City of
Sunfish Lake

COMPREHENSIVE STORMWATER MANAGEMENT PLAN

NOVEMBER 2018

Prepared for:
City of Sunfish Lake

WSB PROJECT NO. 11531-000

wsb

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CITY OF SUNFISH LAKE

November 2018

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

Jeffry Sandberg, PE Reg. No. 25393

BMPs – Best Management Practices

BWSR – Board of Water and Soil Resources

City – City of Sunfish Lake

CAMP – Citizen Assisted Lake Monitoring Program

CSWMP – Comprehensive Stormwater Management Plan (also called the plan, City plan and local plan)

DNR – Department of Natural Resources

DWSMA – Drinking Water Supply Management Area

FEMA – Federal Emergency Management Agency

HWL – High Water Level

ISTSs – Individual Sewage Treatment Systems

LGU – Local Governmental Unit

LMRWMO – Lower Mississippi River Watershed Management Organization

MDH – Minnesota Department of Health

MLCCS – Minnesota Land Cover Classification System

MnRAM – Minnesota Routine Assessment Method for Evaluating Wetland Functions

MPCA – Minnesota Pollution Control Agency

MS4 – Municipal Separate Storm Sewer System

NOAA - National Oceanic and Atmospheric Administration

NPDES – National Pollutant Discharge Elimination System

NWL – Normal Water Level

OHWL – Ordinary High Water Level

PFOS - Perfluorooctane Sulfonate

SWPPP – Storm Water Pollution Prevention Plan

TMDL – Total Maximum Daily Load

WCA – Wetland Conservation Act

WHPA – Wellhead Protection Area

1. EXECUTIVE SUMMARY

This Comprehensive Stormwater Management Plan (CSWMP) for the City of Sunfish Lake (City) has been developed to meet local watershed management planning requirements of the Metropolitan Surface Water Management Act and Board of Water and Soil Resources (BWSR) Rules Chapter 8410. It has also been developed to be in conformance with the requirements of the Lower Mississippi River Watershed Management Organization (LMRWMO), Metropolitan Council requirements, and applicable state and federal laws. This document and its referenced literature is intended to provide a comprehensive inventory of pertinent water resource related information that affects the City and management of those resources.

Section 2 of this plan provides an introduction and purpose. This section also lists the personnel contacts involved in the assistance and implementation of this plan.

Section 3 of this plan provides an inventory of land and water resources within the City. This section of the plan includes a general summary of data related to precipitation, geology, topography, water quality, shoreline ordinances, groundwater, soils, land use, fish and wildlife habitat, and pollutant source locations within the City.

Section 4 of this plan outlines the water resource management related goals and policies of the City, which address the needs of the City and county, as well as regional, state, and federal agencies. Goals and policies have been developed for the City concerning water quantity, water quality, recreation, fish and wildlife management, enhancement of public participation, information and education, groundwater, wetlands, and erosion.

Section 5 of this plan provides an assessment of the existing and potential water resource related concerns within the City. These concerns were identified based on an analysis of the land and resource data collected as part of this plan preparation. Corrective actions have been identified in response to concerns and typically include studies, capital improvements, or programs which may resolve these identified problems.

Section 6 outlines implementation priorities and develops an implementation program. This section contains a prioritized listing of the studies, programs, and capital improvements that have been identified as necessary to respond to the water resource needs within the City, and is presented in a tabular format. The implementation period identified within this report for the programs, studies and capital improvements is from the year 2018 through 2027.

Section 7 discusses the financial considerations of implementing the proposed regulatory controls, programs, and improvements, which have been identified in this plan and their financial impact on the City. The plan indicates that the majority of funding for the policies and corrective actions will be from the City's General Fund. Other possible funding sources for the implementation of this plan includes the City Capital Improvement Program, general fund taxes, special assessments, and grant monies, which may be secured from various local, regional, county, state, or federal agencies.

Section 8 discusses the procedures to be followed in the event this CSWMP is amended. Once this plan is approved, no significant changes to this plan can be facilitated without the approval of the proposed revisions by the LMRWMO within the City that is affected by the change. Significant changes to the plan shall be made known to the Mayor, City Council, City staff, the Metropolitan Council, and the LMRWMO.

This CSWMP will be in effect until significant changes are deemed necessary or the City is required to update the Plan per a Watershed Management Organization Plan update.

Section 9 lists references and/or supplemental documents that were used in the development of this Plan.

2. INTRODUCTION AND PURPOSE

2.1. General

This CSWMP has been developed to provide the City of Sunfish Lake with direction concerning the administration and implementation of water resource activities within the City. This plan is intended to meet the requirements for a local watershed management plan as required by the Metropolitan Surface Water Management Act, be in conformance with BWSR Rules Chapter 8410, and consistent with the County Groundwater Plan.

In addition to being in conformance with the above state law, this plan has also been developed to meet the needs, requirements, and direction outlined by the following list:

1. LMRWMO Watershed Management Plan (2011/Amended 2015)
2. State Laws and Rules concerning wetland management as outlined in the Wetland Conservation Act (WCA) of 1991 and amendments
3. State and Federal laws regarding the need to secure a National Pollutant Discharge Elimination System (NPDES) permit

This plan incorporates the approaches and direction provided in the programs and documents listed above into a comprehensive plan that can be consistently applied across the City. This plan and its policies will be in effect upon adoption of the plan by the Sunfish Lake City Council.

2.2. Personnel Contacts

To implement this plan, a coordinated water resource management approach must be used. This approach utilizes the services of staff personnel within the City and surrounding communities, as well as staff personnel associated with the LMRWMO. The City is entirely within the LMRWMO.

The primary implementation responsibility will lie with the appropriate staff members at the City. Assistance from the surrounding municipalities and the LMRWMO will also be anticipated. Outlined below are the names, addresses, and telephone numbers for personnel having responsibilities for overseeing or implementing various aspects of the CSWMP.

City of Sunfish Lake
City Engineer – Jeff Sandberg, P.E.
WSB & Associates, Inc.
701 Xenia Avenue – Suite 300
Minneapolis, MN 55416
(763) 541-4800

Lower Mississippi River Watershed Management Organization
Administrator – Joe Barten
Dakota County Soil and Water Conservation District
4100 220th St. West, Suite 102
Farmington, MN 55024
(651) 480-7784

2.3. Water Resource Related Agreements

The City has entered into water resource-related agreements that govern in part how the City must manage its water resources. These agreements include the joint powers agreement between the City and LMRWMO, agreements between the City and adjoining communities, or agreements it may have with other governmental units or private parties. Listed below is a

description of the water resource related agreements into which the City has entered. Copies of these agreements or appropriate portions thereof are included in **Appendix B**.

- Cities of Inver Grove Heights, Lilydale, Mendota Heights, St. Paul, Sunfish Lake, Sunfish Lake, and West Saint Paul
    - Revised and Restated Joint Powers Agreement establishing a Watershed Management Organization for the Lower Mississippi River Watershed, 2001, and amendments.

- City of Sunfish Lake and City of Mendota Heights
    - The City has a 12-inch outlet at Sunfish Lake that discharges water to Mendota Heights. The City of Sunfish Lake and the City of Mendota Heights have entered into an agreement that governs the outlet elevation, maintenance of the outlet structure and valve, and operation of the outlet. The invert of the outlet pipe is one inch (1") above the ordinary high water level (OHWL) of 937. The invert of the pipe is the control for the elevation of the lake. Water is then discharged through the pipe to a manhole with a valve that can open and close. The valve structure is operated manually and is open most of the time. Water is then discharged through a series of ditches to Mendota Heights. The City of Mendota Heights maintains and operates the outlet structure. The City of Sunfish Lake will reimburse Mendota Heights for these operational costs. Additionally, the City of Sunfish Lake cannot divert more water to Mendota Heights.

3. LAND AND WATER RESOURCE INVENTORY

As required in Minnesota Rules Section 8410.0060, this section of the plan provides a general description and summary of the climate, geology, topography, surface and groundwater resource data, soils, land use, fish and wildlife habitat, and pollutant sources. This section also identifies where detailed information can be obtained for many of these areas of concern.

3.1. Climate and Precipitation

3.1.1. Climate

The climate within the Minneapolis/St. Paul metropolitan area is described as a humid continental climate with moderate precipitation, wide daily temperature variations, warm humid summers, and cold winters. The total average annual precipitation is approximately 31 inches, of which approximately one-third occurs in the months of June, July and August. The annual snowfall average is about 54 inches and is equivalent to approximately 5.4 inches of water. Average monthly temperature, precipitation, and snowfall are shown in **Table 3.1**. Additional climatological information for the area can be obtained from the Minnesota State Climatology Office website.

3.1.2. Precipitation

A rainfall event having a 99% chance of occurrence in any given year (1-year storm event) within a 24-hour period is approximately 2.5 inches. A rainfall event having a 1% chance of occurrence (100-year storm event) in a 24-hour period is approximately 7.4 inches. This rainfall data was obtained from the Atlas 14 website produced by the National Oceanic and Atmospheric Administration (NOAA), taken at a central point within the City. The 1%, 10-day runoff (snowmelt) is 7.2 inches. Because snowmelt data was not updated with Atlas 14, this data was obtained from the U.S. Weather Bureau Technical Paper 40. Additional precipitation information for the area can be obtained from the NOAA website.

Table 3.1: Average Monthly Temperature, Precipitation, and Snowfall Data for Minneapolis/St. Paul Metropolitan Area

Month	Average Temp (F°)	Precipitation (Inches)	Snowfall (Inches)
January	15.6	0.90	12.2
February	20.8	0.77	7.7
March	32.8	1.89	10.3
April	47.5	2.66	2.4
May	59.1	3.36	0
June	68.8	4.25	0
July	73.8	4.04	0
August	71.2	4.30	0
September	62.0	3.08	0
October	48.9	2.43	0.6
November	33.7	1.77	9.3
December	19.7	1.61	11.9
	Annual Average: 46.2	**Total: 30.61**	**Total: 54.4**

Source: State Climatology Office for the Minneapolis/St. Paul Airport

3.2. Geology and Topographic Information

3.2.1. Geology

The City of Sunfish Lake is located in northern Dakota County (**Figure 1, Appendix A**), five miles south of the City of St. Paul. The City of West St. Paul lies to the north,

Mendota Heights to the west, Eagan to the southwest, and Inver Grove Heights to the east and south. Total area within the corporate limits is approximately 1.7 square miles.

The geomorphology of the City is comprised of Superior Lobe deposits. The composition of the Superior Lobe deposits located in the City consists of glacial lake sand consisting of reddish-brown sand, grading downward into silt deposits laid down periodically on the bottoms of glacial lakes, clay, very fine sand, and till consisting of a reddish-brown sandy loam with cobbles and boulders common throughout. The areas of till found within northern Dakota County are frequently found in complexes intermixed with ice-contact stratified deposits of gravel and sand.

The bedrock formations include the Platteville and Glenwood Formations, the St. Peter Sandstone, the Decorah Shale, the Jordan Sandstone and the St. Lawrence shale. Depth to the bedrock varies from approximately 150 feet to 250 feet below the surface.

Five major bedrock aquifers are accessible for water supply for the City of Sunfish Lake: Prairie Du Chien-Jordan, St. Peter, Mount Simon-Hinckley, Ironton-Galesville, and Platteville Aquifers. City residents utilize the Prairie du Chien-Jordan aquifer most often for private water supply because of its high yield, very good water quality, and relatively easy accessibility.

Additional geologic information for areas within the City can be found in the Geologic Atlas of Dakota County on the Minnesota Department of Natural Resources (DNR) website.

3.2.2. Topography

The topography of the City can be described as moraine (accumulation of soil and stone deposited by glacier activity) topography with many slopes and wetlands. Stormwater runoff from the City of Sunfish Lake is generally directed to the water bodies within the City or the surrounding communities.

There are several lakes within the City including Sunfish Lake, Hornbeam Lake, and Horseshoe Lake. Sunfish Lake is the largest lake with a total surface area of 45 acres and a maximum depth of 32 feet.

The specific drainage patterns, which depict topography for areas within the City, are shown on **Figure 2, Appendix A**.

3.3. Surface Water Resource Data

3.3.1. Wetland Inventory

A wetland inventory has been completed by U.S. Fish and Wildlife Service as published on the National Wetland Inventory Maps, and by the DNR as published in their Public Waters and Wetlands Inventory. These wetland inventories will be utilized to assist in determining if a wetland is present on a given parcel of property within the City. The National Wetland Inventory and the DNR Public Waters/Wetlands maps are shown on **Figure 3, Appendix A**.

The City of Sunfish Lake has adopted a Wetlands Overlay District Ordinance and incorporates by reference the WCA of 1991, as amended, to protect and conserve wetland resources within the City. This ordinance can be found in **Appendix C**.

3.3.2. Major Bodies of Water

There are several water bodies that convey and store water within and through the City as shown on **Figure 3, Appendix A**. These water bodies are as follows:

- Sunfish Lake
- Hornbeam Lake (LMRWMO intercommunity water body)
- Horseshoe Lake
- Wood Duck Pond
- Pagoda Pond
- Several wetlands and small ponds

Some of the wetlands and ponds in the City are landlocked, as shown on **Figure 3, Appendix A**. Water will only flow out of these waterbodies during extreme rainfall or runoff events that occur during extended wet climatic cycles. When climate conditions are normal, water exits these basins through evaporation and/or seepage to the groundwater.

The City's major waterbodies are within private residential areas. No public access is provided within the City limits.

3.3.3. Hydrologic Modeling (Water Quantity)

The City's hydrologic/hydraulic system consists of Sunfish Lake, Hornbeam Lake, Horseshoe Lake as well as other ponds, wetlands, ditches, and storm sewer pipe systems. A watershed description and drainage analysis was completed for the City in 1991. The subwatersheds are illustrated on **Figure 2, Appendix A**. The summary of the hydrologic analysis including the 100-year flow rates are shown in **Appendix D**. This plan assumed fully developed conditions within the City and considered the minimal effects of tributary runoff into the City of Sunfish Lake from the cities of West St. Paul and Inver Grove Heights. Most stormwater from the City is discharged to surrounding communities.

Some minor updates to the model have been made since 1991. These changes were the result of analyzing small drainage areas due to regrading on private property that received permits from the City. The table in **Appendix D** reflects these changes.

The City of Sunfish Lake has remained a low density residential housing community. The City maintains an ordinance that requires a minimum of 2.5 acres (excluding wetlands) for all residential lots. Most lots in the City are larger than the required 2.5 acres. In recent years, the City of Sunfish Lake has experienced very little development. While land uses have not changed dramatically, the City desires to update its hydrologic model to include updated Atlas 14 rainfall data and any land changes that have occurred since the last Plan. For areas where problem drainage areas exist, updated modeling will be completed to address the issue. Based on any future updated modeling, if changes to intercommunity flows occur, they will be forwarded to the LMRWMO.

3.4. Water Resource Problem Areas

Some water resource problem areas and potential problem areas were identified as part of the development of this Plan.

1. The Sunfish Lake outlet is frequently blocked by debris and requires maintenance.
2. The roadside ditch adjacent to Charlton Road does not drain effectively
3. Residents within the City are generally concerned about lake water quality.
4. Multiple culverts within the City are in need of cleaning and/or repair.

Figure 4, Appendix A shows the location of the water resource problem areas. More detailed information about these areas is available in **Section 5** of this Plan.

3.5. Water Quality Data

3.5.1. Overview

Water quality data for the City has been obtained from several water quality monitoring studies for Sunfish Lake, Horseshoe Lake, and Hornbeam Lake. **Figure 5, Appendix A** shows the location of the City water quality monitoring sites. Based on the classification systems of the MPCA and LMRWMO, the water bodies within the City have been classified as shown in **Table 3.2**.

Table 3.2: Water Body Classifications

Classification	Water Body	Minnesota Water Quality Standards**
Deep Lakes	Sunfish Lake	Secchi Disc: 1.4 m TP: 40 ug/L Chl a: 14 ug/L
Shallow Lakes	Horseshoe Lake Hornbeam Lake*	Secchi Disc: 1.0 m TP: 60 ug/L Chl a: 20 ug/L

*Intercommunity water body

**Standards defined by Minnesota Rules 7050 for Class 2B waters in the North Central Hardwood Forest Ecoregion

The City will continue to monitor Sunfish Lake, Hornbeam Lake, and Horseshoe Lake by taking part in the Citizen Assisted Lake Monitoring Program (CAMP). The City's water quality analysis can be found on the Lake Info Sheets in **Appendix E**.

3.5.2. *Impaired Waters*

The MPCA lists Sunfish Lake and the Mississippi River as being impaired, meaning that the water bodies are too polluted or otherwise degraded to meet the water quality standards set by governing bodies.

Sunfish Lake was added to the Impaired Waters List in 2010 for impairment to aquatic recreation due to nutrient/eutrophication biological indicators. A Total Maximum Daily Load (TMDL) report for the LMRWMO was completed in 2014 and can be found on the MPCA's website. The TMDL did not assign a load reduction to the City, as the primary source of nutrients is the lake's internal loading. As noted in **Issue 5.1.1**, an alum treatment was applied to the lake in 2017 as recommended in the TMDL to address the internal loading.

Currently, the portion of the Mississippi River to the west, north, and east of the City (ID 07010206-814) is impaired for mercury and perfluorooctane sulfonate (PFOS) in fish tissue and the water column, PCB in fish tissue, nutrients, total suspended solids, and fecal coliform. While no portion of the City discharges directly to the Mississippi River, stormwater from the City ultimately discharges there. As noted in **Issue 5.1.3**, the City will work with LMRWMO as feasible to improve water quality upstream of the Mississippi River.

For more information on impaired waters and TMDL Plans visit the MPCA's Impaired Waters List.

3.6. Shoreland, Floodplain and Wetland Management Regulations

The City of Sunfish Lake has developed Shoreland Overlay Zoning Regulations. These regulations are designed to protect and preserve the health of the three main recreational lakes – Sunfish Lake, Hornbeam Lake, and Horseshoe Lake. These lakes have been designated in the ordinance as Recreational Development. These regulations are in **Appendix C** and are generally consistent with the DNR Shoreland Ordinance.

The City of Sunfish Lake does not participate in the Federal Emergency Management Agency (FEMA) Flood Insurance Program as there are no FEMA designated 100-year floodplains within the City. However, the City has identified flood inundation areas for its water bodies. Regulation associated with flood inundation areas and 100-year flood elevations are outlined in the Shoreland and Storm Water Ordinances as well as in **Section 4** of this Plan. The 100-year high water level (HWL) information is shown on the tables in **Appendix D**.

The City has adopted Wetland Overlay District regulations in their zoning code. These regulations adopt the WCA and are contained in **Appendix C**.

3.7. Groundwater Appropriations

The DNR Division of Waters regulates water use (appropriation) for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year and requires all users who meet the above criteria for water usage to obtain a permit. The City of Sunfish Lake and residents are not required to obtain this permit based on the DNR Waters exemption for residential uses serving less than 25 people and/or withdrawal of less than 10,000 gallons per day. Some residents along Charlton Road and close to the City of Mendota Heights' boundary receive sewer and water services from the City of Mendota Heights through a Joint Powers agreement between the Cities of Sunfish Lake and Mendota Heights.

3.8. Groundwater Resource Data

Groundwater resource data for areas within the City are available by reviewing the contents of three reports. A brief description of the content in these documents is provided below. These documents may be obtained from Dakota County.

- The Dakota County Geologic Atlas (1990) contains information on aquifers, general depth to groundwater table, and areas sensitive to groundwater pollution. This information indicates that in general, the City has low to medium low sensitivity to groundwater pollution. The Dakota County Geologic Atlas is currently being updated. The City will update its groundwater resource data as necessary upon the release of the update.

- Dakota County 2020 Environment and Natural Resource Management Policy Plan, (2005) contains information about groundwater within the County.

- The Dakota County Comprehensive Plan (DC2030) contains information on the County's natural systems and land use and is currently the guiding document for groundwater protection in the County. The County's Comprehensive Plan is currently being updated (DC2040). Upon its adoption, anticipated in February 2019, DC2040 will become the guiding document on groundwater protection.

The northeast portion of the City is within the Drinking Water Supply Management Area

(DWSMA) and Wellhead Protection Area (WHPA) for the City of South St. Paul, as shown in **Figure 6, Appendix A**.

3.9. Soils Information

The soils in most of the City are sandy, gravelly material deposited by glaciers. The hydrologic soil classification map is shown in **Figure 7, Appendix A**. This soil data is approximate; site-specific conditions should be evaluated to determine soil infiltration capacity for proposed projects. The four soil classifications are defined as follows and the infiltration rates are consistent with the Minnesota Pollution Control Agency's (MPCA) Stormwater Manual:

Group A – Soils have high infiltration rates even when thoroughly wetted. The infiltration rates range from 0.8 to 1.6 inches per hour. These soils consist chiefly of deep, well drained to excessively drained sands and gravel. Group A soils have a high rate of water transmission, resulting in a low runoff potential.

Group A/D – Soils hydrology is a mixture of Group A and Group D. Group A/D soils contain the features and characteristics of both Group A and Group D soils depending on whether the soils are drained or undrained.

Group B – Soils have moderate infiltration rates ranging from 0.3 to 0.45 inches per hour when thoroughly wetted. Group B soils consist of deep moderately well to well drained soils with moderately fine to moderately coarse textures.

Group B/D – Soils hydrology is a mixture of Group B and Group D. Group B/D soils contain the features and characteristics of both Group B and Group D soils depending on whether the soils are drained or undrained.

Group C – Soils have slow infiltration rates around 0.2 inches per hour when thoroughly wetted. Group C soils have moderately fine to fine texture.

Group C/D – Soils hydrology is a mixture of Group C and Group D. Group C/D soils contain the features and characteristics of both Group C and Group D soils depending on whether the soils are drained or undrained.

Group D – Soils have very slow infiltration rates ranging from 0 to 0.06 inches per hour when thoroughly wetted. Group D soils are typically clay soils with high swelling potential, soils with high permanent water table, soils with a clay layer at or near the surface, or shallow soils over nearly impervious material.

The soils in the City are classified as part of the Kingsley-Mahtomedi series. This series consists of gently sloping to very steep, well drained and excessively drained soils formed in loamy and sandy glacial till and sandy glacial outwash on uplands and pitted outwash plains.

Additional information on the geology and soil for the City is available in the Soil Survey of Dakota County on the Natural Resource Conservation Service's website.

3.10. Land Use, Land Cover, and Public Utilities Services

The City of Sunfish Lake's land use is low density residential with the exception of four churches and open space. **Figure 8, Appendix A** shows the City's land use map. There are no proposed changes to these land uses.

The Minnesota Land Cover Classification System, or MLCCS, categorizes urban and built up

areas in terms of land cover rather than land use. MLCCS serves as a tool for City staff to integrate natural area preservation into land planning, land use, and zoning decisions. The City is comprised of mostly developed area with additional zones of herbaceous area, forest, and wetland/water as shown in **Figure 9, Appendix A**.

Water and sewer services are mainly provided by individual wells and septic systems. The City is dependent on groundwater for its water supplies. The City has adopted the standards and regulations in Dakota County Ordinance No. 114 to be followed for the construction, reconstruction, maintenance, operation, repair, registered and reclaimed use, and abandonment of all wells and water supplies.

The City has adopted the MPCA Water Quality Division Individual Sewage Treatment Systems (ISTS) Standards, Minnesota Rules Chapter 7080, as the individual sewage disposal code for the City of Sunfish Lake.

3.11. Fish and Wildlife Habitat

The City of Sunfish Lake provides habitat for a variety of small mammals, reptiles, birds, amphibians, and insects. Maintenance of habitat for wildlife species is important in maintaining ecological stability in the City's natural areas. The City currently employs a professional Forester to assist in providing public information and guidance towards best management practices (BMPs) and habitat preservation for wooded areas. The City has a Comprehensive Tree Preservation program in addition to its Shoreland and Wetlands Overlay Districts regulations to preserve its natural resources and protect fish and wildlife habitat.

The City received a gift of 22 acres of parkland that will remain under the Minnesota Land Trust Conservation Easement Program in perpetuity. This area is located just south of Salem Church Road.

Dakota County completed the "Dakota County Farmland and Natural Areas Protection Plan" in 2002. This plan shows the City as an urban area and no greenways were designated for the City as part of this planning effort.

3.12. Pollutant Source Locations

The MPCA lists the following potential sources of soil and groundwater contamination as shown in **Figure 10, Appendix A**:

- One solid waste site on Windy Hill Road
- Several construction stormwater sites throughout the City
- Two underground tanks along the border with the City of Mendota Heights
- Three petroleum remediation leak sites in the northwestern corner of the City

ISTSs throughout the City are potential sources of contamination. Other sources of groundwater and soil contamination include possible spills on Interstate 494 and other transportation corridors within the City limits. To address this concern, the Minnesota Department of Transportation has assumed responsibility for cleanup and relocation of oil and other contaminants should they occur within these corridors.

3.13. NPDES Phase II

The MPCA implemented the NPDES Phase II Stormwater Program in March 2003. Phase II requires municipal separate storm sewer systems (MS4s) in urban areas with populations over 10,000 and under 100,000 to obtain an NPDES permit. The City has completed a Stormwater

Pollution Prevention Program (SWPPP) in conformance with the MPCA. The City's SWPPP is contained in **Appendix F**. Permits for construction sites greater than 1 acre are also required as part of Phase II.

4. ESTABLISHMENT OF GOALS AND POLICIES

The City of Sunfish Lake has developed a number of goals and policies that conform to the overall purpose that is specified in Minnesota Statutes Section 103B.201. These goals and policies have been developed to be in conformance with the policies required by the LMRWMO (see **Appendix H** for the regulatory framework of water resources within the City of Sunfish Lake). The City of Sunfish Lake will work with the LMRWMO on intercommunity issues.

These goals and policies have also been developed to preserve and use natural water storage and retention systems to:

A. Limit public capital expenditures to control volumes and rates of runoff.

B. Improve water quality.

C. Prevent erosion of soil into surface water systems.

D. Promote groundwater recharge.

E. Protect and enhance fish and wildlife habitat and water recreational facilities.

F. Secure the other benefits associated with the proper management of surface water.

The goals and policies the City has developed address issues related to water quantity, water quality, recreation, fish and wildlife, enhancement of public participation, information and education, public ditch system management, ground water management, wetland management, and soil erosion management. Outlined below are the goals and policies that have been developed for each of the above areas of concern.

Note: After each policy, it is noted if the policy originated from the LMRWMO. If no note, the policy originated with the City.

4.1. Water Quantity

Goal:

Limit public capital expenditures to control runoff volumes, rates, and downstream impacts from development.

Policies:

For additional policies, see the City's Engineering Design Standards for Stormwater Management in **Appendix I**.

1. Low Impact Design will be used to the greatest extent reasonable for development and redevelopment to reduce the amount of impervious surface in the City. *(LMRWMO)*
2. For development or redevelopment that increases impervious surface area by one acre or more, abstraction of 1.0 inches of runoff from the net new impervious surface will be required.
3. Infiltration will not be allowed in areas where the soils are not suitable for infiltration, within a DWSMA or WHPA, or where there is less than three feet (3') of separation between the bottom of the infiltration system and the groundwater or bedrock. The City requires in-situ field tests to verify the on-site soil infiltration rate prior to the construction of infiltration BMPs. *(LMRWMO)*
4. The level of flood protection to be provided along trunk conveyance systems, streams, channels, wetlands, ponds, detention basins, and lakes shall be based on the critical-duration

100-year event, which is defined as the 100-year 24-hour rainfall or the 100-year, 10-day runoff event, whichever is greater. (LMRWMO)

5. Trunk stormwater systems shall be designed to provide discharge capacity for the critical-duration runoff event that is not less than a 10-year frequency event. For open channel conveyance systems, the design criteria shall be for the critical 100-year event. Variances to this standard may apply in areas where in-place storm sewers are designed for a 5-year frequency event. *(LMRWMO)*
6. Emergency overflow structures (e.g., swales, spillways) are to be incorporated, where feasible, into pond outlet structure designs to prevent undesired flooding resulting from storms larger than the 100-year event or from plugged outlet conditions. *(LMRWMO)*
7. All minor drainage systems (non-trunk) and local stormwater collection systems analyses and design will be based on a 10-year event.
8. The peak rate of runoff from the developed subwatershed of a site will not exceed the existing peak discharge rate for the 2-, 10-, and 100-year critical storm event *(LMRWMO).*
9. Drainage calculations for the 2-, 10-, and 100-year critical events must be submitted and approved as part of any development or redevelopment applications of one acre in size or greater prior to the issuance of any building or grading permit.
10. The design storm events shall be as follows:

Event Frequency	***Event Duration***	***Probability of Occurrence in Any Given Year***	***Rainfall Amount (inches)***
1 – Year	24 – Hour	99%	2.5
2 – Year	24 – Hour	50%	2.8
5 – Year	24 – Hour	20%	3.5
10 – Year	24 – Hour	10%	4.2
100 – Year	24 – Hour	1%	7.4
100 – Year	10 – Day Runoff (snowmelt)	1%	7.2 (inches of runoff)

11. The City prefers to provide rate control through site-by-site stormwater detention/retention systems.
12. Detention facility design will include access for maintenance of the outlet structure and to the facility in general. *(LMRWMO)*
13. Easements over floodplains, detention areas, wetlands, ditches, and all other parts of the stormwater system as areas develop or redevelop is required. *(LMRWMO)*
14. Outlets for landlocked basins will be provided based on the following conditions:

    a. Only the existing tributary area may discharge to a landlocked basin, unless provision has been made for an outlet from the basin or hydrologic analysis has been completed showing additional discharge to basin is acceptable. *(LMRWMO)*
    b. The form of outlet may range from temporary pumps to gravity storm sewers. The outlet is to be in place before increased water levels are likely to affect vegetation, slope stability, and property values. *(LMRWMO)*
    c. The City will encourage the reduction of impervious area coverage and increased infiltration opportunities in watersheds tributary to landlocked basins.
    d. In establishing high water elevations and whether outlets are needed for landlocked basins, the long duration events—such as multiple-year wet cycles, high runoff volume events, and/or back-to-back 100-year events—will be considered (e.g., snowmelt events that last for many weeks). *(LMRWMO)*
    e. Emergency overflows or outlets to drainage systems will be provided to any landlocked area if the available stormwater storage capacity is inadequate to prevent flooding of residences and if the available downstream conveyance system capacity is adequate to accept additional flow.
    f. Outflow rates should allow for as much infiltration as possible. Drawdown time to within one foot of the normal water level (NWL) should not exceed 48 hours. *(LMRWMO)*

15. The City's natural ponding areas, such as wetlands and lakes, currently provide and will continue to provide for the impoundment and treatment of surface water runoff as appropriate and according to local, state, and federal regulations.
16. The City intends to use both designated and non-designated areas to store stormwater runoff. Non-designated areas include general depressions, areas lacking easements, low points, and streets where structures and/or property is not damaged and any inundation that occurs will only be temporary in nature.
17. The City will encourage the development of enhanced infiltration practices wherever practical. The City will require that a maintenance plan that includes procedures for maintenance and funding be submitted prior to approval of private infiltration basins. The City will not maintain private infiltration areas. The Minnesota Stormwater Manual contains information on infiltration design guidelines.
18. Uses or activities within the 100-year flood inundation areas that include structures, fill, and obstruction of flood flows or that cause increased flood elevations are prohibited.
19. The City will ensure that development projects undertaken by the City will not overtax the existing downstream stormwater drainage system. *(LMRWMO)*
20. The basement floor will be four feet (4') above the currently observed groundwater elevations in the area and two feet (2') above the elevation of any known or historic high groundwater elevations for the area. Information on historic high groundwater elevation can be derived from any reasonable sources including piezometer data, soil boring data, etc.
21. The minimum floor elevation, which includes the basement, for new development or redevelopment will be at least one foot (1') above the critical 100-year HWL. *(LMRWMO)*
22. Any new development or redevelopment within the City will maintain a minimum building opening of three feet (3') above the anticipated 100-year HWL or three feet (3') above the OHWL, whichever is higher, as a standard practice. However, if this freeboard requirement is considered a hardship, the standard could be lowered to two feet (2') if the following can be demonstrated:
    a. That, within the two-foot (2') freeboard area, stormwater storage is available which is equal to or exceeds 50% of the stormwater storage currently available in the basin below the 100-year HWL.
    b. That a 25% obstruction of the basin outlet over a 24-hour period would not result in more than one-foot (1') of additional bounce in the basin.
    c. An adequate overflow route from the basin is available to provide assurance that one-foot (1') of freeboard will be maintained for the proposed low building opening. *(LMRWMO)*
23. The City will abide by the intercommunity design flows and coordinate with downstream cities if flows exceed what is outlined in modeling information in **Appendix D** or any updated, approved modeling.

4.2. Water Quality

Goal:

Maintain or improve the quality of water in lakes, streams or rivers within or immediately downstream of the City.

Policies:

For additional policies, see the City's Engineering Design Standards for Stormwater Management in **Appendix I**.

1. All stormwater detention facilities will be designed to have a forebay to remove coarse sediment prior to discharge.
2. The City prefers to provide water quality improvement using site-by-site stormwater treatment systems.

3. For development or redevelopment that increases impervious surface area by one acre or more where abstraction is not feasible, a stormwater treatment to NURP standards can be constructed to meet water quality standards. The design for these ponds shall be as follows:

    a. A permanent pool ("dead storage") volume below the principal spillway (normal outlet) shall be greater than or equal to the runoff from a 2.5-inch, 24-hour rainfall over the entire contributing drainage area assuming full development.
    b. A permanent pool average depth (basin volume/basin area) shall be $\geq$ 4 feet, with a maximum depth of $\leq$ 10 feet.
    c. An emergency overflow (emergency outlet) adequate to control the 100-year critical duration event.
    d. Basin side slopes above the NWL should be no steeper than 4:1, and preferably flatter. A basin shelf with a minimum width of ten feet (10') and depth of one foot (1') below the NWL is recommended to enhance wildlife habitat, reduce potential safety hazards, and improve access for long-term maintenance.
    e. To prevent short-circuiting, the distance between major inlets and the normal outlet shall be maximized.
    f. A flood pool ("live storage") volume above the NWL shall be adequate so that the peak discharge rates from 2-, 10-, and 100-year, 24-hour events are no greater than pre-development basin watershed conditions.
    g. No orifice smaller than four inches (4") is allowed in the construction of ponds or outlets within the City.
    h. Retardance of peak discharges for the more frequent storms can be achieved through a principal spillway design which may include a perforated vertical riser, small orifice retention outlet, or compound weir.

4. For development or redevelopment that disturbs one acre or more, the City will require 50% total phosphorus removal. For this policy, mill and overlay and pavement rehabilitation projects will not be considered land disturbance. This water quality requirement will be considered satisfied if the volume control requirement (**Section 4.1, Policy 2)** is met. For areas that discharge directly to a water body for which a TMDL has been completed, the TMDL requirements may replace this policy. *(LMRWMO)*
5. For new stormwater discharge points/outfalls, the City will provide pretreatment (at least grit and floatable removal) of stormwater prior to its discharge to wetlands and other water resources. The City will require pretreatment prior to discharge into any new infiltration system. (LMRWMO)
6. A 16.5-foot buffer of natural vegetation above the NWL or wetland boundary is required around ponds, lakes, and wetlands upon development or redevelopment. These buffers will be promoted and encouraged for all existing properties adjacent to lakes, streams, and wetlands.
7. Classification of City waterbodies are consistent with the MPCA and LMRWMO as given in **Table 3.2**. *(LMRWMO)*
7. The City will continue to implement its water quality monitoring program through CAMP.
8. The City will require implementation of BMPs during development and redevelopment to achieve the goal of reducing nonpoint source pollution, with emphasis placed on the watersheds that drain (or will drain) to the Mississippi River. *(LMRWMO)*
9. The City will encourage the reduction in the amount of impervious surface upon development or redevelopment. *(LMRWMO)*
10. The City will consider both the water quality and flooding impacts of proposed outlets from landlocked basins on downstream water resources. *(LMRWMO)*
11. The City will continue to implement its SWPPP in conformance with the MPCA's NPDES Phase II Rule. The SWPPP is incorporated by reference and information is contained in **Appendix F.**
12. The City will sweep all the City streets at least once in the spring.
13. The City will require skimmers in the construction of new pond outlets and will add skimmers to existing systems whenever feasible and practical.

14. The City will continue to work cooperatively with Dakota County to implement the household hazardous waste disposal program and educate residents on the proper disposal of household hazardous waste.
15. The City will work with neighboring municipalities to require rate control and treatment prior to the discharge of stormwater across municipal boundaries.
16. The City will share water quality data and trends with the LMRWMO and surrounding cities. *(LMRWMO)*
17. The City will update its Illicit Discharge Ordinance in conformance with the NPDES Phase II Permit.
18. The use of pesticides, herbicides, or other products for vegetation or algae control within any water bodies within the City is prohibited unless a permit is obtained from the City and the DNR. The DNR requires a permit for the application of such products on any Public Waters.
19. The use of phosphorus fertilizer is prohibited within the City per Minnesota Statute. Phosphorus fertilizer is not allowed to be used unless it is used for establishment of new lawn or a soil test indicates that phosphorus is needed.
20. The City will inspect all storm sewer outfalls and sediment ponds once every five years in conformance with the City's NPDES Permit. Information about these inspections will be collected and included in the annual SWPPP report.

4.3. Recreation, Fish and Wildlife

Goal:

Protect and enhance recreational facilities and fish and wildlife habitat.

Policies:

For additional policies, see the City's Engineering Design Standards for Stormwater Management in **Appendix I**.

1. The City will cooperate with the DNR, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and other appropriate agencies in promoting public enjoyment and protecting fish, wildlife, and recreational resources in the City.
2. The City will encourage land owners to maintain wetlands and open space areas for the benefit of wildlife.
3. The City requires a 16.5-foot buffer above the NWL or wetland boundary around storm ponds, lakes, and wetlands upon new development or redevelopment. These buffers will be promoted and encouraged for all existing properties adjacent to lakes, streams, and wetlands.
4. The City may incorporate into proposed projects alternative landscape designs that increase beneficial habitat, wildlife, and recreational uses; promote infiltration and vegetative water use; and decrease detrimental wildlife uses (such as beaver dams and goose overabundance) that damage water control facilities, shoreline vegetation, water quality, or recreational facilities. *(LMRWMO)*

4.4. Enhancement of Public Participation, Information, and Education

Goal:

Educate and inform the public on pertinent water resource management issues and increase public participation in water management activities.

Policies:

1. The City will coordinate its education efforts with Dakota County and the LMRWMO. *(LMRWMO)*
2. The City will disseminate information to the public regarding its water resources, stormwater management, groundwater protection, etc. The City will make this information available to active community groups upon request. *(LMRWMO)*
3. The City will continue to implement an education program per its NPDES Phase II SWPPP which may use the following: city newsletters, community access cable TV, individual mailings, and the City website. The City's quarterly newsletter can be viewed online at the City's website.
4. The City will hold an annual public meeting to review stormwater and water resource related items in conformance with the City's NPDES Permit.

4.5. Groundwater

Goal:

To coordinate activities and/or manage surface water runoff to the degree necessary to meet requirements for groundwater protection or management as required by Dakota County, the MPCA, the Minnesota Department of Health (MDH), and the DNR.

Policies:

1. The City will encourage groundwater recharge and protect recharge areas from potential sources of contamination. *(LMRWMO)*
2. The City will use grassed waterways to maximize infiltration where feasible and not detrimental to groundwater supplies. Infiltration design recommendations are provided in the Minnesota Stormwater Manual. *(LMRWMO)*
3. The City has adopted Minnesota Rule 7080 related to ISTSs. In addition to the requirements contained within MPCA Rule 7080, all new, rebuilt, or otherwise modified ISTSs located in the City shall be designed by a person licensed as a site evaluator by Dakota County. The installation of an ISTS shall occur only at the location approved by the City's building official. Installation of the ISTS at any other location shall require submission to and approval of revised design and location plans by the City's building official. The ISTS shall only be installed by a person or company licensed by Dakota County as qualified to install such a system.
4. The City will support the policies in the Dakota County Comprehensive Plan related to groundwater and adopts this Plan by reference. *(LMRWMO)*
5. The City will cooperate with state and regional agencies including the LMRWMO and Dakota County on groundwater monitoring, inventorying, or permitting programs.
6. The City will cooperate with the MDH and Dakota County Environmental Management to ensure that all unsealed or improperly abandoned wells within the City are properly sealed. Technical requirements for the abandonment of these wells will be in conformance with the local and state regulations.

4.6. Wetlands

Goals:
The City will protect wetlands in conformance with the requirements of the WCA.

Policies:

For additional policies, see the City's Engineering Design Standards for Stormwater Management in **Appendix I**.

1. The City is the local governmental unit (LGU) responsible for administering the WCA. *(LMRWMO)*
2. The City does not anticipate any significant growth or development. Therefore, the City will inventory, classify, and determine the functions and values of wetlands on a case-by-case basis as-needed using the most recent version of Minnesota Routine Assessment Method for Evaluating Wetland Functions (MnRAM) or its equivalent. *(LMRWMO)*
3. The City will encourage public and private landowners to maintain wetlands and open space areas for the benefit of wildlife. *(LMRWMO)*
4. Prior to issuance of any City grading or building permits, all development and redevelopment activities must comply with the WCA.
5. This City requires a 16.5-foot buffer above the NWL or wetland boundary around storm ponds, lakes, wetlands, and streams upon new development or redevelopment. These buffers will be promoted and encouraged for all existing properties adjacent to lakes, streams, and wetlands.

4.7. Erosion and Sedimentation

Goals:

To prevent soil erosion and sedimentation.

Policies:

For additional policies, see the City's Engineering Design Standards for Stormwater Management in **Appendix I**.

1. The City will require erosion and sediment control plans for land development and construction work that will disturb one or more acres of land in conformance with NPDES Phase II Construction requirements.
2. The City will require any development or redevelopment to comply with the erosion control and steep slope standards in the City's Storm Water Management Ordinance (**Appendix C**).
3. The City requires the submission and approval of erosion control and grading plans prior to the issuance of any grading or building permits.
4. The City will update its erosion and sediment control ordinances as per the NPDES SWPPP.
5. Point discharges of stormwater to open channels or detention basins shall be constructed in a manner that minimizes added erosion. *(LMRWMO)*
6. Effective energy dissipation devices should be provided at all conveyance system discharges to prevent bank, channel, or shoreline erosion. *(LMRWMO)*
7. Design of stream bank stabilization and streambed control measures should consider unique or special site conditions, energy dissipation potential, adverse effects, preservation of natural processes and habitat, and aesthetics in addition to standard engineering and economic criteria. *(LMRWMO)*
8. Soil erosion shall be prevented through the installation of erosion control practices in accordance with MPCA's *Protecting Water Quality in Urban Areas Manual*.
9. It shall be the responsibility of the developer/contractor to keep streets and property adjacent

to construction areas free from sediment carried by construction traffic at site entrances and access points as well as from site runoff and blowing dust.

10. Acceptable erosion in drainageways is limited to that which causes no net degradation of the watercourse or destruction of properties adjacent to the watercourse. *(LMRWMO)*

5. ASSESSMENT OF PROBLEMS AND CORRECTIVE ACTIONS

Outlined below is an assessment of the existing and potential water resource related problems that are known at this time. These problems have been identified based on an analysis of the land and water resource data collected as part of this local plan preparation.

5.1. Water Quality

Issue 5.1.1: Sunfish Lake was placed on the MPCA's impaired waters list in 2010 for nutrient/eutrophication biological indicators.

> **Corrective Action:** A TMDL was completed in 2014 for the LMRWMO, including Sunfish Lake. In 2017, an alum treatment was applied to the lake as recommended in the TMDL. The City will apply an herbicide treatment for curlyleaf pondweed, if needed, as recommended in the TMDL. The City will continue to enforce the policies of this Plan and its Storm Water Management Ordinance to protect receiving water bodies from increased nutrient and sediment transport.

Issue 5.1.2: Water quality of Hornbeam Lake has been noted as a problem.

> **Corrective Action:** The City will continue to implement its water quality monitoring program and will use this data to review if other studies or projects are needed.
>
> In cooperation with the LMRWMO, the City will encourage the installation of BMPs as the area around Hornbeam Lake develops or redevelops.
>
> The City will continue to educate residents on how to protect the water quality of the water bodies within and adjacent to their properties.

Issue 5.1.3: Portions of Mississippi River to the west, north, and east of the City are on the MPCA's impaired waters list for issues relating to aquatic consumption, aquatic life, and aquatic recreation. See **Section 3.5.2** for a complete list of these impairments.

> **Corrective Action:** While none of the City discharges directly to the Mississippi River, stormwater from the City ultimately discharges there. Improvements in water quality in the City can therefore improve the water quality of the Mississippi River. The City will work with LMRWMO, as feasible, to improve water quality upstream of the Mississippi River.

5.2. Flooding and Stormwater Rate Control

Issue 5.2.1: The drainage swale along Charlton Road is a drainage problem due to poor grades.

> **Corrective Action:** The City will improve the drainage in this area as part of upgrading Charlton Road from gravel to bituminous, which is planned for 2019.

Issue 5.2.2: The outlet for Sunfish Lake is frequently blocked by debris.

> **Corrective Action:** The outlet will be replaced as part of a planned maintenance project in 2019. Operation and maintenance of the outlet will continue as defined in the agreement between the City and Mendota Heights.

Issue 5.2.3: Multiple culverts within the City are plugged or in need of repair.

Corrective Action: Culvert inspections were completed in June 2018. The culvert inspection report can be found in **Appendix G**. The City will perform maintenance and repair, starting with the culverts in Poor or Very Poor condition or those that have the most impact on residents.

5.3. Impacts of Stormwater Management on Recreational Opportunities

Issue 5.3.1: Recent algal blooms noted in Sunfish Lake may prohibit recreational opportunities on the lake.

Corrective Action: The City will continue to implement its water quality monitoring program for Sunfish Lake and use this data to review if other studies or projects are needed.

The City will continue to educate residents on how to protect the water quality of the water bodies within and adjacent to their properties.

5.4. Soil Erosion and Sedimentation

Issue 5.4.1: During significant rainfall events, soil erosion has carried sediment to water bodies within the City. Sediment deposits reduce the depth of water and degrade the quality of water within a basin.

Corrective Action: The City will continue to enforce their Storm Water Management Ordinance and implement the NPDES Phase II Program.

Issue 5.4.2: Erosion occurs in several ravines in the northeastern quadrant of the City.

Corrective Action: As development or redevelopment occur in this area, the City will ensure flows are not increased to the ravines and, as feasible, will work with developers to decrease the erosive potential within the ravines.

5.5. Adequacy of Capital Improvement Program to Address Problems Related to Water Resources

Issue 5.5.1: The capital improvement projects outlined within this plan and the general operating procedures of the City are sufficient to address water resource related concerns. However, the City's funds may not be an adequate to allow for the aggressive implementation of the capital improvement projects.

Corrective Action: The City will review the needs for stormwater capital improvements on a regular basis and will actively seek outside grant funding and assistance to help in the implementation of these projects.

The City will consider establishing a Stormwater Utility to fund stormwater capital improvement projects and will conduct a rate study to determine its feasibility.

5.6. Identification of Potential Problems in the Next 20 Years

Issue 5.6.1: The City anticipates that there will be an increased demand to improve water quality within the City. Additional funding sources will need to be sought to address this demand.

> **Corrective Action:** The City will continue to implement its water quality monitoring program and review the results biennially.
>
> The City will actively seek outside grant funding and assistance, when available and practical, to improve the water quality within the City.

Issue 5.6.2: Climate models suggest that precipitation amounts and intensities will continue to increase in the future. This may mean that the City's existing stormwater infrastructure will be undersized for future precipitation events.

> **Corrective Action:** The City will review the needs for stormwater infrastructure improvements due to increased precipitation on a regular basis and will actively seek outside grant funding and assistance to help in the implementation of these projects. If available resources are not adequate, the City will consider establishing a Stormwater Utility to fund stormwater capital improvement projects.

5.7. Adequacy of Existing Technical Information to Manage Local Water Resources

Issue 5.7.1: The City acknowledges that additional technical and background information is required to efficiently and effectively manage water resources.

> **Corrective Action:** The City will update its hydrologic/hydraulic model for Atlas 14, as land use change occurs in the City, and/or as rate control problems are identified.

6. IMPLEMENTATION PRIORITIES/PROGRAM

Based on the information developed in **Sections 3** through **5**, the City has developed a CSWMP that reflects the needs and concerns of the City Council, City staff, citizens, and the funding capabilities of the City. A prioritized listing of the studies, programs and capital improvements that have been identified as necessary to respond to the water resource needs within the City is outlined in **Table 6.1**. The City anticipates implementing at least to some extent the regulatory programs, studies, or improvements identified within this plan within the next ten years.

Table 6.1 contains the projected costs for Stormwater Capital Improvement Projects (CIP), MS4 Permit and Maintenance Activities, and Stormwater Management Studies/Modeling. The costs associated with these items reflect 2018 costs and do not take into account inflation. This table is for planning and budgeting purposes and costs are considered rough estimates. It is anticipated that these cost estimates will be reviewed annually and updated as needed.

TABLE 6.1

COMPREHENSIVE STORMWATER MANAGEMENT IMPLEMENTATION PLAN

No.	Priority	Project Description	10 Year Total Cost Estimate [1,3]	Possible Funding Sources [2]	Proposed Cost By Year[1]										Comments
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
Capital Improvement Plan															
1	High	Culvert Repair - Culverts identified to be in poor or very poor condition in the 2018 culvert inspections will be repaired.	$25,000	General Fund			$7,500		$5,000		$5,000		$7,500		Issue 5.2.3
2	Medium	Curlyleaf Pondweed Treatment - An herbicide treatment will be applied to Sunfish Lake, if needed, to target curlyleaf pondweed, as recommended in the LMRWMO WRAPS and TMDL report.	$16,000	General Fund & LMRWMO					$16,000						Issue 5.1.1
MS4 Permit and Additional Maintenance Activities															
3		Education Activity Implementation Plan and Program - The City will provide stormwater education and outreach programs for residents within the City. The City will complete an outline of the education program and implementation schedule for the upcoming permit cycle. The Education Program should include: -City Newsletter (min. 2 stormwater-related articles each year) -Coordination with LMRWMO -Public Service Announcements (min. 1 stormwater-related announcement on public access television each year) -Identification of 6 high-priority topics	$1,800	General Fund		$200	$200	$200	$200	$200	$200	$200	$200	$200	Issues 5.1.2, 5.3.1
4		Annual Meeting - Hold annual public meeting combined with City Council Meeting or other public participation/involvement event to solicit public input on the SWPPP, discuss its effectiveness, or amendments. Provide public notice of the meeting. City staff will respond to all public comments and statements received from the public meeting, and document any proposed changes to the SWPPP for final approval by the City Engineer (if applicable). All written and oral input will be documented into the record of decision and submitted in conjunction with the annual report to the MPCA.	$4,500	General Fund		$500	$500	$500	$500	$500	$500	$500	$500	$500	
5		Online Availability of Stormwater Pollution Prevention Program Document - Provide an electronic version of the SWPPP document to allow easier access.	$500	General Fund		$250					$250				
6		Storm Sewer System Mapping - Update storm sewer map to meet the requirements of Part II.D.4. of the MS4 General Permit. Identify outfalls, including unique identification (ID) number assigned by the permittee, and an associated geographic coordinate. Update pond inventory and submit to MPCA.	$1,000	General Fund		$500					$500				

No.	Priority	Project Description	10 Year Total Cost Estimate [1,3]	Possible Funding Sources [2]	Proposed Cost By Year[1]										Comments
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
7		Illicit Discharge Detection and Elimination (IDDE) Program - Review ordinance annually to ensure that ordinance continues to meet the needs of the City and legal requirements. Document information as defined in the City SWPPP. Include procedures to meet permit requirements for the following items: -Inform Public about illicit discharges -Employee Training Program -IDDE Inspections -IDDE Investigations and elimination	$1,800	General Fund		$200	$200	$200	$200	$200	$200	$200	$200	$200	
8		Illicit Discharge Inspections and Mapping - The City will integrate high priority-outfalls and high-risk establishments for IDDE into its annual MS4 inspection activities. City will keep Inspection Map updated.	$1,800	General Fund		$200	$200	$200	$200	$200	$200	$200	$200	$200	
9		Standard Operating Procedures (SOPs) - Update SOPs for IDDE, including emergency response, and Post Construction Stormwater Management within 12 months of the date of MS4 permit coverage. Complete an annual review of SOPs for site inspections and site plan reviews by evaluating checklists and existing guidelines to ensure they are up-to-date to reflect MPCA's current construction general permit requirements.	$2,400	General Fund		$500	$200	$200	$200	$200	$500	$200	$200	$200	
10		Construction Site Inspections - Continue to inspect construction sites for compliance with erosion control plans and construction site waste management. Document inspections and enforcement actions (public and private) and keep on file at City.	$2,250	Developers		$250	$250	$250	$250	$250	$250	$250	$250	$250	
11		Stockpiles, Storage, and Material Handling Area Inspections - Conduct quarterly written inspections of all stockpile, storage, and material handling areas.	$1,800	General Fund		$200	$200	$200	$200	$200	$200	$200	$200	$200	
12		Develop Enforcement Response Procedures (ERPs) - Update Enforcement Response Procedures for Construction Site Activities.	$500	General Fund		$250					$250				
13		Storm Sewer Inspection Program - Conduct one inspection of all City-owned ponds and outfalls prior to expiration date of the MS4 General Permit. Annually inspect of 100% of structural pollution control devices.	$2,250	General Fund		$250	$250	$250	$250	$250	$250	$250	$250	$250	
14		Employee Training - Public Works staff (a minimum of one staff member) will maintain valid certification in NPDES Construction Stormwater Permit related training per NPDES-CSW training requirements.	$1,200	General Fund			$300		$300		$300		$300		

No.	Priority	Project Description	10 Year Total Cost Estimate [1,3]	Possible Funding Sources [2]	Proposed Cost By Year[1]										Comments
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
15		Site Plan Review - The City will review permanent BMP designs and criteria for post-construction stormwater management associated with new development and redevelopment projects of one acre or more. The City will actively look for non-structural opportunities where prudent and feasible. The City will require every applicant for a building permit meet the requirements for erosion and sediment control.	$45,000	Developers		$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	
16		Update Ordinance to Meet New Permit Requirements - Complete Ordinance updates for post-construction runoff from new development and redevelopment within 12 months of extension of permit coverage.	$1,000	General Fund							$1,000				
17		Structural Stormwater BMP Maintenance Program - Develop written program to utilize results from storm sewer inspection findings to determine if repair, replacement, or maintenance measures are necessary to ensure structures function properly and treat effectively. Document annually number of structures repaired or scheduled for maintenance. Inspect 20% of known public outfalls, sediment basins and ponds each year on a rotating basis. Inspect 100% of structural pollution control devices each year. Retain records of inspection, maintenance, and corrective actions for 3 years past the expiration of the MS4 permit.	$2,400	General Fund				$1,200					$1,200		
18		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 with all municipal employees. Distribute education materials to each municipal facility by the end of year 2. Update facilities inventory to include potential pollutants at each site. Update the map of all identified facilities.	$500	General Fund		$250					$250				
Stormwater Management Programs															
19	High	Water Quality Monitoring Program - Continue to monitor water quality on Sunfish Lake, Horseshoe Lake, and Hornbeam Lake. Continue to utilize CAMP.	$6,700	General Fund & LMRWMO		$1,100		$1,300		$1,300		$1,500		$1,500	Issues 5.1.1, 5.1.2, 5.3.1, 5.6.1
20	High	LGU Role - Perform necessary measures as LGU for WCA in the City.	$13,500	General Fund		$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	
21	High	Street Sweeping - Sweep City maintained streets 1 time per year.	$9,000	General Fund		$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	Issues 5.1.1, 5.1.2, 5.1.3
22	High	Aquatic Plant Management Program - Issue permits for vegetation and algal control on waterbodies.	$1,800	General Fund		$200	$200	$200	$200	$200	$200	$200	$200	$200	Issue 5.1.1, 5.3.1

No.	Priority	Project Description	10 Year Total Cost Estimate [1,3]	Possible Funding Sources [2]	Proposed Cost By Year[1] 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Comments
Stormwater Management Studies/Modeling															
23	Medium	Stormwater Utility Rate Study - The City will conduct a study to determine the feasibility of implementing a Stormwater Utility.	$5,000	General Fund						$5,000					Issues 5.5.1, 5.6.2
24	High	Hydrologic/hydraulic Model Update - The City will update its hydrologic/hydraulic model for Atlas 14 precipitation data.	$25,000	General Fund, Grant Funding			$25,000								Issue 5.7.1
		TOTAL	**$172,700**			**$12,350**	**$42,500**	**$12,200**	**$31,000**	**$16,000**	**$17,550**	**$11,200**	**$18,700**	**$11,200**	

[1] Cost estimates are preliminary and subject to review and revision as engineer's reports are completed and more information becomes available. Table reflects 2018 costs and does not account for inflation. Costs generally include labor, equipment, materials, and all other costs necessary to complete each activity. Some of the costs outlined above may be included in other operational costs budgeted by the City.

[2] Funding for stormwater program activities projected to come from following sources - Stormwater Utility Fund, Developers Agreements, Grant Funds, General Operating Fund, or Special Assessments.

[3] Staff time is not included in the cost shown.

7. FINANCIAL CONSIDERATIONS

Implementation of the proposed improvements, programs, and studies identified in this plan will have a financial impact on the City. To establish how significant this impact will be, a review of the means and ability of the City to fund these improvements, programs, and studies is necessary. Outlined below is a listing of various sources of revenue available to the City to implement the water resource management efforts outlined in this plan.

	DESCRIPTION OF FUNDING SOURCE	REVENUE GENERATED
1	Revenue generated by City's General Fund	Variable depending on need for studies, projects, or programs
2	Special assessments for local improvements made under the authority granted by Minnesota Statutes Chapter 429 and 444.	Variable depending on activities undertaken
3	Revenue generated by Watershed Management Special Tax Districts provided for under Minnesota Statutes Chapter 473.882	Variable depending on activities undertaken
4	Capital improvement projects being completed by or in cooperation with the LMRWMO are required to be in conformance with the Revised and restated LMRWMO Joint Powers Agreement.	Variable depending on activities undertaken
5	Grant monies that may be secured from various local, regional, County, State, or Federal agencies. This would include MnDOT, MPCA, Metropolitan Council, the DNR and others	Variable depending on activities undertaken
6	Other Sources: These may be other sources of funding for stormwater activities such as tax increment financing, state aid, etc. The City will continue to explore additional revenue sources as they become available.	Variable depending on activities undertaken
7	Tax abatement	Variable

8. AMENDMENT PROCEDURES

It is the intention of the City to have this CSWMP reviewed and approved by the LMRWMO. Once approved, no significant changes to this plan can be facilitated without the approval of the proposed revisions by the Watershed Management Organization. Significant changes to the local plan shall be made known to the following parties:

1. City Engineer
2. City Council
3. Lower Mississippi River Watershed Management Organization
4. Metropolitan Council
5. Public within the City through a public hearing process
6. Dakota County

Following notification of the above parties, they shall have 60 days to comment on the proposed revisions. Failure to respond within 60 days constitutes approval. Upon receipt of approvals from the Watershed Management Organization, any proposed amendments will be considered approved.

Minor changes to the Plan shall be defined as changes that do not modify the goals, policies, or commitments expressly defined in this plan by the City. Adjustment to subwatershed boundaries will be considered minor changes provided that the change will have no significant impact on the rate or quality in which stormwater runoff is discharged from the City boundaries. Minor changes to this plan can be made by the staff at the City without outside review. It is the intention of the City that this Plan be updated when significant changes to the plan are deemed necessary or an update is required by a Watershed Management Organization Plan update.

Appendix A – Figures

Document Path: K:\101153\1-000\GIS\Maps\Fig 1 - Location.mxd

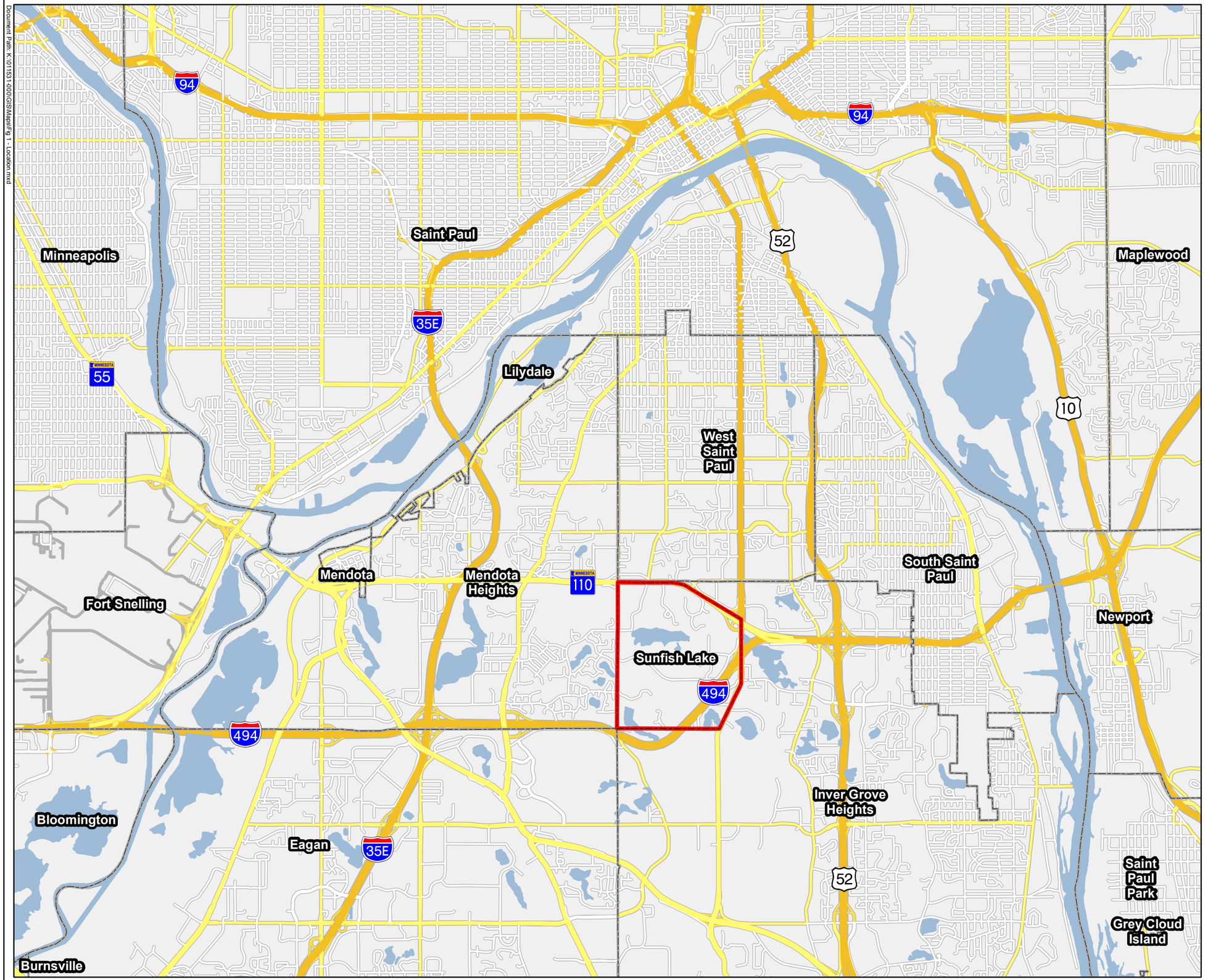

Figure 1 - Location Map
Comprehensive Stormwater Management Plan

- Sunfish Lake Boundary
- Municipal Boundaries
- Lakes

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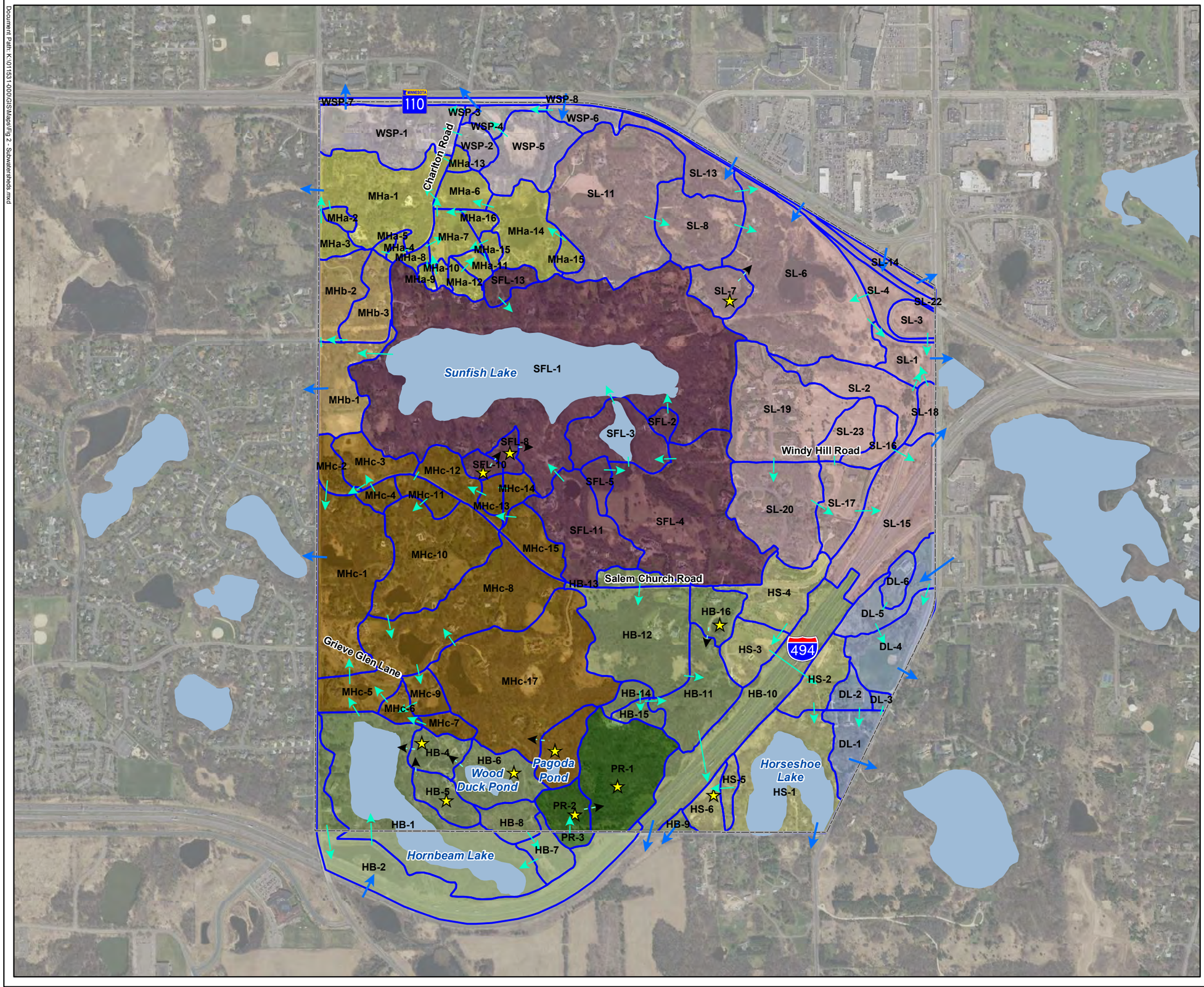

Figure 2 - Subwatersheds Map

Comprehensive Stormwater Management Plan

Flow Arrows

- Across Municipal Boundaries
- Between Subwatersheds
- Between Subwatersheds, greater than 100-year event
- Landlocked Locations
- Lakes
- Subwatersheds
- Sunfish Lake Boundary

Source: City of Sunfish Lake, 2006

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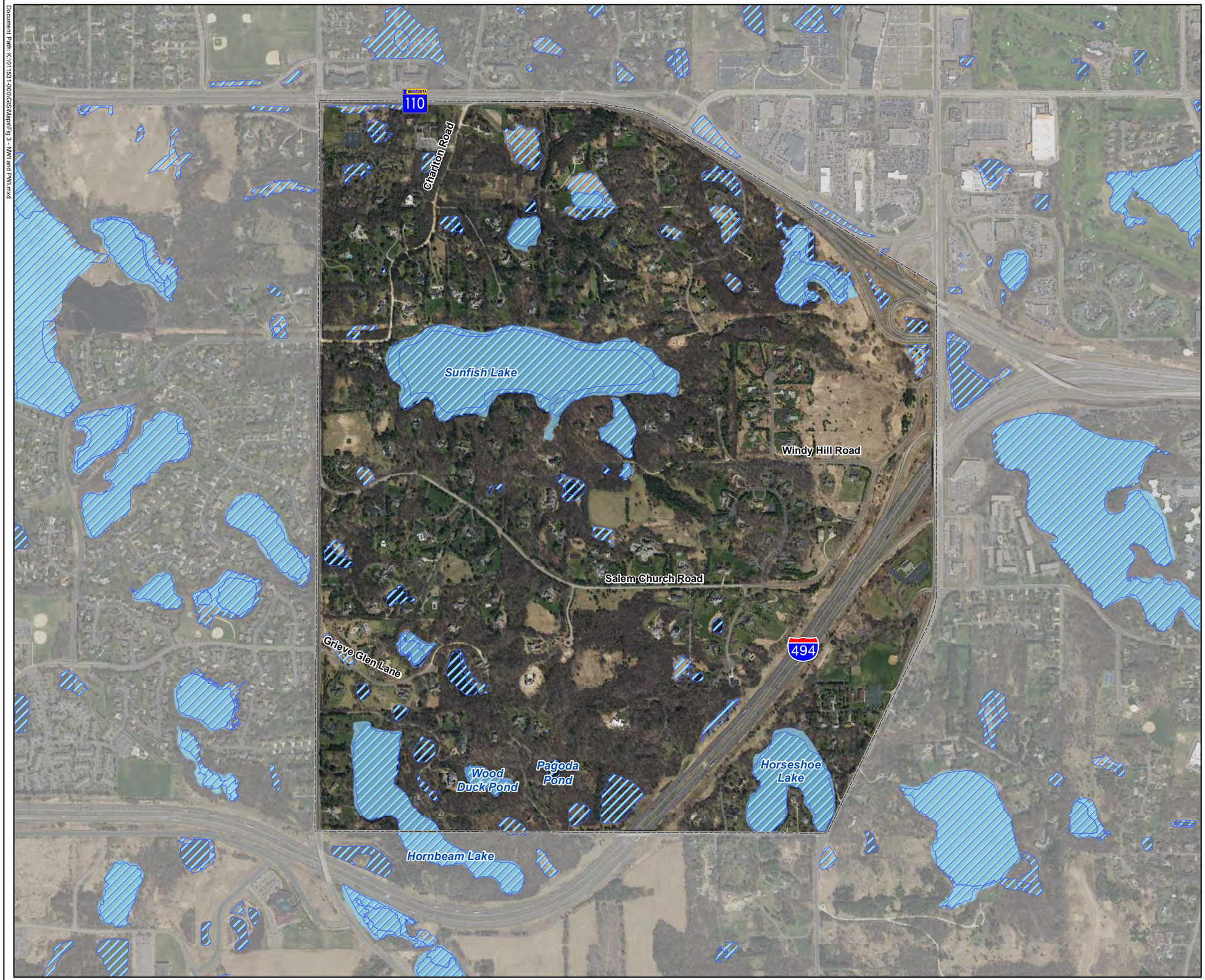

Figure 3 - Wetland and Public Waters Inventory Map

Comprehensive Stormwater Management Plan

DNR Public Waters

National Wetland Inventory

Sunfish Lake Boundary

Source: MN DNR, 2017 / U.S. Fish and Wildlife, 2017

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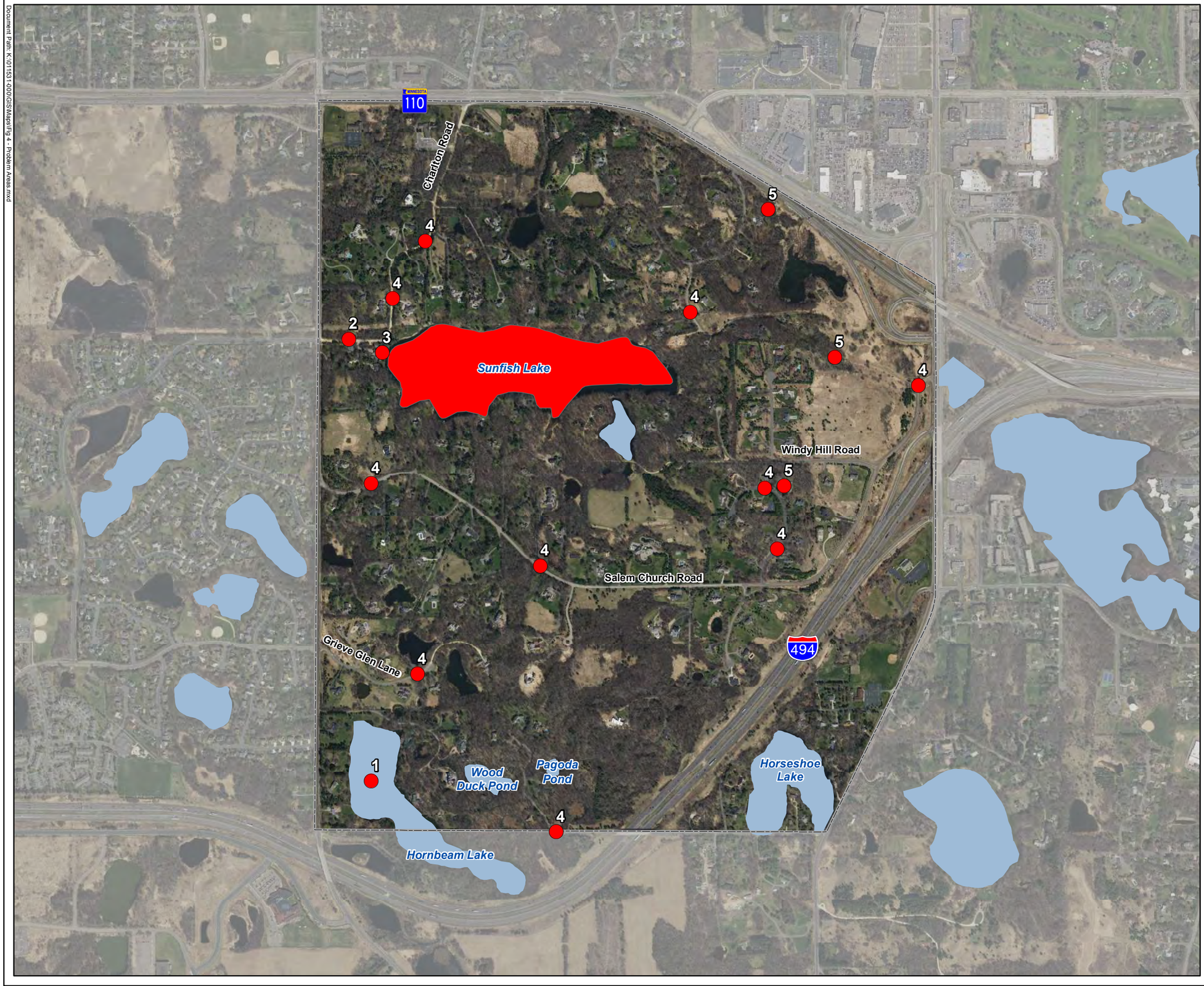

Figure 4 - Water Resource Problem Areas

Comprehensive Stormwater Management Plan

- Problem Areas
- 2018 Impaired Lakes
- Lakes
- Sunfish Lake Boundary

Source: MPCA, 2018 / City of Sunfish Lake, 2018

Problem Areas

Sunfish Lake is impaired for nutrient/eutrophication biological indicators (Issue 5.1.1).

1. Water quality concerns in the Hornbeam Lake (Issue 5.1.2).
2. Drainage issues in the swale along Charlton Road (Issue 5.2.1).
3. Blocked outlet from Sunfish Lake (Issue 5.2.2).
4. Culverts in need of repair throughout the City (Issue 5.2.3).
5. Erosion in ravisines throughout the City (Issue 5.4.2).

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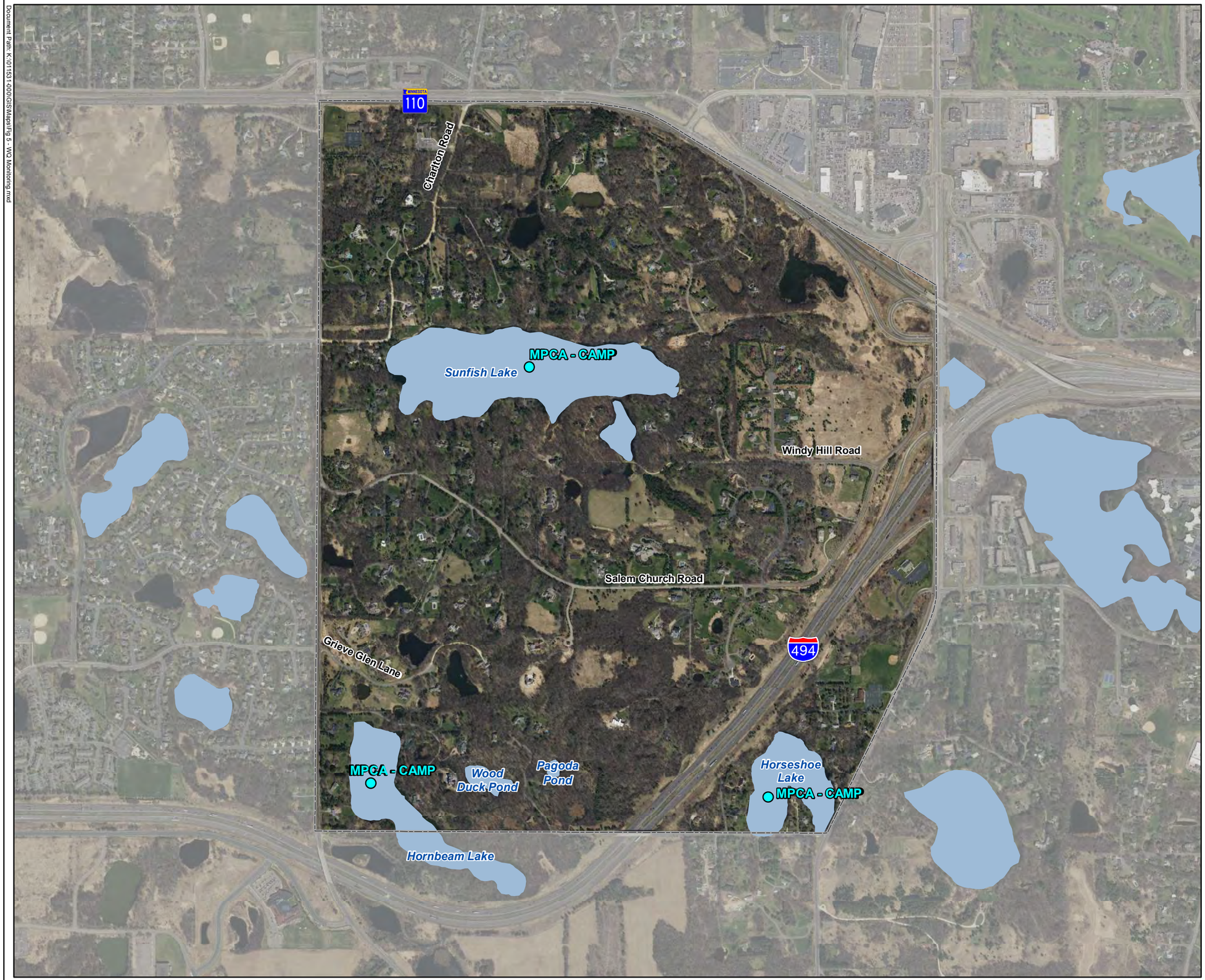

Figure 5 - Water Quality Monitoring Map

Comprehensive Stormwater Management Plan

- Monitoring Sites
- Lakes
- Sunfish Lake Boundary

Source: City of Sunfish Lake, 2018

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Document Path: K:\011531-000\GIS\Maps\Fig 6 - DWSMA and WHPA.mxd

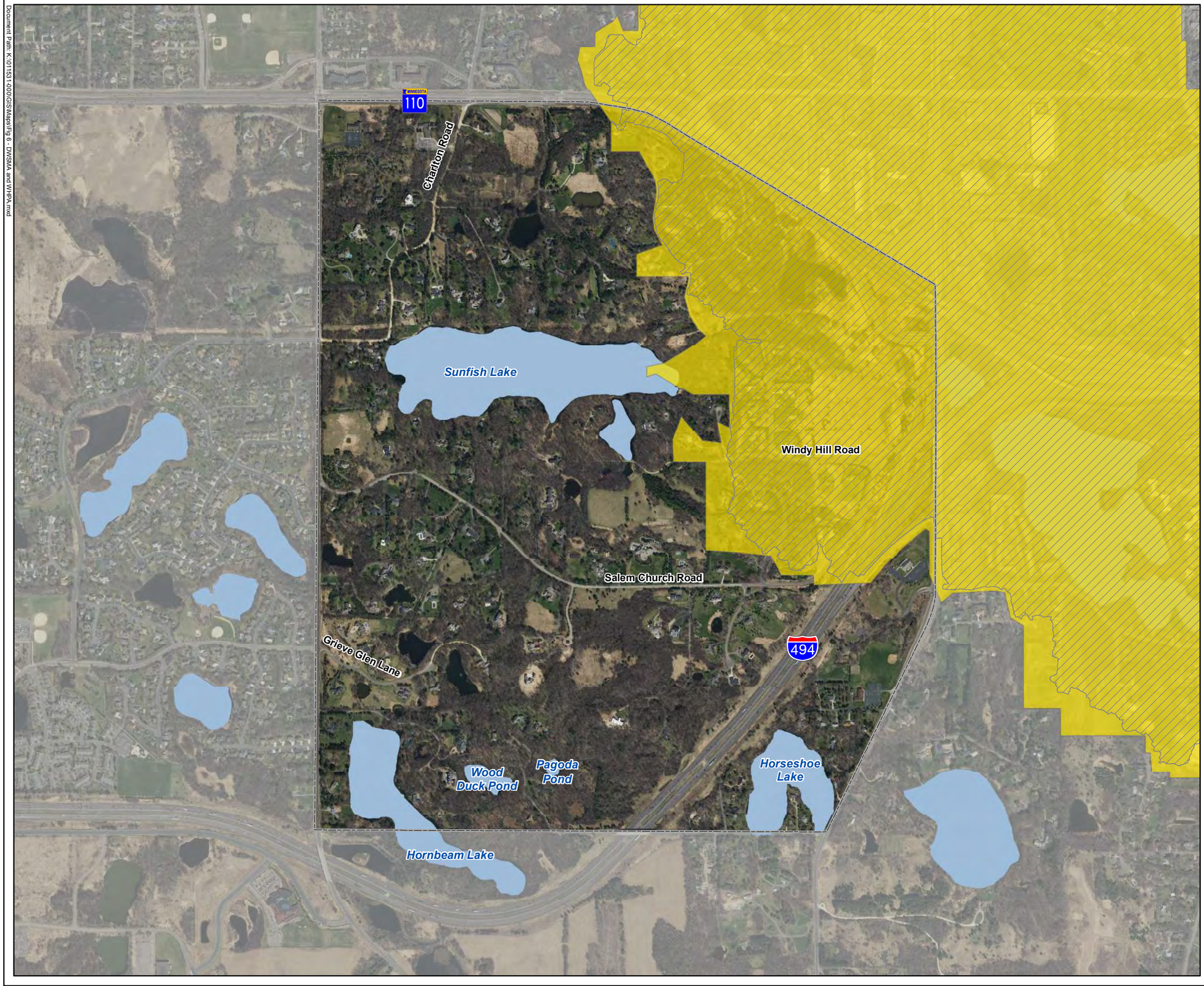

Figure 6 - DWSMA and WHPA Map

Comprehensive Stormwater Management Plan

- DWSMA - High Vulnerability
- Wellhead Protection Area
- Lakes
- Sunfish Lake Boundary

Source: MDH, 2017

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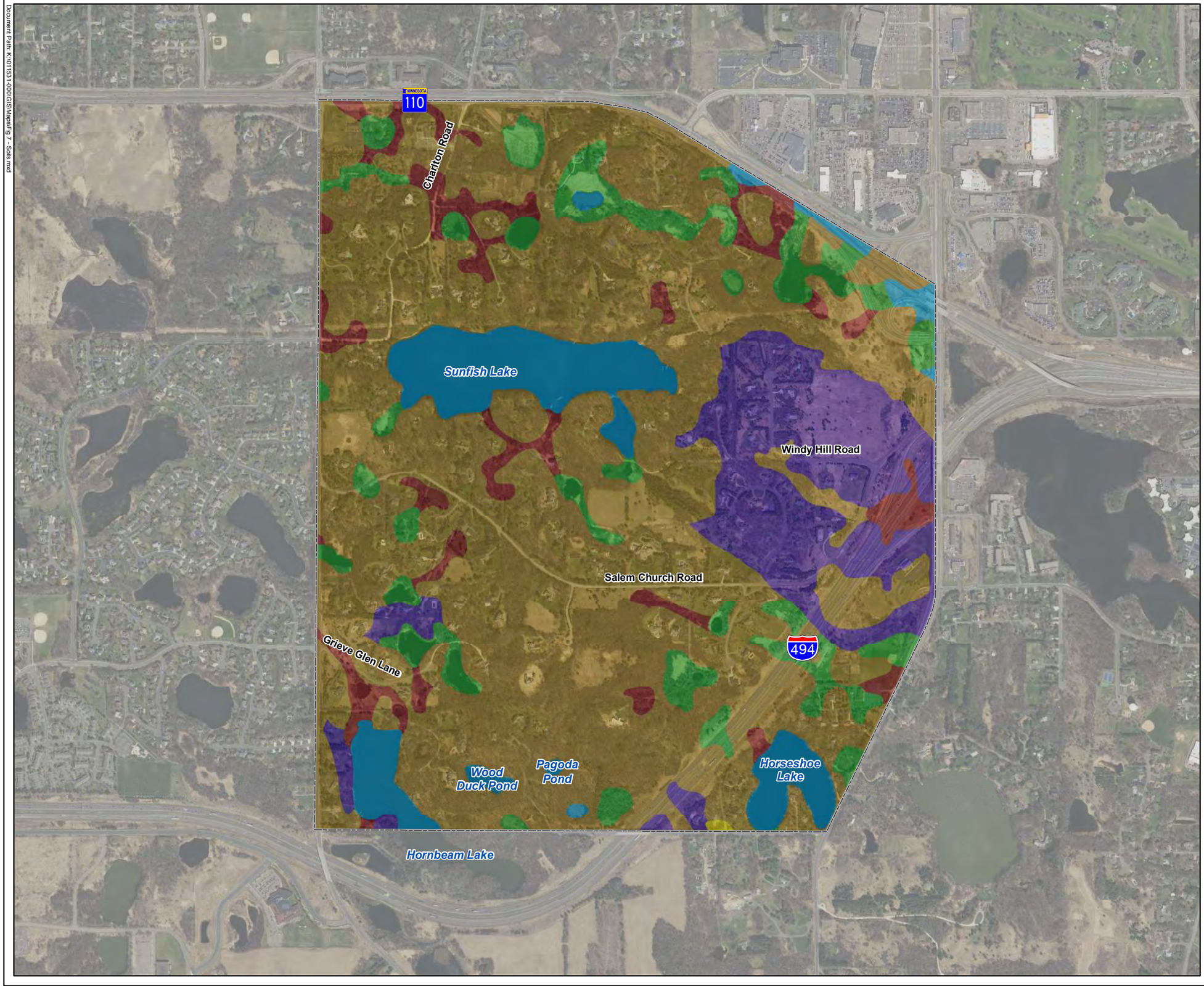

Figure 7 - Soil Groups Map

Comprehensive Stormwater Management Plan

- Wet/Water

Hydrologic Soil Group

- A
- B
- B/D
- C
- C/D
- Sunfish Lake Boundary

Source: NRCS, 2017

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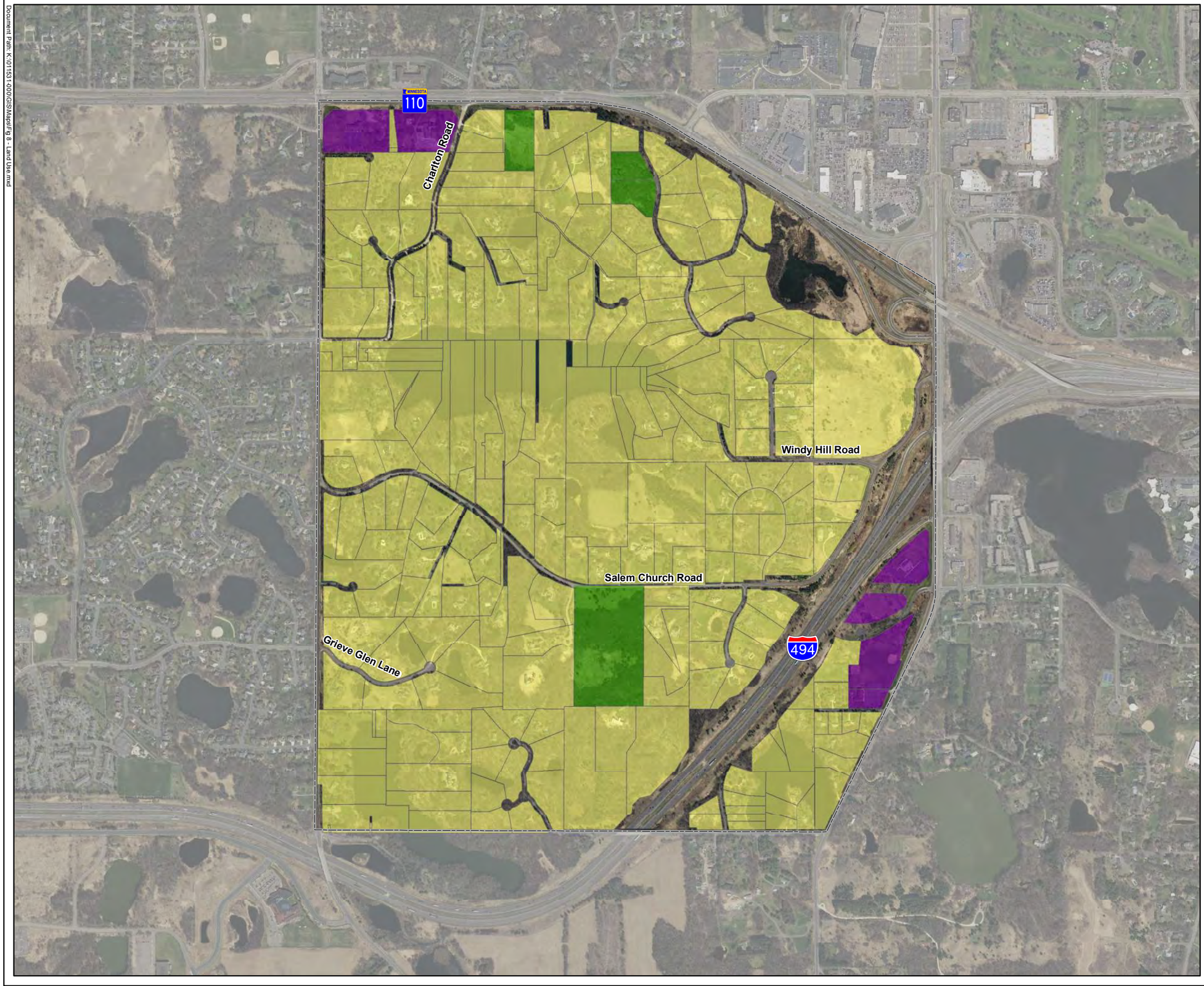

Figure 8 - Land Use Map
Comprehensive Stormwater Management Plan

- Institutional
- Open Space
- Rural Residential
- Sunfish Lake Boundary

Source: City of Sunfish Lake, 2018

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Document Path: K:\011531-000\GIS\Maps\Fig 9 - MLCCS.mxd

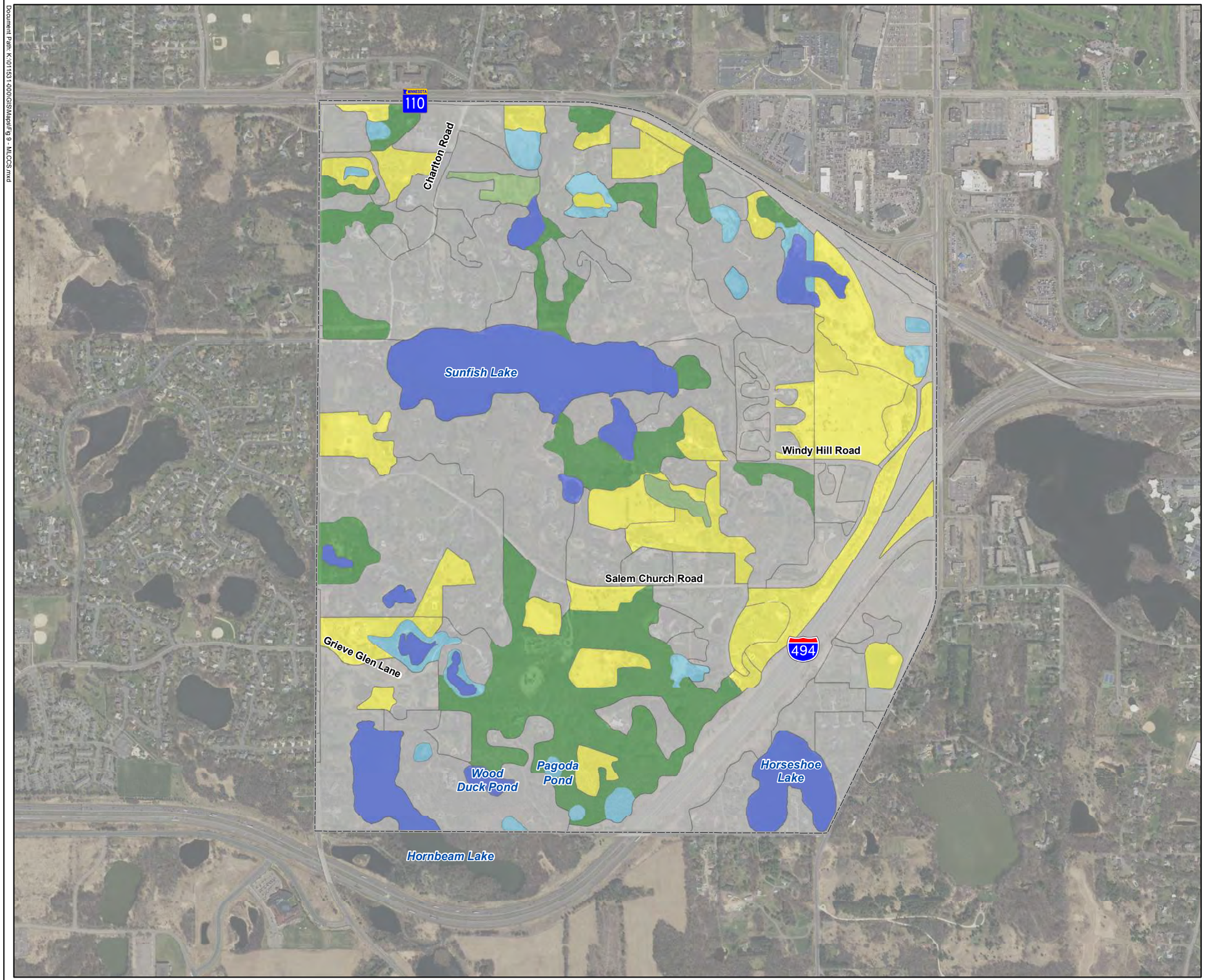

Figure 9 - Minnesota Land Cover Classification System (MLCCS) Map

Comprehensive Stormwater Management Plan

MLCCS Type

- Developed Area
- Herbaceous
- Planted/Cultivated
- Forest
- Wetlands
- Shrubbland
- Water
- Sunfish Lake Boundary

Source: Dakota County SWCD, 2018

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Document Path: K:\011531-000\GIS\Maps\Fig 10 - Pollutant Sources.mxd

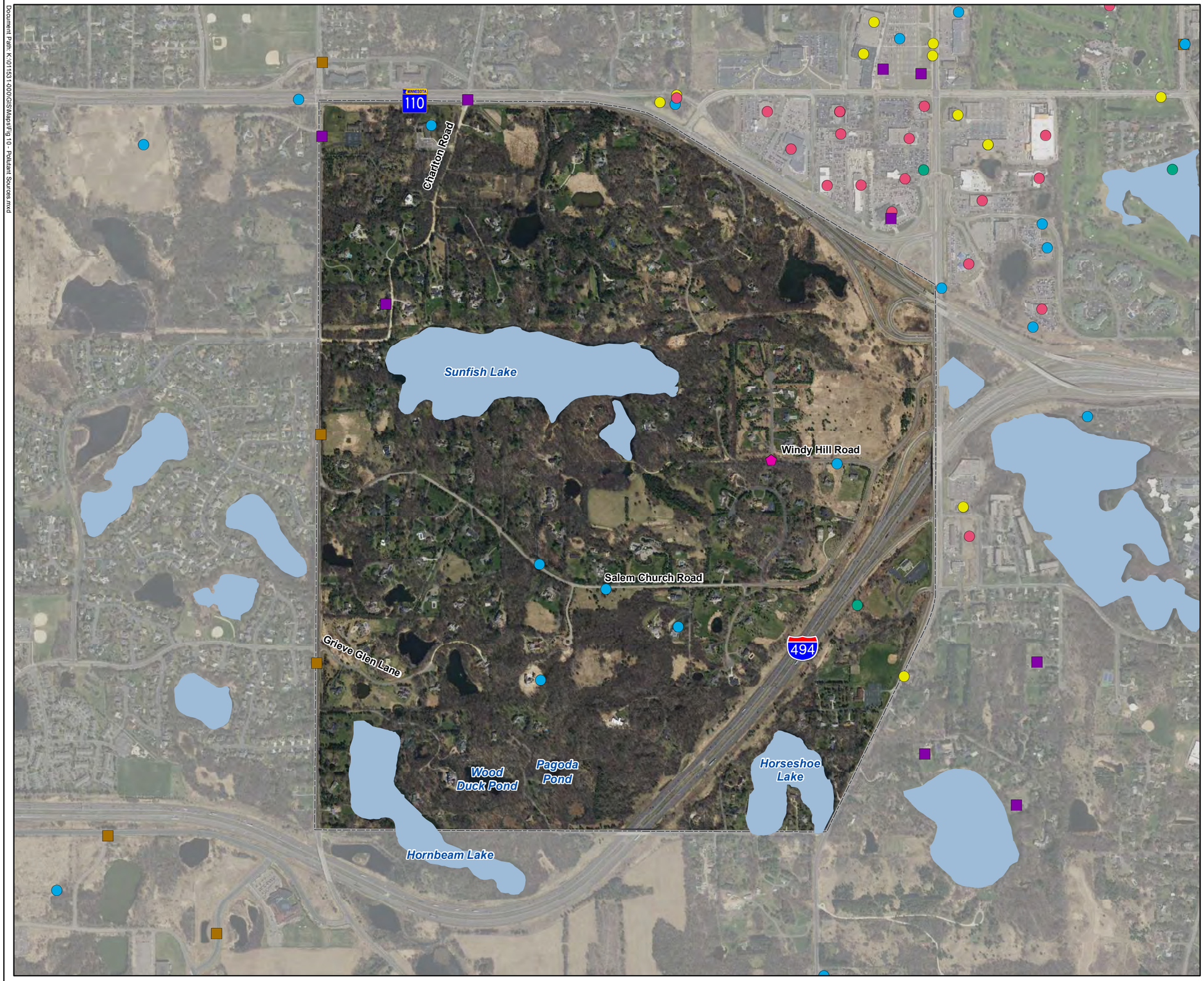

Figure 10 - Pollutant Source Locations Map

Comprehensive Stormwater Management Plan

Pollutant Source

- Construction Stormwater
- Hazardous Waste
- Multiple Activities
- Petroleum Remediation, Leak Site
- Site Assessment
- Solid Waste
- Underground Tanks
- Lakes
- Sunfish Lake Boundary

Source: MPCA, 2018

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Appendix B – Water Resource Related Agreements

REVISED AND RESTATED

JOINT POWERS AGREEMENT ESTABLISHING A WATERSHED MANAGEMENT ORGANIZATION FOR THE LOWER MISSISSIPPI RIVER WATERSHED

THE PARTIES TO THIS AGREEMENT ("Agreement") are Members of the Lower Mississippi River Watershed Management Organization and have land that drain surface water into the Mississippi River. This Agreement amends and restates the original Joint Powers Agreement between the Members which became effective in 1985 and includes all prior Amendments to the 1985 Joint Powers Agreement. This Agreement is made pursuant to the authority conferred upon the parties by Minn. Stat. §§ 471.59 and 103B.201 - 103B.252.

SECTION 1. NAME AND LEGAL BOUNDARY. The parties hereby establish the Lower Mississippi River Watershed Management Organization, hereinafter referred to as the "WMO." The "Legal Boundary Map of the Lower Mississippi River Watershed Management Organization" is attached hereto as Exhibit A.

SECTION 2. PURPOSE. The purpose of this Agreement is to provide an organization to regulate the natural water storage and retention of the Lower Mississippi watershed to:

A. Protect, preserve, and use natural surface and ground water storage and retention systems;

B. Minimize public capital expenditures needed to correct flooding and water quality problems;

C. Identify and plan for means to effectively protect and improve surface and ground water quality;

D. Establish more uniform local policies and official controls for surface and ground water management;

E. Prevent erosion of soil into surface water systems;

F. Promote ground water recharge;

G. Protect and enhance fish and wildlife habitat and water recreational facilities;

H. Secure the other benefits associated with the proper management of surface and ground water; and

I. Carry out all the duties and responsibilities in Minn. Stat. §§ 471.59 and 103B.201 - 103B.252.

SECTION 3. DEFINITIONS.

Subdivision 1. *"Allowable Flow"* means the rate and volume of flow, according the to design criteria set forth in the Watershed Management Plan, at which a Member community may discharge into the drainage system without financial obligation and as the rate and volume of surface water runoff from a tributary area under natural conditions, with a drainage system in place which has been designed and constructed according to the criteria stated herein, excluding diverted waters. Current topographic data that exists on the enactment date of this Agreement shall be used for the determination of the natural conditions and calculation of the allowable flow.

Subdivision 2. *"Board"* means the board of managers of the WMO.

Subdivision 3. *"Council"* means the governing body of a governmental unit which is a Member of this WMO.

Subdivision 4. *"Drainage Facilities"* means any improvement constructed for the conveyance or storage of surface water.

Subdivision 5. *"Drainage System"* means the combination of drainage facilities required to safely control or convey runoff water from a major tributary drainage area(s) to a point of final discharge into a water body.

Subdivision 6. *"Excessive Flow"* means that rate and volume of flow, calculated according to the design criteria in the Watershed Management Plan, from a Member which is in excess of the allowable flow of that Member.

Subdivision 7. *"Governmental Unit"* means any city.

Subdivision 8. *"Lower Mississippi River Watershed"* or *"Watershed"* means the area contained within the "Legal Boundary Map of the Lower Mississippi River Water Management Organization" attached hereto as Exhibit "A".

Subdivision 9. *"Manager"* means the representative appointed to the Board by a Member.

Subdivision 10. *"Member"* means a governmental unit which enters into this Agreement.

Subdivision 11. *"Natural Conditions"* means the characteristics of the land on the date of enactment without regard to any urban development including structures, parking lots, or other artificial improvements.

Subdivision 12. *"Rate of Flow"* means the discharge of surface water runoff as a function of time which has been calculated according to the design criteria identified in the Watershed Management Plan. The rate of flow shall apply to the design and construction of open channels and storm sewer conduits.

Subdivision 13. *"Volume of Flow"* means the total discharge of all surface water runoff which has been calculated according to the design criteria identified in the Watershed Management Plan. The volume of runoff flow shall apply to the design and construction of detention facilities.

Subdivision 14. *"Watershed Management Organization"* or *"WMO"* means the organization created by this Agreement the full name of which is "Lower Mississippi River Watershed Management Organization." It shall be a public agency of its Members.

SECTION 4. MEMBERSHIP. The Membership of the WMO shall consist of the following governmental units, each entitled to the following eligible votes:

Member	Votes
City of Inver Grove Heights	3 votes
City of Lilydale	1 vote
City of Mendota Heights	2 votes
City of Saint Paul	2 votes
City of South Saint Paul	2 votes
City of Sunfish Lake	1 vote
City of West Saint Paul	2 votes

No change in governmental boundaries, structure, organizational status, or character shall affect the eligibility of any governmental unit listed above to be represented on the WMO, so long as such governmental unit continues to exist as a separate political subdivision. A majority of all eligible votes shall be sufficient for all matters, unless otherwise provided for in this Agreement. A majority vote of all Members, with each Member having one vote, shall be required for Section 7. A Member may not cast a split vote. Any Member that fails to contribute their share of the WMO annual administration fund or their allocation of a capital improvement cost, shall be declared ineligible for voting on all matters before the Board, until such contribution is made to the WMO.

SECTION 5. ADVISORY COMMITTEES.

Subdivision 1. Technical Advisory Committee. The following governmental subdivisions or agencies shall be requested to appoint a non-voting advisory Member to the WMO: Dakota County, Ramsey County, Dakota County Soil and Water Conservation District. The advisory Members shall not be required to contribute funds for the operation

of the WMO, except as provided in Minn. Stat. § 103B.251, but may provide technical services.

Subdivision 2. Citizen Advisory Committee. The WMO may establish a citizen advisory committee ("CAC") from the public at large to provide input on Watershed Management Plan revisions and other matters as deemed appropriate. The CAC shall be appointed by the WMO considering individuals nominated by each Member. The WMO will notify each Member of its intent to establish a CAC, will specify the purpose and duration of the CAC, and will request each Member to nominate candidates to be considered for appointment by the WMO. At the time of establishment of a CAC, the WMO will appoint a chair of the CAC, a board member liaison to the CAC, establish a time for submittal of any comments, and specify the support the WMO will provide to the CAC.

SECTION 6. BOARD OF MANAGERS.

Subdivision 1. Appointment. The governing body of the WMO shall be its Board. Each Member shall be entitled to appoint one Manager and an alternate on the Board. The alternate shall have the right to vote in the absence of their representative. Vacancies in the office of Manager shall be filled for the remainder of the term by the Member which appointed or had the right to appoint the Manager. All vacancies shall be filled within ninety (90) days after they occur.

Subdivision 2. Eligibility or Qualification. The Council of each Member shall determine the eligibility or qualification of its representative on the WMO.

Subdivision 3. Term. The Managers shall not have a fixed term, but shall serve at the pleasure of the Member appointing such Manager to the Board.

Subdivision 4. Removal. A Manager may not be removed from the Board prior to the expiration of his or her term, unless the Manager consents in writing or unless removed in accordance with the procedures provided under Minnesota Rules 8410.0040.

Subdivision 5. Compensation. Managers shall serve without compensation from the WMO, but this shall not prevent a Member from providing compensation for its Manager.

Subdivision 6. Organizational Meeting. At the first meeting of the Board each year, the Board shall elect from its Managers a chair, a vice chair, a secretary/treasurer, and such other officers as it deems necessary to conduct its meetings and affairs. The Board shall adopt rules of order and procedure governing its meetings and affairs. The rules of order and procedure may be amended from time to time at either a regular or a special meeting of the Board provided that at least ten (10) days' prior notice of the proposed amendment has been furnished to each person to whom notice of the Board meetings is required to be sent. A majority vote of all eligible votes of the Members of the WMO shall be sufficient to adopt any proposed amendment to such rules of order and procedure.

Subdivision 7. Annual Meeting Requirement. The Board shall meet at least annually, at times and places selected by the Board. If the Board changes its regularly established meeting place or time, it shall place a notice of the change on a bulletin board at least three (3) days in advance in the building where it was scheduled to meet.

Subdivision 8. Committees. The Board may establish committees as it deems appropriate.

Subdivision 9. Quorum. The Board shall not take any action without a quorum present. A quorum shall be at least four Members.

SECTION 7. POWERS AND DUTIES OF THE WMO. The WMO, acting by its Board:

Subdivision 1. Shall prepare, adopt and implement a Watershed Management Plan meeting the requirements of Minn. Stat. § 103B.231;

Subdivision 2. Shall review and approve local water management plans as provided in Minn. Stat. § 103B.235;

Subdivision 3. Shall exercise the authority of a watershed district under Minn. Stat. Chapter 103D to regulate the use and development of land in the watershed when one or more of the following conditions exist:

A. The local government unit exercising planning and zoning authority over the land under Minn. Stat. §§ 366.10 to 366.19, 394.21 to 394.37, or 462.351 to 462.364 does not have a local water management plan approved and adopted in accordance with requirements of Minn. Stat. § 103B.235 or has not adopted the implementation program described in the plan.

B. An application to the local government unit for a permit for the use and development of land, requires an amendment to, or variance from, the adopted local water management plan or implementation program of the local unit.

C. The local government unit has authorized the WMO to require permits for the use and development of land.

Subdivision 4. Shall adopt an annual work plan.

Subdivision 5. May employ such persons as it deems necessary to accomplish its duties and powers.

Subdivision 6. May contract for space and for material and supplies to carry on its activities either with a Member or elsewhere.

Subdivision 7. May acquire necessary personal and real property to carry out its powers and its duties.

Subdivision 8. May make necessary surveys or use other reliable surveys and data, and develop projects to accomplish the purposes for which the WMO is organized.

Subdivision 9. May cooperate or contract with the State of Minnesota or any subdivision thereof or federal agency or private or public organization to accomplish the purposes for which it is organized.

Subdivision 10. May order any governmental unit to carry out the local water management plan which has been approved by the Board. If the local unit of government fails to do so, in addition to other remedies, in its discretion, the Board may implement any required action or improvement in accordance with this Agreement.

Subdivision 11. May acquire, operate, construct, and maintain the capital improvements delineated in the Watershed Management Plan adopted by the Board.

Subdivision 12. May contract for or purchase such insurance as the Board deems necessary for the protection of the WMO and its Board.

Subdivision 13. May establish and maintain devices for acquiring and recording hydrological and water quality data within the watershed area of the WMO.

Subdivision 14. May enter upon lands within or without the watershed to make surveys and investigations to accomplish the purposes of the WMO.

Subdivision 15. May provide any Member with technical data or any other information of which the WMO has knowledge which will assist the Member in preparing land use classifications or local water management plans within the watershed.

Subdivision 16. May provide legal and technical assistance in connection with litigation or other proceedings between one or more of its Members and any other political subdivision, commission, board, corporation, individual, or agency relating to the

planning or construction of facilities to drain or pond storm waters or relating to water quality within the WMO.

Subdivision 17. May accumulate reserve funds for the purposes herein mentioned and may invest funds of the WMO not currently needed for its operations.

Subdivision 18. May collect money, in accordance with the provisions of this Agreement, from its Members and from any other source approved by the Board.

Subdivision 19. May make contracts, incur expenses, and make expenditures necessary and incidental to the effectuation of its purposes and powers.

Subdivision 20. Shall cause to be made an annual audit of the books and accounts of the WMO and shall make and file a report to its Members at least once each year including the following information:

A. The financial condition of the WMO;

B. The status of all WMO projects and work within the watershed; and

C. The business transacted by the WMO and other matters which affect the interests of the WMO. Copies of the report shall be transmitted to the clerk of each Member by March 31 of each year.

Subdivision 21. Shall make the WMO's books, reports, and records available for and open to inspection by its Members or the public at all reasonable times.

Subdivision 22. May recommend changes in this Agreement to its Members. Any amendments shall require ratification by all the parties to this Agreement.

Subdivision 23. May exercise all other powers necessary and incidental to the implementation of the purposes and powers set forth herein and as authorized by Minn. Stat. §§ 103B.201 through 103B.252.

Subdivision 24. Must solicit proposals for all legal, engineering, auditing, and other technical services in accordance with Minnesota Statutes § 103B.227, subd. 5.

Subdivision 25. Shall coordinate its planning activities with contiguous watershed management organizations and counties conducting water planning and implementation under Minn. Stat. Chapter 103B.

Subdivision 26. Shall designate one or more legal newspapers of general circulation which are published in the county(ies) in which the watershed is located.

SECTION 8. POWERS AND DUTIES OF THE OFFICERS OF THE BOARD.

Subdivision 1. It shall be the duty of the Chair of the Board to:

A. Attend and preside at all meetings of the Board;

B. Assist in the preparation of meeting agendas and the annual work plan;

C. See that orders and resolutions of the Board are carried into effect;

D. Sign and execute documents as may be required for the Board's exercise of its powers, except as otherwise required by law; and

E. Perform such other duties applicable to the office as are necessary to fulfill the powers and duties of the Board as set forth in this Agreement, and as provided by law.

Subdivision 2. It shall be the duty of the Vice Chair of the Board to:

A. Perform the duties of the Chair in the Chair's absence; and

B. Perform other duties as assigned from time to time by the Board.

Subdivision 3. It shall be the duty of the Secretary/Treasurer of the Board to:

A. Keep and post a true and accurate record of the proceedings of all meetings of the Board;

B. Keep a record of all amendments, alterations and additions to this Agreement;

C. Prepare and process all correspondence;

D. Prepare and file all reports and statements as required by law and this Agreement;

E. Keep all financial accounts of the WMO, and prepare and present to the Board full and detailed financial statements of the WMO prior to its annual meeting; and

F. Perform other duties as assigned from time to time by the Board.

SECTION 9. CONSTRUCTION OF IMPROVEMENTS.

Subdivision 1. All construction, reconstruction, extension or maintenance of WMO improvements, including outlets, lift stations, dams, reservoirs, or appurtenances of a surface water or storm sewer system ordered by the WMO which involve potential construction by or assessment against any Member or against privately or publicly owned land within the watershed shall adhere to the following procedures set forth in this section. The Board shall secure from its engineers or some other competent person a preliminary report advising it whether the proposed improvement is feasible, whether there are feasible alternatives, whether the proposed improvement shall best be made as proposed or in conjunction with some other improvement, a determination of the quantity and/or quality of storm and surface water contributed to the improvement by each Member, the estimated cost of the improvement(s), including maintenance, the estimated cost to each Member, and evaluating the consistency of the improvement with the Watershed Management Plan capital improvement section. The Board shall then hold a public hearing on the proposed improvement. Notice of the hearing shall be mailed to the clerk of each affected Member and shall also be published in the Board's official newspaper(s). The notice shall be mailed not less than forty-five (45) days before the hearing, shall state the time and place of the hearing, the general nature of the improvement, the estimated total cost, and the estimated cost to each Member.

To order the improvement, a resolution setting forth the order shall require a favorable majority vote of all eligible votes of the Members of the WMO. The order shall

describe the improvement, shall allocate in percentages the cost allocation among the Members, shall determine the method of financing, shall designate the engineers to prepare plans and specifications, and shall designate the entity that will contract for the improvement. The Board shall not order and no engineer shall prepare plans and specification before the Board has adopted a resolution ordering the improvement. After the Board has ordered an improvement, it shall forward the preliminary report to all affected Members with an estimated time schedule for the construction of the improvement.

The Board shall allow not less than 90 days, nor more than 270 days, for each Member to conduct hearings as provided by law or applicable charter requirements, to approve the construction and the method of financing of the improvement which the Member will use to pay its proportionate share of the costs of the improvement.

If the WMO proposes to use Dakota County's and/or Ramsey County's bonding authority, or if the WMO proposes to certify all or any part of an improvement to Dakota and/or Ramsey County for payment, then and in that event all proceedings shall be carried out in accordance with Minn. Stat. § 103B.251.

The Board may order advertising for bids upon receipt of notice from each Member which will be assessed that it has completed its hearing or determined its method of payment, or upon expiration of 270 days after the mailing of the preliminary report to the Members, whichever occurs first.

Subdivision 2. Any Member aggrieved by the determination of the Board as to the financing of an improvement or allocation of the costs of an improvement shall have thirty (30) days after the WMO resolution ordering the improvement to appeal the determination to arbitration. The appeal shall be in writing requesting the arbitration and

shall be addressed to the Board in c/o City of South St. Paul, 125 3rd Ave. N., South St. Paul, MN 55075. The determination of the Member's appeal shall be referred to a Board of Arbitration. The Board of Arbitration shall consist of three (3) persons: one to be appointed by the Board, one to be appointed by the appealing Member, and the third to be appointed by the two so selected. In the event the two persons so selected do not appoint the third person within fifteen (15) days after their appointment, then the chief judge of the District Court of Dakota County shall have jurisdiction to appoint, upon application of either or both of the two earlier selected, the third person to the Board of Arbitration. The third person selected shall not be a resident of any Member and if appointed by the chief judge, shall be a person knowledgeable in the subject matter of the dispute. The arbitrators' expenses and fees, together with the other expenses, not including counsel fees, incurred in the conduct of the arbitration shall be divided equally between the WMO and the appealing Member. Arbitration shall be conducted in accordance with the Uniform Arbitration Act, Minn. Stat. Chapter 572. Arbitration must be completed within the 270 day period provided for in Subdivision 1 of this Section.

Subdivision 3. Contracts for Improvements. The bidding and contracting of the work may be let by any Member or by the WMO as determined by the Board, in compliance with state statutes. Contracts and bidding procedures shall comply with all legal requirements.

Subdivision 4. Supervision. All improvement contracts shall be supervised by the entity awarding the contract. A WMO representative shall also be authorized to observe and review the work in progress and the Members agree to cooperate with the WMO representative in accomplishing the WMO's purposes. Representatives of the WMO shall have the right to enter upon the place or places where the improvement work is in

progress for the purpose of making reasonable tests and inspections. The WMO representative shall report to the Board on the progress of the work.

Subdivision 5. Land Acquisition. The WMO shall not have the power of eminent domain. All easements or interest in land which are necessary for an improvement will be negotiated or condemned in accordance with Minn. Stat. Chapter 117 by the Member where the land is located, and each Member agrees to acquire the necessary easement or right-of-way or partial or complete interest in land upon order of the Board to accomplish the purposes of this Agreement. All reasonable costs of the acquisition, including attorney's and appraiser's fees, shall be a cost of the improvement, and shall be allocated according to the formula for allocating Capital Improvement cost in Section 10, Subdivision 7. If a Member determines it is in its best interests to acquire additional rights in lands for some other purposes, in conjunction with the taking of lands for the improvement, the costs of the acquisition of additional rights in lands will not be included in the improvement costs. The Board, in determining the amount of the improvement costs to be assessed to each Member, may take into consideration the land use for which the additional lands are being acquired and may credit the acquiring Member for the land acquisition to the extent that it benefits the other Members. Any credits may be applied to the cost allocation of the improvement, or the Board, if feasible and necessary, may defer the credits to a future improvement.

Members may not condemn or negotiate for land acquisition to pond or drain storm and surface waters within the corporate boundaries of another Member within the WMO.

SECTION 10. FINANCES.

Subdivision 1. Disbursements. The WMO funds may be expended by the Board in accordance with this Agreement in a manner determined by the Board. The Board shall designate one or more national or state bank or trust companies authorized to receive deposits of public monies to act as depositories for the WMO funds. In no event shall there be a disbursement of WMO funds without approval by the Board and the signature of at least two (2) Board Members, one of whom shall be an officer. The Board may require the secretary/treasurer to file with the Board a bond in the sum of at least $10,000 or such higher amount as shall be determined by the Board. The WMO shall pay the premium on said bond.

Subdivision 2. Budget. On or before July 1 of each year, the Board shall adopt a general fund budget ("Budget") by a majority vote of all Members (with each Member having one vote) for the ensuing year and decide upon the total amount necessary for the general fund. The secretary/treasurer of the Board shall certify the Budget to the clerk of each Member, together with a statement of the proportion of the Budget to be provided by each Member, computed in accordance with Section 10, Subdivision 5. The council of each Member shall review the Budget, and the Board shall upon notice from any Member received prior to August 1, hear objections to the Budget, and may, upon notice to all Members of the time, date, place of and right to participate in the hearing and after a hearing, modify or amend the Budget, and then give notice to the Members of any and all modifications or amendments. Each Member agrees to provide the funds required by the Budget by February 15th of each year.

If a Member fails to provide its share of the funds required by the Budget by February 15 of each year, the unpaid balance of the funds shall accrue interest at a rate of

eight percent (8%) per annum commencing the day following February 15th of the year in which the funds were due. The WMO may take whatever action, at law or in equity it deems appropriate, to collect any amounts due from a Member under this Agreement. The Member agrees to pay the cost of collection, including reasonable attorneys' fees.

Subdivision 3. Maintenance. The Board shall have the option of funding maintenance work through the Budget, or funding as a capital improvement in accordance with Subdivision 6 of this Section. Maintenance costs that are associated with an improvement in the approved Capital Improvement Program, shall be allocated according to the same formula as is applicable for allocating capital improvement costs as identified in Section 10, Subdivision 7. The Members affected by the improvement shall decide on the level of maintenance to be applied to the improvement. If the Members cannot agree, the Board shall make the determination.

Subdivision 4. Tax Levy. If authorized by law, the WMO may levy a tax. The proceeds of any tax levied under this subdivision shall be expended only for the purposes authorized by law. The WMO may accumulate the proceeds of levies as an alternative to issuing bonds to finance improvements.

Subdivision 5. General Fund. Each Member agrees to contribute each year to a general fund to be used for general administration purposes including, but not limited to: improvement projects, salaries, rent, supplies, development of an overall plan, insurance, bonds, and to purchase and maintain devices to measure hydrological and water quality data. The funds may also be used for any other purpose authorized by this Agreement. The annual contribution by each Member shall be based fifty percent (50%) on taxable market value (for the preceding year) and fifty percent (50%) on area in accordance with the following formula:

Annual Watershed Levy = L

Taxable Market Value of a
Member's Property in the Watershed = MV

Taxable Market Value of All Property in the Watershed = TV

Acres of Property a Member Has in the Watershed = A

Total Acres in Watershed = TA

Member Required Contribution = C

$$\tfrac{1}{2} L \times \frac{MV}{TV} + \tfrac{1}{2} L \times \frac{A}{TA} = C$$

Subdivision 6. Capital Improvement.

A. All capital improvements ordered by the Board must be included in the WMO's adopted capital improvement program. An improvement fund shall be established for each improvement ordered by the WMO. If ordered by the Board, each Member agrees to contribute to the funds its proportionate share of the engineering, legal, and administrative costs as determined by the amount to be assessed against each Member as a cost of the improvement. The Board shall submit in writing a statement to each Member, setting forth in detail the expenses incurred by the WMO for each improvement.

Each Member further agrees to pay its proportionate share of the cost of the improvement in accordance with the determination of the Board, under Section 10, Subdivision 7. The Board or the Member awarding the contract shall submit in writing copies of the engineer's certificate authorizing payment during construction and the Member being billed agrees to pay its share of the costs within thirty (30) days after receipt of the statement. The Board may also require payment from Members before awarding a contract based upon an engineer's estimate of cost. Billings will then be adjusted when actual costs are known. The Board or the Member awarding the contract shall advise other contributing Members of the tentative time schedule of the work and the estimated times when the contributions shall be necessary.

B. Notwithstanding the provisions of paragraph (A) of this Subdivision, the WMO may also fund all or any part of the cost of a capital improvement contained in the capital improvement program of the plan in accordance with Minn. Stat. § 103B.251. The WMO and Dakota County and/or Ramsey County may establish a maintenance fund to be used for normal and routine maintenance of an improvement constructed in whole or in part with money provided by Dakota and/or Ramsey County pursuant to Minn. Stat. § 103B.251. The levy and collection of an ad valorem tax levy for maintenance shall be by Dakota and/or Ramsey County based upon a tax levy resolution adopted by the WMO and remitted to the

county(ies) on or before October 1 of each year. If it is determined to levy for maintenance, the WMO shall be required to follow the hearing process established by Minn. Stat. §103D.921. Mailed notice shall also be sent to the clerk of each Member at least thirty (30) days prior to the hearing.

C. The WMO may also fund all or any part of the cost of a capital improvement contained in the capital improvement program of the plan in accordance with Minn. Stat. § 103B.241.

Subdivision 7. Capital Cost Allocation of Improvements in the Board's Watershed Management Plan. All capital improvement costs of improvements designated in the WMO's adopted Watershed Management Plan for construction by the WMO pursuant to Section 10, Subdivision 6A of this Agreement shall be apportioned by the following methods or a combination of these methods:

A. For improvements related to water quality:

1. For water quality monitoring, water quality trend analyses, water quality modeling, and water quality studies, the cost sharing will be proportional to the tributary watershed area.

2. For water quality projects and maintenance, the cost sharing will be based on Allowable Flow, tributary area, and/or relative phosphorus loading.

3. The cost sharing for WMO operation of a future Watershed Outlet Monitoring Program station, or other program that monitors the quality of the stormwater runoff that discharges into the Mississippi River from the WMO, will be proportional to the tributary watershed area.

4. Or other cost sharing method approved by the Board.

5. Pursuant to Minn. Stat. § 103B.251.

B. For improvements related to water quantity:

1. A Member shall be responsible for the costs of construction of that portion of a drainage system that is located within its borders and that is necessary to accommodate its Allowable Flow and the Allowable Flow of all other tributary Members.

2. A Member shall also be responsible for its share of construction costs of a drainage system, whether or not that system is located within its borders, that is necessary to convey Excessive Flows originating within the Member's borders.

3. Increased costs of construction incurred for acquisition of lands, easements and rights of way within natural watercourses shall be the obligation of the Member in which the land lies and shall not be apportioned to other Members to the extent that such costs exceed costs which would have been incurred if there had been no improvement on such lands, easements, or rights of way.

4. Costs of construction shall include all costs associated with a WMO approved improvement (whether trunk sewer or natural conveyance) and whether or not actually constructed, including, but not limited to, costs for design, administration, construction supervision, legal fees, acquisition of lands and improvements and actual construction and maintenance costs.

5. The WMO shall consider any grant money received or to be received by a Member for sanitary sewer/storm sewer separation or for the construction, reconstruction or replacement of storm sewer facilities before making cost allocations among Members and may consider the application of any grant proceeds toward the cost of the improvement before allocating costs between or among the Members involved, provided that such allocation would not violate the terms and conditions of the grant.

6. The attached Exhibit B is incorporated by reference and serves as a compilation of general examples of cost allocation under this Agreement for the hypothetical circumstances stated in the examples.

Subdivision 8. Capital Cost Allocation of Improvements Delineated in Local Watershed Management Plans. All capital improvement costs incurred by the WMO for improvements delineated in local watershed management plans that benefit only that Member, which the WMO undertakes because the Member fails to do so, shall be apportioned entirely to that Member.

SECTION 11. SPECIAL ASSESSMENTS. The WMO shall not have the power to levy special assessments. All such assessments shall be levied by the Member within which the land is located.

SECTION 12. DURATION.

Subdivision 1. Each Member agrees to be bound by the terms of this Agreement until January 1, 2012. It may be continued thereafter upon the agreement of all the parties.

Subdivision 2. This Agreement may be terminated prior to January 1, 2012, by the written agreement of a majority of the Members.

Subdivision 3. In addition to the manner provided in Subdivision 2 for termination, any Member may petition the Board to dissolve the WMO. Upon thirty (30) days' notice in writing to the clerk of each Member, the Board shall hold a hearing and upon a favorable majority vote of all eligible votes of the Members, the Board may by resolution recommend that the WMO be dissolved. The resolution shall be submitted to each Member and if ratified by a majority of the governing bodies of all Members within sixty (60) days, the Board shall then give ninety (90) days written notice of its intent to dissolve the WMO to Dakota County, Ramsey County and the Board of Water and Soil Resources. After the expiration of this 90-day notice period, the Board shall dissolve the WMO, allowing a reasonable time to complete work in progress and to dispose of personal property owned by the WMO.

SECTION 13. DISSOLUTION. Upon dissolution of the WMO or termination of this Agreement, all property of the WMO shall be sold and the proceeds thereof, together with monies on hand, shall be distributed to the Members. Such distribution of WMO assets shall be made in proportion to the total contribution to the WMO required by the last annual Budget.

SECTION 14. EFFECTIVE DATE. This Agreement shall be in full force and effect when all seven (7) Members file a certified copy of a resolution approving this Agreement and have executed this Agreement and filed the executed Agreement with the Board. All Members need not sign the same copy.

IN WITNESS WHEREOF, the undersigned governmental units, by action of their governing bodies, have caused this Agreement to be executed in accordance with the authority of Minn. Stat. § 471.59.

Approved by the City Council
November 6, 20 01.

CITY OF INVER GROVE HEIGHTS

BY: _____

Attest: _____

Approved by the City Council
April 28, 2003.

CITY OF LILYDALE

BY: _____

Attest: _____

Approved by the City Council
_____, 20____.

CITY OF MENDOTA HEIGHTS

BY: _____

Attest: _____

Approved by the City Council
_____, 20____.

CITY OF ST. PAUL

BY: _____

Attest: _____

Approved by the City Council
_____, 20____.

CITY OF SOUTH ST. PAUL

BY: _____

Attest: _____

IN WITNESS WHEREOF, the undersigned governmental units, by action of their governing bodies, have caused this Agreement to be executed in accordance with the authority of Minn. Stat. § 471.59.

Approved by the City Council
_____, 20____.

CITY OF INVER GROVE HEIGHTS

BY: _____

Attest: _____

Approved by the City Council
_____, 20____.

CITY OF LILYDALE

BY: _____

Attest: _____

Approved by the City Council
November 20, 2001.

CITY OF MENDOTA HEIGHTS

BY: Charles E. Mathwig

Attest: Linda L. Hylton

Approved by the City Council
_____, 20____.

CITY OF ST. PAUL

BY: _____

Attest: _____

Approved by the City Council
_____, 20____.

CITY OF SOUTH ST. PAUL

BY: _____

Attest: _____

IN WITNESS WHEREOF, the undersigned governmental units, by action of their governing bodies, have caused this Agreement to be executed in accordance with the authority of Minn. Stat. § 471.59.

Approved by the City Council
_____, 20____.

CITY OF INVER GROVE HEIGHTS

BY: _____

Attest: _____

Approved by the City Council
_____, 20____.

CITY OF LILYDALE

BY: _____

Attest: _____

Approved by the City Council
_____, 20____.

CITY OF MENDOTA HEIGHTS

BY: _____

Attest: _____

Approved by the City Council
January 16, 20 02.
Council File #02-52

Approved as to Form:

BY: Lisa A. Veith
Assistant City Attorney

CITY OF ST. PAUL

BY: Randy Kelly, Mayor

Approved by the City Council
_____, 20____.

CITY OF SOUTH ST. PAUL

BY: _____

Attest: _____

IN WITNESS WHEREOF, the undersigned governmental units, by action of their governing bodies, have caused this Agreement to be executed in accordance with the authority of Minn. Stat. § 471.59.

Approved by the City Council
_____, 20____.

CITY OF INVER GROVE HEIGHTS

BY: _____

Attest: _____

Approved by the City Council
_____, 20____.

CITY OF LILYDALE

BY: _____

Attest: _____

Approved by the City Council
_____, 20____.

CITY OF MENDOTA HEIGHTS

BY: _____

Attest: _____

Approved by the City Council
_____, 20____.

CITY OF ST. PAUL

BY: _____

Attest: _____

Approved by the City Council
November 5, 20 01.

CITY OF SOUTH ST. PAUL

BY: Kathleen A Taylor

Attest: Christy M. Wilcox

Approved by the City Council
12/4, 20 01.

CITY OF SUNFISH LAKE

BY: _____

Attest: _____, Clerk

Approved by the City Council
_____, 20____.

CITY OF WEST ST. PAUL

BY: _____
Its Mayor

BY: _____
Its City Manager

Approved by the City Council
_____, 20____.

CITY OF SUNFISH LAKE

BY: _____

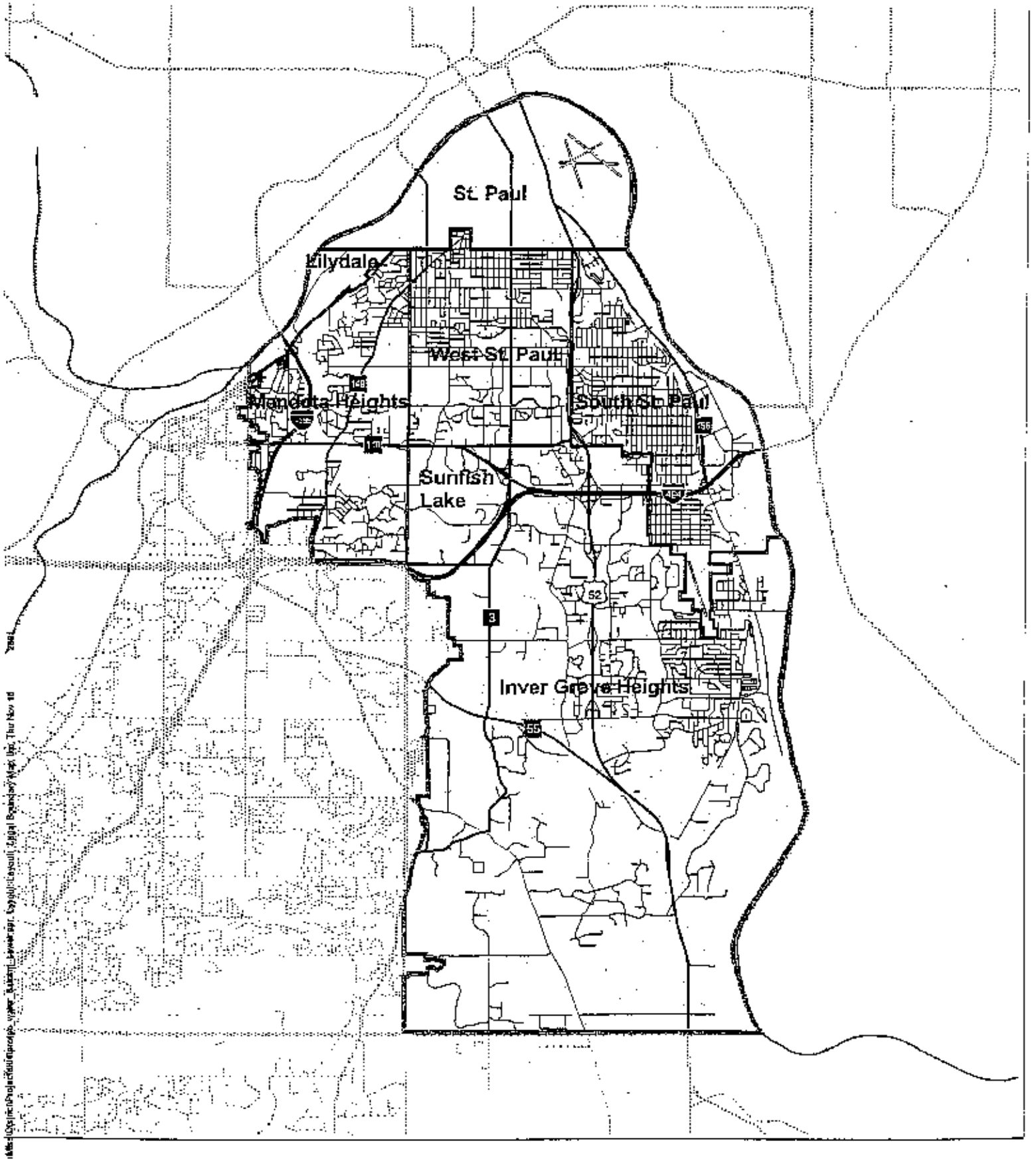
Attest: _____

Approved by the City Council
Nov. 26, 2001.

CITY OF WEST ST. PAUL

BY: _____
Its Mayor

BY: _____
Its City Manager



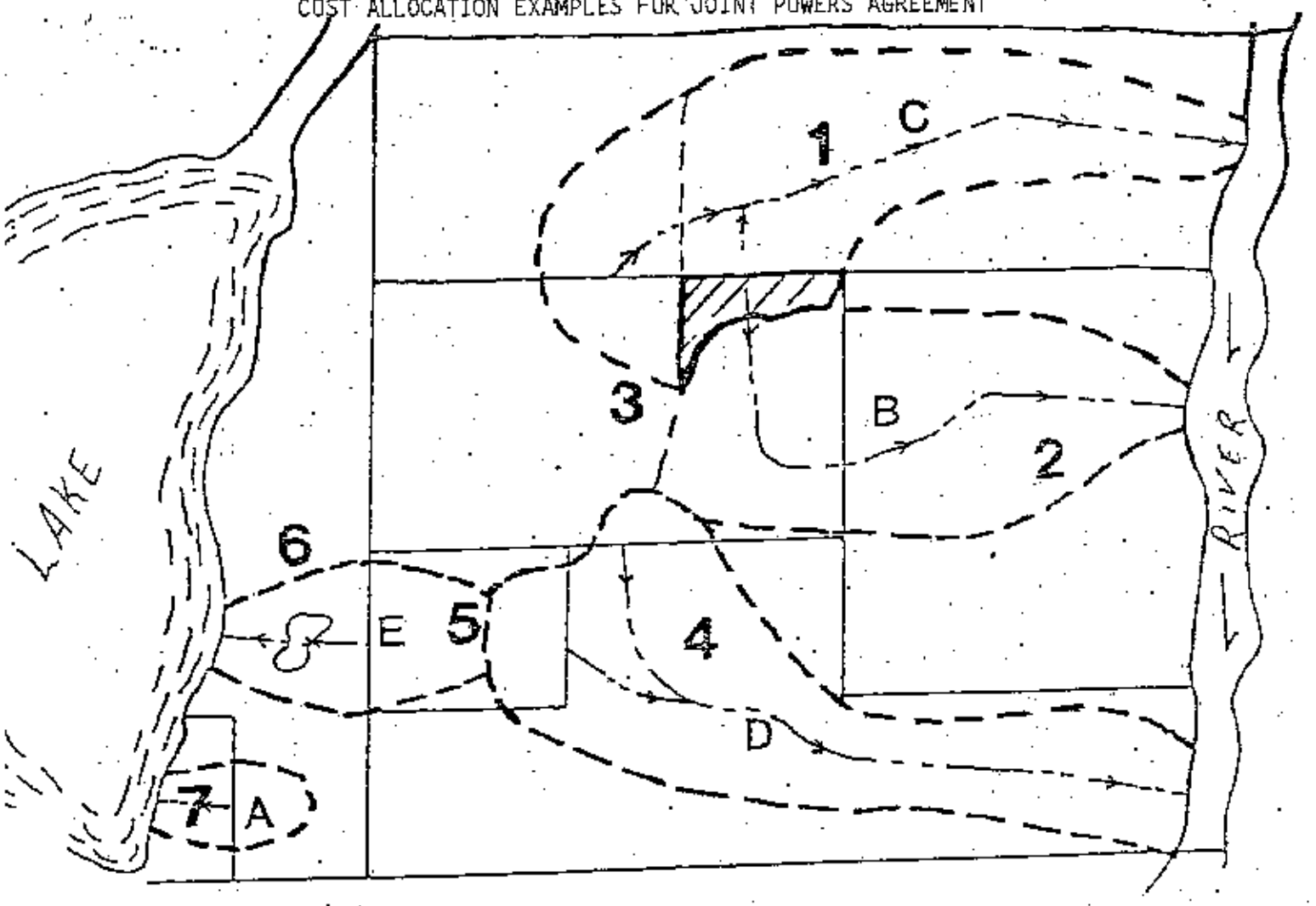
Legal Boundary Map of the
Lower Mississippi River
Watershed Management Organization

Exhibit A

1 0 1 Miles

N

COST ALLOCATION EXAMPLES FOR JOINT POWERS AGREEMENT



EXAMPLE	DESCRIPTION
A.	Two Cities
B.	Two Cities With Diversion In
C.	Two Cities With Diversion Out
D.	Three Cities
E.	Added Ponding

LEGEND

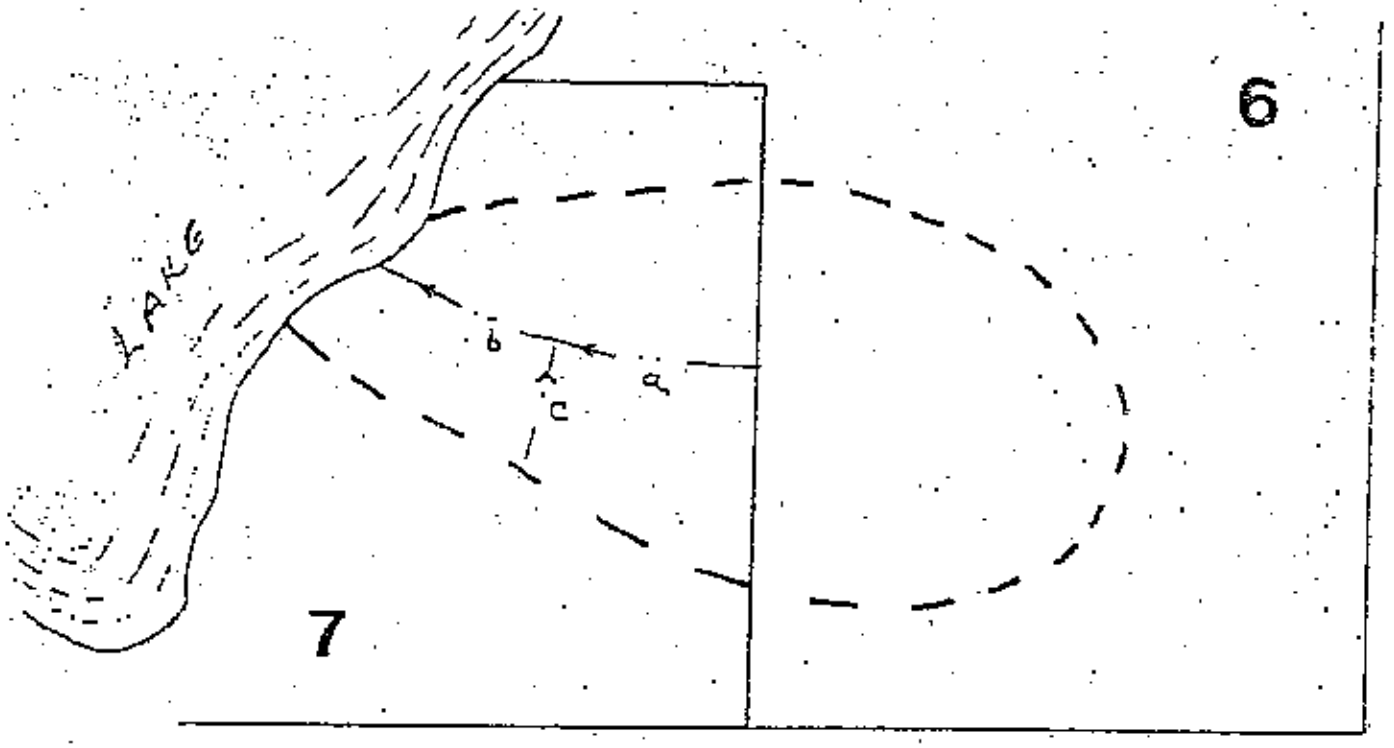
Watershed Boundary

Drainage Facility

City Boundary

Detention Pond

Diverted Area



EXAMPLE "A" – TWO CITIES

Project: Construct project (Segments 'a' and 'b') in City #7 to provide drainage for Cities #6 and #7 under fully developed conditions.

Cost Allocation:

City #6: Cost share = $\frac{Q_{E6}}{Q_T}$ x Total project cost for "a".

City #7: Cost share = Total project cost - $\left(\frac{Q_{E6}}{Q_T} \times \text{Total project cost}\right)$

Where: $Q_{E6} = Q_{T6} - Q_{A6}$;

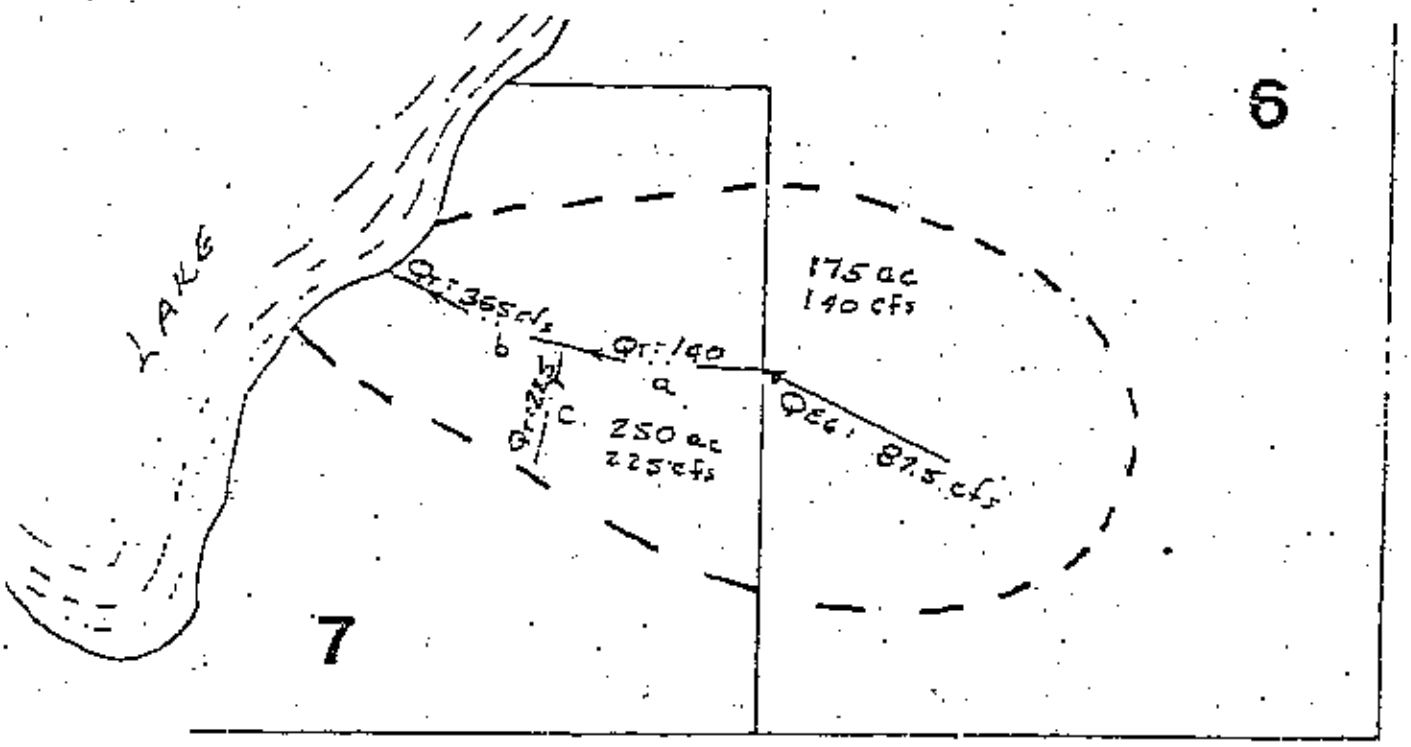
Q_{E6} is the design flow rate from City #6 which is in excess of the allowable flow rate from City #6;

Q_{A6} is the allowable flow rate from City #6;

Q_{T6} is the total design flow rate from City #6;

Q_T is the total flow rate for which the project is designed in each Segment.

City #6: Cost share for Segment "c" = Zero dollar (no tributary flow).



EXAMPLE "A" - TWO CITIES

Sample Calculations

Assume:

City #6 - Area of Watershed within City #6 = 175 acres
Full development runoff (Q_{T6}) = CIA = 0.40 x 2.0"/h x 175 = 140 cfs
Predevelopment runoff (Q_{A6}) = CIA = 0.15 x 2.0"/h x 175 = 52.5 cfs

Then:

Excess runoff (Q_{E6}) (from formulae: $Q_E = Q_T - Q_A$) = 87.5 cfs

1. City #6 cost share for Segment "a" = $\frac{87.5}{140}$ x project cost for "a" = .63 x Project cost for "a".

(From formulae: share = $\frac{Q_E}{Q_T}$ x Project cost)

Note: Segment "a" ends at first point of entry into the system from City #7.

Assume:

City #7 - Area of Watershed within City #7 = 250 acres and all flows from City #7 enter system by way of Segment "c".
Full development runoff (Q_{T7}) = CIA = .50x1.8x250 = 225 cfs
Design flow for Segment "b" = $Q_{T(SEG.\ "a")} + Q_{T7}$ = 140 + 225 = 365 cfs

2. City #6 has no cost share obligation in Segment "c" when there is no tributary flow from City #6.

(continued)

Then:

3. City #6 cost share for Segment "b" = $\frac{87.5}{365}$ x Project cost for "b" = 0.24 Project cost of "b".

(From formulae: Share = $\frac{Q_{E6}}{Q_T}$ x Project cost)

Note:

City #6 can reduce the excess flow (Q_{E6}) by detention ponding even to the amount that the rate of flow from City #6 (Q_{T6}) is no greater than the allowable flow rate (Q_{A6}). Any reduction in the total rate from City #6 would be applied to the excess rate and thereby reduce the obligation of City #6 to share in the cost of constructing any conveyance system in City #7.

SUMMARY OF COSTS

Segment "a":

City #6: Cost share = $\frac{87.5}{140}$ x Project cost for "a".

City #7: Cost share = $\frac{52.5}{140}$ x Project cost for "a".

Segment "b":

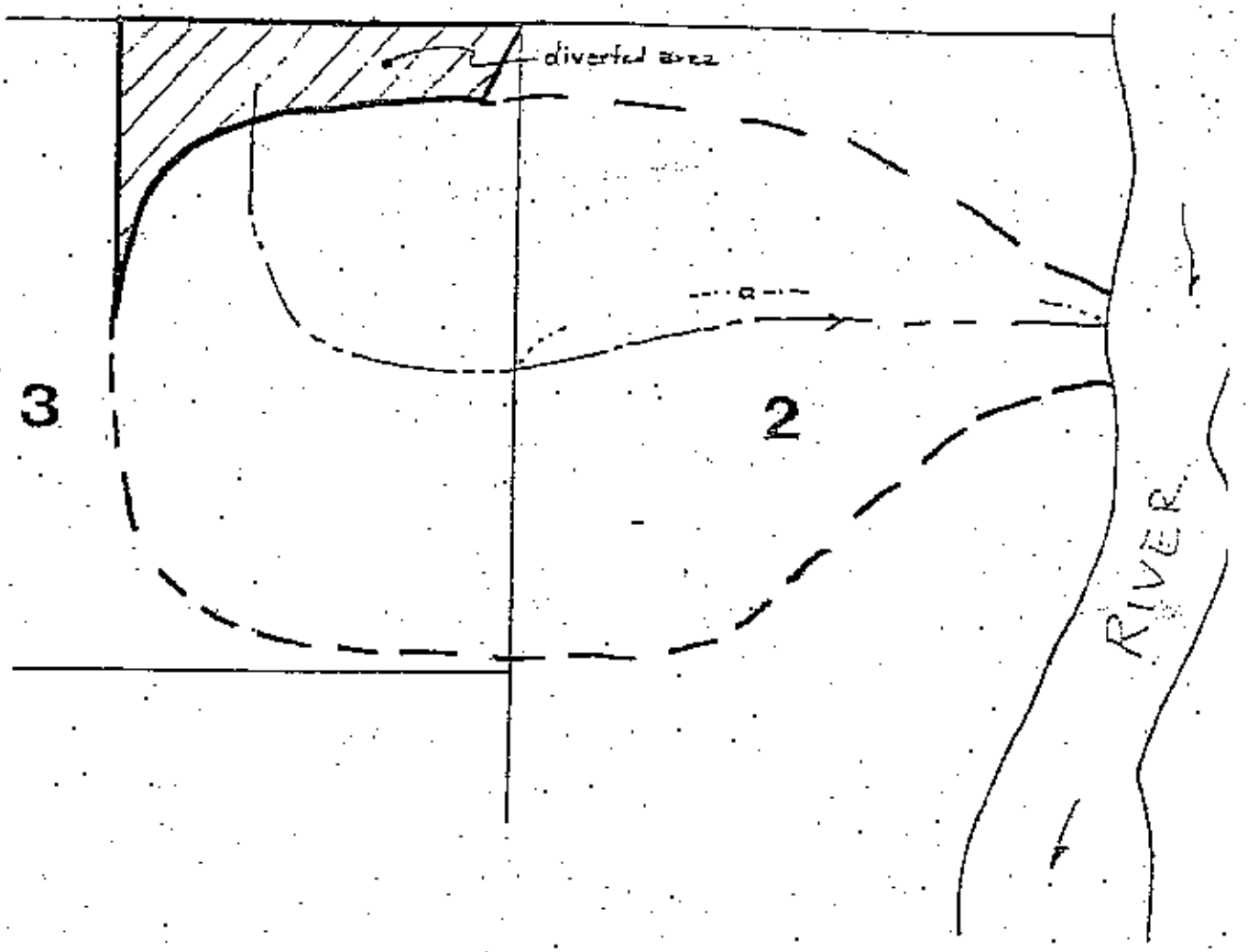
City #6: Cost share = $\frac{87.5}{365}$ x Project cost for "b".

City #7: Cost share = $\frac{277.5}{365}$ x Project cost for "b".

Segment "c":

City #6: Cost share = Zero dollar (no tributary flow).

City #7: Cost share = All of Project cost for "c".



EXAMPLE "B" - TWO CITIES WITH DIVERSION IN

Project: Construct Trunk facility "a" in City #2 only for Cities #2 and #3 under fully developed conditions.

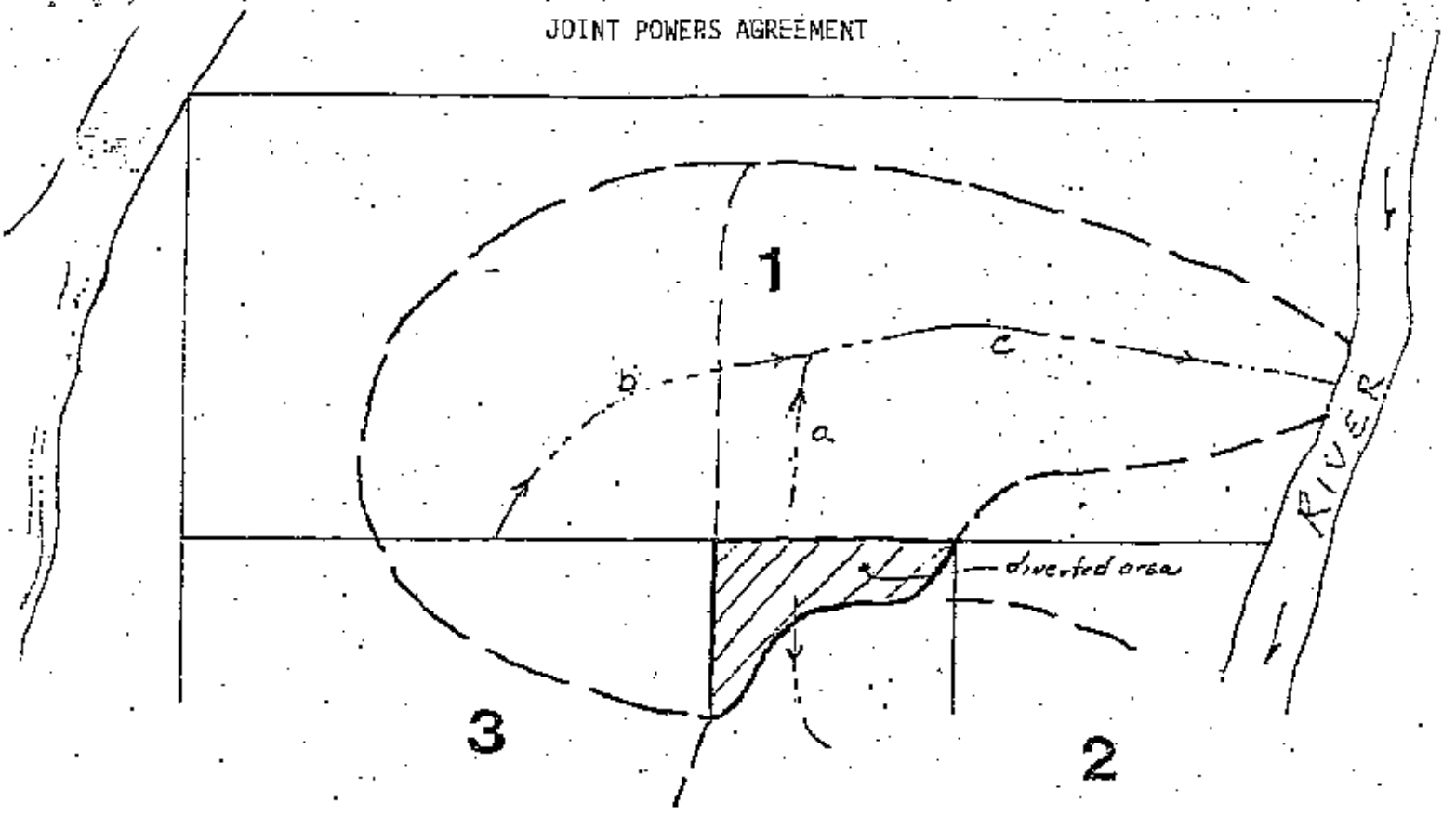
Cost Allocation:

City #3: Cost share = $\frac{Q_{E3}}{Q_T}$ x Total project cost.

Where: $Q_{E3} = Q_{T3} - Q_{A3}$
And Q_{E3} is the design flow from City #3 as described in Example "A" plus all flows coming from the area diverted. All facilities within City #3 are constructed by City #3. Detention in City #3 can reduce Q_{E3};

Q_T and Q_A are as defined in Example "A".

Note: This case applies only where waters are diverted from one City to another City or from one major drainage district to another.



EXAMPLE "C" - TWO CITIES WITH DIVERSION OUT

Project: Construct Trunk Segments "a", "b", "c" in City #1 under fully developed conditions.

Cost Allocation:

City #3: Cost share for Segment "a" = Zero dollars (all flows have been diverted away)

Cost share for Segment "b" = $\frac{Q_{E3}}{Q_T}$ x Total project cost for "b".

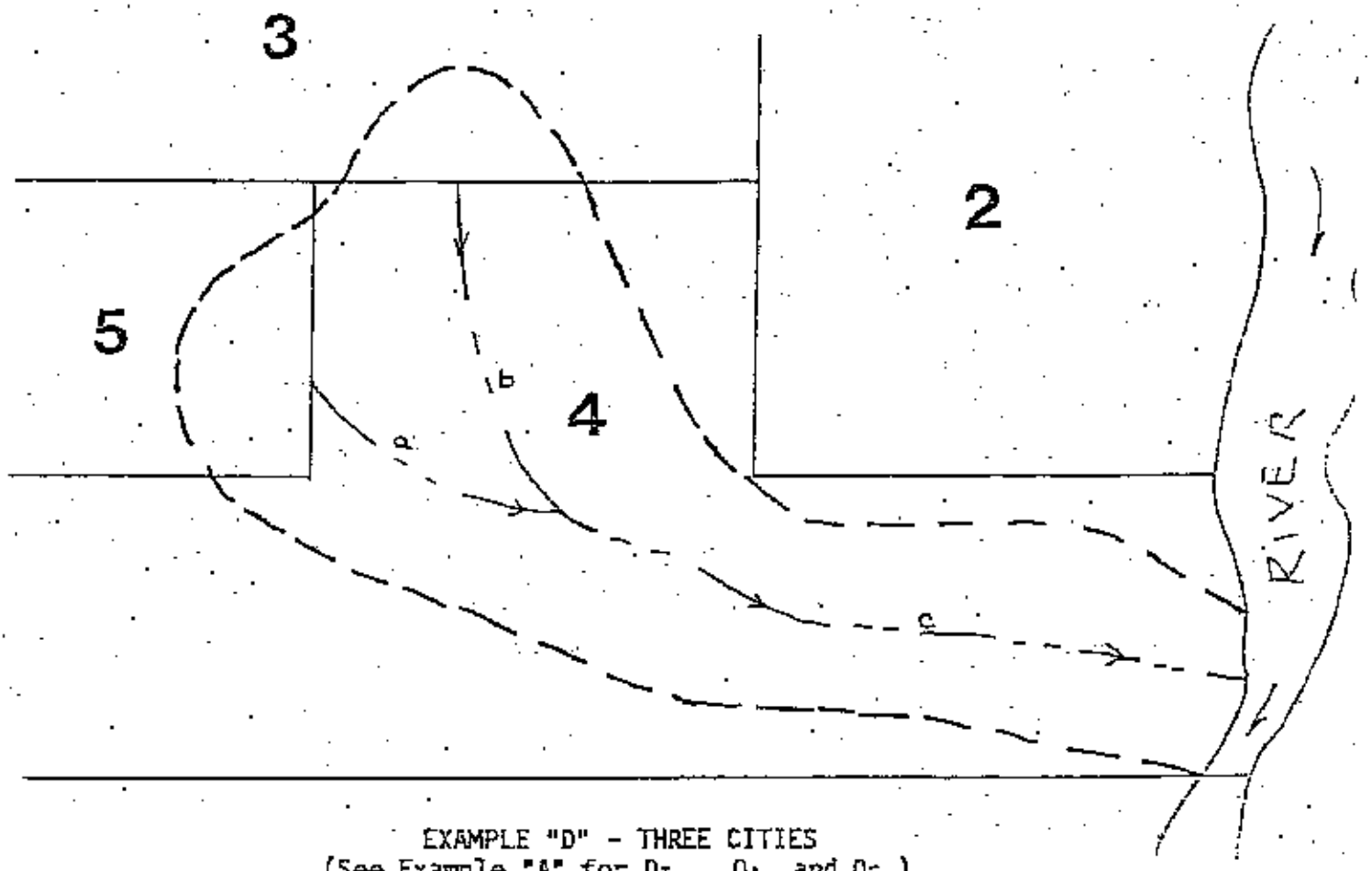
Where: Q_{E3} is the excess flow from City #3 that is tributary to Segment "b" only.

City #3: Cost share for Segment "c" = $\frac{Q_{E3}}{Q_T}$ x Total project cost for "c".

Where: Q_{E3} is the excess flow from City #3 that is tributary to Segment "c" calculated as Q_{E3} tributary to "b" minus Q_{A3} that would have been tributary to "a" had there been no diversion out of the drainage district.

Q_T and Q_A are as defined in Example "A".

Note: This case applies only where waters are diverted from one City to another City, or from one major drainage district to another.



EXAMPLE "D" - THREE CITIES
(See Example "A" for Q_T, Q_A and Q_E)

Project: Construct Project (Segments "a", "b" and "c") in City #4 to provide drainage for Cities #3, #4, and #5 under fully developed conditions.

Cost Allocations:

City #3: Cost share Segment "b" = $\frac{Q_{E3}}{Q_T}$ x Project cost for "b".

Cost share Segment "a" = Zero dollars (no tributary flow).

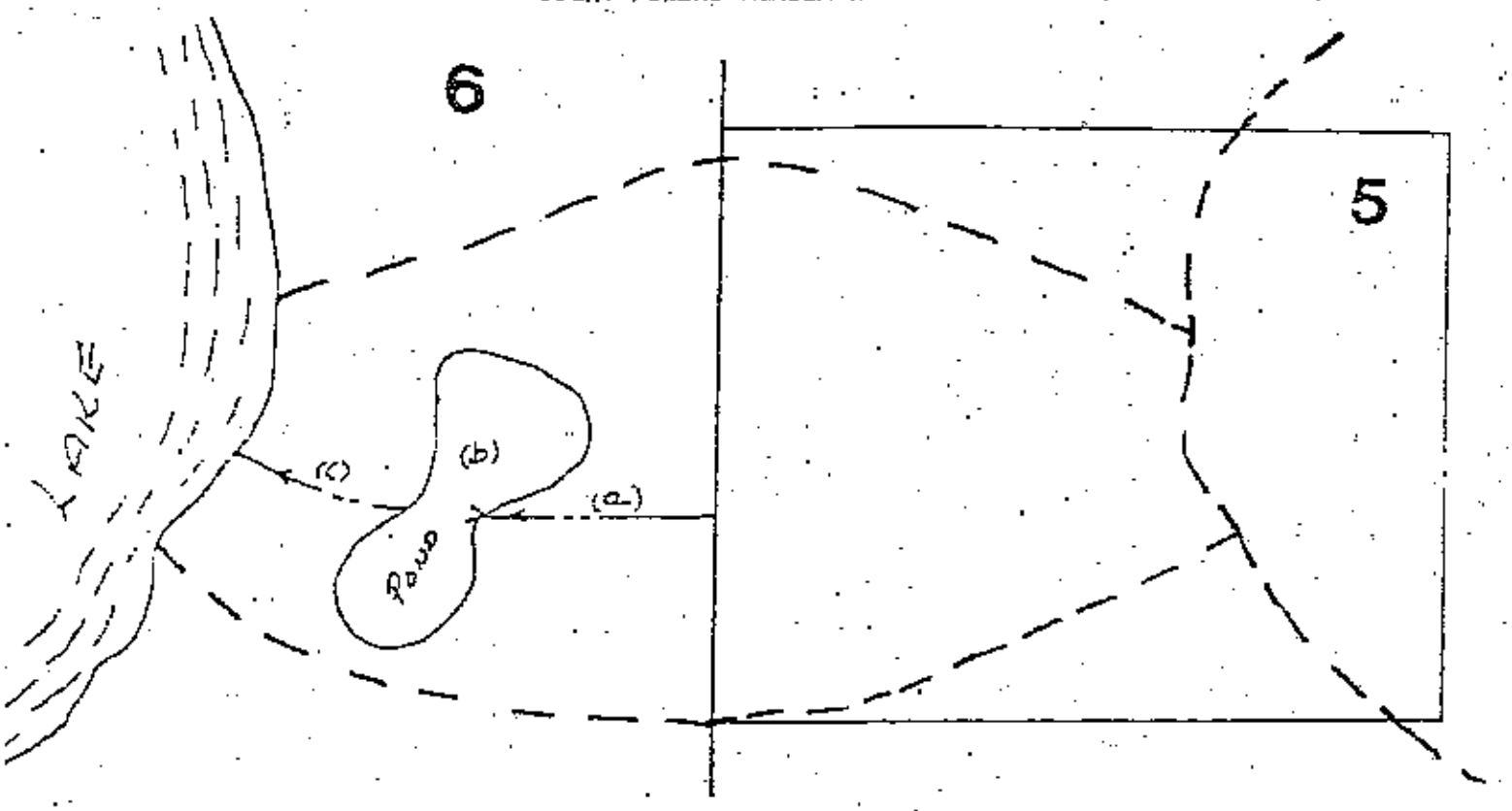
Cost share Segment "c" = $\frac{Q_{E3}}{Q_T}$ x Project cost for "c".

City #5 Cost share Segment "a" = $\frac{Q_{E5}}{Q_T}$ x Project cost for "a".

Cost share Segment "b" = Zero Dollars (no tributary flow).

Cost share Segment "c" = $\frac{Q_{E5}}{Q_T}$ x Project cost for "c".

Where: Q_T is the total flow rate for which each respective Segment is designed.



EXAMPLE "E" - ADDED PONDING
(See Example "A" for definition of Q_T , Q_A and Q_E)

ct: Construct Trunk "a", Detention Pond "b" and Outlet "c" for cities #5 and #6 under fully developed conditions.

Cost Allocation:

City #5 (Trunk "a"): Cost share = $\frac{Q_{E5}}{Q_T}$ x Project cost of Trunk "a".

Where: Q is the total flow rate in Trunk "a".

City #5 (Pond "b"): Cost share = $\frac{V_{E5}}{V_T}$ x Project cost of Pond "b".

Where: V_{E5} is the design Volume of runoff from City #5 which is in excess of the allowable Volume from City #5;

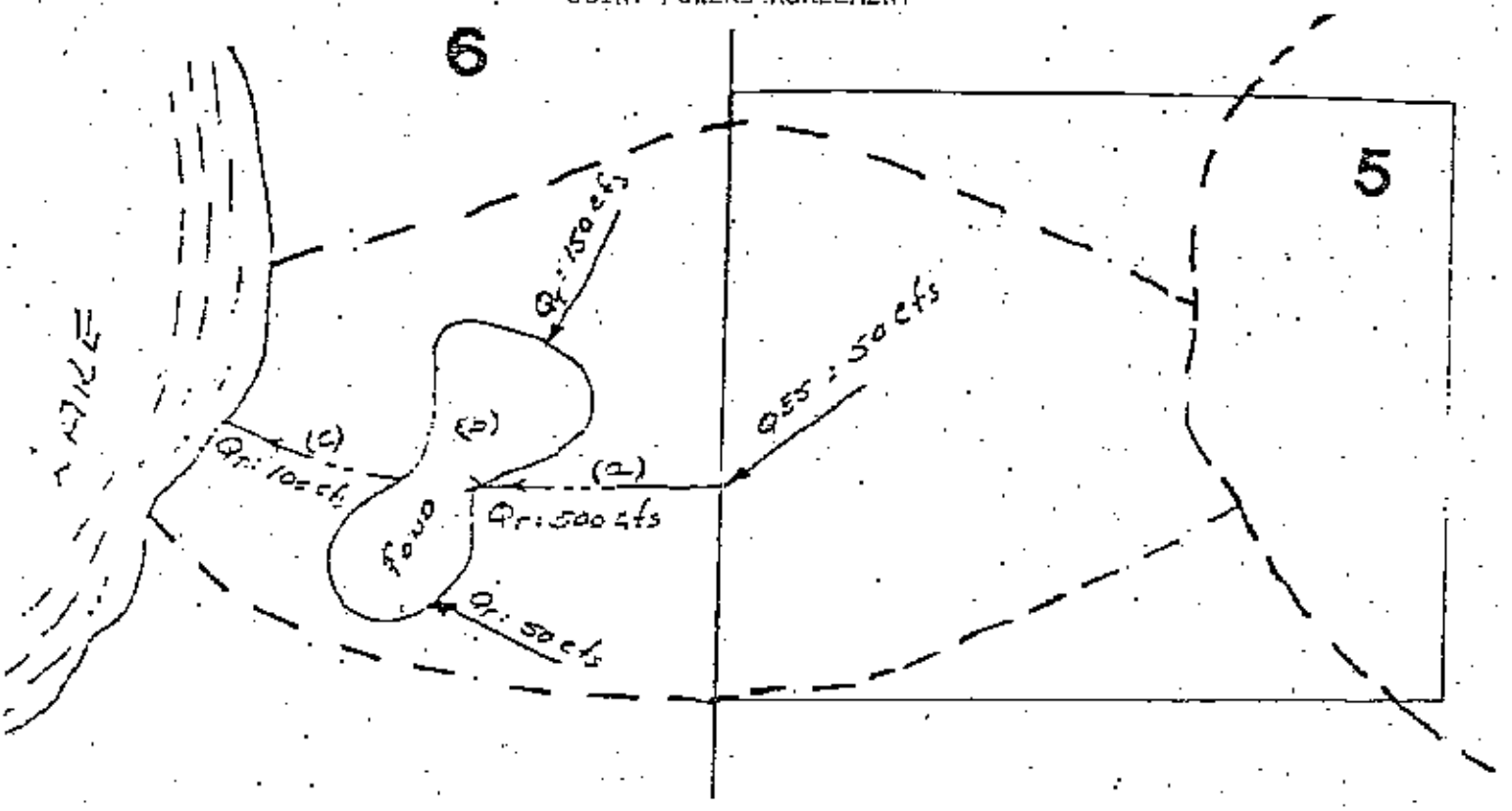
V_T is the total Volume used in the design of the detention pond.

City #5 (Outlet "c"): Cost share = $\frac{Q_{E5}}{Q_T}$ x Project cost of Outlet "c".

Where: Q_{T5} is reduced from Trunk "a" Inlet Q_{E5} by the ratio of $\frac{\text{Outlet } Q_T}{\text{Inlet } Q_T}$;

Inlet Q_T is the summation of all flows into the pond;
Outlet Q_T is the total flow rate out of the pond under design conditions.

te: See Page 9 for sample calculations



EXAMPLE "E" - ADDED PONDING

Example calculation for City #5 cost share for Outlet "c":

Assume:

Q_{E5} = 50 cfs

Q_T Pond inflow in Segment "a" = 500 cfs

Q_T Pond inflow from other areas = 200 cfs

$\leq Q_T$ Pond inflow = 700 cfs

Q_T Pond Outlet "c" = 100 cfs

And:

$$Q_{E5\ (OUTLET)} = Q_{E5\ (INLET)} \times \frac{Q_{T\ (OUTLET)}}{\leq Q_{T\ (INLET)}}$$

$$\text{City \#5 cost share} = \frac{Q_{E5\ (OUTLET)}}{Q_{T\ (OUTLET)}} \times \text{Project cost of Outlet "c"}$$

Then:

$$Q_{E5}\ \text{(for Segment "c")} = \frac{100}{700} \times 50 = 7.14\ \text{cfs}$$

$$\text{City \#5 cost share} = \frac{7.14}{100} \times \text{Project cost of Outlet "c"}$$

JOINT POWERS AGREEMENT BY AND BETWEEN THE CITY OF MENDOTA HEIGHTS AND THE CITY OF SUNFISH LAKE RELATING TO AN OUTLET FOR THE LAKE OF SUNFISH LAKE

This Joint Powers Agreement (the "Agreement") made and entered into this ____ day of August, 1995, (the "Effective Date") by and between the City of Mendota Heights, a Minnesota municipal corporation, hereinafter referred to as MH, and the City of Sunfish Lake, a Minnesota municipal corporation, hereinafter referred to as SFL. Based on the representations, covenants and provisions hereafter contained, the parties do hereby agree as follows:

ARTICLE 1.
RECITALS

1.1. Status of Parties. MH and SFL are both municipal corporations under the laws of the State of Minnesota. The cities adjoin each other.

1.2. Statutory Authority. This Agreement is entered into pursuant to Minnesota Statutes Section 471.59 and the statutes relating to surface water management contained in Minnesota Statutes, Section 103B.201 *et seq.*

1.3. Condition of Sunfish Lake. Within SFL, there exists a body of water known as Sunfish Lake, also identified as DNR No. 19-50P. The ordinary high-water mark for Sunfish Lake, as determined by the Minnesota Department of National Resources (the "MDNR"), is 937 feet above sea level. Sunfish Lake currently does not have a permanent outlet for its water. At the present time, the level of Sunfish Lake is approximately one foot above the ordinary high-water mark as determined by the MDNR. The high-water within Sunfish Lake has caused damage to the shoreline and to the trees and banks along its shore.

1.4. Outlet for Sunfish Lake. The Sunfish Lake Homeowners Improvement Association, Inc. (the "Association"), a Minnesota non-profit corporation, has petitioned SFL for a permit to construct a permanent outlet apparatus for Sunfish Lake more particularly described on Exhibit A hereto (the "Outlet"). The Association's members are comprised of landowners abutting Sunfish Lake. Contemporaneously with the execution of this Agreement, SFL will grant the Association an interim use permit for the installation of the Outlet. After installation is completed, the Outlet will be conveyed by the Association to SFL. Further, by the terms of an easement instrument which allows access to and construction of the Outlet on private property, SFL and MH and their agents and representatives will have the power and authority to enter onto the easement area for the purpose of controlling the Outlet and conducting maintenance and repair thereof.

1.5. Course of Water. The purpose of the Outlet is to allow the water from Sunfish Lake to flow into a series of ditches within SFL and eventually into MH's stormwater management facilities. The MH stormwater management facilities comprise of a series of ditches, pipes,

conduits, ponds and other related stormwater management facilities. The water flow from Sunfish Lake will flow from SFL to MH and eventually into the Mississippi River. The Outlet is being constructed with a valve so that the level of water at Sunfish Lake will be maintained at approximately one inch above the ordinary high-water mark, as determined by the MDNR, of Sunfish Lake.

1.6. Consistency of Outlet Apparatus With Management Plan. SFL has adopted a Water Resources Management Plan prepared by Barr Engineering Company dated February 9, 1991. That Water Resources Management Plan has also been approved by the Lower Mississippi River Water Management Organization. SFL represents and warrants that the Outlet is consistent with the Water Resources Management Plan. Further, SFL represents and warrants that the Outlet has been approved by the Lower Mississippi River Water Management Organization. The parties agree and acknowledge that the stormwater management facilities within MH currently contain sufficient storage capacity to accept the water expected to flow from Sunfish Lake into MH.

1.7. Purpose of Agreement. The purpose of this Agreement is to memorialize the approval by MH of the Outlet and to set forth the operating conditions of the Outlet.

ARTICLE 2.
APPROVAL OF INSTALLATION

2.1. Approval of Installation. MH does hereby approve installation of the Outlet. SFL, by issuance of an interim use permit to the Association, shall cause the Association to install the Outlet pursuant to that certain plan prepared by the engineering firm of Bonestroo, Rosene, Anderlik & Associates, dated May 17, 1995, a copy of which is on file with both MH and SFL. The Outlet's valve shall be set at approximately one inch above the ordinary high-water mark of Sunfish Lake as that ordinary high-water mark has been determined by the MDNR.

ARTICLE 3.
OPERATING CONDITIONS

3.1. Operating Conditions. Upon the request of SFL or in the event MH determines that it is necessary to maintain or repair the Outlet or MH's stormwater management facilities, MH shall:

1. Open or close the valve on the Outlet; and

2. Maintain and repair the Outlet, including related appurtenances.

A request for such tasks shall initiate with SFL and shall be made by the SFL engineer to the MH engineer.

SFL covenants that it shall reimburse MH, within thirty (30) days after receipt of a written invoice, for any costs and expenses incurred by MH in connection with MH's performance of its tasks described herein, including, without limitation, standard hourly charges for personnel, costs of materials, equipment and reasonable overhead charges.

MH may suspend performance of its tasks hereunder in the event: (i) SFL shall fail to make timely payment for MH's costs and expenses incurred in connection with MH's performance of its tasks described herein, (ii) SFL fails to perform one of its obligations or tasks described herein, or (iii) SFL breaches any one of its representations, warranties or covenants herein.

ARTICLE 4.
INDEMNIFICATION

4.1. Indemnification. For good and valuable consideration, the receipt and sufficiency of which is hereby acknuwledged, SFL does hereby agree to indemnify, defend and hold harmless MH and its officers, council, employees and consultants against and in respect with any and all claims, demands, actions, suits, proceedings, losses, costs, expenses, obligations, liabilities, damages, judgments, recoveries and deficiencies, including interest, penalties and reasonable attorneys' fees (collectively, "Claims"), that MH and its officers, council, employees and consultants incur or suffer, unless directly caused by MH's gross negligence or willful misconduct, which arise out of, or result from, or relate to the Outlet or MH's tasks related to this Agreement, including, without limitation, (a) Claims relating to the water level of Sunfish Lake; (b) Claims relating to the granting or denial of any zoning, platting, building, or other development permits on land adjoining Sunfish Lake; (c) Claims relating to the granting, suspension or termination of the permit that is being granted by SFL for the Outlet; or (d) Claims related to MH's performance or non-performance of its tasks in this Agreement, including, but not limited to, the tasks set forth in Article 3 hereof.

ARTICLE 5.
CONSULTATION AND REVIEW

5.1. Consultation and Review. SFL shall not, without first consulting with MH and without first giving MH the opportunity for review and comment, cause or permit any public improvement to be made in SFL that would cause more water diversion to Sunfish Lake than that shown on Figure 2 of the Sunfish Lake Water Resources Management Plan prepared by Barr Engineering dated February 19, 1991. Further, SFL agrees that it will not cause or permit public improvements to be made which would cause more water to be diverted into Sunfish Lake than shown on the referenced management plan unless SFL first obtains the approval of the Lower Mississippi River Water Management Organization.

ARTICLE 6.
TEMPORARY DISRUPTION

6.1. Temporary Disruption. The parties understand and acknowledge that there may be a possible instance whereby MH's stormwater management facilities reach or exceed design capacity, are temporarily blocked, clogged, disrupted, or in need of repair. In such situations, MH shall not be obligated to open the valve on the Outlet and/or can suspend Sunfish Lake effluent discharges until such temporary blockage or clogs, disruption, or capacity limitations within MH have been resolved. MH agrees that it make reasonable efforts to remove any such blockage so that if SFL has made a request for the valve to open, the valve can be so opened. Notwithstanding anything to the contrary contained herein, MH shall not be obligated to modify or change its stormwater management facilities to perform its tasks set forth in this Agreement.

ARTICLE 7.
MISCELLANEOUS

7.1. **Term**. The term of this Agreement shall commence on the Effective Date and shall continue until the ten (10) year anniversary of the Effective Date (the "Initial Term"). After the Initial Term, this Agreement shall be renewed automatically for successive terms of ten (10) years (individually, a "Renewal Term"). Notwithstanding the foregoing, either party may terminate this Agreement as of the last day of the Initial Term or any Renewal Term upon written notice to the other party not less than six (6) months' prior to the expiration of the Initial Term or Renewal Term, respectively. In the event this Agreement is terminated, SFL shall not be required to remove the Outlet or flow from the Outlet to MH's stormwater management facilities.

7.2. **Governing Law**. This Agreement shall be construed and interpreted according to the laws of the State of Minnesota.

7.3. **Amendment**. This Agreement may be amended by the parties but only by a written instrument.

IN WITNESS WHEREOF, the parties have executed this Agreement the date and year first set forth above.

CITY OF MENDOTA HEIGHTS	CITY OF SUNFISH LAKE
By: _____	By: _____
Charles Mertensotto, Its Mayor	Frank Tiffany, Its Mayor
By: _____	By: _____
Kathleen Swanson, Its Clerk	Myra Hamper, Its Clerk

STATE OF MINNESOTA)
) ss.
COUNTY OF DAKOTA)

On this 23rd day of August, 1995, before me a Notary Public within and for said County, personally appeared Charles Mertensotto and Kathleen Swanson to me personally known, who being each by me duly sworn, each did say that they are respectively the Mayor and Clerk of the City of Mendota Heights, the municipality named in the foregoing instrument, and that the seal affixed to said instrument was signed and sealed on behalf of said municipality by authority of its City Council and said Mayor and Clerk acknowledged said instrument to be the free act and deed of said municipality.

KIMBERLEE K. BLAESER
NOTARY PUBLIC – MINNESOTA
My Comm. Expires Jan. 31, 2000

Kimberlee K Blaeser
Notary Public

STATE OF MINNESOTA)
) ss.
COUNTY OF DAKOTA)

On this 24th day of August, 1995, before me a Notary Public within and for said County, personally appeared Frank Tiffany and Myra Hamper to me personally known, who being each by me duly sworn, each did say that they are respectively the Mayor and Clerk of the City of Mendota Heights, the municipality named in the foregoing instrument, and that the seal affixed to said instrument was signed and sealed on behalf of said municipality by authority of its City Council and said Mayor and Clerk acknowledged said instrument to be the free act and deed of said municipality.

MARY E. STUBBS
NOTARY PUBLIC - MINNESOTA
RAMSEY COUNTY
My Comm. Expires Jan. 31, 2000

Mary E. Stubbs
Notary Public

STP:172966-1

Appendix C – City Ordinances

City Ordinances related to Stormwater Management

Subdivision Ordinance
The City's Subdivision Ordinance provides regulations for the subdivision of land with the purpose of guiding development, establishing standards for design and construction, maintaining access to public land and water, and protecting the health, safety, and welfare of residents. The ordinance can be found on the City's website.

Zoning Ordinance
The City's Zoning Ordinance promotes and protects public health, safety, and general welfare by regulating the building of structures, size of open spaces, density of population, and the use of land and structures. The ordinance can be found on the City's website.

Appendix D – Hydrologic Modeling and Subwatershed Data

SUNFISH LAKE WATER MANAGEMENT PLAN
MENDOTA HEIGHTS A

Subwatershed	Area (ac)	Normal Water Level	Natural Overflow Elevation	High Water Level 10 Yr	High Water Level 100 Yr	Peak Discharge (cfs) 10 Yr	Peak Discharge (cfs) 100 Yr	100-Year Flood Storage (ac ft)	Outlet	Downstream Subwatershed	Comments
MHa-1	23.9	921.6	934.7	927.8	930.7	7.9	9.2	3.6	12" CMP	Mendota Heights	
MHa-2	1.4	934.1	937.2	935.7	936.6	2.2	2.9	0.1	10" CMP	MHa-1	
MHa-3	3	936	937.2	937.4	937.7	7.8	16	0.1	10" CMP	MHa-1	Overflows driveway in 10-year event.
MHa-4	1	984.3	987	987	987	*	0.2	0.5	Natural Overflow	MHa-1	
MHa-5	0.7	985.5	986.1	986.2	986.3	1.2	3.3	0.1	Natural Overflow	MHa-4	Overflows driveway in 10-year event.
MHa-6	5	963.2	965.2	964.6	965.4	5	12	0.4	18" CMP	MHa-1	Overflows Charlton Rd. in 100-year event
MHa-7	4.3	967.8	970.8	968.6	969.5	1.7	3.5	1.3	12" CMP	MHa-7 (Ditch)	Assumes regrading of Mulrooney Property
MHa-7 (Ditch)	1.2	965	967.5	966	966.7	2.1	3.5	0.1	12" CMP	MHa-6	Assumes regrading of Mulrooney Property
MHa-8	1.3	980.8	982	981.6	982.1	2.2	6.4	0.1	15" CMP	MHa-7 (Ditch)	Overflows driveway in 100-year event
MHa-9	1	991	993.5	993.5	993.5	0.1	0.5	0.2	Natural Overflow	MHa-8	
MHa-10	1	992.2	994.2	994.2	994.2	0.1	0.3	0.2	Natural Overflow	MHa-7	
MHa-11	2	971		972.4	973.3	3.3	9.1	0.2	12" CMP	MHa-7	Assumes regrading of Mulrooney Property
MHa-12	2.4	983.5	984.9	984.8	985.1	1.7	10	0.1	10" CMP	MHa-11	Overflows driveway in 100-year event
MHa-13	1.2	969.5	971.5	970.4	971.1	3.3	6.1	0.1	18" CMP	MHa-1	
MHa-14	12.9	982.6	983.2	983.2	983.3	1.4	4.8	2.3	Natural Overflow	MHa-6A	
MHa-15	2	993	995	995.1	995.6	5.3	14	0.1	12" CMP	MHa-14	Overflows driveway in 10-year event.
MHa-16	1.6	980	982	981.1	982.1	3.4	7.6	0.1	15" CMP	MHa-7	
MHa-17	1.6	980.4	982	981.4	982.1	1.4	4.9	0.1	10" CMP	MHa-7	

* The pond in this watershed is landlocked, and there is no discharge to the downstream watershed for this event.

Data is from the storm water model prepared by Barr as part of the 1991 Water Resource Management Plan

SUNFISH LAKE WATER MANAGEMENT PLAN
MENDOTA HEIGHTS B

Subwatershed	Area (ac)	Normal Water Level	Natural Overflow Elevation	High Water Level 10 Yr	High Water Level 100 Yr	Peak Discharge (cfs) 10 Yr	Peak Discharge (cfs) 100 Yr	100-Year Flood Storage (ac ft)	Outlet	Downstream Subwatershed	Comments
MH-b-1	11.6	911	919.8	915.2	917.6	33	62	0.4	36" CMP	Mendota Heights	Overflows Delaware Ave. in 100-year event with existing 24" CMP outlet
MHb-2	8.5	920.2	923	922.5	923.9	20	48	0.2	2-18" CMPs	MHb-1	Overflows Charlton Road in 10-year event with existing 12" CMP outlet
MHb-3	8.3	926.2	926.4	927	927.4	6.8	24	0.4	Natural Overflow	MHb-2	

Data is from the storm water model prepared by Barr as part of the 1991 Water Resource Management Plan

SUNFISH LAKE WATER MANAGEMENT PLAN
MENDOTA HEIGHTS C

Subwatershed	Area (ac)	Normal Water Level	Natural Overflow Elevation	High Water Level 10 Yr	High Water Level 100 Yr	Peak Discharge (cfs) 10 Yr	Peak Discharge (cfs) 100 Yr	100-Year Flood Storage (ac ft)	Outlet	Downstream Subwatershed	Comments
MHc-1	28.2	854.4	866.9	859	862.7	9.5	14	13.5	15" CMP	Mendota Heights	
MHc-2	3.2	910.2	912.3	911.9	912.5	6.8	17	0.1	18" CMP	MHc-1	Overflows Salem Church Rd in 100-yr event
MHc-3	7.2	929.8	934.3	934.3	934.3	0.1	0.7	2.6	Natural Overflow	MHc-2	
MHc-4	2.5	933.2	936.9	934.2	934.6	3.7	6.3	0.1	22" Arch	MHc-3	
MHc-5	7.5	870.3	875.5	870.9 [b]	872.8	1.5	5.9	2.3	12" RCP	MHc-1	
MHc-6	2.5	869.5	873.3	872.5	873.4	1.7	9.9	2.4	Natural Overflow	MHc-5	
MHc-7	2.8	880.6	882	882.2	882.4	7.6	16	0.1	Natural Overflow	MHc-6	
MHc-8	30.9	874 [a]	876 [a]	878.4	879.3	***	***	20.5	Natural Overflow	MHc-9	
MHc-9	3.9	872.1	879.2	878.4	879.3	*	10.3	4.2	Natural Overflow	MHc-6	
MHc-10	25.9	877.8	882.7	882.8	882.8	3.5	6.1	7.3	Natural Overflow	MHC-8	
MHc-11	3.7	935	936.5	936.7	937	1.8	17	0.9	Natural Overflow	MHc-10	
MHc-12	6.6	942.7	944.3	944.3	944.6	17	35	0.1	3-18" CMPs	MHc-11	Overflows Salem Church Rd in 10-yr event with existing 2-18" CMP outlet
MHc-13	2.2	949	953.1	953.1	953.2	1.2	6.1	1	Natural Overflow	MHc-12	
MHc-14	2.7	951	955.6	954.3	955.8	5.3	30	0.5	12" CMP	MHc-13	Overflows road in 100-year event
MHc-15	6.7	967.6	968.4	968.6	968.9	15	32	0.1	12" CMP	MHc-14	Overflows road in 10-year event
MHc-17	47	874.7	880.3	880.3	880.4	0.4	3.8	15	Natural Overflow	MHc-8	
MHc-18	7.6	895.6	902.3	898.2	899.4	*	*	3.8	Natural Overflow	MHc-17	

* The pond in this watershed is landlocked, and there is no discharge to the downstream watershed for this event.

*** The pond in this watershed overflows and acts as one with the next downstream pond.

a. Elevation updated from 1991 model based on regrading completed for Lot 2, Block 1 Grieve Glen (2005)

b. Typo corrected from 1991 model

Data is from the storm water model prepared by Barr as part of the 1991 Water Resource Management Plan

SUNFISH LAKE WATER MANAGEMENT PLAN
HORNBEAM LAKE

Subwatershed	Area (ac)	Normal Water Level	Natural Overflow Elevation	High Water Level 10 Yr	High Water Level 100 Yr	Peak Discharge (cfs) 10 Yr	Peak Discharge (cfs) 100 Yr	100-Year Flood Storage (ac ft)	Outlet	Downstream Subwatershed	Comments
HB-1	49.8	870.6	879.1	872.1	872.8	5.2	7.3	49.7	15" RCP	MHc-1	
HB-2	28.6	877.1	--	879.3	880.8	13	20	11.6	24" CMP	HB-1	Inflow enters from Inver Grove Heights
HB-3	4.2	879.8	896.8	881	882	4.3	9	0.3	18" RCP	HB-2	
HB-4	5.6	872	881	874.5	875.6	*	*	2.8	Natural Overflow	HB-1	
HB-5	5.8	876	885	882.2	883.6	*	*	2.9	Natural Overflow	HB-4	
HB-6	11.1	889.7	902.5	891.2	892.3	*	*	6.8	Natural Overflow	HB-4	
HB-7	5.1	882.2	887.5	886.2	887.5	*	0.4	3.2	Natural Overflow	HB-1	
HB-8	5.4	889.3	891.3	891.3	891.3	0.1	0.6	1.6	Natural Overflow	HB-7	
HB-9	1.3	934	940.5	934.8	935.5	3.1	5.9	0.1	18" CMP	InverGroveHeights	
HB-10	29.4	--	**	--	--	28	49	--	Natural Overflow	InverGroveHeights	
						0	6.5	--	Natural Overflow	PR-1	
						0	2	--	Natural Overflow	HB-2	
HB-11	14.3	939	959.1	944.5	948.2	9.2	12	3.3	12" RCP	HB-10	
HB-12	26.9	953.2	957	955.7	957.1	15	63	2.1	24" CMP	HB-11	Overflows road in 100-yr event
HB-13	3.5	1007.4	1011.2	1008.7	1009.6	7.8	15	0.1	24" CMP	HB-12	
HB-14	2.4	967.8	970.6	969.7	970.6	***	***		15" CMP	HB-15	
HB-15	2.4	964.2	970.6	969.7	970.6	*	0.1	2.1	12" CMP	HB-11	
HB-16	6.3	978.8	984	981.6	982.6	*	*	3.2	Natural Overflow	HB-11	
PR-1	22.4	876.2	904.8	881.1	882.8	*	*	11.4	Natural Overflow	HB-2	
PR-2	5.6	886.2	892.1	889.7	892.1	*	*	4	Natural Overflow	PR-1	
PR-3	1.3	908	911	909	910	3.8	7.9	0.1	18" CMP	PR-2	
InverGroveHeights	75.1	881	883.8	882.7	884	15	28	23.9	36" RCP	HB-2	Overflow to Eagan along I-494

* The pond in this watershed is landlocked, and there is no discharge to the downstream watershed for this event.

** The pond in this watershed has an outlet to the downstream watershed as noted. The pond overflows to a different watershed, as noted on the next line(s).

*** The pond in this watershed overflows and acts as one with the next downstream pond.

Data is from the storm water model prepared by Barr as part of the 1991 Water Resource Management Plan

SUNFISH LAKE WATER MANAGEMENT PLAN
HORSESHOE LAKE

Subwatershed	Area (ac)	Normal Water Level	Natural Overflow Elevation	High Water Level 10 Yr	High Water Level 100 Yr	Peak Discharge (cfs) 10 Yr	Peak Discharge (cfs) 100 Yr	100-Year Flood Storage (ac ft)	Outlet	Downstream Subwatershed	Comments
HS-1	29.7	925.5	927	926	926.4	1.4	3.3	23	18" Arch	InverGroveHeights	
HS-2	7.7	961.1	967	962.9	963.9	9.2	17	0.6	24" CMP	HS-1	
HS-3	7.5	962.5	985.5	963.1	964.2	5.4	12	0.9	30" RCP	HS-2	
HS-4	11.4	962	968.8	963.1	964.2	***	***	1	24" CMP	HS-3	
HS-5	2.4	932.1	932.7	932.9	933.1	2.8	9.1	0.1	12" CMP	HS-6	
HS-6	4.4	923.4	935.2	927.5	930	*	*	4.3	Natural Overflow	HS-1	

* The pond in this watershed is landlocked, and there is no discharge to the downstream watershed for this event.

*** The pond in this watershed overflows and acts as one with the next downstream pond.

Data is from the storm water model prepared by Barr as part of the 1991 Water Resource Management Plan

SUNFISH LAKE WATER MANAGEMENT PLAN
DICKMAN LAKE

Subwatershed	Area (ac)	Normal Water Level	Natural Overflow Elevation	High Water Level 10 Yr	High Water Level 100 Yr	Peak Discharge (cfs) 10 Yr	Peak Discharge (cfs) 100 Yr	100-Year Flood Storage (ac ft)	Outlet	Downstream Subwatershed	Comments
DL-1	7.4	915	925	918.3	921.4	12	18	1.3	18" CMP	InverGroveHeights	
DL-2	3.3	954.9	956.5	956.4	956.8	6	35	0.4	12" RCP	DL-1	Overflows road in 100-yr event
DL-3	0.9	954.9	956.5	***	***	***	***	***	15" RCP	DL-1	Overflows road in 100-yr event
DL-4	11.9	955	**	958.1	958.6	22	23	0.3	24" CMP	InverGroveHeights	
			958			2.5	33			DL-3	
DL-5	5.3	977	984.9	978.5	979.6	12	25	0.1	36" CMP	DL-4	
DL-6	3.3	985.6	987.9	988	988.1	5.8	14	0.1	Natural Overflow	DL-5	
DL-7	3.9	986	**	987.7	988.4	9.5	14	0.1	21" RCP	DL-4	
			988			*	5.9			DL-5	

* The pond in this watershed is landlocked, and there is no discharge to the downstream watershed for this event.

** The pond in this watershed has an outlet to the downstream watershed as noted. The pond overflows to a different watershed, as noted on the next line.

*** Discharge, water level and storage values are included in values for subwatershed DL-2. Ponding in DL-2 and DL-3 are assumed to equalize

Data is from the storm water model prepared by Barr as part of the 1991 Water Resource Management Plan

SUNFISH LAKE WATER MANAGEMENT PLAN
SCHMITT LAKE

Subwatershed	Area (ac)	Normal Water Level	Natural Overflow Elevation	High Water Level 10 Yr	High Water Level 100 Yr	Peak Discharge (cfs) 10 Yr	Peak Discharge (cfs) 100 Yr	100-Year Flood Storage (ac ft)	Outlet	Downstream Subwatershed	Comments
SL-1	6.2	942.3	948.2	943.6	944.6	21	46	1.5	2-36" RCPs	InverGroveHeights	
SL-2	12	961.1	965.5	964	965.9	24	46	0.2	30" CMP	SL-1	
SL-3	4.2	944	949.4	944.2	944.7	1.2	2.2	0.5	18" RCP	SL-1	
SL-4	5.9	946.6	949.4	948.2	953	9.2	19	0.6	24" RCP	SL-6	Overflows freeway ramp in 100-yr event
SL-6	52.3	947	947.2	950.5	953	17	20	77.2	21" RCP	SL-1	Inflow enters from West St. Paul and Inver Grove Heights
SL-7	6.5	972	976.8	976.3	976.8	*	*	3	Natural Overflow	SL-6	
SL-8	15.4	966	970.3	966.8	967.8	7.2	17	1.8	36" CMP	SL-6	
SL-11	41.4	980	984.3	980.8	981.9	7.7	18	4	36" CMP	SL-8	
SL-13	8	968	973.2	971	972.3	33	51	3.7	36" CMP	SL-6	Inflow enters from Inver Grove Heights
SL-14	2.9	956.8	963.5	957.9	958.5	7	13	0.4	24" RCP	SL-4	
SL-15	25	956.5	961	960.1	961.8	46	68	1.5	36" RCP	InverGroveHeights	
SL-16	4.3	1002	**	1003.8	1004.3	11	22	0.1	24" CMP	SL-15	
			1004			0	6.8		Natural Overflow	SL-2	
SL-17	9.9	996	1004.2	999.1	1001	54	110	0.2	54" RCP	InverGroveHeights	
SL-18	2.9	957.5	961.3	958.4	959.1	8.4	15	0.1	18" CMP	SL-1	
SL-19	26.4	1006.4	1008.8	1008.3	1009.1	7	27	2.1	18" CMP	SL-20	Overflows Windy Hill Rd in 100-yr event
SL-20	21.3	--	1003.7	--	--	36	73	0	Natural Overflow	SL-17	
SL-23	6.2	1009	**	1011.6	1012.3	9.2	21	0.1	18 CMP	SL-17	
			1012			0	6.8		Natural Overflow	SL-16	
West St. Paul & InverGroveHeights	278.1					323	495		2-54" CSP 1-24" RCP	SL-6	
InverGroveHeights	25.3					87	132		36" RCP	SL-13	

* The pond in this watershed is landlocked, and there is no discharge to the downstream watershed for this event.

** The pond in this watershed has an outlet to the downstream watershed as noted. The pond overflows to a different watershed, as noted on the next line.

Data is from the storm water model prepared by Barr as part of the 1991 Water Resource Management Plan

SUNFISH LAKE WATER MANAGEMENT PLAN
WEST ST. PAUL

Subwatershed	Area (ac)	Normal Water Level	Natural Overflow Elevation	High Water Level 10 Yr	High Water Level 100 Yr	Peak Discharge (cfs) 10 Yr	Peak Discharge (cfs) 100 Yr	100-Year Flood Storage (ac ft)	Outlet	Downstream Subwatershed	Comments
WSP-1	19.2	928	933.7	930.1	931.4	22	44	1.2	36" RCP	West St. Paul	
WSP-2	3.5	975.8	977.8	976.4	977.2	5.9	11	0.1	18" CMP	WSP-1	
WSP-3	0.5	974.4	975.5	974.8	975.2	1.1	2.1	0.1	15" RCP	WSP-1	
WSP-4	2.9	974	979	975.4	976.6	14	30	0.1	36" RCP	West. St. Paul	
WSP-5	14	975.8	978.1	976.2	976.6	1	1.9	1.8	5-10" Control	WSP-4	
WSP-6	3.9	998.7	1001.2	1000.6	1001.6	11	22	0.2	24" CMP	WSP-4	Overflows Sunfish Lane in 100-yr event. Inflow enters from West St. Paul.
WSP-7	4.6	932	934	932.8	933.4	3.1	5.5	0.6	18" CMP	West St. Paul	
WSP-8	0.3	1006.8	1008.3	1008	1008	0.5	1.2	0	18" CMP	WSP-6	
West St. Paul	3.1					3.9	7.9		18" CMP	WSP-6	

Data is from the storm water model prepared by Barr as part of the 1991 Water Resource Management Plan

SUNFISH LAKE WATER MANAGEMENT PLAN
SUNFISH LAKE

Subwatershed	Area (ac)	Normal Water Level	Natural Overflow Elevation	High Water Level 10 Yr	High Water Level 100 Yr	Peak Discharge (cfs) 10 Yr	Peak Discharge (cfs) 100 Yr	100-Year Flood Storage (ac ft)	Outlet	Downstream Subwatershed	Comments
SFL-1	147.1	937.1	939.7	938.3	939.9			124.1	12" Pipe	MHb-1	See agreement for outlet function
SFL-2	1.7	950.2	952.5	952.4	952.5	*	0.2	0.6	Natural Overflow	SFL-1	
SFL-3	13.4	936.6	938.5	939.3	939.9	2.7	***	15.6	12" CMP	SFL-1	
SFL-4	38.5	937.4	938.5	939.2	939.9	47	***	2.1	12" CMP	SFL-3	Overflows driveway in 10-yr event
SFL-5	2.8	947.2	949.7	949.7	949.7	0.1	0.3	0.9	Natural Overflow	SFL-4	
SFL-8	2.5	950.1	953.7	952.3	953.4	*	*	1.6	Natural Overflow	SFL-1	
SFL-10	2.2	952.5	956.3	955.3	956	*	*	1.1	Natural Overflow	SFL-8	
SFL-11	18	960.6	961.3	961.6	962.2	7.8	36	1.4	Natural Overflow	SFL-1	
SFL-12	4	967.1	970.1	968.8	970.2	3.1	6.5	0.3	12" CMP	SFL-3	Overflows driveway in 100-yr event
SFL-13	3.6	980.5	981.6	981.4	981.5	10	22	0.1	2 Catch Basins	SFL-1	

* The pond in this watershed is landlocked, and there is no discharge to the downstream watershed for this event.

*** The pond in this watershed overflows and acts as one with the next downstream pond.

a. Elevation updated from 1991 model based on construction of outlet structure at Sunfish Lake

Data is from the storm water model prepared by Barr as part of the 1991 Water Resource Management Plan

TABLE 12

MAJOR WATERSHED DRAINAGE PATTERNS

Watershed	Area (ac)	Downstream Watershed/City
MHa	67.5	Mendota Heights
MHb	28.4	Mendota Heights
MHc	191.6	Mendota Heights
Inver Grove Heights	129.9	HB
HB	147.3	MHc
HS	63.1	Inver Grove Heights
DL	36.0	Inver Grove Heights
West St. Paul/ Inver Grove Heights	303.4	SL
SL	250.8	Inver Grove Heights
West St. Paul	3.1	WSP
WSP	48.9	West St. Paul
PR	29.3	HB
SFL	233.8	MHb

TABLE 13

ALLOWABLE FLOWS

City Receiving Drainage	Watershed	Area (ac)	Peak Discharge (cfs) Allowable	Design*
Mendota Heights	MHa	67.5	73	8
	MHb, SFL	262.2	224	33
	MHc, HB, PR	498.1	366	10
Inver Grove Heights	HS-1	62.0	67	2
	DL-1	11.6	13	12
	DL-4	24.4	26	22
	SL-1	461.1	277	21
	SL-15	25.0	27	46
	SL-17	68.1	53	54
West St. Paul	WSP-1	27.8	30	22
	WSP-4	24.2	26	14

* Calculated using the critical 10-year event.

The following subsections discusa the location and characteristics of each major watershed. The designation for culvert type ia: CMP - corrugated metal pipe, and RCP - reinforced concrete pipe.

2.3.1 Mendota Heights A (MHa)

The Mendota Heighta A watershed covers apptoximately 68 acres in the northwest portion of City of Sunfish Lake between Delawate Avenue and Snnfish Lane. Drainage from this watershed flowa to the City of Mendota Heights thtough a 12-inch CMP cnlvert nnder Delaware Avenne (County Road 63). A DNR protected wetland (No. 101W) in Subwaterahed MHa-14 adjacent to Snnfish Lane is the most aignificant stormwater atorage area in the MHa watershed. Significant storage is also provided in MHa-1 at the upstream end of the 12-inch cnlvert nndet Delaware Avenne. The toad embankment acts as a dam to provide the necessary the detention storage and is at sufficient elevation to prevent overtopping in the 100-year event. Maintenance work on or replacement of the existing cnlverts under Delaware Avenne will be the tesponsibility of Dakota Connty.

2.3.2 Mendota Heights B (Mhb)

The Mendota Heights B watershed includes an area of approximately 28 actes immediately west of Sunfish Lake. It is located just south of the MHa waterahed, extending from Delawate Avenue on the west to Charlton Road on the eaat. The ontlet from this watershed, a 24-inch CMP culvett nnder Delawate Avenue, directs flow into the City of Mendota Heights. If the level of Snnfish Lake exceeds its natural ovetflow point, the discharge wonld flow into this watershed and to the City of Mendota Heights. There is one small pond in Subwatershed MHb-3.

2.3.3 Mendota Heights C (MHc)

The Mendota Heights C watershed encompasses approximately 192 acres east of Delawara Avenue, batween Hornbeam Lake and Salem Church Road. Drainage from the watershed is directed through a 15-inch CMP culvert under Delaware Avenue to the City of Mendota Heights. A large portion of this watershed is undeveloped. Much of the watershed is normally landlocked and would not overflow except during wet climatic cycles and very heavy rainstorm or snowmelt events. Hornbeam Lake drains north into Subwatershad MHc-1.

There are eight ponds and wetlands which provide significant stormwater storage within the MHc watershed. The pond in Subwatershed MHc-8 is DNR protected wetland 236W.

2.3.4 Hornbeam Lake (HB)

The Hornbeam Lake watershed encompasses the area which drains to Hornbeam Lake. The watershed includes portions of the cities of Inver Grove Heights and Sunfish Lake. The drainage areas within the Cities of Sunfish Lake and Inver Grove Heights are approximately 147 and 131 acres, respectively. Interstate 494 is a significant feature in the Hornbeam Lake watershed. A major portion of the drainage from the watershed flows adjacent to or passes under I-494 and enters a MnDOT pond in Subwatershed HB-2 before it flows into Hornbeam Lake. The portion of this watershed in Inver Grove Heights is to be comprised of low density residential and limited business land uses after it is fully developed.

Hornbeam Lake outlets through a 15-inch RCP pipe to the north into the Mendota Heights C watershed. Hornbeam Lake is a DNR protected Water (No. P19-47). Hornbeam Lake has an ordinary high water level (OHW) of 871.3 feet. In addition to Hornbeam Lake, there are five ponds and wetlands within

this watershed which provide stormwater storage. Wood Duck Pond, a landlocked basin northeast of Hornbeam Lake, is a DNR protected wetland (No. 238W).

2.3.5 Horseshoe Lake (HS)

The Horseshoe Lake watershed covers approximately 62 acres of area in the southeast corner of the City. Interstate 494 runs across the watershed and separates a 19-acre area from the main portion of the watershed containing Horseshoe Lake. A 30-inch RCP culvert under I-494 connects this isolated portion with the main portion of the watershed. Storm runoff from I-494 is diverted to the MnDOT pond in the Hornbeam Lake watershed; therefore, no drainage off I-494 enters Horseshoe Lake.

The outlet of Horseshoe Lake is an 18-inch CMP arch culvert under Pieper Road which directs flows to Inver Grove Heights. The water discharged from this pipe ultimately flows to Marcott Lakes. The invert elevation of the pipe is 925.5 feet. The Minnesota Department of Natural Resources (DNR) has set the OHW for Horseshoe Lake at Elevation 924.9 feet. The outlet elevation is about 0.6 feet higher than the OHW. Historically the lake has discharged from its outlet and therefore the normal water level (NWL) for the lake was assumed to be at the culvert elevation of 925.5. This drainage plan assumes that the outlet will remain at its existing elevation. Horseshoe Lake is the only water body in this watershed and is a DNR protected water (No. P19-51).

2.3.6 Dickman Lake (DL)

The Dickman Lake watershed is the area within the City of Sunfish Lake which is tributary to Dickman Lake in Inver Grove Heights. The watershed consists of approximately 36 acres and is located between I-494 and South Robert Trail, just north of Horseshoe Lake. There are two small depressions

located in the watershed (Subwatersheds DL-4 and DL-1) that function as storm water detention basins. The area drains into Inver Grove Heights through two separate culverts (18-inch and 24-inch CMPs) under South Robert Trail.

2.3.7 Schmitt Lake (SL)

The Schmitt Lake watershed consists of 251 acres in the northeast portion of the City of Sunfish Lake along with 278 acres in West St. Paul and Inver Grove Heights that drain into Subwatershed District SL-6 into the MnDOT pond. Twenty-five acres in Inver Grove Heights drains into SL-13 through a 36-inch culvert into a lowland on a platted lot which eventually drains into the MnDOT pond.

The drainage from the watershed exits the City of Sunfish Lake through four culverts (three 36-inch and one 54-inch RCPs) under South Robert Trail and eventually discharges into Schmitt Lake in Inver Grove Heights. An overflow in the ditch south of the off ramp from T.H. 110 to So. Robert Trail provides a positive outlet for the MnDOT wetland (No. 99W) in Subwatershed SL-6.

The watershed contains two DNR protected wetlands, one each in Subwatersheds SL-11 (No.100W) and SL-6 (No. 99W). There are three other wetland areas that provide stormwater detention storage in Subwatersheds SL-13, SL-8, and SL-7.

2.3.8 West St. Paul (WSP)

The West St. Paul watershed consists of approximately 49 acres in the northwest corner of the City of Sunfish Lake and 3 acres in West St. Paul. Drainage from West St. Paul enters the City of Sunfish Lake through an 18-inch CMP culvert under T.H. 110 east of Sunfish Lane. Two culverts

discharge water northward from the City of Snnfish Lske to West St. Paul in culverts under T.H. 110. A 36-inch RCP culvert flows into West St. Paul immedistely east of Charlton Rosd and snother 36-inch RCP culvert flows into Weat St. Paul east of Delaware Avenue.

The watershed ia near full development in both West St. Paul and the City of Snnfish Lake. A depression in WSP-5 is the only significsnt stormwster storage area in the Sunfish Lake portion of the watershed.

The outlet structure for the depression in Subwstershed WSP-5 is five 10-inch steel pipea, placed by a property owner.

2.3.9 Pieper Road (PR)

The Pieper Road watershed consists of approximately 29 acres north of Pieper Rosd and west of I-494. The watershed drsinage flows into a permanently landlocked depression in Subwstershed PR-1. The watershed is steeply sloped and is mostly nndeveloped. Additional stormwater storage exists in s wetlsnd in Subwaterahed PR-2.

2.3.10 Sunfish Lake (SFL)

The Sunfish Lake watershed consists of approximately 234 acres in the central part of the City. Drainsge from the watershed flows into Sunfish Lske, which cnrrently has a high natural overflow point snd is considered landlocked. Sunfish Lake is a DNR protected water (No. 19-50P). The watershed is nesr fnll development except for an area in the southeast part of the watershed.

In sddition to Sunfish Lake, three other wetlsnds serve as stormwater storage areas in the wstershed. These wetlands are in Subwatersheds SFL-3,

SFL-4, and SFL-11. The wetland in Subwaterahed SFL-3 is a DNR-ptotected wetlaud (No. 237W).

2.4 Drainage System Analysis

A hydtologic/hydtaulic analysis waa petfotmed on the watetsheda in the City of Sunfish Lake to detetmine flood levels in lakes, ponds, wetlands, and detention basins, snd peak diachatges of outflow conveyots. These peak watet levels and dischatges help to asaesa the adequacy of the existing dtainage facilities and to identify ateas whete imptovements ate needed. The criteria and methodology used in thia analysis ate diacusaed below.

2.4.1 Ctitetia

The watetsheds wete analyzed fot the 100-year frequency ptecipitation ot anowmelt tunoff event (the event with a 1 percent chance of occutting in any given yeat) and the 10-yeat ftequency event (the stotm with a 10 petcent chance of occutting in any given yeat). The LMRWMO Plan tequites that detention basins be designed for the ctitical 100-yeat flood. Outflow conveyors (those portions of the conveysnce system which convey outflow from ponding ateas) should be designed with a ptimary capacity of the ctitical 10-yeat flood snd secondaty capacity for the 100-year flood ftom the upstteam ponding atea. Stotm sewer pipes ahould be deaigned to handle the peak flow tate which tesults ftom the ctitical 10-yeat frequency event.

A tange of tainfall and tunoff eventa was analyzed to detetmine the ctitical event for each watetshed. The atotm ot tunoff duration which ptoducea the gteateat dischatge (ot detention stotage volume, as apptoptiate) at each location is consideted the ctitical duration for that watetshed ot storage atea. The 1/2-, 1-, 2-, 3-, 6-, 12-, 24-hout, the 2-, and 4-day

Appendix E – Lake Info Sheets

City of Sunfish Lake

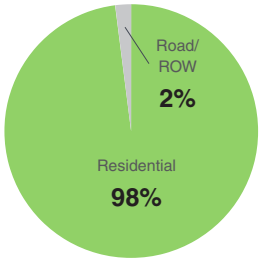
Sunfish Lake

Sunfish Lake is in the central portion of the City of Sunfish Lake, within the Lower Mississippi River Watershed Management Organization (LMRWMO). The land surrounding the lake is residential. Residents can access the lake for boating and fishing from their properties, however no public access is available.

Sunfish Lake Stats

Size: 45.1 acres
Max depth: 32 feet
Watershed size: 232 acres
Major watershed: Mississippi River - Twin Cities
MPCA lake classification: Deep
Impairment listing: Aquatic Recreation
Trophic status: Eutrophic

Sunfish Lake Watershed Land Use



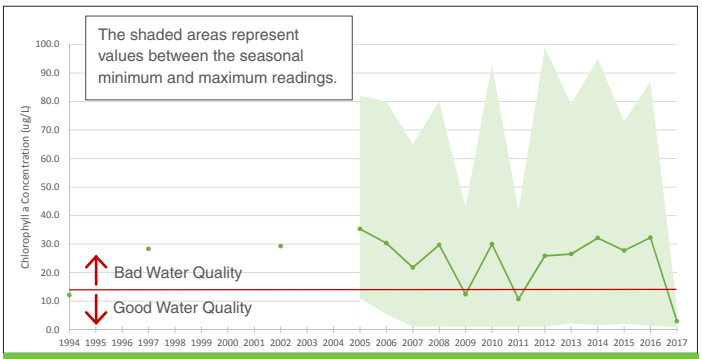
Sunfish Lake Water Quality

The City of Sunfish Lake participates in the Minnesota Pollution Control Agency's (MPCA's) Citizen Assisted Lake Monitoring Program for water quality monitoring of Sunfish Lake. Since monitoring began in 1994, Sunfish Lake has not consistently met the MPCA standards for water quality as measured by Total Phosphorus and Chlorophyll a. Beginning in 2006, Secchi disk depth has been monitored as an additional measure of water quality. Since that time, Sunfish Lake has consistently met the MPCA standard for Secchi depth, except in 2006.

Summary Table

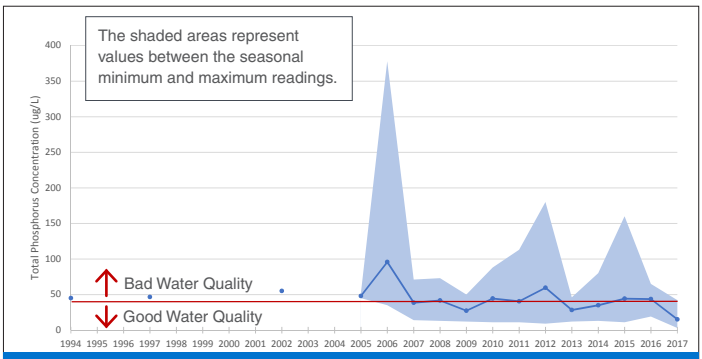
	MPCA Standard	min	max	avg
Chlorophyll a (ug/L)	14	10	99	24
Total Phosphorus (ug/L)	40	3.0	378	44
Secchi depth (m)	1.4	0.4	6.0	2.2

Water Quality Charts



Chlorophyll a

Chlorophyll a is the pigment that gives plants their green color. High levels of Chlorophyll a indicate excessive algae resulting in disproportionate nutrient levels in the lake. Low Chlorophyll a levels indicate good water quality.

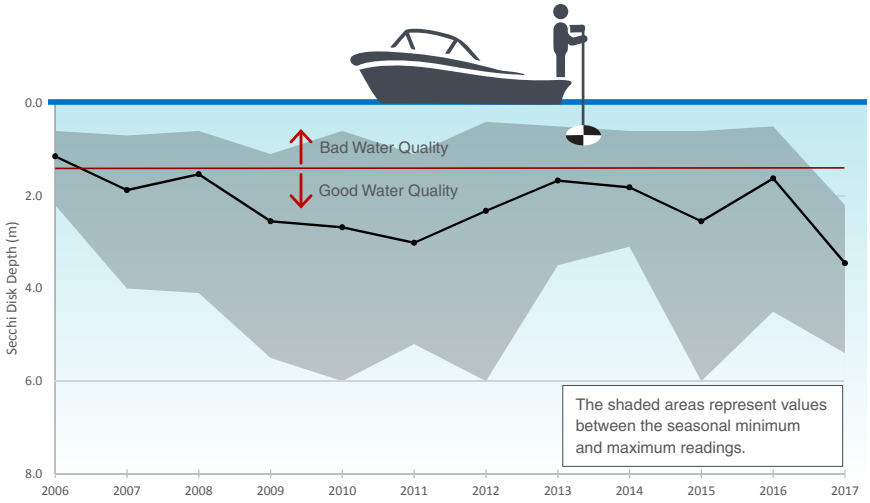


Phosphorus

Phosphorus is a nutrient that plants require for growth. High phosphorus levels can lead to algae blooms, turning lake water green and soupy. Low phosphorus levels indicate good water quality.

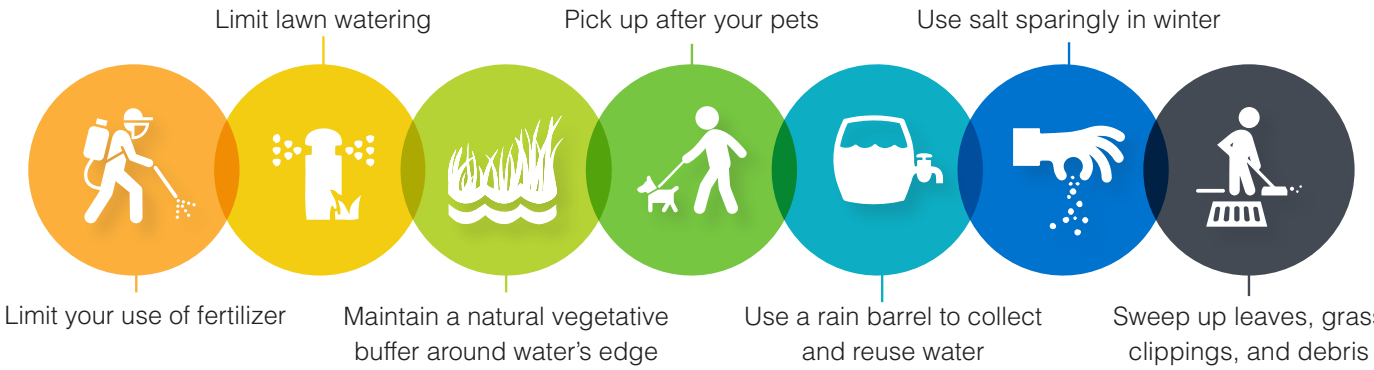
Secchi Disk

A secchi disk is used to measure water clarity. The black and white disk is lowered into the water until it is no longer visible. High secchi disk depths indicate good water quality.



What can you do to keep Sunfish Lake clean?

Rainwater runoff is the leading cause of poor water quality and is the water that flows from paved or hard surfaces into the storm sewer or directly into the lake. There are several ways to limit runoff and to keep it clean:



Upcoming Projects

Water Quality Monitoring - The City of Sunfish Lake will continue to implement the water quality monitoring program for Sunfish Lake in partnership with the MPCA.

Additional Information

LMRWMO Watershed Management Plan
This plan outlines the ways that LMRWMO will enact their vision to manage "water resources and related ecosystems…to sustain their long-term health and integrity."

http://www.dakotaswcd.org/watersheds/lowermisswmo/pdfs/2011%20Lower_Mississippi_River_WMO_adopted_plan_2015amend.pdf

DNR Lake Finder
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Contact

Jeff Sandberg | City Engineer | City of Sunfish Lake | 651-286-8474 | jsandberg@wsbeng.com

City of Sunfish Lake

City of Sunfish Lake

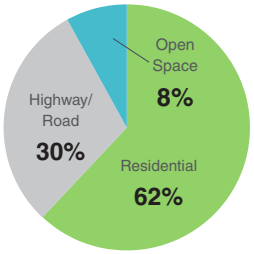
Hornbeam Lake

Hornbeam Lake is an intercommunity waterbody on the southwest edge of the City of Sunfish Lake along the border with Inver Grove Heights, in the Lower Mississippi River Watershed Management Organization (LMRWMO). The land immediately surrounding the lake is residential. Residents can access the lake for boating and fishing from their properties, however no public access is available.

Hornbeam Lake Stats

Size: 22.1 acres
Watershed size: 199 acres
Major watershed: Mississippi River - Twin Cities
MPCA lake classification: Shallow
Impairment listing: None
Trophic status: Eutrophic

Hornbeam Lake Watershed Land Use



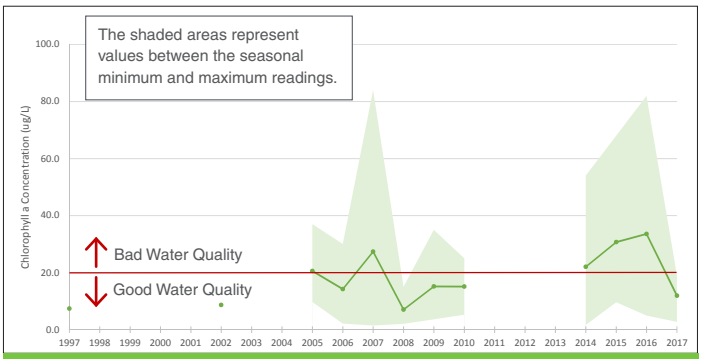
Hornbeam Lake Water Quality

The City of Sunfish Lake participates in the Minnesota Pollution Control Agency's (MPCA's) Citizen Assisted Lake Monitoring Program for water quality monitoring of Hornbeam Lake. Between 1997 (when water quality monitoring began) and 2010, Hornbeam Lake met the MPCA's standards for water quality as measured by Total Phosphorus, Chlorophyll a, and Secchi depth with a few exceptions. However, between 2014 and 2017, Hornbeam Lake has not met MPCA standards with as much consistency.

Summary Table

	MPCA Standard	min	max	avg
Chlorophyll a (ug/L)	20	1.4	84	18
Total Phosphorus (ug/L)	60	19	164	48
Secchi depth (m)	1.0	0.1	10	2.7

Water Quality Charts



Chlorophyll a

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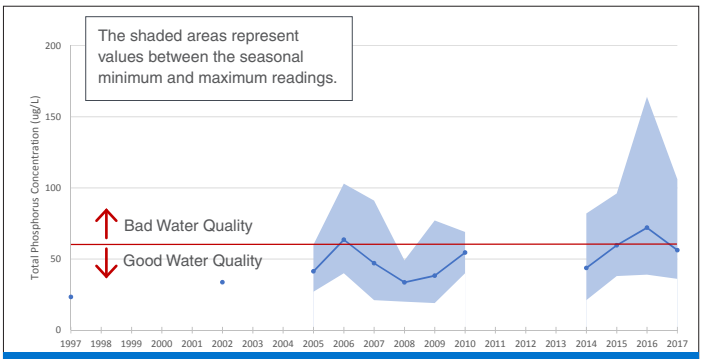

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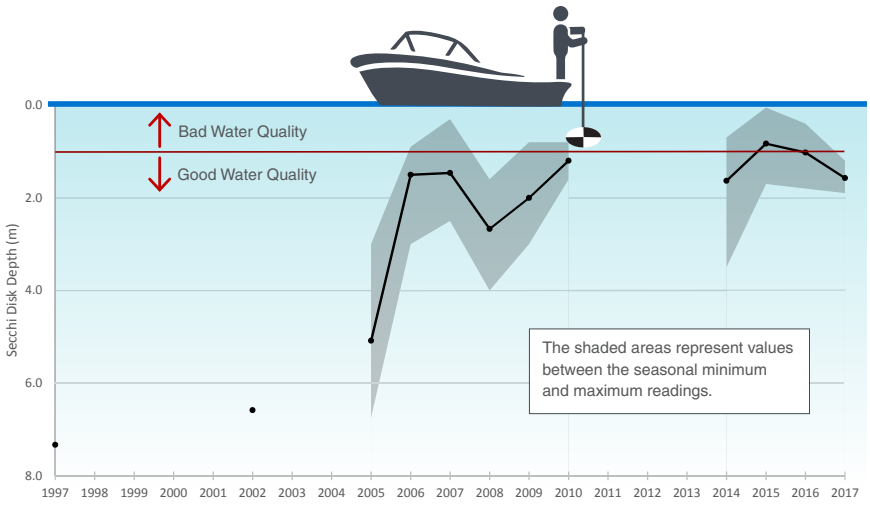
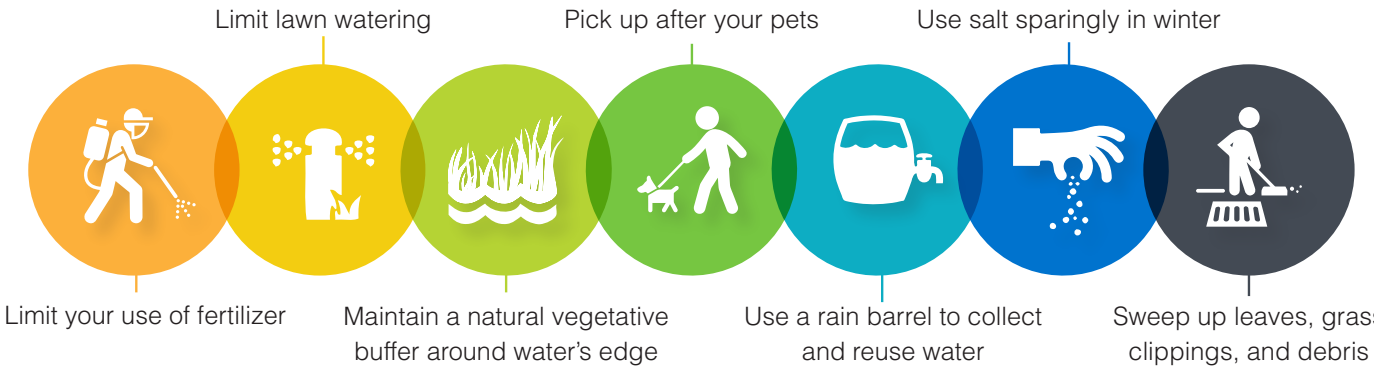


What can you do to keep Hornbeam Lake clean?

Rainwater runoff is the leading cause of poor water quality and is the water that flows from paved or hard surfaces into the storm sewer or directly into the lake. There are several ways to limit runoff and to keep it clean:



Upcoming Projects

Water Quality Monitoring - The City of Sunfish Lake will continue to implement the water quality monitoring program for Hornbeam in partnership with the MPCA.

Additional Information

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Contact

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City of Sunfish Lake

City of Sunfish Lake

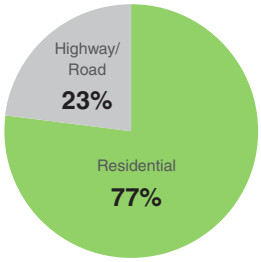
Horseshoe Lake

Horseshoe Lake is in the southeast corner of the City of Sunfish Lake along the border with Inver Grove Heights, in the Lower Mississippi River Watershed Management Organization (LMRWMO). The land immediately surrounding the lake is residential. Residents can access the lake for boating and fishing from their properties, however no public access is available.

Horseshoe Lake Stats

Size: 15.3 acres
Watershed size: 63 acres
Major watershed: Mississippi River – Lake Pepin
MPCA lake classification: Shallow
Impairment listing: None
Trophic status: Mesotrophic

Horseshoe Lake Watershed Land Use



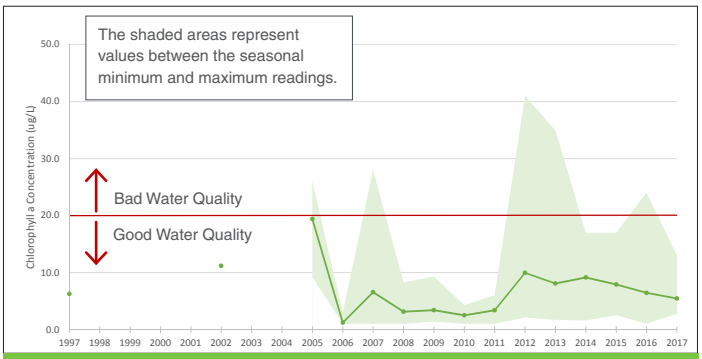
Horseshoe Lake Water Quality

The City of Sunfish Lake participates in the Minnesota Pollution Control Agency's (MPCA's) Citizen Assisted Lake Monitoring Program for water quality monitoring of Horseshoe Lake. Since monitoring began in1997, the average annual water quality readings for Horseshoe Lake have consistently met MPCA standards as measured by Total Phosphorus, Chlorophyll a, and Secchi depth.

Summary Table

	MPCA Standard	min	max	avg
Chlorophyll a (ug/L)	20	1.0	41	6.9
Total Phosphorus (ug/L)	60	10	144	31
Secchi depth (m)	1.0	1.0	10	3.0

Water Quality Charts



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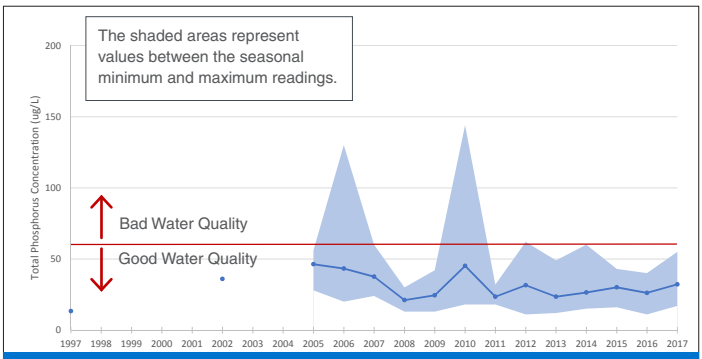

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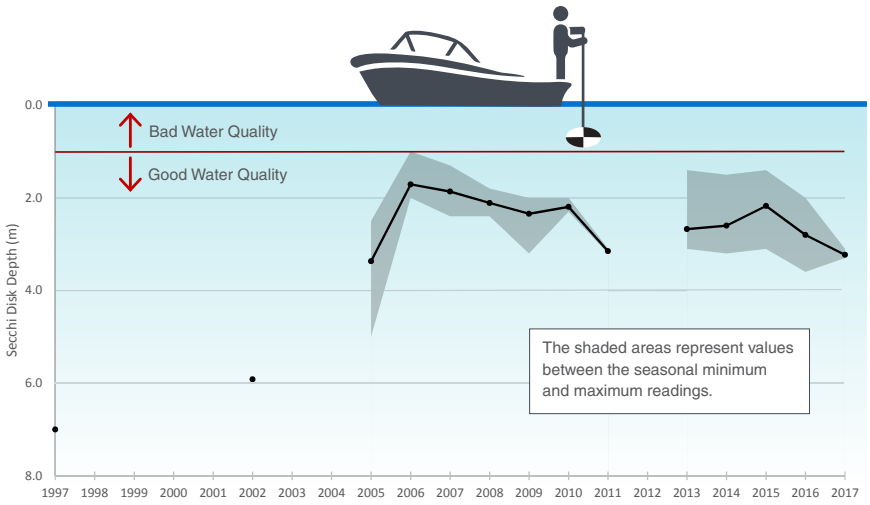

What can you do to keep Horseshoe Lake clean?

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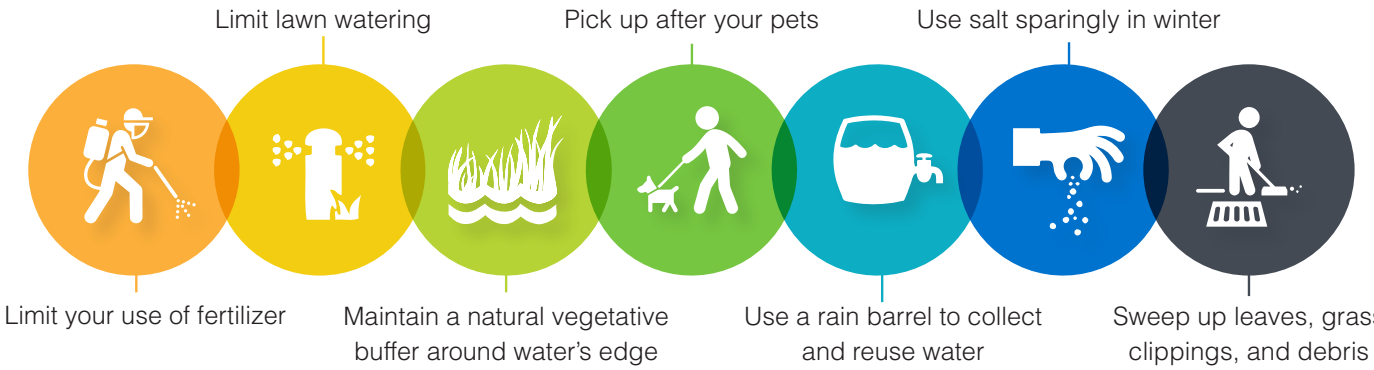

Upcoming Projects

Water Quality Monitoring - The City of Sunfish Lake will continue to implement the water quality monitoring program for Horseshoe Lake in partnership with the MPCA.

Additional Information

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Jeff Sandberg | City Engineer | City of Sunfish Lake | 651-286-8474 | jsandberg@wsbeng.com

City of Sunfish Lake

Appendix F – Storm Water Pollution Prevention Plan

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 Sunfish Lake *County: Dakota
(city, county, municipality, government agency or other entity)

*Mailing address: 701 Xenia Ave. S., Suite 300

*City: Minneapolis *State: MN *Zip code: 55416

*Phone (including area code): 763-541-4800 *E-mail: dsterna@wsbeng.com

MS4 General contact (with Stormwater Pollution Prevention Program [SWPPP] implementation responsibility)

*Last name: Sterna, P.E. *First name: Donald
(department head, MS4 coordinator, consultant, etc.)

*Title: City Engineer

*Mailing address: 701 Xenia Ave. S, Suite 300

*City: Minneapolis *State: MN *Zip code: 55416

*Phone (including area code): 763-541-4800 *E-mail: dsterna@wsbeng.com

Preparer information (complete if SWPPP application is prepared by a party other than MS4 General contact)

Last name: Carlson First name: Jesse
(department head, MS4 coordinator, consultant, etc.)

Title: Environmental Compliance

Mailing address: 701 Xenia Ave South, Suite 300

City: Minneapolis State: MN Zip code: 55416

Phone (including area code): 651-286-8464 E-mail: jcarlson@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: Donald Sterna
(This document has been electronically signed)

Title: City Engineer Date (mm/dd/yyyy): 12/30/2013

Mailing address: 701 Xenia Ave. South Suite 300

City: Minneapolis State: MN Zip code: 55416

Phone (including area code): 763-541-4800 E-mail: dsterna@wsbeng.com

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
Mendota Heights	MCM 6

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.*

Water Resource Related Agreements:

The City has entered into water resource-related agreements that govern in part how the City must manage its water resources. These agreements include the joint powers agreement between the City and Lower Mississippi River Watershed Management Organization, agreements between the City and adjoining communities, or agreements it may have with other governmental units or private parties. Listed below is a description of the water resource related agreements into which the City has entered.

Cities of Inver Grove Heights, Lilydale, Mendota Heights, St. Paul, and West Saint Paul:

Revised and Restated Joint Powers Agreement establishing a Watershed Management Organization for the Lower Mississippi River Watershed, 2001.

City of Sunfish Lake and City of Mendota Heights:

The City of Sunfish Lake has a 12" outlet at Sunfish Lake that discharges water to Mendota Heights. The City of Sunfish Lake and the City of Mendota Heights have entered into an agreement that governs the outlet elevation, maintenance of the outlet structure and valve, and operation of the outlet. The City of Mendota Heights maintains and operates the outlet structure. The City of Sunfish Lake will reimburse Mendota Heights for these operational costs. Additionally, the City of Sunfish Lake cannot divert more water to Mendota Heights.

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 of Sunfish Lake Zoning Ordinance, Section 1216.04 Storm Water Management

Direct link:

http://www.sunfishlake.org/images/Ordinances/Zoning_Ordianance/zo%20sunfish%20lake.pdf

☐ 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:

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: _____

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 of Sunfish Lake Zoning Ordinance, Section 1216.04 Storm Water Management

Direct link:

http://www.sunfishlake.org/images/Ordinances/Zoning_Ordianance/zo%20sunfish%20lake.pdf

☐ 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:

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:

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: _____

   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 of Sunfish Lake Zoning Ordinance, Section 1216.04 Storm Water Management

   Direct link:

   http://www.sunfishlake.org/images/Ordinances/Zoning_Ordianance/zo%20sunfish%20lake.pdf

   ☐ 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. Amend current zoning ordinance to include requirements for maintaining runoff volumes TSS, and TP during new development. These amendments they will be placed on the City Councils meeting agenda for approval within 12 months following the date permit coverage is extended.

B.2.b. Amend current zoning ordinance to reduce runoff volumes, TSS, and TP during redevelopment.The City will draft these amendments and 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 ammend the ordinance to include prohibiting the use of infiltration techniques to achieve the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)). This will occure on the same schedule as in B.2.b.

B.3.a.2: The City will amend the ordinance 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 in B.2.b.

B.3.a.3: The City will amend the ordinance to include the exceptions for linear projects as described in the Permit (PartIII.D.5.a(3)(b)). This will occur in the schedule as in B.2.b.

B.4.a.: The City will amend the ordinance 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 B.2.b.

B.4.b.: The City will amend the ordinance 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 B.2.b.

B.4.c.: The City will amend the ordinance 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 B.2.b.

B.4.d.: The City will amend the ordinance 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 B.2.b.

B.4.f.: The City will amend the ordinance 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 B.2.b.

B.5.c.: The City will amend the ordinance to include conditions to address BMP modification in the future as described in the Permit (PartIII.D.5.a(5)(c)). This will occur on the same schedule as B.2.b.

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:

   The City will revise the existing ordinance Section 1216.04, Storm Water Management to include ERPs to address site erosion, sediment control, post-construction stormwater management, and non-stormwater discharges associated with illicit discharge. This will be completed within 12 months of the date that permit coverage is extended.

B. Describe your ERPs:

City Code: Section 1244.12 Enforcement Procedures

A. Enforcing Authorities

B. Cease and Desist Orders

C. Restoration and Replacement Orders

IV. Storm Sewer System Map and Inventory: (Part II.D.4.)

A. Describe how you manage your storm sewer system map and inventory:

The GIS storm sewer system map is updated when development and or redevelopment occurs within city limits.

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:

Already submitted to the MPCA on 12/21/2011.

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 public education program has been developed to distribute educational materials to the community or conduct equivalent outreach activities. The BMPs identified will focus on the impact of storm water discharges on streams, rivers, and wetlands, and the steps that the public can take to reduce pollutants in storm water runoff.

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
Distribute Educational Materials	*The City will distribute information on illicit discharges, erosion control, 6 MCM's, BMP's, shoreline management, and other SWPPP practices. Document the number of publications distributed and mailed by the City and/or Dakota County. Distribute a minimum of once per year.* *This BMP will continue be implemented into the new permit term.*
Implement an Education Program	*The City will record attendance, web site visits, keep minutes, record statements/requests, and written comments. Annually evaluate and update as needed.* *This BMP will continue be implemented into the new permit term.*
Education Programs	*The City will continue to increase awareness, understanding, and knowledge of daily behavior changes, the City's SWPPP, and 6 MCM's that reduce stormwater pollution within the City.* *This BMP will continue be implemented into the new permit term.*
Coordination of Educational Programming	*The City will continue to coordinate educational components, programming, and schedule with outside organizations.* *This BMP will continue be implemented into the new permit term.*
Annual Public Meeting	*The City will hold an annual public meeting to distribute educational materials and present an overview of the MS4 program and City's SWPPP. This will be conducted at a minimum of once per year.* *This BMP will continue be implemented into the new permit term.*

BMP categories to be implemented	Measurable goals and timeframes

3. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   City Clerk

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 held in combination with a City Council Meeting.

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 the annual public meeting in the official newspaper 30 days prior to the meeting date.* *This BMP will be implemented into the new permit term with the exception that the public notice requirement will be revised to be in conformance with local requirements for holding public meetings.*
Solicit Public Input and Opinion on the Adequacy of the SWPPP	*The City will hold an annual public meeting to solicit public opinion on the SWPPP.* *This BMP will be revised as per the "Consider Public Input" BMP.*
Documentation Procedures	*Record attendance, keep minutes, record statements, and written comments and document changes made to the SWPPP.* *This BMP will be implemented into the new permit term.*

BMP categories to be implemented	Measurable goals and timeframes
Consider Public Input	*The city will provide at a minimum (1) opportunity annually for the public to provide input on the adequacy of the SWPPP. This potentially could be at a council meeting, planning commission meeting, environmental event or other city sponsored function.*

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:

4. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   City Clerk

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.

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.a., The City will incorporate procedures for illicit discharge detection into all inspection and maintenance activities described in the permit (Part III.D.6.e-f). Procedures will be in place within 12 months following the date permit coverage is extended.

C.2.b., The City will incorporate procedures for tracking and detecting the source of illicit discharges using visual inspections. Procedures will be in place within 12 months following the date permit coverage is extended.

C.2.c., The City will incorporate procedures into the IDDE program for training of all field staff to be knowledgeable about identifying illicit discharges and to understand what do in the event that an illicit discharge is discovered described in the permit (Part III.D.3.c). Procedures will be in place within 12 months following the date permit coverage is extended.

C.2.d.& e., The City will incorporate procedures into the IDDE program for identifying priority areas and for a timely response to known, suspected, and reported illicit discharges as and the development of ERPs described in the permit (Part III.D.3.c.g). Procedures will be in place within 12 months following the date permit coverage is extended.

C.2.f., The City will incorporate procedures for investigating, locating, and eliminating the source of illicit discharges. Procedures will be in place within 12 months following the date permit coverage is extended.

C.2.g., The City will incorporate procedures for responding to spills, including ERPs to prevent spills from entering the small MS4. Procedures will be in place within 12 months following the date permit coverage is extended.

C.2.h., The City will incorporate procedures to use ERPs required by permit (Part III.B.) to eliminate the illicit discharge and take required corrective actions when the source of an illicit discharge is found. 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 Map	*Annually update storm sewer system map, as needed.* *This BMP will be continued into the next permit term.*
Regulatory Control Program	*Continue to support Dakota County ordinances relating to illicit discharges, and develop an illicit discharge ordinance (if necessary).* *This BMP will be continued into the next permit term.*
Illicit Discharge Detection and Elimination (IDDE) Plan	*Utilize volunteer organizations to collect trash and debris from roadsides. Document the annual highway miles covered and pounds of trash removed.* *This BMP will be continued into the next permit term.*
Public and Employee Illicit Discharge Information Program	*Train City staff, implement IDDE evaluation procedures, and incorporate BMPs in handling equipment and hazardous materials used by the City. Document the annual quantity of hazardous waste collected by Dakota County from City residents each year.*

	This BMP will be continued into the next permit term.
Identification of Non Stormwater Discharges and Flows	*Maintain a record of all non-stormwater discharges including visual inspections, responsible parties, and corrective actions.* *This BMP will be continued into the next permit term.*

BMP categories to be implemented	**Measurable goals and timeframes**
Illicit Discharge Detection and Elimination (IDDE) and Enforcement Ordinance	*The City will review current applicable ordinances and, if necessary, develop an ordinance which will address the issue of non-stormwater discharges in the City's storm sewer system. Elements of this ordinance will include, but are not limited to defining allowable discharges, setting policy as it pertains to violations, penalties, MPCA standards, and mitigation requirements.*
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.*

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 descriped in the permit (Part III.D.3.h). Procedueres 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:

   City 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 ☒ Yes ☐ No

document site inspections?

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.b., The City will develop written procedures for notifying owners and operators that they need to apply for and obtain coverage under the MPCS's general permit to Discharge Stormwater Associated with Construction Activity No. MN R100001. Procedures will be in place within 12 months following the date permit coverage is extended.

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.: The City will develop written procedures for conducting site ESC 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.f.: The City will develop written procedures for documenting stormwater related comments used to determine project approval as described in the Permit (Part III.D.4.f). 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**
Ordinance or other Regulatory Mechanism	*Continue to support and review annually Dakota County's permit stipulations relating to project specific erosion and sediment control.* *This BMP will continue to be implemented into the new permit term.*
Construction Site Implementation of Erosion and Sediment Control BMP's: Waste Controls for Construction Site Operators	*Construction permits will be required to meet MPCA NPDES Phase II guidelines for erosion and sediment control.* *This BMP will continue to be implemented into the new permit term.*
Procedure for Site Plan Review	*Every applicant for City council approval and/or a Dakota County permit to allow land disturbing activities must submit a project specific stormwater management plan (if applicable) and/or erosion control plan to the City for review.* *This BMP will continue to be implemented into the new permit term.*
Establishment of Procedures for the Receipt and Consideration of Reports of Stormwater Noncompliance	*Defer to Dakota County's procedures for stormwater noncompliance. Obtain a record of all stormwater noncompliance within the City. Maintain Record/Update as needed.* *This BMP will continue to be implemented into the new permit term.*
Establishment of Procedures for Site Inspections and Enforcement	*All erosion control inspections, violations, and remedial actions taken by the City will comply with NPDES Phase II construction permit guidelines. New City staff will be provided erosion control training within 3 years of the individual's hire date. New staff training within 3 years of hire date.* *This BMP will continue to be implemented into the new permit term.*

BMP categories to be implemented	**Measurable goals and timeframes**
Prioritize Inspections	*The City will develop a process to determine the frequency for inspecting high priority inspection sites (e.g., near sensitive receiving waters, projects larger than 5 acres). Within the next permit cycle.*
Documentation Procedures	*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:

   City 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:

   A program of BMPs has been prepared to address storm water runoff from new development and redevelopment projects that disturb equal to or greater than one acre. This program insures that controls are in place that would prevent or minimize water quality impacts from development activities.

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-construction stormwater 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
Development and Implementation of Structural and/or Non-Structural BMP's	*City staff will document and record all repairs, maintenance, or new construction of structural and non-structural BMP's used on City construction projects. Record keeping a minimum of once/year.* *This BMP will continue to be implemented into the new permit term.*
Regulatory Mechanism to Address Post Construction Runoff from New Development and Redevelopment	*Continue to use existing development review policies of Dakota County to address water quality, erosion control, and BMP's.* *This BMP will be revised to identify the adoption of a regulatory mechanism to maintain runoff volumes, TSS, and TP associated with stormwater runoff from new development and redevelopment.*
Long-term Operation and Maintenance of BMP's	*Annually review in conjunction with Dakota County and document modifications to the BMP schedule as defined in the Public Works work schedule.* *This BMP will be revised to require the adoption of policies to ensure the long term operation and maintenance of BMPs installed on private property.*

BMP categories to be implemented	Measurable goals and timeframes
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:

   City 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. Other work associated with this MCM including street sweeping, salting and sanding is contracted.

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:

   F.2.: Not applicable, the City does not have any City owned facilities that contribute to the discharge of pollutants associated with stormwater runoff.

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
Municipal Operations and Maintenance Program	*Develop and implement a pollution prevention operations & maintenance schedule consistent with the BMPs detailed in this permit and minimum control measure #6.* *This BMP will continue to be implemented into the new permit term.*
Street Sweeping Program	*Not Applicable, due to minimal amount of City owned streets and lock of conveyance system adjacent to roads. Rural type roadway system with no curb and gutter.*
Annual Inspection of All Structural Pollution Control Devices	*Not Applicable*
Inspection of a Minimum of 20% of the MS4 Outfalls, Sediment Basins and Ponds Each Year on a Rotating Basis.	*The City will inspect all outfalls, sediment basins, and ponds within the City's storm sewer system. The results of these inspections will be compiled in a report which will include sediment levels, watershed information and recommended maintenance and maintenance schedules. Inspect a minimum of 20% per year.* *This BMP will continue to be implemented into the new permit term.*
Annual Inspection of All Exposed Stockpile, Storage, and Material Handling Areas.	*Evaluate and document all modifications and/or additional BMP's implemented to all stockpiles, storage, and material areas located within City owned property.*

	This BMP will be implemented into the new permit term.
Inspection Follow-up, Including the Determination of Whether Repair, Replacement, or Maintenance Measures are Necessary and the Implementation of the Corrective Measures.	*The City council and City engineer will determine and document all repair, replacement, or maintenance measures.* *This BMP will continue to be implemented into the new permit term.*
Record Reporting and Retention of All Inspections and Responses to the Inspections	*The City will record the number of inspection record requests and distributed materials. Minimum of one/year.* *This BMP will continue to be implemented into the new permit term.*
Evaluation of Inspection Frequency	*The City will retain records of inspection results and any maintenance performed or recommended. After 2 years of inspections, the frequency of inspections may be adjusted at the discretion of the City engineer. Minimum of one/year.* *This BMP will continue to be implemented into the new permit term.*

BMP categories to be implemented	**Measurable goals and timeframes**
Facility Inventory	*Not applicable, that City does not have any City owned municipal facilities.*
Training	*Provide a presentation annually to generate Staff and subcontractor awareness of SWPPP regulations and to develop projects with appropriate BMPs applied.*
Pond Assessment Procedures & Schedule	*In year 1, develop procedures for determining TSS and TP treatment effectiveness of city owned ponds 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.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 develop and implement a stormwater management training program commensurate with each employees job duties as described in the Permit (Part III.D.6.g.). Procedures will be in place within 12 months following the date permit coverage is extended.

F.9., The City has procedures to document inspections, however it will develop written procedures to document 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:

    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

Appendix G – Culvert Condition Report

701 Xenia Avenue South | Suite 300 | Minneapolis, MN 55416 | (763) 541-4800

Memorandum

To: ***Jeff Sandberg, PE, City Engineer***

From: ***Sheue Torng Lee***

Date: ***June 7, 2018***

Re: ***Culvert Condition Report***
WSB Project No. 011527

WSB & Associates, Inc. is pleased to submit this culvert condition report summarizing the results of the culvert inspection performed in May. The culverts were inspected in accordance with the MnDOT HydInfra Inspection Manual. Using the ratings guide from the manual, the condition ratings are listed as follows.

Rating	Condition	Description
1	Excellent	Like new condition
2	Fair	Some wear, but structurally sound
3	Poor	Deteriorated, consider for repair or replacement
4	Very Poor	Serious deterioration

A map showing the condition rating can be found labeled in the **Appendix A** section of this report. Some culverts may be buried, submerged, or out of sight and they were labeled as “Not Able to Rate/Not Visible” with a 0 rating as shown in the map. The condition rating and comment for each culvert is included in a table in **Appendix B**.

The table below summarizes the number of culverts inspected under each condition category.

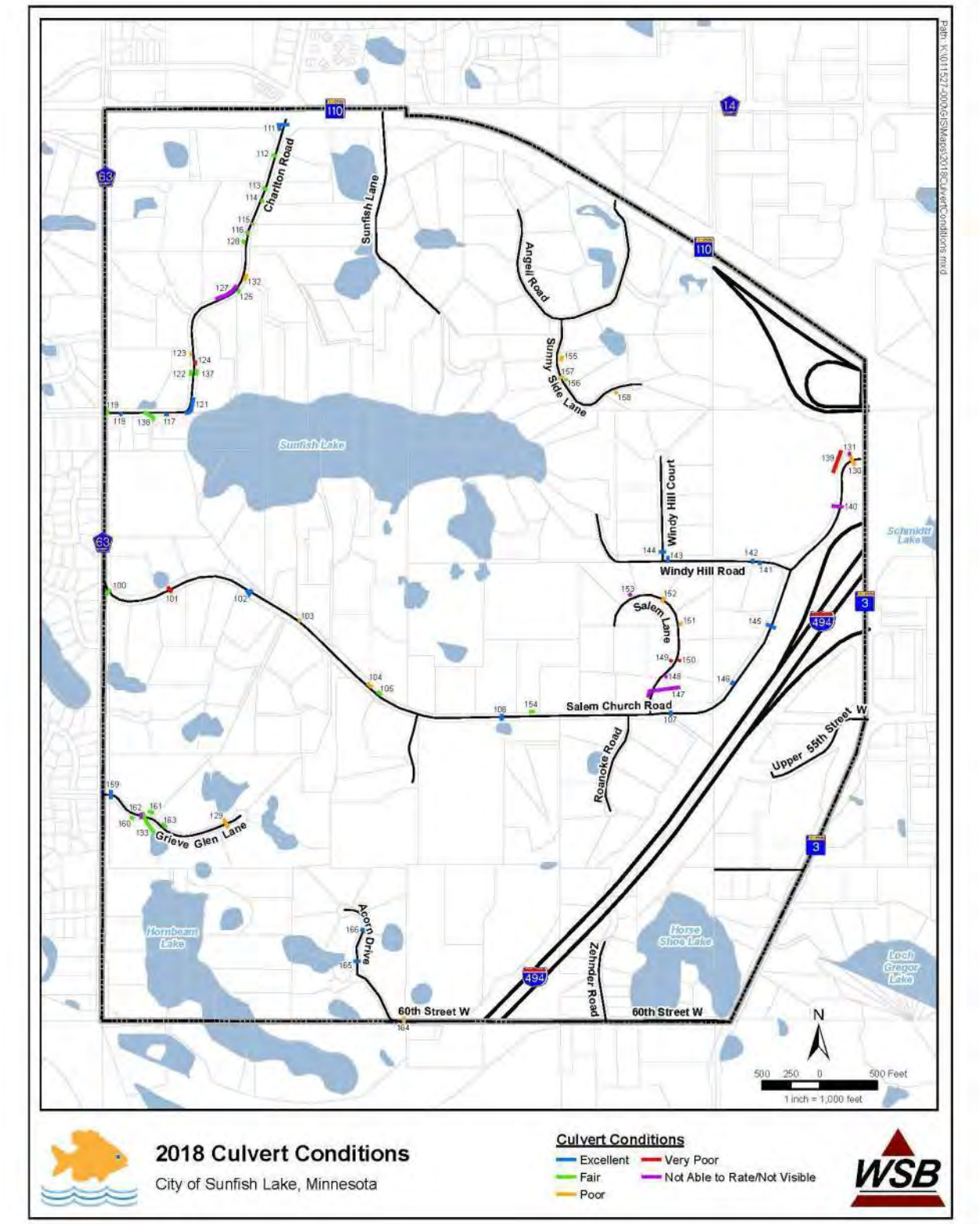
Rating	Condition	Number of Culvert
0	Not able to rate / not visible	7
1	Excellent	16
2	Fair	19
3	Poor	12
4	Very poor	5

Of the 59 culverts evaluated in this survey, it was determined that a majority of the culverts were rated in excellent or fair condition, however, several culverts in these categories have sediment or debris built up and need cleaning performed. Some culverts from the survey were plugged so that water flow is reduced or prevented and they are no longer functioning as desired. There were also a few culverts that need repair.

Photos of the culverts taken during inspection were documented but not included in this report. However, the photos may be provided to the City upon request.

Appendix A

Sunfish Lake
2018 Culvert Condition Map


Path: K:\01152700\GIS\Maps\2018\CulvertConditions.mxd
Charlton Road
Sunfish Lane
Angel Road
Sunny Side Lane
Windy Hill Court
Windy Hill Road
Salem Lane
Salem Church Road
Roanoke Road
Upper 55th Street W
Grieve Glen Lane
Acorn Drive
60th Street W
60th Street W
Zehnder Road
Sunfish Lake
Hornbeam Lake
Horse Shoe Lake
Loch Gregor Lake
Schmidt Lake
110
14
63
494
3
N
500 250 0 500 Feet
1 inch = 1,000 feet
2018 Culvert Conditions
City of Sunfish Lake, Minnesota
Culvert Conditions
Excellent
Very Poor
Fair
Not Able to Rate/Not Visible
Poor
WSB

Appendix B

Sunfish Lake
2018 Culvert Condition and Rating

Culvert ID	Owner	Size	Material	Length (ft)	Rating	Condition	Additional Comments
127	City	4	Drain Tile	225	0	Not Able to Rate/Not Visible	
131	MnDOT	24	RCP	26	0	Not Able to Rate/Not Visible	Could be connecting to Culvert #130 but not visible upon inspection
140	City	24	CMP	97	0	Not Able to Rate/Not Visible	Could not locate the culvert
147	City	12	CMP	55	0	Not Able to Rate/Not Visible	Outlet plugged, inlet mostly plugged
148	City	10	CMP	18.5	0	Not Able to Rate/Not Visible	Almost full of debris
153	City	12	CMP	25	0	Not Able to Rate/Not Visible	Could not locate the culvert
162	City	18	CMP	52	0	Not Able to Rate/Not Visible	Could not locate the culvert
102	City	18	CHD Plastic	45	1	Excellent	Culvert has been lined with plastic
106	City	24	CHD Plastic	56	1	Excellent	
107	City	24	CMP	47	1	Excellent	
111	MnDOT	18	CMP	89	1	Excellent	New, located on state right-of-way
117	City	15	CMP	36	1	Excellent	Looks new
118	City	18	CMP	21	1	Excellent	
121	City	16	CMP	172	1	Excellent	Clean
141	City	15	CMP	24.5	1	Excellent	Bush covering West end of the culvert
142	City	18	CMP	44	1	Excellent	New
143	City	18	CMP	47	1	Excellent	2 culverts
144	City	15	CMP	54	1	Excellent	
145	City	48	RCP	86	1	Excellent	
146	City	15	CMP	30	1	Excellent	
159	City	15	RCP	74	1	Excellent	Very good
165	City	18	RCP	56	1	Excellent	Discharge needs cleaning
166	City	18	RCP	50	1	Excellent	Needs cleaning

Culvert ID	Owner	Size	Material	Length (ft)	Rating	Condition	Comments
100	City	18	CMP	55	2	Fair	1/3 full of debris
105	City	18	CMP	48	2	Fair	
112	City	18	RCP	46	2	Fair	East end needs cleaning
113	City	18	RCP	42	2	Fair	West discharge needs cleaning
114	City	15	CMP	27	2	Fair	Ditch needs cleaning
115	City	12	CMP	19	2	Fair	Needs cleaning
116	City	18	RCP	34	2	Fair	
119	MnDOT	27	RCP	36	2	Fair	
122	City	15	CMP	42	2	Fair	Needs cleaning
125	City	16	CMP	34	2	Fair	
128	City	15	CMP	34	2	Fair	Half full of debris. Ditch needs cleaning
133	City	24	RCP	210	2	Fair	Discharge needs cleaning
137	City	15	CMP	50	2	Fair	Discharge needs cleaning
138	City	15	CMP	36	2	Fair	
154	City	16	RCP	48	2	Fair	Needs cleaning
156	City	12	CMP	12	2	Fair	
160	City	15	CMP	35	2	Fair	East apron needs repair
161	City	15	CMP	48	2	Fair	
163	City	15	CMP	35	2	Fair	
103	City	24	CMP	22	3	Poor	Needs cleaning, Clean and Re-Evaluate
104	City	15	CMP	51	3	Poor	Discharge half full of debris, Clean and Re-Evaluate
123	City	12	CMP	20	3	Poor	Needs cleaning, Clean and Re-Evaluate
129	City	18	RCP	85	3	Poor	Needs cleaning, Clean and Re-Evaluate
130	MnDOT	24	RCP	99	3	Poor	North apron is broken, needs to be replaced

Culvert ID	Owner	Size	Material	Length (ft)	Rating	Condition	Comments
132	City	12	CMP	63	3	Poor	Discharge 80% plugged, Clean and Re-Evaluate
151	City	12	CMP	25	3	Poor	Outlet plugged, Clean and Re-evaluate
152	City	18	CMP	46	3	Poor	
155	City	12	CMP	45	3	Poor	East end smashed needs to be replaced
157	City	18	CMP	37	3	Poor	Needs cleaning, Clean and Re-Evaluate
158	City	12	CMP	18	3	Poor	Discharge needs cleaning, Clean and Re-Evaluate
164	City	18	CMP	50	3	Poor	Discharge needs cleaning, Clean and Re-Evaluate
101	City	27	CMP	56	4	Very poor	North end smashed. South end buried under logs
124	City	15	CMP	36	4	Very poor	Culvert 60% plugged
139	City	30	CMP	203	4	Very poor	North outlet submerged
149	City	12	CMP	20	4	Very poor	Ends smashed could not see into the culvert
150	City	18	CMP	19	4	Very poor	Rusty

Appendix H – Regulatory Framework

Federal Permit Programs

U.S. Army Corps of Engineers (COE) Section 404 Permit Program

The COE administers Section 404 of the Federal Clean Water Act. This regulates the action of putting fill or dredged material into any water or wetland area. The applicant must prove that there are no other alternatives and that mitigation can be accomplished. Mitigation will create water or wetland areas having values sufficient to offset the values lost because of the fill. A national goal is to avoid any net loss of wetlands.

National Pollutant Discharge Elimination System (NPDES) Permit

The U.S. Clean Water Act and Minnesota Statutes regulates discharges to natural receiving water bodies through NPDES permits. The City of Sunfish Lake has submitted its NPDES Storm Water Discharge Permit to the MPCA. This permit is required for cities with populations over 10,000 or cities within a metropolitan area.

State Permit Programs

MPCA Construction Site Permits for Over One-Acre Disturbances

- Any construction activity that disturbs one acre or more of land area is required to apply for an MPCA NPDES permit. Construction activity includes clearing, grading, excavation, road building, demolition, and construction of residential houses, office buildings, commercial facilities, or industrial buildings.

MPCA Water Quality Permits

For discharges of wastewater and construction dewatering.

MPCA Solid Waste Permits

For any disposal of nonhazardous solid waste on property owned by businesses processing, storing or transferring solid waste.

MPCA Hazardous Waste Permits

For treatment, storage or on-site disposal of wastes considered hazardous because of ignitability, corrosivity, reactivity, toxicity or oxidizing characteristics.

MPCA Liquid Storage Permits

Required for all above-ground storage tanks that hold materials capable of polluting the water of the state.

DNR Protected Waters Permits

- Required to do any work which will change or diminish the course, current, or cross-section of any lake, marsh or stream that is designated as a protected water or wetland on the DNR's *Protected Waters and Wetlands Inventory* maps. Protected waters are all water basins and watercourses that meet the criteria set forth in the Minn. Statutes Section 103G.005, subd. 15. Protected wetlands are types 3, 4, and 5 (Cowardin classification[1])
- Required to do any work below the ordinary high water mark: draining, filling, dredging, channeling, construction of dams, harbors or permanent offshore structures and placement of bridges and culverts.
- DNR can establish a minimum protection elevation for water basins and a protected low flow for watercourses.

DNR Water Appropriation Permit

Required to appropriate or use state waters for domestic use serving more than 25 persons and for any other use which exceeds 10,000 gallons/day or 1 million gallons /year.

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[1] Lewis M. Cowardin *Classification of Wetlands and Deepwater Habitats of the United States,* FWS/OBS-79/31. U.S. Fish and Wildlife Service, U.S. Department of Interior, 1979.

DNR Shoreland and Floodplain Zoning Regulations
DNR regulates lands adjoining protected waters and wetlands. Shoreland ordinances are required to specified counties and cities on a priority basis. DNR sets minimum land use standards which local units of government must adopt and enforce through their zoning ordinances, except that planned unit development must be approved directly by the DNR.

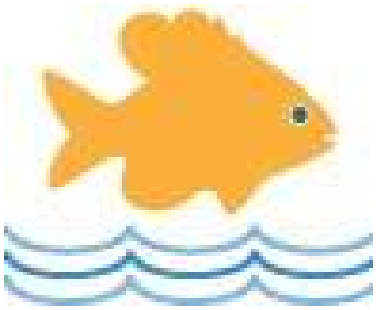
- Shoreland zoning ordinances apply to all land within 1,000 feet of the shore of a protected water basin or wetland and within 300 feet of a protected watercourse or landward extent of a designated floodplain. Standards vary according to the water body classification; standards include land use, lot size, lot width, structure setbacks and sanitary system setbacks.
- Floodplain zoning ordinances apply to lakes and streams and cover all land inundated by 100-year storm events. The floodway is protected as it is needed to carry off the resulting flows. Development along the floodway fringe must conform to the City's shoreland zoning standards as long as it remains protected from 100-year flood damage.

DNR Aquatic Plant Management Permit
Prior to application of any herbicide to a Public Water, a permit from the DNR must be obtained. Application of such materials must comply with the DNR's regulations.

Wetland Conservation Act
Minnesota Rules 8420 provide regulations associated with fill, excavation, or drainage of wetlands within Minnesota. Prior to any impact to wetlands, sequencing must be completed and any unavoidable impacts must be mitigated. The City administers this permit program.

City of Sunfish Lake
The City requires a permit for building activity, land disturbing activities, and wetland alteration. Projects need to be in conformance with City ordinance, the Local Surface Water Management Plan, and the Wetland Conservation Act. The project may also be subject to WMO rules and standards. As stated in City Ordinance, a site plan review form must be filled out to apply for a permit.

Appendix I – Engineering Design Standards for Stormwater Management



ENGINEERING DESIGN STANDRDS

ENGINEER DESIGN STANDARDS FOR STORMWATER MANAGEMENT

NOVEMBER, 2018

Prepared for:
City of Sunfish Lake

WSB PROJECT NO. 2092-570

wsb

Engineering Design Standards for Stormwater Management

City of Sunfish Lake

November 2018
Prepared by WSB & Associates

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APPENDICES

1. DESIGN OVERVIEW

The City of Sunfish Lake's Stormwater Pollution Prevention Plan (SWPPP) identifies the goals and policies that define the City's stormwater management program, which are implemented via City Zoning Code (Section 1216.04: Stormwater Management) and these Engineering Design Standards. Sunfish Lake's stormwater requirements were written to meet the City's goals to preserve, protect, and manage its water resources as well as to meet federal and state stormwater regulations, and the following objectives:

- Minimize increases in stormwater runoff rates from any development to reduce flooding, siltation and erosion and in order to maintain the integrity of stream channels,
- Minimize increases in nonpoint source pollution caused by stormwater runoff from development which would otherwise degrade local water quality,
- Minimize the total annual volume of surface water runoff that flows from any specific site during and following development so as not to exceed the predevelopment hydrologic regime to the maximum extent practicable,
- Ensure that these management controls are properly maintained and pose no threat to public safety, and
- Implement stormwater management controls to help meet current and future total maximum daily load (TMDL) goals, to address the need to improve water quality, and to meet objectives in the Local Water Resources Management Plan.

2. DEFINITIONS

For this Design Manual, the following definitions describe the meaning of the terms used in this Design Manual:

Applicant means a property owner or agent of a property owner who has filed an application for a Stormwater Management Permit.

Applicability means any land disturbing activity requiring a City of Sunfish Lake Stormwater Management Plan as defined in City Zoning Code (Section 1216.04: Stormwater Management).

Channel means a natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

Impervious Area means those surfaces that cannot effectively infiltrate rainfall (e.g., building rooftops, pavement, sidewalks, gravel, driveways, swimming pools, etc.).

Land Disturbance Activity means any activity that changes the volume or peak discharge rate of stormwater runoff from the land surface. This may include the grading, digging, cutting, scraping, or excavating of soil, placement of fill materials, paving, construction, substantial removal of vegetation, or any activity that bares soil or rock or involves the diversion or piping of any natural or fabricated watercourse.

Maintenance Agreement means document recorded against the property which provides for long-term maintenance of stormwater treatment practices.

Nonpoint Source Pollution means pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

Off-Site Facility means a stormwater management measure located outside the subject property boundary described in the permit application for land development activity.

Redevelopment means any construction activity where, prior to the start of construction, the areas to be disturbed have 15 percent or more of impervious surface(s) (*MPCA, Tech Support Document for Post-Construction Stormwater Management)*.

Responsible Party means the entity which will be responsible for ownership and maintenance of Stormwater Treatment Practices.

Stop Work Order means an order which requires that all construction activity on a site be stopped.

Stormwater Management means the use of structural or non-structural practices that are design to reduce stormwater runoff pollutant loads, discharge volumes, and/or peak discharge rates.

Stormwater Management Plan means a set of drawings or other documents submitted by a person as a prerequisite to obtaining a stormwater management approval, which contains all of the required information and specifications pertaining to Stormwater Management.

Stormwater Reviews means every applicant for a building permit, zoning approval, or a site or building plan approval will require a review to evaluate compliance with the City of Sunfish Lake's water quality and water quality requirements as specified in these standards.

Stormwater Runoff means flow on the surface of the ground, resulting from precipitation.

Stormwater Runoff means flow on the surface of the ground, resulting from precipitation.

Stormwater Treatment Practices (STPs) means measures, either structural or nonstructural, that are determined to be the most effective and practical means of preventing or reducing point source or nonpoint-source pollution inputs to stormwater runoff and waterbodies.

Water Quality Volume (WQ_v) means that runoff storage volume needed to treat the specified phosphorus loading as determined in the Sunfish Lake Engineering Design Standards.

Watercourse means a permanent or intermittent stream or other body of water, either natural or fabricated, which gathers or carries surface water.

Watershed means the total drainage area contributing runoff to a single point.

3. PROCEDURE FOR REVIEWING STORMWATER MANAGEMENT PLANS

Every applicant for a building permit, zoning approval, or a site or building plan approval will be required to submit a Stormwater Management Plan to the City of Sunfish Lake.

The following activities are exempt from submitting a Stormwater Management Plan:

1. Applications approved by the City Council on or before the effective date of the Zoning ordinance.
2. Any land disturbing activity for which plans have been approved by the Dakota County Soil and Water Conservation District within six months prior to the effective date of the Zoning ordinance.
3. A lot for which a building permit has been approved on or before the effective date of the Zoning ordinance.
4. Installation of fence, sign, telephone, and electric poles and other kinds of posts or poles.
5. Emergency work to protect life, limb, or property.

The general review process, from the submittal of the concept and final plans to the issuance of the Stormwater Management Plan approval, is summarized in the following seven steps:

1. Determine what stormwater management provisions apply (stormwater management, erosion control, buffers, and/or floodplain management).
2. What permits, or approvals, are required for the project site, and what waivers and/or exemptions are applicable (COE, DNR, MPCA, WCA, etc.)?
3. Are the selected practices appropriate for this site?
4. Are the practices designed to meet the minimum performance criteria?
5. Does the Plan meet other resource protection requirements as specified in the City of Sunfish Lake Code?
6. Are provisions for long-term maintenance adequate, including access and methods for maintenance defined?

4. SUBMITTAL REQUIRMENTS

Requirements for City of Sunfish Lake's Stormwater Management Plan Approval

Stormwater Management Plan (Required)

No stormwater management plan will be approved unless it details how runoff and associated water quality impacts resulting from the development will be controlled or managed (note the exceptions in Section 3). This plan must indicate whether stormwater will be managed on-site or off-site and, if on-site, the general location and type of practices.

The Stormwater Management Plan must be signed by a licensed professional engineer in the State of Minnesota, who will verify that the design of all stormwater management practices meet the submittal requirements outlined in the Plan Review Checklist found in Appendix A. No building permit, grading permit, or subdivision approval shall be issued until a satisfactory final Stormwater Management Plan, or a waiver thereof, shall have undergone a review and been approved by the City after determining that the plan waiver is consistent with the requirements of this manual.

Stormwater Management Conceptual Plan Requirements (Optional)

A stormwater management concept plan submittal is optional, but highly encouraged. A concept plan identifies basic site information, locations of proposed development features, and preliminary locations and sizing of STPs. The concept submittal has a greater chance of identifying major obstacles and can facilitate alternative stormwater management arrangements in a timely fashion and at the onset of project planning. If a concept plan is submitted for review, it should include sufficient information (e.g., maps, basic hydrologic and water quality calculations etc.) to evaluate the environmental characteristics of the project site. This information should show the potential impacts of all proposed development of the site, both present and future, on the water resources, and show the effectiveness and acceptability of the measures proposed for managing stormwater generated at the project site. The intent of this conceptual planning process is to determine the type of stormwater management of stormwater runoff form future development, and to identify major issues prior to completing final plans. The concept plan is less time consuming and more efficient to evaluate proposed development plans with this step of the review process.

The final plan provides more detailed design information for the proposed STPs and includes much more detail in terms of hydrologic conditions and site features.

For redevelopment, an applicant should include within a concept plan measures for controlling existing stormwater runoff discharges and water quality from the site in accordance with the standards of this Manual. After review of the concept plan and modifications are made to that plan as deemed necessary by the City, a final Stormwater Management Plan may be submitted for approval.

Stormwater Management Plan Requirements (Required)
Record drawings are required for all projects that impact wetlands and/or the floodplain, require water quality ponding, have significant grade changes, and/or have other unusual circumstances. Record drawings must be certified by a professional land surveyor or civil engineer. (Record drawings should not include temporary erosion control measures.)

Plan Details

- ☐ North arrow, street names, and lot and block numbers for property or subdivision
- ☐ Location of benchmark, based on the City/County benchmark system
- ☐ Key with all line types, symbols, shading, and cross-hatching denoted
- ☐ Illustration key showing symbols for all information pertaining to lot and building design, including grades, easements, lot and block, setbacks, etc.
- ☐ Plan scale (shown graphically on a bar scale) of: 1 inch = 20 feet, 1 inch = 30 feet, 1 inch = 40 feet, or 1 inch = 50 feet. Plans in other scales will not be reviewed.
- ☐ Total area of subject property, with subtotals of disturbed **and** undisturbed areas (tabulation permitted)
- ☐ Subject property's boundary lines, lot lines and right of way lines
- ☐ All existing and proposed drainage and utility easements
- ☐ All man-made features, including existing and proposed buildings, structures, and paved areas
- ☐ All existing storm sewer facilities within 150 feet of the subject parcel
- ☐ All proposed storm sewer facilities (include grades and size of structures)
- ☐ All existing and proposed natural features including, but not limited to, significant trees and tree lines, wetlands, ponds, lakes, streams, drainage channels, floodplain, etc.
- ☐ Show setbacks and buffers for wetlands, ponds, lakes, streams, and floodplains
- ☐ All adjacent plats, parcels, rights-of-way, section lines, extended a minimum of 100 feet (50 feet for single family home construction) beyond the subject parcel in all directions
- ☐ Crossing out of incorrect information (elevations, distances, etc.) will not be allowed on record plans. Incorrect information must be cleanly removed and replaced with the correct record plan information. Proposed elevations and lengths that are not changed should be check-marked to indicate them as being as- built.

Topography

- ☐ Topography details in a minimum of two-foot contour intervals with existing contours as **dashed lines** and proposed contours as dark, **solid lines**, labeled at each edge of the plan and at other appropriate locations
- ☐ Standard lot benching detail, where appropriate (maximum slopes 3:1)
- ☐ Direction arrows indicating swales and lot drainage patterns (show percent grades along drainage swales on plan)

Elevation Information

- ☐ Proposed top of curb elevations at lot corners and driveway or entrances
- ☐ Finished spot elevations at all high and low points
- ☐ Proposed elevations at garage and lowest floor for proposed buildings
- ☐ Proposed finished ground elevations around home for final grading

Temporary Erosion Control Best Management Practices (BMPs)
Show location of all structural erosion control measures (with standard detail plates and maintenance information for each), including, but not limited to:

- ☐ Temporary rock entrance/exit for all vehicle access points (show on plan and provide detail)
- ☐ Perimeter silt fence; silt fence and/or bale checks should also be placed along swales or slopes greater than 50 feet in length (flare ends of silt fence up slope)
- ☐ Storm sewer inlet filters (indicate type and show graphically on plan at each location)
- ☐ Temporary sediment basins

- ☐ Erosion control mats, fiber blankets, netting, temporary seed, or temporary mulch. All exposed soil areas must be stabilized as soon as possible to limit soil erosion but in no case later than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased and no later than seven (7) days after construction activity in that portion of the site has temporarily or permanently ceased when discharge points on the project is within one mile of a special or impaired water and flows to that special or impaired water.
- ☐ Soil stockpile areas (indicate temporary stabilization measures)
- ☐ **Street Sweeping Required**
  Plans must include a note indicating that all adjacent streets will be swept daily, or as directed by the City, to remove all accumulated materials. Failure to perform any street sweeping within six hours of notice by the City will result in the work being performed by the City and all associated costs billed. The City also requires removal of accumulated materials on streets during winter.

Final Stabilization

New resident construction requires vegetated stabilization from the front curb line to the back of the structure for the entire width of the lot. Show seeding and/or turf establishment locations and specifications, including:

- ☐ Type of seeding (permanent, temporary, dormant)
- ☐ Seed type and application rate
- ☐ Fertilizer type and application rate
- ☐ Mulch type, application rate, and method of anchoring
- ☐ Specifications for installation and maintenance of erosion control mats, blankets, or netting
- ☐ Note requiring seeding/restoration to be completed within 48 hours of final grading
- ☐ Location of all areas to be vegetated

Tree Preservation

Show the following standards when a Tree Preservation Plan is required (see Subdivisions Code Section 1307.15 Tree Preservation for all requirements and additional information):

- ☐ Location, size and species of all trees that are six caliper inches or greater for deciduous trees, or ten feet in height for coniferous trees.
- ☐ Trees to be preserved.
- ☐ Trees to be removed.
- ☐ Trees within 30 feet of grading limits.
- ☐ Method of tree protection.
- ☐ Tree replacement plan.

5. LIST OF ACCEPTABLE PRACTICES

In the development of the STP appropriate for the development or redevelopment, infiltration (water quality volume) is foremost in importance to apply in the design. Filtration is warranted when site conditions do not allow for an effective infiltration facility. For flooding or rate control, detention systems are typically the preferred practice. Low Impact Design (LID) practices are encouraged when they can be functionally incorporated into the design. Alternative practices may be approved at the discretion of the City Engineer.

Volume Control Systems:

- Infiltration trench
- Infiltration basin
- Raingarden
- Underground storage
- Reuse
- Green roofs
- Trees/Tree planters

Filtration Systems:

- Surface sand filter
- Underground sand filter
- Perimeter sand filter
- Organic filter
- Bioretention system
- Raingarden with underdrain
- Pervious pavement with underdrain
- Underground storage with underdrain
- Tree trench

Detention Systems:

- Wet pond
- Stormwater re-use systems
- Multiple pond systems
- Extended detention basin
- Micro-pool extended detention basin
- Dry detention ponds
- Underground storage
- Other, as approved by the City of Sunfish Lake

Wetlands:

- Shallow wetland
- Pond/wetland systems

Open Channel Systems:

- Dry swale
- Wet swale
- Grass swale
- Natural channel, or stream

6. CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

All land disturbing activities are required to follow the construction site runoff control standards within this section and the MPCA NPDES Construction General Permit, as applicable.

6.1 Erosion Control

1. The Permittee must plan for and implement appropriate construction phasing vegetative buffer strips, horizontal slope grading, and other construction practices to minimize erosion. All areas not to be disturbed shall be marked (e.g., with flags, stakes, signs, silt fence etc.) on the project site before any work begins.
2. All exposed soil areas must be stabilized as soon as possible to limit soil erosion but in no case later than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased (and no later than seven days after construction activity in that portion of the site has temporarily or permanently ceased when discharge points on the project is within one mile of a special or impaired water and flows to that special or impaired water).
3. Additional BMPs together with enhanced runoff controls are required for discharges to special waters and impaired waters. The BMPs identified for each special or impaired water are required for those areas of the project draining to a discharge point on the project that is within one mile of a special or impaired water and flows to that water. The additional BMPs are identified in Section 23.1 of the NPDES Construction General Permit.

4. The permittee must stabilize the normal wetted perimeter of any temporary or permanent drainage ditch or swale that drains water from any portion of the construction site, or diverts water around the site, within 200 lineal feet from the property edge, or from the point of discharge into any surface water. Stabilization of the last 200 lineal feet must be completed within 24-hours after connecting to a surface water or property edge.
5. Pipe outlet must have temporary or permanent energy dissipation before connecting to surface water.
6. When possible, all slopes must be graded in such a fashion so that tracking marks from heavy equipment are perpendicular to the slope.
7. All areas disturbed during construction must be restored as detailed in these requirements. The type of permanent restoration shall be clearly shown on the plans including but not limited to sod, seed, impervious cover and structures. A minimum of six inches of topsoil must be installed prior to permanent restoration. Areas in which the top soil has been placed and finish graded or areas that have been disturbed and other grading or site building construction operations are not actively underway must be temporary or permanently restored as set forth in the following requirements.
    a. Areas with slopes that area less than 3:1 must be seeded and mulched within 14 days of the area not being actively worked.
    b. Areas with slopes that area greater or equal to 3:1 must be seeded and erosion control blanket placed within 14 days of the area not being actively worked.
    c. All seeded area must be either mulched and disc anchored, hydro-mulched, or covered by erosion control blanket to reduced erosion and protects the seed. Temporary or permanent mulch must be disc anchored and applied at a uniform rate of two tons per acre and have 90 percent coverage.
    d. If the disturbed area will be re-disturbed within a six-month period, temporary vegetative cover shall be required consisting of an approved seed mixture and application rate.
    e. If the disturbed area will not be re-disturbed within a six-month period, permanent vegetative cover shall be required consisting of an approved seed mixture and application rate.
    f. All areas that will not have maintenance done such as mowing as part of the final design shall be permanently restored using an approved seed mixture and application rate.
    g. Restoration of disturbed wetland areas shall be accomplished using an approved seed mixture and application rate.
8. All erosion control measures must be maintained for the duration of the project until final stabilization has been achieved. If construction operations or natural events damage or interfere with any erosion control measures, they shall be restored to serve their intended function.
9. Additional erosion control measures shall be added as necessary to effectively protect the natural resources of the City. The temporary and permanent erosion control plans shall be revised as needed based on current site conditions and to comply with all applicable requirements.

6.2 Sediment Control Practices

1. Sediment control practices must be established on all down gradient perimeters before any upgradient land disturbing activities begin. These practices must remain in place until final stabilization has been achieved.
2. If the down gradient treatment system is overloaded additional up gradient sediment control practices must be installed to eliminate overloading. The SWPPP must be amended to identify the additional practices.
3. All storm drain inlets must be protected by approved BMPs during construction until all potential sources for discharge have been stabilized. These devices must be maintained until final stabilization is achieved. Inlet protection may be removed if a specific safety concern (street flooding/freezing) has been identified.
4. Temporary stockpiles must have silt fence or other effective sediment controls at the base of the stockpile and shall be placed at least 25 feet away from any road, wetland, protected water, drainage channel, or stormwater inlets. Stockpiles left for more than 14 days must be stabilized with mulch, vegetation, tarps, or other approved means.
5. Vehicle tracking of sediment from a project shall be minimized by approved BMPs. These shall be

installed and maintained at the City approved entrances. Individual lots shall each be required to install and maintained entrances throughout the construction building until a paved driveway is installed.

6. Sediment that has washed or tracked from site by motor vehicles or equipment shall be cleaned from paved surfaces throughout the duration of construction.
7. Silt fence or other approved sediment control devices must be installed in all areas as shown on the SWPPP.
8. Silt fence or other approved sediment control devices shall be required along the entire curb line, except for approved opening where construction entrance will be installed or drainage flows away from curb. This device must be maintained until final stabilization is achieved. Ditch checks shall be required in ditch bottoms. Spacing for the check must be as follows:

$$\frac{Height\ of\ the\ sediment\ device\ used\ [ft]\ x\ 100}{Gradient}$$

9. Dust control measures, such as application of water, must be performed periodically due to weather, construction activity, and/or as directed by the City.
10. Flows from diversion channels or pipes (temporary or permanent) must be routed to sedimentation basins or appropriate energy dissipaters to prevent the transport of sediment to outflow or lateral conveyors and to prevent erosion and sediment buildup when runoff flows into the conveyors.
11. A designated concrete washout area shall be installed on projects that require the use of concrete. All liquid and solid wastes generated by concrete washout operations must be contained in a leak-proof containment facility or impermeable liner. A sign must be installed adjacent to each washout facility to inform operators to utilize the proper facilities.
12. All sediment control measures shall be used and maintained for the duration of the project until final. If construction operations or natural events damage or interfere with any erosion control measures, they must be restored to serve their intended function.
13. Additional sediment control measures shall be added as necessary to effectively protect the natural resources of the City. The temporary and permanent erosion control plans shall be revised as needed based on current site conditions and to comply with all applicable requirements.
14. Preserve a 50-foot natural buffer when a surface water is located within 50 feet of the project's earth disturbances and stormwater flows to the surface water. If a buffer is infeasible, document the reasons in the SWPPP and provide double rows of perimeter sediment controls placed five feet apart.

6.3 Temporary Sediment Basins

A temporary sediment basin (or permanent) shall be provided when 10 or more acres of disturbed soil drain to a common location prior to the runoff leaving the site or entering surface waters. The Permittee is also encouraged, but not required to install temporary sediment basins in areas with steep slope or highly erodible soils even if the area is less than ten acres and it drains to one common area. The basins shall be designed and constructed according to the following requirements:

1. The basins must provide storage below the outlet pipe for a calculated volume of runoff from a 2-year, 24-hour storm from each acre drained to the basin, except that in no case shall the basin provide less than 1,800 cubic feet of storage below the outlet pipe from each acre drained to the basin.
2. Where no such calculation has been performed, a temporary (or permanent) sediment basin providing 3,600 cubic feet of storage below the outlet pipe per acre drained to the basin shall be provided where attainable until final stabilization of the site.
3. Temporary basin outlets will be designed to prevent short-circuiting and the discharge of floating debris. The basin must be designed with the ability to allow complete basin drawdown (e.g., perforated riser pipe wrapped with filter fabric and covered with crushed gravel, pumps or other means) for maintenance activities, and provide a stabilized emergency overflow to prevent failure of pond integrity. Energy dissipation must be provided for the basin outlet within 24 hours of connection to a surface water.

4. Temporary (or permanent) basins must be constructed and made operational concurrent with the start of soil disturbance that is up gradient of the area and contributes runoff to the pond.
5. Temporary basins must be placed outside of surface waters and any buffer zones required by this section and the NPDES Construction General Permit.
6. Where the temporary sediment basin is not attainable due to site limitations, equivalent sediment controls such as smaller sediment basins, and/or sediment traps, silt fences, vegetative buffer strips or any appropriate combination of measures are required for all down slope boundaries of the construction area and for those side slope boundaries deemed appropriate as dictated by individual site conditions. In determining whether installing a sediment basin is attainable, the Permittee must consider public safety and may consider factors such as site soils, slope, and available area on site. This determination must be documented in the SWPPP.
7. The Permittee shall maintain the sedimentation basins and will remain functional until an acceptable vegetative cover is restored to the site, resulting in a pre-development level rate of erosion. The City will not issue building permits for lots containing sediment basins until they have been removed or relocated based on the projects restoration progress.
8. Basins designed to be used for permanent stormwater management shall be brought back to their original design contours prior to acceptance by the City.

6.4 Dewatering and Basin Draining

1. Permittees must discharge turbid water from dewatering or basin draining to a temporary or permanent sediment basin unless infeasible. If water cannot be discharged into a sedimentation basin before entering a surface water it must be treated with the appropriate BMPs, such that the discharge does not adversely affect the receiving water or downstream landowners.
2. The Permittee must make sure discharge points are appropriately protected from erosion and scour. The discharge must be dispersed over riprap, sand bags, plastic sheeting or other acceptable energy dissipation measures. Adequate sediment control measures are required for discharging water that contains suspended soils.
3. If discharge water contains oil or grease, an oil-water separator must be implemented prior to discharge.
4. If dewatering operation uses filters with backwash water, the Permittee must haul the backwash water away for disposal, return the backwash water to the beginning of the treatment process, or incorporate the backwash water into the site in a manner that does not cause erosion.
5. All water from dewatering or basin draining must discharge in a manner that does not cause nuisance conditions, erosion in receiving channels, on down slope properties, or inundation in wetlands causing significant adverse impact to wetlands.

6.5 Inspections and Maintenance

1. The Permittee shall be responsible for inspecting and maintaining all temporary and permanent BMPs.
2. The Permittee must routinely inspect the construction project once every seven days during active construction and within 24-hours of a rainfall event of 0.5 inches or greater in 24-hours.
3. Ensure at least one individual is present on the site (or may be available within three calendar days) and is trained in accordance with Section 6.8 Training.
4. All inspections and maintenance conducted during construction must be recorded in writing and must be retained with the SWPPP. Records of each inspection and maintenance activity shall include:
    a. Date and time of inspection.
    b. Name of person(s) conducting the inspections.
    c. Findings of inspections, including exact locations where corrective actions are required.
    d. Corrective actions taken (including dates, times, and the party completing the maintenance activities).
    e. Date and amount of all rainfall events 0.5 inches or greater in 24-hours.
    f. Documentation of changes made to SWPPP.

g. Location(s) of discharge during the inspection, including the description of the discharge and photographs of the discharge.

5. Parts of the construction site that have achieved final stabilization, but work continues on other parts of the site, inspections of the stabilized areas can be reduced to once a month. If work has been suspended due to frozen ground conditions, the required inspections and maintenance must take place as soon as runoff occurs or prior to resuming construction, which ever happens first.
6. All erosion and sediment BMPs shall be inspected to ensure integrity and effectiveness. All nonfunctional BMPs shall be repaired, replaced or supplemented with a functional BMP by the end of the next business day after discovery, or as soon as field conditions allow access.
7. All silt fences must be repaired, replaced, or supplemented when they become nonfunctional or the sediment reaches half of the height of the fence. These repairs shall be made by the end of the next business day after discovery, or as soon as field conditions allow access.
8. Temporary and permanent sedimentation basins must be drained, and the sediment removed when the depth of sediment collected in the basin reaches half the storage volume. Drainage and removal must be completed within one business day of discovery, or as soon as field conditions allow access.
9. Surface waters, including drainage ditches and conveyance systems, must be inspected for evidence of sediment being deposited by erosion. The Permittee shall remove all deltas and sediment deposited in surface waters, including drainage ways, catch basins, and other drainage systems, and re-stabilize the areas where sediment removal results in exposed soil. The removal and stabilization shall take place within seven days of discovery unless precluded by legal, regulatory, or physical access constraints. The Permittee shall use all reasonable efforts to obtain access. If precluded, removal and stabilization shall take place within seven calendar days of obtaining access. The Permittee is responsible for contacting all local, regional, state and federal authorities and receiving any applicable permits, prior to conducting any work.
10. Construction site vehicle exit locations, including streets and curb and gutter systems within and adjacent to the project, shall be inspected for evidence of off-site sediment tracking onto paved surfaces. Tracked sediment shall be removed from all off-site paved surfaces, within one business day of discovery, or if applicable, within a shorter time.
11. The Permittee is responsible for the operation and maintenance of temporary and permanent water quality management BMPs, as well as all erosion prevention and sediment control BMPs, for the duration of the construction work at the site. The Permittee is responsible until another Permittee has assumed control over all areas of the site that have not been finally stabilized or the site has undergone final stabilization, and a NOT has been submitted to the MPCA.
12. If sediment escapes the construction site, off-site accumulations of sediment shall be removed in a manner and at a frequency sufficient to minimize off-site impacts (e.g., fugitive sediment in streets could be washed into storm sewers by the next rain and/or pose a safety hazard to users of public streets).
13. All infiltration areas shall be inspected to ensure that no sediment from ongoing construction activities is reaching the infiltration area and these areas are protected from compaction due to construction equipment driving across the infiltration area.

6.6 Pollution Management Measures/Construction Site Waste Control

1. At a minimum, the Permittee must meet the pollution prevention management measures as outlined in the MPCA NPDES Construction General Permit, Items 12.1-12.9, as amended. The Permittee must implement the following pollution prevention management measures on the site:
   a. The following products and materials must be stored under cover or protected by an equivalent means to minimize contact with stormwater: building products, landscape materials, pesticides, fertilizers, and treatment chemicals. Products and materials that are not a source of contamination to stormwater or are designed to be exposed to stormwater are exempt from this requirement.
   b. Solid waste, including collected sediment, asphalt and concrete millings, floating debris, paper, plastic, fabric, construction and demolition debris and other wastes must be disposed of properly and must comply with MPCA and Minn. R. ch. 7035 disposal requirements.

c. Hazardous Materials such as oil, gasoline, paint and any hazardous substances must be properly stored, including secondary containment, to prevent spills, leaks or other discharge. Restricted access to storage areas shall be provided to prevent vandalism. Storage and disposal of hazardous waste shall follow MPCA regulations and Minn. R. ch. 7045 regulations.
d. Portable toilets must be positioned upright and secured so they will not tip or be knocked over. Sanitary waste must comply with MPCA and Minn. R. ch. 7041 disposal requirements.
e. External washing of trucks and other construction vehicles must be limited to a defined area of the site. Runoff shall be contained, and waste properly disposed of. No engine degreasing is allowed on site.
f. The City of Sunfish Lake prohibits discharges of any material other than stormwater, and discharges from dewatering or basin draining activities to the City's storm sewer system and surface waters. Prohibited discharges include but are not limited to vehicle and equipment washing, maintenance spills, wash water, and discharges of oil and other hazardous substances.
g. All liquid and solid wastes created by washout operations must be contained to prevent washout wastes from contacting the ground and does not result in runoff from the washout operation or areas. In addition, a sign must be installed indicating the location of the washout facility. All disposal of liquid and solids wastes must comply with MPCA rules.
h. Permittees must provide adequate supplies to clean up discharged materials to be available always and an appropriate disposal method to clean up recovered spilled materials. Spills must be reported and cleaned up immediately as required by Minn. Stat. 115.061, using dry clean up measures where possible.

6.7 Final Stabilization

1. The Permittee must ensure final stabilization of the project prior to submitting the Notice of Termination (NOT).
2. All soil disturbing activities at the site must be complete and all soils must be stabilized by a uniform perennial vegetative cover with a density of at least 70 percent of its expected final growth (unless vegetation is not required, such as impervious surfaces).
3. The permanent stormwater treatment system must be clean of accumulated sediment, meets all stormwater design requirements, and is functioning as designed.
4. The Permittee must clean out all sediment from conveyances prior to submitting the NOT.
5. All temporary synthetic erosion prevention and sediment control BMPs (such as silt fence) must be removed as part of the site final stabilization.
6. For residential construction only, permit coverage is terminated on individual lots when the following criteria is met:
   a. Structures are complete.
   b. Temporary erosion protection and downgradient perimeter control for individual lots has been completed and the residence has been transferred to the homeowner.
   c. The Permittee must distribute the MPCA "homeowner factsheet" to the homeowner so the homeowner is informed for the need, and benefits, of final stabilization.

6.8 Training

1. The SWPPP must provide a chain of command indicating the trained individuals who prepared the SWPPP and who is responsible for the management of the construction site, inspections, and installation, maintenance, and repair of BMPs.
2. The training shall consist of a course developed by a local, state or federal agency, professional organization, water management organization, or soil and water conservation district and must contain information that is related to erosion prevention, sediment control, or permanent stormwater management and must relate to the work that you are responsible for managing.
3. Permittees must ensure trained individuals attend some refresher training course every three years.

7. GUIDANCE ON STORMWATER TREATMENT PRACTICES (STPS)

Designers are expected to follow the requirements of these Engineering Design Standards to meet the volume control, water quality, and water quantity requirements of the City of Sunfish Lake. Designs should also meet the design standards of the *Minnesota Stormwater Manual*. Deviations from recommended guidance will require detailed written explanation with discretion given by the City.

8. BASIC SIZING CRITERIA

Proposed Stormwater Management Plans must incorporate Volume Control, Water Quality Control, and Rate Control as the basis for stormwater management in the proposed development plan. The City of Sunfish Lake, as a permitted MS4, requires for new development projects to have a no net increase from pre-project conditions of total volume, TSS, and TP; in addition, for redevelopment projects within the city, it is required to have a net reduction from pre-project conditions of total volume, TSS and TP.

8.1 Volume Control Requirements

Volume control measures are required on projects to meet the water quality criteria of the City of Sunfish Lake' MS4 Permit obligations. Volume control shall be required for proposed new impervious areas greater than one acre or redevelopment of impervious greater than one acre. If an applicant can demonstrate that the volume control standard has been met, then the water quality sizing criteria shall be considered satisfied.

For linear projects with lack of right-of-way, easements or other permissions from property owners to install treatments systems that can treat the total water quality volume on site, the project must maximize treatment through other methods or combination of methods before runoff is released to nearby surface waters. Alternative treatment options include: grassed swales, filtration systems, smaller ponds, or grit chambers. In all circumstances, a reasonable attempt must be made to obtain right-of-way during the project planning and all attempts of infeasibility must be recorded.

8.2 Volume Control Calculations

Depending on applicability, a proposed development shall capture and retain on site 1.0 inches of runoff from the new impervious surfaces over an acre in post-construction conditions. For redevelopment projects, the performance goal is to capture and retain on site 1.0 inches of runoff from the new and/or fully redeveloped impervious surfaces over one acre. For projects less than one acre the City encourages applicants to incorporate volume control or the water quality provisions to the maximum extent feasible.

The use of infiltration techniques shall be prohibited where the infiltration BMP will receive discharges from or be in constructed in areas:

- Where industrial facilities are not authorized to infiltrate industrial stormwater under and NPDES/SDS Industrial Stormwater Permit issued by the MPCA.
- Where vehicle fueling, and maintenance occur.
- 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 the bedrock.
- Where high levels of contaminant in soil or groundwater will be mobilized by the infiltrating stormwater. Permittees must either complete the MPCA's contamination screening checklist or conduct their own assessment to determine the suitability for infiltration. Permittees must retain the checklist or assessment with their SWPPP documentation.
- A Drinking Water Supply Management Area (DWSMA) is present, as defined by Minn. R. 4720.51000, subp.13, if the system will be in the following areas:
    - In an Emergency Response Area (ERA) within a DWSMA classified as having high or very high vulnerability; or,

- In an ERA within a DWSMA classified as moderate vulnerability, unless the City or an approved higher level of engineering review has been provided to ensure a functioning treatment system and prevention of adverse impacts to groundwater; or,
- Outside of an ERA within a DWSMA classified as having high or very high vulnerability, unless the City or an approved higher level of engineering review has been provided to ensure a functioning treatment system and prevention of adverse impacts to groundwater.

The use of infiltration techniques shall be restricted and subject to additional review where the infiltration BMP will be constructed in any of the following areas:

- Soils in predominately Hydrologic Soil Group D (clay) soils.
- Within 1,000 feet up-gradient, or 100 feet down-gradient of active karst features.
- Soil infiltration rates are more than 8.3 inches per hour unless soils are amended to slow the infiltration rate below 8.3 inches per hour.

Where the site factors listed above limit the construction of infiltration systems, the project proposer shall provide appropriate documentation to the City regarding the limitations. If the City determines that infiltration is restricted or prohibited onsite, the applicant shall consider alternative volume reduction BMPs and the water quality volume must be treated by a wet sedimentation basin, filtration system, regional ponding or similar method prior to the release of stormwater to surface water.

8.3 Water Quality Control

Water quality is required for new or redevelopment projects that exceed one acre of land disturbance (mill and overlay and pavement rehabilitation projects are not considered land disturbance for this policy), per the Lower Mississippi River Watershed Management Organization (LMRWMO).

For development or redevelopment that disturbs one acre or more, the City will require 50% total phosphorus removal. For this policy, mill and overlay and pavement rehabilitation projects will not be considered land disturbance. The water quality control standard shall be considered satisfied if the volume control standard has been satisfied.

For areas that discharge directly to a water body for which a TMDL has been completed, the TMDL requirements may replace the above written water quality policy, if more stringent.

Under certain circumstances, some construction projects cannot meet the TSS and/or TP reduction requirements for new or redevelopment projects on the site of the original construction. All methods must be exhausted prior to considering alternative locations where TSS and TP treatment standards can be achieved. If the City has determined that all methods have been exhausted, the permittee will be required to identify alternative locations where TSS and TP treatment standards can be achieved. Mitigation projects will be chosen in the following order of preference:

1. Locations that yield benefits to the same receiving water that receives runoff from the original construction activity.
2. Locations within the same Department of Natural 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 City of Sunfish Lake.

In addition, mitigation projects shall also meet the following criteria:

- Mitigation projects shall involve the establishment new structural stormwater BMPs or the retrofit of existing structural stormwater BMPs, or the use of a properly designed regional structural stormwater BMP.
- Previously required routine maintenance of structural stormwater BMPs cannot be considered mitigation.
- Mitigation projects must be finished within 24 months after the original construction activity begins.
- A maintenance agreement specifying the responsible party for long-term maintenance shall be identified.

For new stormwater discharge points/outfalls, the City will require pretreatment (at least grit and floatable removal) of stormwater prior to its discharge to wetlands and other water resources.

8.4 Rate Control

1. The peak rate of runoff from the developed subwatershed of a site will not exceed the existing peak discharge rate for the 2-, 10-, and 100-year critical storm events. The design storm events shall be as follows:

Event	Rainfall/Snowmelt Depth (inches)
2-year, 24-hour	2.8
10-year, 24-hour	4.2
100-year, 24-hour	7.4
100-year, 10-day snowmelt	7.2

2. Detention basins shall be designed with capacity for the critical 100-year event, which is defined as the 100-year event that produces the highest water level among 24-hour rainfall events or the 10-day snowmelt runoff event.
3. The maximum duration for rainfall critical event analysis shall be 24-hours except in cases where basins are landlocked, where back to back 24-hour events and the 10-day snowmelt runoff event shall also be used. In all cases a hydrograph method of analysis should be used. For the 24-hour rainfall events, or back to back 24-hour rainfall events, a MSE 3 distribution should be used. For shorter duration critical events other distributions may be used with the approval of the City Engineer.
4. All drainage system analyses and designs shall be based on proposed full development land use patterns.
5. Development adjacent to a landlocked basin and the basin is not provided an outlet, freeboard should be determined based on one of three methods (whichever provides for the highest freeboard elevation):

    a. Two feet above the HWL determined by modeling back to back 100-year, 24-hour events,
    b. Three feet above the highest known water level, or
    c. Five feet above the HWL determined by modeling a single 100-year, 24-hour event.

6. When modeling landlocked basins, the starting water surface elevation should be the basins Ordinary High Water elevation, which can be determined through hydrologic modeling or, in the case of a DNR regulated basin, from a DNR survey.
7. A MSE 3 24-hour rainfall distribution with average antecedent moisture conditions should be utilized for runoff calculations.
8. The recommended minimum outlet diameter is 6 inches due to plugging susceptibility and may supersede the rate control requirement for the 2-year event.
9. City standard detail plates should be utilized for pond outlet structures.

10. Outlet structures should be designed in three phases with primary outlet structure and secondary overflow structure routed to the storm sewer and a defined emergency overflow as the tertiary outlet structure.

8.5 Freeboard

Elevation separations of buildings with respect to ponds, lakes, streams, and stormwater features shall be designed as follows:

1. The basement floor will be four feet above the currently observed groundwater elevations in the area and two feet above the elevation of any known or historic high groundwater elevations for the area. Information on historic high groundwater elevation can be derived from any reasonable sources including piezometer data, soil boring data, percolation testing logs, etc.
2. The minimum floor elevation, which includes the basement, for new or redevelopment will be at least one foot above the critical 100-year flood elevation or high water level.
3. Any new development or redevelopment within the City will maintain a minimum building opening of three feet above the anticipated 100-year high water elevation or three feet above the ordinary high water level, whichever is higher, as a standard practice. However, if this three-foot freeboard requirement is considered a hardship, the standard could be lowered to two feet if the following can be demonstrated:

    a. That, within the two-foot freeboard area, storm water storage is available which is equal to or exceeds 50% of the storm water storage currently available in the basin below the 100-year elevation.
    b. That a 25% obstruction of the basin outlet over a 24-hour period would not result in more than one foot of additional bounce in the basin.
    c. An adequate overflow route from the basin is available to provide assurance that one foot of freeboard will be maintained for the proposed low building opening.

4. Adjacent to channels, creeks, and ravines freeboard will be one feet to the 100-year critical event elevation.

8.6 Floodplain Management

The City prohibits placement of structures, fill or other activities within the 100-year floodplain that will cause an increase in the stage of the 100-year or regional flood or cause in increase in the flood damages in the reach affected. The City may consider such activities if compensatory storage is provided and/or a channel improvement is provided that will not result in the flood stage. Filling within the floodway is prohibited unless the filling meets FEMA, DNR, and City Zoning Code. Applications proposing to alter the floodplain shall submit the cut/fill diagrams along with calculations demonstrating that the filling or alteration of the floodplain is not resulting in a reduction in the flood stage/storage.

8.7 Buffers

Buffers are required adjacent to wetlands for projects proposing new development, per the City's Water Resources Management Plan and City Code. A 16.5-foot natural buffer is required above the 100-year High Water Level or wetland boundary is required around ponds, lakes and wetlands upon new or redevelopment. This buffer is an area of natural vegetation that does not experience impact from mowing, fertilizing, or grading activities. If a buffer is to be disturbed during construction, it will be seeded with a native wetland seed mix.

8.8 Shoreland Management

The City Code (Zoning, Section 1243.04: Shoreland Alterations) has established setbacks for placement of structures and impervious and requirements for shoreland alterations. The City also encourages the following for work occurring within the shoreland zone:

1. Encourage the use of natural vegetation or bioengineering techniques for the stabilization of shorelines.
2. Use materials such as granite or fieldstone for shoreline stabilization project where hard armoring is necessary.
3. Encourage the use of techniques that will minimize runoff and improve water quality associated with new development and redevelopment. When possible use existing natural drainage ways, wetlands, and vegetated soil surfaces to convey, store, filter, and retain stormwater runoff before discharge to public waters. When development density, topographic features, and soil and vegetation conditions are not sufficient to adequately handle stormwater runoff using natural features and vegetation, various types of constructed facilities such as diversions, settling basins, skimming devices, dikes, waterways, and ponds may be used. Preference shall be given to designs using surface drainage, vegetated filter strips, bioretention areas, rainwater gardens, enhanced swales, off-line retention areas, and natural depressions for infiltration rather than buried pipes and human-made materials and facilities (*MnDNR Alternative Shoreland Standards, 2005)*.

8.9 Long Term Inspection and Maintenance of Stormwater Facilities

1. No private stormwater facilities may be approved unless a maintenance plan is provided that defines how access will be provided, who will conduct the maintenance, the type of maintenance and the maintenance intervals. At a minimum, all private stormwater facilities shall be inspected annually and maintained in proper condition consistent with the performance goals for which they were originally designed and as executed in the stormwater facilities maintenance agreement.
2. Access to all stormwater facilities must be inspected annual and maintained as necessary. The applicant shall obtain all necessary easement or other property interests to allow access to the facilities for inspection or maintenance for both the responsible party and the City of Sunfish Lake.
3. Easements over floodplains, detention areas, wetlands, ditches, and all other parts of the stormwater system as areas develop and redevelop is required.
4. All settled materials including settled solids, shall be removed from ponds, sumps, grit chambers, and other devices, and disposed of properly.

9. STORMWATER TREATMENT PRACTICE DESIGN STANDARDS

9.1 Storm Sewers

1. Manhole spacing shall not exceed 400 feet.
2. Where more than one pipe enters a structure, a catch basin/manhole shall be used.
3. Storm sewer pipe should match top of pipe on top of pipe unless grade constraints prevent this. In that case, hydraulic calculations will be necessary to verify that excessive surcharging will not occur.
4. Stormwater pipes shall be designed utilizing the Rational Method. Channel design shall be hydrograph method only. All methods are subject to the City Engineer's approval.
5. Lateral systems shall be designed for the 10-year rainfall using the Rational Method. State Aid roadway storm sewer shall be designed per the State Aid requirements.
6. The minimum full flow velocity within the storm sewer should be three feet per second (fps). The maximum velocity shall be 10 fps, except when entering a pond, where the maximum velocity shall be limited to six fps.
7. Trunk storm sewer should be designed at a minimum to carry 100-year pond discharge, in addition to the 10-year design flow for directly tributary areas. The following table shall be used for the calculation of peak rates using the Rational Method:

Cover Type	10-Year Runoff Coefficient
Single-family Residential	0.4
Multi-family Residential	0.5
Commercial	0.7
Industrial	0.7
Parks, Open Space	0.2
Ponds, Wetlands	1.0

8. For storms greater than the 10-year event, and in the case of plugged inlets, transient street ponding will occur. For safety reasons, the maximum depth in streets should not exceed 1.5 feet at the deepest point.
9. All minor drainage systems (non-trunk) and local stormwater collection systems analyses and design will be based on a 10-year event.
10. To promote efficient hydraulics within manholes, manhole benching shall be provided to half diameter of the largest pipe entering or leaving the manhole.
11. Vaned grate (3067V) catch basin castings shall be used on all streets.
12. The maximum design flow at a catch basin for the 10-year storm event shall be three cubic feet per second (cfs), unless high capacity grates are provided. Catch basins at low points will be evaluated for higher flow with the approval of the City Engineer.
13. All structures located in the street are to be a minimum of four feet deep (rim to invert) and a minimum of three feet deep elsewhere. Two-by-three catch basins are to be four feet deep.

9.2 Outlet and Inlet Pipes

1. Inlet pipes of stormwater ponds shall be extended to the pond normal water level whenever possible.
2. Outfalls with velocities greater than four fps into channels, where the angle of the outfall to the channel flow direction is greater than 30 degrees, requires energy dissipation or stilling basins.
3. Outfalls with velocities of less than four fps, that project flows downstream into a channel in a direction 30 degrees or less from the channel flow direction, generally do not require energy dissipaters or stilling basins, but will require riprap protection.
4. In the case of discharge to channels, riprap shall be provided on all outlets to an adequate depth below the channel grade and to a height above the outfall or channel bottom. Riprap shall be placed over a suitably graded filter material and filter fabric to ensure that soil particles do not migrate though the riprap and reduce its stability. Riprap shall be placed to a thickness at least 2.5 times the mean rock diameter to ensure that it will not be undermined or rendered ineffective by displacement. If riprap is used as protection for overland drainage routes, grouting may be recommended.
5. Discharge velocity into a pond at the outlet elevation shall be six fps or less. Riprap protection is required at all inlet pipes into ponds from the NWL to the pond bottom.
6. Where outlet velocities to ponds exceed six fps, the design should be based on the unique site conditions present. Submergence of the outlet or installation of a stilling basin approved by the City is required when excessive outlet velocities are experienced.
7. Submerged outlet pipes from ponds are not allowed.
8. Outlets for landlocked basins will be provided based on the following conditions:

    a. Only the existing tributary area may discharge to a landlocked basin, unless provision has been made for an outlet from the basin.
    b. The form of outlet may range from temporary pumps to gravity storm sewers. The outlet is to be in place before increased water levels are likely to affect vegetation, slope stability and property values.
    c. The City will encourage the reduction of impervious area coverage and increase infiltration opportunities in watersheds tributary to landlocked basins.

d. In establishing high water elevations and whether outlets are needed for landlocked basins, the long duration events, such as multiple-year wet cycles, high runoff volume events, and/or back-to-back 100-year events will be considered (e.g. snowmelt events that last for many weeks).
e. Emergency overflows or outlets to drainage systems will be provided to any landlocked area if the available storm water storage capacity is inadequate to prevent flooding of residences and if the available downstream conveyance system capacity is adequate to accept additional flow.
f. Outflow rates should allow for as much infiltration as possible. Drawdown time to within one foot of the NWL should not exceed 48 hours.

9. The City will require skimmers in the construction of new pond outlets and the addition of skimmers to existing systems whenever feasible and practical.

9.3 Channels and Overland Drainage

1. Overland drainage routes where velocities exceed four fps should be reviewed by the City Engineer and approved only when suitable stabilization measures are proposed.
2. Open channels and swales are recommended where flows and small grade differences prohibit the economical construction of an underground conduit. Open channels and swales can provide infiltration and filtration benefits not provided by pip.
3. The minimum grade in all unpaved areas shall be two percent.
4. Maximum length for drainage swales shall be 400 feet.
5. Channel side slopes should be a maximum of 4:1 (horizontal to vertical) with gentler slopes being desirable.
6. Riprap shall be provided at all points of juncture, particularly between two open channels and where storm sewer pipes discharge into a channel.
7. Open channels should be designed for the critical 100-year event. Variances to this standard may apply in areas where in-place storm sewers are designed for a five-year frequency event. Riprap may need to be provided.
8. Periodic cleaning of an open channel is required to ensure that the design capacity is maintained. Therefore, all channels shall be designed to allow easy access for equipment.

9.4 Ponds

1. Where on site water quality detention basins are required, the applicant shall submit copies of the calculations determining the design of the basins to the City. The size and design considerations will be dependent on the receiving water body's water quality category, the imperviousness of the development and the degree to which on site infiltration of runoff is encouraged. Design of on-site detention basins, as described in the site's runoff water management plan, shall incorporate recommendations from the nationwide urban runoff program (NURP) and "Protecting Water Quality in Urban Areas", published by the Minnesota pollution control agency, as adopted by the city, or the applicable publications, as adopted by the city. The following design considerations are required for on-site water quality detention basins based on the receiving water's water quality category. These designs include permanent detention for water quality treatment; extended detention designs may be substituted if they provide treatment equivalent to the requirements below:

a. A permanent pool (“dead storage”) volume below the normal outlet shall be greater than or equal to the runoff from a two and one-half inch (2.5") 24-hour storm over the entire contributing drainage area assuming full development.
b. A permanent pool width ratio of 3:1 or greater.
c. All stormwater detention facilities will be designed to have a forebay to remove coarse sediment prior to discharge and keep oil, grease and other floatable material from moving downstream because of normal operations.
d. An emergency overflow (emergency outlet) adequate to control the 100-year critical duration rainfall, runoff event, or plugged outlet conditions.

e. Basin side slopes above the normal water level should be no steeper than 4:1, and preferably flatter. A basin shelf with a minimum width of 10 feet and one foot deep below the normal water level is recommended to enhance wildlife habitat, reduce potential safety hazards, and improve access for long-term maintenance.
f. To prevent short-circuiting, the distance between major inlets and the normal outlet shall be maximized.
g. A flood pool ("live storage" volume above the normal water elevation shall be adequate so that the peak discharge rates from 2-year and 100-year, 24-hour events are no greater than pre-development basin watershed conditions.
h. A permanent pool average depth (basin volume/basin area) shall be > four feet, with a maximum depth of < 10 feet.
i. No orifice smaller than four inches is allowed in the construction of ponds or outlets within the City.
j. Retardance of peak discharges for the more frequent storms can be achieved through a principal spillway design which may include a perforated vertical riser, small orifice retention outlet, or compound weir.
k. All constructed ponds shall be provided a maintenance access from an adjacent roadway. The maintenance access shall be provided in the form of an easement no narrower than 20 feet. The maintenance access shall have a longitudinal slope no steeper than 6:1 and minimal cross slope. Maintenance access routes, due to their extra width, also serve well as emergency overflow (EOF) routes.

9.5 Infiltration/Filtration Practices

1. Sizing of filtration/infiltration practices, or STPs, shall be in conformance with the volume control requirements of this manual and the *Minnesota Stormwater Manual*.
2. When designing an infiltration practice for volume control and water quality management, the City requires in-situ field tests to verify the on-site soil infiltration rate prior to the construction of infiltration BMPs. The Permittee must provide at least one soil boring, test pit, or infiltrometer test from the location of the proposed infiltration practice(s) for determining infiltration rates. The soil boring is required to go to a depth of at least five feet below the proposed bottom of the STP. The soils shall be classified using the Unified Soil Classification system. The least permeable soil horizon will dictate the infiltration rate. Infiltration practices shall be designed to infiltrate the required runoff volume within 48 hours.
3. Pretreatment, in the form of ponds, forebays, filter strips, or other approved methods, shall be provided for all infiltration areas. Pretreatment upstream of volume management practices is a key element in the long-term viability of infiltration areas. The level of pretreatment varies largely depending on the STP and drainage area of the watershed, City staff, and *Minnesota Stormwater Manual* recommendations shall be utilized for determining the appropriate level of pretreatment on a case-by-case basis.
4. The infiltration practice shall not be used within fifty feet of a municipal, community or private well, unless specifically allowed by an approved wellhead protection plan.
5. The infiltration practice shall not be used for runoff from fueling and vehicle maintenance areas and industrial areas with exposed materials prosing contamination risk, unless the infiltration practice is designed to allow for spill containment.
6. The infiltration practice shall not be used in Hydrologic Soil Group (HSG) D soils without soil corrections.
7. Vegetation of infiltration/filtration practices shall be as shown in the City of Sunfish Lake Standard Details. A plan for management for vegetation shall be included in the Stormwater Pollution Prevention Plan.
8. If soils are unsuitable for infiltration, then filtration may be used with drain tile, provided in accordance with the City of Sunfish Lake's Standard Details.
9. Subgrade soils for infiltration/filtration practices shall be as presented in the City of Sunfish Lake's Standard Details. Assume a 40 percent void ratio for clean washed rock and 20 percent for construction sand for the purposes of volume calculations.

10. Rock storage beds shall be constructed using crushed angular granite that has been thoroughly washed to remove all fine particles that could result in clogging of the system.
11. For infiltration benches adjacent to ponds, benches shall have slopes no steeper than 5:1 over the proposed infiltration zone. A slope of 10:1 is preferred. The *Minnesota Stormwater Manual* cites concerns with locating infiltration features immediately adjacent to ponds. To address this, benches shall be located to maintain hydraulic separation from the saturated zone of the pond to minimize the loss of infiltration potential over time.

9.6 Emergency Overflow Paths

1. Emergency Overflows (EOFs) shall be sized with a minimum bottom width of five feet and 4:1 side slopes.
2. The maximum flow depth in EOFs shall be less than equal to one foot as calculated for a 100-year back-to-back storm event.

10. DESIGN EXAMPLES

The design process for each of the acceptable Stormwater Treatment Practices is detailed in the *Minnesota Stormwater Manual*, http://stormwater.pca.state.mn.us/index.php/Main_Page.

11. STORMWATER TREATMENT PRACTICE DETAIL DRAWINGS

Please refer to the City of Sunfish Lake's Engineering Details for the following:

- Bioretention
- Media Filter System
- Vegetative Filter System
- Infiltration Trench
- Infiltration Basin
- Stormwater Pond/Wetland

12. CONSTRUCTION SPECIFICATIONS

Construction specifications and details are found in the *Minnesota Stormwater Manual* for each of the acceptable STPs, unless otherwise restricted by this manual.

13. CHECKLISTS

Refer to Appendix A & B for the Stormwater Management Plan Review Checklist and the Erosion and Sediment Control Inspection Form.

CITY OF Sunfish Lake MINNESOTA

SITE PLAN REVIEW & BUILDING PERMIT APPLICATION PROCEDURES

A checklist of background information and submission requirements for the processing of site plan reviews and building permits is provided below. The intent of this form is to furnish a clear understanding and detailed indication of the materials and documentation necessary for the review of such requests. City Staff will utilize the attached form as a checklist in review of the information which is submitted. Some items may not be applicable to some projects and may be waived with approval of the City Planner.

Processing Procedures:	**Compliance** Yes	No
Review the appropriate sections of the City Zoning Ordinances and Comprehensive Plan.		
Meet with City Staff/Engineer/Planner, if necessary, to discuss proposal.		
File application for site plan review/building permit concurrent with submission requirements as set forth below.		
Application/review fees paid and escrow deposits made.		
Five (5) full size copies and one reduced (11 x 17) copy of all submitted plans.		
Submittal Requirements for Existing Site Elements:		
Names, addresses, and phone numbers of property owners, applicants, surveyor, architect, engineer, or other persons associated with the project.		
Proof of title and the legal description of the property.		
Complete site survey, containing:		
Property boundary lines in relation to known section, quarter section, or quarter-quarter section lines comprising a legal description of the property and including bearings, distances, curve data, and total acreage of parcel.		
Lot dimensions, including width as measured at the front building setback line.		
Date of plan preparation, north arrow and scale no smaller than one inch equals one hundred feet.		
Existing land uses.		
Layout of buildings, old foundations, septic systems, wells, and other site elements which currently exist on the property and those on adjacent properties to within 350 feet.		
Existing building setbacks.		
Adjacent streets and/or rights-of-way (public or private) curb cuts, driveways, etc.		
Existing topography (existing and proposed 2-foot contours must be shown on the same plan).		
Location, size, species, and present condition of all significant trees/vegetation on site. Tree locations should be illustrated on the grading plan.		

	Compliance Yes	No
Shoreline, water elevation, 100-year floodplain/flood fringes/floodways and Ordinary High Water Mark, if applicable.		
Formal delineation of wetlands, lakes, streams, and other public waters on or immediately adjacent to the site, certified by a registered engineer in accordance with the 1991 Wetland Conservation Act. The plans should show shoreline and OHWL.		
Location, dimension, and purpose of all easements.		
Location, size, and elevations of any existing utilities, drainage control devices, or other underground facilities on or adjacent to the property, including drainfields and wells within 50 feet of the property lines on adjacent lands.		
Location and dimensions of existing storm water drainage systems and natural overland drainage patterns, including a calculation (by a qualified engineer) of storm water runoff before construction, if required.		
Subsurface conditions including soil types, rock and groundwater conditions, water quality and availability, results of percolation tests, and proof that no hydric soils exist in the area of development.		
Submittal Requirements for Proposed Design Features:		
Proposed layout of principal and accessory buildings, walls, fences, gates or monuments, and other site structures, showing the proposed structure setbacks from lot lines.		
Architectural elevations (type and materials used in all exterior surfaces) inclusive of top of foundation, finished floor, garage floor, and basement elevations for all structures.		
House plans must show footprint size, total square footage and finished floor area for each level of the structure.		
Top of foundation, finished floor, garage floor and basement elevations must be indicated for all principal structures.		
Building height calculations shall be indicated on site and building plans. The building height limitation shall be determined by taking the average existing grade of the structure and adding thirty (30) feet. The existing grade shall be determined by taking spot elevations at all points around the perimeter of the house and finding the average. The building height as measured on the elevation drawings shall be the distance between the top of foundation and peak of the roof which when added to the top of foundation elevation may not exceed the building height limitation as defined above.		
Proposed driveway(s), curb cuts, streets, and/or rights-of-way (public or private).		
Location and sizing of proposed on-site well water system. Well location must be shown on the site plan.		
Location and size of proposed on-site waste disposal systems, including both primary and back-up drain fields. Drain field locations must be shown on the site plan.		
Grading plan with minimum two foot contours which shall include the proposed grading and drainage of the site, including provision for surface water ponding and drainage. Also to be stipulated are the garage floor, first floor and basement elevations of all structures.		
A plan for soil erosion and sediment control both during construction (erosion control fencing, etc.) and following final grading, after development has been competed.		

	Compliance Yes	No
A drainage plan of the developed site, prepared by a qualified engineer, delineating in which direction and at what rate stormwater runoff will be conveyed from the site and setting forth the areas of the site where stormwater will be allowed to collect.		
Locations and dimensions of all temporary soil or dirt stockpiles.		
Proposed fill, levees, channel modifications, and other methods to overcome flood or erosion hazard areas in accordance with the Zoning Ordinance and applicable state statutes.		
A vegetation preservation and protection plan that shows those trees proposed to be removed, those to remain, the types/locations of trees, and other plantings that are to be installed may also be required.		
A landscape plan showing the proposed species, number, and sizes of trees, shrubs, grasses and other perennials to be planted on site which emphasizes perimeter plantings, screening of the structure from neighboring properties and buffering of garage areas, lighting, mechanical equipment, and other utilitarian type elements. The plan should show the types and locations of ground covers used to permanently stabilize areas disturbed during construction.		
A lighting plan and fixture specifications showing the location, size, type/style, and wattage/ lumens of all exterior lights on site. The source of light shall not be visible from adjacent properties or lakes and all fixtures must be hooded to control the direction of light and glare.		
Where structures are to be placed on lots of five (5) acres or more which are subject to potential replat, a site plan shall indicate a logical way in which the lots could possibly be re-subdivided in the future.		
Applications, statements, and supporting documentation and plans for rezoning, variances, conditional use permits, or other requests being sought in association with site plan/building permit approval.		
Optional fire protection measures such as a sprinkler system in all new construction and/or a dry hydrant or standpipe for utilization of swimming pool water.		
Where applicable, compliance with Airport Noise Abatement regulations must be demonstrated.		
Fences, gates, sheds, free-standing decks, patios or screened porches, docks, and all other accessory structures (proposed and existing) must be shown on plans and will be subject to specific standards outlined in the City's Zoning Ordinance.		
Other information, specified here which may be required by the City: _____		
The applicant is aware that the proposed structure must be clearly staked at least one week before the Planning Commission meeting at which the application will be reviewed.		
Note: Failure on the part of the applicant to supply all necessary information listed herein or any supportive information as requested by the City may be grounds for rejection of the application or denial of the request.		

Construction Site Stormwater Runoff ESC Inspection Form

Site Name:	**Permit No.:**	**Inspector(s):**
Address:	**Inspection Date:** ____ / ____ / ____ **Time:** _____ am/pm	**Photos Taken?** ☐Yes ☐No
Owner:	**Weather:**	**Date of Last Inspection:** ____ / ____ / ____
Contractor:	**Priority Area:** ☐Yes ☐No	**Last Rain Date:** ____ / ____ / ____ **Amount:** _____(inches)
Inspection Reason: ☐Weekly ☐Rain Event ☐Complaint ☐Spot-Check	**Today's Rainfall** **Amount :** _____(inches)	**Rainfall Data Source :** ☐On-site Gauge ☐Weather Station w/in 1 mile

	BMP	Compliant?	Maintenance Required?	Corrective Action(s) Needed & Notes	Date Corrected
1.	Perimeter controls installed/maintained?	☐Yes ☐No	☐Yes ☐No		
2.	Natural features are protected with a BMP?	☐Yes ☐No	☐Yes ☐No		
3.	Storm drain inlets are properly protected?	☐Yes ☐No	☐Yes ☐No		
4.	Stockpiles protected and not placed in a conveyance?	☐Yes ☐No	☐Yes ☐No		
5.	Construction entrance prevents tracking?	☐Yes ☐No	☐Yes ☐No		
6.	Trash/litter collected and contained?	☐Yes ☐No	☐Yes ☐No		
7.	Non-active disturbed areas are stabilized?	☐Yes ☐No	☐Yes ☐No		
8.	Discharge points are free of sediment deposits?	☐Yes ☐No	☐Yes ☐No		
9.	Washout facilities are available/used?	☐Yes ☐No	☐Yes ☐No		
10.	Vehicle fueling areas are free of leaks and spills?	☐Yes ☐No	☐Yes ☐No		
11.	Potential contaminants are protected?	☐Yes ☐No	☐Yes ☐No		

BMP		Compliant?	Maintenance Required?	Corrective Action(s) Needed & Notes	Date Corrected
12.	Any evidence of discharges?	☐Yes ☐No	☐Yes ☐No		
13.	Portable toilets are upright and secure?	☐Yes ☐No	☐Yes ☐No		
15	Dewatering activities are using appropriate BMPs to avoid scour and selected chemicals are suited to soil types?	☐Yes ☐No	☐Yes ☐No		
16.	SWPPP on site?	☐Yes ☐No	☐Yes ☐No		
17.	Inspection reports available?	☐Yes ☐No	☐Yes ☐No		
18.	Training documentation is available?	☐Yes ☐No	☐Yes ☐No		
19.	Other:	☐Yes ☐No	☐Yes ☐No		
20.	Other:	☐Yes ☐No	☐Yes ☐No		

Additional Comments:

CITY OF SUNFISH LAKE
COUNTY OF DAKOTA
STATE OF MINNESOTA

STORMWATER FACILITIES MAINTENANCE AGREEMENT WITH ACCESS RIGHTS AND COVENANTS

(Insert Project Reference Numbers)

This AGREEMENT, made and entered into this ___ day of _____, 20___, for the maintenance and repair of certain Stormwater Management Facilities is entered into between _____ (hereinafter referred to as "OWNER") and the City of Sunfish Lake (hereinafter referred to as "CITY") for the benefit of the CITY, the OWNER, the successors in interest to the CITY or the OWNER, and the public generally.

WITNESSETH

WHEREAS, the undersigned is the owner of that certain real property lying and being in the _____ Land Lot/District, _____ identified as [Tax Map/Parcel Identification Number] _____ and being more particularly described by deed as recorded in the land records of the City of Sunfish Lake, Minnesota, Deed Book _____ Page ____, hereinafter called the "Property".

WHEREAS, the undersigned is proceeding to build on and develop the property; and has submitted the Site Plan/Subdivision Plan known as _____, (Name of Plan/Development) hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the City, provides for detention of stormwater within the confines of the property; and

WHEREAS, the City and the undersigned, its successors and assigns, including any homeowners association, (hereinafter the "Landowner") agree that the health, safety, and welfare of the residents of the City of Sunfish Lake, Minnesota, requires that on-site stormwater management facilities be constructed and maintained on the Property; and

WHEREAS, the City requires that on-site stormwater management facilities as shown on the Plan (the "Facilities") be constructed and adequately maintained by the Landowner.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

(1) When a new drainage control facility is installed, the party having the facility installed shall obtain a copy of the as-built plans from the City of Sunfish Lake Engineering Department. Responsible parties shall make records of the installation and of all maintenance and repair, and shall retain the records for at least ten years. These records shall be made available to the City of Sunfish Lake's City Engineer during Inspection of the facility and at other reasonable times upon request of the City Engineer.

(2) The following operational maintenance activities shall be performed on all permitted systems on a regular basis or as needed:

a) Removal of trash and debris,
b) Inspection of inlets and outlets,
c) Removal of sediments when the storage volume or conveyance capacity of the stormwater management system is below design levels
d) Ensure systems designed for infiltration are drawing down within 48 hours, and
e) Stabilization and restoration of eroded areas.

(3) Specific operational maintenance activities are required, depending on the type of permitted system, in addition to the practices listed in subsection (2), above.

a) Retention, swale and underdrain systems shall include provisions for:
    1. Mowing and removal of grass clippings, and
    2. Aeration, tilling, or replacement of topsoil as needed to restore the percolation capability of the system. If tilling or replacement of the topsoil is utilized, vegetation must be established on the disturbed surfaces.
b) Exfiltration systems shall include provisions for removal of sediment and debris from pretreatment or sediment collection systems.
c) Wet detention systems shall include provisions for operational maintenance of the littoral zone. Replanting shall be required if the percentage of vegetative cover falls below the permitted level. It is recommended that native vegetation be maintained in the littoral zone as part of the system's operation and maintenance plan. Undesirable species such as cattail and exotic plants should be controlled if they become a nuisance.
d) Dry detention systems shall include provisions for mowing and removal of grass clippings.

(4) If the system is not functioning as designed and permitted, operational maintenance must be performed immediately to restore the system. If operational maintenance measures are insufficient to enable the system to meet the design and performance standards of this chapter, the permittee must either replace the system or construct an alternative design.

(5) In the event the Landowner fails to maintain the Facilities in good working condition acceptable to the City, the City may enter upon the Property and take such steps as are necessary to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the Landowner. This provision shall not be construed to allow the City to erect any structure of permanent nature on the land of the Landowner outside of the easement for the stormwater management facilities. It is expressly understood and agreed that the City is under no obligation to routinely maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the City. The Landowner Sunfish Lakes to the City, its authorized agents and employees, a non-exclusive, perpetual easement over, across, under and through the Property for such purposes.

IN WITNESS THEREOF, the parties hereto acting through their duly authorized agents have caused this Agreement to be signed, sealed and delivered:

(Insert Company/Corporation/Partnership Name) [SEAL]

_____

By: (Type Name and Title)

The foregoing Agreement was acknowledged before me
this ____ day of _____, 20___, by

_____

Unofficial Witness

_____

NOTARY PUBLIC

My Commission Expires: _____

CITY OF SUNFISH LAKE, MINNESOTA

ATTACHMENT 1: CITY OF SUNFISH LAKE
GENERAL ENGINEERING STANDARDS FOR STORM WATER TREATMENT FACILITIES

The following are the maintenance requirements for the proper operation of water quality treatment structures provided by the *Minnesota Stormwater Manual,* as amended, and the *Minnesota BMP Manual,* as amended:

Pond Maintenance Requirements

1. Annual inspection, maintenance reporting and certification by a professional engineer (Provided by Owner). Information must be submitted to the City annually.

2. Excavate pond to original design capacity when one half (1/2) of the wet volume of the pond is lost due to sediment deposition.

3. Remove floatable debris in and around the pond area including, but not limited to: oils, gases, debris and other pollutants.

4. Maintain landscape adjacent to the facility per original design, including but not limited to: maintenance of the buffer strip and other plant materials as per original plan design.

5. Maintenance of all erosion control measures including but not limited to: rip rap storm sewer outlets, catch basin inlets, etc.

Environmental Manhole Maintenance Requirements

1. Annual inspection, maintenance reporting and certification by a professional engineer (Provided by Owner). Information must be submitted to the City annually.

2. Maintenance should be performed once the sediment or oil depth exceeds the established requirements recommended by the manufacturer.

3. Maintenance should occur immediately after a spill takes place. Appropriate regulatory agencies should also be notified in the event of a spill.

4. Disposal of materials shall be in accordance with local, state and federal requirements as applicable.

Rain Garden Maintenance Requirements

1. Inlet and Overflow Spillway – Remove any sediment build-up or blockage and correct any erosion.

2. Vegetation
    a. Maintain at least 80% surface area coverage of plants approved per plan.
    b. Removal of invasive plants and undesirable woody vegetation.
    c. Removal of dried, dead and diseased vegetation.
    d. Re-mulch void or disturbed/exposed areas.

3. Annual inspection and maintenance efforts must be documented and submitted to the City.

Filtration Basin Maintenance Requirements

1. Sweep sediment from parking lot 4 times per year

2. Ongoing and as needed:
    a. Prune and weed to maintain appearance
    b. Remove trash and debris
    c. Maintain at least 80% surface area coverage of plants approved per plan.
    d. Removal of invasive plants and undesirable woody vegetation.
    e. Removal of dried, dead and diseased vegetation.
    f. Re-mulch void or disturbed/exposed areas.

3. Semi-annually:
    a. Remove sediment from inflow points (off-line systems)
    b. Inspect aggregate filter system and clean as needed
    c. Shrubs should be inspected to evaluate health. Remove dead and diseased vegetation.

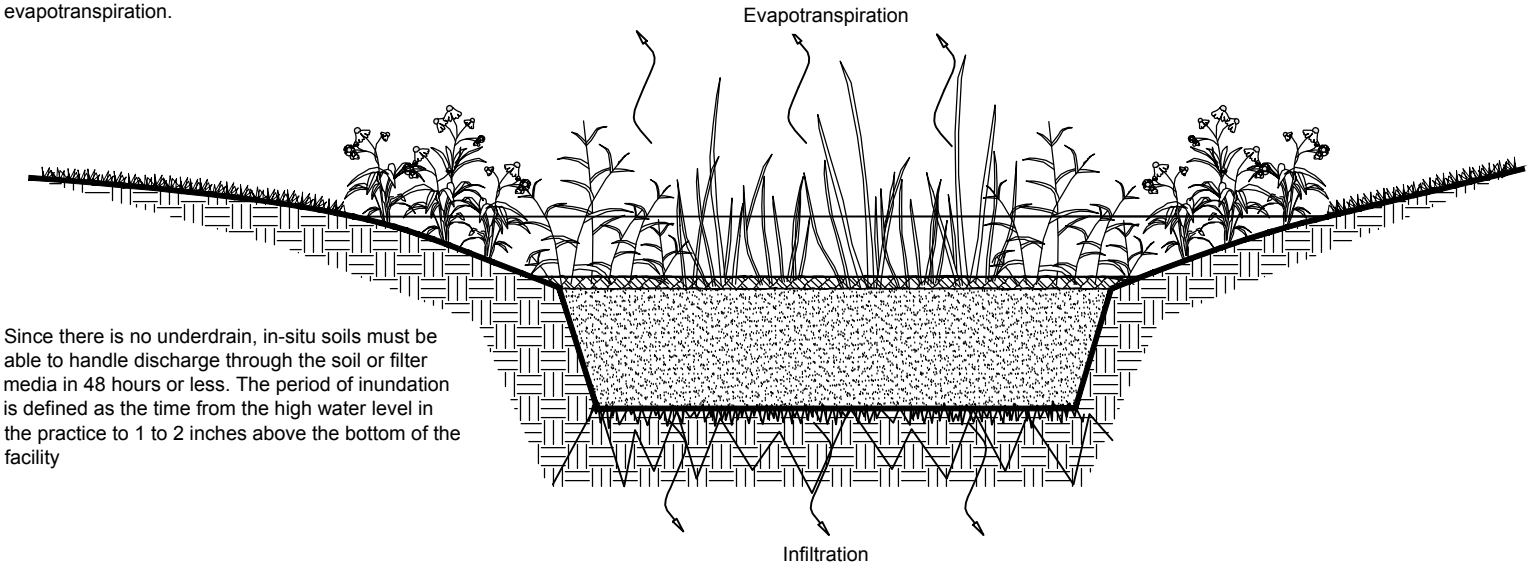
4. Annually:
    a. Inspect and remove any sediment and debris build-up in pre-treatment areas
    b. Inspect inflow points and bioretention surface for buildup of road sand associated with spring melt period. Remove and replant as necessary.

5. 2 to 3 years:
    a. Test pH of planting soils. If pH is below 5.2, add limestone. If pH is 7.0 to 8.0, add iron sulfate plus sulfur.

6. Annual inspection and maintenance efforts must be documented and submitted to the City.

Bioinfiltration

There is no underdrain, so all runoff that flows into the basin and does not overflow into an overflow structure is abstracted from the stormsewer system through infiltration or evapotranspiration.



Since there is no underdrain, in-situ soils must be able to handle discharge through the soil or filter media in 48 hours or less. The period of inundation is defined as the time from the high water level in the practice to 1 to 2 inches above the bottom of the facility

Figure 2-1: Bioinfiltration

Not To Scale

NOT FOR CONSTRUCTION PURPOSES

NO.	REVISION DESCRIPTION	DATE	BY

I hereby certify that this plan 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

Print Name:

Sign Name:

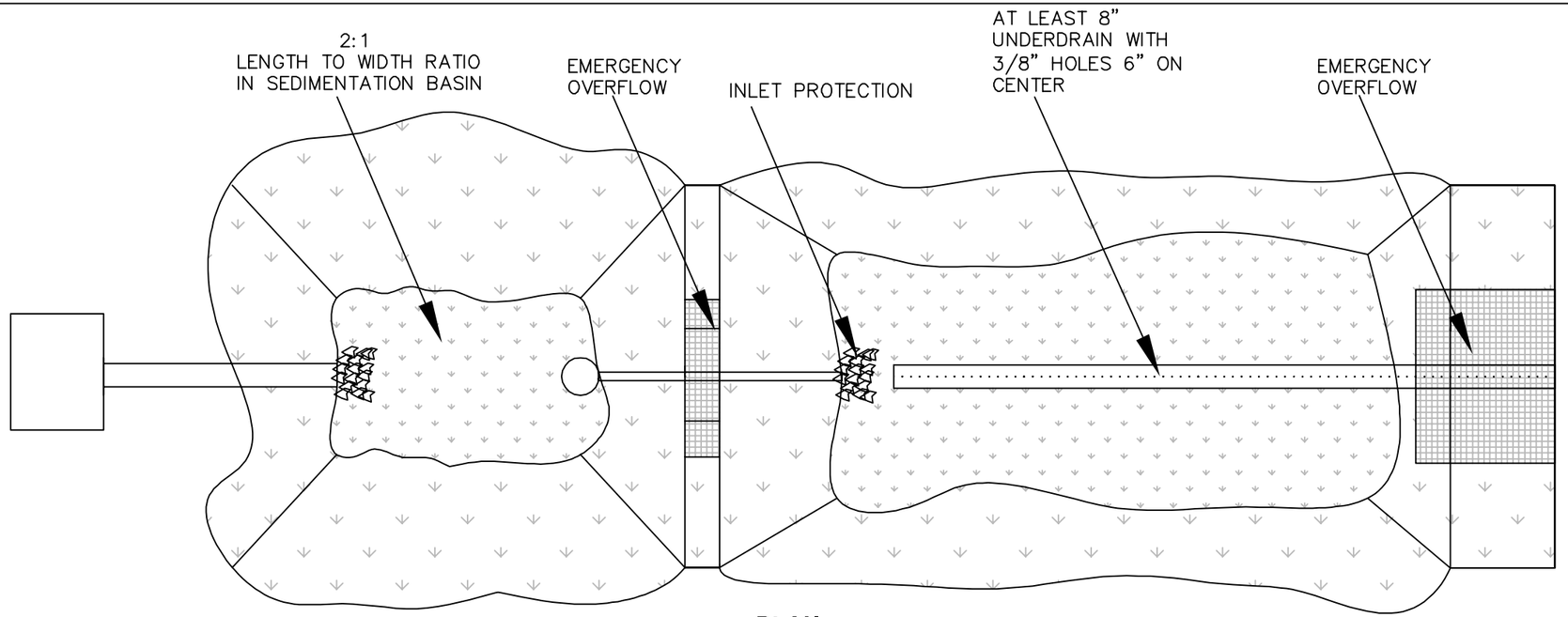
Date License No.

Date

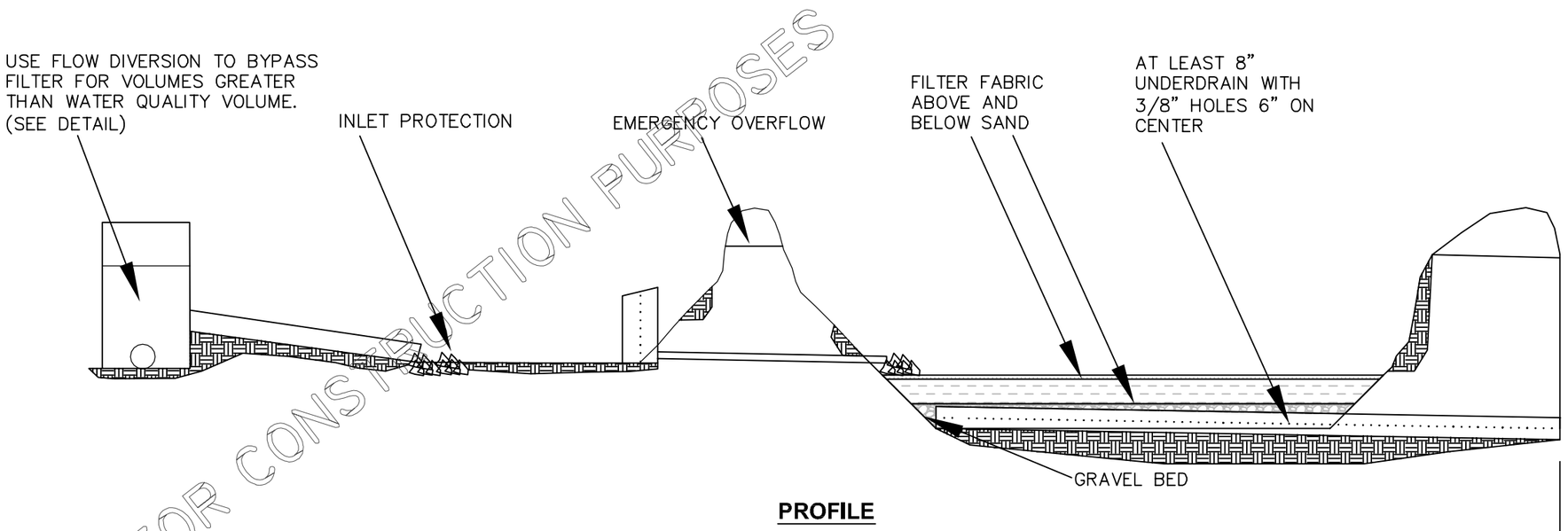
Designed By

Drawn By

Sheet No. of Sheets



PLAN



PROFILE

SURFACE SAND FILTER DETAILS

NOT TO SCALE

CONSTRUCTION SEQUENCING:

1. PERFORM CONTINUOUS INSPECTIONS OF EROSION CONTROL PRACTICES.
2. INSTALL SILT FENCE ALONG THE PERIMETER OF THE SITE TO PREVENT SEDIMENT FROM LEAVING THE SITE DURING THE CONSTRUCTION PROCESS.
3. ALL DOWNGRADIENT PERIMETER SEDIMENT-CONTROL BMPS MUST BE IN PLACE BEFORE ANY UP GRADIENT LAND-DISTURBING ACTIVITY BEGINS.
4. REMOVE TOPSOIL FROM THE SITE AND PLACE IN TEMPORARY STOCKPILE LOCATION. TEMPORARY SEED THE STOCKPILE.
5. INSTALL UNDERGROUND UTILITIES (WATER, SANITARY SEWER, ELECTRIC AND PHONES) TAKING THE LOCATION AND FUNCTION OF STORM WATER BMPS INTO CONSIDERATION.
7. SEED AND MULCH DISTURBED AREAS ON SITE.
8. CONSTRUCT THE ROADS TAKING THE LOCATION AND FUNCTION OF STORM WATER BMPS INTO CONSIDERATION.
9. PERFORM ALL OTHER SITE IMPROVEMENTS TAKING THE LOCATION AND FUNCTION OF THE STORM WATER BMPS INTO CONSIDERATION.
10. FINAL GRADE THE SITE.
11. STABILIZE THE SITE BY IMPLEMENTING THE NATIVE SEEDING AND PLANTING PORTION OF THE LANDSCAPING PLAN.
12. INSTALL THE EROSION CONTROL BLANKET
13. REMOVE THE SILT FENCE AFTER THE SITE IS STABILIZED PER PROJECT ENGINEER APPROVAL.

GENERAL NOTES:

1. INSTALL ALL TEMPORARY EROSION CONTROL MEASURES (IN ACCORDANCE WITH MnDOT GENERAL CONDITIONS 2573) PRIOR TO THE START OF ANY CONSTRUCTION OPERATION THAT MAY CAUSE ANY SEDIMENTATION OR SILTATION AT THE SITE.
2. INSTALL STORM DRAIN INLET PROTECTION TO PREVENT CLOGGING OF THE STORM SEWER AND SEDIMENT LOADS TO DOWNSTREAM STORM WATER FACILITIES OR WATERBODIES.
5. EXCAVATE THE INFILTRATION BASIN TO THE SPECIFIED DEPTH (ELEVATION). IT IS RECOMMENDED THAT ALL SUB MATERIAL BELOW THE SPECIFIED ELEVATION SHALL BE LEFT UNDISTURBED, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
6. GRADE TO THE DEPTH (ELEVATION) SPECIFIED IN THE CONSTRUCTION DOCUMENTS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
7. IN THE EVENT THAT SEDIMENT IS INTRODUCED INTO THE BMP DURING OR IMMEDIATELY FOLLOWING EXCAVATION, THIS MATERIAL WILL NEED TO BE REMOVED FROM THE BASIN PRIOR TO INITIATING THE NEXT STEP IN THE CONSTRUCTION PROCESS. SEDIMENT THAT HAS BEEN WASHED INTO THE BASIN DURING THE EXCAVATION PROCESS CAN SEAL THE PERMEABLE MATERIAL, SIGNIFICANTLY REDUCING THE INFILTRATION CAPACITY OF THE SOILS.
9. **NON-STANDARD COMPONENT:** CLEAN, WASHED 1.5 TO 3.5-INCH GRAVEL SHALL BE PLACED IN THE BOTTOM OF THE BASIN TO THE DEPTH OF AT LEAST 12 INCHES OR AS SPECIFIED IN THE CONSTRUCTION DOCUMENTS. GRAVEL SHOULD BE PLACED IN LIFTS AND LIGHTLY COMPACTED WITH PLATE COMPACTORS.
10. **NON-STANDARD COMPONENT:** THE PERFORATED PIPE (UNDERDRAIN) SHALL BE LAID DIRECTLY ON THE GRAVEL BED. GRADE AND ALIGNMENT SHALL NOT VARY FROM THE PRESCRIBED GRADE BY MORE THAN 0.03 FEET (9 MM) AT ANY POINT. THE JOINTS BETWEEN SECTIONS OF PIPE SHALL BE CONNECTED IN A FASHION ACCEPTABLE TO ENGINEER. ONCE THE PIPE IS IN PLACE, IT SHALL BE COVERED IMMEDIATELY WITH GRANULAR MATERIAL AS SPECIFIED IN THE CONSTRUCTION DOCUMENTS. THE GRANULAR MATERIAL SHALL BE OF UNIFORM DEPTH ON BOTH SIDES OF THE PIPE. SPECIAL INLETS AND SPECIAL DEVICES AT THE OUTLET END OF THE PIPE SHALL BE CONSTRUCTED AS SHOWN IN THE PLANS.
14. SEEDING AND INSTALLATION OF EROSION CONTROL BLANKET SHALL BE COMPLETED WITHIN 48 HOURS OF FINAL GRADING.

NO.	REVISION DESCRIPTION	DATE	BY

I hereby certify that this plan 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

Print Name:_____ Sign Name:_____

Date _____ License No._____

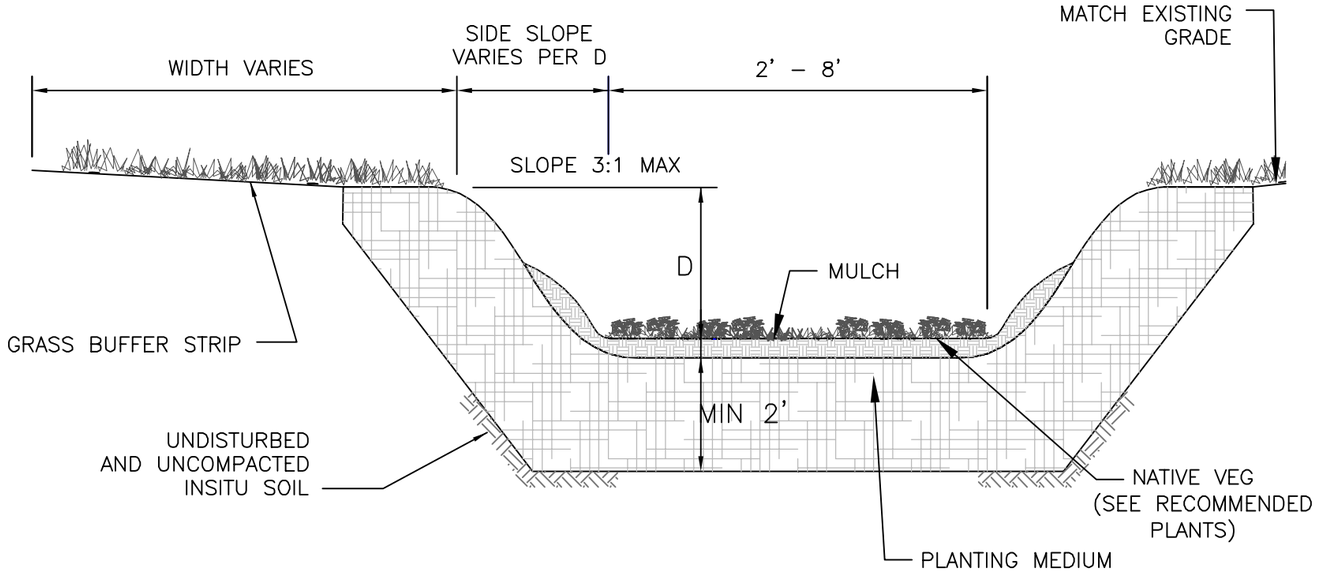
Date	Designed By	Drawn By

Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155-4194
Phone: (651)-296-6300
TTY: (651)-282-5332
WEBSITE:www.pca.state.mn.us/

2005 MINNESOTA STORMWATER MANUAL

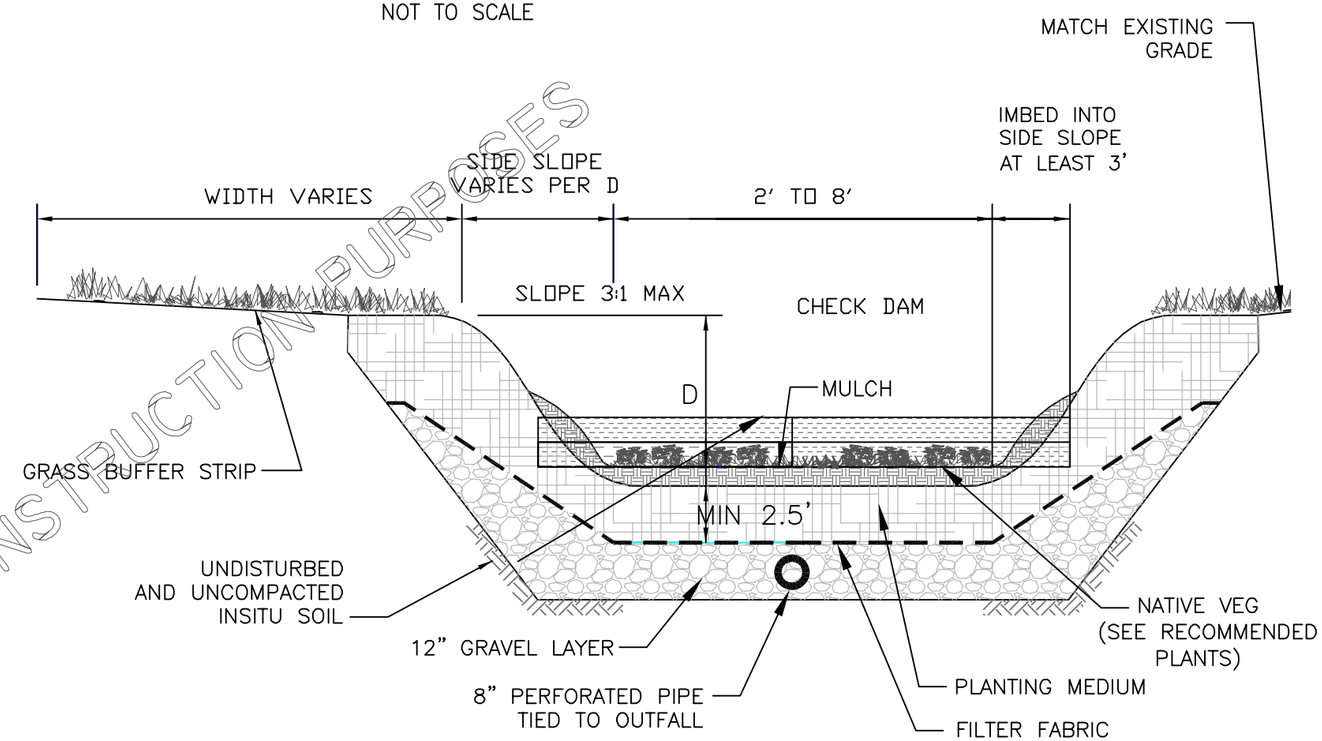
SURFACE SAND FILTER DETAILS

Sheet No. _____ of _____ Sheets



TYPICAL WET SWALE CROSS–SECTION

NOT TO SCALE



TYPICAL DRY SWALE CROSS–SECTION (WITH CHECKDAM)

NOT TO SCALE

CONSTRUCTION SEQUENCING:

1. PERFORM CONTINUOUS INSPECTIONS OF EROSION CONTROL PRACTICES.
2. INSTALL SILT FENCE ALONG THE PERIMETER OF THE SITE TO PREVENT SEDIMENT FROM LEAVING THE SITE DURING THE CONSTRUCTION PROCESS.
3. ALL DOWNGRADIENT PERIMETER SEDIMENT-CONTROL BMPS MUST BE IN PLACE BEFORE ANY UP GRADIENT LAND-DISTURBING ACTIVITY BEGINS.
4. REMOVE TOPSOIL FROM THE SITE AND PLACE IN TEMPORARY STOCKPILE LOCATION. TEMPORARY SEED THE STOCKPILE.
5. INSTALL UNDERGROUND UTILITIES (WATER, SANITARY SEWER, ELECTRIC AND PHONES) TAKING THE LOCATION AND FUNCTION OF STORM WATER BMPS INTO CONSIDERATION.
7. SEED AND MULCH DISTURBED AREAS ON SITE.
8. CONSTRUCT THE ROADS TAKING THE LOCATION AND FUNCTION OF STORM WATER BMPS INTO CONSIDERATION.
9. PERFORM ALL OTHER SITE IMPROVEMENTS TAKING THE LOCATION AND FUNCTION OF THE STORM WATER BMPS INTO CONSIDERATION.
10. FINAL GRADE THE SITE.
11. STABILIZE THE SITE BY IMPLEMENTING THE NATIVE SEEDING AND PLANTING PORTION OF THE LANDSCAPING PLAN.
12. INSTALL THE EROSION CONTROL BLANKET AND COIR ROLL/CHECK DAMS.
13. REMOVE THE SILT FENCE AFTER THE SITE IS STABILIZED PER PROJECT ENGINEER APPROVAL.

GENERAL NOTES:

1. INSTALL ALL TEMPORARY EROSION CONTROL MEASURES (IN ACCORDANCE WITH MnDOT GENERAL CONDITIONS 2573) PRIOR TO THE START OF ANY CONSTRUCTION OPERATION THAT MAY CAUSE ANY SEDIMENTATION OR SILTATION AT THE SITE.
2. INSTALL STORM DRAIN INLET PROTECTION TO PREVENT CLOGGING OF THE STORM SEWER AND SEDIMENT LOADS TO DOWNSTREAM STORM WATER FACILITIES OR WATERBODIES.
4. GRADING OF THE SWALE SHALL BE ACCOMPLISHED USING LOW-IMPACT EARTH-MOVING EQUIPMENT TO PREVENT COMPACTION OF THE UNDERLYING SOILS. SMALL TRACKED DOZERS AND BOBCATS WITH RUNNER TRACKS ARE RECOMMENDED.
5. EXCAVATE THE SWALE TO THE SPECIFIED DEPTH (ELEVATION). IT IS RECOMMENDED THAT ALL SUB MATERIAL BELOW THE SPECIFIED ELEVATION SHALL BE LEFT UNDISTURBED, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
6. GRADE TO THE DEPTH (ELEVATION) SPECIFIED IN THE CONSTRUCTION DOCUMENTS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
7. IN THE EVENT THAT SEDIMENT IS INTRODUCED INTO THE BMP DURING OR IMMEDIATELY FOLLOWING EXCAVATION, THIS MATERIAL WILL NEED TO BE REMOVED FROM THE SWALE PRIOR TO INITIATING THE NEXT STEP IN THE CONSTRUCTION PROCESS. THIS IS ESPECIALLY IMPORTANT IF THE SWALE HAS BEEN DESIGNED TO INFILTRATE STORM WATER; SEDIMENT THAT HAS BEEN WASHED INTO THE SWALE DURING THE EXCAVATION PROCESS CAN SEAL THE PERMEABLE MATERIAL, SIGNIFICANTLY REDUCING THE INFILTRATION CAPACITY OF THE SOILS.
8. MATERIAL EXCAVATED FROM THE SWALE(S) SHALL BE DISPOSED OF ON-SITE AT LOCATIONS (STOCKPILE AREAS) DESIGNATED BY ENGINEER.
9. **NON-STANDARD COMPONENT:** CLEAN, WASHED 1.5 TO 3.5-INCH GRAVEL SHALL BE PLACED IN THE BOTTOM OF THE SWALE TO THE DEPTH SPECIFIED IN THE CONSTRUCTION DOCUMENTS. GRAVEL SHOULD BE PLACED IN LIFTS AND LIGHTLY COMPACTED WITH PLATE COMPACTORS.
10. **NON-STANDARD COMPONENT:** THE PERFORATED PIPE (UNDERDRAIN) SHALL BE LAID DIRECTLY ON THE GRAVEL BED. GRADE AND ALIGNMENT SHALL NOT VARY FROM THE PRESCRIBED GRADE BY MORE THAN 0.03 FEET (9 MM) AT ANY POINT. THE JOINTS BETWEEN SECTIONS OF PIPE SHALL BE CONNECTED IN A FASHION ACCEPTABLE TO ENGINEER. ONCE THE PIPE IS IN PLACE, IT SHALL BE COVERED IMMEDIATELY WITH GRANULAR MATERIAL AS SPECIFIED IN THE CONSTRUCTION DOCUMENTS. THE GRANULAR MATERIAL SHALL BE OF UNIFORM DEPTH ON BOTH SIDES OF THE PIPE. SPECIAL INLETS AND SPECIAL DEVICES AT THE OUTLET END OF THE PIPE SHALL BE CONSTRUCTED AS SHOWN IN THE PLANS.
12. PORTIONS OF SWALE TO BE PLANTED SHALL RECEIVE 3" OF WOODCHIP MULCH (MnDOT TYPE 6).
13. PORTIONS OF SWALE TO BE SEEDED SHALL BE MULCHED WITH CLEAN GRAIN STRAW (MnDOT TYPE 3) AT A RATE OF 2 TONS PER ACRE.
14. SEEDING AND INSTALLATION OF EROSION CONTROL BLANKET SHALL BE COMPLETED WITHIN 48 HOURS OF FINAL GRADING.

NO.	REVISION DESCRIPTION	DATE	BY

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Print Name:

Sign Name: License No.

Date

Date | Designed By | Drawn By

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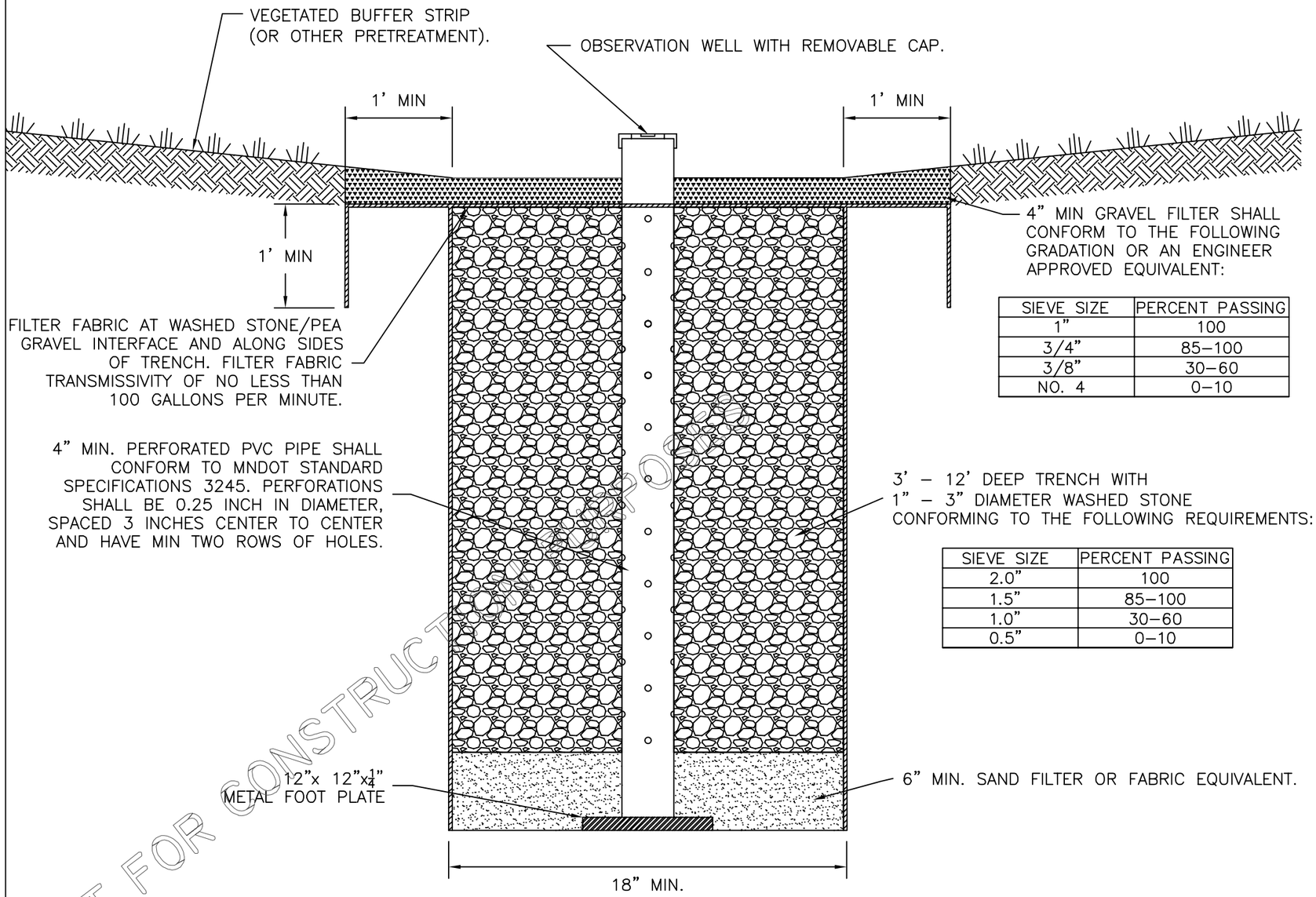
WET AND DRY SWALES

Sheet No. of Sheets



4" MIN GRAVEL FILTER SHALL CONFORM TO THE FOLLOWING GRADATION OR AN ENGINEER APPROVED EQUIVALENT:

SIEVE SIZE	PERCENT PASSING
1"	100
3/4"	85–100
3/8"	30–60
NO. 4	0–10

3' – 12' DEEP TRENCH WITH 1" – 3" DIAMETER WASHED STONE CONFORMING TO THE FOLLOWING REQUIREMENTS:

SIEVE SIZE	PERCENT PASSING
2.0"	100
1.5"	85–100
1.0"	30–60
0.5"	0–10

6" MIN. SAND FILTER OR FABRIC EQUIVALENT.

TYPICAL INFILTRATION TRENCH CROSS–SECTION

NOT TO SCALE

CONSTRUCTION SEQUENCING:

1. PERFORM CONTINUOUS INSPECTION OF EROSION CONTROL PRACTICES.
2. INSTALL SILT FENCE ALONG THE PERIMETER OF THE SITE TO PREVENT SEDIMENT FROM LEAVING THE SITE DURING THE CONSTRUCTION PROCESS.
3. ALL DOWNGRADIENT PERIMETER SEDIMENT-CONTROL BMPS MUST BE IN PLACE BEFORE ANY UP GRADIENT LAND-DISTURBING ACTIVITY BEGINS.
4. REMOVE TOPSOIL FROM THE SITE AND PLACE IN TEMPORARY STOCKPILE LOCATION. TEMPORARY SEED THE STOCKPILE.
5. INSTALL UNDERGROUND UTILITIES (WATER, SANITARY SEWER, ELECTRIC AND PHONES) TAKING THE LOCATION AND FUNCTION OF STORM WATER BMPS INTO CONSIDERATION.
6. ROUGH GRADE THE SITE. IF THE INFILTRATION TRENCH IS GOING TO BE USED FOR TEMPORARY SEDIMENT CONTROL, GRADE THE INFILTRATION TRENCH TO WITHIN THREE (3) FEET OF FINAL GRADE TO PREVENT CLOGGING OF INSITU SOIL.
7. SEED AND MULCH DISTURBED AREAS ON SITE.
8. CONSTRUCT THE ROADS TAKING THE LOCATION AND FUNCTION OF STORM WATER BMPS INTO CONSIDERATION.
9. PERFORM ALL OTHER SITE IMPROVEMENTS TAKING THE LOCATION AND FUNCTION OF THE STORM WATER BMPS INTO CONSIDERATION.
10. FINAL GRADE THE SITE.
11. STABILIZE THE SITE BY IMPLEMENTING THE NATIVE SEEDING AND PLANTING PORTION OF THE LANDSCAPING PLAN.
12. REMOVE THE SILT FENCE AFTER THE SITE IS STABILIZED PER PROJECT ENGINEER APPROVAL.

GENERAL NOTES:

1. INSTALL ALL TEMPORARY EROSION CONTROL MEASURES (IN ACCORDANCE WITH MnDOT GENERAL CONDITIONS 2573) PRIOR TO SITE DISTURBANCE.
2. INSTALL STORM DRAIN INLET PROTECTION TO PREVENT CLOGGING OF THE STORM SEWER AND SEDIMENT LOADS TO DOWNSTREAM STORM WATER FACILITIES OR WATERBODIES.
3. IF THE STORM WATER BMP IS BEING DESIGNED TO SERVE AS A TEMPORARY SEDIMENT BASIN, GRADE THE BMP TO WITHIN THREE (3) FEET OF FINAL GRADE TO PREVENT CLOGGING OF INSITU SOIL. ONCE CONSTRUCTION IN THE CONTRIBUTING DRAINAGE AREA HAS BEEN COMPLETED AND THE SITE IS STABILIZED, EXCAVATE THE INFILTRATION TRENCH TO FINAL GRADE AND COMPLETE CONSTRUCTION OF THE INFILTRATION TRENCH.
4. GRADING OF THE INFILTRATION TRENCH SHALL BE ACCOMPLISHED USING LOW-IMPACT EARTH-MOVING EQUIPMENT TO PREVENT COMPACTION OF THE UNDERLYING SOILS. WIDE TRACKED VEHICLES SUCH AS BACK HOES, SMALL DOZERS AND BOBCATS ARE RECOMMENDED.
5. EXCAVATE THE INFILTRATION TRENCH TO THE SPECIFIED DEPTH (ELEVATION). ALL SUB MATERIAL BELOW THE SPECIFIED ELEVATION SHALL BE LEFT UNDISTURBED, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
6. GRADE TO THE DEPTH (ELEVATION) SPECIFIED IN THE CONSTRUCTION DOCUMENTS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
7. IN THE EVENT THAT SEDIMENT IS INTRODUCED INTO THE BMP DURING OR IMMEDIATELY FOLLOWING EXCAVATION, THE SEDIMENT WILL NEED TO BE REMOVED FROM THE INFILTRATION TRENCH PRIOR TO INITIATING THE NEXT STEP IN THE INFILTRATION TRENCH CONSTRUCTION PROCESS.
8. MATERIAL EXCAVATED FROM THE INFILTRATION TRENCH SHALL BE DISPOSED OF ON-SITE AT LOCATIONS (TEMPORARY STOCKPILE AREAS) DESIGNATED BY ENGINEER.
9. CLEAN, WASHED 1 TO 3-INCH GRAVEL SHALL BE PLACED IN THE BOTTOM OF THE INFILTRATION TRENCH TO THE DEPTH SPECIFIED IN THE CONSTRUCTION DOCUMENTS. GRAVEL SHOULD BE PLACED IN LIFTS AND LIGHTLY COMPACTED WITH PLATE COMPACTORS.

NO.	REVISION DESCRIPTION	DATE	BY

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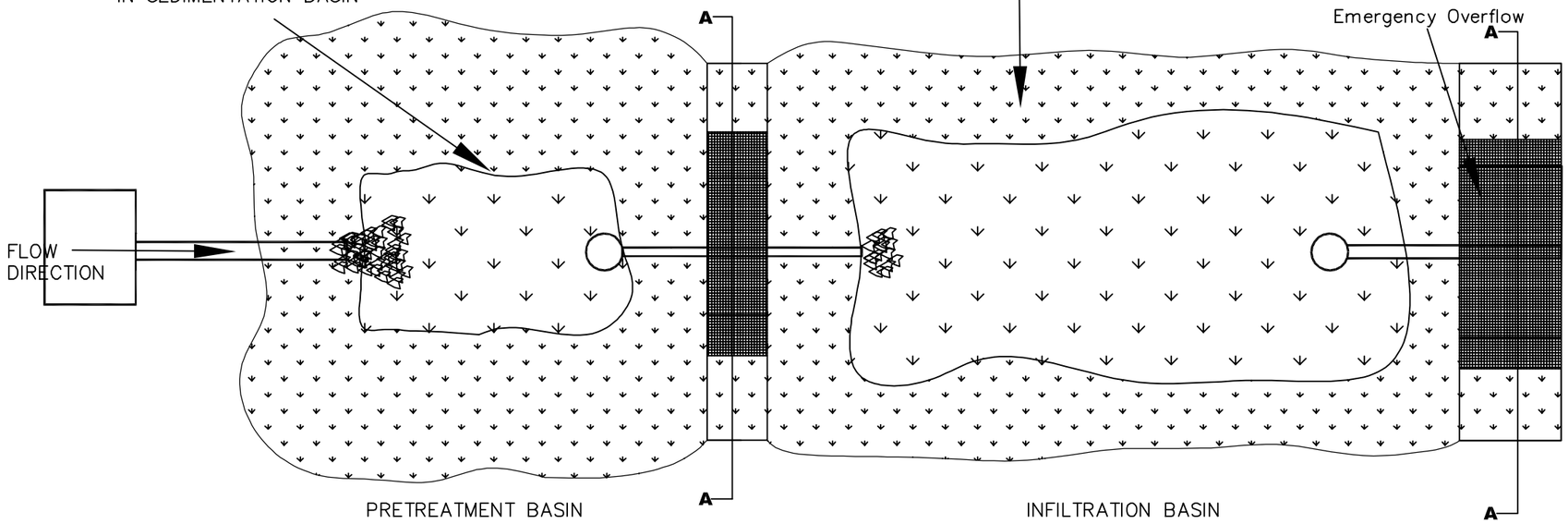
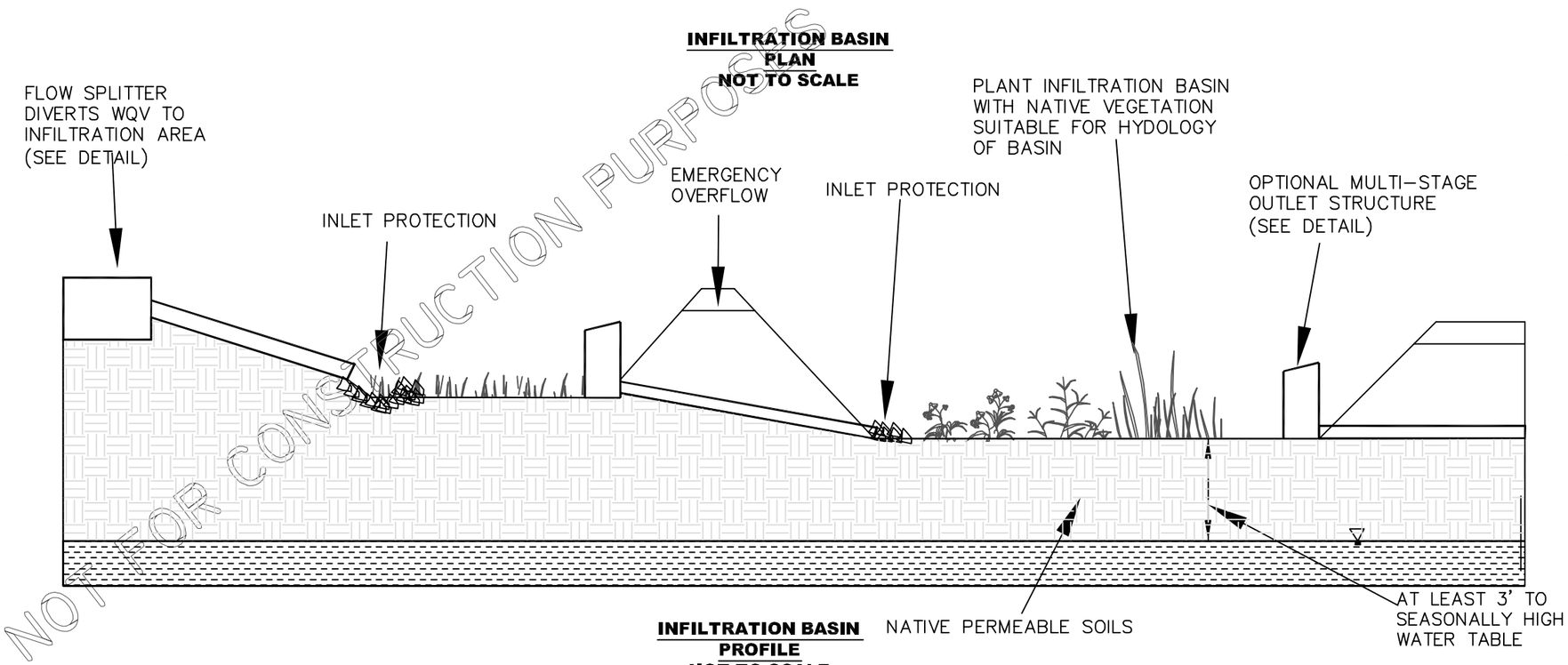
TYPICAL INFILTRATION TRENCH CROSS–SECTION

Sheet No. of Sheets

INFILTRATION BASIN
PLAN
NOT TO SCALE



INFILTRATION BASIN
PLAN
NOT TO SCALE



INFILTRATION BASIN
PROFILE
NOT TO SCALE

CONSTRUCTION SEQUENCING:

1. PERFORM CONTINUOUS INSPECTIONS OF EROSION CONTROL PRACTICES.
2. INSTALL SILT FENCE ALONG THE PERIMETER OF THE SITE TO PREVENT SEDIMENT FROM LEAVING THE SITE DURING THE CONSTRUCTION PROCESS.
3. ALL DOWNGRADIENT PERIMETER SEDIMENT-CONTROL BMPS MUST BE IN PLACE BEFORE ANY UP GRADIENT LAND-DISTURBING ACTIVITY BEGINS.
4. REMOVE TOPSOIL FROM THE SITE AND PLACE IN TEMPORARY STOCKPILE LOCATION. TEMPORARY SEED THE STOCKPILE.
5. INSTALL UNDERGROUND UTILITIES (WATER, SANITARY SEWER, ELECTRIC AND PHONES) TAKING THE LOCATION AND FUNCTION OF STORM WATER BMPS INTO CONSIDERATION.
7. SEED AND MULCH DISTURBED AREAS ON SITE.
8. CONSTRUCT THE ROADS TAKING THE LOCATION AND FUNCTION OF STORM WATER BMPS INTO CONSIDERATION.
9. PERFORM ALL OTHER SITE IMPROVEMENTS TAKING THE LOCATION AND FUNCTION OF THE STORM WATER BMPS INTO CONSIDERATION.
10. FINAL GRADE THE SITE.
11. STABILIZE THE SITE BY IMPLEMENTING THE NATIVE SEEDING AND PLANTING PORTION OF THE LANDSCAPING PLAN.
12. INSTALL THE EROSION CONTROL BLANKET
13. REMOVE THE SILT FENCE AFTER THE SITE IS STABILIZED PER PROJECT ENGINEER APPROVAL.

GENERAL NOTES:

1. INSTALL ALL TEMPORARY EROSION CONTROL MEASURES (IN ACCORDANCE WITH MnDOT GENERAL CONDITIONS 2573) PRIOR TO THE START OF ANY CONSTRUCTION OPERATION THAT MAY CAUSE ANY SEDIMENTATION OR SILTATION AT THE SITE.
2. INSTALL STORM DRAIN INLET PROTECTION TO PREVENT CLOGGING OF THE STORM SEWER AND SEDIMENT LOADS TO DOWNSTREAM STORM WATER FACILITIES OR WATERBODIES.
3. IF THE STORMWATER BMP IS BEING DESIGNED TO SERVE AS A TEMPORARY SEDIMENT BASIN, GRADE THE BMP TO WITHIN THREE (3) FEET OF FINAL GRADE TO PROTECT THE UNDERLYING MATERIAL FROM CLOGGING. ONCE CONSTRUCTION IN THE CONTRIBUTING DRAINAGE AREA HAS BEEN COMPLETED AND THE SITE IS STABILIZED, EXCAVATE THE INFILTRATION BASIN TO FINAL GRADE AND COMPLETE CONSTRUCTION OF THE BMP.
4. GRADING OF THE INFILTRATION BASIN SHALL BE ACCOMPLISHED USING LOW-IMPACT EARTH-MOVING EQUIPMENT TO PREVENT COMPACTION OF THE UNDERLYING SOILS. SMALL TRACKED DOZERS AND BOBCATS WITH RUNNER TRACKS ARE RECOMMENDED.
5. EXCAVATE THE INFILTRATION BASIN TO THE SPECIFIED DEPTH (ELEVATION). IT IS RECOMMENDED THAT ALL SUB MATERIAL BELOW THE SPECIFIED ELEVATION SHALL BE LEFT UNDISTURBED, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
6. GRADE TO THE DEPTH (ELEVATION) SPECIFIED IN THE CONSTRUCTION DOCUMENTS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
7. IN THE EVENT THAT SEDIMENT IS INTRODUCED INTO THE BMP DURING OR IMMEDIATELY FOLLOWING EXCAVATION, THIS MATERIAL WILL NEED TO BE REMOVED FROM THE BASIN PRIOR TO INITIATING THE NEXT STEP IN THE CONSTRUCTION PROCESS. SEDIMENT THAT HAS BEEN WASHED INTO THE BASIN DURING THE EXCAVATION PROCESS CAN SEAL THE PERMEABLE MATERIAL, SIGNIFICANTLY REDUCING THE INFILTRATION CAPACITY OF THE SOILS.
8. SEEDING AND INSTALLATION OF EROSION CONTROL BLANKET SHALL BE COMPLETED WITHIN 48 HOURS OF FINAL GRADING.
9. INFILTRATION AREA SHALL BE STAKED OFF DURING CONSTRUCTION TO RESTRICT HEAVY EQUIPEMENT TRAFFIC FROM COMPACTING NATIVE SOILS.

NO.	REVISION DESCRIPTION	DATE	BY

I hereby certify that this plan 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

Print Name:

Sign Name: License No.

Date

Date | Designed By | Drawn By

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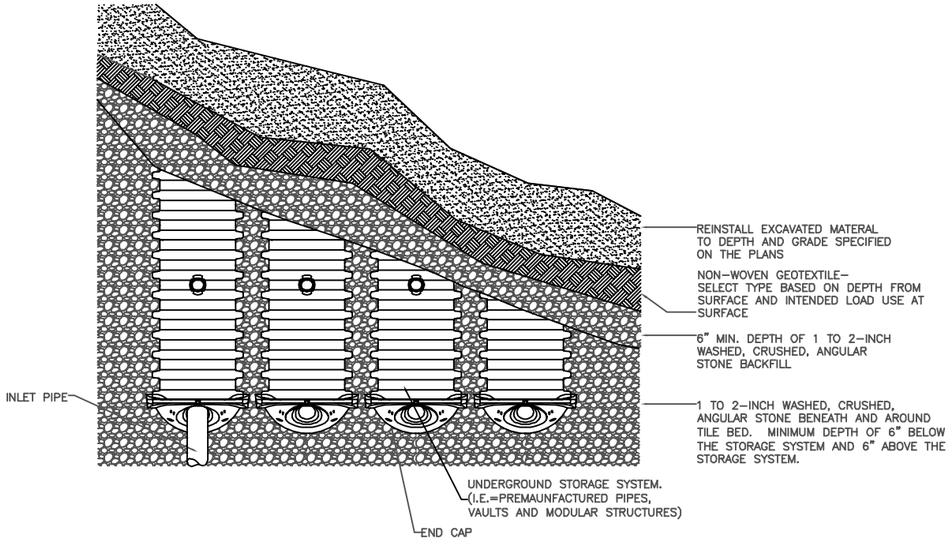
2005 MINNESOTA STORMWATER MANUAL

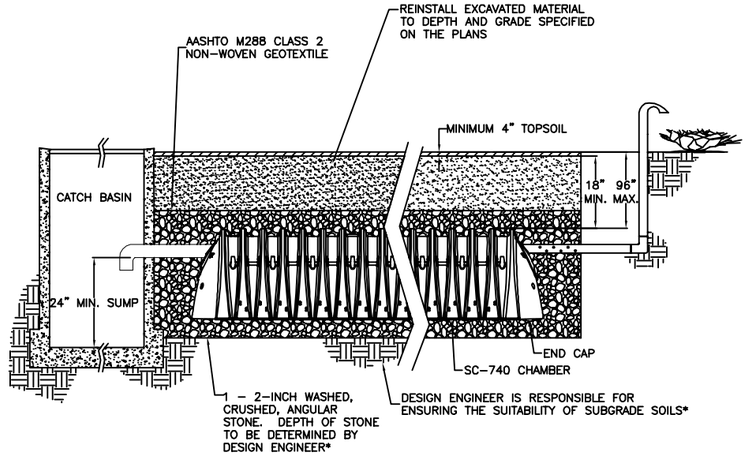
INFILTRATION BASIN PLAN AND PROFILE

Sheet No. of Sheets



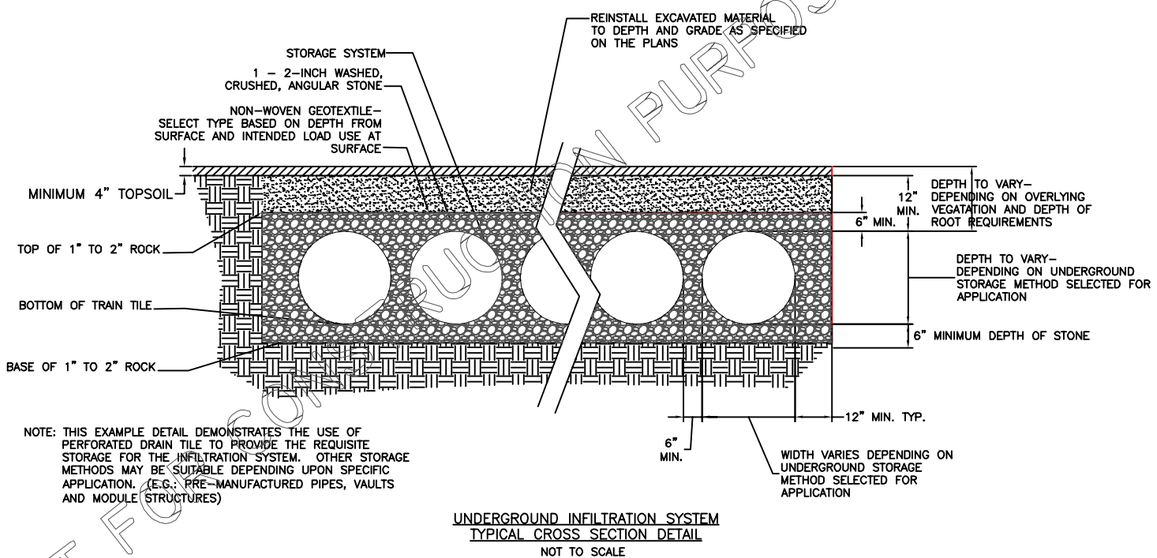
UNDERGROUND INFILTRATION SYSTEM
PLAN VIEW DETAIL

NOT TO SCALE



UNDERGROUND INFILTRATION SYSTEM
VENT DETAIL

NOT TO SCALE



NOTE: THIS EXAMPLE DETAIL DEMONSTRATES THE USE OF PERFORATED DRAIN TILE TO PROVIDE THE REQUISITE STORAGE FOR THE INFILTRATION SYSTEM. OTHER STORAGE METHODS MAY BE SUITABLE DEPENDING UPON SPECIFIC APPLICATION. (E.G.: PRE-MANUFACTURED PIPES, VAULTS AND MODULE STRUCTURES)

UNDERGROUND INFILTRATION SYSTEM
TYPICAL CROSS SECTION DETAIL

NOT TO SCALE

INFILTRATION SUBSURFACE PLANS & PROFILE

NOT TO SCALE

NO.	REVISION DESCRIPTION	DATE	BY

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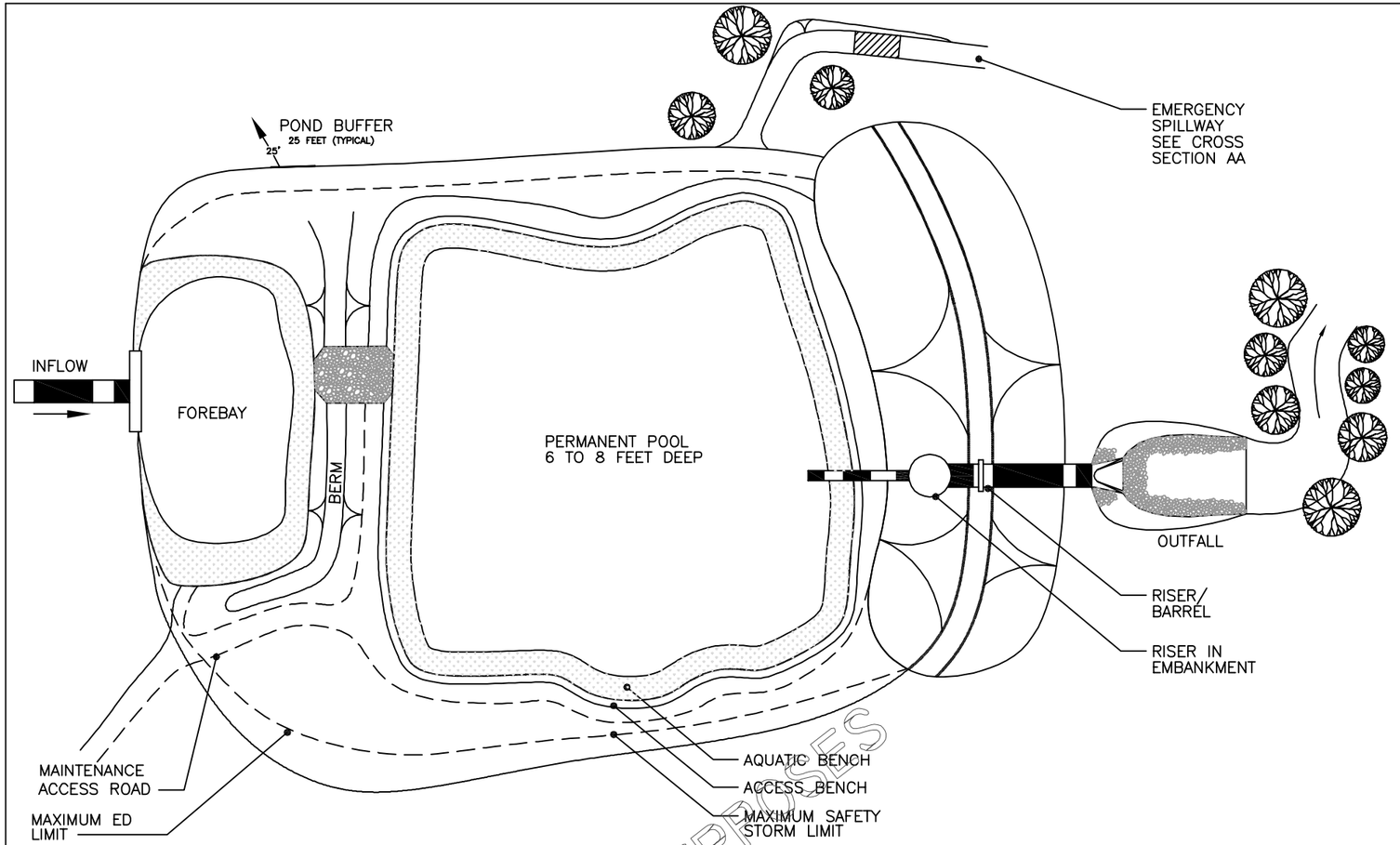
INFILTRATION SUBSURFACE PLANS AND SECTIONS

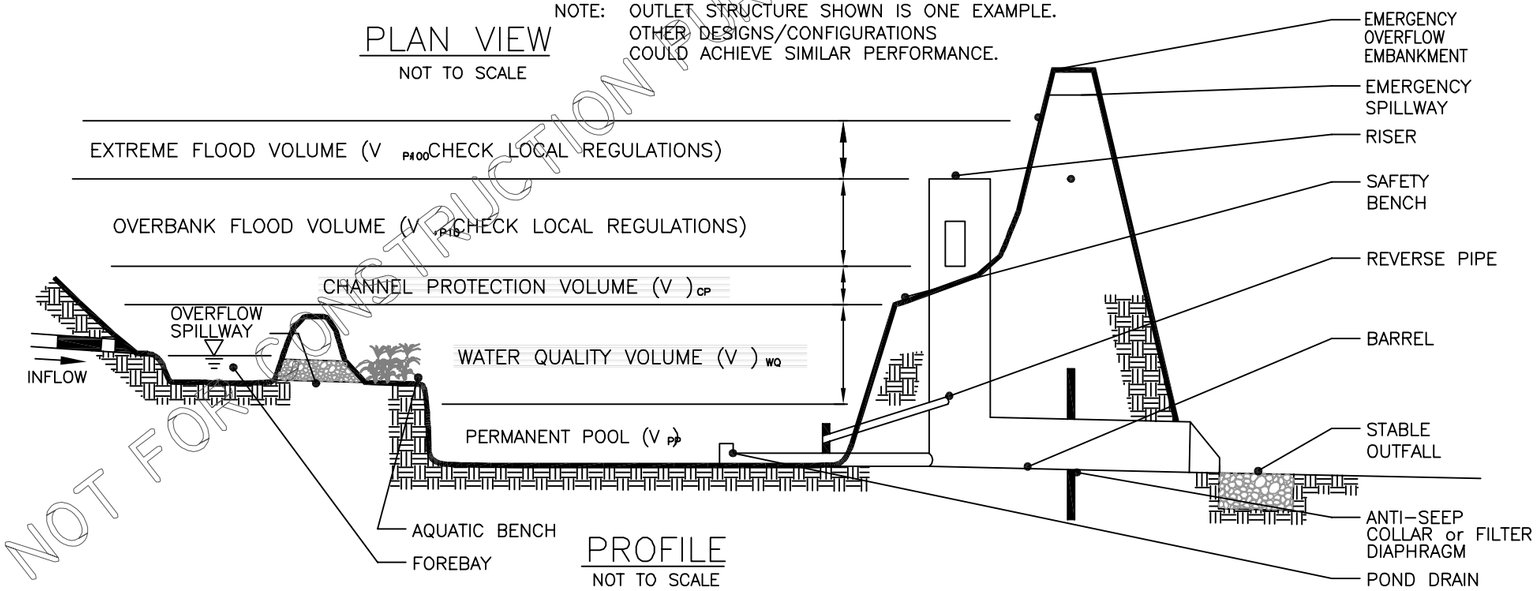
Sheet No. _____ of _____ Sheets



PLAN VIEW

NOT TO SCALE

NOTE: OUTLET STRUCTURE SHOWN IS ONE EXAMPLE. OTHER DESIGNS/CONFIGURATIONS COULD ACHIEVE SIMILAR PERFORMANCE.



PROFILE

NOT TO SCALE

CONSTRUCTION STANDARDS AND SPECIFICATIONS

(ADAPTED FROM STORMWATER MANAGER'S RESOURCE CENTER, WWW.STORMWATERCENTER.NET <http://www.stormwatercenter.net> WITH SOME ADDITIONS)

SITE PREPARATION

1. TEMPORARY EROSION CONTROL MEASURES IN ACCORDANCE WITH MNDOT GENERAL CONDITIONS 2573 SHALL BE INSTALLED PRIOR TO THE START OF ANY CONSTRUCTION OPERATION THAT MAY CAUSE ANY SEDIMENTATION OR SILTATION AT THE SITE.
2. AREAS DESIGNATED FOR BORROW AREAS, EMBANKMENT, AND STRUCTURAL WORKS SHALL BE CLEARED, GRUBBED AND STRIPPED OF TOPSOIL.
3. VEGETATION AND OTHER MATERIAL SHALL BE CLEARED FROM POND AREA.
4. TOPSOIL SHALL BE STOCKPILED FOR FUTURE USE AS SPECIFIED.

EARTH FILL

1. FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS AND SHALL BE FREE OF ROOTS, STUMPS, WOOD, RUBBISH, STONES GREATER THAN 6", FROZEN MATERIAL, AND OTHER OBJECTIONABLE MATERIALS.
2. FILL MATERIAL FOR CENTER OF EMBANKMENT SHALL CONFORM TO UNIFIED SOIL CLASSIFICATION GC, SC, CH, OR CL AND MUST HAVE AT LEAST 30% PASSING THE #200 SIEVE. CONSIDERATION MAY BE GIVEN TO THE USE OF OTHER MATERIALS IN THE EMBANKMENT IF DESIGNED BY A GEOTECHNICAL ENGINEER.
3. MATERIALS USED IN THE OUTER SHELL OF THE EMBANKMENT MUST HAVE THE CAPABILITY TO SUPPORT VEGETATION OF THE QUALITY REQUIRED TO PREVENT EROSION OF THE EMBANKMENT.
4. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED PRIOR TO PLACEMENT OF FILL. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8 INCH THICK (BEFORE COMPACTION) LAYERS WHICH ARE TO BE CONTINUOUS OVER THE ENTIRE LENGTH OF THE FILL. THE MOST PERMEABLE BORROW MATERIAL SHALL BE PLACED IN THE DOWNSTREAM PORTIONS OF THE EMBANKMENT. THE PRINCIPAL SPILLWAY MUST BE INSTALLED CONCURRENTLY WITH FILL PLACEMENT AND NOT EXCAVATED INTO THE EMBANKMENT.
5. WHEN REQUIRED BY THE REVIEWING AGENCY THE MINIMUM REQUIRED DENSITY SHALL NOT BE LESS THAN 95% OF MAXIMUM DRY DENSITY WITH A MOISTURE CONTENT WITHIN 2% OF THE OPTIMUM. EACH LAYER OF FILL SHALL BE COMPACTED AS NECESSARY TO OBTAIN THAT DENSITY, AND IS TO BE CERTIFIED BY THE ENGINEER AT THE TIME OF CONSTRUCTION. ALL COMPACTION IS TO BE DETERMINED BY AASHTO METHOD T-99 (STANDARD PROCTOR).
6. THE CORE OF THE EMBANKMENT SHALL BE PARALLEL TO THE CENTERLINE OF THE EMBANKMENT. THE TOP WIDTH OF THE CORE SHALL BE A MINIMUM OF FOUR FEET. THE HEIGHT SHALL EXTEND UP TO AT LEAST THE 10 YEAR WATER ELEVATION OR AS SHOWN ON THE PLANS. THE SIDE SLOPES SHALL BE 1 TO 1 OR FLATTER. THE CORE SHALL BE COMPACTED WITH CONSTRUCTION EQUIPMENT, ROLLERS, OR HAND TAMPERS TO ASSURE MAXIMUM DENSITY AND MINIMUM PERMEABILITY. IN ADDITION, THE CORE SHALL BE PLACED CONCURRENTLY WITH THE OUTER SHELL OF THE EMBANKMENT.

STRUCTURE BACKFILL

1. BACKFILL ADJACENT TO PIPES OR STRUCTURES SHALL BE OF THE TYPE AND QUALITY CONFORMING TO THAT SPECIFIED FOR THE ADJOINING FILL MATERIAL. THE FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED FOUR INCHES IN THICKNESS AND COMPACTED BY HAND TAMPERS OR OTHER MANUALLY DIRECTED COMPACTION EQUIPMENT. THE MATERIAL NEEDS TO FILL COMPLETELY ALL SPACES UNDER AND ADJACENT TO THE PIPE.
2. AT NO TIME DURING THE BACKFILLING OPERATION SHALL DRIVEN EQUIPMENT BE ALLOWED TO OPERATE CLOSER THAN FOUR FEET, MEASURED HORIZONTALLY, TO ANY PART OF A STRUCTURE. UNDER NO CIRCUMSTANCES SHALL EQUIPMENT BE DRIVEN OVER ANY PART OF A CONCRETE STRUCTURE OR PIPE, UNLESS THERE IS A COMPACTED FILL OF 24" OR GREATER OVER THE STRUCTURE OR PIPE.

CARE OF WATER DURING CONSTRUCTION

1. ALL WORK ON PERMANENT STRUCTURES SHALL BE CARRIED OUT IN AREAS FREE FROM WATER. TEMPORARY DIKES, LEVEES, COFFERDAMS, DRAINAGE CHANNELS, AND STREAM DIVERSIONS NECESSARY TO PROTECT THE AREAS TO BE OCCUPIED BY THE PERMANENT WORKS SHALL BE INSTALLED, AS WELL AS PUMPING AND OTHER EQUIPMENT REQUIRED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE WORK.
2. AFTER HAVING SERVED THEIR PURPOSE, ALL TEMPORARY PROTECTIVE WORKS SHALL BE REMOVED OR LEVELED AND GRADED TO THE EXTENT REQUIRED TO PREVENT OBSTRUCTION OF THE FLOW OF WATER TO THE SPILLWAY OR OUTLET WORKS.
3. STREAM DIVERSIONS SHALL BE MAINTAINED UNTIL THE FULL FLOW CAN BE PASSED THROUGH THE PERMANENT WORKS.

STABILIZATION AND EROSION CONTROL

1. ALL EXPOSED SURFACES OF THE EMBANKMENT, SPILLWAY, SPOIL AND BORROW AREAS, AND BERMS SHALL BE STABILIZED BY SEEDING, LIMING, FERTILIZING AND MULCHING IN ACCORDANCE WITH LOCAL NATURAL RESOURCES CONSERVATION SERVICE STANDARDS AND SPECIFICATIONS. A 4-INCH LAYER OF TOPSOIL SHALL BE PLACED ON THESE AREAS TO SUPPORT STABILIZING VEGETATION
2. FILTER FABRIC PLACED BENEATH THE RIP-RAP SHALL MEET STATE OR LOCAL DEPARTMENT OF TRANSPORTATION REQUIREMENTS FOR A CLASS "C" FILTER FABRIC.

NO.	REVISION DESCRIPTION	DATE	BY

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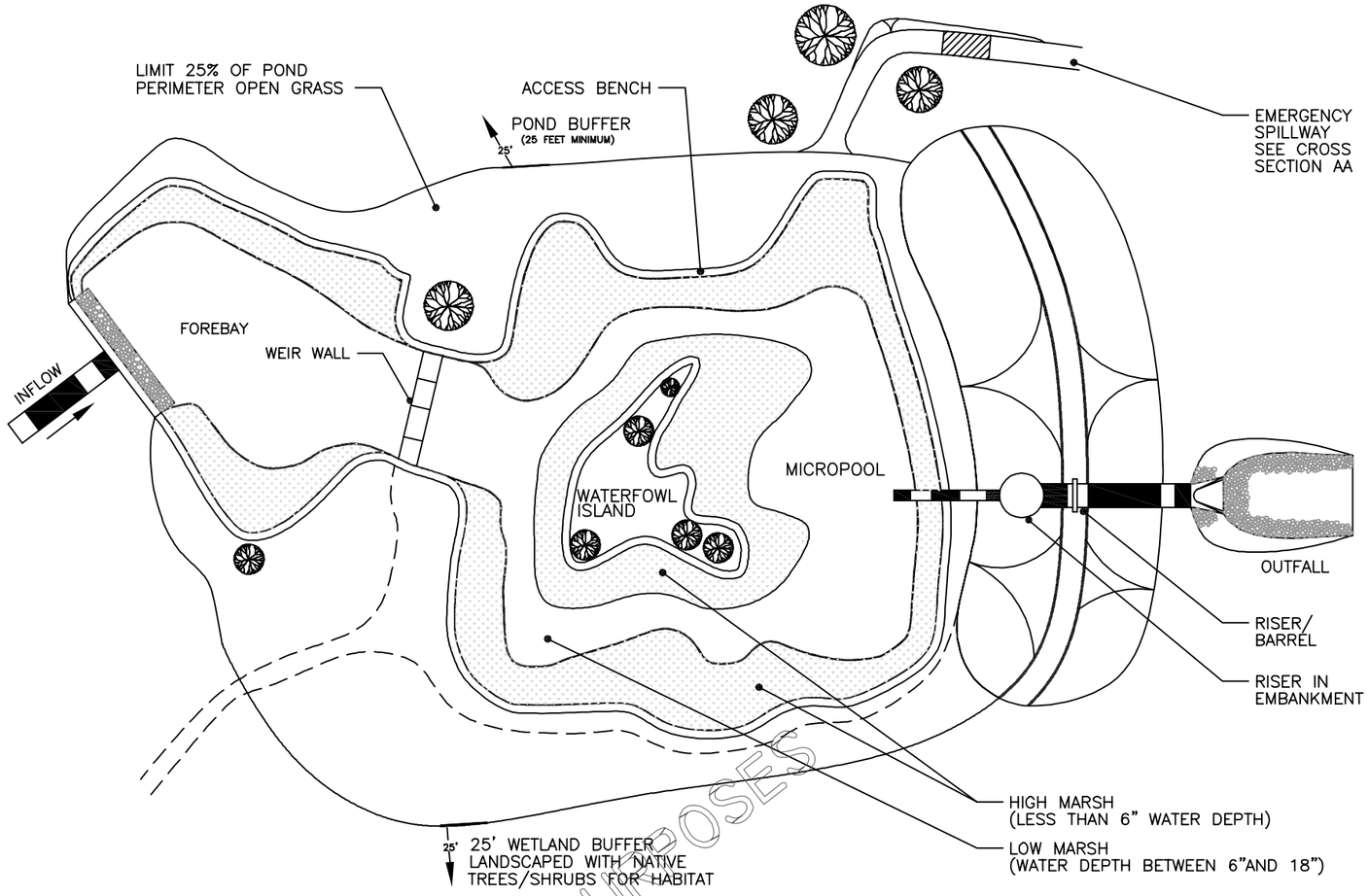
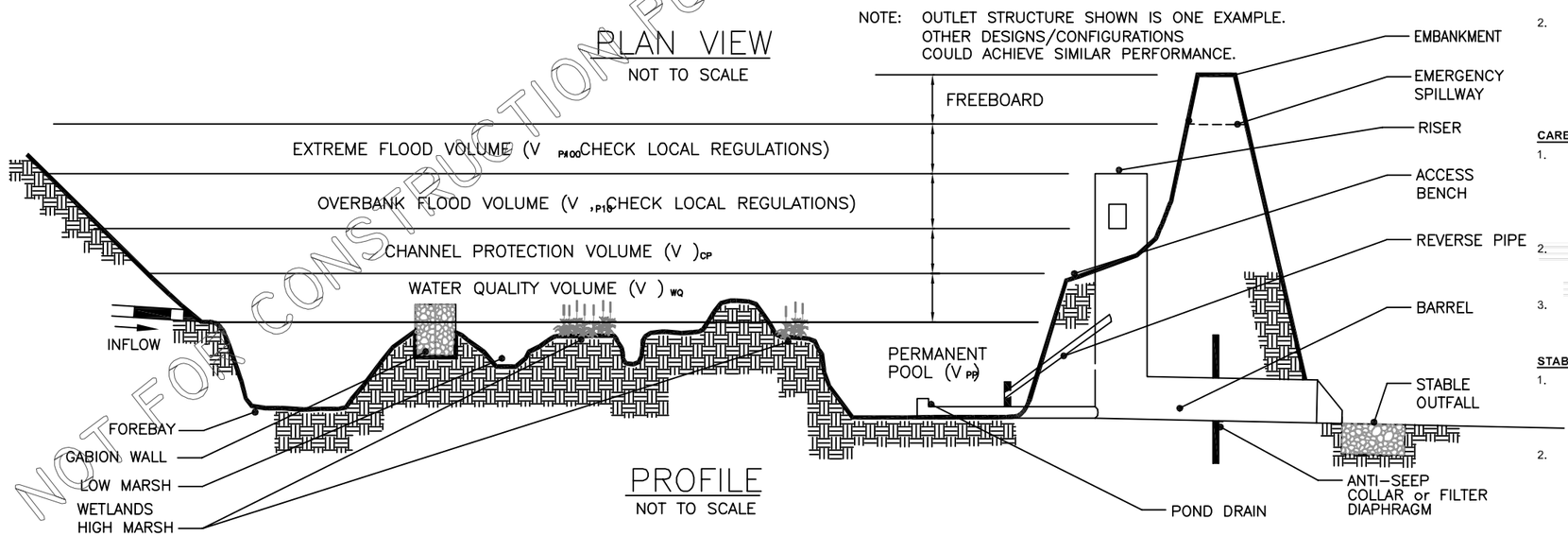
TYPICAL POND PLAN AND PROFILE

Sheet No. of Sheets



PLAN VIEW
NOT TO SCALE



PROFILE
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CONSTRUCTION STANDARDS AND SPECIFICATIONS

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SITE PREPARATION

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2. AREAS DESIGNATED FOR BORROW AREAS, EMBANKMENT, AND STRUCTURAL WORKS SHALL BE CLEARED, GRUBBED AND STRIPPED OF TOPSOIL.
3. VEGETATION AND OTHER MATERIAL SHALL BE CLEARED FROM POND AREA.
4. TOPSOIL SHALL BE STOCKPILED FOR FUTURE USE AS SPECIFIED.

EARTH FILL

1. FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS AND SHALL BE FREE OF ROOTS, STUMPS, WOOD, RUBBISH, STONES GREATER THAN 6", FROZEN MATERIAL, AND OTHER OBJECTIONABLE MATERIALS.
2. FILL MATERIAL FOR CENTER OF EMBANKMENT SHALL CONFORM TO UNIFIED SOIL CLASSIFICATION GC, SC, CH, OR CL AND MUST HAVE AT LEAST 30% PASSING THE #200 SIEVE. CONSIDERATION MAY BE GIVEN TO THE USE OF OTHER MATERIALS IN THE EMBANKMENT IF DESIGNED BY A GEOTECHNICAL ENGINEER.
3. MATERIALS USED IN THE OUTER SHELL OF THE EMBANKMENT MUST HAVE THE CAPABILITY TO SUPPORT VEGETATION OF THE QUALITY REQUIRED TO PREVENT EROSION OF THE EMBANKMENT.
4. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED PRIOR TO PLACEMENT OF FILL. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8 INCH THICK (BEFORE COMPACTION) LAYERS WHICH ARE TO BE CONTINUOUS OVER THE ENTIRE LENGTH OF THE FILL. THE MOST PERMEABLE BORROW MATERIAL SHALL BE PLACED IN THE DOWNSTREAM PORTIONS OF THE EMBANKMENT. THE PRINCIPAL SPILLWAY MUST BE INSTALLED CONCURRENTLY WITH FILL PLACEMENT AND NOT EXCAVATED INTO THE EMBANKMENT.
5. WHEN REQUIRED BY THE REVIEWING AGENCY THE MINIMUM REQUIRED DENSITY SHALL NOT BE LESS THAN 95% OF MAXIMUM DRY DENSITY WITH A MOISTURE CONTENT WITHIN 2% OF THE OPTIMUM. EACH LAYER OF FILL SHALL BE COMPACTED AS NECESSARY TO OBTAIN THAT DENSITY, AND IS TO BE CERTIFIED BY THE ENGINEER AT THE TIME OF CONSTRUCTION. ALL COMPACTION IS TO BE DETERMINED BY AASHTO METHOD T-99 (STANDARD PROCTOR).
6. THE CORE OF THE EMBANKMENT SHALL BE PARALLEL TO THE CENTERLINE OF THE EMBANKMENT. THE TOP WIDTH OF THE CORE SHALL BE A MINIMUM OF FOUR FEET. THE HEIGHT SHALL EXTEND UP TO AT LEAST THE 10 YEAR WATER ELEVATION OR AS SHOWN ON THE PLANS. THE SIDE SLOPES SHALL BE 1 TO 1 OR FLATTER. THE CORE SHALL BE COMPACTED WITH CONSTRUCTION EQUIPMENT, ROLLERS, OR HAND TAMPERS TO ASSURE MAXIMUM DENSITY AND MINIMUM PERMEABILITY. IN ADDITION, THE CORE SHALL BE PLACED CONCURRENTLY WITH THE OUTER SHELL OF THE EMBANKMENT.

STRUCTURE BACKFILL

1. BACKFILL ADJACENT TO PIPES OR STRUCTURES SHALL BE OF THE TYPE AND QUALITY CONFORMING TO THAT SPECIFIED FOR THE ADJOINING FILL MATERIAL. THE FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED FOUR INCHES IN THICKNESS AND COMPACTED BY HAND TAMPERS OR OTHER MANUALLY DIRECTED COMPACTION EQUIPMENT. THE MATERIAL NEEDS TO FILL COMPLETELY ALL SPACES UNDER AND ADJACENT TO THE PIPE.
2. AT NO TIME DURING THE BACKFILLING OPERATION SHALL DRIVEN EQUIPMENT BE ALLOWED TO OPERATE CLOSER THAN FOUR FEET, MEASURED HORIZONTALLY, TO ANY PART OF A STRUCTURE. UNDER NO CIRCUMSTANCES SHALL EQUIPMENT BE DRIVEN OVER ANY PART OF A CONCRETE STRUCTURE OR PIPE, UNLESS THERE IS A COMPACTED FILL OF 24" OR GREATER OVER THE STRUCTURE OR PIPE.

CARE OF WATER DURING CONSTRUCTION

1. ALL WORK ON PERMANENT STRUCTURES SHALL BE CARRIED OUT IN AREAS FREE FROM WATER. TEMPORARY DIKES, LEVEES, COFFERDAMS, DRAINAGE CHANNELS, AND STREAM DIVERSIONS NECESSARY TO PROTECT THE AREAS TO BE OCCUPIED BY THE PERMANENT WORKS SHALL BE INSTALLED, AS WELL AS PUMPING AND OTHER EQUIPMENT REQUIRED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE WORK.
2. AFTER HAVING SERVED THEIR PURPOSE, ALL TEMPORARY PROTECTIVE WORKS SHALL BE REMOVED OR LEVELED AND GRADED TO THE EXTENT REQUIRED TO PREVENT OBSTRUCTION OF THE FLOW OF WATER TO THE SPILLWAY OR OUTLET WORKS.
3. STREAM DIVERSIONS SHALL BE MAINTAINED UNTIL THE FULL FLOW CAN BE PASSED THROUGH THE PERMANENT WORKS.

STABILIZATION AND EROSION CONTROL

1. ALL EXPOSED SURFACES OF THE EMBANKMENT, SPILLWAY, SPOIL AND BORROW AREAS, AND BERMS SHALL BE STABILIZED BY SEEDING, LIMING, FERTILIZING AND MULCHING IN ACCORDANCE WITH LOCAL NATURAL RESOURCES CONSERVATION SERVICE STANDARDS AND SPECIFICATIONS. A 4-INCH LAYER OF TOPSOIL SHALL BE PLACED ON THESE AREAS TO SUPPORT STABILIZING VEGETATION
2. FILTER FABRIC PLACED BENEATH THE RIP-RAP SHALL MEET STATE OR LOCAL DEPARTMENT OF TRANSPORTATION REQUIREMENTS FOR A CLASS "C" FILTER FABRIC.

NO.	REVISION DESCRIPTION	DATE	BY

I hereby certify that this plan 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

Print Name:

Sign Name:

Date License No.

Date | Designed By | Drawn By

Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155-4194
Phone: (651)-296-6300
TTY: (651)-282-5332
WEBSITE:www.pca.state.mn.us/

2005 MINNESOTA STORMWATER MANUAL

SHALLOW WETLAND PLAN AND PROFILE

Sheet No. of Sheets