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DRAFT Local Water Management Plan Update City of Brooklyn Park

November 27, 2018

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Certification

Local Water Management Plan Update

City of Brooklyn Park
Brooklyn Park, MN
BMI Project No. N15.114532

November 27, 2018

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

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Date: November 27, 2018

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Appendix A: Minimum Engineering Standards for Storm Water Management

Appendix B: Chapter 153 Stormwater Management

Acronyms and Abbreviations

Unless otherwise stated in the body of this report the following acronyms and/or abbreviations shall be used

BMP	Best Management Practices
Commissions	Shingle Creek/ West Mississippi Watershed Management Commissions
EPA	United States Environmental Protection Agency
FEMA	Federal Emergency Management Agency
HSG	Hydrologic Soil Group
JPA	Joint Powers Agreement
LGU	Local Government Unit
LWMP	Local Water Management Plan
MCES	Metropolitan Council Environmental Services
MnDNR	Minnesota Department of Natural Resources
MNRRA	Minnesota National River and Recreation Area Plan
MPCA	Minnesota Pollution Control Agency
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NURP	National Urban Runoff Program
OHW	Ordinary High Water level
SWPPP	Storm Water Pollution Prevention Plan
TMDL	Total Maximum Daily Load
USACE	United States Army Corps of Engineers
USDA-NRCS	United States Department of Agriculture-Natural Resources Conservation Service
WCA	Minnesota Wetland Conservation Act
WLA	Wasteload Allocation

I. EXECUTIVE SUMMARY

The City of Brooklyn Park, along with all other communities in the metropolitan area, must update their local water plan, as part of the comprehensive plan update, between January 1, 2017 and December 31, 2018. In general, local surface water plans need to include a summary of the priorities and problems in the community; structural, nonstructural and programmatic actions to take to address the priorities and problems; and clearly identified funding mechanisms to fix the problems. This plan provides the City of Brooklyn Park with an update to the Comprehensive Storm Water Management Plan adopted in 2009. It will serve as a guide to managing the City's surface water, ground water and storm water activities in the City for the 10 year period 2019-2029.

This Local Water Management Plan (LWMP) was prepared in response to the requirements of Minnesota statutes 8410 and 103B.235 as well as the standards set forth by the Shingle Creek and West Mississippi Watershed Management Commission. The Commission adopted their Third Generation Watershed Management Plan in 2013. Member cities are required to update their LWMP to be in compliance with the Commission's Third Generation Watershed Management Plan.

The purpose of this document is to provide the City of Brooklyn Park with an updated LWMP in accordance with the requirements noted above and will serve as a comprehensive planning document to guide the City in conserving, protecting and managing local surface and ground water resources. Local plans must be submitted to the Metropolitan Council and the Commission for review. The watersheds have a 60 day review period upon receipt of the local plan. The Metropolitan Council has 45 days to provide comments to the Commission regarding the revised local water management plan.

This report addresses the City's current water management needs and provides a framework for successful implementation of a comprehensive storm water management program.

The report is organized as follows:

- Section II - Introduction
- Section III - Land and Water Resource Inventory, describes the physical environment including watersheds and drainage patterns, dominant land uses, and significant water bodies within the City.
- Section IV - Goals and Policies, lists the City's goals and policies along with public agency requirements affecting surface water management in the City.
- Section V - System Assessment describes the existing storm water management system in the City and details the various assessments of problems in the existing system.
- Section VI - Implementation Plan, covers regulatory responsibilities, priority implementation items, operation and maintenance, and financial considerations. A Plan amendment process is also identified.
- Section VII - Summary and Recommendations, contains a summary of the LWMP and makes recommendations for implementing the Plan.

The Goals and Policies section of the LWMP (Section IV) outlines goals and policies specific to water management in Brooklyn Park. The goals are broad statements regarding the motivation and intent of the LWMP. The policies that follow the individual goals are specific requirements that promote attainment of the goal.

The primary goal of this plan is to bring the City into statutory compliance and provide the City a framework for effective storm water management, to guide development and redevelopment activities, and also to identify and implement retrofits to the existing system. These retrofits consist

of both projects and programs. Additionally, the plan provides clear guidance on how Brooklyn Park intends to manage surface water quantity and quality.

The System Assessment (Section V) contains a description and assessment of the City's surface water system. The system assessment describes problems that the Plan must address. These assessments are provided by the City, the Commissions and the MPCA. The intent is to identify the source of problems and specific actions the City proposes to take to address these problems either independently or in collaboration with other organizations -most commonly one of the watershed commissions.

This Implementation Plan (Section VI) describes those activities and programs the City proposes to develop to improve its surface water management program. Brooklyn Park will continue to install required storm water treatment systems as part of development and redevelopment and will look for opportunities to upgrade those parts of the system that lack adequate storm water treatment measures.

Section VI also includes:

- An overview of the City's NPDES-MS4 permit.
- A discussion of operation and maintenance procedures and strategies.
- Implementation priorities.
- Financial considerations.
- A discussion of the process for amending this Plan.

Section VII summarizes the LWMP and provides recommendations for implementation of the plan.

After review and approval by the Commissions, the LWMP will be submitted to the City Council for consideration with the following recommendations:

- That the City continues to operate and maintain its storm water system in accordance with this LWMP.
- That the City continues to support a sense of common purpose with the Commissions and adjacent communities regarding storm water management issues.
- That the City adopt this Local Water Management Plan and adopt amendments to it as deemed necessary.

II. INTRODUCTION

A. Background

In 1995, Minnesota Statutes Section 473.859, subd. 2 was amended to make the local water plan (often referred to as local surface water management plans) required by section 103B.235 a part of the land use plan of the local comprehensive plan. Minnesota Rules Chapter 8410, updated in July of 2015, includes the requirements for local water management plans. All communities in the metropolitan area must update their local water plan between January 1, 2017 and December 31, 2018. Therefore, the City of Brooklyn Park must update its local water plan as part of the comprehensive plan update. The community's updated local water plan should be submitted to the Council for its review concurrent with the review by the Watershed Management Organization(s) within whose watershed(s) the community is located. Failure to have an updated local water plan will result in the comprehensive plan being found incomplete for review until the required plan is provided to the Council.

Local water plans must meet the requirements for local water plans in Minnesota Statutes, section 103B.235 and Minnesota Rules Chapter 8410. In general, local surface water plans need to include a summary of the priorities and problems in the community; structural, nonstructural and programmatic actions to take to address the priorities and problems; and clearly identified funding mechanisms to fix the problems.¹

This plan provides the City of Brooklyn Park with an update to the Comprehensive Storm Water Management Plan adopted in 2009. It will serve as a guide to managing the City's surface water system and comply with Minnesota Statutes. The LWMP will guide surface water, ground water and storm water activities in the City for the 10 year period 2019-2029. Periodic amendment to the Plan will likely occur in the intervening 10 years so that the Plan remains current to watershed plan amendments and Metropolitan Council requirements.

The City of Brooklyn Park occupies approximately 26.3 square miles of land in northeastern Hennepin County (**Figure I**). Brooklyn Park is a second-ring suburb, located immediately north of Brooklyn Center along the Mississippi River. Brooklyn Park also borders the cities of Coon Rapids, Fridley, Crystal, New Hope, Maple Grove, Osseo and Champlin.

The City of Brooklyn Park is approximately 85% developed. The existing City land use is one of a well-defined commercial/industrial core surrounded by residential neighborhoods. The City is also home to a large park and open space system. The major natural surface water features of Brooklyn Park are the Mississippi River and Shingle Creek. The topography is relatively flat to gently rolling with a maximum elevation differential of approximately 100 feet.

B. Purpose and Scope

The Brooklyn Park LWMP will serve as a comprehensive planning document to guide the City in conserving, protecting, and managing its surface water resources. The LWMP has been updated to meet requirements as established in Minnesota Rules 8410. In addition, the Plan reflects the requirements of the Commissions with jurisdiction within the City.

The City must submit the LWMP to the Metropolitan Council and the Commissions for review. The Commissions have 60 days for their review after written receipt of the City Plan.

¹ https://metrocouncil.org/Communities/Planning/Local-Planning-Assistance/System-Statements/System-Statements/02393429_BrooklynPark_2015SS.aspx

Met Council provides comments within 45 days. The Council directs its comment to the Commissions which consider these comments in formulating their own comments.

This report addresses the City's current surface water management need and provides a framework for successful implementation of a comprehensive storm water management program.

C. Organization

The report is organized as follows:

- Section III -Land and Water Resource Inventory, describes the physical environment including watersheds and drainage patterns, dominant land uses, and significant water bodies within the City.
- Section IV -Goal and Policies, lists the City's goals and policies along with public agency requirements affecting surface water management in the City.
- Section V -System Assessment describes the existing surface waters and the storm water management system in the City and details the various assessments of problems in the existing system.
- Section VI -Implementation Plan covers regulatory responsibilities, priority implementation items, operation and maintenance, and financing considerations. A Plan amendment process is also identified.
- Section VII -Summary and Recommendations contain' a summary of the LWMP and make recommendations for implementing the Plan.

III. LAND AND WATER RESOURCE INVENTORY

A. Land Use

Figures 2 and 3 show the current Land Use and Zoning Districts within the City of Brooklyn Park. Brooklyn Park is approximately 85% urbanized, with approximately 50% of the land use comprised of single family residential development and the remainder being mostly commercial and industrial development. **Figure 4** shows the Land Cover Classifications in the City. Remaining agricultural and undeveloped lands generally are found along the TH 610 and TH 169 corridors. These lands are expected to develop as shown in the proposed 2040 Land Use Plan for the City of Brooklyn Park (**Figure 5**).

The City also includes significant green spaces as shown in **Figure 6**. In total the City has over 60 developed parks and two golf courses. Several regional trails and the Coon Rapids Dam Regional Park are located within the City limits. The Rush Creek Regional Trail links Elm Creek Park Reserve to Coon Rapids Dam Regional Park. The Shingle Creek Regional Trail begins at its connection with the Rush Creek Regional Trail in Brooklyn Park and heads south through Brooklyn Center, where it connects to the Shingle Creek Parkway and trails in Minneapolis.

The Comprehensive Plan update provides a significant amount of narrative on existing conditions and potential opportunities within the City and the reader is referred to that document for more information on land use planning.

B. Topography and Watersheds

The City of Brooklyn Park is located along the Mississippi River in northeastern Hennepin County. The Minnesota landscape is a product of the continental glaciers. Sediments transported by the glacial meltwaters filled the area with sand and gravel. (Soil Survey of Hennepin County, Minnesota).

Most of Brooklyn Park is relatively flat with some areas having gently rolling terrain. Fairly steep slopes occur along the east border of the City along the Mississippi River. Surface elevations in the City range from approximately 820 feet along the Mississippi River to approximately 920 feet along the City's western border.

The City's hydrologic system is part of the Mississippi River watershed. The City is a member of two watershed management commissions. Both of these Commissions were formed by Joint Power Agreements (JPA). The northern portion of the City is in the West Mississippi Watershed Management Commission. The southern portion of the City is in the Shingle Creek Watershed Management Commission. **Figure 7** shows the jurisdictional boundaries for the two Commissions within the City.

C. Soils

The soils in Brooklyn Park are mapped within the USDA-NRCS Soil Survey of Hennepin County which was updated in 2004. The most common soils mapped in the City of Brooklyn Park are Isan, Hubbard, Soderville, Verndale, Forada, Seelyeville and Duelm (**Figures 8A and 8B**). The acreages of the major soil types in Brooklyn Park are shown in Table 2.1. This table also includes each soils corresponding Hydrologic Soil Group. Most of the City includes soils of the Hydrologic Soil Group A. The Verndale soil is found in 7% of the City and is classified as a hydrologic soil group B. Additional information about each of the soils is available in the soil survey.

Table 2.1 - Soil Types

Soil Type	Hydrologic Group	Area (acres)	% of Total
Isan	A/D	3522	21%
Hubbard	A	3034	18%
Soderville	A	1839	11%
Verndale	B	1231	7%
Forada	A/D	1092	6%
Seelyeville	A/D	968	6%
Duelm	A	898	5%
Urban land		889	5%
Koronis	A	626	4%
Zimmerman	A	590	3%
Dorset	A	303	2%
Other Soils	Various		10%
Water		283	2%
	Total	16984	100%

The infiltration capacity of soils is important in determining the surface water runoff. If the soil has a moderate to high infiltration capacity, a significant portion of precipitation will be infiltrated into the ground thereby reducing the volume of runoff. If a soil has low infiltration capacity, much more precipitation will become surface runoff. The hydrologic soil group (HSG) defines a soil's relative infiltration capacity and determines how much runoff will be generated for a given rainfall event.

“...Soil Scientists have classified soil map units in soil survey reports into Hydrologic Soils Groups (HSGs). The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that occur naturally in group D are assigned to dual classes.

Specifically for those areas with HSGs ratings of A/D, B/D and C/D, they indicate a drained condition/undrained condition rating. Unless the area has a documented, effective and maintained drainage system(s) as the site land-use is proposed to change, the HSGs should be interpreted as a Group D soil.²”

D. Key Water Resources

The key surface water resources within the City of Brooklyn Park include the Mississippi River; several creeks including Shingle Creek, Bass Creek, Eagle Creek, Twin Creek and the Edinbrook-Century Channel-Mattson Brook, Lake Magda and Lake Success; and numerous wetlands. These valuable water resources provide many public benefits for the use and enjoyment of its residents. Key water resources and MnDNR protected waters are shown in **Figure 9** and listed in **Table 2.3**.

² Minnesota Board of Water and Soil Resources, http://www.bwsr.state.mn.us/outreach/eLINK/Guidance/HSG_guidance.pdf
Accessed January 2018

Table 2.3 - Key Water Resources			
Name	DNR ID No.	Area (acres)	Comments
Lakes and Wetlands			
Lake Magda	27-65P	12	Small Lake located in southwestern Brooklyn Park
Lake Success	27-634W	8	Small Lake located in south central Brooklyn Park.
Mueller Marsh	27-565W	21	Wetland adjacent to Bass Creek
Palmer Lake	27-59P	271	Large wetland located on boundary of Brooklyn Park and Brooklyn Center
Unnamed	27-566W	25	Adjacent to Eagle Creek
Unnamed	27-563W	130	Adjacent to Shingle Creek
Unnamed	27-562W	17	Adjacent to Shingle Creek
Unnamed	27-560W	26	Adjacent to Shingle Creek
Rivers and Creeks			
Mississippi River	N/A	N/A	The River defines the entire eastern municipal border
Shingle Creek/Bass Creek/Eagle Creek	N/A	N/A	Natural Streams and County Ditch flowing through southern Brooklyn Park
Edinbrook/CenturyChannel/Mattson Brook	N/A	N/A	Natural Stream and Constructed open channels flowing across entire City (west to east)
Twin Creek	N/A	N/A	Natural Stream flowing through southwest area of City between Crystal and Brooklyn Center

1. Lakes and Ponds

Two lakes are present in the City: Lake Magda and Lake Success.

Lake Magda is a small lake located along the western border of Brooklyn Park adjacent to T.H. 169. There is a small park along the northern edge of the Lake providing public access. Other recreational use on the Lake is by the surrounding property owners. Outflow from the lake drains to Eagle Creek then to Shingle Creek.

The Watershed Plan indicates that Lake Magda is hypereutrophic and listed as impaired for excessive nutrients by the MPCA, and residents report a significant carp population. A TMDL was approved in 2010.

Lake Success is another small lake located in south central Brooklyn Park. The Lake was created by the original developer by excavating sand and gravel from an existing wetland and creating an open water basin. The lake drains through storm drains to Shingle Creek. There is no public land adjacent to this lake. Residents appreciate the aesthetics of the lake and also its recreational value. The lake historically had good water quality, but it appears to be declining. Water levels have also been lower than

expected in recent years, prompting the City and DNR to investigate whether groundwater flows to or from the lake may be changing.

The majority of the ponds in Brooklyn Park were created as part of the storm water system. Although some of these are treated as recreational water bodies by the adjacent residents, the City classifies them as storm water retention basins and maintains them accordingly.

2. Rivers and Creeks

The Mississippi River forms the eastern corporate boundary of Brooklyn Park. Approximately 10% of the City drains to the Mississippi River directly through larger diameter trunk storm sewers extending under Highway 252. The section of the Mississippi River adjacent to Brooklyn Park has an EPA-approved impairment for: Mercury in Fish Tissue, Fecal Coliform; and PCB in Fish Tissue. These impairments are considered non-construction related and do not require any additional best management practices (BMPs) or plan review for compliance with the NPDES/SDS construction permit.

Bass Creek and Eagle Creek are small natural streams located in the southwestern part of the City. Shingle Creek flows through Brooklyn Park from the confluence of Bass Creek and Eagle Creek to the Palmer Lake Basin. Shingle Creek serves as the primary drainage corridor for the southern portion of the City.

Shingle Creek has an EPA-approved impairment for: Aquatic Macroinvertebrate Bioassessments; Chloride; and Dissolved Oxygen. These impairment(s) are considered to be construction related parameters and require the additional best management practices (BMPs) found in Appendix A of the permit (C.1 & C.2) if the project has a discharge point on the project within 1 mile (aerial radius measurement) of, and flows to the impaired stream. Shingle Creek was added to the 303(d) list in 2014 as impaired for aquatic recreation due to excessive levels of E. coli. The TMDL and load reductions are incorporated into the Upper Mississippi River Bacteria TMDL.

Twin Creek is a small natural stream flowing through the southwestern area of the City between Crystal and Brooklyn Center. The Edinbrook/Century Channel is a drainage channel that carries runoff through Brooklyn Park and discharges to Mattson Brook. The Mattson Brook flows to the Mississippi River.

Figure 10 shows impaired waters in the City. **Figure 11** shows potential hotspots and contaminant sources in “What’s in my Neighborhood.” Additional information concerning impaired water issues is provided in Section V of this report. Additional information regarding the condition and management strategies for rivers and creeks in the City is provided in Section IV and V of this report.

3. Wetlands

Figure 9 shows the DNR Protected Waters and Wetlands within the City. The figure also shows additional wetland areas within the City that are included within the National Wetland Inventory (NWI). There are 28 unnamed wetlands within the City that are categorized as DNR protected waters and wetlands. Additional information about these wetlands is contained in **Table 2.3**.

4. Groundwater

The City obtains 100% of its water supply from 17 groundwater wells. Wells within unconfined glacial drift are the primary supply source. The “Wellhead Protection Plan” (approved January 18, 2018 by Minnesota Department of Health) for the City

addresses both water supply vulnerability and source protection. The plan delineated the Wellhead Protection Area (WHPA) and the Drinking Water Supply Management Area (DWSMA), and assessed the vulnerability of the wells and the aquifers (**FIGURE 12**). The Brooklyn Park wells draw from the unconfined drift sand/gravel quaternary aquifer and the Wonewoc-Tunnel City aquifer. Most of the DWSMA is classified as highly vulnerable (H) to contamination due to a lack of an effective confining layer to prevent surface contaminants from reaching the aquifer.³

Commission rules require infiltration of stormwater for volume control and water quality benefits. The Wellhead Protection Plan describes the potential conflict between the benefits of stormwater infiltration (for volume control, surface water quality, rate control, and aquifer recharge) and the risks of aquifer contamination. The Commissions prohibit infiltration with the Emergency Response Area, in areas of known contamination, and on sites with certain land uses such as with petroleum tanks. The City Stormwater Management Ordinance Chapter 153.07 C.5.g Infiltration Requirements states that "...Infiltration will be restricted and subject to additional city review where the infiltration BMP will be constructed... b. Where drinking water supply management areas are present..."

The Minnesota Department of Health and the MPCA offer guidance on evaluating infiltration within DWSMAs (**Figure 13**). Use of this reference will assist the City in evaluating proposed infiltration sites located within the DWSMA.

5. Existing Flood Insurance Studies

The Federal Emergency Management Agency (FEMA) revised the Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) for Hennepin County November 4, 2016. The FIRM maps show all 1% annual chance (i.e.100-year) floodplain boundaries for the County, and include both the floodway and flood fringe for rivers and streams where FEMA has completed detailed engineering studies. Within Brooklyn Park, floodways and flood fringe areas, as well as flood elevations, are provided for Shingle Creek, Edinbrook Channel and the Mississippi River. Special flood hazard areas have also been established around many of the storm water ponds, lakes and wetlands within the City.

Figure 14 shows the FEMA Special Flood Hazard Areas within Brooklyn Park.

Table 2.4 lists the riverine and lacustrine flooding sources studied within the City.

Table 2.4 - FEMA Special Flood Hazard Areas within Brooklyn Park	
Riverine Flooding Sources	Lacustrine Flooding Sources
Bass Creek	Century Channel Pond 1-22
Eagle Creek	Edinbrook Channel Ponds 15-53 and 76
Shingle Creek	Lake Success
Unnamed Creek (Twin Creek)	
Edinbrook Channel	
Mississippi River	

³ WELLHEAD PROTECTION PLAN AMENDMENT PART II, City of Brooklyn Park, Minnesota October 16, 2017

IV. GOALS AND POLICIES

A. Purpose

The primary goal of this plan is to bring the City into statutory compliance and provide the City a framework for effective storm water management, to guide development and redevelopment activities, and also to identify and implement retrofits to the existing system. These retrofits consist of both projects and programs. Additionally, the plan provides clear guidance on how Brooklyn Park intends to manage surface water in terms of both quantity and quality.

This plan is an update to the Comprehensive Storm Water Management Plan adopted in 2009 providing the City with a plan that meets the requirements of the Metropolitan Water Management Act (Minnesota Statute 103B), Minnesota Rules Chapter 8410, and the Commission requirements outlined in their Third Generation Watershed Management Plan dated April 2013.

B. City of Brooklyn Park LWMP Goals and Policies

This section outlines goals and policies specific to surface water management in Brooklyn Park. The goals identified below are broad statements regarding the motivation and intent of the LWMP. The policies that follow individual goals are specific requirements that promote attainment of the goal.

Goal 1

To minimize public capital and maintenance expenditures necessary to control excessive volumes and rates for storm water runoff.

Policy 1.1 - Preserve existing storage capacities of protected waters, wetlands and natural water courses.

Policy 1.2 - Perform hydrologic and hydraulic modeling on a case-by-case basis to analyze runoff characteristics for development and redevelopment projects.

Policy 1.3 - Limit storm water runoff rates from development and redevelopment sites based on the Commission requirements, City Ordinance and design standards.

Policy 1.4 - Provide additional storage either on site or within the subwatershed where necessary to comply with the design standards.

Policy 1.5 - Implement cost effective and efficient method of storm water management to limit public expenditures.

Goal 2

To provide a reasonable level of protection within the City of Brooklyn Park to limit potential flood damage.

Policy 2.1- Prohibit encroachment that will reduce the storage capacity of floodplains, unless mitigating action is undertaken.

Policy 2.2 - Allow only structures that have been flood-proofed or will not be subject to excessive damage in the floodway fringe.

Policy 2.3 - Establish a 10-year rainfall event as the minimum criteria for new storm water conveyance facility designs.

Policy 2.4 - Require new habitable structures to be protected from flooding during the 100-year rainfall event.

Goal 3

To maintain or improve both surface water and groundwater quality.

Policy 3.1 - Require the implementation of water quality best management practices for treatment and/or control of storm water runoff in accordance with Commission requirements, City design standards and TMDL implementation plans.

Policy 3.2 - The City will coordinate efforts with the Commissions and other agencies to establish reasonable short and long term goals for water bodies within the City or impacted by storm water runoff leaving the City.

Policy 3.3 - Support water quality monitoring efforts being undertaken by the Commission.

Goal 3B

Wellhead Protection Goals⁴

Policy 3B.1 - Provide a safe, potable, water supply that meets or exceeds State and Federal standards.

Policy 3B.2 - Manage the available aquifers so as to assure a sustainable water supply.

Policy 3B.3 - Promote and increase public awareness of potential groundwater problems, wellhead protection, and water conservation.

Policy 3B.4 - Monitor and/or restrict activities that expose the groundwater to contamination.

Goal 4

To protect and enhance fish and water related wildlife habitats.

Policy 4.1 - Promote those aspects of local shoreland regulations that enhance fish and wildlife habitat to the extent feasible.

Policy 4.2 - Preserve protected waters and wetlands that provide habitat for game fish and wildlife to the extent feasible.

Policy 4.3 - Coordinate efforts to protect areas of significant natural communities with the MnDNR.

Policy 4.4 - Coordinate efforts to protect rare and endangered species with the MnDNR.

Goal 5

To protect and enhance opportunities for water recreation.

Policy 5.1 - Coordinate efforts with state, county and neighboring municipalities to enhance water-based recreation to the extent practical.

Goal 6

To coordinate storm water management efforts with the Commission, adjacent communities and citizens within Brooklyn Park.

Policy 6.1 - Work with adjacent municipalities and the Commission in planning and implementing mutually beneficial regional storm water management improvements.

- C. Shingle Creek and West Mississippi Watershed Management Commissions Third Generation Watershed Management Plan Goals and Policies.

⁴ Wellhead Protection Plan Amendment Part II, City of Brooklyn Park, Minnesota, October 16, 2017

The following tables in this section address how the goals, policies, and strategies in this Plan address the goals and policies outlined in the Commissions Third Generation Watershed Management Plan Section 4.

Commission Policy	Brooklyn Park Comment or Proposed Action
Goal Area A. Water Quantity	
Goal A.1. Maintain the existing 100-year flood profile throughout the watersheds.	Policy 1.1 and 1.3.
Goal A.2. Determine ecological low flows for Shingle and Bass Creeks	Noted, no proposed action.
Actions:	
a. Maintain and update as necessary a calibrated hydraulic model of Shingle Creek and its tributaries	Noted, no proposed action.
b. Maintain rules and standards requiring new development and redevelopment to control the rate and volume of runoff discharged from their sites, and update those standards as necessary.	Policy 1.3 and City Stormwater Management Ordinance Chapter 153 (Appendix B)
c. Develop a sustainable water budget for each watershed and an action plan for management activities necessary for its achievement.	Noted, no proposed action.

Commission Policy	Brooklyn Park Comment or Proposed Action
Goal Area B. Water Quality	
Goal B.1. 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, Lower Twin, and Ryan Lakes will be removed in 2014.	Policy 3.1, 3.2 and 3.3
Goal B.2. Implement phosphorus and sediment load reduction actions sufficient to achieve de-listing from the Impaired Waters list for Bass, Eagle, Crystal, and Middle Twin Lakes.	Policy 3.1 and 3.2. City Stormwater Management Ordinance Chapter 153 (Appendix B)
Goal B.3. Improve water clarity in the balance of the lakes by 10% over the average of the previous ten years.	Policy 3.2 and 3.3
Goal B.4. Improve at least 30% of the length of Shingle Creek to meet Corridor Study and TMDL design standards.	Policy 3.2 and 3.3

Goal B.5. Maintain nondegradation of all waterbodies compared to 1985 conditions.	Policy 3.1 and 3.3
Actions:	
a. Maintain and update as necessary calibrated P8 models for each lakeshed in Shingle Creek and the major drainage areas of West Mississippi.	Noted, no proposed action.
b. Maintain rules and standards requiring new development and redevelopment to control the total phosphorus and total suspended solids discharged from their sites, and update those standards as necessary.	Policy 3.1. City Stormwater Management Ordinance Chapter 153 (Appendix B)
c. Conduct an intensive BMP assessment for at least 25% of that part of the watershed that developed prior to Commission rules in 1984, and achieve 25% of the recommended load reduction within 10 years of the analysis.	Policy 3.1 and 3.2.
d. Contribute 25% of the cost of TMDL capital implementation projects (up to \$250,000).	Noted, no proposed action.
e. Pursue grant and other funding to implement improvement projects and feasibility studies.	Policy 6.1.
f. Prepare and implement an Annual Monitoring Plan and conduct monitoring necessary to evaluate water quality conditions and trends in the lakes and streams in the two watersheds.	Policy 3.3
g. Evaluate progress toward achieving TMDL goals every five years following adoption of the respective Implementation Plans.	Policy 3.3

Commission Policy	Brooklyn Park Comment or Proposed Action
Goal Area C. Groundwater	
Goal C.1. Infiltrate stormwater runoff from new impervious surface.	Policy 1.3, 3.1, and 3B.4. City Stormwater Management Ordinance Chapter 153 (Appendix B)
Goal C.2. Identify opportunities for and implement projects to infiltrate runoff from existing impervious surface.	Policy 1.3, 3.1, and 3B.4. City Stormwater Management Ordinance Chapter 153 (Appendix B)
Goal C.3. Work with the appropriate state agencies to incorporate groundwater assessment into the sustainable water budget analysis for each watershed.	Noted, no proposed action.
Actions:	
a. Maintain rules and standards requiring new development and redevelopment to abstract or infiltrate stormwater runoff from new impervious surface, and update those standards as necessary.	Policy 1.3, 3.1, and 3B.4. City Stormwater Management Ordinance Chapter 153 (Appendix B)

b. Conduct an intensive BMP assessment for at least 25% of that part of the watershed that developed prior to Commission rules in 1984, and achieve 25% of the recommended volume reduction within 10 years of the analysis.	Policy 3.1 and 3.2.
c. Coordinate with the Minnesota DNR and other agencies to develop an action plan addressing surficial groundwater elevation issues in northern Brooklyn Park and the associated impacts on wetlands and Lake Success.	Policy 3.2 and 6.1.
d. Prohibit infiltration within the Inner Wellhead Protection Zone (IWMZ) and petroleum distribution areas.	Introduce this goal to the City Council in 2019.

Commission Policy	Brooklyn Park Comment or Proposed Action
Goal Area D. Wetlands	
Goal D.1. Maintain the existing functions and values of wetlands identified in the Commissions' Water Quality Plan as high-priority.	Policy 4.2.
Goal D.2. Informed by the sustainable water budget study, improve functions and values of wetlands.	Noted, no proposed action.
Actions:	
a. Adopt a wetland replacement sequencing policy.	Noted, no proposed action.
b. Identify wetland restoration opportunities and implement projects to restore wetland functions and values or to create new wetland acreage.	Policy 4.2, 4.3, 4.4 and 5.1.

Commission Policy	Brooklyn Park Comment or Proposed Action
Goal Area E. Drainage Systems	
Goal E.1. Continue current Hennepin County jurisdiction over County Ditch #13	Noted, no proposed action.
Actions:	
a. Periodically reconsider the appropriate jurisdiction over County Ditch #13.	Noted, no proposed action.

Commission Policy	Brooklyn Park Comment or Proposed Action
Goal Area F. Commission Operations and Programming	
Goal F.1. Identify and operate within a sustainable funding level that is affordable to member cities.	Goal 1 and Policy 1.5
Goal F.2. Foster implementation of TMDL and other implementation projects by sharing in their cost and proactively seeking grant funds.	Policy 3.2, 6.1
Goal F.3. Operate a public education and outreach program that meets the NPDES Phase II education requirements for the member cities.	Policy 3.1 and 3B.3 The Commission's "Education and Public Outreach" has been incorporated into the City's NPDES-MS4 permit.
Goal F.4. 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.	Policy 3.3
Goal F.5. 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, nondegradation, and ecosystem management goals.	Policy 3.1
Goal F.6. Serve as a technical resource for member cities.	Noted, no proposed action.
Actions:	
a. Annually review the budget and Capital Improvement Program.	Policy 6.1
b. Maintain an Education and Public Outreach Committee (EPOC) that is charged with developing and implementing an annual education and outreach plan.	Policy 3B.3. The Commission's "Education and Public Outreach" has been incorporated into the City's NPDES-MS4 permit.
c. Prepare and implement an annual monitoring plan and summarize the results in an annual water quality report.	Policy 3.3
d. According to the schedules set forth in TMDL Implementation Plans, every five years evaluate progress toward meeting TMDL water quality goals, and adjust the Implementation Plans as necessary to achieve progress.	Policy 3.2 and 3.3
e. Every five years or as necessary review the development rules and standards for adequacy and make revisions as necessary.	Policy 3.1

f. Continue research projects on innovative and cost-effective stormwater management practices and technologies.	Policy 1.5 and 3.1
g. Coordinate water resources management between the Commissions and the member cities.	Policy 6.1

D. County, State and Federal Agency Jurisdiction

This section presents a synopsis of the current agency jurisdictions within Brooklyn Park. The City is committed to the preservation and enhancement of its wetlands and water resources through full compliance with local, state, and federal wetlands regulations.

1. Minnesota Department of Natural Resources (DNR)

The DNR has regulatory authority over the lakes, wetlands and watercourses in the Protected Waters Inventory (FIGURE 9). Public Waters are defined within Minnesota Statutes 103G.005 Subdivision 15. Wetlands in the public waters inventory are generally those Types 3, 4, and 5 wetlands in excess of 10 acres in rural areas or in excess of 2.5 acres in municipalities and incorporated areas. Watercourses in the inventory generally include natural streams and altered watercourses with a total drainage areas exceeding two square miles and designated trout streams.

The eastern portion of the City abutting the Mississippi River, is located in the Mississippi River Critical Area Corridor. According to the DNR:

The purposes of designating the Mississippi River as a state critical area include the following:

- a) Protecting and preserving a unique and valuable state and regional resource for the benefit of the health, safety, and welfare of the citizens for the state, region, and nation;
- b) Preventing and mitigating irreversible damage to this resource;
- c) Preserving and enhancing its natural, aesthetic, cultural, and historical value for public use;
- d) Protecting and preserving the river as an essential element in the national, state, and regional transportation, sewer and water, and recreational systems; and protecting and preserving the biological and ecological functions of the corridor.

The MnDNR has three primary roles for the Mississippi River Critical Area Program. The MnDNR has undertaken the mandate of reviewing existing ordinances that affect lands within the Mississippi River Critical Area Corridor for their compliance with state critical area standards and guidelines. Technical assistance for ordinance development will be provided to local communities to ensure adoption and approval of a compliant state critical area ordinance or any ordinance amendments. MnDNR will also provide individualized technical assistance for amending existing ordinances or developing proposed ordinances that will be consistent with the voluntary MNRRA Comprehensive Management Plan (CMP) policies. In addition, adoption or amendment of plans and ordinances affecting lands within the Mississippi River Critical Area Corridor and relating to Executive Order 79-19 purposes and standards are effective only after approval by the MnDNR. The MnDNR reviews the plans and ordinances to ensure their consistency with the provisions of Executive Order 79-19, following an evaluation by the Metropolitan Council.

In communities where critical area plans and ordinances have become effective, the local governmental unit also must notify the MnDNR area hydrologist at least 30 days before action is taken for all development applications or variances requiring a public hearing or discretionary action.

In communities where plans and regulations have not been adopted or approved, the MnDNR is also to be notified about additional types of projects listed in the Interim Regulations. MnDNR will review and comment on the project's compliance with critical area and state requirements and MNRRA policies, as well as provide technical assistance as requested. Notice of the final action is to be sent to the MnDNR.

Other powers and duties of this Minnesota state agency within the City include:

- **Floodplain Management:** The Minnesota DNR offers assistance to local floodplain administrators. Communities use their floodplain ordinance in conjunction with FEMA-approved maps to guide land use decisions. The DNR assists local communities by providing general regulatory assistance.
- **Management of the Flood Hazard Mitigation program.** Program Purpose: To provide technical and financial assistance to local governmental units for conducting flood damage reduction studies and for planning and implementing flood damage reduction measures. Eligible projects include: Flood damage reduction studies for planning and implementing structural and non-structural measures including: acquisition of structures in the flood plain, relocations, flood-proofing, development of flood warning systems, public education, flood plain restorations, dams, dikes, levees, flood bypass channels, flood storage structures, water level control structures and other related activities.
- **Shoreland Management.** Minnesota's Shoreland Management Program guides land development along Minnesota's lakes and rivers to protect their ecological, recreational, and economic values. The state shoreland rules (MR 6120.2500 - 6120.3900) establish minimum standards to protect habitat and water quality and preserve property values. These standards are implemented through local shoreland ordinances. Anyone who owns land along a lake or river should contact their city with questions about the standards and permit requirements that apply to their property. The DNR's role is to ensure that local shoreland ordinances comply with the state shoreland rules and to provide technical assistance and oversight to these local governments.
- **Mississippi River Corridor Critical Area:** The Minnesota Department of Natural Resources (DNR) published rules for the Mississippi River Corridor Critical Area (MRCCA), an important milestone toward protecting the river's 72-mile stretch through the Twin Cities metropolitan area. The rules are the result of extensive collaboration with local governments, business and environmental groups, and property owners to hear concerns, gather ideas, and balance interests for rules that:
 - Improve protections for water quality, habitat and scenic views;
 - Protect existing development and allow redevelopment while protecting key resources; and
 - Provide clear standards for landowners and simplify local government administration.

2. U.S. Army Corps of Engineers (USACE)

The Corps' regulatory program includes Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Under Section 10, a Corps permit is required to do any work in, over or under a 'Navigable Water of the U.S.' Waterbodies have been designated as 'Navigable Waters of the U.S.' based on their past, present or potential use for transportation for interstate commerce. Under Section 404, a Corps permit is required for the discharge of dredged or fill material into waters of the U.S. Many waterbodies and wetlands in the nation are waters of the U.S. and are subject to the Corps' Section 404 regulatory authority.

3. Board of Water and Soil Resources (BWSR)

The local and regional wetland rules are governed by the Wetland Conservation Act (WCA). The WCA, passed in 1991, extends protection to wetlands. The WCA follows a "no net loss" policy. The wetlands covered under the WCA must not be drained or filled, wholly or partially, unless replaced by restoring or creating wetlands of at least equal public value under an approved replacement plan. Replacement ratio is typically 2:1 (2 acres created for every 1 acre filled) for wetland impacts.

A designated Local Government Unit (LOU) is responsible for making exemption, no-loss determinations, and approving replacement plans. Currently, the Commissions act as the LGU for WCA within the City.

The powers and duties of this Minnesota state agency also include:

- Coordination of water and soil resources planning 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.

4. Minnesota Pollution Control Agency (MPCA)

The MPCA implements provisions of Section 404 of the Clean Water Act with guidance from the EPA through a permitting process. The Section 404 permit also requires a Section 401 water quality certification before it is valid. The EPA has given Section 401 certification authority to the MPCA.

The powers and duties of this Minnesota state agency include:

- Fulfilling mandates from the EPA, particularly in regard to the Clean Water Act.
- Administration of Brooklyn Park's NPDES MS4 permit.
- Administration of the NPDES construction stormwater permit program.
- Administration of the NPDES industrial site discharge permit program.
- Development of Total Maximum Daily Loads (TMDLs) for water bodies and watercourses in Minnesota (often in conjunction with other agencies or joint powers organizations such as watersheds).

5. United States Environmental Protection Agency (EPA)

As it relates to surface water management within Brooklyn Park this agency is charged with interpreting and applying aspects of the Clean Water Act. This has led to the City's need for its NPDES MS4 Permit. TMDL limits as mandated by the EPA also

stem from the EPA's role as steward of the Clean Water Act. Administration of both the MS4 permits and TMDL's are handled by the MPCA.

6. Shingle Creek and West Mississippi Watershed Management Commissions (Commission)

The powers and duties of the Commission within Brooklyn Park include:

- Approval authority over the LWMP.
- Ability to develop rules regarding management of the surface water system.
- Ability to develop an annual budget and collect revenue in accordance with the JPA for the purpose of administrative, program and capital improvement costs.
- Regulation of land use and development when one or more of the following apply:
 - The City is in violation of their approved local plan.
 - The City authorizes the watershed toward such regulation.
- Wetland Conservation Act administration as the designated LGU for the City.
- Other powers and duties as given in statute and joint powers agreements.

7. Hennepin County

Hennepin County serves as the Drainage Authority with jurisdiction over County Ditch #13 (Shingle Creek) a portion of which is in Brooklyn Park. County Ditch #13 was established in 1910 as a channelized reach of Shingle Creek extending from Xerxes Avenue North in Brooklyn Park to Webber Park (North 44th Avenue) in Minneapolis.⁵

Hennepin County is also represented on the Technical Evaluation Panel for administration of the WCA in Brooklyn Park.

8. Three Rivers Park District (TRPD)

The TRPD has jurisdiction over the Coon Rapids Dam Regional Park and has partnered with the City on maintenance and reconstruction efforts of the portion of the Rush Creek and Shingle Creek Regional Trail Systems that traverse the City.

9. Metropolitan Council

Metropolitan Council, through Metropolitan Council Environmental Services (MCES), serves as a review agency for Local Water Management Plans. They also review and approve municipal comprehensive plans and have a prominent role in the Mississippi River Critical Area Corridor as described on the MnDNR website:

The Metropolitan Council reviews existing plans that affect lands within the Mississippi River Critical Area Corridor. Technical assistance is provided to communities in amending or adopting plans to conform to Executive Order 79-19 standards and guidelines and any voluntary MNRRA CMP policies. The council reviews all critical area plans and ordinances and makes an evaluation to MnDNR prior to the approval decision. In addition, the council administers the pass-through funds from the National Park Service to provide financial assistance to communities wishing

⁵ Shingle Creek and West Mississippi Watershed Management Commission, Third Generation Watershed Management Plan, April 2013

to revise their plans and ordinances. The council is also involved with oversight of the Metropolitan Land Planning Act.

E. Water Resource Management-related Agreements

The City of Brooklyn Park is party to two separate joint powers agreements (JPA's) related to surface water management:

1. With the cities of Brooklyn Center, Crystal, Maple Grove, Minneapolis, New Hope, Osseo, Plymouth, and Robbinsdale establishing the Shingle Creek Watershed Management Commission.
2. With the cities of Brooklyn Center, Champlin, Maple Grove, and Osseo establishing the West Mississippi Watershed Management Commission.

The City has also designated the Commissions to act as the LGU for administration of the WCA.

F. Impacts of the Brooklyn Park LWMP on Other Units of Government

Upon approval of this LWMP by the Commissions with jurisdiction over the City, it is the City's intent to maintain its current permitting powers through its Permit for Land Disturbing Activities. Currently, the Commissions do not issue permits, so no impact to these organizations would occur. The Commissions would continue in their role as a project review agency.

G. Watershed Rules and Standards that Affect the City of Brooklyn Park

The City of Brooklyn Park stormwater ordinance and engineering standards, presented in **Appendix A and B**, are a close reflection of the rules and standards of the Commissions, only presented through the municipal filter. The Minimum Engineering Standards in Appendix A will be revised to include the Commissions' volume management requirement of 1" of abstraction from new impervious surface; and to note that the water quality standard can be met by infiltrating 1.3" of runoff from impervious surface.

The left column in Table 3.1 is a summary of the Commissions rules and standards, while the right column describes the applicable City controls as described in the LWMP or contained within the City's Code of Ordinances. The standards presented in **Appendix A and B** are the minimum standards for storm water conveyance and management within the City of Brooklyn Park and are required to be met for all new development and redevelopment.

Table 3.1 - Summary of Design Standards and Criteria for Shingle Creek/West Mississippi Watershed Management Commission and the City of Brooklyn Park

	Commission Standard	Applicability	Brooklyn Park Local Control
Project Reviews Required	A Stormwater Management Plan consistent with all applicable management rules and standards* must be reviewed and approved prior to commencement of land disturbing activities. Generally, the Commission reviews single family projects larger than 15 acres and all other land uses larger than 5 acres; linear projects; and projects with wetland impacts where the Commission is LGU for WCA. Cities generally review all other projects.	All development or redevelopment projects of the following types: <input type="checkbox"/> Single family detached housing project 1 acre or larger in size <input type="checkbox"/> Projects in any other land use 0.5 acres or larger in size <input type="checkbox"/> Projects within the 100-year floodplain <input type="checkbox"/> Projects adjacent to or within a lake, wetland, or watercourse <input type="checkbox"/> Any land disturbing activity requested by a member city to be reviewed regardless of project size <input type="checkbox"/> Linear projects creating more than one acre of new impervious surface	All activities requiring a permit for land disturbing activities from the City shall conform to all requirements of federal, state and local laws, rules and regulations.
Rate Control	Peak runoff rates may not exceed existing rates for the 2-year, 10-year, and 100-year critical storm event; or the capacity of downstream conveyance facilities; or	All projects on more than one acre requiring a project review. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.	Ch.153.07 outlines the requirements for Stormwater Management Plans Ch.153.07.C.5.b.3 describes the requirements for Rate Control.

	contribute to flooding		
Volume Management	One inch of impervious surface runoff must be abstracted on site for at least 48 hours (Definition of Abstraction: Removal of stormwater from runoff, by such methods as infiltration, evaporation, transpiration by vegetation, and capture and reuse, such as capturing runoff for use as irrigation water. ⁶)	All projects on more than one acre requiring a project review. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.	Ch.153.07 outlines the requirements for Stormwater Management Plans Ch.153.07.C.5.b.1 b&c describe volume control for new, nonlinear developments and redevelopments. The Minimum Engineering Standards in Appendix A will be revised to include the Commissions' volume management requirement of 1" of abstraction from new impervious surface; and to note that the water quality standard can be met by infiltrating 1.3" of runoff from impervious surface.
Erosion and Sediment Control	Erosion control plan using Best Management Practices (BMPs) and consistent with the NPDES General Construction Permit is required	All projects requiring a project review	Ch.153.08 outlines the requirements for temporary and permanent erosion and sediment controls. Ch153.A.3 lists the projects requiring erosion control plans.
Floodplain Alteration	Compensating storage is required to mitigate floodplain fill	All development or redevelopment projects within the 100-year floodplain regardless of project size	Policy 2.1 Prohibits encroachment that will reduce the storage capacity of floodplains, unless mitigating action is undertaken. Ch152.515.B.3 requires the designated engineer to : "...Compute the floodway necessary to convey or store the regional flood without increasing flood stages and providing compensation storage volumes on a 1:1 basis

⁶Shingle Creek And West Mississippi Watershed Management Commissions Rules and Standards, 2013

			below the 100-year flood elevation.”
Water Quality	Removal of 60% of TP and 85% of TSS, using either permanent sedimentation and water quality ponds consistent with NURP design standards, providing a permanent wet pool with dead storage of at least the runoff from a 2.5 inch event, or a combination of BMPs providing those removals	All projects on more than one acre requiring a project review. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.	Ch153.07.C.5.b requires: “Proposed stormwater management plans shall incorporate volume control, water quality control, and rate control as the basis for stormwater management in the proposed development plan on sites without restrictions. All proposed projects shall be in conformance with the most current requirements of the MPCA’s Municipal Separate Storm Sewer Systems (MS4) Permit and the Shingle Creek and West Mississippi Watershed Management Commissions, as applicable. Ch153.07.C.5.b.2 requires new development with net increase in impervious of 1 acre, and redevelopment with construction area greater than 1 acre, to provide water quality treatment to meet NURP guidelines. Ch153.07.C.5.f Pond design standards require permanent pool “dead storage” volumes greater than or equal to the runoff from a 2.5-inch, 24-hour storm over the entire contributing drainage area assuming full development.
Buffer Strips	Vegetated buffer strips of a minimum 20 foot, average 30 foot width are required adjacent to wetlands and watercourses	All projects requiring a project review that contain or abut a wetland or watercourse	Standard 4B, Appendix A: A vegetated buffer strip with a minimum buffer width of 20-feet and an average width of 30-feet measured from the ordinary high water level of the watercourse or wetland is required adjacent to wetlands, lakes and natural water course.
Wetland	Wetlands may not be drained, filled, excavated, or otherwise altered without an approved wetland replacement plan from the	All land disturbing activity impacting a wetland as defined by the Wetland Conservation Act (WCA)	Wetlands may not be drained, filled or excavated without prior approval from the Shingle Creek or West Mississippi Watershed Management Commission in accordance with the Wetland Conservation Act.

	local government unit (LGU) with jurisdiction		
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*Important Note: Approved TMDL Implementation Plans may have additional site-specific requirements.

V. SYSTEM ASSESSMENT

A. General

This section describes how storm water is conveyed through the City and provides an assessment of the functionality of the system. The storm water drainage system for the City is shown on **Figure 15**. This figure shows storage areas, pipes, channels, and BMPs in the City.

The assessment portion catalogues the various assessments of problems that have been performed in the past. The intent is to identify the source of problems and specific actions the City proposes to make to address these problems either independently or in collaboration with other organizations.

System Description

This subsection describes the surface water management system for the City of Brooklyn Park. Approximately 55% of the City is located in the West Mississippi Watershed, and 45% of the City is located in the Shingle Creek Watershed. The watershed boundary is shown in **Figure 7**.

There are six storm water districts in the City of Brooklyn Park.

1. **West Mississippi Watershed**

Within Brooklyn Park, the West Mississippi watershed generally encompasses the area of the City north of 85th Avenue North and extends from the Mississippi River to the western City boundary. That portion of the City lying easterly of TH 252, south of 85th Avenue is also included. There are four storm water districts within the West Mississippi Watershed: Edinbrook/ Century Channel, Riverside, Oxbow Creek and Northwest. All four districts are tributary to the Mississippi River. A brief description of each district follows:

- **Oxbow Creek** - This district encompasses a small area along 109th Avenue in the northern part of the City. This drainage is collected and flows northerly under 109th Avenue through Oxbow Creek Park in Champlin and eventually reaches the Mississippi River. This drainage has historically been referred to as Oxbow Creek. Storm drains in the Northwest district collect runoff from much of the area that originally drained to Oxbow Creek, this runoff is carried easterly to a wetland complex draining to the Mississippi River.
- **Riverside** - This district encompasses those areas of the City that are located near the Mississippi River and drain to the river either directly or through storm drains. “There are no lakes or streams in this subwatershed... The Commission does not perform water quality monitoring of the Mississippi River.”⁷
- **Edinbrook/Century Channel** - This district generally lies between 85th Avenue and the TH 610 corridor. It is characterized by the constructed drainage channel that serves as the trunk conveyance feature in this district. This channel also conveys runoff from the Cities of Osseo and Maple Grove through Brooklyn Park and outlets into Mattson Brook which flows a short distance to the Mississippi River. The watershed plan indicates: “The subwatershed is generally drained by storm sewers which discharge into Century/Edinbrook Channel, which is a Minnesota DNR protected watercourse. The channel

⁷ Shingle Creek and West Mississippi Watershed Management Commissions, Third Generation Watershed Management Plan, April 2013

system is also known as county ditch #5, although it is not under the ditch authority of Hennepin County. Like the other subwatersheds to the north, this subwatershed is very sandy. Stormwater ponds are often lined to maintain a stable permanent pool. Flow and water quality monitoring conducted in 2010 and 2011 suggests that the subwatershed yields less runoff than Shingle Creek... There are no lakes in this subwatershed. Century and Edinbrook channels are constructed drainageways, in some locations excavated naturally intermittent channels and ditched waterways elsewhere. Edinbrook Channel discharges into Mattson Brook, a small natural stream. In 2010 and 2011 Mattson Brook was monitored for water quality. While this stream is too small to be required to meet state water quality standards, those standards are a useful metric for comparison. Total phosphorus, orthophosphorus, and total suspended solids during base flow were all lower than eutrophication and TSS state standards proposed to be effective in 2014, or ecoregion references. However, during storm events those parameters were measured at nearly or in exceedance of the proposed state standard or reference, indicative of urban wash-off. Four of eleven samples collected exceeded the chronic standard for chloride; none exceeded the acute standard. Five of the eight samples collected exceeded the state standard for *E. coli* concentration. The macroinvertebrate community in Mattson Brook is monitored by student volunteers, so dissolved oxygen concentration was also monitored in this stream. None of the samples fell below the 5 mg/L dissolved oxygen minimum standard.”⁸

- **Northwest** - This District includes much of northern Brooklyn Park between TH 610 and 109th Avenue North. As the City developed, storm drains were constructed in this district to collect runoff from much of the area that originally drained to Oxbow Creek, this runoff is carried easterly and outlets into wetlands near the Mississippi River. Trunk storm drains have been constructed along 101st Avenue to provide an adequate outlet for this area. These trunk lines carry storm water to the eastern end of 101st Avenue where the stormwater is discharged into a large wetland complex on the City’s Environmental Preserve. Water flows on through wetlands within the Coon Rapids Regional Park to eventually outflow to the Mississippi River. The watershed plan explains: “...this subwatershed is very sandy. Stormwater ponds are often lined to maintain a stable permanent pool. Flow and water quality monitoring conducted in 2010 and 2011 suggests that the subwatershed yields less runoff than Shingle Creek... There are no lakes or perennial streams in this subwatershed...in 2010 and 2011 outflow from the Environmental Preserve was monitored for water quality. While this site is not a natural stream and thus is not required to meet state water quality standards, those standards are a useful metric for comparison. Total phosphorus, orthophosphorus, and total suspended solids during base flow were all lower than the eutrophication and TSS standards proposed to be effective in 2014 or ecoregion references. However, during storm events those parameters were measured at nearly or in exceedance of the proposed

⁸ Shingle Creek and West Mississippi Watershed Management Commissions, Third Generation Watershed Management Plan, April 2013

standard or reference, indicative of urban wash-off. Five of the nine samples collected exceeded the state standard for *E. coli* concentration.”⁹

2. Shingle Creek Watershed

The southern portion of the City of Brooklyn Park is within the Shingle Creek Watershed. This watershed encompasses that portion of the City lying generally south of 85th Avenue and west of TH 252—it contains two storm water districts, Shingle Creek and Southwest.

A brief description of these two districts follows:

- **Shingle Creek** – Shingle Creek in this district receives runoff from Brooklyn Park as well as the Cities of Maple Grove, New Hope, Osseo and Plymouth. Shingle Creek is the main storm water conveyance feature in this area. The majority of the tributary area to the creek was developed by the mid 1970's and contains very few water quality treatment facilities. Shingle Creek exits Brooklyn Park through the Palmer Lake basin in Brooklyn Center and continues on through Minneapolis to the Mississippi River.

The Shingle Creek Watershed Management Commission has set a limit on the discharge rate for Shingle Creek at the City's downstream limits. The maximum discharge for Shingle Creek exiting Brooklyn Park is 790 cfs. Based on the Commissions Hydro CAD model from August 2002, which reflected 2002 land use, the 2002 peak flow rate was 634 cfs. Since this portion of Brooklyn Park is essentially fully developed, future changes to the peak flow rates due to development are not expected.

The Watershed Commission is receiving grant funds from FEMA to update the Flood Insurance hydrology and hydraulics models of Shingle Creek. The grant will provide for surveying of bridges and culverts on the creek, for updating the hydrology to reflect the NOAA Atlas 14 design precipitation, and to update the hydraulics models and floodplain maps. Since the NOAA Atlas 14 precipitation depths are greater, and rainfall distribution is more intense, than previous precipitation design data, the simulated peak flows and flood stages are likely to increase.

The Commission assessment of Shingle Creek explains: “The average water yield from the watershed...is 5.1 inches, which is within the range of 4-7 inches per year typically seen in the urbanized part of the Twin Cities Metro Area... Water quality in Shingle Creek is typical of an urban stream in the Twin Cities and is dominated by runoff from impervious surfaces...(Pollutant) Loads are typically higher in years with more storm events and higher annual runoff volumes...Total Phosphorus...concentrations in Shingle Creek...are on the low end of those found in typical urban streams, although concentrations can be high during rain wash-off events... Total Suspended Solids (TSS)...(are)...Higher than ecoregion typical values could be a result of streambank erosion, however the Shingle Creek Corridor Study concluded that both Shingle and Bass Creeks were generally stable and found only a few locations of evident aggradation or excess embeddedness, or areas with a silty streambed. Most of those sites were downstream of storm sewer outfalls or in low- velocity areas. The likely source

⁹ Shingle Creek and West Mississippi Watershed Management Commissions, Third Generation Watershed Management Plan, April 2013

of higher than typical TSS is fine sediments conveyed in stormwater runoff from developed areas....dissolved oxygen data for Shingle Creek...The state standard is a minimum DO concentration of 5 mg/L, and a number of readings are below that threshold. The determination of impairment is based on data collected before 9 AM as that is the period when DO is typically the lowest. The TMDL determined that the likely causes of low DO were low-oxygen discharge from headwaters wetlands and excessive sediment oxygen demand resulting from the overwide channel. Stream restoration to create a low-flow channel, add reaeration structures, and improvements to headwaters wetlands would have the most impact in increasing dissolved oxygen.... The chloride TMDL found that the source of excess chloride was road salt applied for winter ice control, primarily on streets and highways but also in parking lots and other private facilities. An overall 71 percent reduction in chloride from all sources in the entire watershed is required to meet the state chloride standard for streams.”¹⁰

The following paragraphs from the Third Generation Watershed Management Plan provides additional information regarding the lake characteristics and water quality.

Lake Magda:

“Lake Magda is an Impaired Water, and a TMDL and Implementation Plan were completed and approved in 2010. This shallow lake is hypereutrophic. Residents report a significant population of carp is present, but no systematic survey has quantified or characterized the fish community. No systematic plant surveys have been conducted on Lake Magda. Residents report that the dominant aquatic species is sago pondweed, with curly-leaf pondweed, coontail and elodea also present. The TMDL concluded that a nutrient load reduction of 69 percent would be required to consistently meet standards under average precipitation conditions and that internal load management and reduction of nonpoint sources of phosphorus in the watershed by retrofitting BMPs would have the most impact on reducing phosphorus load and improving water quality. Because the watershed to this lake is very small, retrofit opportunities may be limited.”¹¹

Lake Success:

“Lake Success has a very small watershed. Surface runoff from nearby is collected in storm sewers and routed into the lake. The lake outlets south into storm sewer. Over the last several years lake levels have fallen, although since precipitation recently has been above normal the levels have risen. There is some suspicion that groundwater input to the lake has declined, and the lake is now more dependent on runoff to sustain its normal water level. A staff gauge has been installed and lake level is now being read more frequently. The City of Brooklyn Park is working with residents and the DNR to see if lake levels may be affected by groundwater appropriations from the city’s wells. Historically Lake Success has had very good, clear water, although that has changed significantly recently, and residents report more aquatic vegetation and algae blooms. This shallow lake may have “flipped” from a clear-water state to a

¹⁰ Shingle Creek and West Mississippi Watershed Management Commissions, Third Generation Watershed Management Plan, April 2013

¹¹ Shingle Creek and West Mississippi Watershed Management Commissions, Third Generation Watershed Management Plan, April 2013

turbid-water state, although more data are necessary to determine if that is the case and cause(s).”¹²

- **Southwest** – Twin Creek in this district receives storm water runoff from the Cities of Brooklyn Park, New Hope and Crystal. Just downstream from the Brooklyn Park City boundary, Twin Creek flows through DNR protected wetland 639W (located adjacent to the Crystal airport) then into Upper Twin Lake. “Upper Twin is very shallow and hypereutrophic...with frequent algae blooms and occasional winter fish kills.”¹³

City staff have observed surface flooding near the intersection of 67th Avenue N. and Douglas Dr. N. Storm drains in this area need to be analyzed to determine potential solutions.

B. System Assessment

1. City Assessments

Several Previous City assessments have been completed including:

- (i) Comprehensive Storm Drainage Plan for Northern Brooklyn Park, City of Brooklyn Park, Minnesota, Consulting Engineers Diversified, Inc., June 1978 This study included research, analysis and design of stormwater management features in the northern part of the City (i.e. north of 85th Avenue).
- (ii) Comprehensive Stormwater Management Plan, City of Brooklyn Park, Orr-Schelen-Mayeron & Associates, Inc., 1995 (CSWMP) The City assessed the entire storm water system in its 1995 Water Management Plan. The 1995 CSWMP was very detailed in its analysis of problem areas associated with water quality and quantity problems. That report analyzes each drainage district separately, identifying flooding and quality issues on a local level. The reader is referred to that report for an in-depth analysis of storm water management issues.
- (iii) The "Northern Brooklyn Park Trunk Storm Sewer Conveyance System Study" was completed in September, 2000. This study examined in more detail the storm water needs of the City primarily north of the T.H. 610 corridor.
- (iv) Local Water Management Plan, City of Brooklyn Park, Minnesota, 2009. The local water management plan was prepared in response to the requirements of Minnesota Statutes 8410 and 103B.235 as well as the standards set forth by the Shingle Creek and West Mississippi Watershed Management Commissions.
- (v) Groundwater Resources

Specific Brooklyn Park Issues:

- Brooklyn Park obtains all of its municipal water supply from groundwater. The majority is pumped from the "Drift Aquifer". As described in the City's Wellhead Protection Plan the drift aquifer has a high vulnerability to contamination due to rapid infiltration rates through the upper layers of the subsurface geology. This vulnerability creates a conflict for the City

¹² Shingle Creek and West Mississippi Watershed Management Commissions, Third Generation Watershed Management Plan, April 2013

¹³ Shingle Creek and West Mississippi Watershed Management Commissions, Third Generation Watershed Management Plan, April 2013

between government mandates on infiltration of storm water, aquifer recharge and the vulnerability of the resource.

- Beginning in the early 1990's and more recently related to Lake Success the decline of the surficial groundwater levels has been debated by regulatory agencies, residents and City staff. The main issue is whether the observed decline in water levels in Lake Success, and other wetlands located in the northern part of the City, is a direct result of groundwater withdrawals by the City's municipal well field, changes in shallow groundwater due to utility construction such as sanitary sewer interceptors, change in climate, cyclical pattern of drought, or combinations of these. No specific actions other than continued monitoring by the City are proposed at this time.

(vi) Issues

Global issues are major inter-community, inter-watershed, or inter-district issues requiring the cooperation of one or more outside parties. Local issues are storm water management issues that can be resolved by the City of Brooklyn Park.

- Global Issues

The City has completed several retrofit projects to add regional storm water treatment facilities. For example, the Brooklyn Park construction of the 62nd Avenue Stormwater Pond has resulted in a TP annual load reduction of 46 pounds per year to Twin Creek and Upper Twin Lake.

The City will continue to seek opportunities for redevelopment or reconstruction of its infrastructure to improve treatment of storm water runoff. The City intends to explore opportunities to retrofit existing BMPs in the watershed of each TMDL to maximize their pollutant removal capacity. All city construction projects will consider Green Infrastructure practices when feasible. Upon reevaluation of the TMDL waters on a ten-year monitoring cycle conducted by the state, the City will consider any necessary modifications to this approach.¹⁴

- Local Issues

- One of the most challenging issues for the City are the unfunded mandates from state and federal agencies regarding storm water i.e. NPDES-MS4, TMDL's etc.
- Redevelopment sites are evaluated regarding storm water quality improvements by either the City or the Commissions based on the project size, The City is committed to maximizing treatment of storm water runoff for these projects.

2. Watershed Assessments

The Commissions Third Generation Water Management Plan gives a thorough analysis of water resources existing conditions, opportunities and issues within the West Mississippi and Shingle Creek Watersheds, both general and specific to Cities and

¹⁴ City of Brooklyn Park, MS4 SWPPP Application for Reauthorization for the NPDES/SDS General Small Municipal Separate Storm Sewer System (MS4) Permit MNR040000 reissued with an effective date of August 1, 2013

smaller sub watersheds. Although excerpts from the Commissions Plan are included in this document, the reader is directed to that plan for additional details. Shingle Creek Channel Assessment

General Summary:

- A profile survey of Shingle Creek was completed in 1998. In most areas the banks were stable and well vegetated and no severe erosion was detected. Some minor erosion was detected where vegetation had exposed roots, but that is unlikely to be a major source of sediment to the creek.
- In 2004 the Commission completed the initial Shingle Creek Corridor Study and in 2006 a Shingle Creek Corridor Study, Phase II was completed that assessed tributaries and other streams in the two watersheds, specifically Bass Creek and Mattson Brook. Those studies identified general management activities and standards for the streams. Because these stream corridors are either fully developed or in public ownership, the City will manage and implement improvements in conformance with these studies as funding becomes available.

3. Clean Water Act Assessments, Impairments and TMDLs

Shingle Creek, Bass Creek, Lake Magda and the Mississippi River (within the City limits) are listed on the state impaired waters list. The Twin Lake Chain downstream from the City is also impaired. Known as the 303(d) list from the applicable section of the Federal Clean Water Act; these waters are ones that do not currently meet their designated use due to the impact of a particular pollutant or stressor. If monitoring and assessment indicate that a waterbody is impaired by one or more pollutants, it is placed on the list. During the process, a strategy will be developed leading to attainment of the applicable water quality standard. Developing this strategy is commonly known as the Total Maximum Daily Load (TMDL) process and involves the following phases:

- Assessment and listing
- TMDL study
- Implementation plan development and implementation
- Monitoring of the effectiveness of implementation efforts

Responsibility for implementing the requirements of the Federal Clean Water Act falls to the EPA. In Minnesota, the EPA delegates much of the program responsibility to the MPCA. Information on the MPCA program can be obtained at the following web address: <http://www.pca.state.mn.us/water/tmdl/index.html>. The following is an excerpt from the MPCA website describing the program and its need:

"The federal Clean Water Act requires the MPCA to:

- 1. Assess all waters of the state to determine if they meet water quality standards*
- 2. Create a list of impaired waters that do not meet standards, and update the list every even-numbered year.*
- 3. Set pollutant-reduction goals needed to restore impaired waters, called the total maximum daily load*

*States must develop a list of impaired waters that require **total maximum daily load (TMDL) studies**, and submit an updated list to the U.S. Environmental*

Protection Agency (EPA) every even-numbered year for approval. The TMDL is the maximum amount of a pollutant a body of water can receive without violating water quality standards, and an allocation of that amount to the pollutant's sources."

This list forms the starting point for many of the state and federal requirements placed on local governments regarding water quality. However, beyond the federal requirements, there are many reasons for us to move forward with the development of TMDLs. Foremost is the need to clean up our rivers, streams and lakes to maximize their contributions to the state's economy and quality of life and to protect them as a resource for future generations.

For each pollutant that causes a water body to fail to meet state water quality standards, the Federal Clean Water Act requires the MPCA to conduct a TMDL study. A TMDL study identifies both point and non-point sources of each pollutant that fails to meet water quality standards. Water quality sampling and computer modeling determine how much each pollutant source must reduce its contribution to assure the water quality standard is met. Rivers and streams may have several TMDLs, each one determining the limit for a different pollutant.

The absence of a waterbody from the 303(d) list does not necessarily mean the waterbody is meeting its designated uses. It may be that it has either not been sampled or there is not enough data to make an impairment determination. **Table 4.1a** provides a list of impaired waters within Brooklyn Park.

Table 4.1a - List of Impaired Waters within the City of Brooklyn Park					
Water Body	Year First Listed	Assessment Unit ID #	Affected Use	Pollutant or Stressor	TMDL start/ TMDL complete
Mississippi River	1998	07010206-509	Aquatic consumption	Mercury FCA, PCB FCA	1999/2011
Shingle Creek	1998	07010206-506	Aquatic life	Chloride	2002/2006
Shingle Creek	2004	07010206-506	Aquatic life	Low Oxygen	2004/2006
Shingle Creek	2006	07010206-506	Aquatic life	Invertebrate IBI	2013/2015
Shingle Creek	2014	07010206-506	Recreation	E. coli.	2008/2015
Bass Creek	2002	07010206-527	Aquatic life	Fish Bioassessments/Chloride	2007/2009
Lake Magda	2002	27-0065-00	Recreation	Nutrients	2008/2012

Mississippi River TMDL

The **Mississippi River** adjacent to Brooklyn Park has an EPA-approved impairment for: Mercury in Fish Tissue, Fecal Coliform; and PCB in Fish Tissue. These impairments are considered non-construction related and do not require any additional best management practices (BMPs) or plan review for compliance with the NPDES/SDS construction permit.¹⁵

Shingle Creek and Bass Creek Biota and Dissolved Oxygen TMDL

Shingle Creek flows through Brooklyn Park from the confluence of Bass Creek and Eagle Creek near the western boundary of the City to the Palmer Lake Basin. Shingle Creek serves as the primary drainage corridor for the southern portion of the City.

¹⁵ MPCA Construction Stormwater Special Waters Search, <https://pca-gis02.pca.state.mn.us/CSW/index.html>

Shingle Creek has an EPA-approved impairment for: Aquatic Macroinvertebrate Bioassessments; Chloride; and Dissolved Oxygen. These impairments are considered to be construction related parameters and require the additional best management practices (BMPs) for temporary and permanent stormwater management on construction projects within 1 mile of, and flowing to the impaired stream.¹⁶

The Shingle and Bass Creek Biota and Dissolved Oxygen Total Maximum Daily Load (TMDL) Implementation Plan addresses biotic integrity and dissolved oxygen (DO) impairments. The TMDL also identifies additional stressors affecting the biotic integrity of Bass and Shingle Creeks – altered hydrology, lack of habitat, loss of connectedness, and ionic strength (chloride). The previously-completed Shingle Creek Chloride TMDL and Implementation Plan identify the load reductions necessary to reduce chloride concentrations in Shingle Creek. The TMDL implementation plan calls for the City to assist with the activities listed in **Table 4.1b** in order to increase dissolved oxygen and improve biotic integrity.¹⁷

The city continues to implement the best management practices of their MS4 permit and SWPPP (including the Minimum Control Measures (MCMs) 1-6). Existing BMPs will be inspected and maintained as necessary to ensure they are working. The City will continue to seek opportunities for redevelopment or reconstruction of its infrastructure to improve treatment of storm water runoff.

Location	Reach	Action	Responsible Party	Estimated Schedule	Estimated Cost
Watershed Wide		Retrofit BMPs to add stormwater treatment	Cities	Ongoing	Varies by project
Watershed Wide		Increase infiltration in watershed	Cities	Ongoing	Varies by project
Upper Shingle Creek	1	Add reaeration Structures	Brooklyn Park, SCWMO	2020-2025	\$50,000
	2	Thin trees, establish buffer	Brooklyn Park	2015-2020	\$80,000
	3	Ecological stream restoration	Brooklyn Park, SCWMO	2020-2025	\$700,000
	4	Ecological stream restoration	Brooklyn Park, SCWMO	Completed	--
	5 & 6	Enhance restoration	Brooklyn Park	2015-2020	\$70,000
	7 & 8	Enhance restoration	Brooklyn Park	2015-2020	\$50,000
	7 & 8	Restore balance of reach (Regent to Brooklyn Blvd)	Brooklyn Park, Brooklyn Center, SCWMO	2020-2025	\$350,000
	9 & 10	Ecological stream restoration, fish bypass	Brooklyn Park, Brooklyn Center, SCWMO	2012-2015	\$350,000
	11	Enhance off-line refugia	Brooklyn Park, SCWMO	2015-2020	\$500,000
	11	Ecological stream restoration	Brooklyn Park, SCWMO	2012-2015	\$30,000

¹⁶ MPCA Construction Stormwater Special Waters Search, <https://pca-gis02.pca.state.mn.us/CSW/index.html>

¹⁷ Shingle and Bass Creeks Biota and Dissolved Oxygen TMDL Implementation Plan, Wenck Associates, Inc. Maple Plain, MN January 2012

¹⁸ Shingle and Bass Creeks Biota and Dissolved Oxygen TMDL Implementation Plan, Wenck Associates, Inc. Maple Plain, MN January 2012

	12	Ecological stream restoration	Brooklyn Park, SCWMO	2020-2025	\$75,000
Bass Creek	1	Ecological stream restoration	Brooklyn Park, SCWMO	2015-2020	\$300,000
	2	Ecological stream restoration	Brooklyn Park, new Hope, SCWMO	2015-2020	\$300,000

Shingle Creek Chloride TMDL

Shingle Creek was designated an impaired water for chloride concentrations that exceed the state standards in 1998. A TMDL was completed to determine the pollutant reductions needed to meet the chloride standards in Shingle Creek. Most of the chloride in Shingle Creek is attributed to nonpoint sources related to deicing and fertilizer applications, with the primary source being road salt applied to the streets and highways in the watershed. The TMDL concluded that a 71% reduction in chloride must be achieved to meet the state chloride standards.¹⁹

The City of Brooklyn Park and the other stakeholders in the watershed agreed to work collectively to achieve a 71% reduction in chloride use to achieve the standard (understanding that each stakeholder was working under unique financial, public safety and perception, and feasibility limitations). Each stakeholder agreed to implement BMPs to the maximum extent practicable. By incorporating and applying the following BMPs into operations, the City is meeting its TMDL obligations. Activities and BMPs include:²⁰

1. Annually calibrate spreaders and reduce salt by adjusting application rates
2. Use the Road Weather Information Service (RWIS) and other sensors such as truck mounted or hand held sensors to improve application decisions such as the amount and timing of application
3. Evaluate new technologies such as prewetting and anti-icing as equipment needs to be replaced. These technologies will be adopted where feasible and practical.
4. Investigate and adopt new products (such as Clear Lane, a commercially available pretreated salt) where feasible and cost effective. (Reference MS4 Application)
5. Cover salt stockpiles, store salt on impervious surfaces, practice good housekeeping when handling salt to minimize spillage and minimize potential wash off.
6. Annually train operators on finding the best balance between public safety and environmental concerns. Train operators to determine the least amount of product necessary to maintain public safety.
7. Pile snow away from sensitive areas. Sweep streets in as soon as possible in late winter to remove residual salts.
8. BMPs will be incorporated into the NPDES SWPPP. Activities will be tracked and reported in the annual NPDES report.

The implementation plan for the Shingle Creek chloride TMDL has been completed and has been incorporated into its NPDES-MS4 SWPPP. TMDL implementation strategies may result in additional adjustments to the BMP's included in the City's SWPPP.

¹⁹ Shingle Creek Chloride TMDL Implementation Plan, Wenck Associates, Inc. , Maple Plain, MN February 2007

²⁰ Shingle Creek Chloride TMDL Implementation Plan, Wenck Associates, Inc. , Maple Plain, MN February 2007

Lake Magda Nutrient TMDL

Lake Magda is a small lake of about 12 acres located along the western border of Brooklyn Park adjacent to T.H. 169. Lake Magda is hypereutrophic and residents report a significant carp population. Lake Magda has an aquatic recreation affected use.²¹ The lake has an EPA-approved impairment for: Nutrient/Eutrophication Biological Indicators. These impairments are considered to be construction related parameters and require the additional best management practices (BMPs) for temporary and permanent stormwater management on construction projects within 1 mile of, and flowing to the impaired water.²²

The Lake Magda Nutrient TMDL indicates that "...phosphorus load reduction of 69% would be required to consistently achieve a total phosphorus concentration of 60 µg/L, which would meet the state standard."²³

The city continues to implement the best management practices of their MS4 permit and SWPPP (including the Minimum Control Measures (MCMs) 1-6). Existing BMPs will be inspected and maintained as necessary to ensure they are working. The City will continue to seek opportunities for redevelopment or reconstruction of its infrastructure to improve treatment of storm water runoff including identified opportunities (**Table 4.2a**).

Table 4.2a - Brooklyn Park Participation in Lake Magda Implementation Plan Activities²⁴				
Approach	Activity	Responsible Party	Estimated Schedule	Estimated Cost
Reduce External Load	Retrofit BMPs to add stormwater treatment ponds, infiltration, filters, etc.	Brooklyn Park, MNDOT, SCWMO	Ongoing	Varies by project
	Increase infiltration in watershed	Brooklyn Park, MNDOT, SCWMO	Ongoing	Varies by project
	Shoreline Management and Restoration	Property Owners, Brooklyn Park,	Ongoing	\$130,500 to \$217,500
	Street Sweeping	Brooklyn Park	Ongoing	\$65 to \$85 per mile of additional sweeping
Biologic Integrity Management	Aquatic Plant Management	Property Owners, Brooklyn Park,	Ongoing	\$5,000 for plant survey, \$3000 to \$5000 per year for treatments
	Fish Population Management	Property Owners, Brooklyn Park, DNR	Ongoing	Varies by strategy
Tracking and Reporting	Activities will be tracked in annual NPDES MS4 Report	Brooklyn Park, MNDOT, SCWMO	Ongoing	Unknown

²¹ MPCA Impaired Waters Viewer, <https://www.pca.state.mn.us/water/impaired-waters-viewer-iwav> Accessed 1/19/2018

²² MPCA Construction Stormwater Special Waters Search, <https://pca-gis02.pca.state.mn.us/CSW/index.html> accessed 1/18/2018

²³ Lake Magda Nutrient TMDL Implementation Plan FINAL, Wenck Associates, Inc. Maple Plain, MN October 2010

²⁴ Lake Magda Nutrient TMDL Implementation Plan FINAL, Wenck Associates, Inc. Maple Plain, MN October 2010

Twin and Ryan Lakes Nutrient TMDL

Twin Creek is a natural stream flowing through southwest area of the City between Crystal and Brooklyn Center. Twin Creek receives storm water runoff from the Cities of Brooklyn Park, New Hope and Crystal. Just downstream from the Brooklyn Park City boundary, Twin Creek flows through DNR protected wetland 639W (located adjacent to the Crystal airport) then into Upper Twin Lake. The Twin Lakes Chain are impaired waters. **Table 4.2b** provides a list of impaired waters downstream of Brooklyn Park on Twin Creek and the Twin Creek chain of lakes.

Table 4.2b - List of Impaired Waters on Twin Creek downstream of the City of Brooklyn Park

Water Body	Year First Listed	Assessment Unit ID #	Affected Use	Pollutant or Stressor	TMDL start/ TMDL complete
Twin-North	2002	27-0042-01	Aquatic recreation, Aquatic Consumption	Excess nutrients, Hg, PCB, PFOs	2003/2007
Twin-Middle	2002	27-0042-02	Aquatic recreation, Aquatic Consumption	Excess nutrients, Hg, PCB, PFOs	2003/2007
Twin-South	2002	27-0042-03	Aquatic recreation, Aquatic Consumption	Excess nutrients, Hg, PCB, PFOs	2003/2007
Ryan Lake	2002	27-0058-00	Aquatic recreation	Excess nutrients	2003/2007

The city continues to implement the best management practices of their MS4 permit and SWPPP (including the Minimum Control Measures (MCMs) 1-6). Existing BMPs will be inspected and maintained as necessary to ensure they are working. The City will continue to seek opportunities for redevelopment or reconstruction of its infrastructure to improve treatment of storm water runoff.

As part of the Twin Lakes Nutrient TMDL implementation activities, Brooklyn Park constructed the 62nd Avenue Stormwater Pond which has resulted in a TP annual load reduction of 46 pounds per year to Twin Creek and Upper Twin Lake. The City also participated in the restoration activities related to DNR Wetland 639W (tributary to upper Twin Lake). The implemented projects are beneficial and water quality progress is being made in the chain of lakes. Evidence of this is that Lower Twin and Ryan Lakes were “delisted” in 2014²⁵

Implementation efforts to meet the TMDL continue, and the City will cooperate with the Commission and other MS4’s to consider:

“Opportunistic Projects

The cities, Hennepin County, and MnDOT have been routinely including load reduction and infiltration BMPs into their highway and street reconstruction projects.

Maximize Existing BMPs

The member cities have identified several locations in the watershed where existing BMPs, mostly ponds, could be enhanced to achieve additional total phosphorus and dissolved phosphorus load reductions.

Potential enhancement projects include:

- 1) Expand the 62nd Avenue pond and add a filter bench.*
- 2) Stabilize the Twin Creek channel through Edgewood Park, add storage and a filter bench*

²⁵ MPCA Impaired Waters Viewer, <https://www.pca.state.mn.us/water/impaired-waters-viewer-iwav> accessed 1-19-2018

Small BMP Projects

*The subwatershed assessments completed by the Commission in consultation with the cities will identify a number of small BMPs that could be completed along with street or park projects or as stand-alone improvements. Cities will use this information to complete these BMPs as opportunities arise.*²⁶

The city continues to implement the best management practices of their MS4 permit and SWPPP (including the Minimum Control Measures (MCMs) 1-6). Existing BMPs will be inspected and maintained as necessary to ensure they are working. The City will continue to seek opportunities for redevelopment or reconstruction of its infrastructure to improve treatment of storm water runoff including identified opportunities (**Table 4.3**).

Table 4.3 - Brooklyn Park Participation in Twin Lake Chain Implementation Plan Activities²⁷				
Approach	Activity	Responsible Party	Estimated Schedule	Estimated Cost
Opportunistic Projects	Incorporate load reduction and infiltration BMPs into street projects.	Brooklyn Park and other MS4s, MNDOT, SCWMO	Ongoing	Varies by project
Maximize Existing BMPs	Expand 62 nd Avenue Pond and add filter	Brooklyn Park, SCWMO	Ongoing	Unknown
	Stabilize Twin Creek channel through Edgewood Park, add storage and a filter	Brooklyn Park, SCWMO	Ongoing	Unknown
Small BMP Projects	Volume control and water quality treatment BMPs	Brooklyn Park and other MS4s, MNDOT, SCWMO	Ongoing as opportunities arise	Varies by project
Tracking and Reporting	Activities will be tracked in annual NPDES MS4 Report	Brooklyn Park, MS4s, MNDOT, SCWMO	Ongoing	Unknown

VI. IMPLEMENTATION PLAN

A. General

This Implementation Plan section describes those activities and programs the City proposes to develop toward improving its surface water management program. Brooklyn Park will continue to install required storm water treatment systems as part of development and redevelopment and will look for opportunities to upgrade those parts of the system that lack adequate storm water treatment measures. Typically, costs for upgrades and replacements will be borne by the storm water utility fund or through special assessments.

This implementation plan also includes:

- An overview of the City's NPDES MS4 permit.
- A discussion of operation and maintenance procedures and strategies.

²⁶ Twin and Ryan Lakes Nutrient TMDL, *Five Year Review, December 2014*, Wenck Associates, Inc. Maple Plain, Minnesota 55359

²⁷ Twin and Ryan Lakes Nutrient TMDL, *Five Year Review, December 2014*, Wenck Associates, Inc. Maple Plain, Minnesota 55359

- Implementation priorities.
- Financial considerations.
- A discussion of the process for amending this Plan.

B. NPDES Permit Summary

“Stormwater runoff is a leading source of water pollution and can harm surface waters such as lakes, rivers, streams and wetlands. Common pollutants in stormwater runoff include pesticides, fertilizers, oils, metals, pathogens, salt, sediment, litter and other debris. These pollutants are transported via stormwater from a variety of sources including construction projects, industries and urbanized areas.

The MS4 General Permit is designed to reduce the amount of sediment and pollution that enters surface and ground water from storm sewer systems to the maximum extent practicable. Stormwater discharges associated with MS4s are subject to regulation under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS). Through the MS4 General Permit, the system owner or operator is required to develop a stormwater pollution prevention program (SWPPP) that incorporates best management practices (BMPs) applicable to their MS4.”²⁸

The SWPPP identifies BMPs, including education, maintenance, control techniques, system design, engineering methods, and such other practices, both existing and planned, determined appropriate to meet the NPDES Permit requirements.

The City's SWPPP includes specific BMPs in the following broad categories or Minimum Control Measures:

- Public Education and Outreach
- Public Participation and Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control
- Pollution Prevention/Good Housekeeping

Each year of the 5-year permit cycle, the City must conduct an Annual Public Meeting and submit an Annual Report to the MPCA which summarizes:

- a) The status of compliance with Permit conditions;
- b) Assessment of the appropriateness of the BMPs;
- c) Progress towards achieving the measurable goals for each of the minimum control measures;
- d) Storm water activities planned for the next reporting cycle;
- e) A change in any BMP or measurable goals for any of the minimum control measures; and
- f) A notice that the City is relying on another entity to satisfy some of the Permit obligations (if applicable).

²⁸ MPCA MS4 Overview <https://www.pca.state.mn.us/water/municipal-stormwater-ms4> accessed 1/19/2018

The BMPs listed in the SWPPP are a legally enforceable part of the Permit. The City must complete the tasks and milestones to remain authorized to discharge storm water into waters of the state. The LWMP Implementation Plan provides assistance and guidance for specific BMP implementation.

C. Operation and Maintenance

1. Activities

The storm water conveyance system is a major infrastructure investment for the City of Brooklyn Park, both in terms of initial capital cost and ongoing maintenance costs. Typically, system maintenance is funded by the City's storm water utility and through the general fund.

The City's storm water system maintenance responsibilities include items such as the following:

- Street sweeping
- Cleaning of sump manholes and catch basins
- Repair of catch basins, manholes, and pipe segments
- Assessing pipe condition
- Inspection of storm sewer inlet and outlet structures
- Excavation of accumulated sediments from ponds

The City has maintained its stormwater system for decades and City staff have a good understanding of the associated costs. As development brings more pipes, ponds and other structural storm water treatment devices into the system, maintenance will require an increasing amount staff time and maintenance budget.

The management of the storm water system, including record keeping, inspection, assessment, maintenance and replacement of system components is facilitated by the City's GIS database. The City recognized the importance of creating an interactive GIS based system for this purpose and developed the database and mapping platform of the storm water conveyance and management system. The system includes the ponds, pipes, outfalls, pollution control devices, channels, streams and lakes. Through an interactive program developed by City staff, all of the record drawings and construction information is linked to this system. City staff along with the public can view and print this information from this very user friendly map based system. The City is committed to the long term maintenance and improvement of this system.

2. Stormwater Ponds

Storm water ponds represent a significant part of the City's overall stormwater management system. General maintenance of these facilities helps ensure proper performance and reduces the need for major repairs. The City's Operations and Maintenance Department completes inspections of the major storm water elements on a rotating basis to identify needed maintenance and repairs. Inspection and maintenance cover pond inlets, outlets, sideslopes, sediment deposition, and illicit dumping and discharges.

Pond Outlets

A key issue with storm water ponds is ensuring that the outlets perform at design capacity. Inspection and maintenance of basin outlets address the following:

- The area around outlets is kept free and clear of debris, litter, and heavy vegetation. Trash guards are installed and maintained over all outlets to prevent clogging of the downstream storm sewer.
- Trash guards are inspected in accordance with the inspection schedule. Problem areas are addressed more frequently, as required.
- Emergency overflow outlets are provided for all ponds when possible. These are kept clear of debris, equipment, and other materials and properly protected against erosion.

Basin Inlets

Inspection and maintenance of basin inlets address the following:

- Inlets are inspected for erosion.
- Where erosion occurs near an inlet, riprap or other erosion control measures are installed.
- Inlets are inspected for sediment deposits, which can form at the inlets due to poor erosion practices upstream.
- Where sediment deposits occur, these are removed to ensure design capacities of storm sewers entering the basin are maintained.

Illicit Dumping and Discharges

Investigation of illicit dumping and discharge complaints are generally initiated through the City's Code Enforcement Division staff. When a complaint is received they coordinate the investigation with other City departments to determine the source and take any necessary action.

3. Sump Manholes and Sump Catch Basins

Sump manholes and sump catch basins are included in storm sewer systems to collect sediments before they are transported to downstream waterbodies.

4. Storm Sewer Inlet Structures

To fully utilize storm sewer capacity, inlet structures are kept operational in order to efficiently convey runoff into the system. Significant efforts are made to keep catch basins and inlet flared ends free of debris and sediments so as not to restrict inflow and cause flood damage. Leaf and lawn litter are the most frequent cause of inlet obstructions.

5. Open Channels and Ravines

Open channels are typically vegetated and occasionally lined with more substantial erosion protection materials. The lined channels typically require little or no maintenance. Vegetated channels are periodically inspected and maintained, particularly following floods as high flows can create erosion within vegetated channels.

6. Piping System

The storm sewer system constitutes an investment for the City. Currently the City maintains approximately 180 miles of storm sewer pipe, 250 storm water ponds and 760 storm sewer outfalls. The City has developed a comprehensive maintenance

program to maximize the life of the facilities and reduce capital expenditures. The following periodic inspection and maintenance procedures are followed:

- Catch basin and manhole castings are inspected and are cleaned and replaced as necessary.
- Catch basin and manhole rings are inspected and are 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.
- Storm sewer piping is inspected either manually or televised to assess pipe conditions. Inspection items include root damage, deteriorated joints, leaky joints, excessive spalling, and sediment buildup. The piping system is programmed for cleaning, repair, or replacement as needed to ensure the integrity of the system.

7. Street Sweeping

Street sweeping is an integral part of the City's effective surface water management system. It greatly reduces the volume of sediments that have to be cleaned out of sump structures and downstream waterbodies. The City's standard practice is to sweep arterials and secondary roadways three times a year and residential roadways twice a year. The first time is in the spring, beginning in either late March or early April after the risk of later snowfall has passed, the second occurs mid-summer, and the third sweep occurs in the fall after leaf fall.

Brooklyn Park does not allow residents to rake leaves into the street for municipal pickup. Hennepin County and the City encourage residents to compost their yard waste. If residents desire to have yard waste removed by their private hauler, then compostable bags or reusable containers are required. Alternately, yard waste can be brought to the Maple Grove yard waste site which is free for residents of Brooklyn Park. Overall the City's approach to minimizing organic matter entering its storm water system greatly reduces the incidence of inlet blockages and protects the water quality of downstream waterbodies.

The objective of the City's street sweeping and de-icing programs is to minimize impacts from leaf litter, sand, salt and other debris on the surface waters of the City.

8. Detection of Illicit Connections

During routine inspection for inlet grates, outfalls, and other portions of the storm water system, City staff also looks for evidence of illicit discharge, dry weather flow (indicating possible sanitary sewer connections), sedimentation and other non-point source pollution problems. As part of its SWPPP, the City will review any existing illicit discharge ordinances and policies, and develop and implement an illicit discharge action plan.

D. Implementation Priorities and Programs

This section describes those activities and programs that are priorities for the City to implement to improve its surface water management program. These items are generated from the SWPPP, known water resource related problems in the City, and the Commission's Third Generation Watershed Management Plan. A tentative timetable and cost estimate for

each activity or program is included in the following tables. Ongoing operation and maintenance activities detailed in Section VI.C are also included in Table 6.2. Items under the section title SWPPP are efforts the City is taking to comply with the current NPDES permit. Priorities will be adjusted as the NPDES permit is revised in the future.

1. Policies, Ordinances, Rules and Standards: Implementation of this surface water management plan is supported by the policies, ordinances, rules and standards adopted and enforced by the City of Brooklyn Park. The City of Brooklyn Park surface water management plan will adopt and implement the rules and standards for development and redevelopment referenced within the Commission’s 3rd Generation Watershed Management Plan. The City’s Chapter 153 Stormwater Ordinance incorporates the Commission’s rules and standards including stormwater management, erosion and sediment control, wetland alteration, and floodplain alteration. Table 6.1 lists the expected implementation activities, schedules and costs.

Table 6.1 - Ordinances, Rules and Standards		
Implementation Activity	Tentative Date for Implementation	Tentative Cost (\$)
Adoption of Commissions Rules and Standards	Following revisions of Commission Rules	\$2000.
Amend City Ordinances, Rules and Standards to be consistent with Commissions.	Following revisions of Commission Rules	\$5000.
Review of Development and Redevelopment Project Applications for Conformance with Stormwater, Erosion and Sediment Control, and Floodplain Ordinances, Rules and Standards	Ongoing	\$TBD/year

2. Operation and Maintenance of Stormwater Management System: Table 6.2 lists the expected implementation activities, schedules and costs associated with operation and maintenance of the City’s stormwater management system. The system collects, conveys and treats stormwater within the City.

Table 6.2 - Stormwater Management System Operation and Maintenance		
Implementation Activity	Tentative Date for Implementation	Tentative Cost (\$)
Inspect system annually including ponds, ditches and pipes.	Ongoing	\$25,000 per year
Maintenance and repairs (average of 120/year)	Ongoing	\$940,000 per year

Replace components of system in coordination with other City, County and State Projects. Specific BMPs will include installations of pond filtering systems, SAFL baffles, sumps, Stormceptor structures, infiltration vessels, and other devices. These devices will be installed with the construction of large State, County and City projects in the next 10 years and maintained by the City.	Ongoing	\$855,000 per year
Street Sweeping of 260 miles of City Streets, two to three rounds annually.	Ongoing	\$180,000 per year (2018 cost).
Total		\$2,000,000 per year.

3. Studies: Table 6.3 lists the expected implementation activities, schedules and costs for Brooklyn Park participation in studies.

Table 6.3 – Studies		
Implementation Activity	Tentative Date for Implementation	Tentative Cost (\$)
Hydrology and Hydraulics Modeling on a Case by Case Basis. An example project is analysis of surface flooding near the intersection of 67 th Avenue N. and Douglas Dr. N.	Annual	\$5,000 to \$10,000
Lake Success Groundwater Study. The City is working with citizens and the DNR to see if lake levels may be affected by groundwater appropriations or other factors.	Ongoing	TBD

4. TMDLs Table 6.4 lists the expected implementation schedules and costs associated with TMDL implementation plans for the Mississippi River, Shingle Creek and Bass Creek, Lake Magda, and the Twin and Ryan Lakes TMDLS. Annual costs are estimated based upon an assumed 10-year schedule with project costs assumed split with 1/3 paid by the City.

Table 6.4 - TMDLS		
Implementation Activity	Tentative Date for Implementation	Tentative Cost (\$)
Mississippi River TMDL	Ongoing	N/A
Upper Mississippi River Bacteria TMDL (E. coli. load reduction).	Ongoing	N/A
Shingle Creek and Bass Creek Biota and Dissolved Oxygen TMDL	Ongoing	\$6,000 per year.
Shingle Creek Chloride TMDL	Ongoing	Included in MS4 SWPPP
Shingle Creek /Upper Mississippi River Bacteria TMDL(BMP Installations and Staff In-kind for public education regarding pet wastes and waterfowl feeding).	Ongoing	\$5000 per year
Lake Magda Nutrient TMDL (Brooklyn Park cost sharing for shoreline restoration, aquatic plant management and street sweeping).	Ongoing	\$2,000 per year

Twin and Ryan Lakes Nutrient TMDL	Ongoing	Unknown as costs vary by project.
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5. MS4: The City of Brooklyn Park is an NPDES MS4 community. The NPDES MS4 permit and SWPPP require the BMP activities listed within Table 6.5.

Table 6.5 - MS4 and SWPPP Implementation		
Implementation Activity	Tentative Date for Implementation	Tentative Cost (\$)
Maintain Storm Sewer Base Map and GIS System	Annual	\$5,000 to \$10,000 per year
Public Education and Outreach	Annual	\$5,000 per year
Public Participation	Annual	\$2,000 per year
Illicit Discharge Detection and Elimination	Annual	\$3,000 per year
Construction Site Stormwater Runoff Control	Annual	TBD
Post Construction Stormwater Management	Annual	TBD
Pollution Prevention Good Housekeeping for Municipal Operations	Annual	\$5,000 per year
Amend MS4 permit as TMDL implementation plans are approved, modified and updated.	Ongoing	N.A.

6. Commissions Third Generation Watershed Management Plan Requirements. Table 6.6 lists the expected implementation activities, schedules and costs associated with operation and maintenance of the City’s stormwater management system.

Table 6.6 - Commissions Implementation Priorities		
Implementation Activity	Tentative Date for Implementation	Tentative Local Cost (\$)
Shingle Creek WMC Third Generation Watershed Management Plan Requirements		
Shingle Creek Reaeration Project	2013	\$120,000
Shingle Creek Restoration, Regent to Brooklyn Blvd.	2015	\$300,000
Shingle Creek or Bass Creek Restoration Project	2016-2022	\$1,500,000
Develop Whole Watershed Sustainable Water Budgets	2015	No cost to City
Intensive BMP Assessment by Subwatershed	Multi-year	No cost to City
The Watershed Commission is receiving grant funds from FEMA to update the Flood Insurance hydrology and hydraulics models of Shingle Creek.	2019	No cost to City
West Mississippi WMC Third Generation Watershed Management Plan Requirements		
Wetland Restoration Project	2014, 2016, 2018-2022	\$750,000
Develop Whole Watershed Sustainable Water Budgets	2015	No cost to City
Intensive BMP Assessment by Subwatershed	Multi-year	No cost to City

E. Financing

The total average annual cost for operating and maintaining the City of Brooklyn Park's storm water management system is approximately \$2 Million (not including depreciation). This includes storm water management programs, SWPPP activities, systems operation and maintenance, and construction of future improvements and enhancements. The City has adopted a storm water utility to fund maintenance and capital projects. Under the current rate structure this utility generates approximately \$2 Million per year. The City recently raised the stormwater utility fee and will continue to do so as necessary to adequately meet budgetary needs. Appendix C includes a copy of Storm Sewer Utility Rates and Charges adopted December 11, 2017. About 5% of that is available for capital projects with the balance used for maintenance activities. The City periodically reviews the rates and intends to increase the rates over time to allow the establishment of a CIP for storm water projects. The City will make every effort to generate sufficient revenue through the storm water utility fund to accommodate future projects and activities related to regulatory mandates such as TMDL BMP's. However funding for maintenance of the existing infrastructure will hold priority over those projects.

F. Amendment Procedures

The Brooklyn Park LWMP is intended to extend through the year 2029. For the plan to remain dynamic, an avenue must be available to implement new information, ideas, methods, standards, management practices and any other changes that may affect the intent and/or results of the LWMP. The plan may need to be revised from time to time as a result of a Major Plan Amendment to the Commissions' Plan. The amendment procedure for the LWMP is presented below.

Request for Amendment

Written request for Plan amendment is submitted to City staff. The request shall outline the need for the amendment as well as additional materials that the City will need to consider before making its decision.

Staff Review of Amendment

A decision is made as to the validity of the request. Three options exist: 1) reject the amendment, 2) accept the amendment as a minor issue, with minor issues collectively added to the Plan at a later date, or 3) accept the amendment as a major issue, with major issues requiring an immediate amendment. In acting on an amendment request, City staff shall recommend to City Council whether or not a public hearing is warranted. Major amendments to the Plan will have to be submitted to the watersheds for review and approval prior to final action by the Council.

Council Consideration

The amendment and the need for a public hearing shall be considered at a regular Council meeting. A staff recommendation will be presented to the Council for consideration.

Public Hearing and Council

This step allows for public input based on public interest. Council shall determine when the public hearing should occur in the process. Based on the public hearing, the City Council could approve the amendment.

Council Adoption

Final action on an amendment is City Council adoption. However, prior to the adoption, an additional public hearing could be held to review the Plan changes and notify the appropriate stakeholders.

It is anticipated that the City's LWMP will remain in effect through 2029. The City will then review the LWMP for consistency with current water resource management methods. At that time, all annual reports and past amendments will be added to the document. Depending on the significance of changes, a new printing of the LWMP may be appropriate.

VII. SUMMARY AND RECOMMENDATIONS

A. Summary

The Brooklyn Park LWMP will serve as a comprehensive planning document to guide the City in conserving, protecting, and managing its surface water resources. The LWMP meets requirements as established in Minnesota Rules 8410. In addition, the Plan reflects the requirements of the Commissions with jurisdiction within the City.

The Brooklyn Park LWMP has its own particular emphasis, which includes:

- Collecting and compiling the efforts of agencies and organizations including the City, its departments and residents. This includes past reports and studies, management plans, monitoring studies, as well as completed and proposed improvement projects.
- Reviewing the current state of the City's surface water resources in the context of goals and policies, ordinances, operations and maintenance, flood mitigation, and achievement of targeted water quality levels.

- Establishing reasonable, achievable and affordable goals, and supporting them by strong regulatory and management culture. Developing an implementation plan that includes projects and processes that derive from a thorough assessment of current City problem areas and current City surface water regulations and controls.

The review of the City's surface water resources begins with an evaluation of its surface water management goals and policies. Section IV of the Plan provides the City's current goals and policies to achieve these goals

The System Assessment section of the LWMP serves two functions. The first part of the section describes the City's surface water management system. The storm water conveyance system is shown in **Figure 15**. This map indicates the storage areas, conveyance (including pipe and channels) and lakes in the City. The system assessment portion catalogues the various assessments of problems that the Plan must address. The intent is to identify the source of problems and specific actions the City proposes to take to address these problems either independently or in collaboration with some other organization - most commonly one of the watershed management organizations.

Finally, this Plan develops implementation priorities for the City. The Implementation Plan (Section VI) of the Brooklyn Park LWMP describes those activities and programs the City intends to develop to improve its surface water management program. Typically, costs for maintenance, upgrade and/or replacement would be borne by the storm water utility fund, general fund or through special assessments.

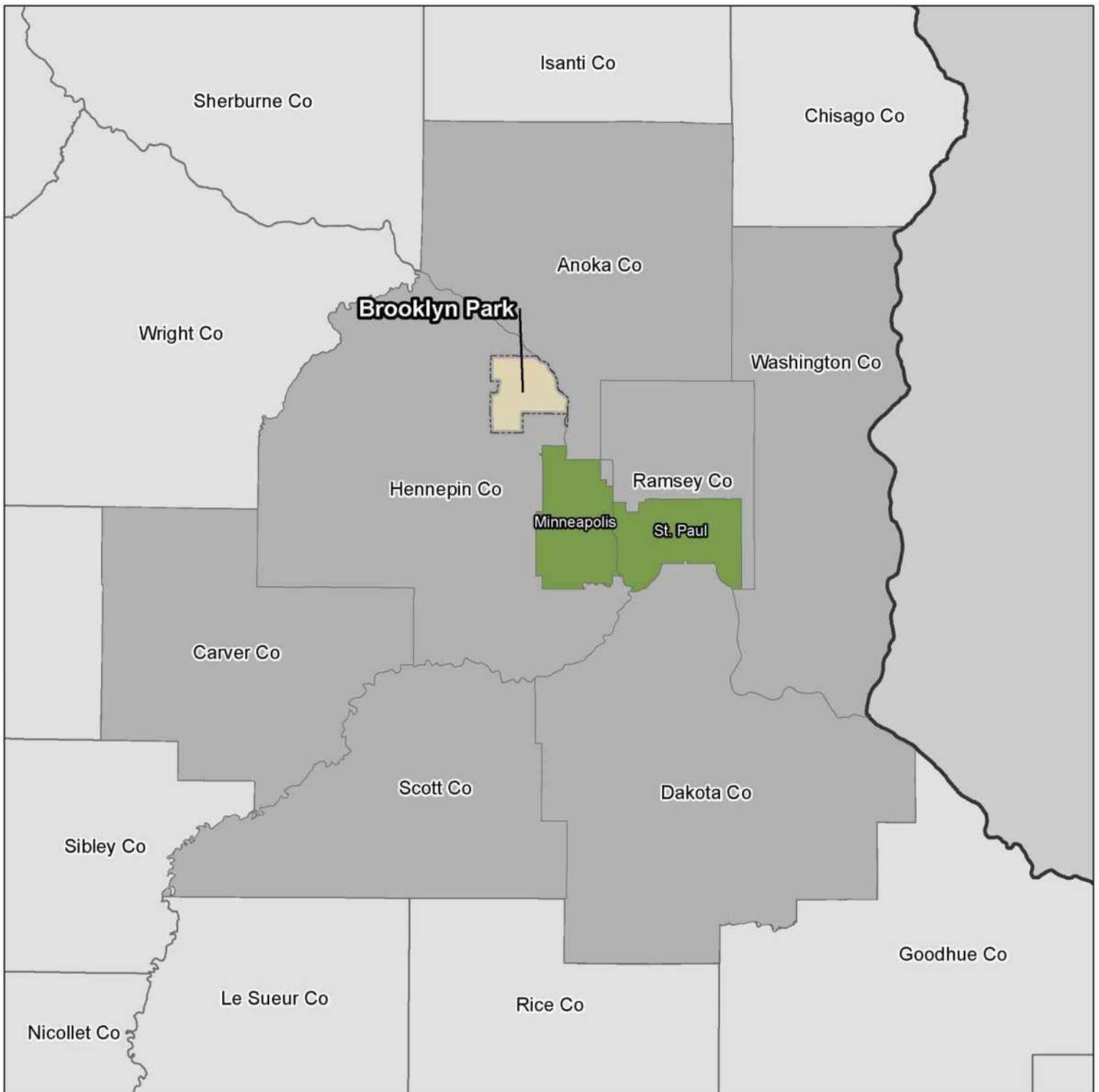
The Implementation Plan section also includes:

- An overview of the City's NPDES permit.
- A discussion of operation and maintenance procedures and strategies.
- Financial considerations.
- Implementation priorities.
- A discussion of the process for amending this plan and an annual report to council.

B. Recommendations

After review and approval by the Commissions, the LWMP will be submitted to the City Council for consideration with the following recommendations:

- That the City continues to operate and maintain its storm water system in accordance with this LWMP.
- That the City continues to support a sense of common purpose with the Commissions and adjacent communities regarding storm water management issues.
- That the City adopt this Local Water Management Plan and adopt amendments to it as deemed necessary.



**Brooklyn Park
Comprehensive Plan**

Regional Location Map
Figure 1



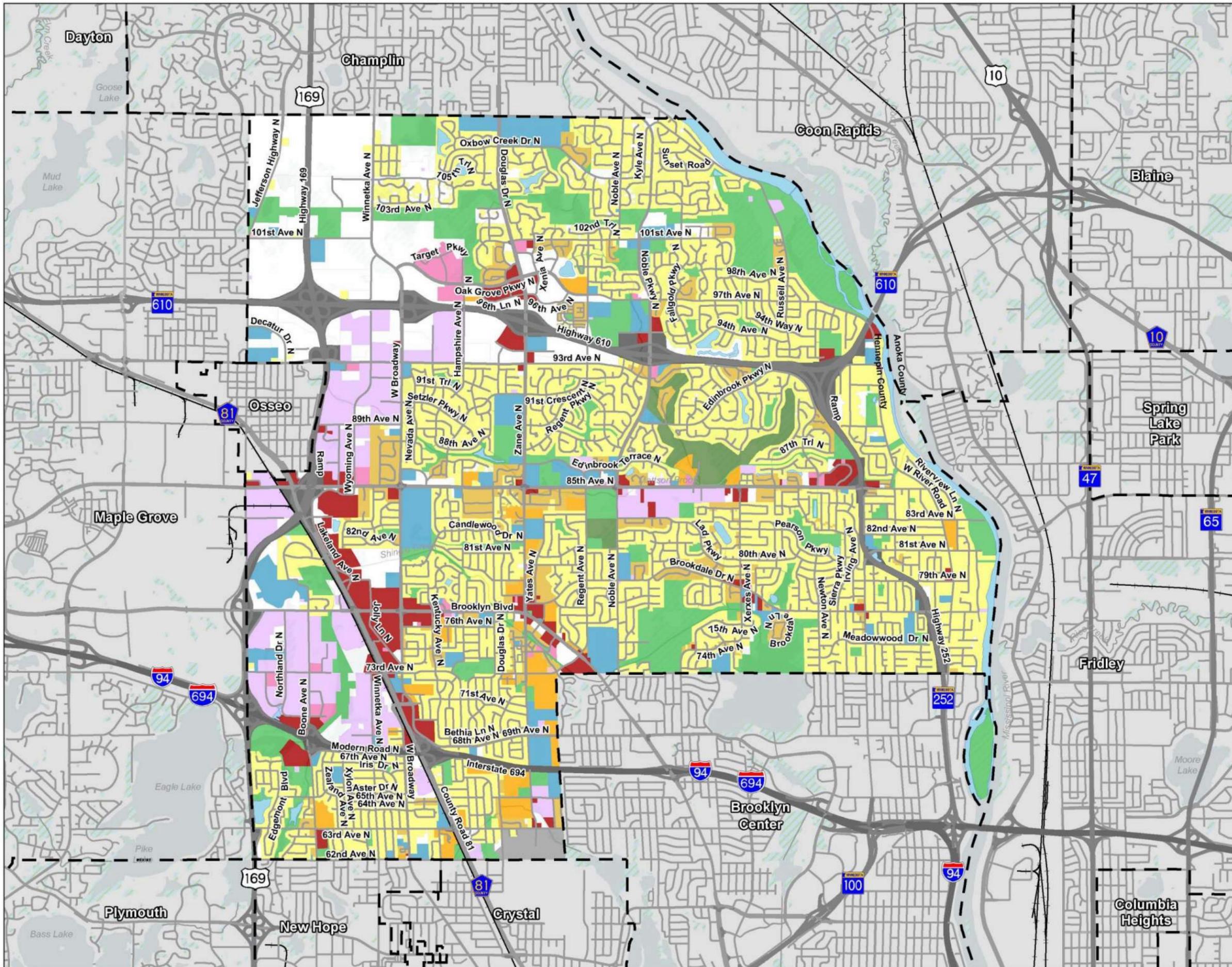
Source: Met Council, Brooklyn Park

Legend

-  City Limits
-  St. Paul & Minneapolis
-  Metro Counties
-  Other Counties



Existing Land Use
Figure 2

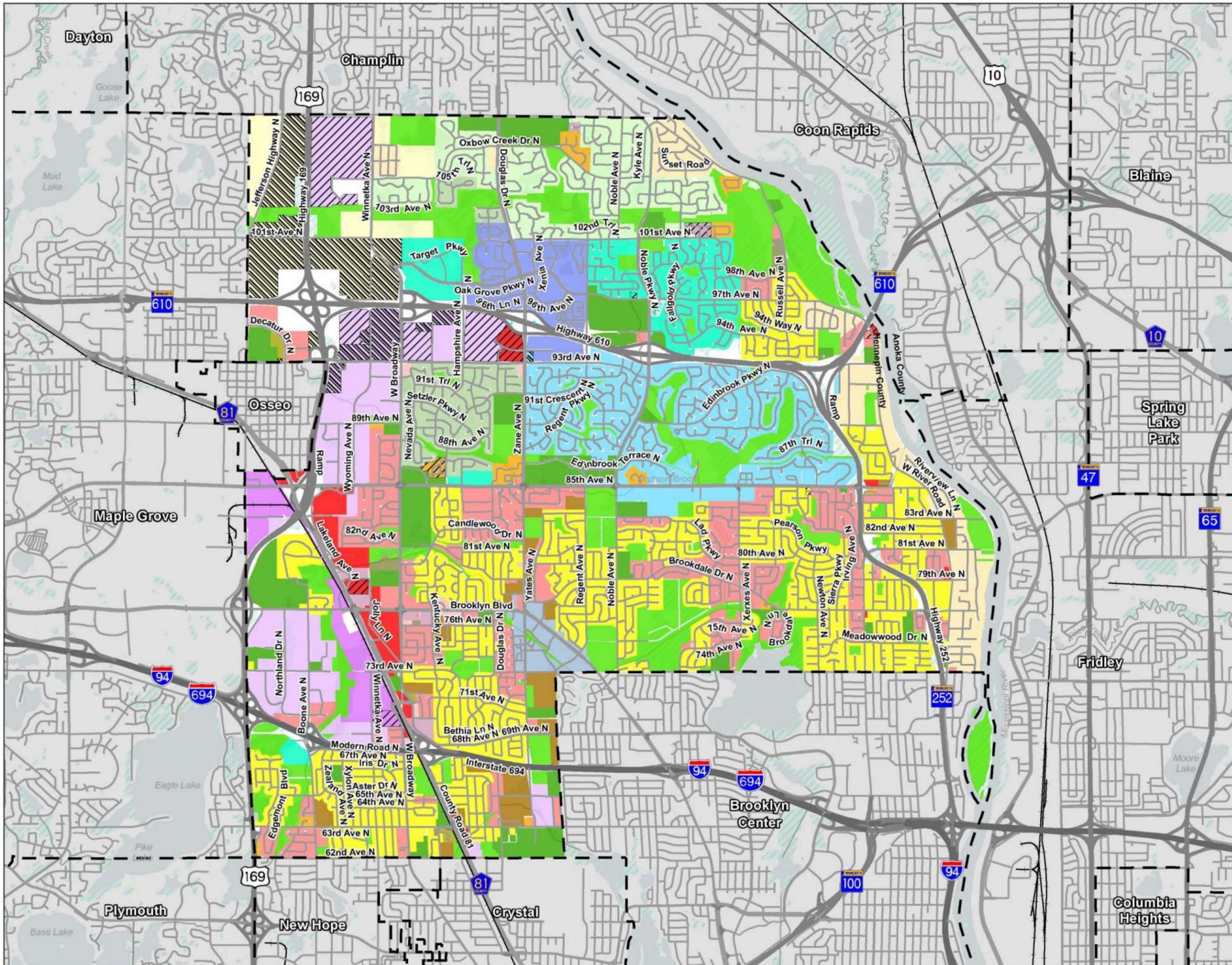


Legend

Existing Land Use

- Single-Family Residential
- Single-Family Attached
- Multifamily
- Mixed Use Residential
- Commercial
- Office
- Industrial and Utility
- Institutional
- Park, Recreational, or Preserve
- Golf Course
- Airport
- Major Highway / Railway
- Open Water
- Agricultural

Source: Met Council, Brooklyn Park



Legend

Zoning

Residential Districts

- Urban Reserve District
- Detached Single Family Estate District
- Detached Single Family Residential District
- Detached Single Family Residential District
- Detached Single Family Residential District
- Detached Single and Attached Two Family Residential District
- Townhouse District
- Detached Single Family Residential
- Multiple Family Residential District
- Multiple Family Residential District
- Multiple Family Residential District

Business Districts

- Office Park District
- Neighborhood Retail Business District
- General Business District
- Vehicle Sales and Showroom District
- Business Park District
- General Industrial District

Special Districts

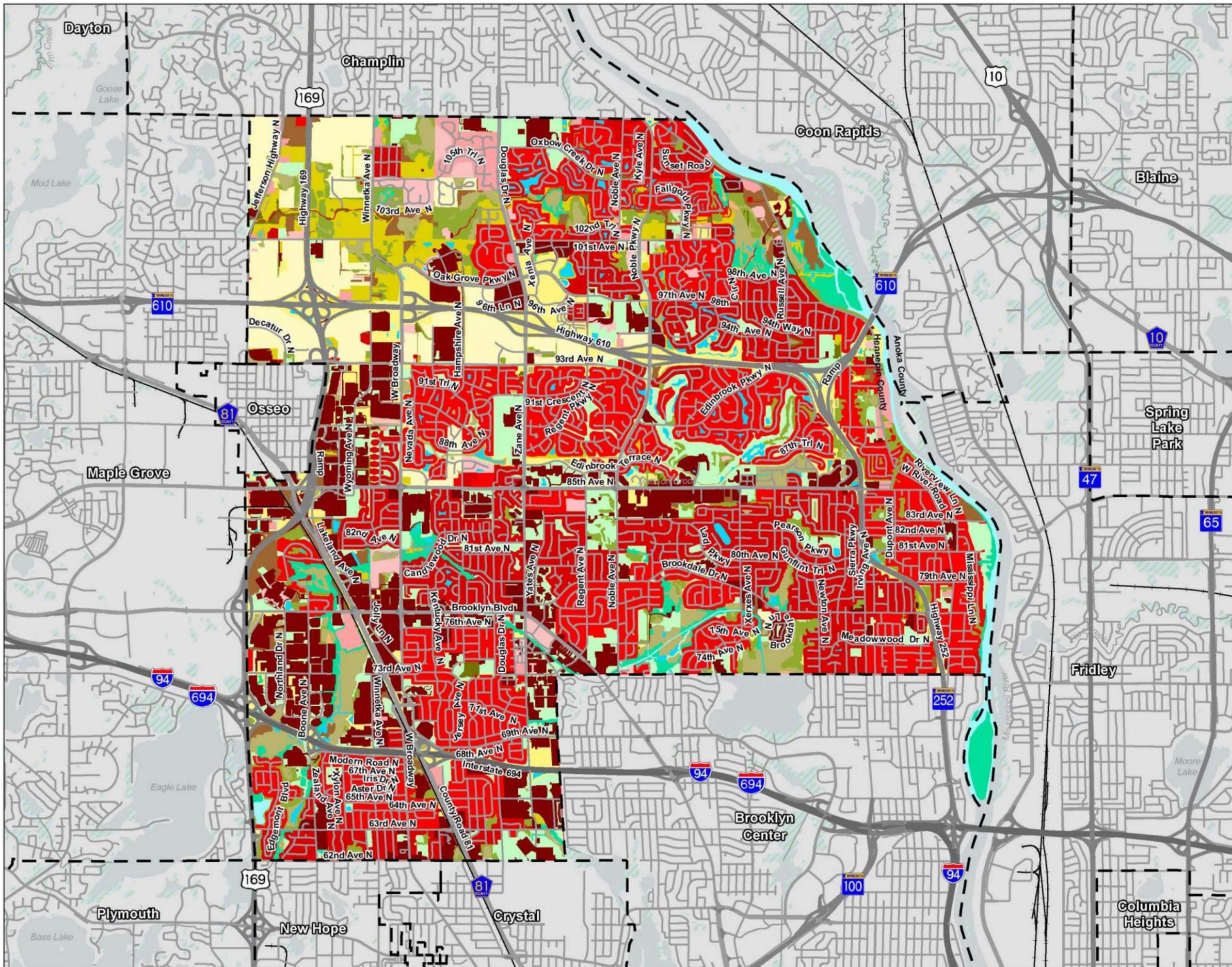
- Planned Community Development District
- Planned Unit Development
- Town Center District
- Conservancy District
- Public Institution
- Village Redevelopment District

Zoning Overlay Districts

- Planned Development Overlay District
- Highway Overlay District

Source: Met Council, Brooklyn Park

Land Cover
Figure 4



Legend 

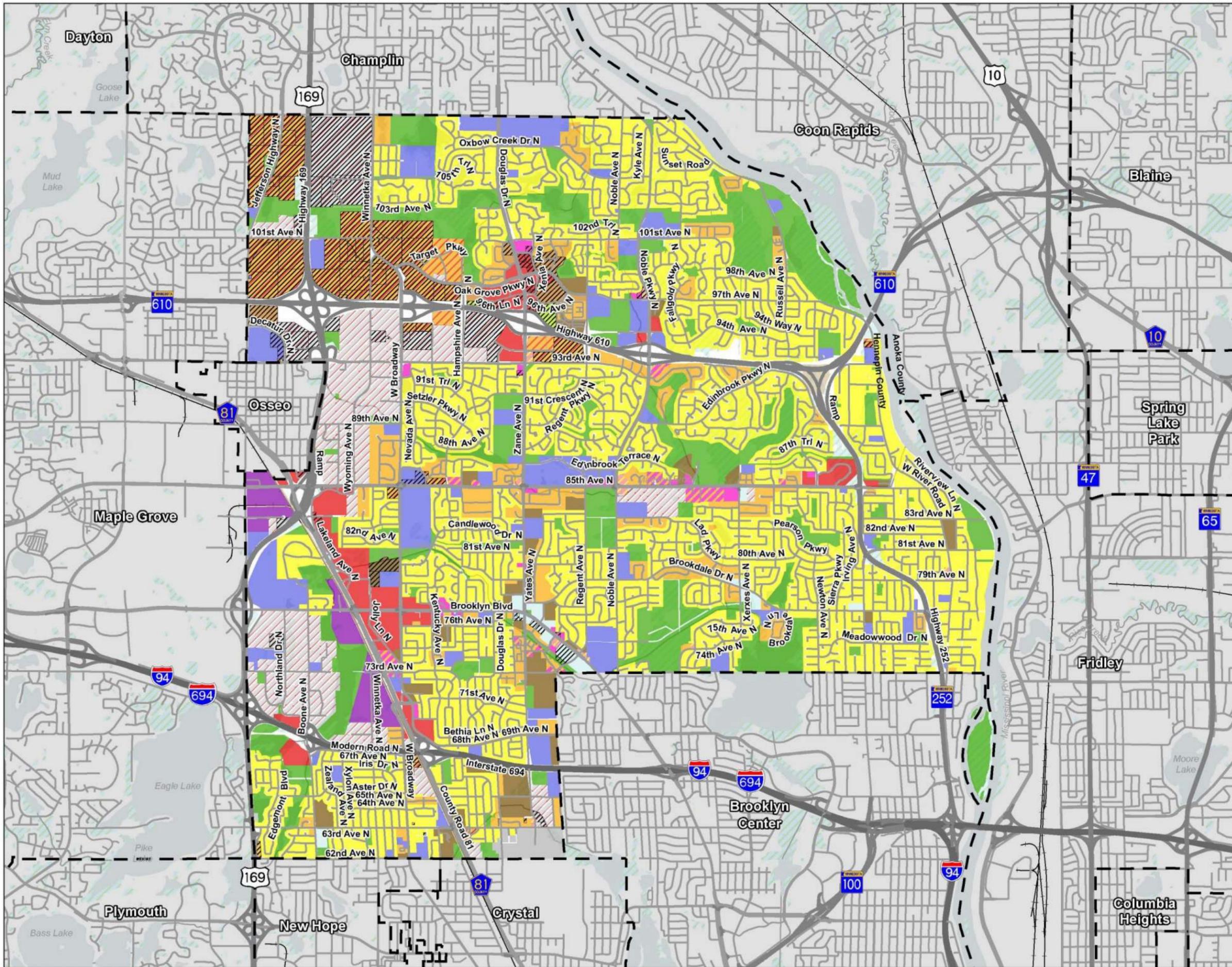
Minnesota Land Cover Classification System

- 11. 5-10% Impervious
- 12. 11-25% Impervious
- 13. 26-50% Impervious
- 14. 51-75% Impervious
- 15. 76-100% Impervious
- 21. Short Grasses
- 22. Agricultural Land
- 23. Maintained Tall Grass
- 24. Tree Plantation
- 31. Forest
- 32. Wetland Forest
- 51. Shrubland
- 52. Wetland Shrubs
- 61. Tall Grasses
- 62. Wetland Emergent Veg.
- 63. Dry Tall Grasses
- 71. Lichen Scrubland
- 81. Rock Outcrop
- 82. Mud Flat
- 90. Open Water
- 92. Wetland Open Water
- Lakes and Ponds
- Island or Land
- Lake, Pond or Reservoir
- River or Stream (polygon)
- Rivers and Streams
- Wetlands

Source: Met Council, Brooklyn Park

Brooklyn Park Comprehensive Plan

2040 Future Land Use
Figure 5



Legend

- Devel/Re devel Areas
- Future Land Use**
- Airport
- Business Park
- Community Commercial
- Flex
- Industrial
- Institutional
- Low Density Residential
- Medium Density Residential
- Medium-High Density Residential
- High Density Residential
- Neighborhood Mixed Use
- Mixed Use
- Neighborhood Service Center
- Office/Limited Business
- Office/Medium Density Residential
- Parks & Open Space
- RR

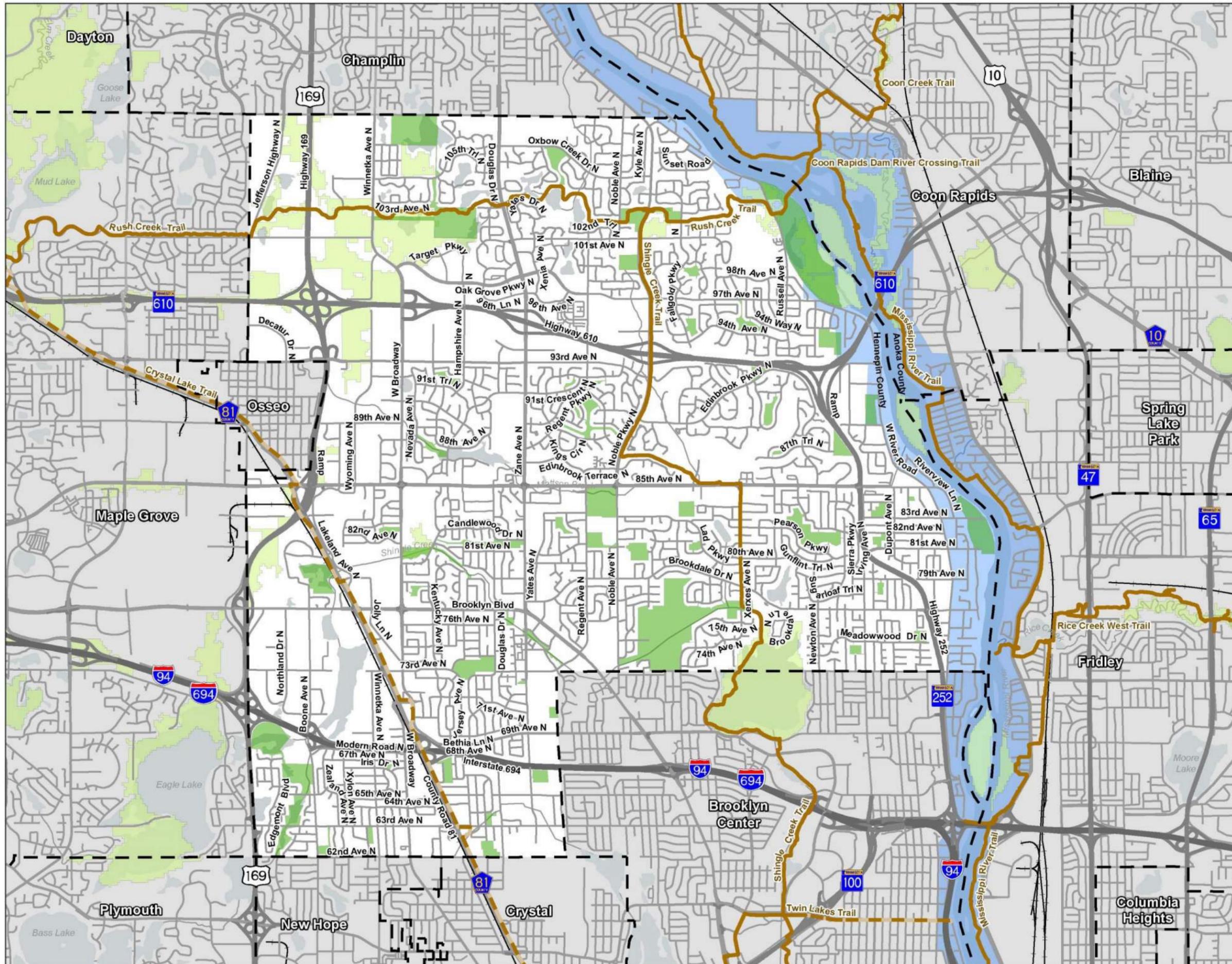
Source: Met Council, Brooklyn Park

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Brooklyn Park Comprehensive Plan

Natural Areas,
Open Space & RSEA
Figure 6



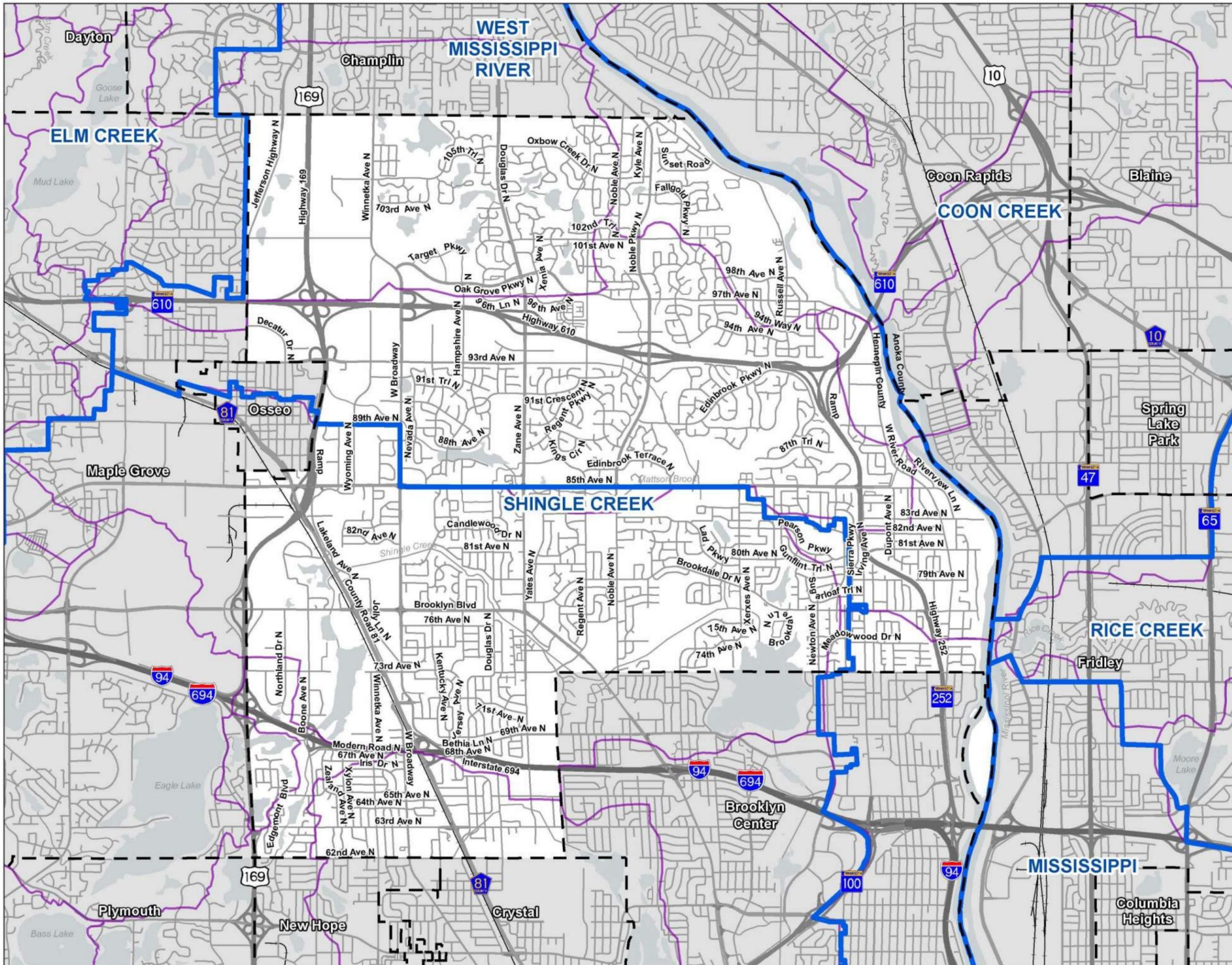
Legend

- Existing
- Planned
- Parks
- Regionally Significant Ecological Areas
- Mississippi River Critical Area

Source: Met Council, Brooklyn Park

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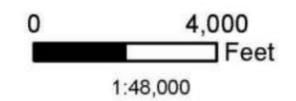


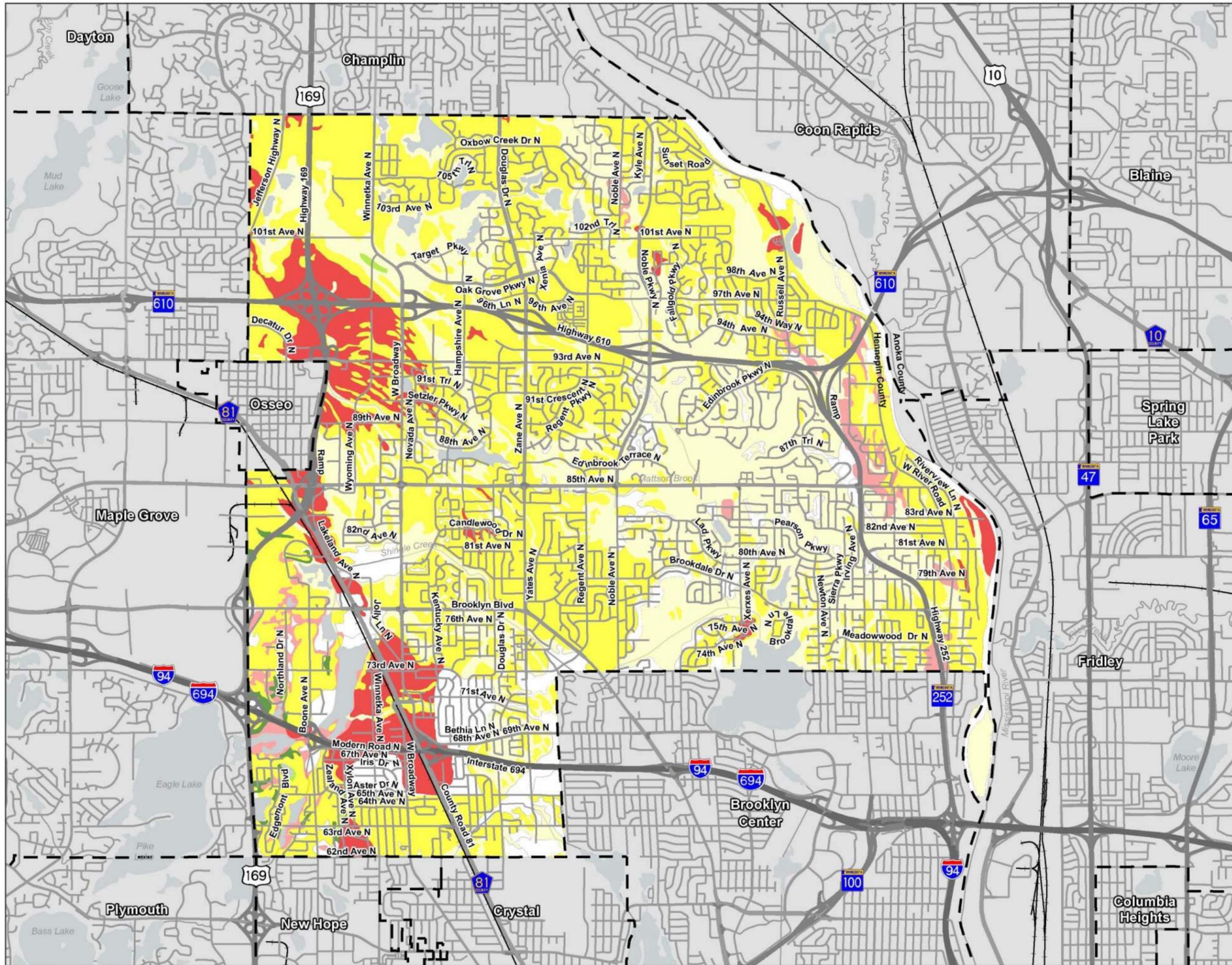
Legend

-  Watershed Management Organization
-  Subwatersheds (Catchments)



Source: Met Council, Brooklyn Park, MnDNR





Legend

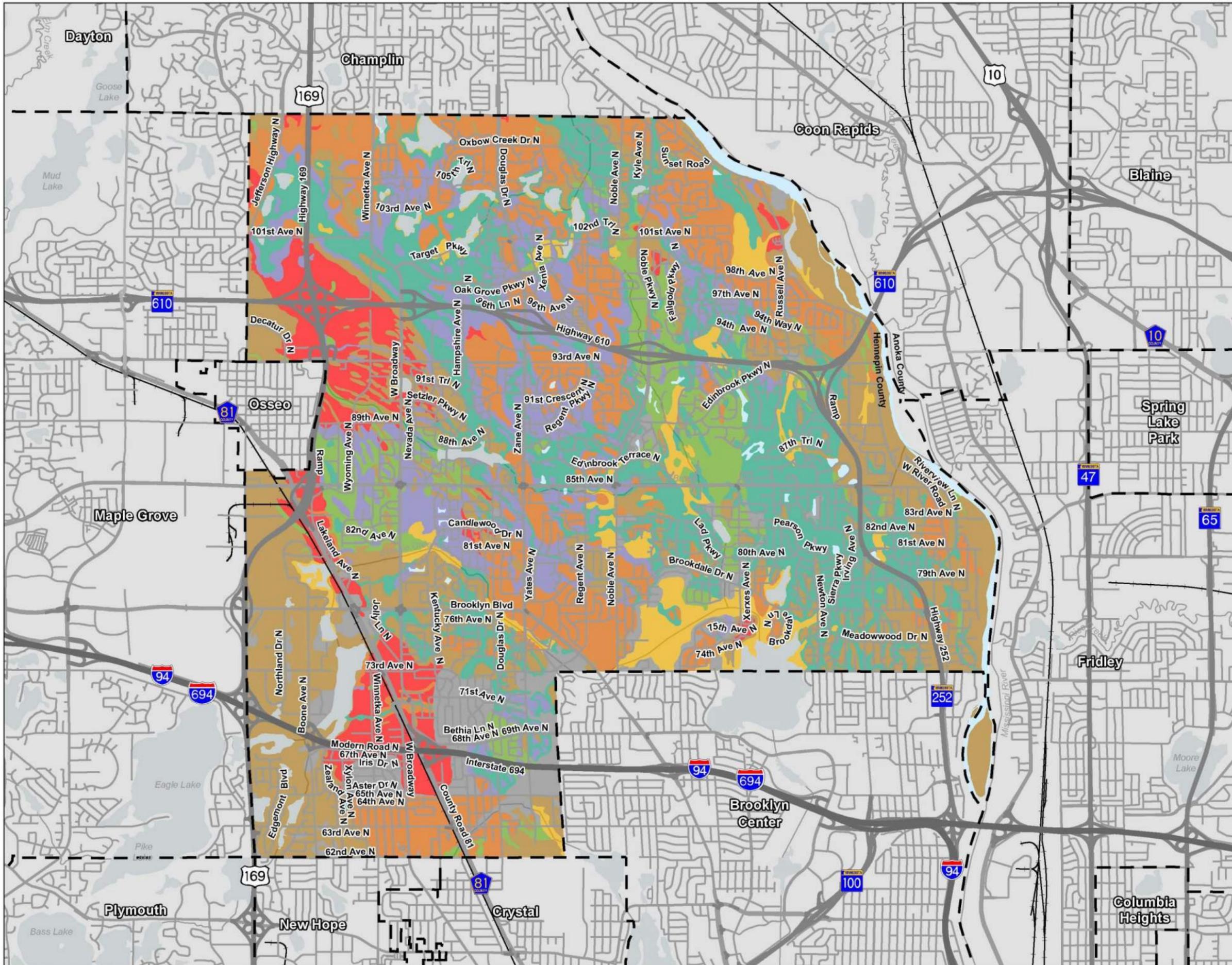
Soils By Drainage Class

- Unclassified
- A
- A/D
- B
- B/D
- C
- C/D

Source: Met Council, Brooklyn Park

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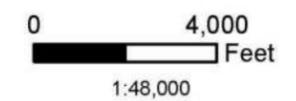


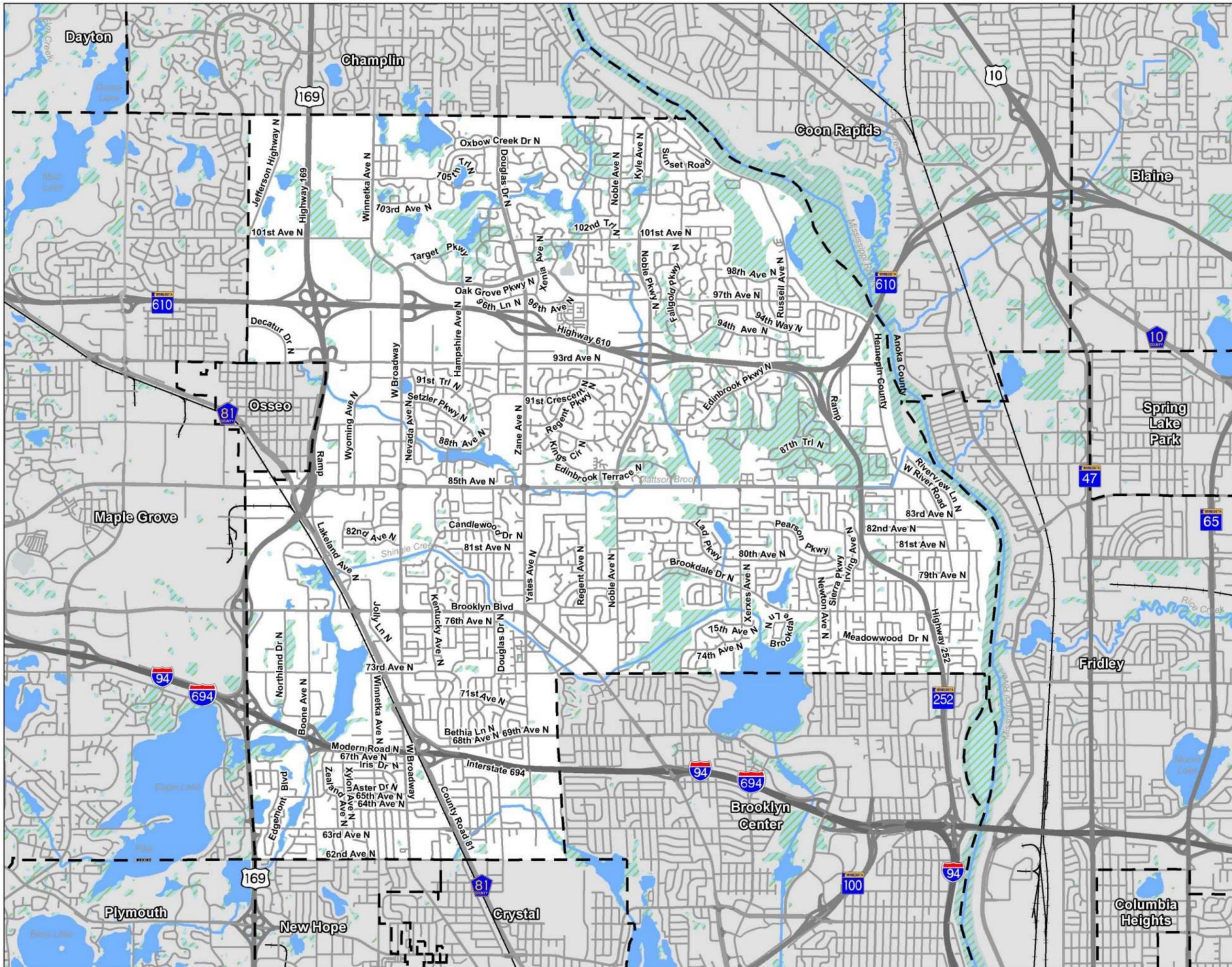
Legend

Soils By Type

-  Isan
-  Hubbard
-  Soderville
-  Verndale
-  Forada
-  Seelyeville
-  Other
-  Urban land
-  Water

Source: Met Council, Brooklyn Park





Legend

-  National Wetlands Inventory
-  PWI - Basin
-  PWI Watercourse

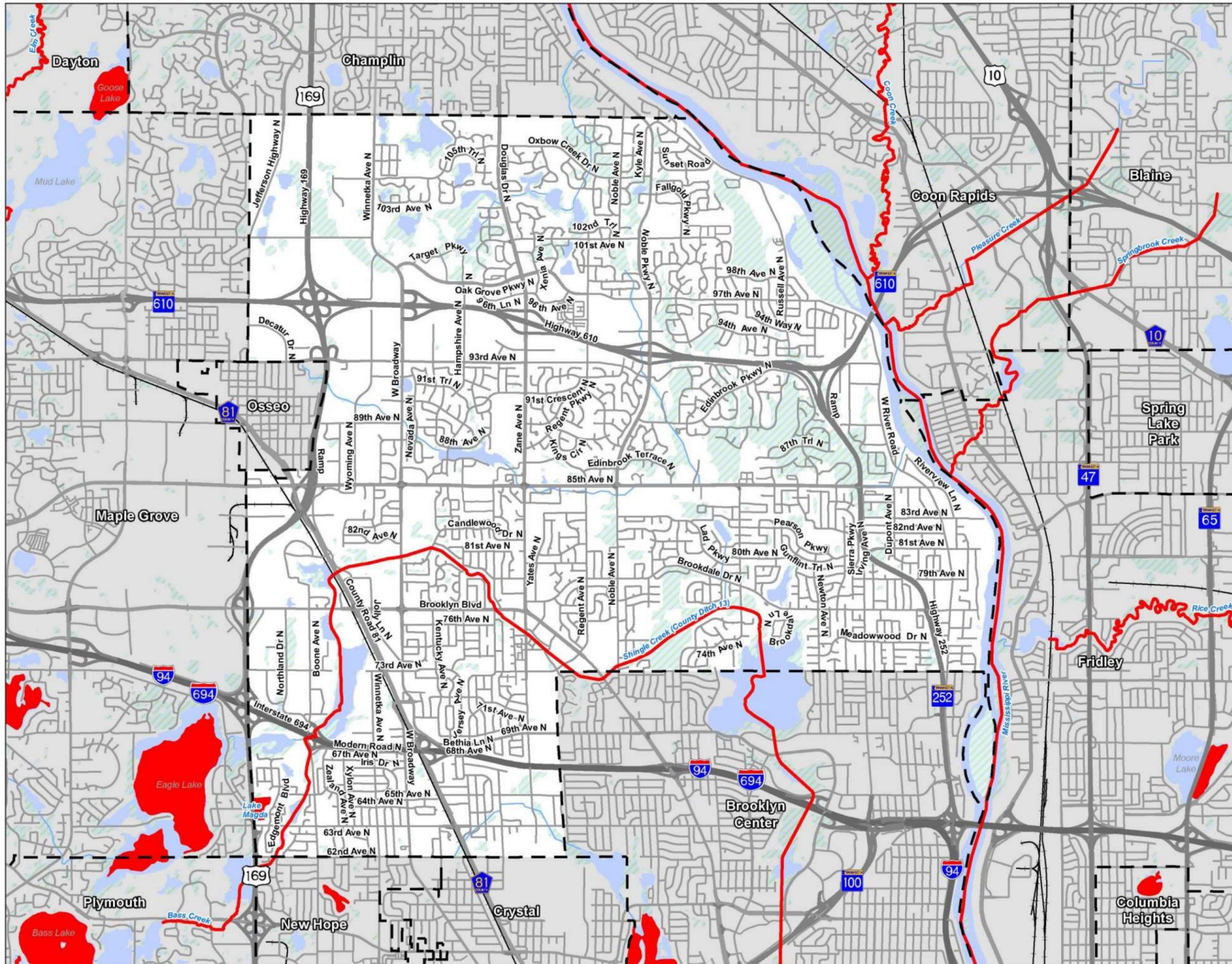


Source: Met Council, Brooklyn Park

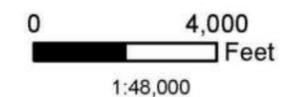


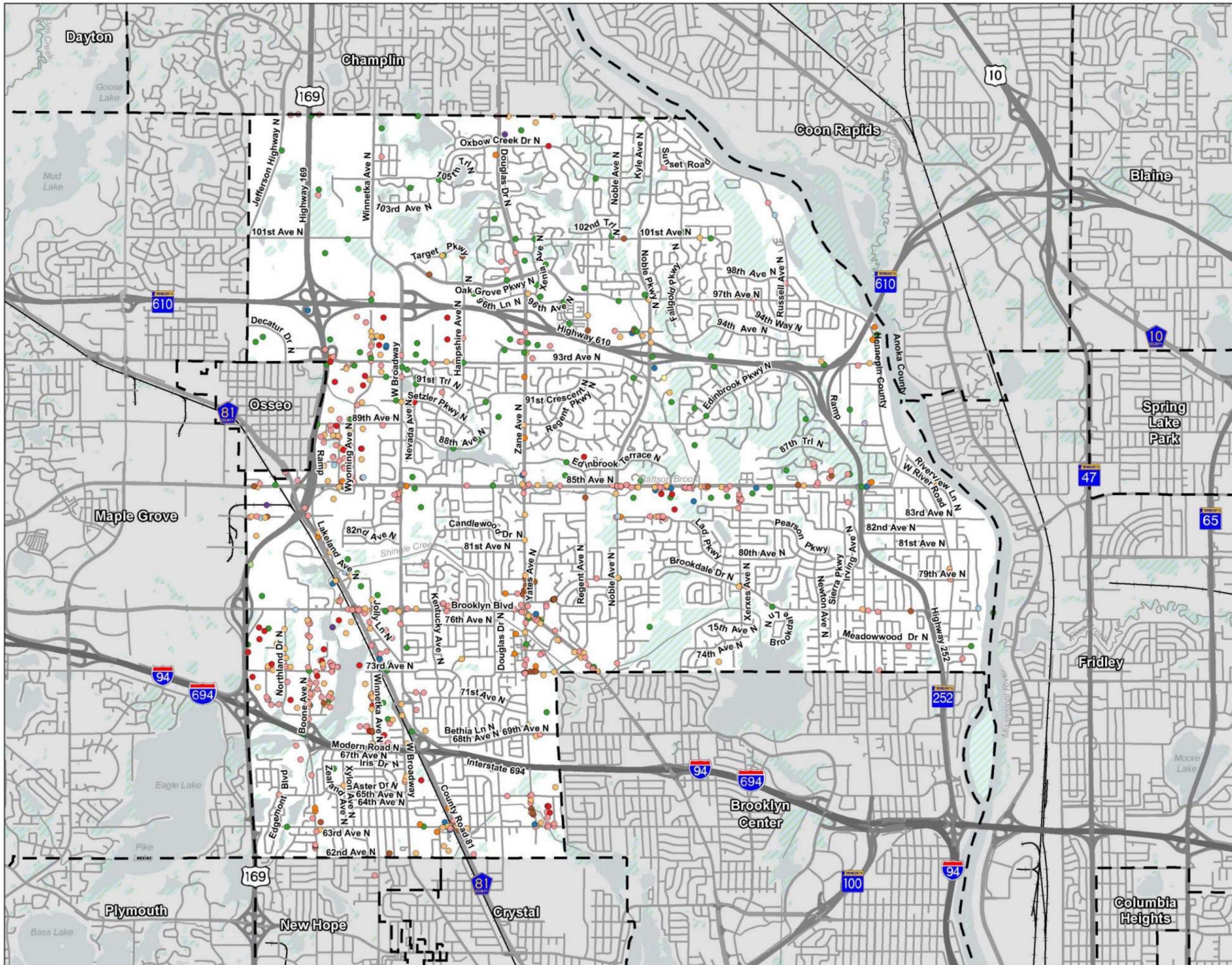
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-  Impaired Lakes
-  Impaired Rivers & Streams



Source: Met Council, Brooklyn Park



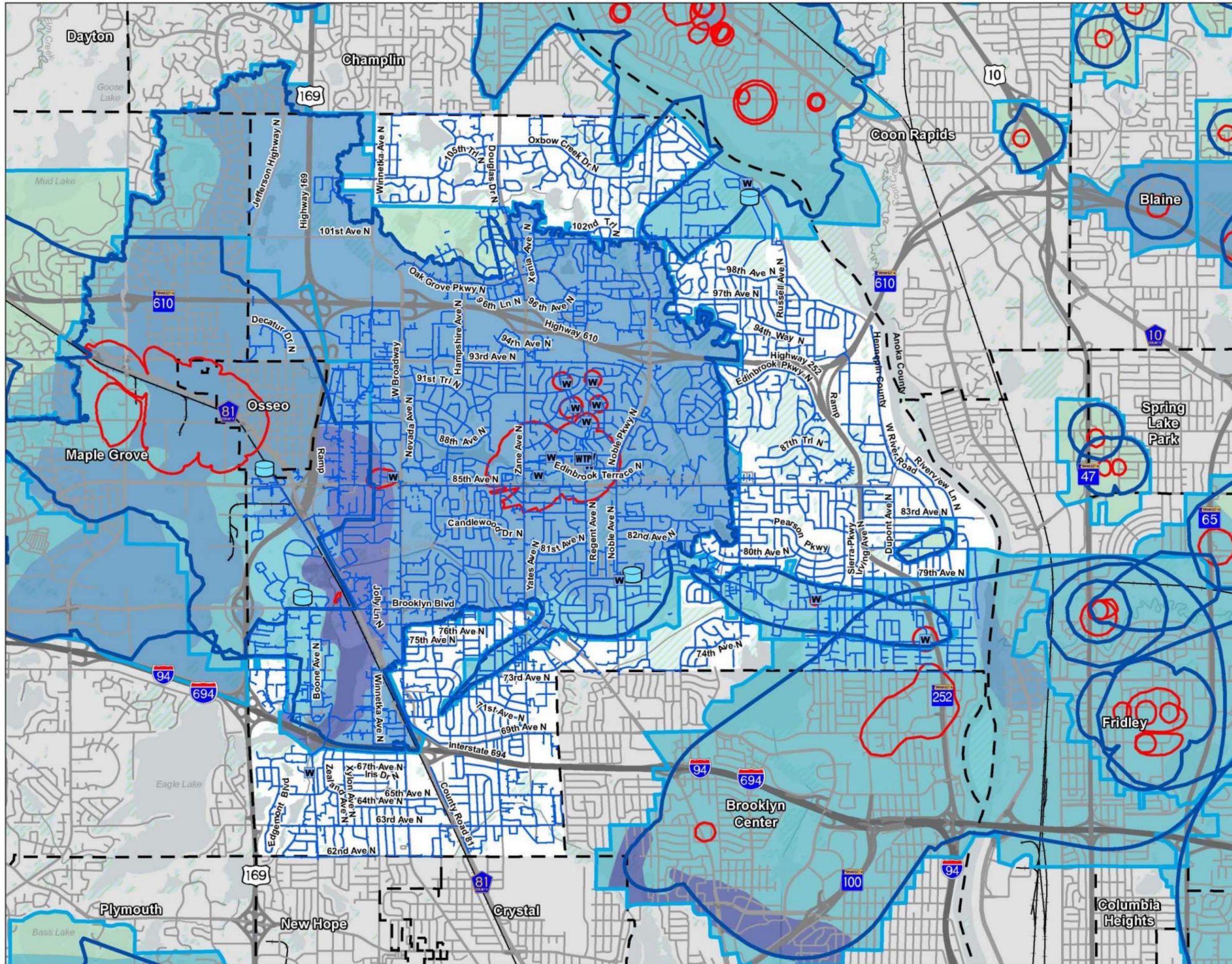


Legend

MPCA WIMN Sites

- Aboveground Tanks
- Brownfields
- CERCLIS Site
- Construction Stormwater
- Hazardous Waste
- Industrial Stormwater
- Multiple Activities
- Petroleum Remediation, Leak Site
- SSTS, Licensed Organization
- Site Assessment
- Solid Waste, Unpermitted Solid Waste
- Underground Tanks
- ▨ Wetlands
- ▨ Lakes and Ponds
- ▨ Rivers and Streams
- City Limits

Source: Met Council, Brooklyn Park



Legend

- Wells
- Water Treatment Plant
- Water Storage
- Watermain
- Wellhead Protection Area
- DWSMA
- Emergency Response Area

DWSMA Vulnerability

- Very High
- High
- Moderate
- Low
- Very Low

Source: Met Council, Brooklyn Park

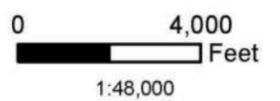
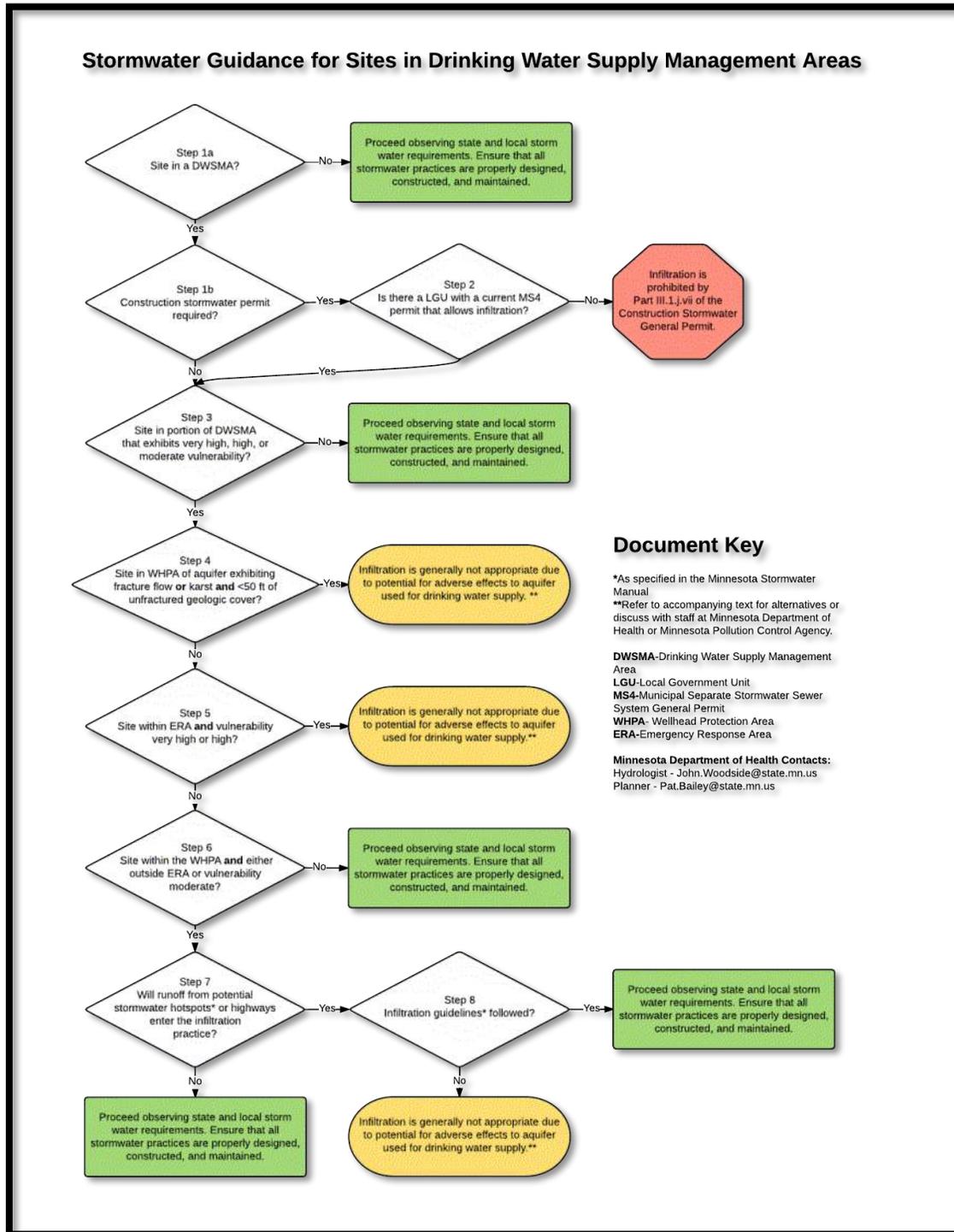
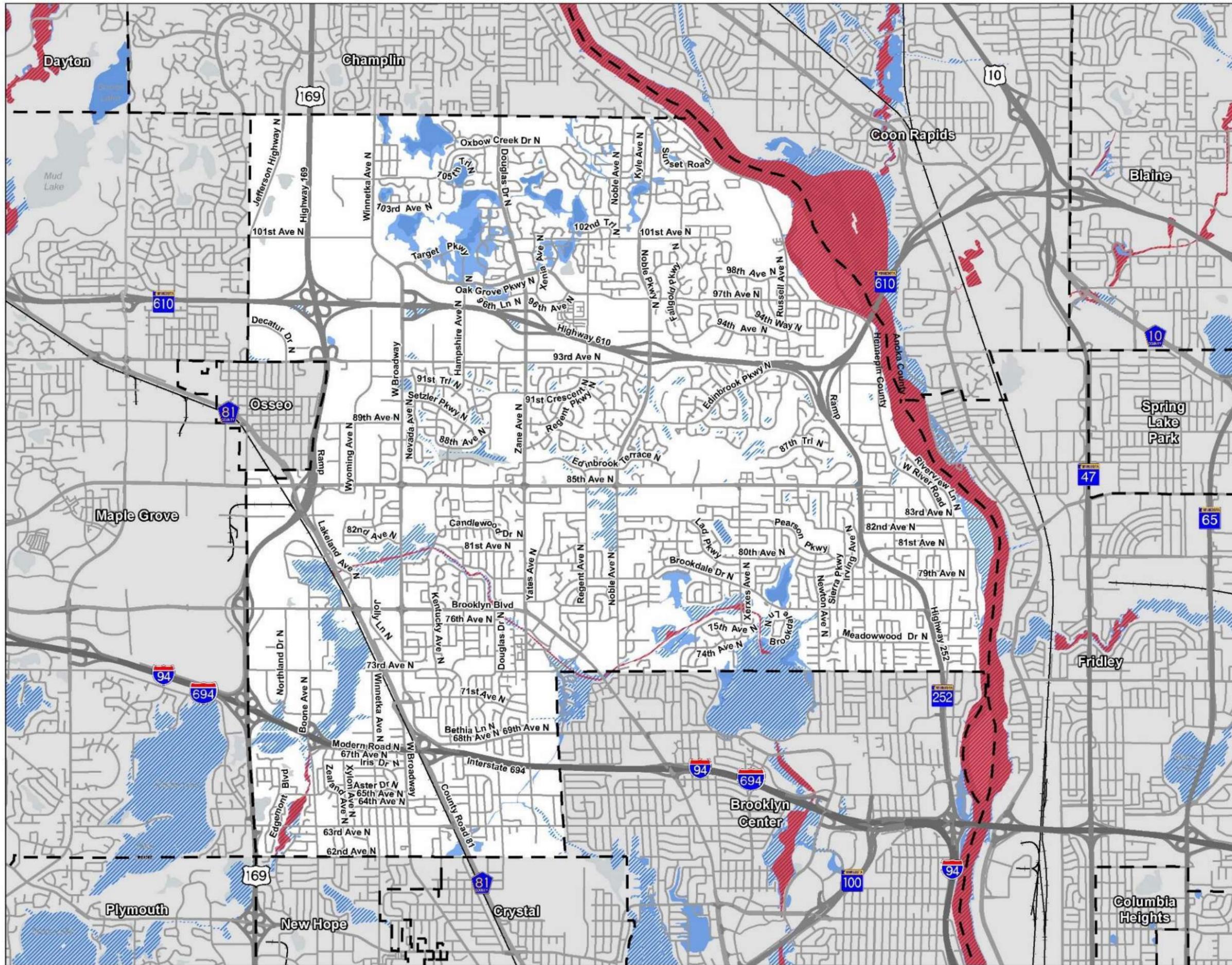


Figure 13 - Flowchart for Evaluating Infiltration within Drinking Water Supply Management Areas²⁹



²⁹ Minnesota Department of Health and Minnesota Pollution Control Agency, Evaluating Proposed Stormwater Infiltration Projects in Drinking Water Supply Management Areas, January 26, 2016



Legend

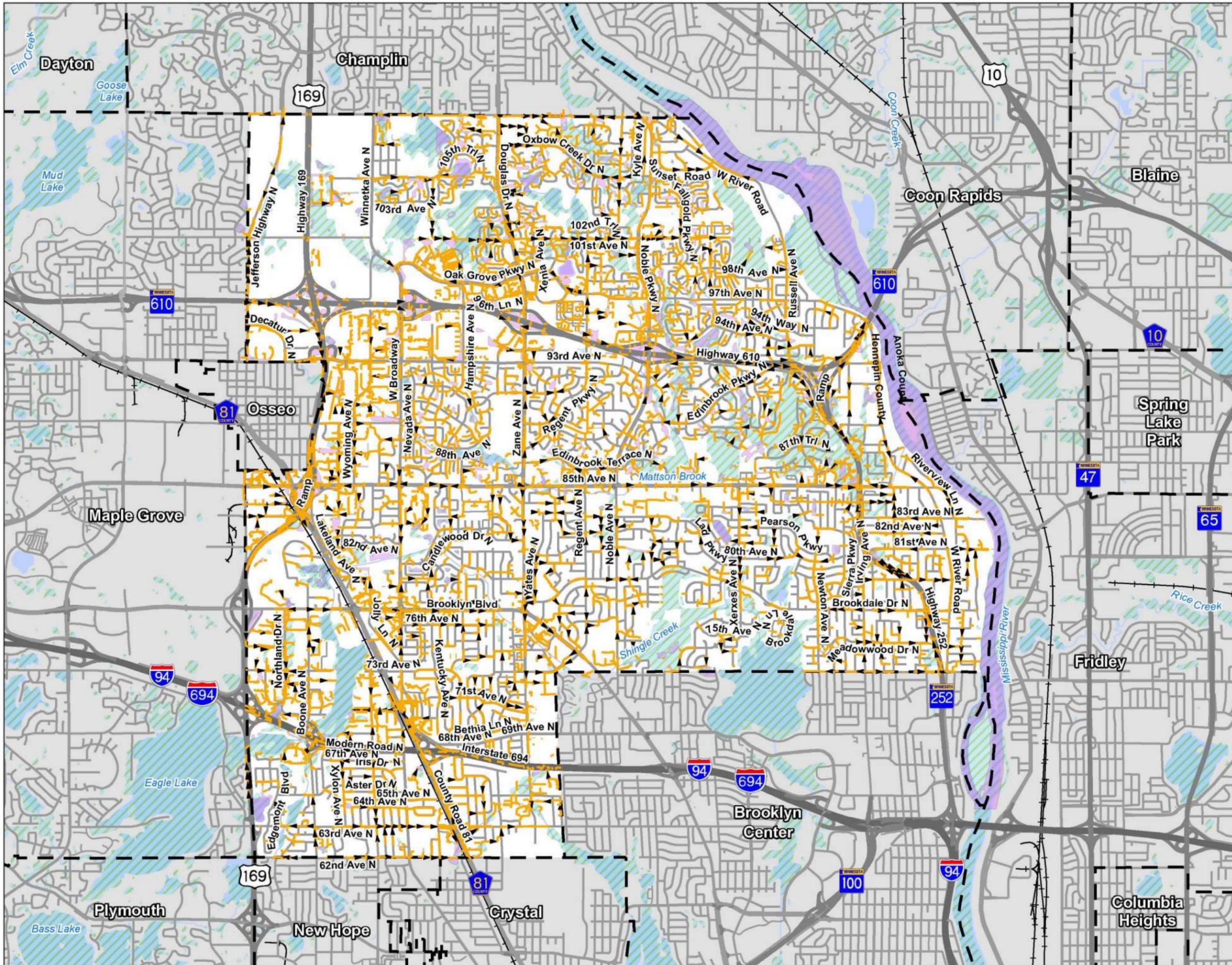
-  100 Year Floodplain
-  500 Year Floodplain
-  Floodway

Source: Met Council, Brooklyn Park

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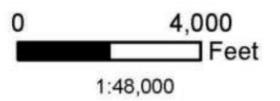
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Legend

-  Storm Pipe
-  Stormwater Ponds
-  National Wetlands Inventory

Source: Met Council, Brooklyn Park



Appendix A: Minimum Engineering Standards for Storm Water Management

Minimum Engineering Standards for Storm Water Management

1. Storm Water Runoff Conveyance

- A. Storm water drainage system design shall be based on a 10-year frequency storm for local and trunk storm sewer, and a 100-year frequency storm for ponds and open channels. The design storms shall be as defined in the NOAA Atlas 14 values for rainfall intensity are as follows:

NOAA Atlas 14 10-Year Depth-Duration-Intensity		
Duration (minutes)	Depth (inches)	Intensity (inches/hour)
5	0.619	7.43
10	0.906	5.44
15	1.11	4.44
30	1.59	3.18
60	2.09	2.09

- B. Storm sewers and open channels shall be designed using the Rational Method or other technical method approved by the City. Runoff Coefficient "C" shall be in accordance with the guidelines provided in the Minnesota Department of Transportation Drainage Manual.
- C. Emergency overflow drainage routes shall be provided at all low point locations a minimum of 1.5 feet below the lowest adjacent building opening. Emergency overflow drainage routes shall be constructed in a manner that will accommodate a 100-year storm event.

2. Storm Water Rate Control

- A. A hydrograph method based on sound hydrologic theory shall be used to analyze runoff rates and high water levels for proposed development and redevelopment projects.
- B. Runoff rates for proposed development and redevelopment sites shall not exceed existing runoff rates for the 2-year, 10 year and 100-year critical storm frequency event or rates noted in the approved local water management plan. Runoff rates may be restricted to less than the existing rates when necessary for the public health and general welfare of the watershed or where restricted downstream capacity exists.
- C. Analysis of flood levels, storage volumes and flow rates for waterbodies and detention basins shall be based on a range of rainfall and snow melt duration producing the critical

flood levels and discharges. Hydrologic analysis shall include a study of runoff rates for a 24-hour duration storm event.

- D. The high water levels of storm water detention facilities shall be based on a minimum 100-year frequency storm event. A minimum freeboard of two (2) feet shall be provided for the lowest adjacent building open.
- E. Emergency overflow routes shall be provided for all detention basins. The elevation of emergency overflow routes shall be a minimum 1.5 feet below all adjacent building openings. Emergency overflow drainage routes shall be constructed in a manner that will accommodate a 100-year storm event. In the event that a surface emergency overflow cannot be constructed, the storage volume shall be expanded to accommodate two 100-year storm events while maintaining the 1.5 foot freeboard.
- F. Various design guidelines contained in the Minnesota Storm Water Manual may be required at the discretion of the City based on specific site conditions.
- G. The maximum side slope of detention areas or open channel shall be 1:4 (Vertical: Horizontal).
- H. Adequate access for future maintenance of storm water detention facilities, including easements, grading and elimination of obstructions shall be provided.
- I. All detention basins water quality ponds or water quality treatment devices which are installed as an integral part of the public storm water conveyance system shall be located within a public easement or another form of recordable document.
- J. For projects that fall outside of the Commissions review requirements volume management in the form of infiltration may be incorporated into the drainage design for development and redevelopment projects. Examples of acceptable infiltration practices include infiltration trenches, rainwater gardens, and infiltration basins. Infiltration shall not be provided for runoff from fueling and vehicle maintenance areas or for runoff from industrial, commercial and institutional parking lots. Infiltration practices shall not be installed in areas with less than 3 feet separation from the bottom of the infiltration system to the elevation of seasonal high groundwater; in areas with less than 5 feet separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater for locations receiving runoff from public and private roadways; areas within 400 feet of a community water well or within 100 feet of a private well; and in areas located within the Drinking Water Supply Management Area of the City of Brooklyn Park or any other community's Drinking Water Supply Management Area that extends into the corporate boundary of the City of Brooklyn Park (without higher engineering review by the City).

3. Storm Water Quality Treatment Ponds

- A. Development and redevelopment projects in excess of one (1) acre or more in size shall incorporate water quality treatment ponds or other effective measures to minimize the discharge of sediment and other storm water related pollutants from the site. This requirement may be waived by the City if the site drains to an existing regional storm water management facility that was designed to accommodate the water quality treatment requirements of the proposed land development project. Infiltration, wetland buffers and erosion control practices may still apply.
- B. Water quality treatment ponds (wet ponds) shall be designed in accordance with National Urban Runoff Program (NURP) guidelines and other specific standards as established by the City of Brooklyn Park.
- C. Water quality treatment ponds shall have an elongated shape (preferably a 3:1 length to width ratio) and be sized with a permanent wet pool volume equal to the runoff from a

2.5-inch storm event generated from the tributary drainage area (when practical as determined by the City of Brooklyn Park).

- D. The ground surface slopes immediately adjacent to ponds shall be less than 25% but greater than 0.5 to 1% to promote flow towards the pond. Ground surface slopes adjacent to the pond shall terminate on a submerged aquatic bench (a shallow slope area just inside the pond perimeter) to prevent people from slipping into the deep water portion of the pond and to facilitating the growth of aquatic plants.
- E. The aquatic bench shall extend into the pond from the normal water level a minimum of 10 feet and shall be sloped at a grade of 1:10 (V:H).
- F. The aquatic benches shall be landscaped to prevent access to the pond.
- G. The ground surface slopes within the permanent pool (below the aquatic bench) shall not exceed 1:3 (V:H).
- H. Permanent pool depth shall be a minimum of four feet and maximum of 10 feet at the deepest points.
- I. The pond outlet shall be equipped with removable trash racks or other approved devices to prevent clogging by large debris and to restrict access to the interior for safety purposes. The pond outlet shall not permit access by small children or unauthorized persons.
- J. Drainage and utility easements shall be dedicated over newly constructed storm water management ponds.

4. Wetlands

- A. Activities within jurisdictional wetlands such as draining, filling, or excavation shall require prior approval from the Commissions in accordance with the Wetland Conservation Act.
- B. A vegetated buffer strip with a minimum buffer width of 20-feet and an average width of 30-feet measured from the ordinary high water level of the watercourse or wetland is required adjacent to wetlands, lakes and natural water course.
- C. Drainage and utility easements shall be dedicated over wetland buffer areas.

5. Floodplain Management

- A. Existing water storage capacity should be preserved below the 100-year critical flood elevation on all public waters within designated floodplain areas.
- B. Development within the floodplain should be minimized that will unduly restrict flood flows or aggravate known high water problems.
- C. Compensatory storage will be required for floodplain fill.