Resource Management." Those chapters of the Wisconsin Administrative Code became effective in October 2002. Chapter NR 120, "Priority Watershed and Priority Lake Program;" and Chapter NR 243, "Animal Feeding Operations" were repealed and recreated in October 2002.

- Tillage setback: Allow no tillage within a five- to 20-foot setback from the top of a surface water channel in agricultural fields for the purpose of maintaining streambank integrity and avoiding soil deposits into State waters

- Phosphorus index: A limit on the amount of phosphorus (an average phosphorus index of 6 or less over the accounting period and which may not exceed a phosphorus index of 12 in any individual year) that may run off croplands as measured by the Wisconsin Phosphorus Index

- Manure storage facilities: All new or substantially altered manure storage facilities must meet current engineering design standards to prevent surface or groundwater pollution

- Process wastewater handling: A prohibition against significant discharge of process water from milk houses, feedlots, and other similar sources

- Clean water diversion: Divert clean water runoff away from contacting feedlots, manure storage facilities, and barnyards in water quality management areas (areas within 300 feet of a stream, 1,000 feet from a lake, or areas susceptible to groundwater contamination)

- Nutrient management: Application of manure or other nutrients to croplands must be done in accordance with a nutrient management plan, designed to meet State standards for limiting the entry of nutrients into groundwater or surface water resources. This standard does not apply to applications of industrial waste, municipal sludge, or septage regulated under other WDNR programs, provided that the material is not comingled with manure prior to application

- Silurian bedrock (this performance standard was added to NR 151 in 2018): To address land spreading of manure on soils in sensitive areas of the State – i.e. where depth to bedrock is shallow and the bedrock is fractured (also described as karst topography), mechanical manure application may not cause fecal contamination of water in a well, or be applied on areas of cropland or pastures that have 24 inches or less of separation between the ground surface and apparent water table, and must be applied in conformance with a nutrient management plan that is consistent with all applicable standards

- Manure management: Prohibitions include no direct runoff from animal feedlots to "waters of the state", no overflow of manure storage facilities, no unconfined manure piles in shoreland areas (areas

within 300 of a stream, 1,000 feet from lakes), and no unlimited livestock access to "waters of the state" where the livestock prevent sustaining an adequate vegetative cover

- TMDL: A crop or livestock producer shall reduce discharges of pollutants from a livestock facility or cropland to surface waters if necessary, to meet a load allocation in a US EPA and state approved TMDL

In general, only if cost share funds are available do those lands that do not meet the NR 151 standards (and were cropped or enrolled in the U.S. Department of Agriculture Conservation Reserve or Conservation Reserve Enhancement Programs as of October 1, 2002), need to meet these agricultural performance standards. Existing cropland that met the standards as of October 1, 2002, must continue to meet the standards. New cropland must meet the standards, regardless of whether cost share funds are available.

Chapter NR 243, "Animal Feeding Operations," of the *Wisconsin Administrative Code* sets forth rules for concentrated animal feeding operations and other animal feeding operations for the purpose of controlling the discharge of pollutants to waters of the State. The definition of concentrated animal feeding operations is any livestock and poultry operations with more than 1,000 animal units. Calculation of animal units depends upon each different type and size class of livestock and poultry. For example, facilities with 1,000 beef cattle, 700 milking cows, or 200,000 chickens each would be the equivalent of 1,000 animal units. All concentrated animal feeding operations and certain types of other animal feeding operations must obtain WPDES permits. In general, the definition of animal feeding operations is any feedlot or facility, other than pasture, where feeding of animals for a total of 45 days in any 12-month period occurs. While none of these operations are located in Milwaukee County, upstream portions of the Milwaukee River and its tributaries located in Dodge, Fond du Lac, Ozaukee, Sheboygan, and Washington Counties may contain these operations which could have an effect on the water quality downstream in Milwaukee County.

Under Chapter NR 216, "Stormwater Discharge Permits" of the *Wisconsin Administrative Code,* agriculture is not exempt from the requirement to submit a notice of intent (NOI) for one or more acres of land disturbance for the construction of structures such as barns, manure storage facilities or barnyard runoff control systems. Construction of an agricultural building or facility must follow an erosion and sediment control plan consistent with Section NR 216.46, *Wisconsin Administrative Code*, including meeting the performance standards of Section NR 151.11, *Wisconsin Administrative Code*. Agriculture is exempt from this requirement for activities such as planting, growing, cultivating and harvesting crops for human or livestock consumption and pasturing of livestock as well as for sod farms and tree nurseries. NR 216

establishes the criteria and procedure for issuance of stormwater discharge permits to limit the discharge of pollutants carried by stormwater runoff into waters of the State.

Nonagricultural (Urban) Performance Standards and Stormwater Discharge Permits

The nonagricultural performance standards set forth in Chapter NR 151 encompass two major types of land management. The first includes standards for areas of new development and redevelopment and the second includes standards for developed urban areas. The performance standards address the following areas:

- Construction sites for new development and redevelopment
- Post construction stormwater runoff for new development and redevelopment
- Developed urban areas
- Nonmunicipal property fertilizing

Chapter NR 151 requires counties and local units of government in urbanized areas to obtain a WPDES stormwater discharge permit as required under Chapter NR 216.[55] All of the communities in Milwaukee County have applied for and been issued these permits.

Chapter NR 151 requires permit holders to reduce the amount of total suspended solids in stormwater runoff from areas of existing development that is in place as of October 2004 to the maximum extent practicable, according to the following standards:

- By March 10, 2008, the NR 151 standards call for a 20 percent reduction
- By October 1, 2013, the standards call for a 40 percent reduction

Permitted municipalities are required to implement the following 1) public information and education programs relative to specific aspects of nonpoint source pollution control; 2) municipal programs for

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[55]*Chapter NR 216 of the Wisconsin Administrative Code, "Storm Water Discharge Permits," sets forth requirements for construction site erosion control and for industrial, municipal, and transportation-related stormwater discharge permits.*

collection and management of leaf and grass clippings; and 3) site-specific programs for application of lawn and garden fertilizers on municipally controlled properties with over five acres of pervious surface. The requirements of Chapter NR 151 (as of March 10, 2008) do not require incorporated municipalities with average population densities of 1,000 people or more per square mile to obtain municipal stormwater discharge permits, however, they must still implement the three programs noted above.

Section NR 151.12 of the *Wisconsin Administrative Code* requires infiltration of post-development runoff from areas developed on or after October 1, 2004, subject to specific exclusions and exemptions as set forth in Sections 151.12(5)(c)5 and 151.12(5)(c)6, respectively. In residential areas, Section NR 151.12 requires infiltration of either 90 percent of the annual predevelopment infiltration volume or 25 percent of the post-development runoff volume from a two-year recurrence interval, 24-hour storm. However, Section NR 151.12 requires use of no more than 1 percent of the area of the project site as an effective infiltration area. In commercial, industrial and institutional areas, NR 151.12 requires infiltration of 60 percent of the annual predevelopment infiltration volume or 10 percent of the post-development runoff volume from a two-year recurrence interval, 24-hour storm. In this case, NR 151.12 requires use of no more than 2 percent of the project site as an effective infiltration area.

3.7 CLIMATE AND CLIMATE CHANGE

Climate, which is the long-term weather conditions in an area, is an important element when assessing and planning for the future health of Milwaukee County and its water and terrestrial resources. Recent assessments have documented changes in Wisconsin's climate over the late 20th century.[56] Projections of Wisconsin's future climate based on downscaled data from 14 global climate models indicate that additional changes will occur through the 21st century.[57] The following sections describe the changes that have

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[56]*For example, Christopher J. Kucharik, Shawn P. Serbin, Steve Vavrus, Edward J. Hopkins, and Melissa M. Motew, "Patterns of Climate Change across Wisconsin from 1950-2006," Physical Geography, Volume 31, pages 1-28, 2010.*

[57]*Wisconsin Initiative on Climate Change Impacts, Wisconsin's Changing Climate: Impacts and Adaptation, Nelson Institute for Environmental Studies, University of Wisconsin-Madison and Wisconsin Department of Natural Resources, 2011. Downscaling is an analysis approach that enables climatological data generated by Intergovernmental Panel on Climate Change general circulation models developed at a relatively coarse geographic scale (e.g., climate change data for several large regions in an entire state) to be modified to represent a finer geographic scale (e.g. at the scale of a county or watershed).*

occurred in Wisconsin's climate since 1950 and the changes that are projected to occur by the middle of the 21st century.

Air Temperature

Based on the 30-year average temperature data during the period of 1981 to 2010 from the official NOAA National Weather Service records, the average annual temperature at Milwaukee's General Mitchell International Airport was 47.8 degrees Fahrenheit. Average annual temperatures in Wisconsin increased over the last half of the 20th century. Between 1950 and 2006, average annual temperature in the State increased by 1.1°F.[58] In the vicinity of the Oak Creek watershed, the increase was between 1.5 and 2.0°F. Much of this increase in average annual temperature occurred in the form of higher night-time low temperatures. For example, over the period 1950 through 2006, the average number of days in which the daily low temperature fell below 0°F decreased by about six days per year. The greatest increase in temperatures occurred during winter and spring months.

The consensus of downscaled results from climate models is that average annual temperatures will continue to increase through the 21st century.[59] Depending on location, the models project that average annual temperatures in Wisconsin will increase by between 4.0°F and 9.0°F over the period 1980 through 2055. The greatest changes are estimated to occur during the winter months, with average winter temperatures being projected to increase by about 7.5°F. By contrast, average temperatures in the County during the summer are projected to increase by about 5.5°F.

Changes in extreme temperatures will accompany these changes in average temperature. The frequency of extreme daily high temperatures is also predicted to increase based on modeling results. The average number of days per year with daily high temperatures greater than 90°F is currently about 12 in southern Wisconsin. This is likely to double to about 25 days per year by 2055. By contrast, the frequency of extreme daily low temperatures is expected to decrease. The average number of days per year with daily low temperatures below 0°F is currently about 15 in southern Wisconsin. This is projected to decrease to about nine days per year by 2055.

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[58] *Kucharik and others, 2010, op. cit.*

[59] *Wisconsin Initiative on Climate Change, 2011, op. cit.*

Precipitation

Based on the 30-year average precipitation data during the period of 1981 to 2010 from the official NOAA National Weather Service records, the average annual precipitation at Milwaukee's Mitchell International Airport was 34.8 inches. Average annual precipitation in Wisconsin increased over the last half of the 20th century. Between 1950 and 2006, average annual precipitation in the State increased by about 3.1 inches.[60] It should be noted that there was substantial variability in the change in average annual precipitation across the State, with some areas experiencing increases up to 7.0 inches, while areas in parts of northern Wisconsin experienced decreases in annual precipitation. Areas within the County experienced annual precipitation increases over this period of between 4.5 and 6.0 inches. Much of the increase in average precipitation occurred during autumn months. In Milwaukee County, average precipitation during autumn months increased between 2.0 and 2.5 inches over the period from 1950 through 2006. Increases in precipitation also occurred to a lesser degree during winter, spring, and summer.

The frequency and magnitude of heavy precipitation events has also been increasing in Wisconsin. Extreme rainfall patterns in the City of Milwaukee illustrates this trend. In the decade between 2001 and 2010, there were 24 days in which 2.0 inches or more of precipitation fell in a single event. This is twice the previous maximum of 12 days with 2.0 inches or more of precipitation, which occurred in the decade between 1951 and 1960.

The consensus from downscaled results of climate models predict several changes in precipitation through the 21st century.[61] Most of the models project an increase in average annual precipitation in Southeastern Wisconsin of about 1.5 to 2.0 inches. The models indicate that the amount of precipitation falling during winter is likely to increase by about 25 percent. Due to the projected increase in temperatures, it is estimated that a greater amount of precipitation occurring during the winter will fall as rain rather than snow.[62] This will be accompanied by both an increase in the likelihood of freezing rain events and decreases in snow depth and snow cover. Model projections also show that Wisconsin will receive more precipitation and more frequent and intense precipitation events during the spring, especially during early spring. As in winter,

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[60] *Kucharik and others, 2010, op. cit.*

[61] *Wisconsin Initiative on Climate Change Impacts, 2011, op. cit.*

[62] *Michael Notaro, David J. Lorenz, Daniel Vimont, Stephen Vavrus, Christopher Kucharik, and Kristie Franz, "21st Century Wisconsin Snow Projections Based on Operational Snow Model Driven by Statistically Downscaled Climate Data," International Journal of Climatology, Volume 31, pages 1615-1633, 2011.*

it will become more likely for early spring precipitation to fall as rain rather than snow. The total amount of precipitation occurring during the summer is not projected to change much, but the models also indicate that the frequency of intense rainfall events will increase. In southern Wisconsin, the frequency of precipitation events in which two or more inches fall in a 24-hour period is expected to increase from about 12 events per decade to 15 events per decade by the middle of the 21st century. These changes will be concentrated in the spring and fall. The projections also indicate that the magnitude of the heaviest precipitation events will also increase. The shift to more heavy rainfall events but little change in total summertime precipitation implies that more dry days will occur in Wisconsin during the summer. More dry days, coupled with higher summer temperatures and the increases in evapotranspiration that may result from higher temperatures, may lead to an increase in the likelihood of summer droughts.

Effects of Climate Change on Water Resources

Climate directly affects water resources and such resources can serve as indicators of climate change at various temporal and spatial scales. The Wisconsin Initiative on Climate Change Impacts (WICCI) has concluded that projected future climate conditions may influence the quantity and quality of the State of Wisconsin's water resources. WICCI also found clear evidence from analysis of past trends and probable future climate projections that there will be different hydrologic responses to climate change in different geographic regions of the State. The differences may affect local variations in land use, soil type and surface deposits, groundwater characteristics, and runoff and seepage responses to precipitation which illustrates the importance of considering the potential climate change effects on local hydrologic conditions and as part of a watershed restoration plan strategy.

Climate change appears to be altering the availability of water (volume), the distribution of rainfall over time, and whether precipitation falls as rain or snow, each of which affects the water cycle. Most of the water entering the landscape arrives as precipitation (rain and snowfall) that falls directly on waterbodies; or runs off the land surface and enters streams, rivers, wetlands, and lakes; or percolates through the soil, recharging groundwater that flows underground and re-emerges as springs discharging into lakes, wetlands, and streams. Even in the absence of climate change, when one part of the system is affected, all other parts are impacted. For example, an overdrawn groundwater aquifer used to irrigate crops or to provide potable water supply can lead to a reduction or complete loss in discharge of a local stream. More importantly, climate change exposes the vulnerabilities of water availability within a given area, and this vulnerability is proportional to how much humans have altered how water moves through the water cycle (e.g. through reducing groundwater recharge potential during land development and/or withdrawals from aquifers). This vulnerability becomes particularly evident during periods of prolonged drought conditions.

As discussed above, downscaled climate models predict that there will be an increase in annual precipitation in southeastern Wisconsin, as well as an increase in precipitation falling as rain rather than snow due to higher temperatures. In addition, the frequency and magnitude of larger rainfall events is projected to increase. The combination of the above projections will likely lead to higher peak stream flows which can often lead to increased streambank erosion and sediment transport, as well as increases in nutrients and other pollutants entering the streams. While intense rainfall events are expected increase, there is projected to be little change in total summertime precipitation, implying that there will be longer stretches of dry weather. These periods of dry weather could lead to decreased summertime baseflows, and when combined with warmer air temperatures, may produce increased water temperatures which can have a harmful impact on fish and other aquatic life.

The WICCI Water Resources Working Group (WRWG) incorporated WICCI's 1980-2055 projections for temperature, precipitation (including occurrence of events), and changes in snowfall to guide their evaluation of potential impacts to hydrologic processes and resources.[63] This team of experts prioritized the highest potential climate change impacts on water resources and proposed adaptation strategies to address impacts across the State of Wisconsin as summarized below:

- Minimize threats to public health and safety by anticipating and managing for extreme events through effective planning;

- Increase resiliency of aquatic ecosystems to buffer the impacts of future climate changes by restoring or simulating natural processes, ensuring adequate habitat availability, and limiting human impacts on resources. Examples include limiting groundwater and surface water withdrawals, restoring or reconnecting floodplains and wetlands, and maintaining or providing migration corridors for fish and other aquatic organisms;

- Stabilize future variations in water quantity and availability by managing water as an integrated resource, keeping water "local," and supporting sustainable and efficient water use for humans and the environment; and

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[63]*The Water Resources Working Group (WRWG) included 25 members representing the Federal government, State government, the University of Wisconsin System, the Great Lakes Indian Fish and Wildlife Commission, and the Wisconsin Wetlands Association. For more details on climate change, impacts, adaptation, and resources visit* www.wicci.wisc.edu/water-resources-working-group.php .

- Maintain, improve, or restore water quality under a changing climate regime by promoting actions to reduce nutrient and sediment loading.

Changing climatic conditions are significant elements to water quality conditions within Milwaukee County and these adaptative strategies are important to protecting surface water and groundwater quality and quantity within the County.

3.8 CONSERVATION PROGRAMS

Coordination with Federal, State, regional, and local agencies is paramount to protecting the land and water resources of Milwaukee County. The conservation programs mentioned below are vital to the successful implementation of this plan. The positive integration of programs and funding sources administered by the County and its cooperating agencies is essential to accomplishing the workplan objectives set forth in Chapter 4.

Federal Programs

Conservation Reserve Program

The Conservation Reserve Program (CRP) is a voluntary program for agricultural landowners that provides annual rental payments and cost-share assistance to establish long-term, resource-conserving covers on eligible farmland. The program was originally authorized by the Food Security Act of 1985 and was reauthorized by the 2018 Farm Bill. The CRP goal is to reduce soil erosion, protect the nation's ability to produce food and fiber, reduce sedimentation in streams and lakes, improve water quality, establish wildlife habitat, and enhance forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as a prairie-compatible, noninvasive forage mix; wildlife plantings; trees; filter strips; or riparian buffers. Farmers receive an annual rental payment for the term of the 10- to 15- year contract based on the agriculture rental value of the land, and up to 50 percent Federal cost sharing to establish vegetative cover. The FSA, an agency of the USDA, administers the program with the NRCS providing technical assistance. NRCS works with landowners to develop their application, and to plan, design, and install the conservation practices on the land.

The Conservation Reserve Enhancement Program (CREP) is a part of the CRP. The CREP targets specific state or nationally significant conservation concerns. In exchange for removing environmentally sensitive land from production and establishing permanent resource conserving plant species, each CREP agreement pays farmers and ranchers an annual rental rate along with other Federal and non-Federal incentives as

applicable. Participation is voluntary, and the contract period is typically 10 to 15 years. While both the CREP and the CRP focus on environmentally sensitive lands, CREP is a partnership between state governments and the Federal government. This partnership is in place to address high priority conservation concerns, and CREP cannot enroll land in the program if the state does not have a CREP agreement.[64]

Other programs that are also part of the CRP, or which the Farm Service Agency administers, include among others: the CRP Grasslands; the Emergency Conservation Program; and the Emergency Forest Restoration Program. Further information about these programs can be obtained from the Farm Service Agency website at www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index.

Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) is a voluntary conservation program that supports agriculture and environmental quality as compatible goals. Through EQIP, farmers may receive financial and technical help with structural and management conservation practices on agricultural land. EQIP offers contracts through the NRCS for conservation practice implementation for periods ranging from one to 10 years, and it pays up to 75 percent of the costs of eligible conservation practices. The program may also make incentive payments and cost share payments to encourage a farmer to adopt land management practices such as nutrient management, manure management, integrated pest management, or wildlife habitat management. Portions of the Wildlife Habitat Incentives Program (WHIP) were carried over into this program.

Conservation Stewardship Program

The Conservation Stewardship Program (CSP) helps agricultural producers maintain and improve their existing conservation systems and adopt additional conservation activities to address priority resources concerns. CSP contracts are for five years, but successfully fulfilling the initial contract (and agreeing to additional conservation objectives) allows the opportunity to compete for an additional five-year term. To meet the renewal stewardship threshold, the participant must agree to meet or exceed two additional priority resource concerns or agree to adopt or improve conservation activities to achieve higher levels of conservation on two existing priority resource concerns. Contract payments are based upon the existing level of conservation on the land uses included in the contract, an NRCS assessment of the existing

[64] *Wisconsin's CREP agreement, in place since 2001, focuses on environmentally sensitive land next to rivers and streams and two designated geographic areas for wildlife habitat.*

stewardship at the time of enrollment and implementing additional conservation activities. The program design is for working lands and is the largest conservation program in the United States with 70 million acres of productive agricultural and forest land enrolled.

Resource Conservation and Development

The Resource Conservation and Development (RC&D) program was established by the Federal Agricultural Act of 1962. This Act directs the USDA to help units of government conserve and properly utilize all resources in solving local issues. Wisconsin has seven RC&Ds, covering all Wisconsin counties. Milwaukee County is a member of the Town and Country RC&D area which was organized to cover 13 counties in southeastern Wisconsin. The Town and Country RC&D helps to facilitate the development and coordination of existing and innovative projects and will assist in finding funding to implement them. Town and Country RC&D has helped promote agricultural, energy, water quality, and educational projects and programs throughout the Region.

The Wildlife Restoration Program

The Wildlife Restoration Program, the nation's oldest wildlife restoration program, through the U.S. Fish and Wildlife Service provides grants to State fish and wildlife agencies for projects to restore, conserve, manage, and enhance wildlife and wildlife habitat. This program provides up to 75 percent Federal cost-share assistance for eligible projects and requires a 25 percent match from non-Federal sources. This program provides up to 100 percent Federal cost-share assistance for eligible insular projects. Eligible projects include identification, restoration, and improvement of areas of land or water adaptable as feeding, resting, or breeding places for wildlife.

The State Wildlife Grants Program

The U.S. Fish and Wildlife Service through the State Wildlife Grants Program provides Federal grant funds to State fish and wildlife agencies for the development and implementation of projects for the benefit of fish and wildlife and their habitats, including species that are not hunted or fished. Priority is placed on projects that protect species of greatest conservation concern. Two types of grants are made under this program: planning grants and implementation grants. Planning grants provide up to 75 percent Federal cost-share assistance for eligible projects and require a 25 percent match from non-Federal sources. Implementation grants under this program provide up to 65 percent Federal cost-share assistance for eligible projects and require a 35 percent match from non-Federal sources.

Healthy Forests Reserve Program

The Healthy Forests Reserve Program (HFRP) helps landowners restore, enhance, and protect forestland resources on private lands through easements and financial assistance. Through the program, landowners promote the recovery of endangered and threatened species under the Endangered Species Act, improve plant and animal diversity, and enhance carbon sequestration. The program provides landowners with 10-year restoration agreements and 30-year or permanent easements for specific conservation actions. Some landowners may avoid regulatory restrictions under the Endangered Species Act by restoring or improving habitat on their land for a specified period of time. Lands enrolled in the HFRP easements must be privately owned, and restore, enhance, or measurably increase the recovery of threatened or endangered species, improve biological diversity, or increase carbon storage.

Agricultural Conservation Easement Program

The Agricultural Conservation Easement Program (ACEP) helps landowners, land trusts, and other entities protect, restore, and enhance wetlands, grasslands, and working farms and ranches through conservation easements.

Under the Agricultural Land Easements component, the ACEP helps state and local governments, American Indian tribes, and non-governmental organizations protect working agricultural lands and limit non-agricultural uses of the land. The NRCS provides financial assistance to eligible partners for purchasing Agricultural Land Easements that protect the agricultural use and conservation values of eligible land. In the case of working farms, the program helps farmers and ranchers keep their land in agriculture. Lands eligible for agricultural land easements includes cropland, rangeland, grassland, pastureland, and nonindustrial private forest land. The NRCS may contribute up to 50 percent of the fair market value of the agricultural land easement. When protecting grasslands of special environmental significance, the NRCS may contribute up to 75 percent of the fair market value of the agricultural land easement.

Under the Wetlands Reserve Easements component, the ACEP helps to restore, protect, and enhance enrolled wetlands. The NRCS provides technical and financial assistance directly to private landowners and Indian tribes to restore, protect, and enhance wetlands through the purchase of a wetland reserve easement. Lands eligible for wetland reserve easements includes farmed or converted wetlands that can be successfully and cost-effectively restored. This program offers landowners three options: permanent easements, 30-year easements, and term easements, with a minimum 10-year duration for each option. For permanent easements, the WRP pays 100 percent of the easement value for the purchase of the easement and between 75 to 100 percent of the restoration cost. For 30-year easements, the WRP pays 50 to 75 percent of the

easement value for the purchase of the easement. In addition, the program pays 50 to 75 percent of restoration costs. For term easements, the WRP pays 50 to 75 percent of the easement value for the purchase of the easement and between 50 to 75 percent of restoration costs. Term easements are easements that are for the maximum duration allowed under applicable State laws. Under the 2008 Federal Farm Bill, municipalities are no longer eligible for payments under WRP, but private landowners remain eligible.

The 2014 Farm Bill streamlines and consolidates the Wetlands Reserve Program and the Grasslands Reserve Program into this program.

Regional Conservation Partnership Program

The Regional Conservation Partnership Program (RCPP) promotes coordination between NRCS and its partners to deliver conservation assistance to producers and landowners. NRCS helps producers through partnership agreements and RCPP conservation program contracts. The program encourages partners to join in efforts with producers to increase the restoration and sustainable use of soil, water, wildlife, and related natural resources on regional or watershed scales. Eligible partners include agricultural or silvicultural producer associations, farmer cooperatives or other groups of producers, state or local governments, American Indian tribes, municipal water treatment entities, water and irrigation districts, conservation-driven non-governmental organizations, and institutions of higher education. Eligible participants may enter into conservation program contracts or easement agreements under the framework of a partnership agreement. In 2020, a current RCPP project in southeastern Wisconsin and Milwaukee County includes the Milwaukee River Watershed Conservation Partnership.

Emergency Watershed Protection Program

The Emergency Watershed Protection Program (EWP) was established by Congress to respond to emergencies created by natural disasters and to take emergency measures to safeguard lives and property after a natural occurrence has caused a sudden impairment of a watershed. Hazards include floods and the products of erosion created by floods, fire, windstorms, or other natural disasters. Local sponsors such as city, County, State, and Tribal governments sponsor Emergency Watershed Protection projects. Sponsors are responsible for 25 percent of the construction costs, which can be direct cash expenditures or in-kind materials or services. The NRCS works with the sponsors to identify watershed impairments that threaten life and/or property (and defines property as significant infrastructure such as dwellings, office buildings, utilities, bridges and roads, but not land). The program cannot utilize funds to solve problems or remedy conditions that existed before the disaster or event. Through the Floodplain Easement portion of the

program, the NRCS may purchase easements on any floodplain lands that have a history of repeated flooding.

Watershed Protection and Flood Prevention Program

The purpose of the Watershed Protection and Flood Prevention Program (including River Basin operations) is to assist Federal, State, local agencies, local governments, Tribal governments, and program participants to protect and restore watersheds from damage caused by erosion, floodwater, and sediment, to conserve and develop water and land resources, and solve natural resource and related economic problems on a watershed basis. The program provides technical and financial assistance to local landowners or project sponsors, builds partnerships, and requires local and state funding contributions. Project sponsors can propose land treatment solutions or structural solutions. An approved watershed plan must be in place prior to initiation of any corrective land treatment or structural solution. Under this program, cities and villages in Milwaukee County that have been affected by flooding issues have worked closely with the Wisconsin Division of Emergency Management to secure FEMA Hazard Mitigation Grant Program funds to purchase properties in the Kinnickinnic, Menomonee, Milwaukee, and Root River floodplains and the Oak Creek floodplain.

Great Lakes Restoration Initiative

The Great Lakes Restoration Initiative (GLRI) is a multiagency Federal effort that targets the most significant environmental problems affecting the Great Lakes. Federal agencies do the work of the GLRI guided by five-year Action Plans. Action Plan III includes input from states, tribes, local governments, universities, business, and others. It outlines priorities and goals for the GLRI for the fiscal years 2020 to 2024, working to accelerate environmental progress in five focus areas: toxic substances and Areas of Concern; invasive species; nonpoint source pollution impacts on nearshore health; habitats and species; and foundations for future restoration areas. Grant opportunities for restoration projects are available, primarily through the Environmental Protection Agency (EPA). Specifically, the EPA and its partner agencies agree on program and project priorities to implement the GLRI Action Plan. The EPA then appropriates money, which in turn provides funding to other Federal government agencies. Those agencies, and the EPA, use that money to fund restoration projects, which the Federal agencies themselves, or other entities such as states, tribes, local governments, universities, or nongovernmental organizations then undertake.

State and Local Programs

Soil and Water Resource Management Program

DATCP administers Wisconsin's soil and water resource management program (SWRM) under the provisions of Chapter 92 of the *Wisconsin Statutes* and Chapter ATCP 50 of the *Wisconsin Administrative Code*. The SWRM grant program supports locally led conservation efforts. Awarding of grant funds to counties pays for conservation staff and provide landowner cost-sharing to implement their LWRMP. The current version of Chapter ATCP 50, revised in February 2018, relates specifically to agricultural programs and it establishes requirements and/or standards for:

- Soil and water conservation on farms
- County soil and water programs, including land and water resource management plans
- Grants to counties to support county conservation staff
- Cost-share grants to landowners for implementing conservation practices
- Design certifications by soil and water professionals
- Local regulations and ordinances
- Cost-share practice eligibility and design, construction, and maintenance

Targeted Runoff Management Grant Program

The Targeted Runoff Management (TRM) Grant Program, in operation since 1999, was significantly revised effective January 1, 2011. Administering Targeted Runoff Management Grants is through Chapter NR 153 and NR 154 of the *Wisconsin Administrative Code*. These grants provide technical and financial assistance to local governments for managing nonpoint source pollution. Most grants address agricultural problems. The agricultural project grants address many types of water resources, including impaired waters in areas with Total Maximum Daily Load (TMDL), impaired waters outside TMDL areas, high-quality surface waters threatened by degradation, and ground water protection and improvement. Agricultural projects can vary in scale, from small-scale projects addressing a single farm to larger-scale projects that address agricultural sources on a watershed basis. The program requires that projects outside a TMDL area must implement the

State's agricultural nonpoint source performance standards and prohibitions set forth in Chapter NR 151. Projects designed to implement TMDLs may also implement practices that indirectly achieve State standards and prohibitions as long as the management practices require achievement of the goals of the TMDL. Targeted Runoff Management (TRM) Grants also provide funding for a limited number of urban storm water construction projects but restrict the urban TRM projects to TMDL areas.[65] Only small-scale projects are available in urban areas.

All TRM grants provide 70 percent cost sharing for construction of management practices, with up to 90 percent cost sharing available for agricultural projects where the farmer qualities for economic hardship. Large scale TRM projects may also provide limited funding for staff support. Each year, the WDNR establishes caps on grant amounts consistent with available funding.

Chapter NR 153 also administers the Notice of Discharge Grants. Notices of Discharge are issued by the WDNR under Chapter NR 243, "Animal Feeding Operations." WDNR issues Notices of Discharge to small and medium livestock operations that fail to meet Federal point source discharge requirements or that are causing fecal contamination of a drinking water well. In many of these cases, this requires the farmer to fix the site regardless of cost sharing. However, the WDNR may decide to offer a grant to help facilitate site clean-up. Not cleaning up problem sites results in issuance of WPDES permits or referral to the Wisconsin Department of Justice for prosecution. The WDNR and DATCP work jointly to address these sites.

Urban Nonpoint Source and Storm Water Management Grant Program

The Urban Nonpoint Source and Storm Water Management Grant Program provides cost-share funds for planning or construction activities for controlling nonpoint source pollution from urban areas. Projects funded by this program are site-specific, serve areas smaller in size than a sub-watershed, and target high-priority problems. Eligible applicants include cities, villages, towns, counties, regional planning commissions, and special purpose districts such as lake districts, sewerage districts, and sanitary districts. In addition, an "urban project area" must meet at least one of the following criteria:

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[65] *Chapters NR 154 and NR 155, which administer a companion grant program, the Urban Nonpoint Source Storm Water Management Grant Program, complements the TRM Program by making grants for urban areas available Statewide for a variety of planning and construction activities. These urban grants are available to address a wide range of water resources including impaired waters in TMDL areas, impaired waters outside TMDL areas, high quality waters that are threatened by stormwater runoff, and groundwater that is threatened or degraded by stormwater runoff.*

- The area has a residential population density of at least 1,000 people per square mile

- The area has a commercial land use

- The area is a portion of a privately-owned industrial site not covered by a WPDES permit issued under Chapter NR 216 of the *Wisconsin Administrative Code*

- The area is a municipally owned industrial site

The maximum cost-share rate available for planning grants is 70 percent of eligible costs. The cap on the total State share for planning projects is $85,000. The maximum cost-share rate available for construction grants is 50 percent of eligible costs, with a total State share for a construction project of $150,000 and a potential grant of an additional $50,000 for land acquisition, where needed. Planning grants can pay for a variety of eligible activities, including stormwater management planning for existing and new development, related information and education activities, ordinance and utility district development, and enforcement. Construction grants can pay for construction of best management practices to control stormwater pollution from existing urban areas. Projects may be eligible for funding whether or not they are designed to meet the performance standards identified in Section NR 151.13 of the *Wisconsin Administrative Code*, but the highest priority in selecting projects under this program is given to projects that implement performance standards and prohibitions contained in Chapter NR 151 or that address waterbodies listed on the Federal Section 303(d) list of impaired waters.

Knowles-Nelson Stewardship Program

The Knowles-Nelson Stewardship Program preserves the State's most significant land and water resources for future generations and provides the land base and recreational facilities needed for quality outdoor experiences. The program achieves these goals by funding the acquisition of land and easements for conservation and recreation purposes, developing and improving recreational facilities, and restoring wildlife habitat. The administrative rules for the program are set forth in Chapter NR 50 and NR 51 of the *Wisconsin Administrative Code*. The program provides 50 percent matching grants to local units of government and qualified nonprofit conservation organizations for the acquisition of land and easements. To maintain eligibility to apply for and receive such funding, local units of government must prepare and periodically update a park and open space plan.

Lake Protection Grant and River Protection Grant Programs

The Lake Protection Grant program as set forth in Chapter NR 191 of the *Wisconsin Administrative Code* assists local governments, lake districts and associations, and other nonprofit organizations in improving and protecting water quality in lakes. A 75 percent State cost-share is available, with a 25 percent local match. Projects that are eligible for cost-share assistance include land acquisition for easement establishment, wetland restoration, and various lake improvement projects such as those involving pollution prevention and control, diagnostic feasibility studies, and lake restoration.

The River Protection Grant program as set forth in Chapter NR 195 of the *Wisconsin Administrative Code* assists local governments, lake districts and associations, and other nonprofit organizations in improving and protecting water quality in rivers. A 75 percent State cost-share is available, with a 25 percent local match. Cost-share funding cannot exceed $50,000 for a management project. The types of projects that are eligible for cost-share assistance include management activities such as land acquisition, easement establishment, ordinance development, installation of nonpoint source pollution abatement projects, river restoration projects, and river plan implementation projects.

Municipal Flood Control Grant Program

Under Chapter NR 199, "Municipal Flood Control Grants," of the *Wisconsin Administrative Code* municipalities, including cities, villages, and towns, as well as metropolitan sewerage districts are eligible for cost-sharing grants from the State for projects to minimize flooding and flood-related damages. Projects may include acquisition and removal of structures; floodproofing of structures; riparian restoration projects, including removal of dams and other artificial obstructions, restoration of fish and native plant habitat, erosion control, and streambank restoration projects; acquiring vacant land to create open-space flood storage areas; constructing structures for collecting, retaining, storing, and transmitting stormwater and groundwater for flood control; and preparing flood insurance studies and other flood mapping projects. Municipalities and metropolitan sewerage districts are eligible for up to 70 percent State cost-share funding for eligible projects and have to provide at least a 30 percent local match.

Clean Water Fund Program

The State Clean Water Fund Program (CWFP) provides financial assistance to municipalities for the planning, design, and construction of projects to control and treat urban stormwater runoff. Eligible applicants include counties, cities, villages, towns, town sanitary districts, public inland lake protection and rehabilitation districts, and metropolitan sewerage districts. Eligible projects must relate to either a WPDES permit, a performance standard, or a plan approved by the WDNR. The primary purpose of an eligible urban runoff

project must be to improve water quality. The program provides loans at an interest rate of 65 percent of the current CWFP market rate.

The CWFP also has a Small Loan Program that provides interest rate subsidies to municipalities that have a loan from the State Trust Fund Loan Program for the planning, design, and construction of urban runoff projects with total estimated costs of $1 million or less.

Wisconsin Coastal Management Program

The Department of Administration, Bureau of Intergovernmental Relations administers the Wisconsin Coastal Management Program (WCMP). The WCMP is a voluntary State-Federal partnership that works through a council appointed by the Governor to provide policy coordination among State agencies and to award Federal funds to local governments and other entities for implementing initiatives related to managing coastal zones in the State. The program has identified wetlands protection, habitat restoration, public access, land acquisition, nonpoint source pollution control, land use and community planning, natural hazards, and Great Lakes education projects as current priorities. The program also aids local governments in managing and protecting shorelands, wetlands, and floodplains through zoning and permitting.

Wisconsin Surface Water Grant Program

The WDNR is proposing to consolidate five related administrative code chapters governing three cost-sharing grant programs into one new administrative code chapter. This would create a comprehensive surface water grant program that provides financial assistance to nonprofit organizations and governmental units to protect and restore surface water and aquatic ecosystems and control aquatic invasive species. The Program's two primary activities include: planning projects to help communities understand the condition of aquatic ecosystems and watersheds, collect data, conduct studies, and develop management plans; and management projects to protect and improve water quality and aquatic habitat and prevent and control aquatic invasive species.

Producer-Led Watershed Protection Program

The Producer-Led Watershed Protection Program focuses on ways to increase farm participation in voluntary efforts by fostering locally led decision making by producers. A Producer-Led Group is located in the northern portion of Milwaukee County as part of the Milwaukee River watershed and is identified as the Milwaukee River Watershed Clean Farm Families. This group is focused on promoting soil health and water quality principles as well as providing funding to area farmers in the project area within the Milwaukee River watershed for implementing conservation practices such as No-Till, cover crops, and harvestable buffers;

nutrient management planning; and low-disturbance manure injections. Grant funding is available through DATCP along with matching dollars from organizations such as the Fund for Lake Michigan help farmers address soil and water quality challengers of their local landscapes with innovative and collaborative approaches. It should be noted that the majority of the active farms and farmlands within the Milwaukee River watershed are located in Ozaukee County.

Table 3.1
Guidelines for Development Considered Compatible with Primary Environmental Corridors and Isolated Natural Resource Areas

Component Natural Resource and Related Features Within Environmental Corridors[a]	**Permitted Development (see General Development Guidelines below)**																
	Transportation and Utility Facilities				Recreational Facilities											Rural-Density Residential Development	Other Development
	Streets and Highways	Utility Lines and Related Facilities	Engineered Stormwater Management Facilities	Engineered Flood Control Facilities[b]	Trails[c]	Picnic Areas	Family Camping[d]	Swimming Beaches	Boat Access	Ski Hills	Golf	Playfields	Hard-Surface Courts	Parking	Buildings		
Lakes, Rivers, and Streams	--[e]	--[f,g]	--	--[h]	--[i]	--	--	X	X	--	--	--	--	--	--	--	--
Riparian Buffer[j]	X	X	X	X	X	X	--	X	X	--	X	--	--	X	X	--	--
Floodplain[k]	--[l]	X	X	X	X	X	--	X	X	--	X	X	--	X	X	--	--
Wetland[m]	--[l]	X	--	--	X[n]	--	--	--	X	--	--[o]	--	--	--	--	--	--
Wet Soils	X	X	X	X	X	--	--	X	X	--	X	--	--	X	--	--	--
Woodland	X	X	X[p]	--	X	X	X	--	X	X	X	X	X	X	X[q]	X	X
Wildlife Habitat	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X
Steep Slope	X	X	--	--	--[r]	--	--	--	--	X[s]	X	--	--	--	--	--	--
Prairie	--	--[g]	--	--	--[r]	--	--	--	--	--	--	--	--	--	--	--	--
Park	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	--	--
Historic Site	--	--[g]	--	--	--[r]	--	--	--	--	--	--	--	--	X	--	--	--
Scenic Viewpoint	X	X	--	--	X	X	X	--	X	X	X	--	--	X	X	X	X
Natural Area or Critical Species Habitat Site	--	--	--	--	--[q]	--	--	--	--	--	--	--	--	--	--	--	--

Note: An "X" indicates that facility development is permitted within the specified natural resource feature. In those portions of the environmental corridors having more than one of the listed natural resource features, the natural resource feature with the most restrictive development limitation should take precedence.

APPLICABILITY

These guidelines indicate the types of development that can be accommodated within primary environmental corridors and isolated natural resource areas while maintaining the basic integrity of those areas. Throughout this table, the term "environmental corridors" refers to primary environmental corridors and isolated natural resource areas.

Under the regional plan:

- As regionally significant resource areas, primary environmental corridors should be preserved in essentially natural, open use in accordance with the guidelines in this table.
- Secondary environmental corridors and isolated natural resource areas warrant consideration for preservation in essentially natural open use, as determined in county and local plans and in a manner consistent with State and Federal regulations. County and local units of government may choose to apply the guidelines in this table to secondary environmental corridors and isolated natural resource areas.

GENERAL DEVELOPMENT GUIDELINES

- Transportation and Utility Facilities: All transportation and utility facilities proposed to be located within the important natural resources should be evaluated on a case-by-case basis to consider alternative locations for such facilities. If it is determined that such facilities should be located within natural resources, development activities should be sensitive to, and minimize disturbance of, these resources, and, to the extent possible following construction, such resources should be restored to preconstruction conditions.

  The above table presents development guidelines for major transportation and utility facilities. These guidelines may be extended to other similar facilities not specifically listed in the table.

Table continued on next page.

Table 3.1 (continued)

- Recreational Facilities: In general, no more than 20 percent of the total environmental corridor area should be developed for recreational facilities. Furthermore, no more than 20 percent of the environmental corridor area consisting of upland wildlife habitat and woodlands should be developed for recreational facilities. It is recognized, however, that in certain cases these percentages may be exceeded in efforts to accommodate needed public recreational and game and fish management facilities within appropriate natural settings. In all cases however, the proposed recreational development should not threaten the integrity of the remaining corridor lands nor destroy particularly significant resource elements in that corridor. Each such proposal should be reviewed on a site-by-site basis.

  The above table presents development guidelines for major recreational facilities. These guidelines may be extended to other similar facilities not specifically listed in the table.

- Rural-Density Residential Development: Rural-density residential development may be accommodated in upland environmental corridors, provided that buildings are kept off steep slopes. The maximum number of housing units accommodated at a proposed development site within the environmental corridor should be limited to the number determined by dividing the total corridor acreage within the site, less the acreage covered by surface water and wetlands, by five. The permitted housing units may be in single-family or multifamily structures. When rural residential development is accommodated, cluster subdivision designs are strongly encouraged.

- Other Development: In lieu of recreational or rural-density residential development, up to 10 percent of the upland corridor area in a parcel may be disturbed in order to accommodate urban residential, commercial, or other urban development under the following conditions: 1) the area to be disturbed is compact rather than scattered in nature; 2) the disturbance area is located on the edge of a corridor or on marginal resources within a corridor; 3) the development does not threaten the integrity of the remaining corridor; 4) the development does not result in significant adverse water quality impacts; and 5) development of the remaining corridor lands is prohibited by a conservation easement or deed restriction. Each such proposal must be reviewed on a site-by-site basis.

  Under this arrangement, while the developed area would no longer be part of the environmental corridor, the entirety of the remaining corridor would be permanently preserved from disturbance. From a resource protection point of view, preserving a minimum of 90 percent of the environmental corridor in this manner may be preferable to accommodating scattered home sites and attendant access roads at an overall density of one dwelling unit per five acres throughout the upland corridor areas.

- Pre-Existing Lots: Single-family development on existing lots of record should be permitted as provided for under zoning at the time the Commission adopted the regional land use plan.

- All permitted development presumes that sound land and water management practices are utilized.

FOOTNOTES

[a] *The natural resource and related features are defined as follows:*

Lakes, Rivers, and Streams: Includes all lakes greater than five acres in area and all perennial and intermittent streams as shown on U.S. Geological Survey quadrangle maps.

Riparian Buffer: Includes a band 50 feet in depth along both sides of intermittent streams; a band 75 feet in depth along both sides of perennial streams; a band 75 feet in depth around lakes; and a band 200 feet in depth along the Lake Michigan shoreline.

Floodplain: Includes areas, excluding stream channels and lake beds, subject to inundation by the 1 percent annual probability flood event.

Wetlands: Includes areas that are inundated or saturated by surface water or groundwater at a frequency, and with a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Wet Soils: Includes areas covered by wet, poorly drained, and organic soils.

Woodlands: Includes areas one acre or more in size having 17 or more deciduous trees per acre with at least a 50 percent canopy cover as well as coniferous tree plantations and reforestation projects; excludes lowland woodlands, such as tamarack swamps, which are classified as wetlands.

Wildlife Habitat: Includes areas devoted to natural open uses of a size and with a vegetative cover capable of supporting a balanced diversity of wildlife.

Steep Slope: Includes areas with land slopes of 12 percent or greater.

Prairies: Includes open, generally treeless areas which are dominated by native grasses; also includes savannas.

Park: Includes public and nonpublic park and open space sites.

Historic Site: Includes sites listed on the National Register of Historic Places. Most historic sites located within environmental corridors are archaeological features such as Native American settlements and effigy mounds and cultural features such as small, old cemeteries. On a limited basis, small historic buildings may also be encompassed within delineated corridors.

Scenic Viewpoint: Includes vantage points from which a diversity of natural features such as surface waters, wetlands, woodlands, and agricultural lands can be observed.

Natural Area and Critical Species Habitat Sites: Includes natural areas and critical species habitat sites as identified in the regional natural areas and critical species habitat protection and management plan.

[b] *Includes such improvements as stream channel modifications and such facilities as dams.*

[c] *Includes trails for such activities as hiking, bicycling, cross-country skiing, nature study, and horseback riding, and excludes all motorized trail activities. It should be recognized that trails for motorized activities such as snowmobiling that are located outside the environmental corridors may of necessity have to cross environmental corridor lands. Proposals for such crossings should be evaluated on a case-by-case basis, and if it is determined that they are necessary, such trail crossings should be designed to ensure minimum disturbance of the natural resources.*

Table continued on next page.

Table 3.1 (continued)

[d] *Includes areas intended to accommodate camping in tents, trailers, or recreational vehicles which remain at the site for short periods of time, typically ranging from an overnight stay to a two week stay.*

[e] *Certain transportation facilities such as bridges may be constructed over such resources.*

[f] *Utility facilities such as sanitary sewers may be located in or under such resources.*

[g] *Electric power transmission lines and similar lines may be suspended over such resources.*

[h] *Certain flood control facilities such as dams and channel modifications may need to be provided in such resources to reduce or eliminate flood damage to existing development.*

[i] *Bridges for trail facilities may be constructed over such resources.*

j Previous editions of these guidelines identified this category as "Shoreland," rather than "Riparian Buffer." Riparian buffers, as defined in footnote "a" of this table, typically would be located within a State-defined shoreland area (see Chapters NR 115 and NR 117 of the Wisconsin Administrative Code*).*

[k] *Consistent with Chapter NR 116 of the* Wisconsin Administrative Code.

[l] *Streets and highways may cross such resources. Where this occurs, there should be no net loss of flood storage capacity or wetlands. Guidelines for mitigation of impacts on wetlands by Wisconsin Department of Transportation facility projects are set forth in Chapter Trans 400 of the* Wisconsin Administrative Code.

[m] *Any development affecting wetlands must adhere to the water quality standards for wetlands established under Chapter NR 103 of the* Wisconsin Administrative Code.

[n] *Only an appropriately designed boardwalk/trail should be permitted.*

[o] *Wetlands may be incorporated as part of a golf course, provided there is no disturbance of the wetlands.*

[p] *Generally excludes detention, retention, and infiltration basins. Such facilities should be permitted only if no reasonable alternative is available.*

[q] *Only if no alternative is available.*

[r] *Only appropriately designed and located hiking and cross-country ski trails should be permitted.*

[s] *Only an appropriately designed, vegetated, and maintained ski hill should be permitted.*

Source: SEWRPC

WD# 256767
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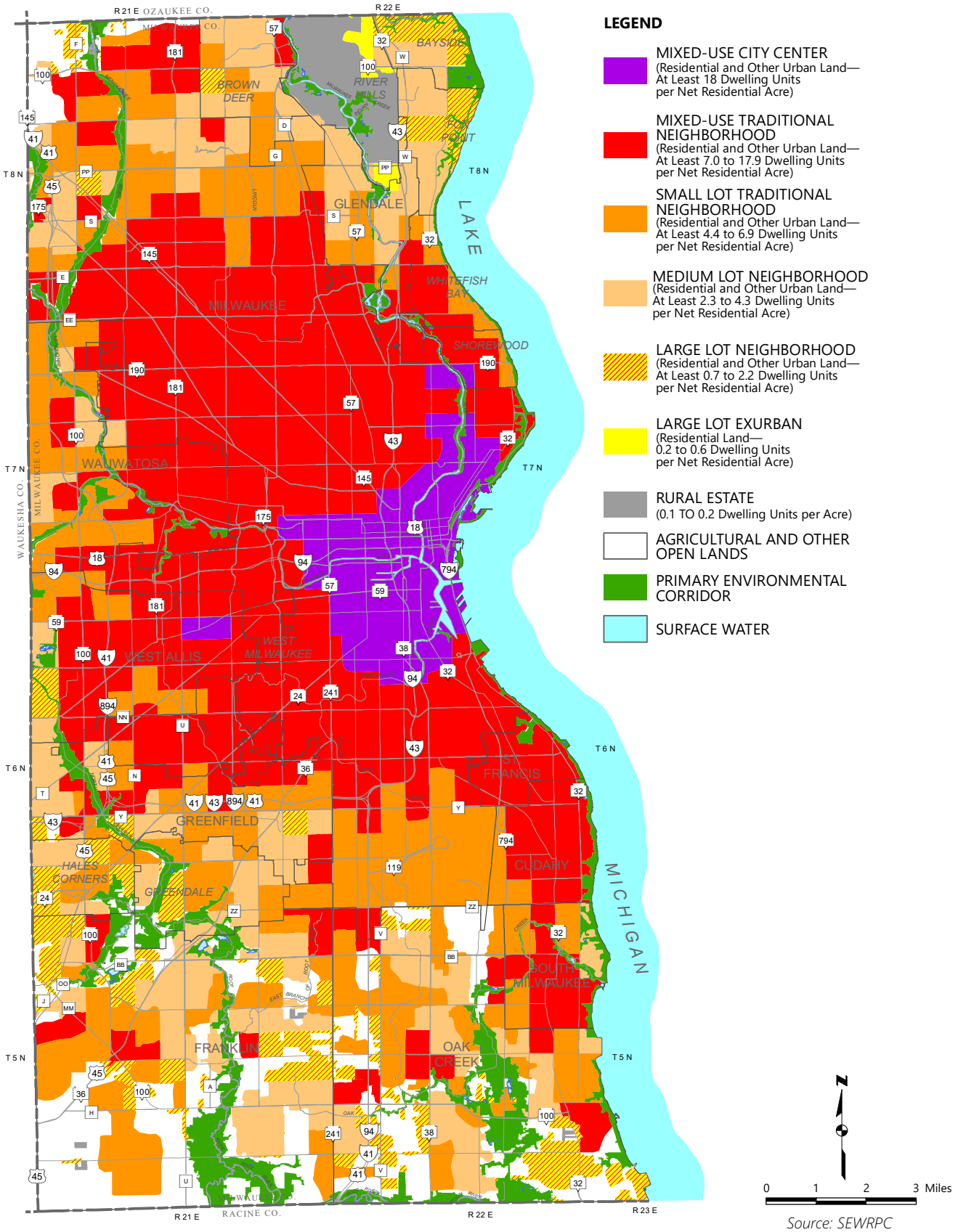
03/09/21

Map 3.1
Regional Land Use Plan as it Pertains to Milwaukee County: 2050



Source: SEWRPC

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