Appendix 5A

Water Resources

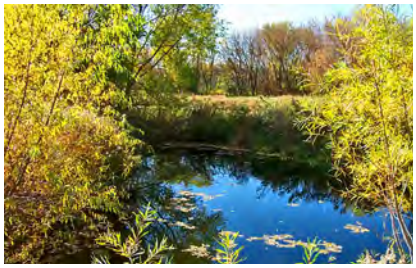
Surface Water Management Plan Draft, 2018-2027

165 pages

City of Golden Valley
Surface Water Management Plan



city of golden valley





September 2018

Surface Water Management Plan

2018-2027

Prepared for
City of Golden Valley

September 2018

Barr Engineering Co.

Surface Water Management Plan

September 2018

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Appendix A City of Golden Valley Storm Water Pollution Prevention Plan (SWPPP)
Appendix B City of Golden Valley/MCWD Coordination Plan

Certifications

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.



Sterling G. Williams Jr.
PE #: 47642

September 11, 2018
Date

Acronyms

Acronym	Description
AIS	Aquatic Invasive Species
APM	Aquatic Plan Management
BCWMC	Bassett Creek Watershed Management Commission
BMP	Best Management Practice
BWSR	Minnesota Board of Water and Soil Resources
CAMP	Citizen Assisted Monitoring Program
CIP	Capital Improvement Program
CLMP	Citizen Lake Monitoring Program
CWA	Clean Water Act
DWSMA	Drinking Water Supply Management Area
EPA	Environmental Protection Agency
FAW	Functional Assessment of Wetlands
FCP	(BCWMC) Flood Control Project
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FWPCA	Federal Water Pollution Control Act
HHPLS	(MCWD) Hydrologic, Hydraulic, and Pollutant Loading Study
JWC	Joint Water Commission
LA	Load Allocation
LGU	Local Governmental Unit
LID	Low Impact Development
LiDAR	Light Detection and Ranging
LOMA	Letter of Map Amendment
MCES	Metropolitan Council Environmental Services
MCM	Minimum Control Measure
MCWD	Minnehaha Creek Watershed District
MCSC	Minnesota Cities Stormwater Coalition
MNDNR	Minnesota Department of Natural Resources
MDH	Minnesota Department of Health
MGS	Minnesota Geological Survey
MIDS	Minimal Impact Design Standards
MLCCS	Minnesota Land Cover Classification System
MnDOT	Minnesota Department of Transportation
MnRAM	Minnesota Routine Assessment Method
MPCA	Minnesota Pollution Control Agency
MPRB	Minneapolis Park and Recreation Board
MRCC	Midwestern Regional Climate Center
MS4	Municipal Separate Storm Sewer System

MSP	Minnesota/St. Paul International Airport
NAPP	National Aerial Photography Program
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NHIS	Natural Heritage Information System
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRMP	Natural Resources Management Plan
NURP	National Urban Runoff Program
NWI	National Wetland Inventory
OHWL	Ordinary High Water Level
P8	Program for Predicting Polluting Particle Passage through Pits, Puddles and Ponds
PWI	Public Waters Inventory
SCADA	Supervisory Control and Data Acquisition
SCS	Soil Conservation Service
SSURGO	Soil Survey Geographic Dataset
SSTS	Subsurface Sewage Treatment System
SWMP	Surface Water Management Plan
SWPMP	Stormwater Pond Management Program
SWPPP	Storm Water Pollution Prevention Program
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VIC	Voluntary Investigation and Cleanup
WCA	Wetland Conservation Act
WHPP	Wellhead Protection Plan
WLA	Waste Load Allocation
WMO	Watershed Management Organization
WOMP	Watershed Outlet Monitoring Program
WRAPS	Watershed Restoration and Protection Strategy
WWTP	Wastewater Treatment Plant

Executive Summary

The City of Golden Valley Surface Water Management Plan (SWMP) sets the course for the City's management of the water resources and stormwater within the City. The SWMP provides data and other background information, outlines the applicable regulations, assesses City-wide and specific issues, sets goals and policies for the City and its resources, and lists implementation tasks to achieve the goals. The SWMP also provides information regarding the funding of the implementation program. The SWMP is organized into six major sections, summarized as follows:

Section 1 – Introduction

Section 1 of this SWMP summarizes the City of Golden Valley's location and history and describes the purpose of the SWMP. This surface water management plan (SWMP) replaces the *2008 City of Golden Valley Surface Water Management Plan* (2008 SWMP) prepared by Barr Engineering Co. The SWMP is intended to provide a complete and detailed guide and reference for managing water resources within the City. The SWMP will assist the City with policy decisions, water resource management, implementation priorities, regulatory program references, and capital improvement budgeting to address water resource issues.

The purpose of this SWMP includes those given in Minnesota Statute 103B.201 for metropolitan water management programs, which include:

- Protect, preserve, and use natural surface and groundwater storage and retention systems;
- Minimize public capital expenditures needed to correct flooding and water quality problems;
- Identify and plan for means to effectively protect and improve surface and groundwater quality;
- Establish more uniform local policies and official controls for surface and groundwater management;
- Prevent erosion of soil into surface water systems;
- Promote groundwater recharge;
- Protect and enhance fish and wildlife habitat and water recreational facilities; and
- Secure the other benefits associated with proper management of surface and ground water.

This SWMP has been developed consistent with the requirements of Minnesota Statutes 103B.235, Minnesota Rules Chapter 8410, guidance from the Metropolitan Council, and the watershed management organizations (WMOs) with jurisdiction in the City including the Bassett Creek Watershed Management Commission (BCWMC) and the Minnehaha Creek Watershed District (MCWD).

This SWMP was approved by the BCWMC Commissioners on September 20, 2018 and by the MCWD Board of Managers on October 11, 2018.

Section 2 – Goals, Objectives, and Policies

This section of the plan describes the goals, objectives, and policies for water resource management within the City of Golden Valley. The City of Golden Valley is proactive in the area of water resource

management, reflecting the value the community places on natural resources. The policies described in this SWMP are designed to continue to maintain and improve the quality and effectiveness of water resource planning and management in the City of Golden Valley. Funding and staffing resources are not always sufficient to meet the full scope of stated goals, objectives, and policies. The City will pursue the goals, objectives, and policies described in this section to the full utilization of available resources. Section 5.0 describes the City's funding sources and implementation program in greater detail.

The City of Golden Valley's 2040 Comprehensive Plan identifies several goals related to the management of stormwater and surface water resources. These goals include:

1. Sustain and improve water quality
2. Maintain and rehabilitate infrastructure
3. Protect and enhance aquatic resources
4. Reduce the risk and impact of floods
5. Ensure capacity of systems meet future needs
6. Balance water usage and conservation
7. Involve and educate the public in water resource management

To achieve these goals, the City has identified objectives and policies. Objectives represent steps towards the City's goals, with policies providing the means to achieving those objectives. The objectives included in Section 2.0 are organized into the following topic areas:

Section 2.1 Water Quality of Lakes and Streams

1. Achieve pollutant load reductions as required by the state or watershed management organizations (e.g., as specified in Total Maximum Daily Loads).
2. Achieve BCWMC and state water quality standards in City lakes and streams to preserve beneficial uses.

Section 2.2 Stormwater Runoff

1. Minimize pollutant loading from stormwater runoff through non-point source pollution reduction and treatment.
2. Comply with all applicable stormwater regulations established by the Federal Government, the State of Minnesota, Hennepin County, the Bassett Creek Watershed Management Commission (BCWMC), the Minnehaha Creek Watershed District (MCWD) and the Metropolitan Council.

Section 2.3 Streams

1. Minimize the volume of stormwater runoff entering Bassett Creek.
2. Increase the groundwater base flow of Bassett Creek.
3. Reduce the frequency of bank full runoff events in Bassett Creek.

Section 2.4 Flood Risk Reduction and Rate Control

1. Minimize the risk of flooding along Bassett Creek, its tributaries, and other flood-prone areas.

2. Protect human life, property, and surface water systems that may be damaged by flood events.
3. Maintain the City's stormwater system to consistently provide the intended level of service and protection.
4. Implement strategies to manage the impact of future increased precipitation and changing climate patterns on City stormwater infrastructure and planning.

Section 2.5 Erosion and Sediment Control

1. Minimize erosion and sedimentation to protect the City's water resources.
2. Implement soil protection and sedimentation controls whenever necessary to maintain public health, safety, and welfare.

Section 2.6 Wetlands, Habitat, Shoreland and Natural Areas

1. Preserve and enhance the quantity and quality of wetlands.
2. Protect and restore natural areas.
3. Protect and enhance fish and wildlife habitat.
4. Maintain and enhance the integrity and ecological function of aquatic resources and shoreland areas.

Section 2.7 Groundwater

1. Protect the quantity and quality of groundwater resources.

Section 2.8 Funding and Administration

1. Provide sufficient funding to implement measures and policies contained in this plan.
2. Promote efficiency in stormwater and surface water management roles through cooperation with WMOs.

Section 2.9 Education and Public Involvement

1. Involve and educate the residents of the City in water resource related issues.
2. Increase public awareness of individual property owner's impacts on water quality.
3. Build community capacity to implement storm water best management practices at a local level.

Section 3 – Land and Water Resource Inventory

Section 3.0 of this Plan contains information on climate and precipitation, topography, watersheds and drainage patterns, land use, soils, geology and groundwater resources, surface waters, wetlands and natural resources, the City stormwater system, water quality, water quantity and flooding, fisheries and aquatic habitat, recreational and scenic areas, and potential pollutant sources in the City. This important information describes the conditions in the City and affects decisions about infrastructure, development, and ecological preservation. By way of summary, some of the most notable information in Section 3 includes:

Climate and precipitation: The climate of the Minneapolis-St. Paul area is a humid continental climate characterized by moderate precipitation, wide daily temperature variations, large seasonal variations in temperature, warm humid summers, and cold winters with moderate snowfall. Average weather imposes little strain on the typical drainage system, however extremes of precipitation and snowmelt are important for design of flood control systems. The National Oceanic and Atmospheric Administration (NOAA) published data on extreme precipitation events that can be used to aid in the design of flood control systems, now called Atlas 14. This data indicates increased precipitation depths for more extreme storm events relative to previously published values.

Topography: The City of Golden Valley is relatively flat, with generally mild slopes and little change in topography across the area. The urbanization of the City over time has greatly altered the natural topography of the watershed. With these alterations, drainage patterns have become more defined. The steep slopes within the City and are typically found along Bassett Creek and the major water bodies within the City. The location of steep slopes is of interest as these areas limit options for land development and have a higher potential for erosion.

Watersheds and Drainage Patterns: There are five major drainage districts within the City of Golden Valley. These districts include the Bassett Creek, Medicine Lake, Minnehaha Creek, Sweeney Lake, and Wirth Lake drainage districts. The Minnehaha Creek drainage district, which covers a small area in the southeast corner of the City, is located within the Minnehaha Creek Watershed District (MCWD). The other four drainage areas are located within the Bassett Creek Watershed Management Commission (BCWMC). All areas of the City of Golden Valley ultimately drain to the Mississippi River.

Land Use: Almost all of the land in Golden Valley is fully developed. As a fully-developed community, changes in land use will be the result of redevelopment. Changes in land use are expected to be modest over the life of this Plan. However, redevelopment with or without land use changes may provide opportunities to implement a variety of stormwater best management practices (BMPs) that can improve water quality, reduce the risk of flooding, provide habitat, or achieve other benefits.

Geology and groundwater: The City of Golden Valley is located in the northwestern portion of a bowl-like bedrock structure underlying the Minneapolis-St. Paul metropolitan area (called the Twin Cities basin). The bedrock is overlain by a layer of glacial drift which varies from over 250 feet thick in the western part of the City and to less than 50 feet near the eastern border of the City. Three buried erosional valleys cut deep into the bedrock and bisect the glacial drift. The region is underlain by four major bedrock aquifers: (1) St. Peter Sandstone, (2) Prairie du Chien-Jordan, (3) Wonewoc Sandstone (formerly Ironton-Galesville Sandstones), and (4) Mt. Simon-Hinckley Sandstones. In addition, there are numerous aquifers in the glacial drift. Some groundwater from the glacial drift and the St. Peter aquifer discharges into Bassett Creek. The remaining aquifers discharge into the Minnesota and Mississippi rivers.

Surface waters: The Minnesota Department of Natural Resources (MNDNR) designates certain water resources as public waters to indicate those lakes, wetlands, and watercourses over which the MNDNR has regulatory jurisdiction. There are several designated and numbered public waters and wetlands within the City, including the following named lakes:

- Sweeney Lake (27-0035P)
- Twin Lake (27-0035P)
- Wirth Lake (27-0037P)
- Westwood Lake (27-0711P)

Portions of the Main Stem of Bassett Creek and Sweeney Lake Branch of Bassett Creek are classified as public water watercourses. All of the above water bodies are classified as priority water bodies by the BCWMC. Within Golden Valley there are three (3) public ditch segments (also known as "county ditches" or "judicial ditches"). Public ditches are established and regulated under Chapter 103E of Minnesota Statutes and are under the jurisdiction of the county.

Wetlands and Natural Resources: Prior to development, much of the land within the City of Golden Valley was wetland. Many wetland areas were drained through farming and development (prior to the establishment of regulations protecting wetlands). Although Golden Valley is almost completely developed, numerous wetlands remain across the City. Several wetland and natural resource inventories have been completed for the City of Golden Valley. In 2015 the City completed a Natural Resource Management Plan (NRMP), (SEH, 2015). The purpose of the NRMP is to guide decisions makers and staff on how to best manage the natural resources within the City, including water, land, wildlife, and vegetation.

City Stormwater System: The City of Golden Valley stormwater management system is comprised of a series of lateral and trunk storm sewers, stormwater ponds, public ditches, and natural water bodies such as creeks, lakes, and wetlands, as well as a number of best management practices (BMPs). Figure 3-13 and Figure 3-14 show Golden Valley's stormwater management system and subsurface (draintile and cleanouts) water management system, respectively. There is also existing stormwater infrastructure that is under the jurisdiction of other entities, including the Minnesota Department of Transportation (MnDOT), Hennepin County, railroads, and private developments within the City. These other entities are responsible for maintaining their own stormwater management infrastructure.

Water Quality: The City recognizes the importance of water quality in its waterbodies has taken steps to protect and improve these resources. These steps include adopting water quality management policies, collecting water quality monitoring data, reviewing projects for conformance with water quality performance standards, and implementing water quality improvement projects. The City of Golden Valley adopts by reference the water quality standards of the BCWMC and Minnesota Pollution Control Agency (MPCA) (Minnesota Rules 7050) and will manage lakes and streams to meet or exceed the applicable water quality criteria. Waterbodies within the City that are listed in the MPCA's impaired waters 303(d) list include Bassett Creek, Sweeney Lake, and Wirth Lake.

Water Quantity and Flooding: The City of Golden Valley cooperates with the BCWMC to manage the quantity of water and reduce the risk of flooding within the City, including operation and maintenance of the BCWMC Flood Control Project features within the City. The City has also cooperated with the BCWMC to develop an XP-SWMM hydrologic and hydraulic model incorporating Atlas 14 precipitation data; the model may be used to assess impacts of potential projects and developments, and prioritize flood risk

reduction efforts. There is a Flood Insurance Study (FIS) for the City of Golden Valley prepared by the Federal Emergency Management Agency (FEMA). The City's FIS, together with the City's floodplain ordinance, allow the City to participate in the federal government's flood insurance program.

Natural Communities and Habitat: Prior to settlement, the major land cover type in the City was a predominantly oak forest interrupted by tallgrass prairie and marsh. Natural vegetation in the City of Golden Valley has been greatly altered by agricultural development and urbanization. Remaining vegetation in the City is typical of that found at the interface between the Eastern Deciduous Forest and the Temperate Grassland. The county biological survey data notes the presence of a tamarack swamp in Theodore Wirth Park. The Natural Heritage Information System (NHIS) also notes occurrences of federally- or state-listed rare animal species within the City. Game fish are present in Bassett Creek, Sweeney Lake, Twin Lake, and Wirth Lake.

Pollutant sources: The sources of potential pollution in the City are varied. The location of these potentially contaminated or hazardous waste sites should be considered as sites are redeveloped and BMPs are implemented. While there are point sources of pollution that are regulated under State permits, the vast majority of pollution reaching surface waters comes from non-point source – those which cannot be traced back to a single source or pipe. Instead, pollutants are carried from land to water in stormwater or snowmelt runoff, in seepage through the soil, and in atmospheric transport. These pollutants of concern include nutrients, bacteria, sediment, chlorides, pesticides, solvents, and chemicals.

Section 4 – Assessment of Issues and Opportunities

This section of the Plan presents and discusses the issues and opportunities facing the City, organized by various topics. Issue identification was an important task in development of this Plan, and included review of Metropolitan Council and watershed management organization (WMO) planning documents, review of available studies and modeling, discussion with City staff, and public engagement performed concurrent with the City's Comprehensive Plan update. The issues discussed in Section 4.0 are organized into the following topic areas:

- **Water quality**: including stormwater runoff water quality, MPCA impaired waters, total maximum daily load studies, waterbody classification and water quality goals, water quality BMP maintenance, and other water quality issues.
- **Water quantity and flood risk reduction**: including floodplain management, hydrologic and hydraulic modeling, and discussion of select local flooding issues.
- **Wetland management:** including wetland and shoreland buffers, aquatic invasive species, and wetland classification and inventory
- **Groundwater management:** including infiltration, groundwater sustainability, and wellhead protection
- **Erosion and sediment control:** including Bassett Creek erosion issues
- **Interagency issues:** include maintenance of infrastructure and park areas not owned by the City

Major opportunities for the City to consider in addressing these issues are summarized at the end of this section, and include cooperative efforts with WMOs, partnerships with adjacent cities, redevelopment opportunities, and coordination with other City programs.

Section 5 – Implementation Program

This section describes the significant components of the City's Surface Water Management Plan (SWMP) implementation program, including implementation of the City's NPDES MS4 Permit, operation and maintenance of the City's stormwater system, education and public involvement, funding, ordinance implementation and official controls, and implementation priorities. The implementation program is presented in tabular format at the end of this section and includes:

- Table 5-1 Implementation Program – Capital Improvements and Studies
- Table 5-2 Implementation Program – Ongoing Programs (Operations, Regulation, and Education)

Much of the stormwater infrastructure within the City is nearing the end of its intended operating life or may be operating past its design life. Over the next several decades, the City will be challenged with needing to repair and/or replace a significant amount of its stormwater infrastructure. To address this issue, the City will implement its Infrastructure Renewal Program (IRP). The IRP provides a schedule and funding source for updating aging infrastructure in coordination with other planned City activities. The City will use the IRP in planning and executing updates to the stormwater management system. Section 5.0 contains more information about the City's IRP.

Section 5.0 also describes the roles of the BCWMC and MCWD with respect to water resource management within the City. This section also provides information regarding updating the SWMP, and the revision/amendment process for the SWMP.

Section 6 – References

This section lists the documents and other references used in the preparation of the SWMP.

1.0 Introduction

1.1 Location and History

The City of Golden Valley is a suburb of the Twin Cities metropolitan area, located just west of the City of Minneapolis. The City contains diverse areas of residential neighborhoods, commercial and industrial developments, and park and recreation facilities. The City of Golden Valley is unique in that it contains several prominent and valuable water resources, such as Bassett Creek, Sweeney Lake, Twin Lake, and Wirth Lake, while at the same time existing as an inner metro area urban-suburban community. Nearly all of the stormwater runoff in Golden Valley drains to Bassett Creek and then on to the Mississippi River. The City recognizes the value of the water resources within and downstream of its borders. The goals, policies, and implementation activities included in this plan demonstrate the City's strong support for natural resource protection and investment in water quality.

The Village of Golden Valley was incorporated on December 16, 1886. During its early years, Golden Valley was an agricultural community of only a few hundred residents, full of farms, mills, and dairies. Residential development began after the Electric Luce Line Railroad was built through the village in 1912. Between 1910 and 1940, Golden Valley's population increased from 692 to 2,040. More residential development followed industry's discovery of Golden Valley after World War II, and the village continued to grow. Golden Valley became a City in 1972.

Today Golden Valley covers 10.5 square miles and has a population of approximately 20,000 (2010 census). More detailed census and demographic information is available in the City's Comprehensive Plan and from the City's website at: www.goldenvalleymn.com.

Golden Valley is a fully developed City. Low density residential land use is the predominant land use, occupying approximately half the City (see Section 3.4). Significant commercial, industrial, and institutional development also exist within the City. The City has 25 parks and nine nature areas within the community.

The City of Golden Valley is located almost entirely within the watershed of Bassett Creek, which is managed by the Bassett Creek Water Management Commission (BCWMC). The far southeast corner of the City, south of I-394 and east of Highway 100, is located within the watershed of Minnehaha Creek, which is managed by Minnehaha Creek Watershed District (MCWD).

1.2 SWMP Purpose and Scope

This surface water management plan (SWMP) replaces the *2008 City of Golden Valley Surface Water Management Plan* (2008 SWMP) prepared by Barr Engineering Co. The purpose of this SWMP is to provide a complete and detailed guide and reference for protecting and managing water resources within the City, including stormwater. The SWMP will assist the City with policy decisions, water resource management, implementation priorities, regulatory program references, and capital improvement budgeting to address water resource issues.

The City's SWMP is a local water management plan prepared in accordance with Minnesota Statute 103B.235 and Minnesota Rules 8410. The purpose of this SWMP includes those purposes given in Minnesota Statute 103B.201 for metropolitan water management programs. According to statute, the purposes of these water management programs are to:

- Protect, preserve, and use natural surface and groundwater storage and retention systems;
- Minimize public capital expenditures needed to correct flooding and water quality problems;
- Identify and plan for means to effectively protect and improve surface and groundwater quality;
- Establish more uniform local policies and official controls for surface and groundwater management;
- Prevent erosion of soil into surface water systems;
- Promote groundwater recharge;
- Protect and enhance fish and wildlife habitat and water recreational facilities; and
- Secure the other benefits associated with proper management of surface and ground water.

This SWMP will guide the City in protecting, preserving, and managing its surface water resources and stormwater system. This SWMP has been developed consistent the requirements of Minnesota Statutes 103B.235, Minnesota Rules Chapter 8410, guidance from the Metropolitan Council, and the watershed management organizations (WMOs) with jurisdiction in the City including the BCWMC and the MCWD.

This SWMP was approved by the BCWMC Commissioners on September 20, 2018 and by the MCWD Board of Managers on October 11, 2018.

1.2.1 Regulatory History

In addition to the purposes and requirements outlined in state statutes and rules, this SWMP reflects numerous other water resource-related state and federal mandates that the City must meet. As state and federal laws have changed over the years, the role of the City in water resource management has evolved. Some of the key regulatory milestones affecting municipal water resource management include, but are not limited to:

1945 – Minnesota legislature authorized a new state Water Pollution Control Commission

1948 – United States (U.S.) Congress enacted the Federal Water Pollution Control Act (FWPCA)

1968 – U.S. Congress enacts the National Flood Insurance Act of 1968 creating the National Flood Insurance Program (NFIP)

1967 – Minnesota legislature created the Minnesota Pollution Control Agency (MPCA)

1972 – U.S. Congress enacted amendments to the FWPCA known as the Clean Water Act (CWA)

1977 – U.S. Congress enacted amendments to the CWA leading to the National Pollutant Discharge Elimination System (NPDES)

1982 – Minnesota legislature enacted the Metropolitan Surface Water Management Act (later becoming Minnesota statute 103B) requiring cities to develop local water management plans

1987 - Minnesota legislature enacted laws broadening attention from "point" source to "nonpoint" source pollution (including stormwater)

1987 – U.S. Environmental Protection Agency (EPA) delegated authority for administering NPDES program to the MPCA

1990 – NPDES Phase I Stormwater Program required regulation of municipal separate storm sewer systems (MS4s) serving more than 100,000 people

1991 – Minnesota Legislature enacted the Wetland Conservation Act (WCA)

1999 – Phase II federal regulations expanded the scope of the NPDES Stormwater Program to include smaller MS4s (including Golden Valley) and limited construction and industrial activities

2002 – MPCA began identifying surface water resources that are impaired for their identified uses (see Section 4.1.2)

2003 – As part of the NPDES Phase II program, the MPCA issued a General Permit (MS4 permit) applicable to Golden Valley; the permit requires cities to comply with six "minimum control measures" (see Section 5.1)

2013 – MPCA reissued the MS4 General Permit; the revised permit, including new requirements for smaller MS4s including Golden Valley

The above regulations and requirements have led to following specific requirements for the City of Golden Valley and other similar cities:

- Preparation of the MS4 General Storm Water Permit Application and Storm Water Pollution Prevention Program
- Preparation of this Surface Water Management Plan (SWMP)
- Preparation of future updates to the NPDES-MS4 permit and SWMP to address the requirements of future Total Maximum Daily Loading (TMDL) analyses.

1.3 Water Resources Agreements

The City of Golden Valley has entered into the following water resource management related agreements:

1. Joint Powers Agreement establishing the Bassett Creek Watershed Management Commission (BCWMC). The original joint powers agreement between the nine member cities (including Golden Valley) went into effect in 1984. A revised and restated joint powers agreement was developed and signed in 1993, and again most recently in 2015.

2. Agreement with the Golden Valley Country Club, Inc. regarding inspection, access, and maintenance for a dam/flood control structure on Golden Valley Country Club property, on Bassett Creek. The agreement was executed in June, 1993.

3. Easement agreement with the Golden Valley Country Club, Inc. regarding inspection, access, and maintenance for a pump/lift station on Golden Valley Country Club property, on Bassett Creek. The agreement was executed in May, 2002.

In addition to the specific agreements listed above, the City continues to require owners of private stormwater facilities to enter into maintenance agreements with the City to ensure that those facilities continue to function as originally intended (see Section 5.2).

2.0 Goals, Objectives and Policies

This section of the plan describes the goals, objectives, and policies for water resource management within the City of Golden Valley. The City of Golden Valley is proactive in the area of water resource management, reflecting the value the community places on natural resources. The policies described here are designed to continue to improve the quality and effectiveness of water resource planning and management in the City of Golden Valley. Funding and staffing resources are not always sufficient to meet the full scope of stated goals, objectives, and policies. The City will pursue the goals, objectives, and policies described in this section to the full utilization of available resources. Section 5.0 describes the City's funding sources and implementation program in greater detail.

The City of Golden Valley's 2040 Comprehensive Plan identifies several goals related to the management of stormwater and surface water resources. These goals include:

1. Sustain and improve water quality
2. Maintain and rehabilitate infrastructure
3. Protect and enhance aquatic resources
4. Reduce the risk and impact of floods
5. Ensure capacity of systems meet future needs
6. Balance water usage and conservation
7. Involve and educate the public in water resource management

To achieve these goals, the City has identified objectives and policies. Objectives and policies are organized into the following topic areas:

- Water quality of lakes and streams
- Stormwater runoff
- Streams
- Flood risk reduction and rate control
- Erosion and sediment control
- Wetlands, habitat, shoreland, and natural areas
- Groundwater
- Funding and administration
- Education and public involvement

2.1 Water Quality of Lakes and Streams

The water quality of lakes and streams within the City is a primary focus of the City's surface water management efforts and the efforts of the Bassett Creek Watershed Management Commission (BCWMC). In its 2015 Watershed Management Plan, the BCWMC established goals for lake and stream management and developed water quality management classifications for several streams, lakes, and ponds within the City (see Section 3.10.2). The City has established the goals, objectives, and policies described herein to be consistent with and complement the water quality goals of the BCWMC.

Objectives:

1. Achieve pollutant load reductions as required by the state or watershed management organizations (e.g., as specified in Total Maximum Daily Loads).

2. Achieve BCWMC and state water quality standards in City lakes and streams to preserve beneficial uses.

Policies:

(a) The City of Golden Valley will consider the protection and enhancement of natural resources including lakes, ponds and adjacent uplands when designing and implementing City projects.

(b) The City of Golden Valley adopts by reference the water quality standards of the BCWMC and MPCA (Minnesota Rules 7050) and will manage lakes and streams to meet or exceed the applicable water quality criteria.

(c) The City of Golden Valley adopts the BCWMC priority waterbody classification system within Golden Valley.

(d) The City of Golden Valley will work with the BCWMC to implement the improvement projects in the City identified in the BCWMC's capital improvement program based on feasibility, prioritization, and available funding.

(e) The City of Golden Valley will prioritize water quality improvement projects that are most effective at achieving water quality goals, including non-structural BMPs and education, with an emphasis give to projects that also provide flood mitigation benefit.

(f) The City of Golden Valley will cooperate with the BCWMC, MCWD, the MPCA and other stakeholders in the preparation and implementation of Total Maximum Daily Load (TMDL) studies for waterbodies on the MPCA's current or future impaired waters (303(d)) list located in, or receiving drainage from, the and/or Watershed Restoration and Protection Strategy (WRAPS) study.

(g) The City of Golden Valley will continue to identify and pursue opportunities to maintain or improve the excellent water quality in Twin Lake.

(h) The City will continue to implement (or require developers to implement) BMPs that reduce phosphorus loading to receiving water within the MCWD by two (2) pounds per year and report progress to the MCWD (see Section 4.1.5.5).

(i) The City of Golden Valley will continue to support the water quality monitoring efforts in the City performed by other agencies and organizations.

2.2 Stormwater Runoff

Objectives:

1. Minimize pollutant loading from stormwater runoff through non-point source pollution reduction and treatment.

2. Comply with all applicable stormwater regulations established by the Federal Government, the State of Minnesota, Hennepin County, the Bassett Creek Watershed Management Commission (BCWMC), the Minnehaha Creek Watershed District (MCWD) and the Metropolitan Council.

Policies:

(a) The City will continue to implement all aspects of the Golden Valley NPDES MS4 permit SWPPP (see Appendix A), including all required inspection and maintenance activities.

(b) The City requires stormwater treatment for development, redevelopment, and linear projects as defined in City Code Section 4.31, and including:

- **New, nonlinear development** that creates more than one acre of new impervious surface shall capture and retain onsite 1.1 inches of runoff from the new impervious surface.
- **Nonlinear redevelopment** sites that create one acre or more of new or fully reconstructed impervious surface shall capture and retain onsite 1.1 inches of runoff from the new or fully reconstructed impervious surface.
- **Linear projects** that create one acre or more of net new impervious surface shall capture and retain onsite 1.1 inches of runoff from the net new or fully reconstructed impervious surface.

(c) If the performance goal is not feasible and/or is not allowed for a proposed project (e.g., due to site restrictions as defined in the MPCA's MIDS flexible treatment options), then the project proposer must implement the flexible treatment options, as shown in the BCWMC Design Sequence Flow Chart in Appendix C of the BCWMC Requirements for Improvements and Development Proposals (2017, as amended).

(d) The City will continue forwarding proposed projects to the BCWMC for review, as required. The types of projects that must be submitted to the BCWMC for review, the BCWMC's review procedure, submittal requirements, guidelines, design criteria, etc. are provided in the BCWMC's document Requirements for Improvements and Development Proposals (2017, as amended, see BCWMC website: http://www.bassettcreekwmo.org/).

(e) The City requires developers to meet all BCWMC requirements, where applicable, as identified in the BCWMC's Requirements for Improvements and Development Proposals (2017, as amended, see BCWMC website: http://www.bassettcreekwmo.org).

(f) The City requires developers to meet all MCWD requirements, where applicable, as identified in the MCWD Rules (see MCWD website: http://www.minnehahacreek.org/).

(g) As part of the City's development review and approval process, the City will continue to ensure that stormwater discharges will not adversely affect endangered species, threatened species, historic places, and archaeological sites.

(h) The City will continue to explore implementation of emerging stormwater management technologies, BMPs, and methods as research develops.

(i) The City will continue to monitor opportunities for BMP implementation, including retrofits and flow diversions, within the City and implement stormwater BMPs as funds and opportunities become available.

(j) The City will continue to require maintenance agreements for private stormwater facilities and maintain procedures, resources, and authority to enforce these agreements.

(k) The City will coordinate with other cities and agencies, as applicable, to encourage ongoing maintenance of water quality facilities draining to, or receiving drainage from, the City.

(l) The City will continue to require project proposers to perform stormwater management activities consistent with the City's stormwater management ordinance.

(m) The City promotes using vegetation, with an emphasis on native species, to assimilate nutrients and limit the rate of stormwater runoff (e.g., buffer strips, vegetated swales).

(n) The City requires project proposers to consider the use of low-impact design elements in proposed projects, including, but not limited to: green roofs, rain gardens, bioswales, and pervious pavement.

(o) The City will request MnDOT involvement in pond sediment removal within MnDOT right-of-way.

(p) The City will continue to implement a program to track installation, inspection, and monitoring of private stormwater facilities.

(q) The City of Golden Valley will continue to work with the League of Minnesota Cities Stormwater Coalition (MCSC) and/or other groups toward identifying and addressing stormwater management issues.

(r) The City will continue to evaluate stormwater pond performance consistent with its SWPPP and consider opportunities to enhance the pollutant removal effectiveness of existing stormwater ponds.

(s) The City prohibits the drainage of sanitary sewage or non-permitted industrial wastes onto any land, watercourse, or storm sewer draining to Bassett Creek (see also City Code Section 4.31 subd. 7).

2.3 Streams

Streams and their respective floodplains provide an important focal point for green space and recreational activities within Golden Valley. These streams are also critical conveyors of stormwater flow. The following goals and policies are designed to protect these important functions of streams within the City.

Objectives:

1. Minimize the volume of stormwater runoff entering Bassett Creek.

2. Increase the groundwater base flow of Bassett Creek.

3. Reduce the frequency of bank full runoff events in Bassett Creek.

Policies:

(a) The City encourages developers and landowners to reduce areas of impervious surface through the use of innovative materials, alternative site design, and other low impact design strategies.

(b) The City will encourage project proposers and private land owners to restore streambank areas where the natural integrity of the creek has been compromised.

(c) The City will coordinate with the BCWMC and private property owners to implement streambank stabilization and restoration projects.

(d) The City will incorporate soft-armoring techniques (e.g., plants, logs, vegetative mats) when implementing streambank and shoreline stabilization and restoration projects, whenever feasible.

(e) The City will maintain and continue to update its Creek Inventory, which identifies outfalls, culverts, significant erosion sites and potential obstructions in the three branches of Bassett Creek within City limits.

2.4 Flood Risk Reduction and Rate Control

Properly designed and managed storm sewer and drainage facilities are necessary to minimize the frequency and extent of flooding. In cooperation with the BCWMC and through the City's floodplain zoning requirements (City Code Section 11.60), Golden Valley works to minimize the risk to people and property from flood waters.

Objectives:

1. Minimize the risk of flooding along Bassett Creek, its tributaries, and other flood-prone areas.

2. Protect human life, property, and surface water systems that may be damaged by flood events.

3. Maintain the City's stormwater system to consistently provide the intended level of service and protection.

4. Implement strategies to manage the impact of future increased precipitation and changing climate patterns on City stormwater infrastructure and planning.

Policies:

(a) The City will continue to implement its Flood Plain Management Zoning Regulations (City Code Section 11.60) and maintain consistency with BCWMC and MCWD floodplain management policies.

(b) The City will permanently protect stormwater ponds and drainage systems by obtaining property land dedication and easements with new development.

(c) The City will design new municipal stormwater facilities to convey no less than the 10-year, 24-hour rainfall event (i.e., the event with a 10% chance of occurring in any year) based on Atlas 14 precipitation data.

(d) The City requires new development, redevelopment, and linear projects to achieve on site volume retention consistent with the requirements of Section 2.2 policy (b) and City Code Section 4.31. For all other projects, the City encourages use of infiltration (where conditions allow), filtration, or other abstraction of runoff from impervious surfaces.

(e) The City requires that post-development peak discharge rates shall not exceed existing discharge rates for the 2-year (50% annual occurrence probability), 10-year (10% annual occurrence probability), and 100-year (1% annual occurrence probability) critical duration storm events, as determined using Atlas 14 precipitation data.

(f) The City requires rate control in conformance with the BCWMC Flood Control Project system design.

(g) The City will allow only those land uses in the BCWMC-established floodplain that will not be damaged by floodwaters and will not increase flooding. Allowable types of land use that are consistent with the floodplain include:

- Open space or recreational uses, such as golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, parks, wildlife habitat, trails, nature preserves and fishing areas.

- Residential lawns, gardens, parking areas, and play areas.
- Non-residential parking areas that meet additional provisions specified in the City floodplain ordinance
- Public utilities (consistent with special permit requirements specified in the City floodplain ordinance)

(h) The City prohibits permanent bridges, docks, storage piles, fences and other obstructions in the floodplain that would collect debris or restrict flood flows.

(i) The City prohibits filling within the BCWMC-established floodplain. Proposals to fill within the BCWMC-established floodplain must obtain BCWMC approval and must provide compensating storage and/or channel modification so that the flood level shall not be increased at any point along the trunk system due to the fill.

(j) The City prohibits expansion of existing non-conforming land uses within the floodplain unless they are fully flood-proofed in accordance with existing codes and regulations, as demonstrated to the satisfaction of the City Engineer.

(k) As opportunities arise, the City will consider dedicating funds to the purchase and/or structural flood-proofing of homes that have less than 2 feet of freeboard from their lowest opening to the established 100 year flood level, or that have an access that has a portion below the 100 year flood level.

(l) The City will require that the lowest floor (including basement) of new permanent structures and significantly redeveloped structures be at least 2 feet above the established 100-year flood plain elevation.

(m) The City discourages development where the sole access to the site is through the established 100-year floodplain. If such access is unavoidable, the City will require that any new roads into the site crossing the floodplain be above the regulatory floodplain elevation and satisfy all applicable floodplain regulations.

(n) The City will continue to perform routine inspection, maintenance, and repair of BCWMC Flood Control Project (FCP) features located within the City and will formally notify the BCWMC of any maintenance and repair action on any FCP feature.

(o) The City will be responsible for the maintenance, repair, and replacement of road crossings and corresponding conveyance structures that were installed as part of the BCWMC FCP.

(p) The City will perform the initial response to emergency conditions related to the performance or failure of the BCWMC FCP.

(q) The City will assume responsibility for maintenance and repair of FCP features that are primarily aesthetic improvements.

2.5 Erosion and Sediment Control

Large areas of Golden Valley contribute stormwater discharge to Bassett Creek, Sweeney Lake, Medicine Lake, Wirth Lake, and other important waters. An erosion and sediment control program is essential to maintaining or improving the quality of the water bodies within, and downstream, of the City. Properly implemented, an erosion and sediment control program can reduce erosion at the source and significantly reduce sediment and pollutant loading into the receiving waters.

Objectives:

1. Minimize erosion and sedimentation to protect the City's water resources.

2. Implement soil protection and sedimentation controls whenever necessary to maintain public health, safety, and welfare.

Policies:

(a) The City will promote land use planning and development that minimizes sediment yield through compliance with established City, BCWMC, and MCWD policies.

(b) The City will review projects and developments for compliance with the City, MPCA, BCWMC, and MCWD erosion and sediment control standards.

(c) The City requires development to comply with and follow appropriate best management practices for erosion and sediment control as specified in the MPCA's Construction Stormwater General Permit and the Minnesota Stormwater Manual, available at: http://stormwater.pca.state.mn.us/index.php/Main_Page.

(d) The City will continue to require permits and the preparation of erosion control plans for construction projects as per Golden Valley City Code Section 4.31. Erosion control plans shall show proposed methods of retaining sediment onsite during construction, and shall specify methods and schedules for restoring, covering, or re-vegetating the site after construction.

(e) The City will continue to perform regular erosion and sediment control inspections.

(f) The City will maintain a process for handling public complaints regarding non-compliance issues.

(g) The City will maintain a record-keeping process to store information regarding site inspections and report compliance to the BCWMC for those projects subject to BCWMC erosion and sediment control standards.

(h) The City will continue to implement its tree and landscape ordinance (City Code Section 4.32).

2.6 Wetlands, Habitat, Shoreland and Natural Areas

Wetlands, shorelands, and natural areas provide a number of benefits that are of direct value to the community. These benefits vary according to the type of wetland or natural area. Collectively, wetlands provide floodwater storage and retention, nutrient assimilation, sediment entrapment, groundwater recharge, aesthetics and recreation, shoreland anchoring and erosion control, and habitat for fish and wildlife. Natural areas also provide for aesthetics, recreation, shoreland stabilization, erosion control, and wildlife habitat.

Objectives:

1. Preserve and enhance the quantity and quality of wetlands.
2. Protect and restore natural areas.
3. Protect and enhance fish and wildlife habitat.
4. Maintain and enhance the integrity and ecological function of aquatic resources and shoreland areas.

Policies:

(a) The City will continue its role as the local governmental unit (LGU) responsible for administering the Minnesota Wetland Conservation Act (WCA).

(b) The City will continue to require wetland delineation and functions and values assessment with development proposals, as needed, and require developers to maximize buffer zones around wetlands where possible.

(c) The City will continue to require proposed projects to sequence wetland impacts in the order of avoid, minimize, and replace, consistent with WCA requirements. Where wetland replacement is necessary, the City prefers local wetland replacement.

(d) The City will continue to develop wetland banks and banking credits as opportunities arise; developed wetland credits will be used primarily for City of Golden Valley projects.

(e) The City will continue to coordinate with other agencies, as necessary, that are also involved in the protection of wetlands.

(f) The City will continue to use its Natural Resource Management Plan as a planning and implementation resource and update it periodically.

(g) The City will continue to develop and maintain buffers of native shoreline vegetation on City property, preserving naturally existing vegetation where applicable.

(h) The City requires projects containing more than one acre of new or redeveloped impervious area to incorporate vegetated buffers around all wetlands. Average minimum buffer widths are required according to the MnRAM wetland classification system, as follows:

- An average of 75 feet and minimum of 50 feet from the edge of wetlands classified as Preserve
- An average of 50 feet and minimum of 30 feet from the edge of wetlands classified as Manage 1
- An average of 25 feet and minimum of 15 feet from the edge of wetlands classified as Manage 2 or 3.

Allowable land uses and vegetative criteria for buffers are specified in the BCWMC's Requirements for Development and Redevelopment (2017, as amended). The City may allow exemptions for public recreational facilities parallel to the shoreline (e.g. trails) up to 20 feet in width, with that width being added to the required buffer width.

(i) The City will encourage and support the voluntary development and maintenance of buffers of native and naturally existing shoreline vegetation on non-City property.

(j) The City will support opportunities to enhance recreational opportunities on Bassett Creek.

(k) The City will develop objectives and guidelines to evaluate and protect the natural integrity of lakes, ponds and adjacent uplands.

(l) The City will maintain its authority for shoreland regulation by continuing to implement its shoreland ordinance (City Zoning Code Section 11.65).

(m) The City will encourage landowners to protect non-disturbed shoreland areas and restore disturbed shorelines and streambanks located on private property to their natural state, where feasible.

(n) The City will encourage preservation of streambank and lakeshore vegetation during and after construction projects.

(o) The City annually inspects wetlands classified as Preserve for terrestrial and emergent aquatic invasive vegetation, such as buckthorn and purple loosestrife, and attempts to control or treat invasive species, where feasible.

2.7 Groundwater

Objective:

1. Protect the quantity and quality of groundwater resources.

Policies:

(a) The City will cooperate with St. Louis Park, Robbinsdale, Plymouth, and Minnetonka regarding wellhead protection programs and activities.

(b) The City will consider the presence of drinking water supply management areas (DWSMAs) when planning, reviewing, and implementing projects.

(c) The City will continue to work with public and private entities that engage in soil and groundwater sampling, monitoring, and remediation.

(d) The City requires infiltration practices to be implemented in accordance with the following guidance for determining the feasibility of infiltration:

- NPDES Construction Stormwater General Permit (2013, as amended)
- BCWMC's Requirements for Improvements and Development Proposals (BCWMC, 2017, as amended)
- Minnesota Department of Health's *Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas* (MDH, 2007)

The City recommends that infiltration practices be designed with consideration for the following guidance:

- Minnesota Pollution Control Agency's Minnesota Stormwater Manual (http://stormwater.pca.state.mn.us/index.php/Main_Page)

(e) The City will cooperate with efforts of the WMOs and others to educate the general public regarding the importance of implementing BMPs to protect groundwater quality and quantity.

(f) The City will share groundwater elevation data with the BCWMC and other public and private partners, when available.

2.8 Funding and Administration

Objectives:

1. Provide sufficient funding to implement measures and policies contained in this plan.

2. Promote efficiency in stormwater and surface water management roles through cooperation with WMOs.

Policies:

(a) The City of Golden Valley will continue to use the Storm Water Utility Fee program as the primary mechanism to fund stormwater related activities.

(b) The City will continue to pursue grant and cost-share funding opportunities for stormwater related programs and projects.

(c) The City will continue forwarding proposed projects to the BCWMC for review. The types of projects that must be submitted to the BCWMC for review, the BCWMC's review procedure, submittal requirements, guidelines, design criteria, etc. are provided in the BCWMC's document Requirements for Improvements and Development Proposals (BCWMC, June 2017, as revised).

(d) The City will provide ordinances and planning document updates affecting stormwater and water resource management to the BCWMC and/or MCWD for review.

(e) For projects in the City ordered by the BCWMC, the City will acquire and maintain easements, right-of-way, or interest of land necessary to implement and maintain the project.

(f) The City will appoint a Commissioner and Alternative Commissioner to participate in the BCWMC Board of Commissioners. City staff will participate in the BCWMC Technical Advisory Committee (TAC).

(g) The City will promote sustainability and resilience through continued implementation of its Resilience and Sustainability Plan and practices identified in the MPCA's Green Step Cities program applicable to stormwater and surface water management.

2.9 Education and Public Involvement

Residents living within the City of Golden Valley have a vested interest in maintaining or enhancing the water quality within the City. Many residents may not be aware of certain practices that harm the environment, or ways they can prevent water quality degradation.

Objectives:

1. Involve and educate the residents of the City in water resource related issues.

2. Increase public awareness of individual property owner's impacts on water quality.

3. Build community capacity to implement storm water best management practices at a local level.

Policies:

(a) The City will maintain a public education program to develop and distribute educational materials and perform outreach activities informing the community about the impacts of stormwater discharges on water bodies and best practices to promote watershed health.

(b) The City will maintain the Golden Valley Environmental Commission to educate residents, raise awareness about environmental responsibility, and create a sense of collaboration in the spirit of making and keeping Golden Valley an environmentally healthy City.

(c) The City of Golden Valley will continue to conduct an annual public meeting (with notice) to discuss its Storm Water Pollution Prevention Program (SWPPP) and inform the public about stormwater impacts. City staff will analyze comments and written materials gathered at the public meeting and adjust the SWPPP, where appropriate.

(d) The City of Golden Valley will continue to assist other agencies, where appropriate, in the development and distribution of educational materials.

(e) The City will continue to utilize volunteer groups to the greatest extent possible for public service projects such as catch basin stenciling, debris clean up, adopt-a-pond, stream bank erosion protection, buckthorn removal, and vegetative buffer strips.

(f) The City will continue the use of demonstration projects as a means of educating the public on issues such as stream bank stabilization, rainwater gardens, and aesthetically pleasing stormwater ponds.

(g) The City will continue to work with other agencies to provide educational materials and programs for schools in the City.

(h) The City will continue to provide educational and informational materials regarding stormwater issues through a variety of media, including, but not limited to:

- City website (goldenvalleymn.gov)
- Cable TV station
- Informational packets to new residents
- City bi-monthly newsletters

3.0 Land and Water Resource Inventory

This section contains information on climate and precipitation, topography, watersheds and drainage patterns, land use, soils, geology and groundwater resources, surface waters, wetlands and natural resources, the City stormwater system, water quality, water quantity and flooding, fisheries and aquatic habitat, recreational and scenic areas, and potential pollutant sources in the City. This important information describes the conditions in the City and affects decisions about infrastructure, development, and ecological preservation.

3.1 Climate and Precipitation

The climate of Golden Valley is a humid continental climate, characterized by moderate precipitation (normally sufficient for crops), wide daily temperature variations, large seasonal variations in temperature, warm humid summers, and cold winters with moderate snowfall.

The mean annual temperature for Golden Valley is 46.2°F, as measured at the Minneapolis/ St. Paul (MSP) airport station (1981-2010). Mean monthly temperatures vary from 15.6°F in January to 73.8°F in July (1981-2010). According to NOAA National Climatic Data Center (NCDC), extreme temperatures recorded at MSP (or downtown Minneapolis prior to April 1938, when the location of official measurement was changed to MSP) were a high of 108°F on July 14, 1936 and a low of -34°F on January 1, 1936 and January 19, 1970. For the 1981-2010 climate normal period, the average date for latest occurrence of freezing temperatures was April 26, while the average date for the first autumn frost was October 7. The average frost-free period (growing season) is approximately 160 days.

Average total annual precipitation at the MSP airport station is 30.6 inches (1981-2010. Annual precipitation recorded at downtown Minneapolis and MSP has ranged from a low of 11.5 inches in 1910, to a high of 40.2 inches in 1911. The mean monthly precipitation varies from 4.3 inches in August to 0.9 inches in January (1981-2010). From May to September, the growing season months, the average rainfall is 19.0 inches or about 62 percent of the average annual precipitation (1981-2010). Average annual lake evaporation is about 31 inches.

Average annual snowfall is 54.4 inches at the MSP airport station (1981-2010). Extreme snowfall records range from 98.6 inches during the 1983-1984 season to 14.2 inches during the 1930-1931 season.

Average weather imposes little strain on the typical drainage system. Extremes of precipitation and snowmelt are important for design of stormwater management and flood risk reduction systems. NOAA has data on extreme precipitation events that can be used to aid in the design of stormwater management and flood risk reduction systems. Extremes of snowmelt most often affect major rivers, the design of large stormwater storage areas, and landlocked basins, while extremes of precipitation most often affect the design of conveyance facilities. In contrast with stormwater drainage facilities, stormwater quality treatment systems are designed based on the smaller, more frequent storms which typically account for the majority of pollutant loadings from urban watersheds.

NOAA published Atlas 14, Volume 8, in 2013. Atlas 14 is the primary source of information regarding rainfall in the region. Atlas 14 supersedes publications TP-40 and TP-49 issued by the National Weather Bureau (now the National Weather Service) in 1961 and 1964. Improvements in Atlas 14 precipitation estimates include denser data networks, longer (and more recent) periods of record, application of regional frequency analysis, and new techniques in spatial interpolation and mapping. Atlas 14 provides estimates of precipitation depth (i.e., total rainfall, in inches) and intensity (i.e., depth of rainfall over a specified period) for durations from 5 minutes up to 60 days.

Runoff from spring snowmelt is significant in this region but is not provided in Atlas 14. The Soil Conservation Service's (now the Natural Resources Conservation Service) National Engineering Handbook, Hydrology, Section 4, presents maps of regional runoff volume. Table 3-1 lists selected precipitation and runoff events used for design purposes.

Table 3-1 Selected Rainfall and Snowmelt Runoff Events

Type	Event Frequency (% chance of annual occurrence)	Duration	Depth (inches)
Rainfall	2-year (50%)	24 hour	2.87
	5-year (20%)	24 hour	3.60
	10-year (10%)	24 hour	4.29
	25-year (4%)	24 hour	5.39
	50-year (2%)	24 hour	6.36
	100-year (1%)	24 hour	7.42
	10-year (10%)	10 day	6.83
	100-year (1%)	10 day	10.2
Snowmelt [1]	10-year (10%)	10 day	4.7
	25-year (4%)	10 day	5.7
	50-year (2%)	10 day	6.4
	100-year (1%)	10 day	7.1

Source: NOAA Atlas 14 – Volume 8. Station: Golden Valley (21-3202). Hydrology Guide for Minnesota (USDA Soil Conservation Service – NRCS)

(1) Snowmelt depth reported as liquid water.

It is important to note that the frequency (also called recurrence interval or return period) of a given storm event is a function of probability. The recurrence interval or return period describes the average time between events of a given magnitude expected over *extremely long* periods of time. The inverse of the recurrence interval is the probability of a given event occurring in any single year (e.g., a 100 year event has a 1% chance of occurring in any single year). It is important to realize that the return period implies

nothing about the actual time sequence of the event. For example, two 100 year events could occur in consecutive years, or even within a single year.

Even with wide variations in climate conditions, climatologists have found four significant climate trends in the Upper Midwest (NOAA, 2013):

- Warmer winters
- Higher minimum temperatures
- Higher dew points
- Changes in precipitation trends – more rainfall is coming from heavy thunderstorm events and increased snowfall

According to NOAA's 2013 assessment of climate trends for the Midwest (NOAA, 2013), annual and summer precipitation amounts in the Midwest are trending upward, as is the frequency of high intensity storms. Higher intensity precipitation events typically produce more runoff than lower intensity events with similar total precipitation amounts; higher rainfall intensities are more likely to overwhelm the capacity of the land surface to infiltrate and attenuate runoff. Precipitation records in the Twin Cities area show that the average annual precipitation has increased (Minnesota Climatology Working Group, 2016).

Additional climate information can be obtained from a number of sources, such as the following:

- For climate information about the Twin Cities metropolitan area: http://www.dnr.state.mn.us/climate/twin_cities/index.html
- Local data available from the Midwestern Regional Climate Center (MRCC): http://mrcc.isws.illinois.edu/CLIMATE/
- For a wide range of Minnesota climate information: http://www.nws.noaa.gov/climate/index.php?wfo=mpx
- For other Minnesota climate information: http://www.dnr.state.mn.us/climate/index.html

3.2 Topography

The City of Golden Valley is relatively flat, with generally mild slopes and little change in topography across the area. The urbanization of the City over time has greatly altered the natural topography of the watershed. With these alterations, drainage patterns have become more defined. There are steep slopes within the City and are typically found along Bassett Creek and the major water bodies within the City. The location of steep slopes is of interest as these areas limit options for land development and have a higher potential for erosion. The highest location in the City is located southeast of the intersection of Flag Avenue North and Olympia Street on the General Mills Research Facility property, with an elevation of 967.5 feet MSL. The lowest point in the City is on the eastern boundary of the City along Bassett Creek where the creek passes from Golden Valley to the City of Minneapolis. The lowest elevation is approximately 816 feet MSL.

For general purposes, the City of Golden Valley currently uses 2-foot elevation contour information based on LiDAR data collected by the MNDNR in 2011.

3.3 Watersheds and Drainage Patterns

There are five major drainage districts within the City of Golden Valley. These districts include the Bassett Creek, Medicine Lake, Sweeney Lake, and Wirth Lake drainage districts, which are all part of the larger Bassett Creek watershed, and the Minnehaha Creek drainage district, which covers a small area in the southeast corner of the City. All areas of the City of Golden Valley ultimately drain to the Mississippi River. Figure 3-1 shows the major drainage districts within the City of Golden Valley.

The major drainage districts used for the hydrological analysis in this report closely follow the major subwatershed divisions published in the Bassett Creek Watershed Management Commission (BCWMC) 2015 Watershed Management Plan. These divides have been updated since the 2008 City plan to reflect more recent topographic data and stormwater management system improvements. The BCWMC (with assistance from cities including Golden Valley) has further subdivided the major drainage districts within the BCWMC into subwatersheds for the purposes of water quality modeling (see Section 3.10.3) and water quantity modeling (see Section 3.11.4). Although some subwatershed divides may change with future redevelopment or stormwater improvements, the City anticipates that such changes will be minor and will be incorporated into future stormwater modeling and management efforts, as necessary.

The subwatersheds delineated for the purposes of hydrologic modeling (see Section 3.11.4) are shown in Figure 3-2. The names of each of the drainage districts are the same as those used by the BCWMC for hydrologic modeling. The BCWMC delineated additional, smaller subwatersheds to provide more accurate inputs for water quality modeling. The subwatersheds delineated by the BCWMC for P8 water quality modeling are presented in Figure 3-3. The subwatershed identifiers shown in Figure 3-3 are those used by the BCWMC and the City. Despite the smaller size of the subwatersheds presented in Figure 3-2 and Figure 3-3, the City may need to further study localized areas for the purposes of future stormwater infrastructure design and analysis.

Figure 3-2 shows the four major drainage districts as well as the subwatersheds and general flow directions, including the location of intercommunity flows. The following is a discussion of the major drainage districts within the City.

3.3.1 Bassett Creek Drainage District

The Bassett Creek Drainage District is the largest district in the City, including approximately 3,900 acres within Golden Valley. The main stem of Bassett Creek begins downstream of the Medicine Lake outlet, flowing southeast through the City of Plymouth and then extends through the City of Golden Valley and the drainage district. The creek crosses under Highway 169 at the western City limits and meanders through the central part of the City toward the northeast corner. At this point, the creek becomes an outlet for the Sweeney Lake-Twin Lake area. Bassett Creek continues south along the eastern City limits, where it receives inflow from Wirth Lake before continuing eastward through the City of Minneapolis to the Mississippi River.

The Bassett Creek Drainage District was divided into 235 subwatersheds within the City for the purposes of the BCWMC hydrologic and hydraulic modeling (see Figure 3-2). Runoff occurring within the watershed is collected by a vast storm sewer system located throughout the district. Several trunk storm sewers route stormwater to Bassett Creek as it meanders from west to east through the watershed. Subwatersheds receiving inflow from drainage areas outside of the City are identified in Figure 3-2.

3.3.2 Medicine Lake Drainage District

The Medicine Lake Drainage District is located in the northwestern corner of the City and includes approximately 220 acres within the City of Golden Valley. The topography of the drainage district varies considerably, ranging from flat areas to steep slopes. Two generally flat areas exist at the ballfields in the Medley Park area and Lakeview Park between Olympia and Winsdale Street. Steep slopes exist west of Flag Avenue, varying as much as 60 feet over a 350 foot City block length. Another area of steep banks exists north of the Medley Park.

The Medicine Lake Drainage District was divided into eight subwatersheds within the City for the purposes of the BCWMC hydrologic and hydraulic modeling (see Figure 3-2). Runoff occurs generally to the west, under Highway 169 and out of Golden Valley into the City of Plymouth and Medicine Lake. Medicine Lake is only 500 to 1500 feet west of Highway 169 and the Golden Valley corporate boundary. Medicine Lake forms the headwaters for the main stem of Bassett Creek. Inflows into the Medicine Lake drainage district from the City of New Hope are shown in Figure 3-2.

3.3.3 Sweeney Lake Drainage District

The Sweeney Lake Drainage District is located centrally in the City extending from the south edge of the City north to the Sweeney-Twin Lake areas. This drainage district includes approximately 2,200 acres within the City of Golden Valley.

The Sweeney Lake Drainage District was divided into 46 subwatersheds within the City for the purposes of the BCWMC hydrologic and hydraulic modeling (see Figure 3-2). Runoff occurring in the north half of the watershed is drained directly to Sweeney Lake as overland flow or through storm sewers. A trunk storm sewer system extends along the Union Pacific (formerly Chicago Northwestern) Railroad from near Golden Valley Road and drains from west to east to Sweeney Lake. Stormwater in the southwestern corner of the drainage district is generally discharged to multiple stormwater ponds throughout the drainage district. Stormwater from the southeastern corner of the watershed is routed northward to Sweeney Lake via trunk storm sewer along Turners Crossroad and the Canadian Pacific (Soo Line) Railroad. Inflow into the Sweeney Lake drainage district from the City of St. Louis Park is shown in Figure 3-2.

3.3.4 Wirth Lake Drainage District

The Wirth Lake Drainage District is in the southeastern portion of the City along the border with the City of Minneapolis. The Wirth Lake Drainage District includes approximately 350 acres within the City of Golden Valley. A storm sewer network in the residential area west of Wirth Lake conveys stormwater runoff to the lake. The area south of the lake is primarily park and open space.

The Wirth Lake Drainage District was divided into 10 subwatersheds within the City for the purposes of the BCWMC hydrologic and hydraulic modeling (see Figure 3-2). Runoff occurring west of the lake drains to Wirth Lake via storm sewer that daylights to a drainage ditch on the east side of Theodore Wirth parkway. Areas south of the lake drain to Wirth Lake via overland flow. Inflows into the Wirth Lake drainage district from the City of Minneapolis is shown in Figure 3-2.

3.3.5 Minnehaha Creek Drainage District

The Minnehaha Creek Drainage District includes only a small portion of the City of Golden Valley, with a total of approximately 80 acres in the City. This drainage district is divided into three subwatersheds. Although this area is within the City of Golden Valley corporate boundary, the storm sewer systems serving this watershed drain stormwater into the City of St. Louis Park to the south, and then into Brownie Lake in Minneapolis. Public land located within this drainage district includes South Tyrol Park and South Tyrol Pond (see Figure 3-4).

3.4 Land Use

The City of Golden Valley is a suburb of the Twin Cities metropolitan area, located just west of the City of Minneapolis. The City contains diverse areas of residential neighborhoods, commercial and industrial developments, and park and recreation facilities. Current land use is presented in Figure 3-4. Estimated future land use is presented in Figure 3-5. Table 3-2 provides more detailed information about the current land use for each major drainage district within the boundary of Golden Valley.

Table 3-2 Land Use (2010) as a Percentage by Major Drainage District

Land Use Category	Land Use Percentage by Major Drainage District					City-wide
	Bassett Creek	Medicine Lake	Minnehaha Creek	Sweeney Lake	Wirth Lake	
Commercial	2%	3%	--	4%	0%	3%
Golf Course	13%	--	--	2%	21%	10%
Industrial	9%	--	--	6%	--	7%
Institutional[1]	4%	2%	--	7%	--	5%
Multi-Family	2%	2%	--	2%	2%	2%
Office	4%	--	--	6%	3%	5%
Park and Open Space	11%	19%	4%	8%	21%	11%
Right of Way	18%	21%	23%	25%	18%	20%
Railroad	2%	--	--	2%	--	2%
Single Family Attached[2]	1%	11%	--	1%	--	1%
Singe Family Detached	33%	42%	67%	34%	35%	34%
Undeveloped & Vacant	1%	--	5%	1%	--	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

(1) includes land use classified as "Institutional and Office"

(2) includes land use classified as "Townhome"

As a fully-developed community, changes in land use will come the result of redevelopment. Changes in land use are expected to be modest over the life of this Plan. However, redevelopment with or without land use changes may provide opportunities to implement a variety of stormwater best management practices (BMPs) that can improve water quality, reduce the risk of flooding, provide habitat, or achieve other benefits.

The City of Golden Valley estimates a general population increase in the future, with most of the projected growth to occur in a few redevelopment areas scattered throughout the City. More detailed information about current and future land use and expected areas of development can be found in the land use section of the City's Comprehensive Plan.

3.5 Soils

Soil composition, slope, and land management practices determine the impact of soils on water resource issues. Soil composition and slope are important factors affecting the rate and volume of stormwater runoff. The shape and stability of aggregates of soil particles—expressed as soil structure—influence the permeability, infiltration rate, and erodibility (i.e., potential for erosion) of soils. Slope is important in determining stormwater runoff rates and susceptibility to erosion.

Infiltration capacities of soils affect the amount of direct runoff resulting from rainfall. Higher infiltration rates result in lower the potential for runoff from the land, as more precipitation is able to enter the soil. Conversely, soils with low infiltration rates produce high runoff volumes and high peak discharge rates, as most or all of the rainfall moves as overland flow.

The Natural Resources Conservation Service (NRCS – formerly the Soil Conservation Service) has established four general hydrologic soil groups. These groups are:

- Group A Low runoff potential—high infiltration rate
- Group B Moderate infiltration rate
- Group C Slow infiltration rate
- Group D High runoff potential—very slow infiltration rate

Combined with land use, the hydrologic soil grouping symbols (A through D) may be used to estimate the amount of runoff that will occur over a given area for a particular rainfall amount. As land is developed for urban use, much of the soil is covered with impervious surfaces, and soils in the remaining areas are significantly disturbed and altered. Development often results in consolidation of the soil and tends to reduce infiltration capacity of otherwise permeable soils, resulting in significantly greater amounts of runoff.

Figure 3-6 presents the most current soils data for the City of Golden Valley; the data are based on the Soil Survey Geographic dataset (SSURGO) from the NRCS. However, because of urban development and land use, there are many portions of the City that have undefined hydrologic soil groups. Most of the City for which hydrologic soil groups have been defined are classified as type C or D soils with low infiltration and high runoff potential. Figure 3-6is intended to provide general guidance about the infiltration

capacity of the soils throughout Golden Valley. However, soils should be inspected on a site-by-site basis as projects are considered.

Detailed information about soil types and distributions within the City is available from the *Soil Survey of Hennepin County, Minnesota* (NRCS, 2004, as amended). The NRCS soil survey identifies much of the City as fill and cut or filled land (referred to as udorthents in the soil survey). Other mapped soils occupying large areas of the City consist mostly of clay and loam and include: Lester loam, Angus loam, Lester complex, and Malardi-Hawick complex. The most recent information from the NRCS soil survey is available online at: https://websoilsurvey.nrcs.usda.gov/app/

3.6 Geology and Groundwater

The City of Golden Valley is located in the northwestern portion of a bowl-like bedrock structure underlying the Minneapolis-St. Paul metropolitan area (called the Twin Cities basin), which has a gentle slope to the southeast. The bedrock is overlain by a layer of glacial drift which varies from over 250 feet thick in the western part of the City and to less than 50 feet near the eastern border of the City. Generally, there is no uniform relationship between the existing surface topography and the bedrock structure. The City is underlain by the Platteville and Glenwood Formation limestone and shale in the south-central part of the City while the west, north, and east sides of the City are underlain by St. Peter Sandstone.

Three buried erosional valleys cut deep into the bedrock and bisect the glacial drift. One valley extends southeast from Medicine Lake through the western part of the City; this valley cuts into the St. Peter Sandstone and is filled with up to 250 feet of glacial drift. The second valley extends northerly from Wirth Lake to the watershed border, cutting into the St. Peter Sandstone and filled with up to 200 feet of drift. The third valley extends through the very southeastern portion of the City and is filled with up to 400 feet of glacial drift.

3.6.1 Bedrock Aquifers

The region is underlain by four major bedrock aquifers: (1) St. Peter Sandstone, (2) Prairie du Chien-Jordan, (3) Wonewoc Sandstone (formerly Ironton-Galesville Sandstones), and (4) Mt. Simon-Hinckley Sandstones. In addition, there are numerous aquifers in the glacial drift. Some groundwater from the glacial drift and the St. Peter aquifer discharges into Bassett Creek. The remaining aquifers discharge into the Minnesota and Mississippi rivers; movement of groundwater within these aquifers is complicated by the intersecting buried bedrock valleys.

As part of the Joint Water Commission with the cities of New Hope and Crystal, Golden Valley currently obtains its water supply from the City of Minneapolis water department. Other cities that border Golden Valley use groundwater for their municipal water supplies. These cities and their water sources include:

- Plymouth – 16 wells in the Prairie du Chien-Jordan aquifer (4 new wells proposed)
- Minnetonka – 14 wells in the Prairie du Chien-Jordan aquifer, 3 wells in the Jordan aquifer, and 1 well in the Prairie du Chien-St. Lawrence aquifer

- Robbinsdale – 4 wells in the Prairie du Chien-Jordan aquifer and 1 well in the St. Peter-Prairie du Chien aquifer
- St. Louis Park – 6 wells in the Prairie du Chien-Jordan aquifer, 4 wells in the Mt. Simon-Hinckley aquifer, and 1 well in the Platteville-St. Peter aquifer.

3.6.2 Surficial Aquifers

Surficial aquifers are water-bearing layers of sediment, usually sand and gravel, which lie close to the ground surface. The City is not aware of any private domestic wells that draw water from these aquifers. Since the surficial aquifers are more susceptible to pollution, they are generally not used for municipal or public supply wells. The depth of the water table varies across the watershed, but is on the order of tens of feet.

Recharge to the surficial aquifers is primarily through the downward percolation of local precipitation. The ponds, lakes, and wetlands scattered throughout the City recharge the groundwater. Some of these waterbodies are landlocked and their only outlet is to the groundwater; some landlocked lakes may be perched above the regional level of the shallow groundwater in the watershed. Some surficial aquifers may also be recharged during periods of high stream stage. Surficial aquifers may discharge to local lakes, streams or to the underlying bedrock.

3.6.3 Wellhead Protection Areas

The increased population in the Twin Cities metropolitan area has put increased pressure on groundwater quantity and quality. The Minnesota Department of Health (MDH) is responsible for the protection of groundwater quality and aims to prevent contaminants from entering the recharge zones of public water supply wells through its wellhead protection program. This includes the development of wellhead protection plans (WHPPs) and guidance to limit potential for groundwater contamination (see Section 4.4.1). Wellhead protection efforts may restrict or prevent the use of certain stormwater BMPs within these areas to prevent possibly contaminated stormwater from reaching groundwater supplies.

Figure 3-7 shows the delineated wellhead protection areas that extend into Golden Valley from surrounding communities, as well as the municipal water supply wells in the area around Golden Valley. Each of the communities adjacent to the City that obtains its municipal water supply from groundwater has an MDH-approved wellhead protection plan

3.7 Surface Waters

3.7.1 MNDNR Public Waters

The MNDNR designates certain water resources as public waters to indicate those lakes, wetlands, and watercourses over which the MNDNR has regulatory jurisdiction. By statute, the definition of public waters includes "public waters" and "public waters wetlands." The collection of public waters and public waters wetlands designated by the MNDNR is generally referred to as the public waters inventory, or PWI.

Public waters are all basins and watercourses that meet the criteria set forth in Minnesota Statutes, Section 103G.005, subd. 15 that are identified on public water inventory maps and lists authorized by Minnesota Statutes, Section 103G.201. Public waters wetlands include all Type 3, Type 4, and Type 5 wetlands, as defined in U.S. Fish and Wildlife Service Circular No. 39, 1971 edition that are 10 acres or more in size in unincorporated areas or 2.5 acres or more in size in incorporated areas (see Minnesota Statutes Section 103G.005, subd. 15a and 17b). A MNDNR permit is required for work within designated public waters.

The MNDNR uses county-scale maps to show the general location of the public waters and public waters wetlands under its regulatory jurisdiction. These maps are commonly known as public waters inventory (PWI) maps. PWI maps also show public waters watercourses and ditches (see Section 3.7.2). The regulatory boundary of these waters and wetlands is called the ordinary high water level (OHWL). The PWI maps and lists are available on the MNDNR's website at: http://www.dnr.state.mn.us/waters/watermgmt_section/pwi/maps.html

Figure 3-8 shows the waters, wetlands, and streams listed on the MNDNR PWI located in the City of Golden Valley. There are 12 designated and numbered public waters basins and 6 public water wetlands within the City, including the following named public water lakes:

- Sweeney Lake (27-0035P)
- Twin Lake (27-0035P)
- Wirth Lake (27-0037P)
- Westwood Lake (27-0711P)

3.7.2 Public Ditches

Within Golden Valley there are three (3) public ditch segments (also known as "county ditches" or "judicial ditches"). A large portion of the Main Stem of Bassett Creek, downstream of the Medicine Lake outlet, is designated as county ditch. In addition, a portion of the north branch of Bassett Creek, just upstream of its confluence with the Main Stem, is designated as a county ditch. A third segment is identified along a drainage system that feeds the Sweeney Lake branch of Bassett Creek from Highway 394 to near Glenwood Avenue. Figure 3-8shows these public ditches. Some of the systems shown as public ditches are no longer in existence, but the public ditch designation has not been removed. One such system is located along Highway 100 in northern Golden Valley. The public ditch system shown following Highway 100 is currently all in a storm sewer pipe and is no longer ditched.

Public ditches are established and regulated under Chapter 103E of Minnesota Statutes and are under the jurisdiction of the county. Although Hennepin County is responsible for the management of county ditches in the City, the county has not actively maintained the county ditches. The BCWMC and the member cities, including Golden Valley, perform work in public ditches. Minnesota state law requires that they go through the public ditch process to perform this work. Per Minnesota Statute 363B.61, cities or watershed management organizations (WMOs) within Hennepin County may petition the county to transfer authority over public ditches to the City or WMO.

3.7.3 Lakes and Ponds

Among the public waters located in the City of Golden Valley (see Figure 3-8) are the following named lakes and ponds:

- Sweeney Lake (27-0035P)
- Twin Lake (27-0035P)
- Wirth Lake (27-0037P)
- Westwood Lake (27-0711P)
- South Rice Pond (27-0645W)

Each of these lakes with the exception of South Rice Pond has been identified as a BCWMC priority waterbody (see Section 4.1.4).

3.7.3.1 Sweeney Lake

Sweeney Lake is a 67-acre lake located in the City of Golden Valley. Sweeney Lake is a recreation waterbody frequently used by residents for swimming, fishing, boating and aesthetic viewing. A public access at the northern end of the lake offers a carry-in boat access and a City nature area on the southern end of the lake offers an overlook deck and canoe launch.

Sweeney Lake has an estimated mean depth of 12 feet, a maximum depth of 25 feet, and a littoral area of approximately 34 acres. Shallow areas near the shoreline of the lake allow for both emergent and submerged vegetation growth. The normal water elevation is at approximately 827.5 feet (NGVD1929 datum) and the 100-year elevation is approximately 831.5 feet (NGVD1929 datum). Sweeney Lake has a total tributary drainage area of approximately 2,396 acres. Portions of St. Louis Park and Golden Valley drain into Sweeney Lake. Sweeney Lake receives outflows from the Ring Ponds, Cortlawn Pond, Schaper Pond and Twin Lake and drains northeast into the Sweeney Lake Branch of Bassett Creek, which connects to the Bassett Creek Main Stem shortly downstream. A precast concrete dam serves as the outlet structure for Sweeney Lake at an elevation of 827.5 feet.

Following severe summer algal blooms in the early 1970s, lakeshore residents for the Sweeney Lakeshore Owners Association organized efforts to protect and improve Sweeney Lake water quality. Residents have operated an aeration system since the 1970s. Initially, residents installed aeration at a few locations; the system has expanded to up to 18 aerators currently distributed throughout the lake. The intent of the aerators is to keep oxygen levels high near the lake bottom, preventing the anoxic release of phosphorus bound in lake sediments. The system is permitted by MNDNR and operates fully during the summer months; winter aeration occurs on a limited basis (SEH and Barr, 2011). The BCWMC is currently conducting a study to evaluate the impact of the aeration system on lake water quality.

Sweeney Lake is a BCWMC Priority 1 Deep Lake waterbody (see Section 4.1.4). The lake is currently listed on the 303(d) impaired waters list for excess nutrients (phosphorus). A TMDL study has been conducted for Sweeney Lake (see Section 4.1.2). Due to excessive phosphorus, the lake is not always suitable for swimming or wading because of low clarity and excessive algae growth. Sweeney Lake is also listed in on the 303(d) impaired waters list for chloride.

3.7.3.2 Twin Lake

Twin Lake is a 21-acre lake connected to Sweeney Lake through a channel that is navigable for small boats, canoes, and kayaks. The southern half of the lake is located within Theodore Wirth Regional Park. The lake is used for swimming, non-motorized boating, fishing, and aesthetic viewing.

Twin Lake has a maximum depth of 56 feet, an average depth of 25.7 feet, and a littoral area of approximately 8 acres. Shallow areas near the shoreline of the lake allow for both emergent and submerged vegetation growth. Floating leaf vegetation is primarily seen in the northern portion of the lake. The lake's normal water elevation is estimated at 827.5 feet (NGVD1929 datum) with a 100-year elevation at 831.5 feet (NGVD1929 datum). Twin Lake's watershed area is 131 acres. An outlet channel discharges beneath a bridge at the north side of the lake into a wetland that is hydraulically connected to Sweeney Lake.

Twin Lake is a BCWMC Priority 1 Deep Lake waterbody (see Section 4.1.4). The lake is not listed as impaired by the MPCA. The relatively high ratio of lake surface to drainage area and lack of high-imperviousness land use around the lake have prevented Twin Lake from experiencing many of negative effects of urbanization (i.e., increased stormwater runoff and pollutant loading).

Summer average concentrations of phosphorus in Twin Lake increased significantly in 2008 and 2009, prompting the BCWMC to performed the *Twin Lake Phosphorus Internal Loading Investigation* (March 2011) to determine the causes of these increased phosphorus levels. The primary source of the phosphorus was identified as increased release from lake sediments (i.e., internal loading). A subsequent feasibility identified alum treatment as the most feasible option based upon cost, probability for success, and maintenance. Based on this recommendation, an alum treatment of Twin Lake was performed in 2015.

3.7.3.3 Wirth Lake

Wirth Lake is a 38-acre lake located in the in the southeast portion of the City. The lake is located in Theodore Wirth Regional Park, which is owned and maintained by the Minneapolis Park and Recreation Board. A public beach and parkland surrounding the lake provide opportunities for swimming, fishing, picnicking, and aesthetic viewing, and non-motorized boating.

Wirth Lake has an estimated mean depth of 14 feet, a maximum depth of 26 feet and a littoral area of approximately 23.3 acres. Shallow areas near the shoreline of the lake allow for both emergent and submerged vegetation growth. Floating leaf vegetation is primarily seen in the northern portion of the lake. Wirth Lake has an ordinary high water level of 818.9 feet (NGVD1929 datum) and a 100-year elevation of 821.5 feet (NGVD1929 datum). Wirth Lake has a 405-acre tributary watershed including portions of the cities of Golden Valley and Minneapolis. The lake has four main inlets, three storm sewers and one open channel in the northern portion of the lake. The Wirth Lake outlet was modified in 2012 to prevent backflow from Bassett Creek to Wirth Lake. The new outlet includes a fabricated steel lift gate which closes during period of high water in Bassett Creek.

Wirth Lake is a BCWMC Priority 1 Deep Lake waterbody (see Section 4.1.4). The lake is currently listed on the 303(d) impaired waters list for mercury and chloride. The lake's mercury impairment is addressed through the statewide mercury TMDL. The lake was previously listed as impaired for excessive nutrients and a TMDL study was performed (Barr Engineering Company, 2010). Wirth Lake was removed from the impaired waters 303(d) list because of water quality improvement projects by the BCWMC, its member cities and the MPRB. The Minnesota Department of Health website has advice on consuming fish caught in Wirth Lake, as the concentrations of mercury in fish tissue exceed the water quality standard.

The MPRB operates a winter aeration system in the northwest portion of the lake. This system increases dissolved oxygen during the winter to maintain fish populations and reduce sediment nutrient release that may occur under anoxic conditions.

3.7.3.4 Westwood Lake

Westwood Lake is a 38-acre lake located on the boundary of the City of Golden Valley and the City of St. Louis Park. Only a small portion of the north side of the lake is located in Golden Valley. Although the lake does not have a public beach, the adjacent parkland and Westwood Hills Nature Center trails surrounding the lake provides opportunities for canoeing or kayaking, aesthetic viewing, birding, and hiking.

Westwood Lake has a maximum depth of 5 feet, a normal water elevation of 886.0 feet (NGVD1929 datum), and a 100-year elevation of 889.0 feet (NGVD1929 datum). The majority of the lake bottom is covered with submerged vegetation due to the shallow nature of the lake and emergent vegetation can be found around the lake's entire circumference. Westwood Lake has a watershed area of approximately 463 acres. Portions of the cities of St. Louis Park, Golden Valley, and Minnetonka drain towards Westwood Lake. Runoff draining to Westwood Lake enters through five storm sewers located around its edge. A 400-foot-long open channel at the north side of the lake discharges to a 27-inch RCP storm sewer at an elevation of 886.0. Drainage from Westwood Lake is tributary to the Main Stem of Bassett Creek.

Westwood Lake is a BCWMC Priority 1 Shallow Lake waterbody (see Section 4.1.4). The lake is not listed as impaired by the MPCA.

3.7.3.5 South Rice Pond

South Rice Pond is an 11-acre waterbody located on the border of the cities of Robbinsdale and Golden Valley in the northeast portion of the City. Parkland adjacent to the lake provides opportunities for aesthetic viewing.

South Rice Pond has a maximum depth of 3 feet and an average depth of 1.7 feet. The lake has a 100-year water elevation of 831.5 feet (NGVD1929 datum). Its 514-acre tributary watershed includes portions of the cities of Crystal, Golden Valley, Minneapolis, and Robbinsdale. South Rice Pond discharges to Bassett Creek via a small channel located at the south end of the pond. South Rice Pond is not list by the BCWMC as a priority waterbody (see Section 4.1.4). The pond is not listed as impaired by the MPCA.

3.7.4 Streams

There are two public water watercourses located within the City of Golden Valley. , including:

- Main Stem of Bassett Creek
- Sweeney Lake Branch of Bassett Creek

Both the Main Stem of Bassett Creek and the Sweeney Lake Branch of Bassett Creek have been classified as BCWMC priority waterbodies (see Section 4.1.4)

3.7.4.1 Main Stem of Bassett Creek

The Main Stem of Bassett Creek begins downstream of the Medicine Lake outlet west of Golden Valley and enters the City near the intersection of Highway 169 and Betty Crocker Drive (see Figure 3-8). The drainage area of Bassett Creek upstream of the City is approximately 19.8 square miles. The Main Stem of Bassett Creek winds northeast through the City before exiting into the City of Crystal, where it is joined by the North Branch of Bassett Creek.

The Main Stem of Bassett Creek, augmented within inflow from the North Branch, re-enters the City of Golden Valley under Highway 100 at the northwest end of the Briarwood Nature Area. From there, the Main Stem of Bassett Creek flows east toward Minneapolis before turning south under Golden Valley Road. Just south of Golden Valley Road, the Sweeney Lake Branch of Bassett Creek discharges to the Main Stem within Theodore Wirth Regional Park. From that confluence, the Main Stem of Bassett Creek flows south along the eastern border of the City before crossing Highway 55 and turning toward Minneapolis.

The total drainage area tributary to Bassett Creek before it leaves the City is approximately 38 square miles. After leaving Golden Valley, Bassett Creek flows through Minneapolis to the Mississippi River, the last portion of which is through a 1.7-mile long tunnel. The creek enters the Mississippi River downstream of the Upper St. Anthony Falls Lock and Dam.

The Main Stem of Bassett Creek is a BCWMC Priority 1 stream (see Section 4.1.4). The Main Stem of Bassett Creek is included on the MPCA's Impaired Waters 303(d) list as impaired for aquatic life (due to chloride and fish bioassessments) and aquatic recreation (due to fecal coliform) (see Table 3-7). The Main Stem of Bassett Creek was included in the Upper Mississippi River Bacteria TMDL and Protection Plan (MPCA, 2014), which was approved by the US EPA in 2014 and addresses the Plymouth Creek impairment due to fecal coliform (see Section 4.1.2).

3.7.4.2 Sweeney Lake Branch of Bassett Creek

The Sweeney Lake Branch of Bassett Creek drains northern St. Louis Park and southern portions of Golden Valley. The Sweeney Lake Branch flows northeast through Schaper Pond and Sweeney Lake and joins the Main Stem of Bassett Creek in Theodore Wirth Regional Park near Golden Valley Road just downstream of Sweeney Lake. The drainage area of the Sweeney Lake Branch prior to its confluence with the Main Stem of Bassett Creek is approximately four square miles. The BCWMC classifies Sweeney Lake Branch of Bassett Creek is a BCWMC Priority 1 stream (see Section 4.1.4).

3.8 Wetlands and Natural Resources

Prior to development, much of the land within the City of Golden Valley was wetland. Many wetland areas were drained or filled as the City developed (prior to the establishment of regulations protecting wetlands). Although Golden Valley is almost completely developed, numerous wetlands remain across the City. Several wetland and natural resource inventories have been completed for the City of Golden Valley.

3.8.1 National Wetland Inventory

Nationally, the U.S. Fish and Wildlife Service (USFWS) is responsible for mapping wetlands across the country, including those in Minnesota. Using the National Aerial Photography Program (NAPP) in conjunction with limited field verification, the USFWS identifies and delineates wetlands, produces detailed maps on the characteristics and extent of wetlands, and maintains a national wetlands database as part of the National Wetland Inventory (NWI). The NWI is periodically updated based on available imagery. Figure 3-9 shows the location of all NWI wetlands within the City of Golden Valley.

3.8.2 City Wetland Inventories

A consultant completed a wetland inventory in 1995 for Golden Valley as part of the City's *1999 Surface Water Management Plan* (H.R. Green, 1999). Aerial photographs from two flights, on May 1, 1995 and on August 15, 1995, were used to determine wetland locations throughout the City. Once the wetlands were located and mapped, each wetland was classified using the Minnesota Routine Assessment Method for Evaluating Wetland Functions (MnRAM) as a guide. The MnRAM methodology has since been revised.

Each wetland was also identified using the Circular 39 (U.S. Fish and Wildlife Service, 1971) criteria to compare with the wetland type established from the remote sensing data. Circular 39 includes a classification system of eight types of wetlands.

Wetland functions that were evaluated as part of the 1995 inventory include:

- Floral diversity and integrity
- Wildlife habitat
- Fishery habitat
- Flooding and stormwater attenuation
- Water Quality Protection
- Aesthetics
- Recreation
- Education and Science

Often, wetland functions may be evaluated based on its position on the landscape. For instance, an isolated basin wetland with no outlet may provide a high level of flooding and stormwater attenuation, but may not receive a high water quality protection ranking because water quality benefits provided do not impact downstream and/or recreational waterbodies. Results of the 1995 wetland inventory, including functions assessments, are summarized in the *1999 Surface Water Management Plan*.

Wetland and pond areas within the City were also evaluated as part of the City's 2015 wetland and pond assessment (WSB, 2015a) and development of the City's *Natural Resource Management Plan* (SEH, 2015). The 2015 City wetland assessment used a MnRAM 3.0 classification system to rate 119 wetlands. The assessment included a field visit to each wetland to record data related to vegetation, hydrology, location, and habitat. The results of the MnRAM assessment were used to determine wetland classification based on BWSR guidance, modified slightly to account for constructed stormwater ponds (WSB, 2015a). Wetland classifications present in the City and the number of wetlands falling into that classification include, in order of decreasing quality:

- Preserve (4 wetlands)
- Manage 1 (8 wetlands)
- Manage 2 (52 wetlands)
- Manage 3 (56 wetlands)

Results of the 2015 wetland assessment are presented in Figure 3-10. Wetland complexes of particular significance are identified in the City's *Natural Resource Management Plan*. The City maintains a database of wetland function and value information. In addition, the City requires site-specific delineations and functions assessments for proposed projects as they occur.

3.8.3 MCWD Functional Wetland Assessment – 2003

In 2001-2003, the MCWD undertook a functional assessment of wetlands (FAW) on wetlands within the district, including the small portion of the southeast corner of Golden Valley located within the Minnehaha Creek watershed district.

The inventory identified wetland vegetation, type, location and boundaries, size, groundwater interaction, function, restoration potential, as well as the presence of buffers, invasive or nuisance vegetation, and rare/unique features. Wetland functions were evaluated using a variant of the MnRAM methodology (MNDNR, 1995). Restoration potential was estimated based on wetland size, property ownership, and ease of restoration. Additionally, both USFWS Cowardin and Circular 39 classifications were assigned to each wetland during field inspections.

Based on the wetland's current function as well as the evaluation of critical wetland resources, and the susceptibility to stormwater degradation, individual wetlands were assigned to one of four categories similar to those used in the City's 2015 wetland assessment (see Section 3.8.2).

There MCWD wetland inventory included only 2 wetlands within the City of Golden Valley—South Tyrol Pond as well as a small wetland on the border with the City of St. Louis Park.

3.8.4 City of Golden Valley Wetland Banks

The City of Golden Valley has established wetland banks to be used for the mitigation of City projects. These include approximately four acres of wetlands at the General Mills Nature Preserve near TH 55 and TH 169 and approximately one acre along Minnaqua Drive south of the Briarwood Nature Area. More information about the City of Golden Valley wetland bank is discussed in Section 2.0.

3.8.5 Bassett Creek Stream Erosion Inventory

The BCWMC and its member cities have identified the extent and severity of stream bank erosion along most of the Bassett Creek trunk system, including the portion of Bassett Creek passing through the City. The City's original inventory was completed by its Department of Public Works in 2003, and it has been updated periodically. Within Theodore Wirth Park, the Minneapolis Park and Recreation Board (MPRB) has also completed erosion inventories along Bassett Creek in the past.

The creek inventory includes the Main Stem of Bassett Creek, the Sweeney Lake Branch of Bassett Creek, and the Medicine Lake Branch of Bassett Creek in Golden Valley. To develop the inventory, City staff walked the length of Bassett Creek identifying, locating, and documenting sites of significant bank erosion and sediment deposition, as well as the presence of obstructions and storm sewer outlet structures. Documentation includes the location of the site on aerial photographs, notes on the details of each site, as well as a digital photograph of each site.

The City estimated the extent of erosion as a percent of the entire bank that was eroding, and classified these locations as minor (less than 25%), moderate (25 – 50%), and severe (more than 50%). Typically, the City found the causes of erosion were related to concentrated runoff from parking lots, streets, and ditch drainage, storm sewer outfalls discharging above the normal water level of the creek, surface runoff across exposed unvegetated slopes, steep slopes, or shaded slopes, and finally, areas where turf is maintained to the edge of the creek with no vegetative buffer area. Additionally, the City identified problems with utility structures including rusty corrugated metal pipes, broken or cracked concrete pipes, pipes pulled apart at the joint, flared end sections that have been removed, buried pipe outlets, significant deposition at the outlet of a structure, debris blocking a structure, as well as protruding pipes and outlets located above the normal water levels of the creek.

To address stream erosion issues, the BCWMC has identified and implemented capital projects to restore streambank areas since the initial stream erosion inventory was performed. Future projects to restore remaining stream erosion issues are included in the BCWMC capital improvement program (see Section 5.5.2) and the City's implementation program (see Table 5-1).

3.8.6 City Natural Resource Inventory and Management Plan

In 2015 the City completed a Natural Resource Management Plan (NRMP), (SEH, 2015). The purpose of the NRMP is to guide decisions makers and staff on how to best manage the natural resources within the City, including water, land, wildlife, and vegetation.

Development of the NRMP was preceded by a 2013 update to the City's natural resources inventory originally completed in 2003 and updated as part of the City's 2008 Comprehensive Plan. The 2013 natural resources inventory included analysis of land cover using the Minnesota Land Cover Classification System (MLCCS, see Figure 3-12) and evaluation of high resolution aerial photography to review land use changes since the 2003 inventory. The 2013 inventory documents significant changes since the 2003 inventory and included additional assessment of invasive species within nature areas, open spaces, and parks.

Maps included in the NRMP identify key natural areas, greenbelts (green corridors or greenways), and open spaces. The NRMP describes several key natural areas and greenbelts in the City, including:

- Adeline Nature Area
- Bassett Creek Nature Area
- Briarwood Nature Area
- General Mills Nature Preserve (South of TH 55)
- Golden Ridge Nature Area
- Laurel Avenue Greenbelt
- Mary Hills Nature Area (now part of Sochacki Park)
- Pennsylvania Woods Nature Area
- Rice Lake Nature Area (now part of Sochacki Park)
- Western Avenue Marsh Area

For these sites, the NRMP describes forest, woodland, and prairie vegetation in each area, as well as invasive species, aquatic resources, wetlands, and recreational amenities. Site management recommendations for each natural area or greenbelt are also provided.

The NRMP includes policies and adaptive management strategies that seek to preserve, restore, and enhance the City's natural areas, green corridors, and open spaces. The NRMP also includes an implementation program identifying short term (1-5 years), medium term (5-10 years), and long term (10+ years) action items. Policies included in the NRMP and directly related to the management of stormwater and surface water management within the City are also included in this Plan in Section 2.0.

The complete NRMP is available from the City website at: www.goldenvalleymn.gov/natural-resources/natural-resources-management.php

3.9 City's Stormwater Management System

The City of Golden Valley stormwater management system is comprised of a series of lateral and trunk storm sewers, stormwater ponds, public ditches, and natural water bodies such as creeks, lakes, and wetlands, as well as a number of best management practices (BMPs). Figure 3-13 and Figure 3-14 show Golden Valley's stormwater management system and subsurface (draintile and cleanouts) water management system, respectively. Figure 3-13 also shows the location of the trunk storm sewers throughout the City. The City defines a trunk storm sewer as any 72-inch round diameter or 88-inch span arch pipe, or larger, which collects flow from laterally-connected pipes along its length.

Figure 3-13 also shows stormwater infrastructure located within the City that is under the jurisdiction of other entities, including the Minnesota Department of Transportation (MnDOT), Hennepin County, and railroads, as well as private developments. These other entities are responsible for maintaining their own stormwater management infrastructure.

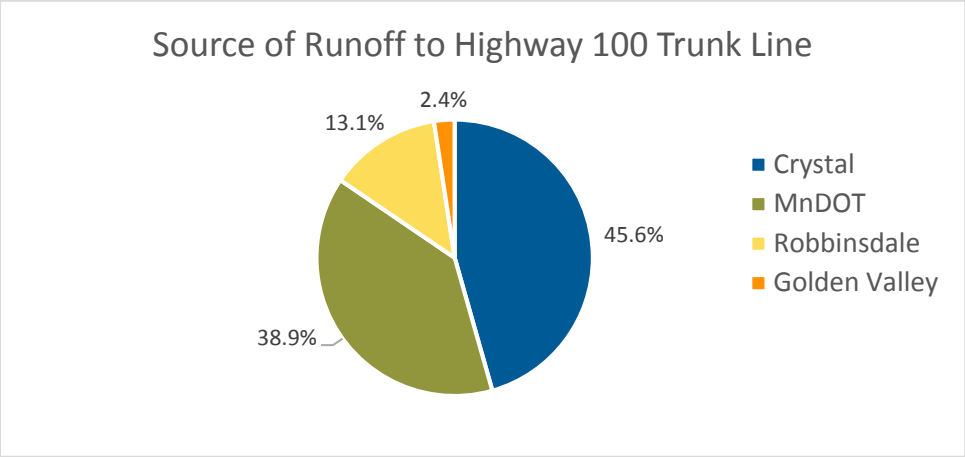
Much of the City's constructed stormwater infrastructure (e.g., pipes) is at or nearing the end of its intended operating life. Aging stormwater infrastructure has contributed to increased frequency of failures

(e.g., sinkholes, washouts) in recent years. The City's recently-implemented Infrastructure Renewal Program (IRP) provides a framework for prioritized updates to the City's stormwater management system (see also Sections 4.2 and 5.2.1).

3.9.1 Summary of the Trunk Stormwater Management System

3.9.1.1 Bassett Creek Drainage District

The Bassett Creek District includes two trunk storm sewer lines. The first trunk section, an 84–inch diameter reinforced concrete pipe, flows south from the City of Crystal along Highway 100. Although much of this pipe flows through Golden Valley, areas outside of the City contribute the majority of the flows.



Historically, this trunk sewer discharged directly into Bassett Creek. However, during the reconstruction of Highway 100 in 2001, a diversion structure was installed near the downstream end of this trunk system. This diversion structure directs low flows and the "first flush" of storm events to the Bassett Creek Park Pond in the City of Crystal, improving water quality treatment of flows through this system. Additionally, the diversion of flows to the pond also provides storage during high flows before discharging to Bassett Creek.

The second trunk storm sewer line in the Bassett Creek District runs south along an easement from Wesley Drive across 10th Avenue where it discharges along Wisconsin Avenue directly into Bassett Creek. This section includes 88-inch to 102-inch span reinforced concrete arch pipe.

3.9.1.2 Medicine Lake Drainage District

There are no City trunk storm sewers located within the Medicine Lake drainage district.

3.9.1.3 Sweeney Lake Drainage District

There are two trunk storm sewer systems located within the Sweeney Lake District. The first trunk storm sewer line runs along the Union Pacific Railroad (formerly Chicago Northwestern) right of way. This reinforced concrete trunk line varies in size from 72-inch to 88-inch diameter, and collects runoff from

various lateral storm sewer systems in the Sweeney Lake District. The trunk line discharges into the Schaper Pond south of Sweeney Lake.

The second trunk storm sewer system runs east along Laurel Avenue. This line consists entirely of 84-inch diameter reinforced concrete pipe and collects runoff from the areas along Laurel Avenue and I-394. This line discharges into a stormwater pond along the railroad, north of Laurel Avenue. The outflow from this pond eventually reaches Sweeney Lake after traveling through a series of ponds.

3.9.1.4 Wirth Lake Drainage District

There are no trunk storm sewers for the City of Golden Valley in the Wirth Lake drainage district.

3.9.1.5 Minnehaha Creek Drainage District

There are no trunk storm sewers for the City of Golden Valley in the Minnehaha Creek drainage district.

3.9.2 Intercommunity Flows

The following section summarizes the location of intercommunity flows between the City of Golden Valley and the surrounding communities. Intercommunity flows include both surface runoff and point discharges (e.g., pipes and channels). The approximate locations of these flows are shown on Figure 3-2.

3.9.2.1 City of Minneapolis

There is surface runoff from the City of Minneapolis that discharges to watersheds along the eastern border of the City and the watershed tributary to Wirth Lake City. The City of Minneapolis has identified several outfalls and delineated watersheds tributary the City of Golden Valley.

3.9.2.2 City of Robbinsdale

There are discharges from subwatersheds in the City of Golden Valley to North Rice Pond in the City of Robbinsdale. Additionally, there are discharges from the City of Robbinsdale to North and South Rice Ponds. South Rice Pond discharges into the City of Golden Valley and eventually into Bassett Creek. In total, approximately 340 acres within the City of Robbinsdale is tributary to the City of Golden Valley.

3.9.2.3 City of Crystal

The City of Crystal contributes flows to the Highway 100 trunk storm sewer system along the northern border of Golden Valley. These flows are then diverted to Bassett Creek Park Pond in the City of Crystal before discharging into Bassett Creek. The City of Crystal also receives flows from the City of Golden Valley from subwatersheds located south of the Bassett Creek Park Pond as well as flows along Bassett Creek.

Runoff from the City of Crystal is also tributary to Golden Valley via the City of New Hope near the intersection of Medicine Lake Road and Winnetka Avenue. This stormwater runoff contributes to flooding issues in the DeCola ponds system (see Sections 4.2.5.1 and 4.2.5.2).

3.9.2.4 City of New Hope

The City of Golden Valley receives inflows from the City of New Hope along the City's northern border (see Figure 3-13). Some of the inflows from New Hope pass through the DeCola Ponds system and contribute to Golden Valley flooding issues near the intersection of Medicine Lake Road and Winnetka Avenue (see Sections 4.2.5.1 and 4.2.5.2). Some of the stormwater from New Hope passes through the Medley Park area in the Medicine Lake drainage district.

A study (Terra Linda Drive/Rosalyn Court Local Flood Improvement Project, 2006) was completed for the City of New Hope as the result of flooding issues along Terra Linda Drive and Medicine Lake Road on border of the Cities of Golden Valley and Medicine Lake Road. This study evaluates several options to alleviate flooding in this area. This study was superseded by the *Medicine Lake Road and Winnetka Avenue Area Long-Term Flood Mitigation Plan* (Barr, 2016; see Section 4.2.5.2).

3.9.2.5 City of Plymouth

The City of Plymouth receives flows from the City of Golden Valley that drain from the Medicine Lake drainage district. Additionally, the City of Golden Valley receives inflows from the City of Plymouth and drainage from Highway 169, which eventually reach the Main Stem of Bassett Creek. The Main Stem of Bassett Creek also enters the City of Golden Valley from the City of Plymouth.

Highway 169 forms the border between the City of Golden Valley and the City of Plymouth. Information in the City of Plymouth's Watershed Management Plan as well as as-builts for the frontage roads on the east and west sides of Highway 169 south of Plymouth Avenue, indicates that Highway 169 may act as a drainage divide between the two cities. More detailed drainage information for Highway 169 may be obtained from MnDOT.

3.9.2.6 City of St. Louis Park

The City of Golden Valley receives flows from the City of St. Louis Park. Westwood Lake, located on the southwest border between Golden Valley and St. Louis Park receives runoff from the City of St. Louis Park. The lake drains to the north and it eventually discharges to the Main Stem of Bassett Creek. Flows from St. Louis Park and drainage from I-394 also enter the City of Golden Valley via several storm sewers south of the Xenia Pond system and through the I-394 and Highway 100 Loop ponds. These flows eventually pass through Sweeney Lake. The portion of the City of Golden Valley that is located in the Minnehaha Creek drainage district flows to the south and discharges to the City of St. Louis Park through three separate storm sewers.

3.9.3 Best Management Practices (BMPs)

In addition to stormwater treatment ponds, the City's stormwater management system includes a number of structural BMPs that improve water quality and manage flood risk. These features include sump manholes/catch basins, environmental manholes, drain tile fields, rain gardens, and skimmer structures. Table 3-3 summarizes the structural BMPs by drainage district within the City of Golden Valley. Figure 3-15 shows the location of BMPs within the City of Golden Valley. Figure 3-15 includes public and private facilities. The City's BMP inventory includes, where applicable, identification of the party

responsible for BMP maintenance. The City has also implemented non-structural best management practices to manage stormwater (e.g., educational programs).

Table 3-3 Summary of Structural Best Management Practices by Drainage District

Best Management Practice	Number per Drainage District (public and private)					Total Number in City
	Bassett Creek	Medicine Lake	Minnehaha Creek	Sweeney Lake	Wirth Lake	
Trunk storm sewer	2	0	0	2	0	4
Pond	23 (public) 4 (private)	1 (private)	0	13 (public) 6 (private)	2 (public) 1 (private)	50
Sedimentation pond	20 (public) 26 (private)	2 (public) 4 (private)	0	13 (public) 20 (private)	1 (public)	86
Bioretention basin	6 (public) 13 (private)	0	0	1 (public) 22 (private)	1 (public) 1 (private)	44
Underground storage	4 (private)	0	0	7 (private)	0	11
Skimmer structures	1 (public)	0	0	1 (public)	0	2
Sump catch basin	104 (public) 8 (private)	0	1 (public) 0 (private)	87 (public) 4 (private)	3 (public)	207
Sump manhole	59 (public) 1 (private)	0	4 (public) 0 (private)	32 (public) 4 (private)	4 (public)	100
Sump manhole with SAFL baffle	11 (public)	2 (public)	0	1 (public) 7 (private)	2 (public)	23
Environmental manhole	2 (public) 4 (private)	0	0	8 (public) 5 (private)	0	19
Buffer strip	14 (public) 46 (private)	2 (public) 1 (private)	1 (public)	6 (public) 52 (private)	1 (public) 4 (private)	127
Conservation easement	5	0	0	9	0	14

Note: based on City GIS data through 2016.

3.9.3.1 BCWMC BMPs

The BCWMC capital improvement program (CIP) published in the 2015 BCWMC Watershed Management Plan (as amended) includes additional recommended BMPs to be implemented within the City of Golden Valley. These BMPs are included in the City's implementation program (see Section 5.0). Additional BMPs may be recommended by the BCWMC in future iterations of the BCWMC CIP. The City will continue to work with the BCWMC to implement recommended BMPs.

3.9.4 BCWMC Flood Risk Reduction Projects

The BCWMC, in a cooperative effort with the COE, MNDOT, MNDNR, and all the cities within the Bassett Creek watershed, undertook a structural flood control project, the Bassett Creek Flood Control Project, from 1987 through 1996. This $40 million flood control project addressed flooding in portions of Golden Valley, Plymouth, Minneapolis, and Crystal and reduced flood elevations along the Bassett Creek corridor by 2 feet in Golden Valley, 1½ feet in Crystal, and up to 4½ feet in Minneapolis. The flood control project also reduced average annual flood damages across the Bassett Creek watershed by 62 percent.

Table 3-4 summarizes the flood control projects constructed within the City of Golden Valley as part of the larger Bassett Creek Flood Control Project. The control structures constructed along Bassett Creek leaves the creek virtually unaffected during normal flow conditions. For large storm events, the storage upstream of control structures generally results in higher water levels than under pre-project conditions, while each control structure lowers peak discharges immediately downstream of the structure.

The BCWMC has constructed other flood risk reduction projects within the City, including the Breck School Stormwater Storage Area, as well as the Cortlawn and Ring Pond systems. Additionally, the City of Golden Valley and the City of Robbinsdale acquired all the area around Rice Lake to preserve the wetland and natural inundation area for temporary stormwater storage. Bassett Creek Park Pond, in Crystal, provides flood storage of flows along Highway 100 in Golden Valley and also provides water quality benefits. Table 3-4 also lists these other projects.

Table 3-4 Summary of Flood Control Projects in the City of Golden Valley

Feature	Year Constructed	Partners
Bassett Creek Flood Control Project		
Golden Valley Flood Control Project: Regent Avenue Crossing Noble Avenue Crossing Minnaqua Drive Bridge Removal Highway 100 Control Structure	1981 - 1984	BCWMC, USACE, Golden Valley
Wisconsin Avenue Control Structure	1987	BCWMC, Golden Valley
Highway 55 Control Structure	1987	BCWMC, USACE, Minneapolis, MNDR
Westbrook Road Crossing	1993	BCWMC, USACE, Golden Valley, MNDR
Golden Valley Country Club	1994	BCWMC, USACE, Golden Valley, MNDR
Other Flood Control Projects		
East and West Ring Ponds	1978	Golden Valley
Cortlawn Pond	1986	Golden Valley
Breck Stormwater Storage Area	1984, 1995	Golden Valley, MnDOT
Land Acquisition around Rice Pond	1990	Golden Valley, Robbinsdale
Bassett Creek Park Pond	1995	BCWMC, USACE, Crystal, MNDR, MnDOT

BCWMC = Bassett Creek Watershed Management Commission; USACE = United States Corps of Engineers; MNDR = Minnesota Department of Natural Resources; MnDOT = Minnesota Department of Transportation

Flood profile elevations for the Bassett Creek Main Stem as well as the Sweeney Lake Branch of Bassett Creek in Golden Valley are included in Table 2-9 of the 2015 BCWMC Watershed Management Plan (2015, as amended). The flood profiles reflect the implementation of the above mentioned flood risk reduction projects.

The BCWMC also implements nonstructural flood control measures, which prevent flood damages from occurring along the BCWMC trunk system. Examples of these measures include:

- Monitoring water levels on lakes and streams in the watershed
- Developing models (e.g., XP-SWMM) to assess flood risk
- Review of proposed projects with potential impacts to floodplains
- Establishing policy and/or requirements to:
    - Set minimum building elevations
    - Preserve floodplain storage
    - Limit alteration to existing structures

3.10 Water Quality

The lakes, ponds, streams, and wetlands in the City of Golden Valley are important community assets. The City recognizes the need for good water quality in its waterbodies has taken steps to protect and improve these resources. These steps include adopting water quality management policies, collecting water quality data, reviewing projects for conformance with water quality performance standards, and implementing water quality improvement projects.

3.10.1 Water Quality Monitoring and Data

A number of agencies and organizations have been monitoring the water quality of the water resources in the City of Golden Valley. Figure 3-16 shows the location of the various water quality (and water quantity) monitoring sites. The following sections discusses the various water quality monitoring efforts that have taken place within the City.

3.10.1.1 City of Golden Valley Monitoring

The City of Golden Valley performed water quality monitoring of several stormwater ponds in 1995 as part of the development of the 1999 SWMP. Since then, the City has not conducted any additional water quality monitoring on its own.

The 1995 monitoring effort included the monitoring of the East and West Ring and Cortlawn stormwater ponds to determine nutrient and sediment loadings from the different land use types and to estimate the effectiveness of stormwater ponds on nutrient and sediment load reduction

Four stormwater runoff events were sampled during the summer and fall of 1995. Removal rates over the four events averaged 82% removal of total phosphorus and 69% removal of total suspended solids.

3.10.1.2 BCWMC Lake and Pond Water Quality Monitoring

The BCWMC performs detailed monitoring of several lakes and ponds within the City of Golden Valley on a rotating basis, including:

- Sweeney Lake
- Twin Lake
- Westwood Lake

The BCWMC has monitored the water quality of South Rice Pond in the past. BCWMC lake monitoring has included assessment of chemical water quality (e.g., total phosphorus, nitrogen chlorophyll a, transparency, pH, dissolved oxygen, conductivity), water clarity (Secchi disc transparency), phytoplankton, zooplankton, and aquatic macrophytes. Chemical water quality, phytoplankton, and zooplankton sampling is typically performed at monthly intervals during the growing season (and twice monthly in early summer). Macrophyte surveys are typically performed twice per growing season, in June and August.

Results of BCWMC water quality monitoring are available from the BCWMC website at: www.bassettcreek.org.

3.10.1.3 BCWMC Stream Biological Monitoring

The BCWMC conducts biotic (invertebrate) monitoring of streams in the watershed on a regular basis and analyzes the data to determine if the water quality is improving or degrading. The biological data are indicators (bioindicators) of water quality.

Monitoring for the presence of biological indicator organisms provides evidence of the water quality of Bassett Creek, including transitory changes in stream water quality related to stormwater runoff. Evaluating benthic macroinvertebrates (bottom-dwelling aquatic organisms, mainly insects) in a stream provides a long-term assessment of its water quality. The benthic invertebrates are exposed to all the temporal variations in stream water quality and 'integrate' the quality of passing water. Therefore the presence or absence of pollutant tolerant organisms demonstrates the water quality impacts of urban runoff better than grab samples of water flowing in the creek. The inventory of benthic organisms also indicates whether there is a suitable food supply for fish.

The BCWMC collected and inventoried benthic organisms from several Bassett Creek locations since 1980. Since 2000, biotic monitoring has been performed by the BCWMC or MPCA at three year intervals (2000, 2003, 2006, 2008/2009, and in 2012) Two of the six sampling locations were located within the City of Golden Valley (see Figure 3-16):

- Main Stem of Bassett Creek at Rhode Island Avenue in Golden Valley
- Sweeney Lake Branch of Bassett Creek at Turner's Crossroad (Xenia Avenue) in Golden Valley

Results of BCWMC biologic stream monitoring are presented in the 2015 BCWMC Watershed Management Plan and available from the BCWMC website at: www.bassettcreek.org.

3.10.1.4 Other Monitoring Programs

The Metropolitan Council's Citizen-Assisted Monitoring Program (CAMP) has been collecting water quality data on a number of Twin Cities metropolitan area lakes since 1980. On a bi-weekly basis (April-October), citizen volunteers collect a surface water sample for laboratory analysis of total phosphorus, total Kjeldahl nitrogen, and chlorophyll-*a*; obtain a Secchi transparency measurement; and provide some user-perception information about the lake's physical and recreational condition. There are a number of lakes that are partially or entirely within the City of Golden Valley that have been monitored as part of the CAMP program. The BCWMC provides funding for all the CAMP monitoring within the City of Golden Valley. For more information about the CAMP program, please see the following website: http://www.metrocouncil.org/environment/RiversLakes/Lakes/index.htm

The Citizen Lake Monitoring Program (CLMP) is a cooperative program combining the technical resources of the Minnesota Pollution Control Agency (MPCA) and the volunteer efforts of citizens who collect water quality data on their lakes. Citizens measure Secchi transparency weekly.

The Minneapolis Park and Recreation Board (MPRB) administers lake and water resource management programs within the City of Minneapolis as well as MPRB-owned land within the City of Golden Valley comprising Wirth Park. The MPRB performs bi-weekly testing of Wirth Lake for total suspended solids, total phosphorus, nitrogen, dissolved oxygen, and other nutrients. This testing is done from the beginning of April to the end of October.

The Hennepin County Environment and Energy Department manages the River Watch program. The program has been in place since 1995, and provides hands-on environmental education opportunities for students in Hennepin County. Each spring and fall, students collect macroinvertebrate data to assess the overall health of the biological communities within streams throughout Hennepin County. Some of the monitoring stations for Bassett Creek have been in place since 1999. The BCWMC assists with funding and support of this program. For more information about the River Watch program, please see the following website: https://www.hennepin.us/riverwatch

3.10.1.5 Water Quality Data

Current water quality data available for BCWMC priority waterbodies located within the City is available from the BCWMC website at: http://www.bassettcreekwmo.org/lakes-streams

Additional water quality data collected by other parties is available using a map-based search tool available from the MPCA's Environmental Data Access website at: https://www.pca.state.mn.us/quick-links/eda-surface-water-search-map-based

3.10.2 Water Quality Management Classifications

Within its jurisdiction, the BCWMC identified priority waterbodies subject to BCWMC water quality standards and management actions. BCWMC priority waterbodies partially or entirely located within the City of Golden Valley are listed in Table 3-5. The City adopts the BCWMC classification system by

reference. The City has assessed the need for further waterbody classification and has not assigned classifications beyond those of the BCWMC or MPCA.

The BCWMC and City have adopted MPCA eutrophication water quality standards applicable to lakes and streams; these standards are listed in Table 3-6. Additional information about the MPCA's eutrophication water quality standards may be found in *Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report and 303(d) List* (MPCA, 2014).

Table 3-5 BCWMC Priority Waterbodies in Golden Valley

BCWMC Priority Classification[1]	Waterbodies
Priority Streams	• Main Stem Bassett Creek • Sweeney Lake Branch Bassett Creek
Priority 1 Deep Lakes	• Sweeney Lake • Twin Lake • Wirth Lake
Priority 1 Shallow Lakes	• Westwood Lake
Priority 2 Shallow Lakes	None

Note(s):
(1) BCWMC waterbody management classifications are described in section 2.7.2.2 of the 2015 BCWMC Watershed Management Plan.

Note that waterbodies within the City are also subject to state water quality standards addition to those presented in Table 3-6; these standards are published in Minnesota Rules 7050 and are applicable to lakes, ponds, and streams in the City.

As the authority responsible for administering the Clean Water Act (CWA) in Minnesota, the MPCA establishes priority rankings for waters that do not meet the water quality standards. The list of impaired waters, sometimes called the 303(d) list, is updated by the state every two years. Waterbodies within the City or receiving runoff from the City that are listed as impaired are summarized in Table 3-7.

Table 3-6 Eutrophication Water Quality Standards for Golden Valley Waterbodies

Waterbody	BCWMC Classification	BCWMC Water Quality Standards							
		Total Phosphorus, summer average (ug/L)	Chlorophyll a summer average (ug/L)	Secchi Depth, summer average (m)	Total Suspended Solids (mg/L)	Daily Dissolved Oxygen Flux (mg/L)	Biological Oxygen Demand (5 day)	*Escherichia coli* (# per 100 mL)	Chloride (mg/L)
Main Stem Bassett Creek Sweeney Lake Branch Bassett Creek	Priority 1 Stream	100	18	NA	30	3.5	2	126 [1]	230
Sweeney Lake Twin Lake Wirth Lake	Priority 1 Deep Lake	40	14	1.4	NA	NA	NA	126 [1]	230
Westwood Lake	Priority 1 Shallow Lake	60	20	1.0	NA	NA	NA	126 [1]	230

Note: standards presented above are summer average values calculated from June through September. MN Rule 7050.0220 includes water quality standards for additional parameters.

(1) 126 organisms per 100 mL as a geometric mean of not less than five samples within any month, nor shall more than 10% of all samples within a month exceed 1,260 organisms per 100 mL

Table 3-7 Summary of Impaired Waters within and downstream of Golden Valley

Waterbody	Impaired Use	Pollutant or Stressor	Year Listed	TMDL Study Target Start	TMDL Study Target Completion	TMDL Study Approved
Sweeney Lake	Aquatic Recreation	Nutrients/Eutrophication	2004	--	--	2011
	Aquatic Life	Chloride	2014	--	--	2016[4]
Wirth Lake	Aquatic Consumption	Mercury in Fish Tissue;	1998	--	--	2008[2]
	Aquatic Life	Chloride	2014			2016[4]
	Aquatic Recreation[1]	Nutrients/Eutrophication	2002	--	--	2010
Bassett Creek (Main Stem)	Aquatic Life	Chloride	2010	--	--	2016[4]
	Aquatic Life	Fish Bioassessments	2004	2012	2016	--
	Aquatic Recreation	Fecal Coliform	2008	--	--	2014[3]
Medicine Lake	Aquatic Consumption	Mercury in Fish Tissue;	1998	--	--	2008[2]
	Aquatic Recreation	Nutrients/Eutrophication	2004	--	--	2011
Minnehaha Creek	Aquatic Life	Dissolved Oxygen	2010	2020	2024	--
	Aquatic Life	Macroinvertebrate Bioassessments	2014	2020	2024	--
	Aquatic Life	Chloride	2008	--	--	2016[3]
	Aquatic Life	Fish Bioassessments	2004	2020	2024	--
	Aquatic Recreation	Fecal Coliform	2008	--	--	2014[3]
Lake Hiawatha	Aquatic Recreation	Nutrients/Eutrophication	2002	--	--	2014

(1) Wirth Lake was delisted for aquatic recreation due to nutrients/eutrophication in 2014.
(2) Wirth Lake mercury impairment is addressed by the statewide mercury TMDL, approved in 2008.
(3) Bassett Creek fecal coliform impairment is addressed by the *Mississippi River Bacteria TMDL Study and Protection Plan*, approved in 2014
(4) Chloride impairments for Bassett Creek, Sweeney Lake, and Minnehaha Creek are addressed by the *Twin Cities Metropolitan Area Chloride TMDL Study*, approved in 2016.

3.10.3 Water Quality Modeling

Water quality modeling serves many purposes, including estimating existing pollutant loads to downstream waterbodies, evaluating performance of existing water quality BMPs, and estimating the potential benefits of future water quality improvements. This section describes City-wide water quality modeling efforts. In addition to the City-wide modeling efforts described in the following subsections, the City has performed localized water quality modeling to evaluate proposed improvements as needed.

3.10.3.1 City PONDNET Modeling (1999)

As part of the development of its 1999 SWMP, the City developed a PONDNET model for the entire City stormwater pond network to identify locations in need of stormwater improvements and increased stormwater pond nutrient and sediment removal efficiency. The PONDNET model estimated total suspended solids (TSS) and total phosphorus (TP) loads from each subwatershed as well as the total loading to the primary water bodies in and near Golden Valley, including Bassett Creek, Sweeney and Twin Lakes, and Medicine Lake. PONDNET estimated these loadings in terms of annual loadings based upon work published by the EPA from the National Urban Runoff Program (NURP) and computed the loadings as the product of mean pollutant concentration and annual runoff volume. The model predicted load reductions due to existing stormwater ponds within the City, but did not account for other BMPs such as filter strips, swales, and street sweeping.

Results of the PONDNET modeling are published in the 2008 SWMP. PONDNET results are not included in this SWMP as they have been superseded by the results of BCWMC watershed-wide P8 water quality modeling (see Section 3.10.3.2).

3.10.3.2 BCWMC P8 Modeling

As part of developing lake and stream watershed management plans, the BCWMC developed models to estimate total flow and phosphorus loadings to lakes and streams within the Bassett Creek watershed using the water quality model P8. P8 (Program for Predicting Polluting Particle Passage through Pits, Puddles and Ponds) is a model for predicting the generation and transport of stormwater runoff pollutants in urban watersheds.

In 2012-2013, BCWMC performed a comprehensive update to the existing Bassett Creek P8 models. Eleven P8 models, distributed throughout the Bassett Creek watershed, were updated to simulate the quantity and quality of water annually added to Bassett Creek during stormwater runoff events. Sources of information for the 2012 model construction included data collected from municipalities and other government agencies, information from previously constructed P8 models, field surveys, estimation from GIS, and calculations from XP-SWMM (i.e., outlet rating curve calculations). Subwatershed delineations for use in the P8 model within the City are shown in Figure 3-3. The P8 modeling results were then compiled and compared to the available monitoring data from the Bassett Creek WOMP station. More detailed information regarding data sources, model updates, and model calibration is included in a report entitled *Bassett Creek Water Quality Modeling* (BCWMC, 2013).

The updated P8 water quality modeling provides a tool for the BCWMC and member cities to use in tracking the progress of the BCWMC and the member cities towards TMDL implementation for impaired waterbodies within and downstream of the City. When projects are proposed and/or completed, the updated P8 model may be used to estimate the loading reduction that will be achieved by the projects. The updated P8 modeling may also be used to evaluate the effect of proposed City and BCWMC projects.

The BCWMC works with the member cities to periodically update the P8 model to incorporate BCWMC capital improvements and BMP information provided by the member cities. The City will provide this information to the BCWMC annually. Estimated total phosphorus concentrations in runoff from subwatersheds within the City are shown in Figure 3-18.

3.10.3.3 MCWD HHPLS (2003)

The MCWD developed a water quality model of the entire Minnehaha Creek watershed district as part of the Hydrologic, Hydraulic, and Pollutant Loading Study (HHPLS) (MCWD, 2003). The pollutant loading model, PLOAD, was used to estimate watershed pollutant loads. A small portion of the southeastern part of Golden Valley is located within the MCWD. The lake water quality model, WiLMS, was used for in-lake modeling of several lakes within the MCWD. None of the lakes within Golden Valley are located within the watershed.

3.11 Water Quantity and Flooding

The City of Golden Valley cooperates with the BCWMC to manage the quantity of water and reduce the risk of flooding within the City. To perform these duties, the City and/or BCWMC have performed studies, constructed flood risk mitigation projects, and performed ongoing monitoring of stage (i.e., water surface elevation) and flow at several locations within the City (see Figure 3-16).

Runoff from most of the City is tributary to the Main Stem of Bassett Creek through overland flow, storm sewer discharge, or other tributaries streams. It is important to note that flows in the Main Stem of Bassett Creek where it enters the City are controlled by the fixed weir outlet on Medicine Lake, in the City of Plymouth. Therefore, baseflows in the creek are significantly affected by the discharge (or lack of discharge) from Medicine Lake.

3.11.1 Flood Insurance Studies

The Federal Emergency Management Agency (FEMA) maps the floodplains of larger basins and streams to create community Flood Insurance Studies (FIS) and Flood Insurance Rate Maps (FIRMs). There is a FIS for the City of Golden Valley. Updated FIRMs for Hennepin County and including the City of Golden Valley were made effective in November 2016. It should be noted, however, that the November 2016 FIRMs are based on analysis performed using older, TP-40 precipitation data versus the newer, Atlas 14 precipitation data (see Section 3.1). The FEMA-delineated floodplain within the City is shown in Figure 3-19.

The FIRM mapping, together with the City's floodplain ordinance, allow the City to participate in the federal government's National Flood Insurance Program (NFIP). Homeowners with federally backed mortgages located within the FEMA-designated floodplains are required to purchase flood insurance. In

some cases, homes within the FEMA-designated floodplains on the FEMA floodplain maps may actually not be in the floodplain. In order to waive the mandatory flood insurance requirements for their homes, residents must remove their homes from the FEMA-designated floodplain by obtaining Letters of Map Amendments (LOMA). The City provides information and technical assistance to help with this effort. The City participates in FEMA's Community Rating System program, which allows eligible residents to receive a discount on purchasing flood insurance.

In addition to FEMA-delineated floodplains, the BCWMC and MCWD have established their own 100-year floodplains for watershed management purposes. WMO-delineated floodplains may differ from FEMA-delineated floodplains due to input data, level of detail, and other factors. The BCWMC recently performed hydrologic and hydraulic modeling using Atlas 14 inputs to establish new 100-year flood elevations and floodplain inundation extents (see Section 4.2.4). The BCWMC and MCWD review proposed activities in their respective floodplain, as described in the BCWMC Requirements document and MCWD Rules document. The City uses the BCWMC and MCWD floodplain information to design public projects and review private development proposals.

3.11.2 BCWMC Flood Control Project

The largest structural Flood Control Project undertaken by the BCWMC was the Bassett Creek Flood Control Project. Constructed from 1987 – 1996, the project was the cooperative effort of the USACE, MnDOT, MNDNR, the BCWMC, and the BCWMC member cities, including the City of Golden Valley. The project controls flooding in portions of Golden Valley, Plymouth, Minneapolis, and Crystal and reduced flood elevations along the Bassett Creek corridor by 2 feet in Golden Valley.

Table 2-8 of the 2015 BCWMC Plan lists all of the features of the BCWMC Flood Control Project. Figure 2-14 of the 2015 BCWMC Plan identifies the BCWMC Flood Control Project structures. Major Flood Control Project features located within the City of Golden Valley include:

- Highway 100 control structure
- Wisconsin Avenue control structure
- Highway 55 control structure
- Golden Valley Country Club control structure

The control structures consist of low flow orifices with overflow weirs to restrict flows. Each control structure leaves the creek virtually unaffected during normal flow conditions. For large storm events, the storage upstream of control structures generally results in higher water levels than under pre-project conditions. In late 2001/early 2002, the Wisconsin Avenue structure, along with the Hampshire Avenue crossing, was outfitted with continuous water level monitoring systems. Water levels at the Hampshire Avenue crossing control the gate structure at Wisconsin Avenue.

Responsibilities related to the BCWMC Flood Control Project are split between the BCWMC and member cities and are described in greater detail in Section 5.3.

3.11.3 Regulatory Water Levels and Flow Rates

Following the construction of the BCWMC Flood Control Project, the BCWMC worked with the USACE to approve revised flood profiles along sections of Bassett Creek for the National Flood Insurance Program's Flood Insurance Rate Map (FIRM). The BCWMC has since updated the flood profiles along Bassett Creek to reflect updated hydrologic and hydraulic analysis performed using Atlas 14 precipitation data (see Section 3.1).

The BCWMC and City use the revised flood profiles in its review of improvements and development proposals. The flood profiles and critical event flow rates that are now in effect are included in Table 2-9 of the 2015 BCWMC Plan (as amended). Current BCWMC policy and City policy requires no net increase in peak flow rates for specific storm events (see Section 2.4).

3.11.4 Water Quantity Modeling

Water quantity modeling is necessary to establish flood levels and determine floodplain extents, design hydraulic structures adequate to meet their intended functions, and assess hydraulic impacts of projects proposed by developers, the City, and the WMOs.

In 2012 and 2013, the BCWMC and its member cities developed a watershed-wide hydrologic and hydraulic model using XP-SWMM software. XP-SWMM allows for calculating both hydrology and hydraulics within one modeling program, rather than requiring two separate programs, as with the HEC-1 and HEC-2 models. Model development was split into two phases, with the first phase in 2012 and 2013 including:

- Updating watershed divides based on recent digital topographic data
- Modifying hydrologic inputs (because of the changes in watershed divides and available methodology)
- Enhancing detail along the creeks by using updated channel geometry and current bridge and culvert geometry

The XP-SWMM model can be used to compare relative changes in flow rate (i.e., existing vs. proposed conditions runoff rates), or relative changes in water surface elevations (i.e., existing vs. proposed conditions maximum water surface elevations in the creeks or storage areas).

Since its initial development, the BCWMC XP-SWMM model has been revised, including:

- Subdividing the original watersheds to increase model resolution and consistency with the BCWMC watershed-wide P8 water quality model (see Section 3.10.3)
- Incorporating additional municipal storm sewer systems between upstream modeled ponds
- Integrating detailed storage in modeled ponds upstream of the creek system
- Incorporating Atlas 14 precipitation depths and updated soils data (see Sections 3.1 and 0)

By incorporating these changes, the modeled runoff rates to the creek system may more realistically represent actual conditions, resulting in an acceptable calibration. The BCWMC has updated the flood

profiles of Bassett Creek (Table 2-9 of the 2015 BCWMC Plan, as amended) to reflect the incorporation of the Atlas 14 precipitation data. Maximum water surface elevations, peak runoff, and peak discharge estimated by the model along the BCWMC Trunk System are published in the *Bassett Creek Hydrologic and Hydraulic Analyses - Phase 2 XPSWMM Model* (Barr, 2017). Peak flow, water surface elevations, and storage volumes for other parts of the City are available upon request from the City.

The City will use the XP-SWMM model to assess hydrologic and hydraulic impacts of potential projects and prioritize flood risk reduction efforts (see Section 5.3). The BCWMC works with the member cities to periodically update the XP-SWMM model to reflect current conditions within the watershed.

The portion of the City located within the MCWD were modeled as part of the MCWD's 2003 Hydrologic, Hydraulic, and Pollutant Loading Study (HHPLS) completed in 2003. The HHPLS used and XP-SWMM model to estimate runoff from the City tributary to the Minnehaha Creek subwatershed. Modeling results are summarized in Volume IV.L of the HHPLS report and are available from the MCWD website at: https://www.minnehahacreek.org/project/hydrologic-hydraulic-and-pollutant-loading-study-hhpls

3.11.5 Water Quantity Monitoring

3.11.5.1 City of Golden Valley Monitoring

The City has performed flow and stage monitoring at a limited number of locations within the City. Some monitoring data are the result of a specific stormwater study while other monitoring data are collected continuously or semi-continuously for the operation of flood control structures.

East and West Ring and Cortlawn Stormwater Pond Monitoring - 1995

In 1995, as part of the development of the 1999 SWMP, the City was involved in a water quality monitoring effort that included the monitoring and sampling of the runoff entering the East and West Ring and Cortlawn stormwater ponds. To obtain representative stormwater runoff samples, each monitoring station also employed a flow measuring device and an automated composite sampler in order to estimate a flow-weighted pollutant load to and from each stormwater pond. Total runoff volumes at each monitoring location are available for each storm event monitored in 1995.

Bassett Creek Staff Gauges – 2002 to Present

In 2002, several staff gages were installed by the City along Bassett Creek. Presently, the City maintains automated or manual staff gauges at the following road crossings along the Main Stem and Sweeney Lake Branch of Bassett Creek:

- Bassett Creek Main Stem
  - Wisconsin Avenue
  - Pennsylvania Avenue
  - Hampshire Avenue
  - St. Croix Avenue
  - Westbrook Road

- T.H. 100 (at the Main Stem outlet structure)
- Regent Avenue
- Bassett Creek Drive
- Golden Valley Road (County Road 66)

- Sweeney Lake Branch Bassett Creek
  - Sweeney Branch at Schaper Park
  - Sweeney Branch upstream of T.H. 100

The City uses these gauges to record the stage of Bassett Creek during various storm and flood events. Figure 3-16 shows the location of the staff gauges located on Bassett Creek within Golden Valley.

3.11.5.2 BCWMC Lake Level Monitoring

The BCWMC is responsible for the monitoring of water levels on the primary lakes within the Bassett Creek Watershed. These monitored lakes include the following lakes within or receiving runoff from the City of Golden Valley:

- Medicine Lake (1972 to present)
- Sweeney Lake (1972 to present)
- Westwood Lake (1974 to present)
- Wirth Lake (2006 to present)

The BCWMC typically measures water levels twice per month during the open water period and once per month in winter. More detailed information is available from the MNDNR lakefinder website (http://www.dnr.state.mn.us/lakefind/index.html) and from the BCWMC, upon request.

3.11.5.3 Stream Gauging and Flow Data

In 2000, the BCWMC, in cooperation with Metropolitan Council Environmental Services (MCES), began monitoring flow and stage in the Main Stem of Bassett Creek as part of the Watershed Outlet Monitoring Program (WOMP). The Bassett Creek WOMP site is located at Irving Avenue, one-fourth mile upstream of the storm sewer tunnel that runs beneath downtown Minneapolis to the Mississippi River (see Figure 3-16). Data collection consists of continuous measurements of stage (which is converted to stream flow using a rating curve), temperature and conductivity. Water quality monitoring is also regularly performed at the site, including monitoring of nutrients, chlorides, solids, and *E. coli.* Data collected at the Bassett Creek WOMP station is maintained and published by the MCES. Information can be found at: metrocouncil.org/

3.12 Fishery and Aquatic Habitat

The MNDNR completed fishery surveys for Sweeney Lake, Twin Lake, and Wirth Lake in Golden Valley as well as for nearby Medicine Lake. Additionally, the MNDNR has stocked Wirth and Medicine Lakes in the recent past.

A 2013 MNDNR survey of Sweeney Lake identified 13 different fish species. Gamefish present in Sweeney Lake included largemouth bass and northern pike. Common carp were also identified in the 2013 survey. The BCWMC also performed a trapnet fish survey of Sweeney and Twin Lakes in 2013. Wirth Lake was most recently surveyed by the MNDNR during the summer of 2012. Although walleye have been sampled in past surveys of Wirth Lake, none were captured in 2012 despite stocking adult walleye every five years (most recently in 2007 and 2012). Walleye fingerlings were stocked in 2011 and 2008. Results can be found at http://www.dnr.state.mn.us/lakefind/index.html.

3.12.1 Aquatic Plants (Macrophytes)

Aquatic plants, or macrophytes, are a natural and integral part of most lake communities. A lake's aquatic plants, generally located in the shallow areas near the shoreline of the lake provide habitat for fish, insects, and small invertebrates, provide food for waterfowl, fish and wildlife, produce oxygen, provide spawning areas for fish, help stabilize and protect shorelines from wave erosion, and provide nesting sites for waterfowl.

The BCWMC performs macrophyte surveys of most of its priority waterbodies. In Golden Valley, this includes Sweeney Lake, Twin Lake, Wirth Lake, and Westwood Lake. Macrophyte surveys are generally performed during the same year as BCWMC chemical water quality monitoring and include two surveys (typically June and August). Macrophyte monitoring includes the identification of key invasive macrophytes (e.g., curlyleaf pondweed and Eurasian watermilfoil) that are present in the waterbodies (see also Section 4.3.2).

Eurasian watermilfoil has been identified in:

- Wirth Lake.

Curlyleaf pondweed has been identified in

- Sweeney Lake
- Twin Lake
- Wirth Lake
- Westwood Lake

BCWMC macrophyte surveys noted that curlyleaf pondweed, while present in Sweeney Lake, Twin Lake, and Westwood Lake, constituted only a minor part of the overall plant community of those lakes and did not warrant management activity at the time (Barr, 2015; Barr, 2016). Continued monitoring of the curlyleaf pondweed presence in these lakes is recommended. The MPRB manages Eurasian watermilfoil and curlyleaf pondweed in Wirth Lake through periodic mechanical harvesting.

3.13 Natural Communities and Recreational Areas

Prior to settlement, the major land cover type in the City was a predominantly oak forest interrupted by tallgrass prairie and marsh. Although scattered remnants of this forest are still present throughout much

of its original range, very few remnants remain within the City according to the map *Natural Communities and Rare Species of Carver, Hennepin, and Scott Counties* (Minnesota County Biological Survey, 1998).

Native vegetation in the City of Golden Valley has been greatly altered by agricultural development and urbanization. Remaining vegetation in the City is typical of that found at the interface between the Eastern Deciduous Forest and the Temperate Grassland. With agriculture gone from the City, urbanization has occurred in former agricultural areas. In addition to the forested areas, numerous wetlands were once present in the City, but the majority have been drained or filled for development.

Minnesota Land Cover Classification System (MLCCS) information is currently available for the City of Golden Valley as a source of information and as a management tool. Figure 3-12 shows the MLCCS classification of natural areas within the City. Natural Resource Inventory (2013) is another source of information and is found in the Parks and Natural Resource Chapter of this comprehensive plan.

The county biological survey map notes the presence of a tamarack swamp in Theodore Wirth Park. This map also notes the presence of a federally or state-listed rare animal species in the City located near Turners Crossroad and Interstate 394. The Natural Heritage Information System (NHIS) also notes occurrences of federally- or state-listed rare animal species within the City. Blanding's turtles, trumpeter swans, peregrine falcons, and hooded warblers are rare species that occur in the area, and the habitat for these species should be protected and improved where feasible. Due to the sensitive nature of this information, the actual species and specific locations are not publicly available.

3.13.1 Recreational Areas

Approximately 15 percent of the City (more than 1,000 acres) is dedicated to parks and open space, with 25 parks and nine nature areas within the community. The City maintains numerous ball fields, courts, and activity areas and nearly 50 miles of trails, all of which are on City property, except for the trails at the General Mills Research facility. By mutual consent between the City and General Mills, these trails are maintained by the City for public use. Additionally, Theodore Wirth Regional Park, part of the Minneapolis Park and Recreation Board, is located along the eastern edge of Golden Valley and extends south into the City of Minneapolis. Sochacki Park is located in the northeast part of the City and is jointly operated by the City of Robbinsdale, City of Golden Valley, and Three Rivers Park Board.

3.14 Potential Pollutant Sources

The sources of potential pollution in the City are many and varied. There are permitted sites, hazardous waste generators, and contaminated sites within the City. The MPCA maintains a database of these sites, which includes permitted sites (air, industrial stormwater, construction stormwater, and wastewater discharge), hazardous waste generating sites, leak sites, petroleum brownfields, tank sites, unpermitted dump sites, and sites enrolled in the Voluntary Investigation and Cleanup (VIC) program. Much of this information can be found in the "What's in my neighborhood?" interactive MPCA map.

The MPCA or Hennepin County should be contacted for details about specific sites, since many of the sites have been cleaned up or are in the clean-up process. The location of these potentially contaminated

or hazardous waste sites should be considered as sites are redeveloped and BMPs are implemented. The presence of soil contamination at many of these sites, if not removed, may limit or prevent infiltration as a stormwater management option.

Additionally, there is currently one Superfund Site within the City of Golden Valley. This site is the Honeywell, Inc. Golden Valley Plant. Spills and leaks have contaminated the soils and groundwater with trichloroethylene, trichloroethane, and other solvents. In 1982, contaminated soils were excavated and disposed of and pump-out wells were installed to address the groundwater contamination.

In contrast to sites with known hazards, non-point source pollution cannot be traced to a single source or pipe. Instead, pollutants are carried from land to water in stormwater or snowmelt runoff, in seepage through the soil, and in atmospheric transport. Discharge from stormwater pipes is considered a non-point source discharge as the pollutants coming from the pipe are generated across the watershed contributing to the pipe, not at a single location. Point sources frequently discharge continuously throughout the year, while non-point sources discharge in response to precipitation or snowmelt events. For most waterbodies, non-point source runoff, especially stormwater runoff, is the major contributor of pollutants.

Failing or substandard subsurface sewage treatment systems (SSTS) may be a non-point source of pollutants. Historically, there were several subsurface sewage treatment systems (SSTS) operating within the City of Golden Valley. The City is not aware of any SSTS systems in the city.

More information about potential pollutant sources is available from the MPCA website: http://www.pca.state.mn.us/index.php/data/wimn-whats-in-my-neighborhood/whats-in-my-neighborhood.html

3.14.1 Hazardous Materials Emergency Response Plan

The City of Golden Valley's Hazardous Materials Emergency Response Plan establishes a procedure for the reporting and mitigation of hazardous material incidents (i.e., a spill, leak, or release of a hazardous material). The City's fire department is responsible for the implementation of this plan.

city of golden valley

- Municipal Boundary
- Major Roadway
- Railroad
- Lakes and Ponds
- Stream
- Ditch/Drainage Way

Drainage District

- Bassett Creek
- Medicine Lake
- Minnehaha Creek
- Sweeney Lake
- Wirth Lake

N

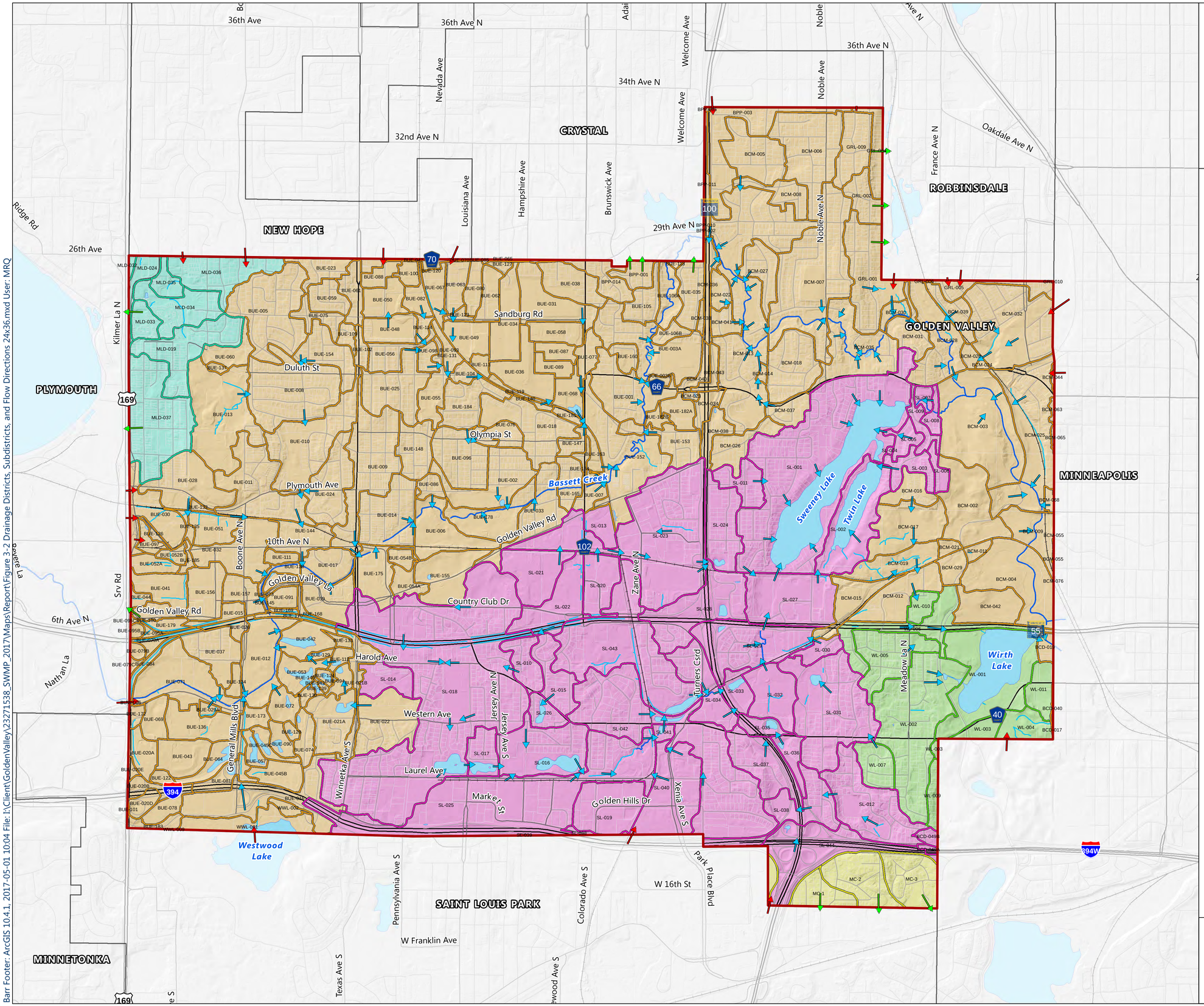
0 2,000 4,000

Feet

Date: November 2018
Sources:
- Barr Engineering Company for watershed boundaries.
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-1
MAJOR DRAINAGE DISTRICTS

Barr Footer: ArcGIS 10.6, 2018-11-02 09:19 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-1 Drainage Districts 24x36.mxd User: MRQ



city of golden valley

- Flow Direction
- Inflows to Golden Valley
- Outflows from Golden Valley
- Municipal Boundary

Subwatershed Boundary

- Bassett Creek
- Medicine Lake
- Minnehaha Creek
- Sweeney Lake
- Wirth Lake
- Major Roadway
- Railroad
- Lakes and Ponds
- Stream
- Ditch/Drainage Way
- Parcel Boundary

Drainage District

- Bassett Creek
- Medicine Lake
- Minnehaha Creek
- Sweeney Lake
- Wirth Lake

N

0 2,000 4,000 Feet

Date: November 2018
Sources:
- Barr Engineering Company for watershed boundaries.
- MN-DOT for roads, railroads, and municipal boundaries.
- Hennipin County for parcel boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-2
DRAINAGE DISTRICTS, SUBDISTRICTS, AND FLOW DIRECTIONS

city of golden valley

- Municipal Boundary
- Major Roadway
- Railroad
- Lakes and Ponds
- Stream
- Ditch/Drainage Way
- Parcel Boundary
- Water Quality Subwatershed Boundary

Drainage District

- Bassett Creek
- Medicine Lake
- Minnehaha Creek
- Sweeney Lake
- Wirth Lake

N

0 2,000 4,000

Feet

Date: November 2018
Sources:
- Barr Engineering Company for watershed boundaries.
- MN-DOT for roads, railroads, and municipal boundaries.
- Hennipin County for parcel boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-3
DRAINAGE DISTRICTS AND WATER QUALITY MODELING SUBWATERSHEDS

Barr Footer: ArcGIS 10.6, 2018-11-02 09:40 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-3 Drainage Districts and Water Quality Modeling Subwatersheds 24x36.mxd User: MRQ

city of golden valley

- Municipal Boundary
- Major Roadway
- Railroad
- Lakes and Ponds
- Stream
- Ditch/Drainage Way

Current Land Use

Residential
- Single Family Detached
- Single Family Attached (Duplex, Triplex)
- Townhome
- Multi-Family (Apartment, Condo)

Commercial
- Office
- Commercial

Industrial
- Industrial (includes Utility)

Open Space
- Parks and Natural Areas
- Open Water

Institutional
- Institutional - Assembly
- Institutional - Civic
- Medical

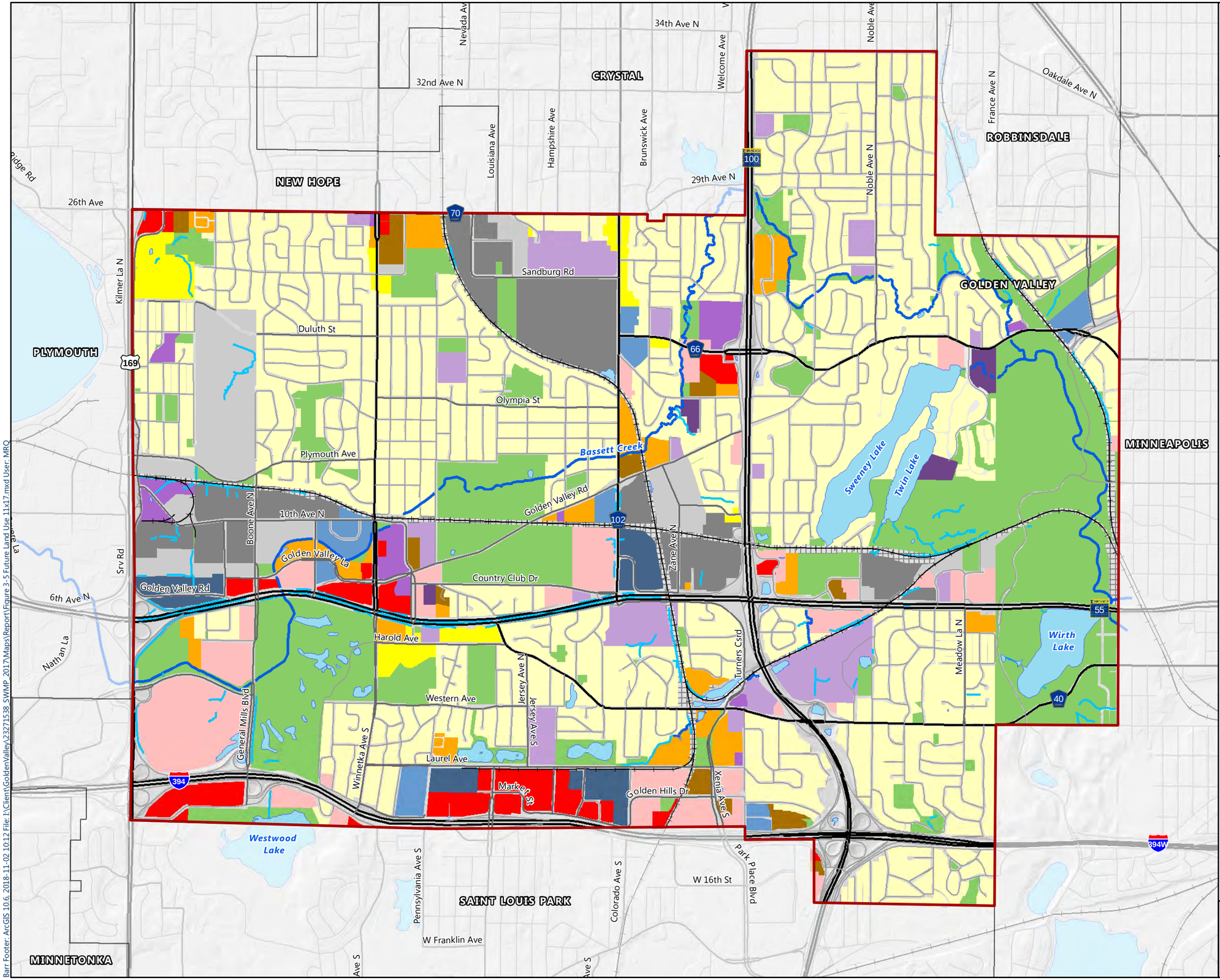
Other
- Railroad
- Right-of-Way (public and private)
- Vacant / Undeveloped

N 0 2,000 4,000 Feet

Date: November 2018
Sources:
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-4
CURRENT LAND USE

Barr Footer: ArcGIS 10.6, 2018-11-02 09:48 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-4 Current Land Use 11x17.mxd User: MRO



city of golden valley

- Municipal Boundary
- Major Roadway
- Railroad
- Lakes and Ponds
- Stream
- Ditch/Drainage Way

Future Land Use

Residential
- Low Density
- Moderate Density
- Medium Density
- High Density

Mixed Use
- Neighborhood
- Community

Commercial
- Office
- Retail/Service

Industrial
- Light Industrial
- Industrial

Open Space
- Park and Natural Areas

Institutional
- Assembly
- Civic
- Medical

Right-of-Way
- Railroad
- Right-of-Way (public and private)

N

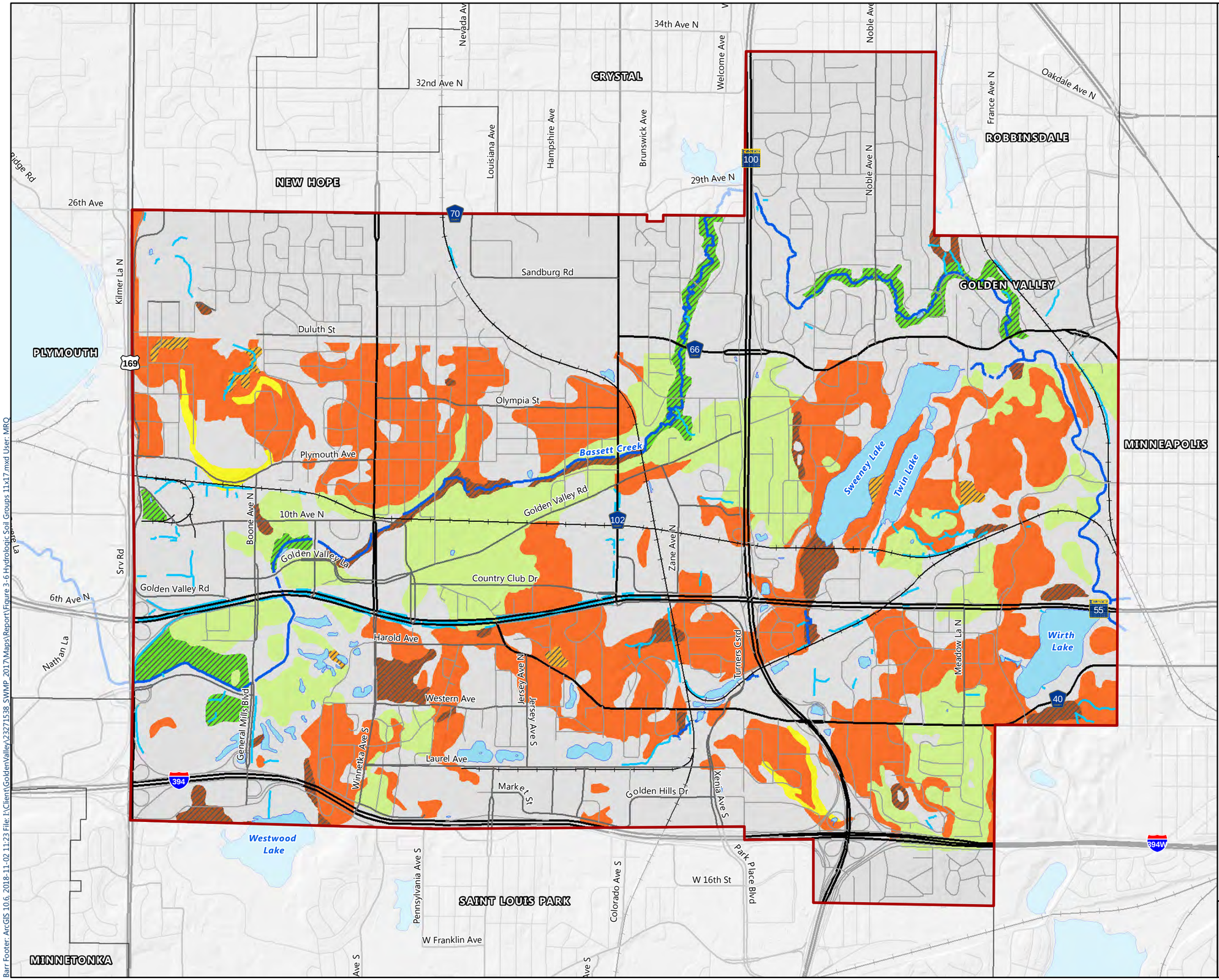
0 2,000 4,000

Feet

Date: November 2018
Sources:
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-5
FUTURE LAND USE

Barr Footer: ArcGIS 10.6, 2018-11-02 10:12 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-5 Future Land Use 11x17.mxd User: MRO



city of golden valley

- Municipal Boundary
- Major Roadway
- Railroad
- Lakes and Ponds
- Stream
- Ditch/Drainage Way

Hydrologic Soils Group

- Urban/No Data
- A - Well Drained
- A/D*
- B - Moderately Drained
- B/D*
- C - Poorly Drained
- C/D*
- D - Very Poorly Drained

* Dual hyrdrologic groups are given for certain wet soils that can be adequately drained. The first letter applies to the drained condition, the second to the undrained condition.

N

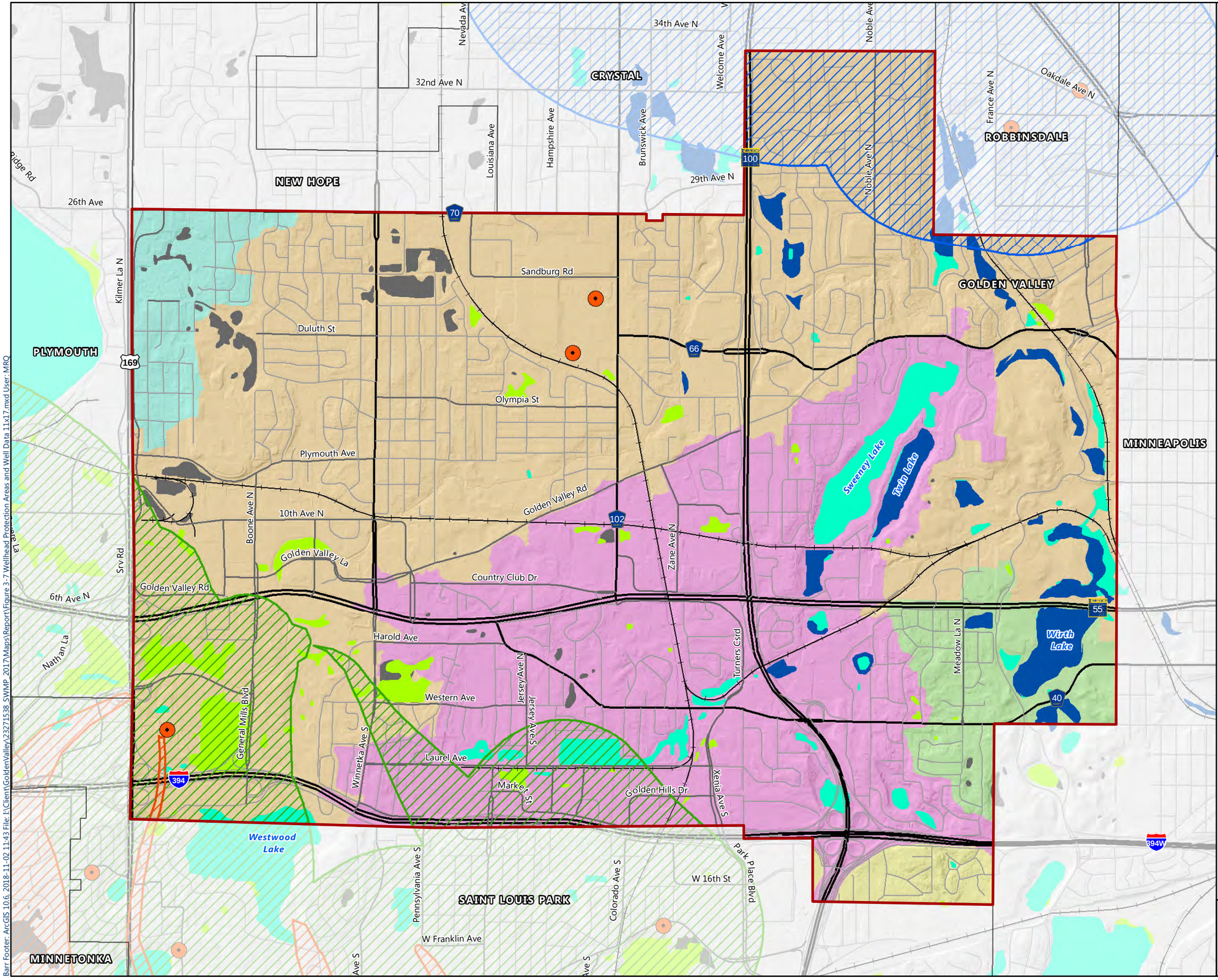
0 2,000 4,000

Feet

Date: November 2018
Sources:
- NRCS for soils data.
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-6
HYDROLOGIC SOIL GROUPS

Barr Footer: ArcGIS 10.6, 2018-11-02 11:23 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-6 Hydrologic Soil Groups 11x17.mxd User: MRQ



city of golden valley

- Municipal Boundary
- Municipal Water Supply Wells
- Major Roadway
- Railroad

Wellhead Protection Area

- Edina
- Robbinsdale
- Saint Louis Park

Surface Water Relationship to Groundwater (Regional Screening by Met Council)

- Disconnected from the regional groundwater system
- Recharges aquifers
- Receives and discharges groundwater
- Supported by upwelling groundwater

Drainage District

- Bassett Creek
- Medicine Lake
- Minnehaha Creek
- Sweeney Lake
- Wirth Lake

N

0 2,000 4,000 Feet

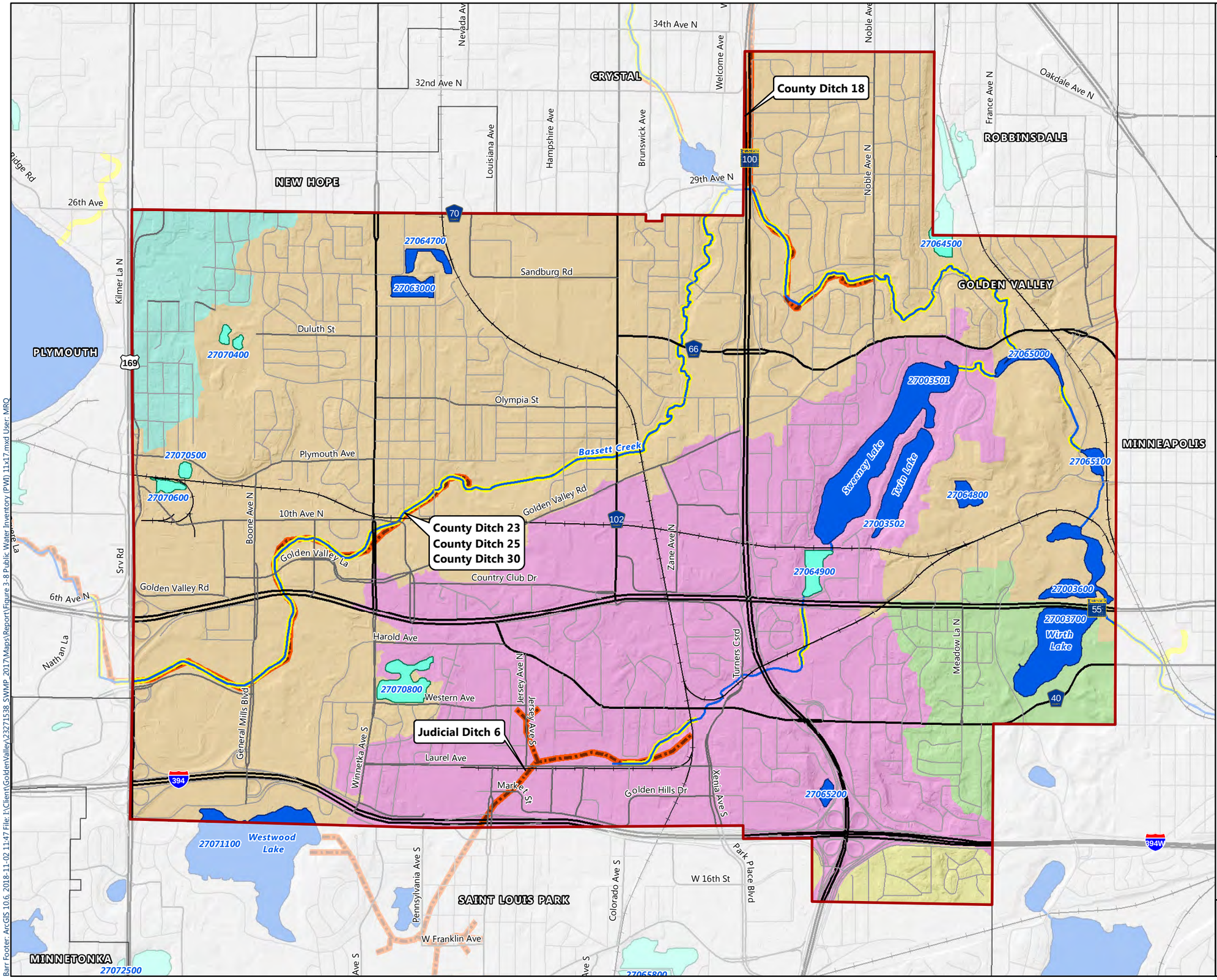
Date: November 2018

Sources:

- *Barr for Surface Water Relationship to Groundwater layer.*
- *MDH for Wellhead Protection Areas (2014).*
- *DNR for Municipal Water Supply Wells (2014).*
- *MN-DOT for roads, railroads, and municipal boundaries.*
- *City of Golden Valley for all other layers.*

FIGURE 3-7
WELLHEAD PROTECTION AREAS AND WELL DATA

Barr Footer: ArcGIS 10.6, 2018-11-02 11:43 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-7 Wellhead Protection Areas and Well Data 11x17.mxd User: MRQ



city of golden valley

- Municipal Boundary
- Major Roadway
- Railroad
- Public Ditches
- Altered Natural Watercourse

Public Water Inventory (PWI)

- Watercourse
- Basin
- Wetland

Drainage District

- Bassett Creek
- Medicine Lake
- Minnehaha Creek
- Sweeney Lake
- Wirth Lake

N

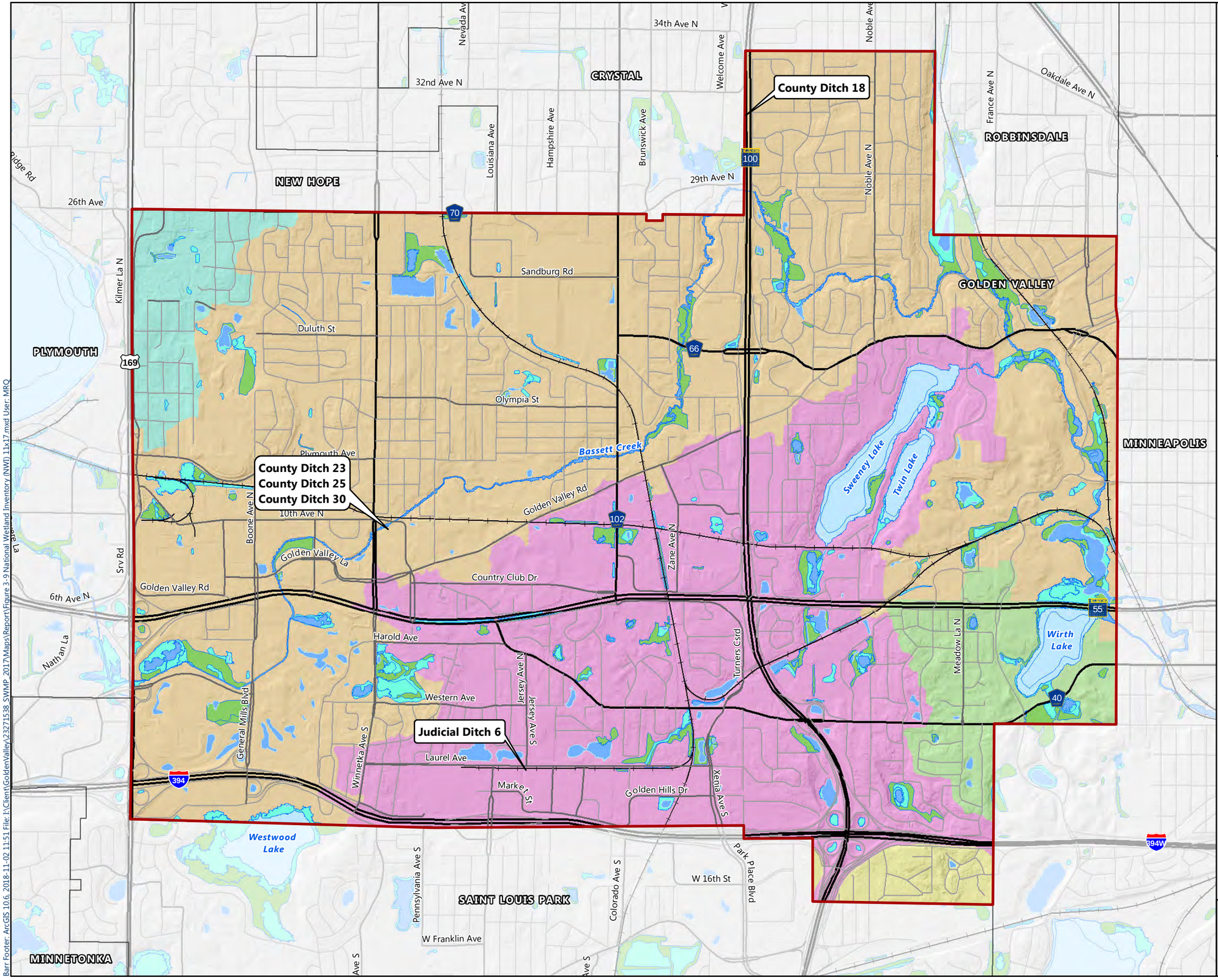
0 2,000 4,000

Feet

Date: November 2018
Sources:
- BCWMC for Public Ditches.
- DNR for PWI lakes and watercourses.
- MPCA for Altered Natural Watercourses.
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-8
PUBLIC WATER INVENTORY (PWI)

Barr Footer: ArcGIS 10.6, 2018-11-02 11:47 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-8 Public Water Inventory (PWI) 11x17.mxd User: MRQ



Municipal Boundary
Major Roadway
Railroad

National Wetland Inventory (NWI)

Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake
Riverine

Drainage District

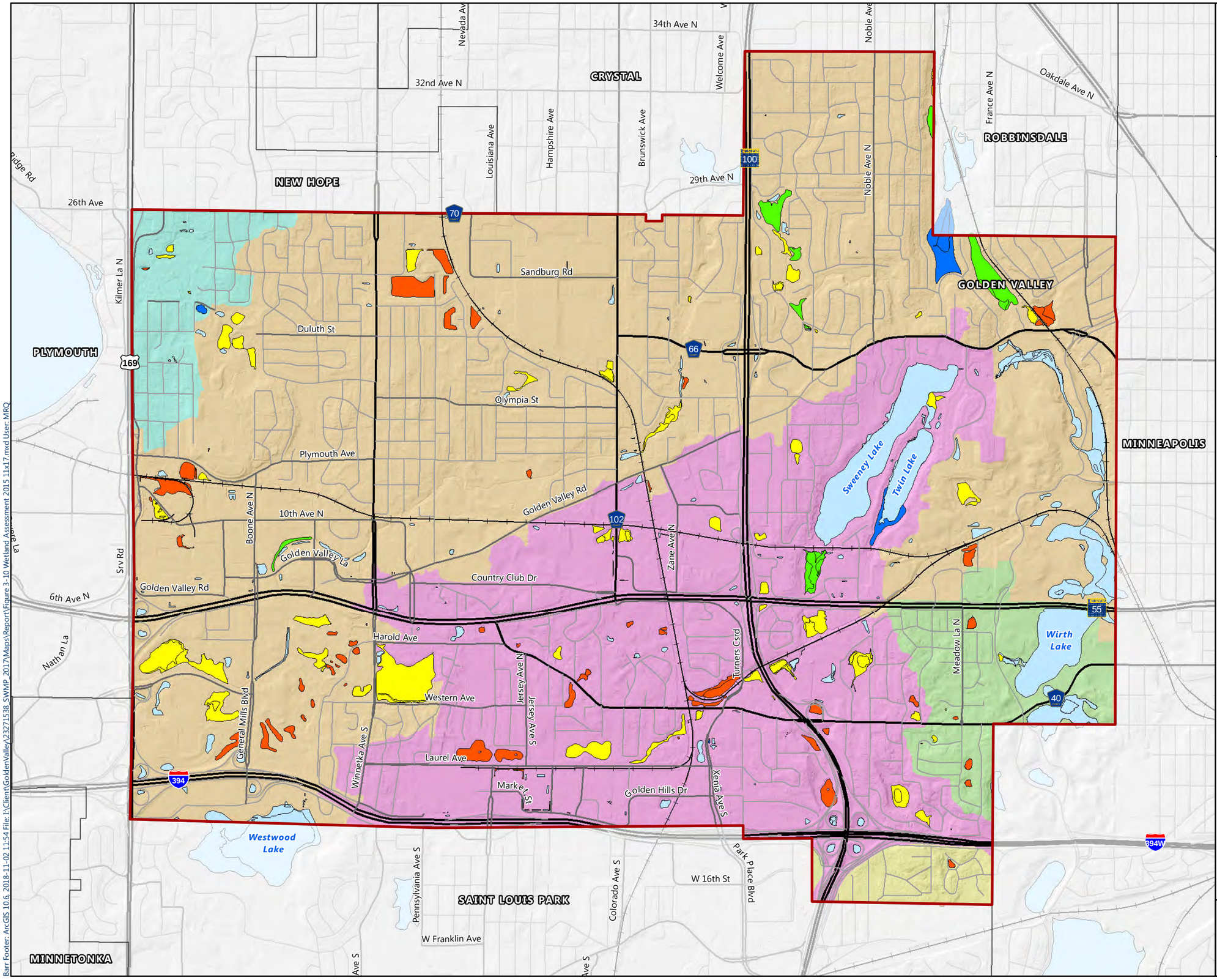
Bassett Creek
Medicine Lake
Minnehaha Creek
Sweeney Lake
Wirth Lake

0 2,000 4,000
Feet

Date: November 2018
Sources:
- BCWMC for Public Ditches.
- USFWS for NWI wetlands.
- MPCA for Altered Natural Watercourses.
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-9
NATIONAL WETLAND INVENTORY (NWI)

Barr Footer: ArcGIS 10.6, 2018-11-02 11:51 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-9 National Wetland Inventory (NWI) 11x17.mxd User: MRQ



city of golden valley

Municipal Boundary

Major Roadway

Railroad

2015 Wetland Assessment

Preserve - Needs an average buffer width of 75 feet with a minimum buffer width of 50 feet

Manage 1 - Needs an average buffer width of 50 feet with a minimum buffer width of 30 feet

Manage 2 - Need an average buffer width of 25 feet with a minimum buffer width of 15 feet

Manage 3 - Need an average buffer width of 25 feet with a minimum buffer width of 15 feet

Other Waterbody - Not assessed

Drainage District

Bassett Creek

Medicine Lake

Minnehaha Creek

Sweeney Lake

Wirth Lake

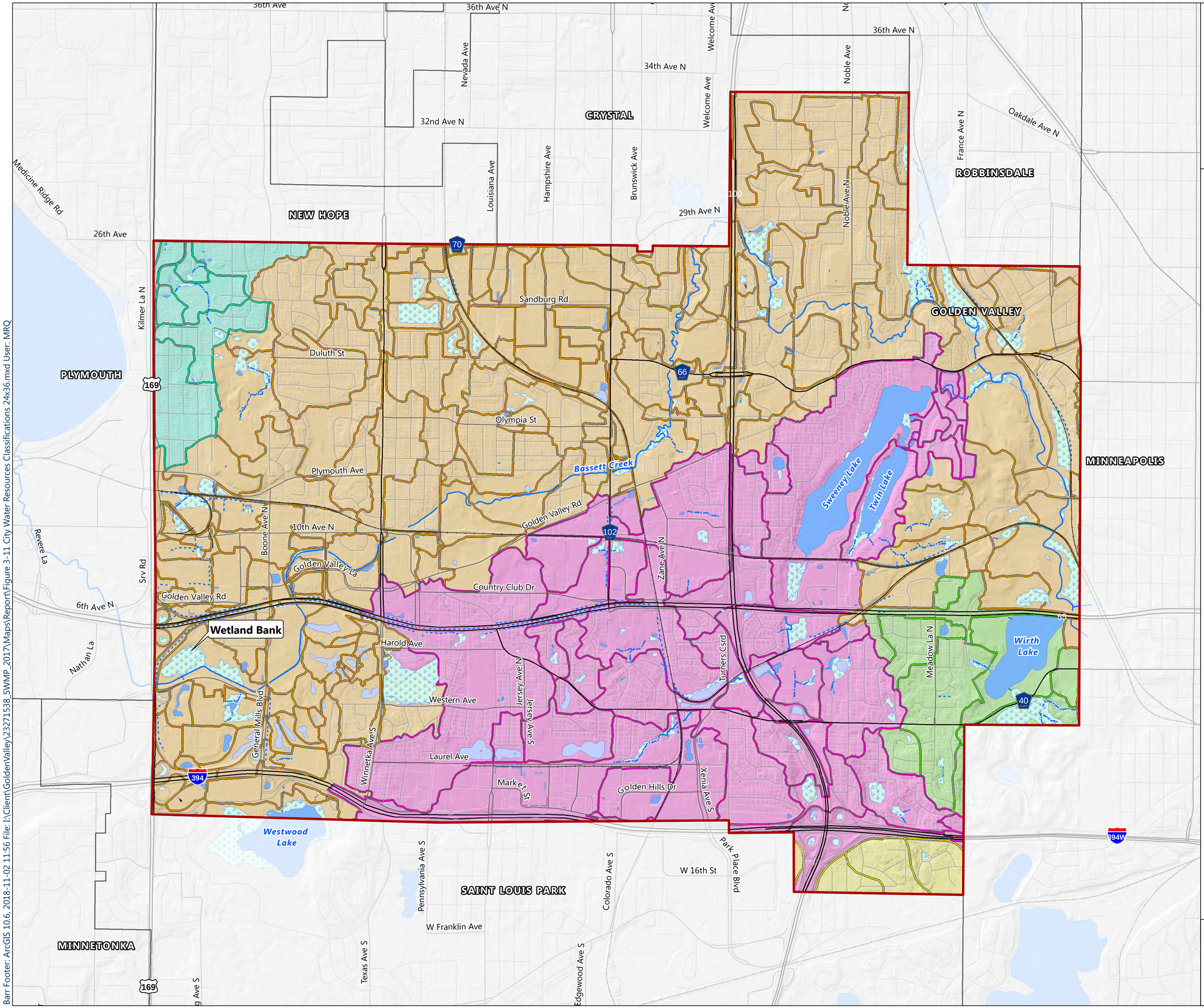
N

0 2,000 4,000 Feet

Date: November 2018
Sources:
- BCWMC for Public Ditches.
- USFWS for NWI wetlands.
- MPCA for Altered Natural Watercourses.
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-10
2015 CITY WETLAND ASSESSMENT

Barr Footer: ArcGIS 10.6, 2018-11-02 11:54 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-10 Wetland Assessment 2015 11x17.mxd User: MRQ



Municipal Boundary
Major Roadway
Railroad
Parcel Boundary

Water Features

Creek
Ditch
Natural Drainage Way
Swale
Spillway
Lake
Pond
Sedimentation Basin
Wetland
Bioretention Basin
Underground Pipe Chamber
Underground Wet Vault

Subwatershed Boundary

Bassett Creek
Medicine Lake
Minnehaha Creek
Sweeney Lake
Wirth Lake

Drainage District

Bassett Creek
Medicine Lake
Minnehaha Creek
Sweeney Lake
Wirth Lake

N

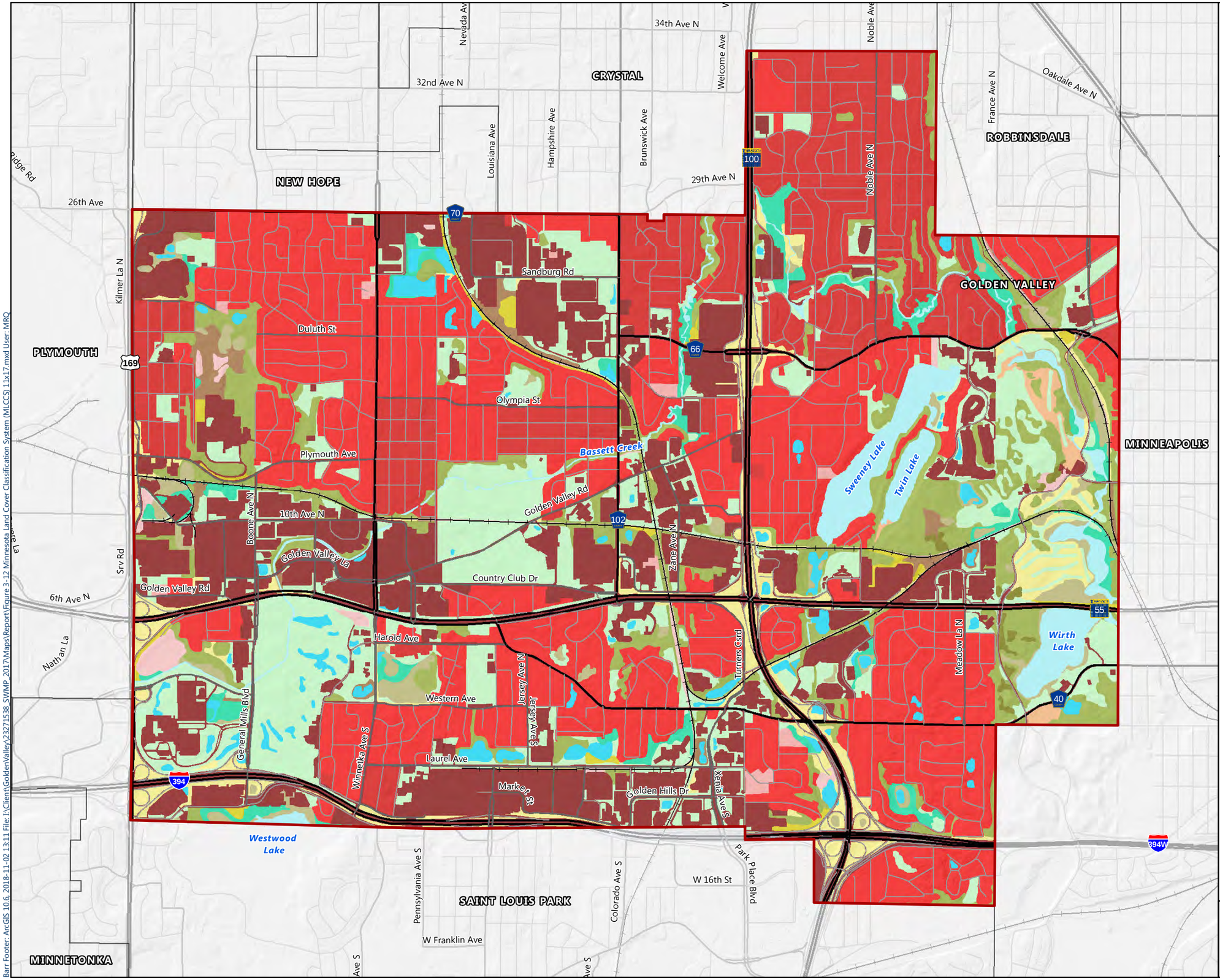
0 2,000 4,000

Feet

Date: November 2018
Sources:
- Barr Engineering Company for watershed boundaries.
- MN-DOT for roads, railroads, and municipal boundaries.
- Hennipin County for parcel boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-11
CITY WATER RESOURCE CLASSIFICATIONS

Barr Footer: ArcGIS 10.6, 2018-11-02 11:56 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-11 City Water Resources Classifications 24x36.mxd User: MRQ



city of golden valley

Municipal Boundary
Major Roadway
Railroad

Land Cover Classification

- 5-10% Impervious
- 11-25% Impervious
- 26-50% Impervious
- 51-75% Impervious
- 76-100% Impervious
- Short Grasses
- Maintained Tall Grass
- Tree Plantation
- Forest
- Wetland Forest
- Shrubland
- Wetland Shrubs
- Tall Grasses
- Wetland Emergent Veg.
- Dry Tall Grasses
- Open Water
- Wetland Open Water

N

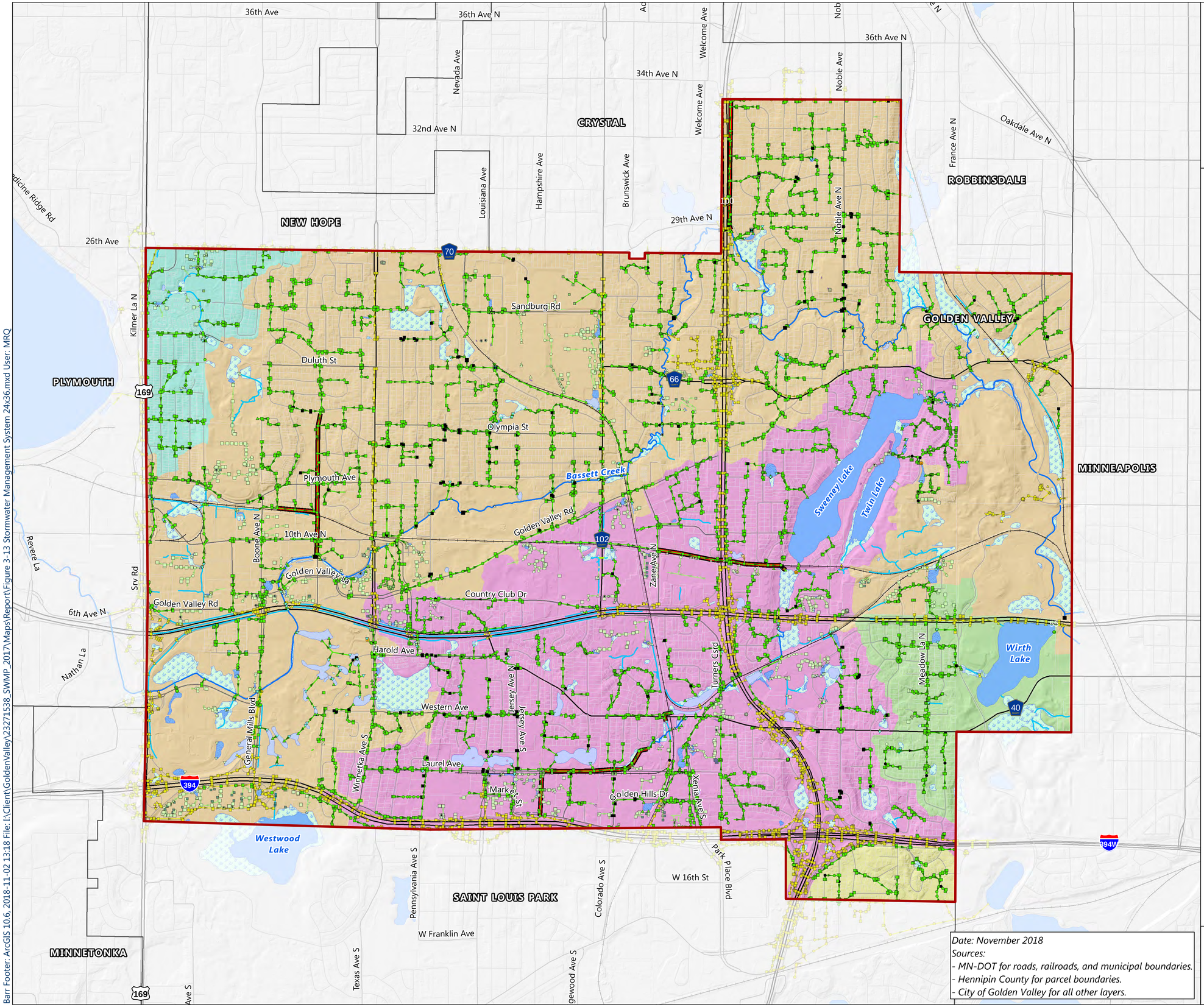
0 2,000 4,000

Feet

Date: November 2018
Sources:
- University of MN for Minnesota Land Cover Classification and Impervious Surface Area dataset, 2013 update.
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-12
MINNEOSTA LAND COVER CLASSIFICATION SYSTEM (MLCCS)

Barr Footer: ArcGIS 10.6, 2018-11-02 13:11 File: I:\Client\GoldenValley\23271538 SWMP 2017\Maps\Report\Figure 3-12 Minnesota Land Cover Classification System (MLCCS) 11x17.mxd User: MRQ



Barr Footer: ArcGIS 10.6, 2018-11-02 13:18 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-13 Stormwater Management System 24x36.mxd User: MRQ

city of golden valley

Water Features
- Creek
- Ditch/Drainage Way
- Lake
- Pond
- Wetland
- Sedimentation Basin
- Bioretention Basin
- Underground Pipe Chamber
- Underground Wet Vault

Storm Sewer Structures
- Catch Basin
- Sump Catch Basin
- Catch Basin Manhole
- Sump Catch Basin Manhole
- Median Drain
- Pipe Inlet
- Outlet Control
- Skimmer
- Flood Control Structure
- Manhole
- Sump Manhole
- Environmental Manhole
- Diverter Manhole
- Control Weir Manhole
- Apron Outlet
- Pipe Outlet
- Private Outlet
- Other Agency Outlet
- Lift Station
- Dry Hydrant
- Drain
- Skimmer
- Gate Valve
- Pipe Transition
- Other Agency Manhole
- Other Agency Catch Basin
- Other Agency Inlet
- Other Agency Outlet
- Other Agency Outlet Control
- Private Manhole
- Private Catch Basin Manhole
- Private Catch Basin
- Private Sump
- Private Environmental Manhole
- Private Pipe Inlet
- Private Outlet
- Private Outlet Control
- Private Skimmer
- Private Pump
- Private Roof Drain
- Abandoned Manhole
- Abandoned Pipe Outlet

Storm Sewer Pipes
- City Storm Sewer
- City Forcemain
- City Storm Culvert
- Other Agency Culvert
- Other Agency Storm
- Private Culvert
- Private Storm
- Private Forcemain
- Abandoned
- Trunk Storm Sewer [1]

Drainage District
- Bassett Creek
- Medicine Lake
- Minnehaha Creek
- Sweeney Lake
- Wirth Lake

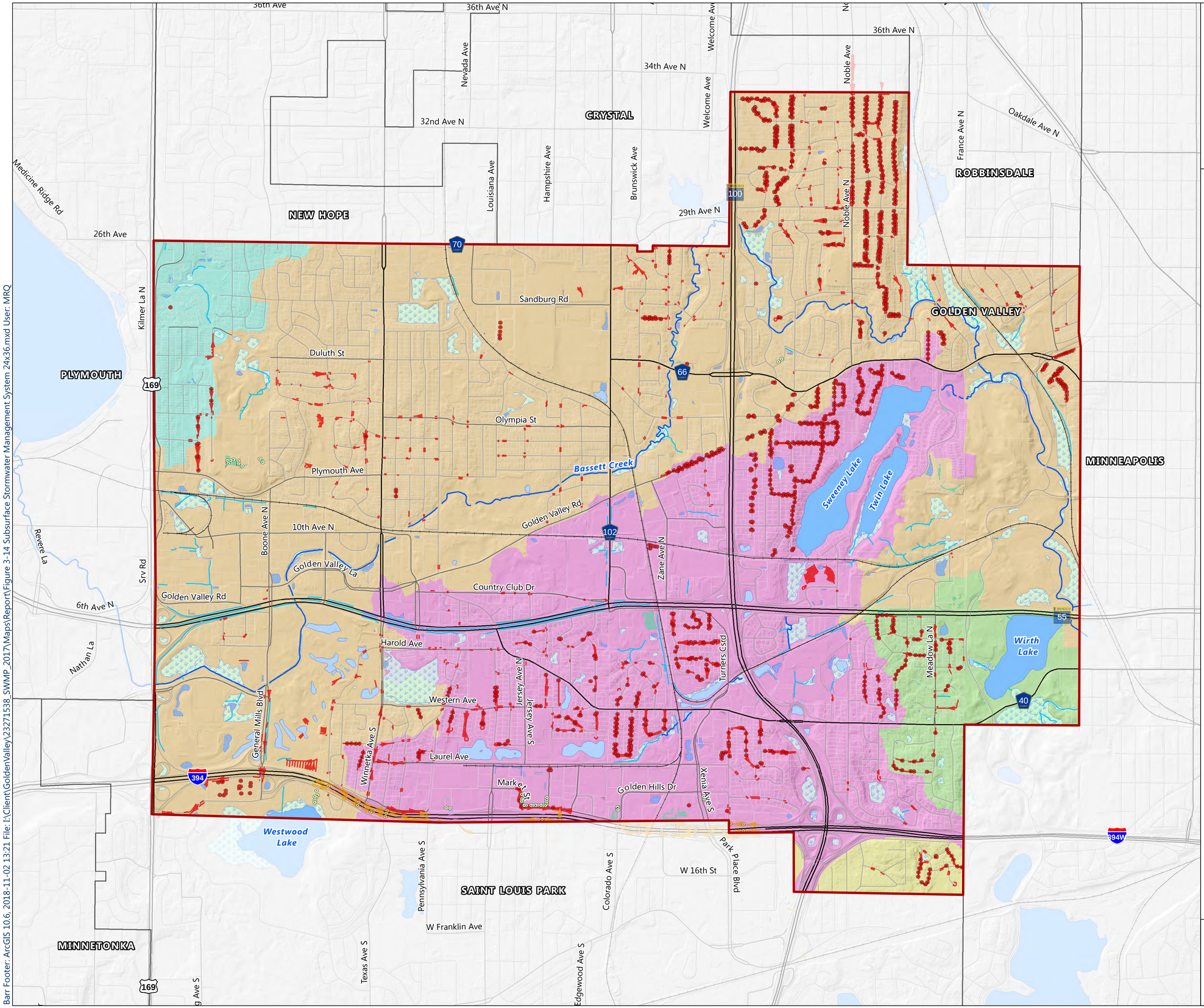
[1] A trunk storm sewer is any 72 inch round diameter or 88 inch span arch pipe, or larger, which collects flow from laterals along its length.

N

0 2,000 4,000 Feet

Date: November 2018
Sources:
- MN-DOT for roads, railroads, and municipal boundaries.
- Hennipin County for parcel boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-13
STORMWATER MANAGEMENT SYSTEM



city of golden valley

- Municipal Boundary
- Major Roadway
- Railroad
- Parcel Boundary

Water Features

- Stream
- Ditch/Drainage Way
- Lake
- Pond
- Sedimentation Basin
- Wetland
- Bioretention Basin
- Underground Pipe Chamber
- Underground Wet Vault

Draintile Structures

- Cleanout
- Other Agency Cleanout
- Private Cleanout

Draintile Pipes

- Draintile
- Other Agency Draintile
- Private Draintile
- Abandoned Draintile

Drainage District

- Bassett Creek
- Medicine Lake
- Minnehaha Creek
- Sweeney Lake
- Wirth Lake

N

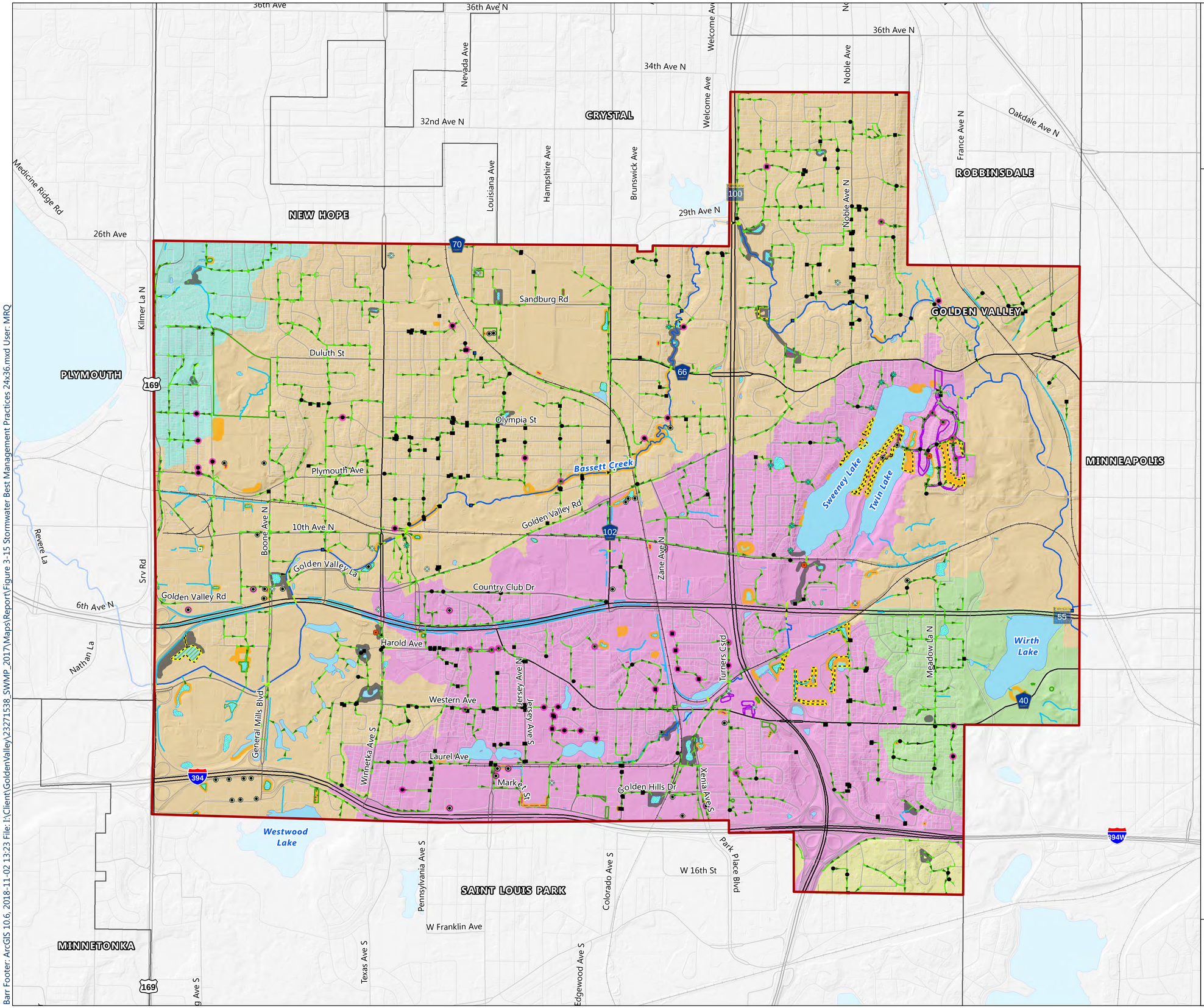
0 2,000 4,000

Feet

Date: November 2018
Sources:
- MN-DOT for roads, railroads, and municipal boundaries.
- Hennipin County for parcel boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-14
DRAINTILE AND
DRAINTILE CLEANOUTS

Barr Footer: ArcGIS 10.6, 2018-11-02 13:21 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-14 Subsurface Stormwater Management System 24x36.mxd User: MRQ



Municipal Boundary
Major Roadway
Railroad
Lakes and Ponds
Ditch/Drainage
Parcel Boundary
City Storm Sewer
City Forcemain
City Storm Culvert

Best Management Practices (BMPs)

Environmental Manhole
Private Environmental Manhole
Sump Manhole
Private Sump
Sump Catch Basin
Sump Catch Basin Manhole
Flood Control Structure
Skimmer
Private Skimmer
Structure Has SAFL Baffle
Sedimentation Basin
Bioretention Basin
Conservation Easement enforced by City
Maintenance Agreement for private stormwater quality treatment facility
Maintenance Agreement for street sweeping
Wetland Bank
Native Buffer maintained by City
Private/Other Agency Buffer

Drainage District

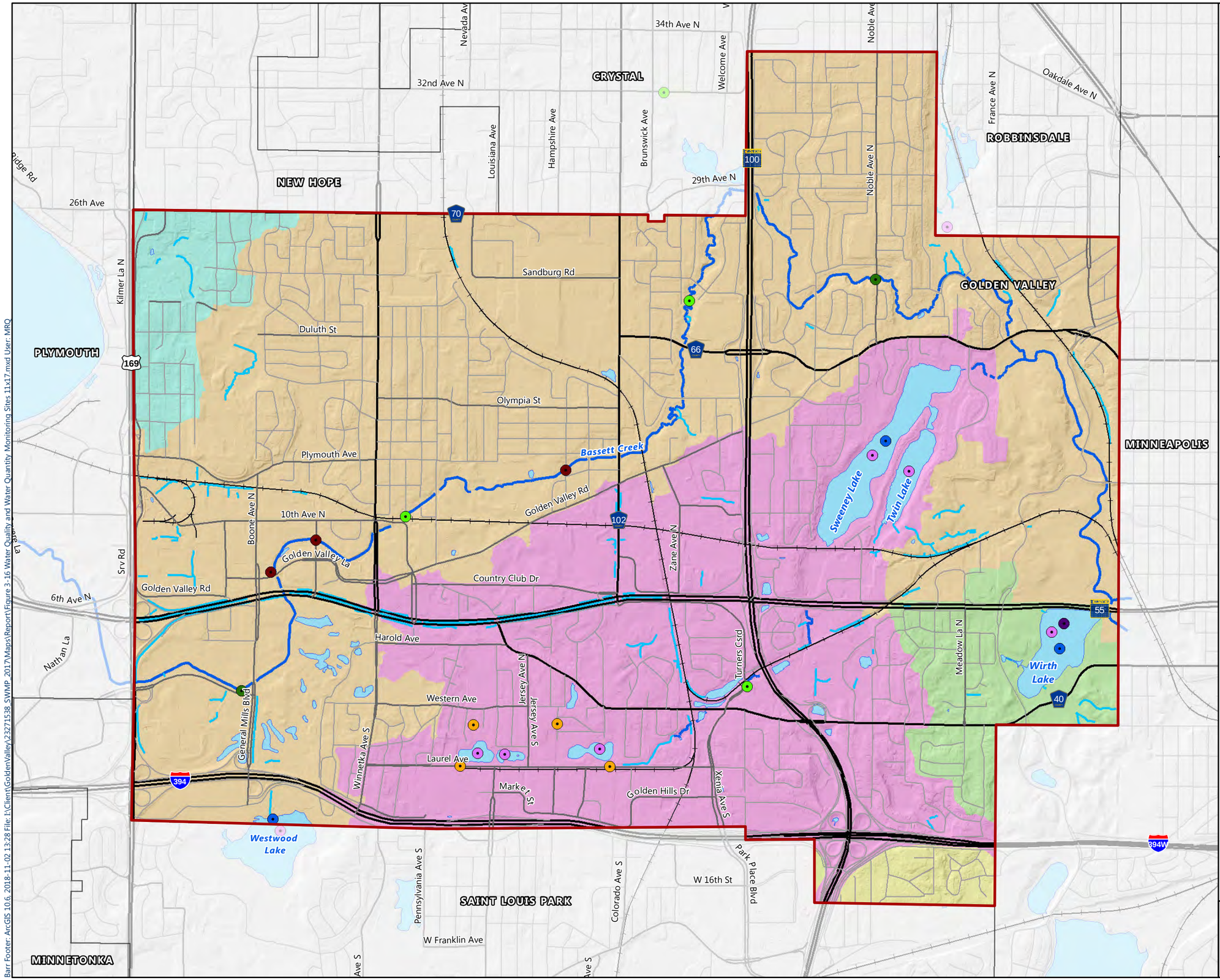
Bassett Creek
Medicine
Minnehaha Creek
Sweeney
Wirth

0 2,000 4,000 Feet

Date: November 2018
Sources:
- MN-DOT for roads, railroads, and municipal boundaries.
- Hennipin County for parcel boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-15
STORMWATER BEST MANAGEMENT PRACTICES

Barr Footer: ArcGIS 10.6, 2018-11-02 13:23 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-15 Stormwater Best Management Practices 24x36.mxd User: MRQ



city of golden valley

Municipal Boundary

Monitoring Sites

- Biotic Index (HCRW)
- Biotic Index (BCWMC)
- Flow (GV) - Staff Gage
- Flow (GV) - Automated
- Lake Level (BCWMC)
- Water Quality (BCWMC)
- Water Quality (MPRB)
- Water Quality (CAMP)
- Water Quality & Volume (GV)

Major Roadway

Railroad

Lakes and Ponds

Stream

Ditch/Drainage Way

Drainage District

- Bassett Creek
- Medicine Lake
- Minnehaha Creek
- Sweeney Lake
- Wirth Lake

BCWMC: Bassett Creek Watershed Management Commission
HCRW: Hennepin County River Watch
CAMP: Metropolitan Council Citizen-Assissted Monitoring Program
MMPRB: Minneapolis Park & Rec Board
GV: Golden Valley
Monitoring limited to four storm events in the summer of 1995.

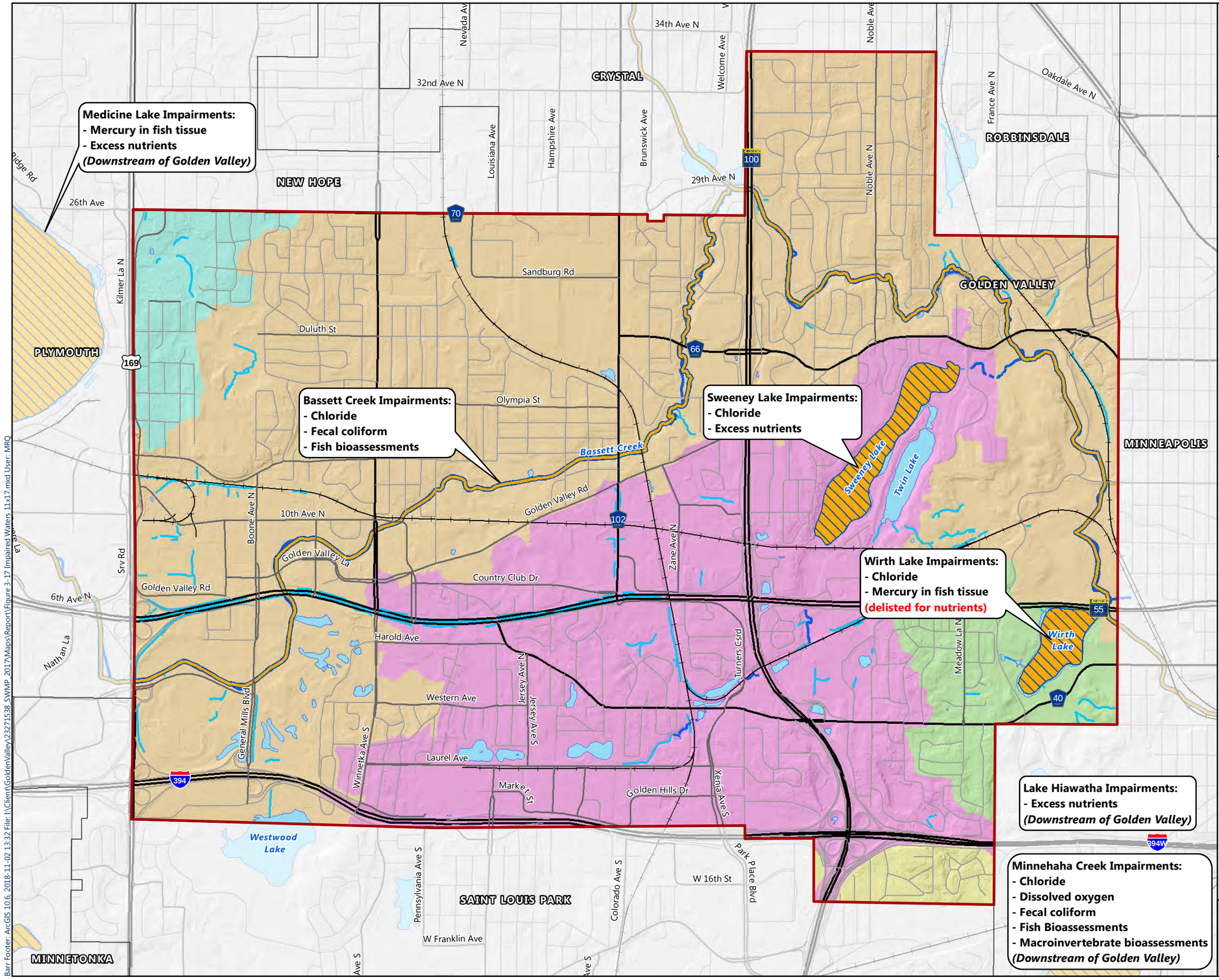
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0 2,000 4,000 Feet

Date: November 2018
Sources:
- Metropolitan Council for CAMP monitoringdata.
- BCWMC for Biotic Index monitoring data.
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-16
WATER QUALITY AND WATER QUANTITY MONITORING SITES

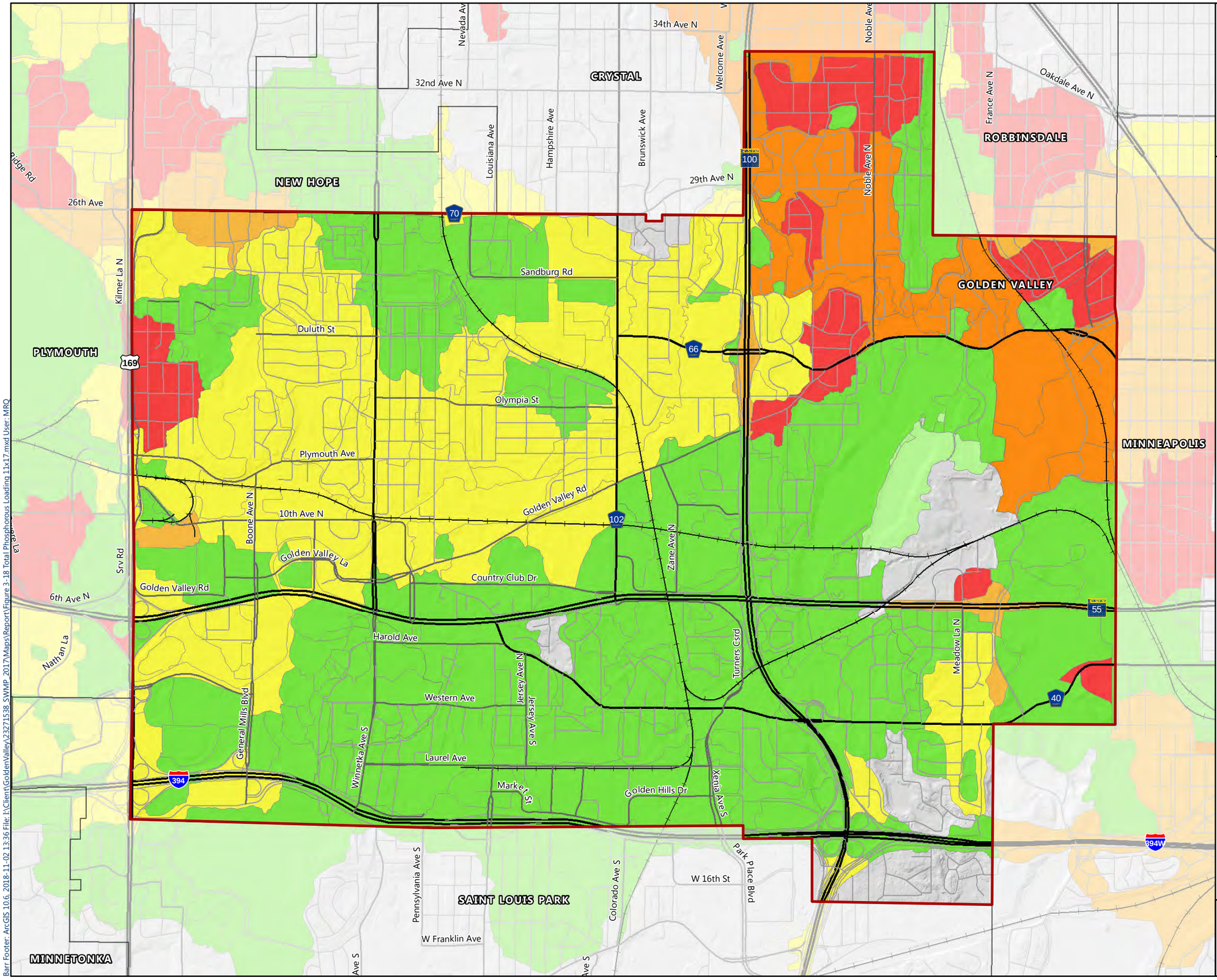
Barr Footer: ArcGIS 10.6, 2018-11-02 13:28 File: I:\Client\GoldenValley\23271538 SWMP 2017\Maps\Report\Figure 3-16 Water Quality and Water Quantity Monitoring Sites 11x17.mxd User: MRQ



Barr Footer: ArcGIS 10.6, 2018-11-02 13:32 File: I:\Client\GoldenValley\23271538_SWMP_2017Maps\Report\Figure 3-17 Impaired Waters 11x17.mxd User: MRO

Date: November 2018
Sources:
- MPCA for Impaired Water Bodies (2016 draft).
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-17
IMPAIRED WATERS



city of golden valley

Municipal Boundary
Major Roadway
Railroad

Phosphorus Concentration in Runoff

- Low (<0.08 mg/L)
- Moderately Low (0.08 - 0.16 mg/L)
- Moderate (0.16-0.24 mg/L)
- High (0.24-0.32 mg/L)
- Very High (>0.32 mg/L)

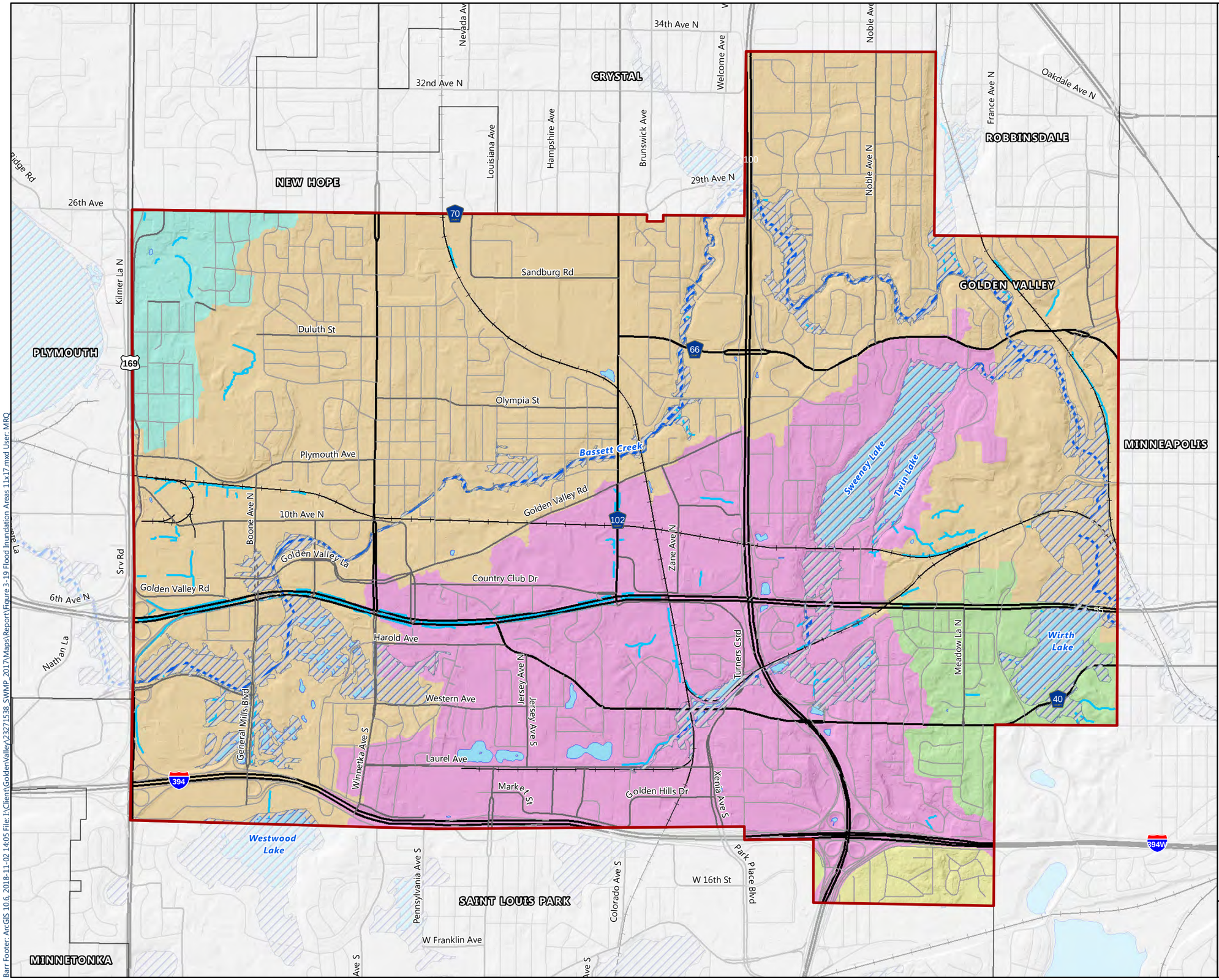
N

0 2,000 4,000
Feet

Date: November 2018
Sources:
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-18
TOTAL PHOSPHOROUS IN RUNOFF

Barr Footer: ArcGIS 10.6, 2018-11-02 13:36 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-18 Total Phosphorous Loading 11x17.mxd User: MRQ



Municipal Boundary
FEMA 100 year Floodplain
Major Roadway
Railroad
Lakes and Ponds
Stream
Ditch/Drainage Way

Drainage District

Bassett Creek
Medicine Lake
Minnehaha Creek
Sweeney Lake
Wirth Lake

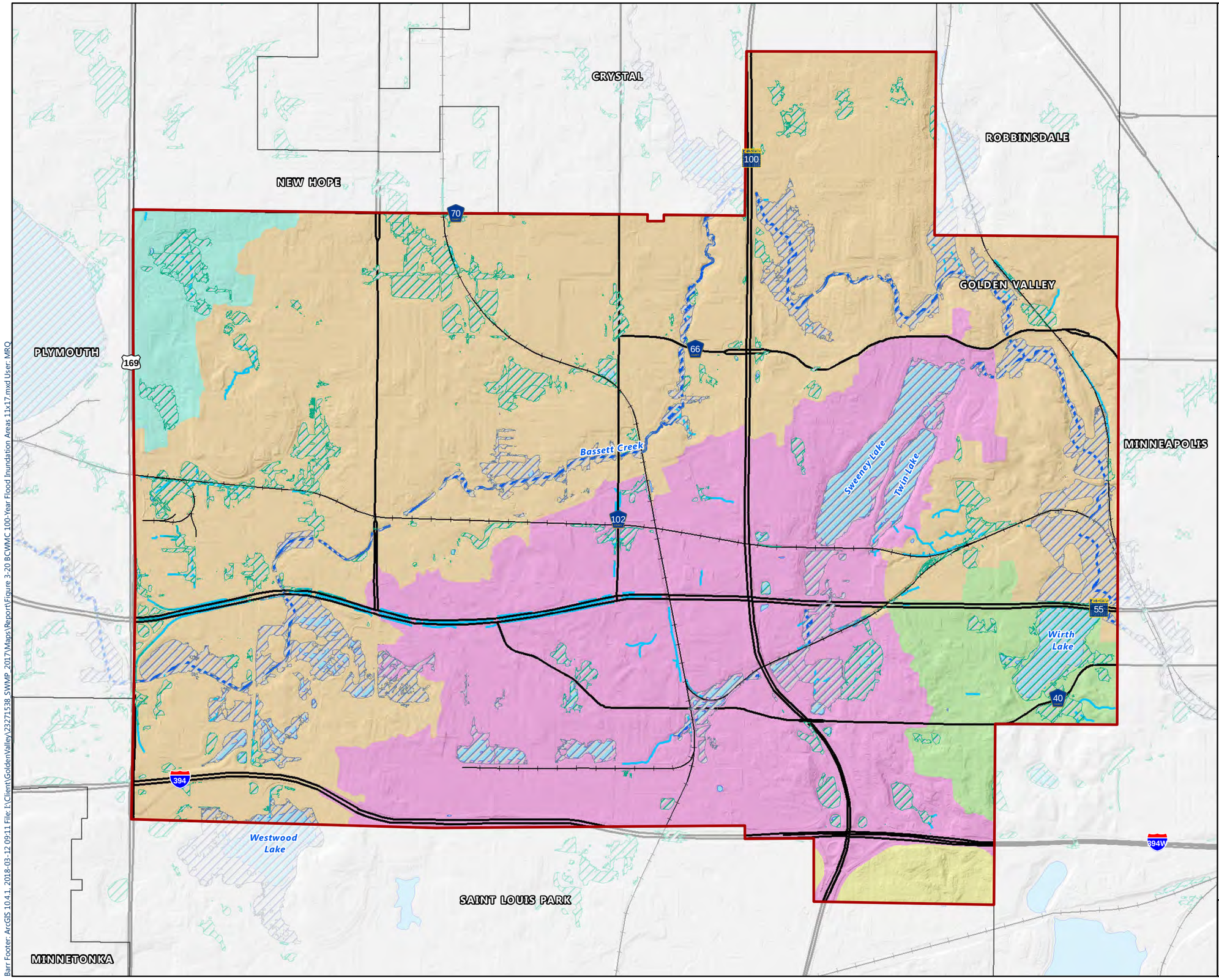
N

0 2,000 4,000
Feet

Date: November 2018
Sources:
- *Barr Engineering Company for flood inundation areas and major watershed boundaries.*
- *MN-DOT for roads, railroads, and municipal boundaries.*
- *City of Golden Valley for all other layers.*

FIGURE 3-19
FEMA 100-YEAR FLOOD INUNDATION AREAS

Barr Footer: ArcGIS 10.6, 2018-11-02 14:05 File: I:\Client\GoldenValley\23271538_SWMP_2017Maps\Report\Figure 3-19 Flood Inundation Areas 11x17.mxd User: MRQ



city of golden valley

- Municipal Boundary

100-Year Flood Inundation Area[1]

- BCWMC Jurisdiction
- City Jurisdiction
- Major Roadway
- Railroad
- Lakes and Ponds
- Stream
- Ditch/Drainage Way

Drainage District

- Bassett Creek
- Medicine Lake
- Minnehaha Creek
- Sweeney Lake
- Wirth Lake

Note:
[1]The inundation areas shown on this figure are based on modeling results and are subject to change.

N

0 2,000 4,000
Feet

Date: November 2018
Sources:
- Barr Engineering Company for flood inundation areas and major watershed boundaries.
- MN-DOT for roads, railroads, and municipal boundaries.
- City of Golden Valley for all other layers.

FIGURE 3-20
BCWMC 100-YEAR FLOOD INUNDATION AREAS

Barr Footer: ArcGIS 10.4.1, 2018-03-12 09:11 File: I:\Client\GoldenValley\23271538_SWMP_2017\Maps\Report\Figure 3-20 BCWMC 100-Year Flood Inundation Areas 11x17.mxd User: MRQ

4.0 Assessment of Issues and Opportunities

This section of the Plan presents and discusses the issues and opportunities facing the City, organized by various topics. Issue identification was an important task in development of this Plan, and included review of Metropolitan Council and watershed management organization (WMO) planning documents, review of available studies and modeling, discussion with City staff, and public engagement performed concurrent with the City's Comprehensive Plan update. The identified issues are discussed in the respective topical subsections below. Major opportunities for the City to consider in addressing these issues are summarized at the end of this section.

4.1 Water Quality

4.1.1 Stormwater Runoff Water Quality

Pollutants are discharged to surface waters as either a point source or nonpoint source. Point source pollutants discharge to receiving surface waters at a specific point from a specific identifiable source. Discharges of treated sewage from a wastewater treatment plant or discharges from an industry are examples of point sources. Unlike point sources, nonpoint source pollution cannot be traced to a single source or pipe. Instead, pollutants are carried from land to water in stormwater or snowmelt runoff, in seepage through the soil, and in atmospheric transport. All these forms of pollutant movement from land to water make up nonpoint source pollution.

For most water bodies, nonpoint source runoff, especially stormwater runoff, is a major contributor of pollutants. As urbanization increases and other land use changes occur in the City, nutrient and sediment inputs (i.e., loading) from stormwater runoff can far exceed the natural inputs to City water bodies. In addition to phosphorus and sediment, stormwater runoff may contain pollutants such as chlorides, oil, grease, chemicals (including hydrocarbons), nutrients, metals, litter, and pathogens (e.g., *E. coli* and fecal coliform), which can severely reduce water quality.

For lakes, ponds, and wetlands, phosphorous is typically the pollutant of major concern. Land use changes resulting in increased imperviousness (e.g., urbanization) or land disturbance (e.g., urbanization, construction or agricultural practices) result in increased amounts of phosphorus carried in stormwater runoff. In addition to watershed (stormwater runoff) sources, other possibly significant sources of phosphorus include atmospheric deposition, and internal loading (e.g., release from anoxic sediments, algae die-off, aquatic plant die-back, and fish-disturbed sediment).

As phosphorus loadings increase, it is likely that water quality degradation will accelerate, resulting in unpleasant consequences, such as profuse algae growth or algal blooms. Algal blooms, overabundant aquatic plants, and the presence of nuisance/exotic species, such as Eurasian watermilfoil, purple loosestrife, and curlyleaf pondweed, interfere with ecological function as well as recreational and aesthetic uses of water bodies. Phosphorus loadings must often be reduced to control or reverse water quality degradation.

Increased urbanization may also result in increased chloride loading from road de-icing practices. Chloride dissolves in stormwater runoff and is not easily removed by traditional stormwater quality best management practices (e.g., sedimentation ponds). Elevated chloride levels can negatively affect fishery populations and other aquatic life.

The Minnesota Pollution Control Agency (MPCA) is the state regulatory agency primarily tasked with protecting and improving water quality in Minnesota. In its enforcement of the federal Clean Water Act (CWA), the MPCA administers the Municipal Separate Storm Sewer System (MS4) permit program. Subject to this program, the City is required to maintain an MS4 permit from the MPCA and annually submit an MS4 report to the MPCA. The MPCA also maintains a list of impaired waters (see Section 3.10.2). Issues related to impaired waters are described in greater detail in Section 4.1.2.

The City currently requires implementation of water quality treatment best management practices (BMPs) for development and redevelopment projects consistent with the triggers and performance standards of the BCWMC. The City may need to revise its performance standards to achieve higher levels of water quality treatment in the future in response to changing WMO, state, or federal requirements or to address impaired waters issues.

4.1.1.1 National Pollutant Discharge Elimination System (NPDES)

Mandated by Congress under the federal Clean Water Act and implemented in Minnesota through the MPCA, the National Pollutant Discharge Elimination System (NPDES) Stormwater Program is a national program for addressing polluted stormwater runoff.

The City of Golden Valley is included in a group of communities with populations greater than 10,000 that are required to obtain a MS4 permit from the MPCA for managing non-point source stormwater. The NPDES MS4 permit addresses how the City will regulate and improve stormwater discharges. The permit must include a Storm Water Pollution Prevention Program (SWPPP) addressing all of the requirements of the permit.

The Golden Valley Physical Development Department manages the permit renewal process, including identifying issues and developing implementation measures to address the issues. Golden Valley's NPDES SWPPP addresses six minimum control measures (MCMs) outlined in the permit requirements:

1. Public Outreach and Education
2. Public Participation/Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention/Good Housekeeping

The SWPPP identifies issues related to the above minimum measures and more. The SWPPP is designed to address these issues thereby minimizing the discharge of pollutants into the City's stormwater system,

protecting and enhancing water quality, and satisfying the appropriate requirements of the Clean Water Act of 1972, as amended.

The MPCA reissued the MS4 General Permit in August, 2013. The 2013 update shifted the initial focus on permit program development towards measuring program implementation. The MPCA is in the process of issuing a new NPDES MS4 General Permit, expected in 2018. The 2018 update is expected to include additional requirements tracking performance of water quality ponds and other stormwater management BMPs. Additional information about the MS4 permit program and SWPPP requirements is available from the MPCA website: http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/municipal-stormwater/municipal-separate-storm-sewer-systems-ms4.html#permit

The City submitted its MS4 SWPPP Authorization for Renewal under the revised general permit in December 2013. The City developed the best management practices (BMP) required in the NPDES permit. The current SWPPP is presented in Appendix A.

TMDL studies for the North Branch and Main Stem of Bassett Creek were not complete at the time the City's MS4 permit was reissued (see Section 4.1.2). Strategies to address the impairments of these resources will be reflected in future reissuances of the permit, if those strategies are applicable to the City. Strategies resulting from future TMDL or WRAPS studies may also impact City stormwater quality requirements.

4.1.2 Impaired Waters and Total Maximum Daily Load (TMDL) Issues

The federal Clean Water Act (CWA) requires states to adopt water quality standards to protect the nation's waters. Water quality standards designate beneficial uses for each waterbody and establish criteria that must be met within the waterbody to maintain the water quality necessary to support its designated use(s). Section 303(d) of the CWA requires each state to identify and establish priority rankings for waters that do not meet the water quality standards. In Minnesota, these responsibilities are administered by the MPCA. The list of impaired waters, sometimes called the 303(d) list, is updated by the state every two years.

The MPCA performs Total Maximum Daily Load (TMDL) studies to address impaired waters. A TMDL is a threshold calculation of the amount of a pollutant that a waterbody can receive and still meet water quality standards. A TMDL study establishes the pollutant loading capacity within a waterbody and develops an allocation scheme amongst the various contributors, which include point sources, nonpoint sources, and natural background, as well as a margin of safety. As a part of the allocation scheme, a waste load allocation (WLA) is developed to determine allowable pollutant loadings from individual point sources (including loads from storm sewer networks in MS4 communities), and a load allocation (LA) is developed to establish allowable pollutant loadings from nonpoint sources and natural background levels in a waterbody. A watershed restoration and protection strategy (WRAPS) is similar to a TMDL and may examine other waterbodies in a watershed in addition to impaired waterbodies. Both TMDLs and WRAPSs may result in implementation plans to address water quality issues of the affected waterbodies.

Impaired waters within the City of Golden Valley or that receive stormwater directly from the City are identified in Table 3-7 and Figure 3-17.

Lake Pepin is on the impaired waters list for excess nutrients. Once the Lake Pepin TMDL study is completed, it may impact the City of Golden Valley, since the area tributary to Lake Pepin includes the entire Mississippi River basin upstream of the lake. Load reductions could be assigned to the City, based on the TMDL study results.

A TMDL study for Sweeney Lake (aquatic recreation impairment) was completed in 2011. Projects to address nutrient loading to Sweeney Lake are included in the BCWMC capital improvement program (see Section 5.5.2). Projects applicable to the City of Golden Valley are included in the City's implementation program (see Table 5-1). A TMDL study addressing the aquatic life impairment of Sweeney Lake is not yet complete.

The aquatic recreation impairments of Main Stem Bassett Creek and the North Branch Bassett Creek, due to fecal coliform and *Escherichia coli*, respectively, are addressed by the Upper Mississippi River Bacteria TMDL Study and Protection Plan approved in 2014. TMDL studies to address impairments of aquatic life in Main Stem Bassett Creek due to chloride and fish bioassessments are in progress.

A TMDL study was completed for Medicine Lake in 2010 to address the aquatic recreation impairment due to excess nutrients. The *Medicine Lake Total Maximum Daily Load* (MPCA, 2010) includes a categorical waste load allocation of approximately 3,200 lbs/year of phosphorus assigned to MS4s tributary to Medicine Lake. The City of Golden Valley comprises 1.7% of the drainage area tributary to Medicine Lake from MS4 communities. The BCWMC serves as the convener for the categorical waste load allocation. Several projects to address nutrient loading to Medicine Lake are included in the BCWMC capital improvement program (see Section 5.5.2). Projects applicable to the City of Golden Valley are included in the City's implementation program (see Table 5-1).

Although not located within the City, both Minnehaha Creek and Lake Hiawatha are included on the impaired waters list (see Table 3-7). The small portion of Golden Valley located within the MCWD is tributary to both of these waterbodies. These impairments are addressed by *Minnehaha Creek E. Coli Bacteria/Lake Hiawatha Nutrients Total Maximum Daily Load* study (MPCA, 2014). The TMDL found that the phosphorus load reduction assigned to the City via the MCWD's 2003 *Hydrologic, Hydraulic, and Pollutant Loading Study* (HHPLS) is sufficient to achieve water quality goals included in the TMDL (see Section 4.1.4). The TMDL does not assign a waste load allocation to the City due to the extremely small area draining to Minnehaha Creek and Lake Hiawatha.

Several waterbodies within the City are listed as impaired due to chlorides and high chloride concentrations in Bassett Creek (and other metropolitan area streams) are an emerging water quality concern. In 2015, the MPCA worked with cities and other stakeholders in the 7-County Twin Cities metropolitan area to assess the level of chloride in water resources, including lakes, streams, wetlands and groundwater. The study identified two primary sources of chloride to metro water resources: (1) salt applied to roads, parking lots and sidewalks for deicing; and (2) water softener brine discharges to

municipal wastewater treatment plants (WWTPs). The *Twin Cities Metro Area Chloride TMDL* was approved by the EPA in 2016. Concurrent with the TMDL, the MPCA and stakeholders also worked together to develop a plan to restore and protect waters impacted by chloride, documented in the *Twin Cities Metropolitan Area Chloride Management Plan* (MPCA, 2015). The City will work with the BCWMC to implement the recommendations included in the *TCMA Chloride Management Plan* in its ongoing operations and through its education program to address the chloride impairments of Sweeney Lake, Wirth Lake, and Bassett Creek.

Historically, the Bassett Creek Watershed Management Commission (BCWMC) has taken the lead in assessing and developing TMDL studies and implementation options for its member cities, including Golden Valley, for impaired water bodies within the BCWMC. The BCWMC capital improvement program includes projects for Sweeney Lake derived from the TMDL study. These projects are included in the City's implementation program summarized in Table 5-1. The completion of current and future TMDL studies will likely result in additional projects and programs to address water quality. The BCWMC and the cities will continue to cooperate on implementing the resulting projects.

The developed nature of the City reduces the availability of space for feasible water quality improvement projects to address water quality issues. Therefore, the City considers opportunities for water quality improvement projects (or water quality benefits potentially as added value on other projects including flood mitigation projects) as redevelopment occurs (see Section 4.8.5). The City maintains a list of priority areas where such projects are likely and desirable to address impaired waters and other water quality issues.

4.1.3 Metropolitan Council Issues

Local water management plans must be consistent with the Metropolitan Council's *2040 Water Resource Policy Plan* (May, 2015). The plan emphasizes integrating planning for wastewater, water supply, and surface water management. The plan includes surface water management strategies designed to:

- Reduce "nonpoint" and "point" source pollution into receiving waters.
- Decrease stormwater runoff
- Partner with state, federal, and local units of government
- Work with stakeholders to promote protection of water bodies
- Decrease adverse impact on water quality in the region

The goals, policies, and implementation items included in this Plan have been developed with consideration for the Metropolitan Council's guidance and contribute to the region water management objections identified by the Metropolitan Council. This Plan is also incorporated into the City's 2018 Comprehensive Plan, which is reviewed and approved by the Metropolitan Council Environmental Services.

4.1.4 Waterbody Classification and WMO Water Quality Goals

The BCWMC 2015 Watershed Management Plan identifies priority waterbodies subject to BCWMC water quality standards and management actions. BCWMC priority waterbodies partially or entirely located

within the City of Golden Valley are listed in Section 3.10.2. The City adopts the BCWMC classification system by reference.

The BCWMC and City have adopted MPCA eutrophication water quality standards applicable to lakes and streams; these standards are listed in Table 3-6. Current water quality data available for BCWMC priority waterbodies located within the City is available from the BCWMC website at: http://www.bassettcreekwmo.org/lakes-streams

The MCWD conducted a Hydrologic, Hydraulic, and Pollutant Loading Study (HHPLS) of the entire Minnehaha Creek watershed in 2003. The MCWD performed additional stream and lake water quality assessments in 2013. The MCWD updated their water quality goals based on the results of the HHPLS, subsequent water quality data, and 2013 water quality assessments. Because only a very small portion of Golden Valley is located within the MCWD and there are no lakes located within this area, the new MCWD water quality goals do not directly apply to waterbodies in Golden Valley. However, the portion of Golden Valley located within the MCWD drains to Lake Hiawatha via the Minneapolis Chain of Lakes and Minnehaha Creek. The HHPLS estimated that a 15 percent reduction in phosphorus loading to Minnehaha Creek from the entire tributary subwatershed would be necessary to achieve the MCWD's phosphorus goals identified in the HHPLS (80 ug/L for Minnehaha Creek and 50 ug/L for Lake Hiawatha). This translates to an annual phosphorus load reduction of 2 pounds from the portion of the City of Golden Valley tributary to Minnehaha Creek. Since completion of the HHPLS, the MPCA has adopted eutrophication water quality standards for streams (see Section 3.10.2). The MCWD phosphorus goal for Minnehaha Creek used in development of the HHPLS is more stringent than current MPCA standards. Section 3.10.2 provides greater detail on water body classification in Golden Valley.

4.1.5 Specific Water Quality Issues and Opportunities

4.1.5.1 Stormwater Pond Management

The City has an extensive network of stormwater ponds and maintains an inventory of its stormwater ponds consistent with the requirements of the City's MS4 permit. Sediment accumulation in stormwater ponds decreases pollutant removal efficiencies. To ensure stormwater ponds continue to function as intended, the amount of sediment accumulated in ponds must be monitored to determine when sediment removal is needed. The City performs sediment removal as necessary when ponds approach 50% sedimentation.

The City developed and began implementing a stormwater pond management program (SWPMP) in 2015 (WSB, 2015b). The SWPMP considers the attributes of each stormwater basin within the city in order to assist the City in scheduling and budgeting pond assessment and maintenance activities and is used to help meet the City's MS4 permit requirements. The City's SWPMP also provides information to assist in tracking Total Suspended Solids (TSS) and Total Phosphorus (TP) loadings to ponds. This information, in combination with results of the BCWMC P8 modeling (see Section 3.10.3.2) may be used to assist in prioritizing maintenance activities for ponds with higher estimated nutrient loading or sedimentation rates.

Some stormwater ponds were constructed before the construction of staged outlets to improve water quality performance (by better detaining more frequent rainfall events that carry the bulk of the pollutant loading) became common practice. As part of the City's ongoing efforts to improve the performance of the stormwater system, the City evaluated existing stormwater ponds to identify those ponds with opportunities for retrofits to improve stormwater detention and water quality performance; the City will implement these retrofits as redevelopment opportunities and funding allow. City. The City also maintains a list of ponding areas not built to National Urban Runoff Program (NURP) design guidelines where dredging or expanding footprint might bring these ponds closer to achieving current water quality performance standards.

4.1.5.2 Stormwater System Maintenance Programming

The City is responsible for the operation and maintenance of its stormwater infrastructure. This includes the periodic inspection of storm sewer components as specified in the City's SWPPP. The City's stormwater funding mechanisms are strained to keep pace with a growing list of issues and demands facing an aging stormwater system. To promote efficiency, the City inspects stormwater systems in coordination with its pavement management program. The City developed an Infrastructure Renewal Program (IRP, see Section 5.2.1) to coordinate stormwater system updates with other utility and transportation work.

4.1.5.3 Private Stormwater Facility Maintenance

For projects requiring private and public entities to install and maintain stormwater infrastructure on their property (e.g., to satisfy stormwater performance standards of the BCWMC, MCWD, and or the City), the City requires maintenance agreements. The number and complexity of private stormwater management facilities within the City has grown over time. It is increasingly difficult to manage, monitor, and inspect these facilities. The City recognizes the need to continue overseeing its program to ensure proper maintenance and water quality treatment capacity. The City maintains a BMP inventory (see Figure 3-15) that includes private facilities and identifies the party responsible for maintenance.

4.1.5.4 Low Impact Development Practices

Soil conditions and existing development throughout the city limit opportunities for additional stormwater management infrastructure. These poor soil conditions resulted as wetlands were filled for development before the Wetland Construction Act in 1991.This is of particular concern along the I-394 corridor, as identified in the CityI-394 Corridor Study initiated in 2005.

To mitigate the difficulty and expense of development and re-development on poor soils, the City will continue to foster sustainable development and work to establish a balance between urban and natural systems. The City will promote the use of low impact development practices (e.g., infiltration, evapotranspiration, reuse/ harvesting, urban forestry, and green roofs) throughout the City, where appropriate. These techniques promote water quality improvements and reduction of runoff volumes to receiving waters.

4.1.5.5 Minnehaha Creek Watershed District (MCWD) Phosphorus Reduction Requirement

Within the small area of the City under the jurisdiction of the MCWD (see Figure 3-1), Golden Valley is required to reduce the annual phosphorus loading to receiving waters by 2 pounds relative to year 2000 levels. The MCWD requires that the City's local water management plan (i.e., this Plan) include strategies and specific steps for achievement of the prescribed loading reductions, including operational, land use, and capital improvements implemented to address this goal. The City achieved this phosphorus reduction goal by implementing a series of BMPs within Minnehaha Creek drainage district (see Section 5.3.1 of the 2008 SWMP). The City is responsible for annually reporting progress toward the loading reduction goal.

4.2 Stormwater Infrastructure Replacement

The City of Golden Valley is responsible for maintaining its stormwater system, including storm sewer pipes, ponds, pond inlets and outlets, and channels. Non-functioning or improperly maintained stormwater management infrastructure may limit the ability of the system to convey runoff, thereby increasing the risk of flooding, limiting water quality treatment effectiveness, and contributing to other negative consequences (e.g., excessive erosion).

As an older, fully developed City, much of the stormwater infrastructure within the City is at or nearing the end of its intended operating life. Aging infrastructure has experienced increased failures in recent years (e.g., sinkholes). Much of the City's stormwater management system will need to be replaced during then coming decades. Replacement of existing stormwater infrastructure represents a significant engineering challenge and capital cost to the City, complicated by the need to provide continuous service and work in fully developed areas crowded by private property and existing utilities.

The City developed an Infrastructure Renewal Program (IRP) to most efficiently replace or otherwise address aging stormwater infrastructure throughout the City (see Section 5.2.1). The IRP provides a schedule and funding source for updating aging infrastructure in coordination with other planned City activities. The City will use the IRP in planning and executing updates to the stormwater management system.

4.3 Water Quantity and Flood Risk Reduction

4.3.1 General Issues

In a natural, undeveloped setting, the ground is often pervious, which means that water (including stormwater runoff) can infiltrate into the soil. Land development dramatically changes how stormwater runoff moves in the local watershed. The conversion of pervious ground surfaces to impervious surfaces (e.g., bituminous or concrete surfaces, compacted gravel, building roofs and structures) reduces infiltration of water into the soil and increases the rate and volume of stormwater runoff. This can create significant problems for downstream properties and water resources. Further, the reduced amount of infiltration means less water is being recharged into the groundwater system, which can result in decreased baseflows in creeks and streams and, potentially, a loss to the long-term sustainability of groundwater drinking water supplies.

Although both high-water levels (flooding) and low-water levels are of concern to City residents and public officials/staff, more concern and attention is usually paid to flooding because it is a greater threat to public health and safety and can result in significant economic losses, including but not limited to:

- Damage to structures, utilities, and transportation facilities
- Flood fighting and post-flood cleanup costs
- Business and property losses
- Increased expenses for normal operating and living during a flood situation
- Benefits paid to owners of flood insurance
- Emergency response and personal safety

Flooding may cause other damages that are harder to quantify, including the following:

- Flooding of roads so they are impassable to emergency vehicles and residents
- Shoreline erosion
- Increased pollution due to the inundation of hazardous materials
- Destruction of riparian habitats and vegetation such as grass, shrubs, trees, etc.
- Unavailability of recreational facilities for use by the public (e.g., inundation of shoreline, park and golf facilities) and/or restricted recreational use of waterbodies
- Alterations to the mix and diversity of wildlife species as a result of inundation of habitats

The BCWMC was originally formed as the Bassett Creek Flood Control Commission to address flooding issues in the watershed as the primary responsibility of the organization. Aging stormwater control facilities and rapid urbanization caused the Bassett Creek watershed to experience flooding problems beginning in the 1960s. Severe storms in the summers of 1974, 1978, and 1987 resulted in millions of dollars in damage to homes and infrastructure. In a 1982 design memorandum, the US Army Corps of Engineers (USACE) estimated the damages sustained by Bassett Creek flooding exceeded approximately $4 million per year (extrapolated to 2017 dollars). The worst problem was the 1.5-mile long Bassett Creek Tunnel, which was undersized and severely deteriorated.

To address the major flooding along Bassett Creek, the BCWMC cooperated with the USACE, Minnesota Department of Transportation (MnDOT), Minnesota Department of Natural Resources (MNDNR), and its member cities to construct the Bassett Creek Flood Control Project (Flood Control Project). Table 2-8 and Figure 2-14 of the 2015 BCWMC Watershed Management Plan lists all of the features of the Flood Control Project, and Section 2.8.1 of the 2015 BCWMC Watershed Management Plan provides a more detailed description of the Flood Control Project. Table 3-4 in this SWMP lists the Flood Control Project features in the City of Golden Valley.

The BCWMC continues to perform activities to protect against flood risks and minimize the problems, damages, and future costs of flooding along the Bassett Creek trunk system (the BCWMC trunk system is defined in Figure 2-15 of the 2015 BCWMC Watershed Management Plan). To that end, the BCWMC:

- Implements flood risk reduction projects

- Monitors water levels on the lakes and streams in the watershed
- Establishes flood levels and reviews proposed activities in the floodplains
- Reviews development and redevelopment projects to make sure there are no detrimental flooding impacts to the BCWMC trunk system

Construction of the Flood Control Project and continued BCWMC and City flood risk reduction practices have addressed the most significant flooding issues along Bassett Creek, though flooding issues still exist as evidenced by the CWMC model adopted in 2017. Continuing Bassett Creek flood control issues include:

- Maintaining and repairing the Flood Control Project system,
- Managing development and redevelopment throughout the watershed to minimize the risk of flooding
- Identifying and implementing additional projects to reduce flood risk along the Bassett Creek trunk system.
- Flood-proofing or voluntary acquisition of homes that are remaining in the floodplain
- Protecting life, property, and surface water systems that could be damaged by flood events.
- Regulating stormwater runoff discharges and volumes to minimize flood risk, flood damages, and the future costs of stormwater management systems
- Providing leadership and assistance to member cities with coordination of intercommunity stormwater runoff planning and design.

The BCWMC and City are jointly responsible for managing flood risk within the City. The responsibilities of each entity are defined in greater detail among the policies included in Section 4.2.2 of the 2015 BCWMC Watershed Management Plan and Section 2.4 of this Plan.

4.3.2 Floodplain Management and Flood Insurance Studies

Minnesota law defines the floodplain as the land adjoining lakes, water basins, rivers, and watercourses that has been or may be covered by the "100-year" or "regional" flood. Floodplains of larger basins and streams are mapped by the Federal Emergency Management Agency (FEMA) on Flood Insurance Rate Maps (FIRMs), which are included in community Flood Insurance Studies (FIS).

The City of Golden Valley has a Flood Insurance Study (FIS). The FIS, together with the City's floodplain management ordinance, allows the City to participate in the federal government's flood insurance program. Homeowners within FEMA-designated floodplains are required to purchase flood insurance. In some cases, homes within FEMA-designated floodplains may actually not be in the floodplain. In order to waive the mandatory flood insurance requirements for their homes, residents must remove their homes from the FEMA-designated floodplain by obtaining a Letter of Map Amendment (LOMA).

Flood risk, however, does not stop at the edge of a mapped floodplain; approximately 25% of all flood insurance claims occur outside of the high-risk areas. Therefore, property owners should assess their own risk of flooding and consider purchasing flood insurance, regardless of whether or not flood insurance is required by FEMA or respective mortgage lenders. The City participates in FEMA's Community Rating System program, which allows eligible residents to receive a discount on purchasing flood insurance.

In addition to FEMA-delineated floodplains, the BCWMC and MCWD have established their own 100-year floodplains for watershed management purposes. WMO-delineated watersheds may differ from FEMA-delineated watersheds due to input data, level of detail, and other factors. FEMA-delineated floodplains within the City were established prior to the publication of the National Oceanic and Atmospheric Administration's (NOAA) Atlas 14 precipitation data (see Section 3.1). The BCWMC recently performed hydrologic and hydraulic modeling using Atlas 14 inputs to establish new 100-year flood elevations and floodplain inundation extents (see Section 4.2.4). The BCWMC and MCWD review proposed activities in their respective floodplain, as described in the BCWMC Requirements document and MCWD Rules, respectively.

There are no known flooding issues, or MCWD-delineated floodplain, within the small (82 acres) MCWD jurisdictional area of the City of Golden Valley.

As development and redevelopment occur within the watershed, appropriate rate and volume controls are necessary to avoid creating future flooding issues or exacerbating existing flooding issues. The BCWMC and MCWD have established rate and volume control performance standards applicable to those areas of the City within their respective jurisdictions. The City has adopted these performance standards (see Section 5.8).

4.3.3 Hydrologic Modeling

The BCWMC completed hydrologic and hydraulic modeling of areas draining to Bassett Creek in early 2017. The modeling used Atlas 14 precipitation data (see Section 3.1) as inputs. Model results were used to determine 100-year flood elevations and floodplain extent (i.e., inundation areas). The resulting 100-year flood elevations along the Bassett Creek trunk system are included in Table 2-9 of the 2015 BCWMC Plan (as amended). The approximate 100-year floodplain based on the BCWMC hydrologic and hydraulic modeling is presented in Figure 3-20.

Information about flood water levels and inundated areas in Golden Valley identified in the 2017 modeling and located outside the Bassett Creek trunk system are available from the City upon request. Areas located within the BCWMC trunk system floodplain (i.e., the BCWMC flood envelope) are subject to floodplain management requirements included in the BCWMC Rules and Requirements document (BCWMC, 2015). The area outside of the BCWMC flood envelope that may be inundated in the 100-year event is defined by the City as the "advisory floodplain". These areas may not subject to BCWMC floodplain requirements under specific circumstances. However, the City manages these areas as floodplain and implements measures to reduce flood risk within these areas, as appropriate.

4.3.3.1 Areas of Potential Localized Flooding Identified by Modeling

The updated hydrologic and hydraulic modeling identifies potential flooding issues resulting from the 100-year design storm. In addition to the areas specifically described in Sections 4.2.5.1 and 4.2.5.2, areas of potential flood risk identified by modeling include:

- Hampshire Park
- Lakeview Park

- Medley Park
- Wesley Park
- Briarwood Nature Area
- Minnaqua Pond

In most cases, the most recent modeling identifies already known or suspected issues (although the magnitude may be increased in some cases). For example, flooding of roads, driveways, trails, and park space near the Briarwood Nature Area is a known issue and has been well-documented.

Additional evaluation of areas is necessary to determine whether the model results are consistent with reported existing and/or anticipated future flooding conditions. This evaluation is included as an implementation item in Table 5-1. Following further assessment of potential flooding issues, the City will use available modeling to optimize its operations to minimize flood risk and evaluate mitigation opportunities.

4.3.4 Specific Water Quantity Issues

4.3.4.1 DeCola Ponds Flooding Issues

Located in the northwestern part of the City, southeast of the intersection of Rhode Island Avenue and Medicine Lake Road, the DeCola Ponds system is comprised of a series of six ponds (DeCola Ponds A through F). The DeCola Ponds system receives water from Golden Valley, the City of New Hope and the City of Crystal. DeCola Ponds A, B, and C were historically wetlands and are classified on the public waters inventory (PWI) by the MNDNR. The DeCola Ponds area is not within a FEMA-delineated floodplain due to the size of the watershed, but is located within the BCWMC-delineated 100-year floodplain (see Figure 3-20).

Chronic flooding has occurred at this location historically, especially in the most downstream ponds in the system (DeCola Ponds D, E, and F), resulting in private and public property damage. Several flood insurance claims have been made in response to area flooding dating back to 1978, and anecdotal evidence suggests there has been unreported damage to properties. A more detailed history of flooding associated with the DeCola Ponds area is documented in the City's *DeCola Ponds Area Flood Mitigation Study* (2012 DeCola Ponds Study; Barr, 2012).

After the 1978 flooding, the City evaluated various alternatives to alleviate the flooding (Barr, July 1979). 1985, the stoplog weir outlet at DeCola Pond F was replaced by a manually-controlled adjustable gate outlet. A 1984 agreement between the City of Golden Valley and the homeowners affected by the flooding (Wildwood Weir Association) gives operational control of the adjustable gate outlet to the Wildwood Weir Association. This agreement can be found in Appendix F of the 2012 DeCola Ponds Study. Because the weir is manually adjustable and under the control of residents, this leaves City staff without systematic control of the structure and could exacerbate the flooding problems.

The 2012 DeCola Ponds Study further addresses flooding at the low point on Medicine Lake Road east of Winnetka Avenue and around the downstream DeCola Ponds. As part of the study, an XP-SWMM model was developed and used to evaluate engineering alternatives to reduce flooding at Medicine Lake Road

and in the DeCola Ponds system. None of the proposed alternatives fully resolved the flooding issues (i.e., some structures would remain at-risk of flooding even with implementation of the project). Additionally, the most promising flood mitigation projects came with a significant cost.

In 2016, the City completed the *Medicine Lake Road and Winnetka Avenue Area Long-Term Flood Mitigation Plan* (MLRWA Flood Mitigation Plan; Barr, 2016) which also addressed the DeCola Ponds system. The MLRWA Flood Mitigation Plan recommended an alternative ("Alternative 2.5") that included the construction of eight flood storage mitigation projects, flood-proofing of 23 structures, and acquisition of four structures (two in Golden Valley, one in New Hope, and one in Crystal). Implementation of the Alternative 2.5 flood mitigation projects has already started with the design and construction of the Liberty Crossing flood mitigation storage and conveyance project as part of the Liberty Crossing redevelopment project in Golden Valley. Additional projects identified in the flood mitigation plan will be implemented as funding allows (see also Section 5.3). Full implementation could take as long as 10 or 20 years (or more) depending on the availability of funding for the various projects.

4.3.4.2 Medicine Lake Road Flooding Issues

Flooding at the low point on Medicine Lake Road occurs at the boundary of the cities of Golden Valley and New Hope and poses a complex intercommunity water management issue. Several feet of flooding has been observed during intense storm events, resulting in the road being temporarily impassable and posing a potential public safety issue. The flooding at Medicine Lake Road is the result of runoff from the cities of Golden Valley, New Hope, and Crystal. Approximately 275 acres contribute runoff to the low point along Medicine Lake Road with the majority of the flows coming from surface overflows from the upstream areas.

Flows from the Medicine Lake Road low point are conveyed downstream to DeCola Pond B via a storm sewer pipe or overland flow. The current storm sewer that carries flows from the Medicine Lake Road low point south along Rhode Island Avenue to DeCola Pond B is restrictive and cannot convey all of the flows reaching the low point. Also, high water levels in the downstream DeCola Ponds system (see Section 4.2.5.1) cause increased flood levels at the low point on Medicine Lake Road.

The City investigated the flooding issues along Medicine Lake Road as part of its MLRWA Flood Mitigation Plan (Barr, 2016). The proposed solution identified in that plan (alternative 2.5, see Section 4.2.5.1) includes solutions to address the Medicine Lake Road flooding issues.

4.3.4.3 Structures within the BCWMC Floodplain

Many Golden Valley homes within the floodplain of the Bassett Creek trunk system have been flood-proofed or removed, including nearly all homes within the Bassett Creek floodplain defined in the 2004 BCWMC Watershed Management Plan. Hydrologic and hydraulic modeling published by the BCWMC in 2017 expanded the floodplain along the BCWMC trunk system in some locations and identified potentially new advisory floodplain areas in the City disconnected from the trunk system. The model results identify many additional structures within the revised 100-year floodplain that were not located within the previously defined 100-year floodplain. In addition to homes located within the BCWMC flood envelope and City advisory floodplain, several homes are also located within 1 foot of the BCWMC

100-year floodplain elevation. These homes would not meet current codes, and are marginally protected and sometimes inaccessible during high water events.

As homes in the floodplain become available for sale, the City will work with property owners to pursue acquisition of them. Funding may come from City funds set-aside for this purpose, or with help from other agencies such as the MDNR and/or the BCWMC. Homes in the floodplain with less than 2 feet of freeboard or with driveways or accesses that are below the BCWMC 100-year flood level may be targeted for this acquisition program.

4.3.4.4 Wisconsin Avenue Control Structure

The Wisconsin Avenue control structure was originally constructed as a fixed weir at the Wisconsin Avenue crossing of Bassett Creek. In 2001, the City installed an automatic gate in a flood control structure at the Wisconsin Avenue crossing of Bassett Creek. Brookview Golf Course is typically inundated when Bassett Creek exceeds approximately elevation 882.0. Operation of the adjustable gate has helped to reduce the inundation time of the golf course.

Proper operation of the flow structure balances the need for rapid draining of floodwaters upstream of Wisconsin Avenue with the need to prevent any increase in downstream peak flood levels. The most vulnerable area for downstream flooding is the Hampshire Avenue crossing. The Wisconsin Avenue gate is currently set to produce a very conservative (i.e., low) downstream flow rate due to vulnerable properties downstream of the gate at the time of its installation. Results of recent modeling (see Section 4.2.4), however, suggest that restrictive flow rates through the structure may contribute to potential flooding issues upstream of the crossing. Since the automated gate was initially installed, downstream homes have been flood-proofed, a pond on the General Mills site has been constructed, and a pond and pumping station have been installed near Highway 55 and Bassett Creek. All of these improvements affect the magnitude of the downstream flow and vulnerability of the downstream properties to high flow.

With these improvements, it may be possible to increase the flow rate through the Wisconsin Avenue structure to reduce flooding on the Brookview Golf Course and potential upstream flooding while still protecting downstream properties. The City will review the results of recent BCWMC hydrologic and hydraulic modeling and consider revising the operations algorithm and manual for the automated gate at the Wisconsin Avenue structure.

4.3.4.5 Public Ditch Maintenance

Public ditches (also referred to as judicial ditches or county ditches) are public drainage systems established under Chapter 103E of Minnesota Statutes and are under the jurisdiction of the county. Some flow systems designated as public ditches are no longer streams but retain the public ditch designation. One such system is located along Highway 100 in Golden Valley and Crystal. The public ditch system shown following Highway 100 is currently all in a storm sewer pipe and is no longer ditched.

While Hennepin County retains responsibility for the management of public ditches within the City, the county has not actively maintained them. Instead, the BCWMC and the member cities, including Golden Valley, perform maintenance work on infrastructure designated as public ditches, while state law requires

a cumbersome public ditch process for them to do so. Hennepin County may transfer authority over public ditches to the City, if such action is petitioned by the City. The City may consider requesting transfer of authority to reduce the cost and efforts of complying with MS 103E. Concurrently the City of Golden Valley will support legislation that eliminates such a requirement. See Figure 3-8 for public ditch system.

4.4 Wetland Management

Diverse wetland systems and shoreland areas are critical components of a healthy hydrologic system and positively affect soil systems, groundwater and surface water quality and quantity, wildlife, fisheries and insects, aesthetics, and recreation. Development of land and other human activities can affect the hydrology and ecological functions of wetlands and shoreland areas. Although Golden Valley is fully developed, numerous wetlands exist across the City (see Section 3.8).

Overloading wetlands beyond their natural capacity with water, sediment, or nutrients diminishes their effectiveness in providing water quality benefits. Most natural wetland systems have developed with relatively low levels of sediment and nutrient inputs (riparian wetlands located in floodplains are an exception). When land use and/or upstream hydrologic systems become altered, the hydraulic, natural sediment, and nutrient loads can (and often do) increase in magnitude and frequency. These changes may result in tipping the ecological balance to benefit non-native, invasive, and aggressive plant species, thereby reducing the benefits to wildlife, fisheries, amphibians, and humans. Degraded water quality in wetlands can pass on to downstream waters, contributing to degradation of additional resources.

Wetlands and shoreland areas provide valuable habitat for many types of wildlife including waterfowl, songbirds, raptors, mammals, fish, and many species of amphibians. Maintaining and improving wildlife viability requires that water resources and land management activities consider the life cycles of various animals. The overall ecological health of wetland and shoreland areas can be significantly impacted by the presence or absence of vegetated buffers (see Section 3.5.1) and aquatic invasive species (see Section 3.5.2).

By considering habitat benefits or detriments when approaching water resources projects, the City has the opportunity to protect and enhance these benefits. The City will identify opportunities to create additional wetland banks in conjunction with flood risk reduction projects (e.g., creation of additional flood storage) and other City projects.

4.4.1 Wetland and Shoreland Buffers

Buffers are upland, vegetated areas located adjacent to wetlands and shoreland areas. Many of the hydrologic, water quality, and habitat benefits achieved by wetland and shoreland areas are directly attributable to, or dependent on, the presence of buffers. Vegetation and organic debris shield the soil from the impact of rain and bind soil particles with root materials, reducing erosion. Vegetation obstructs the flow of runoff, thereby decreasing water velocities, allowing infiltration and uptake of nutrients, and reducing the erosion potential of stormwater runoff. Leaf litter from vegetation can also increase the organic content of the soil and increase adsorption and infiltration. As a physical barrier, vegetation also

filters sediment and other insoluble pollutants from runoff. Vegetation scatters sunlight and provides shade, limiting nuisance algae growth, and reducing the release of nutrients from the sediment. Buffers also have habitat benefits; native plants provide the best food and shelter for native wildlife, including pollinators, fish, and amphibians. Buffers provide needed separation and interspersion areas for animals, to reduce competition and maintain populations.

The presence of adequate buffers surrounding wetland and shoreland areas is critical to preserving the ecological functions and environmental benefits of downstream waterbodies, including wetlands. Establishing buffers in developed areas may be difficult, as existing structures may be located within the desired buffer area. Redevelopment offers an opportunity to establish adequate buffers in areas that are already developed.

The City has included buffer requirements in is stormwater management ordinance (City Code Section 4.31). These requirements are included among the policies and performance standards included in Section 2.0 of this Plan and are consistent with BCWMC buffer requirements for cities. Additionally, buffer requirements of the MCWD are applicable within its jurisdiction.

4.4.2 Aquatic Invasive Species (AIS)

The term "invasive species" describes plants, animals, or microorganisms within lakes and streams that are non-native and that 1) cause or may cause economic or environmental harm or harm to human health, or 2) threaten or may threaten natural resources or the use of natural resources in the state (Minnesota Statutes Chapter 84D.01). Aquatic invasive species (AIS) is a term given to invasive species that inhabit lakes, wetlands, rivers, or streams and overrun or inhibit the growth of native species. Aquatic invasive species pose a threat to natural resources and local economies that depend on them.

AIS identified in the City of Golden Valley by the BCWMC and/or MNDNR include:

- Eurasian watermilfoil (Wirth Lake)
- Curlyleaf pondweed (Sweeney Lake, Twin Lake, Westwood Lake, and Wirth Lake)
- Common carp (Sweeney Lake)
- Chinese mystery snail
- Yellow Iris

Curlyleaf pondweed is an invasive aquatic macrophyte that displaces native aquatic species. Because of the timing of its growth and die-back cycle, curlyleaf pondweed can be a significant source of phosphorus in a lake during the mid-summer months. Eurasian watermilfoil is another invasive macrophyte that can displace native species and significantly interfere with the recreational uses of a lake by forming dense mats at the water surface. Recent BCWMC macrophyte surveys noted that curlyleaf pondweed constituted only a minor part of the overall plant community in Golden Valley lakes and did not warrant additional management activity (see Section 3.12.1). The MPRB manages Eurasian watermilfoil and curlyleaf pondweed in Wirth Lake through periodic mechanical harvesting.

The MDNR has identified common carp in Sweeney Lake. However, the number of carp estimated in the lake is small and no specific management action has been recommended to manage the carp population.

Although not identified within the City, zebra mussels have been identified in surrounding watersheds. Curlyleaf pondweed is of special concern due to its potential as a source of internal phosphorus loading. This submersed aquatic plant grows vigorously during early spring, outcompeting native species for nutrients. After curlyleaf pondweed dies out in early to mid-summer, decay of the plant releases nutrients and consumes oxygen, exacerbating internal sediment release of phosphorus. This process may result in algal blooms during the peak of the recreational use season, which further inhibit native macrophytes by reducing water clarity and blocking sunlight necessary for growth. Common carp may also impact water quality by disturbing bottom sediment, reducing water clarity and releasing sediment-bound phosphorus that may contribute to algal growth.

At the state level, management of AIS is the responsibility of the MNDNR. The City cooperates with the MNDNR, BCWMC, and Hennepin County to address the impacts of AIS at the local level. The BCWMC 2015 Watershed Management Plan describes the BCWMC's role in addressing AIS. City staff have participated in the BCWMC's aquatic plant management/aquatic invasive species (APM/AIS) committee. More information about AIS is available from the BCWMC Rapid Response Plan and MNDNR at: http://www.dnr.state.mn.us/invasives/aquatic/index.html

4.4.3 Wetland Management and Wetland Classification

The City of Golden Valley acts as the Local Governmental Unit (LGU) responsible for administering the Minnesota Wetland Conservation Act (WCA). This includes requiring and verifying that all projects impacting wetlands meet the requirements of the WCA. The City also actively pursues opportunities to restore wetlands, create wetland banks, and establish wetland buffers.

Per the requirements of WCA, the City has developed a comprehensive wetland inventory and continues to inventory, classify, and assess the functions and values of wetlands on an as-needed basis. The City uses the Minnesota Rapid Assessment Method (MnRAM) when performing functions and values assessments. The City implements wetland management performance standards through its stormwater management ordinance and this Plan. The BCWMC requires that member City wetland ordinances:

- Consider the results of functions and values assessments
- Are based on comprehensive wetland management plans, if available
- Include performance standards for wetlands classified as Preserve or Manage 1 similar to BWSR guidance that address:
    - bounce
    - inundation
    - runout control

Results from the 2015 wetland inventory show that Golden Valley has only 4 Preserve and 8 Manage 1 wetlands.

4.5 Groundwater Management

Groundwater is a valuable resource that must be protected from contamination and conserved for sustainable use. Increased population in the Twin Cities metropolitan area has put increased pressure on groundwater supplies. In addition, development results in larger impervious areas and more compacted soils, thus decreasing opportunities for infiltration and recharge.

The City recognizes that surface water resources and groundwater resources are interdependent, although it is extremely difficult to quantify the exchange of water between surface waters and groundwater. The interaction of groundwater and surface water can have negative consequences on either resource. Contaminated groundwater discharged to surface waters may have a direct impact on surface water quality and/or habitat. Declines in groundwater levels may result in decreased baseflow to streams, which can in turn result in decreased water quality and ecosystem function. Lower water levels in lakes may limit recreational use, reduce habitat areas, and result in increased growth of aquatic plants including invasive species (via an increased littoral zone).

Maintaining clean, safe groundwater supplies is critical to human and environmental health and to the economic and social vitality of communities. Groundwater can be contaminated by commercial and industrial waste disposal, landfills, leaking underground storage tanks, subsurface sewage treatment systems (SSTS), mining operations, accidental spills, chloride from deicing practices, feedlots, and fertilizer/pesticide applications. Prevention of groundwater contamination through best management practices is critical. Increased public awareness of the importance of groundwater protection on the public's general health and well-being is critical to promote responsible practices.

While infiltration is often a preferred method of stormwater treatment, it may have negative consequences in areas with vulnerable groundwater resources. Many locations within the City are not favorable for infiltration (e.g., presence of tight soils, aging sanitary sewer pipes, contamination) over sanitary sewer infrastructure. To protect water quality, the City requires that infiltration practices be implemented with consideration of guidance provided by the MPCA in its NPDES General Construction Stormwater permit (2013, as amended), MIDS guidance (2013, as amended), and the Minnesota Department of Health's (MDH), *Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas* (2007).

4.5.1 Wellhead Protection

Golden Valley is part of the Joint Water Commission (JWC) water system (Golden Valley, Crystal, and New Hope). These communities purchase treated Mississippi River water from the City of Minneapolis water department. Therefore the City of Golden Valley does not currently operate community water supply wells. The JWC is considering developing an emergency supply well possibly located in Golden Valley

Several adjacent cities obtain their drinking water from groundwater. Potentially vulnerable wellhead protection areas for municipal wells that belong to the Cities of Robbinsdale and St. Louis Park extend into the City (see Figure 3-7). These cities maintain wellhead protection plans identifying areas of risk and

management practices to protect groundwater resources. Golden Valley will continue to cooperate with St. Louis Park and Robbinsdale with respect to wellhead protection and stormwater runoff management.

The neighboring cities of Plymouth and Minnetonka have wellhead protection plans but the wellhead protection areas for those cities do not extend into the City of Golden Valley.

4.6 Erosion and Sediment Control

Sediment is a major contributor to water pollution. Stormwater runoff from streets, parking lots, and other impervious surfaces carries suspended sediment consisting of fine particles of soil, dust and dirt. Abundant amounts of suspended sediment are carried by stormwater runoff from actively eroding areas.

Although erosion and sedimentation are natural processes, they are often accelerated by human activities, especially during construction activities. Prior to construction, the existing vegetation on a site intercepts rainfall and slows down stormwater runoff rates, which allows more time for runoff to infiltrate into the soil. When a construction site is cleared and graded, the vegetation (and its beneficial effects) is removed. Also, natural depressions that provided temporary storage of rainfall are filled and graded, and soils are exposed and compacted, resulting in increased erosion, sedimentation, and decreased infiltration. As a result, the rate and volume of stormwater runoff from the site increases (*Minnesota Urban Small Sites BMP Manual*, 2001). The increased stormwater runoff rates and volumes cause increased soil erosion, which releases significant amounts of sediment that may enter the City's water resources.

Regardless of its source, sediment deposition decreases water depth, degrades water quality, smothers fish and wildlife habitat, and degrades aesthetics. Sediment deposition can also wholly or partially block culverts, manholes, storm sewers, etc., causing flooding. Suspended sediment, carried in water, clouds lakes and streams and disturbs aquatic habitats. Sediment also reduces the oxygen content of water and is a major source of phosphorus, which is frequently bound to the fine particles. Erosion also results in channelization of stormwater flow, increasing the rate of stormwater runoff and further accelerating erosion. Sediment deposition in detention ponds minimizes negative impacts to downstream resources, but creates a need for periodic maintenance as the storage volume capacity and water quality treatment effectiveness are reduced over time.

As erosion and sedimentation increase, the City's stormwater management systems (e.g., ponds, pipes) require more frequent maintenance, repair, and/or modification to ensure they will function as designed. The City has documented of existing erosion and sedimentation problems at various stormwater ponds and pond inlets. The City also inspects and documents Bassett Creek channel erosion and sediment deposition at storm sewer outfall locations along the creek.

Monitoring the stormwater system, including inspection of sediment build-up in stormwater ponds, continues to be an important task for the City. Continued urbanization in the City will result in increased erosion and sedimentation unless effective erosion prevention and sediment control measures are implemented before, during, and after construction.

In recognition of these issues, the City's ordinances and approval processes address erosion and sediment control at construction sites. The current ordinance requires implementation of temporary and permanent erosion and sediment control measures for developments and other projects. The City will continue its ongoing review of its erosion control program to evaluate its effectiveness and improve it where possible and feasible. In addition, the BCWMC reviews projects which result in more than 200 yards of cut or fill or more than 10,000 square feet of grading.

The City conducts inspections of City-permitted/approved projects to ensure compliance with applicable erosion and sedimentation requirements and identify potential problems. However, the City may not be aware of erosion and sedimentation problems at locations where a City permit/approval is not required. City appreciates when residents notify City staff of potential erosion and sedimentation problems, regardless of location.

In addition to meeting City requirements, owners and operators of construction sites disturbing one or more acres of land must obtain a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit from the MPCA. Owners/operators of sites smaller than one acre that are a part of a larger common plan of development or sale that is one acre or more must also obtain permit coverage. A key permit requirement is the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) with appropriate best management practices (BMPs). The SWPPP must be a combination of narrative and plan sheets that: (1) address foreseeable conditions, (2) include a description of the construction activity, and (3) address the potential for discharge of sediment and/or other potential pollutants from the site. The SWPPP must include the following elements:

- Temporary erosion prevention and sediment control BMPs
- Permanent erosion prevention and sediment control BMPs
- Permanent stormwater management system
- Pollution prevention management measures

A project's plans and specifications must incorporate the SWPPP before applying for NPDES permit coverage. The permittee must also ensure final stabilization of the site, which includes final stabilization of individual building lots.

4.6.1 Bassett Creek Erosion Issues

The maintenance of the natural beauty of Bassett Creek is a primary concern of residents. As a result, there is concern about channel modifications that could negatively impact the aesthetic appeal of the creek. In addition to the maintenance of the creek, areas of concentrated erosion and sedimentation exist along the creek. The BCWMC and its member cities have identified the extent and severity of stream bank erosion along most of the Bassett Creek trunk system, including the portion of Bassett Creek passing through the City of Golden Valley. The City's original inventory was completed by its Department of Public Works in 2003, and it has been updated annually since.

The BCWMC and member cities have performed stream bank stabilization and restoration projects along several reaches of Bassett Creek. Restoration of additional reaches of Bassett Creek are planned for future implementation (see Table 5-1).

4.7 Interagency Issues

The City has many capital project and maintenance requirements that benefit, impact or are also required for other agencies. Often these requirements overlap with other agencies where jurisdiction is shared. Current issues in Golden Valley are shared with the Minnesota Department of Transportation (MnDOT) and the Minneapolis Park and Recreation Board (MPRB).

Issues with MnDOT have primarily concerned maintenance responsibilities for trunk highway related stormwater facilities. When responsibility for implementation and/or maintenance is unclear, projects do not occur in a timely manner or they simply may not occur. The City will seek to engage MnDOT toward making sure that BMPs are installed and maintained by the responsible agency.

The MPRB is a semi-autonomous independent body of Minneapolis City government founded in 1883 by legislative authority. It is responsible for developing and maintaining the Minneapolis park system and providing a comprehensive set of services and recreation programs on behalf of the Minneapolis City Council. The MPRB provides for the maintenance and policing of its park properties.

The MPRB owns large tracts of land outside the City of Minneapolis, including Theodore Wirth Regional Park which lies largely within the City of Golden Valley. As well as large areas of green space and public infrastructure such as roads and utilities, this park contains areas draining to several public waters including Sweeney Lake, Twin Lake, Wirth Lake, Quaking Bog, MNDNR public water 27-648P, and Bassett Creek.

Historically, the park property has been managed by the MPRB and the City of Golden Valley as though it were a part of the City of Minneapolis. To date, no written agreements have been found that specify the respective water resource- related responsibilities of the two parties. Continued coordination between the City of Golden Valley and the MPRB is necessary to address issues including, but not limited to:

- Responsibility for implementation of BCWMC maintenance and capital projects on Bassett Creek and Twin Lake within park property
- Responsibility for implementation of BCWMC and future TMDL projects for Sweeney and Wirth Lakes
- Responsibility for storm sewer system facilities and drainage issues
- BCWMC dues for the park property
- Participation in planning for future park maintenance and improvements
- NPDES MS4 Permit responsibilities within the park land

Golden Valley has authority to administer the Wetland Conservation Act (WCA) and floodplain and shoreland management authority within the park.

Wirth Park is an important resource for City of Golden Valley residents and the City desires a positive and constructive relationship with the MPRB. The City seeks to partner with the MPRB in developing written agreements regarding common issues to achieve the highest level of water quality and infrastructure service on behalf of residents and park users.

4.8 Adequacy of Existing Programs

The City of Golden Valley addresses the stormwater and natural resource management issues described in this section through various means, including:

- Management plans containing goals, objectives, policies, and implementation strategies
- The City's NPDES MS4 permit
- Stormwater system operation and maintenance
- The City's Flood Management Program
- Regulations (e.g., ordinances and official controls)
- Education and Public Involvement
- Capital Improvements

These programs are described in greater detail in Section 5.0 – Implementation. The capacity of the City to fund and carryout these programs is also described in Section 5.0.

4.9 Opportunities

The City of Golden Valley has several distinct opportunities which may assist them in implementing this plan. The City will actively pursue these opportunities.

4.9.1 BCWMC Cooperative Efforts and Funding

The Bassett Creek Watershed Management Commission provides technical support and funding toward solving various water resource problems and completing water resource projects. The Commission has a long record of working successfully with individual member cities toward meeting shared goals, including the City of Golden Valley. The City will continue to collaborate with and contribute to this organization and take advantage of the available benefits. City staff will continue to participate as active members of the BCWMC's Technical Advisory Committee (TAC). Specific opportunities for collaboration include proposed projects included in the BCWMC's capital improvement program as well as those cooperative roles defined in the policies included in Section 4.0 of the BCWMC 2015 Watershed Management Plan.

4.9.2 Cooperation with the MCWD

The MCWD 2017 Watershed Management Plan promotes collaboration with LGUs like the City of Golden Valley. The City will work with the MCWD to assess opportunities within the MCWD's jurisdiction and pursue collaborative action when opportunities arise. Targeted areas of collaboration may include land use policy development and implementation, capital improvement feasibility planning, and City operations and facility maintenance. Collaborative opportunities between the City and MCWD are described in greater detail in Section 5.4. The City will assess opportunities for collaboration through the implementation of its LGU/MCWD coordination plan (see Appendix B).

4.9.3 Cooperative Efforts with MNDNR, MnDOT, Hennepin County and the MPRB

The City has many capital project and maintenance requirements that benefit, impact, or are also required by other agencies. Often these requirements overlap with other agencies where jurisdiction is shared. Current issues in Golden Valley are shared with the Minnesota Department of Transportation (MnDOT), Hennepin County, and the Minneapolis Park and Recreation Board (MPRB). There exist shared issues at Wirth Lake, Twin Lake Sweeney Lake, Bassett Creek, and water quantity issues upstream of Medicine Lake near TH 169. The impaired waters will be the focus of future cooperative efforts aimed at protecting and, in the case of Twin Lake, improving water quality that the City and other agencies might have difficulty addressing individually.

The City has collaborated with Hennepin County to address impaired waters and TMDLs (including Bassett Creek chloride impairment) and flooding issues including the Medicine Lake Road Winnetka Avenue flood mitigation plan. The City also plans to continue to work with the MNDNR to address shared issues including aquatic invasive species, fisheries, and public waters issues.

Successful and cooperative partnerships will benefit all involved parties. The City will continue to require MnDOT and the MPRB to accept fair responsibility for stormwater management on their respective properties, including inspection and maintenance of infrastructure located on their property. Cooperation for the management and financing of future projects, studies, or other activities will benefit all parties. The City will continue to actively seek this cooperation and looks forward to expanding cooperative efforts beyond stormwater management.

4.9.4 Partnership with Neighboring Cities

The City will continue to seek opportunities to partner with neighboring cities to address intercommunity issues. Examples of this is the chronic flooding of the DeCola Ponds system (see Section 4.2.5.1) and Medicine Lake Road (see Section 4.2.5.2). Located in the northwestern part of the City, just east of Winnetka Avenue, the DeCola Ponds system and Winnetka Avenue receive stormwater runoff from Golden Valley, the City of New Hope and the City of Crystal. A joint solution to the problems at this location will result in a reduction in the flood levels at the DeCola Ponds system and along Medicine Lake Road. The City will pursue a cooperative effort for solving this problem, as the most comprehensive solutions will require the support of each affected community. It is expected that all three cities will continue to look for opportunities for flood storage through redevelopment and land use changes.

Medicine Lake is located in the City of Plymouth but a portion of Golden Valley drains to the lake. . Westwood Lake is located primarily in the City of St. Louis Park, although a portion of the tributary watershed, the north shore, and the lake outlet are located within the City of Golden Valley. North and South Rice Ponds are location entirely and partially within the City of Robbinsdale, respectively, while their tributary watersheds include portions of the City of Golden Valley. Brownie Lake is located in Minneapolis, but a portion of Golden Valley drains to the lake. Cooperation between the cities that share these watersheds provides opportunities to efficiently use funding, technical support, and other resources to maximize water quality improvements to these lakes and, ultimately, Bassett Creek or Minnehaha Creek.

4.9.5 Redevelopment Opportunities

Golden Valley is fully developed. Therefore, opportunities for updating and upgrading the City storm drainage system will exist primarily in redevelopment activities. As private and public properties redevelop, the City will implement the policies and programs of this plan. Recent examples of this include the redevelopment of Liberty Crossing and the construction of the new Brookview Community Center. The City will continue to be proactive in using the regulatory controls at its disposal to ensure that opportunities presented by redevelopment to improve the stormwater system and implement the policies of this plan are not lost. The City will continue to coordinate with the BCWMC and MCWD to identify potential partnership opportunities associated with redevelopment.

4.9.6 Coordination with Other City Programs

Coordinating stormwater and surface water management activities with other City programs presents an opportunity to increase operational efficiency, reduce costs, and limit the frequency and duration of disruptions to City services. The City's pavement management program, for example, may be coordinated with stormwater management activities so that potentially disruptive maintenance or improvements may be performed simultaneously with road maintenance, minimizing the number of closures. Park and recreation programs also provide opportunities for the City to consider and implement stormwater management improvement activities with planned City actions.

5.0 Implementation Program

This section describes the significant components of the City's Surface Water Management Plan (SWMP) implementation program, including implementation of the City's NPDES MS4 Permit, operation and maintenance of the City's stormwater system, education and public involvement, funding, ordinance implementation and official controls, and implementation priorities. The implementation program is presented in tabular format at the end of this section. Table 5-1 and Table 5-2 summarize the different types of implementation activities as follows:

- Table 5-1 Implementation Program – Capital Improvements and Studies
- Table 5-2 Implementation Program – Ongoing Programs (Operations, Regulation, and Education)

5.1 NPDES MS4 Permit

Under the U.S. Environmental Protection Agency's (EPA) Storm Water National Pollutant Discharge Elimination System (NPDES) Rules, the City of Golden Valley is required to maintain a Municipal Separate Storm Sewer System (MS4) Permit for managing non-point source stormwater. The City last renewed MS4 permit in 2013 and is scheduled to update its MS4 permit again in 2018.

As part of the permit, the City must also prepare and maintain a Storm Water Pollution Prevention Program (SWPPP) addressing all requirements of the permit.

The SWPPP outlines the appropriate best management practices (BMPs) for the City of Golden Valley to control or reduce the pollutants in stormwater runoff to the maximum extent practicable. The City will accomplish this through the implementation of the BMPs outlined within its SWPPP. These BMPs are a combination of education, operations and maintenance, site control techniques, system design and engineering methods, and other such provisions that are appropriate to meet the requirements of the NDPES permit.

BMPs have been prepared to address each of the six minimum control measures as outlined in the rules:

1. Public education and outreach on stormwater impacts
2. Public participation/involvement
3. Illicit discharge detection and elimination
4. Construction site stormwater runoff control
5. Post-construction stormwater management in new development and redevelopment
6. Pollution prevention/good housekeeping for municipal operations

For each of these six minimum control measures, the City identified appropriate BMPs, along with measurable goals, an implementation schedule, and the City staff responsible to complete each measure. The SWPPP BMP implementation program is incorporated by reference into the City's overall stormwater

implementation program (see Table 5-1 and Table 5-2); additional detail may be found in the City SWPPP (see Appendix A).

Prior to June 30 of each year of the five-year permit cycle, the City must hold an annual public meeting. At this meeting, the City distributes educational materials and presents an overview of the MS4 program and the City's SWPPP. The City also receives oral and written statements and considers them for inclusion into the SWPPP.

Also prior to June 30, the City must submit an annual report to the MPCA. This annual report summarizes the following:

1. Status of Compliance with Permit Conditions. The annual report contains an assessment of the appropriateness of the BMPs and the City's progress toward achieving the identified measurable goals for each of the minimum control measures. This assessment is based on results collected and analyzed, inspection findings, and public input received during the reporting period.
2. Work Plan. The annual report lists the stormwater activities that are planned to be undertaken in the next reporting cycle.
3. Modifications to the SWPPP. The annual report identifies any changes to BMPs or measurable goals for any of the minimum control measures.
4. Notice of Coordinated Activities. A notice is included in the annual report for any portions of the permit for which a government entity or organization outside of the MS4 fulfills, or assists with fulfilling, any BMP contained in the SWPPP.

5.2 Stormwater System Operation and Maintenance

The City of Golden Valley is responsible for maintaining its stormwater system, including storm sewer pipes, ponds, pond inlets and outlets, and channels. The City implements an operation and maintenance program consistent with the requirements of its MS4 SWPPP. The City's operation and maintenance program is incorporated into Table 5-2.

Stormwater pond maintenance is a significant element of the City's overall maintenance program. The program includes sediment removal in many of the primary stormwater treatment ponds in the City. The City maintains a list of ponds that are below 50% of their design volume, based on survey data. Based on survey information and relevant water quality modeling information (e.g., estimated sediment rate), the City prioritizes sediment removal activities as funding is available.

Along with the stormwater pond sediment removal program, the City of Golden Valley also has an active catch basin cleaning program. The City cleans sump catch basins, and many other catch basins that collect sediment, as needed.

The City recognizes the benefits of sweeping streets—sweeping removes pollutants from the pavement surface before the pollutants are carried away by stormwater runoff into lakes and streams. The City has maintained an active street sweeping program for many years. The City currently performs major street sweeping efforts in the spring and in the fall, and completes more routine efforts through the summer

along priority areas. Areas where there is a high degree of deposition of organics and soils onto the street are swept more often. The City monitors its streets and sweeps as often as needed to prevent the accumulation of sediment on the street.

The City performs additional inspection and maintenance activities as required by its MS4 permit and outlined in the City's SWPPP (see Appendix A). The City periodically reviews its operations and maintenance program to determine its adequacy to meet the requirements of its MS4 permit and SWPPP. The City will adjust its program, as needed, to meet these requirements and ensure the City's stormwater system functions as designed.

Other entities, including Hennepin County, MnDOT, and private owners are responsible for maintaining stormwater infrastructure under their respective jurisdictions. The City's project review and permitting process requires submittal of a maintenance agreement for privately owned stormwater infrastructure.

As part of the City's ongoing efforts to improve the performance of the stormwater system, the City performed a City-wide review of opportunities for new and retrofit BMP implementation and maintains a current list of such opportunities. The City will continue to seek to implement these new and retrofit BMPs as funds become available.

5.2.1 Stormwater Infrastructure Renewal Program

The City performs regular inspection and maintenance of its stormwater system consistent with the requirements of its MS4 permit and SWPPP (see Sections 5.1 and 5.2). However, much of the stormwater infrastructure within the City is nearing the end of its intended operating life. In some cases, infrastructure may be operating past its design life. Over the next several decades, the City will be challenged with needing to repair and/or replace a significant amount of its stormwater infrastructure. Replacement of existing infrastructure is complicated by the need to provide continuous service and work in fully developed areas crowded by private property and existing utilities.

Replacement of existing stormwater infrastructure represents a significant potential cost to the City. Currently, the City's stormwater system inspection, maintenance, and improvements are funded through the City's stormwater utility fee, which may not be sufficient to fund large-scale infrastructure replacement (see Section 5.7).

To address the challenge of infrastructure replacement, the City developed an Infrastructure Renewal Program (IRP) to most efficiently replace or otherwise address aging stormwater infrastructure throughout the City (see Section 5.2.1). The IRP provides a schedule and funding source for updating aging infrastructure in coordination with other planned City activities. The IRP divides the City into approximately 40 areas based on similar number of road miles. One area is addressed each year; improvements are performed over a two year period, with underground utilities (including most stormwater infrastructure) addressed during the first year. The City will use the IRP in planning and executing updates to the stormwater management system.

5.3 Flood Management Program

The City performs many actions to reduce the risk of flooding and protect human life, property, and natural resources that may be damaged by flood events. The includes establishing and enforcing to flood risk reduction and rate control policies included in Section 2.4 of this Plan and in City ordinances (see Section 5.8. The City also performs studies and capital improvements to identify and implement projects to reduce the risk and/or consequences of flooding. The city will look for opportunity to partner with public and private entities to address water quantity issues. Potential areas for further study and possible improvements include:

- **DeCola Ponds Area/Medicine Lake Road-Winnetka Avenue** – The City has performed several studies to address reoccurring flooding issues adjacent to Medicine Lake Road and Winnetka Avenue and the downstream DeCola Ponds system (see Sections 4.2.5.1 and Section 4.2.5.2), including the 2012 DeCola Ponds Study (Barr, 2012) and the 2016 MLRWA Flood Mitigation Study (Barr, 2016). Several projects, staged in phases, to jointly address these flooding issues are planned in cooperation with the BCWMC (see Table 5-1).
- **Hampshire Park**
- **Lakeview Park Area**
- **Medley Park Area**
- **Minnaqua Pond/Briarwood Nature Area**
- **Wesley Park Area**

The City may perform additional hydrologic modeling to further evaluate existing and/or anticipated future flood risk at these locations. This evaluation is included as an implementation item in Table 5-1. Following further assessment of these issues, the City will consider options to minimize flood risk and evaluate mitigation opportunities.

The City also participates in the Federal Emergency Management Agency's (FEMA's) National Flood Insurance Program (NFIP). Homeowners within FEMA-designated floodplains are required to purchase flood insurance. The City also participates in FEMA's Community Rating System; this program includes additional floodplain management activities beyond the minimum required by NFIP and allows eligible residents to receive a discount on purchasing flood insurance. The City provides information and technical assistance to residents to address flood risk issues and flood insurance questions.

The City has identified the acquisition of properties affected by, or at-risk of, flooding as a method to address flood risk. As homes in the floodplain (including some flood-proofed homes) become available, the City may work with property owners to pursue voluntary acquisition. Funding may come from City funds set-aside for this purpose or with help from other agencies such as the MNDNR or the BCWMC. Homes with less than 1 foot of freeboard between the lowest floor and the 100-year flood level or have driveways or accesses that are below the 100-year flood level may also be targeted for this acquisition program. In several cases, the City has applied for Hazard Mitigation Assistance (HMA) funding from the Minnesota Department of Public Safety.

The City will continue to seek opportunities to address areas of flood risk through creation of additional flood storage within the watershed, low flow diversions, and incorporating flood mitigation benefits to water quality retrofit or other City projects.

Many of the City's flood mitigation efforts are performed in cooperation with the BCWMC. The coordinated responsibilities of each entity with respect to addressing flood risk are defined in greater detail among the policies included in Section 4.2.2 of the *2015 BCWMC Watershed Management Plan* and Section 2.4 of this Plan, as well as Section 5.3.1.

5.3.1 BCWMC Flood Control Project

The City understands that the BCWMC will continue its inspection and maintenance program for the BCWMC Flood Control Project (FCP) features (see Section 3.9.4). This program is described in the *Bassett Creek Flood Control Project Operation and Maintenance Manual*. The City will continue to perform routine maintenance and repair of FCP features located within the City of Golden Valley and report maintenance and repair actions to the BCWMC. Routine maintenance and repair activities may include:

- Maintain vegetation: remove trees, remove brush, chemically treat stumps, control noxious weeds, and establish vegetation on bare areas.
- Remove debris: woody debris, riprap, trash from channel, inlets, culverts
- Repair erosion; channels, inlet and outlet structures, culvert ends
- Repair/replace riprap: on inlet and outlet ends of culverts, channels, banks
- Remove sediment from channels, structures, culverts, etc.
- Repair/maintain guard rails, hand rails and fencing: remove rust, prime and paint, repair damaged rails and posts, replace rusted-out sections, repair cables, replace posts, repair chain link fence
- Repair concrete pipe: repair joints, tie-bolts, spalling, connection to culverts, breakage
- Repair/replace catch basins, manholes, casting assemblies, grates
- Repair/maintain debris barrier: removal of debris, repair cables, replace poles
- Repair/maintain tunnel inlet trash rack: repair/replace trash rack rods, loose or broken, vandalized, bent
- Street repairs: pavement, curb and gutter, cracks, depressions, settlement

The City may request reimbursement from the BCWMC for maintenance and repairs that exceed $25,000. The City (or other road authority within the City) is also responsible for maintenance, repair, and replacement of road crossings and associated conveyance structures that were installed as part of the FCP.

The City understands that the BCWMC will identify major repairs, rehabilitation, and replacement of FCP features and add those to the BCWMC CIP (see Section 5.5.2); the BCWMC will fund those projects through its ad valorem levy. In the event of an emergency affecting FCP features, the City will perform the initial response, as the BCWMC is not set up to perform emergency response and management services. The BCWMC will assist the City in obtaining reimbursement for emergency

response actions either through BCWMC funds or grants (e.g., Federal Emergency Management Agency funding).

5.4 MCWD Roles and Responsibilities

The Minnehaha Creek Watershed District (MCWD) includes only a small portion of the City of Golden Valley – approximately 80 acres (less than 0.1% of the overall MCWD drainage area). Although this area is within the City of Golden Valley's corporate boundary, the storm sewer systems serving this watershed drain stormwater into the City of St. Louis Park to the south and, ultimately, to Minnehaha Creek.

The MCWD is in the process of updating its Comprehensive Water Resources Management Plan (MCWD Plan). The MCWD Plan details how the watershed district will interact with cities, including Golden Valley, to accomplish its goals, including:

- **Water Quantity** - To manage the volume and flow of stormwater runoff to minimize the impacts of land use change on surface and groundwater.
- **Water Quality** - To preserve and improve the quality of surface and groundwater.
- **Ecological Integrity** - To restore, maintain, and improve the health of ecological systems.
- **Thriving Communities** - To promote and enhance the value of water resources in creating successful, sustainable communities.

The previous MCWD Plan (*MCWD, 2006*) delegated specific actions to the City of Golden Valley, including a phosphorus load reduction from the area of the City tributary to Minnehaha Creek. The current draft MCWD Plan promotes a collaborative approach through the MCWD's Balanced Urban Ecology policy. The policy prioritizes partnership with the land use community to integrate policy, planning, and implementation i to maximize the value of integrated natural and constructed landscapes.

To this end, the MCWD and the City of Golden Valley will collaborate to understand land use and redevelopment opportunities within the City and pursue collaborative action when opportunities arise. Targeted areas of collaboration include:

- Land use policy development and its implementation through planning activities including long-range land use and infrastructure plans, area-wide plans, and recreation and open-space plans.
- Capital improvement feasibility planning for public infrastructure including roads, sewer, drinking water, and localized power generation.
- Land use and development regulation, from initial development feasibility through ongoing inspection and facility maintenance functions.
- City operations and facility maintenance

MCWD spending and use of resources are likely to depend in part on local water plan focus and City commitment to collaborative efforts as identified in the local water management plans (e.g., this Plan) and the City's implementation of it. Examples of possible District activities that could be performed in collaboration with the City of Golden Valley include:

- Joint grant applications: Coordination to seek funding for work that serves aligned interests of the District and City.
- District incentive programs: Grant or cost-share funds awarded at the discretion of the Board of Managers to an LGU, or to institutional or individual property owners within an LGU.
- Technical assistance: Services of the District staff or engineer to assist LGUs and their residents in resolving water resource issues or pursuing opportunities in areas such as flood management, wetland banking and others.
- Education initiatives and coordination of education activities for MS4 compliance and other purposes.
- Conservation: Helping Cities and their property owners achieve mutual conservation goals by serving as easement holder for conservation development, assuming wetland bank maintenance obligations, and similar roles.
- Watershed management district: Using watershed district authority to establish localized taxing district to allow lake associations or other groups with common, geographically defined interests to raise funds in order to pursue community goals.

To facilitate these cooperative actions, the MCWD expects that the City of Golden Valley's local water management plan (this document) promote LGU/MCWD coordination. The goal of coordination efforts is to maintain mutual awareness of needs and opportunities to develop and implement programs and projects that:

i. develop out of coordinated, subwatershed-based planning;
ii. reflect the cooperation of other public and private partners;
iii. align investments; and
iv. secure a combined set of District, LGU and partner goals. The coordination plan provides for ongoing and periodic communications as to land use planning, infrastructure programming, and development regulation.

Many of the policies included in Section 2.0 identify collaborative action with watershed management organizations, including the MCWD. The City will continue to engage the MCWD in land use planning, where appropriate, and consider cooperative roles with the MCWD in developing and implementing programs and capital improvements (see Table 5-1). Coordination activities between the City and MCWD are identified in the LGU/MCWD Coordination Plan included as Appendix B.

The City of Golden Valley coordinates with the MCWD in reviewing and permitting proposed projects located within the MCWD's jurisdiction. Proposers of projects located within the MCWD portion of the City must apply for and obtain applicable permits from the MCWD prior to project construction. This requirement is in addition to any required City permits and state or federally mandated permits (e.g., NPDES). The City will continue to inform proposers of projects located within the MCWD of this requirement. Presently, the City does not wish to assume sole permitting authority for any MCWD rules. If the City pursues permitting authority for MCWD rules in the future, it will do so following the procedure described in see Appendix A of the draft MCWD Plan.

The MCWD requires that cities prepare and submit annual reports to the MCWD detailing actions performed in the previous year relevant to the requirements and goals of the MCWD. The implementation program presented in Table 5-2 includes this task.

5.5 BCWMC Roles and Responsibilities

Nearly all of the City of Golden Valley lies within the jurisdiction of the Bassett Creek Watershed Management Commission (BCWMC) (see Figure 3-1). The BCWMC acknowledges that its success is dependent upon cooperation with its member cities (Golden Valley). The BCWMC relies on the member cities to perform many roles. These roles are detailed in Section 5.1.2 of the *BCWMC 2015 Watershed Management Plan* (BCWMC Plan) and include:

1. Commissioner and Alternate Commissioner appointment
2. Technical Advisory Committee (TAC) participation
3. Project review and permitting
4. Local Water Management Plan preparation
5. Maintaining official controls (e.g., ordinances) consistent with BCWMC requirements
6. Capital Improvement Projects implementation (see Table 5-3 of the BCWMC Plan)
7. Land and easement acquisition for BCWMC projects
8. Financial contribution to the BCWMC general fund (see Section 5.2.2.1 of the BCWMC Plan).

5.5.1 Project Review and Permitting

The City of Golden Valley is responsible for incorporating the BCWMC's requirements into its official controls and implementing BCWMC policies at the time of development and redevelopment. The City informs developers and other project applicants that BCWMC review of their project may be required and directs applicants to the BCWMC requirements and more information online at http://www.bassettcreekwmo.org. Conversely, BCWMC staff will ensure that developers and project applicants have first contacted appropriate City staff before reviewing or discussing details of the proposed project.

Within the BCWMC's jurisdiction, the City of Golden Valley permits only those projects that conform to the policies and standards of the BCWMC. The City is responsible for first reviewing a proposed project and providing preliminary approval to projects that demonstrate compliance with City requirements. Once the proposed project has received preliminary approval from the City. City staff must sign the BCWMC Application Form before it is submitted to the BCWMC for its review. The signed application form authorizes the BCWMC or its staff to commence its review. Following BCWMC review, the BCWMC or its staff will send a letter of approval or disapproval to the City, stating that the proposed project meets the requirements of the BCWMC Plan or stating how the proposed project does not meet BCWMC requirements. The City will not issue construction permits, or other approvals, until the BCWMC has approved the project.

5.5.2 Capital Improvement Program and Implementation

The BCWMC Plan includes a 10-year capital improvement program (CIP) (Table 5-3 in the BCWMC Plan) and the BCWMC maintains a "working CIP" that covers the next 5-year period. The City cooperates with the BCWMC in the development of its CIP. After the BCWMC approves the working CIP, the BCWMC or the member City prepares a feasibility study for the project(s) next in line. Following receipt of the feasibility study, the BCWMC holds a public hearing on the project. After the hearing, the BCWMC decides whether to order the project. When the BCWMC orders a project included in its CIP, the BCWMC begins project implementation through an agreement with the member City where the project is located. The member City is responsible for implementing the project. Table 5.1 of the BCWMC plan lists the project-related costs incurred by member cities that are eligible or ineligible for reimbursements.

BCWMC projects located within the City of Golden Valley and included in the BCWMC CIP or BCWMC working CIP are also included in Table 5-1 of this Plan. The City will cooperate with the BCWMC in the implementation of these projects, including activities performed prior to ordering the project (e.g., development of feasibility studies, cost estimates). The City may also identify projects consistent with BCWMC goals and request the BCWMC add the identified project to the BCWMC CIP.

5.6 Education and Public Involvement

The City of Golden Valley performs various education and communication activities addressing water resources issues. The City's education and public involvement program is closely tied with the City's implementation of its NPDES MS4 permit. Fundamental to those efforts is the City's Comprehensive Stormwater Communication Plan. Through the communication plan, the City distributes educational materials to the community and conducts outreach activities illustrating the impacts of stormwater discharges on water bodies and encouraging good water resource stewardship practices. This program includes materials addressing each of the SWPPP six minimum control measures (see Section 5.1). The plan focuses on the general public, contractors, developers, and business owners.

Educational materials distributed to residents and businesses as part of the Stormwater Communication Plan may include, but are not limited to:

- Adopt a pond
- Phosphorus Free "Fertilizer" Education Brochures
- De-icing chemical and salt best management practices
- "How to Stencil Storm Drains" Brochure
- "There's a Fish on your Street" Storm Drain Brochure
- Yard Waste "Compost" Brochures
- "Grading, Drainage and Erosion Control" Brochure
- "Recyclopedia" - Residents Guide to Recycling, which also addresses stormwater issues.
- IDDE

The City also provides educational materials and links for additional information regarding stormwater issues on the City website with topical information relating to each of the six SWPPP minimum control measures. Topics include, but are not limited to:

- Reporting IDDE
- Watershed education
- Links to local watershed organizations
- Phosphorus education and educational video
- Golden Valley's Surface Water Management Plan information
- Landscaping for water quality information
- Water-wise household decisions
- Water resource projects

The City also provides informational packets to new residents who homestead in Golden Valley. The packets contain information aimed at developing awareness of water resource issues and promoting good water resource stewardship.

The City seeks to inform residents regrading water resource issues through various broadcast media. First, it provides water resource education information on its local cable TV scroll. The information may include volunteer water resource programs, public notices, and other activities regarding the six minimum control measures. Secondly, the City provides a bi-monthly newsletter with at least one page dedicated to environmental issues. Water resource education articles have played a significant role in many of the "CityNews" publications, including issues relating to each of the six minimum control measures from the NPDES Permit.

The City has also established a program to stencil appropriate markings on storm inlets and allow public interest groups to assist. City staff distributes maps and stenciling supplies to volunteer groups and provide volunteers with educational handouts to be distributed to neighborhood residents. The City also provides the "How to Stencil Storm Drains" laminated educational tool and the "There's a Fish on Your Street" educational handout for neighborhood residents.

The City maintains the Golden Valley Environmental Commission under Section 2.56 of the Golden Valley City Code to educate residents, raise awareness about environmental responsibility, and create a sense of collaboration in the spirit of making and keeping Golden Valley an environmentally healthy City.

There are opportunities for residents to participate when the BCWMC conducts its monthly public meetings at Golden Valley City Hall. Invitations are sent via the City website, the cable TV scroll, the City newsletter, and by announcement at the City council meetings. The City also encourages public involvement through the following natural resource volunteer programs:

- Adopt-a-pond
- Adopt-an-open-space
- Buckthorn control

The City will continue to use the Comprehensive Stormwater Communication Plan to promote public education and involvement, and will periodically update the program to address the most relevant topics and communication methods. The City also financially contributes to educational activities performed by the BCWMC.

The City's education and public involvement program is incorporated into Table 5-2.

5.7 Funding Programs

The City of Golden Valley plans to use its stormwater utility fee program (established in 1992) to fund stormwater-related activities. Under the City's system, a stormwater utility fee is charged against all parcels based on acreage and property types (i.e., higher fees for property types that are larger and generate more runoff). The Storm Water Utility Fee is the primary funding source for all stormwater related projects and programs included in the City's Surface Water Management Plan, Pavement Management Program, and NPDES MS4 requirements. The City periodically reviews its stormwater utility program to determine its adequacy for funding the projects and programs needed.

Over the next several years, the City will be challenged with needing to replace an increasing amount of stormwater infrastructure that is at or beyond the end of its design life (see Section 5.2.1). While the City's storm water utility program has to date been adequate to address the City's storm water and surface water management needs, it is possible the City may need to explore alternative funding options. Other funding options available to the City of Golden Valley include:

- Ad valorem taxes (i.e., City general fund)
- Special assessments (Minnesota Statutes 429)
- Franchise fees
- Cost-share opportunities
- Grants

Regardless of the funding sources used, the City will continue to use this Plan and other available resources to ensure that the City carries out its stormwater and surface water management roles in a financially responsible manner.

This plan, along with its capital improvement and implementation programs, combined with the stormwater utility fund provides the City with adequate tools to address current and future surface water issues.

5.8 City Ordinance and Official Controls

The City of Golden Valley manages stormwater to protect life, property, waterbodies within the City, and receiving waters outside the City. Toward this end, the City of Golden Valley created and implements regulatory programs that accomplish these aims. The City intends to continue implementing the following regulations and programs.

City regulations include the following stormwater-related ordinances:

- Stormwater Management ordinance (Golden Valley City Code, Section 4.31).
- Floodplain zoning ordinance (Golden Valley City Code, Section 11.60).
- Shoreland zoning ordinance (Golden Valley City Zoning Code, Section 11.65).
- Zoning ordinance (Golden Valley City Code, Section 11).
- Subdivision ordinance (Golden Valley City Code, Section 12).
- Prohibition regarding phosphorous-containing fertilizers (Golden Valley City Code Section 10.52 and State of Minnesota Statute).
- Coal tar sealant ban (Golden Valley City Code Section 10.54)
- Tree and Landscape ordinance (Golden Valley City Code Section 4.3.2).

Many of the City's stormwater management-related requirements, design standards, and performance standards referenced in the above ordinances are summarized in Table 5-3. The City requires permits and/or approvals for land disturbing projects (including developments), depending on the type and size of the project.

Applications for preliminary plat approvals, major site plan approval, and planned unit development permits must include a grading and drainage plan (showing post-construction stormwater BMPs, as necessary), a stormwater management plan, and a wetland plan.

The City of Golden Valley is the Local Governmental Unit (LGU) responsible for administering the Wetland Conservation Act (WCA). This includes requiring and verifying that all projects impacting wetlands meet the requirements of the Minnesota WCA. The City also actively pursues opportunities to restore wetlands and create wetland buffers.

The City also actively works with the BCWMC and the MCWD toward accomplishing common goals and adhering to the policies of these watershed organizations. The City notifies project proposers of the potential applicability of WMO rules, requirements, and/or permit review. The City coordinates its project review and permitting process with the BCWMC and MCWD, where applicable.

To improve the City's stormwater management effectiveness, the City periodically reviews its stormwater and surface water-related ordinances for consistency with the City goals and policies and other local, state, and federal requirements.

The City's enforcement of ordinances and official controls is incorporated into Table 5-2.

5.9 Implementation Priorities and Coordination

Many of the implementation items listed in the following Tables 5-1 and Tables 5-2 are required per the City's NPDES MS4 permit and incorporated into the City's SWPPP. These tasks will be addressed per the schedule presented in the SWPPP. The City will implement surface water management and stormwater system improvement projects in a priority that achieves the City's goals while promoting efficiency and minimizing cost. Therefore, the City will seek opportunities to coordinate stormwater system repair and/or replacement with its Pavement Management Program, redevelopment opportunities, or other coordinated projects (e.g., park improvements, other utility upgrades).

Generally, the City will places a higher priority on projects, programs, or activities that address issues that, if left unchecked, pose an imminent risk to property, public safety, or environmental resources. This includes flood risk mitigation projects and infrastructure projects that, if deferred, may impact the function of the City's stormwater management system. Specific actions prioritized for implementation through the life of this SWMP are listed in Table 5-1 and Table 5-2 and include the following:

- Implementing improvements to alleviate flooding at Medicine Lake Road Winnetka Avenue (DeCola Ponds) flooding issues
- Identifying, rehabilitating, and/or replacing priority stormwater infrastructure
- Addressing known and potential flood risk issues identified by modeling, including those near Minnaqua Pond and Briarwood Nature Center Area, Hampshire Park Area, Medley Park Area, Wesley Park Area, and other areas at risk of flooding.

The City may also prioritize projects based on the availability of grant funding, cost-share opportunities, or availability of other funding sources that may reduce the City's financial responsibility.

5.9.1 BCWMC Projects

The City cooperates with the BCWMC to implement projects within the City (see Section 5.5.2). Table 5-1 identifies joint BCWMC/City of Golden Valley projects and studies scheduled for implementation in the next 10 years. These projects include:

- Medicine Lake Rd and Winnetka Ave Long Term Flood Mitigation Plan Projects and Water Quality Improvements (BCWMC Projects BC-2, BC-3, BC-8, and BC-10)
- Medley Park Stormwater Treatment Facility to improve water quality in Medicine Lake (BCWMC Project ML-12) and drainage and flooding concerns in the area.
- Dredging of accumulated sediment in Main Stem of Bassett Creek just north of Highway 55, Theodore Wirth Regional Park, to reduce phosphorus loading and improve habitat (BCWMC Project BC-7)
- Bassett Creek main channel restoration to reduce phosphorus and sediment loading, from Regent Avenue to Golden Valley Road (BCWMC Project 2021CR-M)

The BCWMC capital improvement program (Table 5-3 of the BCWMC Plan) also includes several potential projects in the Sweeney Lake watershed scheduled for implementation at some time after 2020. These projects are derived from the Sweeney Lake TMDL study. The scheduling and implementation of these projects may be adjusted based on future observed water quality in Sweeney Lake and performance of other BMPs. Possible future projects in the Sweeney Lake watershed include:

- Sweeney Lake shoreland restoration (BCWMC Project SL-4)
- Water quality retrofits to existing stormwater ponds upstream of Sweeney Lake (BCWMC Project SL-5)
- Dredging of Spring Pond and diversion of Sweeney Lake branch into Spring Pond (BCWMC Project SL-6

- Projects to reduce loading from untreated Hennepin County and MnDOT right-of-way (BCWMC Project SL-7)
- In-lake alum treatment of Sweeney Lake (BCWMC Project SL-8)
- Chemical treatment of inflow to Sweeney Lake from Sweeney Lake Branch of Bassett Creek (BCWMC Project SL-9)
- Impervious area runoff retention and retrofits, including bioretention, rainwater gardens, and soil restoration at various locations (BCWMC Project SL-10)
- Stormwater treatment system for dissolved phosphorus removal upstream of Sweeney Lake (BCWMC Project SL-11)

The estimated costs for the above projects included in Table 5-1 and Table 5-2 are intended as planning level costs. Consistent with the BCWMC capital improvement project implementation process, the City will cooperate with the BCWMC to complete feasibility studies and develop more detailed cost estimates for these projects prior to implementation.

5.10 Plan Update and Amendment Procedures

This Surface Water Management Plan (SWMP or Plan) will guide the City of Golden Valley's activities through 2028, or until superseded by adoption and approval of a subsequent SWMP. The City will begin the process of updating this plan one to two years before its expiration date in coordination with the City's comprehensive planning process. The updated plan will meet the requirements of the applicable Minnesota laws and rules, the BCWMC, and the MCWD.

The City may revise this SWMP through an amendment prior to the scheduled SWMP update, if either minor changes are required, or if problems arise that are not addressed in the SWMP. However, this SWMP remains in full force and effect until an updated SWMP is approved by the BCWMC and the MCWD and adopted by the City.

Any significant changes to this SWMP must be approved by the affected WMO(s). Minor changes to this SWMP will not require WMO approval and can be made by City staff and supplied to the WMOs for their information. The City considers minor changes to be those that do not modify the goals, policies, standards, or commitments identified in the SWMP. Examples of minor changes include:

- Inclusion of updated hydrologic modeling results and mapping, as long as the changes do not significantly affect the rate or quality of intercommunity stormwater runoff.
- Inclusion of new/updated water quality monitoring data.
- Minor changes to the City's implementation program, such as added projects, schedule changes, and revised cost estimates, as long as there are no intercommunity impacts of such changes and the changes are consistent the goals and policies in the SWMP.

If it is unclear whether a proposed SWMP change is minor or not, the City will bring the issue to the WMOs for their determination.

The City's amendment procedure for significant changes to the SWMP is as follows:

- City staff preparation and review of SWMP amendment.
- City council consideration of SWMP amendment. The City council would either approve submittal of the amendment for WMO review and approval, or decide not to move forward with the amendment. If the City council decides to submit the amendment for WMO approval, the council would also need to determine when/if a public hearing or other public process should be undertaken.
- Submittal of proposed SWMP amendment to BCWMC and MCWD for review and approval. The City must also submit the proposed SWMP amendment to the Metropolitan Council and Hennepin County. The proposed SWMP amendment would also be distributed to appropriate City staff. The review process for a SWMP amendment is the same as for the original SWMP—the WMOs have 60 days to review and comment on the proposed SWMP amendment.
- City council adoption of SWMP amendment, after WMO approval of the SWMP amendment.

Table 5-1 Implementation Program – Capital Improvements and Studies

Project ID	Project Description	Cost ($)*	Funding Source	Contract or City Staff	Year	Notes
SS-01	Stormwater improvements performed as part of infrastructure renewal program	$$$	Stormwater Utility	Contract	Ongoing	Projects address water quality, flood risk, and other issues
SS-12	Brookview Golf Course Buffer Zone Implementation	$$	Stormwater Utility	Contract	2019-2029	Addresses water quality and habitat issues
SS-23	Stormwater Pond Dredging	$$$	Stormwater Utility	Contract	Ongoing	Projects address flood risk, water quality, and maintenance issues
SS-25	V-Box Spreader and Anti-Ice	$$	Stormwater Utility	Contract	2019-2024	Addresses water quality (reduced chloride loading)
SS-26	V-Box Spreader and Anti-Ice	$$	Stormwater Utility	Contract	2019-2024	Addresses water quality (reduced chloride loading)
SS-27	Grounds Sweeper	$$	Stormwater Utility	Contract	2019-2024	Addresses water quality (reduced pollutant loading)
SS-34	Flood Mitigation, Flood-proofing, and Voluntary Acquisitions	$$$	Stormwater Utility	Contract	Ongoing	Projects address flood risk issues
SS-41	Bobcat Toolcat	$$	Stormwater Utility	Contract	2019-2024	Equipment to address overall capacity to implement SWMP
SS-48	Medicine Lake Rd and Winnetka Ave Long Term Flood Mitigation Plan Project (DeCola Ponds B and C Improvement Project)	$$$	Stormwater Utility	Contract	2019-2020	BCWMC Project BC-2, BC-3, BC-8; Projects address flood risk issues
SS-49	Medley Park Stormwater Treatment Facility	$$$	Stormwater Utility	Contract	2022-2023	BCWMC Project ML-12; Potential partnership with MnDOT; Addresses water quality issues
SS-50	Additional Sweeney Lake watershed water quality improvement projects	TBD ($$$)	Stormwater Utility	Contract	2023-2027 (TBD)	Based on Sweeney Lake TMDL; BCWMC Projects SL-4, SL-5, SL-6, SL-7. SL-8, SL-9. SL-10, SL-11
SS-51	800 MHz Radios	$$	Stormwater Utility	Contract	2019	Equipment to address overall capacity to implement SWMP

Table 5-1 Implementation Program – Capital Improvements and Studies

Project ID	Project Description	Cost ($)*	Funding Source	Contract or City Staff	Year	Notes
SS-53	MS4 and other storm sewer repairs	$$$	Stormwater Utility	Contract	2019-2027	Activities address water quality and maintenance issues
SS-54	Bassett Creek Main Stem Channel Restoration, Regent Avenue to Golden Valley Road	$$$	Stormwater Utility	Contract	2023-2027 (TBD)	BCWMC Project 2021CR-M; includes water quality improvements to Bassett Creek; Partnership with Three Rivers Park District
TBD	Toledo Ave Flood Mitigation Project	$$$	Stormwater Utility	Contract	2024-2029 (TBD)	Partnership with Homeland Security and Emergency Management (HSEM) to address flood risk issues
TBD	Medicine Lake Rd and Winnetka Ave Long Term Flood Mitigation Plan Project (DeCola Pond F Diversion)	$$$	Stormwater Utility	Contract	2020-2025 (TBD)	BCWMC Project BC-10; Project addresses flood risk issues
TBD	Evaluate options and construct improvements to address flood risk in potential localized flood-prone areas identified by modeling	TBD ($$$)	Stormwater Utility; cost share	Contract	2023-2027 (TBD)	Further evaluation needed; Partnerships with private sector and other government entities when possible
TBD	Participate in future Bassett Creek TMDL and/or WRAPS study	TBD ($)	Stormwater Utility; cost share	City Staff	2019-2029 (TBD)	Project addresses water quality issues

* Costs are presented as low ($), medium ($$), or high ($$$).

Table 5-2 Implementation Program – Ongoing Programs (Operations, Regulation, and Education)

Project ID	Project Description	Cost ($)*	Funding Source	Contract or City Staff	Year	Notes
SP-5	Continue to implement performance standards through project review and permitting	$20,000/year	Stormwater Utility	City Staff	2018-2027	Ongoing
SP-4.A.B	Continue to perform inspections associated for permitted projects	$20,000/year	Stormwater Utility	City Staff	2018-2027	Ongoing
SS-E	Periodically review City official controls and update as needed	$20,000	Stormwater Utility	City Staff, Contract	2018-2027	As needed
SP-6.B	Perform inspection and maintenance activities as documented in City SWPPP	$50,000/year	Stormwater Utility	City Staff,	2018-2027	Ongoing; see City SWPPP for detailed activities
SS-G	Update plan and schedule to prioritize stormwater infrastructure replacement	$10,000	Stormwater Utility	City Staff	2018-2022	Ongoing
SP-1; SP-2	Continue to implement stormwater and surface water education, outreach, and communication activities	$25,000/year	Stormwater Utility	City Staff	2017-2028	Ongoing; activities are detailed in the City's Storm Water Communication Plan and City SWPPP
SS-D	Develop and maintain a list of BMP implementation and retrofit opportunities	$1,000/year	Stormwater Utility	City Staff	2017-2028	Ongoing
SS-F	Coordination with MCWD regarding land use planning and project opportunities; annual reporting to MCWD	$1,000/year	Stormwater Utility	City Staff	2017-2028	Ongoing
SS-H	Maintain pond buffer areas	$50,000/year	Stormwater Utility	Contract	2017-2028	Ongoing
SS-A	Perform periodic updates to City H&H model, in coordination with BCWMC	$10,000/year	Stormwater Utility	Contract	2017-2028	Ongoing
	Total Annual	$182,000/year				

* Costs presented in 2018 for planning purposes.

Table 5-3 City of Golden Valley Stormwater Design and Performance Standards	
Topic Area	**Standard**
General Standards	Building permit, preliminary plat approval, and excavation permit applicants must meet the requirements of the City's zoning and subdivision ordinances, and applicable BCWMC requirements and MCWD rules. Applications for preliminary plat approvals, major site plan approval, and planned unit development permits must include a grading and drainage plan, an erosion control plan, and a wetland plan Stormwater management plans must be submitted for land disturbing activities meeting the criteria listed in City Code 4.31 Subd. 4.A.. For construction sites equal to or greater than one (1) acre, plans must meet the requirements of Part III and Part IV of the NPDES Construction Stormwater Permit. Post-construction stormwater management BMPs constructed and maintained in accordance with the NPDES Construction Stormwater Permit are required for: • New development and redevelopment projects with land disturbance greater than or equal to one (1) acre, including projects less than one (1) acre that are part of a larger common plan of development or sale. • Non-residential development and redevelopment projects greater than one half (1/2) acre and less than one (1) acre that, at the time of permitting, discharge stormwater through their private systems directly to surface water without being routed through a stormwater management facility or BMP. No private stormwater management facilities shall be approved without a maintenance plan consistent with City and applicable BCWMC or MCWD requirements. Owners of private stormwater management facilities shall enter into an agreement with the City describing responsibility for long-term inspection, operation, and maintenance.
Stormwater Runoff Quality	The Minimal Impact Design Standards (MIDS) and performance goals developed under and pursuant to Minnesota Statutes 2009, Section 115.03, Subdivision 5c, along with the MIDS calculator and design sequence flowchart, and design criteria in the Minnesota Stormwater Manual, is the recommended method for achieving post-construction stormwater management requirements. For new development projects there shall be no net increase from pre-project conditions (on an average annual basis) of: • Stormwater discharges of Total Suspended Solids (TSS) • Stormwater discharge volume (unless precluded by limitations listed in City Code 431 Subd. 5.G. • Stormwater discharges of Total Phosphorus (TP) For redevelopment projects there shall be a net reduction from pre-project conditions (on an average annual basis) of: • Stormwater discharges of Total Suspended Solids (TSS) • Stormwater discharge volume (unless precluded by limitations listed in City Code 431 Subd. 5.G. • Stormwater discharges of Total Phosphorus (TP)
Stormwater Runoff Quality	Project proposers must consider the use of low-impact development (LID) elements in proposed projects, including, but not limited to: green roofs, rain gardens, bioswales, and pervious pavement.

Table 5-3 City of Golden Valley Stormwater Design and Performance Standards	
Topic Area	**Standard**
Stormwater Runoff Quality	Project proposers are encouraged to reduce the amount of impervious surface on their sites through the use of innovative materials, alternative site design, and other low impact development strategies.
Stormwater Runoff Volume Control	New, non-linear development projects that create more than one acre of new impervious surface shall capture and retain on site 1.1 inches of runoff from the new impervious surface. Non-linear redevelopment projects that create more than one acre of new or fully reconstructed impervious surface shall capture and retain on site 1.1 inches of runoff from the new or fully reconstructed impervious surface. Linear projects that create one acre or more of net new impervious surface shall capture and retain onsite 1.1 inches of runoff from the net new impervious surface. Stormwater volume control techniques and practices including, but not limited to, infiltration, evapotranspiration, reuse, harvesting, conservation design, urban forestry, and green roofs, shall be given preference as design options provided they are consistent with City zoning, subdivision, and Planned Urban Development requirements, and sanitary sewer inflow and infiltration reduction requirements.
Stormwater Runoff Rate Control	Post-development peak discharge rates shall not exceed existing discharge rates for the 2-year (50% probability of occurring in any year), 10-year (10% probability of occurring in any year), and 100-year (1% probability of occurring in any year) 24-hour storm events, as determined using Atlas 14 precipitation data. The City requires rate control in conformance with the BCWMC flood control project system design.
Stormwater Runoff Rates Control	Stormwater facilities must be designed to convey no less than the 10-year, 24-hour rainfall event (i.e., the event with a 10% chance of occurring in any year). The portions of the stormwater system that convey outflows from ponding areas must be sized to convey the critical 10-year storm flow or the required 100-year outflow from upstream ponding areas, whichever is greater. 100-year level of protection must be provided along all trunk conveyors, streams, and open channels, and around all wetlands, ponds, detention basins, and lakes, based on the critical duration event (precipitation or snowmelt). Pond outlet structure designs must incorporate emergency overflow structures (where feasible) to prevent undesired flooding resulting from storms larger than the 100-year event or plugged outlet conditions. Multi-stage pond outlets should be used to control flows from smaller, less frequent storms. Only the existing tributary area may discharge to a landlocked basin, unless provision has been made for an outlet from the basin.

Table 5-3 City of Golden Valley Stormwater Design and Performance Standards	
Topic Area	**Standard**
Floodplain Management	For structures located outside of the floodplain, the lowest floor (including basement) of all new principal and accessory structures, and additions to existing structures, shall be at least two (2) feet above the calculated high water level of adjacent wetlands, ponds, basins, and stormwater management facilities (or be structurally flood-proofed consistent with City Code 11.60). Calculated high water levels shall be based on relevant federal, state, BCWMC, and City studies. Lowest floor (including basement) minimum building elevation requirements for new principal and accessory structures, and additions to existing structures: • For structures within the floodplain, the lowest floor shall be at least 2 feet above the established 100-year floodplain elevation. • For structures outside the floodplain, the lowest floor shall be at least 2 feet above the calculated high water level of adjacent wetlands, ponds, basins, and stormwater management facilities. Calculated high water levels shall be based on relevant federal, state, BCWMC, and City studies. The City will allow only those land uses in the BCWMC-established floodplain that will not be damaged by floodwaters and will not increase flooding. Allowable types of land use that are consistent with the floodplain include: • Recreation or open space areas such as golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, parks, wildlife habitat, trails, nature preserves and fishing areas. • Parking areas and heliports. • Public utility lines. • Temporary excavation and storage areas.
Floodplain Management	For landlocked basins, existing natural overflow paths must be preserved, emergency overflow routes must be created, or easement corridors for future outlets must be preserved, depending on the relationship between the 100-year flood elevation and the basin's natural overflow
Erosion and Sediment Control	Erosion and sediment control plans must be submitted for land disturbing activities. Erosion and sediment control plans must: • Be prepared by a qualified individual • Conform to the MPCA's NPDES Construction Stormwater General Permit, including temporary and permanent erosion controls • Incorporate appropriate BMPs from the Minnesota Stormwater Manual (as amended) • Show proposed methods of retaining sediment onsite during construction, and shall specify methods and schedules for restoring, covering, or re-vegetating the site after construction

Table 5-3 City of Golden Valley Stormwater Design and Performance Standards	
Topic Area	**Standard**
Erosion and Sediment Control	Projects within the BCWMC boundaries that disturb an area of 10,000 square feet or more or will result in more than 200 cubic yards of cut or fill shall conform to the requirements for Construction Erosion and Sediment Control Plans specified by the BCWMC. Projects within the MCWD boundaries that disturb an area of 5,000 square feet or more or will result in more than 50 cubic yards of cut or fill shall meet the erosion and sediment control requirements specified in the MCWD Rules (as amended). Projects with land disturbing and on-site activities equal to or greater than 1 acre shall meet the requirements of Part III and Part IV of the NPDES Construction Stormwater Permit for erosion and sediment controls and waste controls.
Erosion and Sediment Control	All grading material and soil however placed on a grading site shall remain within the limits of the grading site and not travel onto adjacent property, streets, or other public or private property as dust, mud, chunks, or otherwise, unless approved by all affected parties and the City. Stormwater management plans must be submitted for land disturbing activities and include the following requirements: • Channel erosion shall not occur as a result of the proposed land-disturbing or development activity. • Channelized runoff from adjacent areas passing through the site shall be diverted around disturbed areas, if practical. Or: • All activities on the site shall be conducted in a logical sequence to minimize the area of bare soil exposed at any one time.
Erosion and Sediment Control	Effective energy dissipation devices that reduce outlet velocities to four (4) feet per second or less must be provided at all conveyance system discharges to prevent bank, channel or shoreline erosion.
Erosion and Sediment Control	• Runoff from the entire disturbed area on the site shall be controlled by meeting either 1) and 2), or 1) and 3) below: 1. All disturbed ground left inactive for 14 or more days shall be stabilized by seeding or sodding (only available prior to September 15) or by mulching or covering or other equivalent control measure. 2. For sites with more than 10 acres disturbed at one time, or if a channel originates in the disturbed area, one or more temporary or permanent sedimentation basins shall be constructed. Each sedimentation basin shall have a surface area of at least one percent of the area draining to the basin and at least three feet of depth and constructed in accordance with accepted design specifications. Sediment shall be removed to maintain a depth of three feet. The basin discharge rate shall also be sufficiently low as to not cause erosion along the discharge channel or the receiving water. 3. For sites with less than 10 acres disturbed at one time, silt fences, straw bales, or equivalent control measures shall be placed along all sideslope and downslope side of the site. If a channel or area of concentrated runoff passes through the site, silt fences shall be placed along the channel edges to reduce sediment reaching the channel. The use of silt fences, straw bales, or equivalent control measure must include a maintenance and inspection schedule.
Erosion and Sediment Control	Effective energy dissipation devices are required at all conveyance system discharges to prevent bank, channel or shoreline erosion. The invert of outfalls into ponding areas must be placed at the normal water level or as directed by the City.

Table 5-3 City of Golden Valley Stormwater Design and Performance Standards	
Topic Area	**Standard**
Wetlands and Buffers	New principal structures shall be setback at least 25 feet from a delineated wetland edge Native or natural vegetation buffers must be established or preserved in accordance with the requirement of the BCWMC. Required buffer zone widths vary by waterbody type as follows: • Streams – 10 feet or 25 percent of the distance between the ordinary high water level (OHWL) and the nearest existing structure, whichever is less. • Wetlands – based on Minnesota Routine Assessment Methodology (MnRAM) classification: o Preserve – 75 feet average and minimum of 50 feet o Manage 1 – 50 feet average and minimum of 30 feet o Manage 2 or Manage 3 – 25 feet average and minimum of 15 feet • Lakes – minimum of 10 feet from the OHWL • Stormwater management facilities – buffers shall extend from the normal water level, or bottom of a dry basin, up to the top of bank of the stormwater management facility, and shall be a minimum of 10 feet in width The use of a meandering buffer strip to maintain a natural appearance is encouraged in areas of flat topography An access corridor, not to exceed 20 feet in width or 20 percent of the buffer edge, whichever is less, is permitted. Accessory structures intended to provide access to wetlands such as stairways and docks are permitted in the access corridor. The City may require that the buffer be placed in a conservation easement. Monuments identifying the conservation easement, designed in accordance with City standards, shall be placed every 100 feet to delineate the buffer edge and at intersections with property lines. Where acceptable natural vegetation exists in buffer strip areas, the retention of such vegetation in an undisturbed state is preferred.
Shoreland Management	Shoreline vegetation must be preserved or restored insofar as feasible during and after construction projects. Grading and filling in shoreland areas or alteration of the natural topography of land sloping towards a public water or watercourse tributary to a public water shall be in accordance with the requirement of, and authorized by, the BCWMC. Any work which will change or diminish the course, current, or cross-section of a public water shall be approved by the Minnesota Department of Natural Resources consistent with Minnesota Statutes 105.42.

6.0 References

Barr Engineering Co. July 9, 1979. Correspondence to Mr. Jeff Sweet from Bahram Mozayeny.

Barr Engineering Co. 2012. DeCola Ponds Area Flood Mitigation Study. Prepared for the City of Golden Valley.

Barr Engineering Co. 2016. Medicine Lake Road and Winnetka Avenue Area Long-Term Flood Mitigation Plan. Prepared for the Cities of Golden Valley, New Hope, and Crystal.

Bassett Creek Watershed Management Commission. 2015. Watershed Management Plan.

City of Golden Valley. 2018. Draft Comprehensive Plan.

City of New Hope. 2006. Terra Linda Drive/Rosalyn Court Local Flood Improvement Project.

Howard R. Green Company, 1999. City of Golden Valley Surface Water Management Plan.

Metropolitan Council. 2001. *Minnesota Urban Small Sites BMP Manual.* Prepared by Barr Engineering Co.

Metropolitan Council. 2015. *2040 Water Resources Policy Plan*.

Midwestern Regional Climate Center Website – http://mrcc.isws.illinois.edu/. Cooperators are the National Climate Data Center and the Illinois State Water Survey.

Minnehaha Creek Watershed District. 2018. Minnehaha Creek Watershed District Water Resources Management Plan.

Minnehaha Creek Watershed District. 2006. Minnehaha Creek Watershed District Water Resources Management Plan.

Minnehaha Creek Watershed District. 2003. Hydrologic, Hydraulic, and Pollutant Loading Study.

Minnesota Climatology Working Group. State Climatology Office, Minnesota Department of Natural Resources Division of Ecological and Water Resources: www.climate.umn.edu

Minnesota County Biological Survey, Minnesota Department of Natural Resources. 1998. Natural Communities and Rare Species of Carver, Hennepin, and Scott Counties, Minnesota County Biological Survey Map Series No. 18.

Minnesota Department of Health. 2016, as amended. Evaluating Proposed Stormwater Infiltration Projects in Drinking Water Supply Management Areas.

Minnesota Department of Natural Resources. 2017. Lake Finder Website: www.dnr.state.mn.us/lakefind/index.html.

Minnesota Department of Natural Resources. 2017. Public Waters Inventory (PWI) Maps website: http://www.dnr.state.mn.us/waters/watermgmt_section/pwi/maps.html

Minnesota Geological Survey. 1989. Geologic Atlas of Hennepin County, Minnesota.

Minnesota Pollution Control Agency. Website www.pca.state.mn.us

Minnesota Pollution Control Agency. 2008. Minnesota Statewide Mercury Total Maximum Daily Load.

Minnesota Pollution Control Agency. 2010. Medicine Lake Total Maximum Daily Load.

Minnesota Pollution Control Agency. 2011. Sweeney Lake Total Phosphorus TMDL.

Minnesota Pollution Control Agency. 2013, as amended. National Pollutant Discharge Elimination System (NPDES) General Construction Stormwater Permit.

Minnesota Pollution Control Agency. 2014. Mississippi River Bacteria TMDL Study and Protection Plan.

Minnesota Pollution Control Agency. 2016. Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report and 303(d) List.

Minnesota Pollution Control Agency. 2016. Twin Cities Metropolitan Area Chloride Total Maximum Daily Load.

Minnesota Pollution Control Agency. 2016. Twin Cities Metropolitan Area Chloride Management Plan.

Minnesota Pollution Control Agency. 2017. Environmental Data Access website. http://www.pca.state.mn.us/data/index.html

Minnesota Stormwater Manual contributors. 2017. *Minnesota Stormwater Manua*l. http://stormwater.pca.state.mn.us/index.php/Main_Page

Minnesota Stormwater Manual contributors. 2017. *MIDS calculator*. https://stormwater.pca.state.mn.us/index.php/MIDS_calculator

National Oceanic and Atmospheric Administration. 2013. *NOAA Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 8 Version 2.0: Midwestern States (Colorado, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin).*

Natural Resources Conservation Service (NRCS). 1972. *National Engineering Handbook, Hydrology Section 4*.

NRCS. 2004, as amended. Soil Survey of Hennepin County, Minnesota: http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/minnesota/MN053/0/hennepin.pdf Soils data update: http://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=MN

SEH, Inc. 2015. Natural Resources Management Plan. Prepared for the City of Golden Valley.

United States Fish and Wildlife Service. 1959. *Circular 39 – Wetland Types of the United States*.

WSB and Associates, Inc. 2015. MnRAM Wetland Assessment – WSB Project No. 1473-320.

WSB and Associates, Inc. 2015. Results of Stormwater Pond Surveys and Soil Samples – WSB Project No. 1473-32

Appendices

Appendix A

City of Golden Valley Storm Water Pollution Prevention Program (SWPPP)

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

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

Stormwater Pollution Prevention Program (SWPPP) Document

Doc Type: Permit Application

Instructions: This application is for authorization to discharge stormwater associated with Municipal Separate Storm Sewer Systems (MS4s) under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Permit Program. **No fee** is required with the submittal of this application. Please refer to "Example" for detailed instructions found on the Minnesota Pollution Control Agency (MPCA) MS4 website at http://www.pca.state.mn.us/ms4.

Submittal: This *MS4 SWPPP Application for Reauthorization* form must be submitted electronically via e-mail to the MPCA at ms4permitprogram.pca@state.mn.us from the person that is duly authorized to certify this form. All questions with an asterisk (*) are required fields. All applications will be returned if required fields are not completed.

Questions: Contact Claudia Hochstein at 651-757-2881 or claudia.hochstein@state.mn.us, Dan Miller at 651-757-2246 or daniel.miller@state.mn.us, or call toll-free at 800-657-3864.

General Contact Information (*Required fields)

MS4 Owner (with ownership or operational responsibility, or control of the MS4)

*MS4 permittee name: City of GoldenValley *County: Hennepin
(city, county, municipality, government agency or other entity)

*Mailing address: 7800 Golden Valley Road

*City: Golden Valley *State: MN *Zip code: 55427

*Phone (including area code): (763) 593-8000 *E-mail: JFox@goldenvalleymn.gov

MS4 General contact (with Stormwater Pollution Prevention Program [SWPPP] implementation responsibility)

*Last name: Fox *First name: Joe
(department head, MS4 coordinator, consultant, etc.)

*Title: Water Resource Engineer

*Mailing address: 7800 Golden Valley Road

*City: Golden Valley *State: MN *Zip code: 55427

*Phone (including area code): 763-593-8000 *E-mail: JFox@goldenvalleymn.gov

Preparer information (complete if SWPPP application is prepared by a party other than MS4 General contact)

Last name: Peters First name: Jeff
(department head, MS4 coordinator, consultant, etc.)

Title: WSB & Associates

Mailing address: 701 Xenia Ave South Suite 300

City: Minneapolis State: MN Zip code: 55416

Phone (including area code): (763) 287-7150 E-mail: jpeters@wsbeng.com

Verification

1. I seek to continue discharging stormwater associated with a small MS4 after the effective date of this Permit, and shall submit this *MS4 SWPPP Application for Reauthorization* form, in accordance with the schedule in Appendix A, Table 1, with the SWPPP document completed in accordance with the Permit (Part II.D.). ☒ Yes
2. I have read and understand the NPDES/SDS MS4 General Permit and certify that we intend to comply with all requirements of the Permit. ☒ Yes

Certification (All fields are required)

☒ Yes - *I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted.*

I certify that based on my inquiry of the person, or persons, who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of civil and criminal penalties.

This certification is required by Minn. Stat. §§ 7001.0070 and 7001.0540. The authorized person with overall, MS4 legal responsibility must certify the application (principal executive officer or a ranking elected official).

By typing my name in the following box, I certify the above statements to be true and correct, to the best of my knowledge, and that this information can be used for the purpose of processing my application.

Name: Jeannine Clancy
(This document has been electronically signed)

Title: Director of Public Works Date (mm/dd/yyyy): 12/30/13

Mailing address: 7800 Golden Valley Road

City: Golden Valley State: MN Zip code: 55427

Phone (including area code): 763-593-8000 E-mail: JClancy@goldenvalleymn.gov

Note: *The application will not be processed without certification.*

Stormwater Pollution Prevention Program Document

I. Partnerships: (Part II.D.1)

A. List the **regulated small MS4(s)** with which you have established a partnership in order to satisfy one or more requirements of this Permit. Indicate which Minimum Control Measure (MCM) requirements or other program components that each partnership helps to accomplish (List all that apply). Check the box below if you currently have no established partnerships with other regulated MS4s. If you have more than five partnerships, hit the tab key after the last line to generate a new row.

☒ No partnerships with regulated small MS4s

Name and description of partnership	MCM/Other permit requirements involved

B. If you have additional information that you would like to communicate about your partnerships with other regulated small MS4(s), provide it in the space below, or include an attachment to the SWPPP Document, with the following file naming convention: *MS4NameHere_Partnerships.*

City of Minneapolis (phase I MS4) – Wirth park area.
Maintenance agreement with the City of Minneapolis for outlet structure.

II. Description of Regulatory Mechanisms: (Part II.D.2)

Illicit discharges

A. Do you have a regulatory mechanism(s) that effectively prohibits non-stormwater discharges into your small MS4, except those non-stormwater discharges authorized under the Permit (Part III.D.3.b.)? ☒ Yes ☐ No

1. If **yes:**

   a. Check which *type* of regulatory mechanism(s) your organization has (check all that apply):

   ☒ Ordinance ☐ Contract language
   ☐ Policy/Standards ☐ Permits
   ☐ Rules
   ☐ Other, explain: _____

   b. Provide either a direct link to the mechanism selected above or attach it as an electronic document to this form; or if your regulatory mechanism is either an Ordinance or a Rule, you may provide a citation:

   Citation:

   City Code: Sec. 4.31 Stormwater management Subdivision 6. Stormwater and Urban Runoff Pollution Control

   Direct link:

   http://gv-img.ci.golden-valley.mn.us/Public/DocView.aspx?id=331571&dbid=2

   ☐ Check here if attaching an electronic copy of your regulatory mechanism, with the following file naming convention: *MS4NameHere_IDDEreg.*

2. If **no:**

   Describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, this permit requirement is met:

   The city currently has an ordinance that address illicit discharges, the city will review the current ordinance language to insure that it meets the requirements of the MPCA. A review will be completed and if updates are necessary they will be completed within 12 months of permit coverage being granted.

Construction site stormwater runoff control

A. Do you have a regulatory mechanism(s) that establishes requirements for erosion and sediment controls and waste controls? ☒ Yes ☐ No

1. If **yes:**

a. Check which *type* of regulatory mechanism(s) your organization has (check all that apply):

☒ Ordinance ☐ Contract language
☐ Policy/Standards ☒ Permits
☐ Rules
☐ Other, explain: Stormwater Management Permit

b. Provide either a direct link to the mechanism selected above or attach it as an electronic document to this form; or if your regulatory mechanism is either an Ordinance or a Rule, you may provide a citation:

Citation:

City Code: Sec. 4.31 Stormwater management Subdivision 4. Stormwater Mangement Permit

Standard Details

Stormwater Management Permit

Engineering standards

Direct link:

http://gv-img.ci.golden-valley.mn.us/Public/2/doc/331571/Page1.aspx

☐ Check here if attaching an electronic copy of your regulatory mechanism, with the following file naming convention: *MS4NameHere_CSWreg.*

B. Is your regulatory mechanism at least as stringent as the MPCA general permit to Discharge Stormwater Associated with Construction Activity (as of the effective date of the MS4 Permit)? ☐Yes ☒ No

If you answered **yes** to the above question, proceed to C.

If you answered **no** to either of the above permit requirements listed in A. or B., describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

The City's construction site stormwater runoff control requlatory mechnaism will be updated to be at least as strigent as the MPCA CSW permit. This effort will be completed within 12 months of the date permit coverage is extended.

C. Answer **yes** or **no** to indicate whether your regulatory mechanism(s) requires owners and operators of construction activity to develop site plans that incorporate the following erosion and sediment controls and waste controls as described in the Permit (Part III.D.4.a.(1)-(8)), and as listed below:

1.	Best Management Practices (BMPs) to minimize erosion.	☒ Yes	☐ No
2.	BMPs to minimize the discharge of sediment and other pollutants.	☒ Yes	☐ No
3.	BMPs for dewatering activities.	☐ Yes	☒ No
4.	Site inspections and records of rainfall events	☐ Yes	☒ No
5.	BMP maintenance	☐ Yes	☒ No
6.	Management of solid and hazardous wastes on each project site.	☒ Yes	☐ No
7.	Final stabilization upon the completion of construction activity, including the use of perennial vegetative cover on all exposed soils or other equivalent means.	☒ Yes	☐ No
8.	Criteria for the use of temporary sediment basins.	☐ Yes	☒ No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

C.3. - City will evaluate all mechanisms to enforce dewatering activities and update as necessary within 12 months of reissuance of permit coverage.

C.4. - City currently address inspections in city code but will add language pertaining to rainfall events within 12 months of reissance of permit coverage.

C.5. - City has BMP manuals and guidance documents for contractors. City will evaluate language for BMP maintenance within ordinance language and stormwater guidance documents within 12 months of permit coverage.

C.8. - City will evalute Watershed District requirements and make changes to City's requirements based on that review

process. This will be comleted within 12 months of permit coverage being granted.

Post-construction stormwater management

A. Do you have a regulatory mechanism(s) to address post-construction stormwater management activities?
☒ Yes ☐ No

1. If **yes:**

a. Check which *type* of regulatory mechanism(s) your organization has (check all that apply):

☒ Ordinance ☐ Contract language
☐ Policy/Standards ☐ Permits
☐ Rules
☒ Other, explain: Stormwater Quality Maintenance Agreement, Watershed district requirement through review and comments.

b. Provide either a direct link to the mechanism selected above or attach it as an electronic document to this form; or if your regulatory mechanism is either an Ordinance or a Rule, you may provide a citation:

Citation:

Section 4.31: Stormwater Management, Subdivision 2. Definitions and General Provisions.#30

Direct link:

http://gv-img.ci.golden-valley.mn.us/Public/DocView.aspx?id=331571&searchid=ea5606fa-66cb-438a-aaf1-b3df5480ae93&dbid=2

☒ Check here if attaching an electronic copy of your regulatory mechanism, with the following file naming convention: *MS4NameHere_PostCSWreg.*

B. Answer **yes** or **no** below to indicate whether you have a regulatory mechanism(s) in place that meets the following requirements as described in the Permit (Part III.D.5.a.):

1. **Site plan review:** Requirements that owners and/or operators of construction activity submit site plans with post-construction stormwater management BMPs to the permittee for review and approval, prior to start of construction activity. ☒ Yes ☐ No

2. **Conditions for post construction stormwater management:** Requires the use of any combination of BMPs, with highest preference given to Green Infrastructure techniques and practices (e.g., infiltration, evapotranspiration, reuse/harvesting, conservation design, urban forestry, green roofs, etc.), necessary to meet the following conditions on the site of a construction activity to the Maximum Extent Practicable (MEP):

a. For new development projects – no net increase from pre-project conditions (on an annual average basis) of: ☐ Yes ☒ No

1) Stormwater discharge volume, unless precluded by the stormwater management limitations in the Permit (Part III.D.5.a(3)(a)).
2) Stormwater discharges of Total Suspended Solids (TSS).
3) Stormwater discharges of Total Phosphorus (TP).

b. For redevelopment projects – a net reduction from pre-project conditions (on an annual average basis) of: ☐ Yes ☒ No

1) Stormwater discharge volume, unless precluded by the stormwater management limitations in the Permit (Part III.D.5.a(3)(a)).
2) Stormwater discharges of TSS.
3) Stormwater discharges of TP.

3. **Stormwater management limitations and exceptions:**

a. Limitations

1) Prohibit the use of infiltration techniques to achieve the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)) when the infiltration structural stormwater BMP will receive discharges from, or be constructed in areas: ☐ Yes ☒ No

a) Where industrial facilities are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit issued by the MPCA.
b) Where vehicle fueling and maintenance occur.
c) With less than three (3) feet of separation distance from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of bedrock.
d) Where high levels of contaminants in soil or groundwater will be mobilized by the

infiltrating stormwater.

2) Restrict the use of infiltration techniques to achieve the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)), without higher engineering review, sufficient to provide a functioning treatment system and prevent adverse impacts to groundwater, when the infiltration device will be constructed in areas: ☐ Yes ☒ No
   a) With predominately Hydrologic Soil Group D (clay) soils.
   b) Within 1,000 feet up-gradient, or 100 feet down-gradient of active karst features.
   c) Within a Drinking Water Supply Management Area (DWSMA) as defined in Minn. R. 4720.5100, subp. 13.
   d) Where soil infiltration rates are more than 8.3 inches per hour.

3) For linear projects where the lack of right-of-way precludes the installation of volume control practices that meet the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)), the permittee's regulatory mechanism(s) may allow exceptions as described in the Permit (Part III.D.5.a(3)(b)). The permittee's regulatory mechanism(s) shall ensure that a reasonable attempt be made to obtain right-of-way during the project planning process. ☐ Yes ☒ No

4. **Mitigation provisions:** The permittee's regulatory mechanism(s) shall ensure that any stormwater discharges of TSS and/or TP not addressed on the site of the original construction activity are addressed through mitigation and, at a minimum, shall ensure the following requirements are met:

   a. Mitigation project areas are selected in the following order of preference: ☐ Yes ☒ No
      1) Locations that yield benefits to the same receiving water that receives runoff from the original construction activity.
      2) Locations within the same Minnesota Department of Natural Resource (DNR) catchment area as the original construction activity.
      3) Locations in the next adjacent DNR catchment area up-stream
      4) Locations anywhere within the permittee's jurisdiction.

   b. Mitigation projects must involve the creation of new structural stormwater BMPs or the retrofit of existing structural stormwater BMPs, or the use of a properly designed regional structural stormwater BMP. ☐ Yes ☒ No

   c. Routine maintenance of structural stormwater BMPs already required by this permit cannot be used to meet mitigation requirements of this part. ☐ Yes ☒ No

   d. Mitigation projects shall be completed within 24 months after the start of the original construction activity. ☐ Yes ☒ No

   e. The permittee shall determine, and document, who will be responsible for long-term maintenance on all mitigation projects of this part. ☒ Yes ☐ No

   f. If the permittee receives payment from the owner and/or operator of a construction activity for mitigation purposes in lieu of the owner or operator of that construction activity meeting the conditions for post-construction stormwater management in Part III.D.5.a(2), the permittee shall apply any such payment received to a public stormwater project, and all projects must be in compliance with Part III.D.5.a(4)(a)-(e). ☐ Yes ☒ No

5. **Long-term maintenance of structural stormwater BMPs:** The permittee's regulatory mechanism(s) shall provide for the establishment of legal mechanisms between the permittee and owners or operators responsible for the long-term maintenance of structural stormwater BMPs not owned or operated by the permittee, that have been implemented to meet the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)). This only includes structural stormwater BMPs constructed after the effective date of this permit and that are directly connected to the permittee's MS4, and that are in the permittee's jurisdiction. The legal mechanism shall include provisions that, at a minimum:

   a. Allow the permittee to conduct inspections of structural stormwater BMPs not owned or operated by the permittee, perform necessary maintenance, and assess costs for those structural stormwater BMPs when the permittee determines that the owner and/or operator of that structural stormwater BMP has not conducted maintenance. ☒ Yes ☐ No

   b. Include conditions that are designed to preserve the permittee's right to ensure maintenance responsibility, for structural stormwater BMPs not owned or operated by the permittee, when those responsibilities are legally transferred to another party. ☒ Yes ☐ No

   c. Include conditions that are designed to protect/preserve structural stormwater BMPs and site features that are implemented to comply with the Permit (Part III.D.5.a(2)). If site configurations or structural stormwater BMPs change, causing decreased structural stormwater BMP effectiveness, new or improved structural stormwater BMPs must be implemented to ensure the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)) continue to be met. ☒ Yes ☐ No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within twelve (12) months of the date permit coverage is extended, these permit requirements are met:

B.2.a, B.2.b. Amend current post-construction stormwater ordinance and City Design Standards, which includes goals for reducing post-development TSS and TP loading on an annual basis, to include volume-control and be more consistent with permit language for new and redevelopment sites. The City Engineer will draft these amendments.They will be placed on the City Council's meeting agenda for approval within 12 months following the date permit coverage is extended.

B.3.a.1: The City will amend the ordinance and City Design Standards or agreement language to include prohibiting the use of infiltration techniques for post-construction stormwater management as described in the Permit (PartIII.D.5.a(3)(a).1). The ordinance will be amended on the same schedule as the items in B.2.a and B.2.b.

B.3.a.2: The City will amend the ordinance and City Design Standards to include restricting the use of infiltration techniques for post-construction stormwater management as described in the Permit (PartIII.D.5.a(3)(a).2). This will occur on the same schedule as the items above.

B.3.a.3: The City will amend the ordinance and City Design Standards to include the exceptions for linear projects as described in the Permit (PartIII.D.5.a(3)(b)). This will occur on the same schedule as the items above.

B.4.a.: The City will amend the ordinance and City Design Standards to include order of preference for selecting mitigation project areas as described in the Permit (PartIII.D.5.a(4)(a)). This will occur on the same schedule as the items above.

B.4.b.: The City will amend the ordinance and City Design Standards to include requirements for the creation of mitigation projects as described in the Permit (PartIII.D.5.a(4)(b)). This will occur on the same schedule as the items above.

B.4.c.: The City will amend the ordinance and City Design Standards to include the restriction from using routine maintenance of structural BMPs to meet the requirements for mitigation projects as described in the Permit (PartIII.D.5.a(4)(c)). This will occur on the same schedule as the items above.

B.4.d.: The City will amend the ordinance and City Design Standards to include the requirement to complete mitigation projects within 24 months after the start of the original construction activity as described in the Permit (PartIII.D.5.a(4)(d)). This will occur on the same schedule as the items above.

B.4.f.: The City will amend the ordinance and City Design Standards to mandate that money received from an owner/operator of construction activity, in lieu of meeting the conditions for post-construction stormwater management, shall be used for a public stormwater project as described in the Permit (PartIII.D.5.a(4)(f)). This will occur on the same schedule as the items above.

III. Enforcement Response Procedures (ERPs): (Part II.D.3)

A. Do you have existing ERPs that satisfy the requirements of the Permit (Part III.B.)? ☒ Yes ☐ No

1. If **yes**, attach them to this form as an electronic document, with the following file naming convention: *MS4NameHere_ERPs.*
2. If **no**, describe the tasks and corresponding schedules that will be taken to assure that, with twelve (12) months of the date permit coverage is extended, these permit requirements are met:

B. Describe your ERPs:

http://gv-img.ci.golden-valley.mn.us/Public/DocView.aspx?id=331571&dbid=2

The current ERPs are included in the following City Codes: Section 4.31 subsection 4 (G) Enforcement Actions to Ensure Compliance.

The City Code includes the following enforcement mechanisms:

- Notice of Violation

- Permit suspension

- Construction stop work orders

- Permit Revocation

- Remedial Corrective Action

- Action Against Financial Security

- Misdemeanor Violation

- Cumulative Enforcement

IV. Storm Sewer System Map and Inventory: (Part II.D.4.)

A. Describe how you manage your storm sewer system map and inventory:

New developments are required to provide electronic as-built data in accordance with the GIS Information Requirements located in the City Design Standard. The City GIS specialist updates and maintains all of the City's GIS Information.

B. Answer **yes** or **no** to indicate whether your storm sewer system map addresses the following requirements from the Permit (Part III.C.1.a-d), as listed below:

1. The permittee's entire small MS4 as a goal, but at a minimum, all pipes 12 inches or greater in diameter, including stormwater flow direction in those pipes. ☒ Yes ☐ No
2. Outfalls, including a unique identification (ID) number assigned by the permittee, and an associated geographic coordinate. ☒ Yes ☐ No
3. Structural stormwater BMPs that are part of the permittee's small MS4. ☒ Yes ☐ No
4. All receiving waters. ☒ Yes ☐ No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

C. Answer **yes** or **no** to indicate whether you have completed the requirements of 2009 Minnesota Session Law, Ch. 172. Sec. 28: with the following inventories, according to the specifications of the Permit (Part III.C.2.a.-b.), including:

1. All ponds within the permittee's jurisdiction that are constructed and operated for purposes of water quality treatment, stormwater detention, and flood control, and that are used for the collection of stormwater via constructed conveyances. ☒ Yes ☐ No
2. All wetlands and lakes, within the permittee's jurisdiction, that collect stormwater via constructed conveyances. ☒ Yes ☐ No

D. Answer **yes** or **no** to indicate whether you have completed the following information for each feature inventoried.

1. A unique identification (ID) number assigned by the permittee. ☒ Yes ☐ No
2. A geographic coordinate. ☒ Yes ☐ No
3. Type of feature (e.g., pond, wetland, or lake). This may be determined by using best professional judgment. ☒ Yes ☐ No

If you have answered **yes** to all above requirements, and you have already submitted the Pond Inventory Form to the MPCA, then you do not need to resubmit the inventory form below.

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

E. Answer **yes** or **no** to indicate if you are attaching your pond, wetland and lake inventory to the MPCA on the form provided on the MPCA website at: http://www.pca.state.mn.us/ms4 , according to the specifications of Permit (Part III.C.2.b.(1)-(3)). Attach with the following file naming convention: *MS4NameHere_inventory*. ☐ Yes ☒ No

If you answered **no,** the inventory form must be submitted to the MPCA MS4 Permit Program within 12 months of the date permit coverage is extended.

V. Minimum Control Measures (MCMs) (Part II.D.5)

A. MCM1: Public education and outreach

1. The Permit requires that, within 12 months of the date permit coverage is extended, existing permittees revise their education and outreach program that focuses on illicit discharge recognition and reporting, as well as other specifically selected stormwater-related issue(s) of high priority to the permittee during this permit term. Describe your **current** educational program, including **any high-priority topics included**:

The City of Golden Valley is comprised of a mix of commercial business districts and established residential developments. Therefore the educational focus rotates through residential issues, construction activities, and illicit discharges around commercial business districts. Newsletter distributed to residents includes stormwater section discussing proper practices for activities such as fall yard practices and winter deicing. Recent focus has been on phosphorous reduction, sediment loading, good house keeping and choloride reduction.

2. List the categories of BMPs that address your public education and outreach program, including the distribution of educational materials and a program implementation plan. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the U.S. Environmental Protection Agency's (EPA) *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf).

   If you have more than five categories, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
Education Activity Implementation Plan	*Complete outline of education activity implementation program and implementation schedule for the upcoming permit year.*
Meeting with Building Contractors, Developers, and Excavators	*Hold meetings as needed to inform these professionals of stormwater related issues as appropriate.*
Meetings with Educational Professionals	*Work with Basset Creek Watershed District, Minnehaha Creek Watershed District, Watershed Partners, Stormwater Steering Committee, and Water Resource Coordinators Group to make effective use of stormwater education programs as appropriate.*
City Staff Meetings	*Provide a presentation at City Department meetings to generate Staff awareness of SWPPP regulations and to develop projects with appropriate BMPs applied.*
Newsletter	*Published stormwater pollution prevention related article in the Annual Newsletter to spread awareness of stormwater related issues.*
Cable Access Channel	*Annually broadcasted stormwater related information over the Cable Access Channel.*
Presentations to City Council	*Report on yearly NPDES regulations and activities in Annual Report, urban storm water impacts to water bodies, current SWPPP status during an annual presentation each year of permit cycle. Additionally provide a specific review of SWPPP when considering zoning request.*

BMP categories to be implemented	Measurable goals and timeframes
Citizen Survey	*Send out a written survey in a random sample of mailings. The survey will gauge each selected household's practices related to the topic that will be featured in the following fall's brochure. This will help the City understand what topics are important to the City.*
SWPPP available on-line	*SWPPP we be online for review and comments are welcome at any time.*

3. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   Communication Coordinator

B. MCM2: Public participation and involvement

1. The Permit (Part III.D.2.a.) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement a public participation/involvement program to solicit public input on the SWPPP. Describe your current program:

   An opportunity to hear comments on the SWPPP is provided each year during an annual meeting. City will be evaluating the opportunity of having the SWPPP document online for review as well as comments to be submitted at any time.

2. List the categories of BMPs that address your public participation/involvement program, including solicitation and documentation of public input on the SWPPP. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In

addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf). **If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
Follow applicable public notice requirement	*Provide public notice of meeting to provide input on the SWPPP in accordance with City public hearing notification requirements.*
Annual Meeting	*Hold annual public meeting combined with City Council Meeting or other public participation/involvement event to solicit public input on the SWPPP*

BMP categories to be implemented	Measurable goals and timeframes
Community Reporting Options and Documentation Procedures	*IT department will provide a link on City webpage to report Illicit Discharges. This will allow the city to document number of reports received from City Webpage and responses to citizen reports of illicit discharges during the next 5 year permit cycle.*

3. Do you have a process for receiving and documenting citizen input? ☐ Yes ☒ No

   If you answered **no** to the above permit requirement, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, this permit requirement is met:

   B.3. The City will develop written procedures for receiving, documenting and storing citizen input as described in the permit (Part III.C.2.b). Procedures will be in place within 12 months following the date permit coverage is extended.

4. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   Water Resource Engineer

C. MCM 3: Illicit discharge detection and elimination

1. The Permit (Part III.D.3.) requires that, within 12 months of the date permit coverage is extended, existing permittees revise their current program as necessary, and continue to implement and enforce a program to detect and eliminate illicit discharges into the small MS4. Describe your current program:

   The City has an ordinance that prohibits illicit discharges and connections. City Staff and public works employees are trained to look for any signs of an illicit discharge while on the job. City ordinance describes actions the City can take after an illicit discharge has been identified.

2. Does your Illicit Discharge Detection and Elimination Program meet the following requirements, as found in the Permit (Part III.D.3.c.-g.)?

   a. Incorporation of illicit discharge detection into all inspection and maintenance activities conducted under the Permit (Part III.D.6.e.-f.)Where feasible, illicit discharge inspections shall be conducted during dry-weather conditions (e.g., periods of 72 or more hours of no precipitation). ☒ Yes ☐ No

   b. Detecting and tracking the source of illicit discharges using visual inspections. The permittee may also include use of mobile cameras, collecting and analyzing water samples, and/or other detailed procedures that may be effective investigative tools. ☒ Yes ☐ No

   c. Training of all field staff, in accordance with the requirements of the Permit (Part III.D.6.g.(2)), in illicit discharge recognition (including conditions which could cause illicit discharges), and reporting illicit discharges for further investigation. ☒ Yes ☐ No

   d. Identification of priority areas likely to have illicit discharges, including at a minimum, evaluating land use associated with business/industrial activities, areas where illicit discharges have been identified in the past, and areas with storage of large quantities of significant materials that could result in an illicit discharge. ☐ Yes ☒ No

   e. Procedures for the timely response to known, suspected, and reported illicit discharges. ☐ Yes ☒ No

   f. Procedures for investigating, locating, and eliminating the source of illicit discharges. ☒ Yes ☐ No

   g. Procedures for responding to spills, including emergency response procedures to prevent spills from entering the small MS4. The procedures shall also include the immediate notification of the Minnesota Department of Public Safety Duty Officer, if the source of the illicit discharge is a spill or leak as defined in Minn. Stat. § 115.061. ☒ Yes ☐ No

   h. When the source of the illicit discharge is found, the permittee shall use the ERPs required by the Permit (Part III.B.) to eliminate the illicit discharge and require any needed corrective action(s). ☒ Yes ☐ No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

C.2.d,e., The City will incorporate procedures into the IDDE program for a timely response to known, suspected, and reported illicit discharges as described in the permit (Part III.D.3.g). Procedures will be in place within 12 months following the date permit coverage is extended.

3. List the categories of BMPs that address your illicit discharge, detection and elimination program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf).

   If you have more than five categories, hit the tab key after the last line to generate a new row.

Established BMP categories	**Measurable goals and timeframes**
Storm Sewer System Mapping	*The City GIS storm sewer system map is updated as needed to reflect changes made to system features such as ponds, streams, lakes, wetlands, structural pollution control device, pipes, and outfalls. The existing City GIS Map will be updated as required by Part III.C.1 within 12 months following the date permit coverage is extended.*
Illicit Discharge Detection and Elimination (IDDE) and Enforcement Ordinance	*The City developed an ordinance to prohibit non-stormwater discharge into the stormwater system. The City will review the ordinance yearly to ensure that it continues to meet the needs of the City and legal requirements.*
Illicit Discharge Detection and Elimination (IDDE) Program	*Program to detect and eliminate illegal and/or improper connections to storm sewer drainage system and receiving waters by maintaining a list of existing illicit connection test performed to date within the City.* *Maintain a list of illicit connections tests performed to date within the City. Identify and prioritize future illicit connection assessment sites, and conduct field testing of existing storm sewer system lines* *After detection of illicit discharge the City will utilize proper enforcement procedures and enforce the provisions of the City ordinance pertaining to illegal discharges.*
Public & Employee IDDE Information Program	*Conduct educational seminar and distribute educational material annually to educate the Public and City Employees about the hazards associated with illicit discharges.*
Identification of Non Stormwater Discharges & Flows	*City employees are trained how to identify illicit discharges and what corrective measures should be taken for those discharges identified as being significant contributors of pollutants.*

BMP categories to be implemented	**Measurable goals and timeframes**
IDDE Program Updates	*Update written procedures for illicit discharge inspections, investigations, and response actions. Develop a process to document information as described in the Permit (Part III.3.h) within 12 months following the date permit coverage is extended..*
Illicit Discharge Inspections	*Annually inspect locations identified as high-priority outfalls and around high-risk establishments (fast food restaurants, dumpster, car washes, mechanics, and oil changes.)*
Illicit Discharge Investigation	*As needed televise a section of storm sewer system, collect grab samples or perform other effective testing procedures to find illicit connection in the system.*

4. Do you have procedures for record-keeping within your Illicit Discharge Detection and Elimination (IDDE) program as specified within the Permit (Part III.D.3.h.)? ☐ Yes ☒ No

   If you answered **no**, indicate how you will develop procedures for record-keeping of your Illicit Discharge, Detection and Elimination Program, within 12 months of the date permit coverage is extended:

   C.4., The City will develop written procedures for receiving, documenting and storing citizen input as described in the permit (Part III.D.3.h). Procedures will be in place within 12 months following the date permit coverage is extended.

5. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   Water Resource Engineer.

D. MCM 4: Construction site stormwater runoff control

1. The Permit (Part III.D.4) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement and enforce a construction site stormwater runoff control program. Describe your current program:

   The City requires review of construction site erosion and sediment control (ESC) plans before projects begin, and work with contractors to ensure appropriate and correct use of erosion and sediment control BMPs on sites.

2. Does your program address the following BMPs for construction stormwater erosion and sediment control as required in the Permit (Part III.D.4.b.):

   a. Have you established written procedures for site plan reviews that you conduct prior to the start of construction activity? ☒ Yes ☐ No

   b. Does the site plan review procedure include notification to owners and operators proposing construction activity that they need to apply for and obtain coverage under the MPCA's general permit to *Discharge Stormwater Associated with Construction Activity No. MN R100001*? ☒ Yes ☐ No

   c. Does your program include written procedures for receipt and consideration of reports of noncompliance or other stormwater related information on construction activity submitted by the public to the permittee? ☐ Yes ☒ No

   d. Have you included written procedures for the following aspects of site inspections to determine compliance with your regulatory mechanism(s):

      1) Does your program include procedures for identifying priority sites for inspection? ☐ Yes ☒ No

      2) Does your program identify a frequency at which you will conduct construction site inspections? ☐ Yes ☒ No

      3) Does your program identify the names of individual(s) or position titles of those responsible for conducting construction site inspections? ☐ Yes ☒ No

      4) Does your program include a checklist or other written means to document construction site inspections when determining compliance? ☐ Yes ☒ No

   e. Does your program document and retain construction project name, location, total acreage to be disturbed, and owner/operator information? ☒ Yes ☐ No

   f. Does your program document stormwater-related comments and/or supporting information used to determine project approval or denial? ☒ Yes ☐ No

   g. Does your program retain construction site inspection checklists or other written materials used to document site inspections? ☐ Yes ☒ No

   If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met.

   D.2.c., The City will develop written procedures for receipt and consideration of reports of noncompliance or other stormwater related information on construction activity submitted by the public as described in the Permit (Part III.D.4.c). Procedures will be in place within 12 months following the date permit coverage is extended.

   D.2.d., City will develop written procedures for conducting site Erosion and Sediment Control inspections as described in the Permit (Part III.D.4.d). Procedures will be in place within 12 months following the date permit coverage is extended.

   D.2.g., City will develop written procedures for retaining documents of site Erosion and Sediment Control inspections as described in the Permit (Part III.D.4.d). Procedures will be in place within 12 months following the date permit coverage is extended.

3. List the categories of BMPs that address your construction site stormwater runoff control program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf). **If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
Construction Site Stormwater Runoff Ordinance	*Last Modified on January 15 of 2010.*
Construction Site Plan Review	*City Engineering Staff utilizes the MPCA construction and sediment control checklist from Appendix D of the Current SWPPP for review of NPDES Erosion Control Permits submitted*

	to the department for review.
Erosion Protection Maintenance Memo to Builders	*An erosion control handout, which explains how to properly install a silt fence and other erosion control BMPs is given to the applicant when a building permit is picked up.*

BMP categories to be implemented	**Measurable goals and timeframes**
Permit Update	*Update the City Grading, Building, and ROW permits and Construction Site Stormwater Runoff ordinance to meet the new permit requirements within 12 months following the date permit coverage is extended.*
Prioritize Inspections	*Ensure at least 10% of permitted and inspected sites have been deemed high priority inspection sites (e.g., near sensitive receiving waters, projects larger than 5 acres).*
Permit Application System	*Develop written procedures to track and archive all plan review and inspection documents within 12 months following the date permit coverage is extended.*

4. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   Water Resource Engineer.

E. MCM 5: Post-construction stormwater management

1. The Permit (Part III.D.5.) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement and enforce a post-construction stormwater management program. Describe your current program:

   The City has a post-construction stormwater management ordinace to require the utilization of BMPs for stormwater runoff from new and redevelopment projects, as well as to ensure the maintenance and operation of the stormwater BMPs.

2. Have you established written procedures for site plan reviews that you will conduct prior to the start of construction activity? ☒ Yes ☐ No

3. Answer **yes** or **no** to indicate whether you have the following listed procedures for documentation of post-construction stormwater management according to the specifications of Permit (Part III.D.5.c.):

   a. Any supporting documentation that you use to determine compliance with the Permit (Part III.D.5.a), including the project name, location, owner and operator of the construction activity, any checklists used for conducting site plan reviews, and any calculations used to determine compliance? ☐ Yes ☒ No

   b. All supporting documentation associated with mitigation projects that you authorize? ☐ Yes ☒ No

   c. Payments received and used in accordance with Permit (Part III.D.5.a.(4)(f))? ☐ Yes ☒ No

   d. All legal mechanisms drafted in accordance with the Permit (Part III.D.5.a.(5)), including date(s) of the agreement(s) and names of all responsible parties involved? ☐ Yes ☒ No

   If you answered **no** to any of the above permit requirements, describe the steps that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met.

   E.3., The City will develop written procedures for documention of post-construciton stomwater management as described in the Permit (Part III.D.5.c.). Procedures will be in place within 12 months following the date permit coverage is extended.

4. List the categories of BMPs that address your post-construction stormwater management program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf). **If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	**Measurable goals and timeframes**
Site Plan Review Program	*Golden Valley lies primarily within the Bassett Creek Watershed Management Commissions boundaries. The remaining portion of the City lies within the boundaries of Minnehaha Creek Watershed District. Both organizations*

	provide engineering staff for review and approval of development proposals that meet District requirements. The developers plan must be approved by the WMO and a permit obtained by the City prior to construction. As part of the City permit process, the City ensures that storm water discharges will not adversely affect natural resources.
Encourage the use of structural and non-structural BMPs during review of new and redevelopment projects	*Implement Stormwater retention/detention ponds as a BMP in areas where it is appropriate.* *Developers are encouraged to use infiltration techniques when possible.* *Possible implementation of sand and organic filters into plan review process*
Stabilization Seeding	*The City requires all exposed ground areas to be landscaped with grass, shrubs, trees, or other living ornamental landscape materials. When observed, the City documents violations of seeding provisions and records types of enforcement actions taken.*
Outlet Structure Stabilization	*The City requires outlet structure stabilization within the standard specification for construction including but not limited to tie-rods, stabilization seeding, and class IV-V riprap. The City will continue to include this BMP during construction and document the number of structures stabilized.*
Land Development Ordinance	*Completed ordinance including illicit discharges, erosion and sediment control at construction sites, and post construction runoff from new development and redevelopment*
Stormwater Management Plan	*Completed in 2008 by BARR Engineering*

BMP categories to be implemented	**Measurable goals and timeframes**
Update ordinance to meet new permit requirements	*Complete Ordinance updates including illicit discharges, erosion and sediment control at construction sites, and post construction runoff from new development and redevelopment within 12 months of extension of permit coverage.*
Develop Written Procedures for Site Plan Review	*Develop site plan review procedures that must be completed prior to the start of construction activity within 12 months of extension of permit coverage.*
Document Pertinent Project Information	*Maintain all related documents pertaining to each new or redevelopment project in more user-friendly filing system for better records management. Implement within 12 months.*

5. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   Water Resource Engineer.

F. MCM 6: Pollution prevention/good housekeeping for municipal operations

1. The Permit (Part III.D.6.) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement an operations and maintenance program that prevents or reduces the discharge of pollutants from the permittee owned/operated facilities and operations to the small MS4. Describe your current program:

   The City currently inspects its structural pollution control devices on an annual basis and inspects all of its outfalls, sediment basins and ponds every 5 years. The City inspects stockpiles, storage and material handling areas at the maintenance yard for potential discharges and maintenance of BMPs. The City is evaluating the use of road salt for winter road maintenance activities to reduce chlorides entering our water resources. The City sweeps streets a minimum of twice per year. Maintenance staff is trained annually on various topics related to pollution prevention during maintenance activities.

2. Do you have a facilities inventory as outlined in the Permit (Part III.D.6.a.)? ☐ Yes ☒ No

3. If you answered **no** to the above permit requirement in question 2, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, this permit requirement is met:

   Facilities inventory will be completed within 12 months of permit coverage being extended.

4. List the categories of BMPs that address your pollution prevention/good housekeeping for municipal operations program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. For an explanation of measurable goals, refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf).

   If you have more than five categories, hit the tab key after the last line to generate a new row.

Established BMP categories	**Measurable goals and timeframes**
City Staff Training Program	*Training focused on fertilizer application, pesticide/herbicide application, and mowing discharge.*
Fleet and Building Maintenance Training Program	*Training focused on automotive maintenance program (automotive inspections and washing), spill cleanup training, hazardous materials training, building leak prevention and inspection training.*
Stormwater Systems Maintenance Training Program	*Training focused on parking lot and street cleaning, storm drain systems cleaning, road salt materials management*
Parking Lots & Street Cleaning	*Train employees and document number of times each street is swept annual. Goal is 2 times per year.*
Storm Drain Cleaning System	*Document Number of Sumps cleaned per year. Goal is 100% of the City sumps per year.*
Road Salt Materials Management Program	*Document amount of salt applied each year and train employees in road salt management and application rates annually.*
Storm Sewer Inspection Program	*Conduct one inspection of all City-owned ponds and outfalls prior to expiration date of this permit* *Annual inspection of 100% of structural pollution control devices*
Evaluate Inspection Frequency	*Evaluate inspection records and determine if inspection frequency needs to increase or decrease. Training for Erosion and Sediment Control.*

BMP categories to be implemented	**Measurable goals and timeframes**
Structural Stormwater BMP Maintenance Program	*Based on storm sewer inspection findings determine if repair, replacement, or maintenance measures are necessary to ensure structures proper function and treatment effectiveness. Document annual number or structures repaired or scheduled for maintenance.*
Spill Prevention & Control Plans for Municipal Facilities	*Ensure that plans describing spill prevention and control procedures are consistent among all departments. Conduct annual spill prevention and response training sessions to all municipal employees. Distribute education materials to each municipal facility by the end of year 2.*
Maintenance Yard Inspections	*Once monthly and after < 1"rain events, perform maintenance yard inspections utilizing a checklist for the inspection. Develop checklist format that allows staff to compare results to previous inspections*
Facility Inventory	*Update facilities inventory to include potential pollutants at each site. Create a map of all identified facilities.*
Pond Assessment Procedures & Schedule	*In year 1, develop procedures for determining TSS and TP treatment effectiveness of city owned ponds that are used for treatment of stormwater. Implement schedule in year 2-5.*

5. Does discharge from your MS4 affect a Source Water Protection Area (Permit Part III.D.6.c.)? ☐ Yes ☒ No

   a. If **no**, continue to 6.

b. If **yes**, the Minnesota Department of Health (MDH) is in the process of mapping the following items. Maps are available at http://www.health.state.mn.us/divs/eh/water/swp/maps/index.htm. Is a map including the following items available for your MS4:

1) Wells and source waters for drinking water supply management areas identified as vulnerable under Minn. R. 4720.5205, 4720.5210, and 4720.5330? ☐ Yes ☐ No

2) Source water protection areas for surface intakes identified in the source water assessments conducted by or for the Minnesota Department of Health under the federal Safe Drinking Water Act, U.S.C. §§ 300j – 13? ☐ Yes ☐ No

c. Have you developed and implemented BMPs to protect any of the above drinking water sources? ☐ Yes ☐ No

6. Have you developed procedures and a schedule for the purpose of determining the TSS and TP treatment effectiveness of all permittee owned/operated ponds constructed and used for the collection and treatment of stormwater, according to the Permit (Part III.D.6.d.)? ☐ Yes ☒ No

7. Do you have inspection procedures that meet the requirements of the Permit (Part III.D.6.e.(1)-(3)) for structural stormwater BMPs, ponds and outfalls, and stockpile, storage and material handling areas? ☐ Yes ☒ No

8. Have you developed and implemented a stormwater management training program commensurate with each employee's job duties that:

a. Addresses the importance of protecting water quality? ☐ Yes ☒ No

b. Covers the requirements of the permit relevant to the duties of the employee? ☐ Yes ☒ No

c. Includes a schedule that establishes initial training for new and/or seasonal employees and recurring training intervals for existing employees to address changes in procedures, practices, techniques, or requirements? ☐ Yes ☒ No

9. Do you keep documentation of inspections, maintenance, and training as required by the Permit (Part III.D.6.h.(1)-(5))? ☐ Yes ☒ No

If you answered **no** to any of the above permit requirements listed in **Questions 5 – 9**, then describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

F.5.c. As part of the regulatory mechanism updates for (II.B.3.a.1) the City will provide a BMP to protect drinking water sources that the MS4 discharges may affect as described in the Permit (Part III.D.6.c). The amended ordinance will be placed on the City Council's meeting agenda for approval within 12 months following the date permit coverage is extended.

F.6. The City will develop a procedure for assessing ponds to determine TSS and TP effectiveness as described in the Permit (Part III.D.6.d) This study will develop procedures for determining TSS and TP treatment effectiveness of city-owned ponds used for treatment of stormwater. A schedule will be implemented in years 2 thru 5.

F.7. The City will develop written procedures for inspection of structural stormwater BMPs, ponds and outfalls, and stockpile, storage and material handling areas as described in the Permit (Part III.D.6.f.). Procedures will be in place within 12 months following the date permit coverage is extended.

F.8. The City will evaluate it's training program to insure to is providing training that is commensurate with each employee's job duties. This evaluation will take place within 12 months following the date permit coverage is extended.

F.9., The City will develop written procedures to document inspections, mainenance, and training as described in the Permit (Part III.D.6.h.). Procedures will be in place within 12 months following the date permit coverage is extended.

10. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

Public Works Maintenance Manager / City Engineer.

VI. Compliance Schedule for an Approved Total Maximum Daily Load (TMDL) with an Applicable Waste Load Allocation (WLA) (Part II.D.6.)

A. Do you have an approved TMDL with a Waste Load Allocation (WLA) prior to the effective date of the Permit? ☒ Yes ☐ No

1. If **no**, continue to section VII.

2. If **yes**, fill out and attach the MS4 Permit TMDL Attachment Spreadsheet with the following naming convention**:** *MS4NameHere_TMDL.*

This form is found on the MPCA MS4 website: http://www.pca.state.mn.us/ms4.

VII. Alum or Ferric Chloride Phosphorus Treatment Systems (Part II.D.7.)

A. Do you own and/or operate any Alum or Ferric Chloride Phosphorus Treatment Systems which are regulated by this Permit (Part III.F.)? ☐ Yes ☒ No

1. If **no**, this section requires no further information.
2. If **yes**, you own and/or operate an Alum or Ferric Chloride Phosphorus Treatment System within your small MS4, then you must submit the Alum or Ferric Chloride Phosphorus Treatment Systems Form supplement to this document, with the following naming convention: *MS4NameHere_TreatmentSystem*.

   This form is found on the MPCA MS4 website: http://www.pca.state.mn.us/ms4.

VIII. Add any Additional Comments to Describe Your Program

TMDL Wasteload Allocation Excel Spreadsheet PART II.D.6.a.-e.

Copy and paste from the Master List MS4 TMDL Spreadsheet for your MS4 to the space below.

Attach this completed form with your SWPPP Document at the time of submittal. At a ***minimum,*** *provide all of the information "*"* *items (TMDL Project Name, Type of WLA, Numeric WLA, Unit, Flow Condition, and Pollutant of Concern).*

Permittee name	Preferred ID	TMDL project name*	Waterbody ID	Type of WLA*	Numeric WLA*	Unit*	Percent reduction	Flow condition*	Waterbody name	Pollutant of concern*	Date approved
Golden Valley City	MS400021	Medicine Lake Excess Nutrients TMDL	27-0104-00	Categorical	8.44	lbs/day		N/A	Medicine Lake	Phosphorus	2/8/2011
Golden Valley City	MS400021	Sweeney Lake Total Phosphorus TMDL	27-0035-01	Categorical	4	lbs/day	15%	N/A	Sweeney Lake	Phosphorus	8/10/2011
Golden Valley City	MS400021	Wirth Lake: Excess Nutrients TMDL	27-0037	Categorical	0.104	lbs/day		N/A	Wirth Lake	Phosphorus	10/25/2010

Compliance Schedule PART II.D.6.f.-g.

Is your MS4 currently meeting its WLA for any approved TMDLs? **Go to:** Table 1 **Go to:** Strategies… **Go to:** Table 2

☐ **NO** (Complete Table 1, Strategies for continued BMP implementation beyond the term of this permit, and Table 2 below)
☑ **YES** (Provide the following information below)

If YES, indicate the WLAs (may be grouped by TMDL Project) you believe are reasonably being met. For each WLA, list the implemented BMPs and provide a narrative strategy for the long-term continuation of meeting each WLA. PART II.D.6.g.(1)-(2)

Medicine Lake Excess Nutrients TMDL - The city is meeting its requirements of the TMDL by completing the following tasks on a regular basis:
1. The city provides stormwater education to employees and the public.
2. The city provides water resource education materials to contractors, builders, developers, and the general public.
3. The city performs inspections for the city's illicit discharge detection and elimination program.
4. The city references and makes permitees comply with watershed requirements for post-construction BMP performance.
5. The city continues to monitor and maintain the existing stormwater ponds and other BMPs to sustain removal effectiveness.
6. The city has established maintenance agreements with private owners of permanent BMPs.
7. The city has an established street sweeping program. It sweeps streets at a minimum of two times per year.
8. The city annually inspects and cleans all structural pollution control devices.

Sweeney Lake Total Phosphorus TMDL - The city is meeting its requirements of the TMDL by completing the following tasks on a regular basis:
1. The city provides stormwater education to employees and the public.
2. The city provides water resource education materials to contractors, builders, developers, and the general public.
3. The city performs inspections for the city's illicit discharge detection and eliminationprogram.
4. The city references and makes permitees comply with watershed requirements for post-construction BMP performance.
5. The city continues to monitor and maintain the existing stormwater ponds and other BMPs to sustain removal effectiveness.
6. The city has established maintenance agreements with private owners of permanent BMPs.
7. The city has an established street sweeping program. It sweeps streets at a minimum of two times per year.
8. The city annually inspects and cleans all structural pollution control devices.

Wirth Lake: Excess Nutrients TMDL - The city is meeting its requirements of the TMDL by completing the following tasks on a regular basis:
1. The city provides stormwater education to employees and the public.
2. The city provides water resource education materials to contractors, builders, developers, and the general public.
3. The city performs inspections for the city's illicit discharge detection and elimination program.
4. The city references and makes permitees comply with watershed requirements for post-construction BMP performance.
5. The city continues to monitor and maintain the existing stormwater ponds and other BMPs to sustain removal effectiveness.
6. The city has established maintenance agreements with private owners of permanent BMPs.
7. The city has an established street sweeping program. It sweeps streets at a minimum of two times per year.
8. The city annually inspects and cleans all structural pollution control devices.

Table 1

Fill in the following table with your Interim Milestones, BMP IDs, and Implementation Dates. Replace "TMDL Project Name & Pollutant" Columns with each TMDL Project Name and the corresponding pollutant. Then put an "X" in the boxes for the TMDL that corresponds with each BMP. PART II.D.6.f.(1)-(2)

NOTE:
It is recommended to assign each Interim Milestone (BMP) a BMP ID. You will be required to report on the status of each Interim Milestone and include a BMP ID for all structural BMPs as part of the MS4 Annual Report (see Part III.E.), so including those ID numbers at the time of application may be useful in tracking implementation efforts. If a pond that will be included in the pond inventory (Part III.C.2.) is to be applied toward a WLA, use the same ID for both the pond inventory and TMDL tracking. Non-structural BMPs are not required to have an ID, but it may be useful to assign it an ID for internal MS4 recordkeeping.

MPCA recommends the Implementation Dates align with the submittal of MS4 Annual Reports. Dates selected may not reflect the actual date a BMP is implemented, but shall indicate a BMP will be implemented on that date or before for that reporting year.

Interim Milestone (Best Management Practice)	BMP ID	Implementation Date	Medicine Lake & Excess Nutrients	Sweeney Lake & Total Phosphorus	Wirth Lake & Excess Nutrients

Strategies for continued BMP implementation beyond the term of this permit. PART II.D.6.f.(3)

The city will Identify potential projects , Conduct feasability studies for proposed projects , Identify funding options for proposed projects and If feasable construct projects that add additional benefit to already achieved TMDL goals

Table 2
Target dates the applicable WLA(s) will be achieved. PART II.D.6.f.(4)

TMDL Project	Target Date to Achieve WLA

Appendix B

City of Golden Valley/Minnehaha Creek Watershed District LGU/WMO Coordination Plan

City of Golden Valley LGU/MCWD Coordination Plan

Activity ID	Activity Description	City Staff	Estimated Timeline
LGU-1	Provide annual report to MCWD regarding SWMP implementation progress, including MS4 reporting	Public Works Specialist	Annually (June)
LGU-2	Inform project proposers of applicable MCWD rules and permitting requirements	Public Works Specialist	Ongoing
LGU-3	Meet with MCWD staff to review potential redevelopment activity within MCWD jurisdiction	Public Works Specialist City Planner	As needed[1]
LGU-4	Coordinate City infrastructure maintenance activities in Minnehaha Creek watershed (e.g., pavement management, utility upgrades)	Public Works Specialist	As needed[1]
LGU-5	Provide proposed changes to City ordinance, regulatory controls, and resource management plans to MCWD for review	Public Works Specialist	As needed
LGU-6	Participate in MCWD watershed planning actions by providing review and comment (e.g., watershed plan update, rule updates)	Public Works Specialist	As requested

(1) Frequency of activity within the Minnehaha Creek watershed is anticipated to be limited due to small watershed size