Appendix F

Water Resources Management Plan

This appendix provides supporting content for wastewater related policies and satisfies the Metropolitan Council requirements related to wastewater.

Executive Summary

Introduction

This document is developed in accordance with the regulatory requirements listed below under the Purpose heading. This Water Resource Management Plan (WRMP) initiates the fifth decade of the City of Minneapolis (City) programs and practices that have modernized the sanitary sewer and stormwater drainage systems that directly impact water resources in the City.

Sailboats on Lake Harriet

Credit: Minneapolis Public Works

The modern era of water resource management was initiated in the 1960s when the focus was on the water quality of the Mississippi River. Ongoing overflows of combined sewage and stormwater had resulted in a noticeable decline in the River’s water quality. This approach set in the 1960s, continuing into the 1970s, aimed to reduce the occurrence of these overflows through separation of the sanitary sewer and stormwater systems in conjunction with a City-wide street paving program. In the 1980s, the City began to focus on Bassett Creek, Minnehaha Creek, and Shingle Creek water quality through partnership with watershed organizations. In the 1990s, while the sewer separation was winding down and the watershed management programs were growing, the City expanded its water quality focus to encompass the entire City through the initiation of activities designed to improve the quality of the stormwater runoff. Actions during that era included targeted projects such as the Chain of Lakes Water Quality Improvement Project, and initiation of City-wide activities such as increased frequency of street cleaning. Also in the 1990s, the City began a program to construct stormwater basins and other stormwater capacity improvements aimed at mitigation of areas of ongoing street and building flooding. In the 2000s, the focus shifted back to the sanitary sewers to locate and eliminate sources of clear water to the sanitary sewer, which was identified as necessary to fully eliminate the occurrence of infrequent overflows from the sanitary sewers to the Mississippi River. Primary activities implemented included identification and elimination of rooftop drainage connections to the sanitary sewers, and identification and elimination of other sources of inflow/infiltration (I/I). By the 2010s, all of these activities initiated since the 1960s were successfully working together to improve and protect the water resources within the City.

With the development of this WRMP, the City aims to fully integrate management of the sanitary sewer and stormwater drainage systems to create a holistic approach to water resource management.

This approach is founded in the City's commitment to protect water resources in a manner that respects the needs and demands of all water-related actions, such that activities related to the management of one system are to the benefit, and not detriment, of the other system.

Purpose

The Minneapolis Vision is the foundation of the City's goals and strategic direction that guides management of the City and serves as the foundation for programs and activities implemented as part of the City's 2040 Comprehensive Plan and this Water Resource Management Plan.

The Minneapolis Vision is that the City is a growing and vibrant world-class city with a flourishing economy and a pristine environment, where all people are safe, healthy, and have equitable opportunities for success and happiness.

Successful management of the City's water resources requires a comprehensive program that respects the needs of the water resource while concurrently meeting regulatory requirements and achieving sound fiscal management. The City has prepared this WRMP as a comprehensive planning document that balances these demands as the City conserves, protects, and manages its water resources. This WRMP:

- Compiles, summarizes, and references efforts of agencies, organizations, and departments of the City and the Minneapolis Park and Recreation Board (MPRB). Links are provided to allow users of this report to access specific information that is summarized, but not fully covered, in this WRMP.

Cedar Lake Road Loch Ness Sculpture by Bruce Stillman

Credit: Minneapolis Public Works

- Reviews the current state of the City's water resources in the context of sanitary sewer and stormwater drainage system goals and policies, ordinances, operations and maintenance practices, flood mitigation, and other water resource goals.
- Establishes reasonable and affordable goals that support achievable results within the established regulatory and management structure.
- Lays out the City's approach to assessment, planning, and implementation that is used in the event that a new project or program is required to achieve water resource management goals.

This WRMP is developed in accordance with these multiple regulatory requirements:

- Local Water Plan requirements of Minnesota Statute Section 103b.235 and corresponding Rule 8410.0160.
- Water resource management plan content of the 2018 Minneapolis Comprehensive Plan, as required in Minnesota Statute Section 473.859, and as defined in Metropolitan Council's *Thrive 2040 Water Resource Policy Plan*.
- Municipal sewage collection plan content as required by Minnesota Statute 473.513, and as defined in Metropolitan Council's *Thrive 2040 Water Resource Policy Plan*.
- Supplementary Local Water Plan requirements specific to each of the four watershed management organizations with jurisdiction in the City of Minneapolis: Bassett Creek Watershed Management Commission (BCWMC), Minnehaha Creek Watershed District (MCWD), Mississippi Watershed Management Organization (MWMO), and Shingle Creek Watershed Management Commission (SCWMC).

Content

Detailed information on water resource management in the City of Minneapolis is organized into six sections in this WRMP:

Section 1 – History and Overview of Minneapolis Water Resources

Section 1 describes significant background information that is the foundation of the City of Minneapolis water resource management program. Information includes:

- The history of the City's sewer systems.
- Current trends in the City's water resource management.
- The categories of water resources, as defined by the City: surface water, sanitary collection systems, and stormwater drainage systems.
- Required content and approvals for this WRMP.
- Procedures to amend this WRMP.
- The role of the City's National Pollutant Discharge Elimination System (NPDES) Integrated Permit requirements for annual water resource management reports.

Quaking Bog

Credit: Minneapolis Public Works

Section 2 – Regulatory Requirements, Goals, and Policies

Section 2 summarizes regulatory requirements that influence water resource management in the City. The section outlines Federal, State, and Regional requirements and associated programs, organized according to the following public agencies that establish water resource management requirements that affect the City:

- United States Environmental Protection Agency (EPA).
- United States Army Corps of Engineers (USACE).
- Minnesota Board of Water and Soil Resources (BWSR).
- Minnesota Pollution Control Agency (MPCA).
- Minnesota Department of Natural Resources (MNDNR).
- Metropolitan Council.
- Hennepin County.
- Watershed Management Organizations: BCWMC, MCWD, MWMO, and SCWMC.

Collaboration with these multiple regulatory organizations is important to successful water resource management. Section 2 also includes:

- The City and MPRB goals, strategic direction, and water resource guiding principles that direct water resource management.
- Responsibilities for implementation of goals and policies.
- Descriptions of sanitary sewer and water resource management cooperative agreements.
- Summaries of how the City complies with major regulatory requirements.

Section 2 outlines that the City collaborates with regulatory partners on public and private project development and on ordinances, guidance documents, and policy updates that impact water resources.

Section 3 – Land and Surface Water Inventory and Assessment

Section 3 provides an extensive inventory and detailed characteristics of the physical environment of the City, with an emphasis on the water resources that exist within the municipal boundary of the City:

- Thirteen (13) lakes, four (4) streams, and a 12-mile segment of the Mississippi River.
- Thirty-eight (38) miles of shoreline are contained within the 6.400 acres of MPRB-owned parks.
- 30.61 inches of average precipitation falls each year in the form of rain and snow.
- Four (4) watershed management agencies oversee and guide water resource management.

Section 3 also contains detailed information of the City's population, parks, neighborhoods, soils, climate, bedrock, geology, topography, land use, zoning, wetlands, groundwater, and source water protection.

Detailed information is summarized for each of the waterbodies within the City, plus an additional 10 waterbodies outside the City's boundaries which receive stormwater runoff discharges from the City's stormwater drainage system. The information provided for each waterbody includes a summary of the physical characteristics (MNDNR ID number, MNDNR classification, MN Chapter 7050 use classification, surface area or length, downstream waterbody, watershed area, and watershed management organization), and a summary of known water quality parameters and values. The waterbody history, inventory of studies, and completed capital improvement projects are also included.

The MPRB is an important partner involved in ongoing monitoring of the water quality of many of the City's lakes and streams. Information collected by the MPRB, which is supplemented by water quality monitoring by watershed organizations, has been used by the MPCA to assess which waterbodies have water quality that is below the state standards, termed impairments. As of 2018, the MPCA has determined that the impairments listed in Table ES-1 exist in Minneapolis waterbodies:

Table ES.1 – Existing Impairments in City of Minneapolis Waterbodies

Impairment	Waterbody
Aquatic Consumption (contaminants found in fish tissue)	▪ Brownie Lake ▪ Cedar Lake ▪ Lake Calhoun/Bde Maka Ska ▪ Lake Harriet ▪ Lake Nokomis ▪ Lake of the Isles ▪ Mississippi River ▪ Powderhorn Lake
Aquatic Life (excessive nutrients)	▪ Brownie Lake ▪ Lake Hiawatha ▪ Lake Nokomis ▪ Mississippi River ▪ Powderhorn Lake
Aquatic Life (low oxygen and/or low microorganism count)	▪ Bassett Creek ▪ Minnehaha Creek ▪ Shingle Creek
Aquatic Life (excessive chlorides)	▪ Bassett Creek ▪ Brownie Lake ▪ Diamond Lake ▪ Loring Lake ▪ Powderhorn Lake ▪ Shingle Creek ▪ Spring Lake
Aquatic Recreation (excessive bacteria)	▪ Bassett Creek ▪ Minnehaha Creek ▪ Mississippi River ▪ Shingle Creek

Table 3.52 (page 3-94) describes the multiple activities that the City has established that are aimed at improving the water quality of all waterbodies in the City, including the above-listed impaired waters. Generally, these activities include installation and proper maintenance of structural stormwater management practices (ponds, green infrastructure, etc.), proper management of streets (street cleaning and winter salt management), stormwater management requirements for new developments, erosion and sediment control for public and private construction activities, and public education. Detailed information on these activities are contained in Section 4 and Section 5.

Section 4 – Infrastructure Inventory, Activities, and Assessment

Section 4 provides detailed information on the sanitary sewer and stormwater drainage infrastructure that work together to protect the City's water resources, including:

- Sanitary sewer inventory (age, materials, pipe, tunnels, interceptors, manholes, pump stations, and regulators).
- Stormwater drainage inventory (age, pipe, tunnels, manholes, catch basins, detention facilities, water quality controls, pump stati outfalls).
- Descriptions of public versus private systems.
- Sanitary sewer service area, capacity, and design standards.
- Stormwater drainage areas, capacity, and design standards.
- Flow projections for sanitary sewers.
- Ongoing improvement activities.
- Operation and maintenance activities.
- Condition assessments.
- Coordination with government agencies.
- Responsibilities for infrastructure management.

Stone Arch Bridge

Credit: Minneapolis Public Works

Central Library Green Roof

Credit: Minneapolis Public Works

Section 5 – Regulatory Controls and Water Resource Management Programs

Section 5 recognizes that the public has responsibilities related to water resource management. Section 5 describes the following regulations and programs that require or incorporate public involvement:

Shingle Creek at Lyndale Avenue North

Credit: CDM Smith

- The City and MPRB ordinances that influence water resource management.
- The City's water resource regulatory programs, including stormwater management requirements for new developments, erosion and sediment control practice requirements for public and private construction activities, inflow/infiltration compliance requirements for sanitary sewers on private properties, and illicit discharge compliance requirements for stormwater drainage systems on private properties.
- Inventory of water resource public education efforts by the City, MPRB, and others.
- Administrative responsibilities for the regulatory programs inventoried in Section 5.

Section 6 – Planning and Implementation

Section 6 describes the City's financial and planning processes used to manage water resource management programs. Information includes the City's revenue sources, expenditure framework, and the lifecycle management process used to identify and implement changes in water resource activities. Capital Improvement Projects that have been formally adopted by the Minneapolis City Council as part of the annual budget are identified. The prioritization approach implemented when there are multiple demands on the City's finite financial resources is also presented.

In 2018, the City budgeted $91.1 million for sanitary sewer and stormwater management expenses, of which $41.3 million is paid to the Metropolitan Council for sewage treatment. The remainder of the fund is used for capital improvement expenses, maintenance, street sweeping, and management/administration.

In 2018, the City budgeted $59.4 million for sanitary sewer expenses and $31.7 million for stormwater management expenses.

This WRMP sets a framework for the additional efforts necessary through 2028 to ensure continued management and improvement of the City's valuable water resources.

Ongoing programs include:

- Updated to official controls, including a 2018 update of City Code of Ordinances, Chapter 54, Stormwater Management and an update to the City Stormwater and Sanitary Sewer Guide for development and redevelopment.
- Activities required in the City's NPDES Integrated Permit, including public education, illicit discharge detection and elimination, spill response program, City facility inspections, staff training, erosion and sediment control for City construction projects, street cleaning, winter snow and ice control, stormwater management practice maintenance, City good housekeeping, pilot projects, and ongoing assessments of the condition and capacity of the sanitary sewers and stormwater drainage systems. These programs are budgeted to be $12 million to $13.5 million per year.
- Capital improvement projects in the general categories of:
  - **Sanitary Sewer and Tunnel Rehabilitation** to maintain structural integrity of sanitary system.
  - **Implementation of EPA Stormwater Regulations**, which provide structural stormwater management improvements to further reduce pollutant discharge to waterbodies.
  - **Combined Sewer Overflow Improvements** involving storm drain construction as needed to eliminate stormwater connections to the sanitary sewers.
  - **Storm Drain and Tunnel Rehabilitation** to maintain structural integrity of the stormwater system and improve system capacity.
  - **Flood Mitigation with Alternative Stormwater Management Improvements** as needed to eliminate ongoing flooding through installation of structural stormwater management practices such as stormwater ponds, infiltration practices, and/or green infrastructure such as raingardens.

The projected cost for these capital improvements ranges from $30 million to $80 million per year, to be funded through City budgets, partnerships with other public agencies, state funding, and grants. A year-by-year breakdown of projects and costs is provided in Appendix K.

Annual Reporting

Detailed, up-to-date information on the City's Stormwater Management Plan is found in annual reports prepared by the City and the MPRB.

This WRMP is a planning level document that is intended to inventory the City's water resources and its water resource management infrastructure. It is also intended to outline solutions to identified issues, as well as to present an implementation plan that will serve to maintain and improve the water quality and infrastructure as necessary over the 10-year planning period of this WRMP. Additional detail on the stormwater management activities is available in the City's Stormwater Management Plan (SWMP), which is updated on a 5-year cycle, with the most current update planned for release in early 2019. Annual report, described in more detail in Section 1, serve to communicate specific accomplishments over the previous calendar year. The Minneapolis Water Resources Annual Report is released for public review and is the subject of an annual public hearing conducted by the Minneapolis City Council. City staff is available to meet with watershed organizations, other public agencies, and the public as requested to discuss the previous year's annual reports, proposed changes to this WRMP or to the SWMP, and upcoming capital improvement projects under development by the City.

How to Use this Report

The purpose of this WRMP is to provide a comprehensive description of the City's water resource management programs and projects at the time this report was published. Water resource management in the City continues to evolve as problems are identified or new regulations are adopted. Because of this ever-changing character of water resource management in the City, this plan has been developed with the philosophy to reference, and not duplicate, information that is available online.

Readers are encouraged to go to the original source for the most current and accurate information available. Links are provided to assist the reader in finding appropriate website(s) containing the information referenced in this WRMP. The City will review the links presented in the References and Links section on a routine basis to provide access to the most current information.

Specific information, especially information that is subject to frequent change, is contained either in an appendix to this plan, in one of the City's NPDES Annual Reports, or is identified through referral or link to another organization.

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Section 1 – History and Overview of Minneapolis Water Resources

The Minneapolis Water Resource Management Plan (WRMP) is a document that provides background and direction that the City of Minneapolis (City) utilizes to proactively manage its water resources. This document updates the 2006 Minneapolis Local Surface Water Management Plan and the 2008 Minneapolis Sanitary Sewer Plan. The purpose of this 2018 update is to describe the City's integrated approach for management of issues and activities related to the City's surface waters, stormwater drainage and treatment system, and sanitary collection system. The goal of this integrated approach is to ensure that the improvements in one system do not negatively affect operations in other systems, to ensure protection of the important water resources that define Minneapolis.

History

The City has long been defined by its water resources. The Mississippi River, in its current location, has existed since the last ice age about 12,000 years ago. Before the middle of the 19th Century, the Dakota tribe occupied the area now known as Minneapolis, with the Ojibwe as the other dominant Native American tribe in the area. Figure 1.1 shows the Dakota and Ojibwe place names for many of the significant water resources within the City.[1]

The town of Minneapolis was incorporated in 1856 and the first town council organized in 1858. Saint Anthony and Minneapolis merged in 1872 under the name of Minneapolis. On February 27, 1883, the Legislature acted on a request from the citizens of Minneapolis and authorized an independent Board of Park Commissioners.

Powderhorn Park, 1905

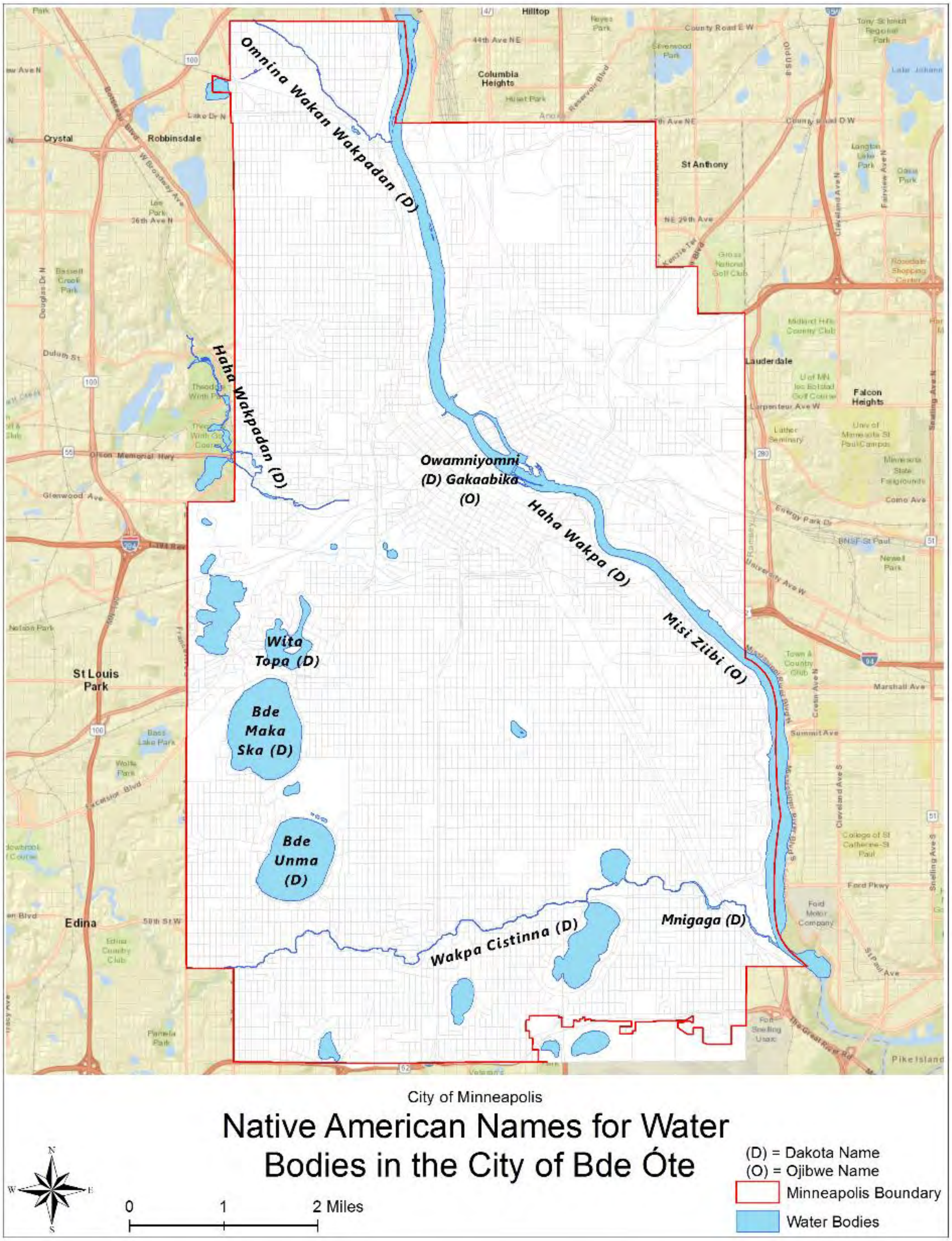
Credit: Minneapolis Park and Recreation Board

Nearly all of the City's lakes were physically altered in the late 1800s to early 1900s. Lakes were dredged, shorelines filled, islands lost and rebuilt, springs buried, creeks rerouted, ponds built, and wetlands drained. This was done mainly for functional and aesthetic purposes. The most significant alterations include:

- Bassett Creek, near downtown, was enclosed in the mid-1880s into an underground culvert to create a railroad yard.

[1] Source: Two Pines Resource Group. *Native American Context Statement and Reconnaissance Level Survey Supplement*. Prepared for the City of Minneapolis Department of Community Planning and Economic Development. July 2016.

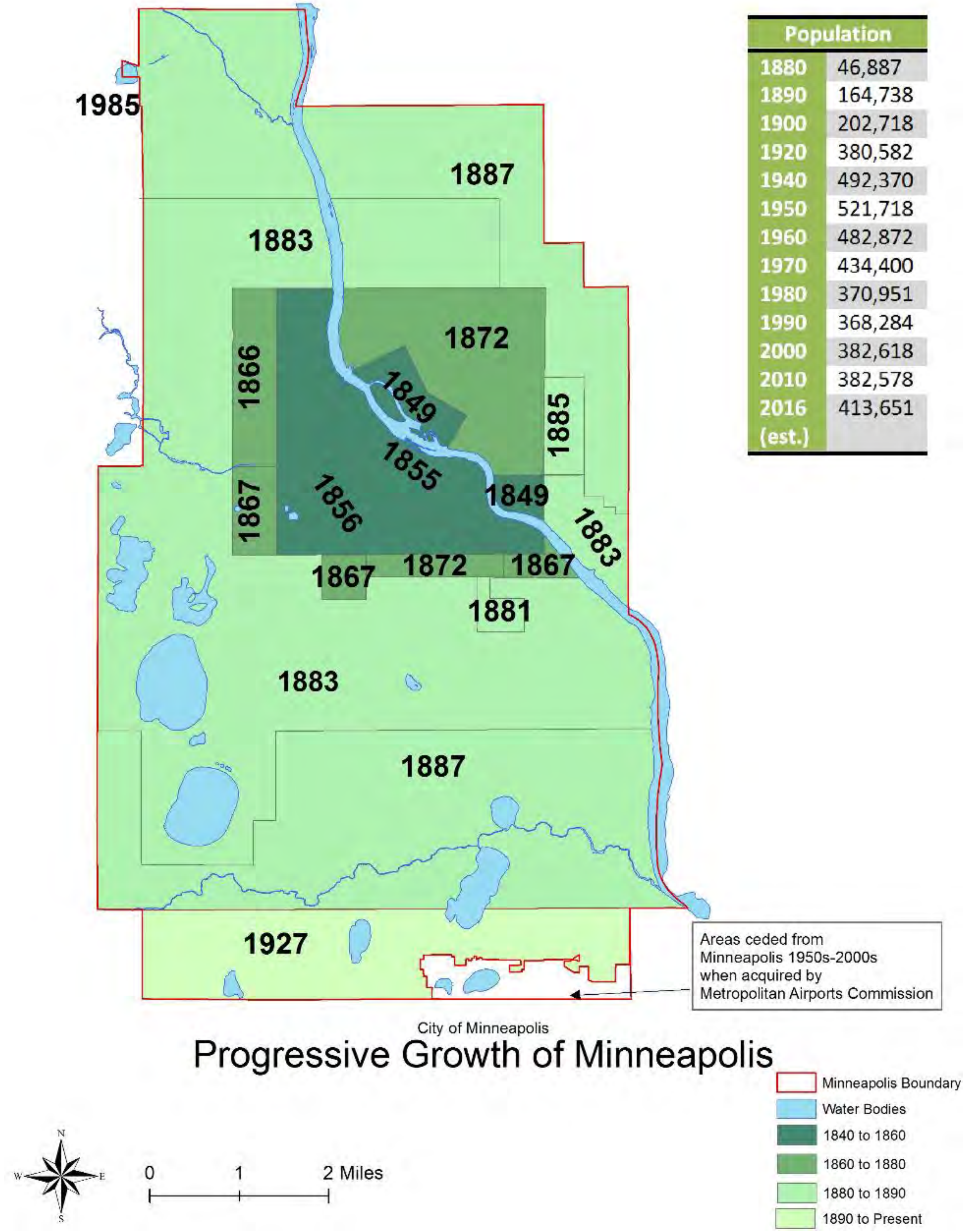
Figure 1.1 – Dakota and Ojibwe Place Names for Significant Water Resources in the City of Minneapolis



- Lake Harriet was extensively dredged and filled on the northwest portion to eliminate marshland and create a more beautiful landscape in the early 1900s. The northern edge of the lake was drained and turned into a meadow for picnics.
- The entire shoreline of Lake Calhoun/Bde Maka Ska received some degree of dredge fill to support parkway construction, which occurred regularly between 1910 and 1925.
- Lake of the Isles was dredged along the north arm to create a uniform depth between 1889 and 1893 and was filled along the swampy east shore to create 4.5 acres of shoreland. These actions eliminated two islands from the lake.
- Channels were created between Brownie Lake, Cedar Lake, Lake of the Isles, and Lake Calhoun/Bde Maka Ska to connect these into a continuous waterbody. A smaller channel was dredged between Lake Calhoun/Bde Maka Ska and Lake Harriet.

Between 1856 and 1927, the area of Minneapolis grew to nearly 59 square miles, as shown in Figure 1.2. In 1856, the City occupied 24 square miles; in 1889, the boundaries expanded to cover 53.5 square miles. The last major annexation of land occurred in 1927, which resulted in the total land area of 58.7 square miles. The population of the City exceeded 300,000 by 1910. To accommodate this rapid growth, the City's infrastructure grew by leaps and bounds in the last 20 years of the 19th Century. In 1889 and 1890, the City constructed 145 miles of sidewalk, and by 1908, there were approximately 125 miles of paved streets.

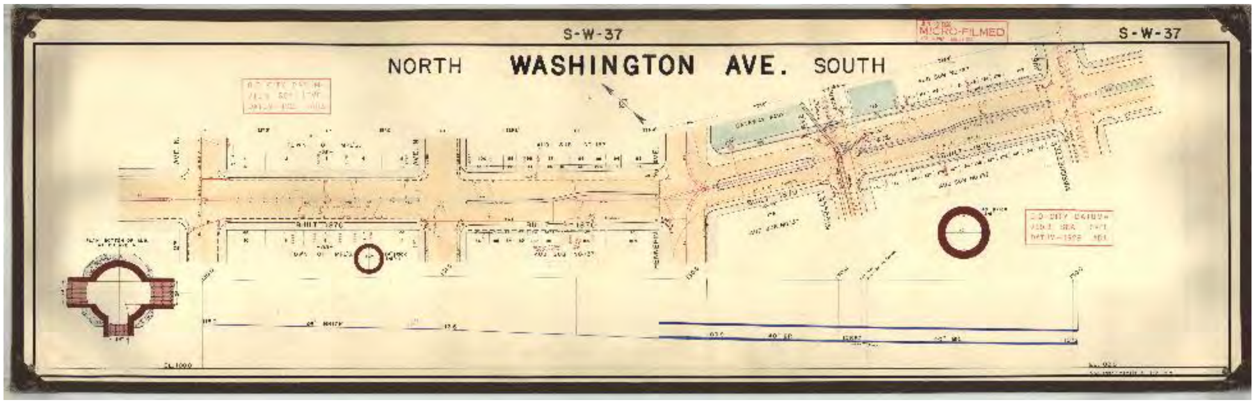
Figure 1.2 – Minneapolis Growth



Population	
1880	46,887
1890	164,738
1900	202,718
1920	380,582
1940	492,370
1950	521,718
1960	482,872
1970	434,400
1980	370,951
1990	368,284
2000	382,618
2010	382,578
2016 (est.)	413,651

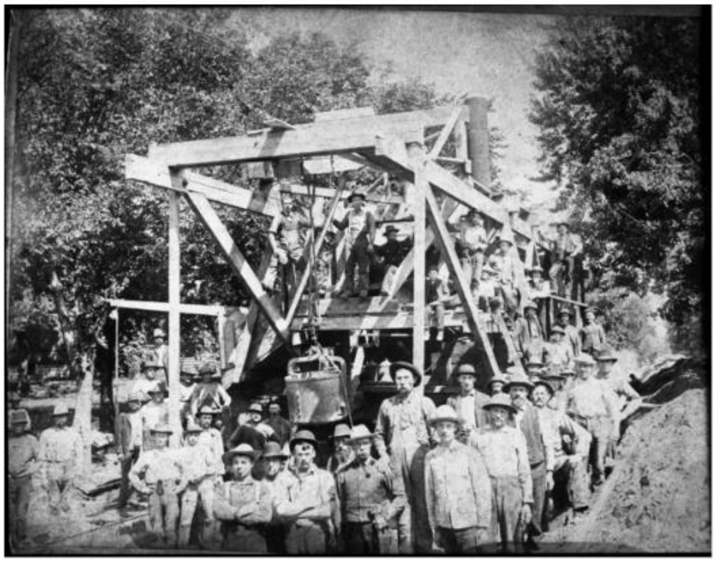
Work began on the City's sewer system in 1870 with the construction of a 40-inch diameter brick sewer on Washington Avenue South, as shown in Figure 1.3. By the early 1900s, there were 225 miles of City sewers.

Figure 1.3 – Washington Avenue Sanitary Sewer System, 1870



Credit: Minneapolis Public Works

Early Sewer Construction in Minneapolis, 1890



Credit: Minnesota Historical Society

Through the 1920s, most of the City was served by a combined sewer system that collected sanitary sewage plus runoff from streets and properties. This combined drainage was conveyed and discharged directly to the Mississippi River without any treatment. Combined sewers were thought to be a major public health advancement at the time of construction as they effectively washed human and animal waste to the river. It is now recognized that combined sewers simply relocated health and environmental problems from the streets to the Mississippi River.

In the early 1930s, the Legislature created the Minneapolis-St. Paul Sewer Board[2] to improve the welfare of the Minneapolis and St. Paul areas through installation of a centralized system of sewage treatment and disposal. The Board constructed a treatment facility in St. Paul, plus a system of interceptor sewers in Minneapolis (and elsewhere) to collect sanitary sewage and convey it to the treatment facility. Overflow regulators were installed to handle excess flows that exceeded the capacity of the interceptors, typically a result of large rain events. These overflow regulators directed the excess flows directly into the Mississippi River. At that time, there was little effort to separate the stormwater

[2] Historical records of the Minneapolis-St. Paul Sewer Board are available at the Minnesota Historical Society (http://www2.mnhs.org/library/findaids/gr00275.xml)

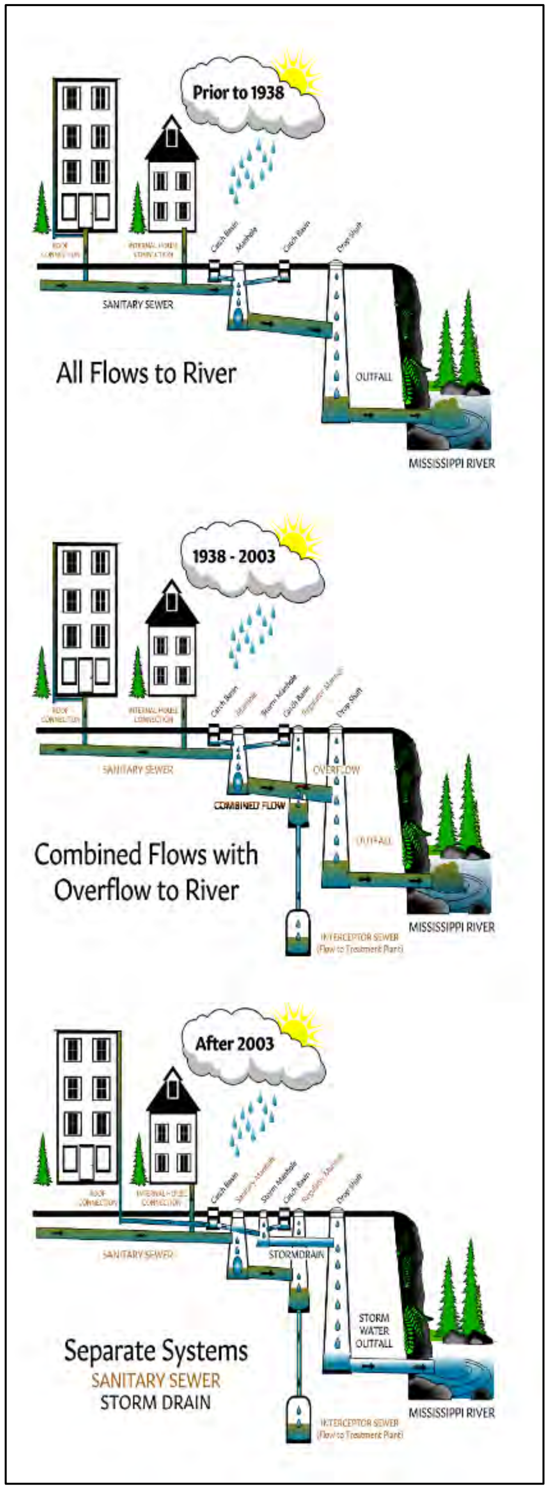
from the combined sewers; however, from the 1930s forward, as the City continued to develop, new areas were served with separate sanitary and storm drainage systems.

The Metropolitan Council (formerly the Metropolitan Waste Control Commission) took responsibility for the interceptors and regulators in the mid-1960s. In 1960, the City banned rainwater drainage to the sanitary sewer ([City Code 1960, As Amend., § 614.010](#)) and all new sewers constructed after 1960 were dedicated to either sanitary or storm flows.

During the 1960s, the movement to separate the combined sanitary and stormwater systems gained momentum when the City began a 30-year program of residential street reconstruction. The City aimed to coordinate storm drain construction with the street reconstruction project which would separate the street runoff from the sanitary sewers. In the late-1970s, the U.S. Environmental Protection Agency (EPA) and the Minneapolis Pollution Control Agency (MPCA) worked with the City to accelerate the separation project schedule.

Analyses conducted in the 1970s and 1980s determined that adequate capacity existed in the sanitary sewers to allow private source of inflow, such as roof rain leaders and foundation drains, to remain connected to the sanitary system. By the early-2000s, however, the capacity for private source of inflow was no longer adequate. For this reason, a 2003 ordinance was enacted to require disconnection of rain leaders and other connections that delivered stormwater into the sanitary system. Currently, the City works to reduce or eliminate the sources of non-sewage that flows into the sanitary sewers, termed inflow (water that makes its way into the sewers via direct connections) and infiltration (seepage through cracks and joints). This continued reduction of inflow/infiltration (I/I) has nearly eliminated occurrence of combined sewer overflows (CSOs), reduced overall treatment costs paid by the City to the Metropolitan Council, and has provided additional capacity in the regional conveyance and treatment. Additional information on the City of Minneapolis' I/I program in contained in Section 4 – Infrastructure Inventory, Activities, and Assessment and Section 5 – Private Systems and Regulatory Controls.

Figure 1.4 – History of Minneapolis Sewer Separation



Minneapolis
City of Lakes

A graphic of how the City's sewer system has been separated over time is shown in Figure 1.4. As shown, sewer separation has been largely achieved in the City. Although small pockets of combined and partially separate sewers remain, there has been no CSO to the Mississippi River related to wet weather since 2010.

Current Trends in Minneapolis Water Resources Management

The City is defined by its lakes, creeks, and the Mississippi River. To protect and care for these valued resources, the City has established comprehensive programs and policies. The City must comply with federal and state regulatory mandates, and as an older, fully developed City, contends with the challenges of aging infrastructure. Management of sanitary sewers, storm drains, and surface waters as separate resources can lead to capacity and financial conflicts. For this reason, the City now manages the sanitary collection, stormwater drainage, and surface water systems as integrated systems. With this WRMP, the City has integrated activities that affect water resources by incorporation of the (previously titled) Minneapolis Sewer Plan into this WRMP. Through this integration, the operation, maintenance, and improvement of the sanitary collection system and stormwater treatment and drainage system work together to drive improvements in the quality of the water resources of the City.

Sanitary Sewer Cleaning

Credit: Minneapolis Public Works

In the future, the City anticipates the need to balance multiple important water resource issues and concerns. One of these is aging infrastructure, where additional resources will be required to maintain the condition and capacity of the infrastructure as the system continues to age. Another important concern is the regulatory mandates to manage stormwater runoff quality and quantity associated with Total Maximum Daily Load (TMDL) programs (see Section 3 – Land and Surface Water Inventory and Assessment), where achievement of progress toward Waste Load Allocations will require resources to focus on stormwater runoff pollutant reduction. The potential for more frequent or more intense wet weather events due to climate change is another concern that necessitates infrastructure investment, such as management of flooding. In anticipation of these numerous demands with limited resources, the City will seek to accomplish multiple water resource goals within their infrastructure improvement projects. For example, private inflow sources are identified for disconnection from the sanitary sewers as part of street reconstruction projects, and water quality improvements are included when flood mitigation projects are carried out. The City expects that this strategy will deliver projects that maintain the condition and capacity of the systems that both improves water quality and provides cost-effective solutions to multiple water resource challenges.

The City is also committed to consideration of emerging techniques and technologies, as well as the anticipated weather changes related to climate change. Preservation of natural resources, disconnection of impervious surface, reduction in impervious area, and continued implementation of cost-effective Stormwater Management Practices (SMPs) are all activities that will address the overall volume, rate, and quality of stormwater that is discharged to surface waters. This will benefit both the City's infrastructure and ultimately the water as follows:

- Reduced velocity of flow in local streams.
- Reduced pollutant loads to surface waters.
- Increased recharge of groundwater.
- Reduced frequency, severity, and duration of localized street/intersection floods.
- Improved capacity of stormwater drainage system.

Construction of Underground Stormwater Treatment

Credit: Minneapolis Public Works

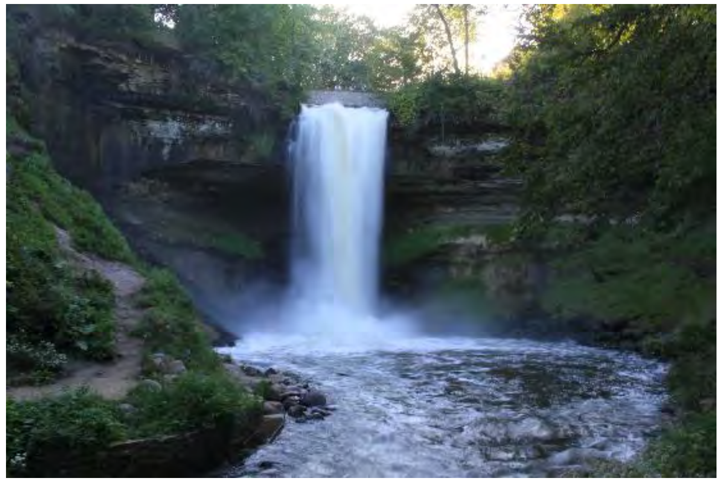
An important water resource tool to manage the sanitary collection system will continue to be reductions in I/I. The overall benefit of this program is the improvement in water quality of the Mississippi River, by eliminating sewer overflows and cost savings for excess treatment at the plant and expansion of regional facilities.

Categorization of Minneapolis Water Resources Systems

The City categorizes its water resource systems into three major groups: surface waters, public infrastructure, and private systems. The public infrastructure is further divided into the sub-categories of sanitary sewer system, stormwater drainage system, and public ditches. Details of each of these systems are further described in Section 3 – Land and Surface Water Inventory and Assessment, and Section 4 – Infrastructure Inventory, Activities, and Assessment. Private systems and responsibilities are described in Section 5 – Regulatory Controls and Water Resource Management Programs.

Surface Waters

Minnehaha Falls



Credit: Minneapolis Public Works

Surface waters include all waters of the state, termed Public Waters, that are within the Minneapolis city boundaries. Public Waters are defined by the Minnesota Department of Natural Resources. Although a segment of Shingle Creek through the City is a County Ditch, and regulated by Minnesota Drainage Law, it is managed as surface water for purposes of this WRMP.

All surface waters have been classified by the MPCA by its beneficial use, the highest class being for domestic water consumption (Class 1). Each class is assigned a water quality standard, which is the basis for preservation and restoration of the quality of the waters of the State.

Infrastructure

Sanitary Sewer System

For the purposes of this WRMP, components of the sanitary system include pipes, manholes, control structures, and lift stations used primarily for the conveyance of sewage to the sanitary interceptors owned by the Metropolitan Council.

Storm Drainage System

Cedar Meadows Stormwater Pond

Credit: Minneapolis Public Works

The storm drain system includes all physical components to both convey and manage the stormwater runoff. Structural conveyance components include street gutters, catch basins, manholes, pipes, tunnels, and pumps; structural SMPs include grit chambers, detention ponds, infiltration devices, filtration devices, underground storage, and outfalls.

Public Ditches

Minnesota Statute 103E, Drainage Law (commonly called the Minnesota Ditch Law) allows for a water management authority to construct and maintain public ditch systems. The Minnesota Board of Water and Soil Resources (BWSR) is the state agency responsible for the oversight of Chapter 103E and has published the Minnesota Drainage Manual (2016) and Understanding Minnesota Public Drainage Law (2002) to provide guidance for management of the public ditch system.

These public ditches are integral to the Minneapolis storm drainage system and are owned and managed by Hennepin County and Minnehaha Creek Watershed District (MCWD).

- Shingle Creek between Xerxes Avenue in Brooklyn Park and 44th Avenue North in Minneapolis is legally Hennepin County Ditch No. 13 and is the responsibility of Hennepin County under the Minnesota Ditch Law. For the purpose of this WRMP, this segment of Shingle Creek is managed as a surface water.

- At the request of the MCWD, Hennepin County transferred the administrative, operation, and maintenance responsibilities for County Ditches No. 14, No. 17, and No. 29 to the MCWD in 1971 and 1972. Each of these ditches discharge to Lake Calhoun/Bde Maka Ska and, within the municipal limits of the City, has been enclosed into a storm drain.

Private Sanitary Sewers and Treatment Systems

Generally, the proper operation and maintenance of private sanitary and stormwater systems is the responsibility of the private property owner. In Minneapolis, this private ownership includes the segment of the private connection that is within the public right-of-way, as well as the connection to the City-owned sanitary sewer. Activities detailed in this report include programs the City has implemented related to private infrastructure, as necessary to ensure compliance with City ordinances.

Private sanitary sewers that connect to the City's sanitary collection system are required to obtain a Sewer Connection Permit from the City's Utility Connections Office of the Public Works Department. Private wastewater treatment facilities are subject to additional requirements set by the MPCA and Metropolitan Council. The Metropolitan Council also requires certain industries that discharge to the sanitary sewers obtain an Industrial Permit, of which there are 165 issued to industries within the City. The City does not maintain a separate list of industrial permits that are managed by these agencies. A data search of the MPCA records found 35 active private industrial permitted wastewater systems in the City as of May 2016.

Private Individual Sewage Treatment Systems (ISTS), also called septic systems, are prohibited by Minneapolis Code of Ordinance Chapter 101 where public sewers are available. Chapter 511 prohibits the construction of such systems for new buildings. The City transferred authority to Hennepin County to regulate ISTS locations within the City. Hennepin County Environmental Health provides septic inspection and enforcement programs under the authority of Hennepin County Ordinance No. 19. This ordinance adopts Minnesota Rules Chapter 7080 governs ISTS and went into effect on January 1, 2000. Hennepin County has reported that there is one active ISTS within the City of Minneapolis.

Private Stormwater Drains and Industrial Stormwater

New private stormwater drains that connect to the City's stormwater system are required to obtain a Utility Connection Permit from the City. Private stormwater outfalls that discharge directly to a surface water are also subject to the City's Utility Connection Permit.

Owners of private stormwater Best Management Practices (BMPs) are required to register the BMP with the City's Public Works Department.

The MPCA requires certain industrial facilities to obtain an Industrial Stormwater General Permit. MPCA records list 160 permits issued to Minneapolis industrial facilities as of May 1, 2016. The City does not maintain an active list of private and/or industrial stormwater permits that are managed by other public agencies.

Minneapolis Water Resource Management Plan (WRMP)

Purpose of Water Resource Management Plan

Successful management of the City's water resources requires a comprehensive program that respects the needs of the water resource while concurrently meeting regulatory requirements and achieving sound fiscal management. The City has prepared this WRMP as a comprehensive planning document that balances these demands as the City conserves, protects, and manages its water resources. This WRMP:

- Compiles, summarizes, and references efforts of agencies, organizations, and departments of the City and the Minneapolis Park and Recreation Board (MPRB). Links are provided to allow users of this report to access specific information that is summarized, but not fully covered, in this WRMP.
- Reviews the current state of the City's water resources in the context of sanitary sewer system and stormwater drainage system goals and policies, ordinances, operations and maintenance practices, flood mitigation, and other water resource goals.
- Establishes reasonable and affordable goals that support achievable results within the established regulatory and management structure.
- Lays out the City's approach to assessment, planning, and implementation that is used in the event that a new project or program is required to achieve water resource management goals.

Relationship to Comprehensive Plan

This WRMP is a chapter of the 2018 Minneapolis Comprehensive Plan and has been reviewed by the Metropolitan Council to ensure compliance with their Comprehensive Water Resources Management Plan.

Relationship to Minneapolis Stormwater Management Program

The Minneapolis Stormwater Management Program (SWMP) is a federally required document that has been prepared in compliance with the City's National Pollutant Discharge Elimination System (NPDES) stormwater permit which is overseen by the Minnesota Pollution Control Agency (MPCA). This WRMP is a planning document that must comply with requirements established by the State of Minnesota and overseen by the Minnesota BWSR and local watershed management organizations. These two documents have the overall goal of improvement of the quality of water resources but have different implementation approaches. The SWMP has a focus on specific SMPs as required in the City's NPDES stormwater permit. The content of the SWMP is not duplicated in this WRMP but is referenced wherever relevant. This WRMP has a broader view that includes the additional water management activities such as management of the surface waters, monitoring, relationship with the City's goals, and management of the City's sanitary collection system, among other planning level activities.

Relationship to Minneapolis Park and Recreation Board Lands and Water Resources

The MPRB owns all parkland in Minneapolis, as well as large parks outside the municipal boundaries of the City. As detailed in Section 3, most of the lakes and streams are within the boundaries of MPRB lands, resulting in the MPRB being a property owner of nearly all shoreline in the City. As a separate agency with an independent elected board, the MPRB has full zoning authority for its land and adopts ordinances that govern operations, land use, and waterbody use. The MPRB is fully responsible for maintenance of their lands, including shorelines, without oversight by the City.

As a separate agency, the MPRB is not governed by this WRMP, but is governed by the NPDES Integrated Permit, which was issued jointly to the City and the MPRB. As co-permittees, the City and the MPRB strive to work closely together to accomplish the water quality goals contained in the NPDES permit, as well as those goals described in this document. Cooperative activities include ongoing collaboration on capital improvement projects, public education, monitoring, and other program activities. As part of this ongoing collaboration, MPRB staff contributed to the development of this WRMP.

Information Contained in Water Resource Management Plan

Water resources management in the City continues to grow. Monitoring information is updated annually, improvements are constructed in the infrastructure, and watershed-based programs are implemented. Because of this ever-changing character of water resources management in the City, this plan has been developed with the philosophy to reference, and not duplicate, information developed by others. As a result, specific information, especially information that is subject to frequent change, is either contained in an appendix to this plan, is contained in one of the City's Annual Reports, or is referenced to another organization. Readers are encouraged to go to the original source for the most current and accurate information available.

Heritage Park Stormwater Channel

Credit: Minneapolis Public Works

In 2015, the Minnesota BWSR adopted a change to Minnesota Rules, Chapter 8410 that revised the required information that must be contained in watershed management plans and local water plans. With respect to local water plans and this WRMP, the new requirements are listed in Table 1.1. A more detailed cross-reference between the Minneapolis WRMP and Local Plan requirements is contained in Appendix A.

Table 1.1 – 2016 Local Plan Requirements

8410.0160 PLAN STRUCTURE
Subpart 1. Requirement Each local water plan must, at a minimum, meet the requirements for local water management plans in Minnesota Statutes, section 103B.235, and this part, except as provided by the watershed management organization plan under part 8410.0105, subpart 9.
Subpart 2. Local Comprehensive Plan Each local government unit must include the local water plan as a chapter of its local comprehensive plan. All local comprehensive plans must be consistent with local water plans adopted under this part.
Subpart 3. Plan Contents Each local water plan, in the degree of detail required in the organization plan, must contain the following: A. An executive summary that summarizes the highlights of the local water plan; B. Appropriate water resource management-related agreements that have been entered into by the local community must be summarized, including joint powers agreements related to water management that the local government unit may be party to between itself and watershed management organizations, adjoining communities, or private parties; C. The existing and proposed physical environment and land use must be described. Drainage areas and the volumes, rates, and paths of storm water runoff must be defined. Data may be incorporated by reference as allowed under parts 8410.0060 and 8410.0105, subpart 9, or the local comprehensive plan; D. An assessment of existing or potential water resource-related problems must be summarized. The problem assessment must be completed for only those areas within the corporate limits of the local government unit and similar to the process under part 8410.0045, subpart 7; E. A local implementation program through the year the local water plan extends must describe nonstructural, programmatic, and structural solutions to problems identified in item D. The program must not jeopardize achievement of the goals of an organization's plan. The implementation components must be prioritized consistent with the principles of part 8410.0045, subpart 1, item A. Local water plans must prioritize the implementation components of an organization plan consistent with the organization priorities set forth under part 8410.0105, only for implementation components that must be facilitated by the local government unit. Local official controls must be enacted within six months of approval of the local water plan by the organization. *(1) include areas and elevations for storm water storage adequate to meet performance standards or official controls established in the organization plan;* *(2) define water quality protection methods adequate to meet performance standards or official controls in the organization plan and identify regulated areas;* *(3) clearly define the responsibilities of the local government unit from that of an organization for carrying out the implementation components;* *(4) describe official controls and any changes to official controls relative to requirements of the organization's plan;* *(5) include a table that briefly describes each component of the implementation program and clearly details the schedule, estimated cost, and funding sources for each component including annual budget tools; and* *(6) include a table for a capital improvement program that sets forth, by year, details of each contemplated capital improvement that includes the schedule, estimated cost, and funding source.*

8410.0160 PLAN STRUCTURE
Subpart 4. Amended procedures. A section entitled "Amendments to Plan" must establish the process by which amendments may be made. The amendment procedure shall conform with the plan amendment procedures in the organization plans that affect the community.
Subpart. 5. Submittal and review. After consideration and before adoption, the local water plan or local water plan amendments shall be submitted for review according to Minnesota Statutes, section 103B.235.
Subpart 6. Adoption and implementation. Each local water plan shall be adopted not more than two years before the local comprehensive plan is due. Extensions of local comprehensive plan due dates do not alter the local water plan schedule. Each local water plan must be adopted and implemented in accordance with the time requirements of Minnesota Statutes, section 103B.235, subdivision 4. Each local government unit must notify watershed management organizations with jurisdiction over area subject to the local water plan and the Metropolitan Council within 30 days of adoption and implementation of the local water plan or local water plan amendment, including the adoption of necessary official controls.

Water Resource Management Plan Management and Adoption

The City is committed to management of its water resources in the most efficient and up-to-date manner feasible. The goal of this plan is to be in compliance with requirements of Minnesota Rule 8410.0160, which governs local water plans, including this WRMP. Once this WRMP is final, the focus will be to implement the recommended programs and to continue to update practices and policies as mandates develop or as new technologies emerge. This approach will allow the flexibility necessary to respond to the layers of regulations that affect the City. This WRMP will be used as the guide to ensure that new practices meet the stated goals and guiding principles. Approval, adoption, and revisions to this plan will follow the format detailed in the following subsections.

Fishing on Lake Harriet

Credit: Minneapolis Public Works

City Council Consideration

The City Council has accepted this draft document for review concurrent with submittal to the Metropolitan Council and watershed management organizations, as defined in Minnesota Statutes, Section 103B.235. Prior to City Council acceptance and adoption, the MPRB staff have had an opportunity to review the draft document for consistency with MPRB activities.

Metropolitan Council, Watershed District, and Watershed Management Organization Review

After City Council acceptance of the draft document, City staff submit the WRMP for agency review, in accordance with procedures set in Minnesota Statute 103B.235 and Minnesota Rule Chapter 8410.0160. Comments from reviewing agencies will be considered for inclusion in the revised WRMP.

Public Review

Public input will be sought through formal and informal communications. City of Minneapolis staff will make the draft document available for review and will solicit comments. Public comments will be considered for inclusion in the revised WRMP. The final revised WRMP will be presented to the Transportation and Public Works Committee of the Minneapolis City Council prior to adoption by the full City Council.

City Adoption

Final adoption will be considered by the Minneapolis City Council and the Mayor after approval by the watershed management organizations, approval by the Metropolitan Council, public review, and a public hearing.

Amendment Procedures

On occasion, amendments to the WRMP may be necessary. The process for a major amendment to this WRMP will follow the steps set for adoption of the report. City staff will determine if an amendment is necessary, either based on a formal written request or based on changes to water resources management goals and objectives. The request shall outline the need for the amendment, as well as additional materials that the City will need to consider before a decision is made.

Minor changes to the WRMP do not require watershed management organization or City Council approval and can be made by City staff but must be supplied to the City Council before being submitted to the watershed organizations for their information. The City considers minor changes to be those that do not modify the goals, policies, or commitments identified in this WRMP. The most significant example of a minor change would be updating the City's Capital Improvement Program (CIP) and implementation program to align with City Council annual adoption of budgets that fund projects and programs.

Section 4 of this WRMP identifies the need to complete analysis of the runoff volumes and flow rates at the 419 stormwater outfalls owned by the City. The results of this analysis will be appended to this WRMP as a minor plan amendment when the analysis is complete.

Annual Reports

Through 2017, three annual reports were published each year that provide the most up-to-date information on water resource related actions and accomplishments. These reports are:

- The Combined Sewer Bypasses and Overflows annual report is prepared by Metropolitan Council with information contributed by the City of Minneapolis. This report includes information on inspection activities, historic precipitation versus overflows, status of rain leader disconnections, status of catch basin disconnections, and planned activities for the future year.

- The NPDES Municipal Separate Storm Sewer Systems (MS4) Phase I Annual Report reports on stormwater related activities governed by the City's NPDES permit. The report summarizes the accomplishments of the previous year in the general categories shown in Table 1.2.

Table 1.2 – NPDES Municipal Separate Storm Sewer Systems (MS4) Phase I Annual Report Contents

Category	Activities
Stormwater Drainage System Maintenance	▪ Number of catch basins repaired ▪ Miles of storm drains cleaned ▪ Miles of storm drains televised and assessed ▪ Feet of storm tunnel repaired ▪ Number of ponds and devices maintained ▪ Number of grit chambers inspected ▪ Number of grit chambers cleaned ▪ Number of outfalls inspected ▪ Number of pump stations monitored, maintained, and rehabilitated ▪ Volume of sediment removed and disposed from storm drains, ponds, and structural controls
Erosion and Sediment Control/Inspection	▪ Number of erosion and sediment control cases managed ▪ Total number of inspections conducted ▪ Number of enforcement actions ▪ Number of citations for non-compliance issued
Site Plan Development	▪ Number of site plans reviewed ▪ Number of site plans approved ▪ Number of new BMPs approved ▪ Total acres and total impervious acres of property with new stormwater management practices
Public Works Street Maintenance	▪ Tons of salt applied during winter street maintenance period ▪ Tons of sand applied during winter street maintenance period ▪ Tons of material collected during spring and summer sweeping operations ▪ Tons of leaves collected for composting during fall sweeping operations ▪ Number of staff attending hazardous materials testing ▪ Number of staff attending salt management training
MPRB Snow and Ice Management	▪ Number of MPRB staff that hold MPCA Road Salt Applicators Training Certificate ▪ Amount of materials recovered as a percentage of materials applied ▪ Amount of salt and sand applied relative to total snowfall
Flood Mitigation	▪ Percentage of City-wide hydrologic/hydraulic models complete to-date
Vegetation Management – Pesticides and Fertilizer Control	▪ Number of MPRB staff who hold pesticide applicator licenses through the Minneapolis Department of Agriculture (MDA) ▪ Number of MPRB staff receiving training and certificates on chloride application ▪ Vegetation management at stormwater management sites, including pest management and prescribed vegetation burns
Illicit Discharge and Improper Disposal	▪ Number of emergency response requests and response time ▪ Number of days of outfall sampling and visual inspections ▪ Number of spill incidents where contaminant boom was utilized ▪ Training on deployment of spill response/containment boom on the Mississippi River ▪ Number of spill response overview sessions for staff

Category	Activities
Illicit Discharge and Improper Disposal (continued)	▪ Number of water and land pollution complaints investigated ▪ Description of brownfield maintenance and monitoring ▪ Number of limited duration sanitary sewer and stormwater discharge permits approved ▪ Number of temporary water discharge permits approved ▪ Number of storage tank permits approved ▪ Number of hazardous materials facilities inspected ▪ Number of emergency response plans for hazardous materials facilities reviewed
New Sanitary Sewers and Stormwater Drains Construction	▪ New storm drain construction projects to eliminate CSO connections to sanitary sewer ▪ Total drainage acres removed from sanitary sewer ▪ Total miles of sanitary sewer installed with cured-in-place liners ▪ Total number of inflow/infiltration repairs completed on sanitary sewers
Public Education	▪ Description of MPRB public education and outreach sessions ▪ Description of Metro Blooms education workshops conducted ▪ Number of participants, catch basins stenciled, trash collected, and door hangers distributed through the Catch Basin Stenciling activities ▪ Number of MPRB parks with water quality education program events ▪ Number of sites, number of volunteers, and pounds of trash collected at Earth Day Watershed Clean-Up sites ▪ Listing of public education websites
Public Participation	▪ Date and location of annual public hearing on the Stormwater Management Program ▪ Number of interested parties receiving notice of annual public hearing ▪ Description of notices sent to neighborhood organizations and government agencies ▪ Summary of testimony presented at public hearing and written comments received
Coordination with Other Government Agencies	▪ Summary of significant activities by watershed organizations, Hennepin County, MPCA, and other agencies
Stormwater Monitoring Results and Data Analysis	▪ Lake water quality trends ▪ Stormwater monitoring sites description, samples collected, parameters tested, and analysis results ▪ Precipitation events greater than 0.10 inches ▪ Water quality monitoring completed ▪ Structural stormwater management sites monitored for pollutant removal effectiveness, including procedures and monitoring results

- The MPRB Water Resources Report summarizes monitoring and analysis for surface waters, stormwater runoff, and BMP effectiveness as completed in the previous year.

The NPDES Integrated Stormwater Permit, contained in Appendix B, will impact these annual reports such that the *Combined Sewer Bypasses and Overflows* annual report will be merged into the *NPDES MS4 Phase I* annual report. This change will be effective for the 2018 annual report, which will be published in 2019.

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Section 2 – Regulatory Requirements, Goals, and Policies

Regulatory Agencies, Requirements, Goals, and Programs

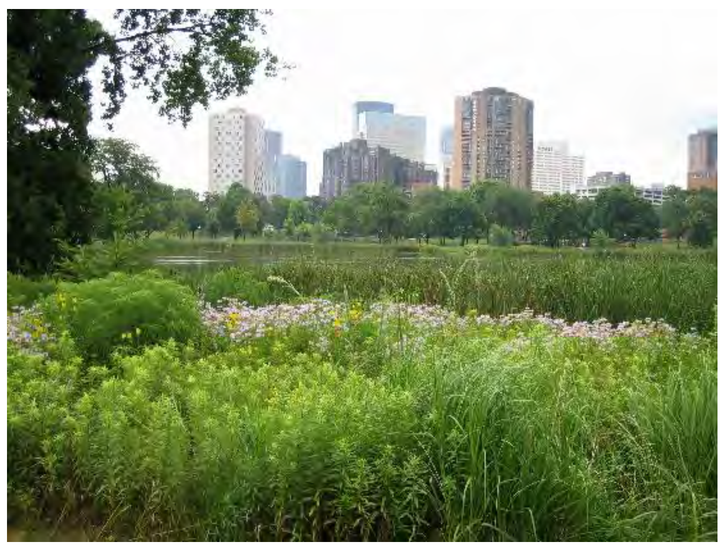
This Minneapolis Water Resource Management Plan (WRMP) is developed to meet the regulatory requirements of Minnesota Statute 103B.235, Minnesota Statute 473.858, Minnesota Statute 473.513, and Minnesota Rule Chapter 8410.0160 (Local Water Management Plans). This WRMP is also designed to meet the local water plan requirements of each watershed organization with jurisdiction in Minneapolis, and the water resource comprehensive plan requirements of the Metropolitan Council. In addition to these comprehensive plan requirements, there are Federal laws and regulations and State statutes and rules that dictate water resource management in the City of Minneapolis (City).

This section describes all applicable regulatory requirements in order to provide detail on the complexity of water resource management. This section also highlights how the City's goals and objectives serve to meet these regulatory requirements.

Federal Requirements and Programs

Clean Water Act

Loring Park Shoreland



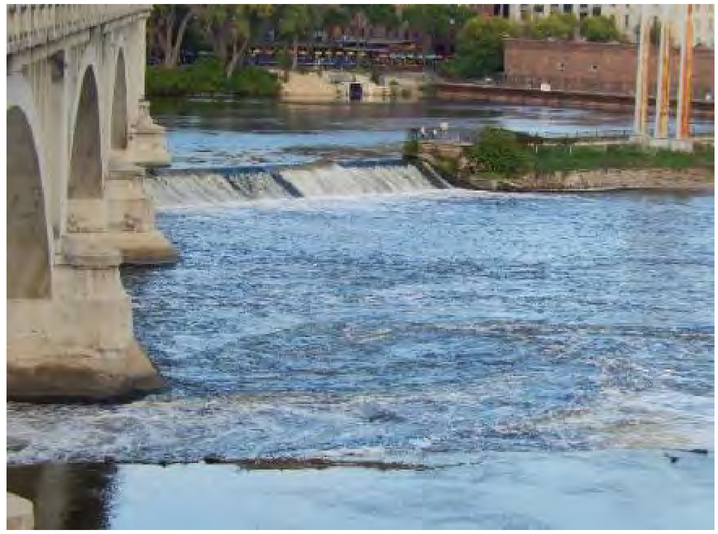
Credit: Minneapolis Public Works

The 1972 amendment of the 1948 Federal Pollution Control Act, known as the Federal Clean Water Act (CWA), governs the discharge of pollutants to waters of the United States. The CWA gave the United States Environmental Protection Agency (EPA) the authority to create federal regulations and permit programs related to Combined Sewer Overflow (CSO), Sanitary Sewer Overflow (SSO), Municipal Separate Storm Sewer Systems (MS4), and activities that alter wetlands. In Minnesota, the authority to issue National Pollution Discharge Elimination System (NPDES) permits under the authority of the CWA has been delegated to the Minnesota Pollution Control Agency (MPCA). Wetland permits are issued by the United States Army Corps of Engineers (USACE). Total Maximum Daily Load (TMDL) limits for pollutants, an initiative mandated by the EPA, also stem from the EPA's role as steward of the CWA.

Environmental Protection Agency – Clean Water Act

NPDES Programs

Mississippi River at Saint Anthony Falls



Credit: CDM Smith

Combined sewer systems, once a common construction practice in older cities across the country, are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in a single pipe. Most of the time, combined sewer systems transport all wastewater to a sewage treatment plant, where it is treated and discharged to a surface water. However, the wastewater volume in a combined sewer system can exceed the capacity of the sanitary sewer system or treatment plant as a result of heavy rainfall or snowmelt. For this reason, combined sewer systems were designed to allow excessive stormwater/wastewater flows to overflow the sanitary sewers and discharge directly to nearby streams, rivers, or other waterbodies. These overflows contain not only stormwater but also untreated human and industrial waste, toxic materials, and debris. Per data collected by the United States Environmental Protection Agency (EPA) in 2004, there are 746 communities that have combined sewer systems in the United States with a combined total of 9,348 CSO outfalls and an (estimated) discharge of 850 billion gallons of combined untreated wastewater and stormwater being discharged each year.[1] As described in Section 1 – History and Overview of Minneapolis Water Resources and Section 4 – Infrastructure Inventory, Activities, and Assessment, the City has worked to eliminate major sources of clear water discharges to the sanitary sewers in an effort to minimize the occurrence of CSO events. To-date, this program has been successful with no measured CSO events since 2010. CSO controls remain in the system to prevent sewage backups into or onto streets and/or into basements during a major precipitation event, and to protect sanitary sewer infrastructure from failures caused by excessive pressure. The EPA continues to regulate CSO systems through the NPDES permit program, which is administered in Minnesota by the MPCA.

Stormwater discharges are generated by stormwater and snowmelt runoff from land and impervious areas such as paved streets, parking lots, and building rooftops. As it flows across the land and impervious surfaces, the runoff often picks up and transports pollutants in quantities that can adversely affect water quality. Most stormwater discharges to rivers, creeks, and lakes are from the storm drains at outfall structures, which are considered point sources and require coverage by an NPDES permit. The primary method to control stormwater discharge is through Stormwater Management Programs (SWMPs) as mandated in NPDES stormwater permits. In 1990, the EPA issued their initial stormwater rules which created stormwater management requirements for municipalities with populations greater than 100,000, certain industrial sites, and active construction sites. The City was designated as a Phase I

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[1] EPA. *Report to Congress, Impacts and Control of CSOs and SSOs*. EPA 833-R-04-001. August 2004

municipality under these rules which led to the development of the stormwater programs described in this WRMP.

EPA CSO Program
EPA Stormwater Program

Sanitary Sewer Overflows

Sanitary Sewer Overflows (SSOs) are occasional, unintentional discharges of raw sewage from municipal, non-combined, sanitary sewers. SSOs occur due to a variety of causes. These causes may include severe weather, clogs, improper system operation and maintenance, or vandalism. The EPA estimates that nationally, there are at least 40,000 SSOs each year. The untreated sewage from these overflows can contaminate public waters, which can result in serious water quality problems. It can also back-up into basements, which causes property damage and threatens public health. There are no documented SSO events within the City between 2014 and 2017.

EPA Sanitary Sewer Overflows

Section 208 Wastewater Treatment

Section 208 of the CWA requires local governments to identify wastewater treatment needs and to develop comprehensive programs to meet those needs. In the metro area, the 208 planning requirements are the responsibility of the Metropolitan Council.

Section 404 Wetlands

Section 404 of the CWA establishes a program that regulates the discharge of dredged or fill material into Waters of the United States, which includes wetlands. Activities regulated under this program include fill for development, water resources projects, infrastructure development, and mining projects. Section 404 requires a permit before a dredge or fill material may be discharged into Waters of the United States. Certain farming and forestry activities are exempt from Section 404 regulation.

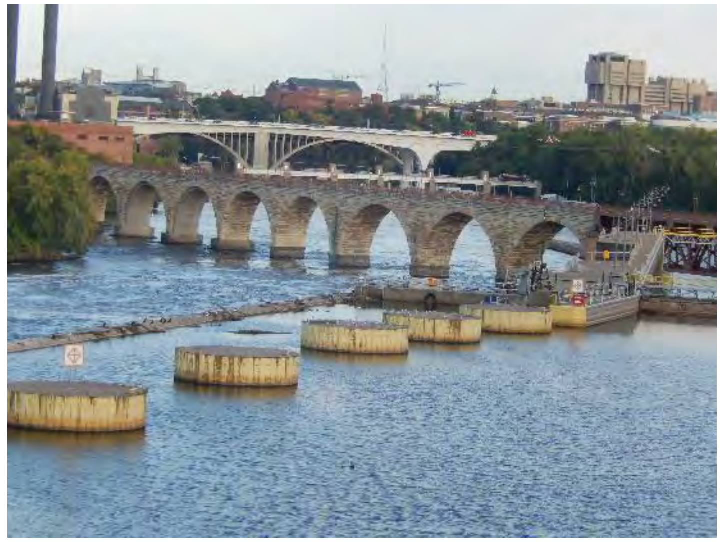
Section 404 Fact Sheet
USACE Section 404 Permits

Nokomis Knoll Wetland

Credit: Minneapolis Public Works

National Flood Insurance Programs

Upper Saint Anthony Falls Lock and Dam, upstream of lock



Credit: Minneapolis Public Works

Since 1974, the City has participated in the National Flood Insurance Program (NFIP) to allow property owners to purchase flood insurance. In Minnesota, the Minnesota Department of Natural Resources (MNDNR) oversees the implementation of this program. To maintain enrollment in the program, the City must implement ordinances and other local controls that manage land use within designated flood zones. Floodplain overlay maps are maintained by the Minneapolis Department of Community Planning and Economic Development (CPED).

FEMA NFIP Program
Minneapolis Zoning Maps

USACE Navigation

The full length of the Mississippi River in the City is designated as a Navigational Water under the U.S. River and Harbors Act. Any construction along the shoreline of the Mississippi River, such as improvement of a stormwater outfall, is subject to USACE permit requirements. The USACE uses this permit process to set design requirements to protect the navigation channel of the River.

USACE Navigation Responsibilities

State Agencies

Local Surface Water Management – BWSR

The Minnesota Board of Water and Soil Resources (BWSR) oversees the state statutes and rules that govern local surface water management in the Twin Cities. The powers and duties of this Minnesota state agency with respect to this WRMP include:

- Coordination of water and soil resources plans among counties, watersheds, and local units of government.
- Facilitation of communication among state agencies in cooperation with the Environmental Quality Board.
- Approval of watershed management plans.

Minnesota Board of Water and Soil Resources/Water Management
Minnesota Statute 2005 Chapter 103B
Minnesota Rule Chapter 8410

Protected Waters and Wetlands – MNDNR

An activity within a public water requires a permit from the MNDNR, which includes appropriation of groundwater, construction of stream crossings, construction of storm drain outfalls, wetland alterations, and dredging. The MNDNR's jurisdiction is generally the area below the Ordinary High-Water level. The MNDNR area hydrologist will coordinate review among other public agencies that also have a role in permit issuance. Public Waters within the City are inventoried in Section 3 – Land and Surface Water Inventory and Assessment.

Bassett Creek

Credit: Minneapolis Public Works

Other programs managed by the MNDNR, which affect the City, include the Flood Damage Reduction Grant Program, NFIP, Floodplain Management Program, Shoreland Management Program, Mississippi River Critical Area Program, and the Mississippi River Management Navigation Program.

Minnesota Water Statutes and Rules – Division of Waters: MNDNR
Floodplain Management Program – Division of Waters: MNDNR
Shoreland Management Program – Division of Waters: MNDNR
Water Permits: MNDNR

Wetlands – BWSR

Under the Minnesota Wetland Conservation Act (WCA), Local Government Units (LGU) may oversee that wetland management activities are in accordance with specific guidelines established by state agencies. The City is designated as the LGU for wetlands within its corporate boundaries except for those wetlands within the Minnehaha Creek Watershed District's (MCWD) boundaries, where the MCWD serves as the LGU.

WCA-protected wetlands are not administered under MNDNR's public waters permit program. The purpose of the WCA is to have LGUs oversee local wetland alteration activities to ensure that there is no net loss of Minnesota's remaining wetlands. The Minnesota BWSR administers the act statewide, and the MNDNR provides enforcement.

Minnesota Board of Water and Soil Resources/Wetland Conservation Act
MN Wetland Conservation Act Rules
Wetlands Conservation Program – Division of Waters: MNDNR
Clean Water Act Section 401 Water Quality Certifications – MPCA

NPDES Permits – MPCA

The federal NPDES permit program is delegated by the EPA to the MPCA for administration in the State of Minnesota. Through 1990, the majority of NPDES discharge permits were issued to wastewater treatment facilities. The MPCA began to issue NPDES permits for stormwater discharges in the early 1990s after the EPA issued regulations for stormwater discharges. The MPCA created three distinct stormwater permitting programs, which align with the NPDES stormwater regulations. Stormwater permits are issued for construction activities, industrial facilities, and municipal separate stormwater sewer systems (MS4s). The MPCA has issued three General NPDES permits which are renewed on a 5-year cycle: Construction activities for sites one acre and greater; Industrial facilities as defined by EPA rules; and, MS4 stormwater systems owned by public agencies, including municipalities, universities, drainage districts, highway departments, and Indian tribes. Permittees are required to apply to be covered under each permit. The MPCA also issued individual permits to larger facilities and MS4 systems, including the issuance of an individual permit to Minneapolis for stormwater discharges.

In the past, the MPCA had issued two separate NPDES permits to the City of Minneapolis. The permit for municipal stormwater discharges permitted by NPDES/SDS Permit No. MN0061018 is held jointly by the City and the MPRB and was last issued in 2011. This permit protected water quality in accordance with Minnesota and United States statutes and rules, which includes Minnesota Statute Chapters 115 and 116, Minnesota Rule Chapters 7001 and 7050, and the CWA. The permit covers the public stormwater discharge points throughout the City operated by the City and the MPRB, which total more than 460. The second NPDES permit that regulated CSOs (NPDES/SDS Permit No. MN0046744) was held jointly by the City of Minneapolis and the Metropolitan Council as co-permittees and was last issued in 2000.

As a replacement for these two permits, the co-permittees negotiated an integrated NPDES permit, effective February 16, 2018, that recognizes the historically connected sanitary sewer and stormwater drain infrastructure, recognizes the diminished risk of CSOs and the need to continue to vigilantly direct resources to renewal of aging infrastructure to maintain service levels, and directs the City to continue to work to identify and prioritize work to minimize the risk of CSOs alongside working to meet other CWA goals. This approach is based on the EPA integrated planning approach to assist municipalities on their critical paths to achieve the human health and water quality objectives of the CWA by identifying efficiencies in implementing requirements that arise from distinct wastewater and stormwater programs, including how to best prioritize capital improvements. A cooperative agreement was developed between the City and the Metropolitan Council that will assign the NPDES Integrated Permit responsibilities between the two organizations. The NPDES Integrated Permit is contained in Appendix B.

Overview – MPCA Stormwater Programs
Stormwater Program for Construction Activity – MPCA
Stormwater Program for Industrial Activity – MPCA
Stormwater Program for Municipal Separate Storm Sewer System – MPCA
Wastewater Permits – MPCA
Watershed Based Permits – United States EPA

Water Quality Standards, TMDLs, and WRAPS – MPCA

The CWA requires states to adopt water quality standards (WQS) for public waters. These standards, contained in Minnesota Rule Chapter 7050, are designed to protect waters for beneficial public uses such as fishing and swimming. A waterbody is determined to be degraded when pollutants within the waterbody are found to exceed the standards set for the beneficial use class assigned to that waterbody. Beneficial use classification for each City public water is inventoried in Section 3 – Land and Surface Water Inventory and Assessment. Assessments are prepared for the U.S. Congress under Section 305(b) of the CWA to estimate the extent to which Minnesota water bodies meet the goals of the CWA. The MPCA is the public agency responsible for assessment of each waterbody on the impaired waters list. Every two years, the MPCA releases a 305(b) Report that includes information about waters of the state: healthy, threatened, and impaired. One element of the 305(b) Report is the 303(d) list which specifies waterbodies that are threatened or impaired. Once the list is approved by the EPA, a strategy needs to be developed that would lead to the attainment of the state WQS contained in Minnesota Rule Chapter 7050. Waterbodies where monitoring has shown impairment are added to the impaired waters list on a two-year cycle. Several surface waterbodies in the City are listed in the state impaired waters 303(d) list. Appendix C lists all of the City's surface waters on the State's 2018 305(b) and 303(d) lists.

Storm Drain Construction

Credit: Minneapolis Public Works

Each waterbody on the approved impaired waters list will eventually be the subject of a TMDL study. The TMDL process involves four phases:

1. 305(b) assessment and 303(d) list development.
2. Development of TMDL study to determine pollutant load allocations.
3. Implementation plan development and implementation.
4. Effectiveness monitoring.

The MPCA has incorporated compliance with TMDL implementation plan recommendations into the NPDES Integrated Permit, an approach which effectively uses the CWA to mandate that stormwater permittees implement the recommendations of each TMDL study. In the City, this affects the stormwater runoff discharges to the list of waters currently on the Draft 2018 Impaired Waters List contained in Appendix C.

In 2008, the MPCA created a watershed approach for the protection and restoration of water quality called WRAPS (Watershed Restoration and Protection Strategy). On a 10-year cycle, the MPCA conducts a detailed investigation of each major watershed in the State. The process involves intensive monitoring, assessment of data, development of restoration, and protection strategies and implementation of recommended solutions. Monitoring information and restoration strategies developed in TMDL studies will be incorporated into each WRAPS plan that is developed by the MPCA. To-date, there has not been any WRAPS plans that have developed strategies for restoration or protection of any water resources in the City.

Minnesota's Impaired Waters and Total Maximum Daily Loads – MPCA
Water Quality Standards – MPCA
Minnesota Rule Chapter 7001
Minnesota Rule Chapter 7050

Groundwater – MNDNR, MPCA, MDA, MDH, Metropolitan Council, Hennepin County

Groundwater in Minnesota is managed by multiple agencies at the federal, state, regional, and local levels. The MNDNR issues temporary and permanent groundwater use permits for wells that withdraw either more than 10,000 gallons per day or 1 million gallons per year, whereas the permit process for discharging groundwater is administered by the City. The MPCA works to clean up groundwater contamination caused by industrial activities. The Minnesota Department of Agriculture (MDA) focuses on the quality of groundwater with respect to agricultural pesticides and fertilizers. The Minnesota Department of Health (MDH) works to ensure that groundwater used for public water supplies meets the requirements of the Safe Drinking Water Act. The MDH also manages the requirements for groundwater well installation and sealing. All agencies monitor the quality of the groundwater and publish results on their websites. Although it does not have a regulatory role, the Metropolitan Council studies the availability of groundwater in the Twin Cities region to evaluate the available water supply in supporting regional projected population growth in those areas that utilize groundwater as the source for drinking water.

Hand Pump at Cedar Lake

Credit: Minneapolis Public Works

Groundwater requirements of significance in the City include the MNDNR well permit requirements, the MPCA programs to clean up contaminated groundwater, MDH Special Well and Boring Construction Areas, North and East Metro Groundwater Management Area, MDH Drinking Water Supply Management Areas, and the MDH requirements for well installation and sealing. Areas of the City with special groundwater protection designations, including protection of the groundwater in Water Supply Management Areas for neighboring municipalities, can be found in Section 3 – Land and Surface Water Inventory and Assessment.

Hennepin County has not adopted a county groundwater management plan, therefore there are no county requirements to incorporate into this WRMP.

Minnesota Department of Natural Resources (MNDNR)
Minnesota Pollution Control Agency (MPCA)
Minnesota Department of Agriculture (MDA)
Minnesota Department of Health (MDH)
Metropolitan Council

Minimal Impact Design Standards (MIDS)

In response to a 2009 statute enacted by the Minnesota Legislature, the Minnesota Pollution Control Agency (MPCA) led a multi-year process, termed Minimal Impact Design Standards (MIDS), that included representation from cities (including Minneapolis), counties, road authorities, watershed organizations, and the development community to establish guidelines that aim to manage stormwater runoff from building sites, roadway projects, and other new construction such that the volume and rate of stormwater runoff will mimic natural conditions. The overall goal is to manage stormwater onsite such that the rate and volume of pre-development stormwater discharge to receiving waters is unchanged.

Green Rooftop on Minneapolis Central Library

Credit: Minneapolis Public Works

MIDS was developed by the MPCA as an advisory program, not a specific regulatory program. To assist municipalities and developers with accomplishing MIDS goals, the following tools were developed:

- Stormwater management practice performance goals for development and redevelopment projects and linear-type projects such as roadways. Included were flexible treatment options for use in locations where achieving MIDS goals is not feasible.
- Sample ordinances that municipalities can opt to use or modify.
- A MIDS “calculator” as a simple alternative to water quality modeling software (such as P8 or WinSLAMM) to compute the approximate amount of pollutant removal that could be expected from specific infiltration-type stormwater management practices.

The MIDS efforts also provided specifications, published in the Minnesota Stormwater Manual, for designers to follow to ensure proper design, installation, and operation of the infiltration-type stormwater management practices (i.e., green infrastructure, and best management practices (BMPs)).

The City approach on the usage of MIDS guidance documents is further described in Section 5, Minimal Impact Design Standards Flexible Treatment Options.

MN MIDS Statute
MPCA MIDS Page

Buffer Law

In 2015/2016, the Minnesota Legislature enacted new requirements for the management of the riparian zone of streams, lakes, wetlands, and public ditches in Minnesota called the Buffer Law. Once implemented, there will be an average 50-foot wide vegetative buffer along the shoreline of all public waters. Procedural requirements are being established by the Minnesota BWSR, and maps that highlight all public waters that require vegetative buffers have been developed by the MNDNR. The Buffer Law allows an exemption from the Buffer Law requirements for properties within municipalities that are subject to NPDES permit requirements, such as the City of Minneapolis. Guidelines for implementation of this exemption have been developed by BWSR.

MN Buffer Law
BWSR Buffer Program
MNDNR Buffer Maps

Anti-Degradation

The CWA requires that states adopt rules to manage surface waters in a manner that does not cause further degradation of the water quality of surface waterbodies. In Minnesota, antidegradation rules apply to all waterbodies that are not on the current MPCA Impaired Waters, 303(d) list. This rule proposes that anti-degradation procedures become a condition of municipality's NPDES wastewater and stormwater permits. An anti-degradation assessment for Minneapolis was conducted by the MPCA in 2010 as part of the reissuance of the NPDES stormwater permit. The conclusion of this assessment was that, since 1988 (the year the Minnesota Anti-Degradation Rule was adopted) there has been no expanded discharge of stormwater. The MPCA determined that the City has reduced, and continues to reduce, stormwater volume and pollutant load discharges to surface waters, as a result of these City actions:

- Since 1988, the City has not created any new or expanded stormwater discharges.
- Since 2000, the City has installed structural SMPs to reduce the discharge of pollutants.
- Since 2000, the City has initiated non-structural stormwater management practices, which are described in the City's Stormwater Management Program.
- Since the 1990s, developments and redevelopments have been required to comply with water quality improvement requirements set by watershed management organizations and by the City stormwater management ordinance.
- Since the 1980s, the City has aggressively worked to separate the stormwater runoff from the sanitary sewers, which has resulted in zero discharge from CSO sewers since 2010.

The City has continued to implement new SMPs and improvements to existing practices since the MPCA completed the anti-degradation assessment in 2010. The NPDES Integrated Permit requires the City submit information to update this anti-degradation determination during the term of the 5-year permit.

MN Anti-Degradation Rules

Regional Water Resource Agencies

Metropolitan Council

The Metropolitan Council works to ensure that municipal comprehensive plans and local water plans are in conformance with regional plans, are consistent with Metropolitan Council policies, and are compatible with the plans of adjacent municipalities. With respect to wastewater management, the Metropolitan Council is designated as the area-wide waste treatment management agency under Section 208 of the CWA. This responsibility divides into two broad areas: protection of the region's water resources is accomplished through urban stormwater management and management of the region's wastewater treatment and conveyance facilities.

Cedar Lake Beach

Credit: Minneapolis Public Works

With respect to wastewater flows, the Metropolitan Council has adopted policies related to management of collection systems to ensure that the regional interceptor conveyance and wastewater facilities have sufficient capacity to manage the expected population changes in the region. The Metropolitan Council also implemented policies that require municipalities to manage the clear water that makes its way into the sanitary collection systems, termed inflow/infiltration (I/I). As owner and operator of the regional sanitary sewer interceptor system, Metropolitan Council was a co-permittee with the City of Minneapolis in the CSO NPDES permit and has worked with the City since the mid-1980s to ensure the near elimination of Minneapolis CSO overflow events.

With respect to water resources, the Metropolitan Council has adopted their Thrive 2040 Water Resources Policy Plan. The 2016 adopted version of this Plan is based on a watershed approach that encourages municipalities to develop policies, programs, and projects that integrate all aspects of municipal water resource management: surface water management, stormwater runoff, sanitary collection systems, and water supply. The goal of this approach is to ensure that decisions made with regard to one area of water resource management are beneficial to all areas of water resource management. This 2018 Minneapolis WRMP is partially based on this watershed approach through the integration of surface water management, stormwater runoff management, and sanitary collection and conveyance system management into this Plan. The water supply section of the 2018 Minneapolis Comprehensive Plan has been developed as a separate section.

Metropolitan Council is required to review this report to ensure that municipalities manage runoff in a manner that does not affect the regional disposal system and that the water resources content of the WRMP is in accordance with MN Rule Chapter 8410. A specific concern of the Metropolitan Council is that their wastewater treatment and conveyance facilities are not negatively affected by excessive I/I in the sanitary collection system.

Appendix C of the 2040 Water Resources Policy Plan lists specific information that municipalities must include in their local water plans. Important issues and information that the City is required to assess in this WRMP include:

- Wastewater System Plan Elements:
  - Description of sanitary collection system.
  - Estimation of current wastewater flows and projections of future wastewater flows.
  - Descriptions of intercommunity interconnections and copies of intercommunity service agreements entered into with an adjoining community after December 31, 2008.
  - Description of the City's policies and activities to reduce the volume of I/I that migrates into the sanitary collection system.
- Local Surface Water Management Plans:
  - Compliance with the requirements of Minnesota Rule Chapter 8410 and Minnesota Statute 103b.235.

A cross-reference between the Metropolitan Council required plan element and this 2018 Minneapolis WRMP is contained in Appendix A. The specific policies and activities that affect this WRMP involve implementation of I/I mitigation and promotion of onsite stormwater treatment, as described in additional detail in the following subsections.

Thrive 2040 Water Resources Policy Plan

Inflow/Infiltration Requirements

The Metropolitan Council has established a policy that states "(t)he Council[2] will not provide additional capacity within its interceptor system to service excessive inflow and infiltration."

To accomplish this policy, the Council will establish I/I goals for all communities that discharge wastewater to the regional wastewater system. Communities that have excessive I/I in their sanitary sewer systems will be required to eliminate the excessive I/I within a reasonable period. Communities that do not meet the goals established by the Metropolitan Council may be subject to a wastewater rate demand charge that is based on the cost of wastewater improvements that would be required to provide capacity beyond the amount designated for that community. The City's approach to management of I/I is further detailed in Section 4 – Infrastructure Inventory, Activities, and Assessment and Section 5 – Regulatory Controls and Water Resource Management Programs.

Water Resource Requirements

The Metropolitan Council's policy on assessment and protection of regional water resources is to continue to monitor the water quality of lakes, rivers, streams, and groundwater to evaluate impacts

[2] Water Resources Policy Plan, page 42

and to measure success. To accomplish this policy, the Metropolitan Council monitors the water quality, evaluates long-term water quality trends, maintains a regional database of water data, undertakes technical studies, and conducts outreach. Monitoring conducted in the City by the Metropolitan Council is summarized in Section 3 – Land and Surface Water Inventory and Assessment.

Hennepin County

Hennepin County's primary role in water resource management is to serve as the Soil and Water Conservation District (SWCD) under Minnesota Statute 103C. Under this statute, SWCDs are established to manage natural resource programs and to work directly with landowners to establish conservation practices. To accomplish these requirements, Hennepin County has adopted the 2015-2020 Natural Resources Strategic Plan that has objectives to protect groundwater resources and to protect and restore lakes, rivers, streams, and wetlands. Specific services provided by Hennepin County include:

- Wetland Conservation Act enforcement.
- Conservation easement monitoring.
- Environmental education and outreach.
- Volunteer management.
- Technical assistance to local governments.
- Financial assistance and cost share programs.

Hennepin County does not have a regulatory role with respect to this WRMP.

BWSR SWCD
Hennepin County 2015-2020 Natural Resources Strategic Plan
Wetland Health Evaluation Program

Watershed Districts and Organizations

Four watershed districts/organizations are represented within the City boundaries. Jurisdictional boundaries of each of the four watershed organizations within the City are shown in Figure 2.1. The primary difference between watershed districts and watershed management organizations relates to how the agency was organized. Watershed districts are created directly by the Minnesota Legislature, while watershed management organizations are created by joint powers agreements among the member municipalities under Minnesota Statute 103B.211. In accordance with the Minnesota Statute 103B.205 Subd. 13, all watershed management entities in the metro area are watershed management organizations regardless of whether they are watershed districts or joint powers entities. Over time, the purpose and function of these organizations have evolved such that there are only small differences between the operational functions of the two types of watershed organizations.

The power and duties of these Minnesota statutory authorities include:

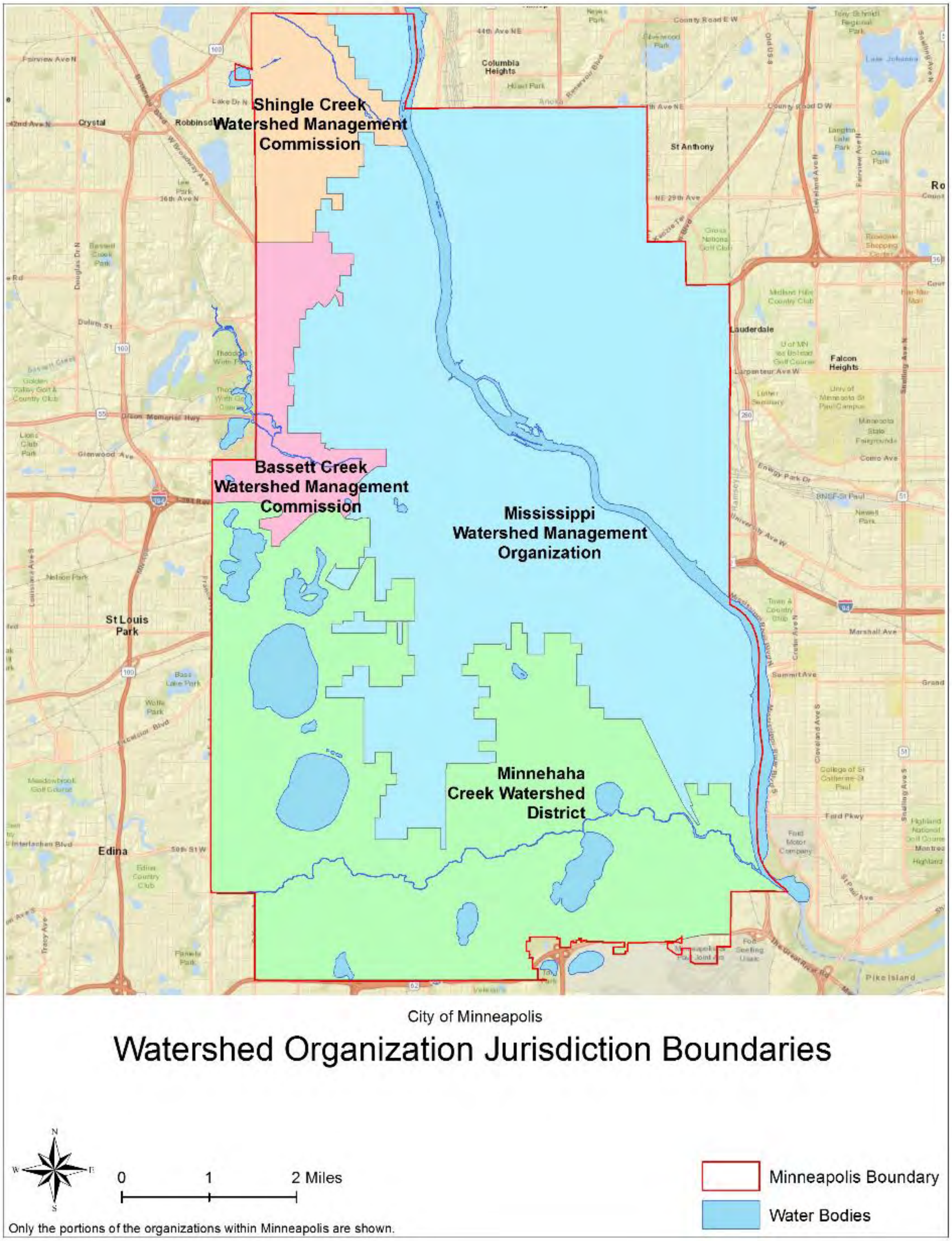
- Approval authority over local water management plans.
- Ability to determine a budget and raise revenue for the purpose of administrative and capital improvement costs.

- Regulation of land use and development if one or more of the following apply:
  - The City does not have an approved local water management plan in place; and/or
  - The City is in violation of its approved local plan.

For purposes of this WRMP, the term watershed organization encompasses both watershed districts and watershed management organizations. Appendix D provides more detailed information on each of the watershed organizations that have jurisdiction within the City.

Each watershed organization has developed a watershed management plan that contains specific goals and policies that guide the overall management within its respective jurisdiction, as contained in Appendix D, and summarized briefly in the following subsections.

Figure 2.1 – Watershed Organization Jurisdictional Boundaries in the City of Minneapolis



Bassett Creek Watershed Management Commission (BCWMC)

Bassett Creek Watershed Sign

Credit: CDM Smith

The Bassett Creek Flood Control Commission was established in 1969 as a nine municipality joint powers agreement with the specific purpose to manage floods that previously occurred along many segments of the creek. These municipalities include the cities of Crystal, Golden Valley, Medicine Lake, Minneapolis, Minnetonka, New Hope, Plymouth, Robbinsdale, and Saint Louis Park. In 1972, the flood control commission reorganized as the Bassett Creek Water Management Commission (BCWMC) and added water quality improvement to its functions. The BCWMC area is the smallest among the four watershed organizations with jurisdiction in the City, which includes the area of the City that drains to the open channel segment of Bassett Creek. Flows that discharge to the Bassett Creek culvert and tunnel system through downtown are under the jurisdiction of the Mississippi Watershed Management Organization (MWMO).

Each member municipality appoints a commissioner and alternate commissioner to serve on the BCWMC board of commissioners. These commissioners and alternate commissioners work together to establish goals and policies to protect and manage the water resources within its member communities of Crystal, Golden Valley, Minnetonka, Medicine Lake, Minneapolis, New Hope, Plymouth, Robbinsdale, and Saint Louis Park. The most current goals for the BCWMC are contained in their third-generation Watershed Management Plan, which was adopted on September 17, 2015. There are 19 goals that are specific to water quality, habitat, aesthetics, recreation, flood control, stormwater management, shoreland integrity, wetland management, public ditches, education, outreach, and climate change. Each goal is linked to specific policies and rules.

Bassett Creek Watershed Management Commission (BCWMC)

Minnehaha Creek Watershed District (MCWD)

The Minnehaha Creek Watershed District (MCWD) is the only organization within the City that was established by the Minnesota Legislature under the Minnesota Watershed District Act. The Board of Managers who govern the MCWD are appointed by the Hennepin County and Carver County Boards of Commissioners. The MCWD hires staff to manage their programs, which include:

- Education.
- Administration and Operations.
- Permits.

- Projects.
- Maintenance and Land Management.
- Research and Monitoring.

Minnehaha Falls in Winter

Credit: Minneapolis Public Works

The MCWD's most current goals, summarized in Appendix D, are based on their January 11, 2018 Watershed Management Plan. The goals in this plan seek to "conserve the natural resources of the Minnehaha Creek watershed principally through analysis of the causes of harmful impacts on the water resources, public information and education, regulation of land use, regulation of the use of waterbodies and their beds, and capital improvement projects." A summary of the MCWD's current rules and 17 watershed management goals is contained in Appendix D.

Minnehaha Creek Watershed District (MCWD)

Mississippi Watershed Management Organization (MWMO)

Mississippi River

Credit: CDM Smith

The area of Minneapolis that drains to the Mississippi River has been organized by a joint powers agreement into the MWMO. Other members include the MPRB and the municipalities of Columbia Heights, Fridley, Hilltop, Lauderdale, Saint Anthony Village, and Saint Paul. Each member municipality, including the City of Minneapolis, appoints a commissioner and an alternate commissioner to serve on the MWMO governing board.

In 2001, the organization became the first joint powers watershed organization to obtain Special Taxing District designation from the Minnesota Legislature (MS 276.066). This allowed the MWMO to hire full-time staff and implement new programs. Activity areas include:

- Capital Projects.
- Communications and Outreach.
- Monitoring.
- Planning.
- Watershed Assessment.

The ten water resources management goals established by the MWMO were initially adopted and included in their 2011 Water Resources Management Plan. The stated purpose of the MWMO that resulted in these goals is to "implement measures that realize multiple objectives, respect ecosystem principles and reflect community values." The specific goals, policies, and implementation priorities of the MWMO are contained in Appendix D.

Mississippi Watershed Management Organization (MWMO)

Shingle Creek Watershed Management Commission (SCWMC)

Shingle Creek

Credit: Minneapolis Public Works

The Shingle Creek Watershed Management Commission (SCWMC) was created by a joint powers agreement in 1984 between the municipalities of Brooklyn Center, Brooklyn Park, Crystal, Maple Grove, Minneapolis, New Hope, Osseo, Plymouth, and Robbinsdale. Each member municipality, including the City of Minneapolis, appoints a commissioner and an alternate commissioner to serve on the SCWMC governing board. The purpose of the SCWMC is to enhance the water quality of the water resources within their watershed through public education, analysis of the causes of harmful impacts, regulation of the use of water bodies, regulation of land use, and capital improvement projects.

The July, 2013 Third Generation Watershed Management Plan of the Shingle Creek Watershed Management Commission established 20 goals that are organized into six Goal Areas: Water Quantity, Water Quality, Groundwater, Wetlands, Drainage Systems, and Commission Operations and Programming. Detailed priorities and goals of the Shingle Creek Watershed Management Commission are contained in Appendix D.

Shingle Creek Watershed Management Commission (SCWMC)

Minneapolis Goals and Policies

Minneapolis Goals

The current statement of the City's goals, and strategic direction, was adopted by the Minneapolis City Council on March 28, 2014. These are based on this Minneapolis Vision:

> *Minneapolis is a growing and vibrant world-class city with a flourishing economy and a pristine environment, where all people are safe, healthy and have equitable opportunities for success and happiness.*

The goals and strategic direction related to the Minneapolis Vision are embedded in or incorporated into the management of the City in order to align these goals with the business plans and annual budgets. The goals are also the foundation for the programs and activities implemented in the (future) Minneapolis Comprehensive Plan and in this WRMP. As part of development of the City's 2018 Comprehensive Plan, City staff have developed a set of environmental policies that will influence the planning for the next 10 years. All of these goals, directions, and policies are listed in Table 2.1. Those directly related to water resource management are identified in this table.

City Vision, Value, Goals, and Strategic Direction

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Table 2.1 – Minneapolis Goals, Strategic Direction, Comprehensive Plan Environmental Policy, and Guiding Principles

2014 Goals, Strategic Direction, and Comprehensive Plan Environmental Policy	Water Resource Management Goal	Guiding Principle #1: Protect People Property and the Environment	Guiding Principle #2: Maintain and Enhance Infrastructure	Guiding Principle #3: Provide Cost Effective Solutions in a Sustainable Manner	Guiding Principle #4: Meet or Surpass Regulatory Requirements	Guiding Principle #5: Educate and Engage the Public	Guiding Principle #6: Enhance Livability and Safety
Living well: Minneapolis is safe and livable and has an active and connected way of life	✓	✓	✓	✓			✓
▪ All neighborhoods are safe, healthy and uniquely inviting.	✓	✓	✓	✓			
▪ High-quality, affordable housing choices exist for all ages, incomes and circumstances.							
▪ Neighborhoods have amenities to meet daily needs and live a healthy life.	✓	✓	✓	✓			✓
▪ High-quality and convenient transportation options connect every corner of the city.		✓	✓				
▪ Residents and visitors have ample arts, cultural, entertainment and recreational opportunities.	✓						✓
▪ The city grows with density done well.	✓	✓	✓	✓	✓		
One Minneapolis: Disparities are eliminated so all Minneapolis residents can participate and prosper							✓
▪ Racial inequities (including in housing, education, income and health) are addressed and eliminated.							✓
▪ All people, regardless of circumstance, have opportunities for success at every stage of life.							✓
▪ Equitable systems and policies lead to a high quality of life for all.	✓	✓	✓	✓	✓	✓	✓
▪ All people have access to quality essentials, such as housing, education, food, child care and transportation.		✓	✓	✓			✓

2014 Goals, Strategic Direction, and Comprehensive Plan Environmental Policy	Water Resource Management Goal	Guiding Principle #1: Protect People Property and the Environment	Guiding Principle #2: Maintain and Enhance Infrastructure	Guiding Principle #3: Provide Cost Effective Solutions in a Sustainable Manner	Guiding Principle #4: Meet or Surpass Regulatory Requirements	Guiding Principle #5: Educate and Engage the Public	Guiding Principle #6: Enhance Livability and Safety
▪ Residents are informed, see themselves represented in City government and have the opportunity to influence decision-making.						✓	
A hub of economic activity and innovation: Businesses – big and small – start, move, stay and grow here	✓			✓	✓		✓
▪ Regulations, policies and programs are efficient and reliable while protecting the public's interests.	✓			✓	✓		
▪ The workforce is diverse, well-educated and equipped with in-demand skills.							✓
▪ We support entrepreneurship while building on sector (such as arts, green, tourism, health, education and high-tech) strengths.					✓		
▪ We focus on areas of greatest need and seize promising opportunities.	✓	✓	✓	✓			✓
▪ Infrastructure, public services and community assets support businesses and commerce.	✓	✓	✓	✓	✓		✓
▪ Strategies with our City and regional partners are aligned, leading to economic success.				✓	✓		
Great Places: Natural and built spaces work together and our environment is protected	✓	✓	✓	✓	✓	✓	✓
▪ All Minneapolis residents, visitors and employees have a safe and healthy environment.	✓	✓	✓	✓			✓
▪ We sustain resources for future generations by reducing consumption, minimizing waste and using less energy.	✓		✓	✓	✓		✓

2014 Goals, Strategic Direction, and Comprehensive Plan Environmental Policy	Water Resource Management Goal	Guiding Principle #1: Protect People Property and the Environment	Guiding Principle #2: Maintain and Enhance Infrastructure	Guiding Principle #3: Provide Cost Effective Solutions in a Sustainable Manner	Guiding Principle #4: Meet or Surpass Regulatory Requirements	Guiding Principle #5: Educate and Engage the Public	Guiding Principle #6: Enhance Livability and Safety
▪ The City restores and protects land, water, air and other natural resources.	✓	✓		✓	✓		✓
▪ We manage and improve the city's infrastructure for current and future needs.	✓	✓	✓	✓	✓	✓	✓
▪ Iconic, inviting streets, spaces and buildings create a sense of place.	✓		✓	✓			✓
▪ We welcome our growing and diversifying population with thoughtful planning and design.	✓	✓	✓			✓	✓
A City that works: City government runs well and connects to the community it serves	✓	✓	✓	✓	✓	✓	✓
▪ Decisions bring City values to life and put City goals into action.	✓				✓	✓	✓
▪ Engaged and talented employees reflect our community, have the resources they need to succeed and are empowered to improve our efficiency and effectiveness.	✓	✓	✓	✓	✓	✓	✓
▪ Departments work seamlessly and strategically with each other and with the community.	✓	✓	✓	✓	✓		
▪ City operations are efficient, effective, results driven, and customer focused.	✓	✓	✓	✓	✓		
▪ Transparency, accountability and ethics establish public trust.	✓	✓	✓	✓	✓	✓	✓
▪ Responsible tax policy and sound financial management provide short-term stability and long-term fiscal health.	✓	✓	✓	✓			

2014 Goals, Strategic Direction, and Comprehensive Plan Environmental Policy	Water Resource Management Goal	Guiding Principle #1: Protect People Property and the Environment	Guiding Principle #2: Maintain and Enhance Infrastructure	Guiding Principle #3: Provide Cost Effective Solutions in a Sustainable Manner	Guiding Principle #4: Meet or Surpass Regulatory Requirements	Guiding Principle #5: Educate and Engage the Public	Guiding Principle #6: Enhance Livability and Safety
Water Policy 1, Protect the City's lakes, creeks, and river as public assets, natural systems, and recreational assets, and manage the surface waters and groundwater, along with public infrastructure for drinking water, sanitary sewer, and stormwater systems, equitably and sustainably to meet current and future needs for those who live, work, do business, and recreate in the City.	✓	✓	✓	✓	✓	✓	✓
Water Policy 2, Integrate water resource management into public and private projects to address multiple stressors, goals, and benefits and minimize adverse impacts to groundwater, or adverse impacts from groundwater to infrastructure, property, and the environment.	✓	✓	✓	✓	✓	✓	✓
Water Policy 3, Value and manage natural areas in and around surface waters, as well as stormwater ponds and other stormwater treatment facilities, as areas supportive of aquatic and terrestrial ecosystems, habitat, and wildlife and as flood storage areas.	✓	✓	✓	✓	✓	✓	✓
Water Policy 4, Respond to and work to minimize adverse impacts of climate change on surface waters, groundwater and stormwater, wastewater, and drinking water infrastructure.	✓	✓	✓	✓	✓	✓	✓

Minneapolis Park and Recreation Board Goals

The MPRB adopted their vision statement and vision themes as a part of the development of the Comprehensive Plan, Minneapolis Park and Recreation Board, 2007-2020. As the primary property owner along the City of Minneapolis' lakes and streams, the MPRB has developed specific goals tied to water resource management. Those goals directly related to water resource management are listed in Table 2.2.

Lake Calhoun/Bde Maka Ska

Credit: Minneapolis Public Works

MPRB Mission, Vision, and Values

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Table 2.2 – MPRB Vision, Goals, and Guiding Principles

MPRB Vision and Goals	Water Resources Goal	Guiding Principle #1: Protect People Property and the Environment	Guiding Principle #2: Maintain and Enhance Infrastructure	Guiding Principle #3: Provide Cost Effective Solutions in a Sustainable Manner	Guiding Principle #4: Meet or Surpass Regulatory Requirements	Guiding Principle #5: Educate and Engage the Public	Guiding Principle #6: Enhance Livability and Safety
Vision Theme 1: Urban forests, natural areas, and waters that endure and captivate	✓	✓	✓	✓		✓	✓
▪ Sound management techniques provide healthy, diverse, and sustainable natural resources.	✓	✓		✓			✓
▪ Healthy boulevard trees connect all city residents to their park system.	✓	✓	✓				✓
▪ Residents and visitors enjoy and understand the natural environment.	✓					✓	✓
▪ People and the environment benefit from the expansion and protection of natural resources.	✓	✓		✓			✓
▪ Knowledgeable stewards and partners generously support the system's natural resources.	✓			✓		✓	✓
Vision Theme 2: Recreation that inspires personal growth, healthy lifestyles, and a sense of community	✓	✓				✓	✓
▪ People play, learn, and develop a greater capacity to enjoy life.	✓	✓				✓	✓
▪ Residents, visitors, and workers enjoy opportunities to improve health and fitness.	✓	✓					✓
▪ People connect through parks and recreation.	✓	✓				✓	✓
▪ Volunteers make a vital difference to people, parks, and the community.	✓					✓	
▪ Parks provide a center for community living.	✓	✓				✓	✓

MPRB Vision and Goals	Water Resources Goal	Guiding Principle #1: Protect People Property and the Environment	Guiding Principle #2: Maintain and Enhance Infrastructure	Guiding Principle #3: Provide Cost Effective Solutions in a Sustainable Manner	Guiding Principle #4: Meet or Surpass Regulatory Requirements	Guiding Principle #5: Educate and Engage the Public	Guiding Principle #6: Enhance Livability and Safety
Vision Theme 3: Dynamic parks that shape city character and meet diverse community needs	✓	✓	✓	✓		✓	✓
▪ Parks shape an evolving city.	✓	✓					✓
▪ Park facility renewal and development respects history and focuses on sustainability, accessibility, flexibility, and beauty.	✓		✓	✓			
▪ Focused land management supports current and future generations.	✓	✓		✓			✓
▪ Financially independent and sustainable parks prosper.	✓			✓			
▪ Through outreach and research, park and recreation services are relevant today and tomorrow.	✓	✓				✓	
▪ Easily accessible information supports enjoyment and use of the park and recreation system.	✓					✓	
Vision Theme 4: A safe place to play, celebrate, contemplate, and recreate	✓	✓				✓	✓
▪ Positive recreation experiences and welcoming parks prevent crime.	✓	✓				✓	✓
▪ Residents, park visitors, and staff make safe choices in the parks.	✓	✓				✓	✓
▪ Intervention and communication reduces safety concerns.	✓	✓				✓	✓
▪ Parks are safe and welcoming by design.	✓	✓				✓	✓
▪ Communities, public and private partners, and staff cooperate to promote safety.	✓	✓				✓	✓

Minneapolis Water Resource Management Policies

Minneapolis Water Resource Guiding Principles

The City and MPRB intend to accomplish their goals and policies through careful consideration of budget limitations, changes to regulations, aging infrastructure needs, and natural resource needs. To further define and accomplish these goals, the WRMP sets up more specific guidance that fits generalized goals into actions that are of critical importance to infrastructure and water resource management, called Guiding Principles. These Guiding Principles are:

Guiding Principle #1 – Protect People, Property, and the Environment

Two significant programs implemented in the City have a common goal of protection of the health and safety of the people of Minneapolis. The CSO I/I program has resulted in elimination of the discharge of sewage into the Mississippi River since 2010. The Flood Mitigation program protects property from the damages incurred by severe and/or regular flooding. Protection of people, property, and the environment means that:

- Overflows from sanitary sewers occur only during extreme events.
- Structures are protected from flooding during the 100-year storm.
- Roadway flooding that impacts public safety and/or commerce is minimized.
- Structures, infrastructure, and surface waters are protected from the detrimental effects of soil erosion and sedimentation.

Guiding Principle #2 – Maintain and Enhance Infrastructure

Brick Egg Sewer

Credit: Minneapolis Public Works

The most effective stormwater BMPs are based on pollution prevention activities, such as maintenance of public infrastructure. For the purpose of this WRMP, the definition of infrastructure includes both structural components (i.e., pipes and stormwater management practice) and natural resource components (i.e., boulevard trees, native vegetation, and natural areas in parks). Critical maintenance practices undertaken by the City include street and public parking lot sweeping, sediment/debris removal from stormwater management practices, construction site erosion and sediment control, facility management, natural resource management, and vegetation management. Maintenance and enhancement of the public infrastructure requires the City to:

- Routinely assess the condition of the sanitary sewers and storm drains.

- Identify and correct sanitary sewer and storm drain capacity issues.
- Inspect and maintain infrastructure and natural resources in a manner that maximizes effectiveness and longevity.
- Develop capital improvements in a manner that minimizes lifecycle costs.
- Match resources to meet needs of inspection, assessment, and implementation requirements.
- Incorporate latest projections of rainfall quantities and frequencies based on advances in modeling and climate science.

Guiding Principle #3 – Provide Cost-Effective Services in a Sustainable Manner

Whenever there are two alternatives that meet the same goal, the City and MPRB will opt for the most cost-effective solution. All lifecycle issues will be a component of cost-effective analyses that involves assessment of the planning/design, construction, operation, and maintenance phases of the infrastructure. Providing cost-effective services in a sustainable manner requires that:

- Both short-term and long-term lifecycle analyses will be conducted to adequately assess all project/program costs.
- Lifecycle analyses will include all costs.
- Multi-objective strategies for water resources management are evaluated with all projects and programs.
- The capabilities and capacities of existing water resources systems are optimized.
- Source water is protected to improve water treatment efficiency.
- Multi-functional capital projects are collaborative.

Guiding Principle #4 – Meet or Surpass Regulatory Requirements

At a minimum, all water resources management activities must meet regulatory requirements. However, Minneapolis residents have voiced the expectation that surface water quality should surpass minimum requirements. Therefore, Minneapolis activities often aim to surpass regulatory requirements, which requires that the City:

- Maintain communications with watershed organizations and adjacent municipalities to maximize cooperative activities and projects that achieve the goals of multiple organizations.
- Anticipate regulatory trends and implement projects/programs before a regulation is finalized.
- Apply standard Maximum Extent Practicable (MEP) to control pollutants in stormwater.
- Provide cross-jurisdictional support to local sewer and stormwater agencies whenever circumstances, such as major storm events, require additional services than available by the local agency.
- Collaborate with watershed organizations early during public and private project development to work towards more beneficial water quality outcomes.

Guiding Principle #5 – Educate and Engage the Public and Stakeholders

Planting for Pollinators

Credit: Minneapolis Public Works

The City and the MPRB have long involved the public in the development of public improvements and programs. A portion of the budget for all projects includes funds to engage the public stakeholders during development of a project/program and educate the public and stakeholders once the project/program is implemented. Education and engagement of the public and stakeholders requires that:

- The public's role in water resources management is established and understood.
- The stakeholders in each project/program are identified and engaged early in the project's/ program's development.
- The service needs and expectations of the public are understood and dictate education and engagement.
- The public's and stakeholder's responsibility, accountability, creativity, and innovation is promoted.
- Employee leadership of citizen engagement activities is the norm and results in effective projects and programs.
- Engagement and education processes facilitate incorporation of regional goals and strategies in water resources management projects/programs.
- Engagement and education processes recognize and respond to the various needs and abilities of a diverse public and accommodates accessibility needs, including language barriers, cultural differences, socioeconomic factors, and more.
- Collaborate with watershed organizations and other stakeholders during the development and implementation of water resource management ordiannces, policies, and guidance documents.

Guiding Principle #6 – Enhance Livability and Safety

Residents judge the quality of their neighborhood by the standards of livability and safety. The quality of Minneapolis parks, and the quality of the surface waters within each park, is directly tied to the success of livability in Minneapolis. Enhancing livability and safety require that:

- High quality water resources are integral to the fabric of the City.
- All water is valued as an asset.
- Water resources are managed to contribute to the fulfillment of quality life expectations.

Kayak School

Credit: Minneapolis Public Works

These water resource management guiding principles provide the direction needed to allow water resources management activities to meet multiple goals – no single principle can be tied to a single goal.

Progress Towards Goals

The City has set up internal monitoring activities that track progress towards water resource management goals. Starting in 2019, for 2018 activities, these will be described in detail in the City's annual reports:

- NPDES Annual Report Documents tracks stormwater management and CSO management activities and goals set by the NPDES Integrated Permit.
- MPRB – Water Resources Report tracks water quality trends in lakes plus other MPRB water resources management activities.

The NPDES CSO and stormwater annual reports will be combined into a single annual report for 2018 activities, which will be published in 2019.

NPDES Annual Report Documents
MPRB Water Resources Reports
CSO Annual Reports

Responsibility for Implementation of Goals and Policies

City of Minneapolis and Minneapolis Park and Recreation Board Responsibilities

Responsibility for water resources management in Minneapolis is split between the City and the MPRB. The City is responsible for the public infrastructure and land use on non-MPRB properties. Authority for lake, beach, and shoreland management is delegated to the MPRB in Minneapolis City Charter Chapter 16, Section 11:

'Whenever the title shall have been acquired for the purpose of this chapter, to the land constituting the shore or shores of any stream of water, lake or pond, said Board may regulate and control the use of such shore or shores and the water contiguous thereto, and in case such ownership should embrace the entire shore or any such lake or pond, said Board is hereby empowered to take any and have exclusive charge and control of the waters of said lake, and may in all things regulate and govern the use of such waters and may prescribe penalties for the violation of such rule and ordinances as it may adopt for that purpose; provided, that said Board shall not prohibit the use of sail or rowboats on such waters.'

Both the City and the MPRB utilize three primary tools to manage water resources within their respective jurisdictions:

- Ordinances that regulate activities on private properties.
- Structural physical infrastructure that conveys, stores, and/or treats sanitary sewage and stormwater drainage.
- Non-structural activities that serve to prevent the discharge of pollutants to water resources.

Camden Lumberman Sculpture by Roger Brodin near Webber Pond

Credit: Minneapolis Public Works

The physical infrastructure is further described in Section 4 – Infrastructure Inventory, Activities, and Assessment, and the ordinances and other non-structural water resource protection activities are described in Section 5 – Regulatory Controls and Water Resource Management Programs.

Water Resources Related Agreements

The City is party to a number of water resources related cooperative agreements. Copies of current agreements are on file and available from Minneapolis Public Works – Division of Surface Waters and Sewers.

Water Resources Agreements

Following is a list of the water resources agreements in effect in 2018:

- Joint powers agreements for the establishment of the following watershed organizations:
  - Bassett Creek Watershed Management Commission amended Joint Cooperative Agreement for the establishment of a Bassett Creek Watershed Management Organization to plan, control, and provide for the development of Bassett Creek, showing changes effective August 29, 2014.

- Mississippi Watershed Management Organization, and Agreement No. C-28991 Joint and Cooperative Agreement for the Mississippi Watershed Management Organization, effective June 2012.
- Shingle Creek Watershed Management Commission Joint and Cooperative Agreement for the establishment of a Shingle Creek Watershed Management Commission to plan, control, and provide for the development of the Shingle Creek Watershed, June 15, 1894, amended March 21, 2006. Agreement was also amended on July 17, 2015, which extended the duration of the joint powers agreement to January 1, 2025.

- Cooperative agreement for the maintenance of County State Aid Highways, Agreement No. C-40670 Road Maintenance Agreement between the County of Hennepin and the City of Minneapolis.
- Cooperative agreement for the maintenance of State Trunk Highways, Agreement No. C-42388 (MnDOT Agreement No. 1001240) State of Minnesota Department of Transportation Routine Maintenance Agreement. Includes a provision that the maintain 50 cubic feet per second (cfs) capacity on the "old" Bassett Creek Tunnel during the 100-year storm event to accommodate the overflow of stormwater that cannot be accommodated in the "new" tunnel.
- Joint and Cooperative Agreement No. C-015730 for Boundary Change, BCWMC and MWMO, September 28, 2000. Includes requirement that the City maintain capacity in the "old" Bassett Creek Tunnel to allow for 50 cfs.
- Memorandum of Understanding (MOU) among the City, MPRB, and MCWD was approved by the Minneapolis City Council in April 2017. The MOU defines processes and commitments for integrated planning, policy, and capital project initiatives across the three organizations. Additionally, it will guide an integrated planning process that actively coordinates and aligns respective work within the Minnehaha Creek Watershed area in the City of Minneapolis.
- Local Cooperation Agreement between Department of the Army and the City for Flood Protection on Bassett Creek (new tunnel construction), June 27, 1986.
- Agreement under Section 215 of Public Law 90-483 Flood Control Project Basset Creek Watershed, Hennepin County, U.S. Army Corps of Engineers, and Golden Valley, May 11, 1979.
- Agreement entered into pursuant to provisions of the Joint Powers Agreement establishing the Bassett Creek Water Management Organization, relating to the construction of an improvement project in cooperation with the U.S. Army Corps of Engineers, Minneapolis and Minnetonka, June 16, 1986; Minneapolis and Robbinsdale, June 17, 1986; Minneapolis and Plymouth, July 7, 1986; Minneapolis and Golden Valley, June 16, 1986; Minneapolis and New Hope, June 9, 1986; Minneapolis and Medicine Lake, June 10, 1986; Minneapolis and Crystal, June 17, 1986; Minneapolis and Saint Louis Park, June 11, 1986.
- Agreement No. 58881, Cooperative Construction Agreement, RE: City cost participation of storm drain tunnel facilities construction by the State primarily along 2nd Street North between 12th Avenue North and 3rd Street North and the Middle Pool of the Mississippi River, February 2, 1978, MnDOT and the City of Minneapolis.

- Agreement No. 58881-1, Cooperative Construction Agreement, Supplement No. 1, RE: City cost participation of storm drain tunnel facilities construction by the State primarily along 2nd Street North between 12th Avenue North and 3rd Street North and the Middle Pool of the Mississippi River, January 28, 1988, MnDOT and the City of Minneapolis.
- Agreement No. 64742, Cooperative Construction Agreement, RE: State cost participation of storm drain tunnel facilities construction by the U.S. Army Corps of Engineers adjacent to T.H. 394 on 3rd Avenue North from 2nd Avenue North to the T.H. 94 ramps in Minneapolis, June 27, 1988, MnDOT and the City of Minneapolis.
- Permit #D-08-21205, MnDOT application for drainage permit, Minnesota Ballpark Authority, January 12, 2008 for stormwater runoff connection from the Twins stadium to new Bassett Creek tunnel.

Sanitary Sewer Agreements

The following agreements have been entered into by the City, which relate to the operation of the sanitary sewer system:

- Interagency agreement between the City and the Metropolitan Council detailing each entity's responsibilities under the 2018 NPDES Integrated Permit. The agreement governs the study of, investment in, and renewal of the interconnected sanitary infrastructure.
- Eleven agencies in the Fort Snelling area have agreements with the City of Minneapolis for water and sanitary sewer service, listed below:
    - Fort Snelling Park.
    - Henry Whipple Building (GSA).
    - Metropolitan Airport Commission.
    - Minnesota Air National Guard.
    - Minnesota Department of Natural Resources.
    - Minnesota Department of Transportation.
    - U.S. Naval Reserve.
    - Veterans Medical Center.
    - Veterans Administration.
    - 934th Medical Service Corps (MSC)/CERU.

Copies of these interagency agreements are available from the Water Treatment and Distribution Division of Minneapolis Public Works.

The City has not entered into any intercommunity agreements with an adjoining community after December 31, 2008.

Compliance with Regulatory Requirements

The City works to balance all regulatory requirements alongside the infrastructure management requirements that are typical of a fully developed city with systems that have been in operation for nearly 150 years. Additionally, compliance with regulatory requirements also requires that the City balance the hydraulic needs of the sanitary sewer and stormwater drainage systems. For example, stormwater disconnected from sanitary sewers for I/I compliance should not cause hydraulic capacity issues in the stormwater drainage system. Given these complexities, the City is fully compliant with the water resource regulatory requirements imposed by federal laws and regulations, state statutes and rules, and watershed organization requirements. To satisfy these requirements, the City has established goals as described in Section 2 – Regulatory Requirements, Goals, and Policies, and programs as detailed in Section 3 – Land and Surface Water Inventory and Assessment, Section 4 – Infrastructure Inventory, Activities, and Assessment, and Section 5 – Regulatory Controls and Water Resource Management Programs. The following provides a summary of how the City is compliant with the regulations cited in this section.

Federal Water Resource Compliance

NPDES Stormwater and Combined Sewer Requirements

The City has been subject to NPDES permit requirements since the initial CSO permit was issued in 1980. The permit was reissued with minor modifications in 1986, 1991, and 1997. These permits detailed the specific actions that the City and the Metropolitan Council were required to implement to reduce, and ultimately minimize, the occurrence of overflows to the Mississippi River of combined sewage/stormwater runoff. In 1990, the EPA issued the Phase I stormwater rules which required larger cities, such as Minneapolis, to develop a comprehensive stormwater management program. The City met the requirements of these rules and began to expand its stormwater management program in 1992 to incorporate water quality management structures and practices. The MPCA eventually issued the first NPDES stormwater permit to Minneapolis in 2000, which was reissued in 2011.

The City continues to manage its sanitary sewer and stormwater drainage systems in compliance with NPDES permits issued prior to the date of this WRMP. Details of the specific programs and projects established to meet these permit requirements are contained in Section 4 – Infrastructure Inventory, Activities, and Assessment and Section 5 – Regulatory Controls and Water Resource Management Programs.

Sanitary Sewer Overflow Requirements

The City is subject to the Capacity Management Operation and Maintenance (CMOM) requirements issued by the EPA. To meet these requirements, the City has opted to incorporate the specific activities into its asset management program.

National Flood Insurance Program

The City has been enrolled in the NFIP since 1974. Enrollment in the program has led to the development of the City's floodplain ordinance and maps that identify the floodplain boundaries along the major streams in the City: Mississippi River, Bassett Creek, Minnehaha Creek, and Shingle Creek. The ordinances and maps have been updated over the 44 years that this program has been in effect. The most current ordinance went into effect on November 4, 2016 and the most current update of the flood maps went into effect on November 4, 2016.

State Water Resource Compliance

Local Surface Water Management Plans

The purpose of this WRMP is to comply with the local water plan requirements established by the BWSR. Additional information on the development, adoption, and future amendments to this WRMP is contained in Section 1 – History and Overview of Minneapolis Water Resources. Appendix A includes a list of the specific requirements for this WRMP and the section of this plan that contains the required information.

Wetland Conservation Act

The City is the LGU responsible for the review and approval of proposals to alter wetlands within the City except for those wetlands located within the Minnehaha Creek watershed, for which the MCWD is the LGU. As an LGU, Minneapolis requires that wetland delineation surveys and mitigation plans be completed for all construction projects that propose to alter a wetland. Minneapolis also coordinates with watershed organizations to ensure that both the WCA and watershed organization requirements are met. Specific program information is contained in Section 5 – Regulatory Controls and Water Resource Management Programs.

Total Maximum Daily Load

Each individual TMDL implementation plan contains specific actions that cities and others should undertake that would, over time, improve the water quality of the specific waterbody to a non-impaired status. The measurable goals of each TMDL implementation plan are set in terms of Waste Load Allocations (WLAs) for permitted discharges, including the discharges permitted in the NPDES Integrated Permit. Each plan will contain a WLA numerical maximum pollutant discharge goal for removal of pollutants from municipal stormwater runoff. The City's NPDES stormwater permit contains a requirement that Minneapolis implement projects and practices as defined as the municipal WLA for each approved TMDL implementation plan. The City's approach is contained in the City's Stormwater Management Program. Specific activities for each approved TMDL implementation plan that is in effect as of the date of this WRMP is described in Section 3 – Land and Surface Water Inventory and Assessment.

Minimal Impact Design Standards

MIDS was developed as a voluntary program. There is no specific state requirement that cities must impose MIDS standards on projects; however, some watershed districts and management organizations have adopted MIDS standards. In accordance with the NPDES Integrated Permit, the City is using the MIDS goals and MIDS Flexible Treatment Options specific to ultra-urban conditions as a foundation for developing revised regulatory controls that address volume management requirements.

Buffer Law

The Minnesota Buffer Law that was enacted in 2015 and amended in 2016 includes a provision that grants a waiver from Buffer Law requirements for cities subject to NPDES stormwater permits. Therefore, the City is not required to establish any buffer protection programs or projects.

Anti-Degradation Rules

In 2010, the MPCA determined that the City is compliant with anti-degradation requirements, and therefore, additional conditions are not required for the City's NPDES permit. If anti-degradation does become a condition of the City's NPDES stormwater permit, then the City will be required to develop anti-degradation prevention, treatment, or pollutant load offset procedures to ensure that developments in the City do not cause an increase in pollutant loads to high quality surface waters. Therefore, the City is fully compliant with anti-degradation requirements and no additional actions are necessary.

Regional Water Resource Compliance

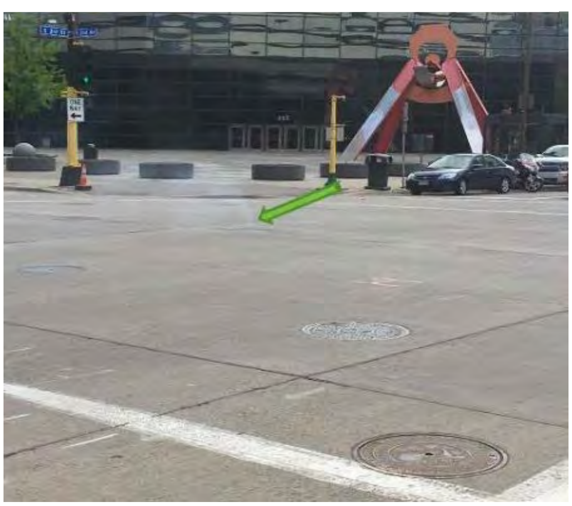
Metropolitan Council Comprehensive Plan

This Water Resource Management Plan is developed to meet both the stormwater and sanitary sewer requirements for comprehensive plans as established by the Metropolitan Council. This Plan will be incorporated as an appendix to the 2018 Minneapolis Comprehensive Plan. Appendix A includes a list of the specific requirements set by the Metropolitan Council and the section of this plan that contains the required information.

Metropolitan Council Inflow/Infiltration Program

The City's approach to reduction in I/I contributions to the sanitary sewer is founded in the CSO approach that was established in the NPDES permit requirements. CSO program progress is described in Section 4 – Infrastructure Inventory, Activities, and Assessment. The primary source of I/I from private properties has been identified as direct connections between rooftop drainage and the sanitary sewers. The inspection and elimination of these rooftop connections is further described in Section 5 – Regulatory Controls and Water Resource Management Programs.

Downtown Smoke Testing of Sanitary Sewers



Credit: Minneapolis Public Works

Neighborhood Smoke Testing of Sanitary Sewers

Credit: Minneapolis Public Works

Local Watershed Organization Requirements

The four watershed organizations that have jurisdiction in the City have each created a set of requirements for the City to implement through this WRMP. Appendix A includes a list of the specific requirements set by each watershed organization and the section of this plan that contains the required information.

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Section 3 – Land and Water Resources Inventory and Assessment

Overview

The focus of this section of the Minneapolis Water Resource Management Plan (WRMP) is on the City's physical environment, including rivers, streams, lakes, and wetlands, as required by Minnesota Rule 8410 and by the requirements of each watershed management authority with jurisdiction within the municipal boundaries of the City. Detailed information is provided for each water resource that is listed as a public water (also termed Protected Water) by the Minnesota Department of Natural Resources (MNDNR). The detailed information includes Department of Natural Resources (DNR) classification, Chapter 7050 beneficial use classification[1], stream length, watershed area, and watershed management information, as well as historical information and current water quality.

Population, Land Area, Neighborhood, and Parks

The City of Minneapolis is the largest city in Minnesota and the county seat of Hennepin County. The 2010 census population of 382,578 is spread over 87 neighborhoods, as shown in Figure 3.1. As of 2016, the City continues to grow, with an estimated population of 413,651.

The City has 151 parks that are wholly or partially within Minneapolis Park and Recreation Board (MPRB) property, which comprise a total of 10 square miles out of a total of 59 square miles of the City. The City has 645 square feet of parkland for every resident. There is a park within six blocks of every resident. In total, the Minneapolis Park System encompasses nearly 6,400 acres of land and water with approximately 24 miles of shoreline along lakes and 14 miles of shoreland along the Mississippi River. MPRB parks are listed in Table 3.1 and shown in Figure 3.2.

[1] Chapter 7050 beneficial use classification are defined in Minnesota Administrative Rule 4050.0140 – Use Classifications for Waters of the State. Generally, Class 1 is applied to waters used for domestic consumption (such as the Mississippi River), Class 2 is applied to waters that support fish, other aquatic life, bathing, boating, or other recreational uses, Class 3 is applied to waters used for industrial consumption, Class 4 is applied to waters used for agriculture and wildlife such as waterfowl, Class 5 applies to waters used for aesthetic enjoyment and navigation, and Class 6 waters apply to all other uses.

Figure 3.1 – City of Minneapolis Neighborhoods

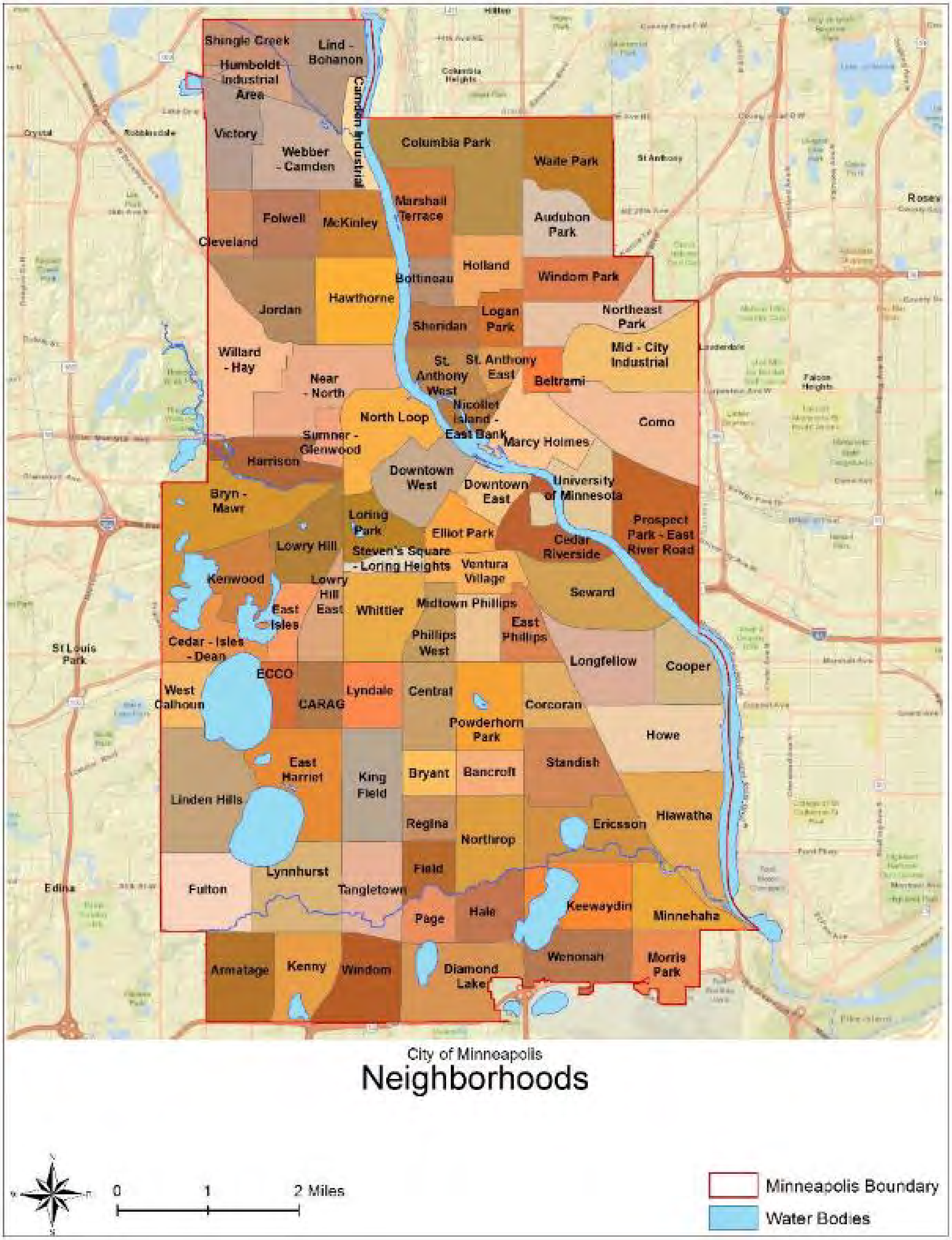


Table 3.1 – Minneapolis Park and Recreation Board Parks

Map ID	Park Name
0	Shingle Creek Park
1	Humboldt Greenway Park
2	49th Ave Corridor Park
3	Bohannon Park
4	North Mississippi Park
5	Webber Park
6	Victory Memorial Parkway
7	Victory Park
8	Folwell Park
9	Cleveland Park
10	Theodore Wirth Parkway
11	Valley View Park
12	Perkins Hill Park
13	Farview Park
14	Jordan Park
15	Newton Triangle
16	Glen Gale Park
17	Irving Triangle
18	Cottage Park
19	Russell Triangle
20	Oliver Triangle
21	North Commons Park
22	Willard Park
23	Hall Park
24	Farwell Park
25	Lovell Square Park
26	Bethune Park
27	Barnes Place Triangle
28	Humboldt Triangle
29	Sumner Field Park
30	Harrison Park
31	Bassett's Creek Park
32	Laurel Triangle
33	Bryn Mawr Park
34	Kenwood Parkway
35	Kenwood Park
36	Fremont Triangle
37	Thomas Lowry Park
38	Brownie Lake Park
39	Cedar Lake Trail – St. Louis Park
40	Cedar Lake Park
41	Lake of the Isles Park
42	Park Siding Park
43	St. Louis Triangle

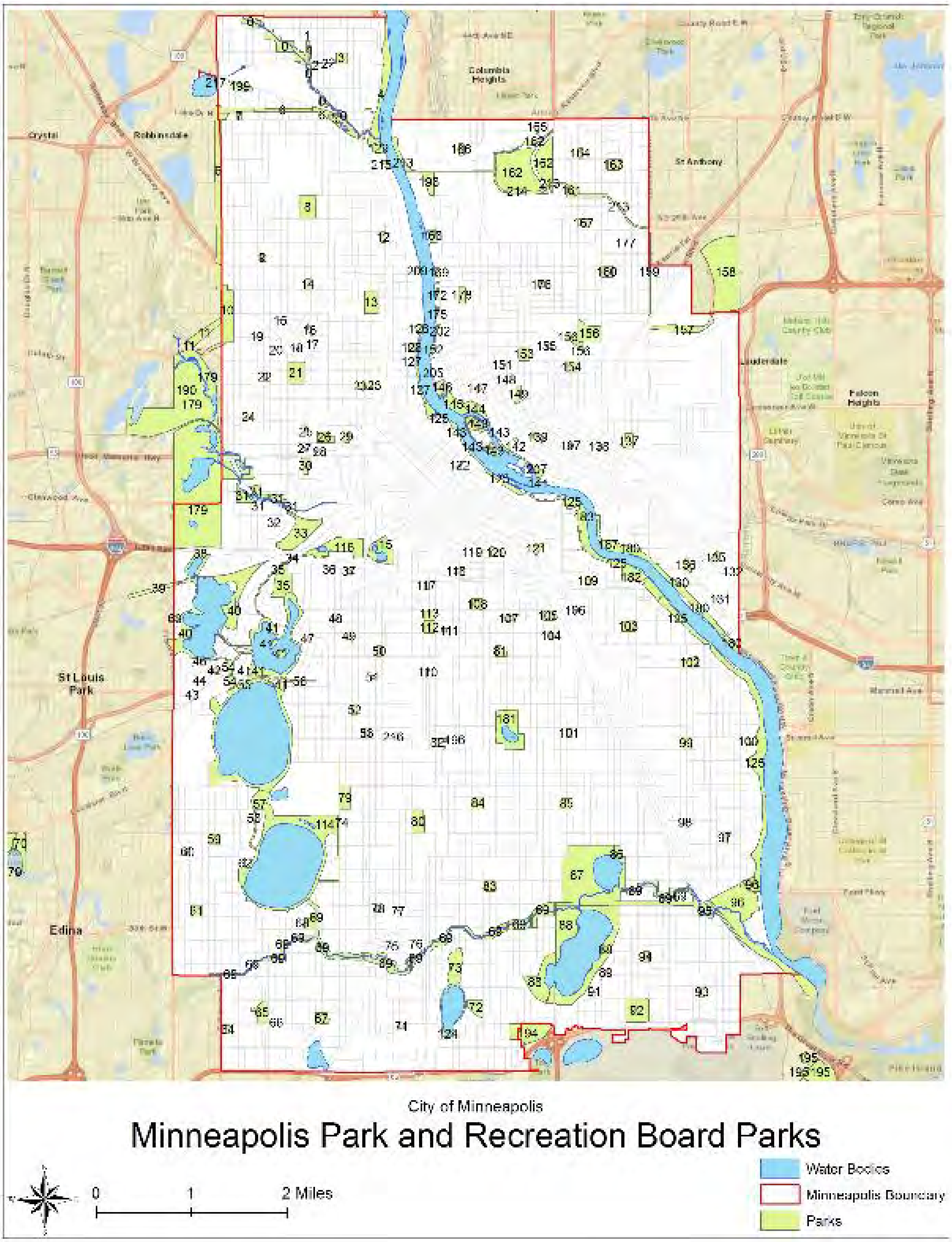
Map ID	Park Name
44	Alcott Triangle
45	Chowen Triangle
46	West End Triangle
47	Levin Triangle
48	Smith Triangle
49	Mueller Park
50	Whittier Park
51	Soo Line Garden
52	Bryant Square Park
53	Painter Park
54	Dean Parkway
55	Lake Calhoun Park
56	The Mall Park
57	William Berry Park
58	Linden Hills Boulevard
59	Linden Hills Park
60	Waveland Triangle
61	Pershing Field Park
62	Dell Park
63	Reserve Block 40 Park
64	Washburn Avenue Totlot Park
65	Armatage Park
66	Penn Model Village Triangle
67	Kenny Park
68	Lynnhurst Park
69	Minnehaha Creek Parkway
70	Meadowbrook Golf
71	Windom South Park
72	Todd Park
73	Pearl Park
74	Kings Highway Park
75	Gladstone Triangle
76	Elmwood Triangle
77	Rustic Lodge Triangle
78	Fuller Park
79	Lyndale Farmstead Park
80	Rev. Dr. Martin Luther King Jr. Park
81	Stewart Park
82	Central Gym Park
83	McRae Park
84	Phelps Park
85	Sibley Park
86	Lake Hiawatha Park
87	Lake Hiawatha Park/Golf Course

Map ID	Park Name
88	Lake Nokomis Park
89	Shoreview & 54th Street East Triangle
90	Shoreview & 54-½ Street East Triangle
91	Shoreview & 55th Street East Triangle
92	Bossen Field Park
93	Morris Park
94	Keewaydin Park
95	Longfellow Gardens Park
96	Minnehaha Park
97	Hiawatha School Park
98	Adams Triangle
99	Longfellow Park
100	Seven Oaks Oval Park
101	Corcoran Park
102	Brackett Park
103	Matthews Park
104	Cedar Avenue Field Park
105	East Phillips Park
106	Normanna Triangle
107	Phillips Community Center
108	Peavey Park
109	Murphy Square Park
110	28th Street Totlot Park
111	Clinton Field Park
112	Morrison Park
113	Washburn Fair Oaks Park
114	Lake Harriet Park
115	Loring Park
116	Parade the Park
117	Stevens Square Park
118	Franklin Steele Square Park
119	Park Avenue Triangle
120	Elliot Park
121	Currie Park
122	Gateway Park
123	Vineland Triangle
124	Diamond Lake Park
125	West River Parkway
126	Orvin “Ole” Olson Park
127	Upper River West Bank Park
128	MPRB Headquarters
129	Camden Boat Launch
130	Caleb Dorr Circle
131	Chergosky Park
132	Clarence Triangle

Map ID	Park Name
133	Orlin Triangle
134	Barton Triangle
135	Tower Hill Park
136	Luxton Park
137	Van Cleve Park
138	Marcy Park
139	Holmes Park
140	Chute Square Park
141	Lucy Wilder Morris Park
142	Main Street Southeast Park
143	Nicollet Island Park
144	BF Nelson Park
145	Boom Island Park
146	Scherer Property
147	Dickman Park
148	Sibley Triangle
149	Saint Anthony Park
150	Monroe Place Triangle
151	Washington Triangle
152	Sheridan Memorial Park
153	Logan Park
154	Beltrami Park
155	Northeast Ice Arena
156	Northeast Athletic Field Park
157	Ridgway Parkway
158	Gross Golf
159	Stinson Park
160	Windom Northeast Park
161	Deming Heights Park
162	Columbia Park Golf Course
163	Waite Park
164	Cavell Park
165	Architect Triangle
166	Hi-View Park
167	Audubon Park
168	Marshall Terrace Park
169	Edgewater Park
170	2220 Marshall Street Northeast
171	2128 Marshall Street Northeast
172	Gluek Park
173	1808 Marshall Street Northeast
174	1812 Marshall Street Northeast
175	1720 Marshall Street Northeast
176	Jackson Square Park
177	Oak Crest Triangle

Map ID	Park Name
178	Bottineau Park
179	Theodore Wirth Park
180	East River Parkway
181	Powderhorn Park
182	Riverside Park
183	Bohemian Flats Park
184	Creekview Park
185	First Bridge Park
186	Mill Ruins Park
187	East River Flats
188	Beard's Plaisance Park
189	Rose/Peace Garden
190	Theodore Wirth Golf Course
191	James I. Rice West River Parkway
192	Eloise Butler Wildflower Garden
193	Bluff Street Park
194	Edward C. Solomon Park
195	Fort Snelling Sports Complex
196	Central Gym Park
197	Northwest Bell Property Park
198	Xcel Energy Field
199	Victory Prairie Dog Park
200	1828 Marshall Street Northeast
201	1415 Ramsey Street Northeast
202	1510 Water Street Northeast
203	1601 16th Avenue Northeast
204	1326 Water Street Northeast
205	Graco Trail Easement
206	1604-½ Marshall Street Northeast
207	Father Hennepin Bluffs
208	1822 Marshall Street Northeast
209	30 31st Avenue North
210	1500 Water Street Northeast
211	3101 Pacific Street
212	50 31st Avenue North
213	Saint Anthony Parkway
214	Saint Anthony & Columbia Trail
215	Ramsey Parcel Park
216	Loring School Pool
217	Ryan Lake Park

Figure 3.2 – Minneapolis Park and Recreation Board Parks



Soils

The City surface soils are highly variable and altered, which is typical of urban cities. The University of Minnesota Department of Soil, Water, Climate and Land Management reports that the native soils in the City are broadly classified as two main soil types: sandy/loamy or silty. Due to the history of the development in the City, there are few areas that have undisturbed soils. Specific soil information is contained in the following watershed management plans and is incorporated into the Minneapolis WRMP by reference.

Bassett Creek Water Management Commission

Hydrologic soil groups within the Bassett Creek Water Management Commission (BCWMC) area are shown in Figure 2.5 of the Commission's 2015 Management Plan. The soils for the area of Minneapolis are shown as "not rated or not available."

Minnehaha Creek Watershed District

The area of the Minnehaha Creek Watershed District (MCWD) that is east of Highway 169, which includes the City, is generally categorized as disturbed soils and have not been assigned a hydrologic soil group. This information is shown on Figure 3 of the 2006 Minnehaha Creek Subwatershed Plan[2], amended June 2013. This data was not amended in the 2018 Watershed Management Plan.

Mississippi Watershed Management Organization

Soils information for the Mississippi Watershed Management Organization (MWMO) area is detailed in the Watershed Management Plan 2011-2021, amended May 2015. Figure 9 – Present Day Urban Soils, identifies the majority of Minneapolis as having Urban Soils. Additional soil information is contained in Figure 10 – Modern Secondary Soil Information, and Figure 11 – Combined Historic and Modern Soil Information. Figure 15 shows that all four Hydrologic Soil Groups (A, B, C, and D) are present in the City, with the highest volume of runoff generated by Hydrologic Soil Group D, and the least volume of runoff generated by Group A soils.

Shingle Creek Watershed Management Commission

The majority of the soils of the Minneapolis area within the Shingle Creek Watershed Management Commission (SCWMC) boundaries consist primarily of Hydrologic Soil Groups A (sandy) and B (loamy). This data is shown in Figure 2.3 of the Shingle Creek Watershed Management Commission Third Generation Watershed Management Plan, April 2013.

Digital Soil Maps

An additional source of soil information is available from the Minnesota Geospatial Information Office (MnGeo). MnGEO has created digital datasets of soil information that are based on county soil surveys published by the Natural Resources Conservation Service (NRCS), including the Hennepin County Soil

[2] MCWD 2017 Comprehensive Plan (draft), page 57, incorporates landforms and geology from the *2007 MCWD Comprehensive Water Resources Management Plan*.

Survey. Detailed soil maps may be generated, with an example of the available data shown in Figure 3.3. The same information in printable format is available online from NRCS.

Figure 3.3 – Detailed Soil Map

Source: MnGEO website[3]

Climate

Precipitation

The City has a continental climate, strongly influenced in the summer months by weather systems that originate in the Gulf of Mexico and the Pacific Ocean. Average and maximum precipitation data are listed in Table 3.2. Precipitation in the form of snowfall is included in these values and is described in terms of water equivalent. Growing season (May through September) precipitation averages 19.03 inches, or approximately 62 percent of the annual precipitation, based on normal precipitation recorded at the Minneapolis-Saint Paul (MSP) International Airport for the period of 1981 through 2010.

[3] Minnesota IT Services, Geospatial Information Office. Digital Soil Mapping in Minnesota. East Mississippi River and Southeast Minneapolis Detailed Soil Map. Generated by CDM Smith. October 2016.

Table 3.2 – City of Minneapolis Precipitation Data

Measure [a]	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Mean Precipitation (inches) [b]	2.43	1.77	1.16	0.90	0.77	1.89	2.66	3.36	4.25	4.04	4.30	3.08	30.61
Maximum Monthly Precipitation [c] (inches)	5.68	5.29	4.27	3.63	2.14	4.75	7.00	9.34	9.82	17.90	9.32	7.53	17.90
Maximum Monthly Precipitation [c] (year)	1971	1991	1982	1937	1981	1965	2001	2012	1990	1987	2007	1942	1987
Maximum 24-Hour Precipitation [c] (inches)	4.83	2.91	2.47	1.21	1.34	1.66	2.58	3.39	3.28	10.00	7.36	3.55	10.00
Maximum 24-Hour Precipitation [c] (year)	2005	1940	1982	1967	2012	1965	2006	2012	2003	1987	1977	1942	1987

[a] *Snow values represent water equivalent*
[b] *30-year period of record (1981 through 2010)*
[c] *75-year period of record (1940 through 2015)*
(Source: University of Minnesota, Department of Soil, Water and Climate, 1981 through 2010,
http://www.files.dnr.state.mn.us/natural_resources/climate/twin_cities/msp_normals_means_extremes_page3.pdf

Extreme Weather

In 2012 and 2013, Minneapolis Public Works participated in the innovative Weather – Extreme Trends (WET) study concerning response to climate change, funded through a grant from the National Oceanic & Atmospheric Administration (NOAA). The study dealt with stormwater drainage system vulnerability, capacity, and cost under climate change, and used long-term climate information and forecasts to support stakeholder-driven adaptation decisions for urban water resources. The purpose for federal funding of this project was to promote stakeholder-driven adaptation of vulnerable stormwater management systems and related water resources as a model for communities facing significant impacts from climate change. The project compared a fully developed area of the City with a developing suburban area in the City of Victoria. The project convened a broad cross-section of the community. The final project report was submitted on January 13, 2104, and the results will be of interest for the City's use in future planning for climate change adaptation.

In anticipation of weather changes related to climate change, the City is committed to continue preservation of natural resources, disconnection of impervious surfaces, reduction in impervious areas, and increased installation of green infrastructure. These actions will serve to counter-act, or potentially improve, the rate and volume of stormwater runoff generated in the future.

Atlas 14

In 2013, the NOAA released Atlas 14, Precipitation-Frequency Atlas of the United States, Volume 8, which contains updated precipitation prediction data for 11 Midwestern states. The data in this report creates precipitation estimates for storms that have durations that range from 5 minutes to 60 days and for frequency intervals of 1-year through 1,000-year. The information updates and supersedes Technical Paper-40 (1961), which was the previous standard for the precipitation estimation utilized to size storm drainage structures within the City.

The Minneapolis Surface Water and Sewers Division of Public Works transitioned to Atlas 14 as the hydrologic basis for storm drainage infrastructure design, first effective for projects constructed in 2016.

Snowfall and Snowmelt

In the winter months (November through March), snow predominates in the City. Table 3.3 lists average monthly snowfalls for the City. Snowfall occurs throughout the winter in small events that do not generate runoff. The snowmelt, which occurs over a comparatively short period of time (e.g., approximately two weeks) in March or April, does not affect the hydraulic capacity of the storm drainage system. Snowmelt does, however, have a significant pollutant load, which can affect the water quality of the water resource.

Table 3.3 – Snowfall Monthly Averages in the City of Minneapolis

Measure	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Mean Snowfall (inches)	0.6	9.3	11.5	12.1	7.8	10.2	2.5	Trace	0.0	0.0	0.0	Trace	54.0
Maximum Monthly Snowfall (inches)	8.2	46.9	33.6	46.4	19.7	36.8	21.8	0.3	0.0	0.0	0.0	0.4	98.6
Minimum Monthly Snowfall (inches)	0.0	0.1	1.8	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4
Source: University of Minnesota, Department of Soil, Water and Climate, 1981 through 2010, http://www.dnr.state.mn.us/climate/twin_cities/snowfall.html													

Hydrologically, the amount of precipitation that is contributed to the groundwater as recharge is between 6 inches and 8 inches per year, as reported by the Minnesota Geologic Society[4].

Bedrock, Surficial Geology, and Topography

The Minnesota landscape is a product of the continental glaciers. It consists of gentle and steep hills, numerous marshes and lakes, and extensive outwash plains. The City has a relatively flat topography, which is a result of outwash deposition that occurred 14,000 years ago by the Des Moines Lobe of the late Wisconsin glaciations.

In general, the bedrock geology of the City consists of undivided layers of limestone, dolostone, sandstone, and shale categorized as Paleozoic Rocks that developed between 225 million years and 600

[4] Geologic Atlas User's Guide: Using Geologic Maps and Databases for Resource Management and Planning, MCS, Open-File Report OFR-12-1. http://www.mngs.umn.edu/user_guide_v1.pdf

million years ago[5]. Surficial materials typically contain various combinations of sands, gravels, and loamy sands covered by the soils, previously described in the Soils section. Detailed maps of the Surficial and Bedrock Geology have been published as the Hennepin County Atlas Series, Atlas C-4, Plate 3 (Surficial Geology) and Plate 4 (Bedrock Geology).

Topography of the City is divided into four main watersheds: Bassett Creek, Minnehaha Creek, Mississippi River, and Shingle Creek. As noted in Table 3.4, approximately 5 percent of the land area is within the Bassett Creek watershed, 36 percent is within the Minnehaha Creek watershed, 54 percent is within the Mississippi River watershed, and 5 percent is within the Shingle Creek watershed. Note that these values represent the physical topography within the City and not the jurisdictional area of the associated watershed organization, which differ slightly.

Table 3.4 – Topographical Watersheds in the City of Minneapolis

Topographical Watershed	Area of Watershed within the City of Minneapolis	Portion of City [a]
Bassett Creek	1,800 acres	5%
Minnehaha Creek	13,400 acres	36%
Mississippi River	19,900 acres	54%
Shingle Creek	2,000 acres	5%

[a] Percentages are rounded

More specific geologic information is contained in watershed management plans and is incorporated into the Minneapolis WRMP by reference, described as follows.

Bassett Creek

A 50-foot layer of glacial drift materials covers the bedrock in the BCWMC area of the City. The bedrock consists of Platteville Limestone over Glenwood Shale. The major bedrock aquifer is within the St. Peter Sandstone, below the Glenwood Shale. Additional detailed information can be found in Section 2.5 of the 2015 Management Plan.

Minnehaha Creek

The bedrock within the City region of the MCWD ranges from 0 feet to 100 feet below the surface. Unique features within the City include glacial drift deposits under Lake Calhoun/Bde Maka Ska and Lake Harriet, and exposed bedrock at Minnehaha Falls. Additional detailed information can be found in Section 2.2.2 of the MCWD 2007-2017 Comprehensive Water Resources Management Plan, Minnehaha Creek Subwatershed Plan, amended June 2013. This data was not amended in the 2018 Watershed Management Plan.

Mississippi River

The Mississippi River has a distinct geologic stratigraphy with a layer of glacial till and river deposits that overlay oceanic limestone, shale, and sandstone bedrock. Under the City, groundwater is located in

[5] Geologic Atlas User's Guide: Using Geologic Maps and Databases for Resource Management and Planning, MCS, Open-File Report OFR-12-1. http://www.mngs.umn.edu/user_guide_v1.pdf

unconsolidated deposits and bedrock formations. Bedrock, examples of which are exposed along the Mississippi River bluffs, is not continuous beneath the glacial drift.

The MWMO Watershed Management Plan 2011-2021, amended May 2015, described two geologic areas within the City: along the Mississippi River and the upland areas beyond the River. Within the Mississippi River corridor, the bedrock is 0 feet to 10 feet below the surface, with areas of exposed bedrock, terrace deposits, peat deposits, and a post-glacial stream. Further from the river, the bedrock ranges from 10 feet to 200 feet below the surface with the overburden consisting of glacial outwash and till. There is a deep valley that runs through the bedrock along a northeast-to-southwest alignment through the City that starts in Columbia Heights and continues through the Minneapolis Chain of Lakes. Additional detailed information can be found in Figure 5 through Figure 7 of Section 4.2.3 of the MWMO Watershed Management Plan.

Shingle Creek

The SCWMC Third Generation Watershed Management Plan, April 2013, describes the City as within the Mississippi Valley Outwash geomorphic region. Bedrock is primarily St. Peter Sandstone. Additional detailed information can be found in Section 2.2.5 of the SCWMC plan.

Land Use and Zoning

The Minneapolis Zoning Code is the primary tool used by the City to manage land use within five primary zoning districts: residential, office-residential, commercial, industrial, and downtown. Additionally, there are three types of overlay districts that influence water resource management as defined in Section 5 – Regulatory Controls and Water Resource Management Programs. These three overlay districts include Floodplain Overlay District, Shoreland Overlay District, and the Mississippi River Critical Area Overlay District. Each primary and overlay zoning district has clearly defined allowable and prohibited land uses. Specific land use requirements can be found in the Minneapolis Code of Ordinances, Title 20, Minneapolis Zoning Code.

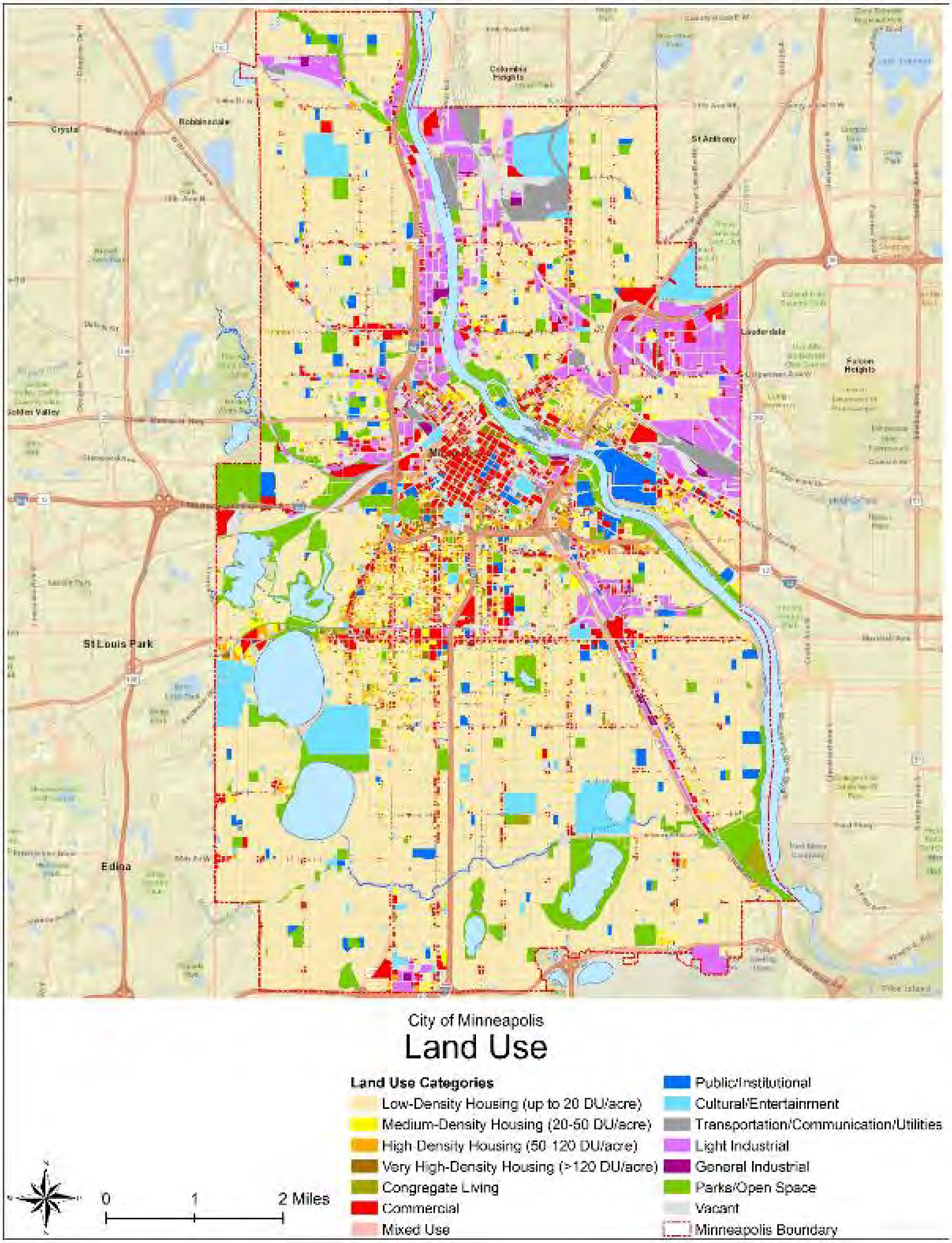
The City has developed land use policies that guide those development and redevelopment projects that propose changes to land use. The most current land use policies were updated in June 2016 and will be in effect until the updated Minneapolis comprehensive plan, Minneapolis 2040, is in effect. The completed plan is anticipated to be completed in late 2018.

The Metropolitan Council estimates that the population of Minneapolis will grow from an estimated 2016 population of 413,651 to a projected population of 459,200 in 2040. To accommodate this growth, planners anticipate a shift to higher density land uses. This shift in land use is detailed in Minneapolis 2040.

Current City land use is shown in Figure 3.4. Future land use information will be available in the Land Use chapter of the 2018 Minneapolis Plan.

Descriptions of how land use information is utilized in sanitary sewer and stormwater capacity estimations are included in Section 4 – Infrastructure Inventory, Activities, and Assessment.

Figure 3.4 – City of Minneapolis Land Use



Minneapolis Waterbodies

The origin of the name Minneapolis is described as a combination of the Dakota *Minnehaha*, translated as falling waters, and the ancient Greek *polis*, translated as city. This name, as well as the nickname "City of Lakes" suitably describe the landscape of the City, which includes the Mississippi River, four streams, and 17 waterbodies, as listed in Table 3.5 and shown in Figure 3.5. Waterbodies included in this table are those that receive stormwater runoff from a Minneapolis owned outfall. The definition of lake, wetland, and stream is based on information obtained from the MNDNR Lake Finder and MPCA Water Quality Dashboard. The tributary areas for each waterbody are shown in Figure 3.6. This section provides historical information and water quality assessments for those waterbodies that are within the municipal limits of the City. Descriptions of waterbodies that are outside of the City which receive runoff generated within the City are briefly described in a separate section.

Table 3.5 – Waterbodies within the City of Minneapolis

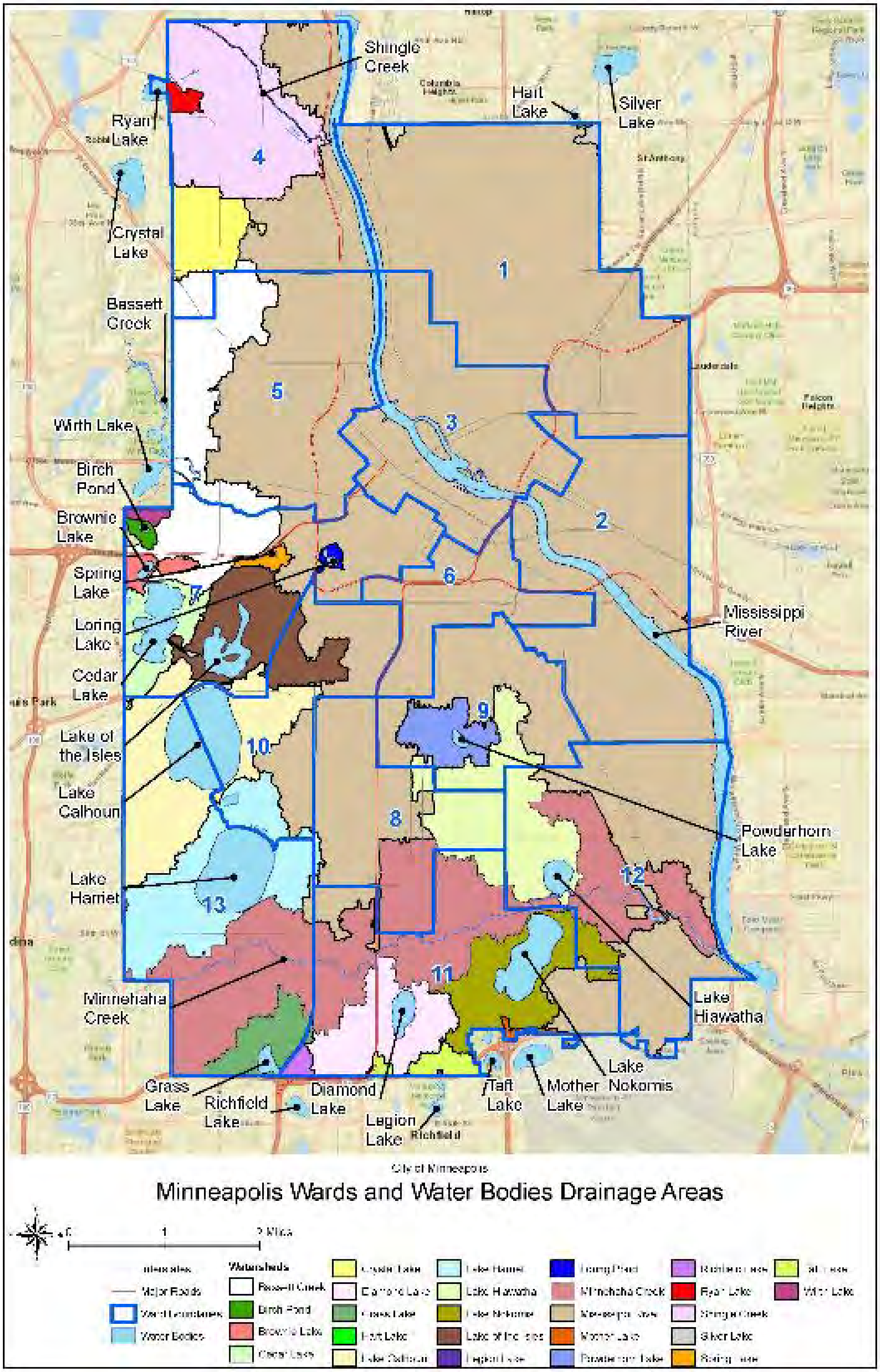
Type	Waterbody	DNR ID	Watershed Organization
River	Mississippi River	07010206-805 [a] 07010206-814 [b]	Mississippi Watershed Management Organization
Stream	Bassett Creek	07010206-538	Bassett Creek Watershed Management Commission
Stream	Minnehaha Creek	07010206-539	Minnehaha Creek Watershed District
Stream	Ryan Creek	07010206-536	Shingle Creek Watershed Management Commission
Stream	Shingle Creek	07010206-506	Shingle Creek Watershed Management Commission
Lake	Birch Pond	27065300	Bassett Creek Watershed Management Commission
Lake	Brownie Lake	27003800	Minnehaha Creek Watershed District
Lake	Cedar Lake	27003900	Minnehaha Creek Watershed District
Lake	Cemetery Lake	27001700	Minnehaha Creek Watershed District
Wetland	Diamond Lake	27002200	Minnehaha Creek Watershed District
Wetland	Ewing Wetland	NA	Minnehaha Creek Watershed District
Wetland	Grass Lake	27068100	Minnehaha Creek Watershed District
Lake	Lake Calhoun/Bde Maka Ska	27003100	Minnehaha Creek Watershed District
Lake	Lake Harriet	27001600	Minnehaha Creek Watershed District
Lake	Lake Hiawatha	27001800	Minnehaha Creek Watershed District
Lake	Lake Nokomis	27001900	Minnehaha Creek Watershed District
Lake	Lake of the Isles	27004000	Minnehaha Creek Watershed District
Lake	Loring Pond	27006500	Mississippi Watershed Management Organization
Lake	Powderhorn Lake	27001400	Minnehaha Creek Watershed District
Lake	Ryan Lake	27005800	Shingle Creek Watershed Management Commission
Lake	Sanctuary Pond	27066500	Minnehaha Creek Watershed District
Shallow Lake	Spring Lake	27065400	Bassett Creek Watershed Management Commission

[a] *Mississippi River ID for purposes of Impaired Waters changed from 07010206-509 by MPCA in 2016*

[b] *Mississippi River ID for purposes of Impaired Water carried forward from 07010206-513, 07010206-501, 07010206-502, 07010206-503, 07010206-504, 07010206-505, and 07040001-531 to 07010206-814*

Figure 3.5 – City of Minneapolis Waterbodies

Figure 3.6 – City of Minneapolis Waterbodies Drainage Areas



Mississippi River

The Mississippi River has historically been the City's source of commerce, recreation, and potable water. Approximately 12.2 miles of the Mississippi River, with a drainage area with Minneapolis of 20,300 acres, flows from northwest to southeast through the City. Hydrologically, the Mississippi River is the ultimate downstream receiving water for nearly all waterbodies in the City, with the exception of a few landlocked wetlands and ponds.

The Minnesota Department of Natural Resources (MNDNR) has segmented the Mississippi River through the City into three segments:

- Coon Creek (in Anoka) to Upper Saint Anthony Falls Dam.
- Upper Saint Anthony Falls Dam to Lower Saint Anthony Falls Lock and Dam.
- Lower Saint Anthony Falls Lock and Dam to Lock and Dam #1 (Ford Dam).

The physical characteristics for each segment of the River are summarized in Table 3.6.

Mississippi River at Lowry Avenue

Credit: CDM Smith

Table 3.6 – Mississippi River Characteristics

River/Stream	Mississippi River, Crow River to Upper Saint Anthony Falls Dam
DNR ID#	07010206-805 [a]
DNR Classification	N/A
Chapter 7050 Classification	1C, 2B, 3C
Length within Minneapolis	5.2 miles
Downstream waterbody	Mississippi River, Upper Saint Anthony Falls Dam to Lower Saint Anthony Falls Lock and Dam
Watershed area within Minneapolis	6,309 acres
Watershed Management Organization	Mississippi Water Management Organization
River/Stream	**Mississippi River, Upper Saint Anthony Falls Dam to Lower St. Anthony Falls Lock and Dam**
DNR ID#	07010206-814 [b]
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5 and 6
Length within Minneapolis	0.6 miles
Downstream waterbody	Mississippi River, Lower Saint Anthony Falls Lock and Dam to Lock and Dam #1
Watershed area within Minneapolis	112,969 acres
Watershed Management Organization	Mississippi Water Management Organization
River/Stream	**Mississippi River, Lower Saint Anthony Falls Lock and Dam to Lock and Dam #1 (Ford Dam)**
DNR ID#	07010206-814 [b]
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5 and 6
Length within Minneapolis	6.4 miles
Downstream waterbody	Mississippi River, Lock and Dam #1 (Ford Dam) to Lock and Dam #2
Watershed area within Minneapolis	1,035 acres
Watershed Management Organization	Mississippi Water Management Organization

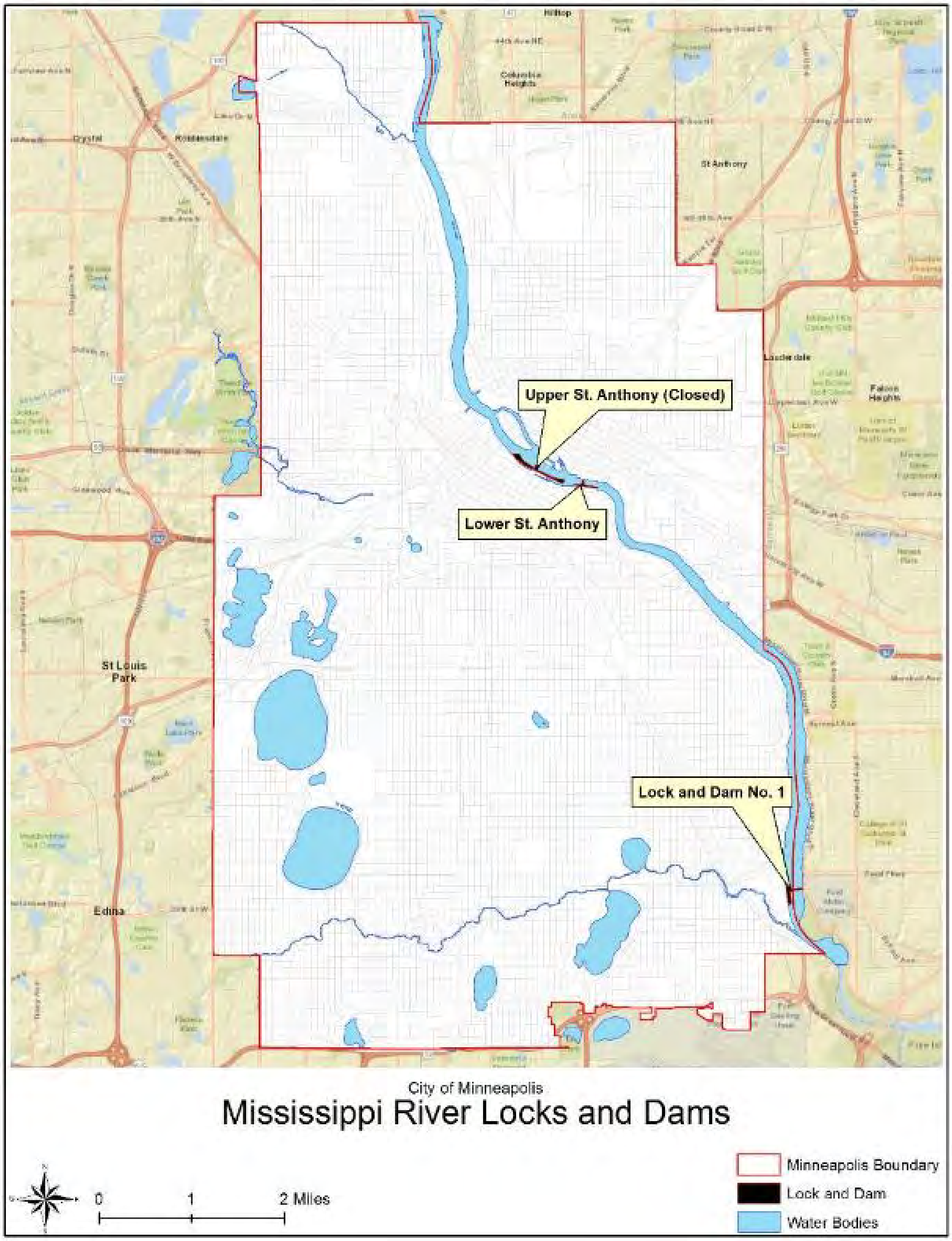
[a] Mississippi River ID for purposes of Impaired Waters changed from 07010206-509 by MPCA in 2016

[b] Mississippi River ID for purposes of Impaired Water carried forward from 07010206-513, 07010206-501, 07010206-502, 07010206-503, 07010206-504, 07010206-505, and 07040001-531 to 07010206-814

Navigation

The City is situated at the upper reaches of the United States Army Corps of Engineers (USACE) Mississippi River navigational system. The Saint Paul District of the USACE operates and maintains 12 locks and dams on the river between the Upper Saint Anthony Falls in downtown Minneapolis and Lock and Dam #10 in Guttenberg, Iowa. Each dam represents a critical step in the “stairway of water” that makes navigation possible between the City and Saint Louis. Figure 3.7 shows the locations of the locks and dams that are within the City. As of 2015, navigation on the Mississippi River is limited to the reach that is downstream of the Upper Saint Anthony Falls Lock and Dam. As described in the section below, titled United States Army Corps of Engineers Closure of Upper Saint Anthony Falls Lock, the lock permanently ended operation as mandated by the U.S. Congress.

Figure 3.7 – Locks and Dams on the Mississippi River, City of Minneapolis



The Upper Saint Anthony Falls Lock and Dam, shown in Figure 3.7 is located on the Mississippi River at river mile 854. The dam consists of a horseshoe dam with a chord dam downstream of the horseshoe and a concrete overflow spillway. The lock is 56 feet wide by 400 feet long. Lower Saint Anthony Falls Dam is located downstream of the Upper Saint Anthony Falls Lock and Dam at river mile 853.9. This lower dam consists of a 275-foot long concrete spillway with four Tainter gates. The lock is also 56 feet wide by 400 feet long.

Upper Saint Anthony Falls Dam, upstream of the Stone Arch Bridge

Credit: CDM Smith

Both the upper and lower dams were constructed by the USACE and became operational in September 1963. The upper lock was closed in 2015 and the lower lock remains open and operates on an occasional schedule. Additional information on the closure is contained in the following subsection.

Lock and Dam #1 (Ford Dam) is located on the Mississippi River at river mile 847.9 in the City. It was constructed in 1917, with major reconstruction in 1929, 1932, and between 1978 and 1983.

United States Army Corps of Engineers Closure of Upper Saint Anthony Falls Lock

Due to concerns about the spread of invasive Asian carp, the 113th Congress included a provision in the *Water Resources Reform and Development Act of 2014 (WRRDA)* that permanently closed the Upper Saint Anthony Falls locks. Title II: Navigation – Subtitle A, Section 2010, Upper Mississippi River Protection contains this provision that closed the Upper Saint Anthony Falls Lock effective June 9, 2015. The Lower Saint Anthony Falls Lock remains open and operates under reduced hours. The WRRDA does allow for the lock to be operational in emergency conditions, as necessary to mitigate flood damage.

Recreational boaters are encouraged to use a 1.5-mile portage that has been established by the MNDNR. The Mississippi River and Recreation Area Visitor Center at the Upper Saint Anthony Falls Lock and Dam remains open for visitors between May and September of each year.

Efforts are underway to assess the environmental impacts of the closure, as well as the opportunities for redevelopment. Additional research on the impacts related to water quality, and fish, mussel, and macroinvertebrate communities in the river is being conducted by Minneapolis River Partnership in a project funded by the Minnesota Environmental Trust Fund. Recreational opportunities are under consideration by the MPRB, as described in Section 3.7.1.3 of the Upper River Master Plan.

United States Army Corps of Engineers Environmental Pool Plans

In 2004, the USACE Fish and Wildlife Work Group, a subgroup of the USACE Saint Paul District River Resources Forum[6], completed Environmental Pool Plans (EPP) for the Mississippi River Pools 1 through 10. The Pool Plans establish common habitat goals and objectives for the Upper Mississippi River and serve as a guide toward a sustainable ecosystem and identify a desired future habitat condition. The EPPs serve as a guide for individual agencies to carry out their respective missions and to seek funds to do so in a way that ensures environmental sustainability in a manner that maintains Congressionally-mandated navigation on the river.

The entire segment of the Mississippi River in the City is within Pool #1. This 18.6-mile pool is located between the Coon Rapids Dam (river mile 866.2) and Lock and Dam #1 (Ford Dam, river mile 847.6). The Fish and Wildlife Working Group (FWWG) had determined that the only viable use of Pool #1 is commercial navigation and recreational boating and, therefore, have not established environmental sustainability goals. Maintenance of navigation is Congressionally mandated and will continue to be the primary goal of this segment.

Initial discussions on updating the EPP to consider the changes related to closure of the Upper Saint Anthony Falls Lock, began with the FWWG in early 2015. The initial EPP updates reflect habitat restoration and enhancement projects, operation and maintenance (O&M) activities, refuge projects, and other agency restoration projects. As of April 2016, Pool #8 has been completed and will be used as a template for updating the other EPPs. The FWWG also began working on a Habitat Needs Assessment II in 2016. This assessment will be incorporated into the EPP revisions. Currently, the EPP revisions are being delayed until after this assessment is complete. It has not been determined if this EPP update will include revisions to Pool #1.

Water Quality

In 2012, the Minnesota Pollution Control Agency (MPCA) published Mississippi River Pools #1 through #8: Developing River, Pool, and Lake Pepin Eutrophication Criteria to reassess each pool of the Mississippi River in an effort to refine the eutrophication status for each pool and to establish water quality criteria that is specific for each pool. The report contains general conclusions of the quality of Pool #1 based on review of long-term data collected by Metropolitan Council and MPCA, as follows:

- There is no significant overall trend in Total Phosphorus (TP) and Dissolved Ortho Phosphorus (DOP) through 2009, except that the TP and DOP for the period between 2005 and 2009 was lower than for the period between 1993 and 2009.
- DOP is high as it enters the metropolitan area and declines in Pool #1, likely due to algal uptake.

[6] River Resources Forum consists of representatives from State and Federal agencies within the jurisdiction of the Saint Paul District of the USACE. Agencies include the USACE, U.S. Fish and Wildlife Service, U.S. Coast Guard, National Park Service, MPCA, MNDNR, Iowa DNR, Wisconsin DNR, MnDOT, Iowa DOT, and Wisconsin DOT.

- Chlorophyll-a (Chl-a) gradually increases through Pool #1. The levels of Chl-a in Pool #1 are strongly influenced by flow in the Mississippi River, which causes the levels to vary from season to season.

Concurrently, the MPCA assessed the turbidity and total suspended solids (TSS) water quality standards and published their conclusions in the May 2011 report Aquatic Life Water Quality Standards Draft Technical Support Document for Total Suspended Solids (Turbidity). This report recommended that the turbidity criteria be eliminated and replaced by TSS standards, which are defined by river nutrient regions. The water quality standards for the Mississippi River segment through the City is now categorized as the Central River Nutrient Region. For this segment, the water quality standards were revised from 25 NTU[7] to 30 mg/l TSS.

The MPCA also published the results of intensive watershed monitoring in a report titled Mississippi River – Twin Cities Watershed Monitoring and Assessment Report (2013). The report draws conclusions based on data collection since 2010 on the pollution of the Mississippi River. Because of increased development, the waterbodies within the watershed continue to experience stress from pollutants such as nutrients, bacteria, and suspended solids.

Site specific water quality standards developed by the MPCA for the Mississippi River became effective on August 11, 2014 and are summarized in Table 3.7.

Table 3.7 – Mississippi River Water Quality Standards, Fridley to Ford Dam

Water Quality Indicator	Water Quality Standard	Average Water Quality Concentration [a]	Monitoring Dates
Chl-a (µg/l)	35	46	1993 to 2009
TP (µg/l)	100	97	1993 to 2009
TSS (mg/l)	30	25	unavailable

[a] *Source: Mississippi River – Twin Cities Watershed Monitoring and Assessment Report (2013)*

Many other agencies are involved in monitoring of the Mississippi River, as follows:

- Metropolitan Council collects samples at Lock and Dam #1 (Ford Dam) and analyzes on a weekly, bi-weekly, or monthly basis, based on the parameter under analysis. Information is available from the Metropolitan Council.
- United States Geological Survey (USGS) records the depth of water of the Mississippi River at the Minneapolis Water Treatment Plant, located in Fridley.
- MWMO collects grab samples one to two times each month at eight sites on the Mississippi River, all of which are in the City of Minneapolis. Results are summarized and published in the MWMO Annual Monitoring Reports.

[7] Nephelometric turbidity units.

- USACE maintains data on water depth, flow rates, precipitation, temperature, wind speed, and ice depth at each of the three lock and dams in the City of Minneapolis. Instantaneous and long-term data for each site is available from the USACE, Saint Paul District Water Control Center.

Summaries of reports and monitoring dates are available at the website for each organization.

The MPCA's 2018 Draft Impaired Waters List identified impairments for the three segments of the Mississippi River (see Table 3.5), as summarized in Table 3.8.

Table 3.8 – Mississippi River Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Consumption/Mercury in Fish Tissue/1998 (3 of 3 segments) Aquatic Consumption/PCB in Fish Tissue/1998 (2 of 3 segments) Aquatic Life/Nutrient and Eutrophication/2016 (1 of 3 segments) [a] Aquatic Recreation/Fecal Coliform (Bacteria)/2002 (3 of 3 segments)
TMDL Status	Fecal Coliform (Bacteria): metro-wide TMDL approved in 2014 Mercury in Fish Tissue: statewide TMDL approved in 2008 Nutrient and Eutrophication: study underway PCB in Fish Tissue: not started
Minneapolis Required Implementation Actions	Fecal Coliform (Bacteria): no action for Mississippi River segments, MPCA will review after 2020 Mercury in Fish Tissue: mercury impairment is not stormwater related

[a] *Crow River to Upper Saint Anthony Falls segment (07010206-805), only*

The Mississippi River segment through the City is tributary to the downstream segment of the Mississippi River that has been identified with water quality impairments related to excess Total Suspended Solids (TSS). The South Metro Mississippi River, Lock and Dam #1 (Ford Dam) to Lock and Dam #4 TSS total maximum daily load (TMDL) report was approved by the EPA on April 26, 2016. This TMDL study concludes that municipalities upstream of Lock and Dam #1, with one exception that does not include the City, are not required to implement additional actions to reduce the load of TSS related to stormwater discharges.

The City, as a municipality with a NPDES stormwater permit, could be required to comply with any identified reductions in stormwater pollutant loads to comply with future Mississippi River TMDL implementation plans that are downstream of the City. The City will continue to track the progress of these, and future, TMDL activities to identify changes in compliance requirements.

Mississippi River Water Quality Improvement Projects

The MPRB has managed a Capital Improvement Program that has included several projects along the Mississippi River that have or will improve the shoreline of the Mississippi River. Most of these projects are improvements to parklands, recreation areas, trails, and parkways.

The Above the Falls Master Plan was completed by the MPRB in 1999 as a master plan for the entire riverfront between Plymouth Avenue North and 42nd Avenue North. The 1999 plan includes near-term and long-term priorities that have resulted in the completion of projects that have included shoreline and other riverfront improvements:

- Completed Projects

- Gluek Park improvements included soil remediation, shoreline restoration, and areas of native plantings.
- Boom Island Park trail improvements included shoreline improvements and rehabilitation of the marina.
- Orvin "Ole" Olsen Park acquisition and landscaping.

- Active Projects
  - Scherer Brothers park development and shoreline improvements includes restoration of Hall Island.
  - Upper Harbor Terminal Park improvements are under development.
- Long-Term Projects
  - Northside Wetlands Park along the riverfront between Lowry Avenue and 35th Avenue North.
  - Development of Northeast riverfront parks through land acquisition.

Other projects that include stabilization or improvements to the Mississippi River shoreline, which are downstream of the Above the Falls segment of the Mississippi River, include:

- Water Works is a project to improve the downtown riverfront near Portland Avenue. Specific components under development will include shoreline improvements.
- West River Parkway Slope Repair was an emergency project to repair a severely eroded section of the Mississippi River Bluff below Amplatz Children's Hospital, completed in 2017.

Streams

Three tributaries to the Mississippi River (Bassett Creek, Minnehaha Creek, and Shingle Creek) originate west of the City and flow through the City to the Mississippi River. A fourth stream, Ryan Creek, is tributary to Shingle Creek. These streams are shown in Figure 3.5.

Bassett Creek is a 12-mile stream that meanders eastward from Medicine Lake through Plymouth and Golden Valley and then through MPRB's Theodore Wirth Park. Near Girard Avenue North in the City of Minneapolis, Bassett Creek flows into a tunnel system that discharges to the Mississippi River downstream of Saint Anthony Falls between the upper and lower dams.

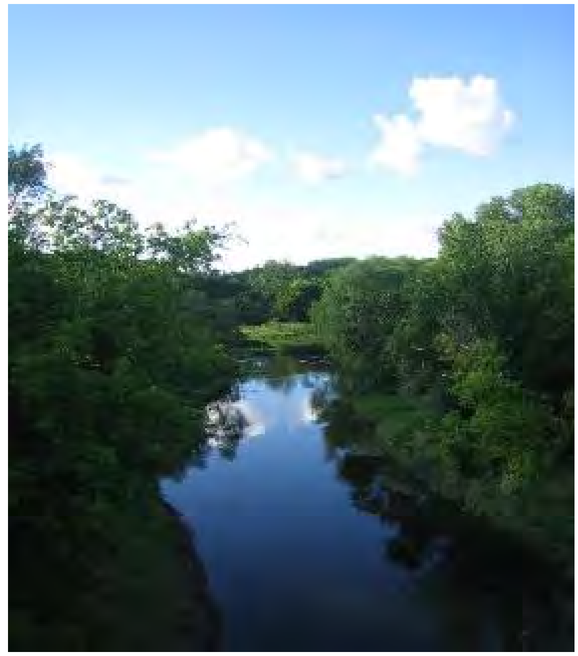
Minnehaha Creek originates at the outlet of Lake Minnetonka (Gray's Bay Dam) located in Minnetonka. The Creek flows 22 miles through the cities of Minnetonka, Hopkins, Saint Louis Park, Edina, and Minneapolis, and ends at the confluence with the Mississippi River upstream of Lock and Dam #1 (Ford Dam).

The main stem of Shingle Creek begins in Brooklyn Park in northwestern Hennepin County and flows southeast to its confluence with the Mississippi River through the far northern neighborhoods of the City of Minneapolis, immediately upstream of the Camden Bridge. The main stem is approximately 11 miles long and drops approximately 66 feet from its source to its mouth. Ryan Creek originates at Ryan Lake and discharges to Shingle Creek at approximately Humboldt Avenue North.

Over the years, these streams have been altered to improve drainage, enhance recreation, facilitate transportation, and support development, which is described in detail in the sections below.

Bassett Creek

Bassett Creek at Wirth Park



Credit: CDM Smith

Bassett Creek is in the mid-section of the City, as shown on Figure 3.5. Bassett Creek originates at Medicine Lake in Plymouth and enters the City of Minneapolis at TH-55. The BCWMC classifies Bassett Creek as a priority waterbody for management purposes.

Originally, Bassett Creek discharged to the Mississippi River at the mouth of the Creek located south of Plymouth Avenue. Construction in the 1980s diverted the lower section of Bassett Creek into a deep tunnel system that discharges to the Mississippi River below Saint Anthony Falls. The Old Bassett Creek Tunnel continues to take local flow which discharge to the Mississippi River at the mouth of original Bassett Creek. This tunnel is still operated and maintained by the City. The physical characteristics of Bassett Creek are summarized in Table 3.9.

Table 3.9 – Bassett Creek Characteristics

River/Stream	Bassett Creek, Main Stem
DNR ID#	07010206-538
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Length within Minneapolis	3.1 [a, b]
Downstream waterbody	Mississippi River, Coon Creek to Upper Saint Anthony Falls Dam
Watershed area within Minneapolis	1,621 acres
Watershed Management Organization	Bassett Creek Watershed Management Commission

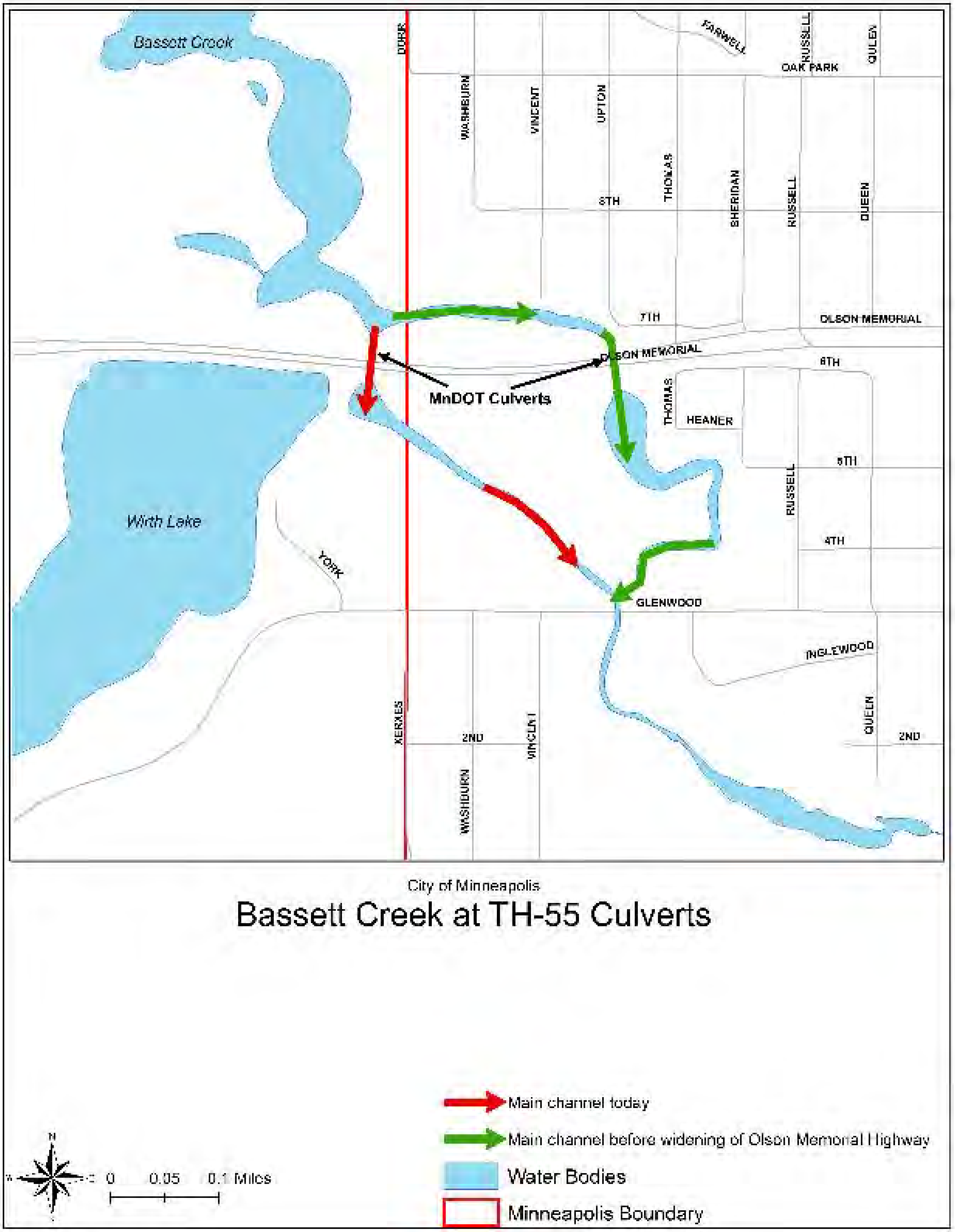
[a] *Length of open watercourse, remainder is enclosed in storm pipe*
[b] *Includes length through MPRB Theodore Wirth Park*

The property along the shoreline is owned by the MPRB between Theodore Wirth Park and Cedar Lake Road. The remainder of the shoreland is in public ownership by the Minneapolis Public Works Department, the Minneapolis School Board, and the Minneapolis Department of Community Planning and Economic Development (CPED).

Development has drastically altered Bassett Creek throughout the history of the City. Meanders were straightened, wetlands were filled, and trees were cut to accommodate development. Early development, which consisted mostly of sawmills and railroads, led to the influx of industrial and commercial development along Bassett Creek. In the late 19th Century, Bassett Creek was channelized and the last few miles diverted into a buried culvert that discharged into the Mississippi River immediately south of the Plymouth Avenue Bridge and above Saint Anthony Falls.

Bassett Creek splits into two channels immediately upstream of Trunk Highway 55 located at the border between the City of Minneapolis and Golden Valley, as shown in Figure 3.8. What is now the main channel contains a concrete weir structure that was constructed by the USACE as a part of the larger 1990 Bassett Creek Flood Control Project. The secondary channel, which was the primary channel until rerouted for widening of Trunk Highway 55 in the 1940s, now serves as an infrequent overflow channel. This secondary channel is subject to heavy sedimentation and collection of trash and debris. Occasionally, the City has cleaned out the channel to maintain its hydraulic function, most recently in 2015. Both channels are identified as Public Waters on the MNDNR Public Waters Inventory Map.

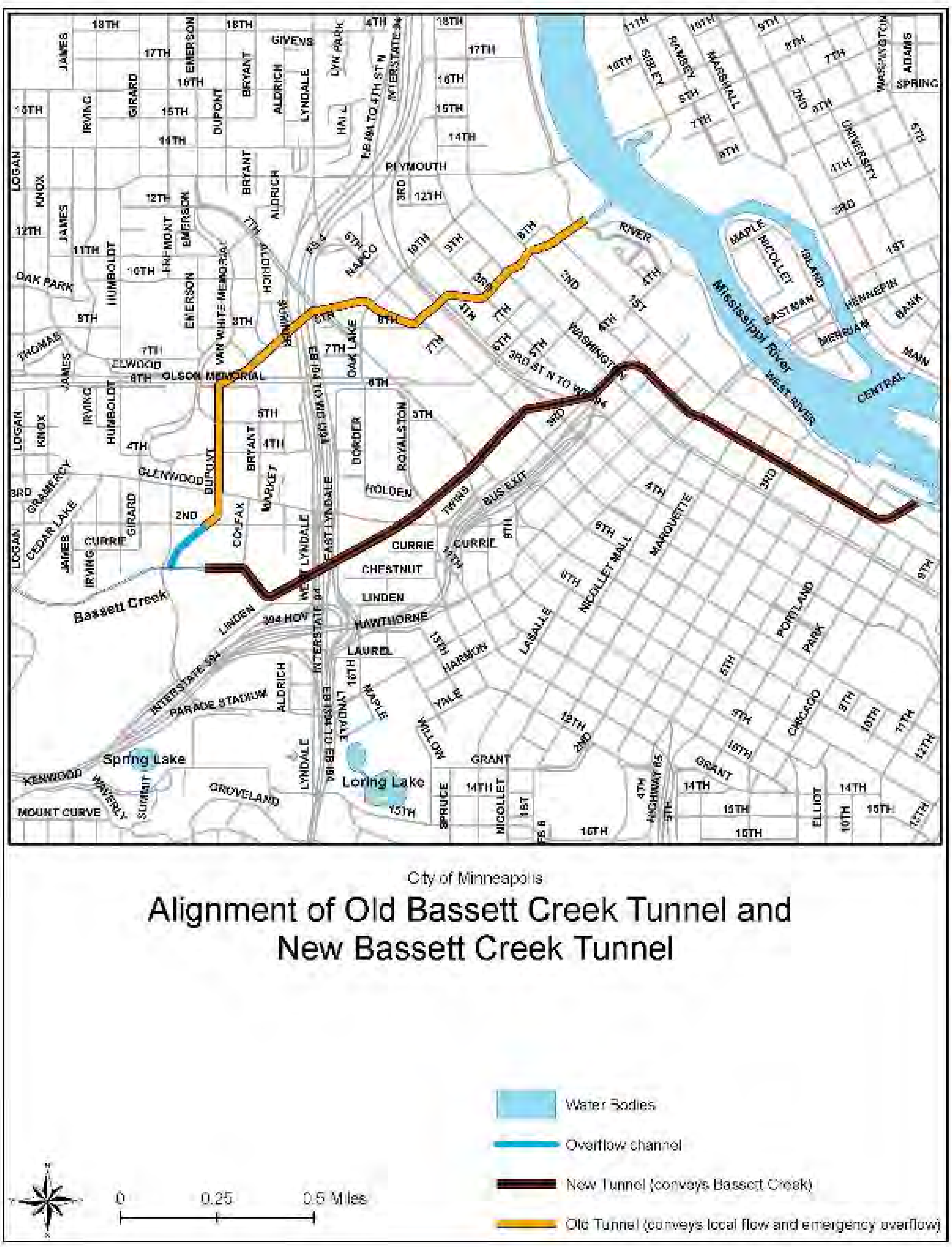
Figure 3.8 – Bassett Creek Culverts at Trunk Highway 55



In 1969, the communities of Crystal, Golden Valley, Medicine Lake, Minnetonka, Minneapolis, New Hope, Robbinsdale, Plymouth, and Saint Louis Park formed the Bassett Creek Flood Control Commission. In 1982, in accordance with the Metropolitan Surface Water Management Act, the Bassett Creek Flood Control Commission became the Bassett Creek Watershed Management Commission (BCWMC). Its mission is to control floods and to maintain and enhance the quality of the surface and ground water resources in the 40-square-mile watershed.

In the 1970s, the original Bassett Creek tunnel required extensive maintenance, could no longer accommodate increased drainage from upstream, and was a contributing factor to upstream flooding in the City. From 1987 to 1996, the USACE, in cooperation with the Minnesota Department of Transportation (MnDOT), MNDNR, the BCWMC, and the BCWMC member cities, constructed $40 million of flood mitigation improvements. The project effectively controlled floods in portions of Golden Valley, Plymouth, Minneapolis, and Crystal, and reduced flood elevations along the Bassett Creek corridor by up to 4.5 feet in the City of Minneapolis. The principal feature of the BCWMC Flood Control Project within the City is the 1.7-mile tunnel through downtown Minneapolis, built in three phases (1979, 1990, and 1992) for a total project cost of $28 million. Base flow from Bassett Creek was diverted to this new culvert/tunnel. The original tunnel remained in place to convey local runoff and to provide an overflow during flood conditions. The deep tunnel ultimately discharges to the Mississippi River downstream of Saint Anthony Falls. The alignments of these culverts and tunnels are shown in Figure 3.9.

Figure 3.9 – Original and New Bassett Creek Alignment



The joint and cooperative agreements that resulted from the BCWMC Flood Control Project, include obligations for the BCWMC and the member cities in regard to developments or other modifications that affect peak flows or hydraulic capacity in both the new and old tunnels. Additionally, the BCWMC has adopted policies that details the responsibilities and procedures for inspection and maintenance of the flood control structures. This is described in greater detail in Section 4, subsection Stormwater Management Sites Inspection and Maintenance.

Stream monitoring to collect water quality and quantity data is performed in cooperation with the Metropolitan Council and BCWMC as part of the Watershed Outlet Monitoring Program (WOMP). The WOMP station on Bassett Creek is located at Irving Avenue, approximately ¼-mile upstream of where Bassett Creek enters the new tunnel. Data collected includes continuous measurements of stream flow, temperature, and conductivity, as well as monthly base flow grab samples and storm event composite samples. This information is used to assess current stream conditions, develop target pollutant loads, and provide continued monitoring after BMPs are completed in the watershed. BCWMC also completes biotic (invertebrate) monitoring of streams on a regular basis. Monitoring for the presence of biological indicator organisms provides evidence of the water quality of Bassett Creek. The types of organisms on the stream bottom depend on the available habitat; the habitat quality is affected by the water quality.

In 2014, the Metropolitan Council published a comprehensive assessment of the water quality of the streams it monitors[8]. Bassett Creek conclusions from this assessment include:

- Bassett Creek is vulnerable to loss of flows caused by excessive groundwater withdrawal. Additional evaluation is required to demonstrate whether there is an actual relationship between Bassett Creek flows and groundwater withdrawals.
- There is an increase in peak flows due to summer rainfall and winter snowmelt.
- TSS concentrations have decreased by 72 percent between the years of 2000 and 2013. Current concentrations are higher than in the Mississippi River, but lower than other metropolitan area highly urbanized streams.
- TP concentrations have decreased since 2000, with the greatest reduction of 17 percent in the 5-year period between 2008 and 2012. The concentration of TP is slightly higher than the Mississippi River, but lower than other urbanized metropolitan area streams.
- Nitrate (NO_3) concentrations decreased by 27 percent between the years 2008 and 2012. The concentration is lower than the Mississippi River and other urbanized metropolitan area streams.
- Chloride (Cl) concentrations are among the highest of streams monitored by Metropolitan Council.

[8] *Comprehensive Water Quality Assessment of Select Metropolitan Area Streams*. St. Paul: Metropolitan Council, 2014

The MPCA's 2018 Draft Impaired Waters List identified impairments for Bassett Creek, as summarized in Table 3.10.

Table 3.10 – Bassett Creek Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Life/Chloride/2010 Aquatic Life/Fishes Bioassessments/2004 Aquatic Recreation/Fecal Coliform (Bacteria)/2008
TMDL Status	Chloride: metropolitan-wide TMDL approved in 2016 Fishes Bioassessments: not started Fecal Coliform (Bacteria): Upper Mississippi TMDL approved in 2014
Minneapolis Required Implementation Actions	Chloride: assessment of winter practices recommended Fecal Coliform (Bacteria): actions recommended

The Main Stem of Bassett Creek was included in the Upper Mississippi River Bacteria TMDL and Protection Plan completed by the MPCA in 2014. The Upper Mississippi River Bacteria TMDL Implementation Plan, March 2016, establishes that a target goal of 79 percent reduction of bacteria load is needed to meet the Waste Load Allocation (WLA) established in the 2014 report. High priority actions have been recommended; however, these actions have not been assigned to a specific organization for implementation:

- Identify and map potential bacteria hot spots, including dog parks.
- Update and enforce pet waste ordinances.
- Conduct public outreach.
- Install filtration and biofiltration, where feasible.
- Direct runoff flows to infiltration and treatment basins or away from impervious surfaces.
- Develop, implement, and enforce Illicit Discharge Detection and Elimination (IDDE).

The Twin Cities Metropolitan Area Chloride Total Maximum Daily Load Study was approved by the MPCA on February 26, 2016 and by the United States Environmental Protection Agency (EPA) on June 6, 2016. All waterbodies assessed in this study, including Bassett Creek, were found to have concentrations of chloride that exceed the State's water quality standards. Over a 10-year monitoring period, the chloride concentration in Bassett Creek exceeded the standard of 230 mg/L on a total of 321 days. The Twin Cities Metropolitan Area Chloride Management Plan, completed in February 2016, requires that all municipalities undertake an assessment of winter maintenance practices and create a plan to reduce winter salt use. Specific reductions in chloride loads have been calculated for each stream; however, there has not been a specific load reduction assigned to individual MS4s.

Since 2006, one stream restoration project has been completed along the Golden Valley segment of Bassett Creek located within Theodore Wirth Park. The Bassett Creek Main Stem Restoration Project, completed in 2015, repaired nine areas of eroded stream bank between Golden Valley Road and the location where Bassett Creek flows into Minneapolis. The 2,100 feet of stabilized stream bank is estimated to reduce the phosphorus loads by 60 pounds per year and the TSS loads by 105,000 pounds per year. The project was funded by the BCWMC and a grant from the Clean Water Fund. Construction was managed by the MPRB.

The next planned phase of streambank stabilization along Bassett Creek within the City of Minneapolis and Theodore Wirth Park are focused on erosion repair and channel restoration. The Bassett Creek Main Stem Erosion Repair Project. is located between Fruen Mill and Dupont Avenue North. A feasibility study was completed in 2016 and construction is planned for 2018. The Restoration of Historic Bassett Creek Channel at Highway 55 is recommended to mitigate problems associated with extreme sedimentation and collection of trash and debris. Additional improvements are anticipated to be completed by the Blue Line Light Rail Transit (LRT) project. The BCWMC has included a project as a placeholder if the LRT project does not fully mitigate the problems. Improvements are planned for 2022.

Minnehaha Creek

Minnehaha Creek is in south Minneapolis, as denoted on Figure 3.5. Minnehaha Creek originates at Gray's Bay Dam on Lake Minnetonka. Near the end of the Creek in Minneapolis is Minnehaha Falls, a popular and scenic area managed by the MPRB. The physical characteristics of Minnehaha Creek are summarized in Table 3.11.

Table 3.11 – Minnehaha Creek Characteristics

River/Stream	Minnehaha Creek
DNR ID#	0701206-539
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Length within Minneapolis	7.7 miles
Downstream waterbody	Mississippi River, Upper Saint Anthony Falls to Lock and Dam #1 (Ford Dam)
Watershed area within Minneapolis	3,347 acres
Watershed Management Organization	Minnehaha Creek Watershed District

The property along the entire shoreline of Minnehaha Creek within the City is owned and managed by the MPRB. This parkland extends to several lakes that flow into Minnehaha Creek, primarily the Chain of Lakes (Brownie, Isles, Cedar, Calhoun/Bde Maka Ska, Harriet), Lake Nokomis, and Lake Hiawatha. The MPRB and the MCWD actively manage Minnehaha Creek and its tributary lakes.

Minnehaha Creek monitoring is conducted by the Metropolitan Council, USGS, and the MCWD at multiple sites along Minnehaha Creek. Metropolitan Council monitors flow and collects water samples at a site at 32nd Avenue. MCWD monitors the Creek for dissolved oxygen, flow, water level, nutrients, suspended solids, chloride, algal abundance, and *E. coli* at three sites along the Creek in Minneapolis: 21st Avenue South (canoe landing at Lake Nokomis weir), 28th Avenue South, and Hiawatha Avenue. The MWCD and USGS cooperate to monitor the flows and water levels at Hiawatha Avenue. Real time data is available on the USGS National Water Information System: Web Interface. for Station 05289200.

Additionally, the MCWD conducted site specific studies in the City, as follows:

Minnehaha Falls in Winter

Credit: Minneapolis Public Works

- Hydrologic, Hydraulic, and Pollutant Loading Study (HHPLS) began in 2001 and resulted in a report published in 2003. The study intended to understand the characteristics of the watershed, quantify water movement, incorporate public input, and form management programs. The overall goal of the study was to improve and maintain the natural resources of the MCWD.

- Minnehaha Creek Base Flow Study is a cooperative study completed by MCWD, MPRB, MWMO, and the University of Minnesota to understand the relationship between base flows in Minnehaha Creek and the groundwater. The study concluded that:

  - Surface waters are the primary source of flow in Minnehaha Creek.
  - Water from the Creek is infiltrated into the groundwater.
  - Focused stormwater infiltration can effectively augment groundwater flows.
  - Improved creek baseflow is possible by targeted infiltration of stormwater in the Creek segment below Lake Harriet.

- Zebra Mussel Monitoring. is an assessment that looks for the presence of Zebra Mussels in Minnehaha Creek. An initial conclusion is that although Zebra Mussels are present in Lake Minnetonka, those that move to Minnehaha Creek experience die-off each year. MPRB Management of Zebra Mussels in Minnehaha Creek and other waterbodies is described in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

- Lake Hiawatha and Minnehaha Creek Fish Survey was conducted in 2009 in four sites along Minnehaha Creek, which included Lake Hiawatha in Minneapolis. This survey concluded that bullheads, carp, and dogfish (which are primarily low-oxygen tolerant fish) probably have an adverse effect on the water quality in Lake Hiawatha.

- Ecosystem Evaluation Program (E-Grade) is under development by the MCWD. The E-Grade Program is intended to provide a holistic view of the health of the entire watershed through the assessment of a variety of ecosystems: deep and shallow lakes, streams, wetlands, land use, groundwater, and hydrology. These ecosystems will be evaluated for their performance in flood control, biodiversity, habitat diversity, recreation, potable water supply, and nutrient cycling to determine the overall health of the watershed. All subwatersheds will be examined on a 10-year cycle with intensive monitoring and data collection over three-year periods.

- Minnehaha Creek Visioning Partnership Final Report was jointly conducted by the USACE and the MCWD in 2005. This report created recommendations for future creek management. Erosion control and streambank stabilization were the highest priorities for the reach downstream of the Browndale Dam that includes the entire segment of Minnehaha Creek through the City. The report recommended the MCWD consider bioengineered stabilization techniques over hard armoring where possible, and that habitat improvement be focused on the management of riparian vegetation and retention of large woody debris rather than instream habitat management. The report also recommended that water quality be improved through the reduction of peak stormwater flows, pretreatment of discharges, application of Best Management Practices (BMPs), good housekeeping practices in the watershed, and repair of streambank erosion.

- Minnehaha Creek Bacterial Source Identification Study is a 2-phase project that began in 2016 to address a TMDL that has been established for the Creek due to elevated levels of *E. coli*. In response to the TMDL, the City initiated this bacterial source identification study to identify the sources of *E. coli* in the Creek and the surrounding watershed. A multiple lines of evidence approach was used to identify *E. coli* sources, which included baseline monitoring, sanitary surveys, groundwater characterization, bacterial regrowth assessments, and a series of special studies. A suite of tools was used for the studies, which included traditional culture techniques, genetic molecular markers, and microbial community analysis. The final report is expected to be completed in 2018 at which point Best Management practices to reduce *E. coli* concentrations in the Creek will be evaluated by the City.

In 2014, the Metropolitan Council published a comprehensive assessment of the water quality of the streams it monitors[9]. Minnehaha Creek conclusions from this assessment include:

- The primary source of water in Minnehaha Creek is from Lake Minnetonka, and the secondary source of water is direct stormwater runoff, which creates a sudden significant increase of flow.

- The section through Edina and Minneapolis is defined as “losing flows,” meaning that water in the Creek flows into the groundwater.

- Minnehaha Creek is located at groundwater levels, which causes Creek flows to be vulnerable to groundwater pumping.

- Water quality of Minnehaha Creek is influenced by water releases from Lake Minnetonka and urban stormwater runoff.

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[9] *Comprehensive Water Quality Assessment of Select Metropolitan Area Streams*. St. Paul: Metropolitan Council, 2014

- TSS concentrations are lower than found in the Mississippi River.
- Nutrient concentrations are lower than found in the Mississippi River.
- Nutrient concentrations in the Creek have shown a long-term decline.
- Chloride loads and concentrations are high, as seen in highly developed urbanized watersheds.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Minnehaha Creek, as summarized in Table 3.12.

Table 3.12 – Minnehaha Creek Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Life/Aquatic Macroinvertebrate Bioassessments/2014 Aquatic Life/Chloride/2008 Aquatic Life/Dissolved Oxygen/2010 Aquatic Life/Fishes Bioassessments/2004 Aquatic Recreation/Fecal Coliform (Bacteria)/2008
TMDL Status	Aquatic Macroinvertebrate Bioassessments: not started Chloride: metropolitan-wide TMDL approved in 2016 Dissolved Oxygen: not started Fishes Bioassessments: not started Fecal Coliform (Bacteria): approved in 2014
Minneapolis Required Implementation Actions	Chloride: assessment of winter practices recommended Fecal Coliform (Bacteria): actions recommended

The Minnehaha Creek 5 Bacteria/Lake Hiawatha Nutrients TMDL plan was approved by the EPA on February 24, 2014. With respect to Minnehaha Creek, the TMDL study established an *E. coli*[10] standard of 1,260 count/mL, and a geometric mean of 126 count/mL. Monitoring data shows that the highest number of exceedances of these standards occurs in the section of Minnehaha Creek that is upstream of Lake Hiawatha with the highest frequency of exceedances found at Chicago Avenue South. The Implementation Activities section of the report generally recommends that MS4s consider these approaches:

- Pet waste management and disposal ordinances.
- Illicit discharge ordinances and IDDE programs.
- Street sweeping, storm drain/catch basin cleaning, and pipe rehabilitation.
- Installation of volume control/infiltration/filtration BMPs.

The Twin Cities Metropolitan Area Chloride Total Maximum Daily Load Study was approved by the MPCA on February 26, 2016 and by the EPA on June 6. 2016. All waterbodies assed in this study were found to

[10] Conversion from Fecal Coliform to *E. Coli* is based on Bacteria TMDL Protocols and Supplemental Requirements, 2007, Minnesota Pollution Control Agency

have concentrations of chloride that exceed the State's water quality standards. Over a 10-year monitoring period, the chloride concentration in Minnehaha Creek exceeded the standard of 230 mg/L on a total of 415 days. The Twin Cities Metropolitan Area Chloride Management Plan, completed in February 2016, requires that all municipalities undertake an assessment of winter maintenance practices and create a plan to make reductions in winter salt use. Specific reductions in chloride loads have been calculated for each stream; however, there has not been a specific load reduction assigned to individual MS4s.

TMDL studies for Fishes Bioassessments, Dissolved Oxygen, and Aquatic Macroinvertebrate Bioassessments have not started.

Multiple streambank and in-stream projects along the segment of Minnehaha Creek within the City have been completed. The Minnehaha Falls and Glen Restoration, completed in 2011, stabilized the streambanks and bluffs, installed rock vanes in the Creek, managed invasive vegetation, constructed walkways and trails, protected historic and cultural resources, and added stormwater management features. The project was completed by the MCWD in cooperation with MPRB, Minneapolis Veterans Home, State of Minnesota, and the USACE. In 1997, the Standish-Ericsson Neighborhood Association (SENA) Wetland was constructed as a vegetative buffer to trap debris and nutrients prior to discharge to Minnehaha Creek. The Minnehaha Creek Channel Modifications/Erosion Management Plan, completed in 1998, consisted of a hydrological model of the lower basin of MCWD under severe runoff conditions. Based on this model, a channel modifications plan was produced. In 2001, the Minnehaha Creek Trail Corridor project consisted of shoreline erosion repairs, construction of channel meander and an adjacent wetland, and the placement of vortex treatment structures upstream of the wetland located at Cedar Avenue.

The wettest 6 months (January 1 through June 30) on record in the Twin Cities occurred in 2014, with June 19th being the sixth wettest day ever recorded in the area. Lake Minnetonka, at the headwaters of Minnehaha Creek, topped its previous record for high water by more than seven inches. This extreme precipitation also caused Minnehaha Creek flows to be the greatest on record, as recorded by the MCWD. The record water levels and flows led to more than $1 million worth of damages. Damage from flooding was widespread and included slope failures, shoreline erosion, damaged culverts, and flooded homes. The City, the MPRB, and the MCWD worked with the Federal Emergency Management Agency (FEMA) to develop plans to fix 11 damaged sites along Minnehaha Creek within MPRB property.

Ryan Creek

The MNDNR considers Ryan Creek as an altered natural watercourse. Ryan Creek originates at Twin Lake in Robbinsdale. The segment within Minneapolis begins at Ryan Lake and discharges to Shingle Creek at 49th Avenue North, as shown on Figure 3.10. The full length of the Creek is approximately 1.0 miles, of which 0.75 miles is within a storm drain and 0.25 miles is an open watercourse located entirely on private property. The physical characteristics of Ryan Creek are summarized in Table 3.13.

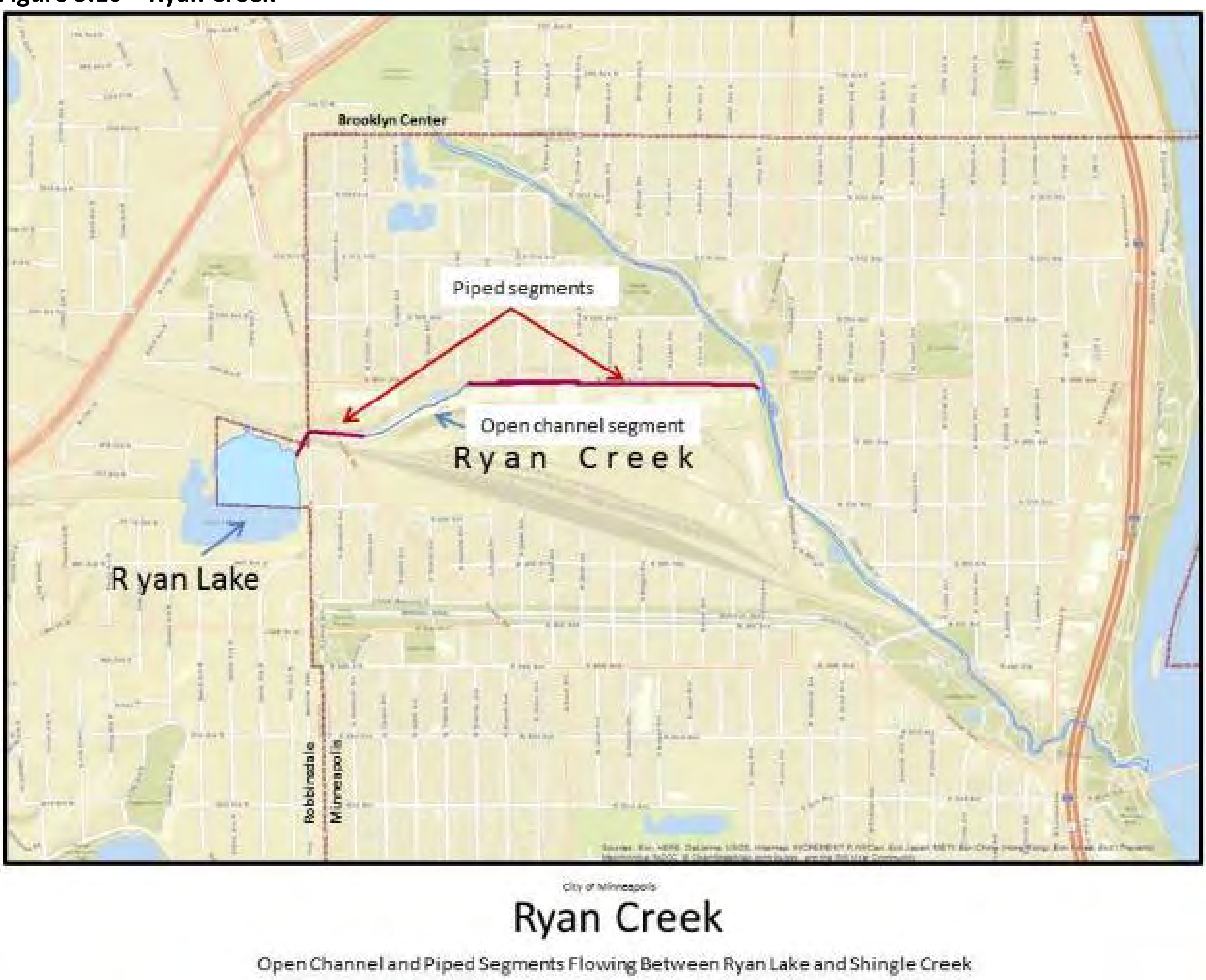
Table 3.13 – Ryan Creek Characteristics

River/Stream	Ryan Creek
DNR ID#	07010206-536
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Length within Minneapolis	0.25 miles [a]
Downstream waterbody	Shingle Creek at 49th Avenue North
Watershed area within Minneapolis	Acreage included in Shingle Creek watershed area
Watershed Management Organization	Shingle Creek Watershed Management Commission

[a] Length of open watercourse, remainder is enclosed in storm drain

Ryan Creek has not been monitored, therefore there is no water quality data. The Creek is not listed on the MPCA Impaired Waters List and there are no planned improvements.

Figure 3.10 – Ryan Creek



Shingle Creek

Shingle Creek is located in north Minneapolis, as denoted on Figure 3.5. Shingle Creek originates in Maple Grove at Eagle Lake and discharges to the Mississippi River immediately upstream of 42nd Avenue North. The physical characteristics of Shingle Creek are summarized in Table 3.14.

Table 3.14 – Shingle Creek Characteristics

River/Stream	Shingle Creek
DNR ID#	07010206-506
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Length within Minneapolis	2.2 miles
Downstream waterbody	Mississippi River, Coon Creek to Upper Saint Anthony Falls
Watershed area within Minneapolis	1,458 acres
Watershed Management Organization	Shingle Creek Watershed Management Commission

The property along the shoreline of the entire length of Shingle Creek in the City is owned and managed by the MPRB.

There are two monitoring sites on Shingle Creek within the City:

- An outlet monitoring site maintained by the SCWMC is located on Shingle Creek upstream of 45th Avenue North. Stream stage is continuously recorded. Grab samples are taken bi-weekly and analyzed for TP, ortho-phosphorus, TSS, Total Kjeldahl Nitrogen (TKN), nitrate, and chloride. Additionally, there are four composite samples taken each year. The site has been monitored since 1997, although the parameters analyzed have changed over time. Annual results are available from the SCWMC.

Webber Falls on Shingle Creek at Lyndale Avenue North

Credit: Minneapolis Public Works

- The second site is on Shingle Creek at Queen Avenue near the border between Minneapolis and the Brooklyn Center. The site is maintained by the USGS as part of their National Water Quality Assessment (NAWQA) Program. Real-time data for flow, stream depth, temperature, and specific conductivity is collected and available at the USGS Water Resources web interface for site USGS 05288105. The SCWMC collects and analyzes grab and composite samples at this site concurrent with the 45th Avenue North monitoring site.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Shingle Creek, as summarized in Table 3.15.

Table 3.15 – Shingle Creek Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Life/Aquatic Macroinvertebrate Bioassessments/2006 Aquatic Life/Chloride/1998 Aquatic Life/Dissolved Oxygen/2004 Aquatic Recreation/Escherichia coli (Bacteria)/2014
TMDL Status	Aquatic Macroinvertebrate Bioassessments: approved in 2011 Chloride: approved in 2007 Dissolved Oxygen: approved in 2011 Escherichia coli (Bacteria): metropolitan wide TMDL approved in 2014
Minneapolis Required Implementation Actions	Aquatic Macroinvertebrate Bioassessments/Dissolved Oxygen: implement in-stream improvements Chloride: assessment of winter practices recommended Escherichia coli (Bacteria): actions recommended

The Shingle Creek and Bass Creek Biota and Dissolved Oxygen TMDL report was approved by the EPA on November 4, 2011. This study identified that the low oxygen of Shingle Creek is caused by a low level of oxygen discharged from the creek's headwaters, excessive uptake of oxygen by the sediment in the wider sections of the creek, and the lack of habitat along the streambanks. The subsequent Shingle and Bass Creeks Biota and Dissolved Oxygen TMDL Implementation Plan was completed in January 2012. Recommendations for the City segment of Shingle Creek between Queen Avenue North and the Mississippi River include:

- Stabilization of the shoreline by select tree removal, shoreline vegetation planting, and buffer establishment.
- Installation of in-stream habitat features such as root wads, tree pins, and riffles.
- Narrow the channel and installation of riffles to improve aeration.
- Evaluation of the benefits of removal of the concrete structure at Webber Park and I-94.
- Creation of a fish passage around the concrete Webber Falls structure.
- BMP retrofits.
- Increase volume of stormwater infiltration.
- Education and outreach.

The Implementation Plan assigns the responsibility for these projects jointly to the City and the SCWMC. In accordance with the 2018 NPDES Integrated Permit, local responsibilities for TMDL compliance are jointly assigned to the City and the MPRB. The MPRB has the primary responsibility to implement all capital projects recommended for Shingle Creek. The City will work cooperatively with the MPRB on all TMDL projects and will negotiate cooperative funding and project management responsibilities on a project-by-project basis.

The Shingle Creek Chloride TMDL Report and the Shingle Creek Chloride TMDL Implementation Plan were developed before the metropolitan-wide chloride TMDL that included the Bassett Creek and Minnehaha Creek watersheds. This TMDL Report estimated that a reduction of 71 percent of chloride loads is necessary to achieve water quality standards. The primary source of chloride (82 percent) is estimated to be from winter road maintenance with the remaining sources from private commercial use, salt storage facilities, groundwater, and residential use. Recommended actions include:

- Retrofit equipment to updated technology, such as temperature sensors to adjust salt application rates, pre-wetting equipment, and anti-icing capabilities.
- Cover all road salt stockpiles and store on impervious surfaces.
- Train operators.
- Stockpile cleared snow away from sensitive areas.
- Continue to research technologies and materials.

Shingle Creek was included in the Upper Mississippi River Bacteria TMDL and Protection Plan completed by the MPCA in 2014. The Upper Mississippi River Bacteria TMDL Implementation Plan, March 2016, establishes that a target goal of 69 percent reduction of bacteria load is needed to meet the WLA established in the 2014 report. High priority actions have been recommended; however, these actions have not been assigned to a specific organization for implementation:

- Identify and map potential bacteria hot spots, including dog parks.
- Update and enforce pet waste ordinances.
- Conduct public outreach.
- Install filtration and biofiltration, where feasible.
- Direct runoff flows to infiltration and treatment basins or away from impervious surfaces.
- Develop, implement, and enforce IDDE discharges.

Shingle Creek Biochar Box

Credit: Minneapolis Public Works

The SCWMC has installed two experimental water quality projects along Shingle Creek on MPRB property. The first is an off-line filter bed at the Webber Park falls that treats Shingle Creek flows. The project was funded by a Section 319 grant and SCWMC levy; no City match was required. The filter bed was installed in the Fall of 2016. The second is an iron- and biochar-enhanced sand filter pond retrofit as part of the biochar grant project in a pond at Creekview Park, just north of 49th

Avenue North and Humboldt Avenue North. This was installed in late Spring 2017. Next steps for both projects include monitoring inflow, outflow, and ambient water quality to assess effectiveness of the filters. The purpose of these installations is to test the efficacy of these filters at removing *E. coli* bacteria and dissolved phosphorus from stormwater runoff and from direct streamflow.

Lakes and Wetlands

Lakes and wetlands described in this WRMP are those which are listed on the MNDNR's Public Waters Inventory (PWI), as authorized by Minnesota Statutes, Section 103G.201, and/or receive discharges of Minneapolis stormwater runoff. Seventeen (17) lakes and wetlands receiving stormwater runoff from the City's drainage system exist partially or wholly within the City, as shown in Figure 3.5. Most of these lakes are integrated into the parks and are the focus of the City's park system. Table 3.16 is a complete list of Minneapolis lakes inventoried in this WRMP.

Table 3.16 – City of Minneapolis Lakes

Minneapolis Lakes Inventoried in this WRMP		
Birch Pond	Brownie Lake	Cedar Lake
Cemetery Lake	Diamond Lake [a]	Ewing Wetland [a]
Grass Lake [a]	Lake Calhoun/Bde Maka Ska	Lake Harriet
Lake Hiawatha	Lake Nokomis	Lake of the Isles
Loring Pond	Powderhorn Lake	Ryan Lake
Sanctuary Pond	Spring Lake [b]	-

[a] *Categorized as a wetland by MPCA, MNDNR, or other.*
[b] *Categorized as shallow lake by MPCA.*

Birch Pond

The physical characteristics of Birch Pond are summarized in Table 3.17.

Table 3.17 – Birch Pond Characteristics

River/Stream	Birch Pond
DNR ID#	27065300
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Landlocked
Surface Area	2.5 acres
Depth – mean	N/A
Depth – maximum	N/A
Watershed area within Minneapolis	39 acres
Watershed Management Organization	Bassett Creek Watershed Management Commission

Birch Pond, surrounded by hills and mature trees, is a landlocked pond located in Theodore Wirth Park within the City of Minneapolis, north of Interstate 394 and south of Wirth Lake. The pond receives runoff from the southbound portion of Wirth Parkway. Birch Pond is managed by the MPRB.

The pond was acquired with the initial 1890 acquisition of 64 acres of Theodore Wirth Park. In 1893, the park board allowed the State Fish Commission to use the pond as a fish hatchery for about 25 years. In 1910, it was renamed after the birch trees that surround the pond.

Prior to the 1990s, water was pumped from the Mississippi River into Bassett Creek and then from Bassett Creek into Birch Pond to supplement water levels in the Chain of Lakes, as further described in the Brownie Lake section. This was accomplished by pumps that moved water from Birch Pond to Brownie Lake. This practice was discontinued in the 1990s to prevent the movement of invasive species into Bassett Creek and Birch Pond. Remnants of the previous conveyance system is located on the east side of the pond.

Bird watching is the main recreational activity at the pond. No public boat access or fishing docks are present.

Buckthorn, an invasive plant species, is managed around Birch Pond as part of a larger effort to prevent buckthorn infestation of the adjacent Eloise Butler Wildflower Garden. In 2014, the MPRB received an Outdoor Heritage Grant from the State of Minnesota to manage invasive vegetation, including buckthorn, in upland and wetland areas of Theodore Wirth Park. Purple loosestrife, an invasive wetland plant, is controlled, as needed, by biocontrol (introduction of leaf-eating beetles). Additional information on efforts to control loosestrife is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPRB monitors the ice conditions of Birch Pond. Birch Pond has not been monitored or evaluated for impairments due to its size.

Brownie Lake

The physical characteristics of Brownie Lake are summarized in Table 3.18.

Table 3.18 – Brownie Lake Characteristics

River/Stream	Brownie Lake
DNR ID#	27003800
DNR Classification	General Development
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Cedar Lake
Surface Area	9 acres
Depth – mean	22 feet
Depth – maximum	47 feet
Watershed area within Minneapolis	94 acres
Watershed Management Organization	Minnehaha Creek Watershed District

Brownie Lake is located immediately south of Interstate 394 and east of Highway 100. It is the upper-most lake in the Minneapolis Chain of Lakes, which also includes Cedar Lake, Lake of the Isles, Lake Calhoun/Bde Maka Ska, and Lake Harriet (from upstream to downstream). The majority of the drainage area is from outside of Minneapolis, which includes residential and commercial areas of Saint Louis Park. Though the Minneapolis Chain of Lakes are interconnected with channels and operate as one waterbody, the individual lakes are considered separate by the MNDNR and MCWD. Brownie Lake is encompassed by Brownie Lake Park with trails and a canoe launch. Brownie Lake's drainage area within the City is predominantly residential.

The surface water elevation of Brownie Lake was significantly lowered after railroad tracks were constructed between it and Cedar Lake in the mid-19th Century, and again in the 1910s when the channel that links Brownie Lake and Cedar Lake was opened. These actions also resulted in a surface area of the lake that is significantly smaller than existed before the railroad lines were installed. The MPRB acquired the lake in a larger (over 100-acre) acquisition as an expansion of Theodore Wirth Park in 1908. After a period of historically low water levels, water from Bassett's Creek was pumped into Brownie Lake in 1958, which created a connection between Bassett Creek and the Minneapolis Chain of Lakes. Water pumped from the creek initially raised lake levels. A pump station on the Mississippi River was constructed in 1966 to supplement Bassett Creek flows which ultimately supplemented the Minneapolis Chain of Lakes water levels. Pump stations were shut down in the 1990s due to concerns of water quality impacts, primarily phosphorus concentrations and invasive species.

In July 1993, a group known as the Water Quality Management Citizen Advisory Committee presented Mayor Sharon Sayles Belton with the Green Report, which evaluated the Chain of Lakes and recommended measures for preservation and improvement. Funded by a Clean Water Partnership grant and made up of members of the MPRB, City Council, neighborhood groups, and community organizations, the Committee developed a report that moved quickly from an assessment of the Chain of Lakes to goals, recommendations, and implementation steps. With support from technical staff, the Committee reported on the state of the Chain of Lakes.

Improvements recommended in the 1993 report were implemented through a 391 Grant awarded by the MPCA. Efforts to improve Brownie Lake and adjacent parkland included a community-wide program that focused on removal of invasive plant species and rehabilitation of a stormwater pipe in Saint Louis Park.

Brownie Lake is included in MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Brownie Lake, as summarized in Table 3.19.

Table 3.19 – Brownie Lake Impaired Water Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Consumption/Mercury in Fish Tissue/1998 Aquatic Recreation/Nutrient/Eutrophication Biological Indicators/2004 (DE-LISTED 2010) Aquatic Life/Chloride/2014
TMDL Status	Mercury in Fish Tissue: statewide TMDL approved in 2007 Chloride: metro-wide TMDL approved in 2016
Minneapolis Required Implementation Actions	Mercury in Fish Tissue: no responsibilities for local municipalities Chloride: assessment of winter practices recommended

In 1998, Brownie Lake was listed as impaired due to mercury in fish tissue. Excess mercury concentrations have been found statewide (about two-thirds of impaired lakes had excess mercury by 2006) and are largely attributed to atmospheric deposition. As such, Minnesota lakes with mercury impairments have been added to a statewide mercury TMDL, which was first approved by the EPA.

In 2004, Brownie Lake was listed for impairment due to excess nutrients and then de-listed in 2010 when the MPCA determined that the water quality standard was met. However, it was noted that the lake could be listed again if total phosphorus concentrations rise. A MPRB 2014 Water Quality Report (May 2015) indicates that total phosphorus in the Minnehaha Creek Subwatershed had increased in June due to heavy precipitation and floods that occurred in 2014. The increase in total phosphorus after de-listing did not result in the lake being re-listed as impaired from excess nutrients; however, the impairment status is continuing to be monitored by the MPCA.

On March 27, 2007, Brownie Lake was added to the statewide mercury TMLDL list for the southwest region with a target completion date of 2025.

Brownie Lake was listed as impaired in 2014 in a metropolitan-wide TMDL study for chloride concentration. The MPCA partnered with local and state experts to create a plan for reduction of chloride concentrations through management of salt use on driving lanes, as summarized in the Twin Cities Metropolitan Area (TCMA) Chloride Management Plan dated February 2016. This plan identifies salts (primarily sodium chloride) applied to paved surfaces in the winter as the major source for elevated chloride concentrations in waters and from water softeners in rural areas as a secondary source. The EPA approved the metropolitan-wide TCMA TMDL on June 9, 2016. The TCMA Chloride Management Plan indicates that Brownie Lake has been identified as being meromixis, based on MPRB monitoring, which may suggest that increase water density from chloride concentrations has impeded the lake's natural mixing and circulation. The MPRB reports that these conditions may be due to alterations to the watershed and outlet that occurred prior to the practice of winter salt application.

In 2008, the MPRB and the Minneapolis Public Works worked on restoration of an area that had eroded on the east side of the lake and replaced a stormwater outlet with a buried drop-structure and pipe. A canoe rack was installed along the north shore of the lake in 2009 and trail improvements were completed in 2014.

Cedar Lake

The physical characteristics of Cedar Lake are summarized in Table 3.20.

Table 3.20 – Cedar Lake Characteristics

River/Stream	Cedar Lake
DNR ID#	27003900
DNR Classification	General Development
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Lake of the Isles
Surface Area	164 acres
Depth – mean	20 feet
Depth – maximum	51 feet
Watershed area within Minneapolis	288 acres
Watershed Management Organization	Minnehaha Creek Watershed District

Cedar Lake Swimming Beach

Credit: Minneapolis Public Works

Cedar Lake is in west-central Minneapolis and makes up part of the Minneapolis Chain of Lakes, which also includes Brownie Lake, Lake of the Isles, Lake Calhoun/Bde Maka Ska, and Lake Harriet. Though the Chain of Lakes are interconnected with channels and operate as one waterbody, the individual lakes are considered as separate waterbodies by the MNDNR and the MCWD. The lake is surrounded by parkland with several recreational resources available: biking and walking paths, ski trail, fish pier, picnic areas with grills, a canoe launch, and 3 public beaches. The lake receives runoff from the City and Saint Louis Park. Though Cedar Lake is typically stratified, there is evidence in some years that the lake may mix during the late summer.

The MPRB acquired the western parkways to Cedar Lake in 1902. The lake was dredged between 1911 and 1917, and channels were created in 1913 and 1916 to connect to Lake of the Isles to the east and Brownie Lake to the northwest. A part of the east shore was donated to MPRB in 1933 and, by 1953, MPRB obtained legal control of Cedar Lake waters despite not owning the entire shoreline. Additional land to the east was purchased through the mid- to late-1950s.

In July of 1993, a group known as the Water Quality Management Citizen Advisory Committee presented Mayor Sharon Sayles Belton with the Green Report, which evaluated the Chain of Lakes and recommended measures for preservation and improvement. Funded by a Clean Water Partnership grant and made up of members of the MPRB, City Council, neighborhood groups, and community organizations, the committee developed a report that moved quickly from an assessment of the Chain of Lakes to goals, recommendations, and implementation steps. With support from technical staff, the committee reported on the state of the Chain of Lakes. The technical data showed Cedar Lake to be eutrophic. Furthermore, Secchi disk Trophic State Index (TSI) values had increased rapidly through the 1960s. The water quality of Cedar Lake was found to be worse than predicted by water quality modeling, which suggested that internal loads played a significant role.

Projects by the Clean Water Partnership to improve water quality in the lake were implemented through a 319 Grant awarded by the MPCA. Projects for Cedar Lake included a 4.6-acre constructed wetland near the southwest corner of the lake to treat stormwater runoff, which was completed in 1995. An aluminum sulfate (alum) treatment project in 1996 improved phosphorus levels at the lake's surface. Secchi disk TSI values increased after the alum treatment ended in 2003 and the lake met the MPCA eutrophication standard for Secchi depth, chlorophyll-a, and total phosphorus, as reported in the MPRB's 2015 Water Resources Report issued in April of 2016.

Cedar Lake is part of the MPRB's annual lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report.

Purple loosestrife, an invasive wetland plant, has been controlled, as needed, by biocontrol (introduction of leaf-eating beetles). Eurasian water milfoil, another invasive water species, is also managed by the MPRB at Cedar Lake via mechanical harvesting. Additional information on efforts to control loosestrife and milfoil is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Cedar Lake, as summarized in Table 3.21.

Table 3.21 – Cedar Lake Impaired Water Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Consumption/Mercury in Fish Tissue/1998
TMDL Status	Mercury in Fish Tissue: statewide TMDL approved in 2008
Minneapolis Required Implementation Actions	Mercury in Fish Tissue: no responsibilities for local municipalities

In 1998, Cedar Lake was listed as impaired due to mercury levels in fish.

Cemetery Lake

The physical characteristics of Cemetery Lake are summarized in Table 3.22.

Table 3.22 – Cemetery Lake Characteristics

River/Stream	Cemetery Lake
DNR ID#	27001700
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Lake Harriet

Surface Area	10 acres
Depth – mean	unknown
Depth – maximum	unknown
Watershed area within Minneapolis [a]	Acreage included in Lake Calhoun/Bde Maka Ska watershed area
Watershed Management Organization	Minnehaha Creek Watershed District

[a] *Watershed area is privately owned and does not receive stormwater runoff from the Minneapolis stormwater drainage system.*

Cemetery Lake, also known as Jo Pond, is located between Lake Calhoun/Bde Maka Ska and Lake Harriet. Cemetery Lake is situated in a garden cemetery, Lakewood Cemetery, developed in the 1870s. All stormwater runoff discharged to Cemetery Lake is from the surrounding cemetery and does not include runoff from City streets. The land is managed by Lakewood grounds crews.

Cemetery Lake has not been monitored or evaluated for impairments.

Diamond Lake

The physical characteristics of Diamond Lake are summarized in Table 3.23.

Table 3.23 – Diamond Lake Characteristics

River/Stream	Diamond Lake
DNR ID#	27002200
DNR Classification	General Development
Chapter 7050 Classification	2D, 3D, 4C, 5, and 6
Downstream waterbody	Minnehaha Creek
Surface Area	51 acres
Depth – mean	3.2 feet
Depth – maximum	5.8 feet
Watershed area within Minneapolis	663 acres
Watershed Management Organization	Minnehaha Creek Watershed District

Diamond Lake is located immediately east of Interstate 35W, to the southeast of Lake Harriet, and to the southwest of Lake Nokomis. Pearl Park borders the lake to the north and Minnehaha Creek and Minnehaha Parkway is further to the north.

Amenities offered at the park include baseball/softball fields, basketball court, football/soccer fields, outdoor hockey and ice skating rink, picnic areas, pickleball court, playground, tennis courts, volleyball courts, restrooms, a wading pool, walking paths, and a canoe launch at the north end of Diamond Lake.

The land surrounding Diamond Lake was acquired by the MPRB in 1927. The land previously contained another lake called Pearl Lake, which was listed as separate from Diamond Lake in 1942. Pearl Lake was filled over the course of a few years in the 1930s, with at least 60,000 yards of fill provided by the nearby airport. Pearl Lake was then repurposed as a park with playing fields and courts, an ice rink, and a playground. A 12-inch drain in the center of the park drains to Diamond Lake. Due to settling and flooding issues at the former Pearl Lake, refilling and re-grading the area occurred multiple times in the park's history. A recreation center was built in 1968. In 2006, an in-ground irrigation system was also added to the playing fields.

A stormwater pond was created in 2000 near 60th Street and 1st Avenue to help alleviate flooding and to treat stormwater upstream of Diamond Lake. In 2007, construction began on a nearby highway (35W/Highway 62) that altered the Diamond Lake watershed drainage area.

Diamond Lake is included in MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Diamond Lake, as summarized in Table 3.24.

Table 3.24 – Diamond Lake Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Recreation/Nutrient/Eutrophication Biological Indicators/2006 (DE-LISTED 2010) Aquatic Life/Chloride/2014
TMDL Status	Chloride: metropolitan-wide TMDL approved in 2016
Minneapolis Required Implementation Actions	Chloride: assessment of winter practices recommended

Diamond Lake was reclassified as a wetland (or game lake) by the MPCA in 2008 due to its depth and percentage of lake that is littoral zone. There are no nutrient standards for wetlands at this time, therefore, there are no eutrophication standards to assess the water quality in the Diamond Lake wetland. Therefore, although Diamond Lake with its previous waterbody classification was listed as impaired for excess nutrients in 2006, it was removed from the impaired waters list in 2010 due to this reclassification to wetland.

The long-term monitoring information for Diamond Lake was used to develop the 2009 Diamond Lake Management Plan, prepared by MPRB, Friends of Diamond Lake, and Health Lakes & Rivers Partnership Committee. The report includes a detailed history of the lake and characteristics of the lake and surrounding land. It establishes long-term goals for the lake and action plans to accomplish those goals. Recommended actions include ongoing monitoring, identification of locations to install structural SMPs, survey of plants and animals, implementation of an education program, improvements to trails, and improvements for water access.

Diamond Lake was listed as impaired in 2014 in a metropolitan-wide TMDL study for chloride concentration with an initial target TMDL completion of 2015. The EPA approved the metropolitan-wide TCMA TMDL on June 9, 2016 in a letter that also identified Diamond Lake as a wetland. The MPCA partnered with local and state experts to create a plan for reduction of chloride concentrations in water through management of salt use on land, resulting in the TCMA Chloride Management Plan in February of 2016. This plan identifies salts (primarily sodium chloride) applied to paved surfaces in the winter as the major source for chloride in waters, and water softeners in rural areas as a secondary source. The implementation for the metropolitan-wide TCMA Chloride Management Plan is further discussed in the section for Brownie Lake, which is also listed in the plan.

Between 2014 and 2016, Metro Blooms led the Diamond Lake Blooming Alleys Project. This cost-share project encouraged residents to install rain gardens, permeable pavements, and/or native plants in areas adjacent to alleys within the Lake Nokomis watershed. A total of 50 properties within 4 alleys participated in the program.

Ewing Wetland

The physical characteristics of Ewing Wetland are summarized in Table 3.25.

Table 3.25 – Ewing Wetland Characteristics

River/Stream	Ewing Wetland
DNR ID#	None
DNR Classification	N/A
Chapter 7050 Classification	2D, 3D, 4C, 5, and 6
Downstream waterbody	Landlocked
Surface Area	2 acres
Depth – mean	Unknown
Depth – maximum	Unknown
Watershed area within Minneapolis	Acreage include in Cedar Lake area
Watershed Management Organization	Minnehaha Creek Watershed District

Ewing Wetland is located to the west of Brownie Lake and Cedar Lake along France Avenue South in Saint Louis Park. The wetland receives runoff from a residential area in the City. Prior to 1995, the wetland was unnamed and privately owned. The upland portion of the property was divided into ten lots and houses were eventually constructed on all lots. Runoff from the local street, and the 10 properties, discharges to a private stormwater pond, which discharges to Ewing Wetland. The wetland area was delineated and platted as an outlot. It was deeded to the Department of Public Works and is currently managed as an undeveloped area.

Ewing Wetland has not been monitored or evaluated for impairments.

Grass Lake

The physical characteristics of Grass Lake are summarized in Table 3.26.

Table 3.26 – Grass Lake Characteristics

River/Stream	Grass Lake
DNR ID#	27068100
DNR Classification	Natural Environment
Chapter 7050 Classification	2D, 3D, 4C, 5, and 6
Downstream waterbody	Richfield Lake
Surface Area	27 acres
Depth – mean	2 feet
Depth – maximum	4.9 feet
Watershed area within Minneapolis	325 acres
Watershed Management Organization	Minnehaha Creek Watershed District

Grass Lake is located immediately northwest of the intersection of Interstate 35W and Highway 62. Despite its name, Grass Lake is officially a wetland according to the MPCA and is known for bird watching. The adjacent land is not part of the Minneapolis Park system, though Grass Lake was added to the MPRB lake sampling program in 2002.

Grass Lake was previously part of the larger Richfield Lake located to the southeast, which was divided by construction of Highway 62. The separated Grass Lake was dredged to help provide fill for the new highway in 1962. The two lakes were joined by a pipe to preserve their former hydrogeology. Stormwater runoff and storm sewers from the highway drain into the wetland. In 1995, grit chambers were constructed at the end of storm drain pipes to remove debris from the runoff prior to discharge to Grass Lake.

Grass Lake is included in MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

Lake Calhoun/Bde Maka Ska

The physical characteristics of Lake Calhoun/Bde Maka Ska are summarized in Table 3.27.

Table 3.27 – Lake Calhoun/Bde Maka Ska Characteristics

River/Stream	Lake Calhoun/Bde Maka Ska
DNR ID#	27003100
DNR Classification	General Development
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Lake Harriet
Surface Area	420 acres
Depth – mean	Unknown
Depth – maximum	82 feet
Watershed area within Minneapolis	1,250 acres
Watershed Management Organization	Minnehaha Creek Watershed District

Lake Calhoun/Bde Maka Ska is located in south Minneapolis as part of the Chain of Lakes and is situated between Lake of the Isles (to the north from West Lake Street) and Lake Harriet (to the south past Lakewood Cemetery). The Minneapolis Chain of Lakes also includes Brownie Lake and Lake of the Isles. Though the Chain of Lakes are interconnected with channels and operate as one waterbody, the individual lakes are considered separate by the MNDNR and MCWD. Lake Calhoun/Bde Maka Ska is the largest lake in Minneapolis, as well as the deepest lake monitored by the MPRB. The lake receives runoff from Minneapolis and Saint Louis Park.

The lake is part of the Grand Rounds National Scenic Byway and is primarily used for recreational activities. Recreational activities include highly used trails, sailing, canoe/kayak, restaurant, and 3 public swimming beaches.

In May 2017, the MPRB started the process for formally restore the name of Lake Calhoun to its original Dakota name of Bde Maka Ska, meaning White Earth Lake. As property owner of the entire shoreline of the Lake, the MPRB has the authority to request a name change but cannot unilaterally approve this change. As of January 2018, the MPRB had formally recognized this Lake as Bde Maka Ska. A formal request for approval has been approved by Hennepin County, the MNDNR, and the United States Board on Geographic Names. As of July 2018, the lake name change is officially Bde Maka Ska.

Land adjacent to the lake was acquired in pieces and coincided with the gradual purchase and donation of lands near Lake of the Isles and Lake Harriet. There was a 25-year gap between the MPRB acquisition of the eastern shores and the south and western shores. The lands around the lake were not completely owned by the MPRB until 1908. Recreational use of the lake started as early as 1887 with a skating rink, a horse racetrack (later moved to Lake of the Isles), and boat rentals. A temporary bathhouse was constructed in 1890 and by the following year, the lake was stocked with fish supplied by the Minnesota Fish Commission.

A channel was constructed to connect the Lake of the Isles to Lake Calhoun/Bde Maka Ska in 1911. Lake Calhoun/Bde Maka Ska was dredged after construction of the connection and again in 1923 through 1925, which created beaches on the south and east shores. Wetlands in the area were drained via pipeline to Lake Calhoun/Bde Maka Ska in 1923 to aid in park development. The channel between Lake of the Isles and Lake Calhoun/Bde Maka Ska was dredged in the 1950s after a period of low water levels. Fishing docks were installed at the lake in 1966. A pump station brought water from Bassett Creek to Brownie Lake and, thus, the rest of the connected Chain of Lakes, as described in the Brownie Lake section.

Lake Calhoun/Bde Maka Ska

Credit: Minneapolis Public Works

In July 1993, a group known as the Water Quality Management Citizen Advisory Committee presented Mayor Sharon Sayles Belton with the Green Report, which evaluated the Chain of Lakes and recommended measures for preservation and improvement. Funded by a Clean Water Partnership grant and made up of members of the MPRB, City Council, neighborhood groups, and community organizations, the Committee developed a report that moved quickly from an assessment of the Chain of Lakes to goals, recommendations, and implementation steps. With support from technical staff, the Committee reported on the state of the Chain of Lakes. The technical data showed Lake Calhoun/Bde Maka Ska to be eutrophic. Furthermore, Secchi disk Trophic State Index (TSI) values had increased rapidly through the 1960s. The water quality of Cedar Lake was found to be worse than predicted by water quality modeling, which suggested that internal loads played a significant role.

The projects recommended in the 1993 report were implemented through a 319 Grant awarded by the MPCA. By 1999, a three-cell wet detention system was installed near the southwest area of Lake Calhoun/Bde Maka Ska to treat stormwater from Minneapolis and Saint Louis Park prior to discharge into the lake. A monitoring and assessment report titled Southwest Lake Calhoun Wetland Ponds Project (1999), documented the effect of these three ponds on pollutant removal. In addition, the MPRB performed shoreline repairs to Lake Calhoun/Bde Maka Ska in 1999 to prevent erosion and installed grit chambers to improve water quality. Grit chamber installation continued until 2004.

Lake Calhoun/Bde Maka Ska is included in MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Lake Calhoun/Bde Maka Ska, as summarized in Table 3.28.

Table 3.28 – Lake Calhoun/Bde Maka Ska Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Consumption/Mercury in Fish Tissue/1998 Aquatic Consumption/Perfluorooctane Sulfonate (PFOS) in Fish Tissue/2008
TMDL Status	Mercury in Fish Tissue: statewide TMDL approved in 2008 PFOS in Fish Tissue: regulatory action by MPCA in lieu of a TMDL
Minneapolis Required Implementation Actions	Mercury in Fish Tissue: mercury impairment is not stormwater related PFOS in Fish Tissue: no municipal action required

Lake Calhoun/Bde Maka Ska was first identified as impaired and added to the Minnesota Statute 303(d) list for mercury content found in fish tissue in 1998. Excess mercury concentrations have been found statewide and are largely attributed to atmospheric deposition. As such, the Minnesota lakes with mercury impairments have been added to a statewide mercury TMDL, which was first approved by the EPA on March 27, 2007. The statewide TMDL is divided into two categories: the northeast and southwest regions, each with separate targets. Lake Calhoun/Bde Maka Ska is included on the statewide mercury TMDL list for the southwest region with a target completion date of 2025. The implementation for the statewide mercury TMDL is further discussed in Appendix E.

Perfluorooctane Sulfonate (PFOS) was first identified in Lake Calhoun/Bde Maka Ska in 2014 by researchers at the University of Minnesota, which led to a fish consumption advisory by the Minnesota Department of Health and the lake being listed as impaired for PFOS. The MPCA used stormwater sampling to trace the contamination back to a metal plating facility (the Douglas Corporation) in Saint Louis Park. The facility stopped using the PFOS-containing product as of 2010 and has implemented additional efforts to prevent PFOS-contaminated stormwater runoff. Continued monitoring is being conducted by the facility and the MPCA. In May of 2016, a Schedule of Compliance was signed by the Douglas Corporation and the MPCA that requires continuation of monitoring and either containment or treatment of the stormwater. According to a Minnesota Conservation Federation blog, "the last testing in 2013 showed PFOS concentrations in fish were decreasing. The MPCA intends to test again in 2016" (MPCA News Release, MPCA announces resolution of investigation in PFOS in Lake Calhoun, published June 14, 2016). To-date, no additional monitoring information has been published.

The TCMA Chloride Management Plan (February 2016) lists Lake Calhoun/Bde Maka Ska as a high-risk waterbody for potential chloride impairment, which means that the chloride concentration in at least one sample of water within the past 10 years was within 10 percent of the chronic water quality standard (207 mg/L chloride). Although the lake has not been listed as impaired for chloride, the TCMA Chloride Management Plan encourages high-risk waterbodies to follow proactive actions similar to those for impaired waters, as prevention for chloride contamination is easier than restoration.

In 2009, permeable pavers and rain gardens were installed as part of a parking lot reconstruction project. A swimming dock and diving platform were installed in 2011. A new fishing dock was constructed in 2012, and the older dock was replaced in 2013.

Vegetation management and water quality improvements for Lake Calhoun/Bde Maka Ska have involved alum treatment to limit phosphorus concentrations (2001), control of the invasive plant species loosestrife through biocontrol, and management of Eurasian water milfoil by mechanical harvesting. These efforts are described in Section 5 – Regulatory Controls and Water Resource Management Programs.

Lake Harriet

The physical characteristics of Lake Harriet are summarized in Table 3.29.

Table 3.29 – Lake Harriet Characteristics

River/Stream	Lake Harriet
DNR ID#	27001600
DNR Classification	General Development
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Minnehaha Creek
Surface Area	335 acres
Depth – mean	29 feet
Depth – maximum	85 feet
Watershed area within Minneapolis	1,120 acres
Watershed Management Organization	Minnehaha Creek Watershed District

As the downstream-most lake in the Chain of Lakes, Lake Harriet is located in the southwest part of Minneapolis near Minnehaha Creek. Other lakes in the Chain of Lakes include Brownie Lake, Lake of the Isles, and Lake Calhoun/Bde Maka Ska. Though the Chain of Lakes are interconnected with channels and operate as one waterbody, the individual lakes are considered separate by the MNDNR and the MCWD.

Sailing, swimming, and fishing are the main recreational activities at the lake. Lyndale Park, along the northern shore of the lake, features gardens, a decorative fountain, a bird sanctuary, and a band shell.

Most of the lake and parkland area was donated to the MPRB in 1895 by Colonel W.S. King, a former park commissioner. Additional land to the north and northeast of the lake, currently Lyndale Park, was donated by King to the MPRB in the 1890s. A road between the park and lake was paved and trees were planted in the park in 1904. By 1910, a rose garden was installed in the park and an access road from King's Highway to the lake was created. Gardens were installed in the park from the 1900s through the 1920s. The bird sanctuary was added in 1936 and the decorative fountain was installed in 1947. A second fountain was installed in 1963 and an expansion of gardens occurred in the 1960s. The rock garden was transformed into the current Peace Garden, that includes a peace bridge flanked by stones from Hiroshima and Nagasaki, Japan in 1985. The floating docks in the lake were extended in 2006.

Lake Harriet

Credit: Minneapolis Public Works

A gravity outlet, open channel, and pipe connection were installed to connect Lake Harriet and Lake Calhoun/Bde Maka Ska. Water from Lake Calhoun/Bde Maka Ska enters Lake Harriet through a submerged pipe near a boat launch to the northeast and Lake Harriet, in turn, discharges to Minnehaha Creek through submerged pipe located to the south.

In July 1993, a group known as the Water Quality Management Citizen Advisory Committee presented Mayor Sharon Sayles Belton with the Green Report, which evaluated the Chain of Lakes and recommended strong measures for preservation and improvement. The committee urged the City and MPRB to proceed with similar evaluations and water quality improvement projects for the other waters in the City that were not covered in the Green Report. Funded by a Clean Water Partnership grant and made up of members of the MPRB, City Council, neighborhood groups, and community organizations, the committee developed a report that moved quickly from an assessment of the Chain of Lakes to goals, recommendations, and implementation steps. With support from their technical staff, the committee reported on the state of the Chain of Lakes. They found that Lake Harriet was the only lake of the four that was mesotrophic based on a significantly lower total phosphorus concentration than the other lakes. The committee considered Lake Harriet as a model for what might be accomplished at Cedar Lake and Lake Calhoun/Bde Maka Ska. One of the key indicators of Lake

Harriet's good water quality was the persistence of daphnia, a zooplankton, throughout the year. As noted for the other lakes, the persistence of daphnia occurs when algal blooms are limited.

Improvements recommended in the 1993 report were implemented through a 319 Grant awarded by the MPCA. The Clean Water Partnership study recommended improvement of water quality by reduction of phosphorus in the lakes. For this purpose, activities affecting Lake Harriet included public education, increased frequency of street sweeping, and limited aluminum sulfate (alum) treatment to control filamentous algae. Grit chambers were installed from 1994 through 1996.

Lake Harriet is included in MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Lake Harriet, as summarized in Table 3.30.

Table 3.30 – Lake Harriet Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Consumption/Mercury in Fish Tissue/1998 Aquatic Consumption/Perfluorooctane Sulfonate in Fish Tissue/2008
TMDL Status	Mercury in Fish Tissue: statewide TMDL approved in 2008 PFOS in Fish Tissue: regulatory action underway by MPCA in lieu of TMDL
Minneapolis Required Implementation Actions	Mercury in Fish Tissue: mercury impairment is not stormwater related PFOS in Fish Tissue: no municipal action required

Lake Harriet has not been listed as impaired for phosphate levels. Although phosphorus levels were identified as a potential risk to the lake, it appears that peak levels occurred in the 1970s and through the implementation of best management practices, such as those listed previously, phosphorus levels have declined since that time.

Lake Harriet was found to be impaired for aquatic consumption and added to the Minnesota Statutes 303(d) list based on mercury content found in fish tissue in 1998. Excess mercury concentrations have been found statewide and are largely attributed to atmospheric deposition. As such, the Minnesota lakes with mercury impairments have been added to the statewide mercury TMDL, which was first approved by the EPA on March 27, 2007. The statewide TMDL is divided into two categories, the northeast and southwest regions, each with separate targets. Lake Harriet is included in the statewide mercury TMDL list for the southwest region with a target completion date of 2025.

According to the EPA Waterbody Quality Assessment Report online database and the MPCA's 2016 Minnesota Impaired Waters List, Lake Harriet is also listed as impaired due to the presence of Perfluorooctane Sulfonate (PFOS) in fish tissue since 2008. As Lake Harriet is connected to Lake Calhoun/Bde Maka Ska, the presence of PFOS in its waters is associated with the identified industrial contamination described in the Lake Calhoun/Bde Maka Ska section. PFOS was first identified in Lake Calhoun/Bde Maka Ska in 2014 by researchers at the University of Minnesota, which led to a fish consumption advisory by the Minnesota Department of Health and the lake being listed as impaired for

PFOS. The MPCA used stormwater sampling to trace the contamination back to a metal plating facility (the Douglas Corporation) in Saint Louis Park. The facility stopped using the PFOS-containing product as of 2010 and has implemented additional efforts to prevent PFOS-contaminated stormwater runoff. Continued monitoring is being conducted by the facility and the MPCA. In May 2016, a Schedule of Compliance was signed by the Douglas Corporation and the MPCA that requires continuation of monitoring and either containment or treatment of the stormwater. According to a Minnesota Conservation Federation blog, "the last testing in 2014 showed PFOS concentrations in fish were decreasing. The MPCA intends to test again in 2016." (MPCA News Release, MPCA announces resolution of investigation in PFOS in Lake Calhoun, published June 14, 2016). To-date, no additional monitoring information has been published.

Vegetation management and water quality improvements for Lake Harriet have involved alum treatment to limit phosphorus concentrations (2001), control of the invasive plant species loosestrife through biocontrol, and management of Eurasian water milfoil by mechanical harvesting. These efforts are described in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

Lake Hiawatha

The physical characteristics of Lake Hiawatha are summarized in Table 3.31.

Table 3.31 – Lake Hiawatha Characteristics

River/Stream	Lake Hiawatha
DNR ID#	27001800
DNR Classification	General Development
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Minnehaha Creek
Surface Area	53 acres
Depth – mean	16.4 feet
Depth – maximum	28 feet
Watershed area within Minneapolis	1,243 acres
Watershed Management Organization	Minnehaha Creek Watershed District

Although Lake Hiawatha has the appearance of a lake, it is actually a widened section of Minnehaha Creek, consisting of a basin north of the main channel of the Creek. As such, the water quality in the lake is greatly dependent on the large inflow from Minnehaha Creek. The lake is located in the Lake Nokomis-Lake Hiawatha Regional Park and adjacent to the Hiawatha Golf Course. The MPCA classifies Lake Hiawatha as a lake, as the average depth is (slightly) greater than 15 feet.

Before it was acquired by the MPRB in 1922, Lake Hiawatha was a shallow wetland named Rice Lake for the wild rice that grew along the shoreline. The lake was dredged and reshaped in the late 1920s. The dredged material was used to fill and create the adjacent Hiawatha Golf Course, which opened in 1934, and a beach on the eastern shore, which was created in 1931. As shores created by dredged materials are susceptible to erosion, a federal work relief project added walls along the southern and eastern shorelines to prevent erosion at Lake Hiawatha in 1939.

The Blue Water Commission was established and issued a report in 1998 on recommendations for Lake Hiawatha and Lake Nokomis. The Blue Water Commission found that Lake Hiawatha and Lake Nokomis are eutrophic. The Commission also identified bacteria contamination and fish kills as among the many other concerns associated with these lakes. The Commission organized their concerns around central themes, such as:

- Swimability – interference by algae and weeds, bacteria contamination, and swimmer's itch.
- Fishability – safety of fish consumption, fish kills, and weeks impeding fishing.
- Aesthetics – odor, clarity, algae blooms, and shoreline aesthetics.
- Plant Diversity and Wildlife – namely reduction in exotic species.
- Shoreline Environment – vegetation restoration and elimination of sediment deltas.

These concerns led the Blue Water Commission to recommend implementation steps. These recommendations included a strong emphasis on reduction of phosphorus loads into both lakes. Since 1998, the City, MPRB, and MCWD have implemented several projects that follow directly from the report recommendations. Examples of these projects include a shoreline and littoral area revegetation (2001) and construction of detention basins within the major subwatersheds to Lake Hiawatha (2000-2001).

Lake Hiawatha is included in the MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Lake Hiawatha, as summarized in Table 3.32.

Table 3.32 – Lake Hiawatha Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Recreation/Nutrient/Eutrophication Biological Indicators/2002
TMDL Status	Excess Nutrients: TMDL approved February 2, 2014
Minneapolis Required Implementation Actions	Excess Nutrients: urban/residential nutrient reduction strategies are encouraged

Lake Hiawatha was identified as impaired by excess nutrients, specifically phosphorus, in 2002. This impairment was documented in a MCWD study that included Lake Hiawatha and eight other lakes in the watershed identified with similar impairments. Long-term monitoring data collected by the MPRB was used to confirm the strong relationship between the water quality of Minnehaha Creek and Lake Hiawatha. For this reason, Lake Hiawatha was removed from this nine-lake study and incorporated into a separate TMDL project that encompassed impairments to Minnehaha Creek. Minnehaha Creek and Lake Hiawatha were added to the TMDL for bacteria impairment based on the fecal coliform indicator.

The Minnehaha Creek bacteria TMDL and the Lake Hiawatha nutrient TMDL both address aquatic recreational use impairments.

Several nonpoint sources were identified as the source of phosphorus load to Minnehaha Creek and Lake Hiawatha. These sources include upstream nonpoint source loads from Lake Minnetonka (headwaters of Minnehaha Creek), atmospheric deposition, wetland and forest sources, groundwater discharge, non-regulated stormwater runoff, and wildlife inputs. Implementation strategies for reduction of phosphorus concentrations include:

- Urban/residential nutrient reduction strategies (e.g., controlled volume runoff, increased infiltration, and vegetation buffers).
- Municipal activities (e.g., increased frequency of street sweeping and installation of stormwater BMPs).
- Protection and restoration of wetlands (especially wetlands in the floodplain of Minnehaha Creek).
- Public education.

The contribution of Minnehaha Creek flows to Lake Hiawatha results in a watershed to lake surface area ratio of 550:1, that is among the highest in Minnesota. Additionally, the lake experiences relatively short residence time (4.4 days), which reduces algae growth, allowing for a greater concentration of phosphorus. Due to these characteristics, site-specific standards for the total phosphorus load goals were developed by the MPCA. The lake is in the implementation phase for achievement of these standards.

In addition to its excess nutrients impairment, Lake Hiawatha was identified in the TCMA Chloride Management Plan (February 2016) as a high-risk waterbody for potential chloride impairment, which means that the chloride concentration in at least one sample of water within the past 10 years was within 10 percent of the chronic water quality standard (207 mg/L chloride). Although the lake has not been listed as impaired for chloride, the TCMA Chloride Management Plan encourages high-risk waterbodies to follow proactive actions similar to those for impaired waters.

After Minnehaha Creek and the Hiawatha Golf Course flooded in 2014, it was discovered that the MPRB pumps approximately 242 million gallons of groundwater annually to keep the property open as a playable, 18-hole golf course. This groundwater use was not part of the MPRB’s existing MNDNR groundwater appropriations permit. As of the date of this report, the City and the MPRB are working with regulatory agencies, members of the public, and other stakeholders to develop a master plan that addresses the high groundwater levels and park use.

Lake Nokomis

The physical characteristics of Lake Nokomis are summarized in Table 3.33.

Table 3.33 – Lake Nokomis Characteristics

River/Stream	Lake Nokomis
DNR ID#	27001900
DNR Classification	General Development
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Minnehaha Creek
Surface Area	204 acres
Depth – mean	14 feet
Depth – maximum	33 feet
Watershed area within Minneapolis	695 acres
Watershed Management Organization	Minnehaha Creek Watershed District

Lake Nokomis is located immediately south of Minnehaha Creek and is situated midway between the Minneapolis Chain of Lakes (to the west) and the Mississippi River (to the east). Lake Nokomis is part of the Lake Nokomis-Lake Hiawatha Regional Park, which also encompasses Lake Hiawatha to the northeast.

Lake Nokomis is the downstream lake in a series of lakes and wetlands that are outside the municipal boundary of the City. The easterly, uppermost lake is Mother Lake, located within the boundaries of the Metropolitan Airport. Mother Lake discharges to Taft Lake, which is at the southwest quadrant of the Crosstown/Cedar Avenue interchange in Richfield. Legion Lake is the uppermost westerly lake that also drains into Taft Lake. Taft Lake discharges into Solomon Park Wetland, which in turn discharges to Lake Nokomis.

The park features biking and walking paths, sports fields, basketball and tennis courts, a recreational center, fishing pier, fountains, playground, a wading pool, picnic area, and boat docks. Swimming beaches are located on the lake, and swimming, sailing, fishing, and ice fishing occur.

The lake was known as Lake Amelia at the time it was purchased by the MPRB in 1907. At the time, the area was comprised of open water, wetland, and a peat bog. A small bathhouse was installed in 1909. The lake was reshaped and dredged to connect the former Lake Amelia to the nearby creek, with water surfaces reduced from 300 acres to 200 acres in 1914. A new bathhouse was constructed by 1920 (replaced in 1967), which led to the high popularity of swimming in the lake. A WPA shore wall was installed along the lagoon and on the east and west shores in the 1930s. Also, in the 1930s, a weir was constructed to fix the water elevation in the lake. The purpose and function of the current structure is to prevent Minnehaha Creek flows from entering the lake.

The lake was treated with sodium arsenite in the 1950s to control weeds that had grown during low water conditions at the time.

The Blue Water Commission was established and issued a report in 1998 on recommendations for Lake Nokomis and the nearby Lake Hiawatha. The Blue Water Commission findings were that Lake Hiawatha and Lake Nokomis are eutrophic. The Commission also identified fecal contamination and fish kills as primary among the many other concerns associated with the lakes. The Commission organized their concerns around central themes, such as:

East Lake Nokomis Wetlands

Credit: Minneapolis Public Works

- Swimability – interference by algae and weeds, fecal contamination, and swimmer's itch.
- Fishability – safety of fish consumption, fish kills, and weeds impeding fishing.
- Aesthetics – odor, clarity, algae blooms, and shoreline aesthetics.
- Plant Diversity and Wildlife – namely reduction in exotic species.
- Shoreline Environment – vegetation restoration and elimination of sediment deltas.

These concerns led the Blue Water Commission to recommend implementation steps. These recommendations included a strong emphasis on reduction of phosphorus inputs into both lakes. The City, MCWD, and MPRB implemented several of the recommendations, which included additional increased frequency of street sweeping starting in 1998, removal of carp in 2000, construction of three wetland settling ponds with grit chambers to the southwest in 2001, and installation of a weir in 2000 to prevent Minnehaha Creek water from flowing into the lake.

The weir separating Minnehaha Creek from the lake was reconstructed in 2000 as an inflatable weir that allows the lake to discharge to the Creek, while it prevents the Creek from overflowing into the lake. The purpose is to prevent the contribution of nutrient-rich water and invasive species (e.g., zebra mussels). This weir is operated according to requirements set in a permit from the MNDNR.

An effort to remove carp from the lake in the winter of 2001-2002 was intended to limit the internal phosphorus loads caused by the fish when they forage in lake sediments. Similar efforts were repeated in a three-year biomanipulation study from 2010 to 2013, which aimed to reduce sediment disturbance by burrowing fish. The biomanipulation study focused on internal circulation of nutrients by the fish population, primarily black bullheads and bluegill sunfish. The project targeted and removed adult bullheads and stocked the lake with walleye, which prey on the bullheads and bluegills.

The Amelia stormwater pond was dredged in 2011 to remove accumulated sediments and to remove invasive plant species. MCWD reconstructed the weir again in 2012.

Lake Nokomis included in MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Lake Nokomis, as summarized in Table 3.34.

Table 3.34 – Lake Nokomis Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Consumption/Mercury in Fish Tissue/1998 Aquatic Consumption/PCB in Fish Tissue/1998 Aquatic Recreation/Excess Nutrients/2002
TMDL Status	Mercury in Fish Tissue: statewide TMDL approved in 2008 PCB in Fish Tissue: study not started Excess Nutrients: TMDL study approved in 2011
Minneapolis Required Implementation Actions	Mercury in Fish Tissue: mercury impairment is not stormwater related PCB in Fish Tissue: N/A Excess Nutrients: municipal actions are encouraged

Lake Nokomis was first identified as impaired and added to the Minnesota 303(d) list for mercury content found in fish tissue in 1998. Excess mercury concentrations have been found statewide and are largely attributed to atmospheric deposition. The lake was also determined to have another impairment with PCB found in fish tissue the same year as its mercury impairment was identified (1998). The EPA Waterbody Quality Assessment Report online database indicates that a TMDL study for this impairment is still needed. The MPCA 2016 303(d) Impaired Waters List projects a TMDL completion by 2025.

Lake Nokomis was identified as impaired by excess nutrients, specifically phosphorus, in 2002. As the TMDL study for this impairment was conducted, eight other lakes within the MCWD were identified with similar impairments and were incorporated into one metropolitan-wide study. Five of the lakes (Brownie Lake, Powderhorn Lake, Diamond Lake, Lake of the Isles, and Lake Hiawatha) were eventually removed from the study for various reasons (i.e., improved water quality criteria or changes to waterbody classification). Of the four other lakes, Lake Nokomis is the only one located in Minneapolis. A metropolitan-wide TMDL report for excess nutrients in these four lakes was approved by the EPA April 25, 2011.

The TMDL report identified phosphorus sources as stormwater runoff, internal loads, and atmospheric deposition. For Lake Nokomis, the TMDL recommended increased frequency of street sweeping, the installation of rain gardens/neighborhood water quality ponds, the installation of rain barrels, the creation of infiltration swales, the installation of curb cuts, the installation of pervious pavement, and educational programs throughout the subwatershed.

The TMDL report indicated that for state nutrient standards to be met, the lake required a reduction in overall phosphorus load. Taft Lake and Legion Lake are involved in the TMDL for Lake Nokomis into which they drain and are responsible for reduction of total phosphorus loads. A phosphorus reduction plan for the two lakes was scheduled to be completed by the Spring of 2016 and included a water reuse infiltration system, native prairie restoration and buffers, grit chambers (Legion Lake only), in-situ flocculation treatment systems (Taft Lake only), construction of the Richfield Parkway North Connection, and removal of Taft Lake Frontage Road.

Between 2015 and 2017, Metro Blooms led the Nokomis Blooming Alley Project. This cost-share project encouraged residents to install rain gardens, permeable pavements, and/or native plants in areas adjacent to alleys within the Lake Nokomis watershed. A total of 180 properties, within 15 alleys, participated in the program. The result was installation of more than 160 rain gardens and permeable pavements.

As a result of University of Minnesota research, it was determined that the carp population of Lake Nokomis likely has a negative effect on the water quality. In 2016, the MPRB and MCWD received a grant from the Minnesota Environment and Natural Resources Trust Fund to update the carp management of Lake Nokomis, its upstream lakes, and connecting storm drains. Currently, the MPRB is collecting data on the carp, including population and patterns of movement. The information will be used to determine the optimal time and locations for winter carp removal. The project also includes study of the viability of carp barriers and completion of a long-term carp management plan. The project is expected to be completed in late-2019.

In 2017, the MPRB initiated a shoreline enhancement project to improve the landscape, vegetation, habitat, and water quality of Lake Nokomis. The long-term goal of this project is to reduce invasive vegetation and increase native vegetation. The MPRB is in the process of soliciting public input. The MPRB received funds from the Minnesota Legacy Outdoor Heritage Fund for the proposed improvements to the northern and eastern shoreline of the lake.

Lake of the Isles

The physical characteristics of Lake of the Isles is summarized in Table 3.35.

Table 3.35 – Lake of the Isles Characteristics

River/Stream	Lake of the Isles
DNR ID#	27004000
DNR Classification	General Development
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Lake Calhoun/Bde Maka Ska
Surface Area	109 acres
Depth – mean	9 feet
Depth – maximum	31 feet
Watershed area within Minneapolis	770 acres
Watershed Management Organization	Minnehaha Creek Watershed District

Lake of the Isles is the center of the Chain of Lakes, near uptown Minneapolis. Though the Chain of Lakes are interconnected with channels and operate as one waterbody, the individual lakes are considered separate by the MNDNR and the MCWD. Two islands are present in the middle of Lake of the Isles, which contributed to the lake's name. Lake of the Isles Park features biking and walking paths, fountains, fishing pier, hockey rink, ice skating rink, and a soccer field. Canoe racks are available on the south and northwest sides of Lake of the Isles.

The history of Lake of the Isles overlaps Lake Calhoun/Bde Maka Ska's history as parkland between the two lakes were acquired concurrently. Lake development projects often included both lakes. Historically, the lake was surrounded by wetlands and contained four islands, two of which were removed during development through fill and dredging. The parkland of the lake was acquired through a donation in 1886. The two islands in the lake were purchased by the MPRB in 1887.

The northern and eastern shores of the lake were dredged from 1889 through 1893. While piecemeal acquisitions of the Lake Calhoun/Bde Maka Ska area took place in the early 1900s, a channel connecting Lake Calhoun/Bde Maka Ska to Lake of the Isles was proposed and ultimately constructed in 1911. Dredging in Lake of the Isles restarted in 1907, around the same time that the land between the two lakes and Kenwood Park to the north were acquired. Additional land between Lake of the Isles and Cedar Lake was donated in 1909 to the MPRB for connection between those two lakes, which was completed in 1913. Paving of the parkway began in 1923.

The historically swampy area of Lake of the Isles was transformed over this time such that water area increased from 100 acres to 120 acres of water, 33 acres of dry land was more than doubled to 80 acres, and 67 acres of wetland was removed completely. However, the use of dredged wetland material as fill to create parkland resulted in settling and erosion issues.

In 1950, the channel between Lake of the Isles and Lake Calhoun/Bde Maka Ska was dredged again to deepen the channel; however, by the late 1950s, sediment had built up in the channel to the extent that canoes could not fit through. Additionally, some parts of the shore would flood during storms due to lack of wetlands.

Aquatic plants flourished during low water periods leading up to the 1950s, which led to treatments of sodium arsenite in 1959.

In July 1993, a group known as the Water Quality Management Citizen Advisory Committee presented Mayor Sharon Sayles Belton with the Green Report, which evaluated the Chain of Lakes and recommended strong measures for preserving and improving them. Funded by a Clean Water Partnership grant and made up of members of the MPRB, City Council, neighborhood groups, and community organizations, the committee developed a report that moved quickly from an assessment of the Chain of Lakes to goals, recommendations, and implementation steps. With support from their technical staff, the committee reported on the state of the Chain of Lakes. Lake of the Isles was found to be eutrophic and had the highest measured total phosphorus concentrations in the entire chain. Algal blooms were frequent. Water quality in the lake was better than predicted by models likely due to the presence of milfoil, a plant that utilizes phosphorus from the water.

The Clean Water Partnership study recommended improvements to water quality through reduction of phosphorus in the lakes. The recommended improvements were funded through a 319 Grant awarded by the MPCA. For this purpose, grit chambers were installed from 1994 to 1999 for stormwater sediment removal, and in 1997 the lake was treated with aluminum sulfate (alum). From 1998 to 1999, the MPRB completed shoreline repairs and native plantings to prevent erosion. In 2001, to improve water quality and shorelines, the MPRB started a similar project that included shoreline stabilization, wetland restoration and enhancement, path reconstruction, and upland plant restoration. Vegetation management to control the invasive species of purple loosestrife and Eurasian water milfoil continues.

Lake of the Isles is included in the MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Lake of the Isles, as summarized in Table 3.36.

Table 3.36 – Lake of the Isles Impaired Waters Status

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Consumption/Mercury in Fish Tissue/1998 Aquatic Consumption/Perfluorooctane Sulfonate (PFOS) in Fish Tissue/2008
TMDL Status	Mercury in Fish Tissue: statewide TMDL approved in 2007 PFOS in Fish Tissue: regulatory action underway by MPCA in lieu of TMDL
Minneapolis Required Implementation Actions	Mercury in Fish Tissue: no municipal responsibilities PFOS in Fish Tissue: no municipal responsibilities

Lake of the Isles was first identified as impaired and added to the Minnesota 303(d) list for mercury content found in fish tissue in 1998. Excess mercury concentrations have been found state-wide and are largely attributed to atmospheric deposition. As such, the Minnesota lakes with mercury impairments have been added to a statewide mercury TMDL, which was first approved by the EPA on March 27, 2007. The statewide TMDL is divided into two categories, the northeast and southwest regions, each with separate targets. Lake of the Isles is included on the statewide mercury TMDL list for the southwest region with a target completion date of 2025.

Lake of the Isles is also listed as impaired due to the presence of PFOS in fish tissue since 2008. Presence of PFOS is primarily related to industrial discharge to Lake Calhoun/Bde Maka Ska. PFOS was first identified in Lake Calhoun/Bde Maka Ska in 2014 by researchers at the University of Minnesota, which led to a fish consumption advisory by the Minnesota Department of Health and the lake being listed as impaired for PFOS. The MPCA used stormwater sampling to trace the contamination back to a metal plating facility (the Douglas Corporation) in Saint Louis Park. The facility stopped using the PFOS-contaminating product as of 2010 and has implemented additional efforts to prevent PFOS-contaminated stormwater runoff. Continued monitoring is being conducted by the facility and the MPCA. In May 2016, a Schedule of Compliance was signed by the Douglas Corporation and the MPCA that requires continuation of monitoring and either contaminant or treatment of the stormwater. According to a Minnesota Conservation Federation blog, "the last testing in 2013 showed PFOS concentrations in fish were decreasing. The MPCA intends to test again in 2016." (MPCA News Release, MPCA announces resolution of investigation in PFOS in Lake Calhoun, published June 14, 2016). To-date, no additional monitoring information has been published.

In addition to its mercury and PFOS impairments, Lake of the Isles was identified in the TCMA Chloride Management Plan from February 2016 as a high-risk waterbody for potential chloride impairment, which means that the chloride concentration in at least one sample of water within the past 10 years was within 10 percent of the chronic water quality standard (207 mg/L chloride). Although the lake has not been listed as impaired for chloride, the TCMA Chloride Management Plan encourages high-risk waterbodies to follow proactive actions similar to those for impaired waters, as prevention for chloride contamination is easier than restoration.

The implementation for the statewide mercury TMDL and the metropolitan-wide TCMA Chloride Management Plan is further discussed in Appendix E.

As part of Arbor Day celebrations in 2008, 125 trees were planted on the north shore. In 2008, the MPRB performed extensive restoration on the wildlife refuges on the lake's two islands.

This channel under the Lake Street bridge was dredged again in 2014 as part of the Metropolitan Council project to replace a sanitary sewer force main that crosses under the channel.

An invasive aquatic plant species, Eurasian water milfoil, was identified in the lake in 1987. Current practice to control the milfoil involves mechanical harvesting of the plant. Lake of the Isles also has experienced extensive areas of purple loosestrife, which is controlled by biocontrol, the release of beetles that feed on the loosestrife. These efforts are further described in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

Loring Pond

The physical characteristics of Loring Pond are summarized in Table 3.37.

Table 3.37 – Loring Pond Characteristics

River/Stream	Loring Pond
DNR ID#	2706500
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Mississippi River
Surface Area	8 acres
Depth – mean	5 feet
Depth – maximum	17 feet
Watershed area within Minneapolis	27 acres
Watershed Management Organization	Mississippi Watershed Management Organization

Loring Pond, which is situated within Loring Park, is divided into a smaller North Bay (DNR #27-0655-01) and a larger South Bay (DNR #27-0655-02). The lake is situated on the edge of downtown Minneapolis, east of Interstate 94 and south of Interstate 394. An augmentation well is used to maintain the water levels at Loring Pond.

Loring Park features a dog park, a bandstand, basketball and tennis courts, biking and walking paths, fishing pier, garden and picnic areas, a restroom facility, a playground, a community arts center, and a wading pool.

The parkland was originally purchased (30 acres) in 1883 and was named Loring Park after the first president of the Park Board, Charles Loring. The lake was excavated and enlarged in 1884. Additional land was purchased in stages and incorporated into Loring Park through 1902.

Loring Pond Wetland Fringe

Credit: Minneapolis Public Works

Several attempts were made in the 1970s to improve water quality in Loring Pond. An Olszewski tube was installed in an attempt to drain high-nutrient hypolimnetic water from the lake. The tube never functioned properly and was abandoned. The pipe was capped in 2014 in an effort to limit water losses from the pond. Dredging of the north arm from 1976 to 1977 also did not improve the water quality of the lake. Augmentation of the lake level with groundwater appears to have had a positive effect on water quality and continues today in accordance with a water appropriation permit issued by the MNDNR.

Further lake restoration and park improvement projects were initiated in 1997. The lake bottom was sealed, lined, and vented. An aerator was installed to help prevent oxygen depletion during the summer months. Multiple vegetation restoration projects were completed throughout the park. In 1999, the shoreline was planted with native vegetation in cooperation with the MNDNR and the Friends of Loring Park. The native shoreline restoration provided a buffer strip for waterfowl management, protection against shoreline erosion, pollutant filtration, and improved lake aesthetics.

In 1998 and 1999, through funds provided by the MPRB and the city's Neighborhood Revitalization Program and Friends of Loring Park, the lake bottom was lined to prevent water loss and the shoreline was planted with native vegetation. In 2007, the north basin was dewatered and the water level in the southern basin was lowered in order to accommodate dredging of the north basin to remove accumulated sediment and restore original depths in the channel between the two basins.

Dewatering for the North Bay dredging project lowered water levels in Loring Pond significantly in 2007. Storm sewer backflow entered Loring Pond several times in 2010 and 2011 during high-intensity rain events and the largest of these events can be seen as peaks in the level graph. Water pressure from storm sewer backflow caused the Loring Pond outlet to deteriorate. In 2011, MPRB staff repaired the cement at the base of the outlet and reinstalled the outlet board. Water levels were manipulated throughout 2014, with water being allowed to drain down throughout the summer and then raised to the top of the outlet wall as part of a cattail removal project. Water levels were then kept near the top of the outlet from 2015 through 2017 by using the augmentation well in accordance with a water appropriate permit issued by the MNDNR.

Loring Pond was monitored by MWMO for water quality and *E. coli* in 2006 and 2007. In 2008, the MPRB took over this monitoring.

Loring Pond is included in MPRB's lake monitoring program. Monitoring results are published each year in the MPRB Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Loring Pond, as summarized in Table 3.38.

Table 3.38 – Loring Pond Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Life/Chloride/2014
TMDL Status	Chloride: metropolitan-wide TMDL approved in 2016
Minneapolis Required Implementation Actions	Chloride: assessment of winter practices recommended

Loring Pond (South Bay) was listed as impaired in 2014 in a metropolitan-wide TMDL study for chloride concentration with an initial target TMDL completion in 2015. The U.S. EPA approved the metropolitan-wide TCMA TMDL on June 9, 2016. The MPCA partnered with local and state experts in the TCMA to create a plan for reduction of chloride concentration in water through management of salt use on land, as summarized in the TCMA Chloride Management Plan (February 2016). This plan identifies salts (primarily sodium chloride) applied to paved surfaces in the winter as the major source for chloride in waters and water softeners in rural areas as a secondary source.

Powderhorn Lake

The physical characteristics of Powderhorn Lake are summarized in Table 3.39.

Table 3.39 – Powderhorn Lake Characteristics

River/Stream	Powderhorn Lake
DNR ID#	27001400
DNR Classification	General Development
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Mississippi River
Surface Area	12 acres
Depth – mean	4 feet
Depth – maximum	20 feet
Watershed area within Minneapolis	323 acres
Watershed Management Organization	Minnehaha Creek Watershed District

Powderhorn Lake is a relatively shallow, landlocked lake surrounded by parkland (Powderhorn Park) and is situated in Minneapolis between Interstate 35W and Hiawatha Avenue, south of East Lake Street.

Recreational activities available at the park include several sports courts, a fishing pier, gardens, picnic areas with grills, ice skating rink, playground, a wading pool, and walking path.

The lake was named after its shape, which resembled a cow horn historically used to carry gunpowder. The MPRB purchased 38 acres of parkland in 1890. Powderhorn Park was expanded the next year with the addition of 20 acres. The lake was deepened by dredging in 1895, which resulted in the creation of a half-acre island. A playground was added in 1907. In 1925, the northern arm of the lake was filled in due to the low water levels, which had dropped significantly since the early 1900s. A shore protection wall was installed along part of the lake in 1940.

Due to continued decreases in water levels, city water was pumped into the lake in 1963 to raise it by ten feet. A permanent pump station was installed to control water levels in the event that water levels are high. Pumped water is discharged to a storm drain that is tributary to the Mississippi River. Use of this pump to control the water levels in Powderhorn Lake was temporarily prohibited by the MNDNR because of the presence of Egeria densa, an evasive plant that had the potential to affect shipping in the Mississippi River. The restriction was lifted after successful eradication carried out by the MNDNR.

In 1975, an aerator was installed in the lake for summer operation to increase the lake's oxygen levels to prevent fish kills. The MNDNR has stocked the lake with fish as part of the Kid's Fishing Pond since 1980.

In 1995, a winter aeration system was installed.

In 1999, the City and MPRB implemented a restoration plan for Powderhorn Lake that continued through 2003. Actions included installation of five grit chambers near stormwater drain outfalls, native shoreline plantings, and alum treatment.

In 2004, the MPRB began annual spring installation of barley straw, used to control blue-green algal growth with mixed results.

In 2007, the MPRB began treatments to control Brazilian waterweed, an invasive aquatic plant. The treatment was successful, as documented by 5 years of MNDNR surveys.

Powderhorn Lake is included in MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Powderhorn Lake, as summarized in Table 3.40.

Table 3.40 – Powderhorn Lake Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Recreation/Nutrient/Eutrophication Biological Indicators/2002/2018 Aquatic Consumption/Mercury in Fish Tissue/2006 Aquatic Life/Chloride/2014
TMDL Status	Excess Nutrients: De-listed in 2012, due to improved water quality Relisted in 2018. TMDL study not started. Mercury in Fish Tissue: statewide TMDL approved in 2007 Chloride: metropolitan-wide TMDL approved 2016
Minneapolis Required Implementation Actions	Mercury in Fish Tissue: no municipal requirements Chloride: assessment of winter practices recommended

In 2002, the lake was first listed as impaired due to excess nutrients, specifically phosphorus. MPRB implemented ongoing annual barley straw treatments in 2004 to improve the water clarity. Due to an improved water quality trend caused by in-lake water quality management, the lake was de-listed for nutrient impairment in 2012. The MPCA and MPRB continued to monitor the lake for changes in lake water quality. Changes observed by the MPCA have resulted in the 2018 relisting of Powderhorn Lake for nutrient impairment.

Powderhorn Lake was identified as impaired and added to the Minnesota 303(d) list for mercury content found in fish tissue in 2006. Excess mercury concentrations have been found statewide and are largely attributed to atmospheric deposition. As such, the Minnesota lakes with mercury impairments have been added to a statewide mercury TMDL, which was first approved by the EPA on March 27, 2007. Powderhorn Lake is included on the statewide TMDL list with a target completion date of 2025.

Powderhorn Lake was listed as impaired in 2014 in a metropolitan-wide TMDL study for chloride concentration. The TCMA Chloride Management Plan identifies salts (primarily sodium chloride) applied to paved surfaces in the winter as the major source for chloride in waters, and water softeners in rural areas as a secondary source. The EPA approved the metropolitan-wide TCMA TMDL on June 9, 2016. The MPCA partnered with local and state experts in the TCMA to create a plan to reduce chloride concentration in water by management of salt use on land.

Native grasses were planted on the east and north hillsides in 1995. As part of a city-wide restoration plan, five continuous deflective separation grit chambers were installed in 2001, native plantings were included again in 2002, and an alum treatment was implemented in 2003. In addition, an aeration system was installed in the lake and a retaining wall was restored in 2002. Two-hundred (200) trees were planted in the park as part of the 2007 Arbor Day celebration.

The Powderhorn Lake Neighborhood of Raingardens project was a three-year community engagement project that began in 2009. Led by Metro Blooms, the project installed 125 raingardens with more than 229 community members involved and more than 70,000 square feet of impervious surface redirected to infiltration BMPs. This project engaged property owners in the Central and Powderhorn Park neighborhoods to install and maintain raingardens on their property, demonstrating that communities can directly impact local water quality by using native plants and sound landscape practices.

Ryan Lake

The physical characteristics of Ryan Lake are summarized in Table 3.41.

Table 3.41 – Ryan Lake Characteristics

River/Stream	Ryan Lake
DNR ID#	27005800
DNR Classification	Recreational Development
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Ryan Creek
Surface Area	15 acres
Depth – mean	Unknown
Depth – maximum	33 feet
Watershed area within Minneapolis	61 acres
Watershed Management Organization	Shingle Creek Watershed Management Commission

Ryan Lake is a mesotrophic lake located in north Minneapolis adjacent to the boundary between Robbinsdale and Minneapolis. Highway 100 is located to the northwest, a railroad corridor (Canadian Pacific Railway) is immediately north of the lake, and Shingle Creek runs farther to the northeast. The North Twin, Middle Twin, and South Twin Lakes (collectively known as Twin Lake) are located to the west. Twin Lake and Ryan Lake are connected within Robbinsdale by Ryan Creek. Ryan Lake is the last lake in what is considered the Twin Lakes Chain of Lakes. Ryan Lake discharges to Ryan Creek and thence to Shingle Creek.

The west and south shores of the lake are owned by private residents, and the MPRB manages publicly held land on the eastern shore. In 2006, a new public dock was installed on the eastern side and a small rain garden was constructed. The MNDNR stocked fish in the lake from 2004 through 2014.

Ryan Lake is occasionally monitored by volunteers organized through the Metropolitan Council's Citizen-Assisted Monitoring Program (CAMP) program.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Ryan Lake, as summarized in Table 3.42.

Table 3.42 – Ryan Lake Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Recreation/Nutrient/Eutrophication Biological Indicators/2002 (DE-LISTED in 2014)
TMDL Status	Excess Nutrients: TMDL study approved in 2007
Minneapolis Required Implementation Actions	Excess Nutrients: ongoing monitoring

Ryan Lake was identified as impaired with excess nutrients, specifically phosphorus, along with the Twin Lakes in 2002. The TMDL study report of the Twin and Ryan Lakes was approved by the EPA on November 9, 2007, and the associated implementation plan was approved by the MPCA four days later.

Although it appears that the total phosphorus loads was least in Ryan Lake among the Twin Cities Chain of Lakes, it still exceeded the state standard concentration limit (40 µg/L) by 4 µg/L total phosphorus. The TMDL identified the primary sources of phosphorus in the lakes as stormwater runoff, a degraded wetland to the north of North Twin Lake, and sources within the lakes themselves (i.e., phosphorus released from sediment and invasive aquatic pondweed). Specific implementation plan actions include strategies for all Twin Lake chain lakes and strategies specific to Ryan Lake. Mitigation strategies includes evaluation of the adequacy of rules, additional Best Management Practices (BMPs) to decrease runoff and increase stormwater treatment, BMPs effectiveness monitoring, increased infiltration in watershed, increased frequency of street sweeping, aquatic plant surveys, and shoreline restoration.

For Ryan Lake, 15 rain gardens were installed in Minneapolis and five sump manholes were installed in Brooklyn Center in an effort to reduce external phosphorus loads. Additionally, a shoreline restoration project was completed in Ryan Lake Park in Minneapolis.

In December 2014, a Twin and Ryan Lakes Nutrient TMDL Five Year Review was provided. The report established a new goal of 19 percent reduction in Ryan Lake's phosphorus loads. Ryan Lake achieved water quality standards for nutrient levels and was de-listed by the MPCA in 2014.

According to the TCMA Chloride Management Plan from February 2016, Ryan Lake is listed as a high-risk waterbody for potential chloride impairment, which means that the chloride concentration in at least one sample of water within the past 10 years was within 10 percent of the chronic water quality standard (207 mg/L chloride). Although the lake has not been listed as impaired for chloride, the TMCA Chloride Management Plan encourages high-risk waterbodies to follow proactive actions similar to those for impaired waters, as prevention for chloride contamination is easier than restoration.

Sanctuary Pond

The physical characteristics of Sanctuary Pond are summarized in Table 3.43.

Table 3.43 – Sanctuary Pond Characteristics

River/Stream	Sanctuary Pond
DNR ID#	27066500
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Lake Harriet
Surface Area	11 acres
Depth – mean	Unknown
Depth – maximum	Unknown
Watershed area within Minneapolis	Acreage included in area for Lake Calhoun/Bde Maka Ska
Watershed Management Organization	Minnehaha Creek Watershed District

Sanctuary Pond, sometimes called Sanctuary Marsh, is situated between Lake Harriet and Lakewood Cemetery, separated from Lake Harriet to the southwest by Lake Harriet Parkway. Sanctuary Pond is located within the Thomas Sadler Roberts Bird Sanctuary. Catch basins in Lakewood Cemetery and along

Lake Harriet Parkway discharge into the pond. The pond and adjacent wetlands are monitored by the Hennepin County Wetland Health Evaluation Program (WHEP).

In 1958, the pond was dredged for fish spawning and a pump building was constructed with a pipeline installed under Lake Harriet Parkway to provide water from Lake Harriet to the pond. By 1987, the pond was expanded and a screen was placed on the pipe connecting to Lake Harriet to prevent fish from entering the pond from the lake. The fish hatchery and pumps are no longer in operation.

Two additional ponds were dredged to the west of Sanctuary Pond in 1991 and 1992.

In 2008, as part of the city's stormwater and rain-leader disconnect program, Lakewood Cemetery to the north disconnected its stormwater connections to the sanitary sewer system and redirected the runoff to Sanctuary Pond.

Spring Lake

The physical characteristics of Spring Lake are summarized in Table 3.44.

Table 3.44 – Spring Lake Characteristics

River/Stream	Spring Lake
DNR ID#	27065400
DNR Classification	N/A
Chapter 7050 Classification	2B, 3C, 4A, 4B, 5, and 6
Downstream waterbody	Bassett Creek
Surface Area	3 acres
Depth – mean	9.5 feet
Depth – maximum	Unknown
Watershed area within Minneapolis	50 acres
Watershed Management Organization	Bassett Creek Watershed Management Commission

Spring Lake is located west of Interstate 94 and immediately south of Interstate 394. Bryn-Mawr Meadows is located farther to the northwest from the lake. Spring Lake, the smallest lake monitored by the MPRB, has limited water quality information available. Seven floating biohavens (floating islands) were installed in Spring Lake in 2011 to act as a wildlife refuge; however, as of 2014, the biohavens are reported to be in poor condition. The lake overflows to Bassett Creek via a constructed storm drain.

Spring Lake is included in MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Spring Lake, as summarized in Table 3.45.

Table 3.45 – Spring Lake Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Life/Chloride/2014
TMDL Status	Chloride: metropolitan-wide TCMA TMDL approved by U.S. EPA in 2016
Minneapolis Required Implementation Actions	Chloride: assessment of winter practices recommended

Spring Lake was listed as impaired in 2014 in a metropolitan-wide TMDL study for chloride concentration with an initial target TMDL completion in 2015. The EPA approved the metropolitan-wide TCMA TMDL on June 9, 2016. The MPCA partnered with local and state experts in the TCMA to create a plan for reduction of chloride concentrations in water by management of salt use on land. The TCMA Chloride Management Plan, completed in February 2016, identifies salts (primarily sodium chloride) applied to paved surfaces in the winter as the major source for chloride in waters and water softeners in rural areas as a secondary source.

Non-Minneapolis Lakes and Wetlands Receiving Stormwater Runoff

There are 10 lakes located outside the municipal boundaries of the City that receive stormwater runoff discharges from the City stormwater drainage system. A full list of these lakes is contained in Table 3.46.

Table 3.46 – Non-Minneapolis Lakes and Wetlands that Receive Minneapolis Stormwater Runoff

Name	DNR ID	Municipality	Watershed Organization
Bassett's Pond	27003600	Golden Valley	Bassett Creek Watershed Management Commission
Crystal Lake	27003400	Robbinsdale	Shingle Creek Watershed Management Commission
Hart Lake	02008100	Columbia Heights	Rice Creek Watershed District
Legion Lake	27002400	Richfield	Minnehaha Creek Watershed District
Mother Lake	27002300	MSP Airport Unincorporated Area	Minnehaha Creek Watershed District
Richfield Lake	27002100	Richfield	Minnehaha Creek Watershed District
Silver Lake	62008300	St. Anthony	Rice Creek Watershed District
Solomon Park Wetland	27068200	MSP Airport Unincorporated Area	Minnehaha Creek Watershed District
Taft Lake	27068300	MSP Airport Unincorporated Area	Minnehaha Creek Watershed District
Wirth Lake	27003700	Golden Valley	Bassett Creek Watershed Management Commission

A brief summary of these lakes and their identified impairments follows.

Bassett's Pond

Bassett's Pond is located in the City of Golden Valley and is situated immediately north of Olson Memorial Highway (Highway 55) in Theodore Wirth Park. The pond is actually a series of deep pools that were dredged as part of the park plan created by Theodore Wirth, the first Minneapolis park commissioner. The pools are in-line with the main stem of Bassett Creek, which enters through the northern end of the pond. Although it has a unique DNR ID, it is managed as a widened section of Bassett Creek rather than a separate pond and does not have a direct contribution of runoff from a Minneapolis pipeshed. As the pond is in Theodore Wirth Park, land use in the area is mostly park and recreational use, with single-family and multi-family residences to the east. The BNSF Railway and Canadian Pacific Railway run near the pond to the north and east.

The chloride, fishes bioassessments, and bacteria (fecal coliform) impairments described in the Bassett Creek section also apply to Bassett's Pond. No additional water quality information was identified with regard to the pond and additional information on the identified creek impairments is discussed further in the Bassett Creek section.

Crystal Lake

Crystal Lake is in the City of Robbinsdale and primarily receives stormwater runoff from a 1,200-acre area of Robbinsdale. However, runoff from a 421-acre area in the City of Minneapolis also drains to Crystal Lake. County Road 81 borders the lake to the west and Lakeview Terrace Park is to its south. Crystal Lake is also located to the south of Ryan Lake.

Crystal Lake does not have a natural outlet. In the mid-1990s, the City of Robbinsdale constructed a pump station to manage lake levels when the water level is high. The pumped water is discharged into the Minneapolis storm drainage system at the intersection of Xerxes Avenue and 42nd Avenue North. The storm drainage system that receives the discharge is historically under capacity, which results in frequent on-street floods of intersections and other low areas. The depth of water in the intersections is worsened whenever the Crystal Lake pump station is in operation. The City Minneapolis is working with City of Robbinsdale on an inter-jurisdictional agreement that defines a pump station operational plan that minimizes flooding in the City of Minneapolis.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Crystal Lake, as summarized in Table 3.47.

Table 3.47 – Crystal Lake Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Recreation/Excess Nutrients/2002
TMDL Status	Excess Nutrients: TMDL study approved in 2009
Minneapolis Related Implementation Actions	Excess Nutrients: urban/residential nutrient reduction strategies are to be implemented as opportunities arise.

Hart Lake

Hart Lake is situated immediately north of the Minneapolis municipal boundary in Anoka County, just north of the Hennepin County border. A 3-acre pipeshed area in the northeast corner of Minneapolis discharges to Hart Lake. Silver Lake is located to the northeast of Hart Lake. Hart Lake is located within and along the Rice Creek Watershed District (RCWD) southwestern boundary. A map of the RCWD impaired waters inventory from 2015 indicates that Hart Lake is not listed as impaired, but Silver Lake is, and the Silver Lake TMDL identifies Minneapolis as one of the parties in the categorical WLA. No TMDL implementation responsibilities are assigned to Minneapolis.

Legion Lake

Legion Lake is located in the City of Richfield, part of a series of lakes and wetlands that are outside the municipal boundary of the City which ultimately flow into Lake Nokomis. Legion Lake is the uppermost westerly lake that drains into Taft Lake, which is at the southwest quadrant of the Crosstown/Cedar Avenue interchange in Richfield. Mother Lake, located within the boundaries of the Metropolitan Airport, is the easterly, uppermost lake. Mother Lake also discharges to Taft Lake. Taft Lake discharges into Solomon Park Wetland, which in turn discharges to Lake Nokomis.

A 2-acre pipeshed area in Minneapolis discharges to Legion Lake. No impairments have been identified for Legion Lake, but Legion Lake is involved in the TMDL for Lake Nokomis. Legion Lake flows intermittently to the Mother-Taft-Solomon wetland complex described in the previous paragraph, which is connected to Lake Nokomis.

The City of Richfield, partnered with MCWD, has completed a Taft Lake/Legion Lake Water Quality Improvement Project in an effort to treat a large area of urban stormwater runoff that previously drained into both lakes. Although neither Taft Lake nor Legion Lake are listed as impaired, both lakes are involved in the TMDL for Lake Nokomis into which they drain. The project was completed in 2016 and includes a water reuse infiltration system, native prairie restoration and buffers, grit chambers (Legion Lake only), in-situ flocculation treatment systems (Taft Lake only), construction of the Richfield Parkway North Connection, and removal of Taft Lake Frontage Road.

Mother Lake

Mother Lake is located at the northwestern corner of the MSP International Airport, situated at the southeast corner of the intersection of Highway 62 and Cedar Avenue, east.

Mother Lake is part of a series of lakes and wetlands that are outside the municipal boundary of the City, which ultimately flow into Lake Nokomis. Mother Lake is the easterly, uppermost lake located within the boundaries of the Metropolitan Airport. Mother Lake discharges to Taft Lake, which is at the southwest quadrant of the Crosstown/Cedar Avenue interchange in Richfield. Legion Lake is the uppermost westerly lake that also drains into Taft Lake. Taft Lake discharges into Solomon Park Wetland, which in turn discharges to Lake Nokomis.

A 3-acre pipeshed area of Minneapolis discharges to Mother Lake. A few remnant wetlands are present at the airport and nearby Mother Lake. The taxiways of two runways are present in the drainage area, which would be associated with vehicular traffic and airplane movement, but no maintenance, deicing, or fueling is conducted in this area. Richfield maintenance facility and MnDOT materials storage and maintenance facility, as well as adjacent Cedar Avenue and Highway 62 roadways, also drain into the lake.

Per the EPA Waterbody Quality Assessment Report online database and the MPCA 2016 Minnesota Impaired Waters List, Mother Lake is not listed as impaired. However, it was noted that Mother Lake, though not itself listed, is involved in the TMDL study for Lake Nokomis, which is directly downstream from Mother Lake.

Richfield Lake

Richfield Lake is in the City of Richfield, immediately southeast of the intersection of I-35W and Highway 62. Minnehaha Creek is located farther north. The Lake is surrounded by Richfield Lake Park. A 58-acre pipeshed area of Minneapolis discharges to Richfield Lake.

Richfield Lake was divided by construction of Highway 62, resulting in part of the former lake being separated to the northwest. The waterbody separated from Richfield Lake is now a wetland known as Grass Lake. The two lakes are joined by a pipe to preserve their former hydrogeology. Stormwater runoff and storm sewers from the highway drain into the lake and wetlands. In 1995, grit chambers were constructed at the end of the sewer pipes to filter out debris form water discharging to the lake and wetlands.

Per the EPA Waterbody Quality Assessment Report online database and the MPCA 2016 Minnesota Impaired Waters List, Richfield Lake is not listed as impaired.

Silver Lake

Silver Lake is situated upstream of Hart Lake between the City of New Brighton and the City of Columbia Heights, south of I-694 and west of I-35W. The Silver Lake watershed is in the southwest portion of the RCWD. A 25-acre pipeshed area of Minneapolis discharges to Silver Lake.

There are two islands in the lake, one of which is accessible by bridge. Overall, the lake is shallow; however, there is a 47-foot deep hole, which is the proposed site for an in-lake alum treatment system.

The MPCA's 2018 Draft Impaired Waters List identified impairments to Silver Lake, as summarized in Table 3.48.

Table 3.48 – Silver Lake Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Recreation/Nutrient/Eutrophication Biological Indicators/2002 Aquatic Consumption/Mercury in Fish Tissue/2012 Aquatic Life/Chloride/2014
TMDL Status	Excess Nutrients: TMDL study approved in 2010 Mercury in Fish Tissue: statewide TMDL approved in 2008. Silver Lake retroactively added to the statewide TMDL approved study in an update in 2012 Chloride: metropolitan-wide TMDL approved in 2016
Minneapolis Related Implementation Actions	Excess Nutrients: urban/residential nutrient reduction strategies are encouraged Mercury in Fish Tissue: no responsibilities for local municipalities Chloride: assessment of winter practices recommended

Solomon Park Wetland

Solomon Park Wetland is in the Edward C. Solomon Park south of Lake Nokomis and north of Taft Lake, across from Highway 62. The Solomon Park area was formerly located within the City of Minneapolis. Recent municipal boundary adjustments resulted in this area becoming part of the unincorporated area of the MSP International Airport. Taft Lake was formerly located within the City of Minneapolis. Recent municipal boundary adjustments resulted in Taft Lake becoming part of the unincorporated area of the MSP International Airport. The lake is part of the larger Mother Lake, Taft Lake, Lake Nokomis complex located northwest of the MSP International Airport. The land was acquired by the MPRB in 2004 from a land swap and long-term lease with the Metropolitan Airports Commission. The Hennepin County WHEP is an ongoing wetland monitoring program that uses a MPCA-developed approach to measure vegetation and invertebrate diversity. WHEP monitored this wetland in 2005.

Taft Lake

Taft Lake was formerly located within the City of Minneapolis. Recent municipal boundary adjustments resulted in Taft Lake becoming part of the unincorporated area of the MSP International Airport. Taft Lake is bordered to the north and northwest by Highway 62, to the east by Cedar Avenue, and to the south by Taft Park. Legion Lake is near the southwest of Taft Lake and Mother Lake is located to the east, across Cedar Avenue. A 139-acre pipeshed area of Minneapolis discharges to Taft Lake.

The City of Richfield, partnered with MCWD, conducted a Taft Lake/Legion Lake Water Quality Improvement Project to treat a large area of urban stormwater runoff that previously drained into both lakes. Although neither Taft Lake nor Legion Lake are listed as impaired, both lakes are involved in the TMDL for Lake Nokomis into which they drain. Additionally, Taft Lake is listed as a high-risk waterbody for potential chloride impairment, which means that the chloride concentration in at least one sample of water within the past 10 years was within 10 percent of the chronic water quality standard (207 mg/L chloride). Although the lake has not been listed as impaired for chloride, the TCMA Chloride Management Plan encourages high risk waterbodies to follow proactive actions similar to those for impaired waters.

Wirth Lake

Wirth Lake is situated immediately south of Olson Memorial Highway (Highway 55) in Theodore Wirth Park in Golden Valley, west of downtown Minneapolis, and is managed by the MPRB. The BCWMC classifies Wirth Lake as a priority waterbody for management purposes.

A majority of the lake's approximately 400-acre watershed is located in the City of Golden Valley and a minor southern portion of the watershed area, 37 acres, is located within the City of Minneapolis.

Wirth Lake is included in MPRB's lake monitoring program. Monitoring results are published each year in the MPRB annual Water Resources Report. Additional information on MPRB water quality monitoring is contained in this Section 3, subsection City-Wide Water Quality Monitoring and Other Efforts.

The MPCA's 2018 Draft Impaired Waters List identified impairments for Wirth Lake, as summarized in Table 3.49.

Table 3.49 – Wirth Lake Impaired Waters Summary

MPCA Impaired Water Status	Impairment
Use/Impairment/Date Listed	Aquatic Recreation/Nutrient/Eutrophication Biological Indicators/2002 (DELISTED 2014) Aquatic Consumption/Mercury in Fish Tissue/1998 Aquatic Life/Chloride/2016
TMDL Status	Excess Nutrients: TMDL approved in 2010 Mercury in Fish Tissue: statewide TMDL approved in 2008 Chloride: metropolitan-wide TMDL plan approved in 2016
Minneapolis Related Implementation Actions	Mercury in Fish Tissue: no municipal action required Chloride: assessment of winter practices recommended

Wetland Inventories

The City of Minneapolis has several wetlands within its boundaries that are identified on the National Wetlands Inventory (NWI) established by the U.S. Fish and Wildlife Service, which do not receive stormwater runoff from the City-owned storm drain system and are not on the MNDNR protected waters list. These wetlands are shown on Figure 3.11 and Figure 3.12. These NWI wetlands consist of many smaller wetlands that are located on either public or privately-owned properties. The primary purpose of the NWI is to track the extent and status of all wetlands in the United States. A secondary purpose of this inventory is to serve as a planning tool to determine if a wetland may be affected by a proposed project.

The MCWD also manages an inventory of wetlands which are greater than one-quarter acre in area. The functional assessment inventory, completed in 2003, evaluated the condition of each wetland and categorized into four management categories. This inventory is incorporated into this WRMP by reference.

The City uses MnRAM to assess all other wetlands in the City, those not otherwise inventoried by the NWI or by a watershed organization. MnRAM is a functional wetland assessment technique developed and maintained by the Minnesota Board of Water and Soil Resources.

Figure 3.11 – City of Minneapolis Wetlands (North of Downtown) – National Wetlands Inventory

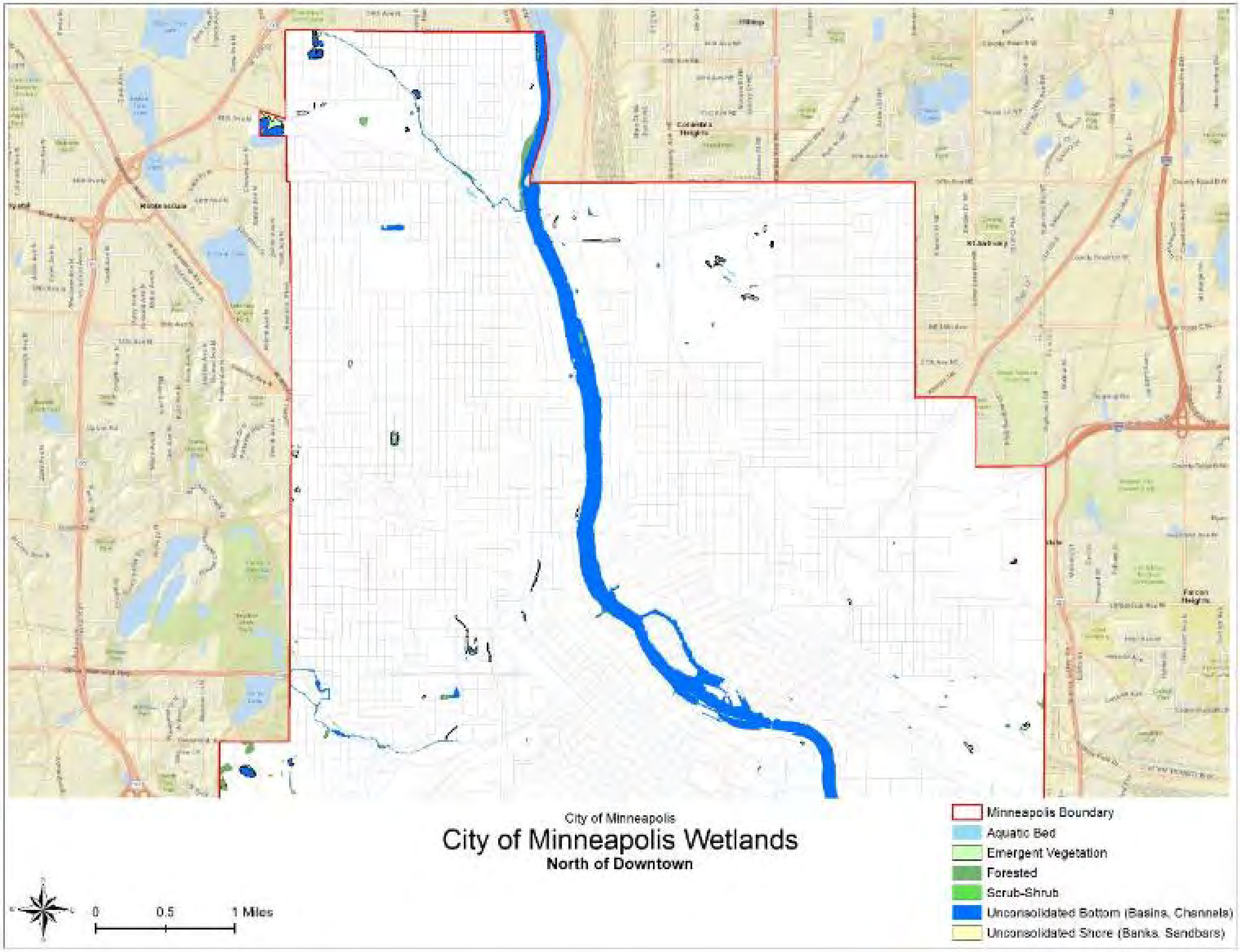
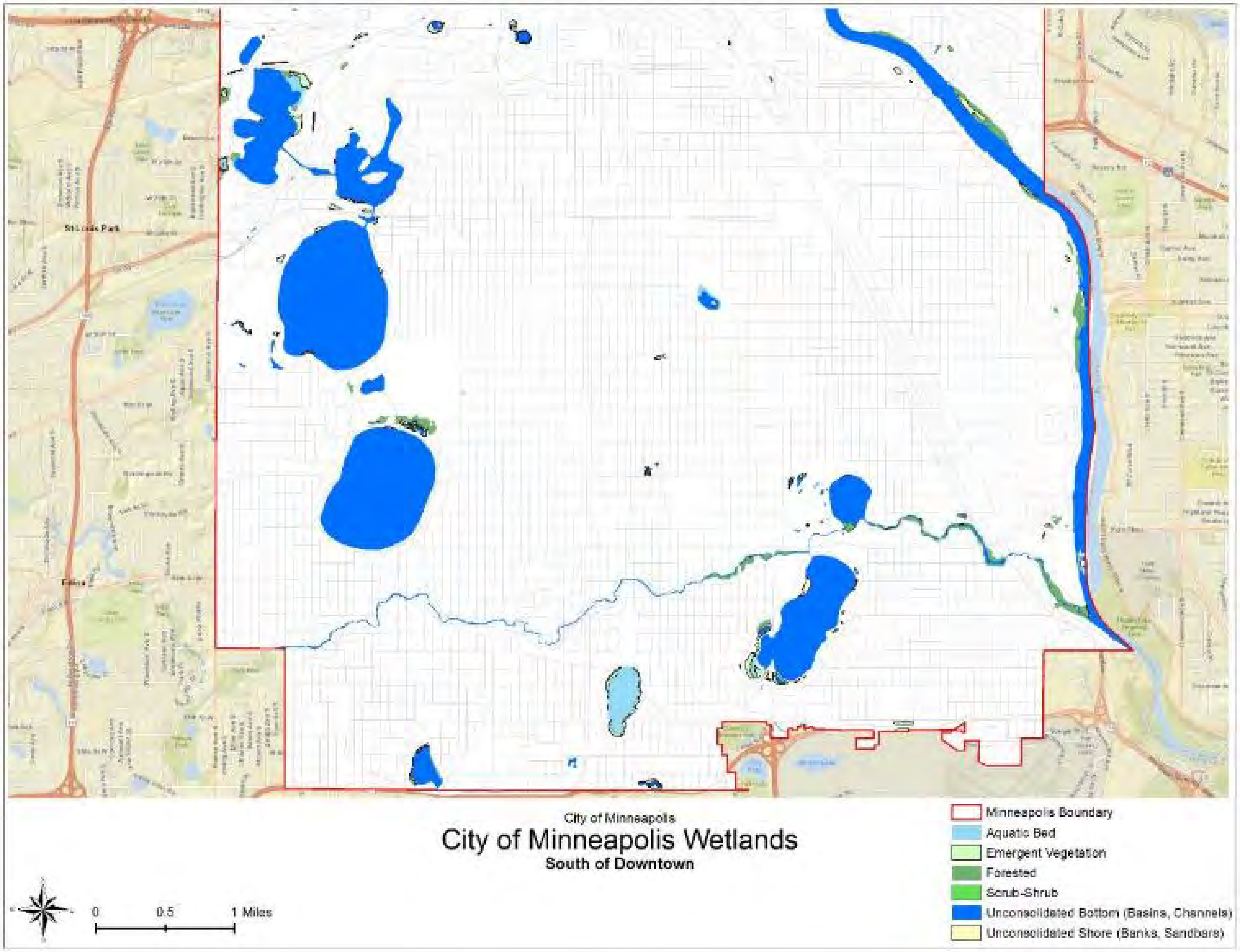


Figure 3.12 – City of Minneapolis Wetlands (South of Downtown) – National Wetlands Inventory



Groundwater

There are many agencies that manage aspects of groundwater in the City. There is no single source for groundwater data in the City; however, information is available at multiple locations:

- The City issues a Temporary Water Discharge Permit. This permit is short-term for construction purposes and does not allow permanent discharge of groundwater so projects must be designed and implemented in a manner that does not rely on permanent groundwater discharge.
- The Minneapolis Department of Health – Environmental Services maintains permits for construction or sealing of wells.
- The MPRB monitors groundwater levels at 8 locations within park property. Locations of MPRB wells are contained in the MPRB's annual Water Resources Report.
- The Minnesota Department of Natural Resources issues permits to construct wells and appropriate groundwater for wells that withdraw 1 million gallons or more of groundwater per year. Permittees are required to submit annual groundwater data on the MNDNR Permitting and Reporting System (MPARS), which is available for download. Data for each permitted well is available to be downloaded.
- The MNDNR maintains the Cooperative Groundwater Monitoring network, which is an inventory of observational monitoring wells that tracks the static water levels over time.
- The USGS maintains a nationwide inventory of groundwater data, which can be found at the National Ground Water Monitoring Network. There are no sites in the City currently monitored by USGS.
- The MPCA collects information on the quality of groundwater in Minnesota.
- The Metropolitan Council, as the agency responsible for long-term planning in the Twin Cities, uses MNDNR data to develop a regional model of the groundwater that is used to assess impacts of long-term water usage caused by population growth and other changes.

Groundwater discharges into the municipal or regional storm or sanitary sewer systems are not allowed without first receiving approval from the City of Minneapolis. Temporary or one-time discharges that are anticipated to occur during construction must first receive a Minneapolis Temporary Water Discharge Permit and provide all related information and supporting documentation needed to issue the permit. If groundwater discharges are anticipated to occur long-term, then a Minneapolis Long-Term Groundwater Discharge Approval must be issued. The City's Stormwater & Sanitary Sewer Guide provides information on permit requirements and supporting documentation needed.

City staff actively participate in working groups and committees that are established to coordinate groundwater management between multiple agencies and organizations. Currently, staff participates in the MPCA groundwater-surface water interaction committee that discusses research, policies, and practices related to those stormwater management practices that infiltrate stormwater runoff.

Additionally, the City is working with multiple local, regional, and state jurisdictions to evaluate shallow groundwater levels in the Lake Nokomis area of Minneapolis.

Unique Features/Fish and Wildlife Habitats/Scenic Areas/Natural Resources/Key Conservation Areas/Ecological Health

There are opportunities with shifts in land use, private redevelopment, and public road reconstruction to collaborate between City departments and with external stakeholders to achieve the best water resource outcomes for the City and it's receiving waters. Two plans have been developed that anticipate these shifts and propose changes that would benefit water resources:

- The MPRB, in cooperation with the MWMO, is in the process of development of an Ecological System Plan. Once complete, the Plan will recommend how to protect the ecology of the parks and the City through park improvement projects. As of the date of this WRMP, the MPRB Ecological Plan has completed development of goals and strategies. There is no set completion date for this effort. Additional information is available at the MPRB Ecological System Plan website.
- Hennepin County has created a natural resources interactive map that can be consulted for detailed information on land cover, ecological significant areas, soils, natural resource corridors, and other natural features for all parcels in the county.

Maps that note unique features, fish habitat, wildlife habitat, and scenic areas of the City that are contained in the Watershed Management Plans of the BCWMC, MCWD, MWMO, and SCWMC are included in this WRMP by reference.

City-Wide Water Quality Monitoring and Other Efforts

City-Wide Water Quality Monitoring and Other Efforts

Minneapolis Park and Recreation Board

As property owner of the lake shoreline in the City, the MPRB is responsible for shoreline maintenance and has created an effective program of monitoring and management, which is specifically described in each affected waterbody. Scientists have analyzed water quality parameters since 1927. The current MPRB lake monitoring program, initiated in 1991, consists of an in-depth assessment of lake quality based on bi-weekly monitoring.

The extensive MPRB monitoring program includes monitoring of:

- Aquatic invasive species
- Aquatic plants
- Fish kills
- Groundwater levels
- Irrigation and augmentation wells
- Lake levels
- Phytoplankton and Zooplankton Monitoring
- Stormwater management practices
- Stormwater runoff
- Winter ice cover

Lake Monitoring

The Environmental Operations Section of the MPRB implemented a lake water quality monitoring program in 1991 as part of a diagnostic study for the Chain of Lakes Clean Water Partnership, which focused on Brownie Lake, Cedar Lake, Lake of the Isles, Lake Calhoun/Bde Maka Ska, and Lake Harriet. The monitoring program was expanded in 1992 to include Lake Hiawatha, Lake Nokomis, Diamond Lake, Powderhorn Lake, Loring Pond, and Wirth Lake. Monitoring at Spring Lake was added on a limited basis in 1993 and Grass Lake was added in 2002. Currently, only ice conditions are monitored at Birch Pond and Ryan Lake. Ryan Lake is occasionally monitored by the Metropolitan Council's CAMP program.

The objectives of the MPRB lake monitoring program are to:

- Protect public health.
- Establish a database for tracking water quality trends.
- Quantify and interpret both immediate and long-term changes in water quality.
- Provide water quality information to develop responsible water quality goals.
- Provide a basis for water quality improvement projects.
- Evaluate the effectiveness of implemented best management practices such as ponds and grit chambers.

A list of the parameters and monitoring frequency is contained in Table 3.50.

Table 3.50 – Schedule of Sampled Parameters for MPRB Monitored Lakes

Parameters	Sampling Frequency
Chloride, Chlorophyll-a, Conductivity, Dissolved Oxygen, pH, Phytoplankton, Secchi Transparency, Temperature, Total Phosphorus, Soluble Reactive Phosphorus, Total Nitrogen, Turbidity	Once per Winter Once in March or April Twice per month May through September Once in October or November
Silica	Once per Winter Once in March or April Once per month May through September Once in October or November
Zooplankton	Once in March or April Once per month May through September Once in October or November
Alkalinity, Ammonia, Hardness, Sulfate, Total Kjeldahl Nitrogen, Nitrate/Nitrite	Once per Winer Once in March or April Once per month May through September Once in October or November
Escherichia coli (*E. coli*)	Once per summer for each lake Weekly at public beaches

LAURI

The MPRB has developed a lake quality classification system termed LAURI (Lake Aesthetic and User Recreation Index) to provide a graphical snapshot of lakes in a non-scientific format. The MPRB uses the Trophic State Index (TSI) as a benchmark for comparison of water quality across all lakes in the City. TSI is calculated from a water transparency, chlorophyll-a values, and surface phosphorus values to produce a score from 0 to 100, although theoretically, the scale has no upper or lower bounds, with higher numbers relating to higher trophic status and lower water quality. In the Twin Cities metropolitan area, it is recommended that a TSI score of 59 or lower be maintained in lakes used for swimming. This recommendation is based upon the aesthetic appeal of the waterbody. Changes in lake water quality can be tracked by analyzing long-term trends in TSI scores. The MPRB uses TSI scores to assess changes in water quality and evaluate the effectiveness of restoration and management activities on the trophic state of the lakes.

The LAURI scoring system was created in 2003, refined in 2009, and again in 2017. LAURI considers five indices of water quality:

1. Public Health, as measured by *E. Coli* at public swimming beaches.
2. Water Quality, as measured by water clarity.
3. Habitat Quality, as measured by plant and fish diversity.
4. Recreational Access, as measured by availability and ease of public access.
5. Aesthetic, as measured by color, odor, garbage, and debris.

Data for the LAURI analysis is collected during regular lake monitoring activities and once per month during beach monitoring trips during the growing season from May through September.

The classification system consists of values for each indicator that result in a score for each of the five measures. Currently, the MPRB reports LAURI information for:

- Brownie Lake
- Lake Calhoun/Bde Maka Ska
- Cedar Lake
- Diamond Lake
- Lake Harriet
- Lake Hiawatha
- Lake of the Isles
- Lake Nokomis
- Loring Pond
- Powderhorn Lake
- Wirth Lake

Further detailed information is available in the Annual Water Quality Monitoring Reports published by the MPRB.

Beach Monitoring

The MPRB has 12 official beaches located on six lakes:

- Wirth Lake (1)
- Cedar Lake (3)
- Lake Calhoun/Bde Maka Ska (3)
- Lake Harriet (2)
- Lake Hiawatha (1)
- Lake Nokomis (2)

MPRB Lake Monitoring

Credit: Minneapolis Park and Recreation Board

Prior to 2003, the City of Minneapolis Environmental Health Department monitored the beaches for fecal coliform bacteria. The MPRB began beach monitoring in 2003 and tested the beaches for *E. coli*, as well as fecal coliform bacteria. From 2004 to the present, MPRB Environmental Management staff monitored the beaches for *E. coli* alone as recommended by the EPA. Epidemiological testing allowed the MPCA to develop an inland lake standard which MPRB has followed since 2006. The inland lakes standard has a single-sample limit of 1,260 organisms per 100 mL and was accepted into rule during 2008 and has been used by MRPB since that time. The MPRB will temporarily close beaches whenever *E. coli* levels exceed these levels. Up-to-date monitoring information for each MPRB beach monitoring information is available from the MPRB.

Zebra Mussel Action Plan

The MPRB Zebra Mussel Action Plan was prepared in response to the discovery of zebra mussels in Lake Minnetonka in 2010 and the subsequent declaration of Minnehaha Creek, Meadowbrook Lake, Lake Hiawatha, and Lake Nokomis as infested waters. Lake Harriet was designated as infested in September 2017. The purpose of the plan is to identify organization-wide best management practices to eliminate the spread of Aquatic invasive species (AIS) through operational activities. The plan is updated to include new data and findings as needed. Key actions include:

- Establishment of operational procedures and best management practices for MPRB staff that access multiple waterbodies during their work activities.
- Purchase of an aquatic plant harvester so that all harvesting is conducted by MPRB staff, eliminating the potential of a contractor inadvertently moving zebra mussels into a City lake.
- Provide education pieces and communication with watercraft owners who have permits to store boats at canoe racks and sailboat buoys.
- Partnership with sailing organizations located on Minneapolis waters to maintain AIS Prevention plans that help to guide best management practices.

- Require contractors and researches working in Minneapolis waterways to maintain AIS Prevention plans along with required MNDNR permits and certifications as part of the permitting and contract process.
- Installation of public education signs and kiosks at boat landings and launches.
- Inspection of all boats and water-related equipment accessing MPRB boat launches on Lake Nokomis, Lake Harriet, and Lake Calhoun/Bde Maka Ska.
- Early detection monitoring of all City lakes for new AIS.
- Development of a comprehensive and adaptable AIS Response Plan in partnership with the MNDNR and the MCWD.

Aquatic Invasive Species Management and Inspection

Purple loosestrife is a shoreline plant that, once established, will rapidly crowd out native shoreline plant species. It has been designated as an invasive aquatic species by the MNDNR. The MPRB works to control loosestrife through biocontrol, the release of beetles that exclusively feast on the loosestrife. This program was developed in the 1990s as part of a cooperative pilot program developed by the MPRB, Minnesota Department of Health (MDH), and the DNR. This biocontrol continues to be the primary management tool for control of purple loosestrife. The presence of this plant within MPRB properties has declined significantly since initiation of this program, although controlled areas of the loosestrife remain to perpetuate the beetle population. Purple loosestrife is controlled at Wirth Lake, Lake Calhoun/Bde Maka Ska, Birch Lake, Lake Harriet, Cedar Lake, and Lake of the Isles.

Eurasian Water Milfoil is a submerged aquatic plant that has been designated as an invasive species by the MNDNR. The MPRB manages the plant in certain lakes by mechanical harvesting.

The MPRB began their Aquatic Invasive Species (AIS) Inspections Program in 2010 with occasional DNR staffed inspections during prime use hours. The MPRB, understanding that prevention is the key to protecting Minneapolis waterbodies, further supported the Inspections Program in 2012 by enacting rules and allocating funding and staff for AIS protection efforts. These efforts included the 100 percent inspections requirement at boat launches on Minneapolis lakes, signage, ability to lock launches when inspectors were not on duty, and increased education efforts.

The MPRB has continued to support AIS prevention with allocated funds, enforced inspection rules at MPRB boat launches, strong partnerships with the boating community, comprehensive sampling and monitoring programs, and education campaigns. MPRB staff work closely with state and local organizations to be abreast of the most current AIS research, prevention, and management efforts.

The MPRB Inspection Program currently requires that all watercraft and water-related equipment accessing the boat launches on Lake Nokomis, Lake Harriet, and Lake Calhoun/Bde Maka Ska between May 1 and December 1 be inspected by DNR-trained staff and certified AIS Inspectors. The launches are closed when Inspectors are not on duty. Inspectors provide AIS education and customer service to the public, as well as assist with early detection monitoring efforts at the launches.

The AIS Inspection Program is conducted by the MPRB in cooperation with the following partners:

- MCWD will provide 36 percent of inspection program costs for 2018.
- Friends of Lake Nokomis monitors early detection zebra mussel samplers on Lake Nokomis.

Wetland Health Evaluation Project

The Hennepin County Wetland Health Evaluation Project (WHEP) is a volunteer wetland monitoring program that uses an MPCA-developed approach to measure vegetation and invertebrate diversity. In Minneapolis, the efforts are coordinated by Hennepin County and funded by the MPRB and the City. This program has expanded to include monitoring of 34 wetlands in Hennepin County, of which six are located within the City, as listed on Table 3.50.

WHEP utilizes teams of MPCA-trained volunteers to collect and analyze wetland data to characterize wetland health. Hennepin County Environmental Services staff then cross-check, synthesize, and report the collected data back to the partner organizations and to the public. Sampling from the wetlands includes both vegetation and invertebrate data. Monitoring results are reported annually by Hennepin County.

The MPRB has sponsored WHEP volunteer teams to monitor wetlands within the park system each year since 2002. Every summer, several wetlands are monitored depending on the needs of the MPRB. Table 3.51 lists the seven sites monitored in 2016 as part of the MPRB sponsored program, including the Roberts Bird Sanctuary wetland, which is monitored annually as a reference wetland site for the City of Minneapolis.

Table 3.51 – Hennepin County Wetland Health Evaluation Project Monitored Wetlands (2016)

WHEP Wetland	2016 Invertebrate Rating	2016 Vegetation Rating
Diamond Lake	Moderate	Moderate
Robert's Bird Sanctuary	Moderate	Moderate
Heritage Park [a]	Moderate	Moderate
Wirth Beach Wetland [b]	Moderate	Moderate
Lower Wirth [b]	Moderate	Moderate
Webber Stormwater Pond [a]	Poor	Moderate
Webber Regeneration Pond [c]	Poor	Moderate

[a] *Stormwater wetland*
[b] *MPRB lake outside Minneapolis municipal boundary*
[c] *Natural swimming pond managed by MPRB*

According to the 2016 report, the wetlands in the City appeared to have moderate to poor invertebrate conditions and moderate vegetation conditions. A historical summary of all WHEP monitoring results is available on an interactive map developed by Hennepin County.

MPRB Golf Course Wetlands Monitoring

The MPRB golf course maintenance staff has received certification through the Audubon International Cooperative Sanctuary Program for golf courses. This certification is a result of the MPRB following environmental management practices that have been developed by Audubon International. A component of this management is ongoing collection and analysis of water samples and visual surveys of aquatic and wetland vegetation. Results are published in the annual Water Resource Reports.

The Audubon Cooperative Sanctuary Program for Golf (ACSPG) is an education and certification program that helps golf courses protect the environment, preserve natural areas, and protect wildlife through improve efficiency and minimize harmful impacts. Audubon International provides both a Site Assessment and Environmental Planning Form to provide guidance for certification. The areas used for the certification process are:

- Environmental Planning
- Wildlife and Habitat Management
- Chemical Use Reduction and Safety
- Water Conservation
- Water Quality Management
- Outreach and Education

MPRB collects both water and vegetation data required for their annual certification by the ACSPG. The ACSPG has a water quality and aquatic plant monitoring component as part of their final certification. Each golf course integrates these data (plant and water chemistry) into their final certification application.

Source Water Protection – Minneapolis

In 1996, amendments to the Safe Water Drinking Act required source water assessments to be prepared for public water systems. The City's own assessment, completed in 2001 and updated in 2009, provides information on:

- The area which supplies drinking water to the Minneapolis Public Works.
- An overview of why this source is susceptible to potential contamination.
- A description of the contaminants of concern.
- The sources of the contaminants of concern, if possible.

The City obtains its drinking water from the Mississippi River, and the Minneapolis Water Works intake is in Fridley. The area most directly connected to the supply and the area over which a spill or contamination could quickly reach the intake is termed the "inner emergency response area." This area includes subwatersheds immediately adjacent to the Mississippi River from the intake upstream to Elk River – a distance along the river of 26 miles. The "outer source water management area" is conceived as an area where protection against chronic sources of contamination is emphasized or where periodic low levels of contamination occur. This management area consists of those subwatersheds immediately adjacent to the Mississippi River from Elk River to Saint Cloud. Notably, the furthest extent of the City "outer source water management area" generally coincides with the downstream portion of St. Cloud's "inner emergency response area." The final assessment area is the entire Mississippi watershed, above the Twin Cities, approximately 19,000 square miles.

The Source Water Assessment document lists potential contamination sources. These sources are derived from several state and federal databases. The overall intent of the assessment is to provide public information. In the document's own words, "The assessment provides the community with a significant amount of information regarding where your drinking water comes from (the source) and what the risks are to the quality of that source." The 2001 Source Water Assessment is available from the Minnesota Department of Health.

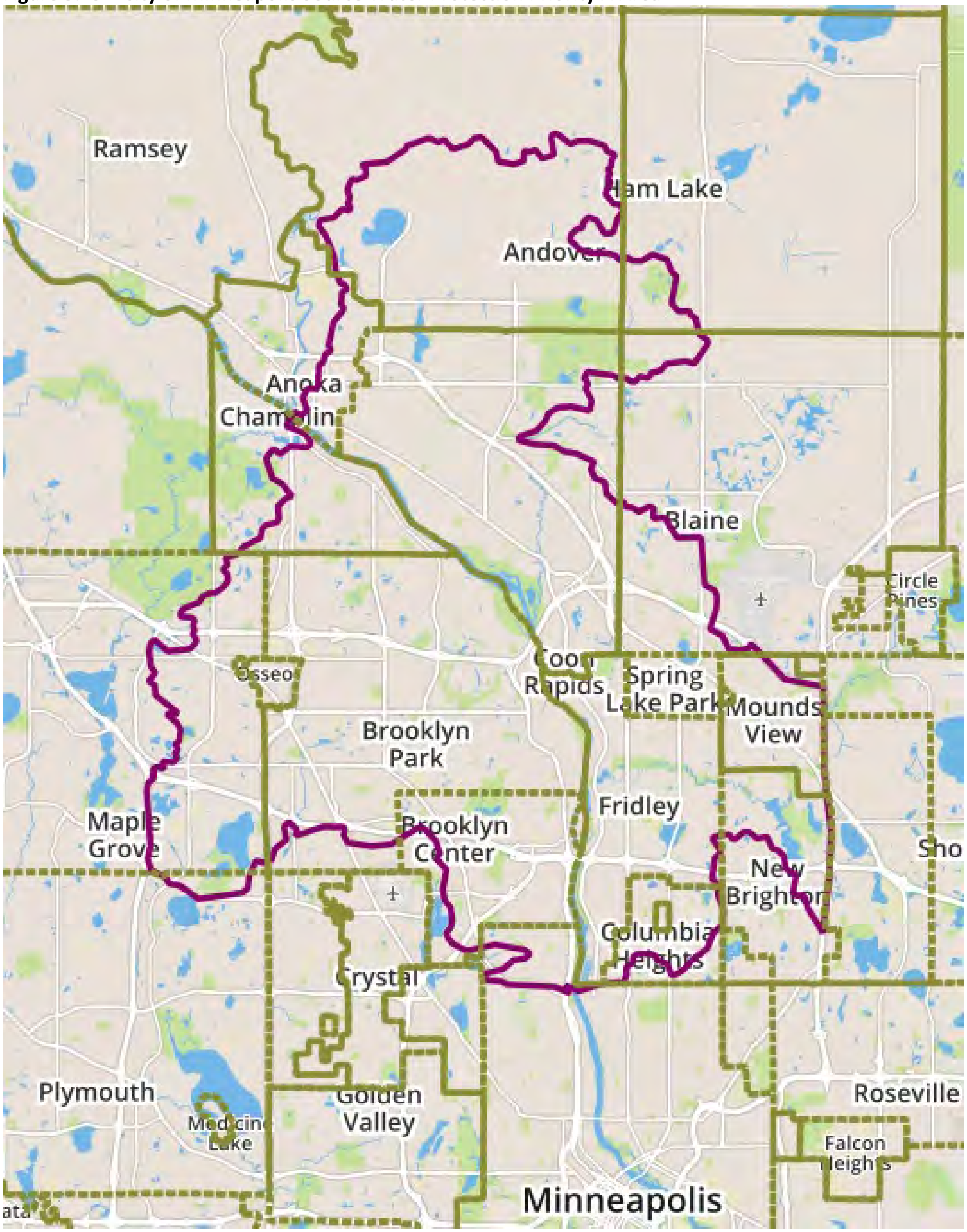
Source Water Protection Plan

In 2002, the City partnered with Saint Cloud and Saint Paul to develop the Upper Mississippi River Source Water Protection Plan, a two-part document that delineates the source water protection area, assesses the susceptibility of contamination, and details the management strategy. Part 1, completed in 2005, delineates the source water protection area and analyzes its sensitivity and susceptibility. Part 2, completed in 2009, develops a specific plan to protect the City's surface water intake from potential contamination. The plan is scheduled to be updated in 2019.

A portion of the City, roughly north of Victory Memorial Parkway, Weber Parkway, and Shingle Creek, falls within the Minneapolis Water Supply Priority Area A Source Water Protection Area, as delineated under the source water assessment in 2005. The area north of the line delineated on **Figure 3.13** represents the Priority A area of the City. The Minneapolis Priority Area A includes Shingle Creek and its watershed, even though the confluence of Shingle Creek and the Mississippi River is downstream of the City water intake. Because of the pooling of the Mississippi River due to the Saint Anthony Falls dam, the possibility exists that water downstream of the intake could travel upstream under certain conditions, such as high winds, and reach the intake. More information about the delineated source water protection area is available at the Upper Mississippi Source Water Protection Project MapFeeder.

In 2016, the City updated the Vulnerability Assessment and found that for the area of the City downstream of this Priority Area A, the City's drinking water source (the Mississippi River) qualifies as "low" in the risk ranking scheme. The risks of source water contamination or drought would either have very low consequences or is very unlikely to occur. It was concluded that additional investment in source water mitigation measures or contingency action strategies to supplement or replace the source would have little to no risk reduction benefits.

Figure 3.13 – City of Minneapolis Source Water Protection Priority A Area



Source: Upper Mississippi River Source Water Protection Project, MapFeeder, accessed December 5, 2017

Source Water Protection – Neighboring Municipalities

Five neighboring municipalities that rely on groundwater source for their potable water supply have identified Water Supply Management Areas of Vulnerability that reach into Minneapolis. Each municipality has identified the risk of well contamination for their water supply, as follows:

- Bloomington – Moderate/Low
- Edina – Moderate/Low
- Richfield – High/Moderate/Low
- Robbinsdale – Low
- Saint Louis Park – Moderate/Low

As described in Section 5 – Regulatory Controls and Water Resource Management Programs, the City will update its Development and Redevelopment regulations and practices as required in the NPDES Integrated Permit. The updates will incorporate requirements specific to these Areas of Vulnerability based on the level of risk that has been identified by each municipality.

Monitoring by Others

In addition to monitoring conducted by the City and the MPRB, there are numerous other agencies that have developed monitoring programs, surveys, and water quality improvement projects. A comprehensive list of these reports and activities is contained in Appendix E.

Compliance with Water Resource Improvement Requirements

The purpose of this section is to describe the physical environment of the City, including detailed descriptions of all surface waters. As property owner of a majority of the shoreline in the City, the MPRB and the City manage a full range of land management, shoreline management, and monitoring to ensure the health of the City's water resources. The MPRB's primary focus includes public education, lake management, monitoring, shoreline management, and property management of parklands adjacent to each water resource. The City's primary focus is on management of the stormwater drainage system: operation, maintenance, improvements, and annual reports. This management focuses on Stormwater Management Practices (SMPs), street maintenance, land management, ordinances, development and redevelopment controls, and public education.

The comprehensive projects and programs managed by the City and the MPRB as described in this section fully satisfy the surface water management requirements set by the NPDES permit, completed TMDL implementation plans, Metropolitan Council, and watershed management organizations. Requirements specific to infrastructure management are summarized in Section 4 – Infrastructure Inventory, Activities, and Assessment; those related to ordinances, education, and other non-structural activities are summarized in Section 5 – Regulatory Controls and Water Resource Management Programs. City projects and programs are fully compliant with the identified regulatory requirements, as described below.

TMDL Mitigation Plans Required Actions

The City is required, through its NPDES Integrated Permit, to comply with the MS4-designated actions contained in the approved TMDL implementation plans. In the City SWMP, Category 8, Progress Toward Waste Load Allocations for Approved Total Maximum Daily Loads, describes the City's overall requirements for compliance with TMDL WLAs. Table 3.52 summarizes the MS4 requirements for those surface waters that are either within the City municipal boundaries and/or receive stormwater runoff that is generated within the City. This table summarizes the requirements contained in TMDL Implementation plans approved as of December 2017. It does not include activities in draft TMDL plans nor information on TMDL studies have not been initiated.

Table 3.52 – TMDL Implementation Plan Requirements and Activities for the City of Minneapolis

Affected Surface Water(s)	Required Actions Under TMDL (for Minneapolis)	WRMP Reference	MS4 SWMP Reference	Other	Description
Aquatic Macroinvertebrate Bioassessments					
Shingle Creek	In-stream improvements: ▪ Shoreline stabilization ▪ In-stream habitat improvements ▪ Assessment of I-94 structure ▪ Create fish passage structure	Section 3 – Shingle Creek Section 6 – Capital Improvement Program	-	-	Cooperative CIP implementation between MPRB, SCWMC, and Minneapolis
Chloride					
Shingle Creek	▪ Upgrade deicing equipment ▪ Cover salt stock-piles ▪ Store cleared snow away from sensitive areas ▪ Operator training	Section 3 – Shingle Creek Section 4 – Stormwater System Operation and Maintenance	Category 6 – Pollution Prevention and Good Housekeeping for Municipal Operations	-	Winter street maintenance practices include proper salt storage, detailed accounting of salt application, condition assessment after each snow event, calibration and maintenance of equipment, and ongoing operator training.
Bassett Creek Brownie Lake Diamond Lake Loring Pond Minnehaha Creek Powderhorn Lake Silver Lake Spring Lake Wirth Lake	▪ Assessment of winter street maintenance practices	Section 4 – Stormwater System Operations and Maintenance	Category 6 – Pollution Prevention and Good Housekeeping for Municipal Operations	-	Winter street maintenance practices include proper salt storage, detailed accounting of salt application, condition assessment after each snow event, calibration and maintenance of equipment, and ongoing operator training.
Dissolved Oxygen					
Shingle Creek	In-stream improvements: ▪ Shoreline stabilization ▪ In-stream habitat improvements ▪ Assessment of I-94 structure ▪ Create fish passage structure	Section 3 – Shingle Creek Section 6 – Capital Improvement Program	-	-	Cooperative CIP implementation between MPRB, SCWMC, and Minneapolis

Affected Surface Water(s)	Required Actions Under TMDL (for Minneapolis)	WRMP Reference	MS4 SWMP Reference	Other	Description
Excess Nutrients					
Lake Hiawatha	▪ Infiltration BMP installation on MPRB properties	Section 6 – Capital Improvement Program	-	-	Cooperative CIP implementation between MPRB, MCWD, and Minneapolis
Lake Nokomis/Legion Lake/Taft Lake	▪ Water quality ordinance for redevelopment projects ▪ BMP retrofits	Section 5 – City of Minneapolis and Minneapolis Park and Recreation Board Code of Ordinances Section 6 – Capital Improvement Projects	Category 5 – Post-Construction Stormwater Management for Public and Private Projects Category 6 – Pollution Prevention and Good Housekeeping for Municipal Operations	-	Ongoing enforcement of stormwater management requirements for new construction projects. Cooperative CIP implementation between MPRB, MCWD, and Minneapolis.
Crystal Lake	▪ Provide focused education and outreach ▪ Implement BMPs as opportunities arise ▪ Perform pond maintenance ▪ Sweep streets twice annually	Section 4 – Stormwater System Operation and Maintenance Section 5 – Public Education, Participation, and Involvement Section 6 – Capital Improvement Projects	Category 1 – Public Education and Outreach Category 6 – Pollution Prevention and Good Housekeeping for Municipal Operations	-	Ongoing maintenance of streets and stormwater SMPs. Ongoing public education. Strategic installation of new structural SMPs.
Silver Lake/Hart Lake	▪ Neighborhood small scale water quality retrofits ▪ P-free fertilizer lawns ▪ Education programs	Section 5 – City of Minneapolis and Minneapolis Park and Recreation Board Code of Ordinances Section 6 – Capital Improvement Projects	Category 1 – Public Education and Outreach Category 6 – Pollution Prevention and Good Housekeeping for Municipal Operations	-	Ongoing public education. Strategic installation of new structural SMPs.
Ryan Lake	▪ In-lake monitoring	Section 3 – City-Wide Water Quality Monitoring	-	MPRB Annual Report	Long-term monitoring to ensure nutrients remain within acceptable limits.

Affected Surface Water(s)	Required Actions Under TMDL (for Minneapolis)	WRMP Reference	MS4 SWMP Reference	Other	Description
Fecal Coliform (Bacteria)					
Bassett Creek Minnehaha Creek Shingle Creek	▪ Pet waste ordinance ▪ IDDE inspection and enforcement ▪ Storm drain maintenance	Section 4 – Stormwater System Operation and Maintenance Section 5 – Public Education, Participation, and Involvement	Category 1 – Public Education and Outreach Category 3 – Illicit Discharge Detection and Elimination Category 6 – Pollution Prevention and Good Housekeeping for Municipal Operations	-	Ongoing maintenance of stormwater SMPs. Ongoing inspection and enforcement of IDDE requirements. Ongoing public education.
Mercury in Fish Tissue					
Brownie Lake Cedar Lake Lake Calhoun/Bde Maka Ska Lake Harriet Lake Nokomis/Legion Lake/Taft Lake Lake of the Isles Mississippi River (downstream of Saint Anthony Falls) Powderhorn Lake Silver Lake/Hart Lake Wirth Lake	▪ Statewide actions by MPCA	NA	NA	NA	-
PFOS in Fish Tissue					
Lake Calhoun/Bde Maka Ska Lake Harriet Lake of the Isles	▪ Regulatory action by MPCA	NA	NA	NA	-

Watershed Organization Required Actions

Two of the four watershed organizations in the City have identified specific surface water actions that will require cooperation by the City, the BCWMC, and the MCWD. The MWMO and the SCWMC have not designated specific water resource actions for implementation by the City.

BCWMC requires its member cities to implement capital improvement projects upon order by the BCWMC. The City projects recommended in the 2015-2025 Watershed Management Plan include:

- Bassett Creek Main Stem Channel Restoration, Cedar Lake Road to Irving Avenue.
- Water quality improvement project in Theodore Wirth Park (undefined).
- Water quality improvement project in Bryn Mawr Meadows.
- Water quality improvement project in Bassett Creek Park.
- Dredging of sediment accumulated within Theodore Wirth Park segment of Bassett Creek.
- Restoration and stabilization of historic Bassett Creek channel.

The City will continue to cooperatively work with the BCWMC towards implementation of these projects.

Additionally, the BCWMC requires that member cities assess the need for a waterbody management classification system. The City aims to be consistent with water resource management in a manner that complies with requirements of all four watershed organizations and that does not create unique systems for regions or watersheds within the City. Therefore, the City opts to not create a separate waterbody classification system.

MCWD requires that member cities assess the potential for erosion at stormwater outfalls caused by excessive runoff discharge velocities. Outfalls identified as having high potential for erosion would require further assessment to determine whether erosion control or energy dissipation could mitigate erosion. The City is in the process of developing stormwater runoff models that will, when complete, predict the discharge velocities at all City outfalls. Once this effort is complete, the City will be able to determine which outfalls have the potential for erosive flows and require additional analysis and mitigation. The MCWD is in the process of development of a 2018 project, in partnership with the MPRB and the City, that will stabilize eroded banks and other erosion areas along the Creek. This work will be funded, in part, by 2014 flood damage funds from the Federal Emergency Management Agency (FEMA).

Minneapolis will continue to work closely with all watershed management organizations towards protection and improvement of water resources in the City. These actions will include, but not be limited to, the sharing of information, review of draft reports, and reference to watershed studies when implementing local projects and programs.

Prioritized Assessment of Water Resource Problems

The City's role in water resource management is to manage its infrastructure in a manner that maintains or improves the quality of water being discharged to surface waters. Within the City of Minneapolis, the in-lake or in-stream water resource management is the responsibility of others, primarily the MPRB as property owner of a majority of the shoreline in the City. The City is working to implement an integrated infrastructure improvement program that maximizes public investments and minimizes risk to human health and the environment. Generally, compliance with NPDES permit requirements, including TMDL required projects, are given the highest priority. Capital improvement projects and sanitary/stormwater management programs that mitigate one or more of the following risks are also given high priority: prevention of the loss of life/personal injury, prevention of severe property damage, minimization of the release of raw sewage, and/or improvement of surface water quality. Projects and programs that mitigate multiple risks are prioritized higher than those that mitigate only one risk.

Additional information on how the City management its water resource infrastructure is contained in Section 4 – Infrastructure Inventory, Activities, and Assessment, and information of water quality programs is contained in Section 5 – Regulatory Controls and Water Resource Management Programs.

Section 4 – System Infrastructure Inventory, Activities, and Assessment

Overview

The City of Minneapolis' (City) sewer and stormwater infrastructure serves to protect water resources via the management of sanitary sewage and stormwater runoff. The City, as primary steward of this infrastructure, has developed a comprehensive set of practices and programs that serve to maintain the function, integrity, and capacity of these systems. This section of the Minneapolis Water Resources Management Plan (WRMP) inventories the City's built stormwater and sewage conveyance systems. Although the City's sanitary and stormwater systems are predominantly independent systems, they were historically connected and, therefore, are managed as interrelated systems that work together to protect the City's water resources.

The major components of each system, as used in this WRMP, consist of:

- Sanitary Sewer System – Sanitary sewer conveyance infrastructure includes pipes, manholes, and lift stations. This infrastructure connects to the Metropolitan Council interceptor, regulator, and treatment facilities for final treatment and discharge to the Mississippi River.
- Stormwater Drain System – The stormwater drain system includes stormwater drainage and conveyance infrastructure, such as gutters, catch basins, pipes, and channels. The system also includes flood control basins and water quality treatment structures such as wet ponds, grit chambers, and infiltration features (rain gardens, infiltration trenches, and tree vaults).

Development of this WRMP involved preparation of an inventory of the sewer systems and development of maps that is based on existing current data and from the City's geographic information system (GIS) database, accessed July 12, 2017. Electronic versions of all GIS maps contained in this section are available to the public, to public agencies, and to watershed organizations upon request.

St. Anthony Falls, 1865

Credit: Minnesota Historical Society

History

The Minneapolis sanitary sewer and stormwater drain systems began in the 1870s as a single-sewer system where all sanitary sewage and stormwater runoff was collected into a single pipe system that discharged directly to either the Mississippi River or Bassett Creek. In the 1920s, the City adopted a two-pipe, separate sewer and stormwater infrastructure policy requiring installation of both stormwater drain and sanitary sewer systems for developing areas of the City. This policy remained in effect until the 1960s, when the City began to add stormwater drains in the pre-1920s single-sewer areas of the City. This new program allowed for redirection of the stormwater runoff from the sanitary sewers into the new stormwater drains. As of 2017, this sewer separation work is substantially complete. The success of this separation effort is evidenced by the near elimination of the risk of wet weather overflows from the sanitary sewer system. Small pockets of direct stormwater connections to the sanitary sewers remain and are described in additional detail in this section. A more detailed description of the history and evolution of the City's sanitary sewer and stormwater infrastructure is described in Section 1 – History and Overview of Minneapolis Water Resources.

Infrastructure Inventory

Sanitary Sewer System

Brick Sanitary Sewer

Credit: Minneapolis Public Works

The City maintains a sanitary sewer system that is more than 140 years old. Because the City is fully developed, major additions to the system are minimal. As is typical with fully-developed cities, the City has a large inventory of older assets constructed during a period of rapid expansion. The oldest sewers in the City system are brick or non-reinforced cement pipe. In the 1880s and early 1890s, brick was used for large diameter sewers (24-inch to 96-inch) which were typically egg-shaped. The egg shape was oriented with the narrow section of the egg at the invert to efficiently convey sanitary flows. The larger section at the top of the egg-shaped sewer provided capacity for higher flows associated with stormwater runoff. These brick and cement sewers are still in operation today. For larger sewers, brick construction was abandoned in approximately 1930 with the emergence of concrete sewer pipe. Smaller diameter (12-inch to 24-inch), oval-shaped cement sewers were installed in areas with lower sewer flow contributions until approximately 1884.

In 1896, the City abandoned the use of cement pipe and began using vitrified clay pipe. Clay remains as the preferred material for smaller diameter sanitary sewer construction throughout the City.

As of 2017, the City, MPRB, and Metropolitan Council sanitary sewer system of shallow sewers and deep tunnels totals 835 miles of trunk and local sewers, which breaks down into 757 miles of City/MPRB sewers and 78 miles of Metropolitan Council interceptors. The interceptor system was originally built by the City and operated as part of the Minneapolis and Saint Paul Sewerage District from the 1930s until 1967 when it was taken over by the Metropolitan Council subsequent to action by the Minnesota legislature. By owner, the City owns 90.6 percent of the sewers, Metropolitan Council owns 9.4 percent of the sewers. Table 4.1 and Table 4.2 present the types, ages, and total lengths of each type of the 757 miles of Minneapolis sanitary sewer system. Figure 4.1 shows the City and Metropolitan Council sanitary sewers, lift stations, and interceptors. Figure 4.2 shows the locations where the City sewers connect to the Metropolitan Council interceptor system.

Table 4.1 – Material and Age of Sanitary System [a]

Material	Size	Year Constructed	Percent of System
Clay	6-inch to 48-inch	1882 to present	78%
Brick	18-inch to 78-inch	1870 to 1930	11%
Cement	10-inch to 18-inch	1882 to 1886	3%
Concrete/RCP	12-inch to 102-inch	1927 to present	3%
Other [b]	6-inch to 102-inch	1931 to present	5%

[a] *Geodatabase data accessed December 30, 2015*

[b] *Cast Iron, Ductile Iron, High Density Polyethylene, Polyvinyl Chloride, Corrugated Metal, Polypropylene, Fiberglass Resin Cement, combined materials, and unknown materials*

Table 4.2 – Sanitary Sewer System Infrastructure Inventory

Component	Length/Quantity
Pipes	
Tunnels	6.1 miles
Trunk and Local Sewers [a]	748 miles
Metropolitan Council Interceptors	78.3 miles
Forcemain	0.5 miles
Pipe-in-Pipe	2.4 miles
Structures	
Manholes [a]	27,499
Lift Stations	9
Regulators (Metropolitan Council owned)	7

[a] *Geodatabase data accessed July 12, 2017*

The regulators inventoried in Table 4.2 were installed in the 1930s to allow for direct discharge of the combined sewage/stormwater into the Mississippi River. The purpose of these regulators was, and continues to be, to prevent the backflow of sewage into basements and onto streets whenever the hydraulic capacity of the sanitary sewer is exceeded during significant rainfall events and to prevent damage to the sanitary sewer as a result of over pressurization that could occur during an intense rain event. Since the 1980s, the City's efforts to reduce the volume of inflow/infiltration (I/I) has resulted in the closure of many of these regulators; as of 2016, only seven remain. The location of these seven regulators and tributary sewersheds are shown in Figure 4.3. The City and the Metropolitan Council have determined that the elimination of these overflow structures may not be feasible due to the potential for public health and safety hazards, in the event that an intense rainfall exceeds the capacity of the sanitary system.

Figure 4.1 – City of Minneapolis Sanitary Sewers, Lift Stations, Intercommunity Connections

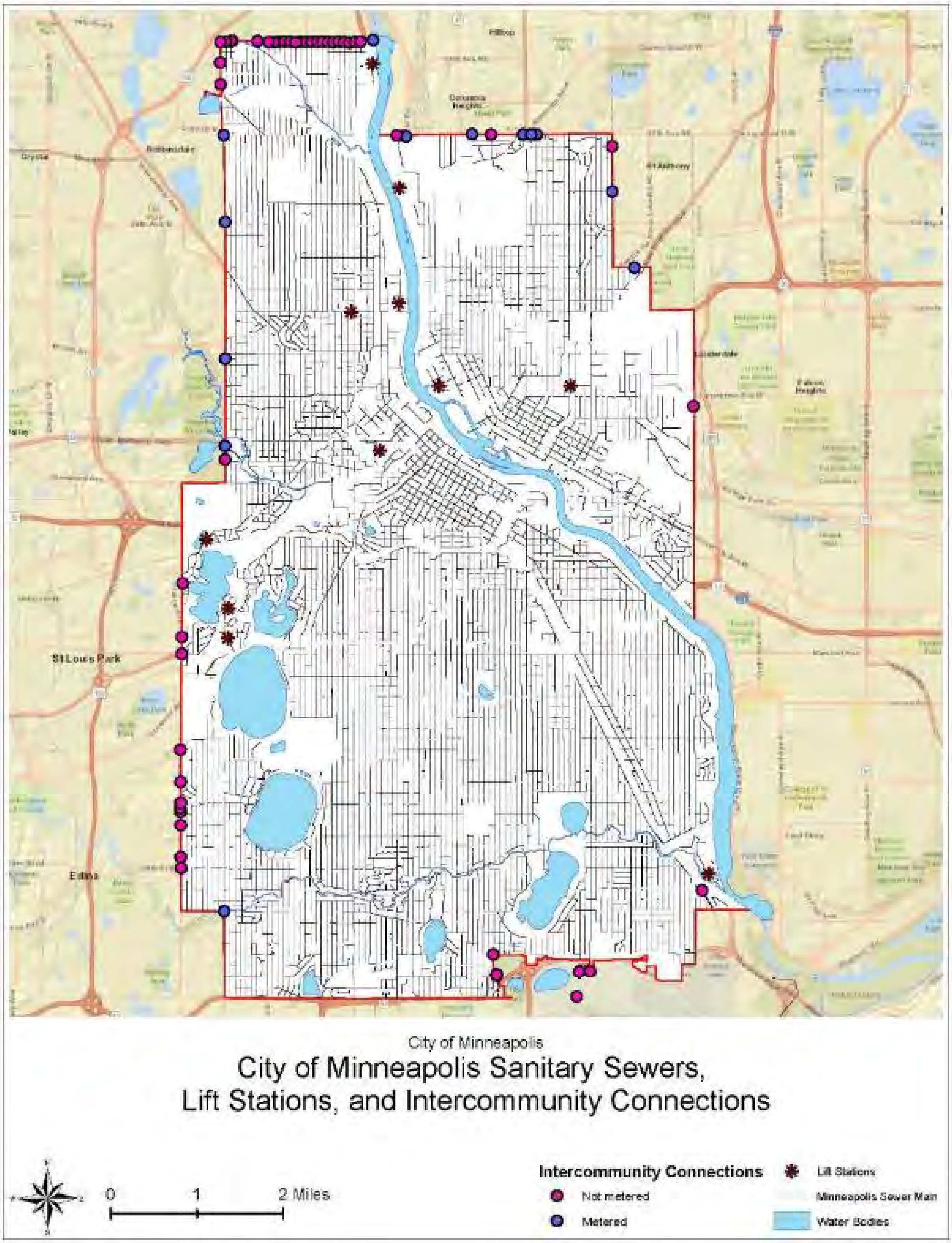


Figure 4.2 – City of Minneapolis Sanitary Sewer Connections to Metropolitan Council Interceptors and Sanitary Service Areas

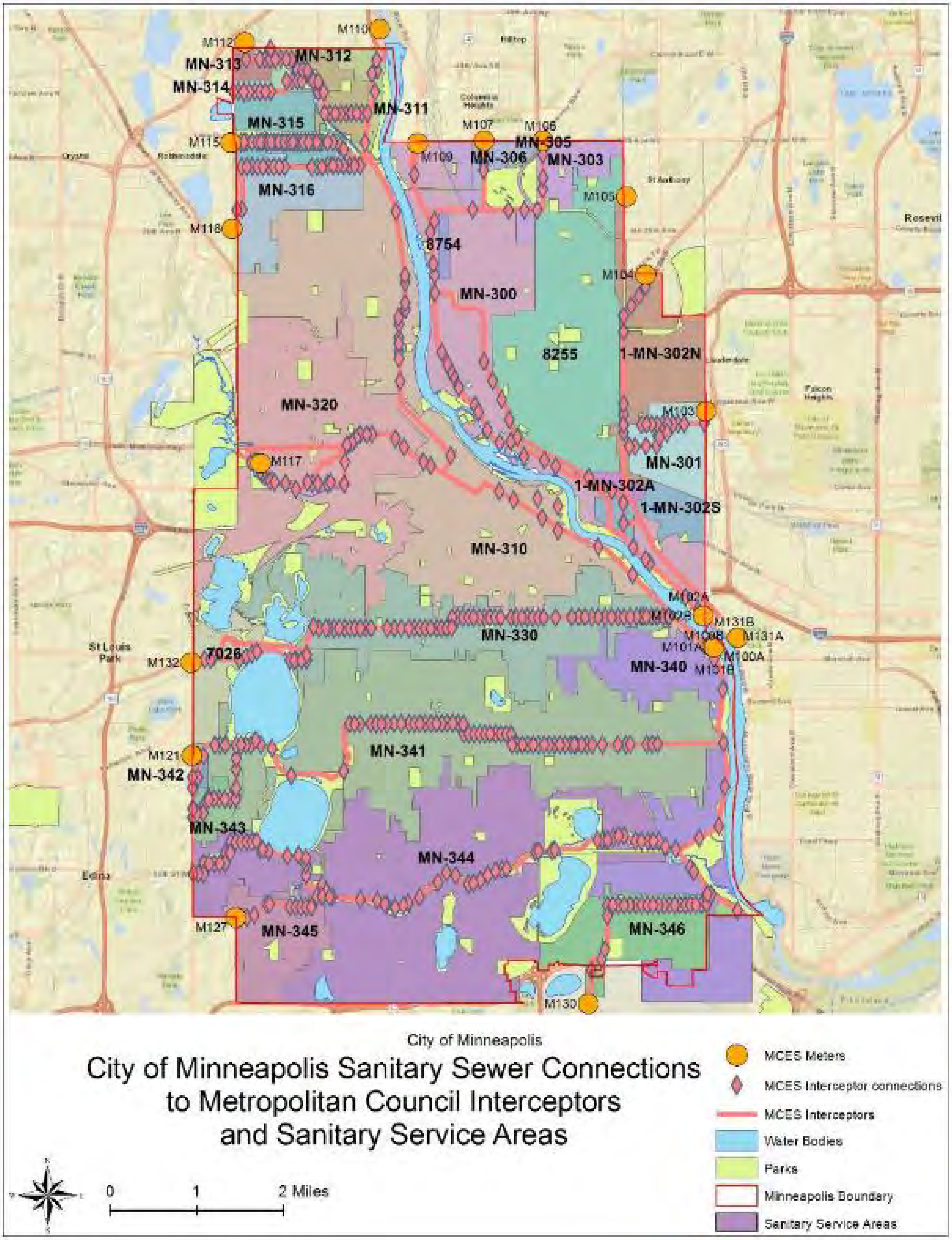
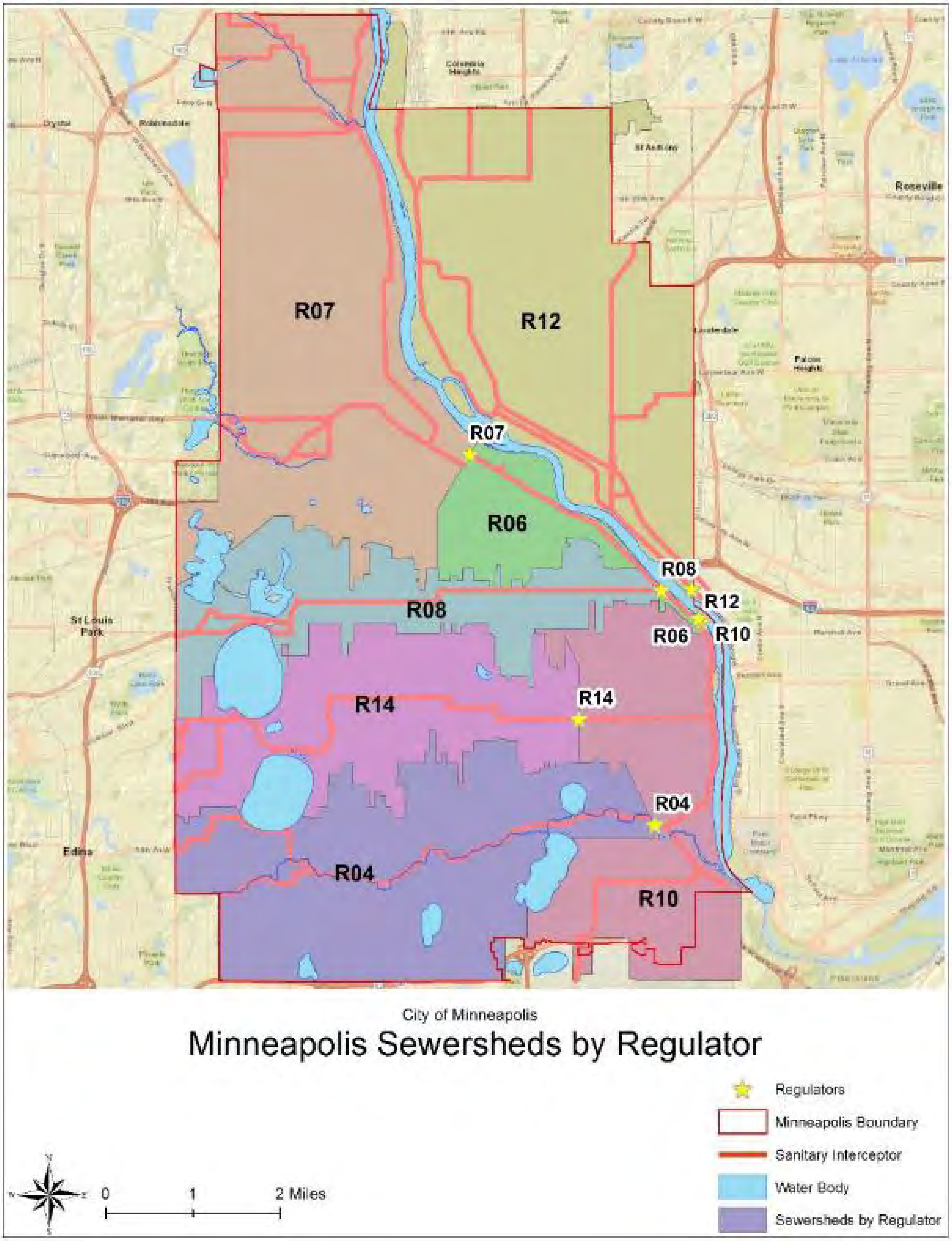


Figure 4.3 – Combined Sewer Overflow Regulator Locations and Sewersheds



Public and Non-Public Wastewater Facilities in the City of Minneapolis

Hennepin County is responsible for tracking private wastewater facilities, and reports that there is one active septic system in the City of Minneapolis. Several privately-owned treatment facilities are located within the City and are permitted under by the Minnesota Pollution Control Agency (MPCA). These facilities maintain a National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit, or a Minnesota State Disposal System (SDS) permit. A current list of privately held wastewater permits in the City is available from the MPCA on the *What's In My Neighborhood* webpage.

Service Connections

The City maintains 97,248 sanitary sewer accounts, as of December 31, 2016.

Stormwater Drain System

The City's initial use of a single-pipe sewer system resulted in minimal construction of a dedicated stormwater drain system prior to the 1920s. By 1930, four percent of the current stormwater drain system had been installed. The period of greatest expansion of the system occurred in the 1930s, associated with new development, and again between 1960 and 1990, as the City constructed stormwater drains to separate stormwater from the sanitary sewers. Table 4.3 summarizes the construction history of the stormwater drain system.

Table 4.3 – Age of Stormwater Drain System [a]

Year Built	Percent of Stormwater Drain System by Length
Pre-1900	0.3%
1901 to 1910	0.6%
1911 to 1920	0.7%
1921 to 1930	2.6%
1931 to 1940	23.8%
1941 to 1950	6.5%
1951 to 1960	7.4%
1961 to 1970	13.5%
1971 to 1980	14.1%
1981 to 1990	11.1%
1991 to 2000	8.9%
2001 to 2006	2.3%
2007 to 2016	0.9%
Construction Date Unknown	7.3%

[a] *Geodatabase accessed July 12, 2017*

In the 1990s, the City began installation of stormwater treatment and flood control facilities to further manage the quality of runoff or to resolve capacity problems, termed Stormwater Management Practices (SMPs). As of 2018, approximately 20 percent of the City's stormwater runoff drains to a flood control or stormwater quality device.

The current stormwater drain system consists of the following major components:

- A drainage network that consists of street gutters, catch basins, manholes, pumps, stormwater drains, deep tunnels, and outfall structures.
- Water quality detention facilities consist of wet ponds, dry ponds, and inline storage, used to control localized flooding.
- Water quality treatment facilities, including stormwater ponds, wet vaults, hydrodynamic structures, sumps, grit chambers, and infiltration facilities, such as rain gardens, infiltration trenches, and tree vaults.

Table 4.4 summarizes the types and quantities the stormwater drain system owned and operated by the City. Figure 4.4 shows the stormwater drain system (note that Figure 4.4 does not include SMPs that are owned by other public agencies or are privately owned), and Figure 4.5 shows the location of City-owned SMPs. This includes the stormwater drain system that transferred to the City from the Minneapolis Park and Recreation Board (MPRB) in 2000. This inventory does not include stormwater drain infrastructure owned by other public agencies, such as the Minnesota Department of Transportation (MnDOT), Hennepin County, and the University of Minnesota.

Table 4.4 – Stormwater Drain System Infrastructure Inventory – City and MPRB Owned [a]

Component	Length/Quantity
Pipes	
Pipes	501.4 miles
Stormwater Tunnels	15.9 miles
Forcemain	0.8 miles
Pipe-in-Pipe	5.7 miles
Structures	
Manholes	19,581
Catch Basins/Inlets	25,308
Detention Facilities (Public)/Storage Structures	87
Grit Chambers/Quality Controls	126
Bioretention/Infiltration/Filtration (Public)	112
Pump Stations	26
Outfalls	419
Connections to Other MS4 Permitted Systems [b]	18

[a] *Geodatabase accessed July 12, 2017*

[b] *Brooklyn Center, Columbia Heights, Edina, Falcon Heights, Golden Valley, Hennepin County, Lauderdale, MnDOT, Minneapolis/Saint Paul Airport, Richfield, Robbinsdale, Roseville, Saint Anthony Village, Saint Paul, Saint Louis Park, and University of Minnesota*

Figure 4.4 – Minneapolis Stormwater Drain System

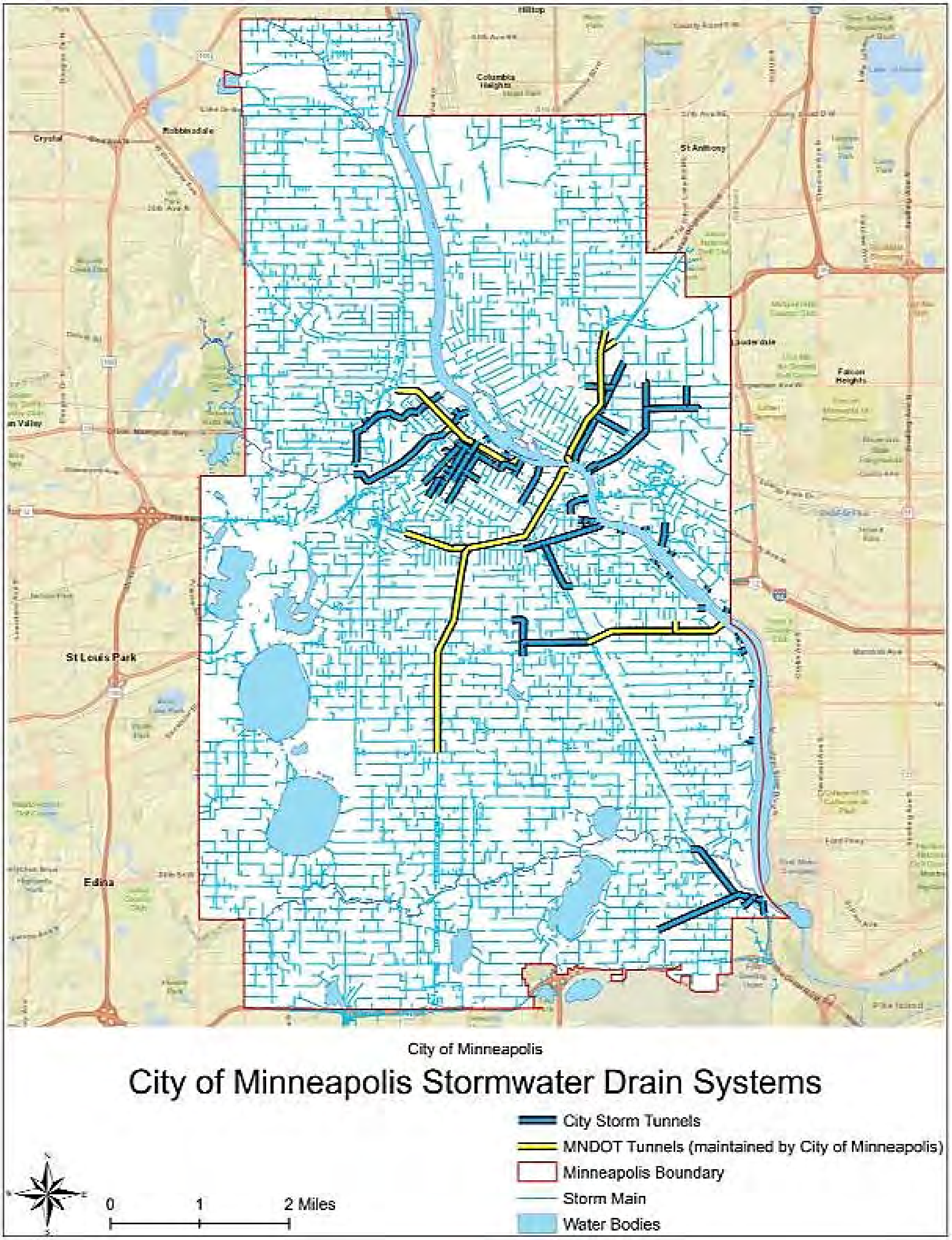
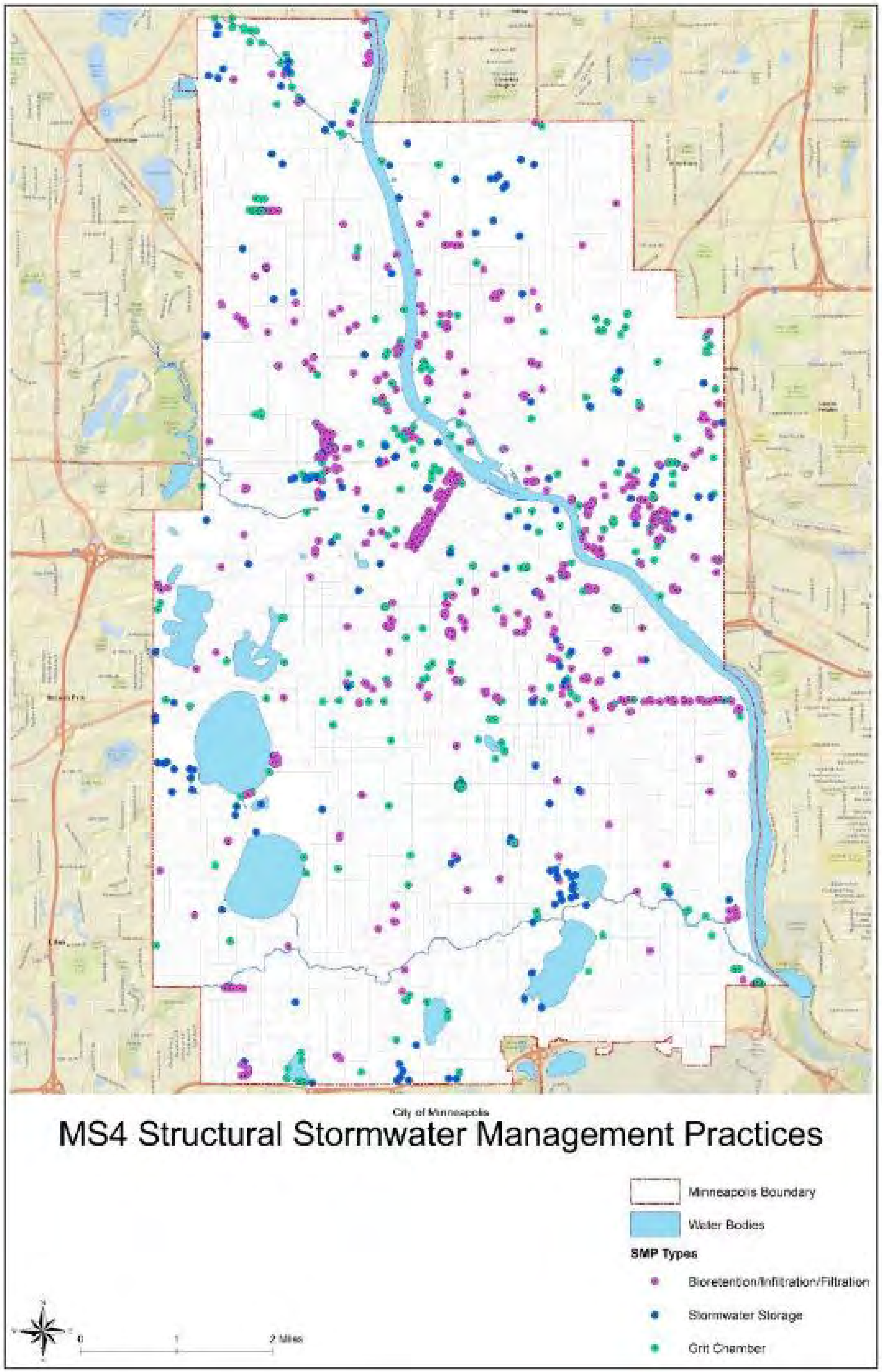


Figure 4.5 – Structural Stormwater Management Practices



Stormwater Drain System Not Owned by the City of Minneapolis

Stormwater drain networks owned and operated by other public agencies are interconnected with the City of Minneapolis stormwater drain system. Cooperative agreements that govern the construction, operation, and maintenance are discussed in Section 2 – Regulatory Requirements, Goals, and Policies, of this WRMP.

Infrastructure related to non-City systems are described below and are not included in the inventories presented in this WRMP.

Minnesota Department of Transportation

MnDOT owns surface drains and deep tunnels that serve the interstate highway system. There are areas of the Minneapolis stormwater system that drain into these storm drains adjacent to interstate highways. For stormwater drains associated with trunk highways, the reverse is generally true – the MnDOT system drains into the City stormwater system. According to Minneapolis GIS database, the MnDOT storm drainage system in the City consists of 10 miles of deep tunnel, 74 miles of storm drains, 1,580 catch basins, 3,973 manholes, 15 grit chambers, and 14 outfalls. As owner of a stormwater drain system, MnDOT is subject to the United States Environmental Protection Agency (EPA) Municipal Separate Storm Sewer System (MS4) Phase II stormwater permit requirements.

University of Minnesota

The University of Minnesota, Minneapolis campus, owns a surface drain and deep tunnel stormwater drain network that discharges directly to the Mississippi River. This system serves the original campus area of the University, an area southeast of University Avenue and 15th Street Southeast. The newer campus areas drain to the Minneapolis system. According to Minneapolis GIS database, the University of Minnesota drainage system within the City consists of 1.2 miles of deep tunnel, 8.2 miles of storm drains, 95 catch basins, 618 manholes, 1 pump station, 12 grit chambers, and 18 outfalls. As owner of a stormwater drain system, the University of Minnesota is subject to the EPA MS4 Phase II stormwater permit requirements.

Hennepin County Public Ditches

Hennepin County is responsible for County Ditch 13, which is also known as Shingle Creek. The section of Shingle Creek from the City border with Brooklyn Center to approximately Humboldt Avenue North is designated as County Ditch 13, as shown in Figure 4.6. For purposes of water quality improvements in this Water Resources Management Plan (WRMP), County Ditch 13 is considered a public water. The Minnesota Department of Natural Resources (MNDNR), however, does not have jurisdiction to issue permits or otherwise approve any improvements to this waterbody. Permission to connect to, or construct, improvements along this ditch must be obtained from Hennepin County.

As a road authority, Hennepin County owns the gutters and catch basins system within its right-of-way and the City owns the storm drains. For the most part, this storm sewer system drains into the City stormwater system. As the owner of a stormwater drain system, and owner of the Ditch, Hennepin County is subject to EPA MS4 Phase II permitting requirements.

Figure 4.6 – Public Ditches in the City of Minneapolis

Minnehaha Creek Watershed District Public Ditches

Since 1972, the Minnehaha Creek Watershed District (MCWD) serves as the authority for all county or judicial ditches that exist within the area of their jurisdiction. Ditches number 29, 14, and 17, shown in Figure 4.6, all drain from the west into Lake Calhoun. Each of these ditches has been constructed as an underground stormwater drain and is interconnected with the City system. As owner of these ditches, the MCWD is subject to EPA MS4 Phase II permitting requirements.

If the MCWD initiates the process to abandon a County Ditch, the City would consider acceptance of the stormwater drain segments provided the sewers are upgraded to be equivalent to current City standards for maintenance, condition, and capacity. City standards that would apply include:

- Maintenance standards that require manholes and other structures to be accessible and maintainable using City-owned equipment.
- Condition standards that ensure the structure has a minimum remaining service life of 50 years.
- Capacity standards that require that the structure is fully capable of conveying the runoff from a 10-year rainfall event and that any flooding occurring during a 100-year event does not impact primary structures.
- Fully established easements and access to these easements where the ditch crosses private properties.
- Abandonment of the public ditch is in accordance with procedures defined in the Minnesota Ditch Law, Minnesota Statute 103E.811.

Bassett Creek Watershed Management Commission

The Bassett Creek Watershed Management Commission (BCWMC) shares with the City and MnDOT the responsibility for the operation, maintenance, and repair of the Bassett Creek culvert/tunnel that was constructed to convey the main flow of Bassett Creek within the deep tunnel system associated with Interstate 394. Section 5.1.1.3 of their 2015 Watershed Management Plan notes that BCWMC accepts responsibility for management and monitoring of their trunk culvert/tunnel system. This plan requires that the City and other tributary cities obtain approval from the BCWMC prior to altering the physical structure or altering the hydrology of the area tributary to the culvert or tunnel. Location of this tunnel is shown in Figure 3.9 in Section 3 – Land and Surface Water Inventory and Assessment.

Infrastructure Service Area, Capacity, and Design Standards

Sanitary Sewer System

The City, as a fully-developed city, has an extensive sanitary sewer collection system that does not have any significant areas without access to sanitary sewers. Therefore, there is no need to extend sanitary sewers. If a unique parcel or development does require extension or alteration of a sewer, then the City will work with the property owner or developer to modify the sewers, as needed. Typically, the costs of new sanitary sewer construction where no sewer presently exists are assessed to the property owner in accordance with the City's special assessments policies and procedures.

Interceptor Service Areas

Twenty-Seven (27) Metropolitan Council Sanitary Sewer Service Areas are located within the City. These areas range in size from the smallest, area MN-305 serving 35 residents (3 acres), to the largest, area MN-344 serving 49,164 residents (5,137 acres), per the 2010 census records.

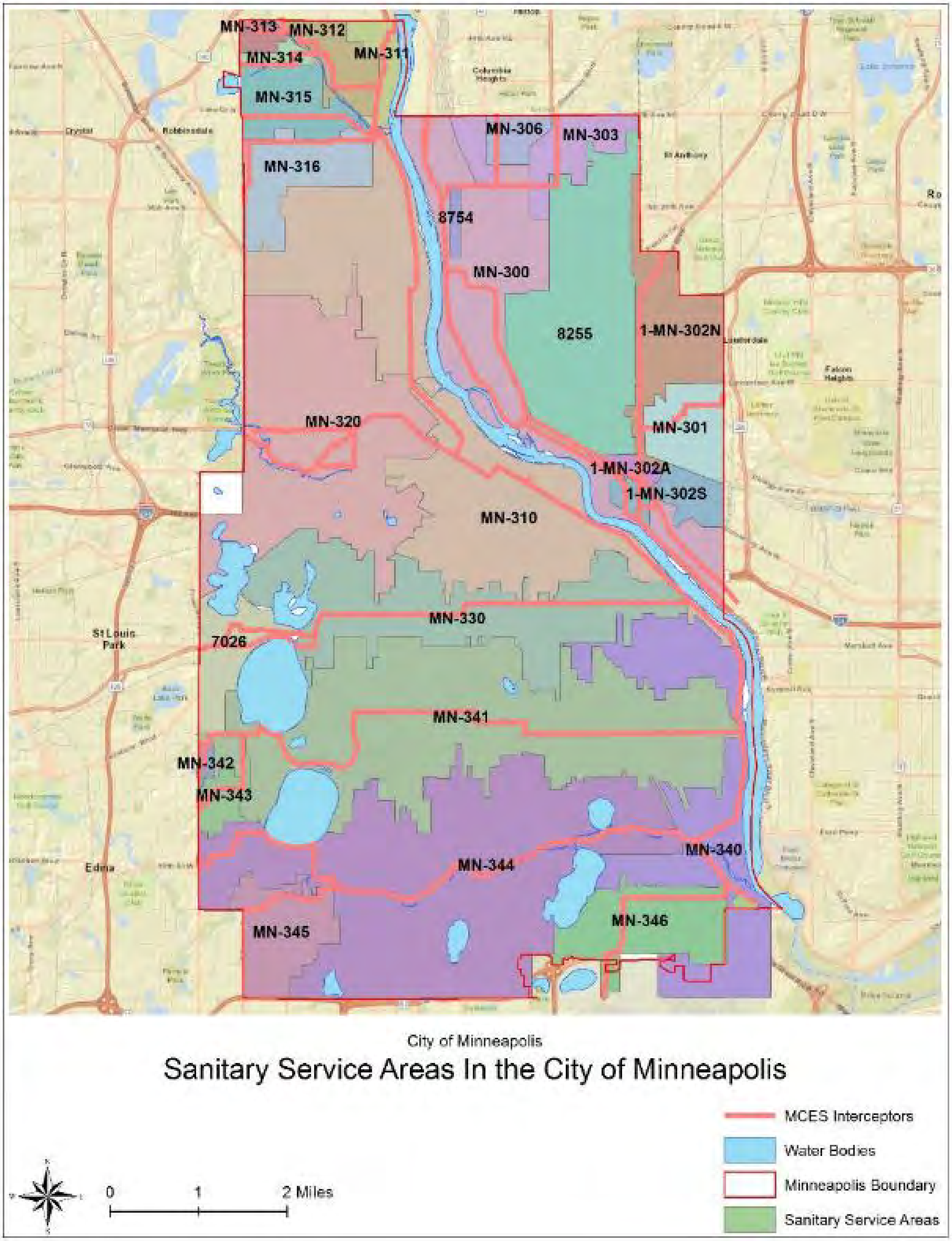
Each Sanitary Sewer Service Area was evaluated using the City's geodatabase and census data to identify service area boundaries, land use within each area, and population. Table 4.5 summarizes the area and population for each area, as shown in Figure 4.7. Appendix G contains detailed statistics on year 2010 land use, population, and households for each Metropolitan Council Sanitary Sewer Service Area. Appendix H includes population projections through 2040, also broken down by Metropolitan Council Sanitary Sewer Service Area.

Table 4.5 – Population and Area for Each Metropolitan Council Sanitary Sewer Service Area

Sanitary Sewer Service Area	2010 Population	Area (acres)
7026	4,708	518
8255	28,822	2,427
8754	197	67
MN-300	22,560	3,209
MN-301	3,297	521
MN-302A	558	103
MN-302N	2,935	972
MN-302S	4,288	357
MN-303	3,852	615
MN-305	35	3
MN-306	586	216
MN-310	63,650	4,373
MN-311	2,242	242
MN-312	3,221	425
MN-313	1,074	112
MN-314	907	94
MN-315	4,151	589
MN-316	7,69	754
MN-320	36,435	3,443
MN-330	41,716	2,500
MN-340	15,018 [a]	2,203
MN-341	65,913	4,755
MN-342	478	47
MN-343	2,287	230
MN-344	49,164 [a]	5,137
MN-345	7,542	744
MN-346	9,247 [a]	979

[a] *Population and area does not include sanitary service to properties not within the City of Minneapolis municipal boundary*

Figure 4.7 – Sanitary Sewer Service Areas in the City of Minneapolis



Flows from Outside the City of Minneapolis

In addition to the wastewater flows from properties within the City limits, there are several connections to the sanitary sewer system from sources located outside the City. These sources are categorized into two groups:

1. Government-owned properties in the Fort Snelling area.
2. Individual properties that connect to the sanitary sewer on a border street.

Government Properties in the Fort Snelling Area

Fourteen agencies in the Fort Snelling area have agreements with the City of Minneapolis for water and sewer service. The primary contributor of wastewater is the Metropolitan Airports Commission, with 214 million gallons (MG) of wastewater discharged in 2015, which represents approximately 76 percent of wastewater flows from the entire Fort Snelling area. The second largest contributor is the Minneapolis Veterans Affairs (VA) Medical Center with 55 MG, or 20 percent, in 2015. A complete list of agencies and 2015 wastewater flow contributions is contained in Appendix I. Copies of the interagency water/sewer agreements are available from the Minneapolis Public Works Water Treatment and Distribution Division. This area is shown in Figure 4.8.

Individual Connections from Outside Minneapolis

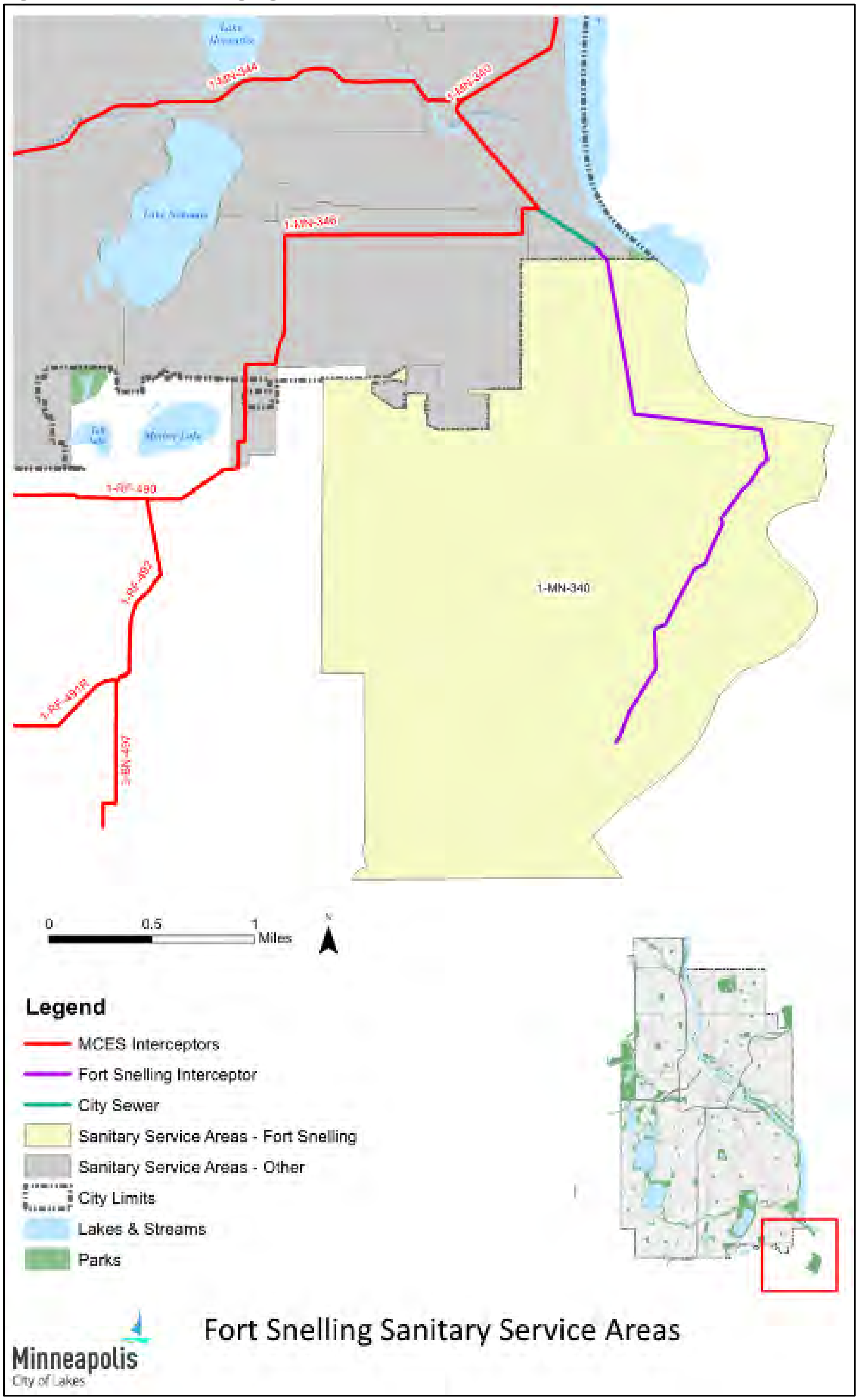
A total of 135 properties outside the City connect to the City sanitary sewer system on border streets. These are summarized in Table 4.6. These properties receive permits from the City for these connections and receive direct monthly water/sewer bills from the City of Minneapolis Utility Billing. There are no inter-city agreements that oversee these connections.

Table 4.6 – Sanitary Sewer Connections from Outside the City of Minneapolis

City	Number of Sanitary Sewer Accounts
Brooklyn Center	12
Edina	71
Golden Valley	16
Robbinsdale	4
Saint Anthony	18
Saint Louis Park	11
Saint Paul	3
Total	135

A complete list of properties that are outside of the City but connect to the sewer system is contained in Appendix I.

Figure 4.8 – Fort Snelling Agreement Service Area



Projection of Wastewater Flows

Wastewater flows in the City's sewersheds were calculated in 2010 and projected to estimate flows through the year 2040. These flow projections are used primarily to identify capacity limitations in the sewer system.

Methodology

In 2016, a base year flow was developed for each Sanitary Sewer Service Area, based on year 2010 City water billing data. Water billing was divided into residential water use and non-residential water use; water billed to residential properties was assumed to be residential and multiple dwelling water use and water billed to non-residential properties was assumed to be commercial, industrial, and government water use.

Water use was then converted into wastewater flows by assuming:

- Water consumed in the winter quarter multiplied by 4 equals the annual residential wastewater flow.
- Non-residential water consumed over the year equals the annual commercial, industrial, and government wastewater flow.

Residential and non-residential wastewater flows were then assigned to each of the City's 27 Sanitary Sewer Service Areas. Flow was allocated to each area proportional to the area's land use. For example, if an area contains 10 percent of the City's residential population, this area is assigned 10 percent of the residential wastewater flow. Employment was used for non-residential use and population was used for residential use.

For wastewater flow projection, it was assumed that per capita water use will not change in the future. Population and employment changes in each Sanitary Sewer Service Area were identified. This projected change in population and employment was obtained from the Transportation Analysis Zone (TAZ) developed by the Metropolitan Council of the City base year 2010 and projected years of 2020, 2030, and 2040. The per capita wastewater flow was then applied to projected population for each area to identify the projected wastewater flows. An in-depth description of this approach is contained in Appendix H.

Results

Table 4.7 summarizes projected wastewater flows for each Sanitary Sewer Service Area through the year 2040. In general, flows are expected to increase the most between 2010 and 2020, and then exhibit smaller changes through 2040.

Table 4.7 – Projected Wastewater Flow for City of Minneapolis Sanitary Sewer Service Areas

Sanitary Sewer Service Area	2010 Total Wastewater Flow (actual gallons per year)	2020 Total Wastewater Flow (projected gallons per year)	Percent Change 2010-2020	2030 Total Wastewater Flow (projected gallons per year)	Percent Change 2020-2030	2040 Total Wastewater Flow (projected gallons per year)	Percent Change 2030-2040
7026	136,491,929	175,437,000	29%	188,951,000	8%	204,538,000	8%
8255	850,071,695	985,062,000	16%	1,027,382,000	4%	1,0722,475,000	5%
8754	8,594,777	9,417,000	10%	9,602,000	2%	9,833,000	2%
MN-300	841,545,263	953,210,000	13%	1,000,479,000	5%	1,055,639,000	6%
MN-301	124,186,467	126,727,000	2%	132,385,000	4%	139,188,000	5%
MN-302A	16,407,442	29,334,000	79%	34,087,000	16%	38,890,000	14%
MN-302N	267,224,048	290,080,000	9%	310,757,000	7%	330,982,000	7%
MN-302S	254,143,488	286,868,000	13%	312,134,000	9%	338,409,000	8%
MN-303	84,771,450	94,283,000	11%	93,332,000	-1%	93,581,000	0%
MN-305	737,942	821,000	11%	813,000	-1%	816,000	0%
MN-306	22,924,447	25,231,000	10%	25,218,000	0%	25,445,000	1%
MN-310	3,991,834,316	4,517,466,000	13%	4,822,333,000	7%	5,129,809,000	6%
MN-311	48,572,405	50,598,000	4%	49,912,000	-1%	50,144,000	0%
MN-312	68,544,613	74,332,000	8%	73,155,000	-2%	73,142,000	0%
MN-313	20,786,199	22,982,000	11%	22,487,000	-2%	22,254,000	-1%
MN-314	17,569,888	19,432,000	11%	19,014,000	-2%	18,818,000	-1%
MN-315	91,962,610	103,571,000	13%	102,644,000	-1%	103,06,000	0%
MN-316	153,611,717	169,658,000	10%	165,779,000	-2%	163,987,000	-1%
MN-320	1,117,081,852	1,254,908,000	12%	1,341,470,000	7%	1,437,683,000	7%
MN-330	1,294,416,457	1,457,336,000	13%	1,534,396,000	5%	1,620,415,000	6%
MN-340	350,392,715	414,714,000	18%	435,105,000	5%	458,722,000	5%
MN-341	1,460,362,781	1,515,996,000	4%	1,537,297,000	1%	1,572,909,000	2%
MN-342	9,802,359	9,998,000	2%	9,641,000	-4%	9,544,000	-1%
MN-343	50,846,946	54,496,000	7%	52,374,000	-4%	51,454,000	-2%
MN-344	1,079,983,010	1,120,847,000	4%	1,101,962,000	-2%	1,100,797,000	0%
MN-345	155,329,505	160,343,000	3%	155,557,000	-3%	153,880,000	-1%
MN-346	186,171,528	203,117,000	9%	198,961,000	-2%	197,704,000	-1%
Total	12,704,367,848	14,126,265,000	11%	14,757,227,000	4%	15,479,117,000	5%

It should be noted that the total flows computed for 2010, which equates to a daily average of 34 million gallons per day (MGD), represents the volume based on water billing records. The total volume recorded by the Metropolitan Council for 2010 equates to an average daily flow of 44 MGD, as reported in Appendix A of the Metropolitan Council Water Resource Policy Plan. This difference of 10 MGD is an aggregate of wastewater that originates from multiple sources, including:

- I/I contributions to the City sanitary sewers, as described in the following section.
- I/I contributions to the Metropolitan Council interceptors that are within the City.

- Temporary groundwater discharges from remediation sites.
- Non-metered flows from 135 individual sanitary sewer connections that are outside of the City, plus the 14 agencies in the Fort Snelling area.

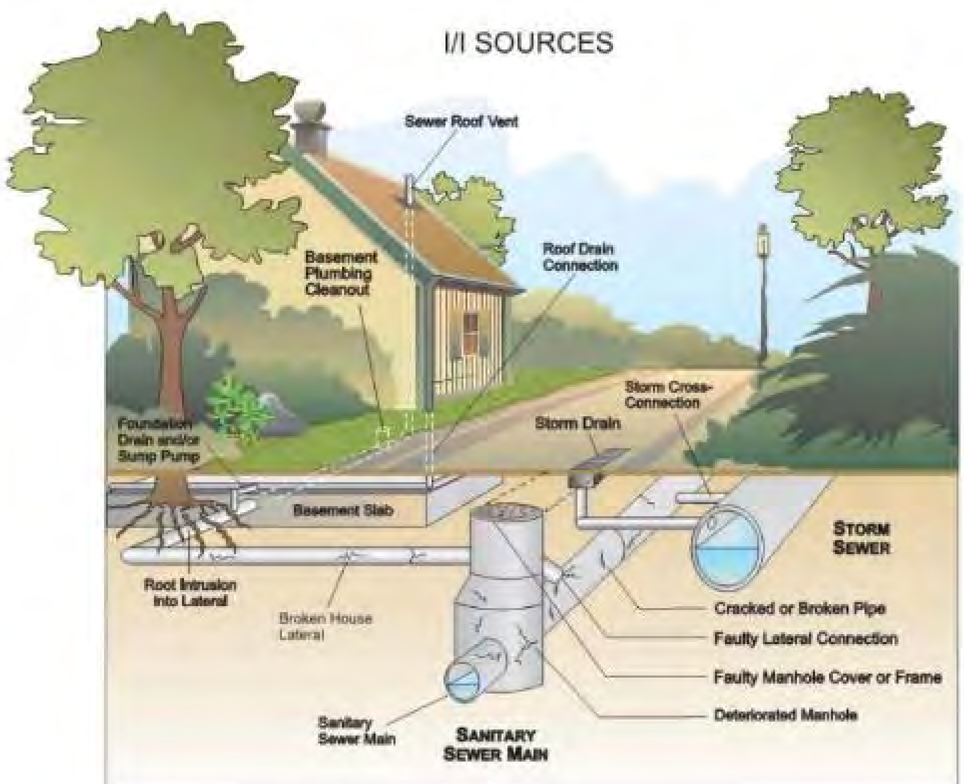
Insufficient information exists to assign the portion of the 10 MGD to these four categories of wastewater contributions nor to any of the 27 individual Sanitary Sewer Service Areas. It can be assumed that the total additional flows represent an average value that will not increase between 2010 and 2040. This contribution is likely to decrease as the City continues to identify and eliminate sources of I/I from its sanitary sewer collection system, as described in additional detail in the following section.

Inflow/Infiltration Flows

Extraneous, clear water (i.e., non-sewage) continues to enter the sanitary sewer as I/I. As shown in Figure 4.9, the 2016 sources on I/I in the City system primarily consist of:

- Groundwater infiltration through damaged sewer infrastructure.
- Rooftop rain leaders with direct connections to the sanitary sewer system.
- Street runoff catch basins with direct connect to the sanitary sewer system.
- Foundation drain and sump pump connections to sanitary sewers that have been installed to prevent groundwater damage to basements.

Figure 4.9 – Typical Sources of Inflow/Infiltration



Source: CDM Smith

In 1999, the City and the Metropolitan Council executed a Memorandum of Understanding (MOU) to conduct a combined sewer overflow (CSO) evaluation study. The study concluded that removal of all public inflow sources, such as catch basin connection, would not eliminate the occurrence of CSO events. Recommendations include a combination of inflow reduction, regulator modifications, and inline storage. The City began Phase II of their CSO program in 2002 with two primary goals:

1. Continued identification of unidentified street catch basin connections to the sanitary sewers and prioritization for elimination.
2. Identification and elimination of private sources of I/I, further described in Section 5 – Regulatory Controls and Water Resource Management Program.

In 2007, Metropolitan Council established I/I goals for all communities that discharge into their treatment system to further reduce excess flow that had created capacity problems in their regional interceptor system and at the wastewater treatment plants. Communities that were identified with excess flow, which included Minneapolis, were required to develop and implement an I/I reduction program.

The City reviewed its 1999 Phase II CSO program and concluded that the actions established in 2002 were on track to meet the 2007 Metropolitan Council I/I reduction goals. Additionally, activities were implemented in 2008 to further reduce I/I and document compliance with Metropolitan Council goals. These activities, which have continued through 2018, include:

- Flow meters installed at 50 sites each year.
- Smoke testing of sanitary sewers to identify unknown catch basin connections and damaged bulkheads.
- Review of record drawings followed by field inspections to identify cross-connections between the sanitary sewer and stormwater drains.
- Repair to manholes and bulkheads that were identified as damaged or with high rates of infiltration.

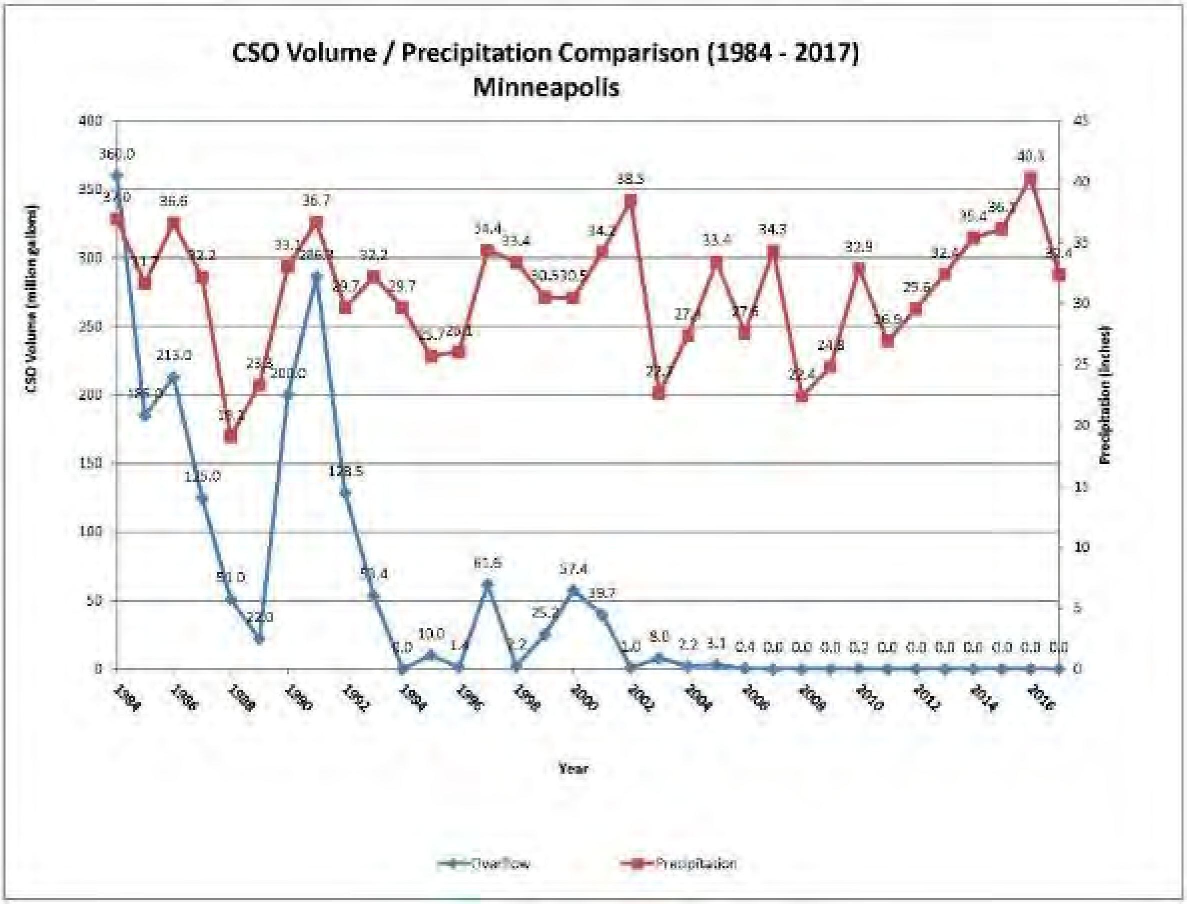
As a result, significant reductions in right-of-way acreage connections to the sanitary sewers have been accomplished, as shown in Table 4.8.

Table 4.8 – Catch Basin Drain Area Removed from Sanitary Sewers

Year	Acres Removed Per Year	Cumulative Acres Removed Since 2003
2003	16.8	16.8
2004	30.1	46.9
2005	8.1	55.0
2006	19.6	74.6
2007	208.7	283.3
2008	22.7	306.0
2009	37.7	343.7
2010	5.3	349.0
2011	86.2	435.2
2012	12.2	447.4
2013	32.3	479.7
2014	44.2	523.9
2015	19.2	543.1
2016	13.2	556.3

The success of the City programs and policies aimed at elimination of catch basin and rooftop connections (described in Section 5 – Regulatory Controls and Water Resource Management Programs) to the sanitary sewer system are evident in the reduction of total annual volume of CSO discharge at the seven CSO regulators. Figure 4.10 shows that there has been no CSO discharges to the Mississippi River since 2006 that were caused by rainfall events. The event in 2010 was determined to be due to infrastructure condition, not a lack of sanitary sewer capacity.

Figure 4.10 – Combined Sewer Overflow Volume and Precipitation, 1984 to 2016



Source: Minneapolis Public Works, Division of Surface Water and Sewers

Efforts to eliminate stormwater runoff connections to the sanitary sewers will persist as the City continues to identify catch basin and other sources of clear water to the sanitary sewers.

In March 2018, the City and the Metropolitan Council executed another MOU to direct their future efforts to coordinate the study of and investment in their connected sanitary sewer infrastructure. Consistent with the MOU, the City and the Metropolitan Council are initiating a comprehensive study of the City and the Metropolitan Council sanitary systems. The goals of that study, which will be completed during multiple phases, include identifying areas in the City with high I/I that contribute to increased risk of CSO events and highlighting how these areas related to areas where the Metropolitan Council's system is capacity limited. Areas identified as having I/I that contributes to risk of CSO and limited capacity will be prioritized for future investment by the City and the Metropolitan Council. Additionally, the study will evaluate the cost/benefit of alternatives to reduce the risk of CSOs, reduce I/I, and increase capacity. Alternatives to be studies include making potential changes to the remaining regulators in the City.

Efforts by the City and Metropolitan Council through 2017 are published annually in the CSO Annual Report. Beginning in 2019 for calendar year 2018, the City will issue a single CSO/Stormwater annual report.

Trunk Sewer Design Capacity

Generally, the trunk sewers in the City are defined as those sewers that convey flow from the local sewers to the Metropolitan Council interceptors. As described in previous sections, the City's trunk sewer system was designed as a single-pipe, combined sewer system. As a result of efforts to disconnect stormwater runoff from the sanitary sewer, much of the current sanitary sewer system is oversized for sewer flows. Specific data on the capacity and flow projections for all trunk sewers are contained in Appendix H.

Stormwater Drain System Capacity

The City has a fully developed stormwater drain system that captures and conveys runoff to the surface waters, as described in Section 3 – Land and Surface Water Inventory and Assessment. The system continues to expand, as needed, based on these primary needs:

- Extension of a stormwater drain to capture the runoff from catch basins and/or roof drains formerly connected to the sanitary sewer.
- Extension of a stormwater drain to access a new stormwater service connection to accommodate changes or redevelopment of a private property.
- Installation of a relief stormwater drain or stormwater storage area to resolve ongoing street and property flooding caused by insufficient capacity of the system.

Stormwater Pipeshed Area Inventory

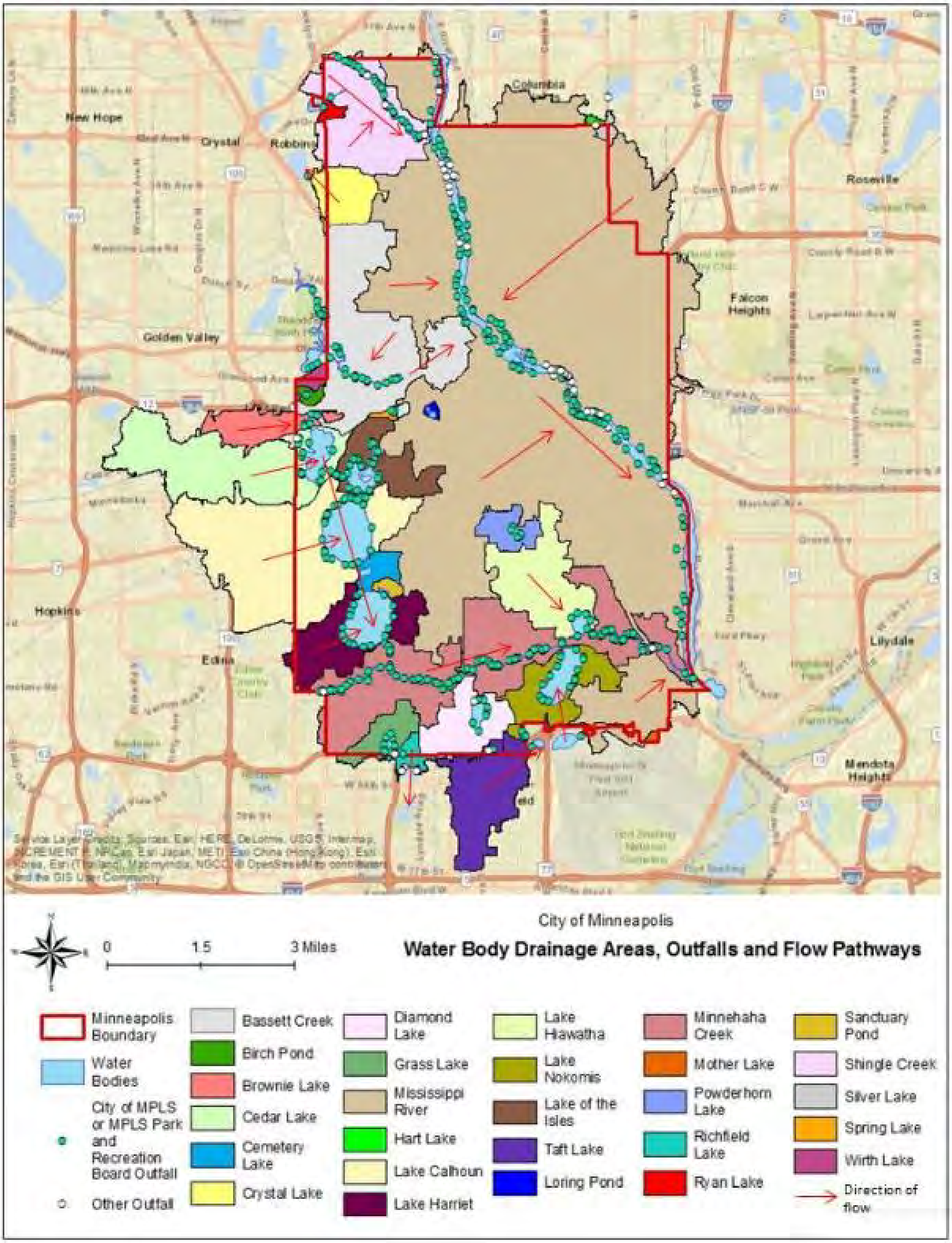
The 419 stormwater outfalls inventoried in Table 4.9 discharge stormwater runoff to the 22 lakes, four streams, and the Mississippi River, as described in Section 3 – Land and Surface Water Inventory and Assessment. Note that this table includes only those surface waters that receive stormwater runoff from the Minneapolis stormwater drainage system, which does not include all surface waters in the City. Figure 4.11 shows all stormwater pipeshed areas in the City. Also note that these pipeshed areas represent the area drained by the Minneapolis stormwater catch basins, pipes, and outfalls, which is not the total drainage area for the waterbodies inventoried in Section 3. The pipeshed areas for each of these stormwater outfalls was initially delineated in 1991 to comply with the EPA stormwater regulations described in Section 2 – Regulatory Requirements, Goals, and Policies. Since that time, areas and impervious surface percentages have been adjusted as necessary to reflect updated information or to accommodate changes caused by a construction project. The information contained in this WRMP is based on a comprehensive review and update of the City's delineation that was completed in 2018. Therefore, there may be some significant changes when compared to the pipesheds reported in the 2006 Local Surface Water Management Plan. Appendix J contains this detailed inventory of the updated delineated areas, including the land use and total pipeshed area for each stormwater outfall.

Table 4.9 – City of Minneapolis Stormwater Pipesheds

Surface Water	Stormwater Runoff Pipeshed Area (acres)	Pipesheds (count)
Bassett Creek	1,493	20
Birch Pond [a]	16	1
Brownie Lake	66	5
Cedar Lake	216	10
Crystal Lake [a]	421	1
Diamond Lake	635	11
Grass Lake	318	10
Lake Calhoun/Bde Maka Ska	1,188	25
Lake Harriet	1,097	21
Hart Lake [a]	3	1
Lake Hiawatha	1,217	6
Lake of the Isles	689	20
Lake Nokomis	652	13
Legion Lake [a]	2	1
Loring Lake	7	3
Minnehaha Creek	3,061	116
Mississippi River	19,736	141
Mother Lake [a]	3	1
Powderhorn Lake	278	5
Richfield Lake [a]	58	2
Ryan Lake	56	1
Shingle Creek	1,378	38
Silver Lake [a]	25	1
Spring Lake	39	3
Taft Lake [a]	139	2
Wirth Lake [a]	37	2

[a] *Waterbodies located outside of the City of Minneapolis*

Figure 4.11 – City of Minneapolis Stormwater Runoff Pipeshed Areas



Note that nearly all stormwater pipesheds drain to surface waters that are within the City. The exceptions are for a pipeshed that drains to Crystal Lake in the City of Robbinsdale (1), Hart Lake in the City of Columbia Heights (1), Silver Lake in the Village of Saint Anthony (1), Legion Lake in the City of Richfield (1), and Richfield Lake in the City of Richfield (0). These pipesheds are inventoried in this WRMP; Section 3 does not include these lakes outside the municipal boundaries of the City of Minneapolis.

There are no significant land-locked pipeshed areas; however, very small pockets of privately-owned land-locked areas exist that are not inventoried by the City. Land-locked waterbodies, including Loring Pond and Powderhorn Lake, are inventoried in Section 3 – Land and Surface Water Inventory and Assessment.

Stormwater Drain Hydraulic Standards

The primary function of the stormwater drain system is to convey the peak flows generated by storm events is to prevent damage to infrastructure and private properties. The current stormwater drain criteria, effective for projects constructed in 2016 and later, considers:

- Rainfall depths based on Minneapolis-based Atlas 14 precipitation with MSE3 rainfall distribution.
- Pipes sized to convey the peak flows generated by a 10-year rainfall event.
- The 10-year, 24-hour rainfall event cannot result in water ponding or flooding on streets.
- A 100-year, 24-hour rainfall event may result in water ponding or flooding but cannot result in flooding of an occupied structure.

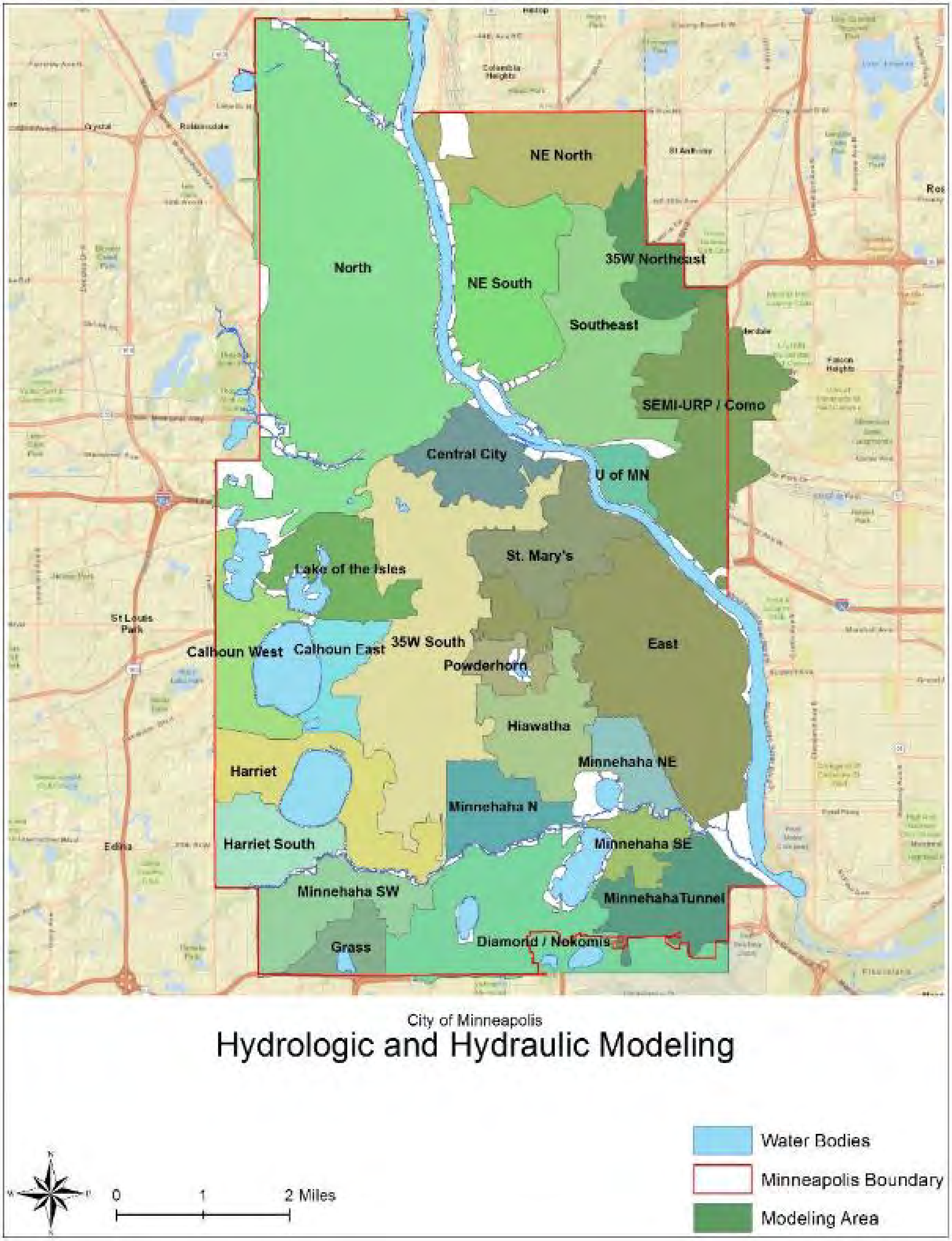
The hydraulic capacity criteria for the City's stormwater drains has changed since the 1930s, evolving from 2-year to 5-year to 10-year rainfall events, and from 1-hour to 24-hour rainfall durations. As a result, segments of the system have insufficient capacity and experience pressurization and/or surface floods during relatively small rainfall events. Over time, the City has corrected some of the most severe of these problems through the Flood Mitigation Program.

The City has developed a city-wide model of the stormwater drain system that is complete as of late 2017. The models will be used to assess capacity, discharge rates, and runoff volumes generated in each of the 406 unique stormwater pipeshed areas in 2018. This model will be used to identify capacity problems, prioritize flood improvements, and evaluate water quality improvement opportunities. Figure 4.12 shows the differentiation of the hydraulic and hydrologic (H&H) models that have been developed.

Once this assessment is complete, the City will identify the remaining areas of known flooding to determine the need for additional stormwater conveyance capacity or storage capacity.

The City of Minneapolis Stormwater and Sanitary Sewer Guide contains hydrologic, hydraulic, and water quality input parameters recommended for all models developed for the City.

Figure 4.12 – Hydrologic and Hydraulic Modeling Areas



Stormwater Management Practices Design Standards

The City considers the Minnesota Stormwater Manual, prepared by the MPCA, to be the City's approved design manual for structural stormwater management practices.

System Operation and Maintenance Activities

Sanitary Sewer System Operation and Maintenance

The City's Public Works Surface Water and Sewers Division – Sewer Operations Section routinely inspects and maintains the sanitary sewer system to ensure the system functions properly. As of 2017, the City has implemented an asset management system that prioritizes sanitary sewer inspection and maintenance based on age of the system, asset criticality, and results from previous inspections. The City's sanitary sewer system has been digitized in a geodatabase and each asset includes attribute information. This geodatabase, which is updated regularly, is used for the asset management system, locating, modeling, and planning/analysis.

The City is responsible for maintenance of the sanitary sewer pipes in the public right-of-way (ROW) and ensuring access for private connections.

The following inspection and maintenance procedures are followed:

- Manhole castings are inspected, cleaned, and replaced, as necessary.
- Manhole rings are inspected and replaced, and/or re-grouted, as necessary.
- Manhole structures are inspected and are repaired or replaced, as needed. Pipe inverts, benches, steps (verifying integrity for safety), and walls are checked. Cracked, deteriorated, and spalled areas are grouted, patched, or replaced.
- Sewers with low flows and/or build-up of material in the invert are cleaned, as needed.
- Lift stations are periodically inspected and monitored to ensure efficient and reliable operation. Pumps are maintained in accordance with manufacturer requirements and are assessed annually.

Sanitary sewer pipes are targeted to be cleaned every 8 to 24 months, depending on pipe size and method of cleaning. Areas with a history of heavy root infestation or high levels of Fats, Oils, and Grease (FOG) typically require a higher level of maintenance and are scheduled for more frequent cleaning.

Routine inspections of the sanitary sewers have identified sewer segments that have defects that weaken the structural integrity of the pipe and/or allow for infiltration of groundwater which contributes to I/I flows. The City has opted to rehabilitate these pipe segments with a technique termed Cured-in-Place Pipe Lining (CIPP). CIPP is a trenchless method used to install a liner that results in a new pipe that is internally attached to the old pipe. The liner strengthens the pipe, plus joints and cracks are sealed to eliminate groundwater infiltration. A Capital Improvement Program that annually funds CIPP lining is further described in Section 6 – Planning and Implementation. Since 2010, this program has funded the lining of 53 miles of sanitary sewer, as detailed in Table 4.10.

Table 4.10 – Sanitary Sewer Cured-in-Place Pipe Rehabilitation Since 2010

Year	CIPP Length (miles)
2010	3.8
2011	5.3
2012	8.1
2013	7.8
2014	6.0
2015	6.3
2016	7.0
2017	6.5

The City is in the process of development of a FOG Control Program. The goal of the program is to aid in preventing the introduction and accumulation into the public sanitary sewer system of fats, oils, and grease from food service establishments and other industrial or commercial establishments generating wastewater that will cause or contribute to sanitary sewer blockages and obstructions.

Stormwater System Operation and Maintenance

Stormwater Drain System Operation and Maintenance

The Public Works Surface Water and Sewers Division – Sewer Operations Section periodically inspects and maintains the stormwater drain system to ensure the system properly functions, and as required after significant rain events. As of 2017, the City has implemented an asset management system that prioritizes stormwater drain and stormwater management practice inspection and maintenance based on age of the system, asset criticality, and results from previous inspections.

Generally, inspection and maintenance procedures include:

- Street maintenance staff inspect and clean basin grates on street sweeping routes during the non-snow months.
- Catch basin and manhole castings are inspected and replaced and/or re-grouted, as necessary.
- Catch basin and manhole rings are inspected and replaced and/or re-grouted, as necessary.
- Catch basin and manhole structures are inspected and are repaired or replaced, as needed. Pipe inverts, benches, steps (verifying integrity for safety), and walls are checked. Cracked, deteriorated, and spalled areas are grouted, patched, or replaced.

Specific information on annual maintenance activities for the stormwater drain system is detailed in the City's NPDES Annual Report.

Catch Basins

To maximize stormwater drain capacity, catch basins (also called inlet structures) are kept operational to allow runoff to flow into underground stormwater drains. Leaf and lawn litter are the most frequent causes of inlet obstructions. The City performs routine visual inspections and cleaning of catch basins and inlets to avoid flow restrictions and localized flooding. Additionally, the City manages an Adopt-a-Drain program that has volunteers removing debris from the catch basin. This program is described in Section 5 – Regulatory Controls and Water Resource Management Programs.

Catch Basin Clogged with Debris

Credit: Minneapolis Public Works

Piping

The City's stormwater drain system has been digitized in a geodatabase and each asset includes attribute information. This geodatabase, which is updated regularly, is used for the asset management system, locating, modeling, and planning/analysis.

Pump Stations

Pump stations are periodically inspected and monitored to ensure efficient and reliable operation. Pumps are maintained in accordance with manufacturer requirements and are assessed annually.

Grit Chambers, Sump Manholes, and Sump Catch Basins

Grit chambers, sump manholes, sump catch basins wet vaults, and hydrodynamic separators are used to collect sediment before it can be transported to downstream waterbodies. Sediment originates primarily from road sanding operations, construction, and soil erosion. These features are installed in stormwater drainage systems as it is more cost-effective to vacuum sediment from a structure than it is to dredge from a waterbody.

Grit Chamber During Construction

Credit: Minneapolis Public Works

Goals:

- Public safety.
- Prevent erosion.
- Protect and improve water quality and ecological function.
- Slow water movement, hold or convert pollutants, and enhance infiltration and evapotranspiration.

- Conduct preventive maintenance for longevity of infrastructure.
- Control invasive species (non-native and selected native species) growth and prevent the production and dispersal of seeds.
- Create a wildlife habitat.
- Provide a neat and attractive appearance.

The City uses suction vacuum equipment to clean these sediment removal structures. For each cleaning, maintenance staff records:

- Quantities of sediment removed.
- Quantities of floatable materials removed.
- The presence of oil.
- The date of cleaning.

Substances removed from grit chambers are combined with debris collected by street sweepers and are properly disposed in accordance with state requirements and specific requirements set by landfill operators.

As part of ongoing work to address the bacteria impairment in Minnehaha Creek, the Public Works Department is testing new procedures in the operation and maintenance of grit chambers within the Minnehaha Creek watershed area. During routine cleaning operations, grit chambers are de-watered into the sanitary sewer system to prevent the discharge of pollutants into the creek. This decision was made after monitoring data from the Minnehaha Creek Bacteria Study indicated that there are elevated levels of bacteria found in the ponding water inside the grit chambers. These protocols will be implemented City-wide after the procedures are fully developed and tested.

Stormwater Management Sites Inspection and Maintenance

Minneapolis Stormwater Management Sites

The City has made substantial investment in stormwater flood control and water quality basins as an integral part of its drain system, which has resulted in numerous flood basins, water quality ponds, and bioretention facilities (rain gardens, infiltration trenches). Frequent and effective maintenance of these facilities helps ensure proper performance and reduces the need for major repairs. Periodic inspections are performed to identify possible problems in and around basins, basin outlets, basin inlets, and side slopes. Maintenance and removal of sediment buildup is performed based on the findings of these inspections.

Vegetation at the stormwater management sites is important to their overall functionality, and the City uses a specialty vegetation management contractor to provide high-quality management and plant materials. Native plant materials are used throughout the system, and species that support pollinators are used at select locations. The City maintains stormwater management sites by the following inspection and maintenance activities:

- Areas around outlets are kept free and clear of debris, litter, and heavy vegetation.
- Trash guards are installed and maintained over outlets to prevent clogging of the downstream stormwater drain. Trash guards are inspected at least once per year, typically in the spring, to remove collected debris. Problem areas are addressed more frequently, as required.

Stormwater Infiltration Basin in Heritage Park

Credit: SRF

- Vegetated channel sections are inspected for signs of erosion, which is repaired by vegetation replacement.
- Emergency overflow outlets are provided for all basins, when possible. These are kept clear of debris and other materials and protected against erosion.
- Inlets are inspected for erosion. Where erosion occurs near an outlet, energy dissipaters or riprap is installed.
- Inlets are inspected for sediment deposits, which can form at the inlets due to upstream erosion. Sediment deposits are removed to ensure that design capacities of stormwater drains entering the basin are maintained.
- Side slopes are kept well-vegetated to prevent erosion and sediment deposition into the basin. Severe erosion alongside slopes can reduce the quality of water discharging from the basin and increase the need for dredging of sediments from the basin.
- Noxious weeds are removed periodically from the area surrounding basins. Prescribed burns are used for this purpose at some locations.
- Some basins in highly developed areas require mowing. If mowing is performed, a buffer strip of 20 feet or more adjacent to the normal water level is typically maintained. This provides filtration of runoff and provides wildlife habitat.
- Basins are inspected to determine if sediment buildup is causing significant loss of storage capacity. Excessive sediment buildup significantly reduces the stormwater treatment efficiency of water quality ponds. Inspections occur after significant rainfalls.
- Sediment removal is performed where excessive sediment buildup has occurred. As a general guideline, ponds require dredging every 15 to 20 years or when the basin is approximately half full of sediment.

Some of the City's stormwater management sites are conducive to providing additional ecosystem services (i.e., habitat, shade, air quality improvement, places for residents to stroll, sit, and observe nature). The Public Works Department is planning additional pollinator forage at its stormwater management pond properties. "Plants for Pollinators" neighborhood events have been held at the South

43rd Street and Park Avenue site (2016) and the Shingle Creek South stormwater pond (2017). A 2018 site is yet to be selected.

MCWD Chain of Lakes and Lake Nokomis Stormwater Management Sites

Stormwater ponds and wetlands at Cedar Lake, Lake Calhoun/Bde Maka Ska, and Lake Nokomis were built as a partnership of the City, the MPRB, the MCWD, and the City of Saint Louis Park with funding assistance from the MPCA. These facilities are on the MPRB land and are managed by the MPRB in partnership with the MCWD. Specifically, the MCWD maintains the vegetation, provides sediment removal (as needed), and is responsible for major repairs at the Nokomis Ponds, Calhoun Pond, and Cedar Meadows Pond. The MPRB conducts routine inspections and provides daily maintenance services including litter removal at these ponds. Additionally, the MPRB conducts all pond inspection and management for the Hiawatha Detention Ponds, which are located within the Hiawatha Golf Course. The City maintains the storm drains associated with all of these facilities.

SCWMC Stormwater Management Sites

The Shingle Creek Watershed Management Commission is initiating a field trial application of a new technology to help reduce bacteria such as E. coli in stormwater. Biochar, a specially engineered type of ground charcoal, added to iron-enhanced sand filters has been effective in lab experiments at removing bacteria in synthetic stormwater. The SCWMC is conducting three field trials to test the effectiveness of these filters at treating real world stormwater runoff by adding the substance to stormwater pond iron-enhanced sand filter benches, to filters placed in storm sewer catch basins, to a filter bed to treat flow diverted from Shingle Creek. Construction occurred in 2017 and effectiveness monitoring will be conducted through 2018.

SCWMC conducted a subwatershed assessment in Minneapolis is 2017. A subwatershed assessment is an intensive study of small areas of land to identify the best locations for small BMPs such as rain gardens, tree trenches, and bioinfiltration basins. This assessment will include the entire area in the City that drains to Crystal Lake in Robbinsdale. Results are expected in 2018.

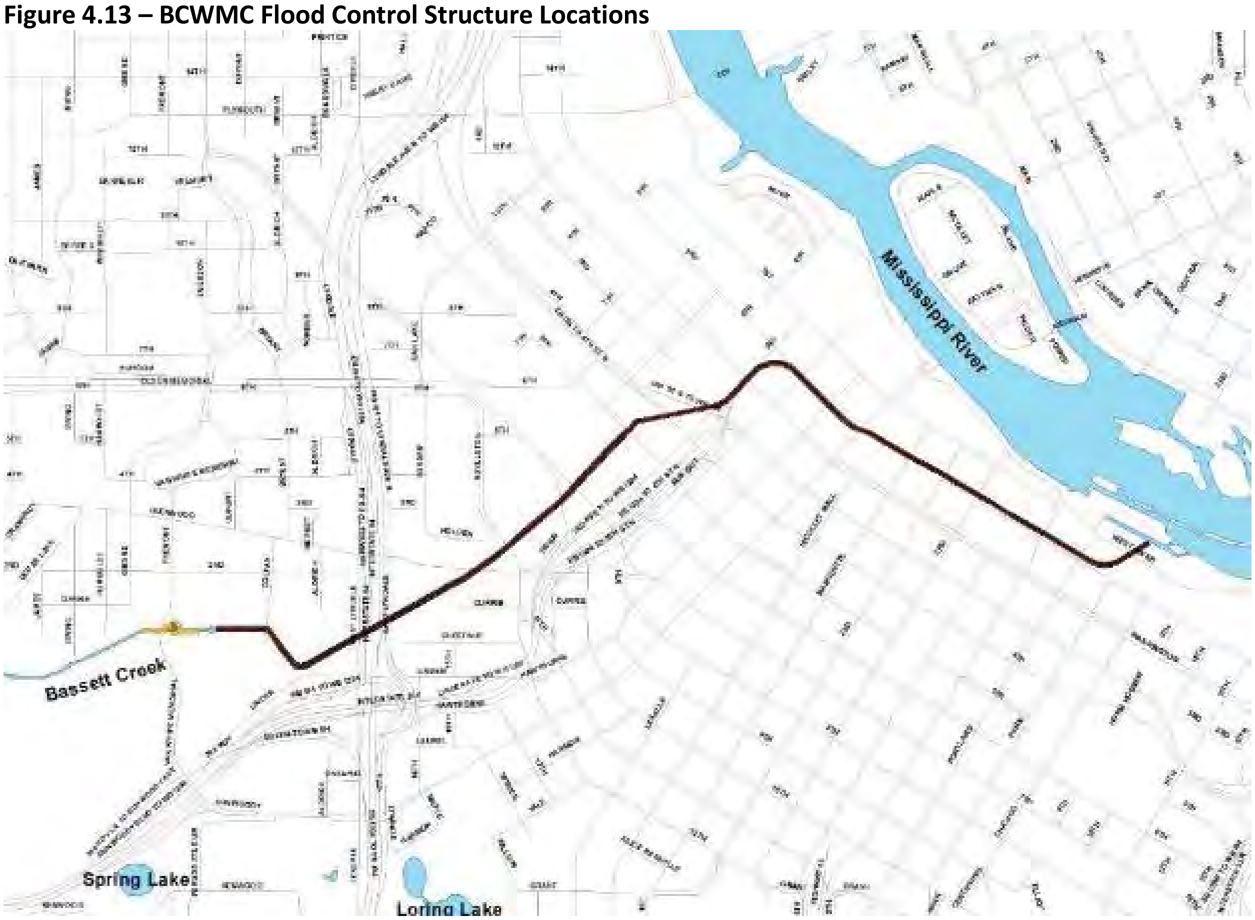
BCWMC Flood Control Structures

The BCWMC has adopted a set of policies that outline schedules, procedures, and responsibilities regarding the inspection and maintenance of the Flood Control Project (FCP) structures. These structures were installed as part of a multi-year, multi-phase project that was completed in 1992 through a partnership between the Army Corps of Engineers, MnDOT, and the nine-member cities of the BCWMC. According to those policies, the BCWMC will continue an inspection and maintenance program for the FCP structures. All non-tunnel structures are inspected annually. The double box culvert is inspected at least once every five years. The 3rd Avenue Deep Tunnel, in conjunction with the MnDOT I-94 tunnel inspection, is inspected every five years and the 2nd Avenue Deep Tunnel is inspected every 10 years. The BCWMC fully funds the FCP inspections, unless more frequent inspections or more complicated inspections beyond the currently used National Association of Sewer Services Companies (NASSCO) Assessment and Certification Program (PACP) is requested or required. Member cities, including Minneapolis, will perform initial responses to emergency situations, with the costs to be reimbursed by the BCWMC. Member cities are also responsible for the upkeep of road crossings.

The BCWMC Engineer submits inspection reports to the City regarding the condition and maintenance and repair needs for the FCP structures. The City is responsible for the work identified by the BCWMC Engineer and for the routine maintenance and repairs not otherwise identified by the BCWMC. The City formally notifies the BCWMC Engineer regarding all completed maintenance and repair actions. The inspection and reporting are essential to ensure that the Commission maintains its eligibility to receive federal funds to repair or replace flood control project features in the event of a catastrophe.

Figure 4.13 shows the location of BCWMC FCP structures located within the City.

Figure 4.13 – BCWMC Flood Control Structure Locations



Street Maintenance

In accordance with EPA regulations, urban street gutters are considered to be part of the stormwater drain system. Therefore, street maintenance is integral to maintenance of the stormwater drain and surface water systems.

Winter Street Maintenance Practices

The City of Minneapolis receives an average of 54 inches of snow per year (see Table 3.2 – Snowfall Monthly Average in the City of Minneapolis). Heavy snows require application of deicing chemicals (e.g., salt) on roads and sidewalks each winter for public safety. Studies indicate that an estimated 80 percent of the environmental damage caused from deicing chemicals is a result of improper storage and handling of the material (MPCA, 1989). Improper storage and overuse of salt increases the risk of high chloride concentrations in runoff and groundwater (MPCA Road Salt and Water Quality). High chloride concentrations can be toxic to fish, wildlife, and vegetation.

Hiawatha Avenue Salt Storage

Credit: Minneapolis Public Works

The City manages several storage facilities that are designed to meet MnDOT specifications for runoff control. Salt stockpiles are stored under cover to minimize potential for runoff and groundwater contamination.

The primary mission of the City is to provide snow and ice control in a manner that balances the environmental concerns, public safety, and cost. The City will continue to implement and improve upon procedures it has established for efficient application of deicing materials. Improvements are constantly being made to reduce costs and minimize environmental damage. Key best management procedures used by the City include:

- Thorough accounting of materials applied to the roads each season.
- Assessment of street conditions after each snow/ice event. Application of additional ice control materials are adjusted accordingly to avoid over-treatment.
- Maintenance and calibration of ice control equipment to prevent excessive application.
- Training of maintenance supervisors at the Local Road Research Board (LRRB).

Application of Anti-Icing Brine to Pavement

Credit: Minneapolis Public Works

Snow and ice control is conducted in a manner that balances the environmental concerns, public safety, and cost.

Street Sweeping

Street sweeping is an integral part of the City's surface water management system. Street sweeping greatly reduces the volume of sediment that must be cleaned from storm drainage structures and from downstream waterbodies.

The City performs two comprehensive city-wide street sweeping events in the spring and fall where approximately 1,100 miles of streets are thoroughly cleaned curb to curb. The spring sweep is intended to collect materials deposited over the winter such as accumulated debris and sand from winter maintenance activities. All 3,700 city alleys, totaling nearly 400 miles, are swept as part of the spring sweep. The fall sweeping program is a comprehensive street sweep and collection of leaves that fall in the street.

In addition to the two major city-wide sweeps, there are additional sweeping operations conducted throughout the non-winter months. The Chain of Lakes and Parkways are swept on a 15-day cycle between the major spring and fall sweeps. The downtown loop and business corridor is swept seven nights per week throughout the spring, summer, and fall, as weather permits. Other major commercial corridors around the City are swept on an approximate 15-day cycle and sweepers are also deployed on a complaint basis throughout the year.

The materials collected from street sweeping are disposed of two ways, based on the nature of the material. The predominantly inorganic materials collected year-round go to a construction demolition landfill site. The predominantly organic materials are disposed of as part of the City's yard waste disposal contract in the fall.

Practices used to optimize the impact of street sweeping include:

- The City enforces temporary parking bans to ensure complete street sweeping.
- Pressurized water is applied to the road to push sediment and leaves into the gutters. A sweeping crew then follows behind the washing crew to clean the gutters.
- A tandem sweeping process is used. Air regenerative sweepers are followed by mechanical sweepers.
- Leaves are collected into piles and sent to a composting facility for disposal.

Spring Street Cleaning

Credit: Minneapolis Public Works

Fall Leaf Collection

Credit: Minneapolis Public Works

Condition and Performance of Sanitary Sewers and Stormwater Drain Systems

Baseline Sanitary Sewer and Stormwater Drain Condition Assessments

The City began a condition assessment program in 2011 to complete closed-circuit television (CCTV) inspection of all small sanitary and stormwater pipes. The goal of this inspection is to develop a baseline assessment of existing pipe conditions throughout the City. As of late-2016, 29 percent of the sanitary system and 72 percent of the stormwater system have been televised. It is anticipated that the baseline condition assessment will be completed by 2024.

The City has budgeted $6 million to rehabilitate or repair sanitary sewers in 2018, and $8 million for subsequent years. CCTV inspections are used to prioritize specific areas in need of pipe lining, repairs, and rehabilitation. Rehabilitation is recommended in areas where sewers are either structurally failing, have excessive infiltration of groundwater, or have excessive root intrusion.

CCTV Inspection of Small Diameter Sanitary Sewer (left) and Visual Inspection of Como Avenue SE Storm Sewer (right)

Credit: Minneapolis Public Works

Deep Tunnel System Condition and Hydraulic Capacity Assessment

In 2004, the City developed a Stormwater Tunnel Management Plan. When the plan was developed, the City inspected approximately 15.9 miles of deep stormwater tunnels and assessed structural condition. This survey did not include the tunnels not owned by the City or assessment of the Old Bassett Creek Tunnel, which is inspected as a culvert by bridge inspectors.

To complement the inspections and evaluation of tunnel conditions, hydrologic and hydraulic modeling by the City was performed to determine the hydraulic loading to each tunnel system. The modeling used a simulated 100-year, 24-hour, 6-inch rainfall event over the area tributary to each tunnel system. The results were evaluated and correlated to structural conditions encountered in the inspections.

The hydraulic analysis showed that most tunnels are surcharged when operating. Based on this hydrologic and hydraulic analysis, it was determined that only four of the tunnel systems operate with no surcharge during the 100-year event. These four tunnel systems operate without surcharge because they are relatively short, have large cross-sections, and serve small drainage areas. The rest of the tunnel systems pressurize during the 100-year event. The effect this has on individual tunnels varies and depends on the tunnel's structural condition.

By linking hydraulic results with structural conditions and action levels, the overall condition of each of the tunnel systems is determined. A 2012 re-assessment of all City stormwater tunnel systems was completed. A long-term inspection schedule based on the 2012 inspection results was established.

Stormwater Management Practice Monitoring

In 2001, the City began contracting with the MPRB to conduct stormwater monitoring to comply with NPDES stormwater permit requirements. Between 2001 and 2005, the MPRB collected and tested stormwater runoff at sites in both the City and the City of Saint Paul. In 2006, the monitoring program was reworked to limit monitoring to four sites in Minneapolis, each one representative of a major land use type:

- Site 6 – 22nd Street East at Aldrich Avenue South (Multi-Family Residential).

- Site 7 – 14th Street East at Park Avenue South (Commercial/Industrial/High Density Residential).
- Site 8a – Pershing Park (Parkland).
- Site 9 – 61st Street West at Lyndale Avenue South (Commercial/Industrial).

ISCO Sampler Set-Up

Credit: Minneapolis Park and Recreation Board

ISCO flow recorders and automatic samplers are installed within the stormwater manholes at each site. Dataloggers record the rate of flow, and then trigger the collection of stormwater samples. Each site automatically uploads data via cell phone modem to a database server maintained by the MPRB. Each site could also be communicated with remotely using Flowlink Pro software to adjust pacing, enable or disable samplers, and to see if a sampling event has been triggered at each site. Automatic samples are collected spring through fall, limiting equipment damage due to freezing. Grab samples are used for collection during winter months.

Effective 2018, each sample is analyzed for the chemical parameters that are listed in Table 4.11.

Table 4.11 – Stormwater Sample Analysis Chemical Parameters, Effective 2018

Parameter	Abbreviation	Units	Sample Type	Frequency
Chloride, Total	Cl	mg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Specific Conductivity	Sp. Cond	µmhos/cm		
E. coli (Escherichia Coli)	*E. coli*	MPN/100Ml		Quarterly (spring, summer, fall, winter)
Hardness, Carbonate	Hard	mg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Copper, Total	Cu	µg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Lead, Total	Pb	µg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Zinc, Total	Zn	µg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Nitrate+Nitrate, Total (as N)	NO_3NO_2	mg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
pH	pH	standard unit	▪ Field Analysis Grab, measured by multi-parameter probe	
Phosphorus, Total Dissolved or Ortho-P	TDP Ortho-P	mg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Phosphorus, Total	TP	mg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events

Parameter	Abbreviation	Units	Sample Type	Frequency
Solids, Total Dissolved	TDS	mg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Solids, Total Suspended	TSS	mg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Solids, Volatile Suspended	VSS	mg/L	▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Solids, Inorganic Suspended by difference	TSS-VSS=ISS		▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Carbon, Organic Dissolved			▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Chemical Oxygen Demand	COD		▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events
Flow			▪ Measurement	
Precipitation			▪ Measurement, at 3800 Bryant Avenue South location	Daily
Oil and Grease [a]			▪ Grab	Quarterly (spring, summer, fall, winter)
Nitrogen, Total			▪ Flow-paced composite samples over non-ice time period (approx. March through Nov.) ▪ Grab samples at least two times during typical winter thaw (approx. Dec. through March)	10 samples per year, select from events 0.10 inch or greater over range of seasons and events

[a] Pilot. If oil and grease is less than 15 mg/L in all quarterly samples for the first 2 years of the permit term, the ***Permittee*** *may end oil and grease sampling at that/those site(s). If oil and grease is at least 15 mg/L in any quarterly sample for the first 2 years of the permit term, then oil and grease sampling must continue through the entire permit term.*

mg/L = milligrams per liter

µg/L = micrograms per liter

MPN/100Ml = most probable number per 100 milliliters

µmhos/cm = micro mhos

Source: NPDES Permit MN0061018

The MPRB continued to monitor each of these four sites through 2017 and has collected 12 years of continuous stormwater runoff quantity and quality data at the same sites. Long-term monitoring by the MPRB, as presented in Table 4.12, shows how the concentration of chemicals in the runoff can vary greatly in any year. A more detailed description of the monitoring results for each storm and for each site is included in the MPRB Water Resources Annual Report.

Table 4.12 – Long-Term Average Flow-Weighted Annual Mean Concentration for Each Chemical Parameter Monitored in the City of Minneapolis

Parameter	Sites 1-5a				Sites 6-9											
Year	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
TP (mg/L)	0.470	0.337	0.474	0.332	0.354	0.548	0.472	0.486	0.583	0.341	0.355	0.368	0.369	0.313	0.337	0.297
TDP (mg/L)	0.112	0.095	0.114	0.121	0.123	0.135	0.108	0.139	0.249	0.063	0.126	0.123	0.157	0.121	0.089	0.088
Ortho-P (mg/L)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0.179	0.097	0.194	0.129	0.109	0.093
TKN (mg/L)	2.21	1.60	2.10	1.94	3.48	3.54	4.43	3.22	3.61	1.53	1.74	2.00	2.34	2.40	1.68	1.72
NH_3 (mg/L)	0.494	0.722	0.346	0.918	1.74	1.64	0.970	0.966	1.64	0.666	0.922	0.719	0.747	1.00	0.262	0.430
NO_3NO_2 (mg/L)	0.398	0.423	0.496	0.382	0.448	0.638	0.496	0.582	0.755	0.414	0.498	0.397	0.402	0.937	0.396	0.290
Cl (mg/L)	37	11	587	40	18	91	412	139	803	60	213	14	72	205	229	12
Hardness (mg/L)	nc	na	nc	nc	na	nc	nc	nc	nc	na	48.0	37	41	41	30	32
TSS (mg/L)	116	83	116	70	108	156	180	148	121	107	104	101	95	123	87	90
VSS (mg/L)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	30	31	29	34	31	32
TDS (mg/L)	306	85	725	130	252	183	737	507	3323	124	693	97	301	359	59	62
cBOD (mg/L)	12	8	16	20	9	9	17	25	53	7	11	13	13	10	8	7
Sulfate (mg/L)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	15	18	8	7	6	6
Cd (µg/L)	0.532	0.518	2.11	2.80	2.50	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Cu (µg/L)	15	31	23	15	19	29	36	16	40	23	25	16	19	13	8	9
Pb (µg/L)	23	17	22	14	41	31	34	28	23	24	18	15	22	16	8	13
Zn (µg/L)	180	76	107	76	86	94	133	132	204	100	103	90	79	68	62	58

nc = data not collected

na = data not analyzed

Note: Cadmium (Cd) was discontinued from monitoring in 2006 because Cd concentrations had typically been below detection for the Minneapolis/St. Paul area

The MPRB also monitors SMPs to develop a performance baseline, as required by the NPDES stormwater permit. Different sites are selected each year for monitoring. For example, the following SMPs were monitored in 2016:

- 37th Avenue North Greenway – Iron Enhanced Sand Filters.
- Webber Park Stormwater Pond.
- Lyndale Dog Park Stormwater Filter (*E. Coli* samples, only).
- 37th Avenue North at Oliver Avenue North – Flood Relief Vault (Hydraulic performance, only).

Grab Sample Collection at Lyndale Dog Park

Credit: Minneapolis Park and Recreation Board

Equipment, methods, parameters, results, and analysis is detailed in each MPRB Water Resources Annual Report.

Coordination with Other Government Agencies

Hennepin County has jurisdiction over 83.5 miles of roads within the City. The City and Hennepin County work together to identify opportunities to retrofit stormwater management systems on Hennepin County road projects.

MnDOT has jurisdiction over 46.3 miles of the roadway within the City. While MnDOT and the City maintain separate stormwater drain systems, runoff water from each system flows into the other's system, necessitating a high level of coordination, including cooperative agreements for construction of new stormwater facilities – including new stormwater drains and best management practices.

The City cooperates with and coordinates efforts with neighboring cities on the management of common drainage areas. Most coordination is accomplished through watershed management organizations, though some cooperative projects have been implemented outside of this structure.

The City is willing to cooperate with the MPRB and associated watershed organization on streambank repairs that are needed in the areas near City-owned outfalls.

The City and Metropolitan Council cooperate on the CSO program to control public and private discharges to the stormwater and sanitary systems.

Responsibilities for Infrastructure Management

Responsibility for managing the infrastructure in the City is primarily the responsibility of the Minneapolis Department of Public Works. Sanitary sewer and stormwater drain systems are the responsibility of the Public Works Division of Surface Water and Sewers (PW-SWS), while street maintenance is the responsibility of the Public Works Division of Transportation Maintenance and Repair

(PW-TMR). Other departments that have a role in the sanitary sewer and stormwater drain management include Finance and Property Services (MFPS) which manage the City-owned properties, and utility billing, MPRB which manages park lands and waterbodies, and the Minneapolis Department of Health (MDH) which are involved in the emergency spill response. A detailed breakdown of these responsibilities is presented in Table 4.13.

Table 4.13 – City of Minneapolis Infrastructure Management Responsibilities

Activity	MFPS	MHD	MPRB	MPW - SWS	MPW-TMR	Other
Stormwater Management						
Pollution Prevention and Good Housekeeping for Municipal Facilities	✓	✓	✓	✓	✓	
Stormwater pond vegetation management			✓	✓		
Runoff management from City facilities	✓		✓	✓	✓	
Condition assessment				✓		
Stormwater monitoring and analysis			✓	✓		MPCA, watershed organizations
TMDL studies and coordination			✓	✓		MPCA
Program assessment, modification and reporting			✓	✓		
Annual reporting			✓	✓		
Planning, design, funding for stormwater drain improvements				✓		
Stormwater management practices O&M			✓	✓		
Street cleaning, snow, and ice removal					✓	
Misc.						
WRMP development and coordination				✓		
Coordination with watershed districts / organizations				✓		
Overall coordination of NPDES requirements				✓		
Integrated pest management			✓	✓		
Sanitary Sewer Management						
I/I compliance – sanitary sewers				✓		
Planning, design, funding for sanitary collection system improvements				✓		
Coordination with Metropolitan Council				✓		
Condition assessment				✓		
O&M				✓		
Water Resource Management						
Lake management			✓			
Natural resource management			✓	✓		
Shoreline and beach management			✓			
Wetland health evaluation project						Hennepin County

City of Minneapolis Water Resources Infrastructure Summary and Evaluation

The City operates a robust program to continually assess and maintain the condition, capacity, and operation of its infrastructure systems, as detailed in this section. The City also improves its infrastructure as needed to meet regulatory requirements. The remainder of this section provides a summary of the City programs and practices and identifies areas that need additional effort to meet regulatory requirements.

Sanitary Sewer System

Capacity Summary and Evaluation

The City's sanitary sewers have sufficient capacity to meet current and future flows. This capacity is a direct result of the City's ongoing efforts to remove stormwater connections to sanitary sewers. Opportunities to construct new sanitary sewers exist in underdeveloped areas of the City. These opportunities are limited and will occur on a case-by-case basis when new development is proposed.

Combined Sewer Overflow and Inflow/Infiltration Summary and Evaluation

The City is committed to continual inspection and disconnection of stormwater connections to the sanitary sewer system. The City's CSO Annual Reports document annual activities and progress towards the I/I goals established by Metropolitan Council through 2017. Future documentation and progress towards I/I goals and guided by the March 2018 MOU will be reported in an annual report that combines both sanitary sewer and stormwater drainage system activities.

Stormwater Management and Drain System

SWMP and Conformance with NPDES Requirements Summary and Requirements

The City's Stormwater Management Program (SWMP) details the City's most current stormwater management activities. It is written to be in compliance with current NPDES permit requirements. The initial SWMP was prepared in September 2011 to be in accordance with the requirements of the January 21, 2011 NPDES stormwater permit. The SWMP was updated in 2013 and 2015 to reflect additions and changes to the City's program. The SWMP will be reissued in late 2018 based on new requirements contained in the NPDES Integrated Permit.

A detailed summary of each year's activities is contained in the City's annual report. Each year through 2017, the City prepared two annual reports, one being an annual summary of stormwater management activities, construction, and monitoring as a documentation of compliance with its NPDES stormwater permit. The second was a documentation of progress towards I/I goals. Beginning in 2018, all stormwater and sanitary activities will be reported in an integrated annual report that combines both sanitary sewer and stormwater drainage system activities, in accordance with the draft NPDES Integrated Permit.

The SWMP and annual reporting requirements are subject to change to be in compliance with future NPDES permits.

Capacity Summary and Evaluation

The City will fully assess the capacity of its stormwater drain system in 2018 as part of a comprehensive analysis of the city-wide XP-SWMM (Storm Water Management Model) modeling. The model will be used to develop runoff volumes and discharge rates at each of the City's 419 outfall structures. This information will be appended to this WRMP as a minor plan amendment after the modeling and analysis is complete.

The prioritization of Capital Improvement Projects, as described in Section 6, is likely to change after the entire stormwater drainage capacity is analyzed. Project prioritization will be updated annually as the City adopts the CIP program each year.

Section 5 – Regulatory Controls and Water Resource Management Programs

Overview

Effective municipal water resource management involves proper land and activity management on both public and private properties. Flows to the sanitary sewers are regulated through permits issued by the City of Minneapolis (City) and the Metropolitan Council. Stormwater management on private property is regulated at the time of development, or redevelopment, through construction permits issued by the City. Public education is utilized to inform residents and property owners of required activities that are not triggered by new construction. This section of the Water Resource Management Plan (WRMP) details the official regulatory controls and programs adopted by the City and the Minneapolis Park and Recreation Board (MPRB) that serve to protect water resources. Official controls include ordinances, City Council resolutions, guidance documents, maps, and this WRMP.

City of Minneapolis and Minneapolis Park and Recreation Board Ordinances

Both the City and the MPRB have adopted ordinances that influence water resource management. A summarized list of the primary City ordinances that relate to water resource management is contained in Table 5.1. A summarized list of the primary MPRB ordinances that relate to water resource management is contained in Table 5.2. Full versions of all City and MPRB ordinances are available at the Minneapolis Code of Ordinances website.

Table 5.1 – City of Minneapolis Code of Ordinances

CODE OF ORDINANCES	
Title 3 – Air Pollution and Environmental Protection	
CHAPTER 48	MINNEAPOLIS WATERSHED MANAGEMENT AUTHORITY
48.60	Provides authority to Minneapolis Health Department to regulate and control watershed pollution.
48.80	Prohibited pollutants definitions.
48.120 - 48.150	Permit and registration requirements for above ground and below ground storage tanks and materials.
48.260	Permit and registration requirements for wells.
48.270	Permit and registration requirements for oil/water separators and sediment traps.
48.300	Storage, stockpile and permit requirements for materials contaminated with pollutants.
CHAPTER 50	MINNEAPOLIS WASTE CONTROL AND DISCHARGE RULES
50.50	Permit requirements for discharge industrial waste to sanitary sewers.
50.60	Permit and annual registration requirements for discharge of runoff from process facilities. Facilities with No Exposure Exemption from MPCA exempt from registration.
50.65	Permit requirements for connection to sanitary sewer.
CHAPTER 52	EROSION AND SEDIMENT CONTROL FOR LAND DISTURBANCE ACTIVITIES
52.50	Activities exempt from obtaining a permit for erosion and sediment control.
52.60	Design requirements minimize surface runoff, erosion, and sedimentation.

CODE OF ORDINANCES	
52.70	Erosion and sediment control practice requirements for prevention of deposition of soil in sensitive areas.
52.100 - 52.130	Erosion and sediment control plan and associated reports content requirements.
52.140 - 52.210	Permit requirements for land disturbance or land filling activity.
52.275	Standards for conveyance and management of stormwater.
CHAPTER 54	STORMWATER MANAGEMENT FOR NEW DEVELOPMENTS
54.30	Establishes the Minneapolis Stormwater Management Design Manual authority. In events of non-conformance, a resolution is adopted by the City Council.
54.50	Stormwater management plan, registration, and annual fee requirements for all land-disturbing projects with stormwater management devices.
54.70	Stormwater Management Plan requirements and strategies to mitigate stormwater runoff required prior to construction.
CHAPTER 55	LAWN FERTILIZER
55.30	Provides authority to the Minneapolis Watershed Management Authority and the Minneapolis Health Department to regulate lawn fertilizer.
55.40	General regulations of fertilizer application.
55.60	Application rates for phosphorous-containing lawn fertilizer.
55.70	Forbids the sale of phosphorous-containing fertilizer in the City of Minneapolis as of January 1, 2002.
CHAPTER 56	PROHIBITED DISCHARGES TO SANITARY OR COMBINED SEWERS (I/I ORDINANCE)
56.60	Provides authority to the Minneapolis Health Department to regulate I/I discharges to sanitary or combined sewers.
56.70	Prohibits stormwater connections to sanitary sewers.
56.90	Requires downspouts not be directed to structures within 10 feet of downspout.
56.100	Permit requirements for disconnection of any rainwater pipe, rainleader, area drain, or other connections.
56.140	Disconnection requirements for rainwater pipes, rainleaders, area drains, or other connections conveying stormwater and/or clearwater from a property to a sanitary sewer system.
56.180 - 56.200	Establishes appeals procedures; sets up appeals panel and procedures.
CHAPTER 57	MERCURY REDUCTION
57.10	Discussion of public health in respect to mercury.
57.20	Prohibits sale and purchase of certain mercury-containing products.
57.30	Retailers required to post visible signage if product contains mercury.
CHAPTER 60	COAL TAR-BASED SEALER PRODUCTS
60.30	Prohibited use of coal tar-based sealants on driveways and other applications.
60.50	Exemption of asphalt-based sealcoat for bona fide research or purpose.
60.60	Establishes penalties.
Title 19 – Water, Sewers, and Sewage Disposal	
Chapter 510	Stormwater Management System and Operation of a Stormwater Utility.
Chapter 511	Sewers and Sewage Disposal
Title 20 – Zoning Code	
CHAPTER 530	SITE PLAN REVIEW
530.160	Requirements for landscaping and screening; establishes minimum requirement of 20 percent of site to be landscaped.
530.190	Encourages use of landscape to intercept and filter runoff.

CODE OF ORDINANCES	
CHAPTER 535	REGULATIONS OF GENERAL APPLICABILITY
535.300 - 535.315	Protection and mitigation of natural features required during development, including stormwater management and groundwater management.
535.680	Prohibits creation of water pollution by operations or occupation of a structure.
CHAPTER 551	SHORELAND OVERLAY DISTRICT
551.440	Describes the purpose of shoreland overlay districts to protect the surface waters and shoreland areas within the City of Minneapolis.
551.510	Prohibits grading and filling more than 10 cubic yards when the land slopes toward a protected water.
551.520	Prohibits removal of vegetation near steep banks sloping toward a protected water.
551.530	Requires all developments to comply with stormwater regulation and to employ best management practices to minimize negative effects of stormwater runoff.
CHAPTER 551	FLOODPLAIN OVERLAY DISTRICT
551.140	Describes purpose of floodplain overlay districts to comply with rules and regulations of the National Flood Insurance Program.
551.590	Requires that materials deposited in the floodplain overlay district be protected (riprap, vegetation, etc.) and describes floodwater protection requirements for public utilities, sewage systems, and water supply systems.
551.600 - 551.645	Establishes prohibited, permitted, and conditional uses within floodplain and flood fringe overlay districts.
551.650	Establishes standards for uses within flood fringe overlay districts.
CHAPTER 551	MISSISSIPPI RIVER CRITICAL AREA OVERLAY DISTRICT
551.660	Describes the Mississippi River Critical Overlay District as an entity that will preserve and enhance the River.
551.700	Prohibits development on bluffs and within 40 feet of top of bluffs.
Title 22 – Land Subdivision	
CHAPTER 598	LAND SUBDIVISION
598.100	Establishes requirements for the protection or mitigation of natural features in a subdivision development, including protected waters, wetlands, significant trees, significant plant communities, steep slopes, and threatened/endangered species habitats.
598.110	Establishes stormwater management requirements for developments.

Table 5.2 – Minneapolis Park and Recreation Board Code of Ordinances

CODE OF ORDINANCES	
Chapter 3 – Bathing and Beaches	
PB3-2	Forbids swimming and bathing at unauthorized beaches or water.
PB3-3	Permit and license requirements to use floatation equipment on park lakes.
PB3-4	Permit requirements for use of underwater breathing equipment in park waters.
Chapter 4 – Boating	
PB4-1	Permit requirements to have or use watercraft on a lake within the City.
PB4-19	Provides authority to the superintendent of parks to enact additional rules and conditions for park waters.
Chapter 10 – Trees and Vegetation	
PB10-1 - PB10-5	Permit requirements and procedure for planting trees within limits of parkway or street.
Chapter 12 – Environmental Protection, Shoreland, and Floodplain Preservation	
PB12-3 - PB12-4	Permit required to install structure on floodplains or protected shorelines.
PB12-5	Restrictions on removing vegetation from floodplains and protected shoreline.
PB12-7	Restrictions on grading or filling floodplains and protected shoreline.
PB12-7	Provides authority for the Park Board to take action on floodplains and protected shorelines, while complying with the State and Federal laws.

Water Resource Management Programs

The City and MPRB manage numerous programs that require actions on the part of citizens and property owners that serve to keep pollutants from being transported to water resources via the storm drainage system or the sanitary sewer system. Detailed information on stormwater programs is available in the current version of the Minneapolis Stormwater Management Program, prepared in accordance with the requirements of the City's National Pollutant Discharge Elimination System (NPDES) Integrated Permit. A description of activities and progress of the CSO and stormwater programs through 2017 is contained in the City's CSO and NPDES Stormwater Annual Reports, and in the MPRB Annual Water Resources Report. Starting in 2019, for calendar year 2018, all NPDES annual summaries will be contained in a single annual report. A general description of these programs is provided in the following sections.

Complaints

The City provides several techniques for the public to use to report environmental complaints:

- The Minneapolis 311 service is a centralized location for the public to request services, communicate with City staff, seek information, or submit complaints. The public can communicate to 311 via the website, by phone, or through a mobile app. Minneapolis 311 assigns each call/complaint to the appropriate department/division, and responses and response time are tracked by the Minneapolis 311 system.
- The Minneapolis Department of Health, Environmental Management, maintains an online complaint submittal form to report any environmental issue such as water quality violations, illegal dumping, chemical spills, etc.

- The Public Works Department maintains a "Who to Call and When" list of direct contact information for sanitary sewer or stormwater specific issues such as street flooding, sewer backups, odors, illegal dumping, etc. Also, included in this contact list, are links to Environmental Management and the MPRB for non-infrastructure complaints.

Emergency Preparedness

The City has established an Emergency Management Office that is responsible for the City's response in the event of an emergency, which is detailed in the City's Emergency Operation Plan.

Spill Response

The Emergency Operation Plan has written a statement of policies and procedures to be followed in the event of a spill that describe the measures taken for spill containment, source elimination, and recovery. The City's Regulatory Services section has overall responsibility for communications, development of an Incident Action Plan, and investigations. A Hazardous Materials Response Team is mobilized in the event of a large spill that has the potential to reach surface waters. After the event, street maintenance staff coordinate the final clean-up and disposal of both the streets and affected sewers/storm drains. Public Works will also collect, manage, and properly dispose of all debris collected from the spill, including sand and other materials used to sop up the spill. Fire Inspection Services staff and others continue to monitor the site and coordinate debriefings to determine the cause of the event, the City's response, and means to limit future events. Training on response procedures is conducted for staff assigned to spill response.

Both the MPCA Duty Officer and the Minnesota Department of Public Safety are informed of all spills that exceed 5 gallons.

Flood Response

In the event of a flood, the City's Emergency Operation Plan details pre-flood preparations, as well as emergency responses during the flood.

Erosion and Sediment Control

In 1996, the City adopted its Erosion and Sediment Control Ordinance (Chapter 52, Minneapolis Code of Ordinances) for the specific purpose of controlling soil erosion and sedimentation to prevent transportation of eroded soil to lakes, creeks, and the Mississippi River. The City of Minneapolis Stormwater and Sanitary Sewer Guide contains a detailed description of the Erosion and Sediment Control requirements, including permits, plan requirements, and additional regulations.

Construction Permits and Inspections

Chapter 52 requires that all land disturbing activity be conducted in a manner that prevents soil sediment from moving from the construction site onto adjacent properties and public rights-of-way. Erosion and Sediment Control Permit requirements are triggered whenever a land disturbing activity exceeds 5 cubic yards in volume or 500 square feet in area. Larger projects that exceed 500 cubic yards in volume or 5,000 square feet in area must also prepare a stormwater management plan as a condition of permit issuance. Permit application forms and fee schedules are available through the City's Development Review Customer Service Center.

Unmanaged Construction Site with Significant Soil Erosion on Sidewalk and Street

Credit: Minneapolis Public Works

The Public Works Department has developed tools to aid in the development of erosion and sediment control plans for projects that exceed 500 cubic yards or 5,000 square feet. Tools include standard notes that can be listed on the erosion and sediment control plan and a checklist of required plan elements. For more in-depth information, contractors and designers are encouraged to utilize information developed by the Minnesota Pollution Control Agency (MPCA), the Minnesota Erosion Control Association, and the University of Minnesota Erosion and Stormwater Management Certification Program.

During construction, sites are inspected and managed by the Minneapolis Department of Health Environmental Services.

Non-Construction Inspection and Enforcement

Non-construction generated erosion and sedimentation inspections and enforcement are conducted on a complaint basis by the Minneapolis Department of Health Environmental Services.

Illicit Discharge Detection and Elimination

Illicit discharges include both intentional dumping of wastes and accidental spills of chemicals/liquids in the City's storm drain system. Intentional would include dumping of oil/paint or other regulated wastes into catch basins. Accidental spills include the accidental releases caused by motor vehicle collisions or electrical transformer overloads. The result is untreated waste and hazardous materials that contribute to high levels of pollutants, which includes heavy metals, toxics, and solvents, being discharged directly into surface waters.

The Environmental Services Section of the Health Department is designated as responsible for control of Illicit Discharge Detection and Elimination (IDDE). Activities include development of baseline information, identification of problem areas, investigation and determination of sources, documentation, and corrective action. Environmental Management also provides education and regulation for unauthorized and non-stormwater discharges in the storm drains.

The City has implemented a storm drain outfall inspection program that includes inspections for flows during dry weather as an approach to identification of IDDE sources, as required by the City's NPDES Integrated Permit. If dry weather flows are detected during an inspection, then a grab sample is collected for analysis to determine if pollutants are present. Public Works Field Services and Department of Health Environmental Services work together to discover the source and ultimately to eliminate the illicit flows.

Additional efforts to eliminate illicit discharges to the storm sewers include public education, and direct response to notifications received from the community, other city departments, and government agencies. Currently, Department of Health Environmental Services addresses complaints of materials being discharged to the Minneapolis storm drainage system whether they are permitted discharges or not. The Department of Health Environmental Services also reviews compliance with NPDES, State Disposal System (SDS), and general stormwater permit requirements for businesses, as needed.

Inflow/Infiltration Compliance, Private Properties

As described in Section 4 – Infrastructure Inventory, Activities, and Assessment, the City recognized that historic building practices that allowed rooftop drainage connections to the sanitary sewer system were a factor in the continued overflow at combined sewer overflow (CSO) regulators. As part of the 2002 Phase II CSO Program, the City began to focus on the identification and elimination of these rooftop drainage connections to the sanitary sewer. To support this initiative, Minneapolis Ordinance Chapter 56 – Prohibited Discharges to Sanitary Sewer System, was updated on August 1, 2003. This updated ordinance authorized a program to inspect suspected rooftop connections and coordinate disconnections with property owners. It requires property owners to redirect rooftop rainleaders and private surface area drainage either to side yards or to the public storm drain system. Property inspections are conducted to identify illegal connections to sanitary sewer and then notifications are sent of the work needed to comply with the ordinance and other official controls.

The purpose of the Minneapolis ordinance Chapter 56 – Prohibited Discharges to Sanitary Sewer System is as follows:

> *MCO 56.10 Purpose: The City of Minneapolis has been pursuing an aggressive campaign of separating its sanitary sewer system from its stormwater drainage system to reduce the number of combined sewer overflows (CSO). However, some rainleaders and other components, which handle stormwater, are still connected to the sanitary sewer system. During rain events, infiltration and inflow from buildings and parking lots with rainleaders and area drains connected to the sanitary sewer system, cause its capacity to be exceeded resulting in overflows to adjacent storm drains. This overflow ends up discharging sewage and stormwater into the Mississippi River. Rooftop drains (rainleaders) that are connected to the sanitary sewer system are one of the major causes of combined sewer overflows.*
>
> *Residential and commercial buildings, usually built before [1930], sometimes have pipes that lead underground directly into the sanitary sewer system, rather than through gutters to lawns or the stormwater drainage system. To protect the environment and prevent these overflows as well as preventing the possibility of sewage backing up into homes and businesses, rainleaders and other connections which deliver stormwater into the sanitary system rather than the stormwater drainage system or to pervious surfaces need to be disconnected. State and federal environmental mandates require us to work to eliminate combined sewer overflows.*
>
> *The city and metropolitan council have conducted studies that determined the main contributor to these overflows is rainleader connections. The purpose of the City of Minneapolis Code of Ordinances Chapter 56 is to define regulations that will aid the city in*

limiting inflow of rainwater to the sanitary sewer system. The ordinance will help to minimize the overflow problem resulting from the lack of capacity of the sanitary system to handle large amounts of rainwater. Rainwater runoff will be more appropriately handled through natural filtration and/or the stormwater drainage system. The net result will be a cleaner Mississippi River and a more efficient waste treatment system.

Previous City official controls and state plumbing codes were applicable to new construction only, and not to existing connections. Additional revisions to Chapter 56 were approved in 2006 to accelerate rooftop disconnections to meet the Metropolitan Council inflow/infiltration (I/I) reduction goals described in Section 4 – Infrastructure Inventory, Activities, and Assessment. These revisions included:

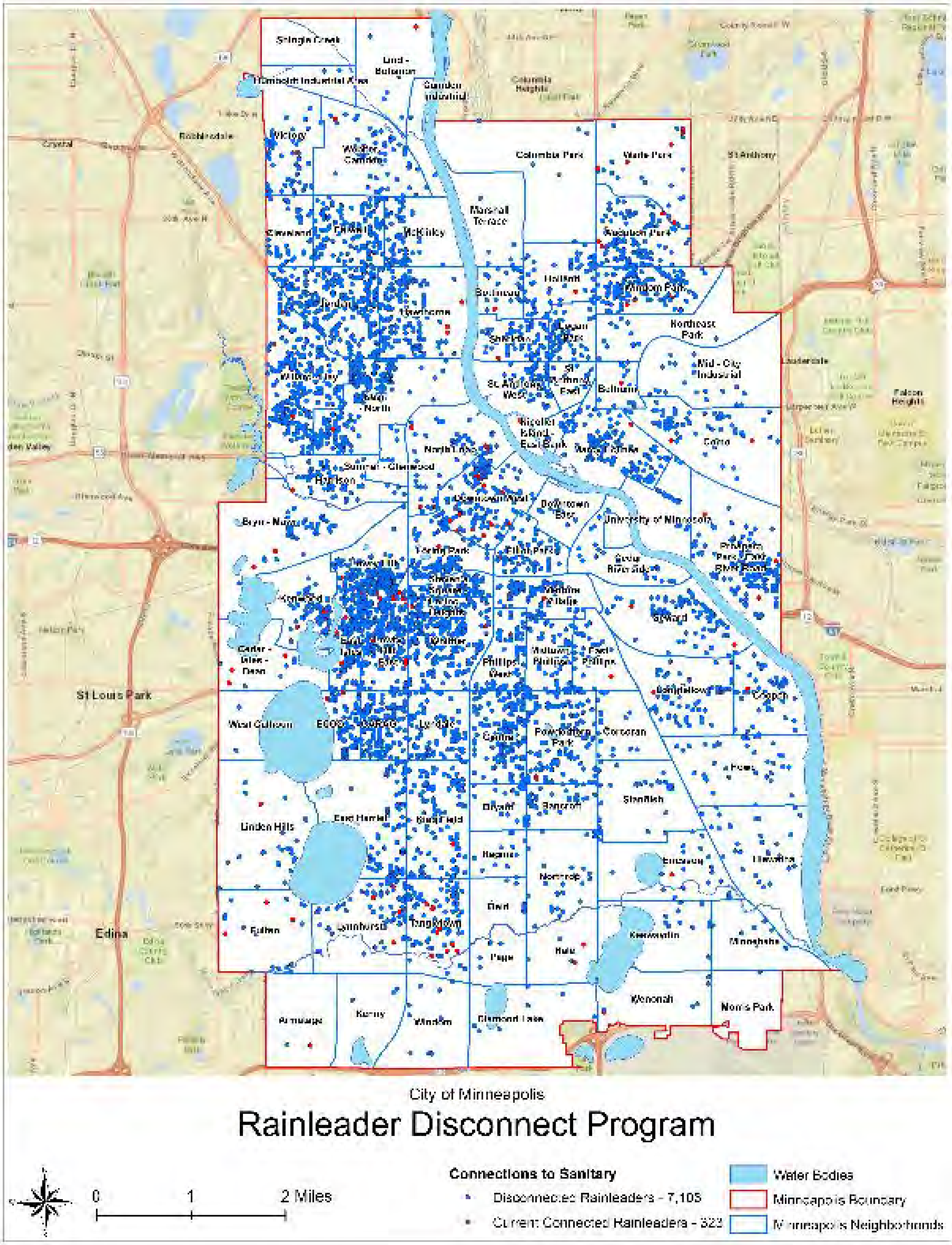
- Provisions to support enforcement of administrative citations.
- Providing the City with the ability to order connections to the storm drain system to be constructed as the sanitary sewer disconnection method.
- Allowing the use of assessments to recover the cost of disconnection of roof drains.

Significant progress has been made on disconnecting rainleaders from the sanitary sewer system. Table 5.3 summarizes the progress made on disconnection of rainleaders from the sanitary sewer through 2017 and Figure 5.1 identifies the location of these rainleaders. The total number of remaining rooftop connections to the sanitary sewer is estimated to be 323.

Table 5.3 – Rooftop Disconnections from Sanitary Sewers

Year	Rooftop Connections Removed Per Year	Cumulative Rooftop Connections Removed
2008	--	4,537
2009	1,021	5,558
2010	427	5,985
2011	186	6,171
2012	133	6,304
2013	220	6,524
2014	150	6,674
2015	315	6,989
2016	105	7,094
2017	7	7,103

Figure 5.1 – Rooftop Disconnections in the City of Minneapolis



Other efforts that work to reduce I/I contributions to the sanitary sewer include:

- Minnesota Code of Ordinances 56.80: Prohibited Connections – (a) Connections not permitted. Rainwater pipes, rainleaders, area drains, or other connections used for conveying stormwater and clearwater from any building, structure, ground, or premises shall be not connected or reconnected with any sanitary sewer system.

- Minnesota Code of Ordinances 56.80: Previously Allowed Connections – (a) Existing connections not permitted. Rainwater pipes, rainleaders, area drains, and other connections used for conveying stormwater and clearwater from any building, structure, ground, or premises which were legally connected to the sanitary sewer system prior to 1961 or those which were connected later by City permission shall be disconnected from the sanitary sewer system pursuant to 56.140 of this Code or by January 1,2005, whichever occurs first.

- Sump Pumps Chapter 56/Chapter 248: Truth in Sale of Housing – Truth in Sale of Housing evaluation is required for the sale of a single-family home, duplexes, townhouses, and first-time condominium conversions. Sump pumps were added to the evaluation in 2007. Sump pumps are evaluated for conformance with Chapter 56 as part of the inspection. Truth in Sale of Housing repairs are required to be completed when a property is sold within 90 days of closing.

Public Education, Participation, and Involvement

Public Education

Successful management of the City's surface water requires positive support and action from the public. To engage City residents and gain their active support and participation, the City and the MPRB maintain several education efforts that aim to inform City residents about basic stormwater management, flood mitigation, water quality concepts, regulations, and policies. Many programs focus on partnering with other agencies and non-profit organizations. The City will continue to work with watershed management organizations on water resource monitoring, education events, professional training, distribution of materials, and other educational activities as opportunities arise.

Adjustments to the program are made each year to reflect changing educational needs and partnership opportunities. In 2017, MPRB Environmental Management naturalist staff participated in 30 Minneapolis community festivals and neighborhood events, as well as concerts and movies. Hands-on water quality education displays focused on neighborhood watersheds and how human activities impact local waterbodies. Education staff utilized portable mini-golf, bean bag toss, an aerial photo floor graphic of the City and its watersheds, and other hands-on learning activities. In addition, 495 people experienced water quality education while canoeing the lakes of the City. Other children's programming focused on water quality education themes in summer programs including a partnership with the Minneapolis Institute of Art that used art and water-related activities to serve 335 kids between 6 and 12 years old. Still more programs incorporated water education themes into the summer camps called Urban Adventure Camp, Outdoor Survival, and Nature Explorers serving 245 kids between 6 and 12 years old.

The following is a snapshot of additional 2017 water quality education projects that are directly supported by the City:

Water Quality Education Materials

Credit: Minneapolis Park and Recreation Board

- The Minneapolis Adopt-a-Drain program has volunteers cleaning debris from catch basin grates in their neighborhoods. Volunteers commit to cleaning their assigned drains for a period of two years.

- Aquatic Invasive Species Program by the MPRB focuses on inspection and signage at public boat launches between May 1 and December 1 each year. Additional detail on the Aquatic Invasive Species program is included in Section 3.

- **Boulevard Bioswales** is a program under development by Minneapolis Surface Water and Sewers in cooperation with the MPRB and Blooming Boulevards. The program will sponsor the creation of rain swales with native plantings to be installed along boulevards that have the ash trees removed by the MPRB. The goal of the program is to reduce stormwater runoff and allow for localized infiltration. Homeowners are presented with a choice of plant palettes, each comprised of pollinator-friendly plant species. These homeowners will be responsible for the ongoing maintenance of the Bioswales. Approximately 900 boulevard rain swales are anticipated to be installed over this four-year period.

- Canines for Clean Water is a joint MPRB and City water quality education program initiated in 2009 that targets dog owners. In 2017, Public Service Announcements were shown that encourage pet owners to pick up pet waste and encourages all property owners to stop or reduce their use of winter salt.

- **Do Not Feed the Ducks** is a successful program to persuade park patrons not to feed the ducks. It utilizes an oversized buoy in the shape of a rubber duck and more than 200 table-top ducks distributed at MPRB licensed restaurants.

Do Not Feed the Ducks Buoy

Credit: Minneapolis Park and Recreation Board

- **Earth Day Watershed Clean-Up** was initiated in 1995 to draw attention to the water quality improvement needs of City lakes, and the effects that individual actions have on urban water quality. The goals of the Earth Day Clean-Up event are to prevent trash and debris from entering Minneapolis waterbodies and to provide a volunteer experience and environmental education to City residents and park users.

Earth Day Watershed Clean-Up

Credit: Minneapolis Public Works

- Minneapolis Surface Water and Sewers has developed education materials aimed at reducing the disposal of Fats, Oils, and Grease (FOG) into the sanitary sewers. Improper disposal of FOB materials tends to clog within the sewers, leading to higher levels of sanitary sewer and lateral cleaning, and/or sewer backups. The materials are primarily developed for restaurants and other food service establishments but are valuable for waste management in all kitchens.

- Greening Teen Teamworks is a summer youth employment program managed by the MPRB for 30+ years. The Greening Teen Teamworks program meets weekly with all sites supervisor and youth to provide education on stormwater runoff, water quality, and actions that should be taken to help keep our lakes, creeks, and river healthy. These site-based youth crews are charged with keeping the parks stormwater drains clear and curb lines picked up, and at parks with waterbodies, the crews remove debris from outlets and tidy up shorelines. The Greening Teen Teamworks program is funded by the MWMO.

- Metro Bloom Program conducts Rain Garden Workshops, including workshop facilitation, rainwater garden design, water quality education, and other assistance for individual property owners.

- **Mississippi River Green Team** is a conservation-based teen crew engaged in daily hands-on environmental work throughout the summer. There are two crews of ten youth each, which work mostly in the natural areas of the Minneapolis park system, and within the watershed of the Mississippi River. Typical work days include invasive species removal, weed wrenching, planting, watering, mulching, and citizen science work.

- **Plants for Pollinators** neighborhood events have been conducted by the Minneapolis Surface Water and Sewers staff to provide information on vegetation at stormwater management sites. To-date, events have been held at the South 43rd Street and Park Avenue site (2016) and the Shingle Creek South stormwater pond (2017). A 2018 site is yet to be selected.

- Minneapolis initiated a city-wide storm drain inlet stenciling program in 1995. Volunteers stencil "DO NOT DUMP, DRAINS TO RIVER" messages next to catch basins and distribute educational door hangers to residences and businesses in the stenciled neighborhoods. Stencils are available in English, Spanish, and Somali.

Storm Drain Stencil Door Hanger

Help keep our natural waterways clean

With its lakes, creeks, waterfalls and the Mississippi River, Minneapolis prides itself on natural water.

A big part of protecting our waterways is right on our streets. Leaves, dirt, garbage and anything that gets left on the street can wash down storm drains and go untreated into our lakes and the river.

When it rains, stormwater carries grass clippings, leaves, cigarette butts, pesticides, fertilizers, antifreeze, paint, gasoline, motor oil and animal waste directly into Minneapolis lakes, creeks and the Mississippi River.

How can you help?

Sign up for the Minneapolis Adopt a Drain program, and commit to clearing leaves and trash from it regularly.

Never put anything down a storm drain. It's for rain and melting snow only.

Be a champion and spread the word with your neighbors.

Learn more or sign up by calling 311 or going to www.minneapolismn.gov/AdoptaDrain.

Minneapolis

Public Works
Call 311 or visit
www.minneapolismn.gov

If you need this material translated or in an alternative format, please call 311.

Credit: Minneapolis Public Works

Storm Drain Stencil Volunteers

Credit: Minneapolis Public Works

The City also funds workshops on how homeowners can improve vegetation and soil conditions to promote activities that retain rainfall and reduce the volume of stormwater runoff. The following workshops are facilitated by Metro Blooms, a Minneapolis based non-profit organization:

- Resilient Yards workshops provide how-to information on rain gardens, turf alternatives, pollinator habitat, trees, and native plantings.

- Turf Alternative workshops present a variety of do-it-yourself alternatives to turf. The workshops provide information on how perennial ground covers reduce the need for irrigation and chemical inputs while maximizing ecological benefits. The two most popular turf alternatives have been Low Maintenance Lawns and Bee Lawns.

Additionally, there are multiple organizations that also provide water quality education to Minneapolis residents and businesses, including:

- Freshwater Society of Minnesota
- Friends of Mississippi River
- Friends of Diamond Lake
- Friends of Lake Hiawatha
- Friends of Lake Nokomis
- Hamline University College for Global Education
- Hennepin County
- Linden Hills Environmental Committee
- Minnehaha Creek Watershed District
- Metro Watershed Partners
- Mississippi Watershed Management Organization
- West Metro Water Alliance

Public Participation and Involvement

As part of the implementation of a new activity or development of a capital improvement project, the City actively seeks to engage the public in the process of decision-making. The City is committed to incorporating community engagement activities into decision-making for all activities undertaken by City departments. The City keeps its residents informed about stormwater and sanitary sewer capital improvement projects through its website and social media platforms. Information is provided on specific projects, and periodic updates on the progress of the listed projects are made available. Public meetings are conducted to invite public input on project-specific issues.

Rat and Rodent Control

In the event of a rat infestation in the sanitary sewer, maintenance staff from the Division of Surface Waters and Sewers will control the population by using poison. Raccoons and other animals commonly found in the storm drainage pipes and/or Stormwater Management Practices (SMPs) are trapped and removed only if the animal is causing damage or otherwise sick or injured.

Site Plan Review and Capital Project Task Force

For development and redevelopment projects, the Public Works Surface Water and Sewers Division (PW-SWS) carries out review for compliance of stormwater and sanitary sewer requirements, as part of the multi-department site plan review process coordinated by the Department of Community Planning and Economic Development (CPED). For projects that propose changes to the City's infrastructure (streets, lights, public utilities, etc.), the Public Works Department coordinates the Capital Projects Task Force (CPTF) process of review for compliance with the City's requirements for working within the public right-of-way.

In October 2017, the PW-SWS posted the City of Minneapolis Stormwater and Sanitary Sewer Guide (Guide) to provide information for developers and site designers to follow to ensure compliance with the City's requirements. The Guide includes a description of the City's stormwater management official controls, including the stormwater management ordinance, hydrologic/hydraulic model guidelines, groundwater permitting, project requirements, responsibilities during construction, and responsibilities following requirements. This Guide is a regulatory control that is, and will continue to be, used to ensure water resource standards are met with each development, redevelopment, and public facility constructed in the City.

Stormwater Management Standards for Development and Redevelopment/Post-Construction Stormwater Management

Shortly after the adoption of this WRMP, the Guide will be updated to change the official controls that regulate stormwater management in the City. Onsite stormwater management has been required for both private developments and new public facilities constructed since 1999 as a condition of site plan approval for developments, redevelopments, and public projects that disturb more than one acre. Chapter 54 of the Code of Ordinances established this requirement, applied pollutant reduction goals for projects that require post-construction stormwater management, and recommended that infiltration (stormwater volume reduction) be maximized to the greatest possible degree except in the cases of likely stormwater contamination (stormwater hotspots). Stormwater management plans submitted for Minneapolis Development Review must provide for stormwater controls to meet the pollution reduction goals contained in Chapter 54. The City has initiated a process to update these requirements in accordance with the NPDES Integrated Permit, the standards established by the watershed district/organizations with jurisdiction in the City, and to define requirements and the approval process for new private outfalls to surface waters. The MS4 permit requires all new and redevelopment projects that create or fully reconstruct one or more acres of impervious surface to retain onsite, to the maximum practicable extent, a stormwater volume of one-inch times the new and/or fully reconstructed impervious surfaces, except where infiltration is prohibited. Road projects are required to reduce a stormwater volume of one-inch times the net increase of impervious surfaces and reduce stormwater runoff volume for fully reconstructed surfaces, except where prohibited. The Permit requires the City's regulatory program to contain prohibitions on stormwater infiltration for sites where runoff may be contaminated, where the soils may be contaminated, in vulnerable wellhead protection areas, or where site conditions prevent effective infiltration (clay soils, sandy soils, Karst, too close to bedrock or groundwater). The Permit addresses mitigation provisions for circumstances where required conditions for stormwater management cannot be cost effectively met for construction projects.

Floodplain Management

Floodplain management is the management of developments and other activities in or near the floodplain that serve to prevent flood damages to structures. The DNR defines floodplain management as "the full range of public policy and action for ensuring wise use of the floodplains. It includes everything from collection and dissemination of flood control information to actual acquisition of floodplain lands, construction of flood control measures, and enactment and administration of codes, ordinances, and statutes regarding floodplain land use."

The National Flood Insurance Program (NFIP) was created by Congress in 1968. As stated by the Federal Emergency Management Agency (FEMA), "The National Flood Insurance Program aims to reduce the impact of flooding on private and public structures. It does so by providing affordable insurance to property owners and by encouraging communities to adopt and enforce floodplain management regulations. These efforts help mitigate the effects of flooding on new and improve structures."

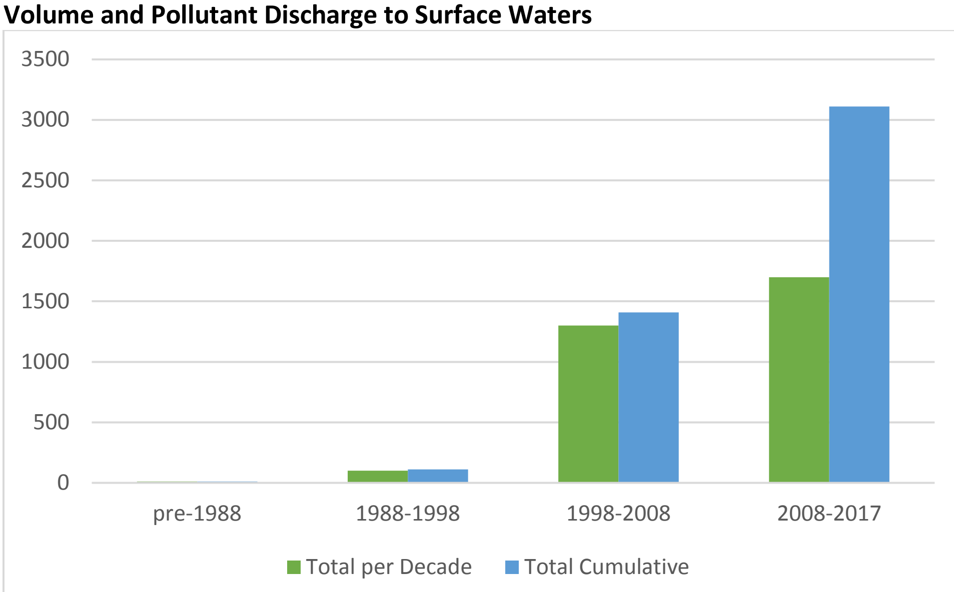
FEMA periodically revises the Flood Insurance Rate Maps (FIRM) to more accurately delineate floodplain boundaries. As new maps are revised, the City adopts these new map panels and updates the provisions of the Floodplain Overlay District to continue participating in the NFIP and to reflect better topographical data and more accurately represent the location of the determined floodway and flood fringe elevations.

The City will continue to implement its Floodplain Ordinance and to manage activities within the floodplain in accordance with State and Federal regulations. Through the ordinance, the City will maintain no net loss of floodplain storage and will not allow changes to the floodplain that will cause any increase to critical 100-year flood elevations. Where more up-to-date floodplain modeling exists, the City will use that information during the development process to provide land owners with a more accurate view of future flood risk to their property.

Anti-Degradation Requirements for Development and Redevelopment

The City is in compliance with the state anti-degradation requirements. The City has not created any new or expanded discharges as defined in 7050.0185 Subp. 2.A. and B. A non-degradation assessment was completed in 2010, with MPCA staff concluding that there had been no expanded discharge of stormwater from the jurisdiction of Minneapolis. From 1988 to 2010, the reduction in impervious cover was estimated at approximately 5 percent. The City has reduced, and is continuing to reduce, discharges through City stormwater management initiatives, City zoning requirements for developers, requirements of the municipal separate storm sewer system (MS4) permit regulations, and requirements of other local water management organizations. There has been a steady increase in the number of private plus City-owned structural best management practices (BMPs) installed in the City since 1988 to reduce runoff volume and pollutant loads, as shown in **Figure 5.2**.

Figure 5.2 – Estimated Cumulative Total Structural BMPs Installed Since 1988 to Reduce Stormwater Runoff Volume and Pollutant Discharge to Surface Waters



The NPDES Integrated Permit requires that the City submit an application for reauthorization of this anti-degradation assessment after issuance of the final permit. No major changes to the status is anticipated.

Watershed Organization Requirements

Stormwater management requirements established by the City overlap with the standards established by the watershed district/organization with jurisdiction in the City. While the City works closely with all four of the watershed management organizations to coordinate water resource approvals, the specific review authority varies with each organization, as follows:

- **BCWMC** has authority to review projects to ensure compliance with their standards. BCWMC will review projects only after the City has completed local review and has affirmed that local requirements have been met.
- **MCWD** has authority to issue permits to projects that meet the standards set in their rules. Generally, the MCWD site plan review is independent from local review and is typically concurrent with all other permit reviews.
- **MWMO** does not issue permits. The MWMO does work closely with member cities to ensure that local controls meet MWMO standards.
- **SCWMC** has authority to review projects to ensure compliance with their standards. SCWMC will review projects only after the City has granted approval that the local requirements have been met.

MCWD allows local governments to assume sole regulatory authority to issue permits for some or all of their permits. This authority could be delegated to the local government after certain conditions set by the MCWD have been met. The City does not wish to assume sole regulatory responsibility for MCWD rules.

These watershed organization requirements overlap with stormwater management requirements set by the MPCA in their General Permit for Construction Activities. Table 5.4 compares the minimum sized site that is required to meet specific stormwater management activities for each of these organizations that are in effect in 2017.

Table 5.4 – Minneapolis and Watershed Organization Permit Requirements for Redevelopments through 2017

Permit Category	Land Use or Activity	Minneapolis Minimum Site Area or Volume [a, b]	BCWMC Minimum Site Area or Volume [c]	MCWD Minimum Site Area or Volume [d, e]	MWMO Minimum Site Area or Volume [f]	SCWMC Minimum Site Area or Volume [g]	MPCA Minimum Site Area or Volume [h]
Erosion Control	All	500 sf	10,000 sf	5,000 sf	Applies requirements to member cities	Required for all sites that require permit	1 acre
Erosion Control	Cut or Fill	5 cy	200 cy	50 cy	N/A	Required for all sites that require permit	N/A
Stormwater Management	All	1 acre disturbance	1 acre new impervious surface	1 acre	1 acre	N/A	1 acre new impervious surface
Stormwater Management	Non-residential	N/A	N/A	N/A	N/A	0.5 acres	N/A
Stormwater Management	Residential	N/A	N/A	N/A	N/A	1 acre	N/A

Source:
[a] *Minneapolis Code of Ordinances, Chapter 52, Erosion and Sediment Control and Drainage*
[b] *Minneapolis Code of Ordinances, Chapter 54, Stormwater Management*
[c] *BCWMC Requirements for Improvements and Development Proposals, September 2015.*
http://www.bassettcreekwmo.org/application/files/9814/4430/8842/AppendixH-RevisedRequirementsDoc-Sept2015-Final.pdf
[d] *MCWD Erosion Control Rule, April 24, 2014.*
http://minnehahacreek.org/sites/minnehahacreek.org/files/attachments/6%20%20Rule%20-%20erosion%20control.pdf
[e] *MCWD Stormwater Management Rule, April 24, 2014.*
http://minnehahacreek.org/sites/minnehahacreek.org/files/attachments/12.%20Rule%20-%20stormwater.pdf
[f] *MWMO Watershed Management Plan, November 15, 2016. http://mwmo.org/reports/watershed-management-plan/*
[g] *SCWMC Rules and Standards, July 11, 2013.*
http://www.shinglecreek.org/uploads/5/7/7/6/57762663/scwm_rules_and_standards_revised_2013.pdf
[h] *MPCA, NPDES General Permit for Construction Activity, August 1, 2013. http://www.pca.state.mn.us/sites/default/files/wq-strm2-68a.pdf*

The City will look for opportunities to partner with watershed organizations to ensure that both City and watershed organization requirements for developments and redevelopments are met. In cases where current city controls are restricting the advancement of a project, the City will review and will seek to modify the controls in a manner that allows for the project to continue while also meeting the City's overall water resource goals. Revisions to official controls proposed by the City will follow an inclusive stakeholder review process that includes all watershed organizations, as well as other affected external stakeholders. Specifically, in 2018, the City will update the stormwater official controls to be in compliance with the NPDES Integrated Permit and revisions recommended in this WRMP.

Wetland Conservation Act

New construction projects that propose to alter wetlands must comply with provisions of the Minnesota Wetland Conservation Act (WCA). The City of Minneapolis, Department of Public Works, is designated as the local government unit (LGU) by the Minnesota Board of Soil and Water Resources, except for the part of the City within the bounds of the Minnehaha Creek Watershed District (MCWD). As LGU, the City is responsible for ensuring the provisions of the WCA are implemented in Minneapolis.

Although most wetlands in the City are located on public property, there are a few small wetlands that are under private ownership. If a development or redevelopment proposes to alter a wetland that is governed by the Wetland Conservation Act, the City will require that the developer delineate the wetland and prepare a wetland mitigation plan that must be approved by the Public Works Division of Surface Water and Sewers. The City may opt to consult with the watershed management organization or a technical evaluation panel (TEP) to ensure that the mitigation plan meets all requirements.

The City's wetland review also includes review for compliance with the BCWMC buffer requirements.

Minimal Impact Design Standards Flexible Treatment Options

The Minimal Impact Design Standards (MIDS) goals are aimed at projects that add at least one acre of impervious surface. It is rare for projects in the City to add this much new pavement or building area. More commonly redeveloped projects in the City actually decrease the total amount of impervious surfaces from earlier built conditions as site designers incorporate stormwater management and green space requirements.

The low-impact approaches, inherent in MIDS, are most easily applied in areas that have not already been developed as dense urban areas. The City of Minneapolis is one of the nation's older, fully developed cities, with an extensive, underground stormwater drain network built to manage runoff from a dense urban pattern of streets and buildings. As a fully developed central city, many of the existing parcels in the City are not of sufficient size to fully implement Minimal Impact Design Standards performance goals. The typical small lot in the City may have insufficient separation between stormwater infiltration devices and sanitary sewer pipes, which creates the potential of the stormwater seeping into the sanitary sewer which would contribute to I/I related flows. Additionally, infiltration on Brownfield sites, those with presence of contaminated soils and/or groundwater, is not allowed by the MPCA. Other physical restrictions include poor soil conditions and utility conflicts. The City is using the MIDS goals as a foundation for developing revised regulatory controls that address volume management requirements of the NPDES Integrated Permit.

Ongoing Stormwater Management Compliance

The Division of Surface Water and Sewers maintains a database of stormwater management practices (SMPs) that have been installed in compliance with official controls established by the City. Developers or property owners are required to submit an annual registration form that reports on the ongoing inspection and maintenance activities for each BMP.

Inspections are conducted periodically to confirm that the stormwater practices are being maintained and that the practices are continuing to function as approved. Inspections include photo documentation of the stormwater practices and follow-up for stormwater practices that are not functioning and/or properly maintained.

The NPDES Integrated Permit requires that the City establishes a legal mechanism between the site owner and the City for structural BMPs. The program is required to contain a process that allows City inspections of BMPs, transfer of maintenance responsibilities to future site owners/maintainers, and procedures that owners must follow to alter site features and/or structural BMPs.

Utility Billing

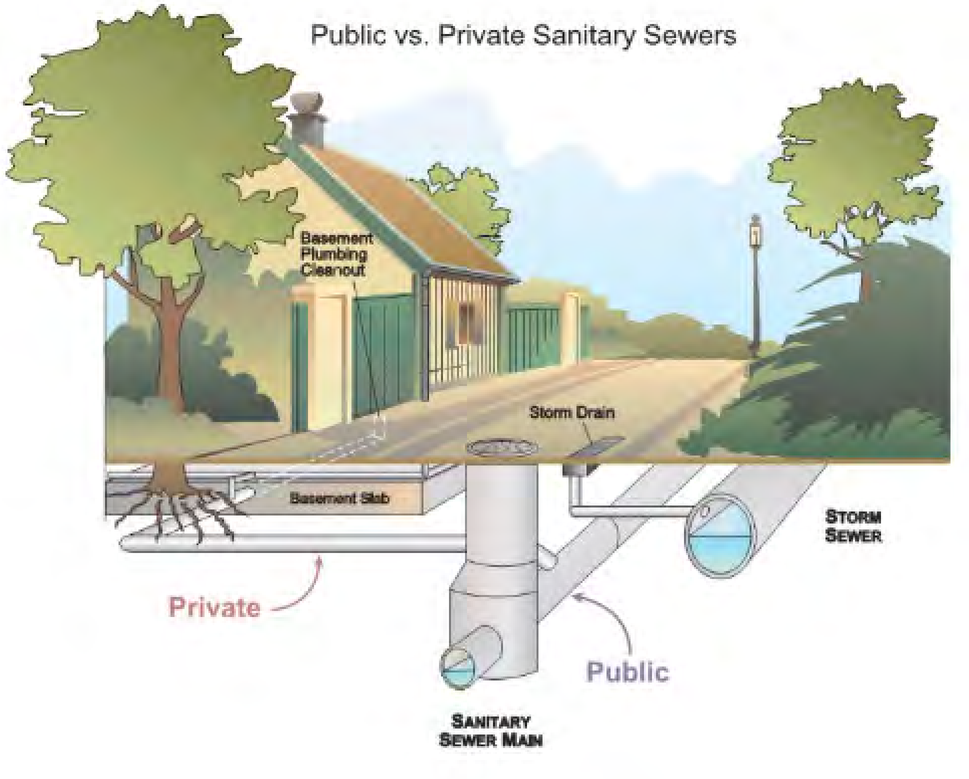
The Minneapolis Finance Department manages all monthly utility billing, including billing for sanitary sewage and stormwater runoff. For residential customers, the sewage charges are based on the average water consumption used during the winter months of December through March. Water consumption in the winter months is used to calculate the average sewer use for the remainder for the year to account for warm weather months when water may be used for irrigation and not end up in the sewer system. This average rate is applied for the remainder of the year.

In 2005, the City adopted a stormwater utility fee structure that applies a flat rate to residential properties and an impervious surface area rate for commercial/industrial/institutional properties. A 50 percent to 100 percent credit may be applied if a property contains stormwater quality and/or stormwater quantity practices. Additional information on stormwater utility fee calculations and credits are contained in the City of Minneapolis Stormwater and Sanitary Sewer Guide.

Utility Permits

In the City, property owners are responsible for the entire length of utility existing between a building, or other location on private property, to the point of connection to the City's main sanitary sewer, as shown in Figure 5.3. Contractors are required to obtain a connection permit from the City's Utility Connections Office prior to connecting directly to the City's sanitary sewer or storm drain. Permits are also required prior to creating an extension or change to an existing privately-owned sanitary sewer or storm drain. The Utility Connections Office will request approval from the Public Works Division of Surface Water and Sewers prior to issuance of a storm drain connection permit. Detailed descriptions of required utility permits and associated requirements are contained in the City of Minneapolis Stormwater and Sanitary Sewer Guide.

Figure 5.3 – Public vs. Private Sanitary Sewers in the City of Minneapolis



City approval of long-term discharges of groundwater to the storm drainage system will require a Long-Term Groundwater Discharge Approval, as detailed in the City of Minneapolis Stormwater and Sanitary Sewer Guide.

From time to time, a developer may propose to add an outfall directly to a waterbody in the City without connection to a City-owned storm drain. This practice is currently prohibited by the City's Code of Ordinances. Chapter 511.30 states "No person shall build or repair any ditch, or lay or repair any pipe or conduit, for the purpose of discharging storm, surface, cooling or condenser water into the Mississippi River or any stream or watercourse within or adjacent to the boundaries of the city." Rules and policies of the MPCA, the watershed organizations, and the City are being reviewed to clarify the proper process for application, review, and approval. After review of these procedures, the City will determine whether to amend Chapter 511.30.

Water Permits

The Minneapolis Health Department Environmental Services is assigned the responsibility to ensure that water utilization on private property is undertaken in accordance with the requirements of the City, Hennepin County, and the State of Minnesota. Accordingly, they have established permit and inspection procedures in the following areas of water usage:

- Temporary Discharge of Water permits are required for the intentional temporary discharge of any water into either the sanitary sewer or storm drain systems.

- Groundwater Well permits are required for temporary wells, permanent wells, and sealing of wells.
- Non-Community Public Water Systems that serve individual facilities are actively inspected to ensure that the privately withdrawn groundwater meets the requirements of the federal Safe Drinking Water Act.

Temporary and permanent groundwater discharge requirements are detailed in the City of Minneapolis Stormwater and Sanitary Sewer Guide.

Appropriations from Small Watercourses

The City and the MPRB do not allow appropriations from lakes, creeks, or wetlands in the City except when approved on a case-by-case basis for maintenance of public lands.

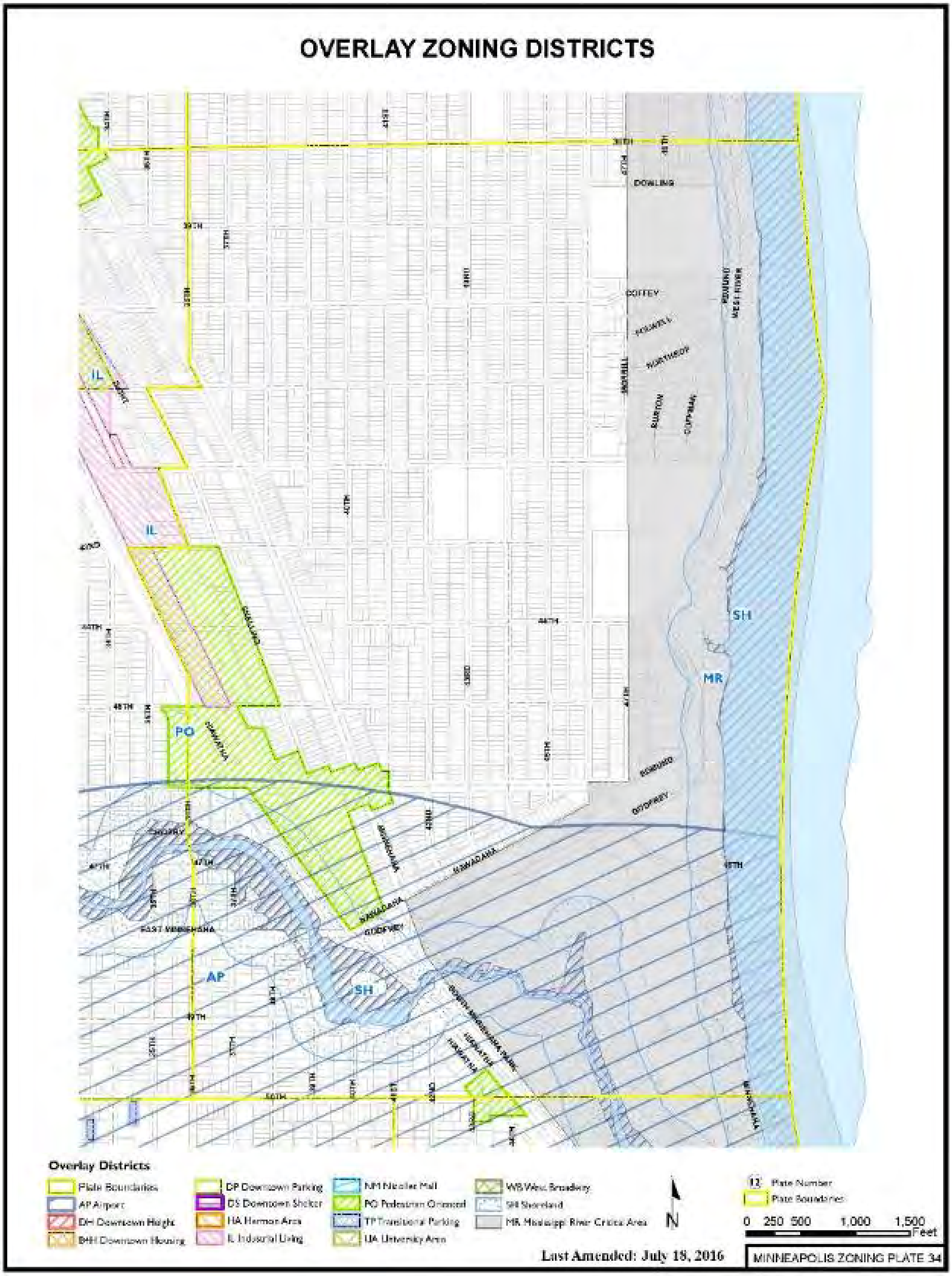
Zoning Code and Land Use

The Minneapolis Zoning Administration Office of CPED is responsible for ensuring that the land use in the City of Minneapolis is in compliance with the Zoning Code. All properties are within one of 23 primary zoning districts that fall into the general categories of Residential District, Office Residence Districts, Commercial Districts, Downtown Districts, and Industrial Districts. Properties may also be within an overlay zoning district which establishes additional land use requirements. Environmental protection requirements, including water resource protection measures, have been incorporated into Minneapolis Zoning Code in the following overlay districts:

- Floodplain Overlay District zoning requirements are established in accordance with the National Flood Insurance Program to maintain the City's eligibility in the National Flood Insurance Program (NFIP). Boundaries of each Floodplain Overlay District are based on the potential extent of flooding of nearby surface waters, primarily creeks and the Mississippi River.
- Shoreland Overlay District aims to preserve the environmental qualities of the City's surface waters and are written in accordance with the requirements of the Minnesota Department of Natural Resources (MNDNR). Boundaries of each Shoreland Overlay District extend 1,000 feet from lakes, ponds, and wetlands; and, 300 feet from rivers and streams.
- Mississippi River Corridor Critical Area Overlay District is a variation of the Shoreland Overlay District that specifically applies to the Mississippi River Corridor. This district's boundaries were established by Executive Order 79-19 issued by Governor Albert Quie.

It is possible that one or more of these overlay districts may apply to an individual property in the City. Figure 5.4 shows an area of Minneapolis where all three of the above overlay districts are mapped.

Figure 5.4 – Overlay Zoning Districts



The 2016 Minnesota Buffer Law could affect the riparian land use and/or zoning for a small number of privately-owned properties along Bassett Creek, Ryan Creek, and some wetlands in the City. Minnesota Statute Section 103F.48, Subd.5(4) provides an exemption to the Buffer Law for municipalities governed by a MS4 National Pollutant Discharge Elimination System (NPDES) permit. This exemption applies where municipalities have provided for riparian protection within their MS4 NPDES permit, construction stormwater permit, or industrial stormwater permit. Therefore, changes to land use to meet Minnesota Buffer Law requirements are not required in Minneapolis.

Administrative Responsibilities

The City and MPRB staff have a wide range of responsibilities and are trained to have a basic understanding of water resources management, including major stormwater management issues such as known stormwater management problem areas, stormwater management expectations for new and redevelopment projects, incorporation of stormwater mitigation into capital improvement projects, erosion and sediment control, and regulatory jurisdiction.

Staff from many City departments and MPRB work cooperatively to ensure that water resource programs are properly managed, and that official controls are enforced. Departments with the greatest involvement include CPED, Minneapolis Finance and Property Services (MFPS), Minneapolis Department of Health (MDH), Minneapolis Public Works Division of Surface Water and Sewers (PW-SWS), and Minneapolis Public Works Transportation (PW-T). Specific functions of each department are compiled into Table 5.5 and described in additional detail in the following sections.

Table 5.5 – Responsibility for Regulatory Actions

Activity	CPED	MFPS	MHD	MPRB	MPW-SWS	MPW-T	Other
Complaints			√	√	√		
Erosion and Sediment Control			√		√		
Emergency Preparedness			√		√		
Illicit Discharge and Detection Elimination			√	√	√	√	
Individual Subsurface Sewage Treatment Systems (ISST)							Hennepin County
I/I Compliance: Private Properties			√		√		
Public Education, Participation, & Involvement				√	√		
Rat, Rodent, and Insect Control					√		
Site Plan Review	√				√	√	
Utility Billing		√			√		
Utility Permits					√	√	
Water Permits		√	√		√	√	
Wetland Conservation Act Administration					√		
Zoning Code Administration	√						

Coordination with Other Government Agencies – Water Resource Programs

All staff involved in water resource management actively interact with the multiple government agencies that regulate water resources in Minnesota, including, but not limited to, agencies described in Section 1 – History and Overview of Minneapolis Water Resources. The City will continue to collaborate with these agencies to provide the most efficient and effective water resource management with minimal duplication of efforts.

Assessment of Minneapolis Water Resource Programs

The status and compliance with the following specific programs are highlighted based on requirements for this Water Resource Management Plan (WRMP) as set by Metropolitan Council and/or watershed organizations:

- **MPCA Construction General Permit New BMP Requirements**. The MPCA requirement to incorporate stormwater controls into projects that create one acre or more of new impervious surface is rarely triggered on development and redevelopment projects within the City. Instead, the City implemented a program that requires stormwater controls for all developments with land disturbance of one acre or greater, regardless of the increase or decrease of impervious surface. This approach has resulted in more onsite stormwater management than would have resulted if the City opted to rely solely on the MPCA Construction General Permit. Since the City requirement is more restrictive than the MPCA requirement established in the MPCA Construction General Permit, it can be concluded that the City standards are more restrictive than the MPCA requirements.

- **MIDS Flexible Treatment Options**. The City of Minneapolis supports the concept of stormwater volume control through site designs that minimize the generation of runoff and through onsite infiltration of the runoff that is generated. MIDS was developed as a voluntary program. There is no specific state requirement that cities must impose MIDS standards on projects; however, some watershed districts and management organizations have adopted MIDS standards. The City is using the MIDS goals and MIDS Flexible Treatment Options specific to ultra-urban conditions as a guide to determine locations where achieving MIDS goals is not feasible as a foundation for developing revised regulatory controls that address volume management requirements of the NPDES Integrated Permit. This will be incorporated in the changes to the City's stormwater management official controls that will be completed in 2018.

- **Anti-Degradation Requirements**. The state anti-degradation requirements are met in the City through a number of programs that reduce impervious cover, reduce discharges, and add structural BMPs to reduce runoff volume and pollutant loads.

- **Wetland Conservation Act (WCA)**. The City complies with the requirements of the WCA by requiring wetland delineation and wetland mitigation plan for all developments that propose to alter a wetland within the City. The City will continue to coordinate with watershed organizations if a wetland is proposed to be affected to ensure that WCA and watershed organization requirements are met.

- **Watershed Management Organization Requirements**. An important objective of the City is to ensure that property owners and developers are not faced with conflicts in stormwater management objectives between state, watershed organization, and City requirements. If a conflict does arise, the City works closely with the affected watershed organization and developer to find a solution that is acceptable to all and not detrimental to the water resource. The City will continue to coordinate with watershed management organizations to ensure that the 2018 update to the stormwater management official controls meets the most current watershed management objectives.

- **Regulatory Controls for BCWMC Flood Control Projects**. The City owns, maintains, and operates two Bassett Creek tunnels. The City is required to ensure that no modifications happen that will add new tributary area, flows, connections, or outlets to the new tunnel without proper vetting and ensuring that there will be no negative impacts to the flood control projects. The City is required to maintain 50 cubic feet per second (cfs) capacity in the "old" Bassett Creek tunnel during the 100-year storm event to accommodate the overflow of stormwater that cannot be accommodated in the "new" tunnel.

- **Inflow/Infiltration Program**. The primary source of I/I from private properties within the City has historically been from direct connections of rooftop runoff to the sanitary sewer, also called rainleaders or roof drains. The aggressive program to locate, inspect, and disconnect the rainleaders, has been an important factor in the deterrence of CSOs since 2007. The City intends to continue to inspect private rainleaders and enforce the rainleader official controls to continue to reduce the peak flows that are discharged to Metropolitan Council interceptors.

- **Private Outfalls**. City ordinance prohibits the creation of new privately owned stormwater outfalls that discharge directly to surface waters. To-date, the enforcement of this prohibition has been inconsistently applied. The City will work internally to set up specific responsibilities to ensure that private stormwater outfalls are not installed as part of future private development or redevelopment projects.

Change That Would Be Adequate to Meet Performance Standards or Official Controls

This WRMP's impact will be to foster collaborative efforts, where each entity does what it does best without another entity duplicating those efforts. In this vein, the City will assume the lead in infrastructure management and construction; MPRB will assume the lead in water quality monitoring and management of park lands; and the watershed organizations will assume the lead in supporting clean water through water resource management and protection.

The WRMP envisions the City and its watershed management organizations will strive to:

- Collaborate on site plan reviews before permit issuance in cases where construction stormwater management comes under review of both the watershed organization and the City, including proposals to construct new outfalls directly to surface waters.

- Cooperate to enforce official controls, including erosion and sediment control, stormwater management, and floodplain alteration requirements.
- Participate in cost-sharing for water quality controls, modeling, and feasibility studies.
- Share modeling, monitoring, and project data and analysis.

The City will continue to seek opportunities to partner with watershed management organizations as stormwater management projects are proposed and under development. The City will involve watershed management organizations and other stakeholders in the process to amend official controls to address regulatory stormwater management, wetland buffer, and floodplain management.

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Section 6 – Planning and Implementation

Overview

The City of Minneapolis (City) has well-established programs that protect, maintain, and improve surface water quality. The intent of this section of the Minneapolis Water Resource Management Plan (WRMP) is to describe the City's structure and process for ongoing management of and changes to the City's water resource management projects and programs.

Water Resource Management Financing

The City's budget is adopted annually and establishes the finances for the year following adoption. Future budgets, such as 5-year Capital Improvement Program (CIP) plans, are presented for planning purposes, yet there is no certainty that future funding will come to fruition. The most current budget, available on the City's Finance and Budget website, should be referenced for information on the financial status of the sanitary sewer and stormwater programs.

Revenue

The total annual budget for the Public Works activities is funded primarily by revenue from the Sanitary Sewer Fund and the Stormwater Fund, supplemented by grants and cost-share agreements described below. Total revenue collected from the sources described in this section is not expected to increase, other than modest adjustments based on inflation. The amount budgeted towards specific activities is likely to be adjusted each year, based on changes in priorities or regulatory requirements.

These sources represent most of the revenue that supports the Sanitary Sewer Fund and the Stormwater Fund:

- **Sanitary Sewer Utility Fee**. The sanitary sewer utility fee is charged to customers each month through the City's utility bill. The fee is computed based on a charge per 100 cubic feet (equivalent to 748 gallons) of water used, plus a monthly fixed charge based on the size of the customer's water meter. Since there are no wastewater meters, the monthly wastewater use is based on the water used by each customer during the winter quarter. Fees are reviewed on an annual basis and adjusted as needed.

- **Stormwater Utility Fee**. In 2005, the City implemented a stormwater utility fee, which is charged to customers each month through the City's utility bill. Prior to that time, the sanitary sewer utility fee was used to fund both sanitary and stormwater expenditures. Stormwater utility fees are calculated using property size, impervious surface measurements, or land use category factors and a monthly rate. Single family residential properties are charged according to a three-tier monthly equivalent stormwater unit (ESU) as the base fee, with the other tiers being slightly lower or higher (25 percent lower or 25 percent higher) based on property area. The monthly rate is reviewed on an annual basis as part of the budget process.

- **Sewer Bonds**. Although this is not an explicit source of revenue, the City may opt to issue sewer bonds to raise money to pay for infrastructure upgrades and replacement. The sale of bonds allows the City to spread the payment of a capital improvement project over a period, typically 10 to 20 years. The debt service on these bonds is paid through the Sanitary Sewer Fund or the Stormwater Fund, as appropriate.

- **Special Assessments**. Assessments against benefitting or responsible properties are used to finance improvements. This is a small revenue source that is applied to specific benefitted properties for selected capital improvement projects.

- **Grants and Cost-Share Agreements**. Though subject to budgetary constraints, state and other grant programs and cost-share opportunities are available for water resource management projects and programs. These revenue sources are used on a case-by-case basis, dependent on the proposed project or activity, and the limitations of the funds. In the recent past, the City has received water resource funding from the following agencies, grants, and cost-share programs:

  - Bassett Creek Watershed Management Commission.
  - Clean Water Fund of the Minnesota Clean Water and Legacy Amendment.
  - Hennepin County Natural Resource Opportunity Grant.
  - Legislative Citizen Commission on Minnesota Resources/Environment and Natural Resources Trust Fund.
  - Metropolitan Council Parks and Open Space.
  - Metropolitan Council Metro Environment Program.
  - Minnehaha Creek Watershed District.
  - Minnesota Legislature Direct Appropriation.
  - Minnesota Department of Natural Resources Flood Mitigation.
  - Minnesota Department of Natural Resources Shoreland Habitat.
  - Mississippi Watershed Management Organization.
  - Public Facilities Authority (PFA) Loans.
  - Shingle Creek Watershed Management Commission.

- **Miscellaneous Revenue**. Other revenue sources include fines, license fees, and permit fees. These revenue sources are relatively small and can vary greatly from year to year.

The MRPB and Environmental Services Department with the City also have responsibilities with regards to water resource protection. They fund their responsibilities through a combination of user fees, permit fees, and general fund.

Expenditures

The City invests in water resource management within the framework of its current capital and operating budgets, established by the City Council and approved by the Mayor on an annual basis. Prioritization is critical to ensure that the capital improvement projects and regulatory programs stay within limits of available revenue. Five-year projections of future project and program expenditures are listed in the City's annual budgets but are subject to considerable change.

The 2018 total annual budget for water resources-related activities by the City is approximately $91 million, of which $59.4 million is the sanitary sewer budget and $31.6 million is the stormwater budget. In recent years, the annual budget has experienced moderate increases, as demonstrated in Table 6.1. These budget figures do not include budgets or expenditures for the drinking water treatment and distribution programs.

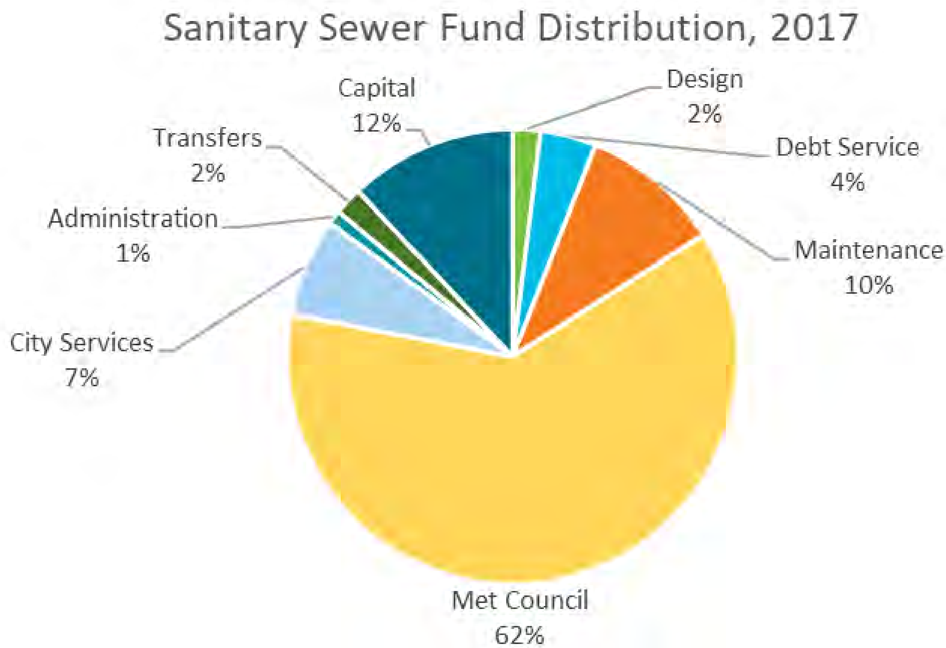
Table 6.1 – City of Minneapolis Sanitary Sewer and Stormwater Operating Budget, 2015 through 2018

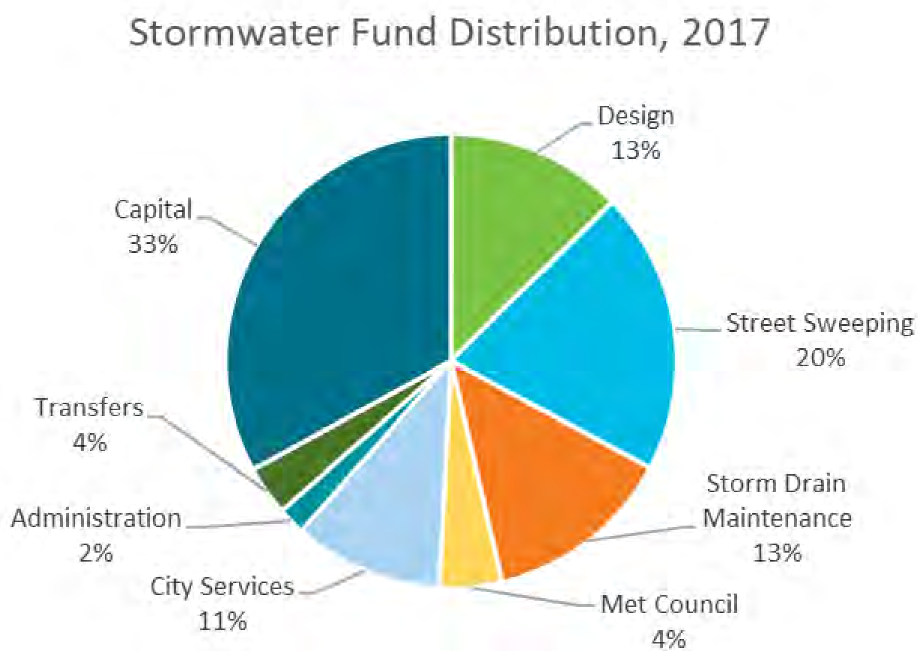
	2015 (actual)	2016 (actual)	2017 (actual)	2018 (adopted)
Sanitary Sewer	$48,892,414	$52,013,183	$54,148,859	$59,450,203
Stormwater	$26,082,314	$28,560,507	$29,033,661	$31,655,363
Total	$74,974,728	$80,573,690	$83,182,520	$91,105,566

The largest expenditure from these budgets, which represents approximately half of the total of the City water resource management budget, is the annual payment to Metropolitan Council for wastewater services, which in 2018 is projected to be $41.3 million. The remainder is utilized by the City for capital improvement and operational (or non-capital) expenses, which are described in the following sections. A snapshot of the 2017 expenditures of the Sanitary Fund and Stormwater Fund is shown in Figure 6.1.

All the expense categories described in this section are financed through the Sanitary Sewer Fund and/or the Stormwater Fund.

Figure 6.1 – 2017 Sanitary Sewer Fund and Stormwater Fund Distribution





Capital Improvement Program

The City's 5-year Capital Improvement Project (CIP) budget is developed in an open process that starts with City department proposals, which are reviewed in detail by a citizen's committee (CLIC – Capital Long-Range Improvement Committee) and the Mayor. The City Council holds public hearings before final budget adoption, which typically occurs in December of each year. The City's 2018 CIP identifies all water resource-related projects programmed by the City for construction in 2017. The most current information is available on the City's Budget website.

Table 6.2 represents the 5-year Capital Improvement Program as submitted to CLIC for the 2019 to 2023 budget cycle.

Table 6.2 – Minneapolis Sanitary Sewer and Storm Sewer Capital Improvement Budget, 2019-2023

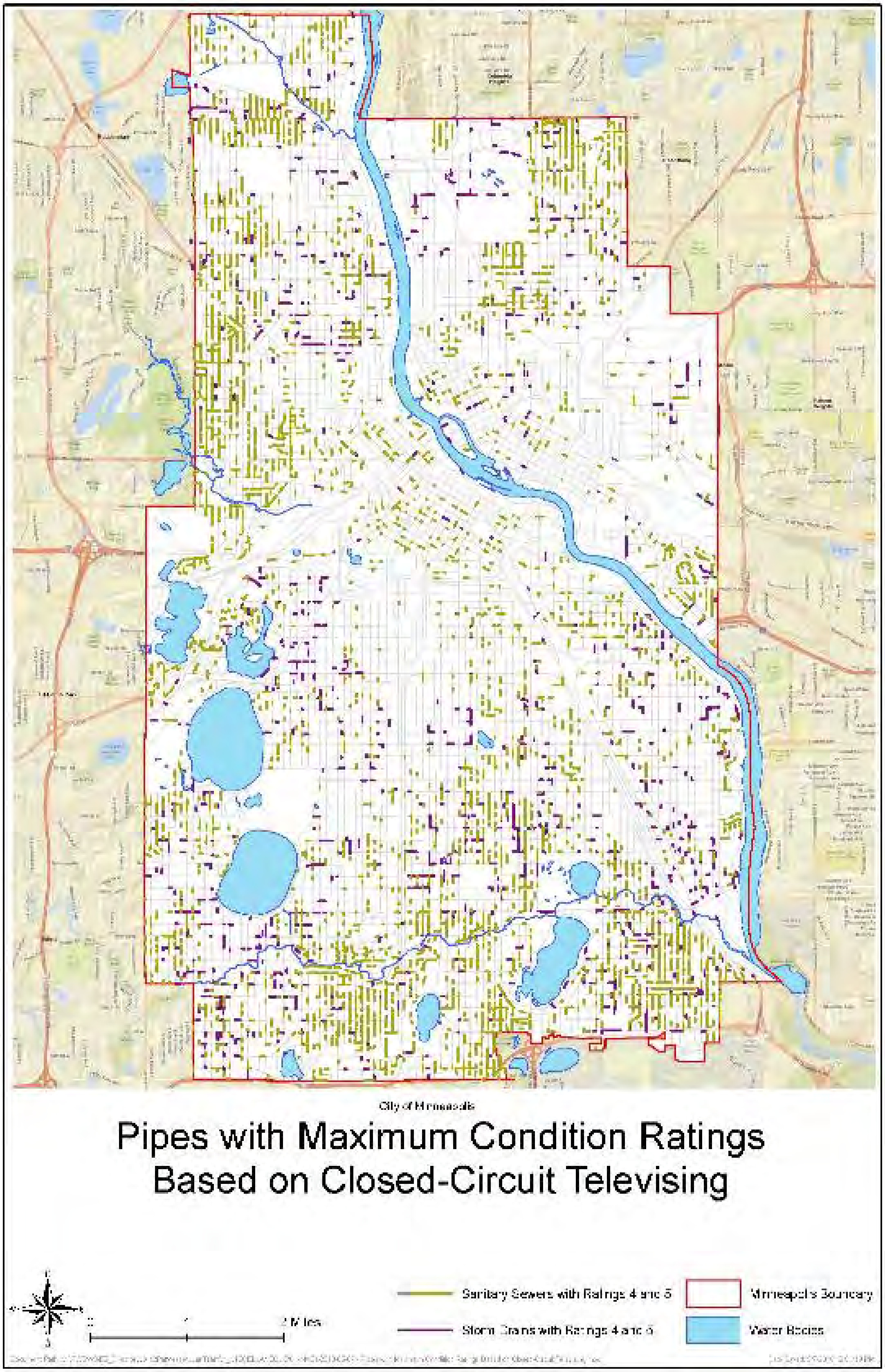
Program	Fund Sources	2019 ($1000)	2020 ($1000)	2021 ($1000)	2022 ($1000)	2023 ($1000)
Infiltration and Inflow Mitigation Program	Sanitary Bonds Sanitary Revenue	$3,500	$3,500	$3,500	$3,500	$3,500
Sanitary Tunnel & Sewer Rehab	Sanitary Bonds Sanitary Revenue	$16,000	$8,000	$8,000	$8,000	$8,000
Implementation of EPA Stormwater Regulations	Stormwater Revenue	$250	$250	$250	$250	$250
Combined Sewer Overflow Improvements	Stormwater Revenue	$1,500	$1,500	$1,500	$1,500	$1,500
Storm Drains and Tunnels Rehab Program	Stormwater Bonds Stormwater Revenue	$6,000	$6,000	$6,000	$6,000	$6,000
I-35W Storm Tunnel Reconstruction	Stormwater Bonds	-	-	-	-	$1,000
Flood Mitigation – Stormwater Alternatives	Stormwater Bonds Stormwater Revenue	$5,000	$5,000	$5,000	$5,000	$5,000
Central City Parallel Storm Tunnel	Stormwater Bonds Stormwater Revenue	-	$11,000	$11,000	$11,000	-

As noted in Table 6.2, sanitary sewer and stormwater drainage projects are grouped into general categories of funding. As described in Section 4 – Infrastructure Inventory, Activities, and Assessment, the City is in the process of fully evaluating the condition, capacity, and water quality needs of the sanitary sewer and stormwater systems. After these evaluations are completed in 2018, the City plans to develop an integrated infrastructure planning program to maximize public investments that minimize risk to human health and the environment, prevent loss of life, personal injury, or severe property damage, minimizes the risk of release of raw sewage to the Mississippi River, and improves water quality of all receiving waterbodies. The purpose of this evaluation will be to identify and prioritize future Capital Improvement Projects that will be funded in the categories that are described below.

- **Inflow/Infiltration Mitigation Program** funds are used to implement projects that will reduce the amount of clear water in the sanitary system and reduce the risks for overflow of untreated sewage mixed with stormwater to the Mississippi River during severe rainstorms. The reduction of clear water in the sanitary sewer system is also required by Metropolitan Council which provides regional wastewater collection and treatment. In 2013, Metropolitan Council implemented an ongoing surcharge program to require communities to continue to make progress in removing inflow/infiltration (I/I) from the system. Reduction of I/I also reduces the total volume of wastewater sent to the treatment plant and therefore reduces the amount of money the City has to pay Metropolitan Council for wastewater treatment. Actions typically include pipe lining, bulkhead repairs, manhole repairs, and other structural rehabilitation.

- **Sanitary Tunnel and Sewer Rehab Program** funds repair and rehabilitate tunnels, pipes, lift stations, and access structures, as prioritized by the Minneapolis Public Works Surface Water and Sewers Division. Efforts to repair and rehabilitate the sanitary sewer system have concentrated on structural failures, improved access to the deep collection tunnels, and proper maintenance of lift stations. Condition assessments have been made to comprehensively address the aging system in order to improve its reliability. The installation of a Supervisory Control and Data Acquisition (SCADA) system is a key component for efficient management of the lift stations. Ongoing work includes replacing worn out components, rehabilitation or removal of system structural flow restrictions, and manhole repairs. The City is using an asset management framework to move from emergency reaction response to a planned rehabilitation program in order to minimize repair costs and liabilities, as well as to maximize work force efficiencies. Sanitary sewers and stormwater drains that have been identified as having the greatest need of rehabilitation are identified in Figure 6.2. Pipes are evaluated using the National Association of Sewer Service Companies (NASSCO) standard condition scale of 1 to 5. Condition ratings 4 and 5 are those that have been identified as the most critical.

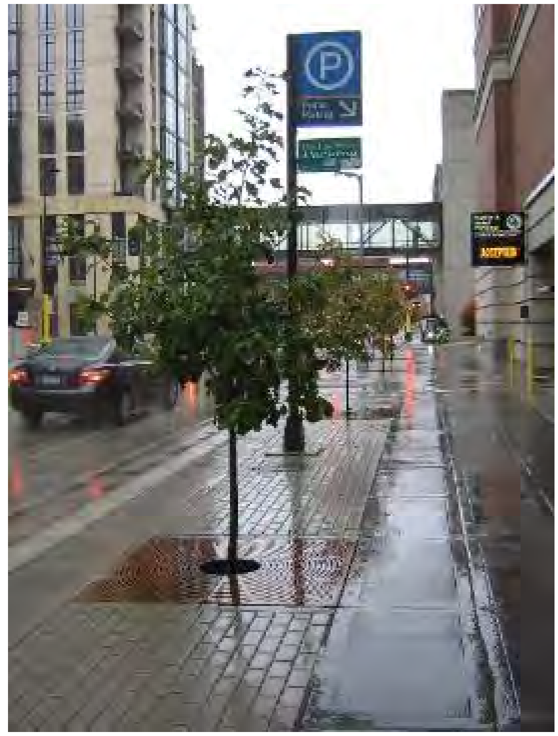
Figure 6.2 – Sanitary Sewers and Stormwater Drains with Maximum Condition Ratings



- **Implementation of United State Environmental Protection Agency (EPA) Stormwater Regulations** contains individual projects to mitigate the pollution effects of urbanization on stormwater runoff. Capital projects related to structural improvements necessary for compliance with TMDL requirements may be funded through this program. Installation of many of the future structural stormwater management practices will be prioritized based on water quality needs, as well as the ability to collaborate with other Public Works improvement projects. Coordination with street reconstruction projects will allow the City to optimize construction costs and minimize public disruption. Future street construction projects are identified in Figure 6.3.

  This program will be the funding source for the local share of the following potential projects that will be led by watershed organizations:

  Downtown Trees Planted within Underground Stormwater Cells

  Credit: Minneapolis Public Works

  - BCWMC: Bryn Mawr Meadows Water Quality Improvement Project (2019)
  - BCWMC: Restoration and Stabilization of Historic Bassett Creek Channel (2021)
  - BCWMC: Bassett Creek Park Water Quality Improvement Project (2024)
  - MCWD: Minnehaha Parkway Stormwater Management (2020-2021)
  - MCWD: Stormwater Volume and Pollutant Load Reduction (2018-2027)
  - MWMO: Greening within the Public Right-of-Way/8th Street Green Infrastructure Pilot Project (2018-2019)
  - SCWMC: Flood Area #5 Water Quality Projects (2018-2022)

- **Combined Sewer Overflow Improvements Program** was originally established in the mid-1980s, as detailed in Section 4 – Infrastructure Inventory, Activities, and Assessment to remove inflow from public sources and provide facilities for private disconnections where no storm drain currently exists in the area. The program complements the I/I Removal Program. The projects to be constructed in this CSO Improvements Program are shown in Figure 6.4.

Figure 6.3 – Street Reconstruction Projects

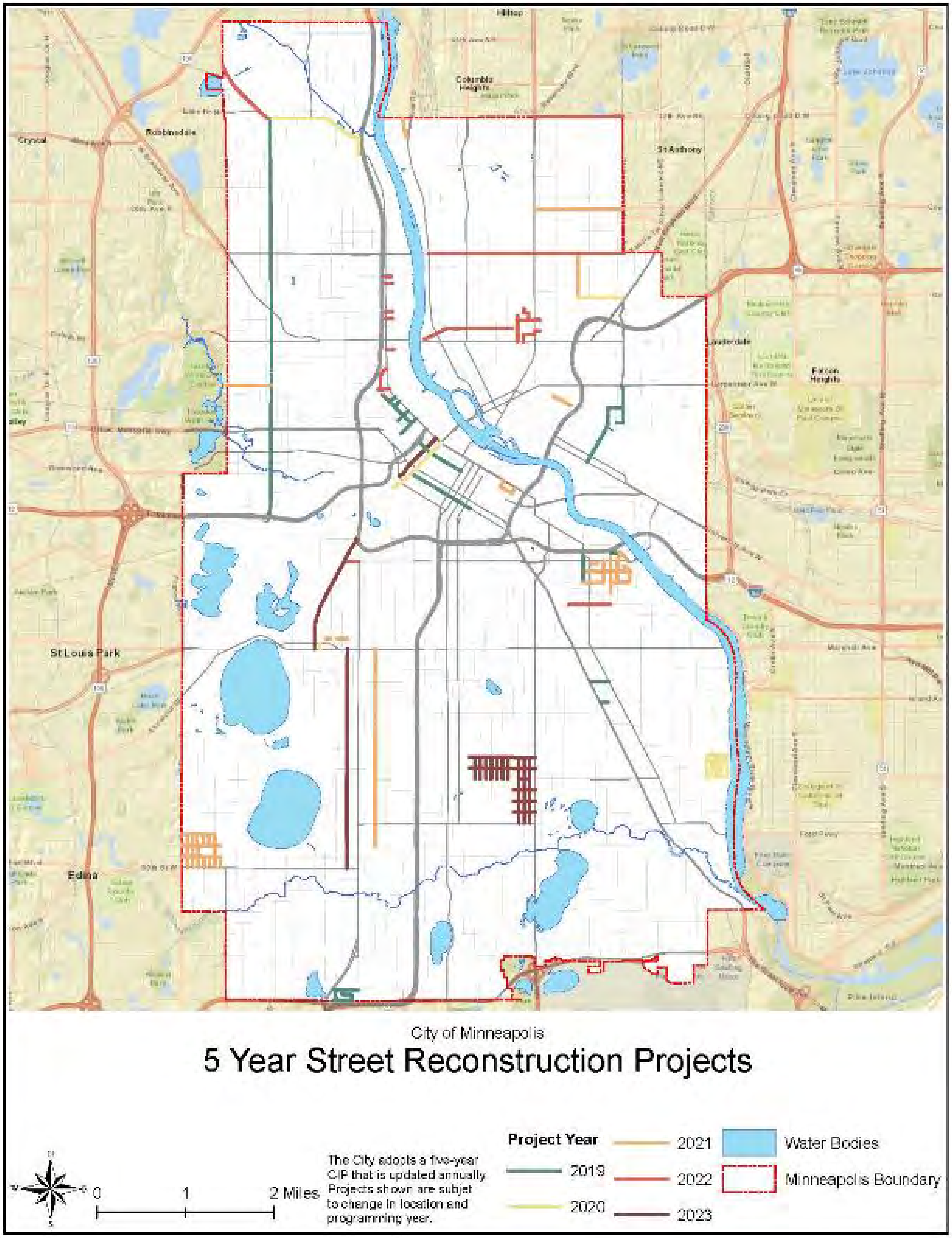
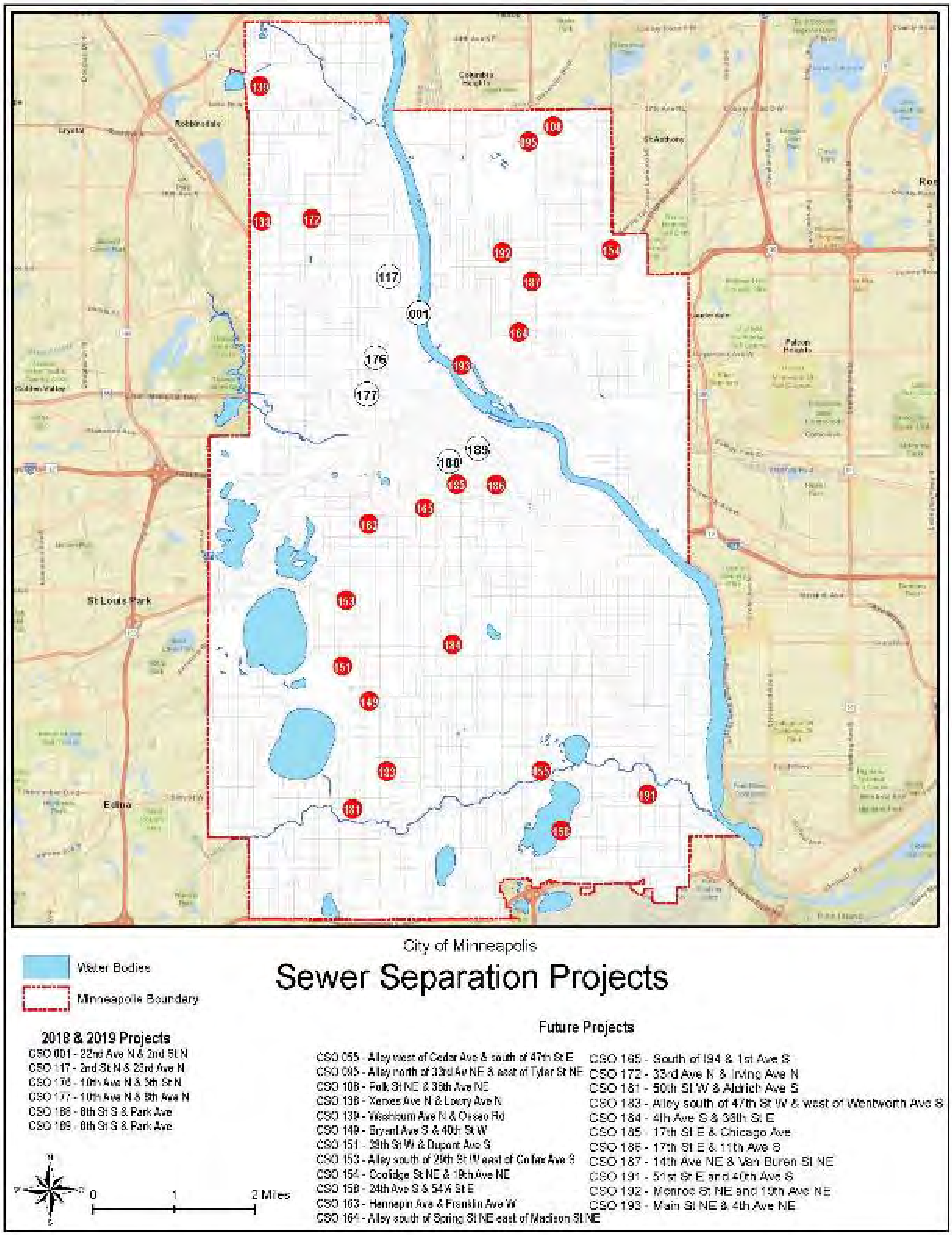


Figure 6.4 – Combined Sewer Overflow Project Areas



- **Storm Drains and Tunnels Rehab Program** is similar to the Sanitary Sewer and Tunnel Rehab Program, except that the funds are used to repair and rehabilitate the condition and/or the capacity of the storm drain and tunnel systems. A 2012 study completed on the storm drain tunnels found that typical problems include voids above or below the tunnel structure, cracking due to pressurization, erosion of the tunnel floor, and infiltration of groundwater. Currently, the Public Works Department is conducting repairs on those considered most critical. The cost to repair these tunnels varies with the magnitude of the problem. As with the sanitary system, the City is utilizing asset management tools to move from emergency reaction response to a planned rehabilitation program in order to minimize repair costs and liabilities, as well as to maximize work force efficiencies. Sanitary sewers and stormwater drains that have been identified as having the greatest need of rehabilitation are identified in Figure 6.2. NASSCO Condition Ratings 4 and 5 are those that have been identified as the most critical.

Minneapolis Central City Tunnel Survey

Credit: CDM Smith

- **Flood Mitigation Program – Stormwater Alternatives** addresses localized flooding and drainage problems. The programs look at volume, load, and rate controls and aim to protect homes and businesses and improve water quality. Hydraulic and hydrologic modeling is being done citywide to determine the extent of the localized problems. When modeling is completed in 2018, flood areas will be evaluated. Areas found to be a highest risk for flooding will be subject to feasibility studies. The results of the feasibility studies will inform selection and prioritization of solutions considering constructability and costs, as well as the need to leverage other opportunities and funding. Solutions for larger-scale drainage problems may include underground storage, pipes, and ponds in combination with green infrastructure such as rain gardens, bioswales, constructed wetlands, and pervious pavements. Future projects for this funding category will be informed by the Hydrologic and Hydraulic Modeling effort described in Section 4 – Infrastructure Inventory,

37th and Columbus Flood Pond

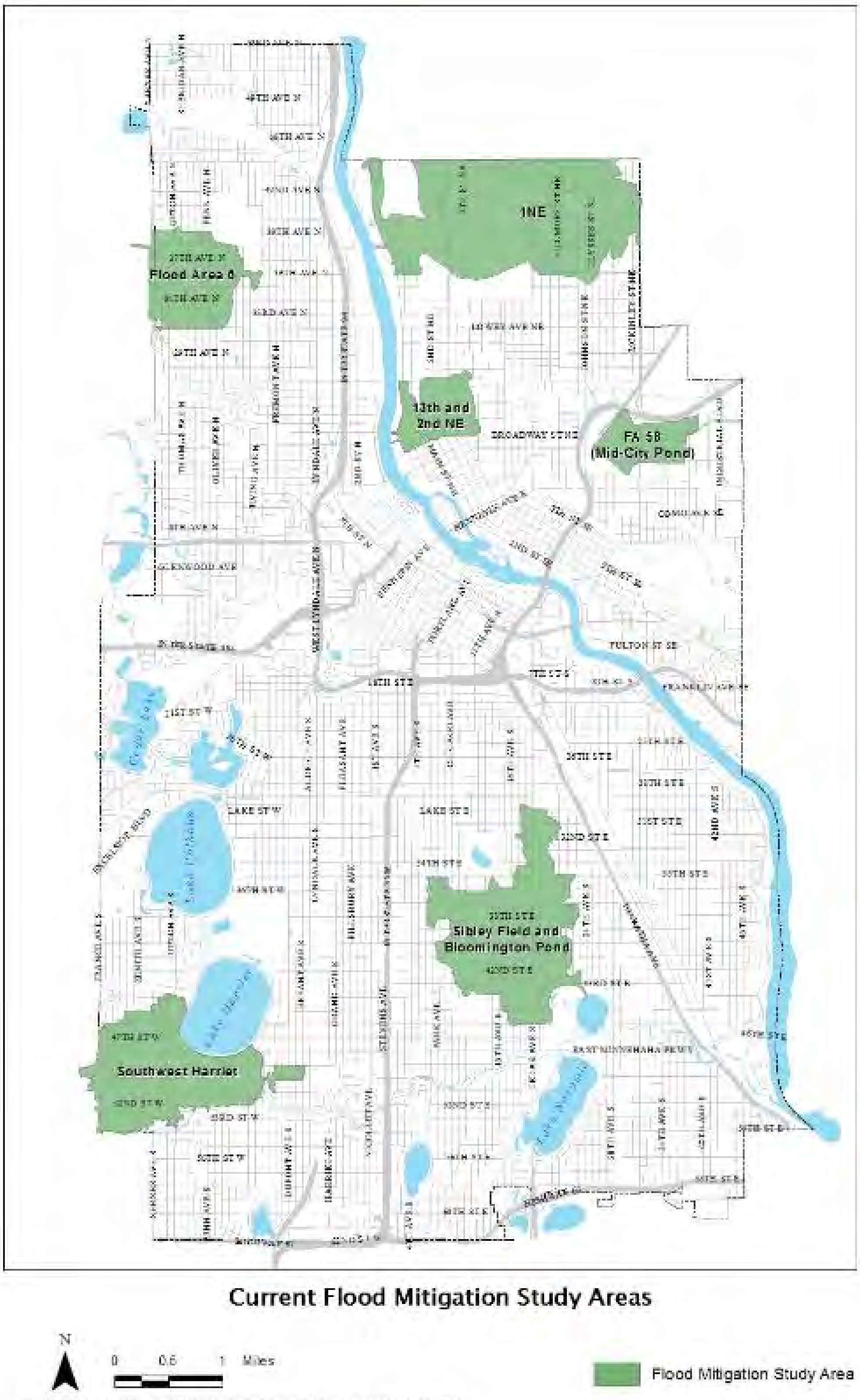
Credit: Minneapolis Public Works

Activities, and Assessment. A preliminary indication of the likely areas in need of hydraulic improvement is shown in Figure 6.5, which shows the flood areas identified in 1999 and 2005.

This program will be the funding source for the local share of the following potential projects that will be led by watershed organizations:

- MCWD: Hiawatha Golf Course Restoration (2020-2021)
- MWMO: 1NE Flood Mitigation and Water Quality Improvements (2018-2020)

Figure 6.5 – Current Flood Mitigation Study Areas



- **Central City Parallel Storm Tunnel** – This project includes design and construction of a new parallel tunnel in the Central City to improve system operations. The system, built from 1939 to 1940, was designed to handle the downtown drainage requirements of that time. Land development has since created a significant increase in the amount of impervious surface, and as a result, an increase in the rate and volume of stormwater directed into the Central City tunnels. The result is over-pressurization that causes degradation of the tunnel liner and erosion of the sandstone behind the tunnel liner. The goal of the project is to reduce this pressurization and ultimately reduce the risk of failure and extend the tunnel's service life. The proposed upgrade is to construct a new parallel tunnel for the Washington Avenue segment, starting at the intersection of Washington Avenue and Hennepin Avenue and ending approximately 150 feet from the outfall at the Mississippi River, as shown in Figure 6.6. Feasibility studies and design are underway and will be followed by three years of construction starting in 2020.

Figure 6.6 – Proposed Central City Parallel Tunnel Alignment

Operational Programs

The Public Works Division of Surface Water and Sewers manages or provides funds for the following programs established to manage water resource activities in the City:

Spring Street Sweeping

Credit: Minneapolis Public Works

- **Operation and Maintenance**. Those operations and maintenance (O&M) activities described in Section 4 – Infrastructure Inventory, Activities, and Assessment are financed entirely through the Sanitary Sewer Fund and the Stormwater Fund.
- **Street Cleaning**. The Stormwater Fund provides funds to operate the City's street cleaning operations.
- **Compliance with EPA Regulations**. This includes non-capital activities necessary to comply with the NPDES stormwater permit and other water resource-related requirements, which are described in Section 5 – Regulatory Controls and Water Resource Management Programs. The Stormwater Fund finances these activities that include inspections, monitoring, public education, public participation, and annual reports. Activities related to TMDL compliance would be funded through this program.
- **Watershed Organization Contributions**. The MCWD and MWMO have taxing authority and obtain all of their Capital Improvement and operational funds through a direct property tax levy. Capital Improvement funds for BCWMC and SCWMC are levied through Hennepin County. The City of Minneapolis, through the Stormwater Fund, directly contributes funds for the BCWMC and SCWMC operating budgets. Contributions are assessed on an annual basis and are based on a formula that takes into account the total area of each member city within the watershed and the net tax capacity of all property within the watershed. The 2016 WMO contributions from the City amounted to:
    - BCWMC $32,885
    - SCWMC $21,948

Stormwater Outfall Inspection

Credit: Minneapolis Public Works

- **Metropolitan Council Contribution**. The annual fee for wastewater treatment of sanitary sewage generated in the City is financed primarily by the Sanitary Sewer Fund (95 percent), with a small contribution from the Stormwater Fund (5 percent). The 2016 payments from the City amounted to $39,190,278.

- **Inflow/Infiltration Compliance**. The sanitary sewer utility finances the non-capital I/I activities, which includes monitoring, metering, inspections, smoke testing, analysis, and annual reports.

- **Sewer Availability Charges Program**. Sewer Availability Charges (SAC) are collected by the City based on criteria established by the Metropolitan Council. All fees collected are paid directly to the Metropolitan Council. The 2016 payment from the City amounted to $8,987,030.

Project and Program Implementation

Framework

The City promulgates programs that creates a framework for prioritization of individual projects. A specific project begins because of a specific need or regulatory requirement. Existing conditions are assessed, coordination with partners is initiated, planning occurs, and then the improvement is implemented. While the general steps are similar for program implementation, specific project considerations and coordination needs will differ. For example, some projects are born out of a need to address pipe condition and risk of infrastructure failure. Others may arise because of the need to address aging infrastructure associated with a street reconstruction project. Still others are initiated based on the need to address water quality concerns or mitigate flooding. Regardless, all projects are selected based on deliberate review of assessment data and need to coordinate and work cooperatively with partners.

The lifecycle of water resources management activities includes three principle phases: assessment, planning, and implementation, including ongoing maintenance or management costs for the life of the project or program. Components of each include:

- **Assessment** involves an array of techniques to validate whether water resource management practices and infrastructure meet critical City efficiency objectives, such as: structural integrity; ability to relieve impacts to health, safety, property, infrastructure, and aquatic life; and, regulatory compliance. Activities include inspection, monitoring, routine record-keeping, and emergency response readiness. Assessment involves coordination and communicaiton with potential project partners.

- **Planning** uses the findings from the assessment phase to identify capital, operational, regulatory, and administrative measures to cost-effectively address critical impacts. Planning activities are initiated once a problem has been identified in the assessment phase or when a new regulation is being promulgated by a public agency.

- **Implementation** puts plans to action by construction of capital improvements, alterations of maintenance activities, and enforcement of regulations.

Additional activities needed to meet water resource management goals are implemented when it is determined that the additional activity will add increased value to those already in place. All new activities are developed under the auspices of the implementation framework. In addition to preliminary communication and coordination during data review and assessment, for each proposed new activity, stakeholders are consulted, a detailed scope is developed, budgets are proposed, and authorization to proceed begins after approval by the City Council and Mayor.

Prioritization

The approach utilized by the City for prioritization of water resource management projects and activities is set up to balance system needs and the need to maximize investment of public dollars. Included as considerations in prioritization are asset management recommendations, capacity analysis, water quality modeling results, cost-effectiveness, and the need to leverage opportunities associated with other ongoing projects (e.g., street reconstruction).

A high/medium/low system is applied to the Implementation Program described below. Highest priority is given to action related to the health and safety of citizens, to infrastructure improvements identified as critical, and to those mandated by the City's NPDES Integrated Permit, including TMDL compliance activities. Medium priority projects and program implementation are those that are important to the integrity of the City's infrastructure and those that have City-wide significance. Low priority is given to projects that are important, but not critical, and to those that have a localized significance as opposed to a City-wide significance.

The City will continue to program water resource projects and programs based on this prioritization approach, which has proven to be both effective and flexible. Changes to prioritization of CIP projects, based on results of ongoing inspections and assessments, will occur on an annual basis as a City revises its CIP program each year.

Implementation Program

The City has created a comprehensive program that is designed to be flexible such that it can adjust to changes of needs and priorities. This iterative, robust program complies with all current regulatory responsibilities while also providing for management of the City's aging water resource infrastructure. As described previously in this section, the City works on a 5-year schedule towards implementation of capital improvements and water resource management activities. Additional projects, which are anticipated for implementation in years 6 through 10, are documented by staff, but are not developed in any significant detail until a project is added to the 5-year program.

Appendix K includes a full list of the Capital Improvement Projects and other stormwater management activities that the City intends to pursue during the 10-year planning period of this WRMP. The CIP projects and the stormwater management improvements slated for the first 5 years have been approved by the City Council and the Mayor and are actively being developed. Projects and other activities programmed for the later years of the 10-year cycle are subject to significant changes as other assessment programs identify critical deficiencies, as other priorities arise, new City Council goals are established, and as other project specific challenges are discovered.

Each year, the City will continue to adjust water resource management projects and activities to ensure that its programs are fully compliant with regulatory requirements. Once costs are identified for new projects or activities, project schedules will be developed and all projects or activities within a specific program will be revised to accommodate the new requirement. This iterative approach applies to new regulatory requirements, as well as newly identified infrastructure maintenance or rehabilitation needs.

Capital Improvement Program

The CIP section of Appendix K lists infrastructure improvement projects that have been identified as having benefits to the sanitary sewer system and to the stormwater drainage infrastructure. The list includes projects that will be led by the City, as well as those that the City will contribute funds which will be led by others (MPRB and watershed organizations).

Ongoing investigations have the potential to identify new improvements that would benefit the water resources of the City which could be given higher priority than projects in the current 5-year CIP, including:

- Development of the **Asset Management Program** has allowed the City to transition from a reactive, emergency response approach to infrastructure maintenance, to a proactive, planned rehabilitation program that identifies infrastructure condition issues. Newly identified issues such as risk or condition may cause an adjustment to the prioritization of rehabilitation projects.

- Completion of the **XPSWMM Systemwide Storm Sewer Modeling** in 2018 will allow the City to identify and prioritize improvement projects to mitigate localized flooding and provide capacity in the system. The modeling work will also help inform rehabilitation, development, and street improvement projects.

- Information developed through the **Pipeshed Delineation and Water Quality Modeling** project will be used to estimate load reductions from the approximately 1,000 public and private structural best management practices (BMPs) in the City, by outfall. This information will help prioritize retrofit and water quality improvements projects based on TMDLs and other water quality factors.

- Subwatershed Assessment study being conducted by the SCWMC is assessing the land area in the City that drains to Shingle Creek, Ryan Lake, and Crystal Lake. Once this assessment is completed, the City will work with the SCWMC and the MPRB to implement recommendations to improve water quality and to meet TMDL requirements in impacted waterbodies. Projects within the watershed will likely be led by the City, while projects within MPRB properties, including in-stream and streambank projects, will likely be led by MPRB with cooperation from the City.

Appendix K contains a comprehensive list of projects identified in Figure 6.2 (Pipes with Maximum Condition Ratings), Figure 6.3 (Street Reconstruction Projects), Figure 6.4 (CSO Project Areas), and Figure 6.5 (Current Flood Mitigation Study Areas).

Stormwater Management Program

The Stormwater Management Program is on a 5-year implementation cycle, which is driven by the City's NPDES Integrated Permit. The current permit period expires in 2022, at which time the MPCA could significantly alter the priorities and specific activities listed in Appendix K.

The highest priority project identified by the City and described in Section 5 – Regulatory Controls and Water Resource Management Programs is to revise the City's official controls, beginning with revisions to the City's stormwater management ordinance, commonly called Chapter 54. The City is committed to updating their official controls through a comprehensive stakeholder process that will involve multiple external stakeholders, including watershed organizations, builders, and developers, as well as interested citizens. The following schedule has been established that anticipates revisions to Chapter 54 within the 180-day period following City adoption of this WRMP:

October 2018

- Prepare first draft of ordinance revisions
- Complete internal reviews
- Develop a list of potential external stakeholders

November 2018

- Incorporate internal review comments into second draft
- Solicit interest from specific stakeholders

December 2018

- Conduct two external stakeholder meetings

January 2019

- Incorporate external review comments into third draft

February 2019

- Internal review of final draft ordinance

March 2019

- City Council reading and adoption

The other official controls that are anticipated to be updated in accordance with the prioritization and schedule set in Appendix K include revisions to the City's SWMP to be in compliance with the newly issued NPDES Integrated Permit, strengthening the wetland and wetland buffer mitigation procedures contained in the Minneapolis Stormwater and Sanitary Sewer Development Guide, and updates to the City's floodplain management requirements.

All other stormwater management activities listed in Appendix K are to be implemented in accordance with the current NPDES Integrated Permit, as detailed in the current and future revisions of the Minneapolis SWMP.

Section 7 – References and Acknowledgements

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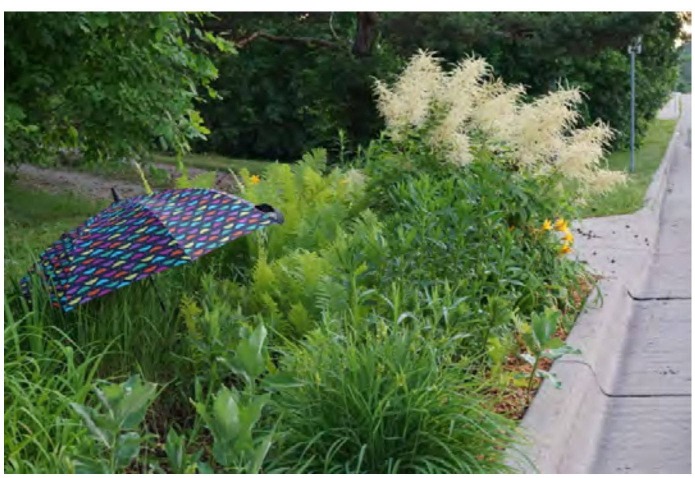

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Appendix A – Cross-Reference of Plan Requirements

Minneapolis
City of Lakes

Cross-Reference Plan Requirements

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
MN Rule 8410.0160				
Subpart 3.A	Executive summary of the local water plan highlights.	Executive Summary	All	ES-1
Subpart 3.B	Water resource management-related agreements.	Section 2	Water Resources Related Agreements	2-33
Subpart 3.C	Existing and proposed physical environment description.	Section 3	Population, Land Area, Neighborhoods, and Parks	3-1
Subpart 3.C	Existing and proposed physical environment description.	Section 3	Soils	3-7
Subpart 3.C	Existing and proposed physical environment description.	Section 3	Climate	3-8
Subpart 3.C	Existing and proposed physical environment description.	Section 3	Bedrock, Surficial Geology, and Topography	3-10
Subpart 3.C	Existing and proposed land use.	Section 3	Land Use and Zoning	3-12
Subpart 3.C	Drainage area.	Section 4	Stormwater Pipeshed Area Inventory	4-24
Subpart 3.C	Drainage area.	Appendix J	2017 Stormwater Catchment Inventory	J-1
Subpart 3.C	Drainage volume.	Section 4	Stormwater Drain Hydraulic Standards	4-27
Subpart 3.C	Drainage rates.	Section 4	Stormwater Drain Hydraulic Standards	4-27
Subpart 3.C	Define paths of stormwater runoff.	Section 4	Figure 4.11 – City of Minneapolis Stormwater Runoff Pipeshed Areas	4-26
Subpart 3.D	Existing or potential water resource-related problems.	Appendix C	TMDL Status	C-1
Subpart 3.D	Existing or potential water resource-related problems.	Appendix E	Monitoring and Assessment Report	E-1
Subpart 3.E	Local implementation program including non-structural, programmatic, and structural solutions.	Section 6	Capital Improvement Program	6-4
Subpart 3.E	Local implementation program including non-structural, programmatic, and structural solutions.	Section 6	Operational Programs	6-15
Subpart 3.E	Prioritized implementation components.	Section 6	Prioritization	6-17
Subpart 3.E.(1)	Areas and elevations for stormwater storage.	Section 4	Stormwater Drain Hydraulic Standards	4-27
Subpart 3.E.(2)	Water quality protection methods.	Section 4	Table 4.4 – Stormwater Drain System Infrastructure Inventory – City and MPRB Owned	4-8
Subpart 3.E.(2)	Water quality protection methods.	Section 5	Water Resource Management Programs	5-4
Subpart 3.E.(3)	Responsibilities of local government in implementation.	Section 4	Responsibilities for Infrastructure Management	4-45
Subpart 3.E.(3)	Responsibilities of local government in implementation.	Section 5	Administrative Responsibilities	5-25

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Subpart 3.E.(4)	Official controls relative to requirements of the implementation plan.	Section 5	City of Minneapolis and Minneapolis Park and Recreation Board Ordinances	5-1
Subpart 3.E.(5)	Table to describe each component of the implementation program, includes schedule, cost, and funding source.	Section 6	Table 6.1 – City of Minneapolis Sanitary Sewer and Stormwater Operating Budget, 2015 through 2018	6-3
Subpart 3.E.(6)	Table of capital improvement programs by year with schedule, estimated cost, and funding source.	Section 6	Capital Improvement Program	6-4
Subpart 4	Describes the process by which amendments to your surface water management plan can be made.	Section 1	Water Resource Management Plan Management and Adoption	1-14
Metropolitan Council Water Resources Policy Plan				
Appendix C-1 Wastewater	Adopted community sewered forecast of households and employment in 10-year increments to 2040, based on the Council's 2040 forecasts with any subsequent negotiated modifications.	Appendix H	Sewage Flow Projections and Trunk Sewer Capacity Analysis by Interceptor Service Area	H-1
Appendix C-1 Wastewater	An electronic map or maps (GIS shape files or equivalent) that show the following information: ▪ Existing sanitary sewer system identifying lift stations, existing connection points to the metropolitan disposal system, and future connection points. ▪ Intercommunity connections and any proposed changes in government boundaries based on Orderly Annexation Agreements.	Section 4	Figure 4.1 – City of Minneapolis Sanitary Sewers, Lift Stations, Intercommunity Connections	4-4
Appendix C-1 Wastewater	Copy of an intercommunity service agreement entered into with an adjoining community after December 31, 2008.	Section 2	Sanitary Sewer Agreements	2-35
Appendix C-1 Wastewater	Description of community's management program for subsurface sewage treatment systems to comply with MPCA 7080, and a copy of the community's current subsurface sewage treatment system ordinance.	Section 1	Private Sanitary Sewers and Treatment Systems	1-10
Appendix C-1 Wastewater	A table or tables that contain capacity and design flows for existing trunk sewers and lift stations.	Appendix F	City of Minneapolis Sanitary Lift Station Inventory	F-1
Appendix C-1 Wastewater	Assignment of 2040 growth forecasts by Metropolitan interceptor facility. In the absence of this information, the Council will make its own assignments for the purpose of system capacity needs determination.	Appendix H	City of Minneapolis Sewage Flow Projections and Trunk Sewer Capacity Analysis by Interceptor Service Area	H-1

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Appendix C-1 Wastewater	Proposed time schedule for the construction of new trunk sewer systems that require connections to the Metropolitan Council Disposal System.	N/A	N/A – no new trunk sewers proposed within the City of Minneapolis	-
Appendix C-1 Wastewater	Accompanying information on the type and capacity of the treatment facilities, whether municipally or privately owned, as well as copies of their appropriate National Pollutant Discharge Elimination System (NPDES) or State Disposal System (SDS) permit.	Section 1	Private Sanitary Sewers and Treatment Systems	1-10
Appendix C-1 Wastewater	City goals, policies, and strategies for preventing and reducing excessive inflow and infiltration (I/I) in local municipal and private sewer systems.	Section 4	Inflow/Infiltration Flows	4-20
Appendix C-1 Wastewater	City goals, policies, and strategies for preventing and reducing excessive inflow and infiltration (I/I) in local municipal and private sewer systems, including: ▪ Requirements and standards for minimizing I/I and for the disconnection of sump pump and foundation drain connections to the sanitary sewer system. To be included are copies of ordinance prohibiting the discharge of foundation drains and/or roof leaders to the sanitary disposal system, as well as copies of ordinance requiring the disconnection of existing foundation drains, sump pumps, and roof leaders from the sanitary disposal system.	Section 5	Inflow/Infiltration Compliance, Private Properties	5-7
Appendix C-1 Wastewater	City goals, policies, and strategies for preventing and reducing excessive inflow and infiltration (I/I) in local municipal and private sewer systems, including: ▪ Information on the extent, source, and significance of existing I/I problems along with an analysis of costs for remediation.	Section 4	Inflow/Infiltration Flows	4-20
Appendix C-1 Wastewater	City goals, policies, and strategies for preventing and reducing excessive inflow and infiltration (I/I) in local municipal and private sewer systems, including: ▪ Implementation plan including program strategy, priorities, scheduling, and financing mechanisms for eliminating and preventing excessive I/I from entering the system.	Section 6	Capital Improvement Program: Inflow/Infiltration Mitigation Program	6-5

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Appendix C-2 Surface Water	1. An executive summary that summarizes the highlights of the local water plan.	Executive Summary	All	ES-1
Appendix C-2 Surface Water	2. A summary of the appropriate water resource management-related agreements that have been entered into by the local community.	Section 2	Water Resources Related Agreements	2-33
Appendix C-2 Surface Water	3. A description of the existing and proposed physical environment and land use. Data may be incorporated by reference for other required elements of this section as allowed by the WMO.	Section 3	Population, Land Area, Neighborhoods, and Parks	3-1
Appendix C-2 Surface Water	3. A description of the existing and proposed physical environment and land use. Data may be incorporated by reference for other required elements of this section as allowed by the WMO.	Section 3	Soils	3-7
Appendix C-2 Surface Water	3. A description of the existing and proposed physical environment and land use. Data may be incorporated by reference for other required elements of this section as allowed by the WMO.	Section 3	Climate	3-8
Appendix C-2 Surface Water	3. A description of the existing and proposed physical environment and land use. Data may be incorporated by reference for other required elements of this section as allowed by the WMO.	Section 3	Bedrock, Surficial Geology, and Topography	3-10
Appendix C-2 Surface Water	3. A description of the existing and proposed physical environment and land use. Data may be incorporated by reference for other required elements of this section as allowed by the WMO.	Section 3	Land Use and Zoning	3-12
Appendix C-2 Surface Water	The following must be defined in the plan: ▪ Drainage areas.	Section 4	Table 4.9 – City of Minneapolis Stormwater Pipesheds	4-25
Appendix C-2 Surface Water	The following must be defined in the plan: ▪ Volumes, rates, and paths of stormwater runoff (runoff rates are recommended for a 24-hour precipitation event with a return frequency of 1 or 2 years. Communities with known flooding issues may want to require rate control for storms with other return frequencies, such as 10-year, 25-year, or 100-year events.	Section 4	Stormwater Drain Hydraulic Standards	4-27

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Appendix C-2 Surface Water	4. An assessment of existing or potential water resource-related problems. At a minimum, the plan should include: ▪ A prioritized assessment of the problems related to water quality and quantity in the community.	Section 3	Minneapolis Waterbodies (see specific waterbody for information)	3-12
Appendix C-2 Surface Water	4. An assessment of existing or potential water resource-related problems. At a minimum, the plan should include: ▪ A list of any impaired waters within their jurisdiction as shown on the current Minnesota Pollution Control Agency (MPCA) 303d Impaired Waters List.	Appendix C	City of Minneapolis TMDL Status	C-1
Appendix C-2 Surface Water	4. An assessment of existing or potential water resource-related problems. At a minimum, the plan should include: ▪ If a Watershed Restoration and Protection Strategy (WRAPS) or TMDL study has been completed for the community, the community should include implementation strategies, including funding mechanisms, that will allow the community to carry out the recommendations and requirements from the WRAPS or TMDL specific to that community.	Section 3	TMDL Mitigation Plans Required Actions	3-93
Appendix C-2 Surface Water	5. A local implementation program/plan that includes prioritized non-structural, programmatic, and structural solutions to priority problems identified as part of the assessment completed for number 4, above. Local official controls must be enacted within six months of the approval of the local water plan.	Section 6	Capital Improvement Program	6-4
Appendix C-2 Surface Water	▪ 5. A local implementation program/plan that includes prioritized non-structural, programmatic, and structural solutions to priority problems identified as part of the assessment completed for number 4, above. Local official controls must be enacted within six months of the approval of the local water plan. The program/plan must: ▪ Include areas and elevations for stormwater storage adequate to meet performance standards or official controls established in the WMO plan(s).	Section 4	Stormwater Drain Hydraulic Standards	4-27
Appendix C-2 Surface Water	5. A local implementation program/plan that includes prioritized non-structural, programmatic, and structural solutions to priority problems identified as part of the	Section 5	Site Plan Review and Capital Project Task Force	5-15

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
	assessment completed for number 4, above. Local official controls must be enacted within six months of the approval of the local water plan. The program/plan must: ▪ Define water quality protection methods adequate to meet performance standards or official controls. At a minimum, the plan should include: ○ Information on the types of best management practices (BMP) to be used to improve stormwater quality and quantity. (A five-year establishment period is recommended for native plantings and bioengineering practices.) ○ The maintenance schedule for the BMP. (The maintenance schedule in plans submitted by regulated Municipal Separate Storm Sewer System (MS4) communities must be consistent with BMP inspection and maintenance requirements of the MS4 permit.)			
Appendix C-2 Surface Water	The program/plan must: ▪ Clearly define the responsibilities of the community from that of the MWO(s) for carrying out the implementation components.	Section 5	Watershed Organization Requirements	5-18
Appendix C-2 Surface Water	The program/plan must: ▪ Describe official controls and any changes to official controls.	Section 5	Change That Would Be Adequate to Meet Performance Standards or Official Controls	5-27
Appendix C-2 Surface Water	The program/plan must: ▪ Describe official controls and any changes to official controls. At a minimum, the plan should include: ○ Stormwater permit requirements and other applicable state requirements.	Section 2	NPDES Permits – MPCA	2-6
Appendix C-2 Surface Water	The program/plan must: ▪ Describe official controls and any changes to official controls. At a minimum, the plan should include: ○ An erosion and sediment control ordinance consistent with NPDES Construction.	Section 5	Erosion and Sediment Control	5-5

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Appendix C-2 Surface Water	The program/plan must: ▪ Describe official controls and any changes to official controls. At a minimum, the plan should include: ○ Identify ways to control runoff rates so that land-altering activities do not increase peak stormwater flow from the site for a 24-hour precipitation event with a return frequency of 1 or 2 years. Communities with known flooding issues may want to require rate control for storms with other return frequencies (10-year, 25-year, 100-year).	Section 5	Stormwater Management Standards for Development and Redevelopment/Post-Construction Stormwater Management	5-16
Appendix C-2 Surface Water	The program/plan must: ▪ Describe official controls and any changes to official controls. At a minimum, the plan should include: ○ Consider use of NOAA Atlas 14, Volume 8 (Precipitation Frequency Atlas of the United States) to calculate precipitation amounts and stormwater runoff rates. (MPCA uses NOAA Atlas 14 in calculations to determine whether the 1-inch standard has been met.)	Section 3	Atlas 14	3-8
Appendix C-2 Surface Water	The program/plan must: ▪ Describe official controls and any changes to official controls. At a minimum, the plan should include: ○ Consider adoption of the MPCA Minimal Impact Design Standards (MIDS) performance goals and flexible treatment options.	Section 5	Minimal Impact Design Standards Flexible Treatment Options	5-20
Appendix C-2 Surface Water	The program/plan must: ▪ Describe official controls and any changes to official controls. At a minimum, the plan should include: ○ For communities that do not adopt MIDS, the plan should use stormwater practices that promote I/I and decrease impervious areas, such as better site design and integrated stormwater management, where practical. (Communities must meet requirements of the MS4 permit if they are regulated. MS4 permit puts preference on green infrastructure, including infiltration. Construction permit will govern this either	Section 5	Stormwater Management Standards for Development and Redevelopment/Post-Construction Stormwater Management	5-16

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
	way, and requires use of green infrastructure, when possible).			
Appendix C-2 Surface Water	The program/plan must: ▪ Include a table that briefly describes each component of the implementation program and clearly details the schedule, estimated cost, and funding sources for each component.	Section 6	Capital Improvement Program	6-4
Appendix C-2 Surface Water	The program/plan must: ▪ Include a table for a capital improvement program that sets forth, by year, details of each contemplated capital improvement that includes the schedule, estimated cost, and funding source.	Section 6	Capital Improvement Program	6-4
Appendix C-2 Surface Water	6. A section titled "Amendments to Plan" that establishes the process by which amendments may be made.	Section 1	Water Resource Management Plan Management and Adoption	1-14
Mississippi Watershed Management Organization				
Table 4. Water, Natural Resources, and Land Use, #1	Executive Summary that summarizes the highlights of the local water plan. Highlights should include local water plan goals, policies, and implementation programs that address problems identified in the MWMO's Plan (Focus Statements in Section 2.7); corrective actions that affect these MWMO concerns; and, any actions requiring MWMO's collaboration.	Executive Summary	All	ES-1
Section 2.7. Focus Area	Water quality	Section 3	Minneapolis Waterbodies (see specific waterbody for information)	3-14
Section 2.7. Focus Area	Water rate and volume.	Section 4	Stormwater Drain Hydraulic Standards	4-27
Section 2.7. Focus Area	Monitoring and data.	Section 3	City-Wide Water Quality Monitoring and Other Efforts	3-83
Section 2.7. Focus Area	Monitoring and data.	Appendix E	Monitoring and Assessment Reports	E-1
Section 2.7. Focus Area	Communications outreach.	Section 5	Public Education, Participation, and Involvement	5-11

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Section 2.7. Focus Area	Ecosystem health.	Section 3	Unique Features/Fish and Wildlife/Scenic Areas/Natural Resources/Key Conservation Areas/Ecological Health	3-83
Section 2.7. Focus Area	Regulations and enforcement.	Section 5	Water Resource Management Programs	5-4
Section 2.7. Focus Area	Urban stormwater management.	Section 4	Figure 4.5 – Structural Stormwater Management Practices	4-10
Section 2.7. Focus Area	Emergency preparedness and response.	Section 5	Emergency Preparedness	5-5
Section 2.7. Focus Area	Financial responsibility and strategies.	Section 6	Water Resource Management Financing	6-1
Section 2.7. Focus Area	Emerging issues.	Section 3	Unique Features/Fish and Wildlife Habitats/Scenic Areas/Natural Resources/Key Conservation Areas/Ecological Health	3-83
Table 4. Water, Natural Resources, and Land Use, #2	Provide a citation and brief description of water resource management-related agreements that have been entered into by the community.	Section 2	Water Resources Related Agreements	2-33
Table 4. Water, Natural Resources, and Land Use, #3	Describe the city's current water resource and ecosystem health-related problems and any problems that are expected to worsen or emerge over the next 10 years given the projected change in the city's growth and land use.	Section 3	Minneapolis Waterbodies (see specific waterbody for information)	3-14
Table 4. Water, Natural Resources, and Land Use, #3	Describe the city's current water resource and ecosystem health-related problems and any problems that are expected to worsen or emerge over the next 10 years given the projected change in the city's growth and land use.	Appendix E	Monitoring and Assessments Reports	E-1
Table 4. Water, Natural Resources, and Land Use, #4	As part of the Local Water Plan and City Comprehensive Plan development process, LGUs should carefully examine how water resources and ecosystem management and protection can be integrated into land use planning and development.	Section 3	Land Use and Zoning	3-12

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Table 4. Water, Natural Resources, and Land Use, #4	Describe how decisions on land use, regional water, and natural resource needs are being reconciled.	Section 6	Project and Program Implementation	6-16
Table 4. Water, Natural Resources, and Land Use, #4	Address the order of authority.	Section 1	Minneapolis Water Resource Management Plan	1-11
Table 4. Water, Natural Resources, and Land Use, #4	Note modifications to ordinance or best practices that could improve greening, habitat protection, and stormwater reuse opportunities.	Section 5	Assessment of Minneapolis Water Resource Programs	5-26
Table 4. Water, Natural Resources, and Land Use, #4	Identify a future amendment process and schedule for reassessing ordinances.	Section 5	Change That Would Be Adequate to Meet Performance Standards or Controls	5-27
Table 4. Water, Natural Resources, and Land Use, #4	Describe efforts to integrate Safe Drinking Water Act and Wellhead Protection plans into Zoning Code.	Section 3	Source Water Protection – Minneapolis	3-89
Table 4. Water, Natural Resources, and Land Use, #4	Describe efforts to integrate Safe Drinking Water Act and Wellhead Protection plans into Zoning Code.	Section 3	Source Water Protection – Neighboring Municipalities	3-92
Table 4. Water, Natural Resources, and Land Use, #5	Include a local implementation program that covers the term of the local water plan.	Section 6	Capital Improvement Program	6-4
Table 4. Water, Natural Resources, and Land Use, #5	Describe the existing and proposed physical environment and land use.	Section 3	Population, Land Area, Neighborhoods, and Parks	3-1
Table 4. Water, Natural Resources, and Land Use, #5	Describe the existing and proposed physical environment and land use.	Section 3	Soils	3-7
Table 4. Water, Natural Resources, and Land Use, #5	Describe the existing and proposed physical environment and land use.	Section 3	Climate	3-8

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Table 4. Water, Natural Resources, and Land Use, #5	Describe the existing and proposed physical environment and land use.	Section 3	Bedrock, Surficial Geology, and Topography	3-10
Table 4. Water, Natural Resources, and Land Use, #5	Describe the existing and proposed physical environment and land use.	Section 3	Land Use and Zoning	3-12
Table 4. Water, Natural Resources, and Land Use, #5	Define drainage areas and the volumes, rates, and paths of stormwater runoff.	Section 4	Stormwater Drain Hydraulic Standards	4-27
Table 4. Water, Natural Resources, and Land Use, #5	Include a stormwater system map that shows ponds, lakes, and wetlands, structural controls, pipes, and pipe sizes, and other conveyances and outfalls.	Section 4	Figure 4.4 – Minneapolis Stormwater Drain System	4-9
Table 4. Water, Natural Resources, and Land Use, #5	Include a stormwater system amp that shows ponds, lakes, and wetlands, structural controls, pipes, and pipe sizes, and other conveyances and outfalls.	Section 4	Figure 4.5 –Structural Stormwater Management Practices	4-10
Table 4. Water, Natural Resources, and Land Use, #5	Include a table that describes each component of the implementation program.	Section 6	Capital Improvement Program	6-4
Table 4. Water, Natural Resources, and Land Use, #5	Include a table that describes each component of the implementation program.	Section 6	Operational Programs	6-15
Table 4. Water, Natural Resources, and Land Use, #5	Include a table for capital improvement program.	Section 6	Capital Improvement Program	6-4
Table 4. Water, Natural Resources, and Land Use, #5	Provide a schedule and annual process for assessing the need for improvements.	Section 6	Project and Program Implementation	6-16
Table 4. Water, Natural Resources, and Land Use, #5	Define the responsibilities of the local government unit from that of the MWMO and other entities.	Section 5	Watershed Organization Requirements	5-18

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Table 4. Water, Natural Resources, and Land Use, #6	Explain interdepartmental coordination of water and natural resource issues in the city.	Section 4	Responsibilities for Infrastructure Management	4-45
Table 4. Water, Natural Resources, and Land Use, #5	Identify a communication process.	Section 5	Administrative Responsibilities	5-25
Table 4. Water, Natural Resources, and Land Use, #5	Provide a description of the interdepartmental city process that facilitates the approval and installation of innovative stormwater management facilities.	Section 5	Site Plan Review and Capital Project Task Forces	5-15
Table 4. Water, Natural Resources, and Land Use, #7	Provide a summary of the member organization's SWPPP and conformance with NPDES permit.	Section 1	Relationship to Minneapolis Stormwater Management Program	1-11
Table 4. Water, Natural Resources, and Land Use, #7	Inspection and maintenance plans.	Section 5	Ongoing Stormwater Management Compliance	5-20
Table 4. Water, Natural Resources, and Land Use, #7	Street sweeping.	Section 4	Street Maintenance	4-35
Table 4. Water, Natural Resources, and Land Use, #7	Spill response and containment plans.	Section 5	Spill Response	5-5
Table 4. Water, Natural Resources, and Land Use, #7	Responsibilities.	Section 5	Administrative Responsibilities	5-25
Table 4. MWMO Standards and Agency Regulations	Wetland alternation permitting process.	Section 5	Wetland Conservation Act	5-19
Table 4. MWMO Standards and Agency Regulations	Permitting, site review, and enforcement ordinances.	Section 5	Stormwater Management Standards for Development and Redevelopment/Post-Construction Stormwater Management	5-16

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Table 4. MWMO Standards and Agency Regulations	County groundwater plan compliance.	N/A	N/A – Hennepin County does not have an adopted groundwater management plan.	-
Table 4. MWMO Standards and Agency Regulations	Lakes on Metropolitan Council priority lake list.	Section 3	Minneapolis Waterbodies (see specific waterbody for information)	3-14
Table 4. MWMO Standards and Agency Regulations	Lakes of MPCA's list of impaired waters.	Appendix C	City of Minneapolis TMDL Status	C-1
Table 4. MWMO Standards and Agency Regulations	TMDL compliance requirement summaries.	Section 3	TMDL Mitigation Plans Required Actions	3-93
Table 4. MWMO Standards and Agency Regulations	TMDL activities completed to-date summaries.	Section 3	TMDL Mitigation Plans Required Actions	3-93
Table 4. Surface Water Appropriations	Identify city administration of small watercourse appropriations.	Section 5	Appropriations from Small Watercourses	5-23
Table 4. Evaluation	Identify measurements to track compliance with local water plan implementation.	Section 1	Annual Reports	1-15
Shingle Creek Watershed Management Commission				
Section 4.4.1	Update existing and proposed physical environment and land use.	Section 3	Population, Land Area, Neighborhoods, and Parks	3-1
Section 4.4.1	Update existing and proposed physical environment and land use.	Section 3	Soils	3-7
Section 4.4.1	Update existing and proposed physical environment and land use.	Section 3	Climate	3-8
Section 4.4.1	Update existing and proposed physical environment and land use.	Section 3	Bedrock, Surficial Geology, and Topography	3-10
Section 4.4.1	Update existing and proposed physical environment and land use.	Section 3	Land Use and Zoning	3-12
Section 4.4.1	Update existing hydrology.	Section 4	Stormwater Drain Hydraulic Standards	4-27
Section 4.4.1	Update proposed hydrology.	Section 4	Stormwater Drain Hydraulic Standards	4-27

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Section 4.4.1	Subwatershed figure and shapefiles.	Section 3	Figure 3.6 – City of Minneapolis Waterbodies Drainage Areas	3-15
Section 4.4.1	Storm drainage system figure and shapefiles.	Section 4	Figure 4.11 – City of Minneapolis Stormwater Runoff Pipeshed Areas	4-26
Section 4.4.1	Storm drainage system figure and shapefiles.	Appendix J	2017 Stormwater Catchment Inventory	J-1
Section 4.4.1	BMP figure and shapefiles.	Section 4	Figure 4.5 – Structural Stormwater Management Practices	4-10
Section 4.4.1	Implementation of goals, policies, rules, and standards at local level.	Section 2	Minneapolis Goals and Policies	2-18
Section 4.4.1	Demonstrate actions to achieve load reductions and other requirements/goals of TMDL implementation plans.	Section 3	TMDL Mitigation Plans Required Actions	3-93
Section 4.4.1	Identify known upcoming projects related to TMDL implementation.	Section 3	TMDL Mitigation Plans Required Actions	3-93
Section 4.4.1	Explain implementation of City Review project review requirements.	Section 5	Site Plan Review and Capital Project Task Force	5-16
Section 4.4.1	Update existing and potential water resource related problems.	Section 3	Minneapolis Waterbodies (see specific waterbody for information)	3-14
Section 4.4.1	Update existing and potential water resource related problems.	Appendix C	City of Minneapolis TMDL Status	C-1
Section 4.4.1	Identify non-structural, programmatic, and structural solutions (including those program elements detailed in Rule 8410).	Section 5	Water Resource Management Programs	5-4
Section 4.4.1	Estimated cost of implementation.	Section 6	Expenditures	6-3
Section 4.4.1	Analysis of City's ability to finance recommended actions.	Section 6	Revenue	6-1
Section 4.4.1	Description of implementation program.	Section 6	Capital Improvement Program	6-4
Section 4.4.1	Description of adoption or amendment of official controls and local policies.	Section 6	Project and Program Implementation	6-16
Section 4.4.1	Programs necessary to implement rules and standards.	Section 5	Water Resource Management Programs	5-4
Section 4.4.1	Policies necessary to implement rules and standards.	Section 2	Minneapolis Goals and Policies	2-18
Section 4.4.1	Capital Improvement Plan.	Section 6	Capital Improvement Program	6-4
Bassett Creek Watershed Management Commission				

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Section 5.3.1.1	Assess problems identified by the BCWMC that affect the City.	Section 3	Bassett Creek	3-11
Section 5.3.1.1	Assess problems identified by the BCWMC that affect the City.	Section 3	Wirth Lake	3-78
Section 5.3.1.1	Assess problems identified by the BCWMC that affect the City.	Section 3	Watershed Organization Required Actions	3-97
Section 5.3.1.1	Propose corrective actions for problems identified by the BCWMC that affect the City; consider collaborative role with BCWMC (no specific problems identified in BCWMC Plan).	Section 3	Table 3.52 – TMDL Implementation Plan Requirements and Activities for the City of Minneapolis	3-94
Section 5.3.1.1	Propose corrective actions for problems identified by the BCWMC that affect the City; consider collaborative role with BCWMC (no specific problems identified in BCWMC Plan).	Section 4	BCWMC Flood Control Structures	4-34
Section 5.3.1.1	Policies and goals must be consistent with the BCWMC Plan.	Section 2	Minneapolis Goals and Policies	2-18
Section 4.2.1 Water Quality Policies	3. Member cities to classify waterbodies according to BCWMC classification system.	Section 3	Watershed Organization Required Actions	3-97
Section 4.2.1 Water Quality Policies	5. Work with BCWMC to implement identified improvement projects.	Section 3	Watershed Organization Required Actions	3-97
Section 4.2.1 Water Quality Policies	15. Member cities shall not allow drainage of sanitary sewage or non-permitted industrial wastes onto land or watercourse discharging to Bassett Creek.	Section 5	Table 5.1 – City of Minneapolis Code of Ordinances	5-1
Section 4.2.1 Water Quality Policies	17. Member cities encouraged to implement practices to minimize chloride loading.	Section 4	Winter Street Maintenance Practices	4-35
Section 4.2.2 Flooding and Rate Control Policies	24. Member cities are responsible for routing maintenance and report of BCWMC flood control structures.	Section 4	BCWMC Flood Control Structures	4-34

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Section 4.2.2 Flooding and Rate Control Policies	29. Member cities must implement BCWMC flood level requirements for new and redeveloped structures (including 2-foot separation between building and 100-year elevation).	Section 5	Zoning Code and Land Use	5-23
Section 4.2.2 Flooding and Rate Control Policies	30. Member cities must require rate control in conformance with Flood Control Project System design.	Section 5	Regulatory Controls for BCWMC Flood Control Projects	5-27
Section 4.2.2 Flooding and Rate Control Policies	37. Member cities are encouraged to remove streets, utilities, and structures that are below current 100-year floodplain as development or redevelopment allows.	Section 5	Zoning Code and Land Use	5-23
Section 4.2.2 Flooding and Rate Control Policies	39. Member cities must maintain ordinances that are consistent with BCWMC floodplain standards. Ordinances must be submitted to BCWMC for review.	Section 5	Zoning Code and Land Use	5-23
Section 4.2.3 Groundwater Management Policies	49. Member cities are encouraged to educate residents regarding the importance of implementing BMPs to protect groundwater quality and quantity.	Section 5	Public Education, Participation, and Involvement	5-11
Section 4.2.3 Groundwater Management Policies	50. Member cities shall share groundwater elevation data, where available, with the BCWMC.	Section 3	Groundwater	3-82
Section 4.2.4 Erosion and Sediment Control Policies	51. Member cities shall continue managing erosion and sediment control permitting programs and ordinances.	Section 5	Erosion and Sediment Control	5-5
Section 4.2.4 Erosion and Sediment Control Policies	54. Member cities shall perform regular erosion and sediment control inspections for projects triggering BCWMC review. Member cities will provide an annual report to BCWMC on compliance with BCWMC standards (as part of MS4 reporting requirements).	Section 5	Erosion and Sediment Control	5-5
Section 4.2.4 Erosion and Sediment Control Policies	55. Local water management plans required to describe existing and proposed ordinances, permits, and procedures addressing erosion and sediment control.	Section 5	Table 5.1 – City of Minneapolis Code of Ordinances	5-1

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Section 4.2.5 Stream Restoration and Protection Policies	62. Member cities are responsible for funding maintenance and repairs of aesthetic improvements.	N/A	N/A – Cost share of capital improvement projects is determined for each specific project	-
Section 4.2.5 Stream Restoration and Protection Policies	64. Member cities shall maintain and enforce BCWMC buffer requirements along priority streams.	Section 5	Wetland Conservation Act	5-19
Section 4.2.6 Wetland Management Policies	65. Member cities are required to inventory, classify, and determine the functions and values of wetlands, maintain a database, and are encouraged to complete comprehensive wetland management plans.	Section 3	Wetland Inventories	3-79
Section 4.2.6 Wetland Management Policies	66. Member cities are required to develop and implement wetland protection ordinances.	Section 5	Wetland Conservation Act	5-19
Section 4.2.6 Wetland Management Policies	68. Member cities shall maintain and enforce BCWMC buffer requirements for projects containing more than one acre of new or redeveloped impervious area.	Section 5	Watershed Organization Requirements	5-18
Section 4.2.6 Wetland Management Policies	69. Member cities are required to manage wetlands in accordance with the WCA.	Section 5	Wetland Conservation Act	5-19
Section 4.2.6 Wetland Management Policies	72. Member cities are required to annually inspect wetlands classified as "Preserve."	N/A	N/A – There are no wetlands within Minneapolis municipal boundaries that are designated classified by BCWMC as "Preserve"	-
Section 4.2.6 Wetland Management Policies	73. Member cities are encouraged to pursue wetland restoration projects.	Section 3	Wetland Inventories	3-79
Section 4.2.6 Wetland Management Policies	74. Member cities are encouraged to participate in wetland monitoring programs such as WHEP.	Section 3	Wetland Health Evaluation Project	3-88
Section 4.2.8 Recreation, Habitat, and Shoreland Management Policies	80. Member cities are responsible for shoreland regulation.	Section 5	Zoning Code and Land Use	5-23
Section 4.2.8 Recreation, Habitat, and Shoreland Management Policies	82. Member cities are encouraged to develop and maintain water-related recreation features.	N/A	N/A – Water recreation is the responsibility of the Minneapolis Park and Recreation Board	-

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Section 4.2.8 Recreation, Habitat, and Shoreland Management Policies	85. Member cities shall consider opportunities to maintain, enhance, or provide new open spaces and/or habitat as part of water resource projects.	N/A	N/A – Features of capital improvement projects is determined for each specific project	-
Section 4.2.8 Recreation, Habitat, and Shoreland Management Policies	89. Member cities shall adopt State buffer and/or shoreland management requirements for public waters.	Section 2	Buffer Law	2-37
Section 4.2.10 Administration Policies	113. Member cities must inform BCWMC regarding updates to city ordinance or comprehensive plans that affect stormwater management.	Section 5	Watershed Organization Requirements	5-18
Section 4.2.10 Administration Policies	119. Member cities shall appoint a technical advisor to the BCWMC TAC.	Section 3	N/A	-
Section 4.2.10 Administration Policies	120. Member cities shall inform developer and other project applicants regarding BCWMC requirements.	Section 5	Watershed Organization Requirements	5-18
Section 4.2.10 Administration Policies	121. Member cities shall permit only those projects that conform to the policies and standards of the BCWMC.	Section 5	Watershed Organization Requirements	5-18
Section 4.2.10 Administration Policies	122. Member cities are required to acquire and maintain easements, right-of-way, or interest in land for BCWMC ordered CIP projects.	Section 5	Watershed Organization Requirements	5-18
Section 5.3.1.1	Describe the maintenance of the stormwater system to prevent flooding and water quality problems.	Section 4	Stormwater System Operation and Maintenance	4-30
Section 5.3.1.1	Assess the need for periodic maintenance of public works, facilities, and natural conveyance systems under the City's jurisdiction.	Section 4	Baseline Sanitary Sewer and Stormwater Drain Condition Assessments	4-38
Section 5.3.1.1	Assess the need to establish a waterbody management classification system to provide for water quality and quantity management. Correlate selected system with BCWMC classification system.	Section 3	Watershed Organization Required Actions	3-97

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Section 5.3.1.1	Identify official controls and programs (ordinances, management plans) to enforce policies of the BCWMC. Implement changes to system within 2 years of BCWMC plan adoption.	Section 3	Watershed Organization Required Actions	3-97
Minnehaha Creek Watershed District				
Appendix A. Data & Information	Identify regional data systems maintained by the District and describe their application to LGU activity.	Appendix E	Monitoring and Assessment Reports	E-1
Appendix A. Data & Information	Describe hydrology and hydraulics (H&H) model.	Section 4	Stormwater Drain Hydraulic Standards	4-27
Appendix A. Data & Information	Provide waterbody flood elevations derived from Atlas 14 precipitation data.	Section 4	Stormwater Drain Hydraulic Standards	4-27
Appendix A. Data & Information	Describe functional assessment of wetlands.	Section 3	Wetland Inventories	3-79
Appendix A. Data & Information	Provide data on biological and physical condition of District streams.	Section 3	Minnehaha Creek	3-33
Appendix A. Data & Information	Provide hydrologic data on water quality, water quantity, and ecological integrity conditions and trends for District resources.	Appendix E	Monitoring and Assessment Reports	E-1
Appendix A. Data & Information	A summary of water resource management-related agreements, including joint powers agreements, into which the LGU has entered with watershed management organizations, adjoining LGU's, private parties, or others.	Section 2	Water Resources Related Agreements	2-33
Appendix A. Data & Information	Maps of current land use and land use at the LGU planning horizon.	Section 3	Figure 3.4 – City of Minneapolis Land Use	3-13
Appendix A. Data & Information	Maps of drainage areas under current and future planned land use with paths, rates, and volumes of stormwater runoff.	Section 4	Figure 4.11 – City of Minneapolis Stormwater Runoff Pipeshed Areas	4-26
Appendix A. Data & Information	Stormwater conveyance map meeting standards of the current MS4 general permit and indicating an outfall or a connection at the LGU boundary.	Section 4	Figure 4.4 – Minneapolis Stormwater Drain System	4-9
Appendix A. Data & Information	An inventory of public and private stormwater management facilities including the location, facility type, and party responsible for maintenance.	Section 4	Figure 4.5 – Structural Stormwater Management Practices	4-10

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Appendix A. Data & Information	A listing and summary of existing or potential water resource-related problems wholly or partly within LGU corporate limits. A problem assessment consistent with Minnesota Rules 8410.0045, subpart 7, is to be completed for each. This includes, but is not limited to: ▪ Areas of present or potential future local flooding. ▪ Landlocked areas. ▪ Regional storage needs.	Section 3	Minneapolis Waterbodies (see specific waterbody for information)	3-14
Appendix A. Data & Information	Executive summary of the local plan highlights.	Executive Summary	All	ES-1
Appendix A. Data & Information	Statement of the process to amend the local plan.	Section 1	Amendment Procedures	1-15
Appendix A. LGU Housekeeping	Describe land, facilities, and operations.	N/A	N/A – Information contained in *Minneapolis Stormwater Management Program, Municipal Separate Storm Sewer System (MS4) Phase I Permit*, revised July 22, 2015	-
Appendix A. LGU Housekeeping: Land	Inventory real property owned by the LGU, including classification of properties in useful terms such as developed, land suited for development/redevelopment, right-of-way, dedicated outlets, park and recreation land, non-developable, or conservation.	N/A	N/A – Information contained in *Minneapolis Stormwater Management Program, Municipal Separate Storm Sewer System (MS4) Phase I Permit*, revised July 22, 2015	-
Appendix A. LGU Housekeeping: Land	Indicate locations of facilities and operations identified in the LGU SWPPP.	N/A	N/A – Information contained in *Minneapolis Stormwater Management Program, Municipal Separate Storm Sewer System (MS4) Phase I Permit*, revised July 22, 2015	-
Appendix A. LGU Housekeeping: Land	Discuss water resource issues and opportunities associated with its properties.	N/A	N/A – Information contained in *Minneapolis Stormwater Management Program, Municipal Separate Storm Sewer System (MS4) Phase I Permit*, revised July 22, 2015	-
Appendix A. LGU Housekeeping: Land	Identify potential opportunities to coordinate with the District or other partners.	Section 5	Coordination with Other Government Agencies – Water Resource Management Programs	5-26
Appendix A. LGU Housekeeping: Facilities and Operations	Inventory facilities that it owns or operates and municipal operations that may contribute pollutants to groundwater or surface waters as required in NPDES MS4 stormwater permit.	N/A	N/A – Information contained in *Minneapolis Stormwater Management Program, Municipal Separate Storm Sewer System (MS4) Phase I Permit*, revised July 22, 2015	-

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Appendix A. LGU Housekeeping: Facilities and Operations	Describe best management practices that it commits to implement to address potential water resource impacts as required in NPDES MS4 stormwater permit.	N/A	N/A – Information contained in *Minneapolis Stormwater Management Program, Municipal Separate Storm Sewer System (MS4) Phase I Permit*, revised July 22, 2015	-
Appendix A. LGU Housekeeping: Facilities and Operations	Discuss issues or opportunities related to particular facilities or operations where the District's technical assistance, LGU/District cooperation, shared facilities/service with other LGUs or other forms of collaboration with other interested parties may results in water resource benefits.	N/A	N/A – To be contained in Memorandum of Understanding between Minneapolis and MCWD	-
Appendix A. LGU Housekeeping: Stormwater Management Facilities	Map locating all stormwater best management practices within the LGU's stormwater conveyance system.	Section 4	Figure 4.4 – Minneapolis Stormwater Drain System	4-9
Appendix A. LGU Housekeeping: Stormwater Management Facilities	Inventory of all stormwater management basins within its political boundaries, whether owned by the LGU or otherwise.	Section 4	Figure 4.5 – Structural Stormwater Management Practices	4-10
Appendix A. LGU Housekeeping: Stormwater Management Facilities	For each basin and other stormwater management practice contained in the map and inventory, the local plan is to identify the party responsible to maintain the practice; state whether the practice is in maintained condition.	N/A	N/A – Information contained in *Minneapolis Stormwater Management Program, Municipal Separate Storm Sewer System (MS4) Phase I Permit*, revised July 22, 2015	-
Appendix A. LGU Housekeeping: Stormwater Management Facilities	For practices that the LGU is responsible to maintain, the date of next maintenance, if maintenance is programmed.	N/A	N/A – Information contained in *Minneapolis Stormwater Management Program, Municipal Separate Storm Sewer System (MS4) Phase I Permit*, revised July 22, 2015	-
Appendix A. LGU Housekeeping: Stormwater	Describe its approach to maintenance of stormwater management practices constructed in conjunction with private development. This includes:	Section 5	Ongoing Stormwater Management Compliance	5-20

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Management Facilities	A. Whether the LGU assumes maintenance responsibility and, if so, under what circumstances. B. The LGU's program to inspect practices and secure maintenance by private parties. C. The means by which the LGU funds its maintenance and inspection activities. D. Other means of funding that are within its legal authority but that it does not presently use.			
Appendix A. LGU Housekeeping: Stormwater Management Facilities	Discuss the scope of its knowledge on deferred maintenance of public and private stormwater management practices within its boundaries.	Section 5	Ongoing Stormwater Management Compliance	5-20
Appendix A. Land Use: Planning	Identify those areas within or adjacent to the LGU that are designated in its local comprehensive land use plan as potential development or redevelopment within comprehensive plan planning horizon. This includes planned rezoning, land assembly, and infrastructure extension or expansion.	N/A	N/A – Information to be contained in 2018 Minneapolis Comprehensive Plan	-
Appendix A. Land Use: Planning	List and describe completed or programmed small area plans and similar planning activities with respect to defined-area redevelopment.	N/A	N/A – Information to be contained in 2018 Minneapolis Comprehensive Plan	-
Appendix A. Land Use: Planning	Describe the procedures by which the LGU plans, programs, and implements transportation infrastructure.	N/A	N/A – Information to be contained in 2018 Minneapolis Comprehensive Plan	-
Appendix A. Land Use: Planning	Describe the procedures by which the LGU plans, programs, and implements sewer and water infrastructure.	Section 6	Project and Program Implementation	6-16
Appendix A. Land Use: Planning	Describe the procedures by which the LGU plans, programs, and implements park and recreation land acquisition and management.	N/A	N/A – Responsibility of Minneapolis Park and Recreation Board	-
Appendix A. Land Use: Planning	Describe the procedures by which the LGU plans, programs, and implements conservation land acquisition and management.	N/A	N/A – Minneapolis is fully developed and has minimal land available for conservation acquisition	-
Appendix A. Land Use: Planning	Date of the most recent approved capital implementation or land acquisition and management program, the frequency of program updating, and internal procedures to	Section 6	Capital Improvement Program	6-4

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
	develop and approve the implementation program and to implement specific actions, and how programming and implementation is coordinated with other LGU activities.			
Appendix A. Land Use: Planning	Provide links to small area/redevelopment plans.	N/A	N/A – Information to be contained in 2018 Minneapolis Comprehensive Plan	-
Appendix A. Land Use: Planning	Provide links to capital implementation programs.	Section 6	Capital Improvement Program	6-4
Appendix A. Land Use: Planning	Provide links to acquisition and management plans.	N/A	N/A – Minneapolis is fully developed and has minimal land available for conservation acquisition	-
Appendix A. Land Use: Development Regulation	Review zoning and subdivision codes and other measures that have been adopted or are being considered and to indicate any role the District might plan in evaluating or implementing any such measures.	Section 5	Table 5.1 – City of Minneapolis Code of Ordinances and Table 5.2 – Minneapolis Park and Recreation Board Code of Ordinances	5-1
Appendix A. Land Use: Development Regulation	Describe whether the LGU development review process incorporates voluntary or obligatory low-impact site design review. If so, describe the process and whether it will facilitate District participation.	Section 5	Site Plan Review and Capital Project Task Force	5-15
Appendix A. Land Use: Development Regulation	Describe whether the LGU requires stormwater management practices, wetlands, or wetland buffers be platted on outlets. If not, describe the obstacles for doing so.	Section 5	Stormwater Management Standards for Development and Redevelopment/Post-Construction Stormwater Management	5-16
Appendix A. Land Use: Development Regulation	Explain the LGU's maintenance responsibility policy and practice within residential, industrial, or other subdivision and how these are funded.	Section 5	Ongoing Stormwater Management Compliance	5-20
Appendix A. Land Use: Development Regulation	Describe wellhead protection plan, policies, and implementation. Describe established policies as to where and when infiltration will not be required or permitted as a stormwater management practice.	Section 5	Minimal Impact Design Standards Flexible Treatment Options	5-20
Appendix A. Land Use: Development Regulation	Describe provisions of official controls or LGU practices that make applicants aware of District permitting requirements.	Section 5	Watershed Organization Requirements	5-18
Appendix A. Land Use: Development Regulation	Identify other regulatory mandates concerning water resources under which it operates. Describe its legal role and responsibility, and compliance status.	Section 2	Regulatory Agencies, Requirements, Goals, and Programs	2-1

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Appendix A. Land Use: Development Regulation	Identify other roles not legally mandated but that the LGU elects to perform. May by in tabular form.	Section 5	Water Resource Management Programs	5-4
Appendix A. Land Use: Development Regulation	Identify any District assistance or coordination that would benefit its implementation of any particular program, specifically: ▪ NPDES MS4 program. ▪ TMDL program. ▪ Anti-degradation requirements. ▪ Safe Drinking Water Act/State wellhead protection program. ▪ National Flood Insurance Program. ▪ State floodplain management law. ▪ State shoreland management law. ▪ Minnesota Wetland Conservation Act.	N/A	N/A – To be contained in Memorandum of Understanding between Minneapolis and MCWD	-
Appendix A. Implementation Program	Describe non-structural, programmatic, and structural solutions to water resources problems.	Section 5	Water Resource Management Programs	5-4
Appendix A. Implementation Program	Present these implementation elements in a table that briefly describes each element, details the schedule, estimated cost and funding sources for the element, and annual budget totals.	Section 6	Capital Improvement Program	6-4
Appendix A. Implementation Program	Present these implementation elements in a table that briefly describes each element, details the schedule, estimated cost and funding sources for the element, and annual budget totals.	Section 6	Operational Programs	6-15
Appendix A. Implementation Program	Break out within this table a capital improvement program that sets forth, by year, details of each contemplated capital improvement including schedule, estimated cost, and funding source.	Section 6	Capital Improvement Program	6-4
Appendix A. Implementation Program	Prioritize implementation elements consistent with the principles of Minnesota Rule 8410.0045, subpart 1.A and District priorities as described in the WMP and communicated to the LGU.	Section 6	Prioritization	6-17

Citation	Requirement	WRMP Section	WRMP Sub-Section(s)	WRMP Page #
Appendix A. Implementation Program	Implementation program as in its judgment will meet these legal requirements.	Section 6	Project and Program Implementation	6-16
Appendix A. LGU/District Coordination Plan	Describe the elements of a coordination plan that the LGU and District can implement at a staff level. The plan should address: ▪ An annual meeting to review water resource plan implementation. ▪ Mutual transmittal of annual NPDES MS4 report. ▪ How the District can receive notice of and consult with the LGU on its land use, infrastructure, park and recreation, and capital improvement efforts. ▪ LGU notices to the District. ▪ District notices to the LGU. ▪ District notices of significant events related to development/redevelopment. ▪ Regulatory coordination. ▪ Public communication and education partnerships or coordination. LGU staff to be made aware of coordination plans.	N/A	N/A – To be contained in Memorandum of Understanding between Minneapolis and MCWD	-

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Appendix B – NPDES Integrated Permit

Minneapolis
City of Lakes

MINNESOTA POLLUTION CONTROL AGENCY

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300
800-657-3864 | Use your preferred relay service | info.pca@state.mn.us | Equal Opportunity Employer

February 16, 2018

The Honorable Jacob Frey
Mayor, City of Minneapolis
350 South 5th Street, Room 331
Minneapolis, MN 55415

RE: Final Reissued National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Permit No. MN0061018
City of Minneapolis and Minneapolis Park and Recreation Board
Minneapolis, Hennepin County, Minnesota

Dear Mayor Frey:

Enclosed is the final permit for the City of Minneapolis and Minneapolis Park and Recreation Board. The Minnesota Pollution Control Agency (MPCA) has prepared this permit in compliance with the provisions of the Clean Water Act, as amended (33 U.S.C. 1251, et seq.), 40 CFR pts. 122, 123, and 124, as amended; Minn. Stat. chs. 115 and 116, as amended; and Minn. R. ch. 7001.

If you have any questions regarding any of the terms and conditions of the final permit, please contact Cole Landgraf at 651-757-2880 or by email at cole.landgraf@state.mn.us.

Sincerely,

Duane Duncanson

This document has been electronically signed.

Duane Duncanson
Supervisor, Municipal Stormwater Unit
Stormwater Section
Municipal Division

CL:ml

Enclosure: Final Permit

cc: Lois Eberhart, City of Minneapolis

National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS)

MN0061018

Permittee: City of Minneapolis and the Minneapolis Park and Recreation Board, herein after the "Permittee"

Facility name: Minneapolis Municipal Storm Water

Receiving water: Waterbodies within and adjacent to the City of Minneapolis

City: Minneapolis **County:** Hennepin

Issuance date: February 16, 2018

Expiration date: February 15, 2023

The State of Minnesota, on behalf of its citizens through the Minnesota Pollution Control Agency (MPCA/Agency), authorizes the Permittee to operate a disposal system at the facility named above in accordance with the requirements of this permit.

The goal of this permit is to reduce pollutant levels in point source discharges and protect water quality in accordance with the U.S. Clean Water Act, Minnesota statues and rules, and federal laws and regulations.

This permit is effective on the issuance date identified above. This permit expires at midnight on the expiration date identified above.

Signature: Duane Duncanson

This document has been electronically signed.

Duane Duncanson
Supervisor, Municipal Stormwater Unit
Stormwater Section
Municipal Division

for the Minnesota Pollution Control Agency

If you have questions about this permit, including specific permit requirements, permit reporting, or permit compliance status, please contact the Minnesota Pollution Control Agency at:

Municipal Stormwater Program
Municipal Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194
Telephone: 651-296-6300 or toll free in Minnesota: 800-657-3864

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PART I. AUTHORIZATION UNDER THIS PERMIT

A. ELIGIBILITY

To be eligible for authorization to **discharge stormwater** under this permit, the applicant must be an **owner** and/or **operator** (**owner/operator**) of a **large municipal separate storm sewer system** (**MS4**) as defined in 40 CFR § 122.26(b)(4).

1. Authorized **Stormwater** Discharges

   This permit authorizes **stormwater discharge**s from the **MS4**.

2. Authorized Non-**Stormwater** Discharges

   The following categories of **non-stormwater discharge**s or flows are authorized under this permit to enter the **Permittee**'s **MS4** only if the **Permittee** does not identify them as significant contributors of pollutants (i.e., **illicit discharge**s), in which case the **discharge**s or flows must be addressed in the **Permittee**'s **Stormwater Management Program** (**SWMP**): water line flushing, landscape irrigation, diverted stream flows, rising groundwaters, uncontaminated groundwater infiltration (as defined at 40 CFR § 35.2005[b][20]), uncontaminated pumped groundwater, **discharge**s from potable water sources, foundation drains, air conditioning condensation, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and **wetlands**, dechlorinated swimming pool **discharge**s, street wash water, and **discharge**s of flows from firefighting activities.

B. LIMITATIONS ON AUTHORIZATION

The following **discharge**s or activities are not authorized by this permit:

1. **Non-stormwater discharge**s, except those authorized in Part I.A.2.

2. **Discharge**s of **stormwater** to the **MS4** from activities requiring a separate NPDES/SDS permit. This permit does not replace or satisfy any other permitting requirements.

3. **Discharge**s of **stormwater** to the **MS4** from any other entity located in the drainage area or outside the drainage area. Only the **Permittee**'s **MS4** and the portions of the storm sewer system under the **Permittee**'s operational control are authorized by this permit.

4. This permit does not replace or satisfy any environmental review requirements, including those under the Minnesota Environmental Policy Act (Minn. Stat. § 116D), or the National Environmental Policy Act (42 U.S.C. §§ 4321 – 4370f).

5. This permit does not replace or satisfy any review requirements for endangered or threatened species, from new **discharge**s that adversely impact or contribute to adverse impacts on a listed endangered or threatened species, or adversely modify a designated critical habitat.

6. This permit does not replace or satisfy any review requirements for historic places or archeological sites, from new **discharge**s which adversely affect properties listed or eligible for listing in the National Register of Historic Places or affecting known or discovered archeological sites.

7. This permit does not authorize **discharge**s to **wetlands** unless the **Permittee** is in compliance with the requirements of Minn. R. 7050.0186.

C. PERMIT AUTHORIZATION

For an applicant to be authorized to **discharge stormwater** from a **large MS4** under this permit the **Commissioner** will communicate to the **Permittee** as to whether the permit should be issued or denied in accordance with Minn. R. 7001. Upon receipt of written notification from the **Commissioner** of permit coverage, the **Permittee** is authorized to **discharge stormwater** from the **large MS4** under the terms and conditions of this permit.

D. RIGHTS AND RESPONSIBILITIES

1. The **Commissioner** may modify this permit or issue other permits, in accordance with Minn. R. 7001, to include more stringent effluent limitations or permit requirements that modify or are in addition to the Minimum Control Measures (MCMs) in Part III.C. of this permit, or both. Modifications may be based on the **Commissioner**'s determination that such modifications are needed to protect water quality.

2. The **Permittee** must manage, operate, and maintain the storm sewer system and areas drained by the storm sewer system within the **Permittee**'s jurisdiction to **reduce** the **discharge** of pollutants to the **Maximum Extent Practicable** (**MEP**). Management may consist of a combination of **Best Management Practices** (**BMP**s), education, other control techniques, system design and engineering methods, and such other provisions as the **Permittee** and/or **Commissioner** determine to be appropriate.

3. Joint **Permittee**s

   a. The following entities are Joint **Permittee**s under this permit. The titles "Joint **Permittee**" and "**Permittee**" are considered the same and are used interchangeably:

      (1) City of Minneapolis by and through its City Council

      (2) City of Minneapolis by and through its Minneapolis Park and Recreation Board

   b. Each Joint **Permittee** is individually liable for:

      (1) Permit compliance for the **discharge**s from portions of the storm sewer system of which it is the **owner** and/or **operator**.

      (2) **Stormwater** management for **discharge**s from portions of the storm sewer system of which it is the **owner** and/or **operator**.

   c. The Joint **Permittee**s are jointly and severally liable for:

      (1) Compliance with annual reporting requirements.

      (2) Ensuring funding for representative monitoring according to established agreements.

      (3) Ensuring implementation of any system-wide management program elements.

(4) Compliance on portions of the storm sewer system where operation, maintenance, or other authority has been transferred from one Joint **Permittee** to another in accordance with legally binding interagency agreements.

(5) Compliance on portions of the storm sewer system where the Joint **Permittee**s jointly own or operate the system.

d. The Joint **Permittee**s must enter into an agreement to define their individual responsibilities for meeting the requirements and conditions of this permit (Agreement). As part of the Agreement, the Joint **Permittee**s must define their individual responsibilities to assure the operation, maintenance, monitoring, and management of the **SWMP** to comply with this permit. This Agreement must become part of the **SWMP** and must include, but not be limited to the following:

(1) A designation of an Authorized Representative to serve as the coordinator of the Joint **Permittee**s.

(2) A delineation of responsibilities to assure all parts of the **SWMP** are implemented and managed according to the conditions of this permit.

(3) A delineation of responsibilities for submittal of the annual report.

PART II. APPLICATION REQUIREMENTS

A. APPLICATION FOR REAUTHORIZATION

1. The **Permittee** must submit a written application for reauthorization at least 180 days before the expiration date of this permit (Minn. R. 7001.0040, subp. 3).

2. If the **Permittee** has submitted a timely application for permit reauthorization, the **Permittee** must continue to conduct the activities authorized by this permit, in compliance with the requirements of this permit, until the **Agency** takes final action on the application, unless the **Agency** determines one of the following:

   a. The **Permittee** is not in substantial compliance with the requirements of this permit, or with a stipulation agreement or compliance schedule designed to bring the **Permittee** into compliance with this permit.

   b. The **Agency**, as a result of an action or failure to act by the **Permittee**, has been unable to take final action on the application on or before the expiration date of the permit.

   c. The **Permittee** has submitted an application with major deficiencies or has failed to properly supplement the application in a timely manner after being informed of deficiencies (Minn. R. 7001.0160).

3. The **Permittee** must submit with an application for reauthorization a revised **SWMP**.

B. DISCHARGES TO IMPAIRED WATERS WITH A U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA)-APPROVED TOTAL MAXIMUM DAILY LOAD (TMDL) THAT INCLUDES AN APPLICABLE WASTE LOAD ALLOCATION (WLA).

For each **applicable WLA** approved prior to the submittal of the application for reauthorization, the **Permittee** must submit the following with an application for reauthorization:

1. **TMDL** project name(s).

2. Numeric **WLA**(s), including units.

3. Type of **WLA** (i.e., categorical or individual).

4. Pollutant(s) of concern.

5. Applicable flow data specific to each **applicable WLA**.

6. For each **applicable WLA** not met at the time of application, a compliance schedule is required. Compliance schedules can be developed to include multiple **applicable WLA**s and must include:

   a. Interim milestones, expressed as **BMP**s or progress toward implementation of **BMP**s to be achieved during the permit term.

   b. Dates for implementation of interim milestones.

   c. Strategies for continued **BMP** implementation beyond the permit term.

   d. Target dates the **applicable WLA**(s) will be achieved.

7. For each **applicable WLA** the **Permittee** is reasonably confident is being met at the time of application, the **Permittee** must provide the following documentation:

   a. Implemented **BMP**s used to meet each **applicable WLA**.

   b. A narrative describing the **Permittee**'s strategy for long-term continuation of meeting each **applicable WLA**.

C. <u>ANTI-DEGRADATION ASSESSMENT</u>

The **Permittee** must submit with an application for reauthorization, data and information requested by the **Commissioner** for an anti-degradation assessment of impacts from **stormwater** runoff in accordance with Minn. R. 7050.0290, subp. 2.

D. <u>SUBMITTING THE APPLICATION FOR REAUTHORIZATION</u>

The **Permittee** must use an electronic submittal process, when provided by the **Agency**, for submitting an application for reauthorization developed in accordance with Part II.A. – C. of this permit. When submitting an application electronically is not possible, the **Permittee** must use the following mailing address:

Supervisor, Municipal Stormwater Unit
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

E. <u>APPLICATION FOR REAUTHORIZATION RECORD RETENTION</u>

The applicant must retain copies of the application for reauthorization, all data and information used by the applicant to complete the application, and any additional information requested by the **Commissioner** during the review of the application, for a period of at least three years beyond the date of permit expiration. This period is automatically extended during the course of an unresolved enforcement action regarding the **MS4** or as requested by the **Commissioner**.

PART III. STORMWATER MANAGEMENT PROGRAM (SWMP)

The **Permittee** must continue to develop, implement, and enforce a **SWMP** designed to **reduce** the **discharge** of pollutants from the **MS4** to the **Maximum Extent Practicable** (**MEP**), to protect water quality and to satisfy the appropriate water quality requirements of the Clean Water Act and the conditions of this permit. The **SWMP** is an enforceable part of the permit.

The **SWMP** must utilize an adaptive management strategy by which the **Permittee** continuously monitors, analyzes, and adjusts the **SWMP** to achieve pollutant reductions to the **MEP**. The **SWMP** must include the Minimum Control Measures (described in Part III.C.1. – 8) and must conform with the requirements of Part III.A. – E. The **SWMP** must consist of the following:

A. REGULATORY MECHANISM(S)

To the extent allowable under state, tribal or local law, the **Permittee** must develop, implement, and enforce a regulatory mechanism(s) to meet the terms and conditions of Part III.C.3. – 5. A regulatory mechanism(s) for the purposes of this permit may consist of contract language(s), ordinance(s), permit(s), standard(s), or any other mechanism(s), that will be enforced by the **Permittee**.

B. ENFORCEMENT RESPONSE PROCEDURES (ERPs)

1. The **Permittee** must develop and implement written ERPs to enforce and compel compliance with the regulatory mechanism(s) described in Part III.A.

2. Enforcement conducted by the **Permittee** pursuant to the ERPs must be documented and include, at a minimum, the following:

   a. Name of the **person** responsible for violating the terms and conditions of the **Permittee**'s regulatory mechanism(s).

   b. Date(s) and location(s) of the observed violation(s).

   c. Description of the violation(s), including reference(s) to relevant regulatory mechanism(s).

   d. Corrective action(s), including a completion schedule, issued by the **Permittee**.

   e. Date(s) and type(s) of enforcement used to compel compliance (e.g., verbal warning, written notice, citation, stop work order, withholding of local authorizations, etc.).

   f. Referrals to other regulatory organizations, if any.

   g. Date(s) violation(s) resolved.

C. MINIMUM CONTROL MEASURES (MCMs)

The MCMs listed below must be included in the **SWMP**. The **Permittee** must define appropriate **BMP**s and measurable goals for each MCM.

1. Public Education and Outreach

The **Permittee** must continue to implement a public education and outreach program of appropriate **BMP**s directed at, but not limited to: residents, developers, businesses, elected officials, policy makers, and municipal staff. **BMP**s must take into account known water quality impairments, community concerns, and the public's knowledge of **stormwater** runoff impacts. At a minimum, the **Permittee** must:

a. Implement the following education and outreach activities. The activities below must be implemented at least once throughout the permit term and the **Permittee** may prioritize the number of activities implemented during each year of the permit term.

(1) A multi-lingual program for residents and businesses to increase the level of awareness about **stormwater** runoff impacts to **receiving water**s. This activity must utilize a variety of communication tools and methods to reach the target audiences and inform them of strategies to **reduce** pollutants in **stormwater** runoff.

(2) Educate the public, businesses, and commercial applicators on the proper application of pesticides, herbicides, and fertilizers and the benefits of retaining grass clippings and leaf litter on lawn surfaces.

(3) Educate the public on proper pet waste disposal.

(4) Educate the public and municipal and commercial applicators on the proper management and application of de-icing and anti-icing compounds for winter maintenance.

(5) Educate developers and contractors on post-construction **stormwater** management **BMP** design, construction, and maintenance methods.

(6) Educate the public about **impaired water**s within the jurisdiction and the **TMDL**s developed to address the impairments.

b. Develop and implement an education and outreach work plan, included in the **SWMP**, that consists of the following:

(1) Specific activities and timelines for each of the topics in Part III.C.1.a.(1) – (6).

(2) Target audiences for each activity where the audience has not been identified in Part III.C.1.a.(1) – (6).

(3) Measurable goals for each activity and target audience. Measurable goals must be stated in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior.

(4) A description of coordination with other **stormwater** education and outreach programs being implemented by other organizations, if applicable. Include a list of formal agreements or partnerships describing the roles performed by the other organizations on behalf of the **Permittee**.

(5) An annual evaluation to measure the extent to which measurable goals for each activity and target audience are attained.

(6) The name or title of the municipal staff responsible for work plan implementation.

c. Maintain documentation of the following information:

(1) All information required under Part III.C.1.b.

(2) Any modifications made to the program as a result of the annual evaluation under Part III.C.1.b.(5).

(3) Activities held, including dates, to reach measurable goals described in Part III.C.1.b.(3).

(4) Quantities and descriptions of educational materials distributed, including dates distributed.

2. Public Participation and Involvement

The **Permittee** must revise their current program and continue to implement a public participation and involvement program to solicit public input on the **SWMP**. At a minimum, the **Permittee** must:

a. Hold at least one public meeting per year for the public to provide input on the adequacy of the **SWMP** and the annual report. The **Permittee** must hold the public meeting prior to the submittal of the annual report to the **Commissioner**. The meeting and notice must include the following information:

(1) The public meeting must be held within the jurisdiction of the **Permittee**.

(2) The **Permittee** must prepare and publish a notice of the public meeting at least 30 days before the meeting. The notice of the public meeting must include the following information:

(a) A reference to the **SWMP**, the annual report, and the proposed modifications to the **SWMP**.

(b) The date, time, and location of the public meeting.

(c) A description of the manner in which the public meeting will be conducted and information about where a copy of the **SWMP** and annual report are available for public review.

(3) The **Permittee** must publish the notice in a newspaper or similar publication of general circulation in the vicinity of the **Permittee**'s jurisdiction. A copy of the notice must be made available to the following: the **Agency Commissioner**, appropriate county officials, any governmental entities that have jurisdiction over activities that directly or indirectly relate to **stormwater** management in the **Permittee**'s jurisdiction, and all other **person**s who have requested that they be informed of public meetings regarding the **SWMP** and annual report.

b. Provide access to the following **stormwater**-related public documents on the **Permittee**'s website:

(1) Current Phase I **MS4** individual permit.

(2) Current **SWMP**.

(3) Current annual report.

(4) Current **stormwater** runoff monitoring and analysis report.

c. Collect public input on the adequacy of the **SWMP**, including input from the public meeting. The **Permittee** must provide the public a reasonable opportunity to make oral statements concerning the **SWMP**.

d. Consider the public input received on the **SWMP** and make appropriate adjustments.

e. Include a formal resolution from the **Permittee**'s governing body adopting the annual report and the **SWMP** with the annual report.

f. Maintain documentation of the following information:

(1) All relevant written input submitted by **person**s regarding the **SWMP**.

(2) All responses from the **Permittee** to written input received regarding the **SWMP**, including any modifications made to the **SWMP** as a result of the written input received.

(3) Date(s) and location(s) of events held for purposes of compliance with this requirement.

(4) Notices provided to the public of any events scheduled to meet this requirement, including any electronic correspondence (e.g., website, e-mail distribution lists, notices, etc.).

3. **Illicit Discharge** Detection and Elimination (IDDE)

The **Permittee** must continue to implement and enforce a program to detect and eliminate **illicit discharge**s as defined in 40 CFR § 122.26(b)(2). To the **MEP**, the **Permittee** must minimize any adverse impact to **receiving water**s from all unauthorized **discharge**s, whether random, frequent, infrequent, accidental or otherwise consisting of pathogens, nutrients, oil, toxic pollutants or other hazardous substances consistent with Minn. Stat. §115.061 and 40 CFR pts. 110 and 116. This requirement applies to **discharge**s to the storm sewer system within the **Permittee**'s jurisdiction including physical connections. The **Permittee** must also select and implement a program of appropriate **BMP**s and measurable goals for this MCM. At a minimum, the **Permittee** must:

a. Update an electronic inventory and map of the storm sewer system, identifying:

(1) **Receiving water**s.

(2) **Structural stormwater BMP**s (except catch basins and storm drain inlets without sumps), including:

(a) The size of the subwatershed area draining to the **structural stormwater BMP**.

(b) The design capacity, estimated design capacity or size of the **structural stormwater BMP**.

(3) Land use types.

(4) All **pipe**s, ditches and swales, including **stormwater** flow direction. Catch basin lead **pipe**s must be added, when applicable.

(5) **Permittee**-owned facilities.

(6) **Outfalls**, including:

(a) **Outfall** identification number.

(b) Geographic coordinate of **outfall** location.

(c) Size of **outfall pipe**.

(d) Size of the subwatershed area draining to each **outfall**.

(e) Percent of **impervious surface**s in the subwatershed area draining to each **outfall**.

(f) The number and type of **structural stormwater BMP**s in the subwatershed area that drains to each **outfall**.

(7) **Stormwater** inflows from other **MS4**s.

b. Effectively prohibit, through ordinance or **other regulatory mechanism** and appropriate ERPs, **illicit discharge**s into the **MS4**.

c. Continue to develop and implement the following processes and procedures:

(1) Receive, track, and investigate complaints of **illicit discharge**s including goals for responding to and eliminating **illicit discharge**s.

(2) Identify the source of the **illicit discharge**s.

(3) Enforce violations of prohibitions on **illicit discharge**s.

(4) Limit infiltration of seepage from municipal sanitary sewers to the **MS4**.

d. Continue to develop and implement a dry weather field screening program to detect and eliminate **illicit discharge**s (except non-**stormwater discharge**s as identified in Part I.A.2.), including illegal dumping, to the system. The field screening program must include:

(1) Written procedures that describe how the **Permittee** will prioritize and investigate portions of the **MS4** where there is a reasonable potential to contain **illicit discharge**s or other sources of **illicit discharge**s. The **Permittee** must prioritize investigations based on the results of field screening, the presence of potential sources of illicit **discharge**s in the geographic area drained by that portion of the **MS4**, history, land use, sanitary sewer system, proximity to sensitive waters and other appropriate information.

(2) Areas or locations to be evaluated.

(3) A schedule for the field screening activities.

(4) Pollutants of interest.

(5) Evaluation procedures including non-sampling evaluation (e.g., visual observations, odors, etc.).

(6) Sampling procedures.

(7) Record keeping.

(8) Notification to the Department of Public Safety Duty Officer as required in Minn. Stat. § 115.061.

(9) The dry weather field screening may be implemented in conjunction with the **outfall** inspection and monitoring programs required by Part III.C.6.e(2) as well as during routine maintenance activities performed in areas included in the **Permittee**'s jurisdiction.

(10) Implementation of enforcement response procedures when **illicit discharge**s are discovered.

e. Continue to implement an education and outreach program for municipal staff, the public, businesses, and industry regarding **illicit discharge**s and improper disposal of waste, including:

(1) Communication and outreach to inform the public, municipal employees, and businesses about the following topics:

(a) Identifying **illicit discharge**s and illicit connections to catch basins, ditches, swales and **structural stormwater BMP**s.

(b) Hazards associated with **illicit discharge**s and illicit connections to the **MS4**.

(c) Reporting **illicit discharge**s and illicit connections to the **Permittee**.

(d) Preventing **illicit discharge**s and illicit connections to the **MS4**.

(e) Containment and response to **illicit discharge**s and spills that may **discharge** to the **MS4**.

(2) Written procedures to promote, publicize, and facilitate public reporting of **illicit discharge**s or water quality impacts associated with **discharge**s into or from the **MS4**.

(3) A central contact, including a phone number for complaints and spill reporting.

(4) The responsibility for municipal staff to notify the Department of Public Safety Duty Officer as required in this permit and the internal procedures for other municipal staff to respond and contain **illicit discharge**s and spills.

f. Implement the following measures for hazardous waste and other industrial facilities:

(1) Maintain and continue to develop an inventory of industrial, commercial, or institutional facilities that **discharge** any flow other than **stormwater** to the **MS4**. The inventory must include the name, location, discharge location to the **MS4**, the receiving water, **discharge** description, and any permit issued for the **discharge**. The **Agency** will provide a list of permitted facilities to the **Permittee** upon request.

(2) A program that identifies non-NPDES permitted **discharge**s from industrial facilities the **Permittee** determines are contributing a substantial pollutant loading to the **MS4**, including:

(a) **Stormwater hotspot**s, to the extent possible, using industrial/commercial **stormwater** risk factors and input from Hennepin County Environmental Services and Minneapolis Inspections Departments to identify these **stormwater hotspot**s and establish priorities.

(b) Municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA).

(3) Written procedures for addressing non-NPDES permitted **discharge**s from industrial facilities the **Permittee** determines are contributing a substantial pollutant loading to the **MS4**, including:

(a) Inspecting the facilities.

(b) Monitoring the facilities' **illicit discharge**s.

(c) Implementing **BMP**s for **illicit discharge**s associated with the **stormwater hotspot**s and priority industrial facilities identified in Part III.C.3.f.(2).

g. Maintain documentation of the following information:

(1) Date(s) and location(s) of illicit discharge inspections conducted.

(2) Reports of alleged **illicit discharge**s received, including date(s) of the report(s), and any follow-up action(s) taken by the **Permittee**.

(3) Date(s) of discovery of all **illicit discharge**s.

(4) Identification of **outfall**s, or other areas, where **illicit discharges** have been discovered.

(5) Sources (including a description and the responsible party) of **illicit discharges** (if known).

(6) Action(s) taken by the **Permittee**, including date(s), to address discovered **illicit discharges**.

4. Construction Site **Stormwater** Runoff Control

Continue to develop, implement and enforce a construction site **stormwater** runoff control program that **reduce**s pollutants in **stormwater** runoff to the **MS4** from **construction activity** with a land disturbance of greater than or equal to one acre, including projects less than one acre that are part of a larger **common plan of development or sale**, that occurs within the **Permittee**'s jurisdiction. The program must incorporate the following components:

a. Regulatory mechanism(s)

A regulatory mechanism(s) that establishes requirements for erosion, sediment, and waste controls that is at least as stringent as the **Agency**'s general permit to *Discharge Stormwater Associated with Construction Activity No. MN R100001* (as of the effective date of this permit). If the **Agency**'s general permit to *Discharge Stormwater Associated with Construction Activity No. MN R100001* is reissued, the Permittee must revise their regulatory mechanism(s), if necessary, within six months of the issuance date of that permit, to be at least as stringent as the erosion, sediment, and waste controls required by that permit. The regulatory mechanism(s) must include the following:

(1) **Owner**s and **operator**s of **construction activity** develop site plans that must be submitted to the **Permittee** for review and approval, prior to the start of **construction activity**. **Stormwater** runoff controls described in site plans must be regularly updated by **owner**s and **operator**s during active **construction activity**.

(2) A requirement for site plans to incorporate erosion, sediment, and waste controls as specified in the **Agency**'s general permit to *Discharge Stormwater Associated with Construction Activity No. MN R100001*. The regulatory mechanism(s) must require that site plans incorporate the following categories of erosion, sediment, and waste controls as described in the above referenced permit:

(a) **BMP**s to minimize erosion.

(b) **BMP**s to minimize the **discharge** of sediment and other pollutants.

(c) **BMP**s for dewatering activities.

(d) Site inspections and records of rainfall events.

(e) **BMP** maintenance.

(f) Management of solid and hazardous wastes on each project site.

(g) Final stabilization upon the completion of **construction activity**, including the use of perennial vegetative cover on all exposed soils or other equivalent means.

(h) Criteria for the use of temporary sediment basins.

b. Site plan review

The program must include written procedures for site plan reviews conducted by the **Permittee** prior to the start of **construction activity**, to ensure compliance with the regulatory mechanism(s). The site plan review procedures must include notification to **owner**s and **operator**s proposing **construction activity** of the need to apply for and obtain coverage under the **Agency**'s general permit to *Discharge Stormwater Associated with Construction Activity No. MN R100001*.

c. Public input

Provide the opportunity for the public to report non-compliant erosion, sediment, and waste controls within the **Permittee** jurisdiction. Various methods for reporting noncompliant erosion, sediment, and waste controls must be available to the public, including: website application, phone calls, and/or email communication.

d. Site inspections

The program must include written procedures for conducting site inspections to determine compliance with the **Permittee**'s regulatory mechanism(s). The written procedures must include:

(1) Procedures for identifying priority sites for inspection. Prioritization can be based on parameters such as: topography, soil characteristics, types of **receiving water**(s), stage of construction, compliance history, weather conditions, or other local characteristics and concerns.

(2) A frequency at which site inspections will be conducted.

(3) Name(s) of individual(s) or position titles responsible for conducting site inspections.

(4) A checklist or form to document site inspections when determining compliance.

e. ERPs required by Part III.B. in this permit.

f. A database of construction sites subject to the **Permittee**'s regulatory mechanism to track site plan review, construction progress and erosion, sediment, and waste control compliance.

g. Staff training

The training must address the job-specific duties for the following position titles or municipal staff:

(1) Erosion and sediment control/**stormwater** inspectors:

(a) Knowledge of the erosion, sediment, and waste control requirements in the **Agency**'s general permit to *Discharge Stormwater Associated with Construction Activity No. MN R100001.*

(b) Familiarity with compliant and noncompliant erosion, sediment, and waste control **BMP**s at construction sites.

(c) Appropriate **BMP** selection, installation, and maintenance.

(d) Erosion, sediment, and waste control inspection documentation and use of enforcement response procedures.

(2) Other construction inspectors: erosion, sediment, and waste control **BMP**s for construction sites and procedures for notifying the appropriate **Permittee** staff of noncompliance.

(3) Construction site plan reviewers: knowledge of the erosion, sediment, and waste control **BMP**s required in the **Agency**'s general permit to *Discharge Stormwater Associated with Construction Activity No. MN R100001* and other erosion and sediment control design standards.

h. Maintain documentation of the following information:

(1) For each site plan review – The project name, location, total acreage to be disturbed, **owner** of the proposed **construction activity**, and any **stormwater** related comments and supporting documentation used by the **Permittee** to determine project approval or denial.

(2) For each site inspection – Inspection checklists or other written means used to document site inspections.

(3) Staff training, including a list of topics covered, names of employees in attendance, and date of each event.

5. Post-Construction **Stormwater** Management

Continue to develop, implement, and enforce a post-construction **stormwater** management program that prevents or **reduce**s **water pollution** after **construction activity** is completed, related to **new development** and **redevelopment** projects and **linear project**s with land disturbance of greater than or equal to one acre, including projects less than one acre that are part of a larger **common plan of development or sale**, within the **Permittee**'s jurisdiction and that **discharge** to the **Permittee**'s **MS4**. At a minimum, the program must consist of the following:

a. A regulatory mechanism(s) that incorporates:

(1) A requirement that **owner**s and/or **operator**s of **construction activity** submit site plans with post-construction **stormwater** management **BMP**s to the **Permittee** for review and approval, prior to the start of **construction activity**.

(2) Conditions for post-construction **stormwater** management:

The **Permittee** must develop and implement a post-construction **stormwater** management program for **construction activity** that requires volume reduction using any combination of **BMP**s, with the highest preference given to **green infrastructure** techniques and practices (e.g., infiltration, evapotranspiration, harvest and use, urban forestry, green roofs, or other volume reduction practices). For projects that create or fully reconstruct one or more acres of **impervious surface**, the project must retain on-site to the **MEP** (not discharge to a surface water) the following treatment volumes by type of project:

(a) For **new development** or **redevelopment** projects (excluding **linear project**s) a **water quality volume** of one (1) inch times the new and/or fully reconstructed **impervious surface**s, unless precluded by the **stormwater** infiltration prohibitions in Part III.C.5.a.(3).

(b) For **linear project**s, a **water quality volume** of one (1) inch times the net increase of **impervious surface**s, in addition to a reduction in **stormwater** runoff volume from fully reconstructed surfaces, unless precluded by the **stormwater** infiltration prohibitions in Part III.C.5.a.(3). Where this cannot be achieved within the existing right-of-way, a reasonable attempt to obtain additional right-of-way, easement, or other permission to treat the stormwater during the project planning process must be made.

(3) **Stormwater** infiltration prohibitions

The **Permittee**'s regulatory mechanism(s) must prohibit the construction of infiltration **structural stormwater BMP**s to achieve the conditions for post-construction **stormwater** management in Part III.C.5.a(2) when the infiltration **structural stormwater BMP** will receive **discharge**s from, or be constructed in areas:

(a) That receive discharges from vehicle fueling and maintenance, regardless of the amount of new and/or fully reconstructed **impervious surface**.

(b) That receive **stormwater** runoff from entities regulated under NPDES for industrial **stormwater**: automobile salvage yards; scrap recycling and waste recycling facilities; hazardous waste treatment, storage, or disposal facilities; or air transportation facilities that conduct deicing activities.

(c) Where high levels of contaminants in soil or groundwater may be mobilized by the infiltrating **stormwater**. To make this determination, the **owner**s and/or **operator**s of **construction activity** must complete the **Agency**'s site screening assessment checklist, which is available in the Minnesota Stormwater Manual, or conduct their own assessment. The assessment must be retained with the site plans.

(d) Where soil infiltration rates are more than 8.3 inches per hour unless soils are amended to slow the infiltration rate below 8.3 inches per hour.

(e) Of predominately Hydrologic Soil Group D (clay) soils.

(f) Within 1,000 feet up-gradient or 100 feet down gradient of active karst features.

(g) Within a Drinking Water Supply Management Area (DWSMA) classified as high or very high vulnerability, as defined in Minn. R. 4720.5100, subp. 13., unless the **Permittee** performs a higher level of engineering review sufficient to provide a functioning treatment system and to maximize protection of groundwater.

(h) Within an Emergency Response Area as defined by the Minnesota Department of Health.

(i) With less than three (3) feet of separation distance from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of bedrock.

(4) **Stormwater** treatment requirements when infiltration is prohibited.

For those projects where the **water quality volume** reduction requirement as described in Part III.C.5.a.(2), cannot be met on site, the **Permittee**'s regulatory mechanism(s) must require the use of other methods of **stormwater** treatment (e.g., wet sedimentation basin, filtration basin) for the required **water quality volume** not treated through volume reduction practices.

(5) Mitigation provisions

There may be circumstances where the **Permittee** or other **owner**s and **operator**s of a **construction activity** cannot cost effectively meet the conditions for post-construction **stormwater** management in Part III.C.5.a.(2) and (4) on the site of the original **construction activity**. For this purpose, the **Permittee** must identify, or may require **owner**s or **operator**s of a **construction activity** to identify, locations where mitigation projects can be completed. The **Permittee**'s regulatory mechanism(s) must ensure that any **stormwater discharge**s not addressed on the site of the original **construction activity** are addressed through mitigation and, at a minimum, must ensure the following requirements are met:

(a) Mitigation project areas are selected in the following order of preference:

1) Locations that yield benefits to the same **receiving water** that receives runoff from the original **construction activity**.

2) Locations within the same Department of Natural Resources (DNR) catchment areas as the original **construction activity**.

3) Locations in the next adjacent **DNR catchment area** up-stream.

4) Locations anywhere within the **Permittee**'s jurisdiction.

(b) Mitigation projects must involve the creation of new **structural stormwater BMP**s or the retrofit of existing **structural stormwater BMP**s, or the use of a properly designed regional **structural stormwater BMP**.

(c) Routine maintenance of **structural stormwater BMP**s already required by this permit cannot be used to meet mitigation requirements of this Part.

(d) The **Permittee** must develop and retain documentation that mitigation projects are carried out consistently with Part III.C.5.a.(5)(a) and (b).

(e) The **Permittee** must document who is responsible for long-term maintenance on all mitigation projects of this Part.

(f) If the **Permittee** receives payment from the **owner** and/or **operator** of a **construction activity** for mitigation purposes in lieu of the **owner** or **operator** of that **construction activity** meeting the conditions for post-construction **stormwater** management in Part III.C.5.a.(2) and (4) the **Permittee** must apply any such payment received to a public **stormwater** project, all projects must be in compliance with Part III.C.5.a.(5)(a)-(e).

(6) Long-term maintenance of **structural stormwater BMP**s

The **Permittee**'s regulatory mechanism(s) must provide for the establishment of legal mechanism(s) between the **Permittee** and **owner**s or **operator**s responsible for the long-term maintenance of **structural stormwater BMP**s not owned or operated by the **Permittee**, that have been implemented to meet the conditions for post-construction **stormwater** management in Part III.C.5.a.(2) and (4). This only includes **structural stormwater BMP**s constructed after the issuance date of this permit, that are directly connected to the **Permittee**'s **MS4**, and that are in the **Permittee**'s jurisdiction. The legal mechanism must include provisions that, at a minimum:

(a) Allow the **Permittee** to conduct inspections of **structural stormwater BMP**s not owned or operated by the **Permittee**, perform necessary maintenance, and assess costs for those **structural stormwater BMP**s when the **Permittee** determines that the **owner** and/or **operator** of that **structural stormwater BMP** has not conducted maintenance.

(b) Include conditions that are designed to preserve the **Permittee**'s right to ensure maintenance responsibility, for **structural stormwater BMP**s not owned or operated by the **Permittee**, when those responsibilities are legally transferred to another party.

(c) Include conditions that are designed to protect/preserve **structural stormwater BMP**s and site features that are implemented to comply with Part III.C.5.a.(2) and (4). If site configurations or **structural stormwater BMP**s change, causing decreased **structural stormwater BMP** effectiveness, new or improved **structural stormwater BMP**s must be implemented to ensure the conditions for post-construction **stormwater** management continue to be met.

b. Site plan review

(1) The program must include written procedures for site plan reviews conducted by the **Permittee** prior to the start of **construction activity**, to ensure compliance with requirements of the regulatory mechanism(s).

(2) Include a process for the review of impacts to the design capacity of existing **structural stormwater BMP**s when new or **redevelopment** projects propose to increase the drainage area, loading and/or **stormwater** volume to the **structural stormwater BMP**s compared to the original design capacity.

c. Maintain documentation of the following:

(1) Any supporting documentation used by the **Permittee** to determine compliance with Part III.C.5.a, including the total **water quality volume** to be achieved, the project name, location, **owner** of the **construction activity**, any checklists used for conducting site plan reviews, and any calculations used to determine compliance.

(2) All supporting documentation associated with the **Permittee**'s approval of proposed stormwater infiltration in high or very high vulnerability areas within a DWSMA.

(3) All supporting documentation associated with mitigation projects authorized by the **Permittee**.

(4) Payments received and used in accordance with Part III.C.5.a.(5)(f).

(5) All legal mechanisms drafted in accordance with Part III.C.5.a.(6).

6. Pollution Prevention and Good Housekeeping for Municipal Operations

Continue to develop and implement an operations and maintenance program that prevents or **reduce**s the **discharge** of pollutants from **Permittee** owned/operated facilities and operations to the **MS4**. The program must include written standard operating procedures for preventing pollution during municipal operations (e.g., street sweeper operation, procedures for lawn maintenance, fertilizer and pesticide usage, equipment cleaning, and vehicle maintenance). At a minimum, the operations and maintenance program must include the following:

a. A facilities inventory

The **Permittee** must develop and maintain an inventory of **Permittee** owned/operated facilities that contribute pollutants to **stormwater discharge**s. Facilities to be inventoried may include, but are not limited to: composting, equipment storage and maintenance, hazardous waste disposal, hazardous waste handling and transfer, landfills, solid waste handling and transfer, parks, pesticide storage, public parking lots, public golf courses, public swimming pools, public works yards, recycling, salt storage, vehicle storage and maintenance (e.g., fueling and washing) yards, and materials storage yards.

b. Development and implementation of **BMP**s for inventoried facilities and municipal operations that prevent or **reduce discharge**s of pollutants to the **MS4** and from:

(1) All inventoried facilities that **discharge** to the **MS4**, and

(2) The following municipal operations that may contribute pollutants to **stormwater discharge**s, where applicable:

(a) Waste disposal and storage, including dumpsters.

(b) Municipal landfills, hazardous waste treatment, disposal and recovery facilities and industrial facilities that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA).

(c) Vehicle fueling, washing and maintenance.

(d) Emergency response, including spill prevention plans.

(e) Cleaning of maintenance equipment, building exteriors, dumpsters, and the disposal of associated waste and wastewater.

(f) Use, storage and disposal of **significant materials**.

(g) Landscaping, park, and lawn maintenance.

(h) Road maintenance, including pothole repair, road shoulder maintenance, pavement marking, sealing, and repaving.

(i) Right-of-way maintenance, including mowing.

(j) Application of herbicides, pesticides, and fertilizers.

(k) Cold-weather operations, including plowing or other snow removal practices, sand use, and application of anti-icing and deicing compounds.

c. Development and implementation of **BMP**s for **MS4 discharge**s that may affect Source Water Protection Areas (Minn. R. 4720.5100 – 4720.5590)

The **Permittee** must incorporate **BMP**s into the **SWMP** to protect any of the following drinking water sources that the **MS4 discharge** may affect and the **Permittee** must include the map of these sources with the **SWMP**, if they have been mapped.

(1) Wells and source waters for DWSMAs identified as vulnerable under Minn. R. 4720.5205, 4720.5210, and 4720.5330.

(2) Source water protection areas for surface intakes identified in the source water assessments conducted by or for the Minnesota Department of Health under the Safe Drinking Water Act, U.S.C. §§ 300j – 13.

d. Pond assessment procedures and schedule

The **Permittee** must develop written procedures and a schedule for the purpose of determining the total suspended solids (TSS) and total phosphorus (TP) treatment effectiveness of all **Permittee** owned/operated ponds constructed and used for the collection and treatment of **stormwater**. The schedule may exceed this permit term and must be based on measurable goals and priorities established by the **Permittee**.

e. Inspections

(1) Unless inspection frequency is adjusted as described below, the **Permittee** must conduct annual inspections of **structural stormwater BMP**s to determine structural integrity, proper function and maintenance needs. Inspections of **structural stormwater BMP**s must be conducted annually unless the **Permittee** determines if either of the following conditions apply:

(a) Complaints received or patterns of maintenance indicate a greater frequency is necessary.

(b) Maintenance or sediment removal is not required after completion of the first two annual inspections, then the **Permittee** may **reduce** the frequency of inspections to once every two (2) years.

(2) Inspect, at a minimum, twenty (20) percent of the **MS4 outfall**s and ponds each year on a rotating basis in order to determine structural integrity, proper function, and maintenance needs.

(3) Inspect all stockpile, storage, and material handling areas that contribute pollutants to stormwater as follows:

(a) Weekly inspections when material is being actively handled, used or disturbed on daily basis.

(b) Monthly inspections when material is not being actively handled, used or disturbed. Install perimeter controls at stockpiles that are not covered to prevent material from discharging to the **MS4**.

f. Maintenance

Based on inspection findings, the **Permittee** must determine if repair, replacement, or maintenance measures are necessary in order to ensure the structural integrity, proper function, and treatment effectiveness of **structural stormwater BMP**s. Necessary maintenance must be completed as soon as possible to prevent or **reduce** the **discharge** of pollutants to the **MS4**. When repair, replacement, or maintenance must be delayed, the **Permittee** must prioritize the needed repair, replacement, or maintenance and implement the following:

(1) Preventive maintenance for the **MS4** components and **structural stormwater BMP**s.

(2) Dewater and dispose of solids, floatables, dredgings, or other pollutants resulting from the control and/or treatment of **stormwater** to prevent any pollutant from such materials from entering **receiving water**s. The **Permittee**, in disposing of such materials, must comply with all applicable statutes and rules.

g. Operate and maintain the **Permittee**'s parking lots, streets, roads, and highways to **reduce** the **discharge** of pollutants to the **MEP**. The **Permittee** must, at a minimum:

(1) Sweep public parking lots, streets, roads, and highways under its jurisdiction including prioritizing areas based on land use, trash, and **stormwater** pollutant levels generated.

(2) Sweep streets at least two (2) times per year, once in the spring and once in the fall and sweep higher priority areas more frequently.

h. Flood control **BMP**s

(1) Ensure that any flood control improvement projects the **Permittee** undertakes are designed to minimize the impacts on the water quality of the **receiving water**. When repairs, improvements or changes are planned for existing flood control devices, the **Permittee** must evaluate the feasibility of retrofitting the existing devices to provide volume reduction and pollutant removal from **stormwater discharge**s.

(2) Document and maintain an inventory of flood control detention facilities that provide rate control of **stormwater discharge**s.

i. Retrofit plan

(1) Develop a retrofit plan to evaluate the ability to implement **structural stormwater BMP**s in areas of the **Permittee**'s jurisdiction that currently do not have **stormwater** runoff treatment or where existing **structural stormwater BMP**s could be enhanced to improve pollutant removal capability. The **Permittee** must submit the retrofit plan to the **Agency** for review and approval within 24 months of receiving permit coverage. Once approved by the **Agency**, the retrofit plan will become an enforceable part of the **SWMP**.

(2) At a minimum, the retrofit plan must include a discussion of the following:

(a) Retrofits on lands the **Permittee** owns, including public parcels of land or public right-of-way areas for implementation of **structural stormwater BMP**s.

(b) Developing strategies to encourage privately owned parcels to install **stormwater** retrofits to **reduce** and/or treat **stormwater** runoff from privately owned **impervious surface**s.

j. Employee training

The **Permittee** must develop and implement a **stormwater** management training program commensurate with employees' job duties as they relate to the **Permittee**'s **SWMP**. The employee training program must:

(1) Address the importance of protecting water quality.

(2) Cover the requirements of the permit relevant to the job duties of the employee.

(3) Include a schedule that establishes initial training for new and seasonal employees, and recurring training intervals for existing employees to address changes in procedures, practices, techniques, or requirements.

k. Maintain documentation of the following information:

(1) Date(s) and description of findings of all inspections conducted in accordance with Part III.C.6.e.

(2) Any adjustments to inspection frequency as authorized under Part III.C.6.e.(1).

(3) A description of maintenance conducted, including dates, as a result of inspection findings.

(4) Pond sediment excavation and removal activities, including:

(a) The unique ID number of each **stormwater** pond from which sediment is removed.

(b) The volume (e.g., cubic yards) of sediment removed from each **stormwater** pond.

(c) Results from any testing of sediment from each removal activity.

(d) Location(s) of final disposal of sediment from each **stormwater** pond.

(5) Employee **stormwater** management training events, including a list of topics covered, names of employees in attendance, and date of each event.

I. Integrated infrastructure management program

The **Permittee** owns and operates a historically interconnected sanitary sewer system and storm sewer system. There are seven (7) controlled structures identified in the system that are capable of releases of untreated wastewater. The structures are located on Metropolitan Council's interceptors and are capable of discharging directly to the Mississippi River. The controlled structures are at the following locations in Minneapolis:

- Minnehaha Pkwy & 39th Ave South
- East 38th Street & 26th Ave South
- Southwest Meters – West River Parkway between 28th Street East & Dorman Ave
- Northwest Meters– West River Parkway between 28th Street East & Dorman Ave
- Eastside Meters – East River Terrace & Emerald Street Southeast
- East 26th Street & Seabury Ave
- Portland Ave South & Washington

The **Permittee** must continue to develop and implement an integrated infrastructure management program to maximize public investments to minimize risk to human health and the environment, to prevent loss of life, personal injury, or severe property damage, and to minimize releases and improve water quality. Requirements of the program include:

(1) Incorporation by reference

The following applicable federal and state laws are incorporated by reference in this program, are applicable to the **Permittee**, and are enforceable parts of this program: 40 CFR pt. 136; Minn. R. 7001, 7050, and 7053; and Minn. Stat. ch. 115 and 116.

(2) Toxic **discharge**s prohibited

Whether or not this program includes effluent limitations for toxic pollutants, the **Permittee** must not **discharge** a toxic pollutant except according to 40 CFR pt. 400 to 460 and Minn. R. 7050, 7052, 7053, and any other applicable **Agency** rules.

(3) Nuisance conditions prohibited

The **Permittee**'s **discharge** must not cause nuisance conditions including, but not limited to: floating solids, scum and visible oil film, acutely toxic conditions to aquatic life, or other adverse impact on the receiving water.

(4) Control users

The **Permittee** must regulate the users of its wastewater treatment facility to prevent the introduction of pollutants or materials that may result in the inhibition or disruption of the conveyance system, treatment facility or processes, or disposal system that would contribute to the violation of the conditions of this program under Part III.C.6.l. of this permit or any federal, state or local law or regulation.

(5) Additional sampling

If the **Permittee** monitors more frequently than required on the Release Sampling Form (Form) outlined in Part III.C.6.l.(13), the results and the frequency of monitoring must be submitted with the Form.

(6) Certified laboratory

A laboratory certified by the Minnesota Department of Health and/or registered by the **Agency** must conduct analyses required by this program. Analyses of dissolved oxygen, pH, temperature, specific conductance, and total residual oxidants (chlorine, bromine) do not need to be completed by a certified laboratory but must comply with manufacturers specifications for equipment calibration and use.

(7) Sample preservation and procedure

Sample preservation and test procedures for the analysis of pollutants must conform to 40 CFR pt. 136 and Minn. R. 7041.3200.

(8) Equipment calibration

Flow meters, pumps, flumes, lift stations, or other flow monitoring equipment used for purposes of determining compliance with this program must be checked and/or calibrated for accuracy at least twice annually.

(9) Maintain records

The **Permittee** must keep the records required by this program for at least three years, including any calculations, original recordings from automatic monitoring instruments, and laboratory sheets. The **Permittee** must extend these record retention periods upon request of the **Agency**. The **Permittee** must maintain records for each sample and measurement. The records must include the following information:

(a) The exact place, date, and time of the sample or measurement.

(b) The date of analysis.

(c) The name of the **person** who performed the sample collection, measurement, analysis, or calculation.

(d) The analytical techniques, procedures and methods used.

(e) The results of the analysis.

(10) Subject to enforcement action and penalties

Noncompliance with a term or condition of this program subjects the **Permittee** to penalties provided by federal and state law set forth in section 309 of the Clean Water Act; United States Code, Title 33, section 1319, as amended; and in Minn. Stat. § 115.071 and 116.072, including monetary penalties, imprisonment, or both.

(11) Noncompliance defense

It shall not be a defense for the **Permittee** in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this program.

(12) Discovery of a release

Upon discovery of a release, the **Permittee** must:

(a) Take all reasonable steps to immediately end the release.

(b) In concert with Metropolitan Council Environmental Services, notify the Minnesota Department of Public Safety Duty Officer at 1-800-422-0798 or 651-649-5451 (metro area) immediately upon discovery of the release. You may contact the **Agency** during business hours at 1-800-657-3864 or 651-296-6300 (metro area).

(c) Recover as rapidly and as thoroughly as possible all substances and materials released or immediately take other action as may be reasonably possible to minimize or abate pollution to waters of the state or potential impacts to human health caused thereby. If the released materials or substances cannot be immediately or completely recovered, the **Permittee** must contact the **Agency**. If directed by the **Agency**, the **Permittee** must consult with other local, state or federal agencies (such as the Minnesota Department of Natural Resources and/or the Wetland Conservation Act authority) for implementation of additional clean-up or remediation activities in wetland or other sensitive areas.

(13) Sampling of a release

Upon discovery of a release, the **Permittee** must:

(a) Collect representative samples of the release. The **Permittee** must sample the release for parameters of concern immediately following discovery of the release. The **Permittee** may contact the **Agency** during business hours to discuss the sampling parameters and protocol. In addition, fecal coliform bacteria samples must be collected where it is determined by the **Permittee** that the release contains or may contain sewage. If the release cannot be immediately stopped, the **Permittee** must consult with **Agency** regarding additional sampling requirements. Samples must be collected at least, but not limited to, two times per week for as long as the release continues.

(b) Submit the sampling results on the Release Sampling Form (http://www.pca.state.mn.us/index.php/view-document.html?gid=18867). The Release Sampling Form must be submitted to the **Agency** within 30 days.

(14) **Agency** initiated permit modification, suspension, or revocation

The **Agency** may modify or revoke and reissue this program under Part III.C.6.l. of this permit pursuant to Minn. R. 7001.0170. The **Agency** may revoke without reissuance this program under Part III.C.6.l. of this permit pursuant to Minn. R. 7001.0180.

7. **Stormwater** Runoff Monitoring and Analysis

The goal of **stormwater** runoff monitoring and analysis is to quantify **stormwater** volumes and pollutant loads from the **MS4** and to provide information on the effectiveness of the **SWMP**. The **Permittee** must continue to develop and implement a monitoring and analysis program, including the following:

a. The quality assurance project plan for lab and field methods and procedures must comply with the following **USEPA** requirements and guidance or receive approval from the **Agency** for variations from these protocols:

(1) **USEPA** Requirement for Quality Assurance Project Plans (**USEPA** QA/R-5) (**USEPA**/240/B-01/003).

(2) **USEPA** Guidance for Quality Assurance Project Plans (**USEPA** QA/G-5) (**USEPA**/600/R98/018).

(3) The **Permittee** must utilize Minnesota Department of Health-certified laboratory(s).

b. The **Permittee** must monitor water quality at a minimum of six (6) sites. Each year, the **Permittee** must select sites to monitor for the following year. Sites may be changed, or rotated, for cost-effective resource use, however reasonable effort must be made to monitor for at least two consecutive years at a site. In choice and location of stations and monitoring activities, consider safety, backwatering effects, and access. The monitoring of selected sites must include:

(1) A determination of **BMP** effectiveness through adaptive management (highest priority).

(2) Representative land use management sites selected by the **Permittee** (second priority).

(3) A determination of contributions from upstream jurisdictions (third priority).

c. The **Permittee** must implement its monitoring and analysis program in accordance with TABLE 1 as follows:

TABLE 1 - MONITORING AND ANALYSIS

Analytical data for samples			Sites 1-6 Monitored by the Permittee (Types 1, 2, 3)					
Parameter	**Sample Type**	**Frequency** (Note 3)	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**
Chloride, Total	Flow-paced composite samples over non-ice time period (approx. March through November) Grab samples at least two times during typical winter thaw (approx. December to March)	10 samples/year, select from events 0.10 inch or greater over range of seasons and events	X	X	X	X	X	X
Copper,total (as Cu)			X	X	X	X	X	X
Lead, Total (as Pb)			X	X	X	X	X	X
Zinc, Total (as Zn)			X	X	X	X	X	X
Hardness, Carbonate (as CaCo3)			X	X	X	X	X	X
Nitrate + Nitrite, Total (as N)			X	X	X	X	X	X
Nitrogen, Total			X	X	X	X	X	X
Phosphorus, Total (as P)			X	X	X	X	X	X
Solids, Total Suspended (TSS)			X	X	X	X	X	X
Solids, Volatile Suspended (VSS)			X	X	X	X	X	X
Solids, Inorganic Suspended by difference (TSS-VSS=ISS)			X	X	X	X	X	X
Carbon, Organic Dissolved			X	X	X	X	X	X
Chemical Oxygen Demand (COD)			X	X	X	X	X	X
Phosphorus, Total Dissolved or Ortho			X	X	X	X	X	X
Solids, Total Dissolved (TDS)			X	X	X	X	X	X
Flow	Measurement	Continuous during period when flow-paced composite samples are collected as required for other parameters in this table Point-estimated when grab samples are collected as required for other parameters in this table	X	X	X	X	X	X
Precipitation	Measurement, at 3800 Bryant Avenue South location	Daily	N/A	N/A	N/A	N/A	N/A	N/A
Oil and grease (Note 1)	Grab	Quarterly (spring, summer, fall, winter)	X	X	X	X	X	X
Escherichia coli (E. coli)			X	X	X	X	X	X
pH (Note 2)	Grab, measured by multi-parameter probe		X	X	X	X	X	X

Note 1: Pilot. If oil and grease is less than 15 mg/L in all quarterly samples for the first 2 years of the permit term, the **Permittee** may end oil and grease sampling at that/those site(s). If oil and grease is at least 15 mg/L in any quarterly sample for the first 2 years of the permit term, then oil and grease sampling must continue through the entire permit term at that/those site(s).
Note 2: Field analysis.
Note 3: Taking into consideration weather and safety.
X: Monitoring of parameter is applicable
N/A: Not applicable

Type 1. A determination of **BMP** effectiveness through adaptive management (highest priority).
Type 2. Representative land use management sites selected by the **Permittee** (second priority).
Type 3. A determination of contributions from upstream jurisdictions (third priority).

8. Additional MCM requirements of the **SWMP**

   Each MCM of the **SWMP** must include the following:

   a. Identification of the sources of pollutants targeted for reduction and the sensitivity of the **receiving water**s.

   b. A description of and the scope of the **BMP**s for each MCM.

   c. Identification of staff and financial resources, including estimated annual budgets, for the permit term dedicated to implementation of the MCM.

   d. Measurable goals for each MCM that will be used to determine the success and/or benefits of the MCM.

   e. Schedules and a protocol for monitoring, recordkeeping, and reporting.

   f. An implementation schedule for new or revised **BMP**s.

   g. A detailed description or copy of any agreement between the **Permittee** and partner(s) to implement the MCM describing the rights, roles, and responsibilities of each party to the agreement.

D. <u>DISCHARGES TO IMPAIRED WATERS WITH A EPA-APPROVED TMDL THAT INCLUDES AN APPLICABLE WLA</u>

If the **Permittee** has one or more **Waste Load Allocations** (**WLA**) in a **USEPA**-approved **TMDL**, the **Permittee** must select and implement a program of appropriate **BMP**s and measurable goals for each MCM including schedules to meet the timeframes for the **WLA**s. At a minimum, the **Permittee** must:

1. For each **applicable WLA** approved prior to the issuance date of this permit, the **Permittee** must submit to the **Agency** for approval, on a form provided by the **Commissioner**, the following information within nine (9) months of receiving permit coverage. Once approved by the **Agency**, the submittal will become an enforceable part of the **SWMP**. The submittal must include the following:

   a. **TMDL** project name(s).

   b. Numeric **WLA**(s), including units.

   c. Type of **WLA** (i.e., categorical or individual).

   d. Pollutant(s) of concern.

   e. Applicable flow data specific to each **applicable WLA**.

   f. For each **applicable WLA** not met by the date of permit coverage, a compliance schedule is required. Compliance schedules can be developed to include multiple **WLA**s associated with a **TMDL** project and must include:

      (a) Interim milestones, expressed as **BMP**s or progress toward implementation of **BMP**s, to be achieved during the term of this permit.

      (b) Dates for implementation of interim milestones.

(c) Strategies for continued **BMP** implementation beyond the term of this permit.

(d) Target dates the **applicable WLA**(s) will be achieved.

g. For each **applicable WLA** the **Permittee** is reasonably confident is being met by the date of permit coverage, the **Permittee** must provide the following documentation:

(a) Implemented **BMP**s used to meet each **applicable WLA**.

(b) A narrative describing the **Permittee**'s strategy for long-term continuation of meeting each **applicable WLA**.

E. <u>ALUM OR FERRIC CHLORIDE PHOSPHORUS TREATMENT SYSTEMS</u>

If the **Permittee** uses an **alum or ferric chloride phosphorus treatment system**, the **Permittee** must comply with the following:

1. Minimum requirements of an **alum or ferric chloride phosphorus treatment system**

a. Limitations

(1) The **Permittee** must use the treatment system for the treatment of phosphorus in **stormwater**. **Non-stormwater discharge**s must not be treated by this system.

(2) The treatment system must be contained within the conveyances and **structural stormwater BMP**s of the **MS4**. The utilized conveyances and **structural stormwater BMP**s must not include any **receiving water**s.

(3) Phosphorus treatment systems utilizing chemicals other than alum or ferric chloride must receive written approval from the **Agency**.

(4) In-lake phosphorus treatment activities are not authorized under this permit.

b. Treatment system design

(1) The treatment system must be constructed in a manner that diverts the **stormwater** flow to be treated from the main conveyance system.

(2) A high flow bypass must be part of the inlet design.

(3) A flocculent storage/settling area must be incorporated into the design and adequate maintenance access must be provided (minimum of 8 feet wide) for the removal of accumulated sediment.

2. Monitoring during operation

a. A designated **person** must perform visual monitoring of the treatment system for proper performance at least once every seven (7) days and within 24 hours after a rainfall event greater than 2.5 inches in 24 hours. Following visual monitoring which occurs within 24 hours after a rainfall event, the next visual monitoring must be conducted within seven (7) days after that rainfall event.

b. Three benchmark monitoring stations must be established. TABLE 2 must be used for the parameters, units of measure, and frequency of measurement for each station.

c. Samples must be collected as grab samples or flow-weighted 24-hour composite samples.

d. Each sample, excluding pH samples, must be analyzed by a laboratory certified by the Minnesota Department of Health and/or the **Agency**, and:

(1) Sample preservation and test procedures for the analysis of pollutants must conform to 40 CFR pt. 136 and Minn. R. 7041.3200.

(2) Detection limits for dissolved phosphorus, dissolved aluminum, and dissolved iron must be a minimum of 6 micrograms per liter (µg/L), 10 µg/L, and 20 µg/L, respectively.

(3) pH must be measured within 15 minutes of sample collection using calibrated and maintained equipment.

TABLE 2 - MONITORING PARAMETERS DURING OPERATION

Station	**Alum Parameters**	**Ferric Parameters**	**Units**	**Frequency**
Upstream-Background	Total Phosphorus	Total Phosphorus	mg/L	1 x week
	Dissolved Phosphorus	Dissolved Phosphorus	mg/L	1 x week
	Total Aluminum	Total Iron	mg/L	1 x month
	Dissolved Aluminum	Dissolved Iron	mg/L	1 x week
	pH	pH	SU	1 x week
	Flow	Flow	Mgd	Daily
Alum or Ferric Chloride Feed	Alum	Ferric	gallons	Daily total dosed in gallons
Discharge from Treatment	Total Phosphorus	Total Phosphorus	mg/L	1 x week
	Dissolved Phosphorus	Dissolved Phosphorus	mg/L	1 x week
	Total Aluminum	Total Iron	mg/L	1 x month
	Dissolved Aluminum	Dissolved Iron	mg/L	1 x week
	pH	pH	SU	1 x week
	Flow	Flow	Mgd	Daily

e. In the following situations, the **Permittee** must perform corrective action(s) and immediately notify the Minnesota Department of Public Safety Duty Officer at 1-800-422-0798 (toll free) or 651-649-5451 (metro area):

(1) The pH of the **discharge**d water is not within the range of 6.0 and 9.0.

(2) Any indications of toxicity or measurements exceeding **water quality standards**.

(3) A spill, as defined in Minn. Stat. § 155.061, of alum or ferric chloride.

3. On-Site Recordkeeping

   A record of the following design parameters shall be kept on-site:

   (1) Site-specific jar testing conducted using typical and representative water samples in accordance with ASTM D2035-08 (2003)

   (2) Baseline concentrations of the following parameters in the influent and **receiving water**s:

      (a) Aluminum or Iron

      (b) Phosphorus

   (3) The following system parameters and how each was determined:

      (a) Flocculent settling velocity

      (b) Minimum required retention time

      (c) Rate of diversion of **stormwater** into the system

      (d) The flow rate from the discharge of the outlet structure

      (e) Range of expected dosing rates

4. Treatment System Management

   The following site-specific procedures shall be developed and a copy kept on-site:

   a. Procedures for the installation, operation and maintenance of all pumps, generators, control systems, and other equipment.

   b. Specific parameters for determining when the solids must be removed from the system and how the solids will be handled and disposed of.

   c. Procedures for cleaning up and/or containing a spill of each chemical stored on-site.

F. STORMWATER MANAGEMENT PROGRAM (SWMP) MODIFICATION

1. The **Commissioner** may require the **Permittee** to modify the **SWMP** as needed, in accordance with the procedures of Minn. R. 7001, and must consider the following factors:

   a. **Discharge**s from the **MS4** are impacting the quality of **receiving water**s.

   b. More stringent requirements are necessary to comply with state or federal regulations.

   c. Additional conditions are deemed necessary to comply with requirements of the Clean Water Act and to protect and restore water quality.

2. Modifications required by the **Commissioner** for the **SWMP** must be requested in writing, setting forth schedules for compliance, and offering the **Permittee** the opportunity to propose alternative **SWMP** modifications to meet the objectives of the requested modification.

3. Modifications that the **Permittee** chooses to make to the **SWMP** must be approved by the **Commissioner** in accordance with the procedures of Minn. R. 7001. All requests must be in writing, setting forth schedules for compliance. The request must discuss alternative program modifications, ensure compliance with requirements of the permit, and meet other applicable laws.

4. The **SWMP** may be modified by the **Permittee** without prior approval of the **Commissioner**, provided the modification is in accordance with the following:

   a. The **Permittee** adds one or more **BMP**(s) and none subtracted from the **SWMP**.

   b. A less effective **BMP** identified in the **SWMP** is replaced with a more effective **BMP**. The alternate **BMP** must address the same, or similar, concerns as the ineffective or failed **BMP**.

   c. The **Commissioner** and public are notified of the modification in the annual report for the year the modification is made. If a less effective **BMP** is replaced with a more effective **BMP**, the **Permittee** must include an explanation of circumstance(s) and reason(s) for the replacement of the **BMP**.

5. Proposed modifications must be included in the annual report required under Part IV.D. and the public must be given prior notification and opportunity for comment through the annual report public notice and meeting required under Part III.C.2. Upon written approval of the **Commissioner**, the **Permittee** may modify the **SWMP** to implement:

   a. **BMP**s needed to make reasonable progress toward meeting one or more **applicable WLA**(s) as required under Part III.D.

   b. Modifications to the **stormwater** runoff monitoring and analysis program in accordance with Part III.C.7. of this permit.

IV. SWMP ASSESSMENT, UPDATES, REPORTING AND OTHER SUBMITTALS

A. SWMP ASSESSMENT

The **Permittee** must complete an annual assessment of the **SWMP** based on information collected and analyzed during the reporting period, including activities implemented in Part III.C.1. – 7. The purpose of the annual **SWMP** assessment is to provide information for improving performance, including but not limited to reducing pollutant loading and runoff volumes, and to optimize associated planning and design, construction, operation, and maintenance of the **MS4**. The annual **SWMP** assessment must be submitted to the **Agency** with each annual report and must include the following:

1. An analysis of the performance and effectiveness of **BMP**s in reducing **stormwater** runoff volumes and pollutant loading to **receiving water**s.

2. An analysis of the effectiveness of the **SWMP** in achieving permit compliance, measurable goals and other **long-term goals**.

3. A fiscal analysis of the budget utilized for implementing the **SWMP** including an evaluation of the resources used to implement the MCMs required by the permit. The analysis must include the capital, operation, maintenance, and staff resource costs for implementing the **SWMP**.

B. SWMP UPDATES

The **Permittee** must complete revisions to incorporate requirements of Part III.A. – E. into the current **SWMP** within 12 months of the date permit coverage is extended, unless other timelines have been specifically established in this permit.

C. RECORDKEEPING

1. The **Permittee** must keep records required by the NPDES/SDS **MS4** permit for at least three (3) years beyond the term of this permit. The **Permittee** must retain copies of the **SWMP**, all documentation necessary to comply with the permit, all data and information used by the **Permittee** to develop the **SWMP**, and any information developed as a requirement of this permit or as requested by the **Commissioner**, for a period of at least three (3) years beyond the date of permit expiration. The **Permittee** must extend these record retention periods upon request of the **Commissioner** and/or during the course of an unresolved enforcement action (Minn. R. 7001.0150, subp. 2[C]).

2. The **Permittee** must make its records, including the **SWMP**, available to the public at reasonable times during regular business hours (see 40 CFR § 122.7 for confidentiality provision).

3. Except for data determined to be confidential according to Minn. Stat. § 116.075, subd. 2, all documents, plans, and reports required by this permit must be available for inspection by the **Agency** upon request. **Stormwater** runoff monitoring or effluent data must not be considered confidential. Confidential material must be submitted according to Minn. R. 7000.1300.

D. ANNUAL REPORTING

The **Permittee** must submit an annual report to the **Agency** by June 30th of each calendar year. The annual report must cover the portion of the previous calendar year during which the **Permittee** was authorized to **discharge stormwater** under this permit. This report must, at a minimum, consist of the following:

1. Public education and outreach

    a. Quantities and descriptions of educational materials distributed and the number of visits by the public to **stormwater** education websites.

    b. A summary of the education and outreach activities held including dates of events.

    c. Any modifications made to the program as a result of the annual evaluation as described in Part III.C.1.b.(5).

    d. If the **Permittee** relied upon other organizations for some, or all, of its education and outreach program, include a summary of activities conducted by those other organizations.

2. Public participation and involvement

    a. A summary of the written public input received on the **SWMP** and the **Permittee**'s response to the input as described in Part III.C.2.

    b. Any modifications made to the **SWMP** as a result of the input received during the public meeting.

    c. The date and location of the public meeting as described in Part III.C.2.a.

    d. A formal resolution from the **Permittee**'s governing body adopting the annual report and the **SWMP** as required in Part III.C.2.e. The resolution must be submitted to the **Agency** no later than August 30th of each year if not available at the time of annual report submittal.

3. Illicit discharge detection and elimination

    a. A description and the date of the most recent update to the electronic storm sewer system inventory and map completed during the reporting year.

    b. The number of spills and **illicit discharge**s that occurred and a description of the response, containment, and cleanup of the spills and **illicit** discharges.

    c. The number of **illicit discharge** inspections and/or screening activities completed during the reporting year and a description of the response, investigation, and enforcement response procedures utilized to eliminate the **illicit discharge**s.

    d. Reports of alleged **illicit discharge**s received, including date(s) of the report(s), and a description of the response, investigation, and enforcement response procedures utilized to eliminate the **illicit discharge**(s).

    e. Sources of **illicit discharge**s, including a description and the responsible party if known.

    f. Identification of **outfall**s or other areas where **illicit discharge**s have been discovered and a description of the response, investigation, and enforcement response procedures utilized to eliminate the **illicit discharge**(s).

g. A description of the education and outreach activities, implemented during the reporting year, to inform municipal employees, the public, and industry about reporting, responding to, and eliminating **illicit discharge**s.

h. Update the inventory of hazardous waste and other industrial facilities, including municipal procedures implemented to **reduce illicit discharge**s to the **MS4** from facilities within the **stormwater hotspot** area.

4. Construction site **stormwater** runoff control

   a. The number of construction site plans reviewed and approved.

   b. The number of construction **stormwater** complaints received and the responses to those complaints.

   c. The number of site inspections completed and a summary of inspection findings.

   d. The number of violations of the **Permittee** regulatory mechanism(s) for construction site **stormwater** runoff control and the types of enforcement response procedures utilized.

   e. The title of the construction **stormwater** training attended by **Permittee** staff.

5. Post-construction **stormwater** management

   a. The number of new and **redevelopment construction activity** projects required to meet the terms of the **Permittee** regulatory mechanism(s).

   b. The number and type of **structural stormwater BMP**s implemented to meet the terms of the regulatory mechanism(s) for new and **redevelopment construction activity**, including the number of **structural stormwater BMP** long-term maintenance agreements executed during the reporting year.

   c. The number of new and **redevelopment construction activity** projects requiring mitigation, including:

      (1) An explanation of why mitigation was required.

      (2) The types of **structural stormwater BMP**s and the expected dates of implementation.

6. Pollution prevention and good housekeeping for municipal operations

   a. A description of **Permittee** facilities and municipal operations that contribute pollutants to **stormwater discharge**s and the **BMP**s implemented to prevent polluted runoff from discharging to the **MS4**.

   b. A description of the **BMP**s implemented for Source Water Protection Areas within the **Permittee**'s jurisdiction.

   c. A brief description of all **outfall** inspection findings including any improvement projects completed at the **outfall** locations.

   d. A list of the **MS4** components or facilities that need to be replaced, repaired, or maintained and a schedule for completing the replacement, repair, or maintenance activity.

e. The results of **structural stormwater BMP** inspections, assessments, maintenance, and repair activities including:

(1) Date.

(2) Estimation of sediment storage capacity and percent capacity remaining.

(3) The date of maintenance and/or repairs completed.

(4) The dates and quantity of removed substances from **structural stormwater BMPs**.

(5) The quantity of material removed by street sweeping. Seasonal sweepings for spring sand and fall leaves must be itemized as part of the total quantity.

(6) The quantity of deicing materials, chemicals, and sand applied to roadways. The location and description of all storage facilities for sand, deicing materials, and anti-icing solution used during winter maintenance activities.

(7) The number, type, and schedule of flood control improvement projects completed, including a description of the pollutant removal capabilities associated with each project.

(8) Employee **stormwater** management training events, including:

(a) Title and topic of training.

(b) Date of training.

(c) Names of **Permittee** staff attending the training.

f. The number and type of **structural stormwater BMP**s implemented as described in the retrofit plan in Part III.C.6.i, if applicable.

7. **Stormwater** runoff monitoring and analysis

a. Proposed **SWMP** modifications to substitute sources of monitoring and analysis data including a discussion of how the data will be utilized to demonstrate compliance with this permit and how it will characterize the nature of **stormwater discharge**s.

b. Any significant operational differences in monitoring and monitoring protocols as established in Part III.C.7.

c. The results of the monitoring and sampling data analysis collected by the **Permittee**, or any other entity on behalf of the **Permittee**, including:

(1) Estimated pollutant event mean concentrations.

(2) Estimated total annual pollutant load to **receiving water**(s).

(3) Estimated total annual volume to **receiving water**(s).

(4) Estimated effectiveness (e.g., removal efficiency, load reduction, etc.) of **structural stormwater BMP**s.

(5) Calibration and verification of **stormwater** models.

d. A brief narrative description of the monitoring results collected by the **Permittee**, or any other entity on behalf of the **Permittee**, including data with tabulations, statistics, summary tables and graphics, by monitoring site with **receiving water** location description, including:

(1) Continuous flow data.

(2) Sample analytical data identified as storm composite or grab with corresponding flows and storm event periods.

(3) Estimate of storm event rainfall which generated the sampled **discharge** including approximate duration between the storm event sampled and the end of the previous measurable storm event (greater than 0.10 inch rainfall).

(4) Loading calculations: estimated annual and seasonal loads (total phosphorus, chloride, total suspended solids, volatile suspended solids, inorganic suspended solids by difference (TSS – VSS = ISS), and total nitrogen for the continuous monitoring stations.

(5) Summary information for each site including drainage area and estimated annual total **discharge** volume, storm event **discharge** volume, storm event discharge values that were used to calculate event-scale pollutant loads, runoff yield (inches/year), analyte flow weighted mean concentrations and analyte annual mean concentrations.

(6) Map showing **receiving water**s and representative land use management site locations as described in Part III.C.7.b.

8. Discharges to impaired waters with a **USEPA**-approved **TMDL** that includes an **applicable WLA**

a. On a form provided by the **Commissioner**, an assessment of progress toward meeting each **applicable WLA**. The assessment of progress must include:

(1) A list of all **BMP**s being applied to achieve each **applicable WLA**. For each **structural stormwater BMP**, the **Permittee** must provide a unique identification (ID) number and geographic coordinate. If the listed **structural stormwater BMP** was inventoried during the 2011 Phase I **MS4** permit term, the same ID number must be used.

(2) A list of all **BMP**s the **Permittee** submitted with the **TMDL** compliance schedule and the stage of implementation for each **BMP**.

(3) An updated estimate of the cumulative reductions in loading achieved for each **pollutant of concern** associated with each **applicable WLA**.

(4) An updated narrative describing any adaptive management strategies used (including projected dates) for making progress toward achieving each **applicable WLA**.

(5) The results of the comparison(s) of estimated pollutant loading(s) to each **impaired water** in the **Permittee**'s jurisdiction and the **Permittee**'s **WLA** for that **impaired water**.

9. **Alum or Ferric Chloride Phosphorus Treatment System**s (if applicable)

   The **Permittee** must submit the following information with the Annual Report. The Annual Report must include a month-by-month summary of:

   (1) Date(s) of operation.

   (2) Chemical(s) used for treatment.

   (3) Gallons of water treated.

   (4) Gallons of alum or ferric chloride treatment used.

   (5) Calculated pounds of phosphorus removed.

   (6) Any performance issues and the corrective action(s), including the date(s) when corrective action(s) were taken.

10. The status of compliance with permit terms and conditions, including an assessment of the **BMP**s identified by the **Permittee** and progress toward achieving the measurable goals for Part III.C.1. – 7. and Part III.D. The assessment must be based on the results of information collected and analyzed, including inspection findings, **stormwater** runoff monitoring and public input received during the reporting period. In addition, the annual report must include:

    a. Any partnerships or activities coordinated with other local governments or organizations to assist with implementing the **SWMP** and any agreements related to this effort.

    b. A change in any **BMP**s or measurable goals for Part III.C.1. – 7. and Part III.D.

11. In addition, the **Permittee** must include the following in the annual report:

    a. A discussion of the modifications made to the **SWMP** as described in Part III.F.4. The discussion must include a description of why the modifications were/are needed. When feasible, this discussion must include qualitative and/or quantitative data demonstrating the effectiveness of the program elements or identifying impacts on the **receiving water**s.

    b. A discussion of the proposed modifications to the **SWMP** as described in Part III.F.5. The discussion must include a description of why the modifications are needed.

    c. The results of the annual assessment of the **SWMP** as required in Part IV.A.

12. Integrated infrastructure management

    The **Permittee** must include in the annual report the following information on the previous calendar year efforts to minimize inflow and infiltration, including but not limited to:

    a. A description of any release events from the sanitary or combined sewer system, including:

       (1) **Outfall** location.

       (2) Duration and volume.

       (3) A summary of any sampling activities and monitoring results associated with the release.

    b. A summary of studies, investigations, and monitoring activities initiated to identify sources of inflow and infiltration.

    c. An updated inventory of all identified areas of inflow to the sanitary sewer system, including:

       (1) Location and sewer shed of individually identified combined sewer areas.

       (2) Catch basins, roof leaders, and other storm water inlets connected to the combined sewer.

       (3) Sewer service area in acres for the locations identified in (1) and (2) above.

       (4) MCES Regulator identification number and geographic coordinates.

       (5) MCES and Minneapolis **outfall** locations and geographic coordinates.

       (6) Total area of each Minneapolis sewer shed tributary to an **outfall** and the percent of combined sewer area in that sewer shed.

    d. A map and summary of projects completed in the past year minimizing inflow and infiltration, including but not limited to sewer separation projects, lined sewer pipes, manhole lining and repairs, and rainleader disconnections.

    e. A description of collaborative arrangements with external partners to minimize releases and improve water quality.

    f. A description of the annual expenditures on items a. – e. above for the reporting year.

E. <u>WHERE TO SUBMIT</u>

The **Permittee** must use an electronic submittal process, when provided by the **Agency**, for submitting information required by this permit. When submitting information electronically is not possible, the **Permittee** must use the following mailing address:

Supervisor, Municipal Stormwater Unit
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

PART V. GENERAL CONDITIONS

A. The **Agency**'s issuance of a permit does not release the **Permittee** from any liability, penalty, or duty imposed by Minnesota or federal statutes or rules or local ordinances, except the obligation to obtain the permit (Minn. R. 7001.0150, subp. 3, item A).

B. The **Agency**'s issuance of a permit does not prevent the future adoption by the **Agency** of pollution control rules, standards, or orders more stringent than those now in existence and does not prevent the enforcement of these rules, standards, or orders against the **Permittee** (Minn. R. 7001.0150, subp. 3, item B).

C. The permit does not convey a property right or an exclusive privilege (Minn. R. 7001.0150, subp. 3, item C).

D. The **Agency**'s issuance of a permit does not obligate the **Agency** to enforce local laws, rules or plans beyond that authorized by Minnesota statutes (Minn. R. 7001.0150, subp. 3, item D).

E. The **Permittee** must perform the actions or conduct the activity authorized by the permit in accordance with the plans and specifications approved by the **Agency** and in compliance with the conditions of the permit (Minn. R. 7001.0150, subp. 3, item E).

F. The **Permittee** must at all times properly operate and maintain the facilities and systems of treatment and control and the appurtenances related to them which are installed or used by the **Permittee** to achieve compliance with the conditions of the permit. Proper operation and maintenance includes effective performance, adequate funding, adequate **operator** staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. The **Permittee** must install and maintain appropriate backup or auxiliary facilities if they are necessary to achieve compliance with the conditions of the permit and, for all permits other than hazardous waste facility permits, if these backup or auxiliary facilities are technically and economically feasible (Minn. R. 7001.0150, subp. 3, item F).

G. The **Permittee** may not knowingly make a false or misleading statement, representation, or certification in a record, report, plan, or other document required to be submitted to the **Agency** or to the **Commissioner** by the permit. The **Permittee** must immediately upon discovery report to the **Commissioner** an error or omission in these records, reports, plans, or other documents (Minn. Stat. § 609.671; Minn. R. 7001.0150, subp. 3, item G; and Minn. R. 7001.1090, subp. 1, items G and H).

H. The **Permittee** must, when requested by the **Commissioner**, submit within a reasonable time the information and reports that are relevant to the control of pollution regarding the construction, modification, or operation of the facility covered by the permit or regarding the conduct of the activity covered by the permit (Minn. R. 7001.0150, subp. 3, item H).

I. When authorized by Minn. Stat. §§ 115.04, 115B.17, subd. 4, and 116.091, and upon presentation of proper credentials, the **Agency**, or an authorized employee or agent of the **Agency**, must be allowed by the **Permittee** to enter at reasonable times upon the property of the **Permittee** to examine and copy books, papers, records, or memoranda pertaining to the activity covered by the permit; and to conduct surveys and investigations, including sampling or monitoring, pertaining to the construction, modification, or operation of the facility covered by the permit or pertaining to the activity covered by the permit (Minn. R. 7001.0150, subp. 3, item I).

J. If the **Permittee** discovers, through any means, including notification by the **Agency**, that noncompliance with a condition of the permit has occurred, the **Permittee** must take all reasonable steps to minimize the adverse impacts on human health, public drinking water supplies, or the environment resulting from the noncompliance (Minn. R. 7001.0150, subp. 3, item J).

K. If the **Permittee** discovers that noncompliance with a condition of the permit has occurred which could endanger human health, public drinking water supplies, or the environment, the **Permittee** must, within 24 hours of the discovery of the noncompliance, orally notify the **Commissioner**. Within five days of the discovery of the noncompliance, the **Permittee** must submit to the **Commissioner** a written description of the noncompliance; the cause of the noncompliance; the exact dates of the period of the noncompliance; if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to **reduce**, eliminate, and prevent reoccurrence of the noncompliance (Minn. R. 7001.0150, subp. 3, item K).

L. The **Permittee** must report noncompliance with the permit not reported under item K as a part of the next report which the **Permittee** is required to submit under this permit. If no reports are required within 30 days of the discovery of the noncompliance, the **Permittee** must submit the information listed in item K within 30 days of the discovery of the noncompliance (Minn. R. 7001.0150, subp. 3, item L).

M. The **Permittee** must give advance notice to the **Commissioner** as soon as possible of planned physical alterations or additions to the permitted facility (**MS4**) or activity that may result in noncompliance with a Minnesota or federal pollution control statute or rule or a condition of the permit (Minn. R. 7001.0150, subp. 3, item M).

N. The permit is not transferable to any **person** without the express written approval of the **Agency** after compliance with the requirements of Minn. R. 7001.0190. A **person** to whom the permit has been transferred must comply with the conditions of the permit (Minn. R. 7001.0150, subp. 3, item N).

O. The permit authorizes the **Permittee** to perform the activities described in the permit under the conditions of the permit. In issuing the permit, the state and **Agency** assume no responsibility for damage to **person**s, property, or the environment caused by the activities of the **Permittee** in the conduct of its actions, including those activities authorized, directed, or undertaken under the permit. To the extent the state and **Agency** may be liable for the activities of its employees, that liability is explicitly limited to that provided in the Tort Claims Act, Minn. Stat. § 3.736 (Minn. R. 7001.0150, subp. 3, item O).

P. This permit incorporates by reference the applicable portions of 40 CFR §§ 122.41 and 122.42(c) and (d), and Minn. R. 7001.1090, which are enforceable parts of this permit.

Q. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

APPENDIX A: DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

The definitions and abbreviations in this part are for purposes of this permit only.

1. "**Active karst**" means geographic areas underlain by carbonate bedrock (or other forms of bedrock that can erode or dissolve) with less than 50 feet of sediment cover.

2. "**Alum or Ferric Chloride Phosphorus Treatment System**" means the diversion of flowing **stormwater** from a **MS4**, removal of phosphorus through the use a continuous feed of alum or ferric chloride additive, flocculation, and the return of the treated **stormwater** back into a **MS4** or **receiving water**.

3. "**Agency**" means Minnesota Pollution Control **Agency** (Minn. Stat. § 116.36, subd. 2).

4. "**Applicable WLA**" means a **Waste Load Allocation** assigned to the **Permittee** and approved by the **USEPA**.

5. "**Best Management Practice**" or "**BMP**" means practices to prevent or **reduce** the pollution of the **waters of the state**, including schedules of activities, prohibitions of practices, and other management practices, and also includes treatment requirements, operating procedures and practices to control plan site runoff, spillage or leaks, sludge, or waste disposal or drainage from raw material storage (Minn. R. 7001.1020, subp. 5).

6. "**Commissioner**" means the **Commissioner** of the Minnesota Pollution Control **Agency** or the **Commissioner**'s designee (Minn. Stat. § 116.36, subd. 3).

7. "**Common plan of development or sale**" means one proposed plan for a contiguous area where multiple separate and distinct land disturbing activities may be taking place at different times, on different schedules, but under one proposed plan. One plan is broadly defined to include design, permit application, advertisement or physical demarcation indicating that land-disturbing activities may occur.

8. "**Construction activity**" includes **construction activity** as defined in 40 CFR § 122.26(b)(14)(x) and small **construction activity** as defined in 40 CFR § 122.26(b)(15) and **construction activity** as defined by Minn. R. 7090.0080, subp. 4. This includes a disturbance to the land that results in a change in the topography, existing soil cover (both vegetative and non-vegetative), or the existing soil topography that may result in accelerated **stormwater** runoff, leading to soil erosion and movement of sediment into **surface waters** or drainage systems. Examples of **construction activity** may include clearing, grading, filling, and excavating. **Construction activity** includes the disturbance of less than one acre of total land area that is a part of a larger **common plan of development or sale** if the larger common plan will ultimately disturb one (1) acre or more. **Construction activity** does not include a disturbance to the land of less than five (5) acres for the purpose of routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. Routine maintenance does not include activities such as repairs, replacement and other types of non-routine maintenance. Pavement rehabilitation (e.g., mill and overlay projects) is not considered **construction activity**.

9. "**Discharge**" means "discharge of a pollutant" as defined in Minn. R. 7001.1020, subp. 12.

10. "**DNR catchment area**" means the Hydrologic Unit 08 areas delineated and digitized by the Minnesota DNR. The catchment areas are available for download at the Minnesota DNR Data Deli website. **DNR catchment area**s may be locally corrected, in which case the local corrections may be used.

11. "**Green infrastructure**" means a wide array of practices at multiple scales that manage wet weather and that maintains or restores natural hydrology by infiltrating, evapotranspiring, or harvesting and using **stormwater**. On a regional scale, green infrastructure is the preservation or restoration of natural landscape features, such as forests, floodplains and wetlands, coupled with policies such as infill and redevelopment that reduce overall imperviousness in a watershed. On the local scale, green infrastructure consists of site and neighborhood-specific practices, such as bioretention, trees, green roofs, permeable pavements and cisterns.

12. "**Illicit discharge**" means any discharge to a **municipal separate storm sewer** that is not composed entirely of **stormwater** except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the **municipal separate storm sewer**) and discharges resulting from firefighting activities (40 CFR § 122.26[b][2]).

13. "**Impaired water**" means waters identified as impaired by the **Agency**, and approved by the **USEPA**, pursuant to section 303(d) of the Clean Water Act (33 U.S.C. § 1313 [d]).

14. **"Impervious Surface"** means a constructed hard surface that either prevents or retards the entry of water into the soil and causes water to run off the surface in greater quantities and at an increased rate of flow than prior to development. Examples include rooftops, sidewalks, driveways, parking lots, and concrete, asphalt, or gravel roads. Bridges over surface waters are impervious surfaces.

15. "**Large municipal separate storm sewer system**" or "**Large MS4**" means all municipal separate storm sewers that are located in an incorporated place with a population of 250,000 or more owned or operated by the United States, a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, **stormwater**, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management Agency under section 208 of the CWA that discharges to waters of the United States.

16. "**Linear Project**" means construction or reconstruction of roads, trails, sidewalks, or rail lines that are not part of a common plan of development or sale. Rehabilitation is not considered reconstruction. Rehabilitation includes mill and overlay and other resurfacing activities within existing right-of-way that do not expose underlying soils.

17. "**Long-term goals**" means those goals established in the **Permittee**'s **stormwater** management program to be accomplished by implementing the NPDES Phase I **MS4** Permit. These goals may have various timeframes and durations including durations longer than one NPDES Phase I **MS4** permit cycle. For example, **long-term goals** may include, but are not limited to, compliance with all **TMDL**s by January 1, 2025; fifty percent (50%) reduction of the annual frequency of street flooding by January 1, 2020; and/or reduction of impervious cover by two percent (2%) within two years of the issuance date of the **SWMP**.

18. "**Maximum Extent Practicable**" or "**MEP**" means the statutory standard (33 U.S.C. § 1342[p][3][B][iii]) that establishes the level of pollutant reductions that an **owner** or **operator** of a regulated **MS4**s must achieve. The **USEPA** has intentionally not provided a precise definition of **MEP** to allow maximum flexibility in **MS4** permitting. The pollutant reductions that represent **MEP** may be different for each **MS4**, given the unique local hydrologic and geologic concerns that may exist and the differing pollutant control strategies. Therefore, the **Permittee** will determine appropriate **BMP**s to satisfy each of the MCMs through an evaluative process. The **USEPA** envisions application of the **MEP** standard as an iterative process.

19. "**Municipal separate storm sewer system**" or "**MS4**" means a conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains:

a. Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, **stormwate**r, or other wastes, including special districts under state law such as a sewer district, flood control district, or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management Agency under section 208 of the federal Clean Water Act, United States Code, Title 33, section 1288, that discharges into **waters of the state**.

b. Designed or used for collecting or conveying **stormwater**.

c. That is not a combined sewer.

d. That is not part of a Public Owned Treatment Works as defined at 40 CFR § 122.2.

Municipal separate storm sewer systems do not include separate storm sewers in very discrete areas, such as individual buildings (Minn. R. 7090.0080, subp. 8).

20. “**New development**” means all **construction activity** that is not defined as **redevelopment**.

21. “**Non-stormwater discharge**” means any **discharge** not composed entirely of **stormwater**.

22. “**Other regulatory mechanism**” means any legally enforceable document, such as a contract or other agreement that has penalties such as withholding payments, fines, or other measures to prevent noncompliance.

23. “**Operator**” means the **person** with primary operational control and legal responsibility for **the municipal separate storm sewer system** (Minn. R. 7090.0080, subp. 10).

24. “**Outfall**” means the point source where a **municipal separate storm sewer system discharge**s to a **receiving water**, or the **stormwater discharge** permanently leaves the **Permittee**’s **MS4**. It does not include diffuse runoff or conveyances which connect segments of the same stream or water systems (e.g., when a conveyance temporarily leaves a **MS4** at a road crossing).

25. “**Owner**” means the **person** that owns the **municipal separate storm sewer system** (Minn. R. 7090.0080, subp. 11).

26. “**Permittee**” means a **person** or **person**s, that signs the permit application submitted to the **Agency** and is responsible for compliance with the terms and conditions of this permit.

27. “**Person**” means the state or any Agency or institution thereof, any municipality, governmental subdivision, public or private corporation, individual, partnership, or other entity, including, but not limited to, association, commission, or any interstate body, and includes any officer or governing or managing body of any municipality, governmental subdivision, or public or private corporation, or other entity (Minn. Stat. § 115.01, subd. 10).

28. “**Pipe**” means a closed human-made conveyance device used to transport **stormwater** from location to location. The definition of **pipe** does not include foundation drain **pipe**s, irrigation **pipe**s, land drain tile **pipe**s, culverts, and road sub-grade drain **pipe**s.

29. “**Pollutant of concern**” means a pollutant specifically identified in a **USEPA**-approved **TMDL** report as causing a water quality impairment.

30. “**Receiving water**” means any lake, river, stream or **wetland** that receives **stormwater** discharges from a **MS4**.

31. "**Redevelopment**" means any **construction activity** where, prior to the start of construction, the areas to be disturbed have 15 percent or more of **impervious surface**(s).

32. "**Reduce**" means **reduce** to the **Maximum Extent Practicable** (**MEP**) unless otherwise defined in the context in which it is used.

33. "**Seasonally saturated soil**" means the highest seasonal elevation in the soil that is in a reduced chemical state because of soil voids being filled with water causing anaerobic conditions. **Seasonally saturated soil** is evident by the presence of redoximorphic features or other information determined by scientifically established methods or empirical field measurements.

34. "**Significant materials**" includes, but is not limited to: raw materials, fuels, materials such as solvents, detergents, and plastic pellets: finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); any chemical the facility is required to report pursuant to Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA); fertilizers, pesticides, and waste products such as ashes, slag, and sludge that have the potential to be released with **stormwater** discharges. When determining whether a material is significant, the physical and chemical characteristics of the material should be considered (e.g., the material's solubility, transportability, and toxicity characteristics) to determine the material's pollution potential (40 CFR § 122.26[b][12]).

35. "**Stormwater**" means **stormwater** runoff, snowmelt runoff, surface runoff, and drainage (Minn. R. 7090.0080, subp. 12).

36. "**Stormwater hotspot**" means any land use or activity that may generate a higher concentration of hydrocarbons, trace metals, or toxic pollutants than are found in typical **stormwater** runoff.

37. "**Stormwater Management Program**" or "**SWMP**" means a comprehensive program developed by the **Permittee** to manage and reduce the discharge of pollutants in **stormwater** to and from the medium or **large MS4**.

38. "**Structural stormwater BMP**" means a stationary and permanent **BMP** that is designed, constructed and operated to prevent or **reduce** the discharge of pollutants in **stormwater**.

39. "**Total Maximum Daily Load**" or "**TMDL**" means the sum of the individual **Waste Load Allocations** for point sources and load allocations for nonpoint sources and natural background, as more fully defined in 40 CFR § 130.2, paragraph (i). A **TMDL** sets and allocates the maximum amount of a pollutant that may be introduced into a **water of the state** and still assure attainment and maintenance of **water quality standards** (Minn. R. 7052.0010 subp. 42).

40. "**USEPA**" means the U.S. Environmental Protection Agency.

41. "**Waste Load Allocation**" or "**WLA**" means the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution, as more fully defined in 40 CFR § 130.2(h). In the absence of a **TMDL** approved by **USEPA** under 40 CFR § 130.7, or an assessment and remediation plan developed and approved according to Minn. R. 7052.0200, subp. 1.C, a **WLA** is the allocation for an individual point source that ensures that the level of water quality to be achieved by the point source is derived from and complies with all applicable **water quality standards** and criteria (Minn. R. 7052.0010 subp. 45).

42. "**Water pollution**" means:

    a. The discharge of any pollutants into any waters of the state or the contamination of any waters of the state so as to create a nuisance or renders such waters unclean, or noxious, or impure so as to be actually or potentially harmful or detrimental or injurious to public health, safety or welfare, to domestic, agricultural, commercial, industrial, recreational or other legitimate uses, or to livestock, animals, birds, fish, or other aquatic life.

    b. The alteration made or induced by human activity of the chemical, physical, biological, or radiological integrity of waters of the state (Minn. Stat. § 115.01, subd. 13(b)).

43. "**Water quality standards**" mean those provisions contained in Minn. R. 7050 and 7052.

44. "**Waters of the state**" means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, reservoirs, aquifers, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface or underground, natural or artificial, public or private, which are contained within, flow through, or border upon the state or any portion thereof (Minn. Stat. § 115.01, subd. 22).

45. "**Water Quality Volume**" means (by type of project):

    a. for **new development** or **redevelopment** projects (excluding **linear project**s) the **water quality volume** equals one (1) inch times the net increase of new and/or fully reconstructed **impervious surface**s (calculated as an instantaneous volume) and is the volume of water to be treated, through the use of any combination of **BMP**s, as required by this permit; or

    b. for **linear project**s, the **water quality volume** equals one (1) inch times the net increase of **impervious surface**s, in addition to a reduction in **stormwater** runoff volume from fully reconstructed surfaces (calculated as an instantaneous volume) and is the volume of water to be treated, through the use of any combination of BMPs, as required by this permit.

46. "**Wetlands**" are those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. **Wetlands** generally include swamps, marshes, bogs, and similar areas. Constructed **wetlands** designed for wastewater treatment are not **waters of the state**. **Wetlands** must have the following attributes:

    a. A predominance of hydric soils.

    b. Inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in a saturated soil condition.

    c. Under normal circumstances, support a prevalence of such vegetation (Minn. R. 7050.0186, subp. 1a.B.).

ABBREVIATIONS AND ACRONYMS

BMP – Best Management Practice
CFR – Code of Federal Regulations
CWA – Clean Water Act
DNR – Department of Natural Resources
DWSMA – Drinking Water Supply Management Area
ERPs – Enforcement Response Procedures
IDDE – Illicit Discharge Detection and Elimination
MCM – Minimum Control Measure
MEP – Maximum Extent Practicable
Mgd – Million gallons/day
Mg/L – Milligrams/liter
MPCA – Minnesota Pollution Control Agency
MS4 – Municipal Separate Storm Sewer System
NPDES – National Pollutant Discharge Elimination System
SARA – Superfund Amendments and Reauthorization Act of 1986
SDS – State Disposal System
SU – Standard Units
SWMP – Stormwater Management Program
TMDL – Total Maximum Daily Load
TP – Total Phosphorus
TSS – Total Suspended Solids
USEPA – United States Environmental Protection Agency
WLA – Waste Load Allocation

Appendix C – City of Minneapolis TMDL Status

Minneapolis
City of Lakes

Minnesota's Impaired Waters List

Introduction

The federal Clean Water Act requires states to adopt water quality standards to protect waters from pollution. The goal is to protect high-quality waters and improve the quality of impaired waters, so that beneficial uses (such as fishing, swimming, and protection of aquatic life) are maintained and restored, where these uses are attainable. *Adapted from MPCA 12/2011 Guidance Manual for Assessing the Quality of Minnesota Surface Waters*.

The process includes the following steps: 1) Assess waters; 2) Determine whether impaired; 3) Place water on the impaired list; 4) Monitor and study the waterbody; 5) Complete a pollutant load allocation formula (called a "Total Maximum Daily Load" or TMDL); 6) Develop a restoration strategy; 7) Implement the strategy; 8) Monitor changes in water quality; and, 9) De-list if standards are being achieved, or 10) Determine next steps. The list of impaired waterbodies, or 303(d) list, is updated every two years.

Name of Surface Water (includes lakes, creeks, wetlands, and Mississippi River). Alphabetical order. *indicates waterbody is not in the City of Minneapolis	Receives City of Minneapolis Municipal Stormwater Runoff?	State ID	Next-in-line Receiving Water	Status of Impairment and TMDL Study	Designated Use that is Affected by the Impairment
BASSETT CREEK	yes (and from upstream municipalities)	07010206-538	Mississippi River	FISHES BIOASSESSMENTS (listed in 2004) – TMDL study not started yet, may be reassessed.	Aquatic Life
				BACTERIA (listed 2008) – TMDL approved Nov. 2014 (metro-wide).	Aquatic Recreation
				CHLORIDE (listed 2010) – TMDL approved June 2016 (metro-wide).	Aquatic Life
BASSETT'S POND* (Part of Bassett Creek. Located in the City of Golden Valley, in Wirth Park, owned and managed by MPRB)	yes	27-0036	Bassett Creek	No impairments.	
BIRCH POND	yes (portion of southbound Wirth Parkway)	27-0653	Landlocked (historic pumping to Chain of Lakes)	No impairments.	
BROWNIE LAKE	yes (and from the City of Saint Louis Park)	27-0038	Cedar Lake	MERCURY IN FISH TISSUE (listed 1998) – Statewide TMDL approved 2008, not stormwater related, no MS4 responsibilities, target completion 2025.	Aquatic Consumption
				EXCESS NUTRIENTS (listed 2004) – **DE-LISTED** 2010 (could be listed again if TP rises).	
				CHLORIDE (listed 2014) – TMDL approved June 2016 (metro-wide).	Aquatic Life

Name of Surface Water (includes lakes, creeks, wetlands, and Mississippi River). Alphabetical order. *indicates waterbody is not in the City of Minneapolis	Receives City of Minneapolis Municipal Stormwater Runoff?	State ID	Next-in-line Receiving Water	Status of Impairment and TMDL Study	Designated Use that is Affected by the Impairment
CEDAR LAKE	yes (and from the City of Saint Louis Park)	27-0039	Lake of the Isles	MERCURY IN FISH TISSUE (listed 1998) – Statewide TMDL approved 2008, not stormwater related, no MS4 responsibilities, target completion 2025.	Aquatic Consumption
CEMETERY LAKE	no	27-0017	Lake Calhoun/Bde Maka Ska	No impairments.	
CRYSTAL LAKE* (located in the City of Robbinsdale)	yes (and from the City of Robbinsdale)	27-0034	Shingle Creek	EXCESS NUTRIENTS (listed 2002) – TMDL approved 2009, in implementation stage.	Aquatic Recreation
DIAMOND LAKE	yes	27-0022	Minnehaha Creek	Was formerly listed for EXCESS NUTRIENTS but removed from list in 2008 because it was determined to be a wetland (or game lake) that had been mischaracterized by MNDNR as a lake. There are no nutrient standards for wetlands at this time.	
				CHLORIDE (listed 2014) – TMDL approved June 2016 (metro-wide).	Aquatic Life
GRASS LAKE (officially a wetland. Was previously part of Richfield Lake, which was divided by construction of Highway 62)	yes	27-0681	Landlocked/ Lower Minnesota River	EXCESS NUTRIENTS (listed in 2006) – **DE-LISTED** in 2016.	Aquatic Recreation
HART LAKE	yes (and from Columbia Heights)	02-0081	Silver Lake	No excess nutrients impairment for Hart Lake, but Hart Lake is involved in the TMDL for Silver Lake.	
LAKE CALHOUN/BDE MAKA SKA	yes (and from upstream municipalities)	27-0031	Lake Harriet	MERCURY IN FISH TISSUE (listed 1998) – Statewide TMDL completed 2008, not stormwater-related, no MS4 responsibilities, target completion 2025.	Aquatic Consumption
				PFOS IN FISH TISSUE (listed 2008) – Regulatory action by MPCA in lieu of TMDL is underway (pollutant source in Saint Louis Park), target completion 2022.	Aquatic Consumption
LAKE HARRIET	yes	27-0016	Minnehaha Creek	MERCURY IN FISH TISSUE (listed 1998) – Statewide TMDL completed 2008, not stormwater-related, no MS4 responsibilities, target completion 2025.	Aquatic Consumption
				2) PFOS IN FISH TISSUE (listed 2008) – Regulatory action by MPCA in lieu of TMDL is underway (pollutant source in Saint Louis Park), target completion 2022.	Aquatic Consumption
LAKE HIAWATHA (Part of Minnehaha Creek)	yes (and from upstream municipalities)	27-0018	Minnehaha Creek	EXCESS NUTRIENTS (listed 2002) – Part of *Minnehaha Creek E. Coli Bacteria/Lake Hiawatha Nutrients TMDL* Study. TMDL approved 2014.	

Name of Surface Water (includes lakes, creeks, wetlands, and Mississippi River). Alphabetical order. *indicates waterbody is not in the City of Minneapolis	Receives City of Minneapolis Municipal Stormwater Runoff?	State ID	Next-in-line Receiving Water	Status of Impairment and TMDL Study	Designated Use that is Affected by the Impairment
LAKE NOKOMIS	yes (and from the City of Richfield and a portion of MSP Airport)	27-0019	Minnehaha Creek	MERCURY IN FISH TISSUE (listed 1998) – Statewide TMDL approved 2008, not stormwater-related, no MS4 responsibilities, target completion 2025.	Aquatic Consumption
				PCB IN FISH TISSUE (listed 1998) – TMDL status unknown, target completion 2025.	Aquatic Consumption
				EXCESS NUTRIENTS (listed 2002) – TMDL approved 2011, in implementation stage. (TMDL name: Minnehaha Creek Watershed Lakes)	Aquatic Recreation
LAKE OF THE ISLES	yes	27-0040	Lake Calhoun/Bde Maka Ska	MERCURY IN FISH TISSUE (listed 1998) – Statewide TMDL approved 2008, not stormwater-related, no MS4 responsibilities, target completion 2025.	Aquatic Consumption
				PFOS IN FISH TISSUE (listed 2008) Regulatory action underway by MPCA in lieu of TMDL (pollutant source in Saint Louis Park), target completion 2022.	Aquatic Consumption
LEGION LAKE* (located in the City of Richfield; the former Legion Lake wetland area in the City of Minneapolis is now Ferdinand Pond)	yes, Minneapolis discharges to one Legion Lake outfall south of Highway 62. Minneapolis also discharges to two MnDOT Ferdinand Pond outfalls north of Highway 62, which discharges to Legion Lake.	27-0024	Taft Lake	No impairment for Legion Lake, but Legion Lake is involved in the TMDL for Lake Nokomis. Minneapolis formerly had outfalls to Legion Lake, but lake was split by Highway 62 project, and Minneapolis outfalls now discharge to Ferdinand Pond, which is not a public water. It is a stormwater pond under the jurisdiction of MnDOT.	
LORING LAKE (commonly called Loring Pond)	yes (little direct runoff BUT takes runoff on occasion from 35W Tunnel)	27-0655	Mississippi River	CHLORIDE (listed 2014) – TMDL approved June 2016 (metro-wide).	Aquatic Life
MINNEHAHA CREEK	yes (and from upstream municipalities)	07010206-539	Mississippi River	FISHES BIOASSESSMENTS (listed 2004) – TMDL study not started, may reassess (baseflow not constant), appears to be on hold until 2020.	Aquatic Life
				CHLORIDE (listed 2008) – TMDL approved June 2016 (metro-wide).	Aquatic Life
				BACTERIA (listed 2008) – Part of *Minnehaha Creek E. Coli Bacteria/Lake Hiawatha Nutrients TMDL* Study. TMDL approved 2014.	Aquatic Recreation

Minneapolis
City of Lakes

Name of Surface Water (includes lakes, creeks, wetlands, and Mississippi River). Alphabetical order. *indicates waterbody is not in the City of Minneapolis	Receives City of Minneapolis Municipal Stormwater Runoff?	State ID	Next-in-line Receiving Water	Status of Impairment and TMDL Study	Designated Use that is Affected by the Impairment
				DISSOLVED OXYGEN (listed 2010) – TMDL not started, may reassess (baseflow not constant), appears to be on hold until 2020.	Aquatic Life
				AQUATIC MACROINVERTEBRATE BIOASSESSMENTS (listed 2014) – TMDL not started.	Aquatic Life
MISSISSIPPI RIVER (the specific reach upstream of Upper Saint Anthony Falls to Crow River [was previously Coon Creek])	yes (and from upstream municipalities)	07010206-805	N/A	PCB IN FISH TISSUE (listed 1998) – Targeted TMDL completion date 2025.	Aquatic Consumption
				BACTERIA (listed 2002) – TMDL approved Nov. 2014 (metro-wide), bacteria not an issue in this river segment this round, MPCA plans to look again in 2020.	Aquatic Consumption
				EXCESS NUTRIENTS (listed 2016) – TMDL study underway with Lake Pepin.	Aquatic Life
MISSISSIPPI RIVER (the specific reach between Upper and Lower Saint Anthony Falls)	yes (and from upstream municipalities)	07010206-814	N/A	MERCURY IN FISH TISSUE (listed 1998) - Statewide TMDL approved 2008, not stormwater-related	Aquatic Consumption
				PCB IN FISH TISSUE (listed 1998) – Targeted TMDL completion date 2025.	Aquatic Consumption
				BACTERIA (not listed, but part of TMDL study) – TMDL approved Nov. 2014 (metro-wide). Bacteria not an issue in this River segment this round. MPCA plans to look again in 2020.	Aquatic Recreation
MISSISSIPPI RIVER (the specific reach downstream of Lower Saint Anthony Falls to Lock and Dam #1)	yes (and from upstream municipalities)	07010206-814	N/A	MERCURY IN FISH TISSUE (listed 1998) – Statewide TMDL approved 2008, not stormwater-related, no MS4 responsibilities	Aquatic Consumption
				BACTERIA (listed 2002) – TMDL approved Nov. 2014 (metro-wide). Bacteria not an issue in this River segment this round. MPCA plans to look again in 2020.	Aquatic Recreation
MISSISSIPPI RIVER* (impaired downstream of confluence with Minnesota River to Lake Pepin)	this impairment is downstream of the City of Minneapolis segments	07010206-814	N/A	TOTAL SUSPENDED SOLIDS (TSS) (listed 1998) (replaced turbidity with site-specific TSS standard) – South Metro Mississippi River TSS TMDL near completion. **Zero reduction required for Minneapolis MS4.**	Aquatic Life
LAKE PEPIN* (widening of Mississippi River) (as tributary to Lake Pepin nutrient/eutrophication biological indicators TMDL)	this impairment is downstream of the City of Minneapolis segments	25-0001	N/A	EXCESS NUTRIENTS (listed 2002) – Lake Pepin TMDL in progress.	Aquatic Recreation
MOTHER LAKE* (formerly in the City of Minneapolis, now Airport)	yes	27-0023	Lake Nokomis	No excess nutrients impairment for Mother Lake, but Mother Lake is involved in the TMDL for Lake Nokomis.	

Minneapolis City of Lakes

Name of Surface Water (includes lakes, creeks, wetlands, and Mississippi River). Alphabetical order. *indicates waterbody is not in the City of Minneapolis	Receives City of Minneapolis Municipal Stormwater Runoff?	State ID	Next-in-line Receiving Water	Status of Impairment and TMDL Study	Designated Use that is Affected by the Impairment
POWDERHORN LAKE	yes	27-0014	Landlocked (has been pumped to Mississippi River in the past)	MERCURY IN FISH TISSUE (listed 1998) – Statewide TMDL approved 2008, not stormwater-related, no MS4 responsibilities, target completion 2025.	Aquatic Consumption
				EXCESS NUTRIENTS (listed 2002) – **DE-LISTED** in 2012, due to improved water quality. **RE-LISTED** in 2018. TMDL not started.	Aquatic Recreation
				CHLORIDE (listed 2014) – TMDL approved June 2016 (metro-wide).	Aquatic Life
RICHFIELD LAKE	yes (and City of Richfield and MnDOT)	27-0021	Minnesota River	No impairments.	
RYAN CREEK (primarily conveyed by storm drain pipe, about two blocks exposed, on industrial property)	yes (and Ryan Lake)	Unknown	Shingle Creek	No impairments.	
RYAN LAKE part* (located in the City of Minneapolis and in the Cities of Robbinsdale and Brooklyn Center)	yes (and from upstream municipalities)	27-0058	Ryan Creek	EXCESS NUTRIENTS (listed 2002) – TMDL approved 2007, **DE-LISTED** 2014 because of restoration activities under TMDL Implementation Plan.	
SANTUARY MARSH	no	27-0065	Lake Harriet	No impairments.	
SHINGLE CREEK	yes (and from upstream municipalities)	0701206-506	Mississippi River	CHLORIDE (listed 1998). TMDL approved 2007, now in implantation stage.	Aquatic Life
				DISSOLVED OXYGEN (listed 2004) – TMDL approved 2011, now in implementation stage.	Aquatic Life
				AQUATIC MACROINVERTEBRATE BIOASSESSMENTS (listed 2006) – TMDL approved 2011, now in implementation stage.	Aquatic Life
				BACTERIA (listed 2014) – TMDL approved Nov. 2014 (metro-wide).	Aquatic Recreation
SILVER LAKE* (located in the Cities of New Brighton and Columbia Heights)	yes, from a very small corner of the City of Minneapolis (and from the Cities of New Brighton, Columbia Heights, and Saint Anthony Village)	62-0083	Ramsey County Ditch #3, then Rice Creek	EXCESS NUTREINTS (listed 2002) – TMDL approved 2010, now in implementation stage.	Aquatic Recreation
				MERCURY IN FISH TISSUE (listed 1998) – Statewide TMDL approved 2008, not stormwater-related, no MS4 responsibilities, target completion 2025.	Aquatic Consumption
				CHLORIDE (listed 2014) – TMDL approved June 2016 (metro-wide).	Aquatic Life

<table>
<tr><th>Name of Surface Water (includes lakes, creeks, wetlands, and Mississippi River).
Alphabetical order.
*indicates waterbody is not in the City of Minneapolis</th><th>Receives City of Minneapolis Municipal Stormwater Runoff?</th><th>State ID</th><th>Next-in-line Receiving Water</th><th>Status of Impairment and TMDL Study</th><th>Designated Use that is Affected by the Impairment</th></tr>
<tr><td>SPRING LAKE</td><td>yes (and from I-394)</td><td>27-0654</td><td>Connection verified to 48-inch to new BC Tunnel to Mississippi River</td><td>CHLORIDE (listed 2014) – TMDL approved June 2016 (metro-wide).</td><td>Aquatic Life</td></tr>
<tr><td>TAFT LAKE* (formerly in the City of Minneapolis, now Airport)</td><td>yes (formerly part of the City of Minneapolis, now Airport)</td><td>27-0683</td><td>Lake Nokomis</td><td>No excess nutrients impairments for Taft Lake, but Taft Lake is involved in the TMDL for Lake Nokomis.</td><td></td></tr>
<tr><td>WEBBER POND (MPRB is requesting removal from public waters listing due to reconstruction)</td><td>no (reconstructed 2013-2015 with no stormwater outfalls to it)</td><td>27-1118</td><td>Shingle Creek</td><td>No impairments.</td><td></td></tr>
<tr><td rowspan="3">WIRTH LAKE* (located in the City of Golden Valley, in Wirth Park, owned and managed by MPRB)</td><td rowspan="3">no apparent City of Minneapolis municipal runoff (MPRB only; parkway runoff appears to be only in the City of Golden Valley)</td><td rowspan="3">27-0037</td><td rowspan="3">Bassett Creek</td><td>MERCURY IN FISH TISSUE (listed 1998) – Statewide TMDL approved 2008, not stormwater-related, no MS4 responsibilities, target completion 2025.</td><td>Aquatic Consumption</td></tr>
<tr><td>CHLORIDE (listed 2016) – TMDL approved June 2016 (metro-wide).</td><td>Aquatic Life</td></tr>
<tr><td>EXCESS NUTRIENTS (listed 2002) – TMDL approved 2010 (Wirth Lake Excess Nutrients TMDL Report). DE-LISTED 2014 because of activities carried out under TMDL Implementation Plan.</td><td></td></tr>
</table>

Color Key:	Notes:
Chloride	MERCURY – Presence of mercury is primarily airborne, not stormwater runoff. Statewide Mercury TMDL is being carried out by MPCA. No MS4.
Bacteria	PFOS – Presence of perfluorooctane sulfonate (PFOS) is primarily related to industrial discharge. Regulatory action in lieu of TMDL is underway.
Excess Nutrients	PCB – Polychlorinated biphenyls.
Related to Lake Nokomis Excess Nutrients TMDL	* indicates waterbody is not in the City of Minneapolis
Total Suspended Solids	
Dissolved Oxygen, or Bioassessments for fish or aquatic macroinvertebrates	***Message from Minnesota's Clean Water Council: We recognize that people are hungry for immediate results; however, managing water resources is an ongoing task, and some clean water outcomes may take several decades to achieve. Once a best management practice have been implemented, it often takes many years, or decades, before a positive environmental outcome is achieved in a highly degraded river, lake, or groundwater source.***
PFOS or PCB	
Mercury – no MS4 responsibilities	

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Appendix D – Watershed District and Watershed Management Organizations

Minneapolis
City of Lakes

The City of Minneapolis falls under the jurisdiction of four watershed management organizations: Bassett Creek Watershed Management Commission (BCWMC), Minnehaha Creek Watershed District (MCWD), Mississippi Watershed Management Organization (MWMO), and Shingle Creek Water Management Commission (SCWMC). An overview of the requirements of each organization is presented below, but readers are encouraged to contact each organization directly to obtain the most up-to-date information on their goals, policies, and programs. Contact information is current as of December 2017.

Bassett Creek Watershed Management Commission

c/o Barr Engineering Co.
430 Market Pointe Drive, Suite 200
Minneapolis, MN 55435
Ph: (952) 832-2600
Fax: (952) 832-2601
http://www.bassettcreekwmo.org

The Bassett Creek watershed, nearly 40 square miles, is divided into four major subwatersheds. The nine municipalities represented by the BCWMC include: Plymouth, Medicine Lake, Golden Valley, Robbinsdale, Crystal, New Hope, Minnetonka, Saint Louis Park, and Minneapolis.

The BCWMC adopted its first Watershed Management Plan in February 1972. The Commission adopted its Second Generation Plan in September 2004. The BCWMC's Third Generation Plan was approved by Minnesota Board of Water and Soil Resources (BWSR) in August 2015 and adopted by the Commission on September 17, 2015. The BCWMC Plan sets the vision and guidelines for managing water resources within the boundaries of the BCWMC.

Summary of Goals

Water resources management goals developed by the BCWMC are included in Table E.1.

Table E.1 – Bassett Creek Watershed Management Commission Goals

Goal	Description
GOAL 1	Manage the surface water resources of the watershed to meet or exceed state standards and BCWMC water quality goals for wetlands, lakes, and streams.
GOAL 2	Improve the quality of stormwater runoff reaching the Mississippi River by reducing nonpoint source pollution.
GOAL 3	Protect and enhance fish and wildlife habitat in the BCWMC.
GOAL 4	Take into account aesthetics and recreational opportunities within the watershed when completing BCWMC projects.
GOAL 5	Reduce stormwater runoff volume for the purposes of improving water quality.
GOAL 6	Protect against flood risks along the Bassett Creek trunk system.
GOAL 7	Protect human life, property, and surface water systems that could be damaged by flood events.
GOAL 8	Reduce stormwater runoff rates and volumes to minimize flood problems, flood damages, and the future costs of stormwater management systems.
GOAL 9	Provide leadership and assist member cities with coordination of intercommunity stormwater runoff issues.
GOAL 10	Notwithstanding that which occurs from natural processes, minimize erosion and sedimentation to protect the BCWMC's water resources and health, safety, and welfare.

Goal	Description
GOAL 11	Maintain or improve shoreland integrity and implement stream restoration measures to maintain or enhance ecological functions, as well as human health, safety, and welfare.
GOAL 12	Increase the quality and quantity of wetlands in the BCWMC.
GOAL 13	Protect the quantity and quality of groundwater resources.
GOAL 14	Manage public ditches in a manner that recognizes their current use as urban drainage systems and as altered natural waterways.
GOAL 15	Raise awareness of the BCWMC's existence and its role in protecting and improving water quality, minimizing flooding, and preserving the watershed's ecological functions and aesthetics.
GOAL 16	Strengthen public confidence in the BCWMC's expertise and enable meaningful public participation in the planning process and ongoing projects conducted by the BCWMC.
GOAL 17	Raise awareness of the impact that individuals, businesses, and organizations have upon water resources and motivate the audiences to change persona/corporation behavior that has a negative impact on the watershed.
GOAL 18	Minimize the spread and manage the adverse impacts of harmful aquatic invasive species.
GOAL 19	Develop a greater understanding of climate change and its impact on water resources, including stormwater infrastructure capacity and flooding, and develop strategies to appropriately manage future impacts.

Source: BCWMC

Policies

Chapter 4 of the BCWMC Watershed Management Plan establishes water quality policies in the areas of Water Quality, Flooding and Rate Control, Groundwater Management, Erosion and Sediment Control, Stream Restoration and Protection, Wetland Management, Public Ditch, Recreation, Habitat and Shoreland Management, Education and Outreach, and Administration. Specific policies include:

Water Quality Policies

1. The BCWMC will classify priority waterbodies based on desired water quality standards and other uses of the waterbodies. Table 2-6 lists the management classifications of the priority waterbodies.

2. The BCWMC adopts MPCA water quality standards (Minnesota Rule 7050, as amended) for BCWMC priority waterbodies (Table 2-7).

3. Member cities shall classify other waterbodies according to the BCWMC classification system and include this information in their local water management plans.

4. The BCWMC will work with stakeholders to manage its priority waterbodies to meet the applicable water quality goals of the BCWMC.

5. The BCWMC and the member cities will implement the improvement options listed in the BCWMC's CIP (Table 5-3) to address the water quality of priority waterbodies based on feasibility, prioritization, and available funding (see policy 110 regarding CIP prioritization criteria).

6. The BCWMC will prioritize water quality improvement projects that are most effective at achieving water quality goals, including non-structural BMPs and education.

7. The BCWMC will cooperate with member cities, the MPCA and other stakeholders in the preparation of total maximum daily load (TMDL) studies for waterbodies on the MPCA's current or future impaired waters 303(d) list, including Northwood Lake and Bassett Creek. The BCWMC will work to align TMDL implementation items into its Watershed Management Plan to achieve efficiency. The BCWMC will work with the cities to evaluate funding options for the TMDL studies.

   The BCWMC may append future studies to this Plan with the intent that they serve as the equivalent to a TMDL study.

8. The BCWMC will continue to identify opportunities to achieve and maintain excellent water quality in priority waterbodies.

9. The BCWMC will continue to monitor its priority waterbodies on a rotating schedule as described in the BCWMC Monitoring Plan (Appendix A). Monitoring may include biota, vegetation, and water chemistry (e.g., nutrients, chloride in streams). The objective of the monitoring is to detect changes or trends in the water quality over time and the effectiveness of efforts to preserve/improve water quality. The BCWMC will determine the appropriate frequency of monitoring under programs funded by the BCWMC.

10. For every year sampling is conducted for the BCWMC's lakes and/or streams, the BCWMC will compile the available monitoring data, include the data in an annual report available on the BCWMC website, and submit the data to the MPCA in an appropriate format.

11. The BCWMC will coordinate monitoring efforts with other programs including:

    - Member city monitoring
    - Metropolitan Council Citizen Assisted Monitoring Program (CAMP) and Watershed Outlet Monitoring Program (WOMP)
    - Three Rivers Park District monitoring
    - Minneapolis Park and Recreation Board monitoring
    - Minnesota Pollution Control Agency Citizen Lake Monitoring Program (CLMP) and other monitoring
    - Hennepin County River Watch Program

12. The BCWMC requires all stormwater to be treated in accordance with the MPCA's Minimal Impact Design Standards (MIDS) performance goal for new development, redevelopment, and linear projects. If the MIDS performance goal is not feasible and/or is not allowed for a proposed project, then the project proposer must implement the MIDS flexible treatment options, as shown in the MIDS Design Sequence Flow Chart, or BCWMC approved alternative.

13. The BCWMC will review projects and developments to evaluate compliance with the MPCA's Minimal Design Standards (MIDS) performance goals, triggers, and flexible treatment options (which are adopted by the Commission as BCWMC water quality management standards) if the

projects are located in member cities that have not adopted the MIDS performance goals, triggers, and flexible treatment options, or at the request of a member city. For projects located in member cities that have adopted the MIDS performance goals, triggers, and flexible treatment options, the member cities shall review projects for conformance with MIDS water quality treatment standards, unless Commission review is requested by the member cities.

14. The BCWMC requires public agencies to comply with water quality management standards and policies presented in this Plan in order to maintain or improve water quality of stormwater runoff.

15. Member cities shall not allow the drainage of sanitary sewage or non-permitted industrial wastes onto any land or into any watercourse or storm sewer discharging into Bassett Creek.

16. The BCWMC will maintain a water quality model (e.g., P8) for each watershed. Each year, member cities shall provide the BCWMC with plans for BMPs constructed within their city. The BCWMC will update the model annually to incorporate completed BCWMC capital improvements and BMP information provided by the member cities. The BCWMC will develop a summary report of the water quality model results and provide that report to the member cities to assist in their MS4 reporting.

17. The BCWMC encourages member cities to implement best management and good housekeeping practices to minimize chloride loading to surface water and groundwater resources, utilizing emerging technology, as appropriate.

18. The BCWMC will assist and cooperate with member cities, MPCA, MDNR, MnDOT, other watersheds and other stakeholders in implementing projects or other management actions resulting from the Minnesota Pollution Control Agency's Twin Cities Metro Chloride Project or future chloride TMDL.

Flooding and Rate Control Policies

19. The BCWMC will maintain a Flood Control Emergency Repair Fund for funding emergency repairs of the BCWMC Flood Control Project features.

20. The BCWMC will maintain a Long-Term Maintenance Fund with annual assessments. The BCWMC will use the Long-Term Maintenance Fund to fund major repairs and major maintenance of the BCWMC Flood Control Project features (Flood Control Project features are listed in Table 2-8).

21. The BCWMC will regularly inspect the BCWMC Flood Control Project system, including water level control and conveyance structures, and perform the follow-up reporting. This is part of the BCWMC's annual water quality and flood control programs (see Table 5-4).

22. During the first five years of Plan implementation, the BCWMC will work with the member cities to determine responsibilities for major rehabilitation and replacement of the BCWMC Flood Control Project features and establish the associated funding mechanisms.

23. The BCWMC will finance major maintenance and repair of water level control and conveyance structures that were part of the original BCWMC Flood Control Project on the same basis as the

original project. New road crossings of the creek that were installed as part of the project will be maintained by the city where the structure is located.

24. Member cities shall be responsible for routine maintenance and repair of BCWMC Flood Control Project structures located within each city. Each member city shall be responsible for routine cleaning, including removal of debris, brushing, and tree removal from the BCWMC Flood Control Project features located within their city.

25. The BCWMC will reevaluate flood elevations and flood risk to affected properties based on the most recent NOAA precipitation data (e.g., Atlas 14) and will determine actions for protection, including partnering with and applying for grants from Federal and State agencies.

26. When implementing BCWMC flood risk reduction projects, the BCWMC will identify properties prone to flooding. The most effective and reasonable solutions as approved by the member city will be evaluated. Solutions to be considered may include purchase of the properties, with attention to impact on tax base and other community factors.

27. The BCWMC will develop criteria for the allocation of funding for flood risk reduction projects, which may include the purchase of property prone to flooding.

28. The BCWMC will monitor or coordinate with other entities to monitor water levels on the primary lakes in the watershed. Water levels on Bassett Creek and other waterbodies will be monitored periodically during flooding events.

29. The member cities must implement the BCWMC's development policies, including minimum building elevations of at least 2 feet above the 100-year flood level for new and redeveloped structures, as outlined in the BCWMC's *Requirements for Improvements and Development Proposals* document (BCWMC, 2015, as revised).

30. The BCWMC encourages property owners to implement best management practices to reduce the volume of stormwater runoff beyond the minimum requirements imposed by the city's MS4 permit, NPDES construction stormwater permit and MIDS performance goal adopted by the BCWMC. Examples of stormwater runoff volume reduction methods include:

    - Reducing the amount of planned impervious surface (as areas develop).
    - Reducing the amount of impervious surface (during development).
    - Additional infiltration and/or evapotranspiration.
    - Stormwater reuse.

31. The BCWMC and member cities must require rate control in conformance with the Flood Control Project system design and this Plan.

    The BCWMC requires cities to manage stormwater runoff so that future peak flow rates leaving development and redevelopment sites are equal to or less than existing rates for the 2-year, 10-year, and 100-year events.

32. The BCWMC requires the retention of on-site runoff from development and redevelopment projects consistent with the MPCA's Minimal Impact Design Standards (MIDS) performance goals. These includes the retention of:

    - 1.1 inches of runoff from impervious areas for new development creating more than 1 acre of new impervious area
    - 1.1. inches of runoff from new or fully reconstructed impervious areas for redevelopment creating one or more acres of new or fully redeveloped impervious area
    - 0.55 inches of runoff from new or fully reconstructed impervious areas for linear projects creating one or more acres of new or fully redeveloped impervious area (or 1.1 inches from the net increase in impervious area, whichever is greater)
    - If an applicant is unable to achieve the performance goals due to site restrictions, the MIDS flexible treatment options approach shall be used, following the MIDS design sequence flow chart.

    For all other projects, the BCWMC encourages the use of infiltration, filtration, or other abstraction of runoff from impervious areas for all development and redevelopment projects as a best practice to reduce stormwater runoff.

33. The BCWMC will revise floodplain elevations along the trunk system as necessary to reflect channel improvement, storage site development, or requirements established by appropriate state or federal governmental agencies.

34. The BCWMC will allow only those land uses in the BCWMC-established floodplain that will not be damaged by floodwaters and will not increase flooding. Allowable types of land use that are consistent with the floodplain include recreation areas, parking lots, temporary excavation and storage areas, public utility lines, agriculture, and other open spaces.

35. The BCWMC prohibits the construction of basements in the floodplain; construction of all other infrastructure within the floodplain in subject to BCWMC review and approval.

36. The BCWMC prohibits permanent storage piles, fences and other obstructions in the floodplain that would collect debris or restrict flood flows.

37. Where streets, utilities, and structures currently exist below the 100-year floodplain, the BCWMC encourages the member cities to remove these features from the floodplain as development or redevelopment allows.

38. The BCWMC requires that projects within the floodplain maintain no net loss in floodplain storage and no increase in flood level any point along the trunk system. The BCWMC prohibits expansion of existing non-conforming land uses within the floodplain unless they are fully flood-proofed in accordance with codes and regulations.

39. The BCWMC requires member cities to maintain ordinances that are consistent with BCWMC floodplain standards. Member cities must submit ordinances to the BCWMC for review.

40. The BCWMC will review changes in local water management plans, comprehensive land use plans, and other plans, for their effect on the adopted floodplain and Flood Control Project, when such plans are submitted to BCWMC.

41. The BCWMC will update, as necessary, the existing flood profile to reflect any increases resulting from modifications to a flood storage site or the Flood Control Project system, following the approval of those modifications by the BCWMC, local and state agencies, and after a public hearing on the modification plan has been held.

42. BCWMC will review diversion plans to determine the effect of the proposal on the Bassett Creek watershed and such plans will be subject to BCWMC approval. With respect to diversions, the BCWMC:

    - Prohibits any diversions of surface water within, into, or out of the watershed that may have a substantial adverse effect on stream flow or water levels at any point within the watershed.
    - Requires that plans for intra- or inter-watershed diversions must include an analysis of the effects of the diversion on flooding, water quality and aesthetic quality along the creek.
    - Requires effort be made to ensure that there is no fish migration from one watershed to another.

43. The BCWMC will pursue opportunities to collaborate with state agencies and other entities in the development of action plans (or similar management tools) related to the response of surface water and groundwater resources to long-term changes in precipitation and hydrology.

44. The BCWMC will continue to monitor water quantity and quality in the watershed and will seek opportunities to contribute BCWMC data to other datasets, for the purpose of assessing the response of surface water and groundwater resources to long-term changes in precipitation and hydrology.

Groundwater Management Policies

45. The BCWMC will review all MDNR groundwater appropriate permit applications in the BCWMC excluding applications for temporary appropriations permits.

46. The BCWMC will work with member cities to consider a program to review development or redevelopment projects which include long-term dewatering within 1,000 feet of priority waterbodies.

47. The BCWMC will collaborate with local and state agencies if/when these agencies develop a groundwater action plan in an effort to gain a better understanding of groundwater-surface water interaction and develop management strategies that consider the protection of both resources. The role of the BCWMC may include:

- Collaborate with local and state agencies to identify data gaps and attempt to fill those gaps through collection of groundwater level data and/or surface water flow data.
- Coordinate with appropriate local and state agencies to develop a groundwater budget for the watershed.
- Coordinate with appropriate local and state agencies to develop and utilize tools to assess surface water impacts and groundwater impacts of groundwater use (e.g., refinement of the Metro groundwater model, synchronization of the BCWMC XP-SWMM model with groundwater models).

48. To protect groundwater quality, the BCWMC requires infiltration practices to be implemented in accordance with the following guidelines for determining the feasibility of infiltration:
    - NPDES General Construction Stormwater Permit (2013, as amended)
    - Minimal Impact Design Standards (MIDS) Design Sequence Flow Chart (2013, as amended)
    - Minnesota Department of Health's Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas (MDH, 2007)

    The BCWMC recommends that infiltration practices be designed with consideration for the following guidance:

    - BCWMC's Requirements for Improvements and Development Proposals (BCWMC, 2015, as amended)
    - Minnesota Pollution Control Agency's *Minnesota Stormwater Manual* (http://stormwater.pca.state.mn.us/index.php/Main_Page)
49. The BCWMC encourages member cities to educate residents regarding the importance of implementing BMPs to protect groundwater quality and quantity.
50. Member cities shall share groundwater elevation data, where available, with the BCWMC.

Erosion and Sediment Control Policies

51. Member cities shall continue managing erosion and sediment control permitting programs and ordinances as required by their NPDES MS4 permit and the NPDES Construction Stormwater General Permit. These programs must address:
    - Permitting and inspection of erosion controls
    - Erosion and sediment control at individual building sites
    - Requirements and procedures for reviewing, approving, and enforcing erosion control plans
52. The BCWMC will review projects and developments to evaluate compliance with BCWMC erosion and sediment control standards.

The types of projects that must be submitted to the BCWMC for review, the BCWMC's review procedure, submittal requirements, guidelines, design criteria, etc. are provided in the BCWMC's document *Requirements for Improvements and Development Proposals* (BCWMC, 2015, as revised).

53. The BCWMC requires preparation of erosion control plans for construction projects meeting the applicable BCWMC threshold. Erosion control plans shall meet the standards given in the NPDES Construction Stormwater General Permit (as amended), and shall show proposed methods of retaining waterborne sediments onsite during the construction period, and shall specify methods and schedules for restoring, covering, or re-vegetating the site after construction.

54. Member cities shall perform regular erosion and sediment control inspections for projects triggering BCWMC review and subject to BCWMC erosion and sediment control standards. The member cities will annually report to the BCWMC regarding compliance with BCWMC standards as part of annual MS4 reporting or as requested by the Commission.

55. The BCWMC requires local water management plans to describe existing and proposed city ordinances, permits, and procedures addressing erosion and sediment control.

56. The BCWMC will work with member cities to evaluate end-of-pipe sediment sources and controls. Following adequate source control, the BCWMC may fund removal of end-of-pipe sediment deltas downstream of intercommunity watersheds, or facilitate collaboration among responsible parties to remove these deltas.

Stream Restoration and Protection Policies

57. The BCWMC will continue to maintain a Channel Maintenance Fund through an annual assessment. This fund will be used to help finance minor stream maintenance, repair, stabilization, and restoration projects and/or portions of larger stream restoration projects.

58. The Channel Maintenance Fund may also be used to finance the BCWMC's share of maintenance projects that have a regional benefit, or to partially fund smaller, localized projects that cities wish to undertake.

59. Major stream and streambank stabilization and restoration projects will be considered and prioritized by the BCWMC for inclusion in its annual CIP. Stabilization and restoration projects may include any or all of the following components:

    - Restoration of a stream or streambank area to the designed flow rate
    - Restoration or stabilization of a stream or streambank area that has either resulted in damage to a structure, or where structural damage is likely
    - Restoration or stabilization of a stream or streambank to reduce erosion, improve water quality, and improve riparian or in-stream habitat
    - Restoration or stabilization of a stream or streambank to address flooding, mitigation of water quality impairment, or minimizing the potential for water quality impairment

60. Recognizing their benefits to biodiversity and more natural appearance, the BCWMC will strive to implement stream and streambank restoration and stabilization projects that use soft armoring techniques (e.g., plants, logs, vegetative mats) as much as possible and wherever feasible.

61. The BCWMC will consider improving natural habitat and navigability, and will consider the needs of pedestrians when planning and implementing near-stream and in-stream projects, and when rehabilitating existing projects.

62. The member cities are responsible for funding maintenance and repairs that are primarily aesthetic improvements.

63. The BCWMC will take into account aesthetic and habitat values of future flood control and stabilization/restoration projects.

64. Member cities shall maintain and enforce buffer requirements adjacent to priority streams for projects that will result in more than 200 yards of cut or fill, or more than 10,000 square feet of land disturbance. Buffer widths adjacent to priority streams must be at least 10 feet or 25 percent of the distance between the ordinary high-water level and the nearest existing structure, whichever is less.

    Allowable land uses, and vegetative criteria for buffers are specified in the BCWMC's *Requirements for Development and Redevelopment* (BCWMC, 2015, as amended). Member cities may allow exemptions for public recreational facilities parallel to the shoreline (e.g., trails) up to 20 feet in width, with that width being added to the required buffer width.

Wetland Management Policies

65. The BCWMC requires member cities to inventory, classify and determine the functions and values of wetlands, either through a comprehensive wetland management plan or as required by the Wetland Conservation Act (WCA).

    Member cities shall maintain a database of wetland functions and values assessment results.

    The BCWMC encourages member cities to complete comprehensive wetland management plans as part of their local water management plan or as an implementation task identified in their local water management plan. Completed comprehensive wetland management plans shall be submitted to the BCWMC for review and comment.

66. The BCWMC requires member cities to develop and implement wetland protection ordinances that consider the results of wetland functions and values assessments, and are based on comprehensive wetland management plans, if available. For wetlands classified as Preserve or Manage 1, member cities shall implement standards for bounce, inundation, and runout control that are similar to BWSR guidance; member cities are encouraged to apply standards for other wetland classifications.

67. The BCWMC adopts the Minnesota Rapid Assessment Method (MnRAM) as the wetland assessment method and the wetland management classification system. Member cities are

encouraged to use MnRAM for all wetland assessment and classifications, but are not required to perform reassessments using MnRAM for wetlands already assessed.

68. Member cities shall maintain and enforce buffer requirements for projects containing more than one acre of new or redeveloped impervious area. Average minimum buffer widths are required according to the MnRAM classification (or similar classification system):

    - An average of 75 feet and minimum of 50 feet from the edge of wetlands classified as Preserve
    - An average of 50 feet and minimum of 30 feet from the edge of wetlands classified as Manage 1
    - An average of 25 feet and minimum of 15 feet from the edge of wetlands classified as Manage 2 or 3.

    Allowable land uses and vegetative criteria for buffers are specified in the BCWMC's Requirements for Development and Redevelopment (BCWMC, 2015, as amended).

    Member cities may allow exemptions for public recreational facilities parallel to the shoreline (e.g., trails) up to 20 feet in width, with that width being added to the required buffer width.

69. The member cities are required to manage wetlands in accordance with the WCA. The BCWMC will assist the member cities with managing wetlands in accordance with the WCA, as requested. The MnDOT is the LGU within its rights-of-way.

70. The BCWMC will serve as the local governmental unit (LGU) responsible for administering the WCA for member cities, as requested (currently Medicine Lake, Robbinsdale, and St. Louis Park).

71. The BCWMC prefers any wetland mitigation to be performed within the same subwatershed as the impacted wetland.

72. The BCWMC requires that member cities annually inspect wetlands classified as Preserve for terrestrial and emergent aquatic invasive vegetation, such as buckthorn and purple loosestrife, and attempt to control or treat invasive species, where feasible.

73. The BCWMC encourages member cities to pursue wetland restoration projects, as opportunities allow.

74. The BCWMC encourages member cities to participate in wetland monitoring programs (e.g., Wetland Health Evaluation Program).

Public Ditch Policies

75. The BCWMC encourages member cities to petition Hennepin County to transfer authority over public ditches in the BCWMC to the member cities (per MN Statute 383B.61). If authority is transferred to the member cities, the BCWMC and cities will manage these drainages similar to other BCWMC waterways, in accordance with the BCWMC's latest adopted Plan. Until authority

over public ditches is transferred, the BCWMC will continue to recognize Hennepin County's jurisdiction over public ditches in the BCWMC.

76. In consideration for the original function of public ditches to provide drainage of agricultural lands, the BCWMC will support the efforts of other entities to pursue legislation abandoning public ditches on land zoned non-agricultural.

77. The BCWMC will manage abandoned or transferred public ditches that are part of the trunk system consistent with the policies of this Plan. Member cities will be responsible for management of abandoned or transferred public ditches that are not on the trunk system, but are currently part of their municipal drainage system.

Recreation, Habitat, and Shoreland Management Policies

78. The BCWMC will consider developing and implementing a shoreland habitat monitoring program for its Policy 1 lakes to monitor biological and physical indicators and to recommend management actions (to cities or for the Commission's consideration) based upon monitoring results. If implemented, monitoring may include assessment of upland and aquatic vegetation buffer zones, erosion, sedimentation, and the presence of non-native invasive species.

79. The BCWMC will support and collaborate with other entities (e.g., agencies, lake association, cities, counties) to manage and prevent the spread of aquatic invasive species; BCWMC service may include point-intercept surveys of aquatic vegetation, feasibility studies, technical analysis, education, exploring funding options, and applying for grants. The BCWMC will not manage increased growths of native aquatic vegetation resulting from improved water quality.

80. The member cities are responsible for shoreland regulation and are required to adopt MDNR-approved shoreland ordinances, in accordance with the MNDR's priority phasing list.

81. The BCWMC will promote the protection of natural and native shoreland areas, including the preservation of lakeshore and streambank vegetation during and after construction projects, and the establishment and maintenance of buffers adjacent to priority waterbodies. The BCWMC will seek opportunities to restore disturbed shorelines and streambanks to their natural state where feasible.

82. The BCWMC encourages cities to develop and maintain water-related recreational features (such as trails adjacent to waterbodies and water access points), with consideration for buffers, use of pervious surfaces, and other best management practices to reduce runoff.

83. The BCWMC will take into account aesthetics, habitat, and recreation benefits during CIP project selection and prioritization, and when considering how a project might address multiple Commission goals (see policy 110).

84. The BCWMC will encourage public and private landowners to maintain, preserve or restore open space and native habitats such as wetlands, uplands, forests, shoreland, streambanks, and prairies for the benefit of wildlife through education and by providing information on grant programs.

85. Member cities shall consider opportunities to maintain, enhance, or provide new open spaces and/or habitat as part of wetland creation or restoration, stormwater facility construction, development, redevelopment, or other appropriate projects.

86. The BCWMC will cooperate with the MDNR and other entities, as requested, to protect rare and endangered species under the State's Endangered Species Statute. The BCWMC will review the Natural Heritage Information System during the design phase of Commission projects.

87. The BCWMC will submit data, as available, and encourages others to submit data regarding occurrences of rare and endangered species and native plant communities to the State's Natural Heritage Information System.

88. The BCWMC will consider implementing a grant or cost-share program to fund the establishment of buffers adjunct to priority waterbodies.

89. Member cities will adopt State buffer and/or shoreland management requirements for public waters in incorporated areas, if and when they are promulgated.

Education and Outreach Policies

90. The BCWMC will develop an education and outreach plan (see Appendix B). The education and outreach plan will identify key messages about watershed management and guidance for distributing that information to specific stakeholder audiences using various, targeted methods. The BCWMC will regularly view its education and public involvement plan and update it, as necessary.

91. The BCWMC will develop and maintain standard BCWMC messaging items to increase awareness of the BCWMC and its role.

92. The BCWMC will evaluate the success of its education and public involvement plan.

93. The BCWMC will recruit volunteers to conduct monitoring and participate in activities sponsored or promoted by the BCWMC and will provide training as needed (e.g., Citizen Assisted Monitoring Program, River Watch, adopt-a-stream, adopt-a-wetland programs).

94. The BCWMC will support cooperative educational and volunteer programs, such as the West Metro Water Alliance, Blue Thumb, River Watch, Metro Blooms, Metro Watershed Partners, Citizen Assisted Monitoring Program, Wetland Health Evaluation Program, etc.

95. The BCWMC will develop and implement a recognition program (certificates, letters of appreciation, events, thank you ads, etc.) for BCWMC volunteers.

96. The BCWMC will update and maintain its website and use it to communicate with and provide information to the public.

97. The BCWMC will seek opportunities to incorporate education and public involvement efforts into all of its proposed projects.

98. The BCWMC will seek opportunities to use a citizen advisory committee to complete tasks meaningful to the Commission.

99. The BCWMC will distribute BCWMC meeting notices and agendas to city officials and key staff. The meeting notice and/or agenda will include a description of the key discussion item(s).

100. The BCWMC will post informational signs at BCWMC projects during construction.

The BCWMC will consider installing permanent informational signs at BCWMC watershed projects, major BCWMC waterbodies, monitoring sites, demonstration projects, adopt-a-stream/wetland sites, etc.

The BCWMC will work with cities and other road authorities to install stream identification signs along roads at stream crossings.

101. The BCWMC will regularly hold watershed tours for the Commission and the public.

102. The BCWMC will tailor its communications and educational strategies to present complex and/or technical issues in a manner that is appropriate for the audience.

Administration Policies

103. The BCWMC will fund 100 percent of eligible project costs for those projects listed in the 10-year CIP (Table 5-3). Eligible project costs are listed in Table 5-1. The Commission will determine eligibility of project costs following the completion of a feasibility study for the project. The projects will be funded in accordance with the BCWMC joint powers agreement and (specifically) Minnesota Statutes 103B.251. The BCWMC will follow the process for ordering projects as outlined in its joint powers agreement and summarized in Section 5.2.1.1

104. The Commission will review projects that trigger BCWMC review. The types of projects that must be submitted to the BCWMC for review, the BCWMC's review procedure, submittal requirements, guidelines, design criteria, etc. are provided in the BCWMC's document *Requirements for Improvements and Development Proposals* (BCWMC, 2015, as revised).

105. At the request of the member cities, the BCWMC will review projects that would not otherwise trigger review per the BCWMC's *Requirements for Improvements and Development Proposals* (BCWMC, 2015, as revised).

106. The BCWMC will review local water management plans for compliance with this Plan's goals and policies.

107. The BCWMC will annually evaluate member cities' compliance with the goals and policies of this Plan (see Section 5.1.1.6). The BCWMC will take appropriate administrative or legal action in response to non-compliance.

108. The BCWMC will review applications for MDNR Work in Public Waters Permits.

109. The BCWMC will annually review and update its 10-year CIP. The BCWMC will re-evaluate new or proposed additions to the CIP annually or as new data or opportunities develop, with consideration for the criteria outlined in policy 110.

110. The BCWMC will consider including projects in the CIP that meet one or more of the following “gatekeeper” criteria.

- Project is part of the BCWMC trunk system (see Section 2.8.1, Figure 2-14 and Figure 2-15)
- Project improves or protects water quality in priority waterbody
- Project addresses an approved TMDL or watershed restoration and protection strategy (WRAPS)
- Project addresses flooding concern

The BCWMC will use the following criteria, in addition to those listed above, to aid in the prioritization of projects:

- Project protects or restores previous Commission investments in infrastructure
- Project addresses intercommunity drainage issues
- Project addresses erosion and sedimentation issues
- Project will address multiple Commission goals (e.g., water quality, runoff volume, aesthetics, wildlife habitat, recreation, etc.)
- Subwatershed draining to project includes more than one community
- Addresses significant infrastructure or property damage concerns

The BCWMC will place a higher priority on projects that incorporate multiple benefits, and will seek opportunities to incorporate multiple benefits into BCWMC projects, as opportunities allow.

111. The BCWMC defines the trunk system as the collection of waterbodies and natural or constructed conveyances listed in Table 2-9 of this Plan.

112. The BCWMC may review proposed changes to member city development regulations (e.g., zoning and subdivision ordinances) at its discretion or the request of the member cities.

113. Member cities must inform the BCWMC regarding updates to city ordinances or comprehensive plans that will affect stormwater management. Stormwater management elements of the member cities’ comprehensive plans must conform to the BCWMC Plan.

114. The BCWMC will annually assess its progress towards the goals presented in this plan, using quantitative metrics where appropriate. The BCWMC will provide this analysis, or a summary, to BWSR, as as part of its annual reporting.

115. The BCWMC will work with member cities to assess the financial impact of regulatory controls and identify areas where the BCWMC may assist member cities in meeting the requirements of their MS4 permits.

116. The BCWMC will periodically review its capital improvement program (CIP) process and revise the process, as necessary.

117. The BCWMC will assist in calculating or calculate when necessary, the apportionment of costs between adjoining communities for water resource projects with intercommunity participation.

118. The BCWMC will assist member cities in resolving watershed management disputes, as requested. The BCWMC will follow the dispute resolution procedure described in Section 5.1.1.5 of this Plan.

119. The BCWMC will maintain a Technical Advisory Committee (TAC) to promote communication and cooperation between the BCWMC and member cities. Member cities shall appoint a technical advisor to the TAC and encourage the technical advisor to attend BCWMC meetings.

120. The BCWMC will continue to rely on member cities to implement the BCWMC's policies at the time of development and redevelopment. Member cities shall inform developers and other project applicants regarding BCWMC requirements.

121. The BCWMC will continue to rely on member cities to issue permits. Member cities shall permit only those projects that conform to the policies and standards of the BCWMC. The BCWMC will review proposed projects after the member city has provided preliminary approval (indicating compliance with the member city's local water management plan) and submitted a signed BCWMC application form to the BCWMC. Member cities shall not issue construction permits, or other approvals, until the BCWMC has approved the project.

122. For CIP projects that have been ordered by the Commission, the BCWMC requires member cities to acquire and maintain easements, right-of-way, or interest in land necessary to implement and maintain projects upon order of the BCWMC (the cost of land acquisition may be eligible for Commission reimbursement, see Table 5-1).

Summary of Rules

A synopsis of BCWMC rules is presented below.

Floodplain Regulations

The following policies regarding floodplain regulation within the Bassett Creek watershed have been adopted:

1. The floodplain of Bassett Creek is defined as that area lying below the 100-year flood elevations as shown in the BCWMC Watershed Management Plan, or as subsequently revised due to channel improvement, storage site development, or requirements established by appropriate state or federal governmental agencies.

2. No land use of a type which would be damaged by flood waters is permitted within the floodplain.

3. Allowable types of land use which are consistent with the floodplain, such as recreation areas, parking lots, excavations and storage areas, agriculture, and other open space uses, would be allowed only to the extent that they would not increase flooding. Permanent storage piles, fences, and other obstructions, which would collect debris or provide restriction to flood flows are not allowed.

4. Filling will generally not be allowed within the floodplain established in the BCWMC Watershed Management Plan. If any municipality desires to fill within the established floodplain, such filling will require the approval of the BCWMC and require provisions for compensating storage and/or channel improvement so that the flood level shall not be increased at any point along the channel due to the fill.

5. Expansion of existing, non-conforming land uses within the floodplain will be prohibited unless they are fully floodproofed in accordance with existing codes and regulations.

Water Resources Regulations

Water Quality Management

The lakes, rivers, ponds, streams, and wetlands of the Bassett Creek watershed are an important community asset. These resources supply aesthetic and recreational benefits, in addition to providing wildlife habitat and refuge. The BCWMC recognizes a need to ensure adequate water quality in the waterbodies in its jurisdiction, and has taken steps to protect these resources. The Water Quality Management Policy was adopted to protect, preserve, and manage the water resources in the Bassett Creek watershed.

Control of Streambank Erosion and Streambank Degradation

Streambank erosion and streambank degradation control measures must:

1. Be employed whenever the ne sediment transport for a reach of stream is greater than zero or whenever the stream’s natural tendency to form meanders directly threatens damage to structures, utilities, or natural amenities in public areas.

2. Include effective energy dissipation devices or stilling basins to prevent streambank or channel erosion at all stormwater outfalls.

3. Specify riprap consisting of natural angular stone suitable graded by weight for the anticipated velocities.

4. Provide riprap to an adequate depth below the channel grade and to a height above the outfall or channel bottom to ensure that the riprap will not be undermined by scour or rendered ineffective by displacement.

5. Specify that riprap be placed over a suitable graded filter material or filter fabric to ensure that soil particles do not migrate through the riprap and reduce its stability.

6. Require that streambank stabilization and streambed degradation control structures be submitted for review by the BCWMC. The review will consider the need for the work, the adequacy of design,

unique or special site conditions, energy dissipation, the potential for adverse effects, contributing factors, preservation of natural processes, or aesthetics.

Water Quality Best Management Practices

The Minnesota Stormwater Manual should be used to determine the currently approved water quality BMPs such as bioretention basins, sand filters, infiltration basins, stormwater ponds, tree trench systems, and grit chambers and their design guidance.

Sediment Control

To protect the water resources of the Bassett Creek watershed from increased sediment and associated water quality problems, the BCWMC has established the following policies to encourage land use planning and development that minimizes sediment yield:

1. Provide specific measures to control erosion based on the grade and length of the slopes onsite.

2. The sedimentation ponds will be cleaned on a regular interval determined by calculating the sediment yield expected from the tributary watershed and comparing it to the capacity of the pond.

3. Preservation and improvement of marsh areas for sediment removal by natural filtration is recommended if the natural intrinsic value of the wetland is not adversely affected.

4. The design of storm sewer, stream channel improvements, and channel crossings must consider temporary erosion and sediment reduction measures to be implemented during construction and permanent measures to eliminate erosion and reduce sediment production during operations.

Minnehaha Creek Watershed District

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The Minnehaha Creek Watershed District (MCWD) covers approximately 178 square miles and is home to eight major creeks, 129 lakes, and thousands of wetlands. The MCWD includes all or part of 27 cities and two townships in Hennepin County and Carver County. The MCWD “seeks to conserve the natural resources of the Minnehaha Creek watershed principally through analysis of the causes of harmful impacts on the water resource, public information and education, regulation of land use, regulation of the use of waterbodies and their beds, and capital improvement projects.” The MCWD’s Water Resources Management Plan was adopted in July 2007. It outlines the MCWD’s mission, goals and policies, and implementation plan.

Summary of Goals

Water resources management goals developed by the MCWD are included in Table E.2.

Table E.2 – Minnehaha Creek Watershed District Goals

Goal	Description
GOAL 1	Promote abstraction and filtration of surface water where feasible for the purpose of improving water quality and increasing groundwater recharge throughout the watershed.
GOAL 2	Promote activities which maintain, support, and enhance floral, faunal quantity, and ecological integrity of upland and aquatic resources throughout the watershed.
GOAL 3	Conserve, maintain, and improve aesthetic, physical, chemical, and biological composition of surface waters and groundwater within the District.
GOAL 4	Minimize the risks of threats to public health through the development of programs, plans, and policies that improve the quality of surface and groundwater resources.
GOAL 5	Maintain or reduce existing flows from drainage within the watershed to decrease the negative effects of stormwater runoff and bounce from existing and proposed development, as well as provide low flow augmentation to surface waters.
GOAL 6	Preserve the natural appearance of shoreline areas and minimize degradation of surface water quality which can result from dredging operations.
GOAL 7	Maintain the hydraulic capacity of and minimize obstruction to navigation without compromising wildlife habitat in water courses and preserve water quality and navigation appearance in shoreland areas.
GOAL 8	Improve water quality by promoting BMPs requiring their adoption in local plans and their implementation on development sites.
GOAL 9	Enhance public participation and knowledge regarding District activities and provide information and educational material to municipalities, community groups, businesses, schools, developers, contractors, and individuals.
GOAL 10	Maintain public ditch systems within the District as required under Statutory jurisdiction.
GOAL 11	Preserve, create, and restore wetland resource and maximize the benefits and functionality of wetlands to the watershed.
GOAL 12	Protect and maintain existing groundwater flow, promote groundwater recharge, and improve groundwater quality and aquifer protection.
GOAL 13	Reduce the severity and frequency of flooding and high water by preserving and increasing the existing water storage capacity below 100-year flood elevations on all waterbodies within MCWD.
GOAL 14	Promote the recreational use, where appropriate, of surface waters within MCWD by providing recreation opportunities for citizens by promoting the use and enjoyment of water resources with the intent of increasing the livability and quality of life within the watershed.
GOAL 15	Control temporary sources of sediment resulting from land disturbance and identify, minimize, and correct the effects of sedimentation from erosion-prone and sediment source areas.
GOAL 16	Promote effective planning to minimize the impact of development and land use change on water resources, as well as achieve watershed District goals.
GOAL 17	Solicit input from the general public with the intent that policies, projects, and programs will address local community values and goals, as well as protect historic and cultural values regarding water resources; strive to manage expectations; base decision on an educated public; and, foster an educated and informed public within the watershed.

Source: MCWD

Summary of Rules

MCWD rules seek to:

- Protect public health and welfare and the natural resources by reasonable regulation of the modification or alteration of lands and waters on the MCWD.
- Reduce the severity and frequency of flooding and high water.

- Preserve floodplains and wetlands.
- Improve the chemical and physical quality of surface water.
- Reduce sedimentation.
- Preserve hydraulic and navigational capacity of waterbodies.
- Preserve natural shoreland features.
- Minimize public expectations to avoid or correct such problems in the future.

A synopsis of the MCWD rules is presented below.

Illicit Discharge Detection and Elimination Rule

The MCWD's Illicit Discharge Detection and Elimination Rule states that the District will regulate illicit connections and discharges of pollutants into its MS4 system and watercourses in the watershed.

Any new direct connection to or replacement of and existing connection to the District's MS4 will require obtaining a permit from the District. All illicit connections and illicit discharges into the District's MS4 system or District watercourses are prohibited.

Floodplain Alteration Rule

The MCWD's Floodplain Alteration Rule states that it is the MCWD Board of Managers' policy to:

- Preserve existing water storage capacity below the 100-year high water elevations on all waterbodies in the watershed to minimize the frequency and severity of high water.
- Minimize development below 100-year high water elevations that will unduly restrict flood flows or aggravate known high water problems.
- Mitigate historical losses in floodplain volume and promote the conservation and restoration of floodplain habitat where feasible.
- Promote uniform and consistent application of floodplain regulation throughout the watershed.
- Promote the natural functions and benefits of floodplains.

The MCWD Board of Managers will conduct the floodplain management program and review all projects proposed within the 100-year floodplain. Floodplain alteration criteria will guide the Board of Managers' review of developments and redevelopments within the floodplain. Local Stormwater Management Programs (SWMPs) must include floodplain management strategies. The Board of Managers will review these floodplain management strategies for conformity with this rule and will transfer permitting authority for floodplain alterations if local floodplain ordinances conform to MCWD's Floodplain Alteration Rule.

Wetland Protection Rule

The MCWD's Wetland Protection Rule states that it is the policy of the District to:

- Achieve no net loss in the quantity, quality, and biological diversity of Minnesota's existing wetlands.
- Avoid or minimize direct or indirect impacts from activities that destroy or diminish the quantity, quality, and biological diversity of wetlands and rectify the impact of any such activity by repairing, rehabilitating, or restoring the affected wetland environment.
- Reduce or eliminate the impact of such activity over time by preservation and maintenance operation during the life of the activity.
- Compensate for the impact on the wetlands by restoring a wetland or replacing or providing substitute wetland resources or environments.
- Promote competent administration of the WCA within the watershed.

The United States Army Corps of Engineers (USACE) potentially has jurisdiction over all wetlands in Minnesota. The MNDNR, through a USACE/MNDNR general permit, currently has authority to preserve protected waters and wetlands. The wetlands under the MNDNR's jurisdiction include most types 3, 4, and 5 wetlands as defined in the U.S. Fish and Wildlife Circular No. 39. The MNDNR requires a permit for changes to a protected water or wetland. BWSR provides administrative guidance over implementation of the WCA of 1991.

The MCWD serves as the LGU for implementing the WCA where LGU authority has not been obtained by a municipality. MCWD Wetland Protection Rule applies to types 1, 2, 3, 4, 5, 6, 7, and 8 wetlands. It also includes requirements for wetland buffers, restrictions for excavation in wetlands, and for locating replacement wetlands. Local SWMPs must incorporate the requirements of the Wetland Protection Rule or continue to allow the MCWD to regulate wetland protection. In addition, cities shall assess functions and values by utilizing one of several methodologies listed in the WCA Rules. Cities issuing permits for work in and around wetlands will inform the permittee that these activities may also need MNDNR and USACE permits prior to approval of the local permit.

Stormwater Management Rule

It is the policy of the District to:

- Promote abstraction of precipitation and stormwater runoff where feasible for the purposes of improving water quality, increasing groundwater recharge, reducing flooding, and promoting the health of native and designed plant communities and landscapes.
- Preserve, maintain, and improve the aesthetic, physical, chemical, and biological composition of surface waters and groundwater within the District.
- Limit or reduce stormwater runoff from drainage within the watershed to decrease the negative effects of land-disturbing activities on surface water quality and flooding.
- Protect and maintain existing groundwater flow, promote groundwater recharge, and improve groundwater quality and aquifer protection.

- Promote the preservation and use of native vegetation for stormwater runoff abstraction and pollutant load reduction.
- Promote non-degradation of water quality from new development and improvement in water quality from redevelopment.
- Promote the management of stormwater onsite for the purposes of providing local groundwater recharge and maintaining natural hydrology.

The District's Stormwater Management Rule covers developments of land for residential, commercial, industrial, institutional, or public roadway uses. It also covers redevelopment and additions to existing development. It directs permit applicants to apply for a permit and prepare a local stormwater management plan for the individual project. It also directs them to prepare an erosion control plan for construction and land development activities. The MCWD Board of Managers will transfer permit and review authority to communities that have approved stormwater management plans. An approved stormwater management plan will conform to the Stormwater Management Rule and will implement equal or equivalent design criteria for stormwater quantity and quality and require equal or equivalent exhibits. The MCWD Board of Managers will consider any variance requested from these local stormwater management plans.

Erosion Control Rule

The MCWD Board of Managers requires preparation and implementation of erosion control plans for land-disturbing activities to limit erosion from wind and water, reduce slow volumes and velocities of stormwater moving offsite, reduce sedimentation into waterbodies, and protect soil stability during and after site disturbance. Sediment and erosion control should reflect the following principles:

- Minimize, in area and duration, exposed soil and unstable soil conditions.
- Minimize disturbance of natural soil cover and vegetation.
- Protect receiving waterbodies, wetlands, and storm sewer inlets.
- Retain sediments from disturbed properties onsite.
- Minimize unintentional offsite sediment transport on trucks and equipment.
- Minimize work in and adjacent to waterbodies and wetlands.
- Maintain stable slopes.
- Avoid steep slopes and the need for high cuts and fills.
- Minimize disturbance to the surrounding soils, root systems and trunks of trees, and vegetation adjacent to site activity that are intended to be left standing.
- Prevent and/or mitigate the compaction of site soils.

The MCWD Board of Managers requires cities to adopt the MPCA BMPs and put these into their local SWMP. These BMPs will meet the MCWD Board of Managers' Erosion and Sedimentation Control policies. MCWD approval of individual local SWMPs will require cities to take responsibility for enforcing erosion and sedimentation control plans for all development and redevelopment sites through their normal permitting procedures. This includes erosion control provisions for small sites associated with building permits, driveway permits, and grading permits.

Local SWMPs must also require documentation that the project has received a NPDES Stormwater Permit from the MPCA (if required by the MPCA). The MCWD Board of Managers policy requires landowners proposing to develop land to prepare an erosion and sediment control plan for all construction activities that remove or disturb existing protective cover. The developer must have city approval of this plan before starting any construction. The SWMP must address sediment containment. The local SWMP must also require establishing permanent vegetative cover as soon as construction is complete. The erosion and sediment control plan must outline the direction of all site runoff and the location of erosion control measures. Structural methods for erosion control may include, but are not limited to, silt fences, hay bale barriers, diversion dikes, and sedimentation basins. The local SWMP shall also require installation of structural measures in accordance with the manufacturers' specifications and accepted MPCA guidelines. Non-structural methods include, but are not limited to, natural plant barriers, phased development practices, and grading practices that minimize slopes. Local SWMPs must require employing these methods in accordance with accepted engineering standards and in accordance with the MPCA BMPs.

The erosion control plan must temporarily and permanently replace plant cover. These practices include, but are not limited to, seeding, mulching, and sodding. Local SWMPs must require proper care of all structural and non-structural erosion control measures that must remain in place until the establishment of permanent plant cover. The MCWD Board of Managers recommends that LGUs obtain a surety to make sure that the developer adequately carries out the plan.

Shoreline and Streambank Improvements Stabilization Rule

The MCWD Board of Managers adopted shoreline stabilization rules to:

- Preserve and enhance the natural appearance and function of shorelines and streambanks.
- Preserve and enhance wildlife, fisheries, and recreational resources of surface waters.
- Ensure that the surface water quality and ecological integrity of the riparian environment is not compromised because of stabilization practices.
- Assure that improvement of shoreline and streambank areas to prevent erosion complies with accepted engineering principles in conformity with MNDNR construction guidelines.
- Encourage and foster the use of bioengineering, lakescaping, and conservation of natural vegetation as preferred means of stabilizing shorelines and streambanks.
- Discourage the use of beds and banks of waterbodies for the placement of roads, highways, and utilities.

The MCWD Board of Managers encourages cities to adopt and carry out ordinances to protect shoreland. These shoreland ordinances shall address the control of shoreland development as identified in the 1989 MNDNR *Statewide Standards for Management of Shoreland Areas*. The cities have the responsibility to administer and enforce these shoreline management regulations. The MCWD Shoreline and Streambank Stabilization Rule applies to shoreline and streambank improvements. The MCWD Board of Managers may delegate permitting authority for shoreline improvements to the cities if the Board of Managers decides that member cities have either made this rule part of their local shoreline ordinance or their ordinance does the same thing.

Stream and Lake Crossings Rule

The MCWD Stream and Lake Crossings Rule discourages the use of lake beds and beds of waterbodies for the placement of roads, highways, and utilities. The Rule further lists criteria, which stream and lake crossing projects must meet. Local SWMPs will be reviewed for conformity to the Rule.

Mississippi Watershed Management Organization

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Boundaries of the MWMO include the Mississippi River as it runs through the City of Minneapolis, as well as the land that drains to the river. The MWMO contains portions of the City of Lauderdale, the City of Minneapolis, the City of Saint Anthony, and the City of Saint Paul. The final member of the MWMO is the MPRB. The MWMO provides for the long-term management of its water and associated land resources through the development and implementation of projects, programs, and policies that respect ecosystem principles and reflect changing community values. The MWMO assists and cooperates with member cities, other units of government, non-profit agencies, and a variety of groups in managing its water resources to achieve this vision.

The MWMO adopted its Water Resources Management Plan in 2011 with plan amendments adopted in 2012, 2013, and 2015. The MWMO Plan presents the organization's missions, its goals and policies, and its priorities for implementation.

The primary purpose of the MWMO Plan is to provide for the wise, long-term management of the water and associated natural resources within the watershed through implementation measures that realize multiple objectives, respect ecosystem principles, and reflect community values.

Summary of Goals

Water resources management goals developed by the MWMO are included in Table E.3.

Table E.3 – Mississippi Watershed Management Organization Goals

Goal	Description
GOAL 1	Implement water quality initiatives to protect, maintain, or improve the water quality of the Mississippi River and other water resources within the MWMO.
GOAL 2	Implement water rate and volume initiatives to protect downstream resources from the impacts of high stormwater runoff volumes, limit the frequency at which flood damage occurs, and reduce the severity and frequency of drought-like conditions.
GOAL 3	Implement monitoring and data assessment initiatives to assemble the best scientific data to inform water resource decision making and to identify successful implementation of stormwater management practices based on water quality and quantity trends.
GOAL 4	Implement communication and outreach initiatives to increase citizen awareness of water resource issues and communicate the value of resource stewardship so that citizens action positively impacts MWMO water and natural resources.
GOAL 5	Implement ecosystem health initiative to protect, create, and enhance vegetated areas, native plant communities, habitat, open space, and public infrastructure.
GOAL 6	Implement regulations and enforcement initiatives to promote consistency across jurisdictions in the standards, compliance and enforcement of regulations for the protection and improvement of water and natural resources.
GOAL 7	Implement urban stormwater management initiative to promote unique and effective stormwater solutions to address the highly-developed urban condition of the watershed.
GOAL 8	Implement emergency preparedness and response initiatives to prepare the MWMO and member organizations to protect water and natural resources in the event of an emergency that threatens the health and function of these resources, and assist them in alleviating damages to resources from emergencies.
GOAL 9	Implement emerging issues initiatives that will both develop awareness of and address changing conditions to protect water and natural resources.
GOAL 10	Implement financial responsibilities and strategy initiative that will fund the protection and improvement of the quality and quantity of water and natural resources through effective, transparent, and responsible utilization and leveraging of funds.

Source: MWMO

Summary of Rules

The MWMO does not issue permits or provide approval letters for construction projects. Instead, it relies on the existing permitting and enforcement bodies of its member cities. The MWMO Board reserves the right to review and comment on plans that affect the quality and quantity of water within and across its watershed and subwatershed boundaries. Local governments are responsible for:

- Maintaining existing and proposed storm drain conveyance systems, including stormwater detention ponds, sewers, and inlet and outlet drainage structures.
- Issuing building and grading permits.
- Performing inspections to ensure compliance during construction.

The MWMO maintains oversight responsibility to monitor local SWMP implementation. If member cities do not follow their approved SWMPs, the MWMO will enforce its standards and rules.

Erosion and Sediment Control

The member communities of the MWMO shall adopt and implement erosion and sediment control standards or ordinances to reduce erosion and sedimentation. Member cities shall also follow the BMPs described in the MPCA document, *Protecting Water Quality in Urban Areas*, or other such documents created by member cities to achieve no adverse impact to receiving waterbodies. Construction activities, including redevelopment, utility installation, and road construction, are required to obtain a NPDES Construction Permit from the MPCA in addition to local permitting requirements.

Shoreline and Floodplain

The MWMO requires its member cities to have on file both a MNDNR approved Floodplain Ordinance and a MNDNR approved Shoreline Ordinance. Where no ordinance is applicable< MWMO requires there be no encroachment on floodways that reduces capacities or expedites flood flows. It is also MWMO policy to allow in the flood zone only those structures that have been protected from high water, either through floodproofing or by other construction techniques recognized and accepted by the MWMO Board.

Land Use

Although specific zoning and land use planning remains with the individual cities, the MWMO urges its member cities to regulate any activities that may cause contamination of surface and groundwater through restrictive permitting, zoning, and licensing.

Stormwater and Drainage Design Performance

The MWMO requires all its member cities to develop stormwater management ordinances that address the following requirements:

- Reduce runoff through coordinated efforts of state and local agencies.
- Update development and enforcement standards for major new construction and redevelopment projects.
- Promote increased stormwater retention in new construction and redevelopment projects.

Shingle Creek Watershed Management Commission

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The Shingle Creek/West Mississippi Watershed covers approximately 67 square miles in east-central Hennepin County. There are ten cities in this watershed, and they jointly manage the water resources in this area through the Shingle Creek and West Mississippi Watershed Management Commissions. The Commissions work jointly for those communities that are members of both the SCWMC and the West Mississippi Watershed Management Commission. The goal of the Commissions is to enhance the water quality of the water resources within their watersheds through public education, analysis of the causes of harmful impacts, regulation of the use of waterbodies, regulation of land use, and capital improvement projects.

The Commissions adopted their First Generation Management Plan in 1990, their Second Generation Plan in 2004, and their Third Generation Plan in 2013.

The SCWMC Plan includes: an updated land and water resources inventory; goals and policies in eight specific areas; an assessment of problems and identification of corrective actions; an implementation program; and, a process for amending the Plan. It describes how the Shingle Creek and West Mississippi Watershed Management Commissions will address activities in the two watersheds in the ten-year period.

Summary of Goals

Water resources management goals developed by SCWMC are included in Table E.4.

Table E.4 – Shingle Creek Watershed Management Commission Goals

Goal	Description
GOAL 1	Maintain the existing 100-year flood profile throughout the watersheds.
GOAL 2	Determine ecological low flows for Shingle Creek and Bass Creek.
GOAL 3	As lake water quality improves, and lakes are removed from the State's Impaired Waters List, implement management strategies to protect lake water quality. It is anticipated that Schmidt Lake, Lower Twin Lake, and Ryan Lake will be removed in 2014.
GOAL 4	Implement phosphorus and sediment load reduction actions sufficient to achieve de-listing from the Impaired Waters List for Bass Lake, Eagle Lake, Crystal Lake, and the Middle Twin Lakes.
GOAL 5	Improve water clarity in the balance of the lakes by 10 percent over the average of the previous ten years.
GOAL 6	Improve at least 30 percent of the length of Shingle Creek to meet Corridor Study and TMDL design standards.
GOAL 7	Maintain non-degradation of all waterbodies compared to 1985 conditions.
GOAL 8	Infiltrate stormwater runoff from new impervious surface.
GOAL 9	Identify opportunities for and implement projects to infiltrate runoff from existing impervious surface.
GOAL 10	Work with the appropriate state agencies to incorporate groundwater assessment into the sustainable water budget analysis for each watershed.
GOAL 11	Maintain the existing functions and values of wetlands identified in the Commission's Water Quality Plan as high priority.
GOAL 12	Informed by the sustainable water budget study, improve functions and values of wetlands.
GOAL 13	Continue current Hennepin County jurisdiction over County Ditch #13.
GOAL 14	Identify and operate within a sustainable funding level that is affordable to member cities.
GOAL 15	Foster implementation of TMDL and other implementation projects by sharing in their cost and proactively seeking grant funds.
GOAL 16	Operate a public education outreach program that meets the NPDES Phase II education requirements for the member cities.
GOAL 17	Operate a monitoring program sufficient to characterize water quantity, water quality, and biotic integrity in the watersheds and to evaluate progress toward meeting TMDL goals.
GOAL 18	Maintain rules and standards for development and redevelopment that are consistent with local and regional TMDLs, federal guidelines, source water and wellhead protection requirements, sustainable water yields, non-degradation, and ecosystem management goals.
GOAL 19	Serve as a technical resource for member cities.

Source: SCWMC

Summary of Rules

SCWMC rules and standards protect the public health, welfare, and natural resources of the watershed by regulating the improvement or alteration of land and waters in the watershed to:

- Reduce the severity and frequency of high water.
- Preserve floodplain and wetland storage capacity.
- Improve the chemical and physical quality of surface waters.
- Reduce sedimentation.
- Preserve the hydraulic and navigational capacities of waterbodies.
- Promote and preserve natural infiltration areas.
- Preserve natural shoreline features.

In addition to protecting natural resources, these rules and standards are intended to minimize future public expenditures on problems caused by the improvement or land and water alterations. A synopsis of SCWMC rules is presented below.

General Standards

- All land-disturbing activities, whether requiring a project review under SCWMC rules or otherwise, shall be undertaken in conformance with BMPs and in compliance with the standards and criteria in the SCWMC rules.
- SCWMC project reviews are required of: any single-family, detached housing project 15 acres or larger in size; projects in any other land use such as commercial, industrial, or institutional 5 acres or larger in size; and, any land-disturbing activity requested by a member city to be reviewed regardless of project size. Projects smaller in size are reviewed by municipalities.
- No personal shall conduct land-disturbing activities without protecting adjacent property and waterbodies from erosion, sedimentation, flooding, or other damage.
- Development shall be planned and conducted to minimize the extent of disturbed area, runoff velocities, and erosion potential, and to reduce and delay runoff volumes. Disturbed areas shall be stabilized and protected as soon as possible and facilities or methods used to retain sediment onsite.
- When possible, existing natural watercourses and vegetated soil surfaces shall be used to convey, store, filter, and retain runoff before discharge into public waters or a stormwater conveyance system.
- When possible, runoff from roof gutter systems shall discharge onto lawns or other pervious surfaces to promote infiltration.

- Use of fertilizers and pesticides in the shoreland protection zone shall be done to minimize runoff into public waters using earth material, vegetation, or both. No phosphorus fertilizer shall be used unless a soil nutrient analysis shows a need for phosphorus or in the establishment of new turf.

- When development density, topographic features, and soil and vegetation conditions are not sufficient to adequately handle runoff using natural features and vegetation, various types of constructed facilities such as diversions, settling basins, skimming devices, dikes, waterways, and ponds may be used. The SCWMC encourages designs using surface drainage, vegetation, and infiltration rather than buried pies and man-made materials and facilities.

- Whenever the SCWMC determines that any land-disturbing activity has become a hazard to any person, endangers the property of another, adversely affects water quality of any waterbody, increases flooding, or otherwise violated SCWMC rules, the SCWMC shall notify the member city where the problem occurs and the member city shall require the owner of the land upon which the land-disturbing activity is located, or other person or agent in control of such land, to repair or eliminate such condition within the time period specified therein. The owner of the land upon which a land disturbing activity is located shall be responsible for the cleanup and any damages from sediment that has eroded from such land. The SCWMC may require the owner to submit a project review application under SCWMC rules before undertaking any repairs or restoration.

Stormwater Management

No person or political subdivision shall commence a land-disturbing activity or the development or redevelopment of land for the following types of projects without first submitting to and obtaining approval of a project review from the SCWMC or member city that incorporates a stormwater management plan for this activity, development, or redevelopment:

- Plans of any land development or site development of 1 acre or larger for single-family detached housing use and 0.5 acres or larger for all other land uses.

- Plans of any land development or individual site development adjacent to or within a lake, wetland, or a natural or altered watercourse, as listed in the final inventory of Protected Waters and Wetlands for Hennepin County, as prepared by the MNDNR.

- Plans for any land development or site development within the 100-year floodplain, as defined by the Flood Insurance Study for the member city.

- Plans of any land development or site development regardless of size, if such review is requested by a member city.

- Single-family developments of more than 15 acres that drain to more than one watershed, for that portion of the site draining into Shingle Creek/West Mississippi Watershed.

- Linear projects that create one acre or more of new impervious surface.

Erosion and Sediment Control

No person or political subdivision shall commence a land-disturbing activity or the development or redevelopment of land for: any single-family detached housing project 15 acres or larger in size; projects in any other land use such as commercial, industrial, or institutional 5 acres or larger in size; linear projects that create one acre or more of new impervious surface; or, any land-disturbing activity requested by a member city to be reviewed regardless of project size without first submitting to and obtaining approval of a project review from the SCWMC that incorporates an erosion and sediment control plan for the activity, development, or redevelopment.

Floodplain Alteration

No person or political subdivision shall alter or fill land below the 100-year critical flood elevation of any public waters, public waters wetland, or other wetland without first obtaining an approved project review from the SCWMC.

Wetland Alteration

No person or political subdivision shall drain, fill, excavate, or otherwise alter a wetland without first obtaining the approval of a wetland replacement plan from the LGU with jurisdiction over the activity.

Bridge and Culvert Crossings

No person or political subdivision shall construct or improve a road or utility crossing across Shingle Creek or any watercourse with a tributary area more than 100 acres without first submitting to the SCWMC and receiving approval of a project review.

Buffer Strips

No person or political subdivision shall commence a land-disturbing activity or the development or redevelopment of land for: any single-family detached housing project 15 acres or larger in size; projects in any other land use such as commercial, industrial, or institutional 5 acres or larger in size; any land-disturbing activity requested by a member city to be reviewed regardless of project size; or, on land that contains or is adjacent to a watercourse or wetland without first submitting to and obtaining approval of a project review from the SCWMC that incorporates a vegetated buffer strip between the development or redevelopment and the watercourse or wetland.

Appendix E – Monitoring and Assessment Reports: Minneapolis Water Resources

Minneapolis
City of Lakes

The following tables contain an inventory of water quality reports and studies for City of Minneapolis (City) water resources. The information is organized according to stream or lake name. Titles and time of publication of reports to each stream or lake are listed long with the organization responsible for their authorship and a brief description. Lakes and streams in the City that are not contained in this inventory have no monitoring data or assessment studies. Stormwater or Stormwater Management Practices (SMP) studies are contained within the inventory of that study's tributary water resource. All information has been collected by public organizations, including: the City; the Minneapolis Park and Recreation Board (MPRB); Federal, state, and regional governments; and, non-profit organizations. Privately collected data and studies are not included in this inventory. The primary focus of this inventory is to present data that has been published and assessed. This inventory does not include data that has been collected but has not been assessed and summarized into a publication. A full range of monitoring data is available through a waterbody search on the MPCA Environmental Data webpage and the Metropolitan Council's Key Water Information Catalogue.

The organizations responsible for these publications include:

- Bassett Creek Watershed Management Commission (BCWMC)
- Minneapolis Park and Recreation Board (MPRB)
- Minneapolis Public Works (MPW)
- Minnehaha Creek Watershed District (MCWD)
- Minnesota Department of Natural Resources (MNDNR)
- Minnesota Department of Transportation (MnDOT)
- Minnesota Pollution Control Agency (MPCA)
- Mississippi Watershed Management Organization (MWMO)
- Rice Creek Watershed District (RCWD)
- Shingle Creek Watershed Management Commission (SCWMC)
- United States Army Corps of Engineers (USACE)
- United States Environmental Protection Agency (EPA)
- United States Geological Survey (USGS)
- Volunteer Stream Monitoring Partnership (VSMP)

Bassett Creek

Report Name/Date	Agency Responsible	Type of Study	Description
Bassett Stormwater Monitoring Study (1992)	BCWMC	Monitoring and Assessment Report	
A Biotic Index Evaluation of Bassett Creek and Plymouth Creek (1995, 2000, 2012, 2015)	BCWMC	Monitoring and Assessment Report	Summary of macroinvertebrate monitoring. Study analyzed the water quality using biotic indices.
Watershed Outlet Monitoring (1998-Ongoing)	MPRB, Metropolitan Council, MCWD, BCWMC	Monitoring Activity	Flow monitoring and water quality sampling.
2003 and 2004 Water Quality Study of Wirth Lake (MPRB) and Bassett Creek (2003, 2004)	BCWMC	Studies and Reports	
Upper Mississippi River Bacteria TMDL and Protection Plan (2004)	BCWMC, MPCA, EPA	TMDL Study	Main stem of Bassett Creek TMDL analysis included in the Upper Mississippi plan.
Bassett Creek E. coli Bacteria Monitoring (2010)	BCWMC, Barr Engineering	Monitoring and Assessment Memorandum	Water samples were collected to analyze Bassett Creek for E. coli.
Comprehensive Water Quality Assessment of Select Metropolitan Area Streams (2014)	Metropolitan Council	Monitoring and Assessment Report	Water quality assessment of monitored streams. Provides average annual concentrations of total suspended solids, total phosphorus, nitrate, and chloride from 2003-2012.
Upper Mississippi River Bacteria TMDL Implementation Plan (2016)	BCWMC, MPCA, EPA	TMDL Implementation Plan	Set goals for reduction in bacteria load to meet waste load allocations.
Macroinvertebrate Surveys (Ongoing)	River Watch, VSMP, BCWMC, MCWD, SCWMC	Survey and Assessment	Completed by trained volunteers. Also includes Minnehaha Creek and Shingle Creek.
Water Quality Monitoring Report (2015, 2016)	MDA	Monitoring	Annual pesticide monitoring of groundwater and surface water at select locations in Minnesota. Bassett Creek sampled from 2006 through 2016 at Irving Avenue North.

Brownie Lake

Report Name/Date	Agency Responsible	Type of Study	Description
Water Resources Reports (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels
Water Quality Report (2015)	MCWD	Report	Total phosphorus in the Minnehaha Creek Subwatershed increased due to heavy precipitation.

Cedar Lake

Report Name/Date	Agency Responsible	Type of Study	Description
Green Report (1993)	Water Quality Management Citizen Advisory Committee	Report	Evaluated Chain of Lakes and recommended preservation action.
Constructed Wetlands Monitoring for Pollutant Removal and Performance Assessment (1999-2001)	MPRB, Metropolitan Council	Monitoring Activity	▪ Cedar Meadows ▪ SENA wetland ▪ Lake Harriet subsurface flow wetland
Chain of Lakes Alum-Macrophyte Interaction (2002)	MPRB	Studies and Reports	Study conducted to investigate and document the efficiency of alum treatment in Lake Calhoun/Bde Maka Ska, Lake Harriet, and Lake of the Isles
Water Resources Reports (Annual)	MRPB	Monitoring Report	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels
Water Quality Monitoring Report (2015, 2016)	MDA	Monitoring	Annual pesticide monitoring of groundwater and surface water at select locations in Minnesota. Cedar Lake monitored in 2008.

Crystal Lake

Report Name/Date	Agency Responsible	Type of Study	Description
TMDL Study (2009)	SCWMC, MPCA	TMDL Study	Listed for excess phosphorus concentration.
TMDL Implementation Plan (2009)	MPCA	TMDL Implementation Plan	Introduces an implementation plan to reduce average phosphorus loading by 72 percent.
Citizen Assisted Lake Monitoring Program (Ongoing)	SCWMC, Metropolitan Council	Monitoring and Assessment	Monitoring conducted bi-weekly by citizen volunteers.
Crystal Lake Nutrient TMDL Five Year Review (2017)	SCWMC	Report	Review of completed implementation actions and progress toward meeting TMDL load reductions and other goals.
Annual Water Quality Report (Ongoing)	SCWMC	Monitoring and Assessment	Water quality, fish, and aquatic vegetation monitoring conducted periodically by Commission technical staff.

Diamond Lake

Report Name/Date	Agency Responsible	Type of Study	Description
Diamond Lake Management Plan (2009)	MPRB, Friends of Diamond Lake	Assessment	Includes history of Diamond Lake, monitoring information, and recommended actions to improve habitat and water quality.
Diamond Lake Watershed Monitoring and Modeling Project (2009)	MnDOT	Monitoring and Assessment Report	Evaluation of pollutant loading and its effect on water quality in Diamond Lake. Measured metals in stormwater runoff and looked at treatment efficiency of Lake Mead Stormwater Pond.
Water Resources Reports (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels

Grass Lake

Report Name/Date	Agency Responsible	Type of Study	Description
MPRB Sampling Program (2002)	MPRB	Survey and Assessment	Water samples were collected to analyze water quality.
Water Resources Reports (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels

Lake Calhoun/Bde Maka Ska

Report Name/Date	Agency Responsible	Type of Study	Description
Green Report (1993)	Water Quality Management Citizen Advisory Committee	Report	Evaluated Chain of Lakes and recommended preservation actions.
Calhoun Wetland Pond Performance Report (1999)	MCWD	Monitoring and Assessment Report	Monitored flow in Lake Calhoun/Bde Maka Ska and three tributary ponds to document pollutant removal.

Report Name/Date	Agency Responsible	Type of Study	Description
TMDL (2007-Ongoing)	MPCA	TMDL Study	Statewide TMDL approved for mercury in fish tissue.
Chain of Lakes Alum-Macrophyte Interaction Assessment (2002)	MPRB	Studies and Reports	Study conducted to investigate and document the efficiency of alum treatment in Lake Calhoun/Bde Maka Ska, Lake Harriet, Cedar Lake, and Lake of the Isles
Water Resources Report (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels
PFOS Monitoring (2014-2016)	MPCA	Monitoring	PFOS impairment addressed through regulatory action rather than a TMDL study.

Lake Harriet

Report Name/Date	Agency Responsible	Type of Study	Description
Pesticide Study: Lake Harriet Watershed Site 1 (1992-1995)	MPRB	Studies and Reports	Water and street sweeping samples were taken and analyzed for pesticides.
Green Report (1993)	Water Quality Management Citizen Advisory Committee	Report	Evaluated Chain of Lakes and recommended preservation actions.
Constructed Wetlands Monitoring for Pollutant Removal and Performance Assessment (1999-2001)	MPRB, Metropolitan Council	Monitoring Activity	▪ Cedar Meadows ▪ SENA wetland ▪ Lake Harriet subsurface flow wetland
Chain of Lakes Alum-Macrophyte Interaction Assessment (2002)	MPRB	Studies and Reports	Study conducted to investigate and document the efficiency of alum treatment in Lake Calhoun/Bde Maka Ska, Lake Harriet, Cedar Lake, and Lake of the Isles.
Water Resources Reports (Annual)	MPRB	Monitoring Repot	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels

Report Name/Date	Agency Responsible	Type of Study	Description
Water Quality Monitoring Report (2015, 2016)	MDA	Monitoring	Annual pesticide monitoring of groundwater and surface water at select locations in Minnesota. Lake Harriet monitored in 208 and 2010.

Lake Hiawatha

Report Name/Date	Agency Responsible	Type of Study	Description
Report and Recommendations for the Management of Lake Nokomis and Lake Hiawatha (1998)	Blue Water Commission	Assessment and Report	Contains concerns and recommended solutions regarding the water quality of Lake Nokomis and Lake Hiawatha. It found that the lakes were eutrophic.
Lake Hiawatha and Minnehaha Creek Fish Survey (2009)	MCWD	Survey	Conducted at four sites along the 22-mile Minnehaha Creek corridor. Found that black bullheads, carp, dogfish, and white suckers were the most common species. Low-oxygen tolerant species dominated, likely having adverse effects on water quality.
Water Resources Reports (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels
Minnehaha Creek E. Coli Bacteria/Lake Hiawatha Nutrients TMDL (2013)	EPA	TMDL Plan	Part of the Minnehaha Creek *E. coli* Bacteria Study.

Lake of the Isles

Report Name/Date	Agency Responsible	Type of Study	Description
Green Report (1993)	Water Quality Management Citizen Advisory Committee	Report	Evaluated Chain of Lakes and recommended preservation actions
Chain of Lakes Alum-Macrophyte Interaction Assessment (2002)	MPRB	Studies and Reports	Study conducted to investigate and document the efficiency of alum treatment in Lake Calhoun/Bde Maka Ska, Lake Harriet, Cedar Lake, and Lake of the Isles.
Water Resources Reports (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton

Report Name/Date	Agency Responsible	Type of Study	Description
			▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels

Lake Nokomis

Report Name/Date	Agency Responsible	Type of Study	Description
Report and Recommendations for the Management of Lake Nokomis and Lake Hiawatha (1998)	Blue Water Commission	Assessment and Report	Contains concerns and recommended solutions regarding the water quality of Lake Nokomis and Lake Hiawatha. It found that the lakes were eutrophic.
Minnehaha Creek Watershed Lakes (2011)	MCWD, MPCA, EPA	TMDL Study	Excess nutrient TMDL study, currently in implementation. Lake Nokomis was part of the overall Minnehaha Creek Watershed Lakes analysis.
Biomanipulation Study (2010-2013)	MCWD	Study and Improvement	Management of lake fish population. Succeeded in increasing the walleye population, reducing the black bullhead and blue gill populations, and observing an increase of the population of native aquatic plants.
Water Resources Reports (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels
Phosphorus Reduction Plan (2016)	MCWD	TMDL Implementation Plan	Focuses on redevelopment and retrofits on private property to reduce nutrient loading.
Water Quality Monitoring Report (2015, 2016)	MDA	Monitoring	Annual pesticide monitoring of groundwater and surface water at select locations in Minnesota. Lake Nokomis monitored in 20017 and 2012.

Loring Lake

Report Name/Date	Agency Responsible	Type of Study	Description
Water Resources Reports (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level

Report Name/Date	Agency Responsible	Type of Study	Description
			▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels

Minnehaha Creek

Report Name/Date	Agency Responsible	Type of Study	Description
Macroinvertebrate Surveys (Ongoing)	River Watch, VSMP, BCWMC, MCWD, SCWMC	Survey and Assessment	Completed by trained volunteers. Also includes Bassett Creek and Shingle Creek. Monitoring goal is to provide conditions necessary to support a healthy macroinvertebrate community.
Monitoring of Flows and Water Levels at Hiawatha Avenue (Ongoing)	MCWD, USGS	Monitoring	Real time data available at the USGS National Water Information System: Web Interface station 05289200.
Watershed Outlet Monitoring (1998-2013)	MPRB, Metropolitan Council, MCWD, BCWMC	Monitoring Activity	Flow monitoring and water quality sampling. Also completed at Bassett Creek.
Minnehaha Creek Monitoring Information (2001)	Metropolitan Council	Monitoring and Assessment Report	Monitoring of stream flow and macroinvertebrate populations. Water samples also analyzed.
Constructed Wetlands Monitoring for Pollutant Removal and Performance Assessment (1999-2001)	MPRB, Metropolitan Council	Monitoring Activity	▪ Cedar Meadows ▪ SENA wetland ▪ Lake Harriet subsurface flow wetland
Hydrologic/Hydraulic and Pollutant Loading Study (2003)	MCWD	Study	Documentation and quantification of the watershed's hydrologic and hydraulic properties. Identifies existing water management issues resulting from current and past land uses, defines the impact of future land use changes, and recommends how MCWD can address these changes.
Minnehaha Creek Visioning Partnership Final Report (2005)	MCWD, USACE	Report	Recommendations for future management of the Creek. Erosion control and support of aquatic life were the highest priorities for improvement.
Lake Hiawatha and Minnehaha Creek Fish Survey (2009)	MCWD	Survey	Conducted at four sites along the 22-mile Minnehaha Creek corridor. Found that black bullheads, carp, dogfish, and white suckers were the most common species. Low-oxygen tolerant species dominated, likely having adverse effects on water quality.
Comprehensive Water Quality Assessment of Select	Metropolitan Council	Monitoring and Assessment Report	Water quality assessment of monitored streams. Provides information on pollutants, trend

Report Name/Date	Agency Responsible	Type of Study	Description
Metropolitan Area Streams (2014)			analysis, and macroinvertebrate assessment.
Minnehaha Creek E. Coli Bacteria/Lake Hiawatha Nutrients TMDL (2013)	EPA	TMDL Plan	Described E. coli exceedance and strategies to manage the bacteria.
Minnehaha Creek Base Flow Study	MCWD, MWMO, University of Minnesota	Monitoring	Study of the hydrology in the Minnehaha Creek watershed. Seeks an understanding of what portion of the Creek's water is sourced from Lake Minnetonka, stormwater, and groundwater and to track changes over time. Aims to prevent dry period by increasing base flow.
Zebra Mussel Monitoring (Ongoing)	MCWD	Monitoring	Tracking the presence of zebra mussels.
Ecosystem Evaluation Program (E-Grade, Under Development)	MCWD	Monitoring and Assessment	Evaluated watershed ecosystems to determine the overall health of the system.
Water Quality Monitoring Report (2015, 2016)	MDA	Monitoring	Annual pesticide monitoring of groundwater and surface water at select locations in Minnesota. Minnehaha Creek sampled from 2006 through 2016 at 32nd Avenue South.

Mississippi River

Report Name/Date	Agency Responsible	Type of Study	Description
Mississippi Watershed Management Organization Monitoring Program (Ongoing)	MWMO	Monitoring Activity	Monitoring at eight locations along the Mississippi River, five stormwater outfalls, and Loring Pond. Monitors for fecal coliform, and E. coli at all points. Also monitors various physical and chemical parameters at the stormwater outfalls.
Upper Mississippi (1994-Ongoing)	USGS	Monitoring and Assessment Report	Monitoring to describe the status of, and trends in, the quality of the nation's streams and rivers.
Environmental Pool Plans-Mississippi River Pools 1-10 (2004)	USACE	Monitoring and Assessment Reports	Highlighted the areas of habitats and specific habitat features that should be preserved along the River.
Upper Mississippi River Bacteria TMDL and Protection Plan (2004)	MPCA, EPA	TMDL Study	Summarized the impaired reaches of the Mississippi River and the plan for protecting these areas.
Upper Mississippi River Bacteria TMDL Implementation Plan (2016)	MPCA, EPA	TMDL Implementation Plan	Sets goals for reduction in bacteria load to meet waste load allocations.
Aquatic Life Water Quality Standards Draft Technical Support Document for Total Suspended Solids (2011)	MPCA	Monitoring and Assessment Reports	Assessed the turbidity and suspended solids water quality standards along the Mississippi River.
Mississippi River Pools 1 through 8: Developing River,	MPCA	Monitoring and Assessment Report	Assessed each pool of the Mississippi River to refine the eutrophication status for each pool

Report Name/Date	Agency Responsible	Type of Study	Description
Pool, and Lake Pepin Eutrophication Criteria (2012)			and to establish water quality criteria.
Lock and Dam #1 Sample Analysis (Ongoing)	Metropolitan Council	Monitoring and Assessment	Samples are collected at Lock and Dam #1 and analyzed on a weekly, bi-weekly, or monthly basis based on the parameter being analyzed.
Macroinvertebrate Monitoring (1996-Ongoing)	SCWMC	Monitoring and Assessment Reports	Macroinvertebrate study that assessed the health of Shingle Creek. The study was conducted to understand the effects of changes in the urban environment on both Shingle Creek and the Mississippi River.
Mississippi River – Twin Cities Watershed Monitoring and Assessment Report (2013)	MPCA	Monitoring and Assessment	Demonstrates that the watershed is exhibiting signs of pollution including nutrients, bacteria, and suspended solids.
South Metro Mississippi River Total Suspended Solids Total Maximum Daily Load (October 2015)	MPCA	TMDL Study	Concludes that municipalities upstream of Lock and Dam #1 are not required to implement additional actions to reduce the load of total suspended solids related to stormwater discharges.

Powderhorn Lake

Report Name/Date	Agency Responsible	Type of Study	Description
Powderhorn Park Restoration Project (Diagnostic Study and Implementation Plan) (1999)	MPRB, MPW	Survey and Assessment	Assessment of lake and development of a work plan that led to many of the Powderhorn Lake Improvements.
Water Resources Reports (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results of monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels

Ryan Lake

Report Name/Date	Agency Responsible	Type of Study	Description
Ryan Lake TMDL Study (2007)	SCWMC, MPCA, EPA	Survey and Assessment	Monitoring information for Ryan Lake. Created an implementation plan with the goal of reducing phosphorus loading.
Water Resources Report (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results of monitoring data, including:

Report Name/Date	Agency Responsible	Type of Study	Description
			▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels
Twin and Ryan Lakes Nutrient TMDL Five Year Review (2014)	SCWMC	Report	Annual Water Quality Report (ongoing).
Annual Water Quality Report (Ongoing)	SCWMC	Monitoring and Assessment	Water quality, fish, and aquatic vegetation monitoring conducted periodically by Commission technical staff.

Shingle Creek

Report Name/Date	Agency Responsible	Type of Study	Description
Shingle Creek Water Quality Data (1995)	USGS	Studies and Reports	Trace elements were analyzed in streambed sediment and fish tissue as a part of the National Water Quality Assessment Program.
Shingle Creek TMDL (1996)	USGS	Monitoring and Assessment Reports	USGS collected chemical and biological samples in Shingle Creek as part of the National Water Quality Assessment Program.
Shingle Creek Flow and Water Quality Data (1996-Ongoing)	USGS, MNDNR	Studies and Reports	Real time data available at USGS Water Resources web interface for site USGS 05288105.
Stream Monitoring Program (1996-Ongoing)	SCWMC	Monitoring and Assessment Reports	Samples are collected from March to November and analyzed for total phosphorus, dissolved phosphorus, volatile suspended solids, chemical oxygen demand, and chloride.
Macroinvertebrate Monitoring (1996-Ongoing)	SCWMC	Monitoring and Assessment Reports	Macroinvertebrate study to assess the health of Shingle Creek. The study is important to understand the effects of changes in the urban environment on both Shingle Creek and the Mississippi River.
Rapid Bioassessment Sampling (1996, updated 1997)	SCWMC	Monitoring and Assessment Reports	Biological sampling and habitat assessment was conducted to analyze invertebrate community abundance and diversity.
Shingle Creek Channel Profile (1998)	SCWMC	Monitoring and Assessment Reports	A profile survey and an inspection of Shingle Creek was performed, noting erosion, blockages, bank failures, and the need for repairs.
Shingle Creek Natural Area Management Plan (2002)	MPRB	Monitoring and Assessment Reports	An ecological inventory, stream analysis, and trails and interpretive opportunities assessment. Potential areas for recreation and

Report Name/Date	Agency Responsible	Type of Study	Description
			management strategies were identified and recommendations made for stream and trail improvements.
Upper Mississippi River Bacterial TMDL and Protection Plan (2014)	MPCA	TMDL Report	Study included monitoring station on Shingle Creek at 45th Avenue North.
Shingle Creek Chloride (2005)	SCWMC	Survey and Assessment	Spatial extent, persistence, and severity of chloride exceedances; identification and quantification of the sources of chloride in Shingle Creek including point and non-point sources; allocation of Shingle Creek's assimilative capacity to both point and non-point sources; and, development of safety margins protective of State water quality standards.
Shingle Creek Chloride TMDL Report (2007)	SCWMC, EPA, Hennepin County, MnDOT	TMDL Report	Report of the results of the Shingle Creek chloride TMDL study. Recommendations for reducing chloride loads into Shingle Creek.
Shingle Creek Chloride TMDL Report (2007)	SCWMC, MPCA, Hennepin County, MnDOT	TMDL Implementation Plan	Recommendations for reducing chloride loads into Shingle Creek.
Shingle Creek and Bass Creek Biota and Dissolved Oxygen TMDL (2011)	SCWMC, MPCA	TMDL Study	Identified low oxygen levels in Shingle Creek as the likely cause of biotic integrity of both streams. Recommendations on how to increase dissolved oxygen levels.
Shingle Creek and Bass Creek Biota and Dissolved Oxygen Implementation Plan (2012)	SCWMC, MPCA	TMDL Implementation Plan	Recommendations on how to achieve the goals of the TMDL study are explored in depth.
Upper Mississippi River Bacterial TMDL Implementation Plan (2016)	SCWMC, MPCA	TMDL Implementation Plan	Recommendations for reaching the TMDL goals.
Macroinvertebrate Surveys (Ongoing)	Hennepin County, SCWMC	Survey and Assessment	Completed by trained volunteers.
Water Quality Monitoring Report (2015, 2016)	MDA	Monitoring	Annual pesticide monitoring of groundwater and surface water at select locations in Minnesota. Shingle Creek sampled in 2010 at 45th Avenue North.

Silver Lake

Report Name/Date	Agency Responsible	Type of Study	Description
Excess Nutrients TMDL (2010, updated 2012)	RCWD, MPCA, EPA	TMDL Report	Identified phosphorus as the nutrient of particular concern. An implementation strategy was created to reduce both this watershed load and internal load of phosphorus in Silver Lake.

Report Name/Date	Agency Responsible	Type of Study	Description
Excess Nutrients TMDL Implementation Plan (2011)	RCWD, MPCA, EPA	TMDL Implementation Plan	Recommendations for reaching nutrient loading goals.

Spring Lake

Report Name/Date	Agency Responsible	Type of Study	Description
Water Resources Reports (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results on monitoring data, including: ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Fish stocking ▪ Aquatic plant survey (2012 report) ▪ Winter ice cover ▪ Beach monitoring ▪ Chlorophyll-a ▪ Total phosphorus ▪ Secchi depth

Wirth Lake

Report Name/Date	Agency Responsible	Type of Study	Description
Wirth Lake Watershed and Lake Management Plan (1996)	BCWMC	Management Plan	Establishes guidelines for meeting water quality goals set for Wirth Lake. The focus is on reducing phosphorus loading to the lake.
2003 and 2004 Water Quality Study of Wirth Lake (MPRB) and Bassett Creek (2003 and 2004)	BCWMC	Studies and Reports	
Excess Nutrients TMDL (2010)	BCWMC, MPCA, EPA	TMDL Study	Listed as an impaired waterbody in 2002 for excess phosphorus. De-listed in 2014. The study was conducted to improve water quality. Phosphorus was determined to be the primary nutrient affecting water quality.
Excess Nutrients TMDL Implementation Plan (2010)	BCWMC, MPCA, EPA	TMDL Implementation Plan	Identified sources of phosphorus and suggested ways to reduce phosphorus loading.
Water Resources Reports (Annual)	MPRB	Monitoring Report	Yearly reports summarizing results on monitoring data, including: ▪ Physical, biological, and chemical parameters ▪ Lake level ▪ Phytoplankton and zooplankton ▪ Trophic state index ▪ Winter ice cover ▪ Aquatic plants ▪ Fish ▪ Zebra mussels

Citywide

Report Name/Date	Agency Responsible	Type of Study	Description
Surface Water Quality Monitoring in the City of Minneapolis	MPW, MPRB	Report	Overview of surface water monitoring efforts and resulting publications over time in the City.
Study of Lake Water Quality of the 145 Metropolitan Lakes (1980-Ongoing)	Metropolitan Council	Monitoring and Assessment Report	Summarizes the results of the Citizen Assisted Monitoring Program. Samples are collected from mid-April through mid-October and analyzed for a total phosphorus, total Kjeldahl nitrogen, and chlorophyll-a.
Citizens Lake Monitoring Program (1996-Ongoing)	MPCA	Monitoring and Assessment Report	Volunteer monitoring of lake water quality.
Flood Report (1997)	MPRB	Studies and Reports	Recommendations of the Public Works, Sewer Design Division for flood mitigation in 39 discrete problem areas in the City.
Citizen Stream – Monitoring Program (1998-2003)	MPCA	Monitoring and Assessment Report	Volunteers completed transparency readings and recreational suitability rankings.
Stormwater BMP Monitoring (2002-Ongoing)	MPRB, MPW	Monitoring Activity	Inlet and outlet pipe discharge monitoring for total phosphorus, total Kjeldahl nitrogen, total dissolved phosphorus, total dissolved solids, total suspended solids, and other.
Aquatic Resource Assessment (2003)	Metropolitan Council	Monitoring and Assessment Reports	Report consisted of a GIS-based assessment to evaluate selected physical, biological, and cultural indicators for surface water resources in the Twin Cities metropolitan area.
Water Resources Reports (Annual)	MPRB	Monitoring Report	Four stormwater sites in the City were monitored in order to characterize the pollutant load of runoff from small areas representing various types of land use. The monitoring is performed as a requirement of an NPDES MS4 permit.
Summary of NPDES Monitoring (2003-2004)	MPRB	Studies and Reports	Five sites in the City and St. Paul were monitored for runoff and water quality between March and November as part of the NPDES Phase I requirements.
2003 and 2004 Grit Chamber Monitoring (2003, 2004)	MPRB	Studies and Reports	Monitored 96 grit chambers and concluded that the concentrations leaving the chamber were higher than those coming in, a conclusion indicating that more frequent cleaning of the chamber may be required.
Weather Summary – Annual Report (2003, 2004)	MPRB	Studies and Reports	Data was recorded from three tipping buckets, rain gages in the City.

Report Name/Date	Agency Responsible	Type of Study	Description
Results Minneapolis, Healthy Lakes, Rivers and Streams (2006)	Minneapolis	Report	Report on progress towards long-term water quality goals.
Wetland Health Evaluation (Annual)	Hennepin County	Monitoring Activities	Annual monitoring of various wetlands in Hennepin County. List of wetlands may change each year.

SCWMC

Report Name/Date	Agency Responsible	Type of Study	Description
Regional Pond Investigation	SCWMC	Report	Identified subwatersheds with little or no water treatment facilities.

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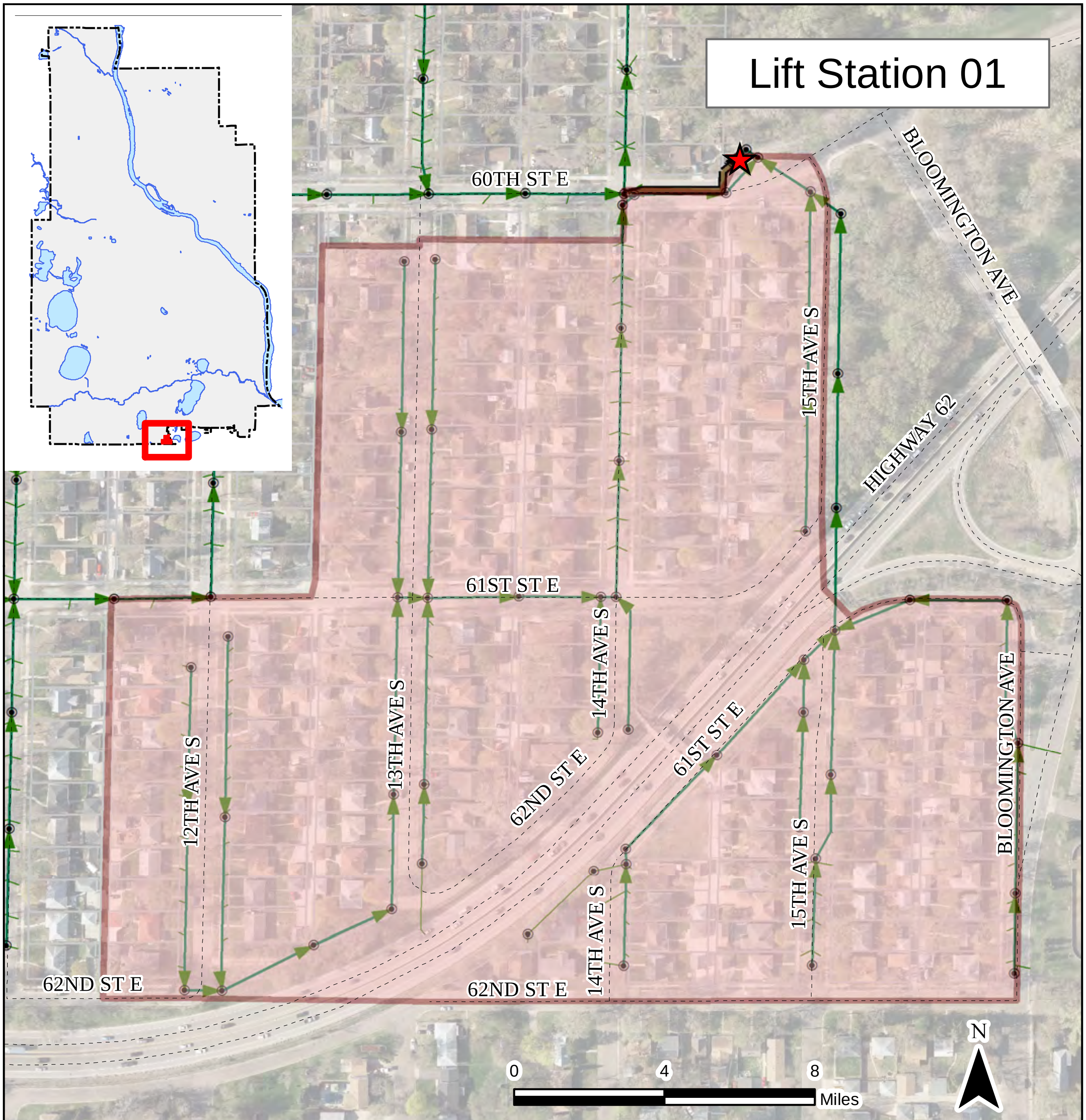


Lift Station	Existing Design Flow (gpm)		
	Based on 2016 Water Use	Based on SAC Units	Combination of SAC & Water Use*
01	46	105	105

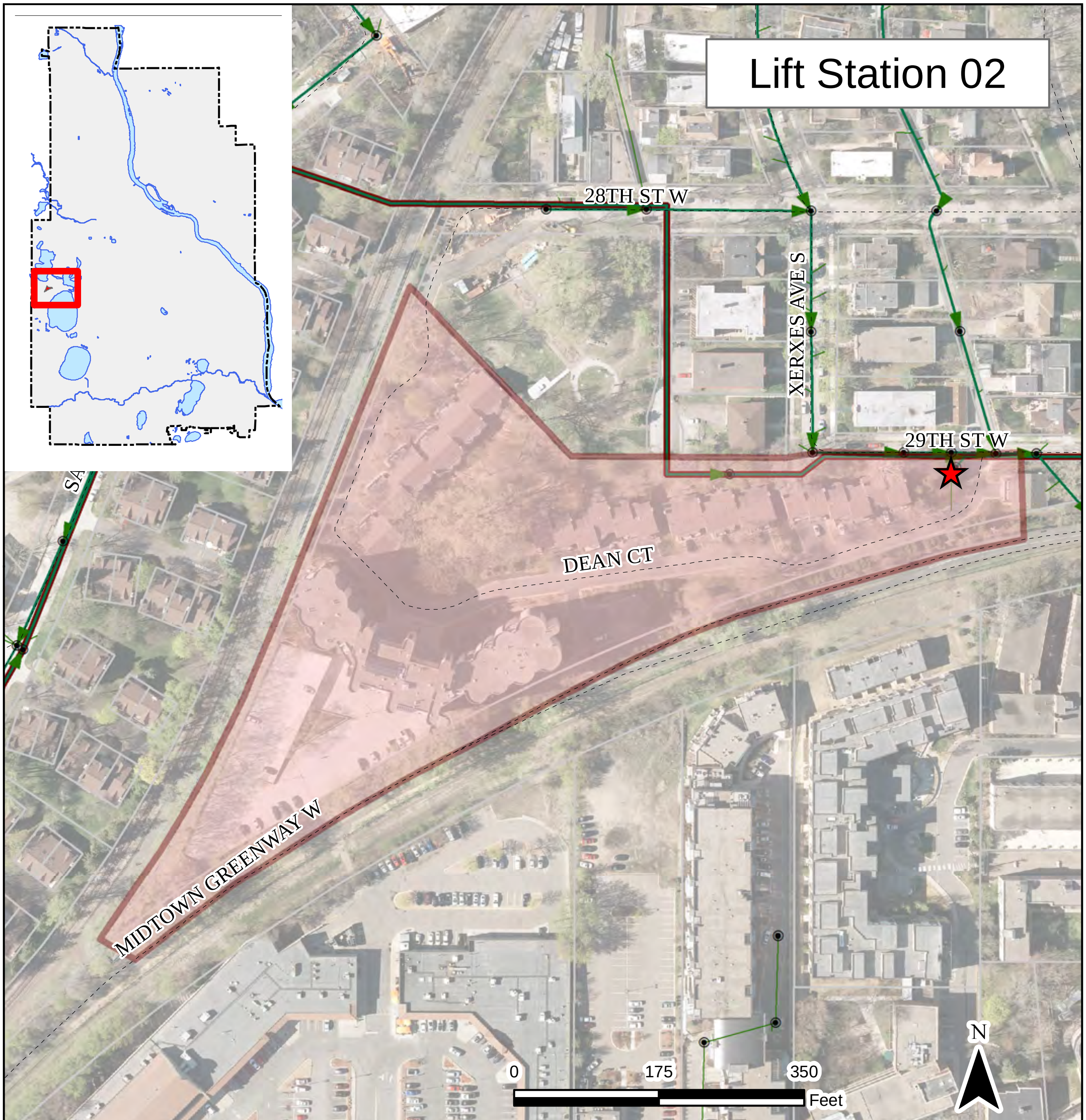
* Primarily SAC values. When no SAC values determined, then 2016 water use used.

Sanitary Lift Station 01

Lift Station 01 Service Area

Lift Station	Location	Pump #	Manufacturer Description	H.P.	Pump Capacity (gpm)	Power Source
01	1454 E 60th St	1	Flygt 3101-432	5	450	240 Volt 3 Phase
01	1454 E 60th St	2	Flygt 3101-432	5	450	240 Volt 3 Phase

Lift Station 02



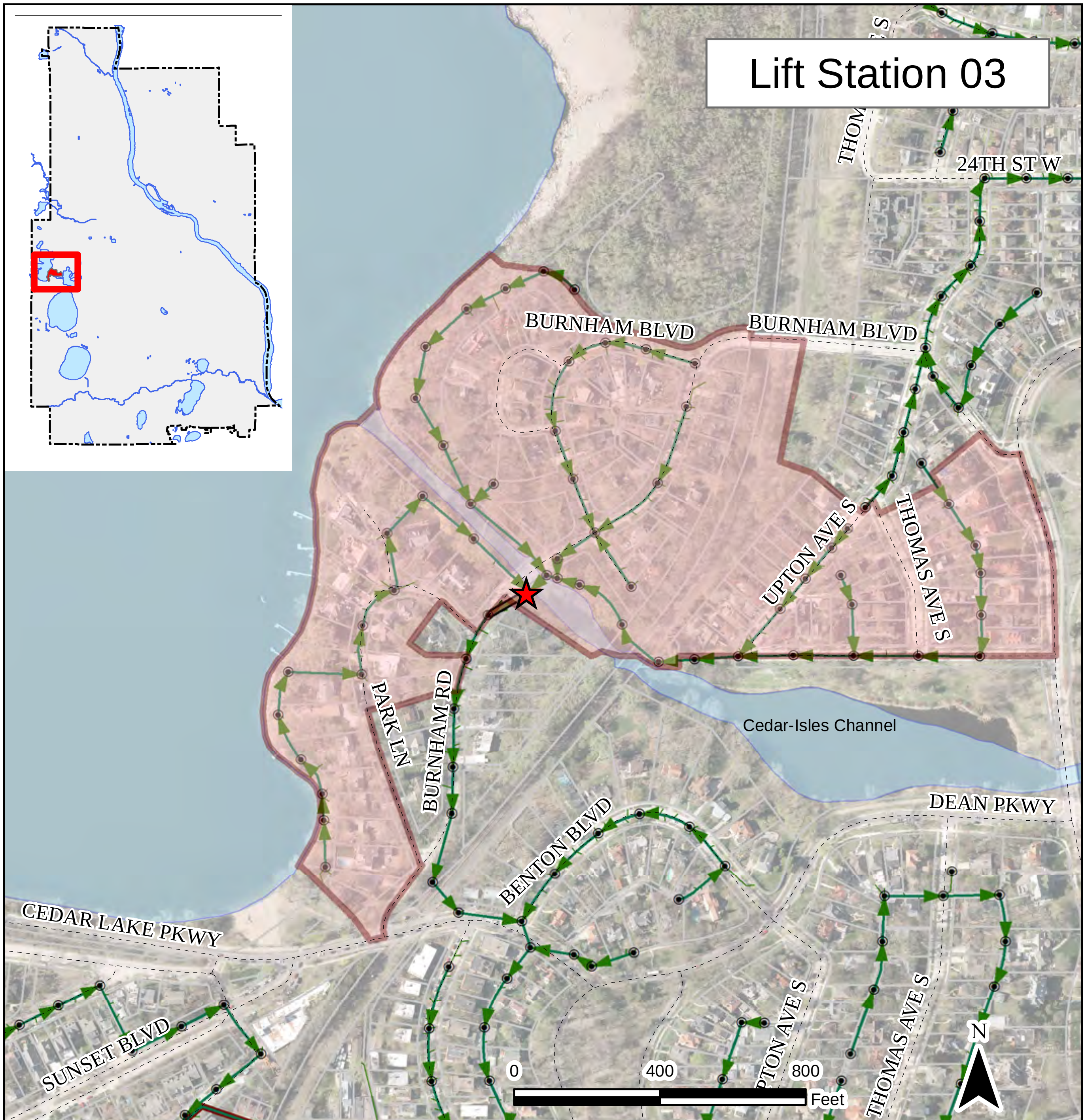
Lift Station	Existing Design Flow (gpm)		
	Based on 2016 Water Use	Based on SAC Units	Combination of SAC & Water Use*
02	34	109	109

* Primarily SAC values. When no SAC values determined, then 2016 water use used.

Sanitary Lift Station 02

Lift Station 02 Service Area

Lift Station	Location	Pump #	Manufacturer Description	H.P.	Pump Capacity (gpm)	Power Source
02	3123 W 29th St (Inside Private Enterance)	1	Flygt 3126	9.4	400	240 Volt 3 Phase
02	3123 W 29th St (Inside Private Enterance)	2	Flygt 3126	9.4	400	240 Volt 3 Phase



Lift Station	Existing Design Flow (gpm)		
	Based on 2016 Water Use	Based on SAC Units	Combination of SAC & Water Use*
03	34	71	71

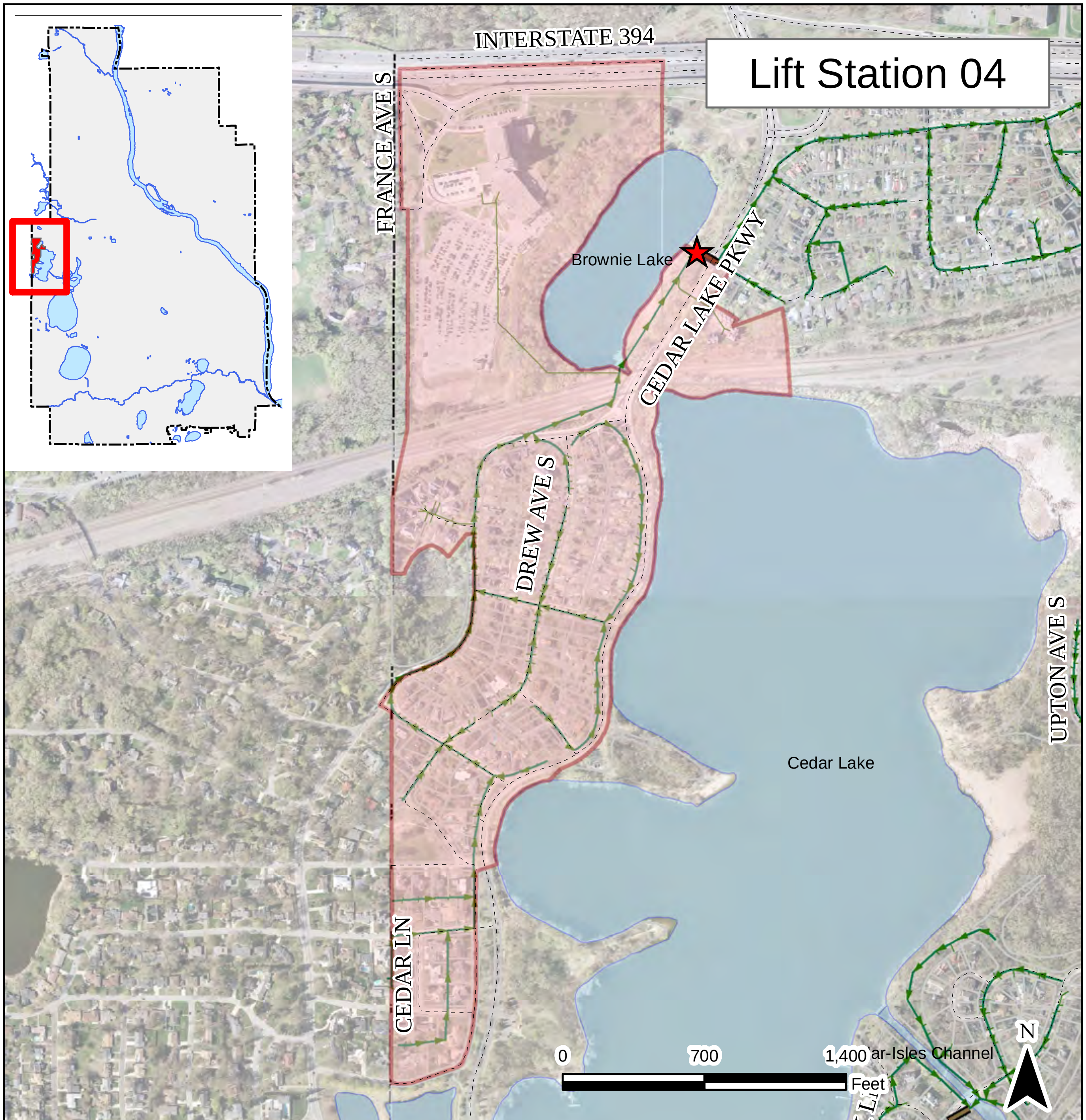
* Primarily SAC values. When no SAC values determined, then 2016 water use used.

Sanitary Lift Station 03

Lift Station 03 Service Area

Lift Station	Location	Pump #	Manufacturer Description	H.P.	Pump Capacity (gpm)	Power Source
03	2561 Burnham Rd(Below Bridge)	1	Flygt 3126-432	9.4	550	240 Volt 3 Phase
03	2561 Burnham Rd(Below Bridge)	2	Flygt 3126-432	9.4	550	240 Volt 3 Phase

Lift Station 04



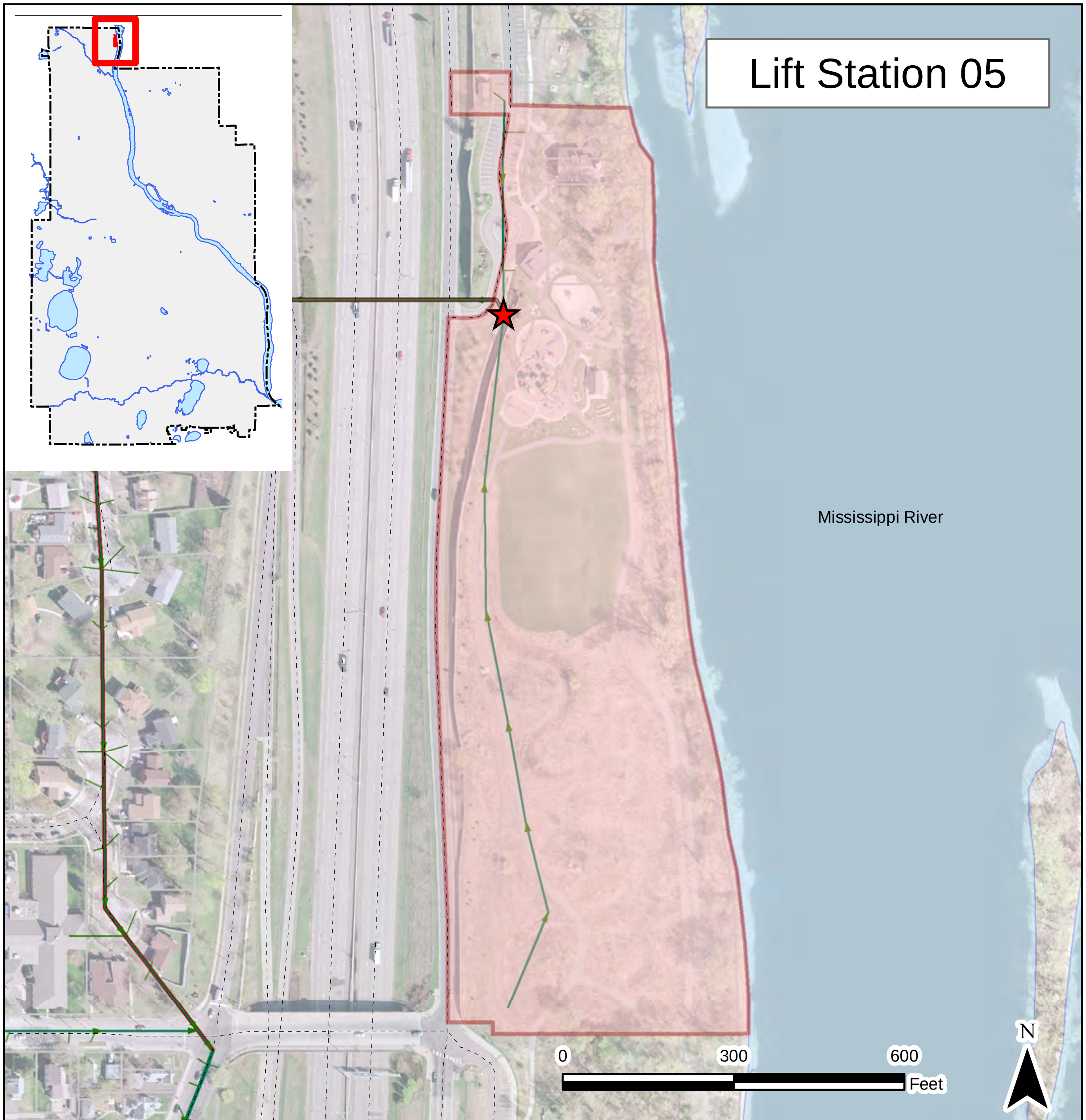
Sanitary Lift Station 04

Lift Station 04 Service Area

Lift Station	Existing Design Flow (gpm)		
	Based on 2016 Water Use	Based on SAC Units	Combination of SAC & Water Use*
04	92	138**	172

* Primarily SAC values. When no SAC values determined, then 2016 water use used.

Lift Station	Location	Pump #	Manufacturer Description	H.P.	Pump Capacity (gpm)	Power Source
04	Brownie Lake (1509 Cedar Lake Pkwy)	1	Flygt 3200	35	600	480 Volt 3 Phase
04	Brownie Lake (1509 Cedar Lake Pkwy)	2	Flygt 3200	35	600	480 Volt 3 Phase



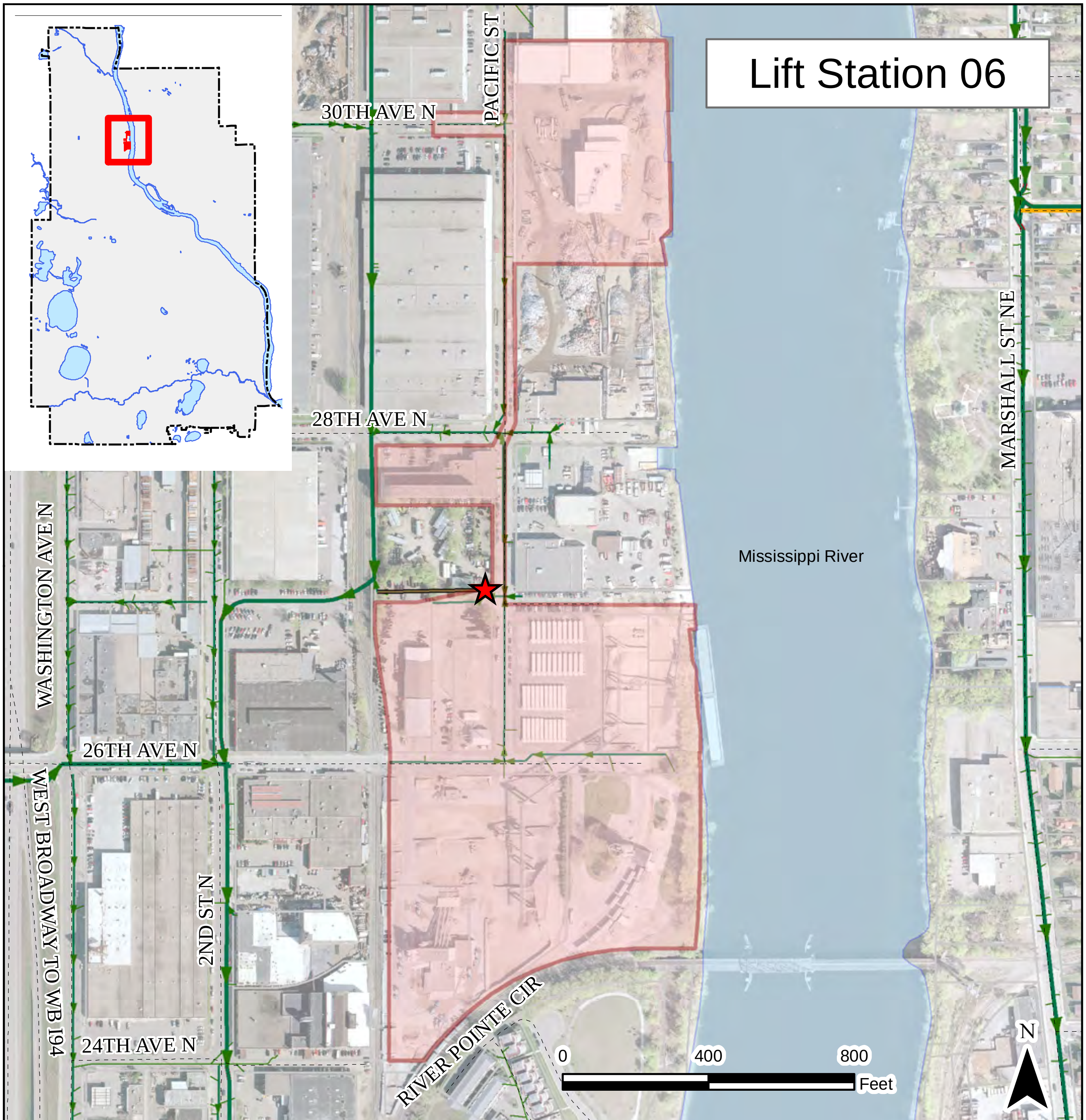
Lift Station	Existing Design Flow (gpm)		
	Based on 2016 Water Use	Based on SAC Units	Combination of SAC & Water Use*
05	4	4	4

* Primarily SAC values. When no SAC values determined, then 2016 water use used.

★ Sanitary Lift Station 05

Lift Station 05 Service Area

Lift Station	Location	Pump #	Manufacturer Description	H.P.	Pump Capacity (gpm)	Power Source
05	Mississippi Regional Park (5114 Mississippi Drive N)	1	Flygt 3126-280	10	350	240 Volt 3 Phase

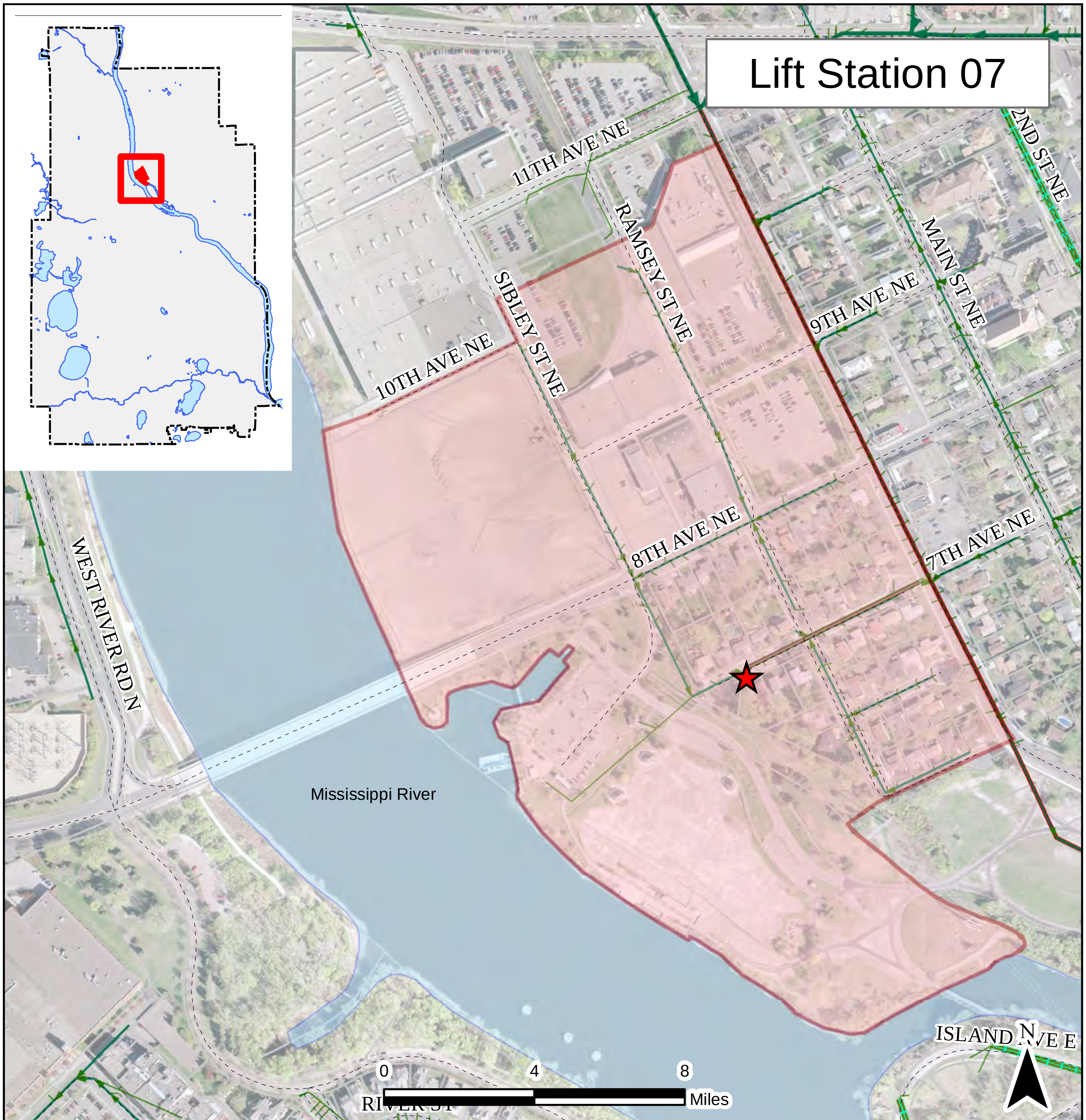


Lift Station	Existing Design Flow (gpm)		
	Based on 2016 Water Use	Based on SAC Units	Combination of SAC & Water Use*
06	32	***	32

* Primarily SAC values. When no SAC values determined, then 2016 water use used.
*** No SAC units can be determined for all properties.

Sanitary Lift Station 06
Lift Station 06 Service Area

Lift Station	Location	Pump #	Manufacturer Description	H.P.	Pump Capacity (gpm)	Power Source
06	2701 Pacific St (NW corner)	1	Deming	5	350	240 Volt 3 Phase
06	2701 Pacific St (NW corner)	2	Deming	5	350	240 Volt 3 Phase



Lift Station	Existing Design Flow (gpm)		
	Based on 2016 Water Use	Based on SAC Units	Combination of SAC & Water Use*
07	41	36**	54

* Primarily SAC values. When no SAC values determined, then 2016 water use used.

** No SAC unites can be determined for some property(ies).

- ★ Sanitary Lift Station 07
- Lift Station 07 Service Area

Lift Station	Location	Pump #	Manufacturer Description	H.P.	Pump Capacity (gpm)	Power Source
07	Boom Island (38 - 7th Ave NE)	1	Smith & Loveless	10	500	240 Volt 3 Phase
07	Boom Island (38 - 7th Ave NE)	2	Smith & Loveless	10	500	240 Volt 3 Phase

Lift Station	Existing Design Flow (gpm)		
	Based on 2016 Water Use	Based on SAC Units	Combination of SAC & Water Use*
08	4	***	4

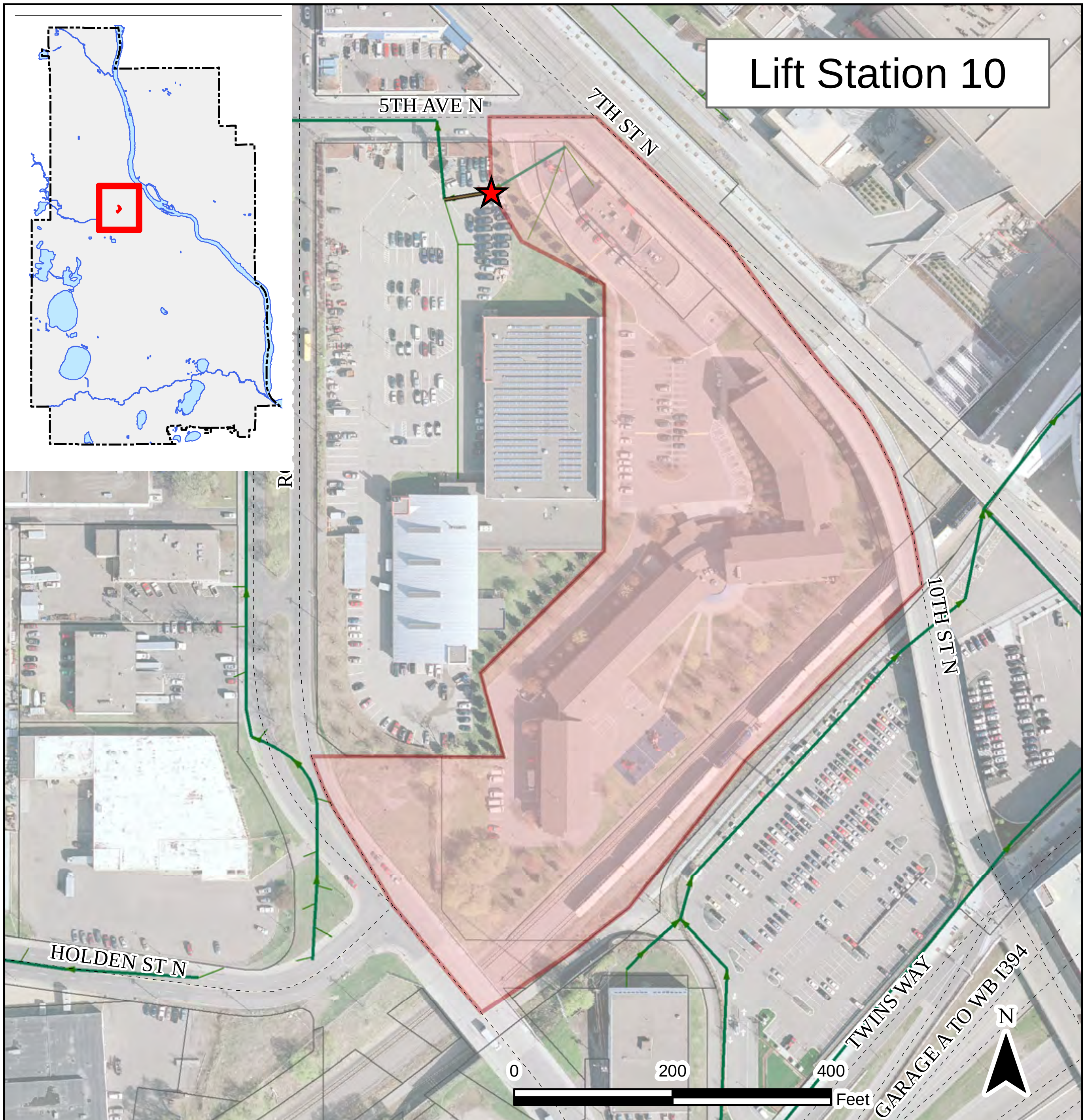
* Primarily SAC values. When no SAC values determined, then 2016 water use used.

*** No SAC units can be determined for all properties.

Sanitary Lift Station 08

Lift Station 08 Service Area

Lift Station	Location	Pump #	Manufacturer Description	H.P.	Pump Capacity (gpm)	Power Source
08	1001 Winter St NE	1	Deming	5	500	240 Volt 3 Phase
08	1001 Winter St NE	2	Deming	5	500	240 Volt 3 Phase



Lift Station	Existing Design Flow (gpm)		
	Based on 2016 Water Use	Based on SAC Units	Combination of SAC & Water Use*
10	53	129	129

* Primarily SAC values. When no SAC values determined, then 2016 water use used.

Sanitary Lift Station 10

Lift Station 10 Service Area

Lift Station	Location	Pump #	Manufacturer Description	H.P.	Pump Capacity (gpm)	Power Source
10	Mary's Place (661-5th Ave N)	1	Flygt 3102.181	5	500	240 Volt 3 Phase
10	Mary's Place (661-5th Ave N)	2	Flygt 3102.181	5	500	240 Volt 3 Phase

Appendix G – Sanitary Service Areas

Minneapolis
City of Lakes

Sanitary Service Area

7026

2010 CENSUS	HOUSEHOLDS
4,908	2,905

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
22,572,896.92	636	518.20

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	6,688,724.38	29.6%	2	0.3%
Industrial and Utility	0.00	0.0%	0	0.0%
Institutional	353,827.89	1.6%	2	0.3%
Major Highway	97,469.81	0.4%	1	0.2%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	293.81	0.0%	0	0.0%
Mixed Use Residential	541,143.54	2.4%	7	1.1%
Multifamily	2,406,366.24	10.7%	64	9.7%
Office	432,090.09	1.9%	3	0.5%
Open Water	133,097.29	0.6%	0	0.0%
Park, Recreational, Preserve	4,841,590.06	21.4%	23	3.5%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	1,058,605.50	4.7%	14	2.1%
Single Family Attached	825,004.14	3.7%	109	16.6%
Single Family Detached	4,944,860.70	21.9%	423	64.3%
Undeveloped	249,823.48	1.1%	10	1.5%
	22,572,896.92	100.0%	658	100.0%

Sanitary Service Area

8255

2010 CENSUS	HOUSEHOLDS
28,823	12,761

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
105,708,971.85	7,987	2,426.74

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	12,303.42	0.0%	0	0.0%
Industrial and Utility	14,118,177.12	13.4%	183	2.4%
Institutional	5,571,847.92	5.3%	68	0.9%
Major Highway	4,236,936.29	4.0%	1	0.0%
Mixed Use Commercial	300,205.43	0.3%	2	0.0%
Mixed Use Industrial	933,688.93	0.9%	18	0.2%
Mixed Use Residential	997,323.15	0.9%	72	1.0%
Multifamily	8,457,937.64	8.0%	403	5.4%
Office	378,903.22	0.4%	10	0.1%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	6,051,437.45	5.7%	31	0.4%
Railway	3,096,990.43	2.9%	41	0.5%
Retail and Other Commercial	6,242,992.38	5.9%	228	3.0%
Single Family Attached	14,633,849.58	13.8%	1,731	23.0%
Single Family Detached	37,993,319.37	2.5%	4,622	61.5%
Undeveloped	2,683,319.37	2.5%	106	1.4%
	105,708,971.85	100.0%	7,516	100.0%

Sanitary Service Area

8754

2010 CENSUS	HOUSEHOLDS
221	101

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
2,899,864.42	287	66.57

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	178,880.01	6.2%	3	1.0%
Institutional	133.57	0.0%	0	0.0%
Major Highway	0.00	0.0%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	37,540.27	1.3%	3	1.0%
Multifamily	72,854.28	2.5%	3	1.0%
Office	27,776.41	1.0%	2	0.7%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	0.00	0.0%	0	0.0%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	108,935.58	3.8%	9	3.0%
Single Family Attached	545,553.33	18.8%	73	24.3%
Single Family Detached	1,671,264.31	57.6%	205	68.1%
Undeveloped	256,926.67	8.9%	3	1.0%
	2,899,864.42	100.0%	301	100.0%

Sanitary Service Area

MN-300

2010 CENSUS	HOUSEHOLDS
22,023	8,825

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
139,776,347.84	4,927	3,208.82

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	1,891,342.81	1.4%	0	0.0%
Industrial and Utility	26,414,024.15	18.9%	186	4.0%
Institutional	19,114,233.82	13.7%	66	1.4%
Major Highway	6,608,402.98	4.7%	2	0.0%
Mixed Use Commercial	152,486.57	0.1%	2	0.0%
Mixed Use Industrial	946,644.26	0.7%	11	0.2%
Mixed Use Residential	1,653,924.32	1.2%	66	1.4%
Multifamily	9,876,984.39	7.1%	210	4.5%
Office	268,791.41	0.2%	10	0.2%
Open Water	591,158.35	0.4%	0	0.0%
Park, Recreational, Preserve	10,983,561.96	7.9%	88	1.9%
Railway	11,127,297.47	8.0%	48	1.0%
Retail and Other Commercial	7,617,964.19	5.5%	195	4.2%
Single Family Attached	14,672,060.05	10.5%	1,371	29.6%
Single Family Detached	23,704,482.17	17.0%	2,296	49.6%
Undeveloped	4,152,988.92	3.0%	78	1.7%
	139,776,347.84	100.0%	4,629	100.0%

Sanitary Service Area

MN-301

2010 CENSUS	HOUSEHOLDS
3,282	1,206

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
22,682,810.19	772	520.73

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	10,290,773.12	45.4%	55	7.3%
Institutional	147,434.15	0.6%	3	0.4%
Major Highway	0.00	0.0%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	1,323,247.71	5.8%	4	0.5%
Mixed Use Residential	70,498.99	0.3%	4	0.5%
Multifamily	1,065,878.93	4.7%	10	1.3%
Office	0.00	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	0.00	0.0%	0	0.0%
Railway	3,902,277.07	17.2%	11	1.5%
Retail and Other Commercial	206,802.48	0.9%	7	0.9%
Single Family Attached	1,155,852.39	5.1%	142	18.9%
Single Family Detached	4,039,370.57	17.8%	508	67.6%
Undeveloped	480,674.78	2.1%	7	0.9%
	22,682,810.19	100.0%	751	100.0%

Sanitary Service Area

MN-302A

2010 CENSUS		HOUSEHOLDS
567		107

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
4,487,914.00	188	103.03

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	0.00	0.0%	0	0.0%
Institutional	4,074,755.35	90.8%	29	52.7%
Major Highway	0.00	0.0%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	47,233.69	1.1%	3	5.5%
Multifamily	229,318.48	5.1%	18	32.7%
Office	0.00	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	0.00	0.0%	0	0.0%
Railway	79,433.03	1.8%	0	0.0%
Retail and Other Commercial	54,331.47	1.2%	4	7.3%
Single Family Attached	2,841.97	0.1%	1	1.8%
Single Family Detached	0.00	0.0%	0	0.0%
Undeveloped	0.00	0.0%	0	0.0%
	4,487.914.00	100.0%	55	100.0%

Sanitary Service Area

MN-302N

2010 CENSUS		HOUSEHOLDS
2,883		1,172

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
34,325,505.18	1,095	971.90

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	156,190.93	0.5%	0	0.0%
Industrial and Utility	17,053,492.87	49.7%	135	12.9%
Institutional	0.00	0.0%	0	0.0%
Major Highway	2,245,503.66	6.5%	14	1.3%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	173,914.35	0.5%	1	0.1%
Mixed Use Residential	27,378.24	0.1%	1	0.1%
Multifamily	646,590.23	1.9%	26	2.5%
Office	1,973,294.04	5.7%	20	1.9%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	33,621.99	0.1%	0	0.00%
Railway	607,319.49	1.8%	5	0.5%
Retail and Other Commercial	2,392,924.94	7.0%	36	3.4%
Single Family Attached	631,794.76	1.8%	70	6.7%
Single Family Detached	6,993,182.12	20.4%	723	69.3%
Undeveloped	1,390,297.55	4.1%	13	1.2%
	34,325,505.18	100%	1,044	100.0%

Sanitary Service Area

302S

2010 CENSUS	HOUSEHOLDS
4,656	891

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
10,794,067.70	571	357.02

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	4,203,239.29	38.9%	47	14.3%
Institutional	0.00	0.0%	0	0.0%
Major Highway	0.00	0.0%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	322,825.51	3.0%	5	1.5%
Multifamily	1,125,879.26	10.4%	35	10.6%
Office	30,107.23	0.3%	1	0.3%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	240,870.97	2.2%	1	0.3%
Railway	1,024,622.48	9.5%	5	1.5%
Retail and Other Commercial	2,111,633.97	19.6%	65	19.8%
Single Family Attached	402,350.71	3.7%	52	15.8%
Single Family Detached	614,302.81	5.7%	64	19.5%
Undeveloped	718,235.47	6.7%	20	6.1%
	10,794,067.70	100.0%	329	100.0%

Sanitary Service Area

MN-303

2010 CENSUS	HOUSEHOLDS
3,841	1,654

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
26,777,110.21	1,519	615.07

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	3,486,042.46	13.0%	2	0.1%
Industrial and Utility	2,417,369.71	9.0%	10	0.7%
Institutional	389,169.55	1.5%	4	0.3%
Major Highway	1,289,725.13	4.8%	2	0.1%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	43,559.48	0.2%	3	0.2%
Multifamily	224,624.79	0.8%	9	0.6%
Office	0.00	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	943,512.50	3.5%	7	0.5%
Railway	2,283,384.02	8.5%	2	0.1%
Retail and Other Commercial	207,377.77	0.8%	8	0.5%
Single Family Attached	319,756.45	1.2%	35	2.3%
Single Family Detached	13,765,108.27	51.4%	1,438	94.2%
Undeveloped	1,407,480.08	5.3%	6	0.4%
	26,777,110.21	100.0%	1,526	100.0%

Sanitary Service Area

MN-305

2010 CENSUS	HOUSEHOLDS
35	15

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
145,259.57	8	3.38

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	0.00	0.0%	0	0.0%
Institutional	15,889.41	10.9%	0	0.0%
Major Highway	0.00	0.0%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	0.00	0.0%	0	0.0%
Multifamily	0.00	0.0%	0	0.0%
Office	0.00	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	0.00	0.0%	0	0.0%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	112,549.53	77.5%	6	67.0%
Single Family Attached	0.00	0.0%	0	0.0%
Single Family Detached	16,856.64	11.6%	3	33.0%
Undeveloped	0.00	0.0%	0	0.0%
	145,295.57	100.0%	9	100.0%

Sanitary Service Area

MN-306

2010 CENSUS	HOUSEHOLDS
584	239

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
9,404,470.93	391	215.95

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	3,285,422.54	34.9%	3	0.8%
Industrial and Utility	1,412,575.55	15.0%	7	1.8%
Institutional	0.00	0.0%	0	0.0%
Major Highway	61,646.83	0.7%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	0.00	0.0%	0	0.0%
Multifamily	0.00	0.0%	0	0.0%
Office	0.00	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	38,630.05	0.4%	1	0.3%
Railway	24,136.80	0.3%	0	0.0%
Retail and Other Commercial	105,370.89	1.1%	8	2.0%
Single Family Attached	450,109.98	4.8%	37	9.3%
Single Family Detached	3,488,805.27	37.1%	331	83.2%
Undeveloped	537,773.02	5.7%	11	2.8%
	9,404,470.93	100.0%	398	100.0%

Sanitary Service Area

MN-310

2010 CENSUS	HOUSEHOLDS
63,005	26,865

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
190,345,010.59	13,550	4,372.77

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	17,090,206.74	9.0%	268	2.6%
Institutional	19,856,445.48	10.4%	365	3.6%
Major Highway	17,925,304.69	9.4%	20	0.2%
Mixed Use Commercial	3,558,398.61	1.9%	86	0.8%
Mixed Use Industrial	2,159,358.77	1.1%	29	0.3%
Mixed Use Residential	3,245,279.36	1.7%	137	1.3%
Multifamily	17,035,948.90	9.0%	748	7.4%
Office	4,519,572.32	2.4%	97	1.0%
Open Water	231,218.65	0.1%	0	0.0%
Park, Recreational, Preserve	16,383,947.42	8.6%	116	1.1%
Railway	2,524,069.12	1.36%	47	0.5%
Retail and Other Commercial	23,108,717.89	12.1%	773	7.6%
Single Family Attached	12,274,871.86	6.4%	1,441	14.2%
Single Family Detached	45,646,941.64	24.0%	5,650	55.6%
Undeveloped	4,784,729.12	2.5%	379	3.7%
	190,345,010.59	100.0%	10,156	100.0%

Sanitary Service Area

MN-311

2010 CENSUS		HOUSEHOLDS
1,983		711

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
10,542,547.60	517	242.19

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	1,275,482.08	12.1%	13	2.6%
Institutional	95,454,57	0.9%	1	0.2%
Major Highway	2,170,052.59	20.6%	1	0.2%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	0.00	0.0%	0	0.0%
Multifamily	7,144.89	0.1%	0	0.0%
Office	0.00	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	2,298,166.05	21.8%	29	5.7%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	366,945.79	3.5%	18	3.6%
Single Family Attached	209,500.18	2.0%	22	4.3%
Single Family Detached	3,750,557.48	35.6%	412	81.4%
Undeveloped	369,243.97	3.5%	10	20.0%
	10,542,547.60	100.0%	506	100.0%

Sanitary Service Area

MN-312

2010 CENSUS	HOUSEHOLDS
3,445	1,262

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
18,477,240.99	1,907	424.90

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	434,235.15	2.4%	3	0.%
Institutional	1,326,094.15	7.2%	9	0.5%
Major Highway	0.00	0.0%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	0.00	0.0%	0	0.0%
Multifamily	298,879.56	1.6%	11	0.6%
Office	0.00	0.0%	0	0.%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	2,708,509.92	14.7%	27	1.5%
Railway	63,330.74	0.3%	0	0.0%
Retail and Other Commercial	210,859.34	1.1%	10	0.6%
Single Family Attached	832,888.37	4.5%	139	7.8%
Single Family Detached	11,879,814.73	64.3%	1,481	82.8%
Undeveloped	722,629.03	3.9%	109	6.1%
	18,477,240.99	100.0%	1,789	100.0%

Sanitary Service Area

MN-313

2010 CENSUS	HOUSEHOLDS
1,073	371

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
4,859,680.28	435	111.84

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	0.00	0.0%	0	0.0%
Institutional	0.00	0.0%	0	0.%
Major Highway	0.00	0.0%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	0.00	0.0%	0	0.0%
Multifamily	6,198.51	0.1%	0	0.0%
Office	789.11	0.0%	0	0.0%
Open Water	208,176.70	4.3%	2	0.5%
Park, Recreational, Preserve	957,665.18	19.7%	5	0.5%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	1,557.57	0.0%	0	0.0%
Single Family Attached	140,538.11	2.9%	13	3.0%
Single Family Detached	3,538,219.32	72.8%	415	95.2%
Undeveloped	6,535.78	0.1%	1	0.2%
	4,859,680.28	100.0%	436	100.0%

Sanitary Service Area

MN-314

2010 CENSUS	HOUSEHOLDS
902	312

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
4,102,846.36	357	94.19

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	21,256.03	0.5%	0	0.0%
Institutional	204,714.40	5.0%	2	0.6%
Major Highway	0.00	0.0%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	0.00	0.0%	0	0.0%
Multifamily	15,259.91	0.4%	2	0.6%
Office	816.85	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	589,591.03	14.4%	2	0.6%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	15,548.65	0.4%	1	0.3%
Single Family Attached	97,725.83	2.4%	7	2.0%
Single Family Detached	3,156,455.65	76.9%	330	95.9%
Undeveloped	1,478.02	0.0%	0	0.0%
	4,102,846.36	100.0%	344	100.0%

Sanitary Service Area

MN-315

2010 CENSUS	HOUSEHOLDS
4,155	1,767

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
25,642,459.86	1,553	589.27

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	4,854,135.99	18.9%	19	1.2%
Institutional	1,131,480.84	4.4%	19	1.2%
Major Highway	39,608,83	0.2%	1	0.1%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	108,119.12	0.4%	11	0.7%
Multifamily	460,247.68	1.8%	20	1.3%
Office	0.00	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	3,438,808.94	13.4%	10	0.6%
Railway	2,169,862.07	8.5%	6	0.4%
Retail and Other Commercial	342,201.45	1.3%	18	1.1%
Single Family Attached	572,936.11	2.2%	56	3.5%
Single Family Detached	11,587,490.71	45.2%	1,418	89.2%
Undeveloped	946,568.13	3.7%	22	1.4%
	25,642,459.86	100.0%	1,589	100.0%

Sanitary Service Area

MN-316

2010 CENSUS		HOUSEHOLDS
7,677		2,950

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
32,461,024.64	3,096	753.50

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	0.00	0.0%	0	0.0%
Institutional	7,509,166.25	23.1%	19	0.6%
Major Highway	50,823.63	0.2%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	125,926.86	0.4%	11	0.4%
Multifamily	225,284.46	0.7%	19	0.6%
Office	23,980.79	0.1%	2	0.1%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	378,721.85	1.2%	2	0.1%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	361,941.89	1.1%	21	0.7%
Single Family Attached	1,604,025.93	4.9%	170	5.5%
Single Family Detached	22,027,362.13	67.9%	2,855	91.6%
Undeveloped	153,790.84	0.5%	17	0.5%
	32,461,024.64	100.0%	3,116	100.0%

Sanitary Service Area

MN-320

2010 CENSUS	HOUSEHOLDS
36,464	16,035

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
149,118,262.89	10,413	3,442.74

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	14,523,685.21	9.7%	205	2.5%
Institutional	12,834,094.77	8.6%	284	3.5%
Major Highway	10,949,985.49	7.3%	10	0.1%
Mixed Use Commercial	267,696.02	0.2%	6	0.1%
Mixed Use Industrial	206,192.33	0.1%	4	0.0%
Mixed Use Residential	1,039,631.30	0.7%	51	0.6%
Multifamily	10,431,980.08	7.0%	389	4.8%
Office	1,888,655.71	1.3%	25	0.3%
Open Water	562,940.36	0.4%	1	0.0%
Park, Recreational, Preserve	20,553,006.56	13.8%	105	1.3%
Railway	1,962,043.42	1.3%	10	0.1%
Retail and Other Commercial	8,546,096.84	5.7%	277	3.4%
Single Family Attached	12,501,514.13	8.4%	1,363	16.8%
Single Family Detached	46,956,547.75	31.5%	5,044	62.2%
Undeveloped	5,894,192.92	4.0%	337	4.2%
	149,118,262.89	100.0%	8,111	100.0%

Sanitary Service Area

MN-330

2010 CENSUS	HOUSEHOLDS
41,202	19,160

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
108,896,201.07	9,262	2,499.93

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	8,377,148.74	7.7%	157	2.1%
Institutional	7,310,052.05	6.7%	117	1.6%
Major Highway	2,396,215.75	2.2%	2	0.0%
Mixed Use Commercial	436,976.18	.04%	10	0.1%
Mixed Use Industrial	446,241.34	0.4%	9	0.1%
Mixed Use Residential	1,839,943.26	1.7%	125	1.7%
Multifamily	13,723,550.16	12.6%	825	11.1%
Office	2,190,420.06	2.0%	23	0.3%
Open Water	269,219.76	0.2%	0	0.0%
Park, Recreational, Preserve	11,651,604.89	10.7%	95	1.3%
Railway	187,510.42	0.2%	3	0.0%
Retail and Other Commercial	9,627,990.31	8.8%	472	6.3%
Single Family Attached	16,407,603.53	15.1%	1,894	25.4%
Single Family Detached	32,261,027.83	29.6%	3,597	48.3%
Undeveloped	1,770,696.78	1.6%	122	1.6%
	108,896,201.07	100.0%	7,451	100.0%

Sanitary Service Area

MN-340

2010 CENSUS	HOUSEHOLDS
15,070	6,894

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
95,979,763.29	5,770	2,203.4

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	775,798.94	1.0%	4	0.1%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	2,045,310.80	2.7%	28	0.5%
Institutional	8,685,849.20	11.4%	47	0.9%
Major Highway	1,253,666.45	1.7%	3	0.1%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	184,052.89	0.2%	15	0.3%
Multifamily	2,225,018.98	29%	106	1.9%
Office	0.00	0.0%	0	0.0%
Open Water	125,316.60	0.2%	0	0.0%
Park, Recreational, Preserve	13,473,971.81	17.8%	32	0.6%
Railway	589,577.12	0.8%	1	0.0%
Retail and Other Commercial	3,739,990.60	4.9%	178	3.3%
Single Family Attached	4,176,686.17	5.5%	463	8.5%
Single Family Detached	38,257,888.21	50.4%	4,552	83.5%
Undeveloped	363,700.51	0.5%	25	0.5%
	75,896,828.27	100.0%	5,454	100.0%

Sanitary connections and Sewer Service Area information include the area of outside of the city but land use and population are only for the area within city limit.

Sanitary Service Area

MN-341

2010 CENSUS	HOUSEHOLDS
66,124	27,903

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
207,114,253.48	20,237	4,754.71

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	457,063.54	0.2%	0	0.0%
Industrial and Utility	4,306,641.46	2.1%	107	0.6%
Institutional	18,226,689.02	8.8%	166	0.9%
Major Highway	3,801,585.50	1.8%	6	0.0%
Mixed Use Commercial	183,230.17	0.1$	4	0.0%
Mixed Use Industrial	36,238.58	0.0%	2	0.0%
Mixed Use Residential	2,049,864.98	1.0%	130	0.7%
Multifamily	12,533,747.65	6.1%	897	4.7%
Office	258,152.17	0.1%	8	0.0%
Open Water	1,072,183.55	0.5%	1	0.0%
Park, Recreational, Preserve	14,478,460.56	7.0%	62	0.3%
Railway	1,354,507.41	0.7%	10	0.1%
Retail and Other Commercial	9,335,697.71	4.5%	545	2.8%
Single Family Attached	22,363,165.89	10.8%	2,690	14.0%
Single Family Detached	115,010,591.88	55.5%	14,414	75.3%
Undeveloped	1,646,433.40	0.8%	108	0.6%
	207,114,253.48	100.0%	19,150	100.0%

Sanitary Service Area

MN-342

2010 CENSUS	HOUSEHOLDS
472	206

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
2,033,220.50	200	46.68

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	0.00	0.0%	0	0.0%
Institutional	181,189.85	8.9%	1	0.4%
Major Highway	0.00	0.0%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	0.00	0.0%	0	0.0%
Multifamily	0.00	0.0%	0	0.0%
Office	0.00	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	0.00	0.0%	0	0.0%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	0.00	0.0%	0	0.0%
Single Family Attached	178,643.84	8.8%	25	10.8%
Single Family Detached	1,665,708.38	81.9%	204	88.3%
Undeveloped	7,678.43	0.4%	1	0.4%
	2,033,220.50	100.0%	231	100.0%

Sanitary Service Area

MN-343

2010 CENSUS	HOUSEHOLDS
2,424	1,097

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
10,004,997.50	1,000	229.68

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	0.00	0.0%	0	0.0%
Institutional	465,707.13	4.7%	5	0.5%
Major Highway	0.00	0.0%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	29,167.19	0.3%	3	0.3%
Multifamily	486,215.62	4.9%	25	2.6%
Office	0.00	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	576,763.91	5.8%	2	0.2%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	570,439.73	5.7%	25	2.6%
Single Family Attached	815,364.17	8.1%	89	9.4%
Single Family Detached	7,029,332.43	70.3%	796	84.1%
Undeveloped	32,007.30	0.3%	2	0.2%
	10,004,997.50	100.0%	947	100.0%

Sanitary Service Area

MN-344

2010 CENSUS	HOUSEHOLDS
49,952	20,854

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
223,757,215.63	19,100	5,136.78

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	15,607.26	0.0%	0	0.0%
Golf Course	6,941,923.69	3.1%	6	0.0%
Industrial and Utility	2,683,539.09	1.2%	42	0.2%
Institutional	12,238,610.43	5.5%	115	0.6%
Major Highway	6,808,710.00	3.1%	1	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	60,584.83	0.0%	1	0.0%
Mixed Use Residential	500,532.69	0.2%	29	0.2%
Multifamily	3,166,757.94	1.4%	137	0.7%
Office	84,633.57	0.0%	5	0.0%
Open Water	428,333.34	0.2%	0	0.0%
Park, Recreational, Preserve	23,285,138.74	10.5%	75	0.4%
Railway	330,364.81	0.1%	4	0.0%
Retail and Other Commercial	5,837,668.62	2.6%	250	1.3%
Single Family Attached	10,944,267.59	4.9%	1,221	6.5%
Single Family Detached	147,653,262.84	66.4%	16,881	89.5%
Undeveloped	1,293,811.60	0.6%	99	0.5%
	222,273,747.05	100.0%	18,866	100.0%

Sanitary connections and Sewer Service Area information include the area outside of the city but land use and population are only for the area within city limit.

Sanitary Service Area

MN-345

2010 CENSUS	HOUSEHOLDS
7,554	3,231

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
32,419,107.93	3,248	744.26

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	0.00	0.0%	0	0.0%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	0.00	0.0%	0	0.0%
Institutional	400,435.67	1.2%	3	0.1%
Major Highway	256,295.95	0.8%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	22,591.47	0.1%	2	0.1%
Multifamily	117,730.53	0.4%	5	0.2%
Office	0.00	0.0%	0	0.0%
Open Water	0.00	0.0%	0	0.0%
Park, Recreational, Preserve	2,225,843.23	6.9%	17	0.5%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	674,873.83	2.1%	16	0.5%
Single Family Attached	1,615,868.75	5.0%	174	5.4%
Single Family Detached	27,052,938.21	83.4%	3,016	93.2%
Undeveloped	52,530.28	0.2%	3	0.1%
	32,419,107.93	100.0%	3,236	100.0%

Sanitary Service Area

MN-346

2010 CENSUS	HOUSEHOLDS
9,252	4,046

AREA

(Includes public right of ways)

SQUARE FEET	SANITARY CONNECTIONS	ACRES
42,648,160.47	4,076	979.07

LAND USE

TYPE	AREA – SQUARE FEET	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Airport	392,483.32	1.0%	2	0.1%
Golf Course	0.00	0.0%	0	0.0%
Industrial and Utility	0.00	0.0%	0	0.0%
Institutional	1,389,380.29	3.5%	12	0.3%
Major Highway	1,668,106.47	4.2%	0	0.0%
Mixed Use Commercial	0.00	0.0%	0	0.0%
Mixed Use Industrial	0.00	0.0%	0	0.0%
Mixed Use Residential	0.00	0.0%	0	0.0%
Multifamily	1,129,1100.72	2.8%	46	1.2%
Office	0.00	0.0%	0	0.0%
Open Water	2,030.38	0.0%	0	0.0%
Park, Recreational, Preserve	3,989,895.29	9.9%	7	0.2%
Railway	0.00	0.0%	0	0.0%
Retail and Other Commercial	364,908.06	0.9%	19	0.5%
Single Family Attached	886,044.18	2.2%	99	2.5%
Single Family Detached	30,269,609.30	75.5%	3,786	95.3%
Undeveloped	8,156.30	0.0%	1	0.0%
	40,099,724.31	100.0%	3,972	100.0%

Sanitary connections and Sewer Service Area information include the area of outside of the city but land use and population are only for the area within city limit.

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Appendix H – City of Minneapolis Sewage Flow Projections and Trunk Sewer Capacity Analysis by Interceptor Service Area

Instructions and Methodology

Sewage flow in the City of Minneapolis (City) is not metered at the source, rather billing is based on water consumption; billing data provides the most accurate and accessible source of sewage flow estimates available. Base year sewage flow estimates (2010) for the City were derived from customer billings for water service from the City Utility Billing Department. The data is grouped into Residential, Multiple Dwelling, Commercial, Industrial, Government, and Wholesaled water to other municipalities. As the sewer projection is for the City, all except Wholesaled water to other municipalities were used for projection. Residential and Multiple Dwelling were tied up as one and matched with population projection for residential sewer flow projection while Commercial, Industrial, and Government were grouped and matched with employment projection to estimate their sewer flow projections.

In the case of Residential sewer flow projection, it is based on 2010 winter season (December, January, February) usage of Residential and Multiple Dwelling to remove outflow to stormwater by irrigation. The usage of water in these three months was multiplied by four to estimate sewer outflow for the year.

If Sewer Service Areas include outside areas of the City of Minneapolis, those parcels were excluded as they are not part of the City. Hence, the projection estimates only the City part of the sewersheds. Also, this projection was calculated under an assumption that there is no change in water use per capita.

Process Overview

Base Data

- 2010 annual water usage by land use (Source: City of Minneapolis Utility Billing Department).
- Existing land use (Source: City of Minneapolis).
- Population and employment projections by Transportation Analysis Zone (TAZ) for the City of Minneapolis area; base year 2010, and projections for 2020, 2030, and 2040, with polygon shape file (Base Data Source: Metropolitan Council, Minnesota Geospatial Commons. Revised Population Forecast Source: City of Minneapolis Community Planning and Economic Development).
- Demographic projections of the City by Sanitary Sewer Service Areas; base year 2010, and projections for 2020, 2030, and 2040, derived from TAZ projections made by Metropolitan Council (Source: City of Minneapolis Public Works).
- Polygon shape file of Interceptor Service Areas of Minneapolis (Source: City of Minneapolis Public Works).

Major Steps

- Citywide sewage flow total was calculated based on annual water usage of non-residential usage and winter usage of residential usage (December, January, and February) to remove outflow to stormwater by irrigations and then multiplied by four to estimate usage for the year.

- Citywide sewage flow total was apportioned to each Interceptor Service Area based on population and employment proportion of the Interceptor Service Areas; employment was used for non-residential use and population was used for residential use.
- Existing land use was generalized into residential and non-residential uses.
- Citywide sewage flow total was apportioned to each Interceptor Service Area based on percentage of residential and non-residential land use. For example, if an Interceptor Service Area contains 5 percent of the City's residential land uses, then 5 percent of the 2010 residential water usage was apportioned for that area.
- For each Interceptor Service Area, the 2020 projected changes in population and employment were multiplied by the 2010 per capita water usage and added to the 2010 sewer flow. This process was repeated for each Interceptor Service Area using projected changes in population and employment in 2030 and 2040.

Demographic Projection for the City of Minneapolis by Interceptor Service Area (2010 ~ 2040)

The following table provides figures for population, number of households, and employment for each Interceptor Service Area of Minneapolis. These figures were derived from projections of change in population and employment by Transportation Analysis Zone, which were created by the Metropolitan Council, and updated by the City of Minneapolis Community Planning and Economic Development. For the purpose of this report, Transportation Analysis Zones were modified by various spatial analysis me[1]

[1] Transportation Analysis Zones (Official TAZ System w/3,030 Zones) with Current Forecasts, Metropolitan Council, Minnesota Geospatial Commons, https://gisdata.mn.gov/dataset/us-mn-state-metc-trans-anlys-zones-official-current. Revised forecasts created by City of Minneapolis Community Planning and Economic Development, *MPLS_2040_TAZ*, October 10, 2018.

Demographic Projection of the City of Minneapolis by Interceptor Service Area, 2010 through 2040

Interceptor Service Area	Population (2010)	Households (2010)	Employment (2010)	Population (2020)	Households (2020)	Employment (2020)	Population (2030)	Households (2030)	Employment (2030)	Population (2040)	Households (2040)	Employment (2040)
7026	4,908	2,905	2,487	6,225	3,168	3,160	7,916	4,008	3,199	10,041	5,034	3,238
8255	28,823	12,761	15,794	35,705	14,989	18,858	37,310	15,314	19,104	38,924	15,712	19,347
8754	221	101	282	268	117	333	274	119	337	278	120	341
MN-300	22,023	8,825	20,053	27,884	12,173	21,839	29,535	12,702	22,334	31,280	13,349	22,831
MN-301	3,282	1,206	3,176	3,079	1,233	3,665	3,205	1,249	3,711	3,331	1,269	3,756
MN-302A	567	107	308	504	234	644	538	247	652	575	264	660
MN-302N	2,883	1,172	11,108	3,026	1,241	12,778	3,120	1,260	12,938	3,218	1,285	13,096
MN-302S	4,656	891	9,980	5,643	2,507	11,557	5,954	2,806	11,701	6,382	3,172	11,846
MN-303	3,841	1,654	617	4,410	1,718	721	4,640	1,797	786	4,889	1,892	851
MN-305	35	15	4	40	15	4	41	16	4	41	16	4
MN-306	584	239	608	618	243	721	629	247	730	634	250	738
MN-310	63,005	26,865	143,000	74,850	35,290	166,234	80,541	37,563	176,866	86,597	40,347	187,495
MN-311	1,983	711	276	2,147	767	281	2,192	776	284	2,235	786	288
MN-312	3,445	1,262	434	3,787	1,316	524	3,864	1,331	531	3,924	1,349	537
MN-313	1,073	371	0	1,147	371	0	1,168	376	0	1,175	381	0
MN-314	902	312	48	964	312	123	981	316	125	987	320	126
MN-315	4,155	1,767	699	4,910	1,865	933	5,035	1,886	944	5,137	1,912	955
MN-316	7,677	2,950	424	8,991	3,145	601	9,117	3,180	610	9,172	3,223	616
MN-320	36,464	16,035	22,126	42,760	19,230	25,347	46,512	20,911	26,329	50,654	22,963	27,313
MN-330	41,202	19,160	25,800	44,620	22,266	34,087	48,861	23,778	34,539	53,379	25,626	34,988
MN-340	15,070	6,894	3,875	18,413	7,561	4,647	19,569	7,923	4,725	20,739	8,362	4,805
MN-341	66,124	27,903	11,224	70,584	31,084	14,783	73,119	31,976	15,028	75,141	33,068	15,273
MN-342	472	206	40	459	213	76	459	216	77	459	220	78
MN-343	2,424	1,097	412	2,563	1,152	546	2,550	1,174	552	2,542	1,201	559
MN-344	49,952	20,854	7,862	53,523	21,700	8,630	54,074	22,023	8,771	54,368	22,422	8,917
MN-345	7,554	3,231	674	8,100	3,347	754	8,101	3,434	763	8,089	3,540	772
MN-346	9,252	4,046	413	10,505	4,249	551	10,697	4,303	558	10,806	4,366	566
Total	**382,578**	**163,540**	**281,724**	**435,992**	**191,508**	**332,395**	**460,002**	**200,926**	**346,198**	**484,997**	**212,447**	**360,000**

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Capacity and Design Flows for Existing Trunk Sewer for 2010, 2020, 2030, and 2040 by Interceptor Service Area

Trunk Sewers

Trunk sewers were identified for each interceptor service area. In some cases, the Metropolitan Council interceptors serve as trunk sewers and these are noted in the tables presented in the maps for each interceptor service area. If an interceptor service area has more than one trunk sewer, then it was divided into trunk sewer areas based on the number of trunk sewers present. If it has only one trunk sewer, then the interceptor service area will be the same as the trunk sewer service area.

Average Wastewater Flows (Base Flows)

Average wastewater base flows were estimated based on 2010 annual water usage of non-residential customers and winter usage of residential customers (December, January, and February) multiplied by 4 and projections made through 2040 based on TAZ projections as described in Appendix G. Citywide sewage flow total was apportioned to each interceptor service area based on population and employment proportion of the interceptor service area; employment was used for non-residential use and population was used for residential use. If the interceptor service area has divisions based on trunk sewer areas, a portion of the sewer flow for the interceptor will be apportioned further to each trunk sewer service area based on population and employment proportion of the trunk sewer service area. Annual average base flow volume was computed by adding both the residential and non-residential flows.

If sewer service areas include outside areas of Minneapolis, those areas were excluded as they are not part of Minneapolis. Hence, the flow is estimated only for the Minneapolis part of the service area.

Where Metropolitan Council interceptors serve as a trunk sewer, the flows are incremental as there is flow already in the system generated by other service areas.

Design Flows

Design flow was calculated for each trunk sewer for base flow year 2010 and projections for 2020, 2030, and 2040 by converting the annual base flow volume into million gallons per day (mgd) and multiplying it by a factor of 4 to account for peak flow and inflow and infiltration (I/I).

Existing Pipe Capacity

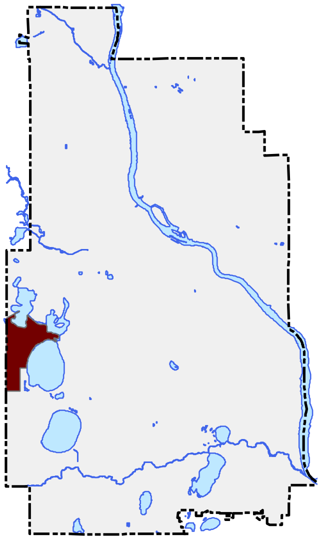
Pipe capacity of each trunk sewer was calculated based on Manning equation at full depth. Manning's Roughness Coefficient was assumed to be 0.013 for all pipes. Pipe capacity was not calculated for Metropolitan Council interceptors where they serve as a trunk sewer.

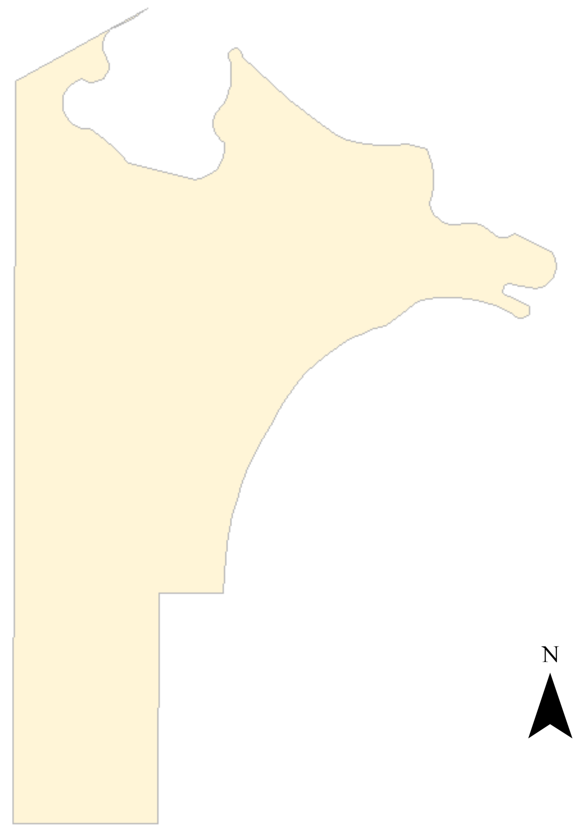
Base Data

- 2010 annual water usage by land use (Source: City of Minneapolis Utility Billing).
- Existing land use (Source: City of Minneapolis).

- Population and employment projections by Transportation Analysis Zone for Minneapolis Area; base year 2010 and projections of 2020, 2030, and 2040 with polygon shapefile (Base Data Source: Metropolitan Council. Revised Population Forecast Source: City of Minneapolis Community Planning and Economic Development).
- Demographic projections of the City of Minneapolis by Sanitary Sewer Service Areas; base year 2010 and projections of 2020, 2030, and 2040 derived from Transportation Analysis Zone projections made by Metropolitan Council (Source: City of Minneapolis Public Works).
- Polygon shapefile of Interceptor Service Areas of Minneapolis (Source: City of Minneapolis Public Works).
- Trunk sewer pipe properties like diameter, length, and inverts (Source: City of Minneapolis GIS database).

Interceptor Service Area 7026



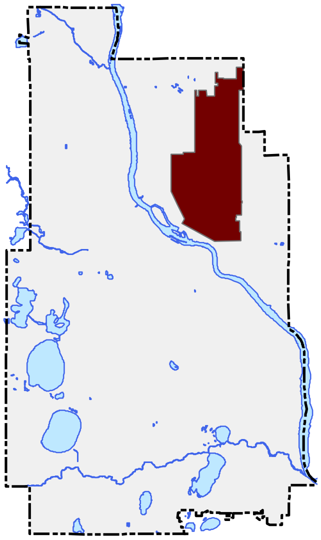


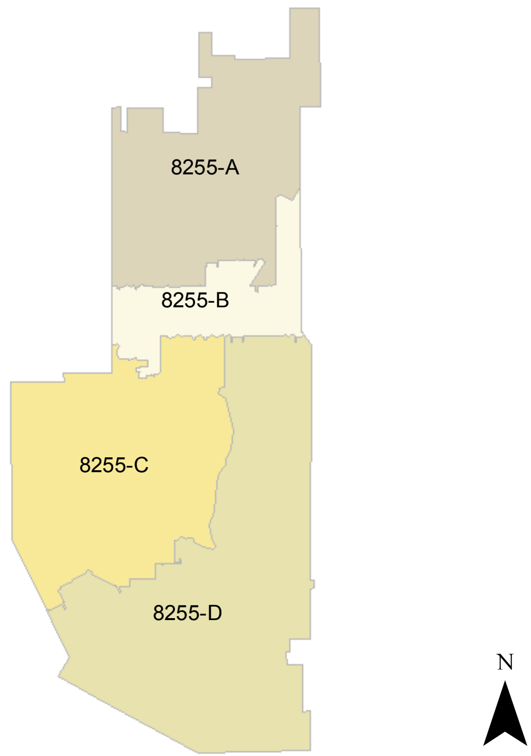
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
7026	2.564	2.980	16.22%	3.338	12.02%	3.786	13.43%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
7026	Midtown Greenway W and E Lake Calhoun Pkwy	30	X

Interceptor Service Area 8255



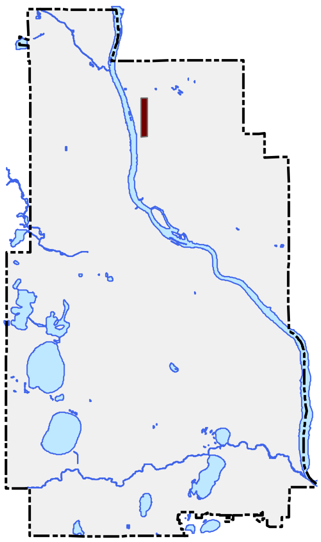


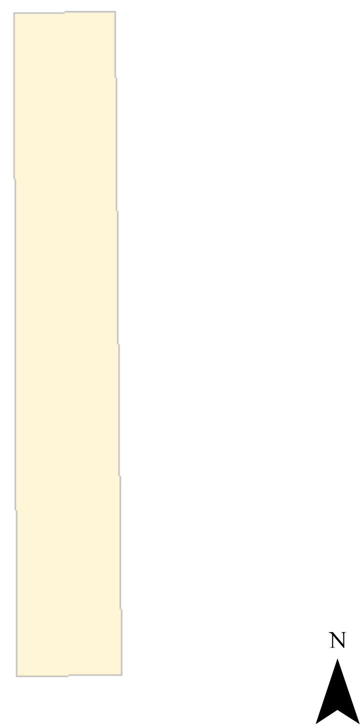
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
8255-A	2.176	2.503	15.00%	2.542	1.56%	2.578	1.41%
8255-B	0.877	1.044	19.08%	1.069	2.37%	1.095	2.44%
8255-C	2.680	3.096	15.52%	3.182	2.75%	3.267	2.68%
8255-D	4.378	5.545	26.67%	5.781	4.25%	6.019	4.13%
Total	10.111	12.189		12.573		12.959	

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-MCES interceptors serve as trunk sewer for all areas and hence the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties				Trunk Full Pipe Capacity, MGD	MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	Slope (%)	n value		
8255-A	Central Ave NE and Lowry Ave NE	30	0.24%	0.013	12.98	
8255-B	Central Ave NE and 22nd Ave NE	18	0.25%	0.013	3.39	
8255-C	5th St NE and 3rd Ave NE	48	0.28%	0.013	49.19	
8255-D	University Ave SE and 13th Ave SE	120				X

Interceptor Service Area 8754



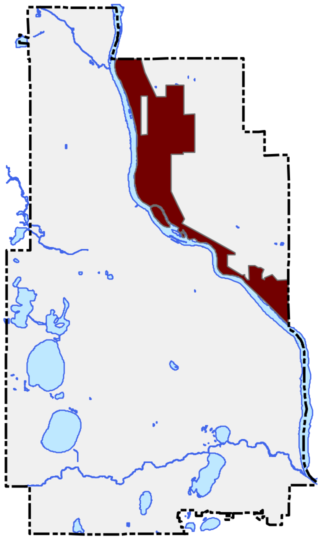


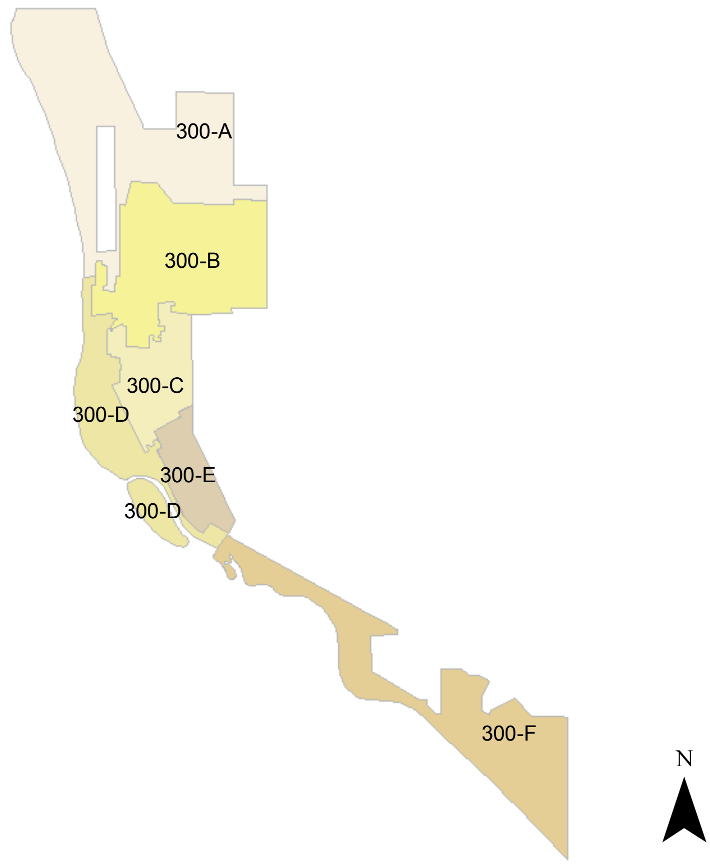
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
8754	0.265	0.285	7.69%	0.287	0.74%	0.289	0.61%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
8754	22nd Ave NE and Grand St NE	96	X

Interceptor Service Area MN-300



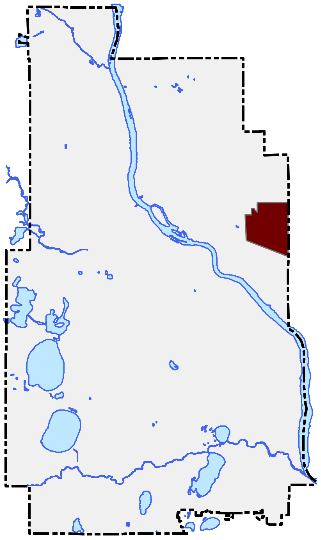


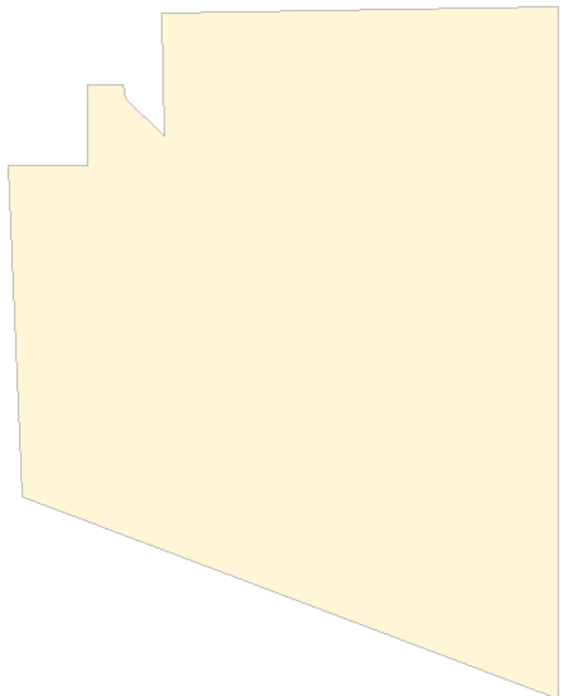
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-300-A	2.728	2.905	6.50%	3.013	3.72%	3.132	3.94%
MN-300-B	2.361	2.587	9.56%	2.666	3.08%	2.746	2.99%
MN-300-C	0.888	1.105	24.49%	1.130	2.24%	1.152	1.98%
MN-300-D	1.118	1.387	24.02%	1.426	2.80%	1.463	2.62%
MN-300-E	0.613	1.061	73.12%	1.139	7.37%	1.225	7.49%
MN-300-F	1.982	2.239	12.94%	2.357	5.27%	2.480	5.24%
Total	9.690	11.284		11.731		12.198	

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-MCES interceptors serve as trunk sewer for all areas and hence the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties				Trunk Full Pipe Capacity, MGD	MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	Slope (%)	n value		
MN-300-A	23rd Ave NE and Marshall St NE	65				X
MN-300-B	22nd Ave NE and Marshall St NE	24	0.25%	0.013	10.23	
MN-300-C	11th Ave NE and Main St NE	42	1.30%	0.013	74.13	
MN-300-D	2nd St SE and 2nd Ave SE	54 x 72 Horseshoe				X
MN-300-E	3rd Ave NE and Main St NE	48	0.40%	0.013	58.71	
MN-300-F	Emerald St and East River Terr	72				X

Interceptor Service Area MN-301



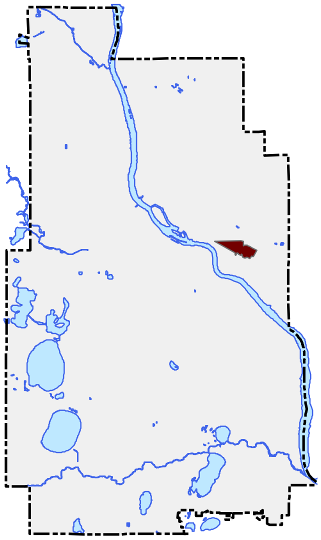


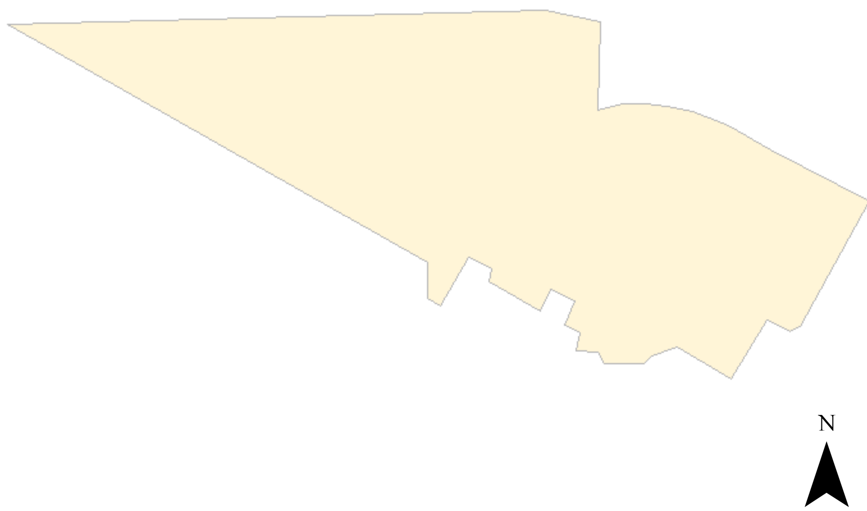
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-301	2.725	2.787	2.29%	2.823	1.28%	2.859	1.27%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-301	Elm St SE and 19th Ave SE	66	X

Interceptor Service Area MN-302A



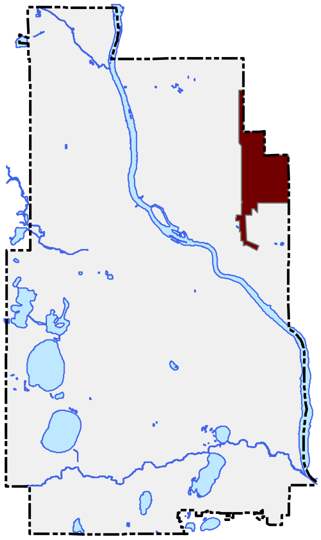


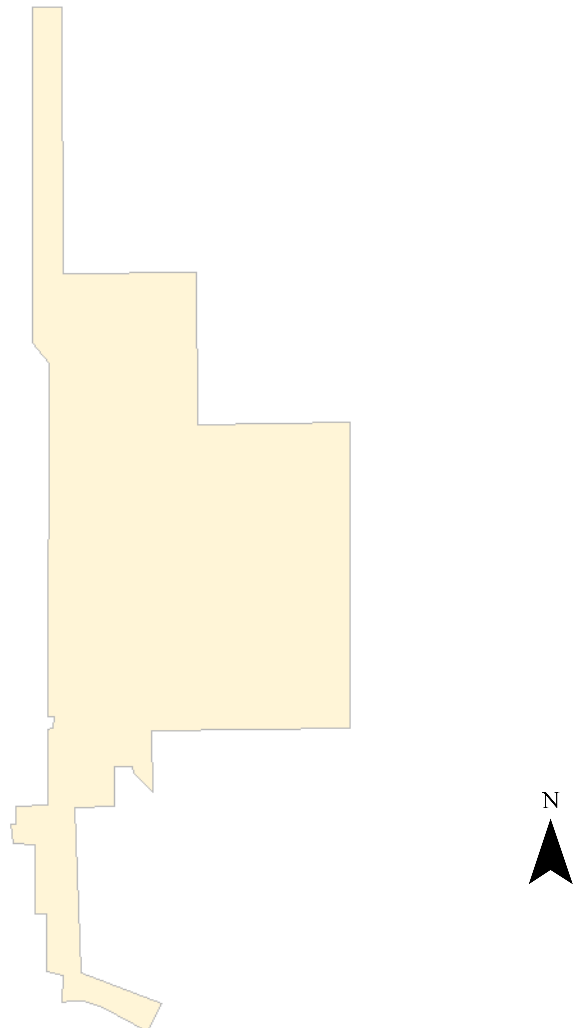
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-302A	0.486	0.544	12.04%	0.553	1.64%	0.562	1.68%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-302A	Oak St SE and University Ave SE	42	X

Interceptor Service Area MN-302N



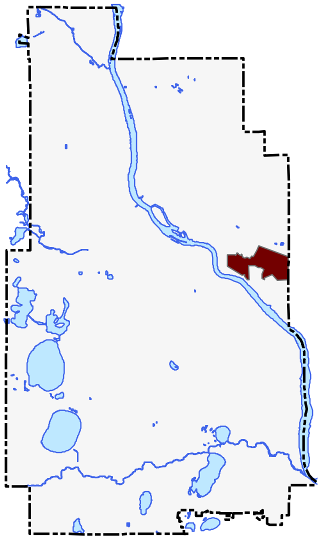


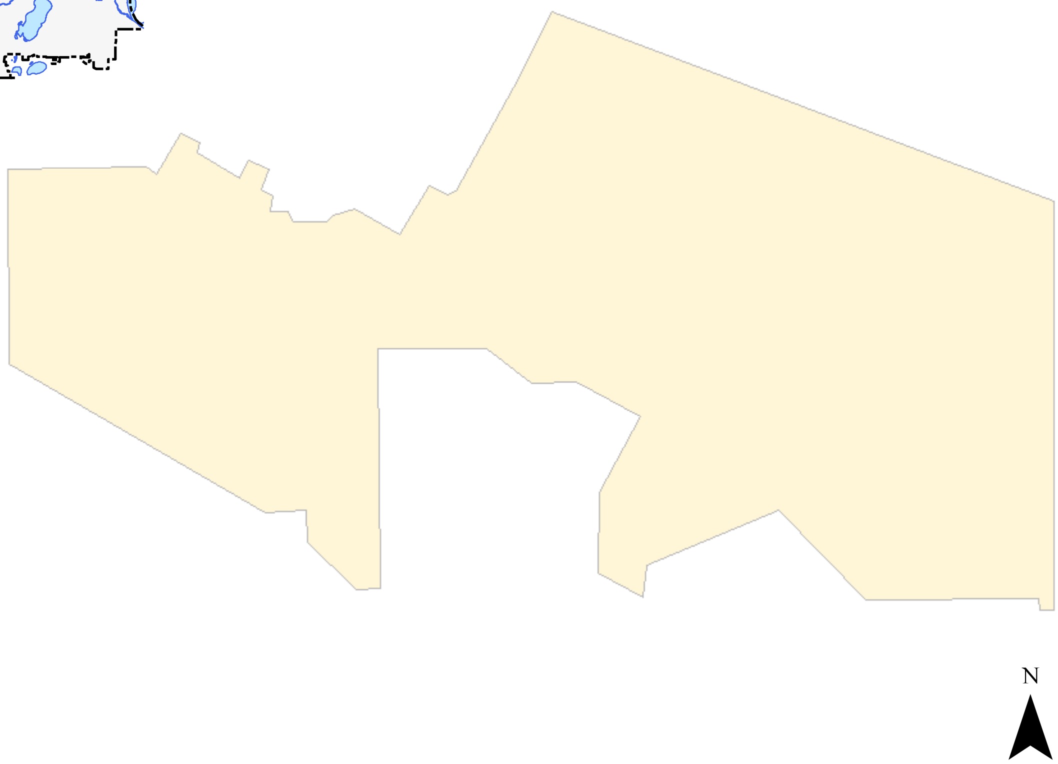
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-302N	5.895	6.281	6.54%	6.334	0.85%	6.388	0.85%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-302N	Dinkytown Greenway SE and 6th St SE	96	X

Interceptor Service Area MN-302S



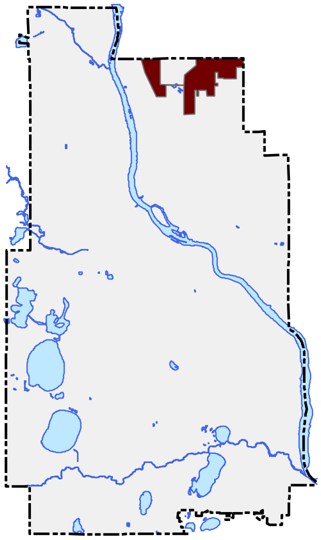


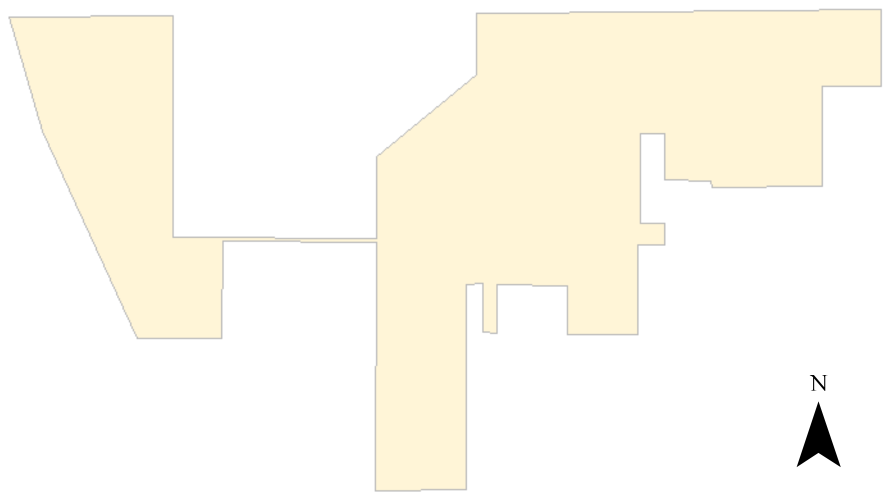
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-302S	1.847	2.388	29.26%	2.483	3.98%	2.602	4.81%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-302S	Oak St SE and East River Pkwy	42	X

Interceptor Service Area MN-303

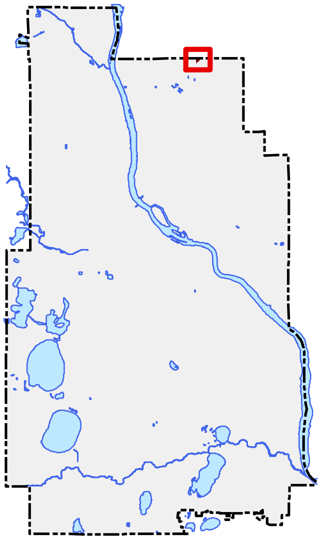




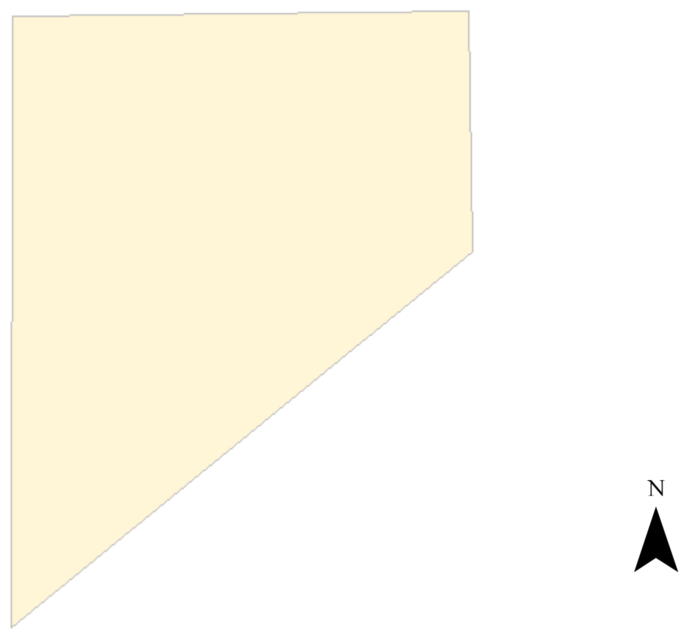
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-303	2.190	2.330	6.38%	2.392	2.63%	2.457	2.74%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-303	University Ave NE between 32nd Ave NE and 30th Ave NE	36	X



Interceptor Service Area MN-305

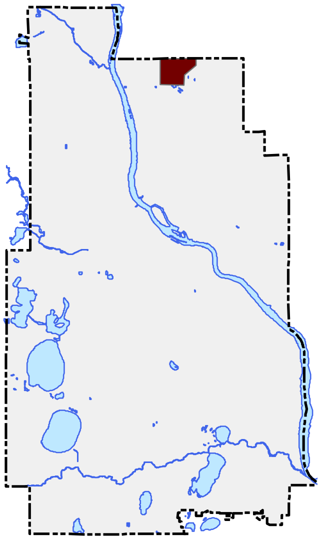


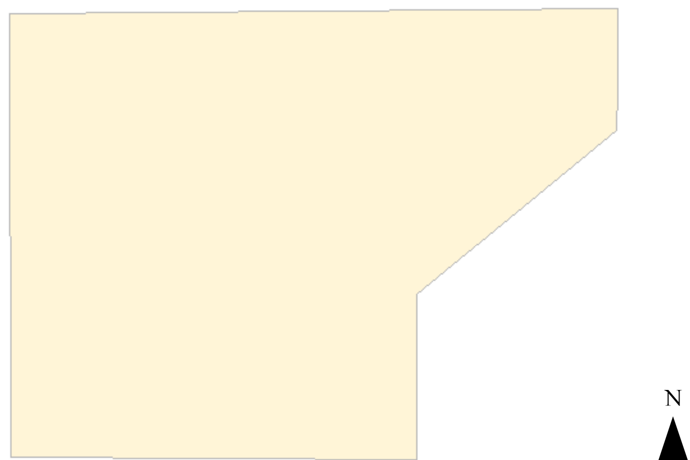
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-305	0.007	0.008	13.99%	0.008	2.03%	0.008	1.94%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-305	Tyler St NE & 36th Ave NE	16	X

Interceptor Service Area MN-306



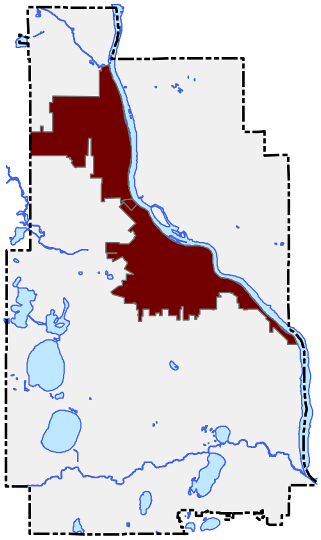


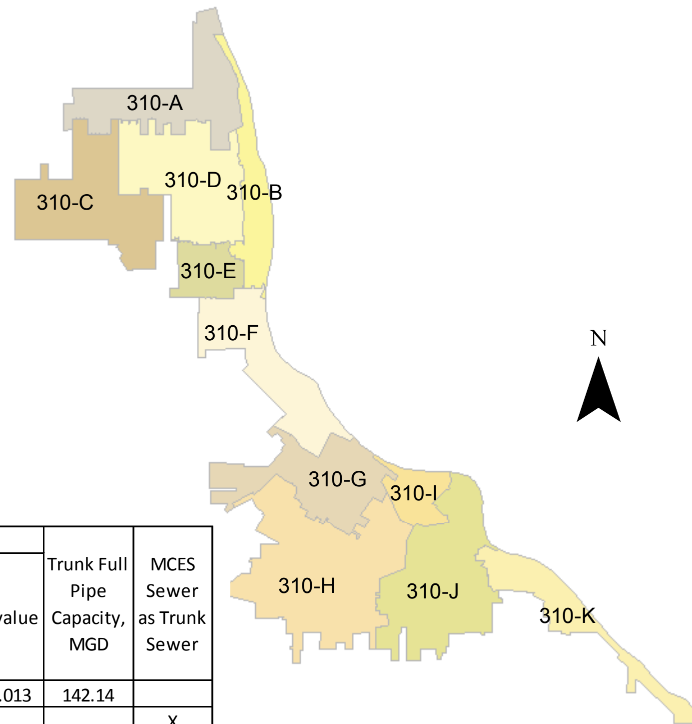
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-306	1.175	1.207	2.65%	1.211	0.34%	1.214	0.25%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-306	Saint Anthony Pkwy and 5th St NE	48	X

Interceptor Service Area MN-310





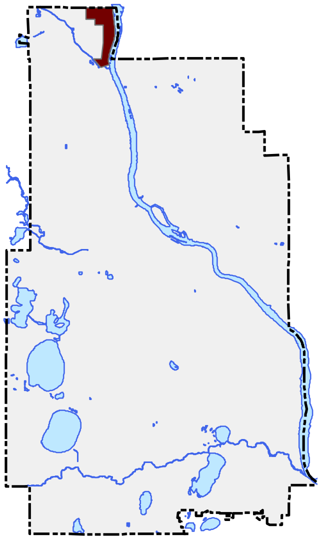
Interceptor Service Area	Trunk Pipe Properties				Trunk Full Pipe Capacity, MGD	MCES Sewer as Trunk Sewer
	Location	Diameter/ Equivalent Diameter, inch	Slope (%)	n value		
MN-310-A	Port of MPLS Dr & 1st St N	52	1.53%	0.013	142.14	
MN-310-B	21st Ave N and 2nd St N	54				X
MN-310-C	Fremont Ave N & 26th Ave N	60	0.32%	0.013	95.21	
MN-310-D	26th Ave N & 2nd St N	78	25.9%	0.013	117.36	
MN-310-E	21st Ave N & 2nd St N	48	0.43%	0.013	60.87	
MN-310-F	Marquette Ave & Washington Ave S	40	0.19%	0.013	24.88	
MN-310-G	Chicago Ave & Washington Ave S	90				X
MN-310-H	11th Ave S & 4th St S	60	1.13%	0.013	178.91	
MN-310-I	2 1/2 St S & 19th Ave S	96				X
MN-310-J	Locust St & 23rd Ave S	102 x 102 Horseshoe				X
MN-310-K	On riverfront near W River Pkwy S and 26th St E	120				X

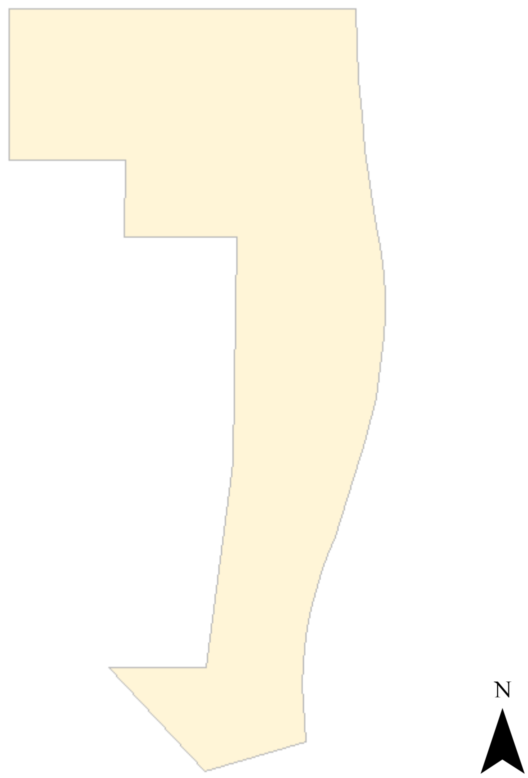
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-310-A	1.320	1.475	11.73%	1.487	0.82%	1.487	0.04%
MN-310-B	1.581	1.665	5.32%	1.670	0.31%	1.676	0.34%
MN-310-C	2.033	2.231	9.76%	2.207	-1.10%	2.164	-1.93%
MN-310-D	1.870	1.978	5.75%	1.990	0.65%	1.990	-0.02%
MN-310-E	0.549	0.535	-2.60%	0.554	3.70%	0.572	3.25%
MN-310-F	1.654	2.661	60.89%	2.873	7.96%	3.091	7.62%
MN-310-G	1.764	6.586	273.36%	8.458	28.43%	10.406	23.03%
MN-310-H	3.129	3.152	0.73%	4.063	28.93%	4.992	22.86%
MN-310-I	0.506	1.195	136.23%	1.313	9.89%	1.450	10.42%
MN-310-J	1.876	2.181	16.22%	2.446	12.16%	2.714	10.97%
MN-310-K	0.726	0.754	3.84%	0.794	5.26%	0.831	4.68%
Total	17.008	24.411		27.855		31.374	

Note: 1-Sewer Service Area outside of Minneapolis was not considered.

2-MCES interceptors serve as trunk sewer for all areas and hence the flows are incremental.

Interceptor Service Area MN-311



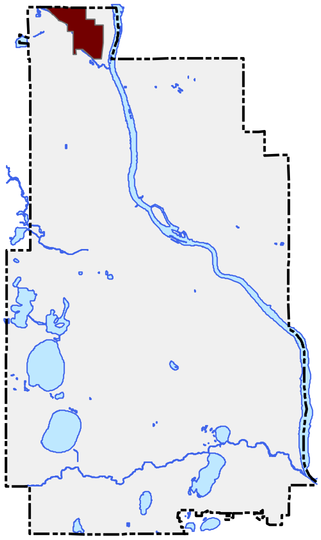


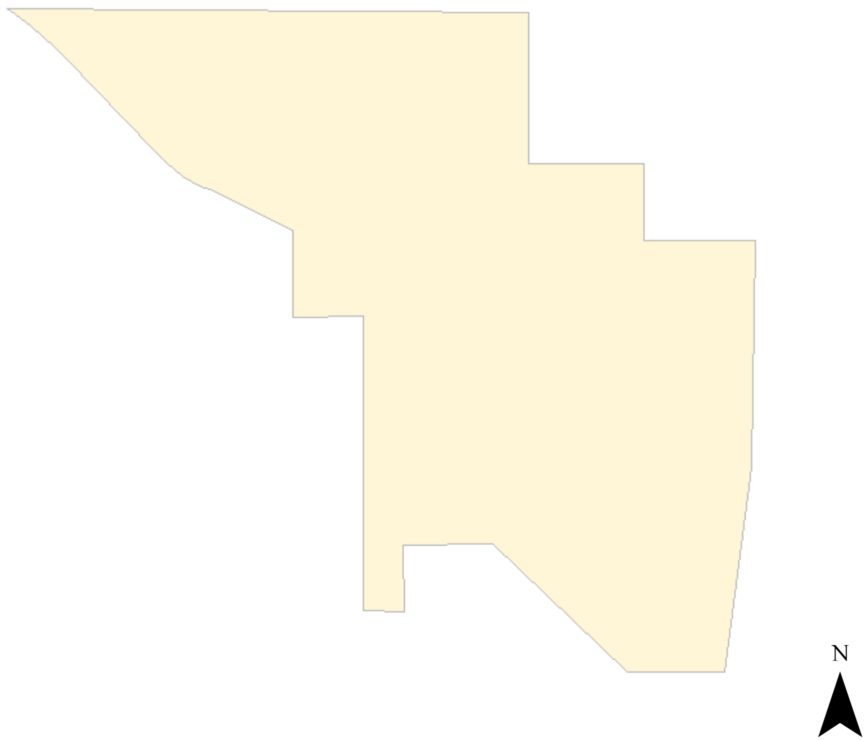
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-311	0.655	0.690	5.34%	0.700	1.45%	0.709	1.37%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-311	Lyndale Ave N north of Webber Pkwy at Shingle Creek	48	X

Interceptor Service Area MN-312

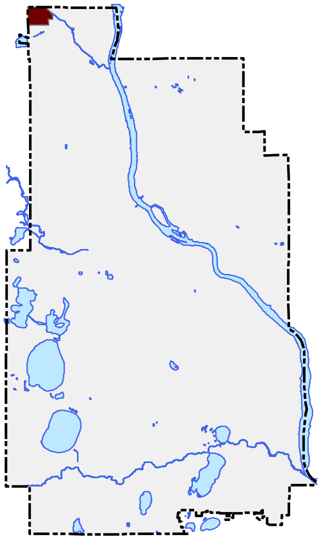




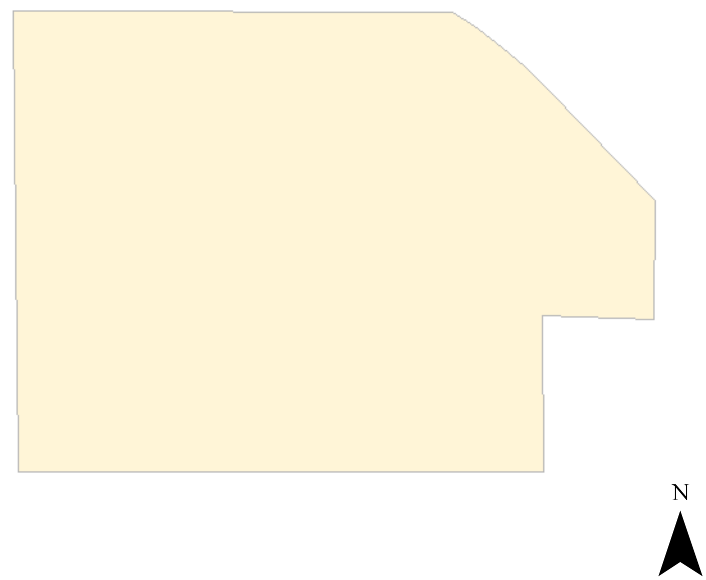
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-312	1.513	1.603	5.95%	1.620	1.08%	1.634	0.85%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-312	Lyndale Ave N and 47th Ave N	72	X



Interceptor Service Area MN-313

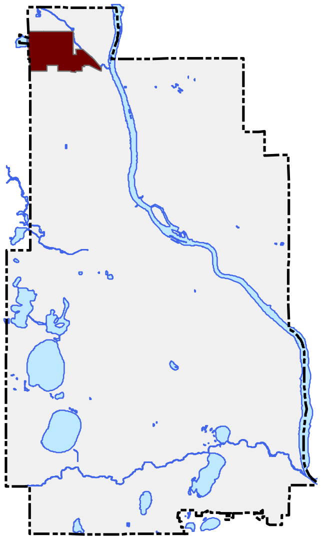


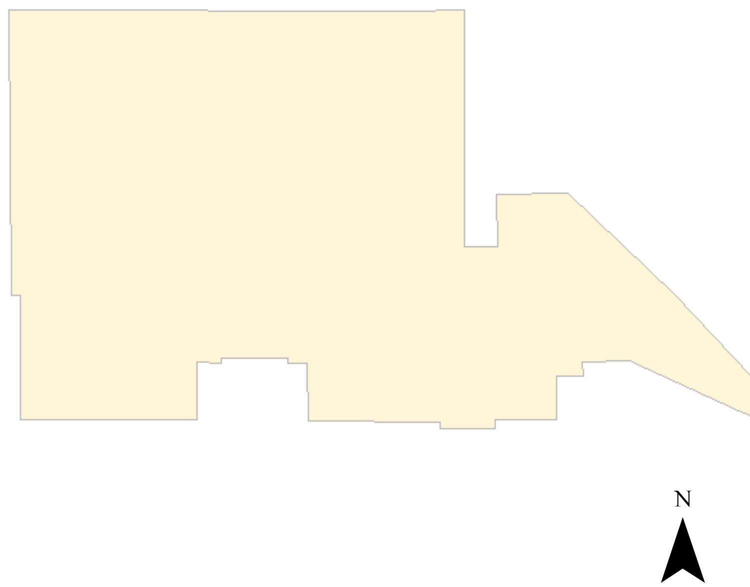
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-313	0.341	0.356	4.45%	0.360	1.24%	0.362	0.39%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-313	Penn Ave N and 52nd Ave N	24	X

Interceptor Service Area MN-315



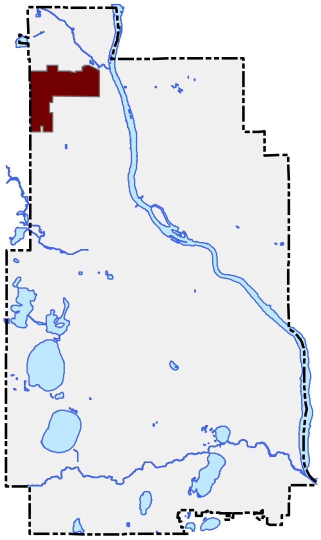


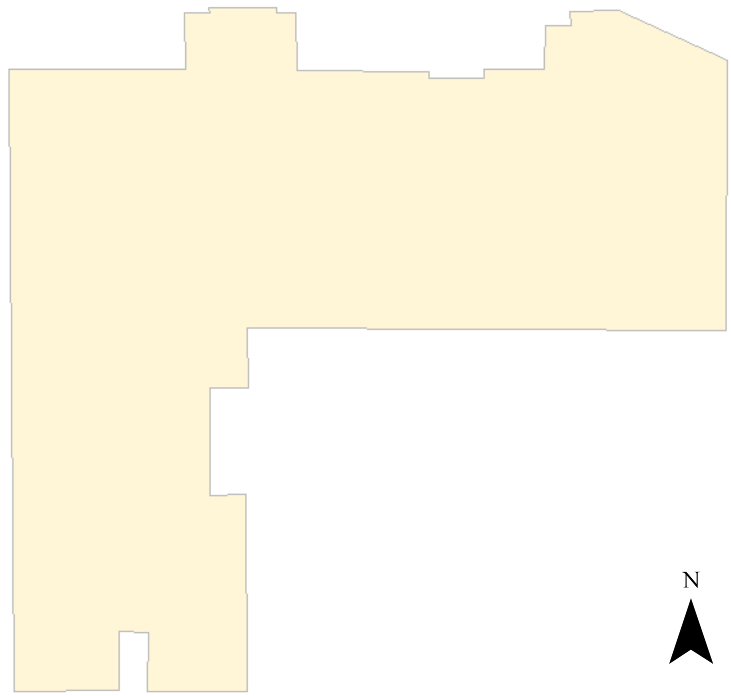
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-315	2.325	2.531	8.87%	2.559	1.12%	2.583	0.91%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-315	Webber Pkwy and Lyndale Ave N	54	X

Interceptor Service Area MN-316

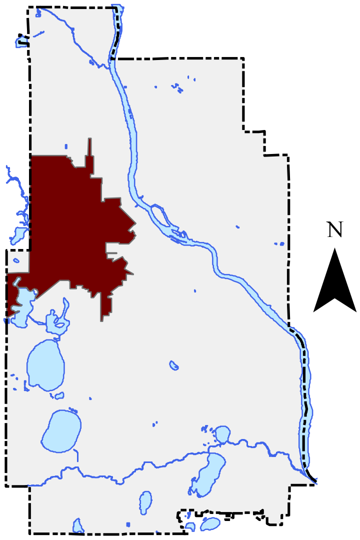




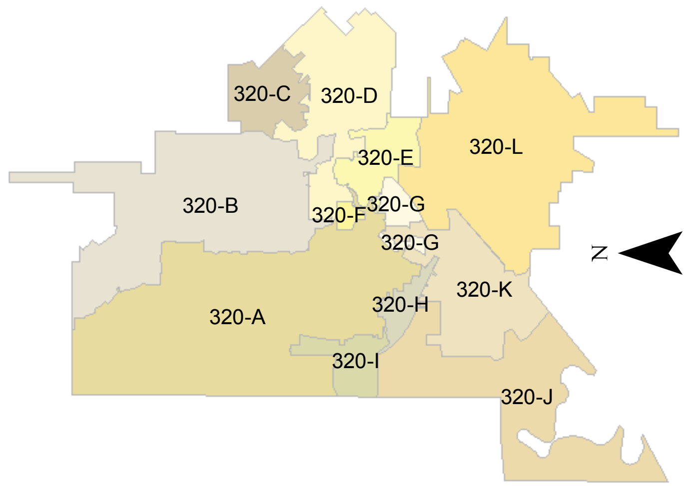
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-316	3.826	4.136	8.09%	4.164	0.68%	4.176	0.30%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-316	42nd Ave N and Lundale Ave N	72	X



Interceptor Service Area MN-320

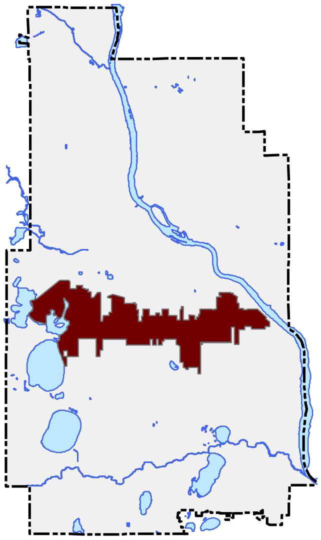


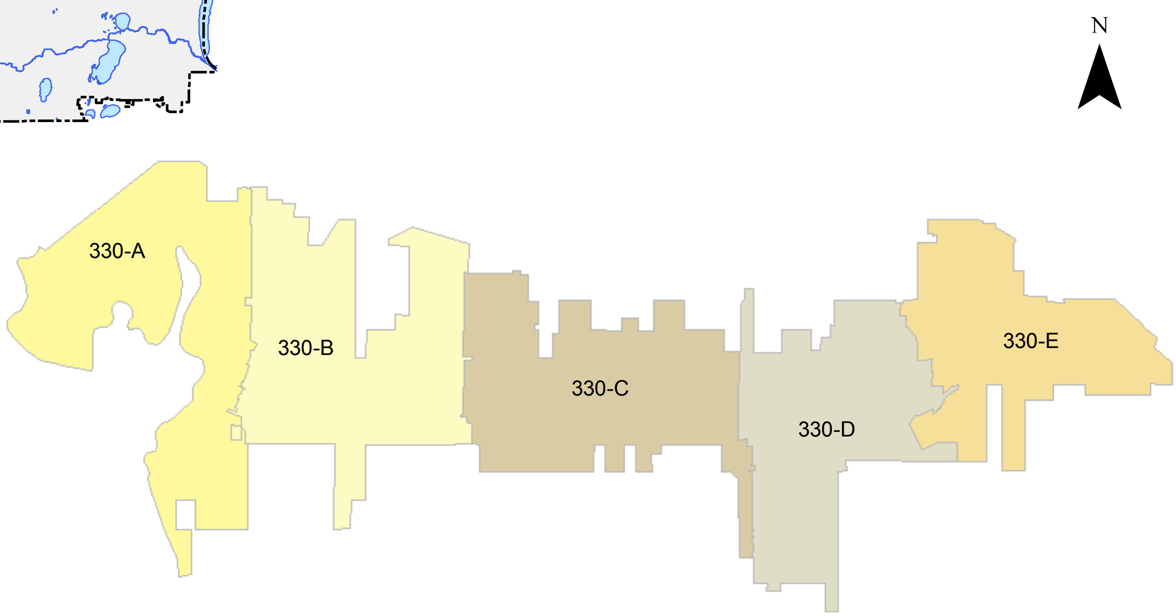
Interceptor Service Area	Trunk Pipe Properties				Trunk Full Pipe Capacity, MGD	MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	Slope (%)	n value		
MN-320-A	W Chestnut Ave & Morgan Ave N	51	0.79%	0.013	96.98	
MN-320-B	Sumner Ct & Aldrich Ave N	54	3.20%	0.013	227.32	
MN-320-C	8th Ave N & 5th St N	48	2.14%	0.013	135.79	
MN-320-D	2nd Ave N & 5th St N	102 x 72 oval				X
MN-320-E	6th Ave N between Bryant Ave N & Girard Terr	86				X
MN-320-F	Humboldt Ave N & 4th Ave N	15	0.12%	0.013	1.45	
MN-320-G	Van White Memorial Blvd & 2nd Ave N	86				X
MN-320-H	Morgan Ave N & Chestnut Ave W	42				X
MN-320-I	Thomas Ave N & Inglewood Ave	18	0.18%	0.013	1.77	
MN-320-J	Russell Ave S & W Chestnut Ave	18	0.05%	0.013	1.52	
MN-320-K	Currie Ave W & Irving Ave N	86				X
MN-320-L	Between 2nd Ave N & Colfax Ave N (int) & I394	72	0.33%	0.013	157.22	

Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-320-A	3.026	3.218	6.36%	3.232	0.42%	3.229	-0.09%
MN-320-B	2.463	2.403	-2.44%	2.504	4.21%	2.608	4.16%
MN-320-C	0.411	0.705	71.33%	0.784	11.19%	0.878	12.07%
MN-320-D	1.141	1.486	30.17%	1.953	31.49%	2.500	27.97%
MN-320-E	0.366	0.386	5.38%	0.427	10.47%	0.473	10.86%
MN-320-F	0.065	0.065	1.13%	0.073	11.37%	0.081	11.58%
MN-320-G	0.207	0.221	6.80%	0.224	1.30%	0.227	1.23%
MN-320-H	0.052	0.056	7.47%	0.057	2.60%	0.058	1.69%
MN-320-I	0.073	0.080	10.60%	0.080	-0.29%	0.078	-2.13%
MN-320-J	1.360	1.421	4.44%	1.426	0.36%	1.430	0.32%
MN-320-K	0.675	0.752	11.31%	0.764	1.64%	0.775	1.38%
MN-320-L	2.268	3.305	45.71%	3.560	7.71%	3.813	7.11%
Total	12.108	14.097		15.083		16.150	

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area MN-330

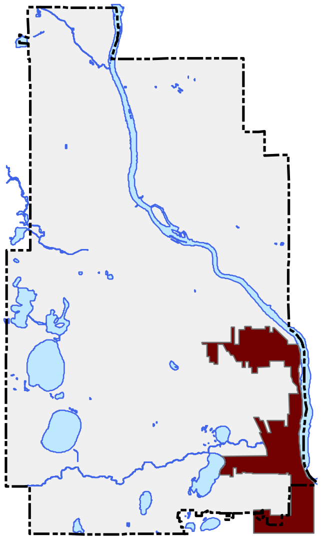




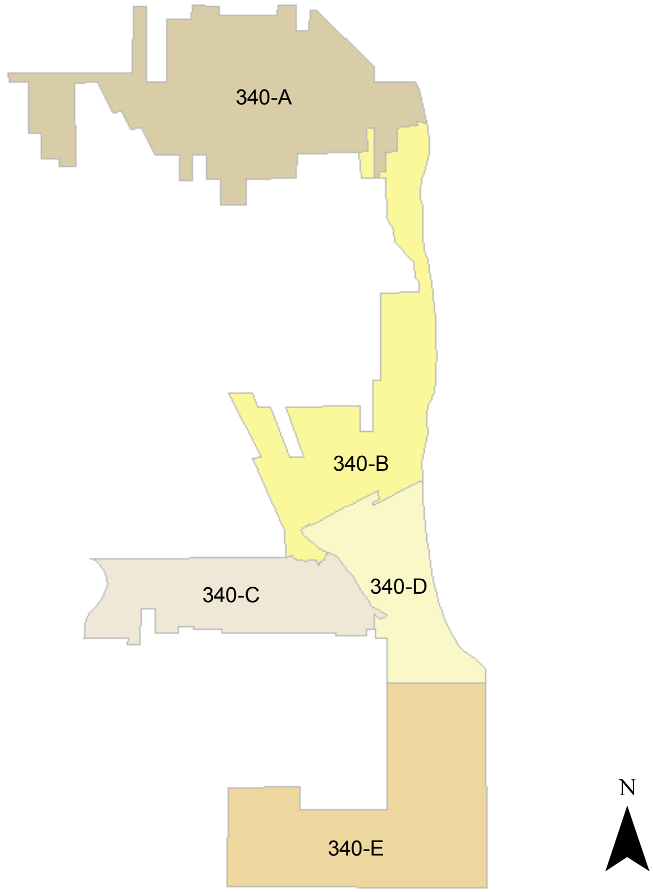
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-330-A	1.672	1.820	8.84%	1.886	3.60%	1.954	3.64%
MN-330-B	2.325	3.122	34.31%	3.350	7.29%	3.577	6.78%
MN-330-C	2.267	3.235	42.71%	3.411	5.43%	3.587	5.17%
MN-330-D	2.067	2.269	9.78%	2.567	13.14%	2.894	12.76%
MN-330-E	1.946	2.304	18.40%	2.512	8.99%	2.743	9.20%
Total	10.277	12.751		13.725		14.756	

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-MCES interceptors serve as trunk sewer for all areas and hence the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-330-A	27th St E & Hennepin Ave	54	X
MN-330-B	27th St E & Nicollet Ave	72	X
MN-330-C	26th St E & 15th Ave S	96	X
MN-330-D	26th St E & 24th Ave S	96	X
MN-330-E	26th St E & 39th Ave S	96	X



Interceptor Service Area MN-340

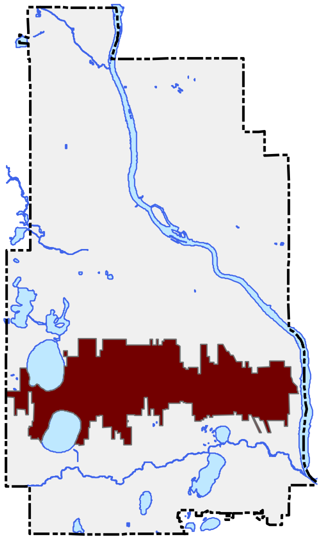


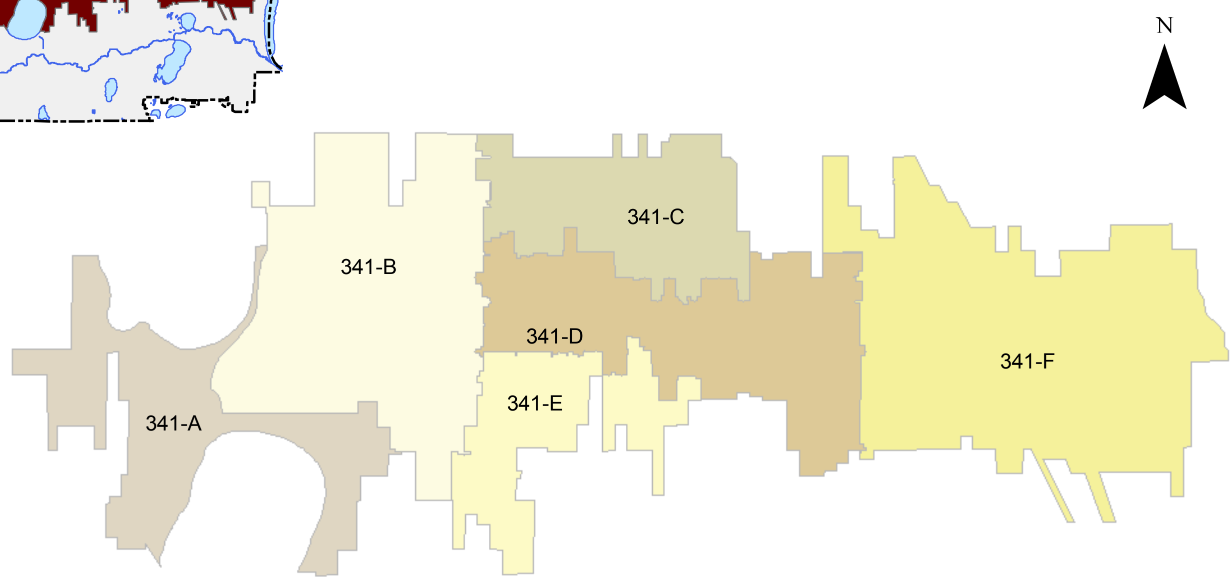
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-340-A	2.888	3.243	12.31%	3.349	3.25%	3.449	3.00%
MN-340-B	1.648	1.957	18.75%	2.060	5.26%	2.177	5.67%
MN-340-C	1.172	1.322	12.77%	1.339	1.29%	1.350	0.81%
MN-340-D	0.381	0.401	5.24%	0.430	7.10%	0.459	6.81%
MN-340-E	0.599	0.621	3.72%	0.623	0.28%	0.625	0.31%
Total	6.687	7.544		7.799		8.059	

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-MCES interceptors serve as trunk sewer for all areas and hence the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties				Trunk Full Pipe Capacity, MGD	MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	Slope (%)	n value		
MN-340-A	Lake St E & W River PKWY	66	0.46%	0.013	147.18	
MN-340-B	32nd St E & W River PKWY	66 X 72 Horseshoe				X
MN-340-C	Hiawatha Ave & 50th St E	42 X 72 Hourseshoe	14.64%	0.013	71.40	
MN-340-D	46th Ave S & Godfrey PKWY	42 X 72 Horseshoe				X
MN-340-E	Hiawatha Ave & 54th St E	36 X 72 Semi Elliptical	0.13%	0.013	41.43	

Interceptor Service Area MN-341





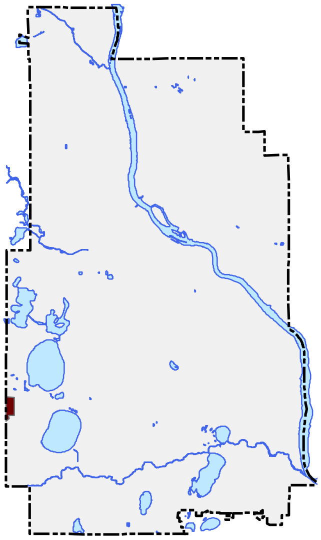
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-341-A	1.929	2.009	4.13%	2.017	0.42%	2.025	0.41%
MN-341-B	5.497	5.997	9.10%	6.135	2.30%	6.272	2.22%
MN-341-C	1.852	1.823	-1.58%	1.901	4.31%	1.968	3.51%
MN-341-D	3.155	3.362	6.54%	3.403	1.24%	3.414	0.32%
MN-341-E	1.668	1.710	2.51%	1.698	-0.67%	1.676	-1.33%
MN-341-F	5.560	6.498	16.88%	6.764	4.09%	7.035	4.01%
Total	19.661	21.398		21.919		22.390	

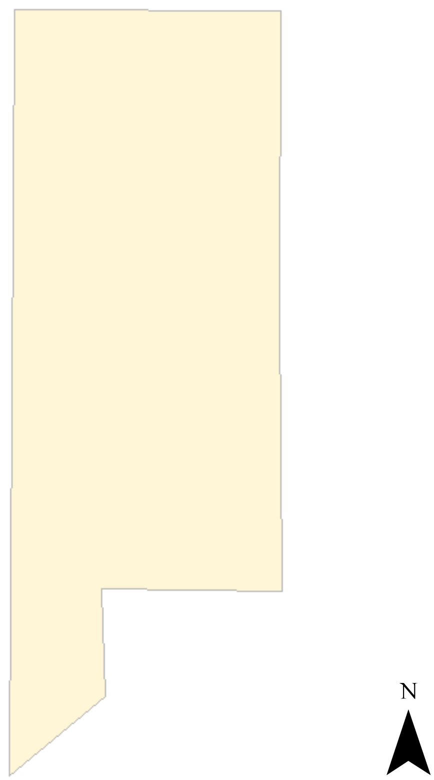
Note: 1-Sew er Service Area outside of Minneapolis w as not considered.

2-MCES interceptors serve as trunk sew er for the areas of MN-341-A, MN-341-B, MN-341-D & MN-341-F and hence the flow s are incremental.

Interceptor Service Area	Trunk Pipe Properties				Trunk Full Pipe Capacity, MGD	MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	Slope (%)	n value		
MN-341-A	Dupont Ave S & 40th St W	60				X
MN-341-B	38th St W & Blaisdell Ave	90				X
MN-341-C	15th Ave S & 37th Ave S	57	1.25%	0.013	164.11	
MN-341-D	38th St W & 22nd Ave S	111				X
MN-341-E	Park Ave & 3th St E	66	0.12%	0.013	75.17	
MN-341-F	38th St E & Edmund BLVD	54				X

Interceptor Service Area MN-342



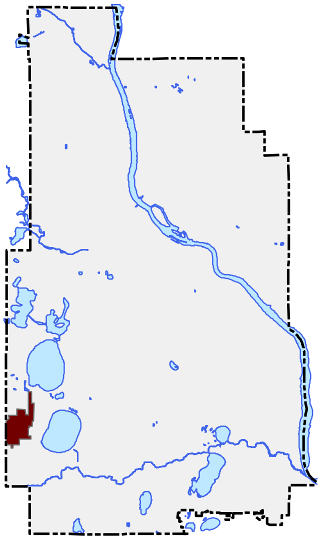


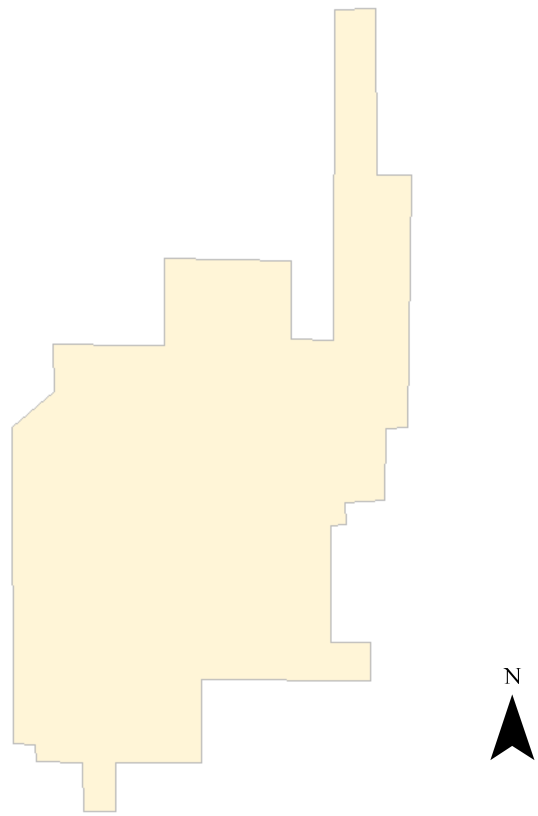
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-342	0.205	0.210	2.44%	0.210	0.11%	0.210	0.09%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-342	Drew Ave S and 39th St W	14	X

Interceptor Service Area MN-343



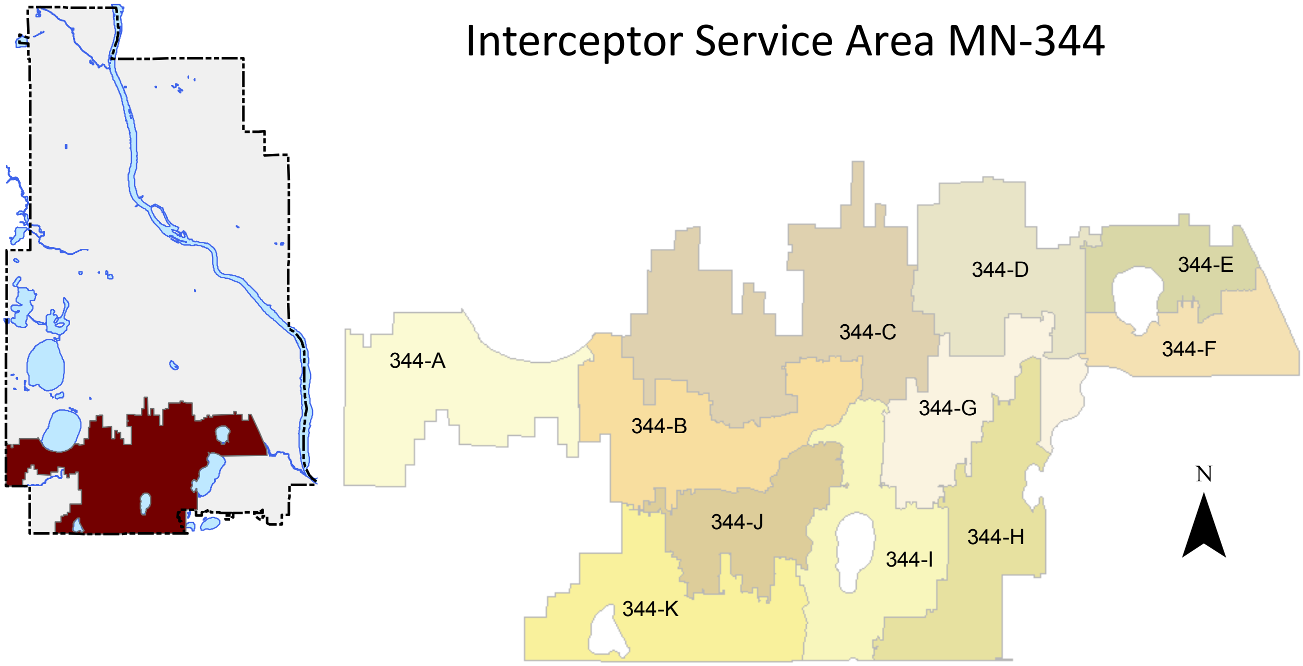


Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-343	0.949	1.007	6.03%	1.005	-0.12%	1.005	-0.02%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-343	38th St W and Xerxes Ave S	24	X

Interceptor Service Area MN-344

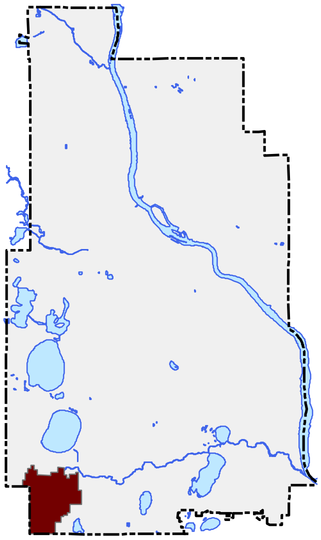


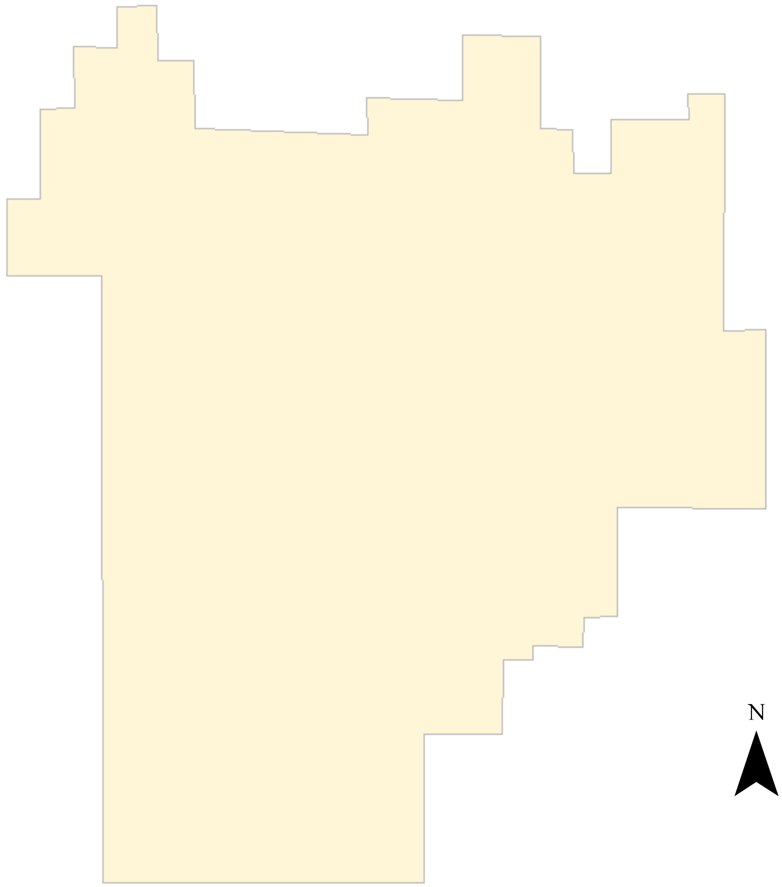
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-344-A	2.303	2.448	6.32%	2.439	-0.39%	2.431	-0.31%
MN-344-B	1.825	1.774	-2.80%	1.762	-0.69%	1.749	-0.73%
MN-344-C	3.383	3.477	2.79%	3.473	-0.12%	3.461	-0.35%
MN-344-D	2.567	2.764	7.70%	2.799	1.27%	2.822	0.81%
MN-344-E	1.092	1.167	6.94%	1.182	1.25%	1.194	1.04%
MN-344-F	1.121	1.229	9.61%	1.243	1.13%	1.252	0.69%
MN-344-G	1.133	1.217	7.36%	1.239	1.79%	1.250	0.89%
MN-344-H	1.463	1.548	5.84%	1.582	2.14%	1.607	1.60%
MN-344-I	1.482	1.528	3.10%	1.556	1.79%	1.576	1.31%
MN-344-J	1.344	1.394	3.78%	1.392	-0.16%	1.389	-0.19%
MN-344-K	2.395	2.462	2.80%	2.488	1.06%	2.516	1.10%
Total	20.108	21.010		21.155		21.247	

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties				Trunk Full Pipe Capacity, MGD	MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	Slope (%)	n value		
MN-344-A	W 51st St and James Ave S	24				X
MN-344-B	E Minnehaha Pkwy and 5th Ave S	48				X
MN-344-C	E Minnehaha Pkwy and Portland Ave	102	0.33%	0.013	397.99	
MN-344-D	E Minnehaha Pkwy and Longfellow Ave	84	0.12%	0.013	143.00	
MN-344-E	E 46th St and Nokomis Ave S	35	0.28%	0.013	21.16	
MN-344-F	E 47th St and 38th Ave S	132 x 123 Horseshoe				X
MN-344-G	E 48th St and Cedar Ave S	110				X
MN-344-H	E Minnehaha Pkwy and 18th Ave S	21	0.15%	0.013	3.97	
MN-344-I	E Minnehaha Pkwy and Park Ave	110				X
MN-344-J	E Minnehaha Pkwy and Stevens Ave	22	0.32%	0.013	6.56	
MN-344-K	E 60th St and I35W	21	0.22%	0.013	4.80	

Interceptor Service Area MN-345

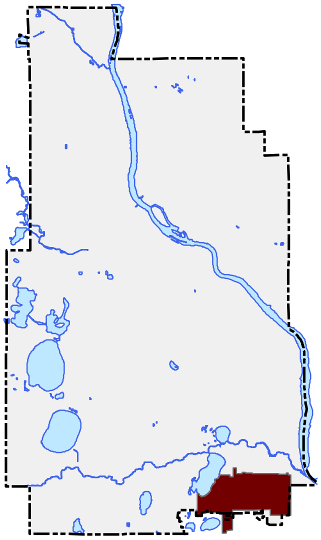




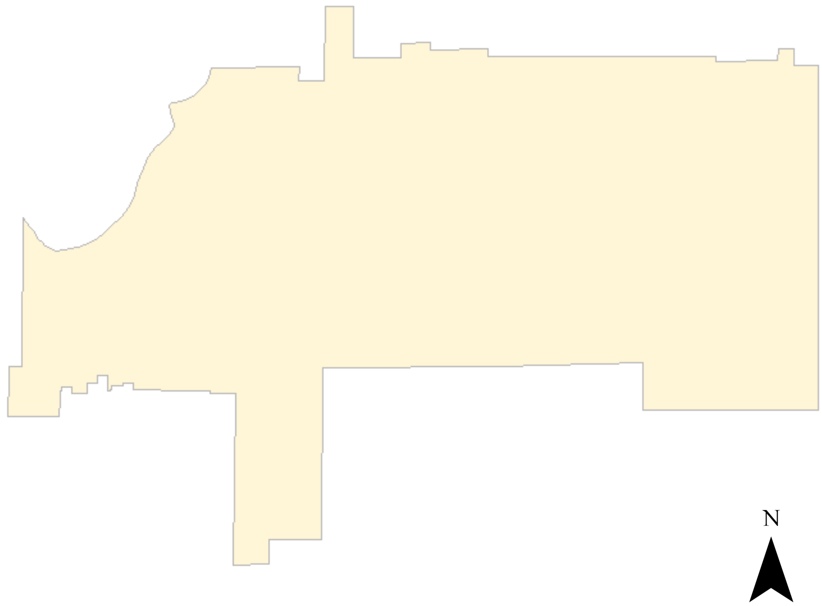
Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-345	2.928	3.057	4.44%	3.059	0.07%	3.059	-0.01%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.
2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-345	Humboldt Ave S and W Minnehaha Pkwy	30	X



Interceptor Service Area MN-346



Interceptor Service Area	2010 Design Flow Rate Based on 2010 Water Use, MGD	2020 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2010-2020	2030 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2020-2030	2040 Design Flow Rate (Projected), MGD	Design Flow Rate Percent Change 2030-2040
MN-346	3.337	3.626	8.65%	3.667	1.14%	3.691	0.66%

Note: 1-Sewer Service Area outside of Minneapolis was not considered.

2-Where MCES interceptors serve as trunk sewer, the flows are incremental.

Interceptor Service Area	Trunk Pipe Properties		MCES Sewer as Trunk Sewer
	Location	Diameter/Equivalent Diameter, inch	
MN-346	52nd St E and 46th Ave S	75	X

Appendix I – External Properties Served by City of Minneapolis Sanitary Sewers

Fort Snelling Area Sewer Estimates for 2015

Agency	Address	Estimates (Gallons) 2015	Proportion within Fort Snelling Area
Metropolitan Airports Commission	6040 South 28th Avenue	214,208,416	75.94%
Minnesota Air National Guard	5891 46th Avenue South	3,387,161	1.20%
Veterans Medical Center	1 Veterans Drive	55,343,037	19.62%
Veterans Administration B-89	6001 Minnehaha Avenue	356,814	0.13%
Veterans and Community Housing	5115 54th Street East	772,731	0.27%
Bishop Henry Whipple Building/GSA	1 Federal Drive	3,758,196	1.33%
Minnesota Department of Natural Resources (Fort Snelling Park)	101 Snelling Lake Road	1,529,008	0.54%
Minnesota Department of Transportation	6000 Minnehaha Avenue	206,454	0.07%
934th SPTG/CERU	4122 59th Street East	1,342,753	0.48%
United States Army – 88th Regional Support Command	506 Roeder Circle	667,998	0.24%
Marine Forces Reserve	6400 Bloomington Road	151,097	0.05%
Minneapolis Park and Recreation Board (Fort Snelling Golf Course)	5701 Leavenworth Avenue	51,613	0.02%
Minneapolis Park and Recreation Board (Neiman Sports Complex)	6247 Bloomington Road, 100 Federal Drive	169,053	0.06%
Northern Star Council Base Camp	201 Bloomington Road	139,880	0.05%
Fort Snelling Total		**282,084,211**	**100%**

Properties with Sanitary Sewer Connections

Property ID	Account No.	Street Address	City
292923220001	4260257401	2530 Kasota Avenue	St. Paul
202923330005	2031122400	2565 Kasota Avenue	St. Paul
292923220012	2031183401	2578 Kasota Avenue	St. Paul
1011821110002	6160193400	5145 Xerxes Avenue North	Brooklyn Center
1011821110002	6160193400	5145 Xerxes Avenue North	Brooklyn Center
1011821110005	2030727400	5123 Xerxes Avenue North	Brooklyn Center
1011821110006	2030726401	5117 Xerxes Avenue North	Brooklyn Center
1011821110007	2030725402	5109 Xerxes Avenue North	Brooklyn Center
1011821110012	6010193401	5243 Xerxes Avenue North	Brooklyn Center
1011821110013	2030732401	5233 Xerxes Avenue North	Brooklyn Center
1011821110014	2030731404	5223 Xerxes Avenue North	Brooklyn Center
1011821110021	2030724406	5101 Xerxes Avenue North	Brooklyn Center
1011821110022	2030730402	5211 Xerxes Avenue North	Brooklyn Center
1011821110023	6010192404	5201 Xerxes Avenue North	Brooklyn Center
1011821140014	730523401	3001 51st Avenue North	Brooklyn Center
0702824440140	6160181400	4540 France Avenue South	Edina
1802824110004	611287401	4634 France Avenue South	Edina
1802824110006	611289403	4640 France Avenue South	Edina
1802824110007	611290400	4646 France Avenue South	Edina
1802824110008	611291403	3900 47th Street West	Edina
1802824110077	6160187401, 6160187402	4620 France Avenue South	Edina
1802824110080	611285401	4624 France Avenue South	Edina
1802824110082	6160186401	4612 France Avenue South	Edina
1802824110083	611284403, 611284404	4610 France Avenue South	Edina
1802824110084	611283402	4608 France Avenue South	Edina
1802824110085	6160185400	4606 France Avenue South	Edina
1802824110086	6160184401	4604 France Avenue South	Edina
1802824110087	6160183400	4602 France Avenue South	Edina
1802824110088	6160182400, 6160182401	4600 France Avenue South	Edina
1802824140005	6160189402	4804 France Avenue South	Edina
1802824140007	611299402	4812 France Avenue South	Edina
1802824140008	611300400	4824 France Avenue South	Edina
1802824140009	611301411	4830 France Avenue South	Edina

Property ID	Account No.	Street Address	City
1802824140010	611302401	4846 France Avenue South	Edina
1802824410061	611311402	5132 France Avenue South	Edina
1802824410187	6160191400	5100 France Avenue South 101	Edina
1802824410262	6160219400	5120 France Avenue South 101	Edina
1802824440012	611312.401	5232 France Avenue South	Edina
1802824440115	611313.401	5300 France Avenue South	Edina
2002824210134	511817403	3301 54th Street West	Edina
2002824210146	6160265402	5420 Xerxes Avenue South	Edina
2002824240001	2011410.400	5624 Xerxes Avenue South	Edina
2002824240002	2011411.400	5628 Xerxes Avenue South	Edina
2002824240005	2011412.402	5700 Xerxes Avenue South	Edina
2002824240006	2011413.405	5704 Xerxes Avenue South	Edina
2002824240008	2011414.401	5712 Xerxes Avenue South	Edina
2002824240009	2011415.401	5716 Xerxes Avenue South	Edina
2002824240010	2011416.402	5720 Xerxes Avenue South	Edina
2002824240011	2011417.402	5724 Xerxes Avenue South	Edina
2002824240012	2011418.402	5728 Xerxes Avenue South	Edina
2002824240013	2011419.402	5732 Xerxes Avenue South	Edina
2002824240014	2011420.401	5736 Xerxes Avenue South	Edina
2002824240015	2011421.401	5740 Xerxes Avenue South	Edina
2002824240107	2011405.402	5600 Xerxes Avenue South	Edina
2002824240108	2011406.400	5604 Xerxes Avenue South	Edina
2002824240109	2011407.401	5608 Xerxes Avenue South	Edina
2002824240110	2011408.401	5612 Xerxes Avenue South	Edina
2002824240111	2011532.401	5616 Xerxes Avenue South	Edina
2002824240112	2011409.402	5620 Xerxes Avenue South	Edina
2002824310001	6160202407	5800 Xerxes Avenue South	Edina
2002824310003	6160204401	5812 Xerxes Avenue South	Edina
2002824310007	2011425400	5832 Xerxes Avenue South	Edina
2002824310008	2011426401	5836 Xerxes Avenue South	Edina
2002824310009	2011427402	5844 Xerxes Avenue South	Edina
2002824310010	2011428400	5848 Xerxes Avenue South	Edina
2002824310161	6160205401	5900 Xerxes Avenue South	Edina
2002824310162	2011429400	5904 Xerxes Avenue South	Edina
2002824310163	6160206401	5908 Xerxes Avenue South	Edina
2002824310164	2011430401	5912 Xerxes Avenue South	Edina
2002824310165	2011431407	5916 Xerxes Avenue South	Edina

Property ID	Account No.	Street Address	City
2002824310166	6160207400, 6160207401	5920 Xerxes Avenue South	Edina
2002824340004	2011434.401	6016 Xerxes Avenue South	Edina
2002824340005	2011435.403	6020 Xerxes Avenue South	Edina
2002824340006	2011436.402	6026 Xerxes Avenue South	Edina
2002824340007	2011437.401	6030 Xerxes Avenue South	Edina
2002824340008	2011439.402	6036 Xerxes Avenue South	Edina
2002824340009	2011445.403	6124 Xerxes Avenue South	Edina
2002824340010	2011446.403	6128 Xerxes Avenue South	Edina
2002824340011	2011447.402	6132 Xerxes Avenue South	Edina
2002824340031	2011438.402	6032 Xerxes Avenue South	Edina
2002824340032	2011440.401	6040 Xerxes Avenue South	Edina
2002824340053	6160209401	6012 Xerxes Avenue South	Edina
2002824340060	2011441.400	6100 Xerxes Avenue South	Edina
2002824340061	2011442.400	6104 Xerxes Avenue South	Edina
2002824340062	2011443404	6108 Xerxes Avenue South	Edina
2002824340121	2011444.401	6116 Xerxes Avenue South	Edina
1702924240023	1911827401	1915 Xerxes Avenue North	Golden Valley
1702924240024	1911828403, 1911828404, 1911828405	1917 Xerxes Avenue North	Golden Valley
1702924240027	1911831401	1935 Xerxes Avenue North	Golden Valley
1702924240028	1911832.400	1949 Xerxes Avenue North	Golden Valley
1702924310004	1911824401	1707 Xerxes Avenue North	Golden Valley
1702924310006	6020303403, 6020303404	1715 Xerxes Avenue North	Golden Valley
1702924310008	1911825400	1725 Xerxes Avenue North	Golden Valley
1702924310035	1911841400	1611 Xerxes Avenue North	Golden Valley
1702924310036	1911820400	1633 Xerxes Avenue North	Golden Valley
1702924310037	6020302403	1635 Xerxes Avenue North	Golden Valley
1702924310038	1911821403	1639 Xerxes Avenue North	Golden Valley
1702924310044	1911819400	1617 Xerxes Avenue North	Golden Valley
1702924310057	6020301404	1631 Xerxes Avenue North	Golden Valley
1702924340002	1911818400	1541 Xerxes Avenue North	Golden Valley
1702924340003	1911817401	1511 Xerxes Avenue North	Golden Valley
1702924340004	1911816402	1501 Xerxes Avenue North	Golden Valley
1011821440036	6010188401	4623 Xerxes Avenue North	Robbinsdale

Property ID	Account No.	Street Address	City
1011821440037	2030723400	4627 Xerxes Avenue North	Robbinsdale
1011821440038	6010187405	4617 Xerxes Avenue North	Robbinsdale
1011821440039	2030722401	4615 Xerxes Avenue North	Robbinsdale
0702824110006	511804.400	3810 France Avenue South	St Louis Park
0702824110007	511803.401	3808 France Avenue South	St Louis Park
0702824110008	511805.400	3814 France Avenue South	St Louis Park
0702824110009	511806.401	3818 France Avenue South	St Louis Park
0702824110010	511807.403	3824 France Avenue South	St Louis Park
0702824110011	511808.400	3828 France Avenue South	St Louis Park
0702824110012	511809.401	3834 France Avenue South	St Louis Park
0702824110013	511810.405	3838 France Avenue South	St Louis Park
0702824110014	511811.400	3844 France Avenue South	St Louis Park
0702824110105	511812.402	3910 France Avenue South	St Louis Park
0702824110107	511814.405	3930 France Avenue South	St Louis Park
0602923220015	6030456402	3509 Stinson Boulevard Northeast	St. Anthony
0602923230024	1431276403, 1431276404	3421 Stinson Boulevard Northeast	St. Anthony
0602923230026	6030453404	3415 Stinson Boulevard Northeast	St. Anthony
0602923230027	1431275404	3413 Stinson Boulevard Northeast	St. Anthony
0602923230029	1431274401	3401 Stinson Boulevard Northeast	St. Anthony
0602923320001	1431265401	3117 Stinson Boulevard Northeast	St. Anthony
0602923320031	1431269404	3207 Stinson Boulevard Northeast	St. Anthony
0602923320032	1431270402	3211 Stinson Boulevard Northeast	St. Anthony
0602923320033	1431271400	3213 Stinson Boulevard Northeast	St. Anthony
0602923320034	6030449402	3219 Stinson Boulevard Northeast	St. Anthony
0602923320035	6030450403, 6030450404	3239 Stinson Boulevard Northeast	St. Anthony
0602923320036	1431272400	3241 Stinson Boulevard Northeast	St. Anthony
0602923320037	6030451403	3245 Stinson Boulevard Northeast	St. Anthony
0602923320039	1431273404	3249 Stinson Boulevard Northeast	St. Anthony
0602923320056	6030448401	3141 Stinson Boulevard Northeast	St. Anthony
0602923320057	1431266401	3137 Stinson Boulevard Northeast	St. Anthony
0602923320059	1431267401	3149 Stinson Boulevard Northeast	St. Anthony
0702923220001	6030446400	2420 St Anthony Boulevard	St. Anthony

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Appendix J – 2017 Stormwater Catchment Inventory

Minneapolis
City of Lakes

Summary

Receiving Water	Area (acres)	Impervious (Percent)	Single Family and Duplex (Percent)	Multi Family (Percent)	Percent Institutional (Percent)	Commercial (Percent)	Industrial (Percent)	Right-Of-Way (Percent)	Golf Course (Percent)	Park, Recreational, or Preserve (Percent)	Railway (Percent)	Airport (Percent)	Open Water (Percent)
Bassett Creek	1621.227	40.62%	43.07%	1.24%	3.48%	2.13%	3.88%	24.25%	0.00%	20.37%	1.57%	0.00%	0.00%
Birch Pond	38.83913	10.30%	0.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.88%	0.00%	0.00%	0.00%
Brownie Lake	93.86526	40.28%	30.95%	0.00%	0.01%	28.62%	0.00%	18.56%	0.00%	18.17%	3.11%	0.00%	0.58%
Cedar Lake	287.8228	31.50%	37.97%	1.05%	2.17%	0.43%	0.00%	18.65%	0.07%	37.77%	0.65%	0.00%	1.30%
Crystal Lake	420.8843	41.74%	61.97%	1.74%	2.61%	0.72%	0.00%	30.27%	0.00%	2.68%	0.00%	0.00%	0.00%
Diamond Lake	663.6601	47.77%	45.57%	4.01%	2.19%	3.57%	7.93%	27.81%	0.00%	8.91%	0.00%	0.00%	0.00%
Grass Lake	324.7184	43.28%	59.01%	0.12%	3.18%	2.31%	0.00%	29.88%	0.00%	4.86%	0.00%	0.00%	0.64%
Hart Lake	3.328352	51.18%	24.81%	0.00%	0.00%	19.23%	0.00%	52.68%	0.00%	0.00%	3.27%	0.00%	0.00%
Kenilworth Lagoon	41.45015	28.17%	57.84%	0.00%	0.00%	0.00%	0.00%	18.51%	0.00%	22.34%	0.00%	0.00%	1.30%
Lagoon	93.24384	59.97%	30.19%	16.39%	2.52%	7.61%	0.00%	21.19%	0.00%	21.83%	0.00%	0.00%	0.26%
Lake Calhoun	1156.957	44.10%	35.30%	8.05%	1.62%	5.79%	0.14%	20.53%	5.10%	15.11%	0.00%	0.00%	0.02%
Lake Harriet	1120.545	38.57%	46.59%	1.75%	2.80%	1.46%	0.00%	20.20%	0.00%	26.07%	0.00%	0.00%	1.12%
Lake Hiawatha	1243.385	42.92%	49.79%	2.92%	2.90%	1.97%	0.00%	26.89%	10.42%	5.10%	0.00%	0.00%	0.01%
Lake Nokomis	695.8433	35.05%	47.73%	0.10%	2.05%	0.40%	0.00%	22.87%	0.00%	26.61%	0.00%	0.01%	0.23%
Lake of the Isles	728.3157	45.48%	41.77%	10.59%	2.43%	3.39%	0.30%	24.13%	0.00%	17.18%	0.00%	0.00%	0.22%
Legion Lake	2.128003	43.04%	60.49%	0.00%	0.00%	0.00%	0.00%	39.51%	0.00%	0.00%	0.00%	0.00%	0.00%
Loring Pond	27.20128	16.25%	0.00%	3.14%	3.48%	0.07%	0.00%	1.34%	0.00%	91.49%	0.00%	0.00%	0.48%
Minnehaha Creek	3347.379	38.61%	52.95%	0.78%	3.20%	1.51%	0.19%	24.22%	0.73%	15.86%	0.02%	0.00%	0.00%
Mississippi River	20312.97	57.65%	29.22%	6.04%	6.48%	6.08%	11.95%	28.77%	1.55%	7.81%	2.46%	0.07%	0.13%
Mother Lake	30.51718	45.44%	25.27%	0.00%	1.49%	0.09%	0.00%	63.95%	0.00%	0.00%	0.00%	9.20%	0.00%
Powderhorn Lake	322.6616	43.50%	44.26%	5.70%	3.69%	1.64%	0.00%	27.08%	0.00%	17.54%	0.00%	0.00%	0.09%
Richfield Lake	57.56983	65.03%	27.22%	3.44%	1.02%	27.66%	0.07%	40.59%	0.00%	0.00%	0.00%	0.00%	0.00%
Ryan Lake	60.61078	42.29%	50.29%	0.00%	0.00%	0.00%	10.03%	28.27%	0.00%	2.18%	8.77%	0.00%	0.46%
Shingle Creek	1457.685	44.66%	40.50%	1.20%	2.30%	1.08%	8.78%	19.90%	1.17%	22.17%	3.75%	0.00%	0.33%
Silver Lake	24.98636	41.23%	66.09%	3.39%	0.00%	2.24%	0.00%	28.28%	0.00%	0.00%	0.00%	0.00%	0.00%
Spring Lake	49.99404	32.63%	40.24%	0.27%	6.44%	0.00%	0.00%	15.71%	0.00%	37.09%	0.00%	0.00%	0.25%
Taft Lake	138.9113	45.06%	57.64%	0.00%	0.00%	0.00%	0.00%	42.12%	0.00%	0.24%	0.00%	0.00%	0.00%
Wirth Lake	40.58665	6.09%	0.21%	0.00%	0.00%	0.00%	0.00%	0.20%	0.00%	99.59%	0.00%	0.00%	0.00%
Grand Total	34407.28	50.90%	36.17%	4.63%	4.92%	4.54%	7.81%	26.74%	1.58%	11.72%	1.72%	0.05%	0.16%

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Detail

Outfall Number	Watershed Type	Area Acres	Receiving Water	Percent Imperviousness	Percent Direct Imperviousness	Single Family and Duplex (Percent)	Multi Family (Percent)	Institutional (Percent)	Commercial (Percent)	Industrial (Percent)	ROW (Percent)	Golf Course (Percent)	Park, Recreation and Preserve (Percent)	Railway (Percent)	Airport (Percent)	Open Water (Percent)
	Direct Watershed	128.7	Bassett Creek	0.3	0.2	10.3	0.0	0.0	0.0	17.9	7.1	0.0	64.7	0.0	0.0	0.0
40-001A	Pipeshed	20.9	Bassett Creek	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
40-010	Pipeshed	711.8	Bassett Creek	0.5	0.3	60.0	1.7	3.2	2.7	0.0	29.1	0.0	3.4	0.0	0.0	0.0
40-020	Pipeshed	15.3	Bassett Creek	0.5	0.3	67.7	0.0	0.0	0.0	0.0	28.5	0.0	3.9	0.0	0.0	0.0
40-025	Pipeshed	1.4	Bassett Creek	0.5	0.3	43.4	0.0	0.0	0.0	0.0	44.1	0.0	12.4	0.0	0.0	0.0
40-030	Pipeshed	45.4	Bassett Creek	0.4	0.3	61.9	0.0	0.0	0.0	0.0	25.4	0.0	12.7	0.0	0.0	0.0
40-040	Pipeshed	73.3	Bassett Creek	0.4	0.2	62.4	1.3	1.4	0.5	0.0	31.9	0.0	2.5	0.0	0.0	0.0
40-050	Pipeshed	6.8	Bassett Creek	0.7	0.6	13.1	0.0	0.0	0.0	0.0	86.9	0.0	0.0	0.0	0.0	0.0
40-060	Pipeshed	2.2	Bassett Creek	0.4	0.3	65.7	0.0	0.0	0.0	0.0	23.8	0.0	10.5	0.0	0.0	0.0
40-070	Pipeshed	6.0	Bassett Creek	0.5	0.3	34.7	0.0	0.0	0.0	0.3	21.6	0.0	43.5	0.0	0.0	0.0
40-080	Pipeshed	138.6	Bassett Creek	0.3	0.2	29.3	0.0	21.5	5.5	0.0	12.4	0.0	31.2	0.0	0.0	0.0
40-090	Pipeshed	13.3	Bassett Creek	0.4	0.2	70.0	0.0	0.0	0.0	0.5	26.9	0.0	2.5	0.0	0.0	0.0
40-095	Pipeshed	0.5	Bassett Creek	0.5	0.4	0.0	0.0	0.0	0.0	36.6	2.1	0.0	61.3	0.0	0.0	0.0
40-100	Pipeshed	23.5	Bassett Creek	0.4	0.3	35.0	9.4	7.3	1.0	0.0	23.7	0.0	23.7	0.0	0.0	0.0
40-110	Pipeshed	5.7	Bassett Creek	0.4	0.3	61.8	2.5	0.0	0.0	0.0	26.4	0.0	9.2	0.0	0.0	0.0
40-120	Pipeshed	55.2	Bassett Creek	0.4	0.3	60.2	1.6	0.8	2.4	0.0	32.3	0.0	2.7	0.0	0.0	0.0
40-130	Pipeshed	32.1	Bassett Creek	0.5	0.3	52.7	7.9	1.8	1.0	0.0	35.6	0.0	1.0	0.0	0.0	0.0
40-140	Pipeshed	244.9	Bassett Creek	0.3	0.3	19.8	0.2	0.0	2.3	1.1	23.6	0.0	44.9	8.1	0.0	0.0
40-145	Pipeshed	4.7	Bassett Creek	0.7	0.7	5.5	0.0	0.0	0.0	94.3	0.2	0.0	0.0	0.0	0.0	0.0
40-150	Pipeshed	23.9	Bassett Creek	0.6	0.5	34.3	5.0	0.0	0.0	35.1	25.6	0.0	0.0	0.0	0.0	0.0
40-155	Pipeshed	67.0	Bassett Creek	0.4	0.4	0.0	0.0	0.0	0.0	36.0	12.3	0.0	43.2	8.5	0.0	0.0
	Direct Watershed	22.9	Birch Pond	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	99.8	0.0	0.0	0.0
81-010PB	Pipeshed	15.9	Birch Pond	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
	Direct Watershed	24.6	Brownie Lake	0.2	0.2	0.0	0.0	0.0	35.4	0.0	1.1	0.0	56.2	5.1	0.0	2.2
51-010(B)DOT	Pipeshed	3.7	Brownie Lake	0.6	0.5	0.0	0.0	0.0	50.7	0.0	34.7	0.0	14.6	0.0	0.0	0.0
51-010(C)	Pipeshed	25.9	Brownie Lake	0.4	0.2	67.9	0.0	0.0	4.8	0.0	27.4	0.0	0.0	0.0	0.0	0.0
51-020	Pipeshed	12.2	Brownie Lake	0.3	0.2	68.3	0.0	0.0	0.0	0.0	30.6	0.0	1.1	0.0	0.0	0.0
51-030	Pipeshed	16.6	Brownie Lake	0.5	0.5	17.9	0.0	0.0	37.4	0.0	19.9	0.0	14.6	10.1	0.0	0.0
51-040	Pipeshed	0.9	Brownie Lake	0.6	0.4	24.5	0.0	0.0	0.0	0.0	60.4	0.0	15.2	0.0	0.0	0.0

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51-050	Pipeshed	10.1	Brownie Lake	0.8	0.7	0.0	0.0	0.0	87.7	0.0	12.3	0.0	0.0	0.0	0.0	0.0
	Direct Watershed	71.5	Cedar Lake	0.1	0.1	7.5	0.0	0.0	0.0	0.0	2.3	0.0	82.3	2.6	0.0	5.2
52-010	Pipeshed	52.7	Cedar Lake	0.3	0.2	40.2	0.0	0.0	0.0	0.0	17.7	0.0	42.1	0.0	0.0	0.0
52-030	Pipeshed	4.1	Cedar Lake	0.3	0.2	70.1	0.0	0.0	0.0	0.0	29.9	0.0	0.0	0.0	0.0	0.0
52-040	Pipeshed	3.5	Cedar Lake	0.5	0.3	31.4	5.7	0.0	0.0	0.0	29.5	0.0	33.4	0.0	0.0	0.0
52-050	Pipeshed	17.8	Cedar Lake	0.5	0.3	42.5	6.9	0.0	1.7	0.0	33.3	0.0	15.7	0.0	0.0	0.0
52-070	Pipeshed	64.7	Cedar Lake	0.5	0.3	58.2	2.5	1.8	1.5	0.0	33.9	0.0	2.1	0.0	0.0	0.0
52-075	Pipeshed	13.1	Cedar Lake	0.4	0.3	13.2	0.0	23.0	0.0	0.0	9.6	0.0	54.2	0.0	0.0	0.0
52-080	Pipeshed	8.9	Cedar Lake	0.4	0.3	26.5	0.0	22.7	0.0	0.0	5.9	0.0	44.8	0.0	0.0	0.0
52-100	Pipeshed	10.2	Cedar Lake	0.4	0.3	42.7	0.0	0.0	0.0	0.0	15.2	0.0	42.2	0.0	0.0	0.0
52-110	Pipeshed	27.4	Cedar Lake	0.3	0.2	58.7	0.0	0.0	0.0	0.0	17.9	0.0	23.4	0.0	0.0	0.0
52-120	Pipeshed	13.9	Cedar Lake	0.4	0.2	64.6	0.0	0.0	0.0	0.0	31.4	0.0	4.0	0.0	0.0	0.0
63-010	Pipeshed	420.9	Crystal Lake	0.4	0.3	62.0	1.7	2.6	0.7	0.0	30.3	0.0	2.7	0.0	0.0	0.0
	Direct Watershed	28.9	Diamond Lake	0.1	0.1	53.0	0.0	5.0	0.0	0.0	3.4	0.0	38.6	0.0	0.0	0.0
71-020	Pipeshed	15.5	Diamond Lake	0.3	0.2	66.0	0.0	0.0	0.0	0.0	25.7	0.0	8.3	0.0	0.0	0.0
71-030	Pipeshed	29.9	Diamond Lake	0.4	0.3	61.0	2.9	1.9	2.0	0.0	27.4	0.0	4.8	0.0	0.0	0.0
71-040	Pipeshed	17.3	Diamond Lake	0.2	0.1	29.7	0.0	0.0	0.0	0.0	10.5	0.0	59.8	0.0	0.0	0.0
71-050	Pipeshed	122.3	Diamond Lake	0.4	0.2	62.3	0.0	0.9	2.0	0.0	30.7	0.0	4.1	0.0	0.0	0.0
71-060	Pipeshed	4.2	Diamond Lake	0.5	0.3	69.6	0.0	0.0	4.6	0.0	25.5	0.0	0.3	0.0	0.0	0.0
71-070 (A)	Pipeshed	260.6	Diamond Lake	0.6	0.5	31.9	8.2	2.5	7.0	20.2	20.2	0.0	9.9	0.0	0.0	0.0
71-070 (B)	Pipeshed	74.4	Diamond Lake	0.5	0.4	50.9	3.5	2.3	2.2	0.0	41.2	0.0	0.0	0.0	0.0	0.0
71-080 (A)	Pipeshed	40.8	Diamond Lake	0.7	0.7	25.9	1.5	1.7	1.1	0.0	69.8	0.0	0.0	0.0	0.0	0.0
71-080 (B)	Pipeshed	62.6	Diamond Lake	0.3	0.2	64.3	1.9	3.8	0.3	0.0	29.7	0.0	0.0	0.0	0.0	0.0
71-090	Pipeshed	4.3	Diamond Lake	0.4	0.2	55.7	0.0	0.0	0.0	0.0	17.0	0.0	27.3	0.0	0.0	0.0
71-100	Pipeshed	2.7	Diamond Lake	0.7	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
	Direct Watershed	6.6	Grass Lake	0.1	0.1	10.6	0.0	0.0	0.0	0.0	8.2	0.0	50.0	0.0	0.0	31.3
83-010DOT	Pipeshed	23.4	Grass Lake	0.7	0.6	27.3	0.0	0.0	25.2	0.0	47.5	0.0	0.0	0.0	0.0	0.0
83-012	Pipeshed	1.1	Grass Lake	0.4	0.3	32.7	0.0	0.0	0.0	0.0	60.6	0.0	6.8	0.0	0.0	0.0
83-015	Pipeshed	0.9	Grass Lake	0.3	0.2	74.7	0.0	0.0	0.0	0.0	9.6	0.0	15.7	0.0	0.0	0.0
83-020 (B)	Pipeshed	55.1	Grass Lake	0.5	0.3	72.6	0.0	0.0	0.4	0.0	26.5	0.0	0.5	0.0	0.0	0.0

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83-030	Pipeshed	1.4	Grass Lake	0.5	0.3	68.1	0.0	0.0	0.0	0.0	19.3	0.0	12.6	0.0	0.0	0.0
83-040	Pipeshed	1.1	Grass Lake	0.4	0.3	67.1	0.0	0.0	0.0	0.0	18.8	0.0	14.1	0.0	0.0	0.0
83-050	Pipeshed	31.5	Grass Lake	0.3	0.2	71.2	0.0	0.0	0.0	0.0	28.4	0.0	0.4	0.0	0.0	0.0
83-060	Pipeshed	8.5	Grass Lake	0.3	0.2	81.2	0.0	0.0	0.0	0.0	16.8	0.0	2.0	0.0	0.0	0.0
83-070	Pipeshed	1.6	Grass Lake	0.4	0.3	51.5	0.0	0.0	0.0	0.0	28.1	0.0	19.7	0.0	0.0	0.7
83-080	Pipeshed	193.5	Grass Lake	0.4	0.3	57.7	0.2	5.3	0.7	0.0	30.3	0.0	5.7	0.0	0.0	0.0
61-010CH	Pipeshed	3.3	Hart Lake	0.5	0.4	24.8	0.0	0.0	19.2	0.0	52.7	0.0	0.0	3.3	0.0	0.0
52-020	Pipeshed	4.2	Kenilworth Lagoon	0.3	0.2	63.2	0.0	0.0	0.0	0.0	31.6	0.0	5.2	0.0	0.0	0.0
53-010	Pipeshed	5.4	Kenilworth Lagoon	0.5	0.3	65.9	0.0	0.0	0.0	0.0	32.5	0.0	1.6	0.0	0.0	0.0
53-030 (A)	Pipeshed	11.6	Kenilworth Lagoon	0.3	0.2	66.9	0.0	0.0	0.0	0.0	29.9	0.0	3.2	0.0	0.0	0.0
	Direct Watershed	20.3	Kenilworth Lagoon	0.2	0.1	49.4	0.0	0.0	0.0	0.0	5.6	0.0	42.4	0.0	0.0	2.7
54-010	Pipeshed	87.5	Lagoon	0.6	0.5	32.2	17.5	2.7	8.1	0.0	22.6	0.0	17.0	0.0	0.0	0.0
54-215	Pipeshed	0.3	Lagoon	1.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
	Direct Watershed	5.4	Lagoon	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.2	0.0	0.0	3.8
	Direct Watershed	56.7	Lake Calhoun	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	99.5	0.0	0.0	0.4
54-040	Pipeshed	232.6	Lake Calhoun	0.6	0.5	37.6	11.4	2.6	14.4	0.7	31.2	0.0	2.1	0.0	0.0	0.0
54-050 (A)	Pipeshed	27.9	Lake Calhoun	0.3	0.2	12.1	5.3	6.9	0.0	0.0	8.1	0.0	67.6	0.0	0.0	0.0
54-052	Pipeshed	3.2	Lake Calhoun	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
54-055 (A)	Pipeshed	13.8	Lake Calhoun	0.2	0.1	31.3	0.0	0.0	0.0	0.0	11.7	0.0	57.0	0.0	0.0	0.0
54-060	Pipeshed	9.6	Lake Calhoun	0.4	0.3	58.7	0.0	0.0	0.0	0.0	17.2	0.0	24.1	0.0	0.0	0.0
54-070	Pipeshed	52.4	Lake Calhoun	0.5	0.3	64.1	0.5	0.0	0.0	0.0	29.2	0.0	6.2	0.0	0.0	0.0
54-080	Pipeshed	435.3	Lake Calhoun	0.4	0.3	54.6	2.0	1.7	2.2	0.0	24.2	0.0	4.9	0.0	0.0	0.0
54-090	Pipeshed	1.1	Lake Calhoun	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
54-095	Pipeshed	10.3	Lake Calhoun	0.4	0.3	57.1	0.0	0.0	0.0	0.0	12.9	0.0	30.0	0.0	0.0	0.0
54-100	Pipeshed	83.8	Lake Calhoun	0.1	0.1	2.8	0.0	3.4	0.0	0.0	9.2	0.0	0.3	0.0	0.0	0.0
54-110	Pipeshed	25.1	Lake Calhoun	0.2	0.1	26.6	0.0	0.1	0.0	0.0	13.9	0.5	5.8	0.0	0.0	0.0
54-115	Pipeshed	0.0	Lake Calhoun	0.9	0.6	0.0	52.1	0.0	0.0	0.0	47.9	0.0	0.0	0.0	0.0	0.0
54-120	Pipeshed	15.2	Lake Calhoun	0.4	0.2	15.2	8.7	0.0	0.0	0.0	15.1	0.5	15.1	0.0	0.0	0.0
54-130	Pipeshed	0.4	Lake Calhoun	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
54-140 (A)	Pipeshed	113.9	Lake Calhoun	0.6	0.5	4.8	32.4	0.5	16.2	0.0	13.0	0.1	16.7	0.0	0.0	0.0

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54-140 (B)	Pipeshed	8.4	Lake Calhoun	0.6	0.5	0.0	0.0	0.0	41.8	0.0	16.2	0.0	42.1	0.0	0.0	0.0
54-150	Pipeshed	54.7	Lake Calhoun	0.5	0.3	24.8	29.1	0.0	1.2	0.0	12.0	0.0	32.9	0.0	0.0	0.0
54-160	Pipeshed	1.9	Lake Calhoun	1.0	0.8	0.0	69.7	0.0	0.0	0.0	19.1	0.0	11.2	0.0	0.0	0.0
54-170	Pipeshed	6.2	Lake Calhoun	0.7	0.6	0.0	8.8	0.0	23.1	0.0	16.4	0.0	51.8	0.0	0.0	0.0
54-180PB	Pipeshed	1.4	Lake Calhoun	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
54-190	Pipeshed	1.8	Lake Calhoun	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
54-200	Pipeshed	0.9	Lake Calhoun	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
54-210	Pipeshed	0.3	Lake Calhoun	1.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
	Direct Watershed	23.8	Lake Harriet	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.3	0.0	0.0	9.7
57-005	Pipeshed	73.4	Lake Harriet	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
57-010	Pipeshed	25.1	Lake Harriet	0.3	0.2	50.2	0.0	0.0	0.0	0.0	15.4	0.0	34.4	0.0	0.0	0.1
57-015	Pipeshed	0.0	Lake Harriet	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
57-020	Pipeshed	157.3	Lake Harriet	0.5	0.3	63.2	2.6	3.1	0.7	0.0	29.5	0.0	1.0	0.0	0.0	0.0
57-030	Pipeshed	13.4	Lake Harriet	0.3	0.2	52.5	0.0	0.0	0.0	0.0	24.2	0.0	23.3	0.0	0.0	0.0
57-040	Pipeshed	38.2	Lake Harriet	0.3	0.2	71.9	0.0	0.0	0.0	0.0	24.9	0.0	3.2	0.0	0.0	0.0
57-050	Pipeshed	4.0	Lake Harriet	0.3	0.2	54.1	0.0	0.0	0.0	0.0	25.3	0.0	20.6	0.0	0.0	0.0
57-060	Pipeshed	27.2	Lake Harriet	0.5	0.3	67.1	2.0	0.0	3.7	0.0	27.0	0.0	0.1	0.0	0.0	0.0
57-070	Pipeshed	81.4	Lake Harriet	0.4	0.3	69.0	0.0	0.6	0.0	0.0	30.1	0.0	0.3	0.0	0.0	0.0
57-080	Pipeshed	6.8	Lake Harriet	0.3	0.2	77.7	0.0	0.0	0.0	0.0	20.8	0.0	1.5	0.0	0.0	0.0
57-090 (A)	Pipeshed	23.5	Lake Harriet	0.4	0.3	69.5	0.0	0.0	0.0	0.0	30.0	0.0	0.5	0.0	0.0	0.0
57-090 (B)	Pipeshed	3.0	Lake Harriet	0.4	0.2	52.2	0.0	0.0	0.0	0.0	33.1	0.0	14.7	0.0	0.0	0.0
57-095	Pipeshed	4.9	Lake Harriet	0.3	0.2	87.5	0.0	0.0	0.0	0.0	6.4	0.0	6.1	0.0	0.0	0.0
57-100 (A)	Pipeshed	360.8	Lake Harriet	0.5	0.3	60.0	0.7	5.9	3.2	0.0	27.2	0.0	2.9	0.0	0.0	0.0
57-110	Pipeshed	26.3	Lake Harriet	0.3	0.2	50.2	0.6	0.2	0.0	0.0	12.4	0.0	36.5	0.0	0.0	0.0
57-120	Pipeshed	49.9	Lake Harriet	0.6	0.4	38.4	22.6	8.8	5.5	0.0	22.9	0.0	1.9	0.0	0.0	0.0
57-130	Pipeshed	1.8	Lake Harriet	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
57-140	Pipeshed	3.8	Lake Harriet	0.5	0.3	11.9	3.8	0.0	0.0	0.0	20.4	0.0	63.9	0.0	0.0	0.0
57-150	Pipeshed	23.3	Lake Harriet	0.4	0.2	61.8	3.2	1.4	0.0	0.0	25.5	0.0	8.2	0.0	0.0	0.0
57-160	Pipeshed	21.0	Lake Harriet	0.3	0.2	36.0	0.8	0.0	0.0	0.0	5.1	0.0	58.0	0.0	0.0	0.0
57-170	Pipeshed	151.6	Lake Harriet	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.2	0.0	0.0	6.8

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	Direct Watershed	26.5	Lake Hiawatha	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.5	0.2	80.8	0.0	0.0	0.7
76-005 (A)	Pipeshed	195.9	Lake Hiawatha	0.2	0.1	23.3	0.7	0.5	0.1	0.0	13.0	0.6	0.0	0.0	0.0	0.0
76-010	Pipeshed	920.2	Lake Hiawatha	0.5	0.3	55.8	3.7	3.8	2.5	0.0	30.3	0.0	3.8	0.0	0.0	0.0
76-020	Pipeshed	88.4	Lake Hiawatha	0.4	0.3	61.3	0.8	0.3	1.5	0.0	30.2	0.0	5.0	0.0	0.0	0.0
76-030	Pipeshed	7.6	Lake Hiawatha	0.6	0.4	44.1	0.0	0.0	0.0	0.0	24.6	0.0	31.3	0.0	0.0	0.0
76-040	Pipeshed	3.4	Lake Hiawatha	0.5	0.3	55.1	3.3	0.0	0.0	0.0	33.8	0.0	7.8	0.0	0.0	0.0
76-050	Pipeshed	1.4	Lake Hiawatha	0.7	0.4	40.8	0.3	0.0	0.0	0.0	34.2	0.0	24.7	0.0	0.0	0.0
	Direct Watershed	43.5	Lake Nokomis	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.1	0.0	0.0	0.9
72-010	Pipeshed	14.3	Lake Nokomis	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
72-020	Pipeshed	21.7	Lake Nokomis	0.5	0.3	52.1	2.0	0.0	3.9	0.0	27.4	0.0	14.6	0.0	0.0	0.0
72-030	Pipeshed	10.3	Lake Nokomis	0.2	0.1	13.2	0.0	0.0	0.0	0.0	0.2	0.0	86.5	0.0	0.0	0.0
72-040 (A)	Pipeshed	149.0	Lake Nokomis	0.4	0.3	63.2	0.2	3.0	0.3	0.0	29.0	0.0	4.2	0.0	0.0	0.0
72-050	Pipeshed	2.7	Lake Nokomis	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
72-055(B)PB	Pipeshed	114.1	Lake Nokomis	0.3	0.2	49.2	0.0	3.2	0.0	0.0	23.7	0.0	23.9	0.0	0.1	0.0
72-090	Pipeshed	92.9	Lake Nokomis	0.3	0.2	48.6	0.0	0.8	0.5	0.0	25.2	0.0	24.1	0.0	0.0	0.6
72-115(A)PB	Pipeshed	148.7	Lake Nokomis	0.3	0.2	52.4	0.0	3.2	0.0	0.0	25.3	0.0	19.1	0.0	0.0	0.0
72-125PB	Pipeshed	78.5	Lake Nokomis	0.4	0.2	58.6	0.0	0.6	1.3	0.0	27.6	0.0	11.9	0.0	0.0	0.0
72-130	Pipeshed	1.6	Lake Nokomis	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.8	0.0	59.3	0.0	0.0	39.9
72-140	Pipeshed	13.1	Lake Nokomis	0.1	0.1	0.0	0.0	0.0	0.0	0.0	1.4	0.0	98.6	0.0	0.0	0.0
72-150	Pipeshed	3.8	Lake Nokomis	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
72-160	Pipeshed	1.7	Lake Nokomis	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
53-020	Pipeshed	8.5	Lake of the Isles	0.5	0.3	59.7	0.0	0.0	0.0	0.0	33.3	0.0	7.0	0.0	0.0	0.0
53-040	Pipeshed	2.4	Lake of the Isles	0.4	0.3	66.3	0.0	0.0	0.0	0.0	19.9	0.0	13.8	0.0	0.0	0.0
53-050	Pipeshed	12.5	Lake of the Isles	0.4	0.2	71.7	0.0	0.0	0.0	0.0	22.8	0.0	5.6	0.0	0.0	0.0
53-060	Pipeshed	18.7	Lake of the Isles	0.4	0.2	65.6	0.2	0.0	0.8	0.0	28.4	0.0	5.1	0.0	0.0	0.0
53-070	Pipeshed	2.5	Lake of the Isles	0.4	0.2	51.8	0.0	0.0	0.0	0.0	26.3	0.0	21.9	0.0	0.0	0.0
53-080	Pipeshed	10.0	Lake of the Isles	0.4	0.2	62.5	0.0	0.0	0.0	0.0	21.4	0.0	16.1	0.0	0.0	0.0
53-090	Pipeshed	44.7	Lake of the Isles	0.4	0.2	66.7	0.6	3.2	0.7	0.0	25.5	0.0	3.3	0.0	0.0	0.0
53-100	Pipeshed	114.8	Lake of the Isles	0.3	0.2	42.9	0.4	1.6	0.0	0.0	19.6	0.0	35.5	0.0	0.0	0.0
53-110	Pipeshed	4.5	Lake of the Isles	0.3	0.2	45.6	0.0	0.0	0.0	0.0	10.1	0.0	44.4	0.0	0.0	0.0

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53-120	Pipeshed	92.0	Lake of the Isles	0.5	0.3	55.9	10.5	2.3	2.6	0.0	28.2	0.0	0.4	0.0	0.0	0.0
53-130	Pipeshed	7.8	Lake of the Isles	0.4	0.2	71.2	0.0	0.0	0.0	0.0	16.8	0.0	12.1	0.0	0.0	0.0
53-140	Pipeshed	3.8	Lake of the Isles	0.4	0.3	69.6	0.0	0.0	0.0	0.0	20.3	0.0	10.1	0.0	0.0	0.0
53-150	Pipeshed	138.6	Lake of the Isles	0.6	0.4	40.4	15.1	4.0	7.5	0.0	31.0	0.0	2.0	0.0	0.0	0.0
53-160	Pipeshed	193.1	Lake of the Isles	0.6	0.4	32.5	23.7	3.5	5.9	1.1	27.8	0.0	5.4	0.0	0.0	0.0
53-170	Pipeshed	6.0	Lake of the Isles	0.4	0.3	57.0	0.0	0.0	0.0	0.0	21.3	0.0	21.7	0.0	0.0	0.0
53-180	Pipeshed	0.6	Lake of the Isles	0.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
53-190	Pipeshed	7.0	Lake of the Isles	0.3	0.2	50.6	0.0	0.0	0.0	0.0	13.2	0.0	36.2	0.0	0.0	0.0
	Direct Watershed	60.7	Lake of the Isles	0.1	0.1	3.6	0.0	0.0	0.0	0.0	0.3	0.0	93.4	0.0	0.0	2.7
64-110	Pipeshed	2.1	Legion Lake	0.4	0.3	60.5	0.0	0.0	0.0	0.0	39.5	0.0	0.0	0.0	0.0	0.0
	Direct Watershed	20.0	Loring Pond	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.2	0.0	99.1	0.0	0.0	0.7
45-010	Pipeshed	0.0	Loring Pond	1.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
45-020	Pipeshed	2.2	Loring Pond	0.6	0.5	0.0	39.3	43.5	0.4	0.0	14.7	0.0	2.1	0.0	0.0	0.0
45-030	Pipeshed	5.0	Loring Pond	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
	Direct Watershed	286.7	Minnehaha Creek	0.2	0.1	10.8	0.0	3.8	0.0	0.0	2.6	0.0	72.7	0.1	0.0	0.0
70-005ED	Pipeshed	3.9	Minnehaha Creek	0.6	0.4	57.3	0.1	9.5	0.0	0.0	33.1	0.0	0.0	0.0	0.0	0.0
70-010ED	Pipeshed	4.2	Minnehaha Creek	0.5	0.3	60.2	0.0	0.0	5.5	0.0	34.3	0.0	0.0	0.0	0.0	0.0
70-015	Pipeshed	9.4	Minnehaha Creek	0.4	0.3	66.9	0.0	0.0	0.0	0.0	32.4	0.0	0.8	0.0	0.0	0.0
70-020	Pipeshed	33.0	Minnehaha Creek	0.4	0.2	71.1	0.0	0.0	0.0	0.0	28.9	0.0	0.0	0.0	0.0	0.0
70-025	Pipeshed	0.9	Minnehaha Creek	0.6	0.3	45.2	0.0	0.0	0.0	0.0	54.8	0.0	0.0	0.0	0.0	0.0
70-030	Pipeshed	10.6	Minnehaha Creek	0.4	0.2	69.6	0.0	0.0	0.0	0.0	30.4	0.0	0.0	0.0	0.0	0.0
70-035	Pipeshed	5.2	Minnehaha Creek	0.5	0.3	76.7	0.0	0.0	0.0	0.0	20.9	0.0	2.4	0.0	0.0	0.0
70-040	Pipeshed	2.5	Minnehaha Creek	0.4	0.2	67.8	0.0	0.0	0.0	0.0	27.5	0.0	4.6	0.0	0.0	0.0
70-050	Pipeshed	12.8	Minnehaha Creek	0.2	0.1	72.1	0.0	0.0	0.0	0.0	27.9	0.0	0.0	0.0	0.0	0.0
70-055	Pipeshed	319.0	Minnehaha Creek	0.4	0.3	62.6	0.7	1.2	1.6	0.0	27.2	0.0	6.7	0.0	0.0	0.0
70-060	Pipeshed	0.6	Minnehaha Creek	0.4	0.3	34.8	0.0	0.0	0.0	0.0	5.4	0.0	59.8	0.0	0.0	0.0
70-065	Pipeshed	11.5	Minnehaha Creek	0.2	0.2	83.4	0.0	0.0	0.0	0.0	10.0	0.0	6.5	0.0	0.0	0.0
70-075	Pipeshed	2.5	Minnehaha Creek	0.3	0.2	59.2	0.0	0.0	0.0	0.0	40.8	0.0	0.0	0.0	0.0	0.0
70-080	Pipeshed	8.6	Minnehaha Creek	0.4	0.3	53.8	0.3	0.0	3.6	0.0	36.6	0.0	5.7	0.0	0.0	0.0
70-085	Pipeshed	228.0	Minnehaha Creek	0.4	0.2	69.4	0.1	0.7	0.4	0.0	28.5	0.0	1.0	0.0	0.0	0.0

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70-090	Pipeshed	14.5	Minnehaha Creek	0.4	0.2	64.0	0.0	0.0	0.0	0.0	33.3	0.0	2.7	0.0	0.0	0.0
70-100	Pipeshed	7.7	Minnehaha Creek	0.5	0.3	64.1	0.0	0.0	0.0	0.0	35.9	0.0	0.0	0.0	0.0	0.0
70-130	Pipeshed	81.8	Minnehaha Creek	0.4	0.3	56.6	0.0	10.5	0.0	0.0	25.4	0.0	7.5	0.0	0.0	0.0
70-150	Pipeshed	8.6	Minnehaha Creek	0.3	0.2	56.0	0.0	0.0	0.0	0.0	6.1	0.0	37.9	0.0	0.0	0.0
70-152	Pipeshed	0.3	Minnehaha Creek	0.4	0.2	45.0	0.0	0.0	0.0	0.0	35.8	0.0	19.2	0.0	0.0	0.0
70-153	Pipeshed	0.1	Minnehaha Creek	0.6	0.4	20.4	0.0	0.0	0.0	0.0	40.3	0.0	39.3	0.0	0.0	0.0
70-157	Pipeshed	1.2	Minnehaha Creek	0.4	0.3	30.3	0.0	0.0	0.0	0.0	34.1	0.0	35.6	0.0	0.0	0.0
70-165	Pipeshed	25.6	Minnehaha Creek	0.3	0.2	69.8	0.0	0.0	0.0	0.0	28.4	0.0	1.8	0.0	0.0	0.0
70-167	Pipeshed	2.3	Minnehaha Creek	0.2	0.1	29.8	0.0	0.0	0.0	0.0	37.0	0.0	33.2	0.0	0.0	0.0
70-170	Pipeshed	28.1	Minnehaha Creek	0.3	0.2	56.7	0.8	0.0	0.0	0.0	22.8	0.0	19.6	0.0	0.0	0.0
70-175	Pipeshed	34.8	Minnehaha Creek	0.4	0.3	55.1	0.6	2.3	1.0	0.0	28.0	0.0	13.0	0.0	0.0	0.0
70-180	Pipeshed	57.8	Minnehaha Creek	0.4	0.3	68.3	0.5	1.1	0.5	0.0	27.3	0.0	2.2	0.0	0.0	0.0
70-185	Pipeshed	1.3	Minnehaha Creek	0.3	0.2	37.4	0.0	0.0	0.0	0.0	2.0	0.0	60.5	0.0	0.0	0.0
70-190	Pipeshed	11.7	Minnehaha Creek	0.4	0.2	67.0	0.0	0.0	0.0	0.0	31.7	0.0	1.3	0.0	0.0	0.0
70-200	Pipeshed	44.6	Minnehaha Creek	0.4	0.2	67.9	0.0	5.7	0.0	0.0	24.0	0.0	2.3	0.0	0.0	0.0
70-225	Pipeshed	11.8	Minnehaha Creek	0.4	0.2	66.3	0.0	0.0	0.0	0.0	30.1	0.0	3.6	0.0	0.0	0.0
70-240	Pipeshed	5.1	Minnehaha Creek	0.4	0.2	70.8	0.0	0.0	0.0	0.0	22.6	0.0	6.5	0.0	0.0	0.0
70-245	Pipeshed	10.1	Minnehaha Creek	0.4	0.2	67.2	0.0	0.0	0.0	0.0	28.0	0.0	4.9	0.0	0.0	0.0
70-250	Pipeshed	3.1	Minnehaha Creek	0.5	0.3	71.7	0.0	0.0	0.0	0.0	24.0	0.0	4.3	0.0	0.0	0.0
70-253	Pipeshed	71.8	Minnehaha Creek	0.5	0.4	47.9	2.3	4.8	14.0	0.0	30.2	0.0	0.8	0.0	0.0	0.0
70-255 (A)	Pipeshed	3.4	Minnehaha Creek	0.1	0.1	92.8	0.0	0.0	0.0	0.0	7.2	0.0	0.0	0.0	0.0	0.0
70-255 (B)	Pipeshed	39.3	Minnehaha Creek	0.3	0.2	69.0	0.0	0.0	0.0	0.7	28.4	0.0	2.0	0.0	0.0	0.0
70-260 (A)	Pipeshed	0.0	Minnehaha Creek	0.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
70-260 (B)	Pipeshed	22.4	Minnehaha Creek	0.3	0.2	66.6	0.0	0.0	0.0	2.8	27.7	0.0	2.9	0.0	0.0	0.0
70-265 (A)	Pipeshed	14.8	Minnehaha Creek	0.3	0.2	74.6	0.0	0.0	0.0	0.0	20.9	0.0	4.5	0.0	0.0	0.0
70-265 (B)	Pipeshed	137.3	Minnehaha Creek	0.5	0.3	59.0	4.2	5.3	3.8	0.0	26.2	0.0	1.5	0.0	0.0	0.0
70-270	Pipeshed	4.8	Minnehaha Creek	0.2	0.1	76.9	0.0	0.0	0.0	0.0	16.9	0.0	6.2	0.0	0.0	0.0
70-275	Pipeshed	5.2	Minnehaha Creek	0.4	0.3	19.0	0.0	0.2	2.2	0.0	11.5	0.0	67.1	0.0	0.0	0.0
70-280	Pipeshed	8.9	Minnehaha Creek	0.3	0.2	72.5	0.0	0.0	0.0	0.0	24.0	0.0	3.5	0.0	0.0	0.0
70-285	Pipeshed	14.7	Minnehaha Creek	0.3	0.2	72.7	0.2	0.0	0.0	0.0	27.1	0.0	0.0	0.0	0.0	0.0

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70-290	Pipeshed	4.5	Minnehaha Creek	0.3	0.2	76.6	0.0	0.0	0.0	0.0	14.8	0.0	8.6	0.0	0.0	0.0
70-295	Pipeshed	2.0	Minnehaha Creek	0.2	0.1	27.1	0.0	0.0	0.0	0.0	2.4	0.0	70.5	0.0	0.0	0.0
70-300	Pipeshed	3.7	Minnehaha Creek	0.3	0.2	49.9	0.0	0.0	0.0	0.0	42.9	0.0	7.2	0.0	0.0	0.0
70-305	Pipeshed	12.2	Minnehaha Creek	0.3	0.2	71.3	3.0	0.0	0.0	0.0	25.1	0.0	0.6	0.0	0.0	0.0
70-307	Pipeshed	0.4	Minnehaha Creek	0.4	0.3	19.1	0.0	0.0	0.0	0.0	80.9	0.0	0.0	0.0	0.0	0.0
70-310	Pipeshed	3.1	Minnehaha Creek	0.2	0.1	72.2	0.0	0.0	0.0	0.0	16.7	0.0	11.1	0.0	0.0	0.0
70-315	Pipeshed	10.6	Minnehaha Creek	0.3	0.2	50.9	0.0	0.0	0.0	0.0	12.4	0.0	36.6	0.0	0.0	0.0
70-320	Pipeshed	25.2	Minnehaha Creek	0.3	0.2	71.6	0.0	0.0	0.0	0.0	23.4	0.0	5.0	0.0	0.0	0.0
70-325	Pipeshed	1.7	Minnehaha Creek	0.4	0.2	89.9	0.0	0.0	0.0	0.0	10.1	0.0	0.0	0.0	0.0	0.0
70-330	Pipeshed	262.6	Minnehaha Creek	0.5	0.3	56.9	0.4	11.7	0.8	0.0	30.2	0.0	0.1	0.0	0.0	0.0
70-335	Pipeshed	1.6	Minnehaha Creek	0.4	0.3	25.0	0.0	0.0	0.0	0.0	10.4	0.0	64.6	0.0	0.0	0.0
70-340	Pipeshed	0.6	Minnehaha Creek	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
70-345	Pipeshed	4.3	Minnehaha Creek	0.3	0.2	60.8	0.0	0.0	0.0	0.0	27.4	0.0	11.8	0.0	0.0	0.0
70-350	Pipeshed	236.5	Minnehaha Creek	0.4	0.3	44.5	1.0	0.3	3.1	0.1	24.0	0.0	27.0	0.0	0.0	0.0
70-355	Pipeshed	1.5	Minnehaha Creek	0.3	0.2	48.7	0.0	0.0	0.0	0.0	31.1	0.0	20.2	0.0	0.0	0.0
70-360	Pipeshed	138.8	Minnehaha Creek	0.3	0.2	51.6	0.4	0.6	1.3	0.0	23.2	0.0	23.0	0.0	0.0	0.0
70-365	Pipeshed	5.2	Minnehaha Creek	0.5	0.3	60.4	0.0	8.4	0.0	0.0	25.0	0.0	6.2	0.0	0.0	0.0
70-370	Pipeshed	3.7	Minnehaha Creek	0.3	0.2	56.2	0.0	0.0	0.0	0.0	16.6	0.0	27.3	0.0	0.0	0.0
70-375	Pipeshed	5.6	Minnehaha Creek	0.4	0.3	52.6	0.0	7.5	0.0	0.0	34.7	0.0	5.2	0.0	0.0	0.0
70-380	Pipeshed	14.7	Minnehaha Creek	0.4	0.2	67.1	0.0	0.0	0.0	0.0	27.8	0.0	5.0	0.0	0.0	0.0
70-385	Pipeshed	20.7	Minnehaha Creek	0.3	0.2	64.0	0.7	0.0	0.0	0.0	25.6	0.0	9.7	0.0	0.0	0.0
70-390 (B)	Pipeshed	54.6	Minnehaha Creek	0.4	0.2	61.8	0.0	5.5	0.0	0.0	32.1	0.0	0.6	0.0	0.0	0.0
70-395	Pipeshed	50.0	Minnehaha Creek	0.4	0.2	66.9	0.0	0.0	0.0	0.0	27.7	0.0	5.3	0.0	0.0	0.0
70-400	Pipeshed	7.8	Minnehaha Creek	0.3	0.2	65.0	0.0	0.0	0.0	0.0	31.5	0.0	3.5	0.0	0.0	0.0
70-405	Pipeshed	3.5	Minnehaha Creek	0.4	0.3	45.9	0.0	0.0	0.0	0.0	40.7	0.0	13.4	0.0	0.0	0.0
70-407	Pipeshed	0.5	Minnehaha Creek	0.8	0.6	0.0	0.0	0.0	0.0	0.0	2.9	0.0	97.1	0.0	0.0	0.0
70-408	Pipeshed	1.1	Minnehaha Creek	0.3	0.3	0.2	0.0	0.0	0.0	0.0	2.8	0.0	97.0	0.0	0.0	0.0
70-410	Pipeshed	4.1	Minnehaha Creek	0.4	0.3	47.6	0.0	0.0	0.0	0.0	33.4	0.0	19.0	0.0	0.0	0.0
70-415	Pipeshed	105.8	Minnehaha Creek	0.4	0.2	46.8	0.1	0.7	0.9	0.0	24.2	0.0	27.3	0.0	0.0	0.0
70-420	Pipeshed	12.4	Minnehaha Creek	0.4	0.2	64.9	0.0	0.0	0.0	0.0	34.0	0.0	1.1	0.0	0.0	0.0

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70-425PB	Pipeshed	19.5	Minnehaha Creek	0.4	0.3	20.9	0.6	5.9	14.3	0.0	19.3	0.0	39.0	0.0	0.0	0.0
70-427	Pipeshed	29.6	Minnehaha Creek	0.1	0.1	16.7	0.0	0.0	0.0	0.0	6.5	0.0	76.8	0.0	0.0	0.0
70-430	Pipeshed	2.8	Minnehaha Creek	0.3	0.2	0.0	0.0	0.0	0.1	0.0	0.6	0.1	91.3	0.0	0.0	0.0
70-435	Pipeshed	7.7	Minnehaha Creek	0.3	0.2	0.0	0.0	0.0	0.0	0.0	2.2	0.0	97.8	0.0	0.0	0.0
70-440	Pipeshed	28.0	Minnehaha Creek	0.6	0.4	43.6	1.2	11.6	6.8	0.0	30.5	0.1	0.0	0.0	0.0	0.0
70-443PB	Pipeshed	13.3	Minnehaha Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.9	7.8	0.0	0.0	0.0
70-445	Pipeshed	5.4	Minnehaha Creek	0.4	0.2	52.4	0.0	0.0	0.0	0.0	21.9	0.0	25.7	0.0	0.0	0.0
70-446	Pipeshed	0.0	Minnehaha Creek	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
70-447	Pipeshed	1.6	Minnehaha Creek	0.7	0.4	50.3	0.0	0.0	0.0	0.0	36.6	0.0	13.1	0.0	0.0	0.0
70-449	Pipeshed	0.4	Minnehaha Creek	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
70-450	Pipeshed	0.7	Minnehaha Creek	0.7	0.4	28.1	8.1	0.0	0.0	0.0	54.8	0.0	9.1	0.0	0.0	0.0
70-465	Pipeshed	2.9	Minnehaha Creek	0.4	0.2	66.9	0.0	0.0	0.0	0.0	28.9	0.0	4.2	0.0	0.0	0.0
70-467	Pipeshed	0.1	Minnehaha Creek	0.7	0.5	14.6	0.0	0.0	0.0	0.0	9.7	0.0	75.7	0.0	0.0	0.0
70-470	Pipeshed	6.3	Minnehaha Creek	0.4	0.2	66.0	0.2	0.0	0.0	0.0	31.9	0.0	2.0	0.0	0.0	0.0
70-475	Pipeshed	229.2	Minnehaha Creek	0.5	0.3	60.7	1.9	7.1	1.2	0.0	28.9	0.0	0.1	0.1	0.0	0.0
70-477	Pipeshed	1.3	Minnehaha Creek	0.4	0.2	45.2	0.0	0.0	0.0	0.0	49.6	0.0	5.2	0.0	0.0	0.0
70-479	Pipeshed	2.3	Minnehaha Creek	0.4	0.2	69.1	0.0	0.0	0.0	0.0	21.8	0.0	9.1	0.0	0.0	0.0
70-480	Pipeshed	0.2	Minnehaha Creek	0.5	0.3	0.0	0.0	0.0	0.0	0.0	15.9	0.0	84.1	0.0	0.0	0.0
70-485	Pipeshed	6.4	Minnehaha Creek	0.4	0.2	68.3	0.0	0.0	0.0	0.0	31.0	0.0	0.7	0.0	0.0	0.0
70-490 (A)	Pipeshed	48.0	Minnehaha Creek	0.4	0.3	55.5	0.2	14.7	0.0	0.0	29.1	0.0	0.4	0.1	0.0	0.0
70-495	Pipeshed	8.2	Minnehaha Creek	0.3	0.2	50.4	0.0	0.0	0.0	0.0	21.4	0.0	28.2	0.0	0.0	0.0
70-500	Pipeshed	0.8	Minnehaha Creek	0.4	0.2	46.0	0.0	0.0	0.0	0.0	36.1	0.0	17.9	0.0	0.0	0.0
70-505	Pipeshed	6.9	Minnehaha Creek	0.4	0.2	65.9	0.0	0.0	0.0	0.0	25.1	0.0	9.1	0.0	0.0	0.0
70-510	Pipeshed	35.9	Minnehaha Creek	0.3	0.2	50.2	3.2	0.3	0.3	0.0	20.2	0.0	25.8	0.0	0.0	0.0
70-515	Pipeshed	66.6	Minnehaha Creek	0.5	0.3	54.3	4.4	3.3	7.5	0.0	27.8	0.0	2.7	0.0	0.0	0.0
70-520	Pipeshed	4.1	Minnehaha Creek	0.4	0.2	47.9	0.0	0.0	0.0	0.0	31.3	0.0	20.8	0.0	0.0	0.0
70-525	Pipeshed	4.7	Minnehaha Creek	0.3	0.2	54.6	0.0	0.0	0.0	0.0	21.8	0.0	23.6	0.0	0.0	0.0
70-530	Pipeshed	1.0	Minnehaha Creek	0.4	0.2	70.3	0.0	0.0	0.0	0.0	2.2	0.0	27.5	0.0	0.0	0.0
70-535	Pipeshed	23.5	Minnehaha Creek	0.4	0.3	59.6	0.9	0.0	2.8	0.0	29.7	0.0	6.3	0.6	0.0	0.0
70-540	Pipeshed	5.2	Minnehaha Creek	0.5	0.3	69.5	0.0	0.0	0.0	0.0	25.6	0.0	5.0	0.0	0.0	0.0

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70-545	Pipeshed	2.3	Minnehaha Creek	0.5	0.3	48.7	0.0	0.0	0.0	0.0	29.4	0.0	21.9	0.0	0.0	0.0
70-550	Pipeshed	2.0	Minnehaha Creek	0.4	0.2	47.8	0.0	0.0	0.0	0.0	50.4	0.0	1.8	0.0	0.0	0.0
70-555	Pipeshed	0.8	Minnehaha Creek	0.4	0.3	4.2	0.0	0.0	0.0	0.0	5.7	0.0	90.0	0.1	0.0	0.0
70-560	Pipeshed	4.0	Minnehaha Creek	0.3	0.2	54.4	0.0	0.0	0.0	0.0	19.8	0.0	25.9	0.0	0.0	0.0
70-570	Pipeshed	1.7	Minnehaha Creek	0.3	0.2	60.3	0.0	0.0	0.0	0.0	24.1	0.0	15.6	0.0	0.0	0.0
70-575	Pipeshed	16.3	Minnehaha Creek	0.3	0.2	72.9	0.0	0.0	0.0	0.0	25.1	0.0	2.0	0.0	0.0	0.0
70-576	Pipeshed	3.7	Minnehaha Creek	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
70-577PB	Pipeshed	1.0	Minnehaha Creek	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
70-578PB	Pipeshed	3.2	Minnehaha Creek	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
70-579PB	Pipeshed	0.7	Minnehaha Creek	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
70-580	Pipeshed	137.4	Minnehaha Creek	0.4	0.3	40.6	1.2	0.0	2.2	3.6	22.1	0.0	30.3	0.0	0.0	0.0
10-010DOT	Pipeshed	84.5	Mississippi River	0.4	0.3	52.2	0.0	2.5	0.2	0.0	34.3	0.0	10.7	0.0	0.0	0.0
10-015PB	Pipeshed	0.8	Mississippi River	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
10-020PB	Pipeshed	2.4	Mississippi River	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.4	0.0	99.6	0.0	0.0	0.0
10-030PB	Pipeshed	8.3	Mississippi River	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.6	0.0	99.4	0.0	0.0	0.0
10-040DOT	Pipeshed	160.4	Mississippi River	0.5	0.4	39.5	0.0	7.6	0.7	4.2	39.1	0.0	8.9	0.0	0.0	0.0
10-050	Pipeshed	116.9	Mississippi River	0.5	0.3	57.5	1.3	1.4	3.5	6.8	28.6	0.0	0.8	0.0	0.0	0.0
10-055PB	Pipeshed	1.8	Mississippi River	0.3	0.3	0.0	0.0	0.0	0.0	33.4	6.2	0.0	60.3	0.0	0.0	0.0
10-060	Pipeshed	6.5	Mississippi River	0.2	0.2	0.0	0.0	0.0	0.0	68.6	31.1	0.0	0.4	0.0	0.0	0.0
10-065PB	Pipeshed	0.3	Mississippi River	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
10-067PB	Pipeshed	26.0	Mississippi River	0.3	0.3	0.0	0.0	0.0	0.0	91.8	0.9	0.0	7.3	0.0	0.0	0.0
10-070PB	Pipeshed	15.4	Mississippi River	0.3	0.2	0.0	0.0	0.0	0.0	3.5	1.9	0.0	87.3	7.2	0.0	0.1
10-073	Pipeshed	65.2	Mississippi River	0.8	0.8	0.1	0.0	0.0	0.0	84.1	15.6	0.0	0.0	0.2	0.0	0.0
10-074PRV	Pipeshed	10.9	Mississippi River	0.2	0.2	0.0	0.0	0.0	0.0	65.9	14.7	0.0	13.1	6.3	0.0	0.0
10-077	Pipeshed	1.1	Mississippi River	0.0	0.0	0.0	0.0	0.0	0.0	60.9	39.1	0.0	0.0	0.0	0.0	0.0
10-085PRV	Pipeshed	1.9	Mississippi River	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
10-090(A)PRV	Pipeshed	2.9	Mississippi River	0.9	0.9	0.0	0.0	0.0	0.0	97.7	2.2	0.0	0.0	0.0	0.0	0.2
10-090(B)PRV	Pipeshed	8.6	Mississippi River	0.9	0.9	0.0	0.0	0.0	0.0	81.0	4.5	0.0	0.0	13.3	0.0	1.2
10-090(C)PRV	Pipeshed	7.6	Mississippi River	0.7	0.7	0.0	0.0	0.0	0.0	81.4	2.6	0.0	0.0	16.0	0.0	0.0
10-090(D)PRV	Pipeshed	7.2	Mississippi River	0.9	0.9	0.0	0.0	0.0	0.0	90.3	8.7	0.0	0.0	1.0	0.0	0.0

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10-100	Pipeshed	1466.7	Mississippi River	0.4	0.4	34.9	0.5	0.6	0.7	15.1	21.0	0.1	5.0	9.0	0.0	0.0
10-110 (A)	Pipeshed	292.4	Mississippi River	0.5	0.3	46.6	0.9	0.9	1.5	3.2	36.9	0.0	10.0	0.0	0.0	0.0
10-115PB	Pipeshed	2.9	Mississippi River	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
10-117PB	Pipeshed	0.1	Mississippi River	0.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
10-120 (C)	Pipeshed	0.8	Mississippi River	1.0	1.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
10-120(a)	Pipeshed	103.8	Mississippi River	0.5	0.4	34.9	2.3	4.3	2.7	22.7	25.2	0.0	3.4	4.4	0.0	0.0
10-120(b)	Pipeshed	256.8	Mississippi River	0.4	0.3	57.7	2.7	3.2	2.0	5.2	28.8	0.0	0.0	0.3	0.0	0.0
10-130	Pipeshed	322.2	Mississippi River	0.7	0.6	24.3	1.0	3.9	2.6	27.7	17.0	0.0	0.5	23.0	0.0	0.0
10-140(a)	Pipeshed	3.4	Mississippi River	1.0	0.9	0.0	0.0	0.0	0.0	86.4	5.3	0.0	0.0	0.0	0.0	8.3
10-145	Pipeshed	10.9	Mississippi River	0.8	0.8	5.1	0.0	0.0	11.7	34.2	40.9	0.0	0.0	0.5	0.0	7.7
10-150	Pipeshed	148.4	Mississippi River	0.6	0.5	41.3	1.9	0.0	7.4	17.0	28.8	0.0	1.2	1.9	0.0	0.6
10-160	Pipeshed	20.8	Mississippi River	0.6	0.6	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
10-170	Pipeshed	167.6	Mississippi River	0.5	0.4	34.6	4.3	5.8	3.6	15.3	28.6	0.0	7.8	0.0	0.0	0.0
10-180	Pipeshed	276.1	Mississippi River	0.5	0.4	43.9	6.7	5.1	3.6	4.3	29.2	0.0	5.9	1.4	0.0	0.0
10-183PB	Pipeshed	1.4	Mississippi River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
10-185PRV	Pipeshed	11.1	Mississippi River	1.0	1.0	0.0	0.0	0.0	0.0	92.2	7.8	0.0	0.0	0.0	0.0	0.0
10-190	Pipeshed	26.9	Mississippi River	0.9	0.9	0.0	0.0	0.0	0.0	76.5	21.5	0.0	0.0	2.0	0.0	0.0
10-200	Pipeshed	47.4	Mississippi River	0.6	0.5	22.7	0.2	5.8	1.8	27.2	19.5	0.0	3.9	18.9	0.0	0.0
10-210 (A)	Pipeshed	2.2	Mississippi River	1.0	1.0	0.0	0.0	0.0	0.0	84.6	15.4	0.0	0.0	0.0	0.0	0.0
10-210 (B)	Pipeshed	87.6	Mississippi River	0.6	0.5	34.3	0.6	6.7	2.0	22.4	23.5	0.0	9.7	0.8	0.0	0.0
10-220	Pipeshed	17.5	Mississippi River	0.8	0.7	0.0	11.1	38.7	11.1	5.0	16.9	0.0	17.1	0.0	0.0	0.0
10-230	Pipeshed	231.0	Mississippi River	0.5	0.4	45.3	2.9	7.8	3.7	9.0	31.1	0.0	0.2	0.0	0.0	0.0
10-240	Pipeshed	115.3	Mississippi River	0.8	0.7	15.7	5.0	4.3	20.2	15.8	35.5	0.0	2.9	0.0	0.0	0.5
10-250	Pipeshed	245.1	Mississippi River	0.6	0.4	37.8	8.1	7.5	6.6	11.2	28.5	0.0	0.0	0.1	0.0	0.2
10-260	Pipeshed	16.5	Mississippi River	0.9	0.8	0.0	0.0	15.9	36.4	22.3	18.7	0.0	6.8	0.0	0.0	0.0
10-270	Pipeshed	71.4	Mississippi River	0.6	0.5	31.6	8.2	3.5	3.0	22.8	30.9	0.0	0.0	0.0	0.0	0.0
10-280	Pipeshed	44.5	Mississippi River	0.9	0.9	0.0	0.0	0.3	1.1	70.0	28.7	0.0	0.0	0.0	0.0	0.0
10-290	Pipeshed	17.8	Mississippi River	0.6	0.5	0.0	0.0	0.0	0.0	53.8	14.5	0.0	29.2	0.0	0.0	2.5
10-295	Pipeshed	851.1	Mississippi River	0.6	0.5	17.5	16.8	7.8	5.0	18.4	30.7	0.0	3.7	0.1	0.0	0.0
10-297	Pipeshed	3.2	Mississippi River	0.8	0.6	0.9	81.8	0.0	0.0	6.7	10.6	0.0	0.0	0.0	0.0	0.0

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10-300	Pipeshed	1.4	Mississippi River	0.9	0.8	0.0	0.0	0.0	0.0	0.0	18.8	0.0	39.6	0.0	0.0	41.6
10-305	Pipeshed	23.9	Mississippi River	0.5	0.4	36.9	5.0	0.0	0.2	5.1	22.7	0.0	30.2	0.0	0.0	0.0
10-310(B)	Pipeshed	66.0	Mississippi River	0.4	0.3	34.2	6.0	8.4	0.7	0.0	25.4	0.0	25.2	0.0	0.0	0.0
10-315	Pipeshed	3.0	Mississippi River	0.3	0.2	17.2	0.0	0.0	0.0	0.0	7.1	0.0	75.7	0.0	0.0	0.0
10-316	Pipeshed	6.5	Mississippi River	0.2	0.2	26.1	0.0	0.0	0.0	0.0	10.7	0.0	63.1	0.0	0.0	0.0
10-320	Pipeshed	394.3	Mississippi River	0.6	0.5	37.0	7.3	4.7	4.0	12.3	24.4	0.0	5.5	4.9	0.0	0.0
10-325	Pipeshed	2.6	Mississippi River	0.3	0.2	38.4	11.5	0.0	0.0	0.0	8.4	0.0	41.7	0.0	0.0	0.0
10-330	Pipeshed	30.8	Mississippi River	0.7	0.5	59.2	12.8	1.2	4.6	0.9	10.7	0.0	9.1	1.5	0.0	0.0
10-340	Pipeshed	7.0	Mississippi River	0.6	0.5	0.0	0.2	84.7	1.5	2.4	2.9	0.0	8.3	0.0	0.0	0.0
10-345	Pipeshed	5.3	Mississippi River	0.7	0.5	0.0	35.5	34.5	0.0	0.0	24.5	0.0	5.5	0.0	0.0	0.0
10-350	Pipeshed	30.9	Mississippi River	0.9	0.8	9.8	23.0	0.0	26.6	9.1	29.0	0.0	2.0	0.0	0.0	0.4
10-360	Pipeshed	16.1	Mississippi River	0.6	0.5	0.0	0.9	32.5	8.2	0.0	22.8	0.0	29.8	5.8	0.0	0.0
10-370	Pipeshed	11.9	Mississippi River	0.8	0.6	0.0	27.0	4.6	20.7	0.0	32.1	0.0	14.6	0.0	0.0	1.0
10-373	Pipeshed	0.9	Mississippi River	0.7	0.6	0.0	0.0	0.0	0.5	0.0	32.9	0.0	57.6	0.0	0.0	8.9
10-375PB	Pipeshed	1.3	Mississippi River	0.4	0.4	0.0	0.0	0.0	79.6	0.0	4.2	0.0	16.2	0.0	0.0	0.0
10-380	Pipeshed	20.4	Mississippi River	0.9	0.8	0.0	15.3	41.4	10.2	0.0	14.5	0.0	16.1	0.0	0.0	2.5
10-390 (B)	Pipeshed	18.7	Mississippi River	0.9	0.8	6.3	19.1	0.0	0.6	39.4	14.3	0.0	13.5	6.1	0.0	0.7
10-390(A)PRV	Pipeshed	30.1	Mississippi River	0.8	0.7	0.0	20.4	0.0	24.5	16.1	26.3	0.0	7.4	0.0	0.0	5.3
10-395	Pipeshed	16.1	Mississippi River	0.9	0.7	0.0	33.1	9.7	19.7	0.1	11.1	0.0	26.3	0.0	0.0	0.0
10-395PB	Pipeshed	2.9	Mississippi River	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.6	0.0	0.0	5.4
10-397	Pipeshed	2.8	Mississippi River	0.9	0.8	0.0	0.0	0.0	0.0	65.1	0.4	0.0	33.4	0.0	0.0	1.1
10-400DOT	Pipeshed	809.4	Mississippi River	0.7	0.6	17.5	3.2	8.0	10.5	10.6	42.1	0.0	6.4	1.6	0.0	0.0
10-410	Pipeshed	349.7	Mississippi River	1.0	0.9	0.5	3.8	8.6	49.4	0.1	35.8	0.0	1.6	0.3	0.0	0.0
10-420	Pipeshed	192.7	Mississippi River	0.9	0.8	1.4	7.3	16.1	32.3	5.7	29.3	0.0	7.5	0.4	0.0	0.0
10-430DOT	Pipeshed	3188.7	Mississippi River	0.6	0.5	30.1	12.4	5.8	7.8	0.8	36.8	0.0	6.3	0.0	0.0	0.0
10-440DOT	Pipeshed	1273.1	Mississippi River	0.5	0.4	33.3	2.1	2.0	4.4	7.9	33.5	0.1	16.1	0.7	0.0	0.0
10-450	Pipeshed	1020.8	Mississippi River	0.7	0.6	17.8	9.1	5.6	7.4	25.3	24.1	0.0	3.2	7.4	0.0	0.0
10-455	Pipeshed	6.7	Mississippi River	0.7	0.7	0.0	0.0	0.0	2.8	43.9	27.6	0.0	25.6	0.0	0.0	0.0
10-460	Pipeshed	827.0	Mississippi River	0.7	0.7	14.6	3.5	2.9	5.1	49.0	20.4	0.0	0.0	4.5	0.0	0.0
10-465PB	Pipeshed	19.6	Mississippi River	0.5	0.4	0.0	17.2	0.0	0.0	0.0	13.9	0.0	68.9	0.0	0.0	0.0

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10-470	Pipeshed	10.3	Mississippi River	0.6	0.6	0.0	0.0	83.2	0.0	0.0	16.0	0.0	0.8	0.0	0.0	0.0
10-475	Pipeshed	0.2	Mississippi River	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
10-480	Pipeshed	26.8	Mississippi River	0.6	0.5	0.0	11.1	46.7	8.6	0.0	22.2	0.0	11.4	0.0	0.0	0.0
10-485	Pipeshed	12.6	Mississippi River	0.6	0.5	0.0	0.0	70.3	0.0	0.0	0.2	0.0	29.5	0.0	0.0	0.0
10-487	Pipeshed	2.3	Mississippi River	0.9	0.8	0.0	0.0	68.1	0.0	0.0	27.7	0.0	4.3	0.0	0.0	0.0
10-488	Pipeshed	3.4	Mississippi River	0.6	0.5	0.0	0.0	63.2	0.0	0.0	27.6	0.0	9.2	0.0	0.0	0.0
10-489	Pipeshed	2.3	Mississippi River	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	99.9	0.0	0.0	0.0
10-490	Pipeshed	138.9	Mississippi River	0.7	0.6	5.1	25.3	24.9	9.5	0.5	28.4	0.0	3.7	2.5	0.0	0.0
10-500	Pipeshed	636.8	Mississippi River	0.6	0.5	29.3	13.7	7.6	4.4	4.2	34.1	0.0	4.8	1.8	0.0	0.0
10-505	Pipeshed	8.6	Mississippi River	0.6	0.5	0.0	0.0	51.6	0.0	0.0	11.3	0.0	37.1	0.0	0.0	0.0
10-506	Pipeshed	2.1	Mississippi River	0.5	0.4	0.0	0.0	14.6	0.0	0.0	0.0	0.0	85.4	0.0	0.0	0.0
10-507	Pipeshed	6.1	Mississippi River	0.2	0.1	0.0	0.0	4.1	0.0	0.0	0.0	0.0	95.9	0.0	0.0	0.0
10-508	Pipeshed	0.1	Mississippi River	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
10-510	Pipeshed	55.4	Mississippi River	0.7	0.6	4.5	5.7	46.5	4.8	0.0	27.6	0.0	10.9	0.0	0.0	0.0
10-511	Pipeshed	2.5	Mississippi River	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	98.1	0.0	0.0	1.6
10-512	Pipeshed	3.0	Mississippi River	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.8	0.0	0.0	0.2
10-513	Pipeshed	6.4	Mississippi River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
10-515	Pipeshed	14.1	Mississippi River	0.2	0.2	0.0	0.0	0.0	0.0	0.0	6.4	0.0	93.6	0.0	0.0	0.0
10-530	Pipeshed	200.9	Mississippi River	0.8	0.7	2.4	3.5	63.2	3.6	6.4	16.4	0.0	0.8	3.7	0.0	0.0
10-540DOT	Pipeshed	34.8	Mississippi River	0.6	0.5	5.2	0.8	0.0	0.0	0.0	54.1	0.0	39.9	0.0	0.0	0.0
10-550	Pipeshed	23.1	Mississippi River	0.5	0.4	36.3	20.1	0.0	4.8	0.0	32.2	0.0	6.6	0.0	0.0	0.0
10-560	Pipeshed	331.8	Mississippi River	0.8	0.7	2.9	7.6	10.0	6.5	46.3	15.1	0.2	3.4	8.2	0.0	0.0
10-565	Pipeshed	152.0	Mississippi River	0.6	0.5	26.0	10.1	3.4	9.1	2.5	40.6	0.0	8.3	0.0	0.0	0.0
10-568	Pipeshed	23.3	Mississippi River	0.6	0.4	40.9	6.9	13.5	1.1	0.0	25.7	0.0	9.7	2.4	0.0	0.0
10-570	Pipeshed	218.5	Mississippi River	0.5	0.4	39.4	3.5	2.7	7.2	7.5	30.4	0.0	9.3	0.0	0.0	0.0
10-580	Pipeshed	8.4	Mississippi River	0.3	0.2	78.1	0.0	0.0	0.0	0.0	13.7	0.0	8.2	0.0	0.0	0.0
10-600	Pipeshed	126.2	Mississippi River	0.3	0.2	62.0	1.4	3.0	1.9	0.0	29.1	0.0	0.9	1.6	0.0	0.0
10-605	Pipeshed	2.5	Mississippi River	0.4	0.4	0.0	0.0	80.5	0.0	0.0	0.1	0.0	19.4	0.0	0.0	0.0
10-607	Pipeshed	1.8	Mississippi River	0.4	0.3	0.0	0.0	38.5	0.0	0.0	0.0	0.0	61.5	0.0	0.0	0.0
10-610	Pipeshed	40.5	Mississippi River	0.4	0.3	51.9	0.5	1.7	0.6	2.4	32.6	0.0	10.4	0.0	0.0	0.0

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10-615	Pipeshed	15.1	Mississippi River	0.3	0.3	4.1	0.0	28.1	0.0	0.0	8.4	0.0	16.2	43.2	0.0	0.0
10-630DOT	Pipeshed	989.1	Mississippi River	0.6	0.5	26.8	4.9	7.4	12.4	11.2	28.0	0.0	9.0	0.4	0.0	0.0
10-640	Pipeshed	271.8	Mississippi River	0.5	0.3	54.3	3.3	5.8	2.9	2.6	29.9	0.0	1.2	0.0	0.0	0.0
10-660	Pipeshed	297.7	Mississippi River	0.4	0.3	59.6	0.9	2.8	0.4	1.9	28.1	0.0	6.4	0.0	0.0	0.0
10-670	Pipeshed	144.7	Mississippi River	0.4	0.2	65.5	0.2	1.5	0.0	0.0	28.6	0.0	4.2	0.0	0.0	0.0
10-680	Pipeshed	666.5	Mississippi River	0.5	0.4	48.9	2.4	3.3	2.9	6.5	33.1	0.0	0.8	2.1	0.0	0.0
10-690	Pipeshed	68.5	Mississippi River	0.4	0.3	39.9	0.0	33.1	0.0	0.0	16.4	0.0	10.6	0.0	0.0	0.0
10-700	Pipeshed	214.4	Mississippi River	0.5	0.3	55.9	4.8	3.3	0.7	4.0	28.4	0.0	2.8	0.0	0.0	0.0
10-710	Pipeshed	38.3	Mississippi River	0.3	0.2	35.7	1.7	10.5	0.1	0.0	12.3	0.0	39.7	0.0	0.0	0.0
10-712	Pipeshed	0.2	Mississippi River	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
10-720	Pipeshed	1009.9	Mississippi River	0.5	0.3	50.3	3.0	5.0	1.4	0.8	30.7	0.0	6.9	0.7	1.4	0.0
10-800	Pipeshed	2.3	Mississippi River	0.3	0.2	0.0	0.0	0.0	0.0	0.0	2.7	0.0	97.3	0.0	0.0	0.0
15-005UM	Pipeshed	3.2	Mississippi River	0.6	0.6	0.0	0.0	2.1	0.0	92.3	5.6	0.0	0.0	0.0	0.0	0.0
15-010UM	Pipeshed	2.4	Mississippi River	0.4	0.4	0.0	0.0	93.1	0.0	0.0	1.8	0.0	0.0	5.0	0.0	0.0
15-020UM	Pipeshed	0.2	Mississippi River	0.9	0.8	0.0	0.0	80.2	0.0	0.0	19.8	0.0	0.0	0.0	0.0	0.0
15-030UM	Pipeshed	0.2	Mississippi River	0.9	0.8	0.0	0.0	99.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
15-040UM	Pipeshed	3.7	Mississippi River	0.9	0.9	0.0	0.0	92.3	0.0	0.0	3.8	0.0	0.0	3.9	0.0	0.0
15-045UM	Pipeshed	0.5	Mississippi River	0.9	0.8	0.0	0.0	96.8	0.0	0.0	0.0	0.0	1.1	0.0	0.0	2.1
15-050UM	Pipeshed	28.8	Mississippi River	0.7	0.7	0.0	0.5	50.4	0.8	2.4	3.8	0.0	0.4	41.3	0.0	0.4
15-060UM	Pipeshed	0.7	Mississippi River	0.8	0.8	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-070UM	Pipeshed	4.8	Mississippi River	0.7	0.6	0.0	0.0	94.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0
15-080UM	Pipeshed	13.5	Mississippi River	0.7	0.6	0.0	0.0	97.0	0.0	0.0	2.4	0.0	0.6	0.0	0.0	0.0
15-100UM	Pipeshed	11.9	Mississippi River	0.8	0.7	0.0	0.0	72.3	0.0	0.0	23.5	0.0	4.2	0.0	0.0	0.0
15-110UM	Pipeshed	3.1	Mississippi River	0.9	0.8	0.0	0.0	58.0	0.0	0.0	38.7	0.0	3.2	0.0	0.0	0.0
15-120UM	Pipeshed	2.1	Mississippi River	0.9	0.8	0.0	0.0	68.5	0.0	0.0	27.3	0.0	4.2	0.0	0.0	0.0
15-130UM	Pipeshed	7.7	Mississippi River	0.9	0.8	0.0	0.0	99.2	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0
15-140UM	Pipeshed	0.4	Mississippi River	0.4	0.4	0.0	0.0	27.3	0.0	0.0	72.7	0.0	0.0	0.0	0.0	0.0
15-145UM	Pipeshed	28.6	Mississippi River	0.8	0.7	0.0	0.0	83.3	0.0	0.0	3.7	0.0	13.0	0.0	0.0	0.0
15-150UM	Pipeshed	4.0	Mississippi River	0.7	0.6	0.0	0.0	59.7	0.0	0.0	32.1	0.0	8.2	0.0	0.0	0.0
15-160UM	Pipeshed	8.4	Mississippi River	0.8	0.7	0.0	0.0	90.7	0.0	0.0	5.6	0.0	3.7	0.0	0.0	0.0

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15-170UM	Pipeshed	1.7	Mississippi River	0.5	0.5	0.0	0.0	99.2	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0
10-080PRV	Pipeshed	23.0	Mississippi River	0.9	0.8	0.0	0.0	0.0	0.0	81.0	6.9	0.0	0.0	12.1	0.0	0.0
	Direct Watershed	15.8	Mississippi River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	94.8	0.0	0.0	0.0
	Direct Watershed	120.7	Mississippi River	0.1	0.1	0.0	0.0	0.0	0.0	3.2	1.1	0.0	94.6	0.0	0.0	1.0
	Direct Watershed	81.8	Mississippi River	0.2	0.2	0.0	6.2	0.3	0.0	0.0	5.1	0.0	80.5	0.2	0.0	2.9
	Direct Watershed	0.3	Mississippi River	1.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
	Direct Watershed	3.1	Mississippi River	0.8	0.7	0.0	0.0	68.2	0.0	0.0	12.1	0.0	0.3	0.1	0.0	19.3
	Direct Watershed	1.8	Mississippi River	0.7	0.7	0.0	0.0	29.7	12.1	0.0	44.7	0.0	0.0	9.0	0.0	4.5
	Direct Watershed	10.0	Mississippi River	0.3	0.3	0.0	0.7	31.1	0.0	55.6	4.2	0.0	6.2	0.9	0.0	1.3
	Direct Watershed	41.2	Mississippi River	0.5	0.4	0.0	0.0	0.0	0.0	23.8	2.9	0.0	71.2	0.0	0.0	2.1
	Direct Watershed	1.8	Mississippi River	1.0	1.0	0.0	0.0	0.0	0.0	0.0	44.7	0.0	0.0	0.0	0.0	55.3
	Direct Watershed	1.1	Mississippi River	0.4	0.3	0.0	0.0	0.0	0.0	2.1	0.3	0.0	66.8	0.0	0.0	30.7
	Direct Watershed	0.6	Mississippi River	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.6	0.0	0.0	0.4
	Direct Watershed	5.8	Mississippi River	0.5	0.5	0.0	0.0	12.9	0.0	80.8	2.3	0.0	0.0	0.0	0.0	4.0
	Direct Watershed	12.7	Mississippi River	0.4	0.4	0.0	0.0	0.0	0.0	50.7	9.7	0.0	34.3	0.0	0.0	5.3
	Direct Watershed	0.9	Mississippi River	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	95.2	0.0	0.0	4.8
	Direct Watershed	0.5	Mississippi River	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.8	0.0	0.0	0.2
	Direct Watershed	0.4	Mississippi River	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.9	0.0	0.0	8.1
	Direct Watershed	1.3	Mississippi River	0.2	0.2	1.5	44.2	0.0	0.0	0.0	52.3	0.0	0.0	1.9	0.0	0.0
	Direct Watershed	1.3	Mississippi River	0.5	0.3	46.8	0.0	0.0	0.0	0.0	52.4	0.0	0.0	0.8	0.0	0.0
	Direct Watershed	14.8	Mississippi River	0.3	0.2	0.0	0.0	2.5	6.8	0.0	9.6	0.0	77.3	1.3	0.0	2.5
	Direct Watershed	13.7	Mississippi River	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.3	0.6	0.0	2.2
	Direct Watershed	2.6	Mississippi River	0.5	0.5	5.0	3.2	0.0	38.8	0.0	36.4	0.0	0.0	16.5	0.0	0.0
	Direct Watershed	10.5	Mississippi River	0.5	0.5	0.7	15.3	0.0	3.6	31.8	36.5	0.0	0.9	11.2	0.0	0.0
	Direct Watershed	16.6	Mississippi River	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.7	0.0	93.8	0.0	0.0	5.5
	Direct Watershed	6.2	Mississippi River	0.9	0.9	2.1	0.0	0.0	15.6	53.6	19.2	0.0	0.0	9.5	0.0	0.0
	Direct Watershed	14.2	Mississippi River	0.2	0.2	0.0	0.0	0.0	0.0	93.8	4.0	0.0	0.0	0.0	0.0	2.2
	Direct Watershed	7.2	Mississippi River	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
	Direct Watershed	0.0	Mississippi River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
	Direct Watershed	0.0	Mississippi River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0

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	Direct Watershed	23.3	Mississippi River	0.6	0.6	0.0	0.8	6.6	0.0	43.1	13.6	0.0	26.6	5.1	0.0	4.1
	Direct Watershed	21.5	Mississippi River	0.3	0.3	19.3	2.8	0.0	4.1	26.3	5.6	0.0	28.5	6.5	0.0	6.9
	Direct Watershed	0.3	Mississippi River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.9	0.0	0.0	33.1
	Direct Watershed	0.6	Mississippi River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	78.4	0.0	0.0	21.6
	Direct Watershed	19.0	Mississippi River	0.8	0.8	0.0	0.0	0.0	0.0	69.2	2.2	0.0	0.0	13.8	0.0	14.7
	Direct Watershed	0.1	Mississippi River	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.2	0.0	0.0	16.8
	Direct Watershed	80.6	Mississippi River	0.4	0.4	0.4	0.9	1.7	2.8	76.3	6.7	0.0	8.3	0.0	0.0	2.9
	Direct Watershed	1.1	Mississippi River	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Direct Watershed	0.2	Mississippi River	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Direct Watershed	36.7	Mississippi River	0.1	0.1	0.0	0.0	0.0	0.0	0.0	2.2	0.0	97.8	0.0	0.0	0.0
	Direct Watershed	7.0	Mississippi River	0.6	0.5	0.0	0.0	9.8	0.0	23.1	1.0	0.0	9.0	0.0	0.0	0.0
	Direct Watershed	27.8	Mother Lake	0.5	0.4	22.5	0.0	1.6	0.1	0.0	65.8	0.0	0.0	0.0	9.9	0.0
74-020	Pipeshed	2.8	Mother Lake	0.5	0.2	52.7	0.0	0.0	0.0	0.0	45.5	0.0	0.0	0.0	1.8	0.0
	Direct Watershed	44.6	Powderhorn Lake	0.1	0.1	4.1	0.3	0.0	0.0	0.0	0.6	0.0	94.4	0.0	0.0	0.6
82-010	Pipeshed	24.5	Powderhorn Lake	0.6	0.4	33.0	14.2	9.7	5.6	0.0	26.3	0.0	11.1	0.0	0.0	0.0
82-015	Pipeshed	3.1	Powderhorn Lake	0.2	0.1	4.7	3.5	0.0	0.0	0.0	10.8	0.0	80.9	0.0	0.0	0.0
82-020	Pipeshed	69.9	Powderhorn Lake	0.4	0.3	51.7	7.8	0.9	1.9	0.0	30.1	0.0	7.6	0.0	0.0	0.0
82-030	Pipeshed	81.2	Powderhorn Lake	0.5	0.3	53.8	6.6	1.5	2.2	0.0	33.9	0.0	2.1	0.0	0.0	0.0
82-040	Pipeshed	99.4	Powderhorn Lake	0.5	0.3	53.3	3.9	7.7	0.8	0.0	32.0	0.0	2.2	0.0	0.0	0.0
65-010DOT	Pipeshed	5.3	Richfield Lake	0.8	0.7	4.8	30.4	0.3	14.0	0.8	49.7	0.0	0.0	0.0	0.0	0.0
65-020(A)DOT	Pipeshed	52.2	Richfield Lake	0.6	0.5	29.5	0.7	1.1	29.0	0.0	39.7	0.0	0.0	0.0	0.0	0.0
	Direct Watershed	4.9	Ryan Lake	0.1	0.1	4.7	0.0	0.0	0.0	81.6	8.0	0.0	0.0	0.0	0.0	5.7
21-010	Pipeshed	55.7	Ryan Lake	0.5	0.3	54.3	0.0	0.0	0.0	3.7	30.1	0.0	2.4	9.5	0.0	0.0
	Direct Watershed	79.5	Shingle Creek	0.2	0.2	1.8	1.5	8.7	0.5	2.1	5.8	0.0	77.4	2.0	0.0	0.0
20-010	Pipeshed	1.8	Shingle Creek	0.5	0.3	50.9	0.0	0.0	0.0	0.0	40.7	0.0	8.4	0.0	0.0	0.0
20-011 (A)	Pipeshed	93.0	Shingle Creek	0.4	0.3	61.3	0.0	0.0	0.0	0.0	23.5	0.2	10.0	0.0	0.0	5.1
20-012	Pipeshed	1.5	Shingle Creek	0.6	0.3	40.3	10.3	0.0	0.0	0.0	47.5	0.0	1.9	0.0	0.0	0.0
20-013	Pipeshed	0.7	Shingle Creek	0.3	0.2	30.8	0.0	0.0	0.0	0.0	13.9	0.0	55.3	0.0	0.0	0.0
20-020	Pipeshed	5.5	Shingle Creek	0.3	0.2	38.9	1.4	0.0	0.0	0.0	21.8	0.0	37.9	0.0	0.0	0.0
20-030	Pipeshed	8.6	Shingle Creek	0.4	0.3	62.6	0.0	0.0	0.0	0.0	22.8	0.0	14.6	0.0	0.0	0.0

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20-040	Pipeshed	16.4	Shingle Creek	0.4	0.2	68.1	0.0	0.0	0.0	0.0	20.1	0.0	11.8	0.0	0.0	0.0
20-050	Pipeshed	1.4	Shingle Creek	0.4	0.2	65.0	0.0	0.0	0.0	0.0	19.4	0.0	15.6	0.0	0.0	0.0
20-060	Pipeshed	3.6	Shingle Creek	0.7	0.5	33.2	0.0	27.1	0.0	0.0	33.4	0.0	6.2	0.0	0.0	0.0
20-065	Pipeshed	1.4	Shingle Creek	0.4	0.3	48.3	0.0	0.0	0.0	0.0	33.5	0.0	18.1	0.0	0.0	0.0
20-067PRV	Pipeshed	3.6	Shingle Creek	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
20-070	Pipeshed	34.5	Shingle Creek	0.4	0.3	62.5	0.0	4.5	0.0	0.0	28.2	0.0	4.8	0.0	0.0	0.0
20-080	Pipeshed	34.4	Shingle Creek	0.4	0.3	69.9	0.5	1.6	0.0	0.0	19.1	0.0	9.0	0.0	0.0	0.0
20-090	Pipeshed	4.1	Shingle Creek	0.7	0.6	0.0	0.0	68.7	0.0	0.0	13.1	0.0	18.2	0.0	0.0	0.0
20-095	Pipeshed	0.4	Shingle Creek	0.4	0.2	65.1	0.0	0.0	0.0	0.0	0.0	0.0	34.9	0.0	0.0	0.0
20-100 (B)	Pipeshed	34.9	Shingle Creek	0.5	0.3	54.1	0.0	0.6	0.0	0.0	25.8	0.0	19.5	0.0	0.0	0.0
20-110	Pipeshed	104.0	Shingle Creek	0.6	0.5	30.7	0.0	0.0	0.9	48.0	14.9	0.0	0.4	5.1	0.0	0.0
20-125	Pipeshed	13.0	Shingle Creek	0.4	0.3	68.4	0.0	0.0	0.0	0.0	25.7	0.0	5.9	0.0	0.0	0.0
20-133	Pipeshed	1.1	Shingle Creek	0.6	0.4	38.3	0.0	0.0	0.0	0.0	26.6	0.0	35.1	0.0	0.0	0.0
20-134PRV	Pipeshed	8.1	Shingle Creek	0.7	0.7	0.0	0.0	0.0	0.0	98.8	1.0	0.0	0.1	0.0	0.0	0.0
20-135PRV	Pipeshed	59.6	Shingle Creek	0.8	0.8	0.0	0.0	0.0	0.0	83.6	0.7	0.0	0.0	15.7	0.0	0.0
20-140	Pipeshed	2.5	Shingle Creek	0.5	0.3	61.8	6.5	0.0	0.0	0.0	13.7	0.0	18.1	0.0	0.0	0.0
20-150	Pipeshed	12.7	Shingle Creek	0.4	0.2	65.4	0.0	0.0	0.0	0.0	29.6	0.0	5.0	0.0	0.0	0.0
20-170	Pipeshed	3.4	Shingle Creek	0.5	0.3	40.0	0.0	0.0	0.0	0.0	13.0	0.0	47.0	0.0	0.0	0.0
20-180	Pipeshed	45.7	Shingle Creek	0.9	0.9	3.3	6.3	0.2	0.0	11.2	4.5	0.0	3.3	71.3	0.0	0.0
20-190	Pipeshed	1.0	Shingle Creek	0.5	0.4	27.9	0.0	0.0	0.0	0.0	13.0	0.0	59.1	0.0	0.0	0.0
20-200	Pipeshed	18.9	Shingle Creek	0.4	0.3	59.5	0.0	1.6	0.0	0.0	25.4	0.0	13.5	0.0	0.0	0.0
20-210 (A)	Pipeshed	227.6	Shingle Creek	0.3	0.2	45.8	0.6	0.7	0.6	0.0	20.3	0.0	30.1	1.9	0.0	0.0
20-210 (B)	Pipeshed	0.1	Shingle Creek	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
20-215	Pipeshed	475.3	Shingle Creek	0.4	0.2	44.9	1.7	2.9	0.9	0.0	20.3	0.0	29.1	0.3	0.0	0.0
20-220	Pipeshed	29.1	Shingle Creek	0.6	0.5	38.2	1.6	0.0	4.1	21.6	27.9	0.0	6.6	0.0	0.0	0.0
20-230	Pipeshed	24.0	Shingle Creek	0.5	0.3	33.0	0.8	2.1	0.0	0.0	17.3	0.0	46.8	0.0	0.0	0.0
20-240	Pipeshed	33.8	Shingle Creek	0.5	0.4	49.2	5.5	9.6	6.8	0.0	28.5	0.0	0.4	0.0	0.0	0.0
20-250	Pipeshed	7.2	Shingle Creek	0.8	0.8	5.6	0.0	0.0	34.3	0.0	57.0	0.0	3.1	0.0	0.0	0.0
20-260	Pipeshed	6.0	Shingle Creek	1.0	1.0	0.0	0.0	0.0	10.3	71.7	18.0	0.0	0.0	0.0	0.0	0.0
20-270DOT	Pipeshed	41.7	Shingle Creek	0.5	0.3	59.9	2.6	2.1	1.0	0.0	34.4	0.0	0.0	0.0	0.0	0.0

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20-280DOT	Pipeshed	8.8	Shingle Creek	0.8	0.7	0.0	0.0	0.0	0.5	2.8	94.2	0.0	2.6	0.0	0.0	0.0
20-290DOT	Pipeshed	8.6	Shingle Creek	0.8	0.7	0.0	0.0	0.0	17.2	31.2	48.6	0.0	3.1	0.0	0.0	0.0
62-010SAV	Pipeshed	25.0	Silver Lake	0.4	0.3	66.1	3.4	0.0	2.2	0.0	28.3	0.0	0.0	0.0	0.0	0.0
	Direct Watershed	10.8	Spring Lake	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0	98.6	0.0	0.0	1.1
43-010	Pipeshed	11.6	Spring Lake	0.6	0.5	17.5	0.0	27.7	0.0	0.0	11.2	0.0	43.6	0.0	0.0	0.0
43-020	Pipeshed	16.8	Spring Lake	0.3	0.2	65.0	0.0	0.0	0.0	0.0	22.5	0.0	12.5	0.0	0.0	0.0
43-030	Pipeshed	10.8	Spring Lake	0.3	0.2	66.5	1.3	0.0	0.0	0.0	25.3	0.0	6.9	0.0	0.0	0.0
	Direct Watershed	0.2	Taft Lake	0.4	0.3	0.0	0.0	0.0	0.0	0.0	96.6	0.0	0.0	0.0	3.4	0.0
73-010	Pipeshed	53.2	Taft Lake	0.4	0.2	68.8	0.0	0.0	0.0	0.0	31.2	0.0	0.0	0.0	0.0	0.0
73-020	Pipeshed	85.6	Taft Lake	0.5	0.4	50.8	0.0	0.0	0.0	0.0	48.8	0.0	0.4	0.0	0.0	0.0
	Direct Watershed	4.0	Wirth Lake	0.1	0.1	2.1	0.0	0.0	0.0	0.0	0.1	0.0	97.7	0.0	0.0	0.0
42-010	Pipeshed	0.0	Wirth Lake	1.0	0.6	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
42-030	Pipeshed	36.6	Wirth Lake	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	99.8	0.0	0.0	0.0

Appendix K – Water Resource Management Implementation Program (2019 to 2028)

Minneapolis
City of Lakes

Implementation Activities

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
Part I – Administration and City-Wide Programs and Projects					
Create/Modify City Ordinances	Review and revise ordinances as needed to meet the requirements of the City's SWMP and the BCWMC, MCWD, MWMO, and SCWMC.	The City's ordinances will be reviewed to ensure consistency with the goals and policies of this WRMP and for consistency with WMO, state, and federal rules and policies.	City Staff	2018-2019	SW Utility
Capital Improvement Program Updates	The City's Capital Improvement Program needs to be revised periodically.	The capital improvements program will be reviewed annually to include projects or programs that are necessary or recommended.	City Staff	Ongoing	SW Utility
WRMP Amendments	This WRMP may need to be amended periodically.	This WMRP will be amended as required.	As Required	As Required	SW Utility
WRMP Update/Revision	This WRMP will expire in 2028 and needs to be updated/revised to be consistent with WMO plans and policies and state and federal rules.	This WRMP will be updated to maintain compliance with state and federal rules and WMO policies.	300,000	2026-2028	SW Utility
Stormwater Public Education Activities	Implement the City's education program including educational and outreach tasks called out in the City's SWMP.	Maintain the education program to educate residents about water resource issues.	90,000 per year	Ongoing	SW Utility
Public Participation and Involvement	Continue to implement public participation and public involvement activities called out in the City's SWMP.	Tap into numerous public participation and public involvement activities to solicit input on specific stormwater-related activities and decisions.	City Staff	Ongoing	SW Utility
Illicit Discharges Investigation Program	Minimize the discharge of pollutants to the maximum extent practicable by detecting, investigating, and resolving illicit discharges.	Addressing all illegal dumping and disposal of unpermitted, non-stormwater flows in the City's stormwater drainage system including pipes, gutters, swales, and other conveyance infrastructure.	City Staff	Ongoing	SW Utility
Spill Response Program	Minimize the discharge of pollutants to lakes, creeks, wetlands, and the Mississippi River by appropriately responding to spills.	The immediate goals of response are safety, containment of the spill, recovery of hazardous materials, and collection of data for use in assessment of site impacts.	City Staff	Ongoing	SW Utility
Facilities Inspection Program	Minimize the discharge of pollutants by conducting site visits of facilities that store large quantities of regulated and hazardous materials.	Site inspections yield information about the drainage patterns to nearest storm drain inlet or waterbody, identification of the receiving waterbody and outfall locations, and handling, storage, and transfer procedures.	City Staff	Ongoing	SW Utility

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
Source Control Education and Outreach Program	Develop education to create behavior change in ways that will improve water quality.	Reduce pollutants at the source by focusing education efforts towards target pollutants and identified audiences.	City Staff	Ongoing	SW Utility
Coordinated Staff Training Program	Delivery City-wide staff training on the stormwater management program.	Develop and conduct training related to the SWMP into all relevant parts of the business of City government in a coordinated, cost-effective way to fulfill federal and state requirements.	City Staff	Ongoing	SW Utility
Construction Site Stormwater Runoff Control for City Capital Projects	Minimize the discharge of pollutants from construction sites by requiring erosion prevention and sediment control measures.	Project design, plan review, inspection, enforcement, and staff education.	City Staff	Ongoing	SW Utility
Construction Site Stormwater Runoff Control for Development/Redevelopment	Minimize the discharge of pollutants from construction sites by requiring erosion prevention and sediment control measures.	Plan review, inspection, enforcement, and education.	City Staff	Ongoing	SW Utility
Post Construction Stormwater Management	Maintain the post construction stormwater management and SWMP tasks for development/redevelopment.	Ordinance update, design standards, plan review, and education.	City Staff	Ongoing	SW Utility
Post Construction Stormwater Management – Ongoing Compliance	Ensure ongoing compliance for private BMPs.	Inspections to ensure facilities are continuing to function as designed and approved and carrying out maintenance or rehabilitation activities as needed.	City Staff	Ongoing	SW Utility
Review and Approval for Projects Proposing to Modify MS4 System	Adding, modifying, or removing infrastructure that is part of the MS4 system.	Review and approve projects that will physically alter the MS4 system for the betterment of the system and to avoid adverse capacity, maintenance, and pollutant discharge impacts.	City Staff	Ongoing	SW Utility
Pilot Projects	Identify opportunities to improve management of pollutant loads.	Engage emerging technologies and develop and maintain a toolbox of options to improve water resource management.	100,000	Ongoing	SW Utility
City Good Housekeeping	Maintain the City pollution prevention/good housekeeping practices and related SWMP tasks including sanitary and storm sewer maintenance.	Structure clean-out, city facility operations and maintenance, training, inspections, recording, and reporting.	City Staff	Ongoing	SW Utility
Street Sweeping and Cleaning Program	Minimize the discharge of pollutants to the storm drain system and receiving waterbodies.	Remove leaf litter, sediment, and debris from streets and gutters before the materials, and pollutants attached to them, can be washed into storm drain inlets.	9,970,000 per year	Ongoing	SW Utility
Snow and Ice Control	Use salt and deicing chemicals responsibly to protect public safety and the needs of the environment.	Manage, monitor, and report on the application of chemicals for snow and ice control on streets and alleys and in storage facilities.	City Staff	Ongoing	General Fund

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
Stormwater Monitoring Program	Water quality monitoring and analysis to understand and improve stormwater management program effectiveness.	Monitoring of water quality BMPs to determine effectiveness and representative land use pipesheds.	224,500 per year	Ongoing	SW Utility
Annual SWPPP Update and Meeting	Make any needed updates to the City's SWMP and hold an annual public meeting to receive public input.	Involve residents in water resource issues development and implementation tasks.	City Staff	Ongoing	SW Utility
Impaired Waters Tracking and Review	Monitor impaired waters list and respond with review and implementation as needed per the SWMP.	The City will remain fully informed and responsive to impaired waters issues.	City Staff	Ongoing	SW Utility
Fleet Vehicles	Replace sanitary and stormwater program vehicles.	Maintain transportation.	-	-	SW Utility
Retrofit Plan	NPDES MS4 Program requirement.	Plan to evaluate the City's ability to implement structural stormwater BMPs in areas where there is no stormwater runoff treatment or where existing stormwater treatment could be enhanced.	City Staff	2019	SW Utility
Flood Mitigation Program H&H Model Development Feasibility Analysis and Project Prioritization	Model and inventory of flood areas throughout the City and analyze for solutions.	Develop flood model for the entire City and prioritize proposed improvements.	7,777,777+	Ongoing	SW Utility
Ongoing Water Quality Modeling	Ongoing modeling of water quality will be needed to quantify pollutant load reduction due to BMP implementation.	Update model.	City Staff	2017 to 2019	SW Utility
Sedimentation Pond Maintenance	Sedimentation ponds require frequent cleaning and maintenance.	Continue to implement program to inspect, clean, and maintain sedimentation and water quality ponds.	100,000 per year	Ongoing	SW Utility
Part II – Capital Improvements					
Infiltration and Inflow Mitigation Program					
Reduce the amount of infiltration and inflow to the sanitary sewer system including CIPP lining program and miscellaneous repairs			**3,500,000 per year**	**Ongoing**	**Sanitary Bonds Sanitary Utility**
Sanitary Tunnel and Sewer Rehabilitation Program					
Repair and rehabilitation of tunnels, pipes, lift stations, and access structures.			**8,000,000 to 16,000,000 per year**	**Ongoing**	**Sanitary Bonds Sanitary Utility**
00001.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Vincent Avenue N	715,000	2018	Sanitary Bonds Sanitary Utility
00001.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Vincent Avenue N	10,000	2018	Sanitary Bonds Sanitary Utility

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
00002.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Hoyer Heights	1,748,000	2018	Sanitary Bonds Sanitary Utility
00002.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Hoyer Heights	1,000,000	2019	Sanitary Bonds Sanitary Utility
00002.4	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Hoyer Heights	100,000	2018	Sanitary Bonds Sanitary Utility
00002.5	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Hoyer Heights	396,000	2018	Sanitary Bonds Sanitary Utility
00003.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	3415 Central Avenue	267,000	2018	Sanitary Bonds Sanitary Utility
00004.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	2800 Pacific	100,000	2018	Sanitary Bonds Sanitary Utility
00005.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Mid-City Industrial	1,208,000	2018	Sanitary Bonds Sanitary Utility
00005.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Mid-City Industrial	3,000,000	2018	Sanitary Bonds Sanitary Utility
00005.4	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Mid-City Industrial	200,000	2018	Sanitary Bonds Sanitary Utility
00006.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Broadway Avenue NE	5,000	2018	Sanitary Bonds Sanitary Utility
00007.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Fremont Avenue N (8^{th} to 7^{th})	308,000	2018	Sanitary Bonds Sanitary Utility
00008.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Chestnut Avenue W (Vincent to Upton)	181,000	2018	Sanitary Bonds Sanitary Utility
00008.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Chestnut Avenue W (Vincent to Upton)	30,000	2018	Sanitary Bonds Sanitary Utility
00009.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Hennepin Avenue (33^{rd} to 35^{th})	65,000	2018	Sanitary Bonds Sanitary Utility
00010.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	4338 Portland	232,000	2018	Sanitary Bonds Sanitary Utility
00011.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	12^{th} Avenue South (41^{st} to 42^{nd})	205,000	2018	Sanitary Bonds Sanitary Utility
00011.4	Sanitary Sewer Repair and Rehabilitation – Design and Construction	40^{th} Avenue S (28^{th} to 29^{th})	178,000	2018	Sanitary Bonds Sanitary Utility
00011.6	Sanitary Sewer Repair and Rehabilitation – Design and Construction	18^{th} Avenue (43^{rd} to 44^{th})	206,000	2018	Sanitary Bonds Sanitary Utility
00012.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	4740 Xerxes Avenue S	335,000	2018	Sanitary Bonds Sanitary Utility

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
00012.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	4740 Xerxes Avenue S	3,500	2018	Sanitary Bonds Sanitary Utility
00013.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Xerxes Avenue S 953rd to 54th)	426,000	2018	Sanitary Bonds Sanitary Utility
00014.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Girard Avenue S (53rd to Minnehaha)	350,000	2018	Sanitary Bonds Sanitary Utility
00014.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Girard Avenue S (53rd to Minnehaha)	10,000	2018	Sanitary Bonds Sanitary Utility
00015.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Cedar Avenue S (51st to 52nd)	40,000	2018	Sanitary Bonds Sanitary Utility
00015.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Cedar Avenue S (51st to 52nd)	45,000	2018	Sanitary Bonds Sanitary Utility
00016.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Minnehaha (53rd to 54th)	192,000	2018	Sanitary Bonds Sanitary Utility
00016.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Minnehaha (53rd to 54th)	17,000	2018	Sanitary Bonds Sanitary Utility
00017.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Lyndale Avenue S and 58th Street	88,000	2018	Sanitary Bonds Sanitary Utility
00017.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Lyndale Avenue S and 58th Street	37,000	2018	Sanitary Bonds Sanitary Utility
00018.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Solomon Park	330,000	2018	Sanitary Bonds Sanitary Utility
00018.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Solomon Park	5,000	2018	Sanitary Bonds Sanitary Utility
00019.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	34th Avenue S (56th to 58th)	120,000	2018	Sanitary Bonds Sanitary Utility
00019.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	34th Avenue S (56th to 58th)	800,000	2019	Sanitary Bonds Sanitary Utility
00021.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Irving Sewer	TBD	2019	Sanitary Bonds Sanitary Utility
00021.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Irving Sewer	TBD	2020	Sanitary Bonds Sanitary Utility
00022.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	2nd Avenue N	TBD	2019	Sanitary Bonds Sanitary Utility
00022.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	2nd Avenue N	1,000,000	2019	Sanitary Bonds Sanitary Utility
00023.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Hennepin Avenue S Downtown	500,000	2019	Sanitary Bonds Sanitary Utility

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
00023.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Hennepin Avenue S Downtown	4,250,000	2019	Sanitary Bonds Sanitary Utility
00023.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Hennepin Avenue S Downtown	4,250,000	2020	Sanitary Bonds Sanitary Utility
00024.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	BLRT Sanitary	TBD	2019	Sanitary Bonds Sanitary Utility
00024.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	BLRT Sanitary	TBD	2020	Sanitary Bonds Sanitary Utility
00026.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Glenwood Avenue Sanitary	90,000	2018	Sanitary Bonds Sanitary Utility
00026.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Glenwood Avenue Sanitary County	TBD	2020	Sanitary Bonds Sanitary Utility
00027.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	2nd Street N and Plymouth Avenue N Sanitary	265,000	2018	Sanitary Bonds Sanitary Utility
00027.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	2nd Street N Sanitary	6,000,000	2020	Sanitary Bonds Sanitary Utility
00027.3	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Plymouth Avenue N Sanitary	100,000	2018	Sanitary Bonds Sanitary Utility
00027.4	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Plymouth Avenue N Sanitary	500,000	2019	Sanitary Bonds Sanitary Utility
00028.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Hennepin Avenue S at 33rd – Construction	70,000	2018	Sanitary Bonds Sanitary Utility
00028.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Hennepin Avenue S at 33rd – Inspection	10,000	2018	Sanitary Bonds Sanitary Utility
00029.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	East River Road Sanitary	TBD	2019	Sanitary Bonds Sanitary Utility
00029.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	East River Road Sanitary	TBD	2020	Sanitary Bonds Sanitary Utility
00030.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Lake Harriet Parkway	TBD	2019	Sanitary Bonds Sanitary Utility
00030.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Lake Harriet Parkway	TBD	2020	Sanitary Bonds Sanitary Utility
00031.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	42nd	TBD	2019	Sanitary Bonds Sanitary Utility
00031.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	42nd	TBD	2020	Sanitary Bonds Sanitary Utility
00032.2	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Wenonah West Design 2	60,000	2019	Sanitary Bonds Sanitary Utility

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
00036.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	Misc. Paving Project Sanitary Repairs	100,000	2018	Sanitary Bonds Sanitary Utility
00037.1	Sanitary Sewer Repair and Rehabilitation – Design and Construction	42nd and 19th	7,500	2018	Sanitary Bonds Sanitary Utility
Implementation of Environmental Protection Agency Stormwater Regulations					
Structural and Water Quality Improvement Projects Necessary for Total Maximum Daily Load Compliance			**250,000 per year**	**Ongoing**	**SW Utility**
Restoration and Stabilization of Historic Bassett Creek Channel	Stream Restoration within Bassett Creek Watershed	Provide erosion control and restoration within the Bassett Creek stream channel.	500,000	2022	SW Utility BCWMC
Bryn Mawr Meadows	Water Quality Improvement Project within Bassett Creek Watershed	Install water quality and volume reduction BMPs.	500,000	2020 to 2021	SW Utility BCWMC
Bassett Creek Park Water Quality Improvement Project	Water Quality Improvement Project within Bassett Creek Watershed	Install water quality and volume reduction BMPs.	500,000	2024	SW Utility BCWMC
Dredging of Accumulated Sediment in Main Stem Bassett Creek just North of Highway 55, Wirth Park	Water Quality Improvement Project within Bassett Creek Watershed	Install water quality and volume reduction BMPs.	400,000	2021	SW Utility BCWMC
Minnehaha Parkway Stormwater Management	Water Quality Improvement Project within Minnehaha Creek Watershed	Install water quality and volume reduction BMPs.	1,400,000	2020 to 2021	SW Utility MCWD
Stormwater Volume and Pollutant Load Reduction	Water Quality Improvement Project within Minnehaha Creek Watershed	Install water quality and volume reduction BMPs.	500,000	2018 to 2027	SW Utility MCWD Grants
Restoration of Eroded Riverbank Sites	River Restoration within Mississippi River Corridor	Reduce bank erosion, improve water quality and habitat along the Mississippi River.	1,000,000	2018 to 2021	MWMO
Greening within the Public Right-of-Way/8th Street Green Infrastructure Pilot	Water Quality Improvement Project within Mississippi River Watershed	8th Street road reconstruction. Addition of urban greening and green stormwater infrastructure.	1,000,000	2018 to 2019	SW Utility MWMO
Northeast Green Campus Water Quality Improvements	Water Quality Improvement Project within Mississippi River Watershed	Parking lot improvements and innovative stormwater management.	200,000	2018 to 2020	MWMO
Prospect North Partnership Water Quality Improvements	Water Quality Improvement Project within Mississippi River Watershed	Bridal Veil Creek subwatershed.	3,500,000	2018 to 2019	MWMO
Scherer Park	Water Quality, Water Conservation, and Habitat Improvements within Mississippi River Watershed	Shoreline restoration and the development of wetlands, biohavens, and a riverine island.	1,500,000	2018 to 2019	MWMO
Old Bassett Creek Tunnel	Water Quality and Water Conservation Improvements	Structural repairs and modifications to the Old Bassett Creek Tunnel, including the addition of access shafts to facilitate future removal of sediment.	2,000,000	2018 to 2020	SW Utility MWMO

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
Water Works Park	Water Quality and Green Infrastructure Project	West bank of the Mississippi River just north of the Stone Arch Bridge. Installation of green infrastructure practices and a stormwater reuse system.	900,000	2018 to 2019	MWMO MPRB
Upper Harbor Terminal	Site and District-Scale Water Quality Improvements	Provide water quality treatment, improve ecosystem services, provide band and shoreline habitat restoration.	600,000	2019 to 2020	MWMO
Shingle Creek Restoration	Stream Restoration within Shingle Creek Watershed	Provide stream corridor improvements on Shingle Creek within Webber Park.	500,000	2019	SW Utility SCWMC
Shingle Creek Restoration	Stream Restoration within Shingle Creek Watershed	Provide stream corridor improvements on Shingle Creek along Lower Reach 7; USGS station at Queen Avenue to Webber Park.	500,000	TBD	SW Utility SCWMC
10-100	Water Quality Improvement	1825 acre pipeshed draining to Mississippi River.	11,310,000	TBD	SW Utility WMO Partners Grants
10-450	Water Quality Improvement	1021 acre pipeshed draining to Mississippi River.	15,640,000	TBD	SW Utility WMO Partners Grants
10-460	Water Quality Improvement	889 acre pipeshed draining to Mississippi River.	10,960,000	TBD	SW Utility WMO Partners Grants
54-100	Water Quality Improvement	1461 acre pipeshed draining to Lake Calhoun/Bde Maka Ska.	5,500,000	TBD	SW Utility WMO Partners Grants
10-295	Water Quality Improvement	851 acre pipeshed draining to Mississippi River.	13,390,000	TBD	SW Utility WMO Partners Grants
10-720	Water Quality Improvement	1239 acre pipeshed draining to Mississippi River.	10,590,000	TBD	SW Utility WMO Partners Grants
10-560	Water Quality Improvement	1021 acre pipeshed draining to Mississippi River.	4,220,000	TBD	SW Utility WMO Partners Grants
10-410	Water Quality Improvement	350 acre pipeshed draining to Mississippi River.	14,140,000	TBD	SW Utility WMO Partners Grants
52-100	Water Quality Improvement	1667 acre pipeshed draining to Cedar Lake.	450,000	TBD	SW Utility WMO Partners Grants

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
76-010	Water Quality Improvement	920 acre pipeshed draining to Lake Hiawatha.	8,840,000	TBD	SW Utility WMO Partners Grants
10-500	Water Quality Improvement	637 acre pipeshed draining to Mississippi River.	9,940,000	TBD	SW Utility WMO Partners Grants
10-680	Water Quality Improvement	667 acre pipeshed draining to Mississippi River.	9,000,000	TBD	SW Utility WMO Partners Grants
40-010	Water Quality Improvement	716 acre pipeshed draining to Bassett Creek.	6,570,000	TBD	SW Utility WMO Partners Grants
73-020	Water Quality Improvement	1152 acre pipeshed draining to Taft Lake.	1,700,000	TBD	SW Utility WMO Partners Grants
10-320	Water Quality Improvement	394 acre pipeshed draining to Mississippi River.	4,410,000	TBD	SW Utility WMO Partners Grants
10-130	Water Quality Improvement	332 acre pipeshed draining to Mississippi River.	3,480,000	TBD	SW Utility WMO Partners Grants
Mississippi River Direct	Water Quality Improvement	577 are pipeshed draining directly to Mississippi River.	880,000	TBD	SW Utility WMO Partners Grants
10-420	Water Quality Improvement	193 acre pipeshed draining to Mississippi River.	5,310,000	TBD	SW Utility WMO Partners Grants
54-080	Water Quality Improvement	954 acre pipeshed draining to Lake Calhoun/Bde Maka Ska.	2,950,000	TBD	SW Utility WMO Partners Grants
51-030	Water Quality Improvement	376 acre pipeshed draining to Brownie Lake.	970,000	TBD	SW Utility WMO Partners Grants
57-100 (A)	Water Quality Improvement	363 acre pipeshed draining to Lake Harriet.	3,540,000	TBD	SW Utility WMO Partners Grants
10-530	Water Quality Improvement	268 acre pipeshed draining to Mississippi River.	2,800,000	TBD	SW Utility WMO Partners Grants

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
10-250	Water Quality Improvement	245 acre pipeshed draining to Mississippi River.	3,200,000	TBD	SW Utility WMO Partners Grants
10-180	Water Quality Improvement	276 acre pipeshed draining to Mississippi River.	2,900,000	TBD	SW Utility WMO Partners Grants
20-215	Water Quality Improvement	480 acre pipeshed draining to Shingle Creek.	2,670,000	TBD	SW Utility WMO Partners Grants
54-040	Water Quality Improvement	233 acre pipeshed draining to Lake Calhoun/Bde Maka Ska.	3,720,000	TBD	SW Utility WMO Partners Grants
71-070 (A)	Water Quality Improvement	273 acre pipeshed draining to Diamond Lake.	3,280,000	TBD	SW Utility WMO Partners Grants
10-110 (A)	Water Quality Improvement	292 acre pipeshed draining to Mississippi River.	3,430,000	TBD	SW Utility WMO Partners Grants
70-055	Water Quality Improvement	380 acre pipeshed draining to Mississippi River.	2,400,000	TBD	SW Utility WMO Partners Grants
10-640	Water Quality Improvement	272 acre pipeshed draining to Mississippi River.	2,930,000	TBD	SW Utility WMO Partners Grants
10-570	Water Quality Improvement	219 acre pipeshed draining to Mississippi River.	2,710,000	TBD	SW Utility WMO Partners Grants
10-230	Water Quality Improvement	231 acre pipeshed draining to Mississippi River.	2,930,000	TBD	SW Utility WMO Partners Grants
10-490	Water Quality Improvement	139 acre pipeshed draining to Mississippi River.	2,500,000	TBD	SW Utility WMO Partners Grants
10-240	Water Quality Improvement	115 acre pipeshed draining to Mississippi River.	3,170,000	TBD	SW Utility WMO Partners Grants
53-160	Water Quality Improvement	193 acre pipeshed draining to Lake of the Isles.	2,460,000	TBD	SW Utility WMO Partners Grants

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
70-330	Water Quality Improvement	263 acre pipeshed draining to Minnehaha Creek.	2,520,000	TBD	SW Utility WMO Partners Grants
10-660	Water Quality Improvement	298 acre pipeshed draining to Mississippi River.	2,310,000	TBD	SW Utility WMO Partners Grants
10-170	Water Quality Improvement	168 acre pipeshed draining to Mississippi River.	2,200,000	TBD	SW Utility WMO Partners Grants
10-120 (b)	Water Quality Improvement	257 acre pipeshed draining to Mississippi River.	2,350,000	TBD	SW Utility WMO Partners Grants
54-140 (A)	Water Quality Improvement	159 acre pipeshed draining to Lake Calhoun/Bde Maka Ska.	1,070,000	TBD	SW Utility WMO Partners Grants
40-140	Water Quality Improvement	250 acre pipeshed draining to Bassett Creek.	1,880,000	TBD	SW Utility WMO Partners Grants
10-565	Water Quality Improvement	153 acre pipeshed draining to Mississippi River.	2,830,000	TBD	SW Utility WMO Partners Grants
10-150	Water Quality Improvement	148 acre pipeshed draining to Mississippi River.	1,960,000	TBD	SW Utility WMO Partners Grants
20-210 (A)	Water Quality Improvement	285 acre pipeshed draining to Shingle Creek.	1,280,000	TBD	SW Utility WMO Partners Grants
10-700	Water Quality Improvement	214 acre pipeshed draining to Mississippi River.	1,930,000	TBD	SW Utility WMO Partners Grants
63-010	Water Quality Improvement based on Total Maximum Daily Load	515 acre pipeshed draining to Crystal Lake.	5,530,000	TBD	SW Utility WMO Partners Grants
72-020	Water Quality Improvement based on Total Maximum Daily Load	21 acre pipeshed draining to Lake Nokomis.	270,000	TBD	SW Utility WMO Partners Grants
72-040 (A)	Water Quality Improvement based on Total Maximum Daily Load	149 acre pipeshed draining to Lake Nokomis.	1,980,000	TBD	SW Utility WMO Partners Grants

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
72-055 (B) PB	Water Quality Improvement based on Total Maximum Daily Load	114 acre pipeshed draining to Lake Nokomis.	970,000	TBD	SW Utility WMO Partners Grants
72-090	Water Quality Improvement based on Total Maximum Daily Load	136 acre pipeshed draining to Lake Nokomis.	920,000	TBD	SW Utility WMO Partners Grants
72-115 (A) PB	Water Quality Improvement based on Total Maximum Daily Load	149 acre pipeshed draining to Lake Nokomis.	1,360,000	TBD	SW Utility WMO Partners Grants
72-125 PB	Water Quality Improvement based on Total Maximum Daily Load	79 acre pipeshed draining to Lake Nokomis.	890,000	TBD	SW Utility WMO Partners Grants
73-010	Water Quality Improvement based on Total Maximum Daily Load	54 acre pipeshed draining to Taft Lake.	610,000	TBD	SW Utility WMO Partners Grants
76-005 (A)	Water Quality Improvement based on Total Maximum Daily Load	196 acre pipeshed draining to Lake Hiawatha.	610,000	TBD	SW Utility WMO Partners Grants
76-020	Water Quality Improvement based on Total Maximum Daily Load	88 acre pipeshed draining to Lake Hiawatha.	1,220,000	TBD	SW Utility WMO Partners Grants
76-030	Water Quality Improvement based on Total Maximum Daily Load	8 acre pipeshed draining to Lake Hiawatha.	110,000	TBD	SW Utility WMO Partners Grants
76-040	Water Quality Improvement based on Total Maximum Daily Load	3 acre pipeshed draining to Lake Hiawatha.	70,000	TBD	SW Utility WMO Partners Grants
76-050	Water Quality Improvement based on Total Maximum Daily Load	1 acre pipeshed draining to Lake Hiawatha.	40,000	TBD	SW Utility WMO Partners Grants
Combined Sewer Overflow Improvements					
Work towards separations of the sanitary and storm sewer systems where feasible and cost-effective.			**1,500,000 per year**	**Ongoing**	**SW Utility**
180	Sewer Separation Project	29th Avenue S and Franklin Avenue E	136,000	2018	SW Utility
176	Sewer Separation Project	10th Avenue N and 5th Street N	145,000	2018	SW Utility
177	Sewer Separation Project	10th Avenue N and 8th Avenue N	210,000	2018	SW Utility
001	Sewer Separation Project	22nd Avenue N and 2nd Street N	692,500	2019	SW Utility
117	Sewer Separation Project	2nd Street N and 23rd Avenue N	825,000	2019	SW Utility

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
188	Sewer Separation Project	8th Street S and Park Avenue	180,000	2019	SW Utility
189	Sewer Separation Project	8th Street S and Park Avenue	202,500	2019	SW Utility
095	Sewer Separation Project	Alley north of 33rd Avenue N and east of Tyler Street NE	375,000	2020	SW Utility
108	Sewer Separation Project	Polk Street NE and 36th Avenue NE	960,000	2020	SW Utility
154	Sewer Separation Project	Coolidge Street NE and 19th Avenue NE	377,500	2020	SW Utility
195	Sewer Separation Project	Coolidge Street NE and 22nd Avenue NE	277,500	2020	SW Utility
138	Sewer Separation Project	Xerxes Avenue N and Lowry Avenue N	117,500	2021	SW Utility
139	Sewer Separation Project	Washburn Avenue N and Osseo Road	190,000	2021	SW Utility
158	Sewer Separation Project	24th Avenue S and 54½ Street E	52,500	2021	SW Utility
153	Sewer Separation Project	Alley south of 29th Street W and east of Colfax Avenue S	500,000	2021	SW Utility
164	Sewer Separation Project	Alley south of Spring Street NE and east of Madison Street NE	337,500	2021	SW Utility
149	Sewer Separation Project	Bryant Avenue S and 40th Street W	312,500	2021	SW Utility
165	Sewer Separation Project	South of I-94 and 1st Avenue S	307,500	2021	SW Utility
181	Sewer Separation Project	50th Street W and Aldrich Avenue S	127,500	2022	SW Utility
187	Sewer Separation Project	14th Avenue NE and Van Buren Street NE	672,500	2022	SW Utility
193	Sewer Separation Project	Main Street NE and 4th Avenue NE	352,500	2022	SW Utility
194	Sewer Separation Project	Marshall Street NE and 16th Avenue NE	430,000	2022	SW Utility
151	Sewer Separation Project	38th Street W and Dupont Avenue S	75,000	2023	SW Utility
191	Sewer Separation Project	51st Street E and 40th Avenue S	100,000	2023	SW Utility
163	Sewer Separation Project	Hennepin Avenue and Franklin Avenue W	57,500	2023	SW Utility
042	Sewer Separation Project	Stevens Avenue and Lake Street E	922,500	TBD	SW Utility
055	Sewer Separation Project	Alley west of Cedar Avenue and south of 47th Street E	612,500	TBD	SW Utility
069	Sewer Separation Project	Alley west of Pillsbury and north of 43rd Street W	572,500	TBD	SW Utility
086	Sewer Separation Project	Alley east of Grand Avenue and north of 42nd Street W	622,500	TBD	SW Utility
088	Sewer Separation Project	Alley west of Harriet Avenue and south of 46th Street W	535,000	TBD	SW Utility
089	Sewer Separation Project	Alley west of Garfield Avenue and north of 46th Street W	557,500	TBD	SW Utility

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
109	Sewer Separation Project	Alley east of Pillsbury Avenue and south of 43rd Street W	542,500	TBD	SW Utility
121	Sewer Separation Project	Alley north of W 38th Street and east of Blaisdell Avenue S	857,500	TBD	SW Utility
133	Sewer Separation Project	Stevens Avenue S and 35th Street E	190,000	TBD	SW Utility
150	Sewer Separation Project	Stevens Avenue and 32nd Street E	232,500	TBD	SW Utility
172	Sewer Separation Project	33rd Avenue N and Irving Avenue N	580,000	TBD	SW Utility
183	Sewer Separation Project	Alley south of 47th Street W and west of Wentworth Avenue S	665,000	TBD	SW Utility
184	Sewer Separation Project	4th Avenue S and 36th Street E	367,500	TBD	SW Utility
186	Sewer Separation Project	17th Street E and 11th Avenue S	282,500	TBD	SW Utility
192	Sewer Separation Project	Monroe Street NE and 19th Avenue NE	417,500	TBD	SW Utility
Storm Drains and Tunnels Rehabilitation Program					
Repair and rehabilitate the condition and/or capacity of the storm drain and tunnel systems.			**6,000,000 per year**	**Ongoing**	**SW Bonds SW Utility**
00001.1	Storm Sewer Repair and Rehabilitation Project	Hoyer Heights	250,000	2018	SW Bonds SW Utility
00001.2	Storm Sewer Repair and Rehabilitation Project	Hoyer Heights	250,000	2019	SW Bonds SW Utility
00002.1	Storm Sewer Repair and Rehabilitation Project	61st Street W	300,000	2018	SW Bonds SW Utility
00003.1	Storm Sewer Repair and Rehabilitation Project	Mid-City Industrial (inc FA58)	186,000	2018	SW Bonds SW Utility
00004.1	Storm Sewer Repair and Rehabilitation Project	34th Avenue S	45,000	2018	SW Bonds SW Utility
00005.1	Storm Sewer Repair and Rehabilitation Project	Cedar/Longfellow Alley Drain	150,000	2018	SW Bonds SW Utility
00005.2	Storm Sewer Repair and Rehabilitation Project	Cedar/Longfellow Alley Drain	150,000	2018	SW Bonds SW Utility
00006.1	Storm Sewer Repair and Rehabilitation Project	Lyndale Outfall	160,000	2018	SW Bonds SW Utility
00006.2	Storm Sewer Repair and Rehabilitation Project	Lyndale Outfall	565,000	2018	SW Bonds SW Utility
00008.1	Storm Sewer Repair and Rehabilitation Project	Central City Tunnel Rehabilitation	650,000	2018	SW Bonds SW Utility

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
00008.2	Storm Sewer Repair and Rehabilitation Project	Central City Tunnel Rehabilitation	650,000	2019	SW Bonds SW Utility
00009.1	Storm Sewer Repair and Rehabilitation Project	Phillips Tunnel Shaft	TBD	2018	SW Bonds SW Utility
00009.2	Storm Sewer Repair and Rehabilitation Project	Phillips Tunnel Shaft	80,000	2018	SW Bonds SW Utility
00010.1	Storm Sewer Repair and Rehabilitation Project	10th Avenue Tunnel Phase 5	165,000	2018	SW Bonds SW Utility
00010.2	Storm Sewer Repair and Rehabilitation Project	10th Avenue Tunnel Phase 5	2,900,000	2018	SW Bonds SW Utility
00011.1	Storm Sewer Repair and Rehabilitation Project	Glenwood Avenue Storm	200,000	2018	SW Bonds SW Utility
00012.1	Storm Sewer Repair and Rehabilitation Project	11th Avenue Outfall	50,000	2018	SW Bonds SW Utility
00013.1	Storm Sewer Repair and Rehabilitation Project	SCADA Construction	385,000	2018	SW Bonds SW Utility
00014.1	Storm Sewer Repair and Rehabilitation Project	Como Tunnel Drill Hole Design	65,400	2018	SW Bonds SW Utility
00017.2	Storm Sewer Repair and Rehabilitation Project	Pump Station Construction Phase I	120,000	TBD	SW Bonds SW Utility
00017.3	Storm Sewer Repair and Rehabilitation Project	Pump Station Construction Phase II	1,100,000	TBD	SW Bonds SW Utility
00018.2	Storm Sewer Repair and Rehabilitation Project	Pump Station Inspection	180,000	TBD	SW Bonds SW Utility
00020.1	Storm Sewer Repair and Rehabilitation Project	SCADA Construction Inspection	175,000	TBD	SW Bonds SW Utility
00021.1	Storm Sewer Repair and Rehabilitation Project	Storm Alley – 34th/35th and Oliver/Newton	TBD	2018	SW Bonds SW Utility
00021.2	Storm Sewer Repair and Rehabilitation Project	Storm Alley – 34th/35th and Oliver/Newton	TBD	2019	SW Bonds SW Utility
00022.1	Storm Sewer Repair and Rehabilitation Project	Storm Alley – 14th Avenue N – Upton Avenue N and Thomas Avenue N	TBD	2018	SW Bonds SW Utility
00022.2	Storm Sewer Repair and Rehabilitation Project	Storm Alley – 14th Avenue N – Upton Avenue N and Thomas Avenue N	TBD	2019	SW Bonds SW Utility

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
00023.1	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between Washburn Avenue N and Vincent Avenue N, north of Lowry Avenue	TBD	2018	SW Bonds SW Utility
00023.2	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between Washburn Avenue N and Vincent Avenue N, north of Lowry Avenue	TBD	2019	SW Bonds SW Utility
00024.1	Storm Sewer Repair and Rehabilitation Project	Storm Alley – 43rd Street E, west of the intersection with 39th Avenue S	TBD	2018	SW Bonds SW Utility
00024.2	Storm Sewer Repair and Rehabilitation Project	Storm Alley – 43rd Street E, west of the intersection with 39th Avenue S	TBD	2019	SW Bonds SW Utility
00025.1	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between 40th Avenue S and 41st Avenue S, south of 40th Street E	TBD	2018	SW Bonds SW Utility
00025.2	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between 40th Avenue S and 41st Avenue S, south of 40th Street E	TBD	2019	SW Bonds SW Utility
00026.1	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between 40th Avenue S and 41st Avenue S, south of 43rd Street E	TBD	2018	SW Bonds SW Utility
00026.2	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between 40th Avenue S and 41st Avenue S, south of 43rd Street E	TBD	2019	SW Bonds SW Utility
00027.1	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between Snelling Avenue and Minnehaha Avenue, south of 44th Street E	TBD	2018	SW Bonds SW Utility
00027.2	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between Snelling Avenue and Minnehaha Avenue, south of 44th Street E	TBD	2019	SW Bonds SW Utility
00028.1	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between 41st Avenue S and 42nd Avenue S, north of 33rd Street E	TBD	2018	SW Bonds SW Utility
00028.2	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between 41st Avenue S and 42nd Avenue S, north of 33rd Street E	TBD	2019	SW Bonds SW Utility
00029.1	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between Irving Avenue S and James Avenue S, south of 53rd Street W	TBD	2018	SW Bonds SW Utility
00029.2	Storm Sewer Repair and Rehabilitation Project	Storm Alley – Between Irving Avenue S and James Avenue S, south of 53rd Street W	TBD	2019	SW Bonds SW Utility
I-35W Storm Tunnel Reconstruction					
Reconstruct and/or expand the I-35W tunnel systems to provide additional capacity.			**9000,000,000**	**2023 to 2025**	**SW Bonds SW Utility State Funding**
Flood Mitigation with Alternative Stormwater Management					

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
Address localized flooding and drainage problems while looking at volume, pollutant loads, and rate controls			**5,000,000 per year**	**Ongoing**	**SW Bonds SW Utility WMO Partners Grants MPRB**
Southwest Harriet Flood Mitigation – includes FA 29-30	Flood Mitigation Program	Provide flood mitigation and water quality treatment as possible.	72,000,000	Prioritized through Flood Mitigation Program	SW Utility MCWD Grants
Hiawatha Golf Course Restoration	Flood Mitigation Program	Provide flood mitigation and water quality treatment as possible.	1,940,000	2020 to 2021	SW Utility MPRB MCWD Grants
1 NE Watershed Phase I Improvements	Flood Mitigation Program	Provide flood mitigation and water quality treatment as possible.	16,000,000	2019 to 2023	SW Utility MWMO Grants SW Bonds
13th and 2nd NE	Flood Mitigation Program	Provide flood mitigation and water quality treatment as possible.	TBD	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 58 – Mid-City Pond	Flood Mitigation Program	Provide flood mitigation and water quality treatment as possible.	2,905,000	2018	SW Bonds SW Utility
FA 05- 35th Avenue N to Dowling/Washburn to Morgan	Flood Mitigation Program	Provide a new storm drain from 35th Avenue N and Vincent to Crystal Lake in Robbinsdale.	32,000,000 to 64,000,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants SCWMC
FA 06 – 30th Avenue N to 33rd/Dupont to Irving Avenue N	Flood Mitigation Program	Project substantially completed. One connection remains to be made at 33rd Avenue N.	TBD	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 08 – 3rd Street N and 23rd Avenue N	Flood Mitigation Program	Updated storm drain between 22nd Avenue N and 25th Avenue N	1,361,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
FA 13 – Clinton Avenue S, 45th Street E to 46th Street E	Flood Mitigation Program	Upgrade existing storm drains along E 46th Street between Clinton Avenue S and 5th Avenue S and on 5th Avenue S between E 46th Street and E 46th Street	6,275,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MCWD MPRB
FA 14 – E 40th Street, 4th Avenue S to 5th Avenue S	Flood Mitigation Program	Upgrade existing storm drains along E 40th Street between 5th Avenue S and Clinton Avenue S	1,039,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants State Funds
FA 15 – 22nd Street W and Garfield Avenue S	Flood Mitigation Program	Construct new storm drain on both 22nd Street E and along Lyndale Avenue S	7,280,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MnDOT
FA 17 – 43rd Street W and Wentworth Avenue S	Flood Mitigation Program	Construct relief drains along 43rd Street W, which terminate at the I-35W tunnel.	3,315,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MnDOT
FA 18 – 50th and Wentworth Avenue S	Flood Mitigation Program	Construct relief drains along 47th Street W, Pleasant Avenue S, and Garfield Avenue S which terminates at the I-35W tunnel.	8,791,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MnDOT
FA 21 – Bloomington Holding Pond	Flood Mitigation Program	Construct new storm drain to new flood ponds in Hiawatha Golf Course and new pumps.	4,924,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MCWD MPRB
FA 22 – Sibley Field	Flood Mitigation Program	Construct new storm drain on Longfellow Avenue S and a new inlet structure to Sibley Field.	5,422,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MCWD MPRB
FA 25 – W 45th Street, Nicollet to 1st	Flood Mitigation Program	Install a relief storm drain along 44th Street W and 45th Street W to the I-35W storm tunnel.	2,505,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MnDOT

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
FA 29 and 30 -50th to 51st, Zenith to York Avenue S, 51st Street W and Abbot Avenue S	Flood Mitigation Program	Upgrade existing storm drain to Lake Harriet.	15,975,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 32 – E 49th Street and Stevens Avenue S	Flood Mitigation Program	Construct new outlet to MnDOT system at E 49th Street and Stevens Avenue S.	1,154,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MnDOT
FA 36 – Victory Memorial Parkway and Xerxes Avenue	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 39 – 46th Avenue S, 36th Street E to 37th Street E	Flood Mitigation Program	Upgrade existing storm drains to the Mississippi River when area streets are reconstructed or renovated.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 40 – W 38th Street and Kings Highway	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MPRB
FA 41 – 27th Avenue NE and Stinson Boulevard	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 42 – 10th Avenue S and E 27th Street (Abbott Hospital)	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MPRB
FA 44 – 29th Avenue NE and Tyler Street NE	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	2,585,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 45 – W 33rd Street and Girard Avenue S	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	2,585,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 47 – W 22nd Street and Emerson Avenue S	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
FA 48 – 2nd Street NW and Lowry Avenue NE	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	4,707,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 49 – 32nd Avenue NE and Garfield	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	2,585,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 50 – 3542 Polk Street NE and 3547 Tyler Street NE Alley	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	2,585,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 51 – 34th Avenue NE and Central Avenue NE	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	2,585,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 52 – 35th Avenue NE and 5th Street NE	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	2,585,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 53 – 27th Avenue NE and Randolph Street NE	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	2,585,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 54 – Shoreham Yards (Lake Sandy)	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	2,585,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 55 – 16xx Lyn-Park Avenue N	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 56 – 56xx Xerxes Avenue S	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 57 – 44xx Chowen Avenue S	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
FA 58 – Summer Street NE and McKinley Place	Flood Mitigation Program	New storm sewer has been installed. Certify the status of this area and update its status in the project file.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 59 – Lyndale Avenue S, 26th Street E to 27th Street E	Flood Mitigation Program	CSO and alley flooding issue. Needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 60 – 2129 Emerson Avenue S	Flood Mitigation Program	Intersection is low point. Needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 61 – E 40th Street, Van Nest to I-35W	Flood Mitigation Program	Identified during I-35W Tunnel Study.	2,020,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants MnDOT
FA 62 – 6th Avenue SE at 7th Street SE	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 63 – 28th Avenue S and Humboldt Avenue S	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
FA 64 – 2900 Upton, part of Logan Pond watershed	Flood Mitigation Program	See Figure 6.6 – Historically Identified Flood Project Areas for project location – needs detailed Hydrologic and Hydraulic Analysis.	6,102,000	Prioritized through Flood Mitigation Program	SW Bonds SW Utility Grants
Central City Parallel Storm Tunnel					
Design and construction of a new tunnel in the Central City area to address increases in the rate and volume of stormwater in downtown tunnels.			**33,000,000**	**2020 to 2022**	**SW Bonds** **SW Utility** **State Funds** **Grants**
Central City Parallel Tunnel	Stormwater tunnel design and construction project.	Design	641,000	2018	SW Bonds SW Utility
Central City Parallel Tunnel	Stormwater tunnel design and construction project.	Design	1,000,000	2018	SW Bonds SW Utility

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
Central City Parallel Tunnel	Stormwater tunnel design and construction project.	Construction	9,500,000	2020	SW Bonds SW Utility State Funds Grants
Central City Parallel Tunnel	Stormwater tunnel design and construction project.	Construction	9,500,000	2021	SW Bonds SW Utility State Funds Grants
Central City Parallel Tunnel	Stormwater tunnel design and construction project.	Construction	9,500,000	2022	SW Bonds SW Utility State Funds Grants
Reimbursable Storm Drain Construction					
Stormwater Utility upgrades needed as part of street reconstruction projects. Cost estimate is for total reconstruction.			**2,000,000 per year**	**Ongoing**	**SW Bonds** **SW Utility** **Assessment Bonds** **Net Debt Bonds** **MSA**
PV054	Street Reconstruction	8th Street S, Hennepin Avenue to Chicago Avenue.	18,474,000	2019	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV095	Street Reconstruction	4th Street N and S, 2nd Avenue N to 4th Avenue S.	14,220,000	2019	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV125	Street Reconstruction	33rd Street E and 35th Street E, Hiawatha to Minnehaha and Railroad Tracks to Dwight Avenue.	2,840,000	2019	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
PV135	Street Reconstruction	North Loop Paving.	9,365,000	2019	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV118	Street Reconstruction	Hennepin Avenue, Washington Avenue to 12th Street S.	22,960,000	2020	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV139	Street Reconstruction	18th Avenue NE, Johnson to Stinson.	4,965,000	2020	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV147	Street Reconstruction	Girard Avenue S, Lake to Lagoon.	1,295,000	2020	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV141	Street Reconstruction	Grand Avenue S, Lake to 48th.	14,575,000	2021	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV113	Street Reconstruction	29th Street W, Phase II.	2,115,000	2021	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV142	Street Reconstruction	Downtown East Paving.	3,120,000	2021	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
PV137	Street Reconstruction	29th Avenue NE, Central to Stinson.	8,575,000	2021	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV152	Street Reconstruction	Plymouth Avenue, Washburn to Penn.	5,440,000	2021	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV156	Street Reconstruction	Johnson Street NE, 18th Avenue NE to Lowry Avenue NE.	4,499,000	2021	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV122	Street Reconstruction	Dowling Avenue N, I-94 to 1st Street N.	3,340,000	2022	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV123	Street Reconstruction	Logan Park Commercial.	6,650,000	2022	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV143	Street Reconstruction	North Industrial.	5,640,000	2022	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV154	Street Reconstruction	Franklin Avenue, Hennepin to Lyndale.	2,055,000	2022	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
PV146	Street Reconstruction	9th Street SE, 6th Avenue SE to 9th Avenue SE.	2,460,000	2022	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV092	Street Reconstruction	Technology Drive, 37th Avenue NE to Marshall Street NE.	1,025,000	2022	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV138	Street Reconstruction	26th Street E, 29th Avenue S to Minnehaha Avenue.	4,510,000	2022	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV140	Street Reconstruction	13th Avenue NE, Sibley Street NE to Washington Street NE.	7,575,000	2022	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV150	Street Reconstruction	1st Avenue N, Washington Avenue to 10th Street N.	12,135,000	2023	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV126	Street Reconstruction	Bryant Avenue S, Lake Street W to 50th Street W.	18,390,00	2023	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV127	Street Reconstruction	37th Avenue NE, Central to Stinson.	10,240,000	2023	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA

Project Name/Location	Description	Proposed Improvement	Cost Estimate ($)	Proposed Year	Funding Source
PV158	Street Reconstruction	Hennepin Avenue, Lake Street to Douglas Avenue.	18,585,000	2023	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV153	Street Reconstruction	Sunrise/60th/58th, Xerxes to Aldrich.	11,025,000	2024	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV132	Street Reconstruction	1st/Marquette, 12th Street S to Lake Street E.	14,555,000	2024	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV149	Street Reconstruction	4th Avenue S, 3rd Street S to 10th Street S.	9,905,000	2024	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV151	Street Reconstruction	4th Street NE, Broadway to Lowry.	6,010,000	2024	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
PV157	Street Reconstruction	33rd Avenue NE, Central Avenue to Stinson Boulevard NE.	11,250,000	2024	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA
BR117	Street Reconstruction	1st Street N, Bridge over Bassett Creek.	1,380,000	2020	SW Bonds SW Utility Assessment Bonds Net Debt Bonds MSA

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Minneapolis
City of Lakes

Timelines and Annual Costs

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
Part I – Administration and City-Wide Programs and Projects												
Create/Modify City Ordinances	City Staff	City Staff	-	-	-	-	-	-	-	-	-	-
Capital Improvement Program Updates	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
WRMP Amendments	As Required	As Required	As Required	As Required	As Required	As Required	As Required	As Required	As Required	As Required	As Required	-
WRMP Update/Revision	-	-	-	-	-	-	-	-	-	150,000	150,000	-
Stormwater Public Education Activities	150,000	150,000	150,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000	-
Public Participation and Involvement	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Illicit Discharges Investigation Program	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Spill Response Program	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Facilities Inspection Program	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Source Control Education and Outreach Program	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Coordinated Staff Training	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Construction Site Stormwater Runoff Control for City Capital Redevelopment	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Construction Site Stormwater Runoff Control for Development/Redevelopment	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Post Construction Stormwater Management	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Post Construction Stormwater Management – Ongoing Compliance	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Review and Approval for Projects Proposing to Modify MS4 System	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Pilot Projects	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	-
City Good Housekeeping	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Street Sweeping and Cleaning Program	9,866,000	9,972,000	10,271,000	10,580,000	10,900,000	11,230,000	11,571,000	11,923,000	12,287,000	12,663,000	13,052,000	-

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
Snow and Ice Control	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Stormwater Monitoring Program	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	-
Annual SWPPP Update and Meeting	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Impaired Waters Tracking and Review	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Retrofit Plan	-	City Staff	City Staff	-	-	-	-	-	-	-	-	-
Flood Mitigation Program H&H Model Development, Feasibility Analysis, and Project Prioritization	2,010,000	1,953,000	1,448,000	1,183,000	1,183,000	160,000	160,000	160,000	160,000	160,000	160,000	-
Ongoing Water Quality Modeling	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	City Staff	-
Sedimentation Pond Maintenance	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	-
Part II – Capital Improvement Projects												
* Refer to the City's Public Works Capital Improvement Projects (CIP) webpage for additional project detail and staff contact information for all projects contained in the adopted 5-year CIP. http://www.ci.minneapolis.mn.us/cip/WCMSP-178520 ** All programs and costs after 2023 are not budgeted in the City's CIP. *** Costs presented are total cost which includes City local costs plus anticipated cost-share and grants by other organizations.												
Infiltration and Inflow Mitigation Program	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	-
Sanitary Tunnel and Sewer Rehabilitation Program												
Overall Program Budget (after 2023, assumed)	16,000,000	16,000,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000	-
00001.2	715,000	-	-	-	-	-	-	-	-	-	-	-
00001.3	10,000	-	-	-	-	-	-	-	-	-	-	-
00002.2	1,748,000	-	-	-	-	-	-	-	-	-	-	-
00002.3	-	1,000,000	-	-	-	-	-	-	-	-	-	-
00002.4	100,000	-	-	-	-	-	-	-	-	-	-	-
00002.5	396,000	-	-	-	-	-	-	-	-	-	-	-
00003.2	267,000	-	-	-	-	-	-	-	-	-	-	-
00004.2	100,000	-	-	-	-	-	-	-	-	-	-	-
00005.2	1,208,000	-	-	-	-	-	-	-	-	-	-	-
00005.3	-	3,000,000	-	-	-	-	-	-	-	-	-	-
00005.4	200,000	-	-	-	-	-	-	-	-	-	-	-

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
00006.3	5,000	-	-	-	-	-	-	-	-	-	-	-
00007.2	308,000	-	-	-	-	-	-	-	-	-	-	-
00008.2	181,000	-	-	-	-	-	-	-	-	-	-	-
00008.3	30,000	-	-	-	-	-	-	-	-	-	-	-
00009.2	65,000	-	-	-	-	-	-	-	-	-	-	-
00010.2	232,000	-	-	-	-	-	-	-	-	-	-	-
00011.2	205,000	-	-	-	-	-	-	-	-	-	-	-
00011.4	178,000	-	-	-	-	-	-	-	-	-	-	-
00011.6	206,000	-	-	-	-	-	-	-	-	-	-	-
00012.2	335,000	-	-	-	-	-	-	-	-	-	-	-
00012.3	3,500	-	-	-	-	-	-	-	-	-	-	-
00013.3	426,000	-	-	-	-	-	-	-	-	-	-	-
00014.2	350,000	-	-	-	-	-	-	-	-	-	-	-
00014.3	10,000	-	-	-	-	-	-	-	-	-	-	-
00015.1	40,000	-	-	-	-	-	-	-	-	-	-	-
00015.2	45,000	-	-	-	-	-	-	-	-	-	-	-
00016.2	192,000	-	-	-	-	-	-	-	-	-	-	-
00016.2	17,000	-	-	-	-	-	-	-	-	-	-	-
00017.2	88,000	-	-	-	-	-	-	-	-	-	-	-
00017.3	37,000	-	-	-	-	-	-	-	-	-	-	-
00018.2	330,000	-	-	-	-	-	-	-	-	-	-	-
00018.3	5,000	-	-	-	-	-	-	-	-	-	-	-
00019.1	120,000	-	-	-	-	-	-	-	-	-	-	-
00019.2	-	800,000	-	-	-	-	-	-	-	-	-	-
00021.1	-	TBD	-	-	-	-	-	-	-	-	-	-
00021.2	-	-	TBD	-	-	-	-	-	-	-	-	-
00022.1	-	TBD	-	-	-	-	-	-	-	-	-	-
00022.2	-	1,000,000	-	-	-	-	-	-	-	-	-	-
00023.1	-	500,000	-	-	-	-	-	-	-	-	-	-
00023.2	-	4,250,000	-	-	-	-	-	-	-	-	-	-
00023.3	-	-	4,250,000	-	-	-	-	-	-	-	-	-
00024.1	-	TBD	-	-	-	-	-	-	-	-	-	-

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
00024.2	-	-	TBD	-	-	-	-	-	-	-	-	-
00026.2	90,000	-	-	-	-	-	-	-	-	-	-	-
00026.3	-	-	TBD	-	-	-	-	-	-	-	-	-
00027.1	265,000	-	-	-	-	-	-	-	-	-	-	-
00027.2	-	-	6,000,000	-	-	-	-	-	-	-	-	-
00027.3	100,000	-	-	-	-	-	-	-	-	-	-	-
00027.4	-	500,000	-	-	-	-	-	-	-	-	-	-
00028.1	70,000	-	-	-	-	-	-	-	-	-	-	-
00028.2	10,000	-	-	-	-	-	-	-	-	-	-	-
00029.1	-	TBD	-	-	-	-	-	-	-	-	-	-
00029.2	-	-	TBD	-	-	-	-	-	-	-	-	-
00030.1	-	TBD	-	-	-	-	-	-	-	-	-	-
00030.2	-	-	TBD	-	-	-	-	-	-	-	-	-
00031.1	-	TBD	-	-	-	-	-	-	-	-	-	-
00031.2	-	-	TBD	-	-	-	-	-	-	-	-	-
00032.2	-	60,000	-	-	-	-	-	-	-	-	-	-
00036.1	100,000	-	-	-	-	-	-	-	-	-	-	-
00037.1	7,500	-	-	-	-	-	-	-	-	-	-	-
Implementation of Environmental Protection Agency Regulations												
Overall Program Budget (after 2023, assumed)	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	-
Restoration and Stabilization of Historic Bassett Creek Channel	-	-	-	-	500,000	-	-	-	-	-	-	-
Bryn Mawr Meadows	-	-	250,000	250,000	-	-	-	-	-	-	-	-
Bassett Creek Park Water Quality Improvement Project	-	-	-	-	-	-	500,000	-	-	-	-	-
Dredging of Accumulated Sediment in Main Stem Bassett Creek just North of Highway 55, Wirth Park	-	-	-	400,000	-	-	-	-	-	-	-	-
Minnehaha Parkway Stormwater Management	-	-	700,000	700,000	-	-	-	-	-	-	-	-
Stormwater Volume and Pollutant Load Reduction	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	-	-

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
Restoration of Eroded Riverbank Sites	250,000	250,000	250,000	250,000	-	-	-	-	-	-	-	-
Greening within the Public Right-of-Way/8th Street Green Infrastructure Pilot	500,000	500,000	-	-	-	-	-	-	-	-	-	-
Northeast Green Campus Water Quality Improvements	66,000	66,000	66,000	-	-	-	-	-	-	-	-	-
Prospect North Partnership Water Quality Improvements	1,750,000	1,750,000	-	-	-	-	-	-	-	-	-	-
Scherer Park	750,000	750,000	-	-	-	-	-	-	-	-	-	-
Old Bassett Creek Tunnel	660,000	660,000	660,000	-	-	-	-	-	-	-	-	-
Water Works Park	450,000	450,000	-	-	-	-	-	-	-	-	-	-
Upper Harbor Terminal	-	300,000	300,000	-	-	-	-	-	-	-	-	-
Shingle Creek Restoration	-	500,000	-	-	-	-	-	-	-	-	-	-
10-100	-	-	-	-	-	-	-	-	-	-	-	11,310,000
10-450	-	-	-	-	-	-	-	-	-	-	-	15,640,000
10-460	-	-	-	-	-	-	-	-	-	-	-	10,960,000
54-100	-	-	-	-	-	-	-	-	-	-	-	5,500,000
10-295	-	-	-	-	-	-	-	-	-	-	-	13,390,000
10-720	-	-	-	-	-	-	-	-	-	-	-	10,590,000
10-560	-	-	-	-	-	-	-	-	-	-	-	4,220,000
10-410	-	-	-	-	-	-	-	-	-	-	-	14,140,000
52-100	-	-	-	-	-	-	-	-	-	-	-	450,000
76-010	-	-	-	-	-	-	-	-	-	-	-	8,840,000
10-500	-	-	-	-	-	-	-	-	-	-	-	9,940,000
10-680	-	-	-	-	-	-	-	-	-	-	-	9,000,000
40-010	-	-	-	-	-	-	-	-	-	-	-	6,570,000
73-020	-	-	-	-	-	-	-	-	-	-	-	1,700,000
10-320	-	-	-	-	-	-	-	-	-	-	-	4,410,000
10-130	-	-	-	-	-	-	-	-	-	-	-	3,480,000
Mississippi River Direct	-	-	-	-	-	-	-	-	-	-	-	880,000
10-420	-	-	-	-	-	-	-	-	-	-	-	5,310,000
54-080	-	-	-	-	-	-	-	-	-	-	-	2,950,000
51-030	-	-	-	-	-	-	-	-	-	-	-	970,000

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
57-100 (A)	-	-	-	-	-	-	-	-	-	-	-	3,540,000
10-530	-	-	-	-	-	-	-	-	-	-	-	2,800,000
10-250	-	-	-	-	-	-	-	-	-	-	-	3,200,000
10-180	-	-	-	-	-	-	-	-	-	-	-	2,900,000
20-215	-	-	-	-	-	-	-	-	-	-	-	2,670,000
54-040	-	-	-	-	-	-	-	-	-	-	-	3,720,000
71-070 (A)	-	-	-	-	-	-	-	-	-	-	-	3,280,000
10-110 (A)	-	-	-	-	-	-	-	-	-	-	-	3,430,000
70-055	-	-	-	-	-	-	-	-	-	-	-	2,400,000
10-640	-	-	-	-	-	-	-	-	-	-	-	2,930,000
10-570	-	-	-	-	-	-	-	-	-	-	-	2,710,000
10-230	-	-	-	-	-	-	-	-	-	-	-	2,930,000
10-490	-	-	-	-	-	-	-	-	-	-	-	2,500,000
10-240	-	-	-	-	-	-	-	-	-	-	-	3,170,000
53-160	-	-	-	-	-	-	-	-	-	-	-	2,460,000
70-330	-	-	-	-	-	-	-	-	-	-	-	2,520,000
10-660	-	-	-	-	-	-	-	-	-	-	-	2,310,000
10-170	-	-	-	-	-	-	-	-	-	-	-	2,200,000
10-120 (b)	-	-	-	-	-	-	-	-	-	-	-	2,350,000
54-140 (A)	-	-	-	-	-	-	-	-	-	-	-	1,070,000
40-140	-	-	-	-	-	-	-	-	-	-	-	1,880,000
10-565	-	-	-	-	-	-	-	-	-	-	-	2,830,000
10-150	-	-	-	-	-	-	-	-	-	-	-	1,960,000
20-210 (A)	-	-	-	-	-	-	-	-	-	-	-	1,280,000
10-700	-	-	-	-	-	-	-	-	-	-	-	1,930,000
63-010	-	-	-	-	-	-	-	-	-	-	-	5,530,000
72-020	-	-	-	-	-	-	-	-	-	-	-	270,000
72-040 (A)	-	-	-	-	-	-	-	-	-	-	-	1,980,000
72-055 (B) PB	-	-	-	-	-	-	-	-	-	-	-	970,000
72-090	-	-	-	-	-	-	-	-	-	-	-	920,000
72-115 (A) PB	-	-	-	-	-	-	-	-	-	-	-	1,360,000
72-125 PB	-	-	-	-	-	-	-	-	-	-	-	890,000

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
73-010	-	-	-	-	-	-	-	-	-	-	-	610,000
76-005 (A)	-	-	-	-	-	-	-	-	-	-	-	601,000
76-020	-	-	-	-	-	-	-	-	-	-	-	1,220,000
76-030	-	-	-	-	-	-	-	-	-	-	-	110,000
76-040	-	-	-	-	-	-	-	-	-	-	-	70,000
76-050	-	-	-	-	-	-	-	-	-	-	-	40,000
Combined Sewer Overflow Improvements												
Overall Program Budget (after 2023, assumed)	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	-
180	136,000	-	-	-	-	-	-	-	-	-	-	-
176	145,000	-	-	-	-	-	-	-	-	-	-	-
177	210,000	-	-	-	-	-	-	-	-	-	-	-
001	-	692,500	-	-	-	-	-	-	-	-	-	-
117	-	825,000	-	-	-	-	-	-	-	-	-	-
188	-	180,000	-	-	-	-	-	-	-	-	-	-
189	-	202,500	-	-	-	-	-	-	-	-	-	-
095	-	-	375,000	-	-	-	-	-	-	-	-	-
108	-	-	960,000	-	-	-	-	-	-	-	-	-
154	-	-	377,500	-	-	-	-	-	-	-	-	-
195	-	-	277,500	-	-	-	-	-	-	-	-	-
138	-	-	-	117,500	-	-	-	-	-	-	-	-
139	-	-	-	190,000	-	-	-	-	-	-	-	-
158	-	-	-	52,500	-	-	-	-	-	-	-	-
153	-	-	-	500,000	-	-	-	-	-	-	-	-
164	-	-	-	337,500	-	-	-	-	-	-	-	-
149	-	-	-	312,500	-	-	-	-	-	-	-	-
165	-	-	-	307,500	-	-	-	-	-	-	-	-
181	-	-	-	-	127,500	-	-	-	-	-	-	-
187	-	-	-	-	672,500	-	-	-	-	-	-	-
193	-	-	-	-	352,500	-	-	-	-	-	-	-
194	-	-	-	-	430,000	-	-	-	-	-	-	-
151	-	-	-	-	-	75,000	-	-	-	-	-	-
191	-	-	-	-	-	100,000	-	-	-	-	-	-

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
163	-	-	-	-	-	57,500	-	-	-	-	-	-
042	-	-	-	-	-	-	-	-	-	-	-	922,500
055	-	-	-	-	-	-	-	-	-	-	-	612,500
069	-	-	-	-	-	-	-	-	-	-	-	572,500
086	-	-	-	-	-	-	-	-	-	-	-	622,500
088	-	-	-	-	-	-	-	-	-	-	-	535,000
089	-	-	-	-	-	-	-	-	-	-	-	557,500
109	-	-	-	-	-	-	-	-	-	-	-	542,500
121	-	-	-	-	-	-	-	-	-	-	-	857,500
133	-	-	-	-	-	-	-	-	-	-	-	190,000
150	-	-	-	-	-	-	-	-	-	-	-	232,500
172	-	-	-	-	-	-	-	-	-	-	-	580,000
183	-	-	-	-	-	-	-	-	-	-	-	665,000
184	-	-	-	-	-	-	-	-	-	-	-	367,500
186	-	-	-	-	-	-	-	-	-	-	-	282,500
192	-	-	-	-	-	-	-	-	-	-	-	417,500
Storm Drains and Tunnels Rehabilitation Program												
Overall Program Budget (after 2023, assumed)	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	-
00001.1	250,000	-	-	-	-	-	-	-	-	-	-	-
00001.2	-	250,000	-	-	-	-	-	-	-	-	-	-
00002.1	300,000	-	-	-	-	-	-	-	-	-	-	-
00003.1	185,740	-	-	-	-	-	-	-	-	-	-	-
00004.1	45,000	-	-	-	-	-	-	-	-	-	-	-
00005.1	150,000	-	-	-	-	-	-	-	-	-	-	-
00005.2	150,000	-	-	-	-	-	-	-	-	-	-	-
00006.1	160,000	-	-	-	-	-	-	-	-	-	-	-
00006.2	565,000	-	-	-	-	-	-	-	-	-	-	-
00008.1	650,000	-	-	-	-	-	-	-	-	-	-	-
00008.2	-	650,000	-	-	-	-	-	-	-	-	-	-
00009.1	TBD	-	-	-	-	-	-	-	-	-	-	-
00009.2	80,000	-	-	-	-	-	-	-	-	-	-	-
00010.1	165,000	-	-	-	-	-	-	-	-	-	-	-

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
00010.2	2,900,000	-	-	-	-	-	-	-	-	-	-	-
00011.1	200,000	-	-	-	-	-	-	-	-	-	-	-
00012.1	50,000	-	-	-	-	-	-	-	-	-	-	-
00013.1	385,122	-	-	-	-	-	-	-	-	-	-	-
00014.1	65,400	-	-	-	-	-	-	-	-	-	-	-
00017.2	-	-	-	-	-	-	-	-	-	-	-	120,000
00017.3	-	-	-	-	-	-	-	-	-	-	-	1,100,000
00018.2	-	-	-	-	-	-	-	-	-	-	-	180,000
00020.1	-	-	-	-	-	-	-	-	-	-	-	175,000
00021.1	TBD	-	-	-	-	-	-	-	-	-	-	-
00021.1	-	TBD	-	-	-	-	-	-	-	-	-	-
00022.1	TBD	-	-	-	-	-	-	-	-	-	-	-
00022.2	-	TBD	-	-	-	-	-	-	-	-	-	-
00023.1	TBD	-	-	-	-	-	-	-	-	-	-	-
00023.2	-	TBD	-	-	-	-	-	-	-	-	-	-
00024.1	TBD	-	-	-	-	-	-	-	-	-	-	-
00024.2	-	TBD	-	-	-	-	-	-	-	-	-	-
00025.1	TBD	-	-	-	-	-	-	-	-	-	-	-
00025.2	-	TBD	-	-	-	-	-	-	-	-	-	-
00026.1	TBD	-	-	-	-	-	-	-	-	-	-	-
00026.2	-	TBD	-	-	-	-	-	-	-	-	-	-
00027.1	TBD	-	-	-	-	-	-	-	-	-	-	-
00027.2	-	TBD	-	-	-	-	-	-	-	-	-	-
00028.1	TBD	-	-	-	-	-	-	-	-	-	-	-
00028.2	-	TBD	-	-	-	-	-	-	-	-	-	-
00029.1	TBD	-	-	-	-	-	-	-	-	-	-	-
00029.2	-	TBD	-	-	-	-	-	-	-	-	-	-
I-35W Storm Tunnel Reconstruction												
Overall Program Budget (after 2023, assumed)	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	-
Southwest Harriet Flood Mitigation – includes FA 29/30	-	-	-	-	-	-	-	-	-	-	-	72,000,000

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
Hiawatha Golf Course Restoration	-	-	970,000	970,000	-	-	-	-	-	-	-	-
1NE Watershed Phase I Improvements	-	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	-	-	-	-	-	-
13th and 2nd NE	-	-	-	-	-	-	-	-	-	-	-	TBD
FA 58 – Mid-City Pond	2,905,000	-	-	-	-	-	-	-	-	-	-	-
FA 05 – 30th Avenue N to Dowling/Washburn to Morgan	-	-	-	-	-	-	-	-	-	-	-	32,000,000 to 64,000,000
FA 06 – 30th Avenue N to 33rd, Dupont to Irving Avenue N	-	-	-	-	-	-	-	-	-	-	-	TBD
FA 08 – 3rd Street N and 23rd Avenue N	-	-	-	-	-	-	-	-	-	-	-	1,360,000
FA 13 – Clinton Avenue S, 45th to 46th Street E	-	-	-	-	-	-	-	-	-	-	-	6,280,000
FA 14 – E 40th Street, 4th to 5th Avenue S	-	-	-	-	-	-	-	-	-	-	-	1,040,000
FA 15 – 22nd Street W and Garfield Avenue S	-	-	-	-	-	-	-	-	-	-	-	7,280,000
FA 17 – 43rd Street W and Wentworth Avenue S	-	-	-	-	-	-	-	-	-	-	-	3,310,000
FA 18 – 50th and Wentworth Avenue S	-	-	-	-	-	-	-	-	-	-	-	8,790,000
FA 21 – Bloomington Holding Pond	-	-	-	-	-	-	-	-	-	-	-	4,920,000
FA 22 – Sibley Field	-	-	-	-	-	-	-	-	-	-	-	5,420,000
FA 25 – W 45th Street, Nicollet to 1st	-	-	-	-	-	-	-	-	-	-	-	2,510,000
FA 29 and 30 – 50th to 51st, Zenith to York Avenue S, 51st Street W and Abbott Avenue S	-	-	-	-	-	-	-	-	-	-	-	15,970,000
FA 32 – E 49th Street and Stevens Avenue S	-	-	-	-	-	-	-	-	-	-	-	1,150,000
FA 36 – Victory Memorial Parkway and Xerxes Avenue	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 39 – 46th Avenue S, 36th to 37th Street E	-	-	-	-	-	-	-	-	-	-	-	6,100,000

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
FA 40 – W 38th Street and Kings Highway	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 41 – 27th Avenue NE and Stinson Boulevard	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 42 – 10th Avenue S and E 27th Street (Abbott Hospital)	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 44 – 29th Avenue NE and Tyler Street NE	-	-	-	-	-	-	-	-	-	-	-	2,580,000
FA 45 – W 33rd Street and Girard Avenue S	-	-	-	-	-	-	-	-	-	-	-	2,580,000
FA 47 – W 22nd Street and Emerson Avenue S	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 48 – 2nd Street NW and Lowry Avenue NE	-	-	-	-	-	-	-	-	-	-	-	4,710,000
FA 49 – 32nd Avenue NE and Garfield	-	-	-	-	-	-	-	-	-	-	-	2,580,000
FA 50 – 3542 Polk Street NE/3547 Tyler Street NE (Alley)	-	-	-	-	-	-	-	-	-	-	-	2,580,000
FA 51 – 34th Avenue NE and Central Avenue NE	-	-	-	-	-	-	-	-	-	-	-	2,580,000
FA 52 – 35th Avenue NE and 5th Street NE	-	-	-	-	-	-	-	-	-	-	-	2,580,000
FA 53 – 27th Avenue NE and Randolph Street NE	-	-	-	-	-	-	-	-	-	-	-	2,580,000
FA 54 – Shoreham Yards (Lake Sandy)	-	-	-	-	-	-	-	-	-	-	-	2,580,000
FA 55 – 16xx Lyn-Park Avenue N	-	-	-	-	-	-	-	-	-	-	-	2,580,000
FA 56 – 56xx Xerxes Avenue S	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 57 – 44xx Chowen Avenue S	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 58 – Summer Street NE and McKinley Place	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 59 – Lyndale Avenue S, 26th to 27th Street E	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 60 – 2129 Emerson Avenue S	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 61 – E 40th Street, Van Nest to I-35W	-	-	-	-	-	-	-	-	-	-	-	2,020,000
FA 62 – 6th Avenue SE at 7th Street SE	-	-	-	-	-	-	-	-	-	-	-	6,100,000

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
FA 63 – 28th and Humboldt Avenue S	-	-	-	-	-	-	-	-	-	-	-	6,100,000
FA 64 – 2900 Upton, part of Logan Pond Watershed	-	-	-	-	-	-	-	-	-	-	-	6,100,000
Central City Parallel Storm Tunnel												
Design	641,420	-	-	-	-	-	-	-	-	-	-	-
Design	-	1,000,000	-	-	-	-	-	-	-	-	-	-
Construction	-	-	9,500,000	-	-	-	-	-	-	-	-	-
Construction	-	-	-	9,500,000	-	-	-	-	-	-	-	-
Construction	-	-	-	-	9,500,000	-	-	-	-	-	-	-
Reimbursable Storm Drain Construction Related to Street Reconstruction (Total Reconstruction Cost Listed)												
Overall Program Budget (after 2023, assumed)	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	-
PV054	-	18,474,000	-	-	-	-	-	-	-	-	-	-
PV095	-	14,220,000	-	-	-	-	-	-	-	-	-	-
PV125	-	2,840,000	-	-	-	-	-	-	-	-	-	-
PV135	-	9,365,000	-	-	-	-	-	-	-	-	-	-
PV118	-	-	22,960,000	-	-	-	-	-	-	-	-	-
PV139	-	-	4,965,000	-	-	-	-	-	-	-	-	-
PV147	-	-	1,295,000	-	-	-	-	-	-	-	-	-
PV141	-	-	-	14,575,000	-	-	-	-	-	-	-	-
PV113	-	-	-	2,115,000	-	-	-	-	-	-	-	-
PV142	-	-	-	3,120,000	-	-	-	-	-	-	-	-
PV137	-	-	-	8,575,000	-	-	-	-	-	-	-	-
PV152	-	-	-	5,440,000	-	-	-	-	-	-	-	-
PV156	-	-	-	4,499,000	-	-	-	-	-	-	-	-
PV122	-	-	-	-	3,340,000	-	-	-	-	-	-	-
PV123	-	-	-	-	6,650,000	-	-	-	-	-	-	-
PV143	-	-	-	-	5,640,000	-	-	-	-	-	-	-
PV154	-	-	-	-	2,055,000	-	-	-	-	-	-	-
PV146	-	-	-	-	2,160,000	-	-	-	-	-	-	-
PV092	-	-	-	-	1,025,000	-	-	-	-	-	-	-
PV138	-	-	-	-	4,510,000	-	-	-	-	-	-	-

Project Name/Location	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	TBD
PV140	-	-	-	-	7,575,000	-	-	-	-	-	-	-
PV150	-	-	-	-	-	12,135,000	-	-	-	-	-	-
PV126	-	-	-	-	-	18,390,000	-	-	-	-	-	-
PV127	-	-	-	-	-	10,240,000	-	-	-	-	-	-
PV158	-	-	-	-	-	18,585,000	-	-	-	-	-	-
PV153	-	-	-	-	-	-	11,025,000	-	-	-	-	-
PV132	-	-	-	-	-	-	14,555,000	-	-	-	-	-
PV149	-	-	-	-	-	-	9,905,000	-	-	-	-	-
PV151	-	-	-	-	-	-	6,010,000	-	-	-	-	-
PV157	-	-	-	-	-	-	11,250,000	-	-	-	-	-
BR117	-	-	1,380,000	-	-	-	-	-	-	-	-	-

Appendix L – Minnehaha Creek Watershed District Coordination Plan

Coordination Plan

The Minnehaha Creek Watershed District (MCWD) Watershed Management Plan (2018) indicates a desire to coordinate subwatershed planning with partners and align investments to improve water resources as development and redevelopment occurs. The City of Minneapolis (City) and MCWD have a history of partnership. The past successes have largely been the result of strong working relationships that promote regular conversations.

In 2017, the City, the Minneapolis Park and Recreation Board (MPRB), and the MCWD initiated a Memorandum of Understanding (MOU) to share responsibility for improving environmental quality within the Minnehaha Creek subwatershed of the City and recognize the benefit of working in close partnership at the intersection of the vision and mission of the respective organizations.

The goals of the MOU are to work together to coordinate and align policies, plans, and capital improvements to improve the natural and built environments within the Minnehaha Creek subwatershed in the City, and to work together to identify multi-jurisdictional initiatives to achieve complex water resource goals, such as:

- Reducing flooding.
- Achieving regional pollutant load reductions identified in total maximum daily loads (TMDLs).
- Reducing discharge volumes to, and peak flows within Minnehaha Creek.
- Eliminating combined sewer overflows and reducing inflow and infiltration to the sanitary sewer.

As articulated in the MOU, the City and the MCWD are committed to working together to integrate natural resource goals across disciplines to intersect with planned recreation improvements, infrastructure improvements, development, etc., to reduce cost and maximize public benefit.

The City and the MCWD will achieve the desired integration through the use of a predictable and repeatable annual work plan, identifying opportunities to establish shared agency priorities that can be subsequently incorporated into budgets, capital improvement plans, policy development, master planning efforts, and other agency-specific plans and initiatives.

These shared agency priorities are intended to benefit from collaborative planning, cost sharing, and the development of investment strategies that will attract additional outside funding, through the coordinated pursuit of grant funds, legislation, and other partnerships.

To better maintain awareness of needs and opportunities and to implement programs and project that meet the goals of the MCWD and the City, the partners will implement the following integrated planning process:

- The parties commit to working together by designating staff representatives to a Planning Team who are well informed about all respective agency goals, plans, and budgets.
- The Planning Team will collaborate at least quarterly to identify opportunities for shared agency priorities and be responsible for jointly recommending to policy-makers the alignment of policies,

long-range planning efforts, master plans, feasibility studies, capital improvement plans, and the operational and project budgets to support them.

- The City of Minneapolis prepared budget requests for the Capital Long Range Improvement Committee (CLIC) in the first quarter of each calendar year to establish capital project and program priorities for five years.
- The MCWD begins budget forecasting in the first quarter of each calendar year and produces a draft 2 to 3 year capital improvement plan, which it distributes for review in June of each calendar year.
- On or before March of each year, the Planning Team will produce a draft 2 to 5 year Partnership Plan and Investment Strategy. The Plan will inform and be informed by the CLIC process and the development of the MCWD capital improvement plan. The Plan will identify opportunities for integrating planning, policy, and capital project initiatives across agencies. The Plan will include, but not necessarily be limited to:
    - A brief initiative/project description.
    - Estimated upfront costs, capital costs, and long-term operation and maintenance costs.
    - Potential cost sharing opportunities across the agencies.
    - Supporting outside funding and financing (grants, appropriations, bonding, etc.).
    - Timelines for implementation including quarterly milestones.
- The parties agree that this Partnership Plan is intended as a planning guide for coordinated project planning and implementation but does not formally obligate any party to implementation of any specific project; such commitments are to be addressed in specific project agreements.
- On or before June 30 each year, the partners will present the Plan for review and a resolution of support by each party's governing board or council. For the City, the CLIC process and development and presentation of the annual budget will satisfy this provision. The Plan will inform the respective agencies' budget priorities.
- Following review and support of the Plan by each agency, the Planning Team will jointly develop a project specific implementation plan to be memorialized into a project specific agreement. Project specific implementation plans will detail roles and responsibilities for further feasibility studies, design, bidding, construction management and oversight, and long-term operations and maintenance.

In addition, the City will:

- Transmit the annual NPDES MS4 report to the MCWD.
- Notify the MCWD of:

- Institution and completion of small area plans and other focused development or redevelopment planning within the MCWD.
- Significant alterations within the City's MS4 system.
- Partnership opportunities for public communications and education.

Coordination Plan Meeting Framework

Consistent with the MOU, quarterly Planning Team meetings will occur. To ensure coordinated progress, one of the quarterly Planning Team meetings will be dedicated to annual reporting on progress towards WRMP implementation. The meeting will include the City's Director of Surface Water and Sewers, Water Resources Regulatory Coordinator, Project Engineer responsible for development/redevelopment reviews, Project Managers for specific projects of interest, CPED Director of Long Range Planning or their designee, and the Minneapolis Park and Recreation Board's Director of Environmental Management. The City will accommodate reasonable requests from the MCWD for additional meetings and communication. Specific communication plans and schedules will be made for discrete projects or programs that arise that need more detailed accounting. The City's Water Resources Regulatory Coordinator will facilitate communication among appropriate parties based on the scope of the item.

Opportunities for Regulatory Coordination

The City is eager to continue and expand cooperative work with MCWD in the following areas:

- CIP and Budget Planning: The City's process for this is described in more detail in Section 6 of the WRMP.
- Private Development and Redevelopment: The City will share known upcoming projects at the annual meeting. The City will inform permit applicants of the potential need for a MCWD permit and, when one is required, will not issue a City permit until the MCWD permit application has been made.
- Public Development and Redevelopment: Because of our strong working relationship with the MCWD, the City is continually seeking opportunities for coordination. This occurs through informal conversations as opportunities arise. Any future efforts including small area plans, rezoning studies, resiliency plans, or other planning activity will be shared at the annual meeting.
- Operation and Maintenance: The City will inform the MCWD of illicit discharges in a timely manner and share a summary of the illicit discharge detection and elimination (IDDE) program at each annual meeting. Additionally, the City will share its MS4 inspection results through its NPDES MS4 Annual Report and at each annual meeting. If the MCWD discovers an illicit discharge in the City, they will notify the City in a timely manner, so action can be taken to address the issue.
- Addition of link to MCWD permitting website and/or handouts explaining District permitting to the development services website with a map of watersheds in the City.
- City Planners will inform applicants at the time of PDR application that permits may be required from the District and provide them with the necessary information to contact District staff.

District staff will be notified when development/redevelopment applications are distributed for staff review and comment.

- District staff will be notified when PW-SWS staff has approved a development/redevelopment plan.
- Existing and new City Planners assigned to areas within the District will receive guidance on the role of the District in development review and the desire of the District to work in partnership with private developers to achieve greater natural resource benefits.

Capital Improvement Program Planning

The City will work closely with the MCWD to identify and implement water resource related partnership projects. Some upcoming opportunities for partnership include:

- Federal Emergency Management Agency (FEMA) Flood Repairs to Minnehaha Creek: The MCWD has been awarded monies from the FEMA to repair sections of streambank on Minnehaha Creek, damaged during the 2014 flooding. This work intersects with the clean water and recreation goals of the MPRB that has planned investments in trail improvements within areas of identified damage to Minnehaha Creek, is undertaking an ecosystems services plan for MPRB land, and has interest in developing a shared vision for the Minnehaha Creek corridor through the City of Minneapolis (discussed below). This work also intersects with the clean water and infrastructure management goals of the City that has planned storm sewer improvements within the areas of identified damage to Minnehaha Creek.
- Minnehaha Parkway Regional Trail Master Plan: The master plan will be prepared between 2018 and 2019 in a three-agency collaboration between MPRB, the City, and the MCWD. This master plan will set the vision for the Minnehaha Parkway Regional Trail which encompasses 253 acres with 5.3 miles of parkway and includes most of the corridor along Minnehaha Creek. The MCWD has also been awarded monies from the Clean Water Legacy Fund to integrate the planning of FEMA damage repair (noted above) with opportunities to address water quality issues associated with stormwater discharges into Minnehaha Creek. Together, these efforts will improve the ecological integrity of the Minnehaha Creek corridor and reduce pollutant loading to Lake Hiawatha, and impaired water. The parties have a mutual interest in collaboratively planning this work to identify opportunities for the intersection of streambank improvements, stormwater management improvements, infrastructure improvements, recreation investments, ecosystems, and corridor plans. Together, these three agencies will prepare a master plan that will set a vision and priorities for future park improvements and management along the Minnehaha Creek corridor for the next 20 to 30 years.
- Hiawatha Golf Course: The MPRB is working with a Community Advisory Committee to identify potential land use changes that support the reduced groundwater pumping scenario endorsed by the MPRB commissioners. Future changes will prioritize methods of addressing TMDL levels at Lake Hiawatha, water and habitat quality at Lake Hiawatha and Minnehaha Creek, localized flooding, local stormwater infrastructure function and capacity, and enhanced or expanded public recreation opportunities.

- Southwest Harriet Flood Mitigation in the Vicinity of Fulton, Linden Hills, and Lynnhurst Neighborhoods of the City: There is a need to integrate planning and implementation actions to address localized flooding southwest of Lake Harriet. The City completed the feasibility study in August 2018 in coordination with MCWD and the MPRB. Future selection of individual projects to mitigate flooding and improve water quality will be done recognizing programmed neighborhood park improvements and aligning with MCWD efforts to minimize pollutants and minimize peak flows to connect downstream waters.

- Outfall Repair along Minnehaha Creek: High priority reaches have been identified along Minnehaha Creek where stream restoration could improve streambank stability. Many of these reaches contain a number of storm sewer outfalls that require repair or improvement. There are opportunities to partner with planned transportation and park restoration projects to repair storm sewer outfalls, reduce erosion, improve the quality of the riparian area through bioengineering and native vegetation plantings, and improve fish and macroinvertebrate habitat.

- Minnehaha Creek Bacterial Source Identification Study: Due to elevated levels of fecal coliform bacteria and exceedances of the *E. coli* water quality standards, the entire length of Minnehaha Creek is listed as impaired. The City has initiated a bacterial source identification study to identify the sources of *E. coli* within the City. To-date, this study has determined what the major sources of *E. coli* are, if they are human sources, if bacterial regrowth in the Creek and storm sewer system contributes to *E. coli* levels, and if groundwater is a source. The next steps of this study are to develop, study, and begin to implement bacteria management BMPs with the assistance of the MCWD and MPRB.

Public and Private Project Coordination

The Minneapolis Development Review (MDR) is a service center administered by Community Planning and Economic Development (CPED). This service center receives private development and redevelopment project proposals and carries out the preliminary development review (PDR) process. Most development and redevelopment project proposals are routed through the PDR process. This process precedes issuance of building and other types of permits.

Public Works Surface Water and Sewers (PW-SWS) staff is involved in the PDR process to review sanitary sewer connections to public infrastructure, site drainage, and adherence to the City's Stormwater Management Ordinance. PW-SWS staff refer applications to the MCWD for all development and redevelopment projects within the watershed. The MCWD will carry out its own review and issue and enforce permits or approvals.

CPED staff review development and redevelopment proposals with the guidance of the City's Comprehensive Plan and Zoning Ordinances. The City of Minneapolis 2040 Comprehensive Plan includes the policies, principals, and goals that guide development across the City. Minneapolis 2040 has 17 policies that directly address Environmental Systems within the City. These policies related to water resource management include:

- Manage the City's surface waters, groundwaters, stormwater, wastewater, and drinking water equitably and sustainably, while minimizing the adverse impacts of climate change.

- Manage natural areas in and around surface waters, as well as stormwater ponds and other stormwater treatment facilities, as areas supportive of aquatic and terrestrial ecosystems.
- Integrate water resource management into public and private projects in order to benefit natural systems.
- Ensure City infrastructure and residents are resilient to the shocks and stresses of climate change.
- Establish environmental justice frameworks for policy and regulation.
- Protect and improve soil health to sustain and promote plant, animal, and human health.
- Improve the tree canopy and urban forest.
- Require landscaping in conjunction with new development and that complements its surroundings and enhances the built environment.
- Improve the ecological functions of the natural environment in the urban context through planning, regulation, and cooperation.

Policies guiding management of environmental systems and impacts, including City operations, water resources, waste management and recycling, air quality, brownfields cleanup, and energy are implemented on a short- to long-term planning schedule. Implementation activities and opportunities to coordinate with MCWD are noted below:

Term	Activity	Department
Short-term	**Water Resources** – Continue to fund and implement programs per the management plan to maintain and improve sanitary sewer and stormwater infrastructure and protect water resources in the City.	▪ Public Works Department ▪ Projects within the MCWD watershed will be discussed by the Planning Team and progress reviewed at quarterly meetings. ▪ City and MCWD resiliency planning will be discussed by the Planning Team and evaluated at annual meetings.
Short-term	**Service Provision** – Continue to provide high quality City services to the community, including but not limited to public safety, water, sanitation, and health.	▪ Community Planning and Economic Development (CPED) ▪ Public Works Department ▪ Regulatory Services ▪ Health Department ▪ Fire Department ▪ Police Department ▪ Communications Department ▪ Coordinate with MCWD to make short-term infrastructure repairs to outfalls and provide operations and maintenance to best management practices.
Short-term	**Technical Assistance, Grant, and Loan Programs** – Continue to use and expand the portfolio of tools and programs linked to economic competitiveness goals such as grants for brownfield cleanups.	▪ CPED ▪ Public Works will coordinate with MCWD if/when projects may be eligible for funding by MCWD to improve water quality or meet other shared goals.

Term	Activity	Department
Long-term	**Environmental Impacts of Transportation** – The City will work to encourage bicycle and transit use to reduce environmental impacts created from single-occupancy trips. The progress made on achieving climate action goals in the comprehensive plan will be tracked and measured as part of City climate goals.	▪ CPED ▪ Public Works Department ▪ Health Department ▪ City Coordinator's Office ▪ Coordinate with MCWD on transportation projects that may have an impact on water quality of may offer an opportunity for water quality improvement.

Small Area Plans outline a long-range vision for land use and development in very specific areas of the City. A list of completed Small Area Plans is available in the Minneapolis 2040 Plan at: https://minneapolis2040.com/small-area-plans/

Information on approved plans including the Minneapolis Plan for Sustainable Growth, Citywide and Multi-Sector Plans, and Rezoning Studies along with maps of current planning and development activities and all current planning applications can be found at: http://www.ci.minneapolis.mn.us/cped/planning/index.htm

For projects that propose changes to the City's publicly-owned infrastructure (streets, lights, public utilities, etc.), the Public Works Department coordinates the Capital Projects Task Force (CPTF) process of review for compliance with the City's requirements for working within the public right-of-way. PW-SWS staff will refer City Project Managers to MCWD for all public projects within the watershed. The MCWD will carry out its own review and issue and enforce permits or approvals.

PW-SWS staff will communicate with MCWD at quarterly meetings about development and redevelopment projects and public infrastructure projects that span jurisdictions and include stormwater BMPs.